Appendix A1

East Dike Mitigative Works and As-built Drawings

Meadowbank East Dike Grouting Response Plan – Completed Works, July 14, 2009

Observation and Comments Following Work Carried Out on East Dike August 1, 2009 – Meadowbank Gold Project

East Dike Construction As-built Report, Report No. 07-1413-0074; 09-1428-5007 Doc. 900 Ver. 0 Rev. 1

TECHNICAL MEMORANDUM

DATE	July 14, 2009	**PROJECT No.**	07-1413-0074 Doc. No. 916 Ver. 0
TO	Eric Lamontagne; Gaston Blanchette; Denis Gourde Agnico-Eagle Mines Limited Meadowbank Division		
FROM	Grant Bonin; Dan Walker; Michel Julien	**EMAIL**	gbonin@golder.com; drwalker@golder.com; mjulien@golder.com

MEADOWBANK EAST DIKE GROUTING RESPONSE PLAN – COMPLETED WORKS

Based on piezometer and thermistor data collected between May 19 and 21, along with an observed relatively slow rate of decrease in the downstream dewatering pond water level, leakage through the East Dike near sta. 60+490 was considered to be a strong possibility. In response to this concern, a contingency grouting plan was developed to assist Agnico-Eagle Mines Ltd. (AEM) in the preparation and procurement of the necessary equipment and materials to address this situation.

The following presents the results of remedial works carried out upstream of the East Dike center line cutoff, details of instrumentation installed downstream of the cutoff, and reviews the step-wise contingencies that should be incorporated into AEM operational considerations for the East Dike should such remedial grouting measures be required in the future.

1.0 BACKGROUND

As discussed in Technical Memo Doc. No. 893 entitled “Meadowbank East Dike Grouting Response Plan_DRAFT”, data obtained from installed vibrating wire piezometers and thermistors 490-P2-C tended to infer that lake water was flowing at a fairly large rate close to the interface between bedrock and the East Dike slurry wall in proximity to sta. 60+490. The zone with heads and temperatures out of the range of predicted values appeared to be from the base of the cutoff wall to approximately 5 m depth into bedrock in the zone near sta. 60+490.

2.0 REMEDIAL WORKS CARRIED OUT

2.1 Mobilization and Sequence of Activities

Table 1 below highlights key dates throughout the development and implementation of the contingency program.

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Table 1: Key Dates

Action	Date Started	Date Completed
Incident Reported	Tuesday, May 19	--
Initial Contingency Planning	Wednesday, May 20	Monday, May 25
Mobilization	Thursday, May 21	Tuesday, May 26
Upstream Casing Installation	Monday, May 25	Saturday, May 30
Downstream Casing Installation	Wednesday, May 27	Thursday, May 28
Bedrock Drilling	Wednesday, May 27	Monday, June 1
Grouting	Thursday, May 28	Monday, June 1
D/S Monitoring Equipment Arrived [1]	Sunday, May 31	--
Piezometer Installation	Thursday, June 4	Friday, June 5

NOTE: 1) Downstream monitoring equipment included, devices for measurement of real-time electrical conductivity and downhole flow rate.

Dynamitage T.C.G. Inc. (TCG), a subsidiary of Le Groupe Gilbert Ltd., the grouting contractor for the previously completed East Dike grouting program, mobilized two drilling crews and two grouting crews to site. Mr. Grant Bonin of Golder Associates Ltd. (Golder) was mobilized to provide technical direction and quality assurance of the remedial works.

Casing installation was carried out 24 hr/day. Bedrock drilling was carried out on night shift to start with, but eventually switched over to day shift as the grouting crews began to complete all open stages. The two grouting crews worked dayshift only.

2.2 Equipment

Equipment used during the grouting works was similar to that used during the East Dike grouting program. This included the use of the following:

- Two, metal, 12.2 m (40 ft) long, sea container grouting shelters (C-216 and C-217) (Photograph 1);
- 420 L capacity Chemgrout CG-680/3L8/EH high shear colloidal mixers and agitators with progressive cavity, helical-screw Moyno grout pumps;
- RST Instrument, Permeation Grout Monitoring Systems (Photograph 2);
- Geopro (Bimbar), heavy duty grout packers inflated with a water / anti-freeze solution;
- Grouting QA equipment: mud balance, bleed cylinders, digital thermometers, flow cone (Photograph 2);
- Rockmaster 990 downhole hammer casing drill; and
- Tamrock 996 top hammer bedrock drill rig.

For the purposes of measuring apparent viscosities, an ASTM 939 Flow Cone (rather than a standard Marsh Funnel) was used as means of collecting suitable data for the high viscosity/cohesion (low mobility) grout mixes that were anticipated to be used.

2.3 Drilling

Casings were installed at 3 m centre-to-centre spacings, 0.75 m to 1.0 m upstream of the previously completed grout curtain (Figure 1). Bedrock was drilled to approximately 5 m below the end of each installed casing. The depths to which the casings were initially installed, in relation to the inferred "competent" bedrock from the centre-line cutoff of the completed East Dike grouting program, and the depth of the base of the cutoff wall are shown on Figure 2.

Summary information obtained by the drillers during installation of the casings and bedrock drilling are provided on Table A-1 in Appendix A. Noteworthy observations are discussed below:

- The grout hole at proposed stationing 60+490 was shifted 1.0 m to sta. 60+491 so that it would not interfere with the installed vibrating wire piezometers installed at that station.
- The grout hole at proposed stationing 60+496 was re-drilled at sta. 60+495.7 because a casing weld broke during installation, forcing the driller to abandon the initially proposed location.
- During installation of the casings, soft material, possibly from the cutoff wall, was intersected at sta. 60+451 to 60+466 as well as from sta. 60+493 to 60+499.
- While drilling grout hole 60+475, water/air return was lost at approximately 3 m depth into bedrock, below the installed end of the casings.
- While drilling grout hole 60+478, a soft (bentonite-like) seam was encountered at 1.5 m depth into bedrock, and a gravel seam appeared to have been encountered at 3 m depth into bedrock, below the installed end of the casings.

2.4 Grouting

2.4.1 General

Grouting was guided and carried out as outlined in Technical Memo Doc. No. 893 "Meadowbank East Dike Grouting Response Plan_DRAFT" and as per the East Dike grouting program, with the exception that downhole, flow rate measurements prior to commencing grouting of a particular stage, and downstream electrical conductivity measurements, were not carried out concurrent with the upstream grouting activities as the monitoring equipment did not arrive on site in time to be used extensively.

Stage sequence numbers were as per the convention followed during the East Dike grouting program. Stage 2 consisted of grouting the lower approximately 4.5 m of bedrock, while Stage 3 consisted of grouting out the end of the casing. Where the upstream casings were installed more than 0.5 m below the base of the cutoff wall, as evaluated by inspection of Figure 2, they were pulled back various depths by a Caterpillar 385 excavator provided by AEM.

The excavator was available to the remedial grouting activities from the afternoon of Friday, May 29 onwards. As such, some of the casings which could have been pulled back (*i.e.*, 60+454 and 60+457) were not because of the expedient nature with which the works were required to be carried out at the start of the remedial program.

2.4.2 Grout Mix Design

All grouting was completed using Type 30 (HE) cement. As conventional cementitious grouts were expected to be subject to washout at low to moderate flow rates, both anti-washout as well as thixotropic admixtures were used. These were:

1) BASF Rheomac UW 450 – an anti-washout admixture; and

2) Minova Celbex 653 – a thixotropic admixture.

Final mix designs along with flow cone results are summarized in Table 2 below. Further QA results, including specific gravity, bleed and temperatures are summarized in Table B-1 in Appendix B.

Table 2: Summary of Grout Mixes Used with Flow Cone Results

Mix	Water	Type HE Cement	Rheomac UW 450	Celbex 653	No. of Batches	Flow Cone (sec)			
						Spec.	Mean	St.Dev.	No.Mix
A	56 L	80 kg	0 mL	0 mL	2	10.5	10	1.2	27
B	40 L	80 kg	0 mL	0 mL	4	12.5	16	5.5	22
B+	40 L	80 kg	350 mL	0 mL	4	14.5	23	6.0	4
B++	40 L	80 kg	700 mL	0 mL	4	20+	44	13.5	3
C-	40 L	80 kg	0 mL	50 mL	4	20+	17	2.1	4
C	40 L	80 kg	0 mL	100 mL	4	30+	37	9.1	6
D	40 L	80 kg	0 mL	200 mL	6+	40+	-	-	1

In addition to those listed above, several contingency mixes were considered should thicker, faster setting grouts be required in the event of higher seepage flows. These included sanded grout mixes, pumpcrete mixes, and in extreme circumstances, “flash” setting silicate grout mixes. In the end, none of the aforementioned mixes were required.

2.4.3 Grouting Procedure

Grouting proceeded in a given borehole within each stage 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. Refusal was considered to have been achieved when obtaining a penetrability of less than 0.1 L/min/m/bar held for a period of 10 minutes.

Grouting was initiated starting with Mix A and approximately thickened according to the number of batches specified in Table 2. Mixes B+ and B++ were used sparingly as a limited quantity (22 L) of Rheomac UW 450 was available at the start of the remedial grouting program. Consequently, the majority of the grouting was carried out using Celbex 653 and a thickening sequence of Mixes A, B, C and D. Mix C- was developed towards the end of the program as it was found that the flow cone time of Mix C was too high to permeate beyond the wall of the grout hole.

2.4.4 Progress and Quantities

The progress of grouting activities was monitored on a daily basis. Grout takes achieved are summarized in Table 3 below. Figure 3 is a cross-section of grout take with the final mix used and injection pressure achieved for a given stage in grout holes along the upstream line of holes. More detailed information, including volumes of each mix injected, as well as achieved pressures and penetrabilities are provided in Table B-1 in Appendix B.

Table 3: Grout Take Summary

Stage	Total	Grout Take			
		<100 L/m	100-200 L/m	200-400 L/m	>400 L/m
2	25	23	2	0	0
3	25	7	6	6	6

Graphs of injection pressure and flow rate versus volume, injection pressure versus flow rate, and penetrability versus time for each stage (with the exception of Stage 3 of grout holes 60+491, 60+493 and 60+496 completed on June 1) are provided in Appendix C.

2.4.5 Downstream Monitoring

Downstream casing installation commenced on May 27. Casings were installed for the purposes of monitoring of the potential leak zone and were located along a line approximately 2 m downstream of the centre-line cutoff at sta. 60+460, 60+470, 60+480, 60+500 and 60+510.

It was initially proposed that while carrying out injection grouting within the upstream line of holes, any change in the pH or conductivity of the sampled waters from the downstream holes would indicate the adjacent zone in which future grouting activities should be concentrated. However, as previously discussed, the real-time, electrical conductivity monitoring equipment was not available until the morning of June 1.

A Yellow Springs YSI 85, capable of measuring conductivity, dissolved oxygen, salinity, and temperature in real-time, with a 50 ft long cable was provided by AEM's Environmental Department (Photograph 4). Following calibration and checking the response to the potential injection of grout into "clear" lake water, all but the injection of the last three Stage 3's in grout holes 60+491, 60+493 and 60+496 had been completed.

Background electrical conductivity readings taken in the downstream piezometer holes during injection grouting of these final three stages ranged between 30 µS and 110 µS. Mix water (*i.e.*, lake water) had a conductivity ranging between 40 µS and 70 µS.

2.5 Ground Improvement Achieved

The intent of the grouting response program was to reduce potential flows through the closely fractured, near surface bedrock and beneath the base of the cutoff wall in an area where it was inferred that excess seepage may have existed based on instrumentation results. The closure objectives were to bring each stage of grouting to refusal at the specified maximum pressure and to employ split-spacing techniques in the event that higher order holes were deemed necessary.

All Stage 2's and 3's were brought to refusal at the target maximum pressures. No stages that were injected encountered the initially anticipated elevated flows. As indicated on Table 2, and by the number of QA samples obtained of each mix and inspection of Figure 3, the majority of the stages were closed using either Mix A or Mix B.

2.5.1 Stage 2

Within Stage 2, only grout holes 60+463 and 60+481 were closed with Mixes B++ and Mix C, respectively. Inspection of the injection records (Appendix C) indicates that closure would have likely been achieved eventually in each of these stages with Mix B. The addition of the anti-washout admixture (Rheomac UW 450) while injecting Stage 2 of 60+463, and the addition of the thixotropic admixture (Celbex 653) while injecting Stage 2 of 60+481, simply accelerated closure.

Following the addition of Celbex 653, Stage 2 of 60+481 closed after injecting approximately 56 L of Mix C, while Stage 2 of 60+463 closed after injecting approximately 120 L of Mix B+ and a further 97 L of Mix B++. This observation is typical of the addition of anti-washout versus thixotropic admixtures as cementitious, anti-washout assisted grout mixes tend to permeate farther than thixotropic grouts (Note: had there been wide open fractures in the bedrock, it would have taken much more than approximately the volume of the grout hole to close Stage 2 after the addition of either of these two admixtures.

By inspection of Figure 3, and taking into consideration the above comments, the lower, approximately 4.5 m in bedrock along the upstream line of holes is considered to be closed.

2.5.2 Stage 3

Within Stage 3, the addition of the Celbex 653 often accelerated closure, an example of which is provided in Figure 4; the marked up injection record for Stage 3 of grout hole 60+487. Other examples of such ground response were observed for Stage 3 of grout holes 60+448, 60+466, 60+475, 60+478, 60+481, 60+499, and 60+508 (and by inspection of Table B-1, grout hole 60+496). The use of Mix D, double the amount of Celbex 653 compared to Mix C, brought about closure of Stage 3 of grout holes 60+502 and 60+511.

High takes with prolonged injection prior to closure were observed in Stage 3 of grout holes 60+451 and 60+472. However, it is possible that these high takes were the result of injecting grout into the core backfill material in the case of 60+451, or replacing the volume removed from the hole during the process of drilling and re-drilling in the case of 60+472.

2.6 Downstream Piezometer Installations

Installation of five vibrating wire piezometers, one each at sta. 60+460, 60+470, 60+480, 60+500 and 60+510, approximately 2 m downstream of the centreline of the cutoff, was completed on June 4 after the grouting works had finished. These piezometers were installed approximately 0.2 m below the end of the installed casings, at the depths summarized in Table 4 below.

Table 4: Piezometer Installation Locations

Vibrating Wire Piezometer	Piezometer Elevation (m.a.s.l.)
60+460	125.15
60+470	124.76
60+480	125.44
60+500	125.78
60+510	126.06

A bentonite-rich, 2.5:1:0.3 water:cement:bentonite ratio grout was used to backfill the piezometer holes until grout was determined to be inside the casings. The casings were then pulled back approximately 1.5 to 2.0 m to expose the installed vibrating wire piezometer, and the same backfill grout mix was injected until grout was again determined to be inside the casings.

This initial backfill was allowed to set up overnight, and the casings were then re-backfilled to surface the following morning.

Figure 5 is the set of readings for these piezometers obtained on June 28, 2009. The downstream pond level on June 28 was approximately 126.6 m.a.s.l. The pressure head at all five piezometers, as well as those previously installed at stations 60+450 and 60+490 continue to trend slowly downwards. It is also interesting to note that the temperature recorded by the piezometer previously installed at station 40+490 has recovered close to that which had been recorded before the contingency grouting program was initiated.

3.0 CONTINGENCY PLANNING

It is important that contingency grouting plans be in place on site should further remedial grouting activities be required. These contingency plans include, but should not be limited to, the following list of activities expanded from the previously compiled Technical Memo Doc. No. 893 “Meadowbank East Dike Grouting Response Plan_DRAFT”:

- Approximately 20 pails of Celbex 653 are to remain on site and be available quickly if needed. Celbex 653 has a shelf-life of 6 months if properly stored in a dry location. We recommend that a fresh supply of approximately 4 pails should be kept on site at all times. The remainder of the materials currently on site could be shipped back to Muliturethanes Ltd. Restocking charges may apply.

- Rheomac UW 450 is an essential component of anti-washout assisted cementitious grout mixes, sanded grout mixes, and pumpcrete. As such, it is recommended that a fresh quantity of 210 L (one barrel) should be kept at the project site at all times. The minimum shelf life of Rheomac UW 450 is 12 months, but may be greater depending on storage conditions. Rheomac UW 450 admixture must be stored at temperatures above 7 °C to avoid dispensing difficulties due to thickening, and must not be allowed to freeze since it cannot be reconstituted after thawing.

- Mix testing, with the available screened esker sand and ⅜" minus materials should be carried out to determine the approximate dosages of superplasticizer and anti-washout admixtures. An appropriate starting point for these mix designs is provided in Table 5 below.

Table 5: Sanded Grout and Pumpcrete – Approximate Mix Designs

Mix Design	Material Type [1,2,3]	Material Quantity	Sand Specification	
			Sieve Size	% Passing
Sanded Grout	Water	80 L	No.8	100
	Type HE Cement	100 kg	No. 16	70 to 100
	Specified Sand	100 kg	No. 50	20 to 60
	AWA Admixture	0.5 to 2.0% BWOC	No. 200	0 to 3
	Flow Cone [4]	60+ secs		
Pumpcrete	Water	60 L	⅜"	100
	Type HE Cement	100 kg	No. 4	95 to 100
	Specified Sand	300 kg	No. 8	80 to 100
	High Range SP		No. 16	50 to 90
	AWA Admixture	1.0 to 2.0% BWOC	No. 30	25 to 65
	Slump	< 50 mm	No. 50	10 to 35
			No. 100	2 to 10
			No. 200	0 to 3

NOTE:
1) BWOC = by weight of cement
2) SP = superplasticizer
3) AWA = anti-washout
4) ASTM 939 Flow Cone to be used.

- Consideration may be given to replacing up to 30% of the cement in the pumpcrete with fly ash. This low mobility grout would need to be mixed in the batch plant on site. Alternative mix designs may be more appropriate depending on available materials on site. Consideration should be given to using an accelerator such as BASF Pozzutec 20+ if fly ash is substituted for cement.

- Sodium silicate grouting equipment including high pressure silicate transfer pumps and piping details should be developed in the event that high flows are encountered. A guideline for this method, including equipment and piping requirements, mix designs and silicate:grout proportions has been provided in the memorandum entitled "Agnico-Eagle Meadowbank Dike – Grouting Preparations" provided by Peter White of Multiurethanes Ltd.

- As the delivery times of newly ordered transfer pumps is typically four to six weeks, these pumps should be purchased and stored in a secure area on site. Piping details including the approximate quantities to complete a minimum of 10 grout holes should be developed. An approximate list of material quantities for one such set-up through the deepest portion of the East Dike and 5 m into bedrock (or a total of 19.5 m) is provided in Table 6 below.

Table 6: Material Quantities for Silicate Grouting (Example for One Set-up)

Item		Unit	Number
Cementitious Grout Delivery Piping (nominal ID = 38 mm (1½")) [1]			
	Threaded steel pipe	1.5 m lengths	13
	Couplers	each	12
	38 mm to 25 mm bushings (reducers)	each	1
	Nipples, 50 mm length	each	3
	25 mm ID, elbow	each	1
	25 mm full-flow valves	each	1
Silicate Delivery Piping (nominal ID = 10 mm (⅜"))			
	Threaded steel pipe	1.5 m lengths	13
	Couplers	each	12
	Nipples, 50 mm length	each	2
	Elbow		
	Full-flow valves	each	2
	#6 hydraulic hose with JIC female swivel hose ends	each	5
	JIC-NPT adapters	each	2
Tee or wye concentric (box) adaptors to join cement and silicate grout pipes		each	1
High pressure silicate transfer pump (plus spare)		each	2

NOTE:
1) 1¼" or 2" ID threaded steel pipe may be used in place of the 1½" cementitious grout delivery pipe.

GOLDER ASSOCIATES LTD.

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Attachments: Photographs 1 to 4
Figures 1 to 5
Appendix A – Table A-1
Appendix B – Table B-1
Appendix C – Injection Records

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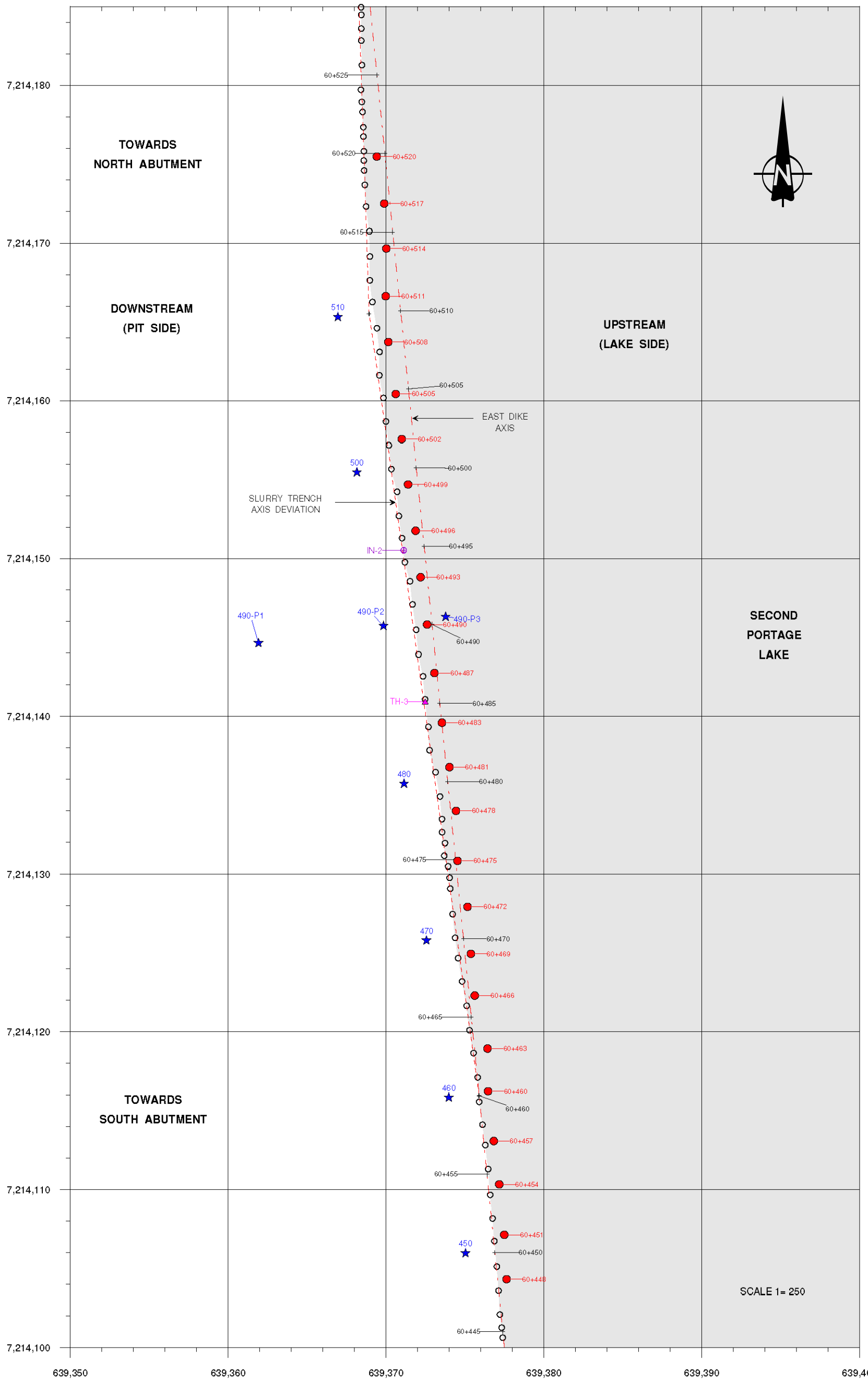
Photograph 1: Contingency Grouting Program set-up. – May 30, 2009

Photograph 2: ASTM 939 Flow Cone and Real-Time Monitoring System. – June 1, 200

Photograph 3: Gravel encountered at depth in 60+478. Note angularity. – May 27, 2009

Photograph 4: Background reading of electrical conductivity; mix/lake water – June 1, 2009

FILE: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2700 Contingency Grouting\Figures\Figure 1_Plan_View.ppt



LEGEND:

- CONTINGENCY GROUT HOLES
- EAST DIKE CUT-OFF GROUT HOLES
- ★ INSTALLED VIBRATING WIRE PIEZOMETER LOCATION
- ▲ INSTALLED THERMISTOR LOCATION
- ⊕ INSTALLED SLOPE INCLINOMETER LOCATION

PROJECT

AEM

AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

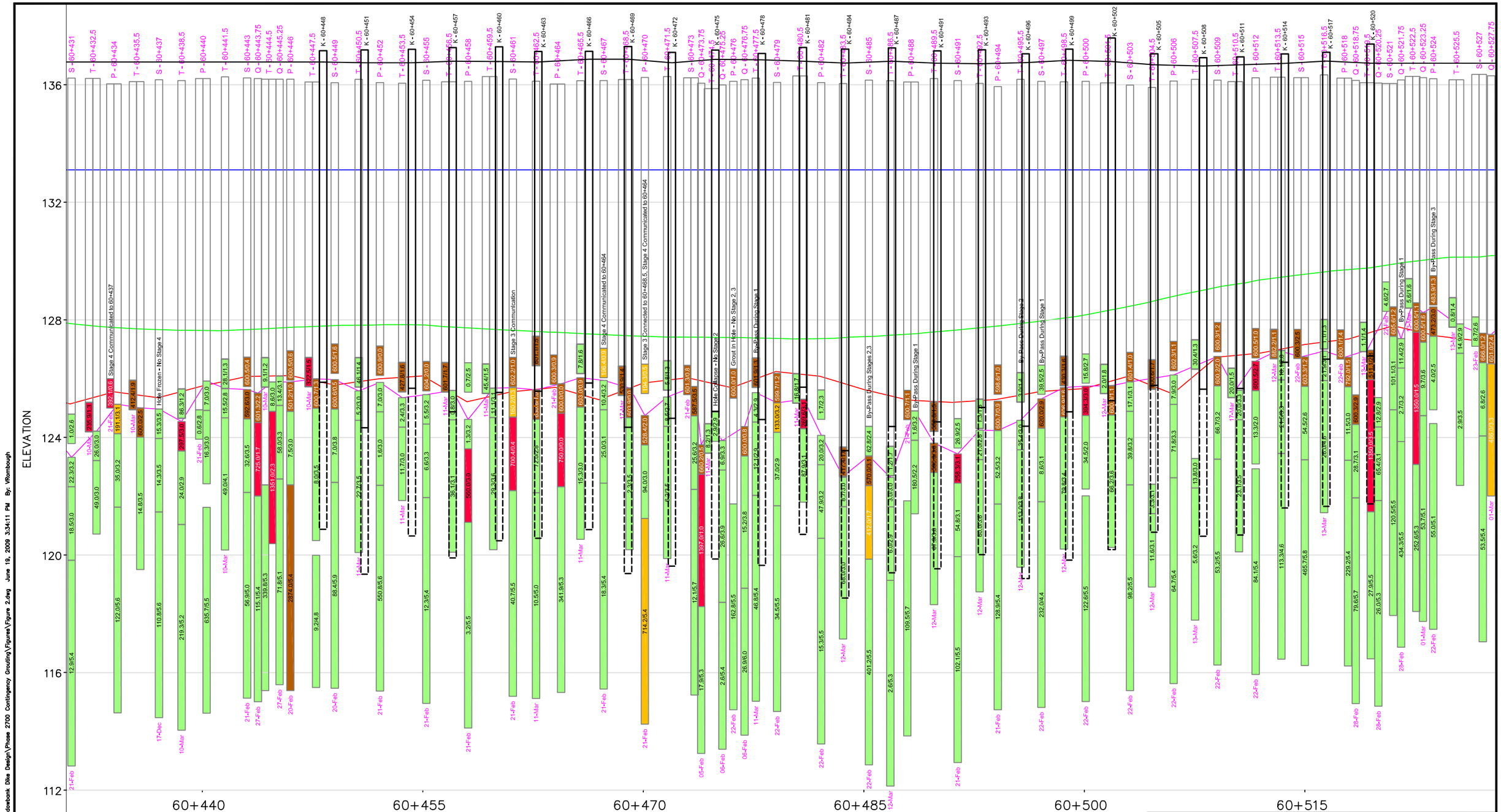
TITLE

EAST DIKE CONTINGENCY GROUTING PLAN VIEW

Golder Associates

PROJECT No.	07-1413-0074		PHASE No.	2700/****	
DESIGN	GRB	18JUN09	SCALE	As Shown	REV.
CADD	VTR	18JUN09			
CHECK	GRB	18JUN09			
REVIEW					

FIGURE 1



LEGEND:

BOREHOLE NAME
P-PRIMARY
S-SECONDARY
T-TERTIARY
Q-QUATERNARY
K-QUINARY

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 — THICK GREY 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 INTERPOLATED FROM 2006 BATHYMETRY DATA. DETAILED BATHYMETRY (0.5m INTERVAL) BASED ON 2008 SURVEY.
4) CASING COLLAR REFERENCE ELEVATIONS PROVIDED BY AEM.
5) DASHED LINES INDICATE DEPTH TO WHICH BEDROCK DRILLING WAS CARRIED OUT.

PROJECT
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MEADOWBANK GOLD PROJECT
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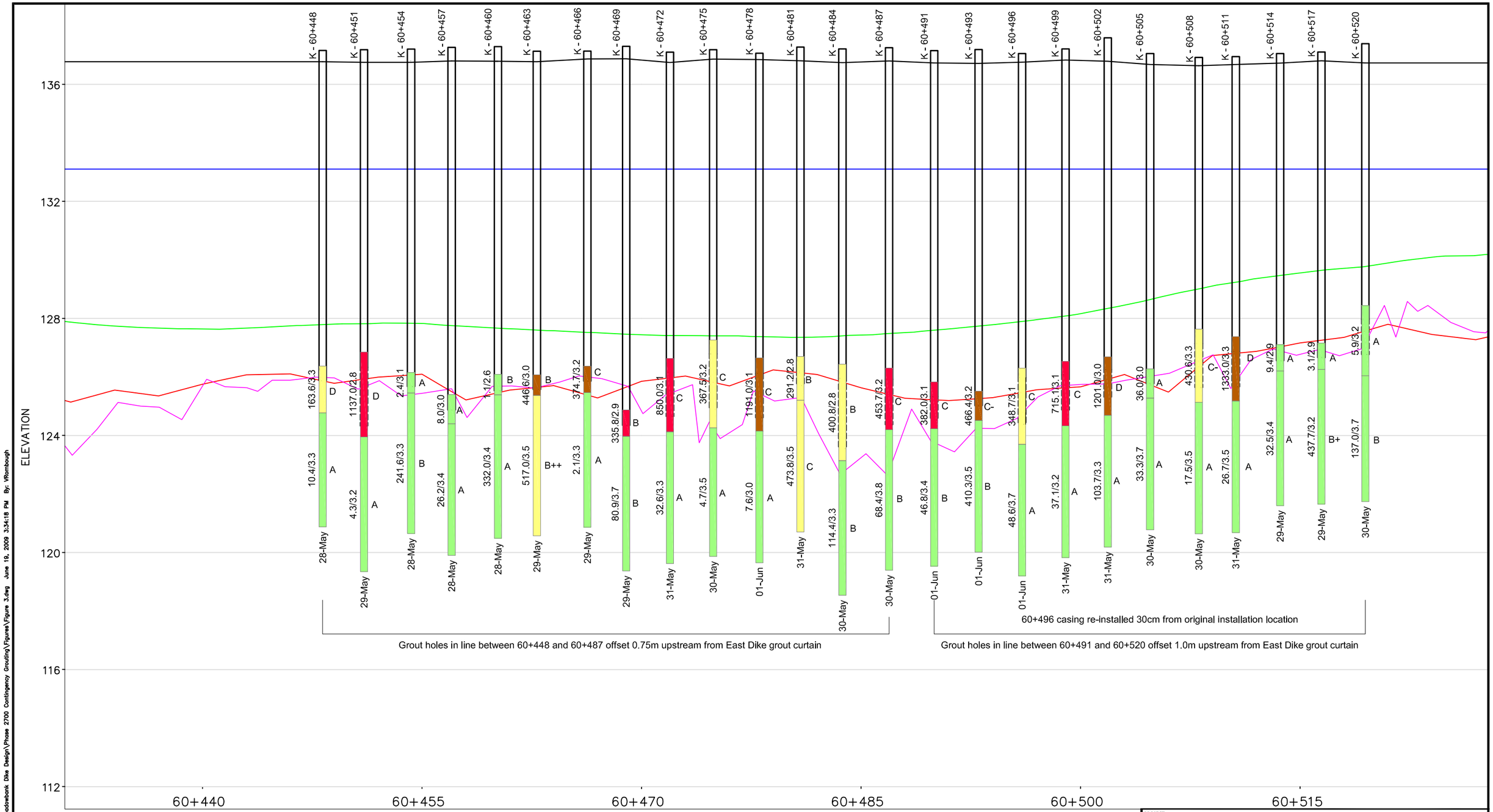
TITLE
EAST DIKE CONTINGENCY GROUTING CASING INSTALLATION

Golder Associates

PROJECT No.		07-1413-0074	FILE No.		
DESIGN	GRB	JUN09	SCALE	AS SHOWN	REV. 0
CADD	VTR	JUN09			
CHECK	GRB	JUN09			
REVIEW	-	-			

FIGURE 2

Drawing File: G:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2700 Contingency Grouting\Figures\Figure 2.dwg June 19, 2009 3:34:11 PM By: VRombough



LEGEND:

PRESSURE OBTAINED (BARS) — P - 60+104 — BOREHOLE NAME
P-PRIMARY
S-SECONDARY
T-TERTIARY
Q-QUATERNARY
K-QUINARY

3.3/2.0 — A — FINAL MIX BEING INJECTED AT CLOSURE

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

- 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 INTERPOLATED FROM 2006 BATHYMETRY DATA. DETAILED BATHYMETRY (0.5m INTERVAL) BASED ON 2008 SURVEY.
4) CASING COLLAR REFERENCE ELEVATIONS PROVIDED BY AEM.
5) DASHED LINES INDICATE THE DISTANCE THAT THE INSTALLED CASINGS WERE PULLED BACK BEFORE GROUTING STAGE 3.

PROJECT
AEM
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE
EAST DIKE CONTINGENCY GROUTING GROUTING PROGRESS CROSS SECTION

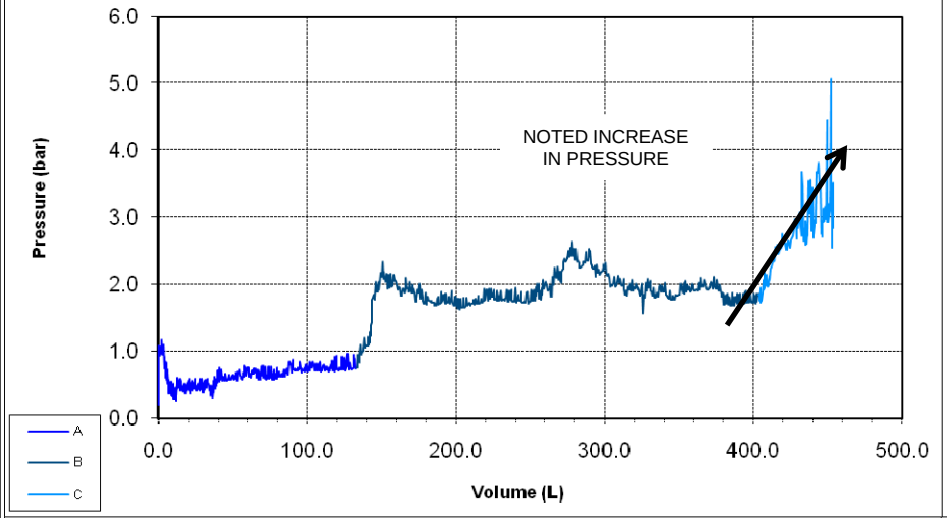
Golder Associates

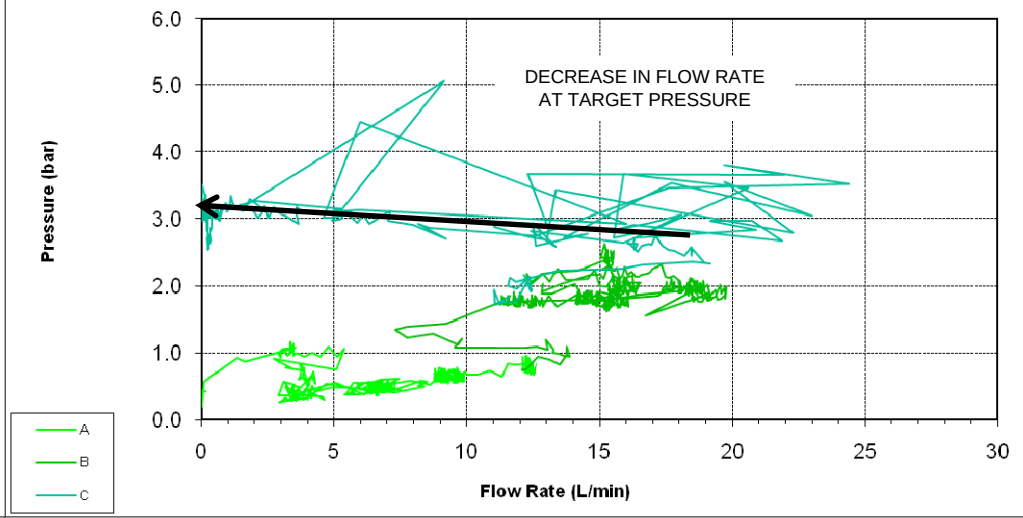
PROJECT No.		07-1413-0074	FILE No.		
DESIGN	GRB	JUN09	SCALE	AS SHOWN	REV. 0
CADD	VTR	JUN09			
CHECK	GRB	JUN09			
REVIEW	-	-			

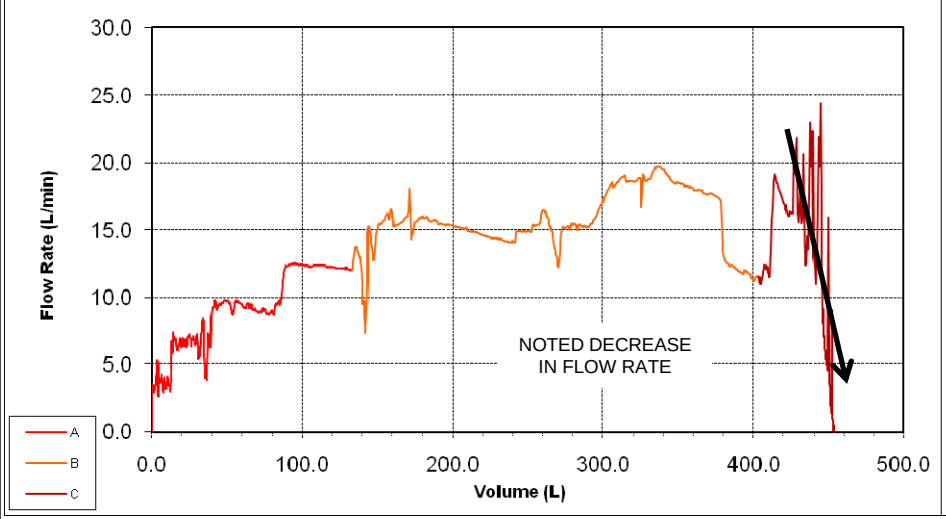
FIGURE 3

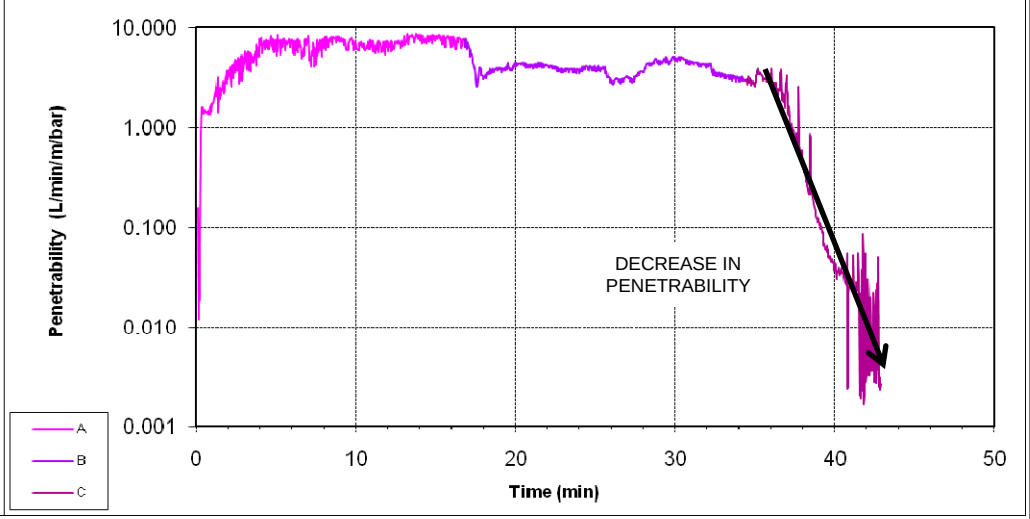
Drawing File: C:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2700 Contingency Grouting\Figures\Figure 3.dwg June 19, 2009 3:34:18 PM By: VRombough

FILE: O:\ACTIVE\ 2007\1413\07-1413-0074 MEADOWBANK DIKE DESIGN\PHASE 2700 CONTINGENCY GROUTING\FIGURES\Figure 4_Celbex.ppt









Date:	30-05-09	Hole ID:	60+487	Top Interval:	10.50	Mix Type:	A-C
Grout Plant:	C-216	Starting Time:	16:14:12	Bottom Interval:	12.60	Pfinal (bar):	3.2
Inj. Method:	Single packer	Finishing Time:	16:57:04	Interval Length:	2.10	Qfinal (L/min):	0.0
Injection Type:	Rock	Total Time:	00:42:52	Stage:	3	Vtotal (L):	453.7

PROJECT

AEM

AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE

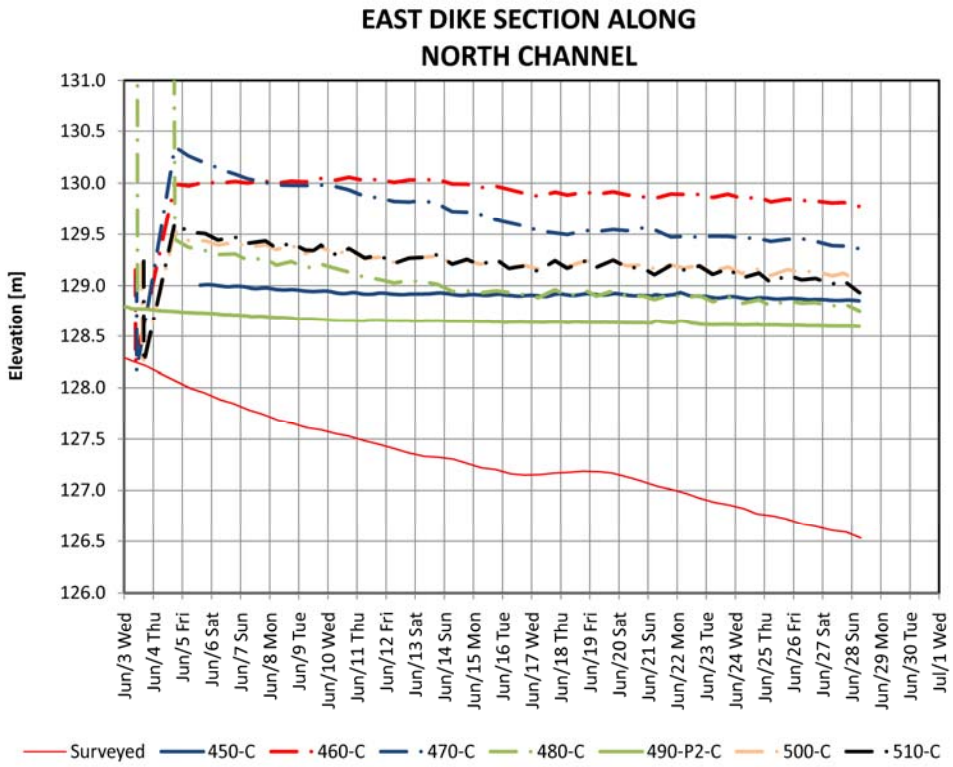
EAST DIKE CONTINGENCY GROUTING EXAMPLE - EFFECT OF THE ADDITION OF CELBEX 653

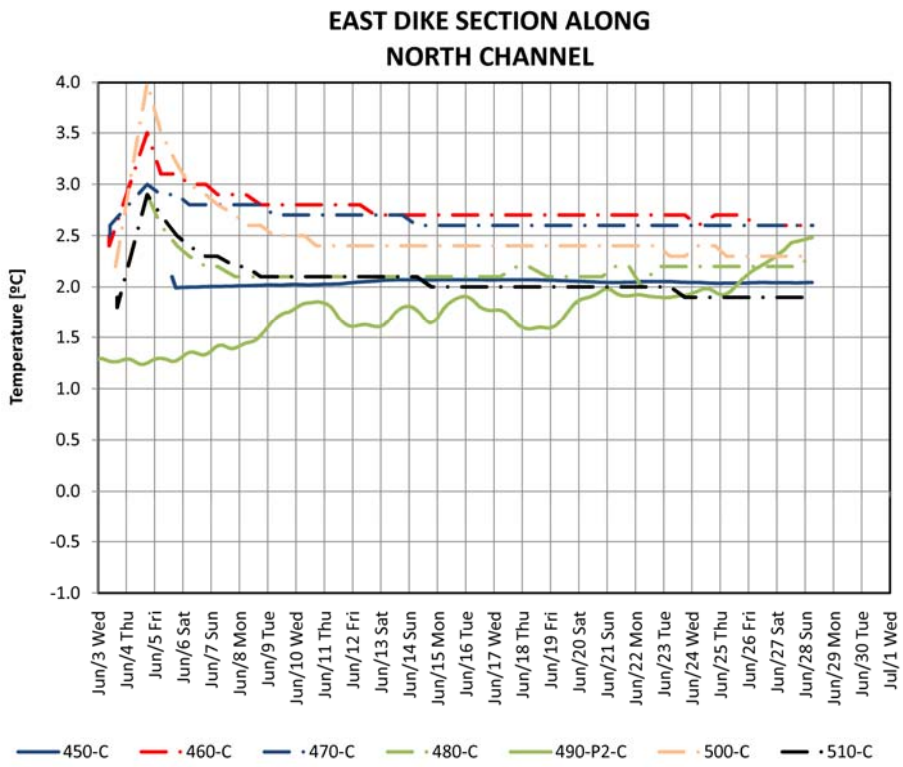
Golder Associates

PROJECT No.	07-1413-0074		PHASE No.	2700/****	
DESIGN	GRB	29JUN09	SCALE	NTS	REV.
CADD	VTR	29JUN09			
CHECK	GRB	29JUN09			
REVIEW					

FIGURE 4

FILE: O:\ACTIVE\ 2007\1413\07-1413-0074 MEADOWBANK DIKE DESIGN\PHASE 2700 CONTINGENCY GROUTING\FIGURES\Figure 5 Piezeometers.ppt





NOTE: DATA UPDATED THROUGH 28-06-2009

PROJECT

AEM

AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE

EAST DIKE CONTINGENCY GROUTING DOWNSTREAM VIBRATING WIRE PIEZOMETERS

Golder Associates

PROJECT No.	07-1413-0074		PHASE No.	2700/****	
DESIGN	GRB	29JUN09	SCALE	NTS	REV.
CADD	VTR	29JUN09			
CHECK	GRB	29JUN09			
REVIEW					

FIGURE 5

APPENDIX A

TABLE A-1 DRILLING RECORDS

TABLE A-1

SUMMARY OF EAST DIKE CONTINGENCY GROUTING DRILLING AND CASING INSTALLATION

Hole	Survey			Casing			Drilling			Comments
	Easting	Northing	Collar (masl)	Date Installed (dd-mmm-yy)	Length Installed (m)	Stick-up (m)	Date Drilled (dd-mmm-yy)	Depth Drilled In Rock (m)	Total Hole Depth (m)	
60+448	639377.64	7214104.32	136.77	27-May-09	11.28	0.38	27-May-09	5.0	15.9	
60+451	639377.50	7214107.14	136.75	26-May-09	12.85	0.43	27-May-09	5.0	17.4	Void/soft ground encountered at ~5.6 m
60+454	639377.18	7214110.34	136.75	26-May-09	11.53	0.45	27-May-09	5.0	16.1	Soft ground encountered at ~7.1 m
60+457	639376.83	7214113.09	136.80	26-May-09	12.39	0.46	27-May-09	5.0	16.9	Soft ground encountered between ~7.9 - 9.3 m followed by hard ground for 0.9 m and then soft ground once more
60+460	639376.47	7214116.25	136.79	26-May-09	11.76	0.50	27-May-09	5.0	16.3	Soft ground encountered at ~6.6 m More soft ground encountered between ~7.8 - 11.3 m
60+463	639376.44	7214118.94	136.77	26-May-09	11.56	0.36	27-May-09	5.0	16.2	Soft ground encountered between ~7.8 - 11.3 m
60+466	639375.63	7214122.31	136.87	26-May-09	11.28	0.27	27-May-09	5.0	16.0	Soft ground encountered between ~7.8 - 11.3 m
60+469	639375.38	7214124.96	136.87	26-May-09	12.95	0.43	27-May-09	5.0	17.5	
60+472	639375.17	7214127.94	136.74	26-May-09	12.45	0.36	27-May-09	5.0	17.1	Lost water return at 3 m depth in bedrock Re-Drilled 31-May-09
60+475	639374.53	7214130.83	136.86	25-May-09	12.29	0.32	26-May-09	5.0	17.0	Lost water return at 3 m depth in bedrock
60+478	639374.44	7214134.01	136.85	25-May-09	12.45	0.21	27-May-09	5.0	17.2	Soft ground encountered at 5.9 m Bentonite seam encountered 1.5 m in bedrock Gravel seam encountered 3 m in bedrock Re-Drilled 31-May-09
60+481	639374.02	7214136.78	136.80	25-May-09	11.56	0.47	28-May-09	5.0	16.1	
60+484	639373.55	7214139.61	136.74	25-May-09	13.66	0.47	28-May-09	5.0	18.2	
60+487	639373.08	7214142.77	136.80	25-May-09	12.88	0.45	28-May-09	5.0	17.4	
60+491	639372.61	7214145.81	136.73	30-May-09	12.62	0.41	31-May-09	5.0	17.2	
60+493	639372.20	7214148.82	136.71	29-May-09	12.17	0.48	31-May-09	5.0	16.7	Soft ground encountered between ~9.7 - 12.1 m (hammer sank)
60+496	639371.88	7214151.78	136.75	29-May-09	12.75	0.30	01-Jun-09	5.0	17.5	Soft ground encountered between ~7.8 - 9.6 m (hammer sank)
60+499	639371.41	7214154.71	136.83	29-May-09	12.34	0.38	30-May-09	5.0	17.0	Soft ground encountered during drilling
60+502	639371.00	7214157.57	136.79	29-May-09	12.34	0.80	30-May-09	5.0	16.5	
60+505	639370.62	7214160.43	136.68	29-May-09	11.28	0.37	30-May-09	5.0	15.9	
60+508	639370.15	7214163.73	136.64	29-May-09	11.28	0.28	30-May-09	5.0	16.0	
60+511	639369.98	7214166.64	136.68	28-May-09	11.28	0.27	28-May-09	5.0	16.0	
60+514	639370.02	7214169.67	136.72	27-May-09	10.49	0.45	28-May-09	5.0	15.0	
60+517	639369.89	7214172.49	136.80	27-May-09	10.44	0.45	28-May-09	5.0	15.0	
60+520	639369.42	7214175.48	136.73	27-May-09	10.62	0.45	28-May-09	5.0	15.2	

Check: GRB

Notes: 1) masl: meters above sea level
2) New casing installed to replace the damaged one at 60+496 was located 30 cm away at 60+495.7; Casing was sunk only 0.03 m deeper than the previous and was not re-surveyed.
3) Notes regarding loss of water return in bedrock are based on conversations with TCG drillers.

APPENDIX B

TABLE B-1 TABLE OF QUANTITIES

TABLE B-1
SUMMARY OF EAST DIKE CONTINGENCY GROUTING QA AND QUANTITIES

Hole	Order (P, S, T, Q, K)	Date	Stage				Take				Duration		Termination			QA			Temperatures						Comments
			Stage #	From	To	Length	Mix	Volume	V_{TOTAL}	Take	Start	End	P_{FINAL}	Q_{FINAL}	Penetrab	Flow Cone	Bleed	Specific Gravity	Cement	Water	Ambient	Rheomac	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)	
60+448	K	28-May-09	Stage 3	12.00	10.40	1.6	A	80.0	-	-	15:22	-	-	-	-	5.5*	0	1.72	37	5	12	-	-	26	
							B	66.0	-	-	-	-	-	-	-	6.7*	0	-	-	-	-	-	-	-	
							D	17.6	163.6	102.3	-	15:50	3.3	0.6	0.1	39.6*	0	-	-	-	-	-	-	-	
		28-May-09	Stage 2	15.90	12.00	3.9	A	10.4	10.4	2.7	10:45	11:08	3.3	0.3	0.02	5.5*	0	1.71	-	-	-	-	-	-	Celbex
60+451	K	29-May-09	Stage 3	12.80	9.90	2.9	A	131.0	-	-	11:05	11:25	0.5	12	10	5.8*	-	-	-	-	-	-	-	-	Casing pulled back 2.0m
							B	450.0	-	-	11:25	11:51	2.5	18	2.5	7.15*	0	1.86	-	-	-	-	-	-	
							B+	100.0	-	-	11:51	12:15	3.0	12	0.7	7.8*	0	1.85	18	7	10	8	-	28	Rheomac
							B++	207.0	-	-	12:15	-	3.0	7	0.8	9.9*	0	-	-	-	-	-	-	-	Rheomac
							C	145.0	-	-	-	12:45	3.0	12	1.4	10.2*	0	-	-	-	-	-	-	-	Celbex
							D	104.0	1137.0	392.1	12:45	13:05	2.8	2.7	0.3	-	-	-	-	-	-	-	-	-	Celbex
		29-May-09	Stage 2	17.40	12.80	4.6	A	4.3	4.3	0.9	8:06	8:13	3.2	0.5	0.04	8.7*	1	-	39	5	9	-	-	17	
60+454	K	28-May-09	Stage 3	11.30	10.60	0.7	A	2.4	2.4	3.4	15:13	15:20	3.1	0	0.01	-	-	-	-	-	-	-	-	-	
		28-May-09	Stage 2	16.10	11.30	4.8	A	120.0	-	-	11:23	-	-	-	-	-	-	-	-	-	-	-	-	-	
							B	121.6	241.6	50.3	-	12:09	3.3	1.6	0.1	6.8*	0	-	-	-	-	-	-	-	
60+457	K	28-May-09	Stage 3	12.40	11.40	1	A	8.0	8.0	8.0	14:53	15:09	3.0	0.2	0.06	-	-	-	-	-	-	-	-	-	
		28-May-09	Stage 2	16.90	12.40	4.5	A	26.2	26.2	5.8	14:24	14:51	3.4	0.2	0.01	5.5*	0	1.71	-	-	-	-	-	-	
60+460	K	28-May-09	Stage 3	11.40	10.70	0.7	B	1.1	1.1	1.6	17:22	17:28	2.6	0	0.01	-	-	-	-	-	-	-	-	-	Back pressure
		28-May-09	Stage 2	16.30	11.40	4.9	A	65.0	-	-	16:39	-	-	-	-	5.6*	0	1.72	20	6	8	-	-	26	
							B	267.0	332.0	67.8	-	17:18	3.4	3	0.2	6.8*	0	-	-	-	-	-	-	-	
60+463	K	29-May-09	Stage 3	11.40	10.70	0.7	A	120.0	-	-	9:37	10:07	2.3	12	1	5.5*	-	1.68	24	5	9	-	-	23	
							B	326.6	446.6	638.0	10:07	10:47	3.0	0	0.01	-	-	-	-	-	-	-	-	-	
		29-May-09	Stage 2	16.20	11.40	4.8	A	54.0	-	-	8:16	8:35	1.0	6	1.8	-	-	-	-	-	-	-	-	-	
							B	246.0	-	-	8:35	8:55	3.0	15	1	7.3*	-	1.85	-	-	-	-	-	-	
							B+	120.0	-	-	8:55	9:11	3.4	5	0.3	8.4*	0	-	-	-	-	-	-	-	Rheomac
							B++	97.0	517.0	107.7	9:11	9:35	3.5	2.3	0.1	9.8*	0	1.85	-	-	-	-	-	-	Rheomac
60+466	K	29-May-09	Stage 3	11.40	10.50	0.9	A	70.0	-	-	15:36	-	-	-	-	-	-	-	17	5	-	-	-	19	
							B	270.0	-	-	-	-	-	-	-	31.0	-	-	-	-	-	-	-	-	
							C	34.7	374.7	416.3	-	16:19	3.2	0.2	0.06	37.0	-	-	-	-	-	-	-	-	Celbex
		29-May-09	Stage 2	16.00	11.40	4.6	A	2.1	2.1	0.5	15:26	15:33	3.3	0	0	14.5	-	-	-	-	-	-	-	-	
60+469	K	29-May-09	Stage 3	12.90	12.00	0.9	A	100.0	-	-	17:41	-	-	-	-	10.8	-	-	22	4	-	-	-	17	
							B	235.8	335.8	373.1	-	18:15	2.9	0	0	19.5	-	-	22	4	-	-	-	19	
		29-May-09	Stage 2	17.50	12.90	4.6	A	29.0	-	-	17:12	-	-	-	-	10.2	-	-	8	4	-	-	-	13	
							B	51.9	80.9	17.6	-	17:32	3.7	0.7	0.04	30.0	-	-	8	4	-	-	-	13	
60+472	K	31-May-09	Stage 3	12.60	10.10	2.5	A	76.0	-	-	14:18	14:31	0.2	9	30.2	9.5	-	-	8	5	-	-	-	16	Casing deepened 0.6m, then pulled 1.5m
							B	383.0	-	-	14:31	15:00	2.9	15	2.4	15.8	-	-	-	-	-	-	-	17	
							B+	264.0	-	-	15:00	16:17	2.9	1.1	0.16	29.0	-	-	-	-	-	-	-	15	Rheomac
							B++	83.0	-	-	16:17	16:50	3.0	1.1	0.1	35.4	-	-	-	-	-	-	-	-	Rheomac
							C	44.0	850.0	340.0	16:50	17:02	3.1	0.6	0.08	34.0	-	1.82	8	5	10	-	-	21	Celbex
		31-May-09	Stage 2	17.10	12.60	4.5	A	32.6	32.6	7.2	10:49	11:07	3.3	0	0	10.3	-	1.71	-	-	-	-	-	-	
60+475	K	30-May-09	Stage 3	12.60	9.60	3	A	70.0	-	-	11:20	11:32	-	-	-	11.6	-	-	11	8	-	-	-	16	Casing pulled back 1.9m
							B	249.0	-	-	11:32	11:50	2.8	16.5	1.9	15.0	-	-	29	4	-	-	-	24	
							C	48.5	367.5	122.5	11:50	11:57	3.2	0	0	32.0	-	-	-	-	-	-	-	-	Celbex
		30-May-09	Stage 2	17.00	12.60	4.4	A	4.7	4.7		8:40	8:46	3.5	0.4	0.03	11.0	-	-	15	9	-	-	-	17	
60+478	K	01-Jun-09	Stage 3	12.70	10.20	2.5	A	157.0	-	-	8:30	8:52	1.3	12	2.2	9.5	-	-	-	-	-	-	-	20	Casing deepened 1.5m,then pulled 1.5m
							B	387.0	-	-	8:52	9:15	1.6	18	4.4	13.4	-	-	34	5	-	-	-	24	
							B+	230.0	-	-	9:15	9:39	3.1	9.3	1.3	26.1	-	-	-	-	-	-	-	22	Rheomac
							B++	307.0	-	-	9:39	10:53	2.8	8	1.2	36.0	-	-	-	-	-	-	-	25	Rheomac
							C	110.0	1191.0	476.4	10:53	11:15	3.1	0.1	0.02	-	-	-	-	-	-	-	-	-	Celbex
		01-Jun-09	Stage 2	17.20	12.70	4.5	A	7.6	7.6	1.7	7:15	7:23	3.0	0.2	0.02	11.6	-	-	24	5	-	-	-	15	
60+481	K	31-May-09	Stage 3	11.60	10.10	1.5	A	134.0	-	-	11:20	11:37	0.9	13	13.1	9.5	-	-	7	5	-	-	-	13	Casing pulled back 0.5m
							B	157.2	291.2	194.1	11:37	11:55	2.8	0.1	0.03	15.5	-	-	19	5	15	-	-	17	
		31-May-09	Stage 2	16.10	11.60	4.5	A	100.0	-	-	8:56	9:12	0.8	9	1.8	11.1	-	-	-	-	-	-	-	15	
							B	317.5	-	-	9:12	9:36	3.0	15	1.2	19.0	-	-	-	-	-	-	-	17	
							C	56.3	473.8	105.3	9:36	9:45	3.5	0.4	0.03	-	-	-	-	-	-	-	-	-	Celbex

TABLE B-1
SUMMARY OF EAST DIKE CONTINGENCY GROUTING QA AND QUANTITIES

Hole	Order (P, S, T, Q, K)	Date	Stage				Take				Duration		Termination			QA			Temperatures						Comments
			Stage #	From	To	Length	Mix	Volume	V_{TOTAL}	Take	Start	End	P_{FINAL}	Q_{FINAL}	Penetrab	Flow Cone	Bleed	Specific Gravity	Cement	Water	Ambient	Rheomac	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)	
60+484	K	31-May-09	Stage 3	13.60	10.30	3.3	A	64.8	-	-	7:30	7:41	0.6	9.7	5.1	10.6	-	-	11	7	-	-	-	14	Casing pulled back 2.4m
							B	336.0	400.8	121.5	7:41	8:20	2.8	0.3	0.03	17.5	-	-	-	-	-	-	-	20	
		30-May-09	Stage 2	18.20	13.60	4.6	A	96.0	-	-	15:27	15:48	3.1	10	0.7	11.3	-	-	-	-	-	-	-	-	
							B	18.4	114.4	24.9	15:48	15:55	3.3	0.2	0.02	-	-	-	-	-	-	-	-	-	
60+487	K	30-May-09	Stage 3	12.60	10.50	2.1	A	133.0	-	-	16:14	16:30	0.8	12.1	7.0	11.2	-	-	23	8	-	-	-	19	Casing pulled back 1.4m
							B	270.5	-	-	16:30	16:48	1.7	13	2.8	17.6	-	-	23	9	-	-	-	22	
							C	50.2	453.7	216.0	16:48	16:57	3.2	0	0	-	-	-	14	-	-	-	-	-	Celbex
		30-May-09	Stage 2	17.40	12.60	4.8	A	48.1	-	-	14:40	14:50	3.1	6.2	0.36	11.6	-	-	31	8	-	-	-	19	
							B	20.3	68.4	14.3	14:50	14:57	3.8	1	0.05	15.0	-	-	-	-	-	-	-	-	
60+491	K	01-Jun-09	Stage 3	12.50	10.90	1.6	A	68.0	-	-	14:03	14:13	0.4	9	27.4	9.9	-	-	19	5	-	-	-	16	Casing pulled back 0.8m
							B	249.0	-	-	14:13	14:30	1.8	18	5.3	13.6	-	-	-	-	-	-	-	19	
							C	65.0	382.0	238.8	14:30	14:41	3.1	0	0	55.5	-	-	-	-	-	-	-	17	Celbex
		01-Jun-09	Stage 2	17.20	12.50	4.7	A	37.5	-	-	7:54	8:05	3.5	2	0.1	-	-	-	-	-	-	-	-	-	
							B	9.3	46.8	10.0	8:05	8:12	3.4	1	0.06	14.0	-	-	-	-	-	-	-	18	
60+493	K	01-Jun-09	Stage 3	12.20	11.20	1	A	116.2	-	-	15:38	15:54	1.2	12.1	8.2	9.4	-	1.63	19	11	15	-	-	21	
							B	305.9	-	-	15:54	16:17	3.0	10.6	3.5	10.9	-	1.81	19	11	14	-	-	22	
							C-	44.3	466.4	466.4	16:17	16:29	3.2	0	0	19.2	-	1.82	19	11	13	-	-	22	Celbex
		01-Jun-09	Stage 2	16.70	12.20	4.5	A	95.3	-	-	13:45	14:00	2.3	10.2	1.4	-	-	-	-	-	-	-	-	-	
							B	315.0	410.3	91.2	14:00	15:27	3.5	1.1	0.07	11.6	-	1.83	19	11	14	-	-	21	
60+496	K	01-Jun-09	Stage 3	13.00	10.40	2.6	A	75.0	-	-	15:39	15:52	0.7	-	-	10.0	-	-	6	6	-	-	-	15	Casing pulled back 1.6m
							B	210.0	-	-	15:52	16:10	2.3	-	-	13.7	-	-	6	6	-	-	-	17	
							C	63.7	348.7	134.1	16:10	16:20	3.1	0.1	0.03	-	-	-	6	5	-	-	-	17	Celbex
		01-Jun-09	Stage 2	17.50	13.00	4.5	A	48.6	48.6	10.8	12:57	13:30	3.7	1.3	0.08	9.3	-	1.64	20	11	14	-	-	20	
60+499	K	01-Jun-09	Stage 3	12.50	10.30	2.2	A	74.0	-	-	9:06	9:18	0.5	9.3	9.9	9.4	-	1.62	18	9	17	-	-	19	Casing pulled back 1.2m
							B	294.0	-	-	9:18	9:39	1.3	15.6	5.8	11.4	-	1.81	19	10	17	-	-	21	
							C-	282.0	-	-	9:39	9:58	2.8	15.1	2.1	18.9	-	1.82	19	10	17	-	-	22	
							C	65.1	715.1	325.0	9:58	10:10	3.1	0.2	0.02	34.1	-	1.81	19	10	16	-	-	22	
		31-May-09	Stage 2	17.00	12.50	4.5	A	37.1	37.1	8.2	15:13	15:39	3.2	0.6	0.04	-	-	-	-	-	-	-	-	-	
60+502	K	31-May-09	Stage 3	12.10	10.10	2	A	146.0	-	-	15:50	16:08	0.2	13.4	33.9	-	-	-	-	-	-	-	-	-	Casing pulled back 1.0m
							B	302.0	-	-	16:08	16:28	1.7	15.2	4.3	12.3	-	1.82	33	12	18	-	-	21	
							C-	288.0	-	-	16:28	16:47	2.4	14.6	3.0	15.6	-	1.82	32	11	17	-	-	23	Celbex
							C	260.0	-	-	16:47	17:03	2.6	15.4	3.1	31.4	-	1.81	33	11	18	-	-	22	Celbex
							D	205.0	1201.0	600.5	17:03	17:26	3.0	0	0	36.8	-	1.82	33	12	11	-	-	23	Celbex
		31-May-09	Stage 2	16.60	12.10	4.5	A	103.7	103.7	23.0	14:27	15:00	3.3	1.3	0.09	9.3	-	1.64	31	10	10	-	-	23	
60+505	K	30-May-09	Stage 3	11.40	10.40	1	A	36.0	36.0	36.0	17:29	17:50	3.0	0	0	-	-	-	-	-	-	-	-	-	
		30-May-09	Stage 2	15.90	11.40	4.5	A	33.3	33.3	7.4	17:09	17:25	3.7	1.2	0.07	-	-	-	-	-	-	-	-	-	
60+508	K	31-May-09	Stage 3	11.50	9.00	2.5	A	72.0	-	-	11:22	11:35	0.6	6.4	4.8	9.4	-	1.65	29	12	15	-	-	23	Casing pulled back 1.5m
							B	298.0	-	-	11:35	11:56	2.0	15.5	3.1	12.1	-	1.81	30	13	16	-	-	25	
							C-	60.6	430.6	172.2	11:56	12:07	3.3	0.1	0.01	15.4	-	1.81	32	10	23	-	-	23	Celbex
		30-May-09	Stage 2	16.00	11.50	4.5	A	17.5	17.5	3.9	16:39	16:50	3.5	1.2	0.07	-	-	-	-	-	-	-	-	-	
60+511	K	31-May-09	Stage 3	11.50	9.30	2.2	A	160.0	-	-	7:45	8:03	0.9	8.8	1.5	9.5	-	1.63	31	12	15	-	-	22	Casing pulled back 1.2m
							B	204.0	-	-	8:03	8:40	2.0	12.1	1.8	12.2	-	1.82	31	12	15	-	-	25	
							B+	306.0	-	-	8:40	8:54	2.9	11.1	1.8	16.3	-	1.83	31	12	15	-	-	26	Rheomac
							B++	256.0	-	-	8:54	9:20	2.8	13.8	1.5	59.1	-	1.83	31	12	15	-	-	20	Rheomac
							C	324.0	-	-	9:20	9:45	2.8	14.2	2.4	-	-	-	29	12	15	-	-	23	Celbex
							D	83.0	1333.0	605.9	9:45	9:58	3.3	0	0	-	-		30	12	15	-	-	-	Celbex
		30-May-09	Stage 2	16.00	11.50	4.5	A	26.7	26.7	5.9	16:18	16:30	3.5	1.3	0.08	9.6	-	1.60	32	15	13	-	-	21	
60+514	K	29-May-09	Stage 3	10.40	9.50	0.9	A	9.4	9.4	10.4	16:55	17:09	2.9	0.1	0.02	-	-	-	-	-	-	-	-	-	
		29-May-09	Stage 2	15.00	10.40	4.6	A	32.5	32.5	7.1	16:33	16:49	3.4	1.1	0.07	9.4	-	1.71	23	8	15	-	-	17	
60+517	K	30-May-09	Stage 3	10.40	9.50	0.9	A	3.1	3.1	3.4	7:38	7:45	2.9	0	0	9.1	-	1.61	23	9	11	-	-	19	
		29-May-09	Stage 2	15.00	10.40	4.6	A	70.0	-	-	17:18	17:30	0.8	9	2.4	-	-	-	-	-	-	-	-	-	
							B	337.0	-	-	17:30	18:02	3.5	8.1	0.5	11.6	0	1.81	-	-	-	-	-	-	
							B+	30.7	437.7	95.2	18:02	18:12	3.2	0	0	18.8	0	1.81	17	9	11	-	-	-	Rheomac
60+520	K	30-May-09	Stage 3	10.90	8.50	2.4	A	5.9	5.9	2.5	10:09	10:14	3.2	0.6	0.08	9.2	-	1.65	31	8	18	-	-	16	Casing pulled back 1.2m
		30-May-09	Stage 2	15.20	10.90	4.3	A	45.0	-	-	8:11	8:24	0.5	6	2.8	-	-	-	-	-	-	-	-	-	
							B	92.0	137.0	31.9	8:24	8:44	3.7	1.1	0.07	10.4	-	1.61	20	9	11	-	-	16	

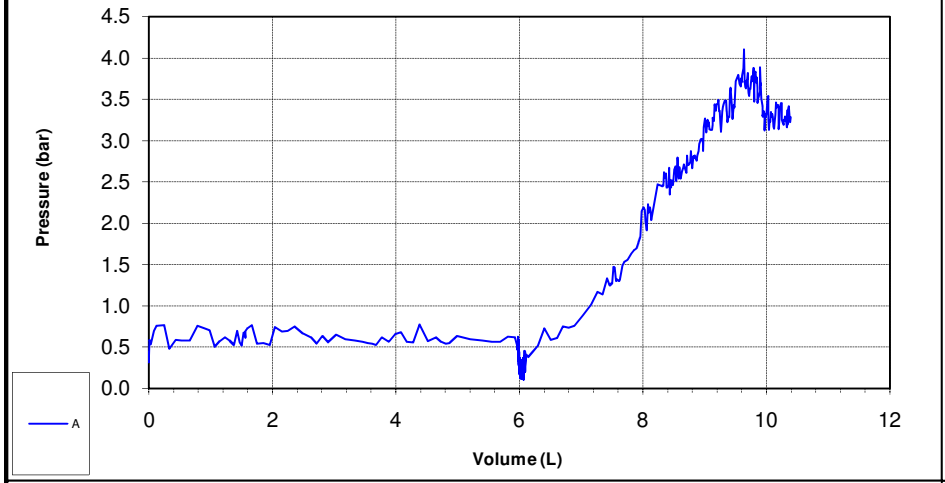
Notes: 1) Reference elevation for stage depths is ground surface
2) * Indicates that sawed off Marsh Funnel with 10 mm orifice was used prior to the arrival on site of the ASTM 939 Flow Cone.

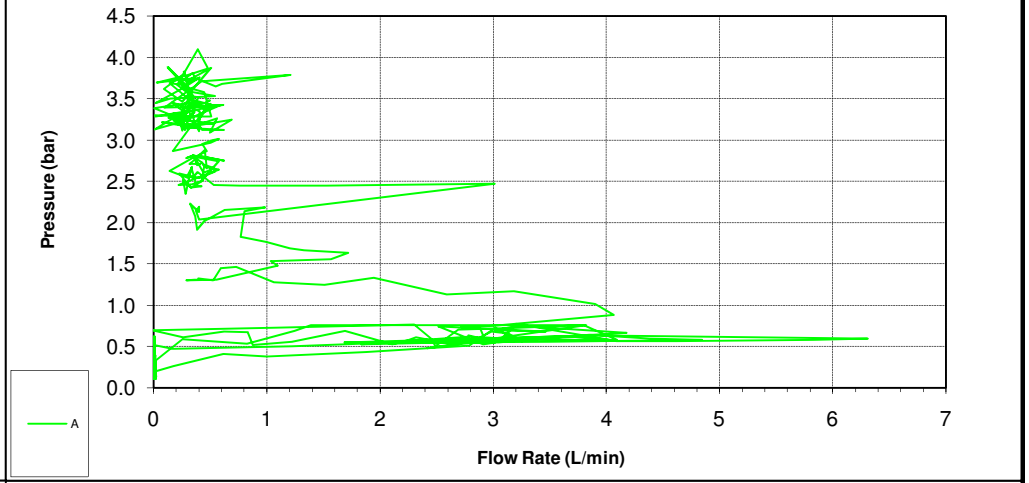
Check: GRB

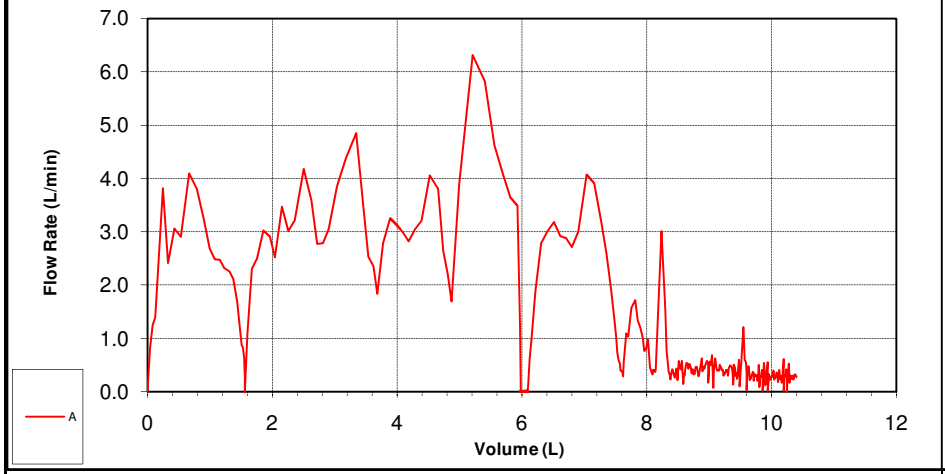
APPENDIX C

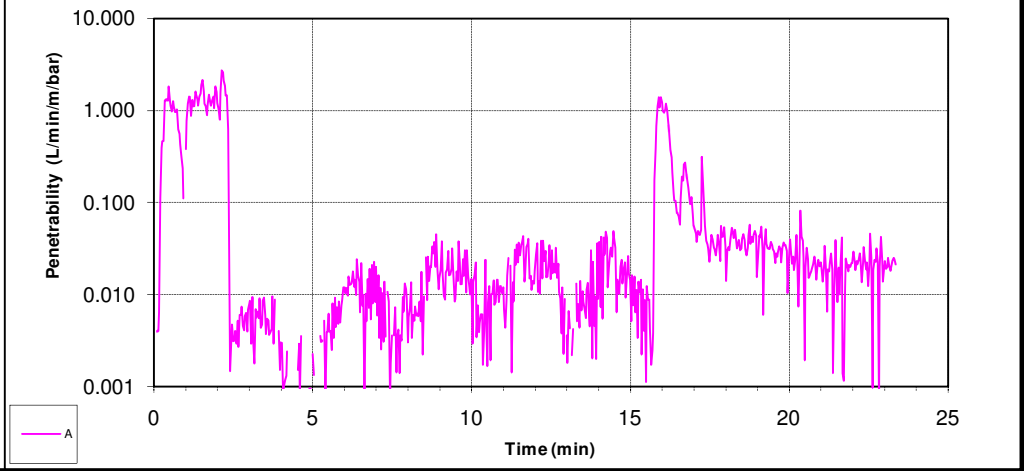
INJECTION RECORDS

Title:	Injection Report - East Dike Contingency Grouting							
Date:	28-05-09	Hole ID:	60+448	Top Interval:	12.00	Mix Type:	A	Comments:
Grout Plant:	C-216	Starting Time:	10:44:56	Bottom Interval:	15.90	Pfinal (bar):	3.3	
Inj. Method:	Single packer	Finishing Time:	11:08:18	Interval Length:	3.90	Qfinal (L/min):	0.3	
Injection Type:	Rock	Total Time:	00:23:22	Stage:	2	Vtotal (L):	10.4	









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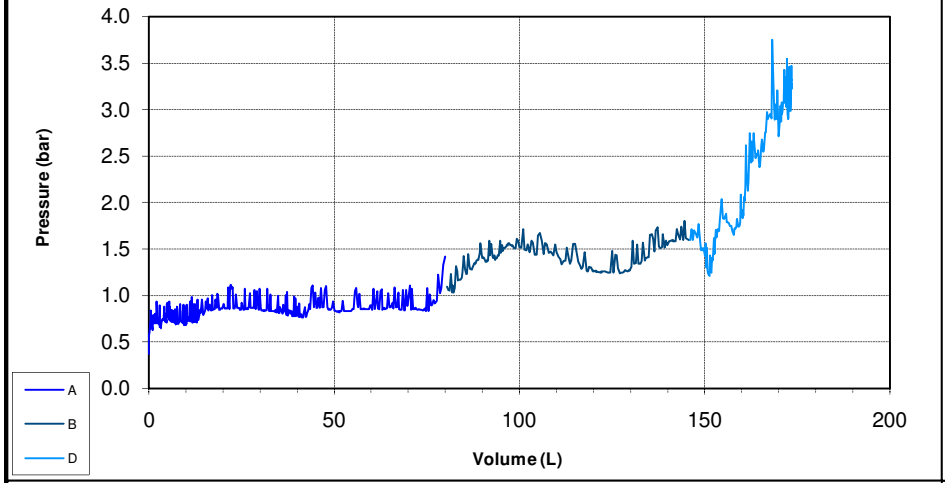
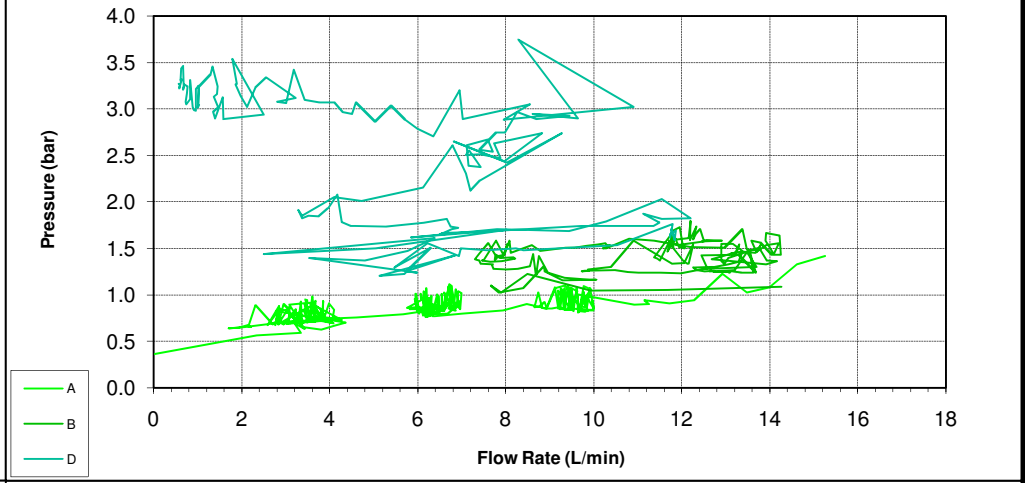
AGNICO EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

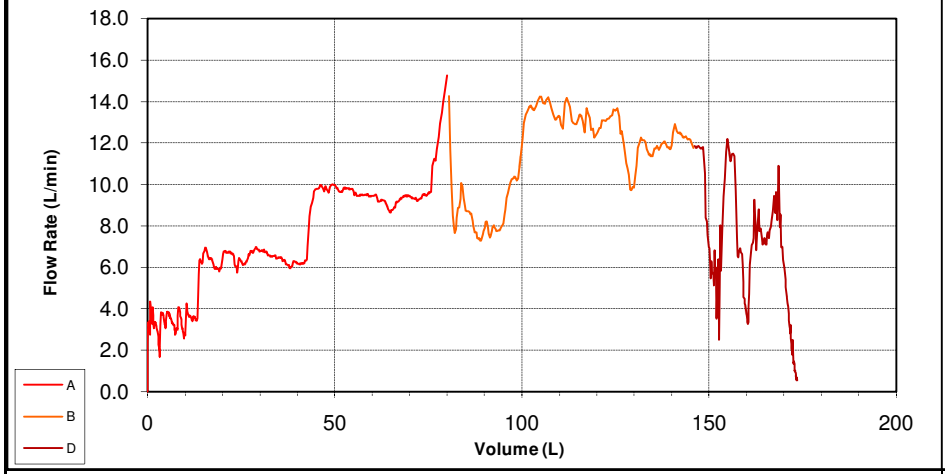
Golder Associates

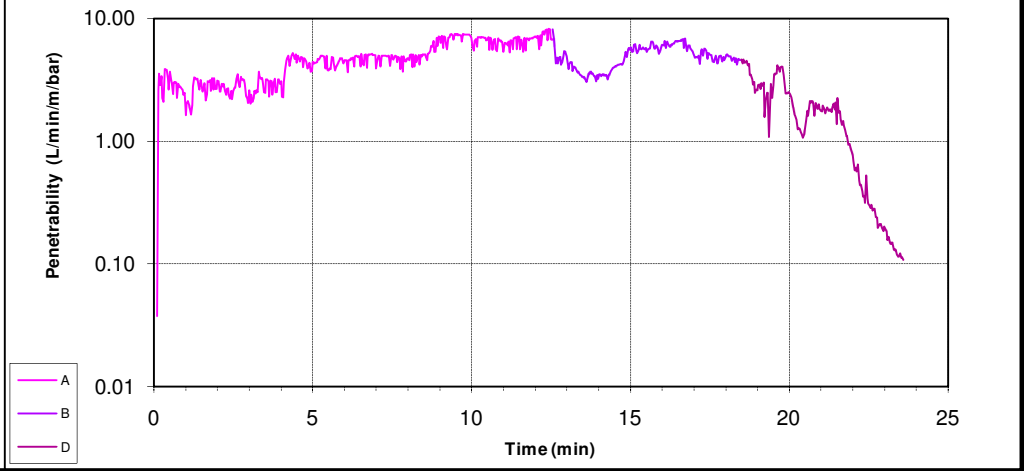
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	28-05-09	Hole ID:	60+448	Top Interval:	10.40	Mix Type:	A, B, D	Comments:
Grout Plant:	C-216	Starting Time:	15:22:38	Bottom Interval:	12.00	Pfinal (bar):	3.3	
Inj. Method:	Single packer	Finishing Time:	15:50:20	Interval Length:	1.60	Qfinal (L/min):	0.6	
Injection Type:	Rock	Total Time:	00:27:42	Stage:	3	Vtotal (L):	173.6	









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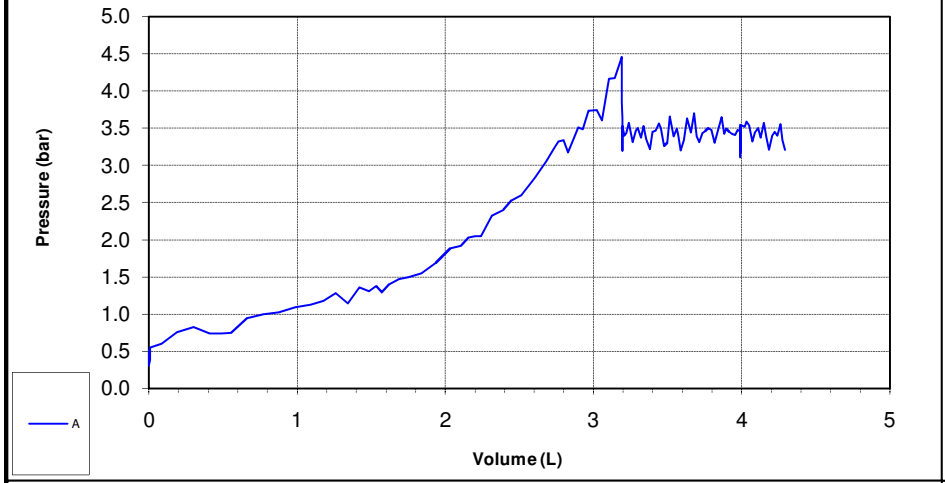
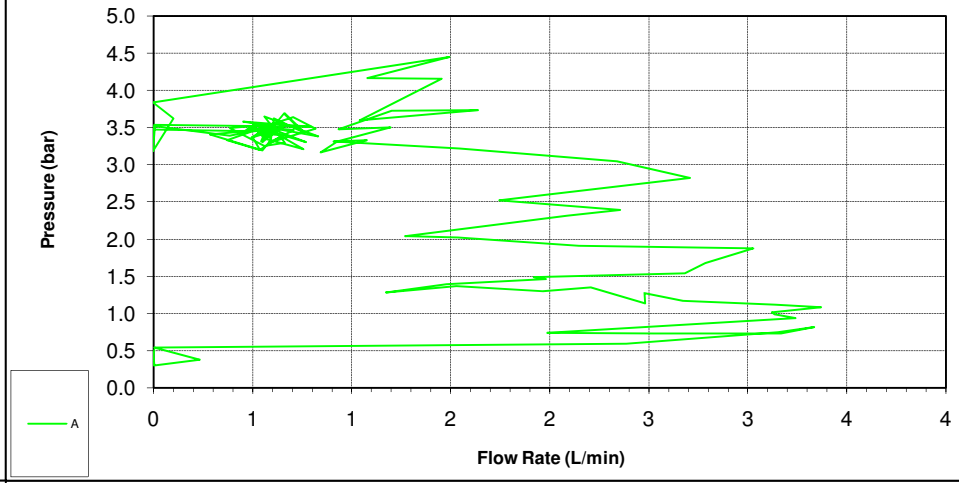
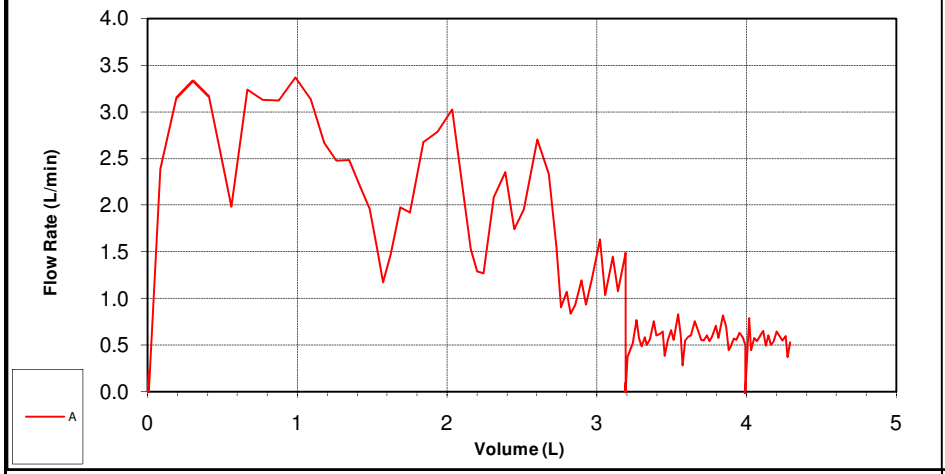
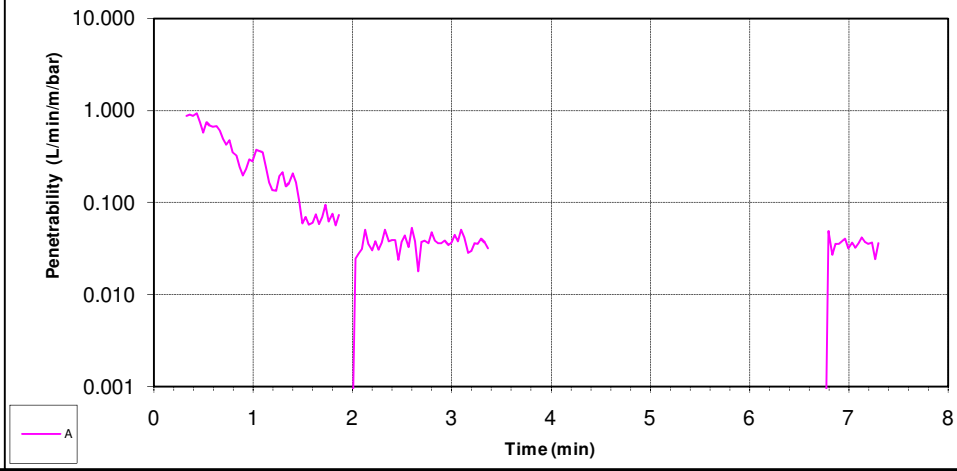
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	29-05-09	Hole ID:	60+451	Top Interval:	12.80	Mix Type:	A	Comments:
Grout Plant:	C-216	Starting Time:	08:06:10	Bottom Interval:	17.40	Pfinal (bar):	3.2	
Inj. Method:	Single packer	Finishing Time:	08:13:28	Interval Length:	4.60	Qfinal (L/min):	0.5	
Injection Type:	Rock	Total Time:	00:07:18	Stage:	2	Vtotal (L):	4.3	









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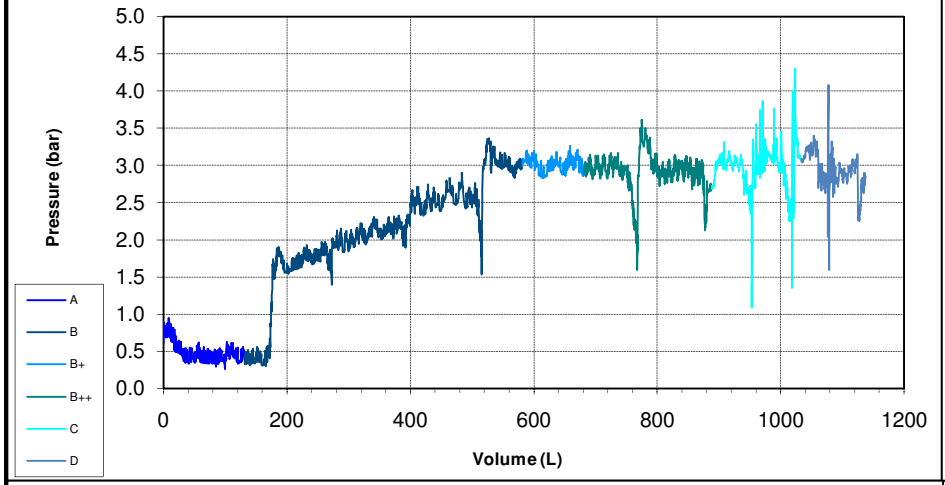
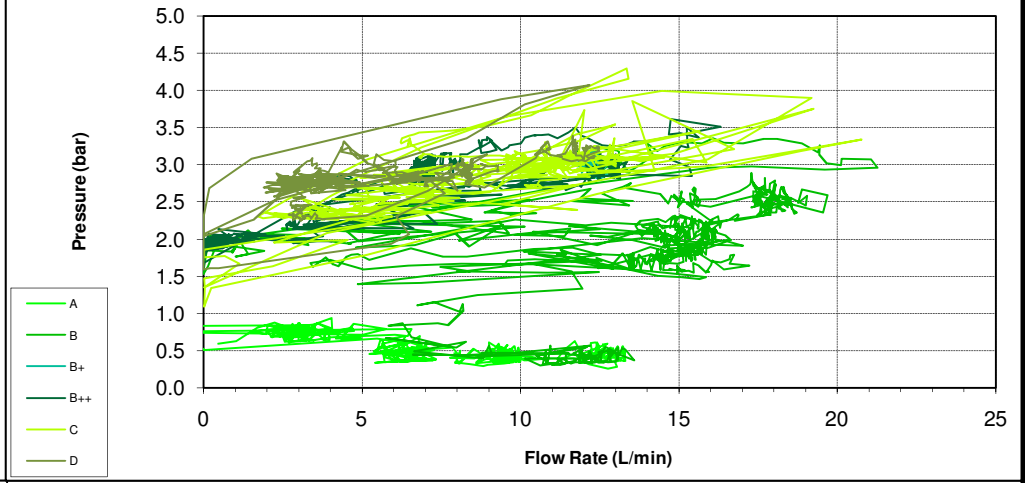
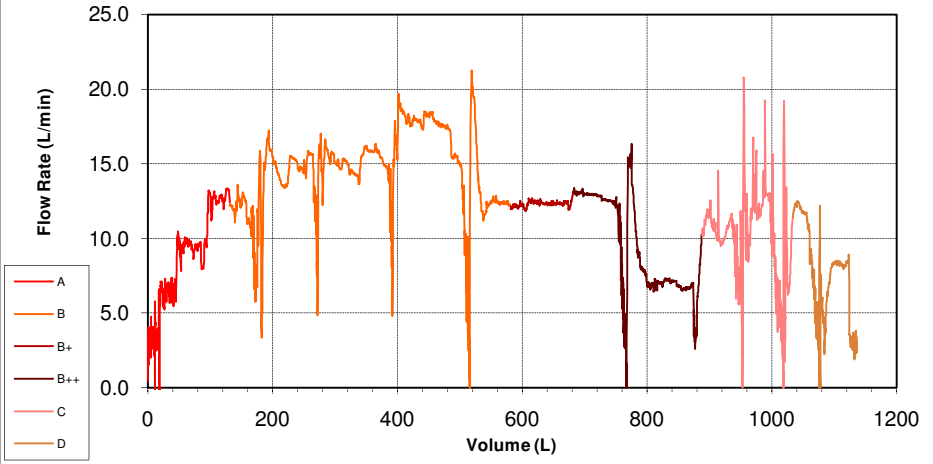
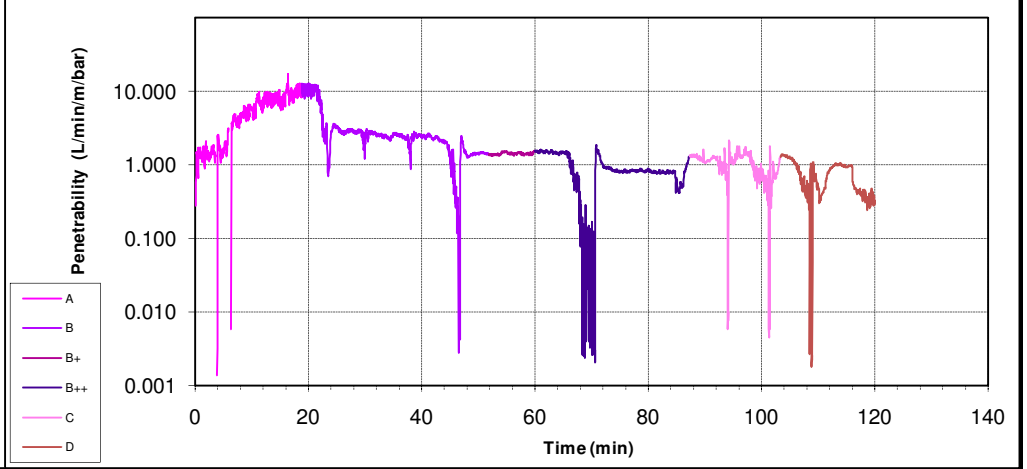
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	29-05-09	Hole ID:	60+451	Top Interval:	9.90	Mix Type:	A-D	Comments:
Grout Plant:	C-216	Starting Time:	11:05:08	Bottom Interval:	12.80	Pfinal (bar):	2.8	
Inj. Method:	Single packer	Finishing Time:	13:05:04	Interval Length:	2.90	Qfinal (L/min):	2.7	
Injection Type:	Rock	Total Time:	01:59:56	Stage:	3	Vtotal (L):	1137.0	









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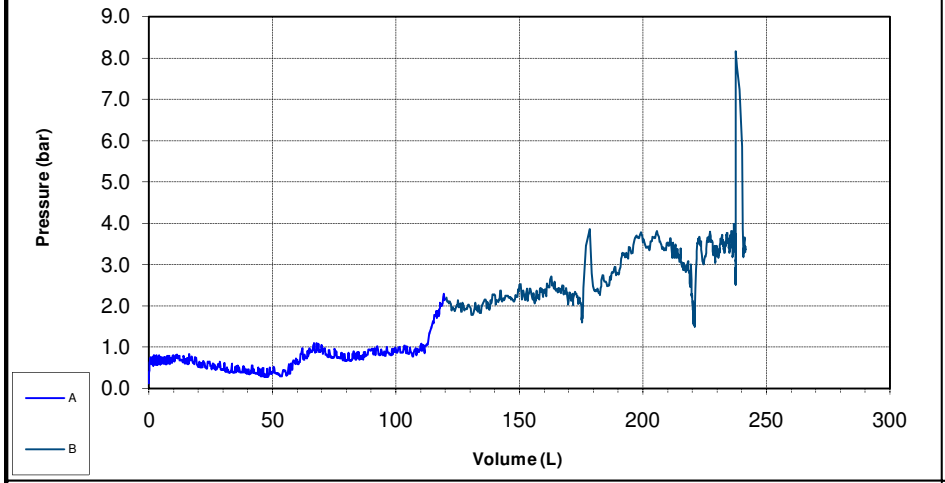
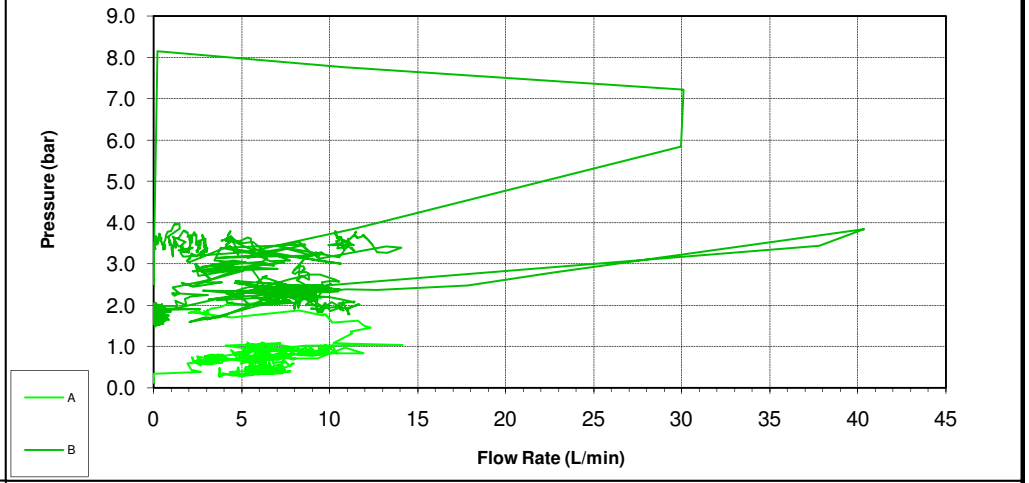
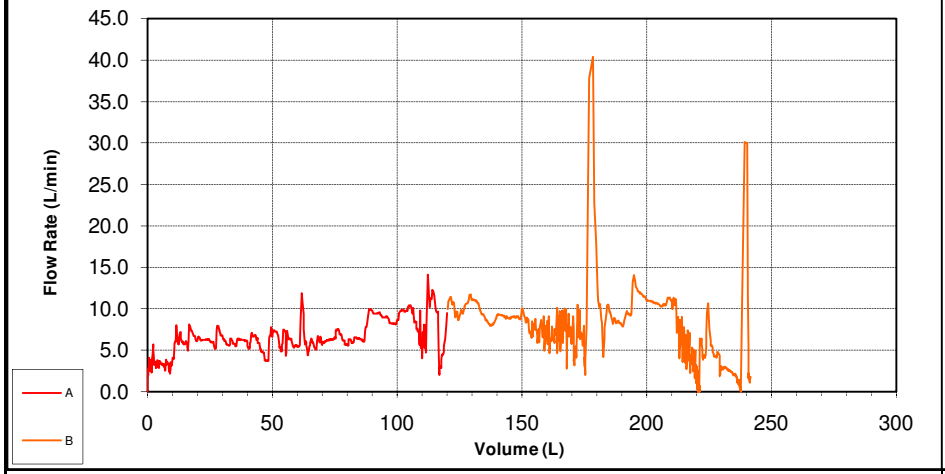
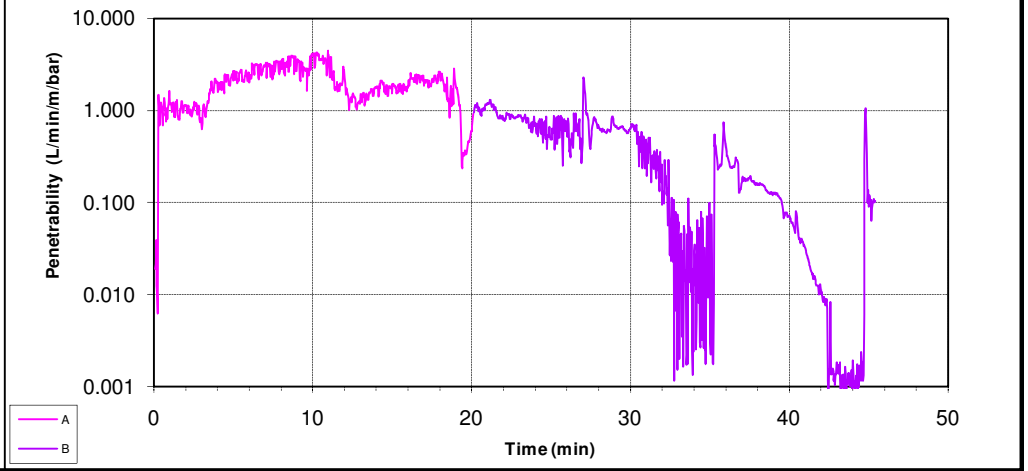
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	28-05-09	Hole ID:	60+454	Top Interval:	11.30	Mix Type:	A-B	Comments:
Grout Plant:	C-216	Starting Time:	11:23:54	Bottom Interval:	16.10	Pfinal (bar):	3.3	
Inj. Method:	Single packer	Finishing Time:	12:09:30	Interval Length:	4.80	Qfinal (L/min):	1.6	
Injection Type:	Rock	Total Time:	00:45:36	Stage:	2	Vtotal (L):	241.6	









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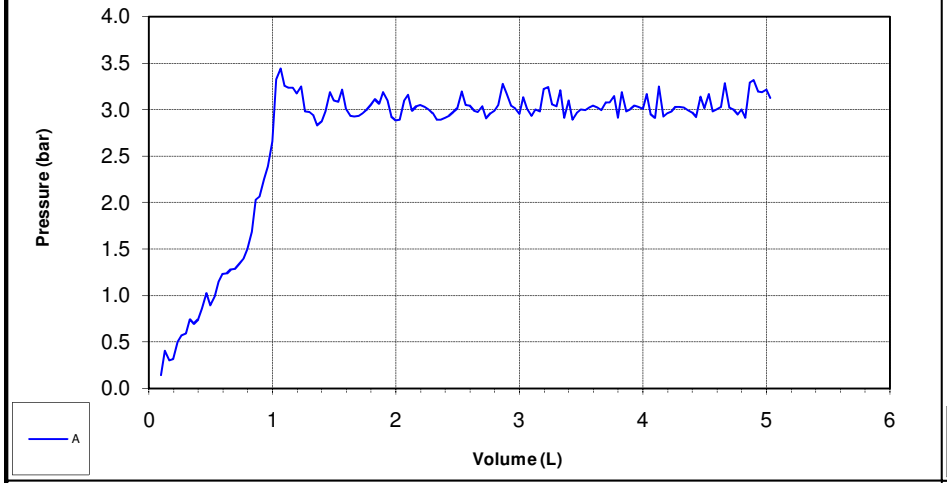
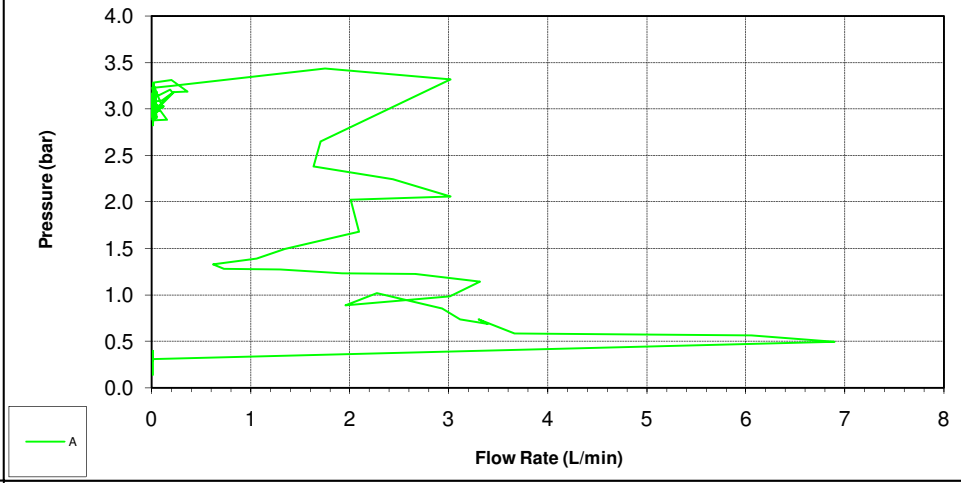
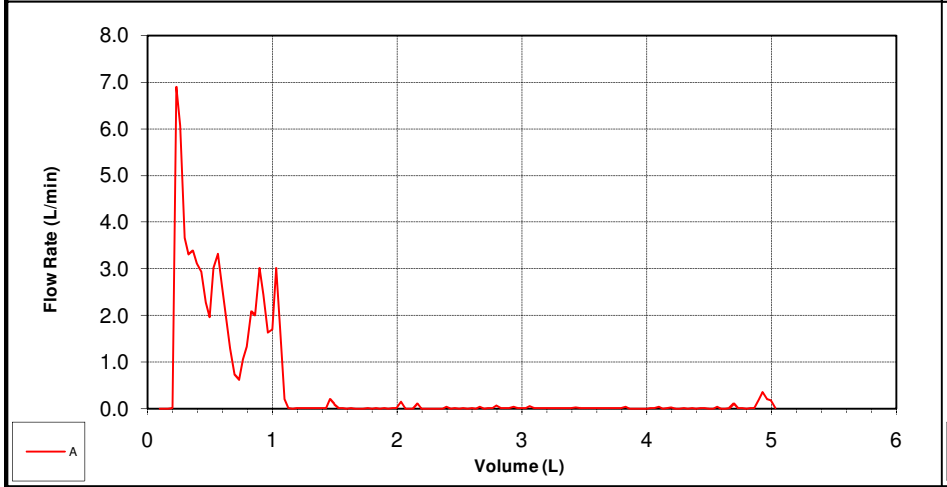
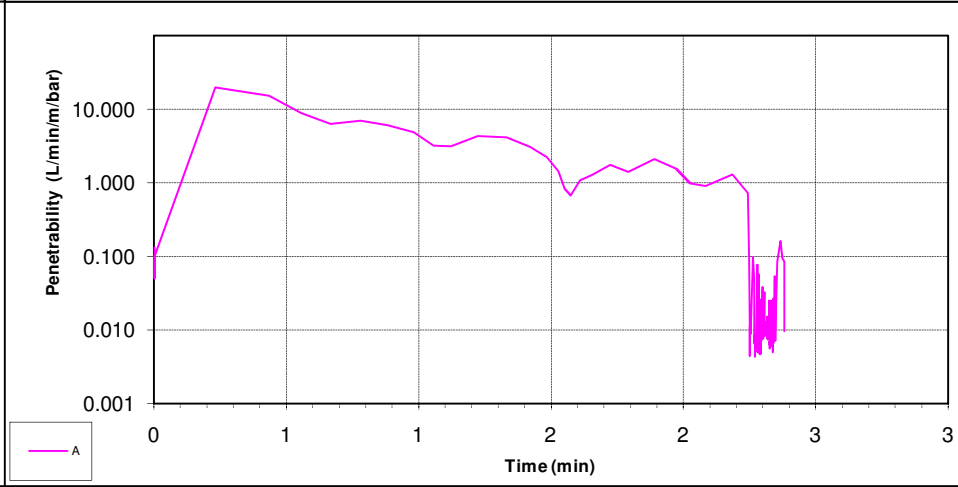
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	28-05-09	Hole ID:	60+454	Top Interval:	10.60	Mix Type:	A-B	Comments:
Grout Plant:	C-216	Starting Time:	15:13:06	Bottom Interval:	11.30	Pfinal (bar):	3.1	
Inj. Method:	Single packer	Finishing Time:	15:20:04	Interval Length:	0.70	Qfinal (L/min):	0.0	
Injection Type:	Rock	Total Time:	00:06:58	Stage:	3	Vtotal (L):	2.4	









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AGNICO EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
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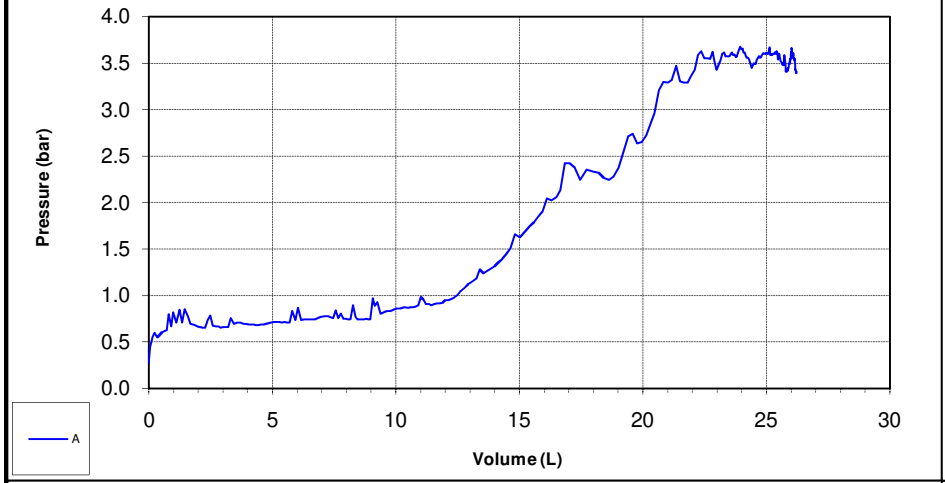
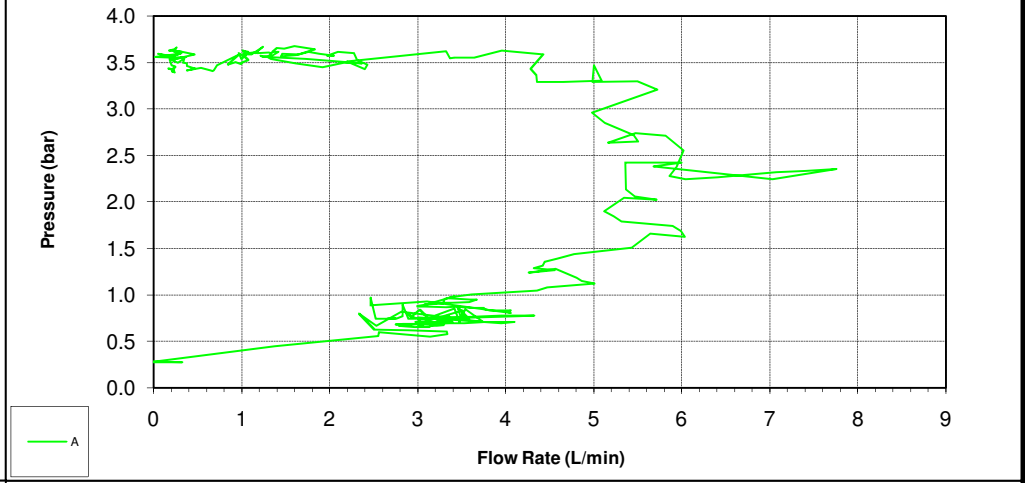
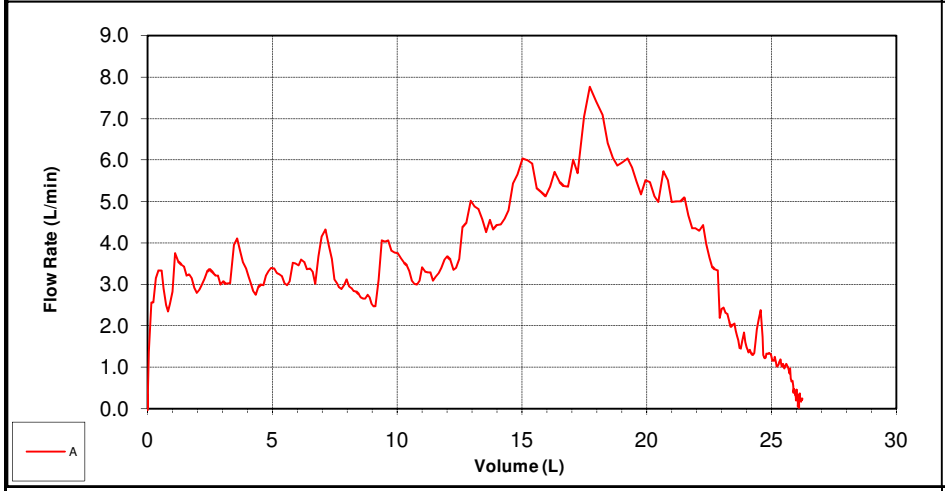
Golder Associates

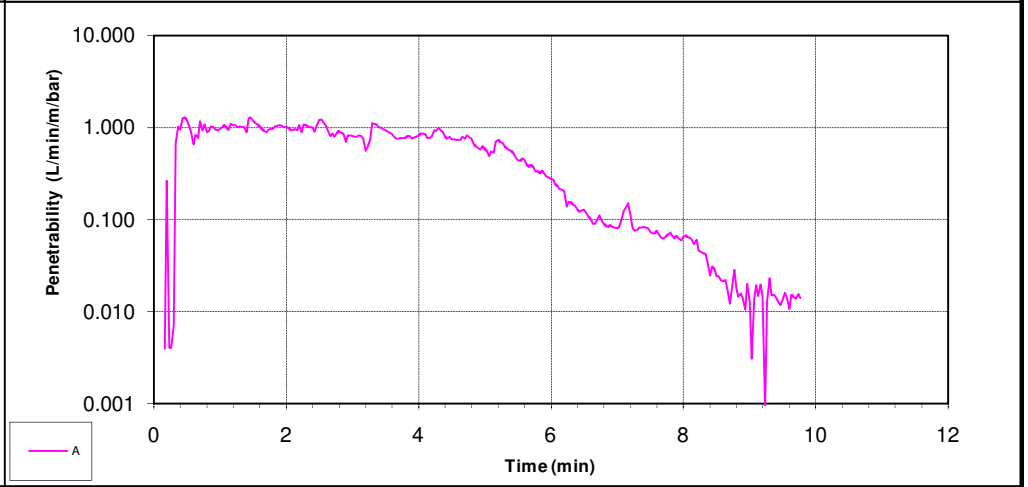
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	28-05-09	Hole ID:	60+457	Top Interval:	12.40	Mix Type:	A	Comments:
Grout Plant:	C-216	Starting Time:	14:24:38	Bottom Interval:	16.90	Pfinal (bar):	3.4	
Inj. Method:	Single packer	Finishing Time:	14:51:04	Interval Length:	4.50	Qfinal (L/min):	0.2	
Injection Type:	Rock	Total Time:	00:26:26	Stage:	2	Vtotal (L):	26.2	









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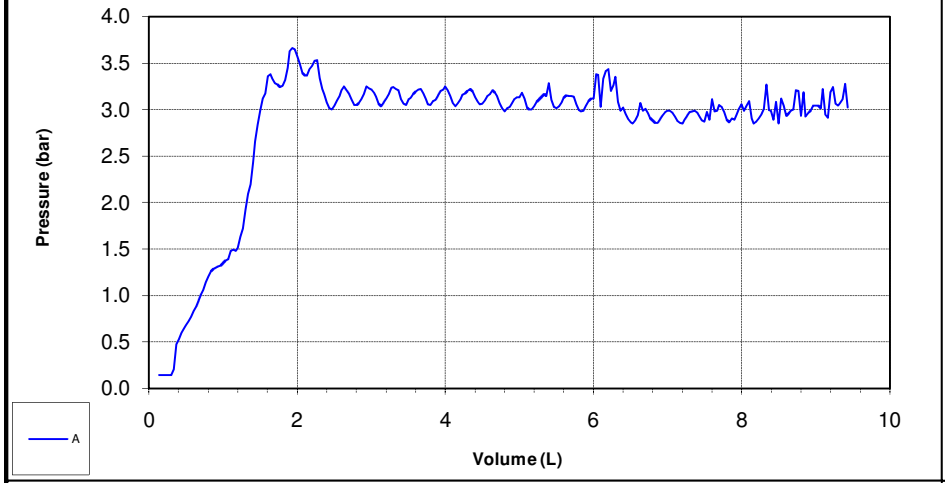
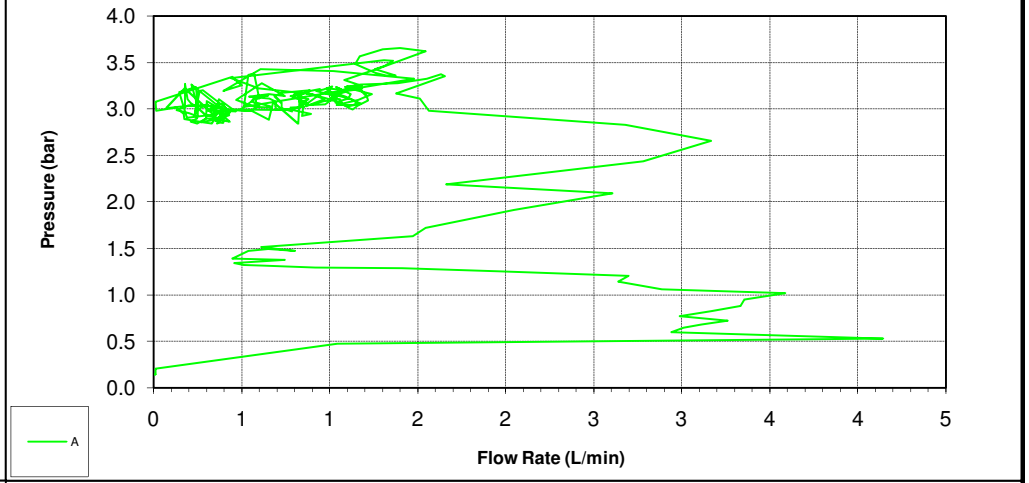
AGNICO EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

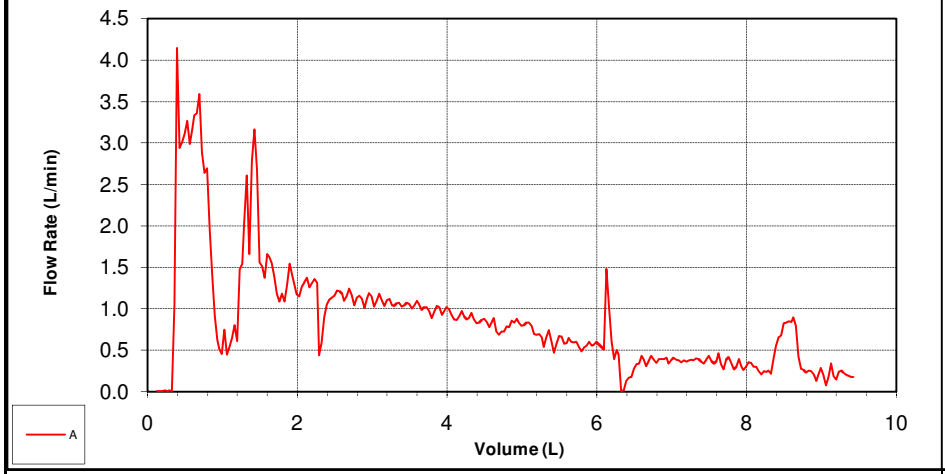
Golder Associates

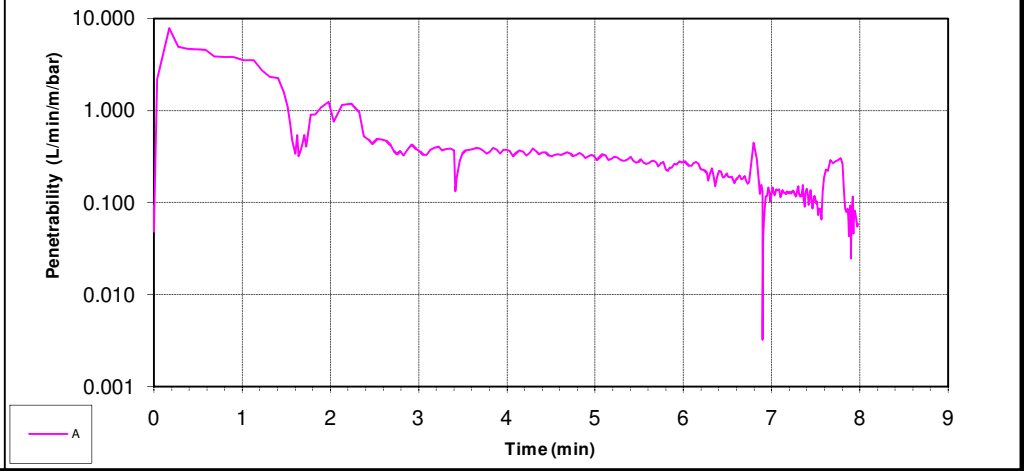
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	28-05-09	Hole ID:	60+457	Top Interval:	11.40	Mix Type:	A	Comments:
Grout Plant:	C-216	Starting Time:	14:53:46	Bottom Interval:	12.40	Pfinal (bar):	3.0	
Inj. Method:	Single packer	Finishing Time:	15:09:04	Interval Length:	1.00	Qfinal (L/min):	0.2	
Injection Type:	Rock	Total Time:	00:15:18	Stage:	3	Vtotal (L):	8.0	









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MEADOWBANK GOLD PROJECT
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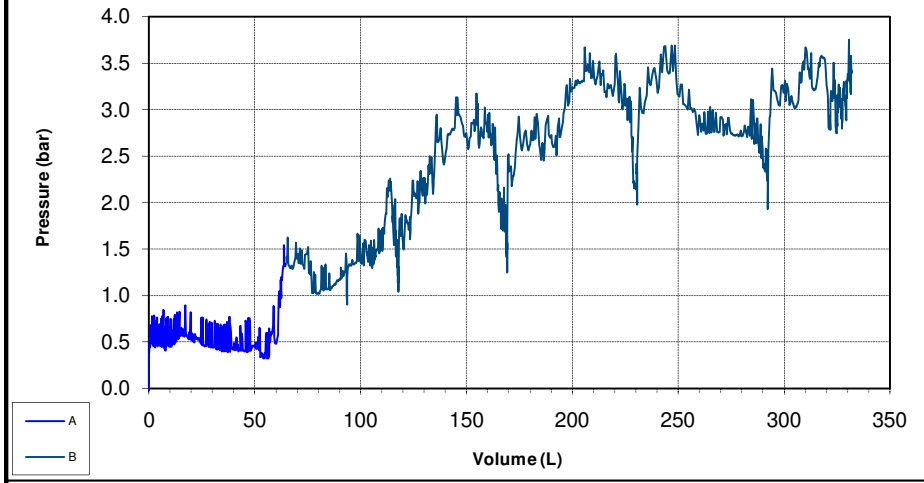
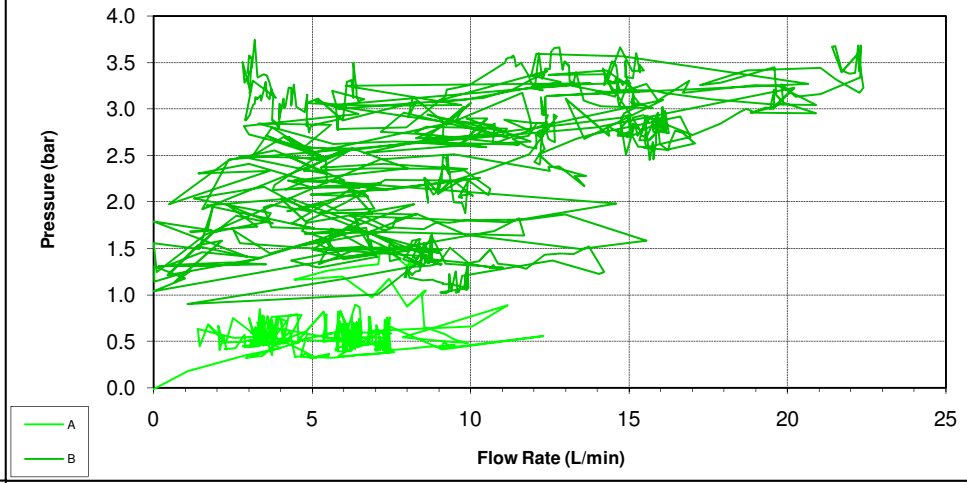
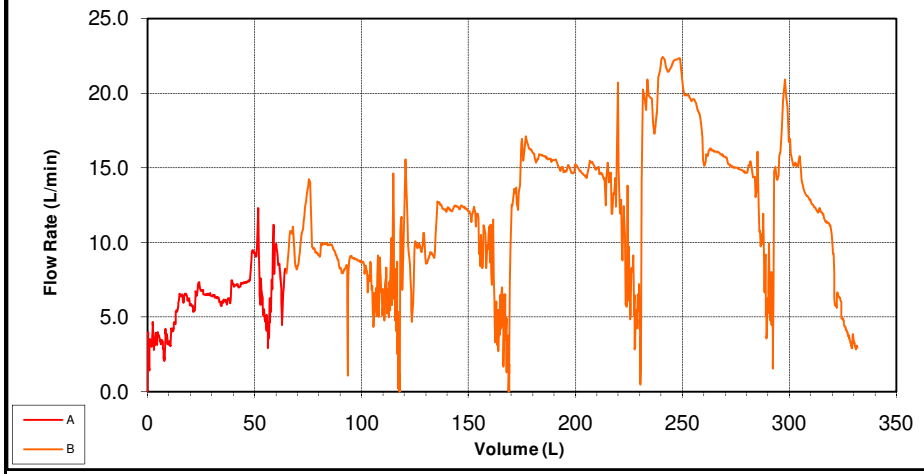
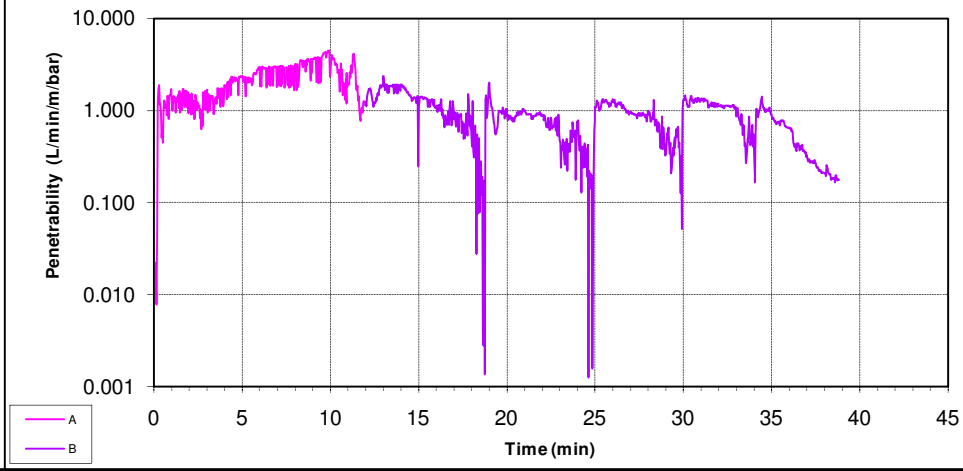
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	28-05-09	Hole ID:	60+460	Top Interval:	11.40	Mix Type:	A-B	Comments:
Grout Plant:	C-216	Starting Time:	16:39:54	Bottom Interval:	16.30	Pfinal (bar):	3.4	
Inj. Method:	Single packer	Finishing Time:	17:18:42	Interval Length:	4.90	Qfinal (L/min):	3.0	
Injection Type:	Rock	Total Time:	00:38:48	Stage:	2	Vtotal (L):	332.0	









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MEADOWBANK GOLD PROJECT
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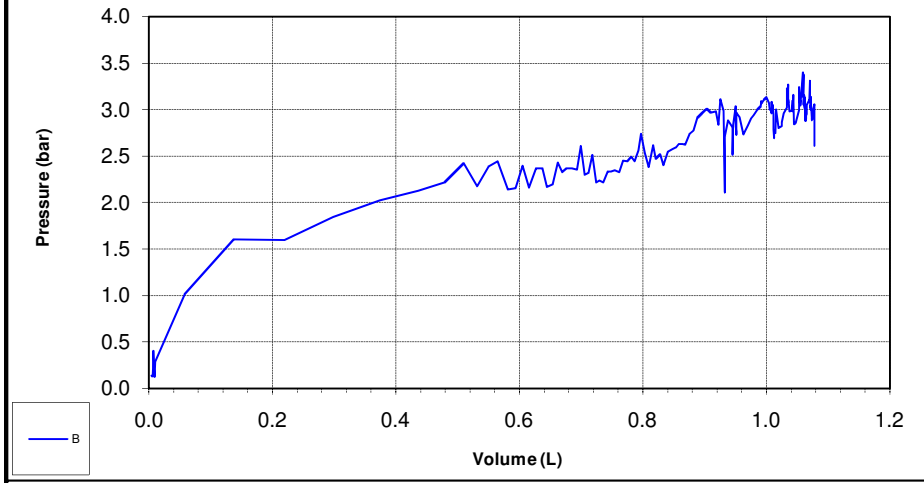
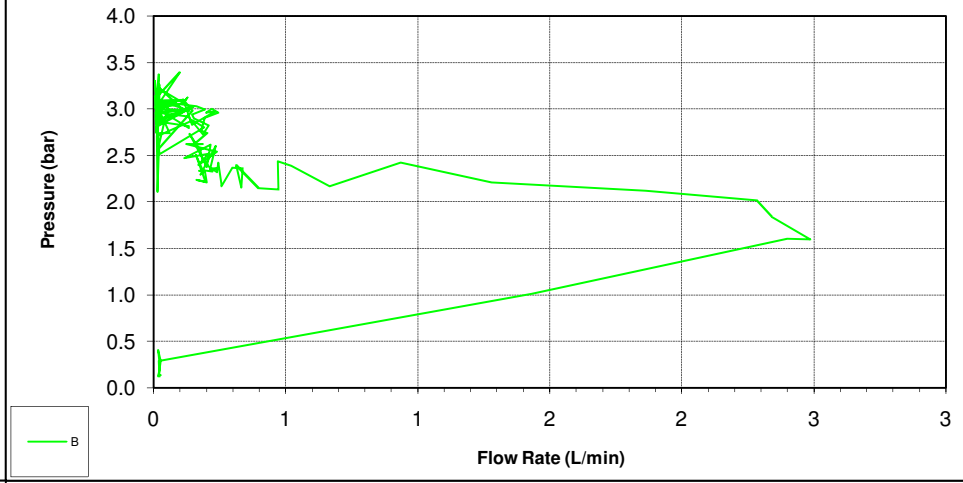
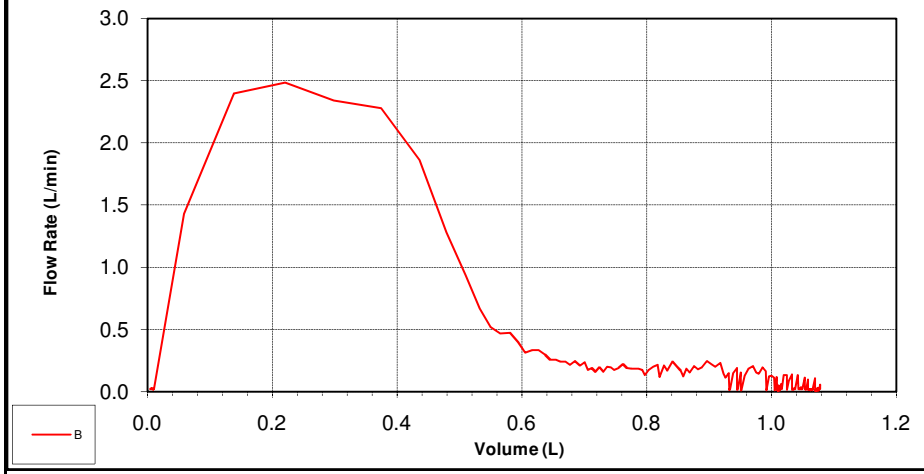
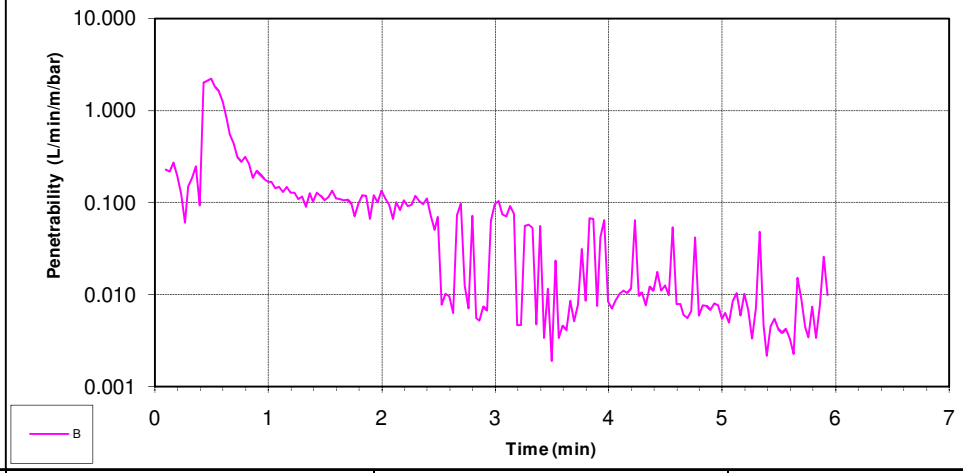
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	28-05-09	Hole ID:	60+460	Top Interval:	10.70	Mix Type:	A-B	Comments:
Grout Plant:	C-216	Starting Time:	17:22:46	Bottom Interval:	11.40	Pfinal (bar):	2.6	
Inj. Method:	Single packer	Finishing Time:	17:28:42	Interval Length:	0.70	Qfinal (L/min):	0.0	
Injection Type:	Rock	Total Time:	00:05:56	Stage:	3	Vtotal (L):	1.1	









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MEADOWBANK GOLD PROJECT
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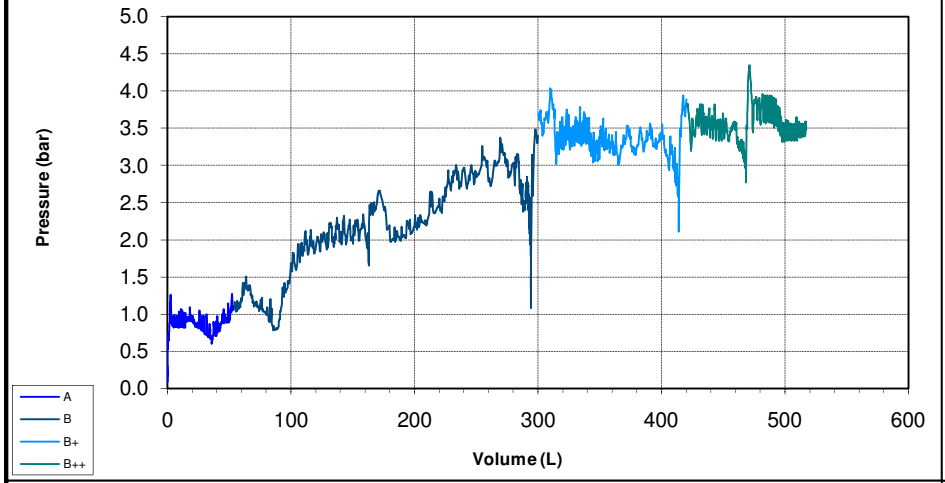
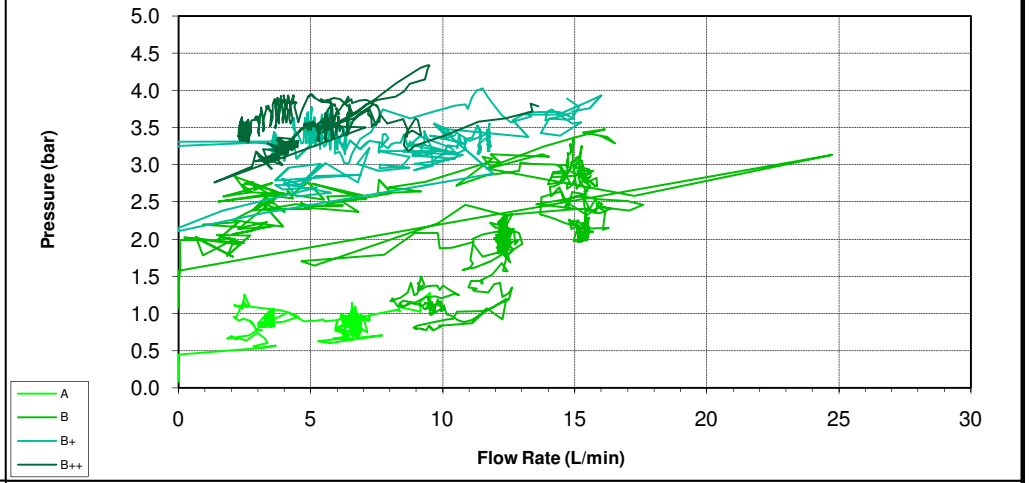
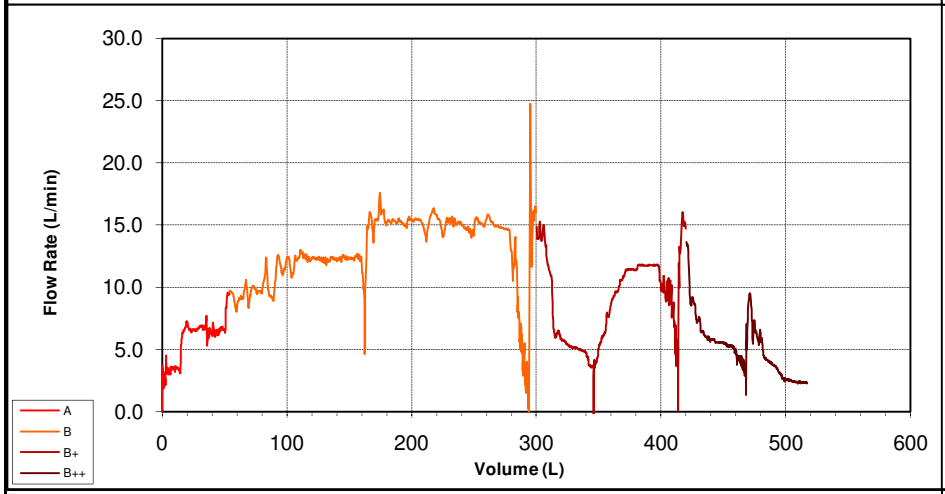
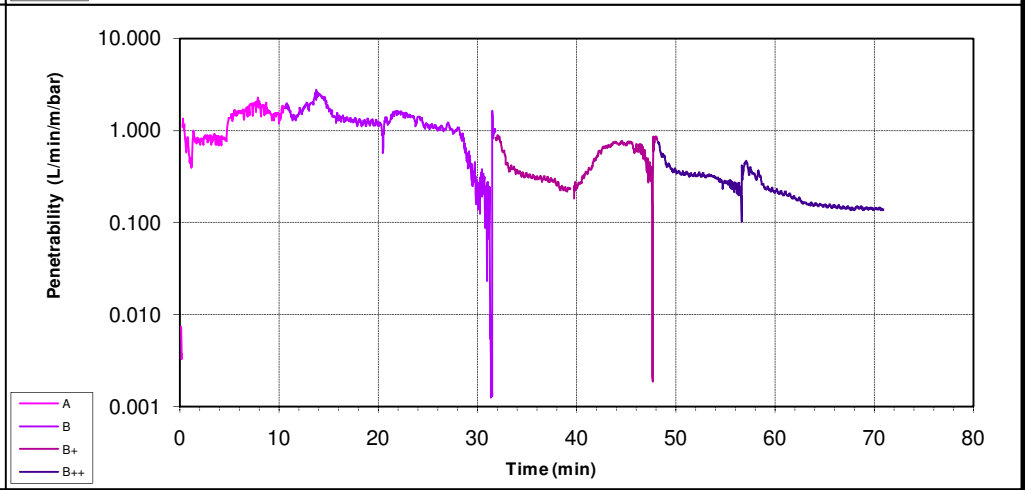
PROJECT No. 07-1413-0074		Phase/Task No. 2700/****	
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	29-05-09	Hole ID:	60+463	Top Interval:	11.40	Mix Type:	A-D	Comments:
Grout Plant:	C-216	Starting Time:	08:16:10	Bottom Interval:	16.20	Pfinal (bar):	3.5	
Inj. Method:	Single packer	Finishing Time:	09:35:06	Interval Length:	4.80	Qfinal (L/min):	2.3	
Injection Type:	Rock	Total Time:	01:18:56	Stage:	2	Vtotal (L):	517.0	









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MEADOWBANK GOLD PROJECT
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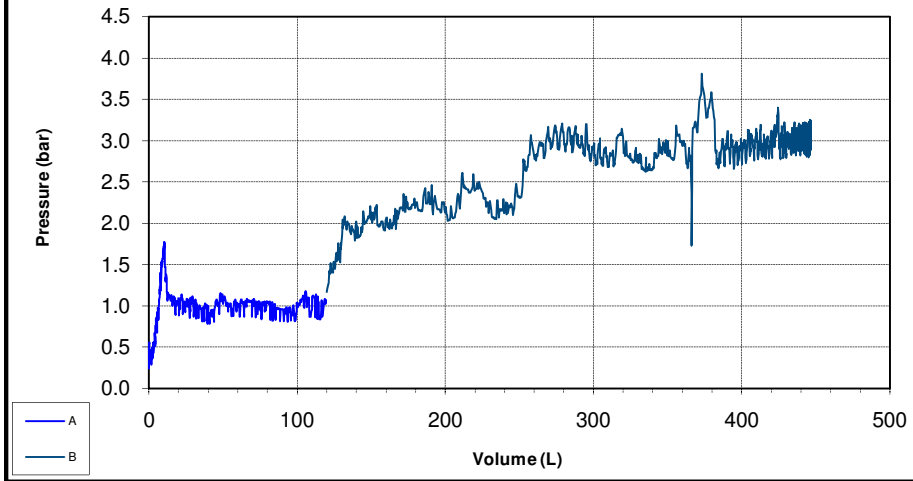
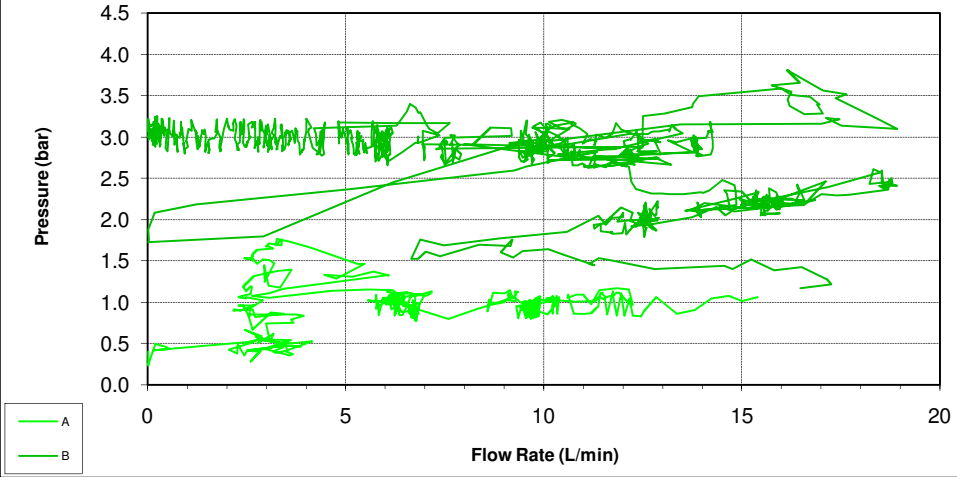
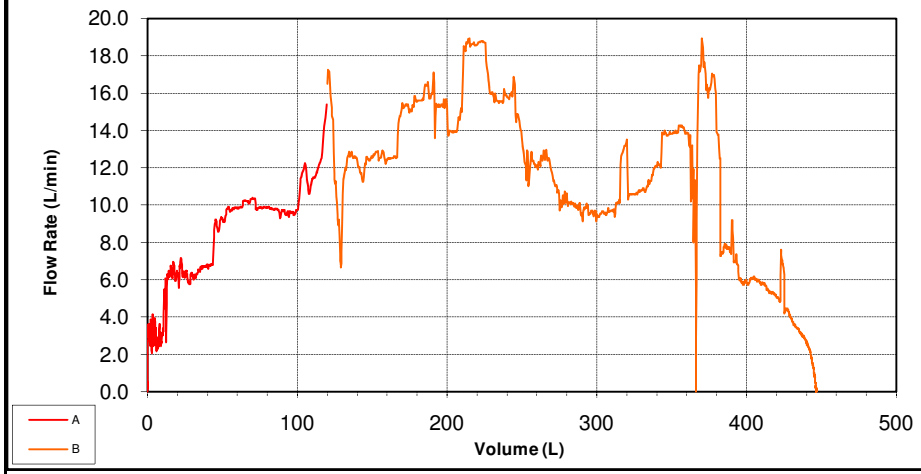
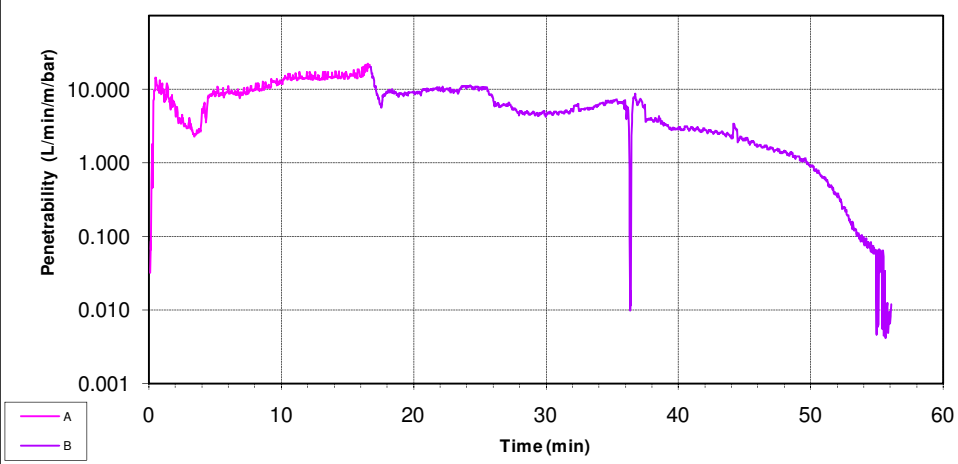
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	29-05-09	Hole ID:	60+463	Top Interval:	10.70	Mix Type:	A-B	Comments:
Grout Plant:	C-216	Starting Time:	09:37:02	Bottom Interval:	11.40	Pfinal (bar):	3.0	
Inj. Method:	Single packer	Finishing Time:	10:47:02	Interval Length:	0.70	Qfinal (L/min):	0.0	
Injection Type:	Rock	Total Time:	01:10:00	Stage:	3	Vtotal (L):	446.6	









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MEADOWBANK GOLD PROJECT
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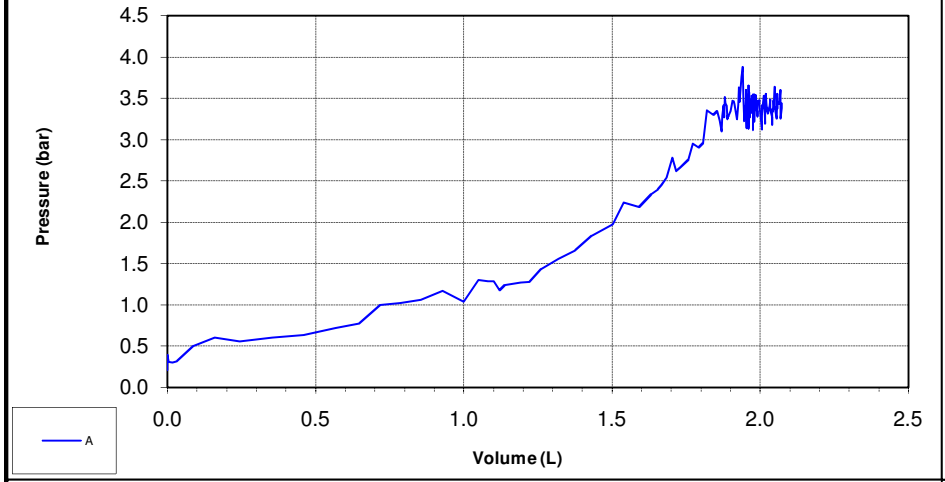
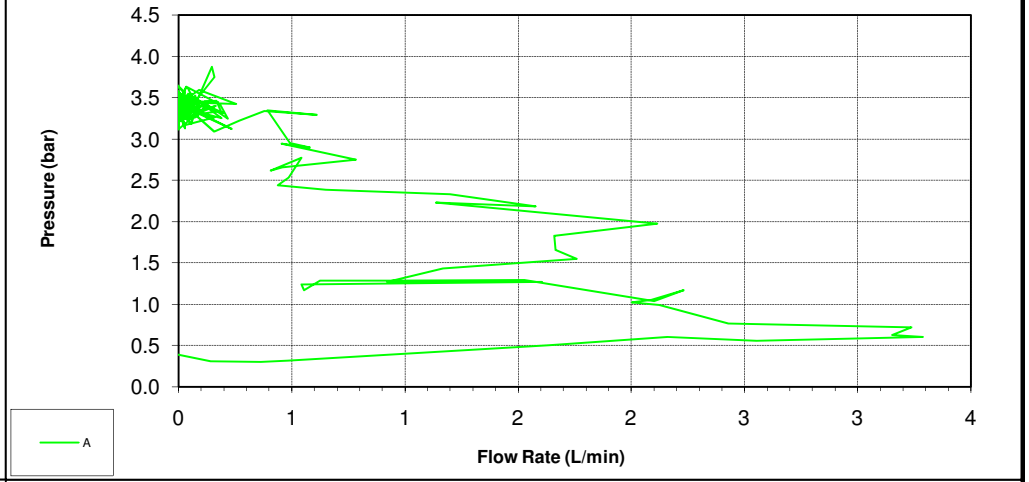
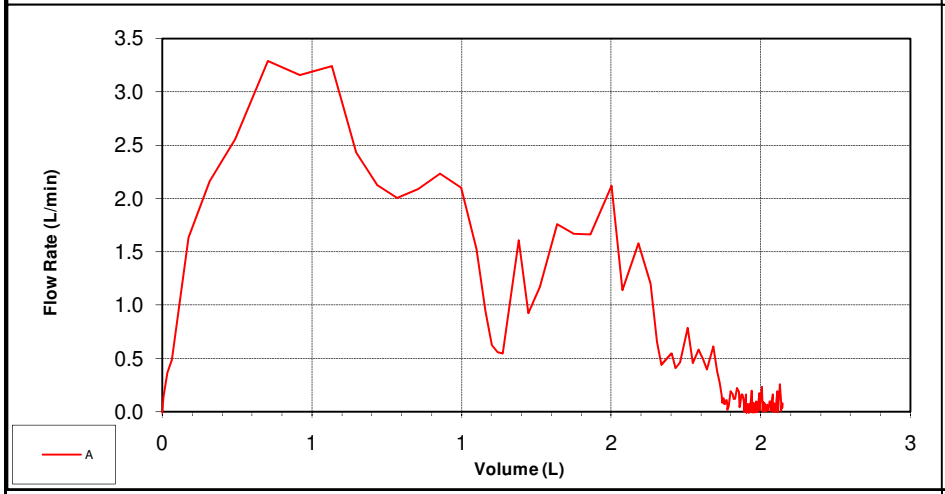
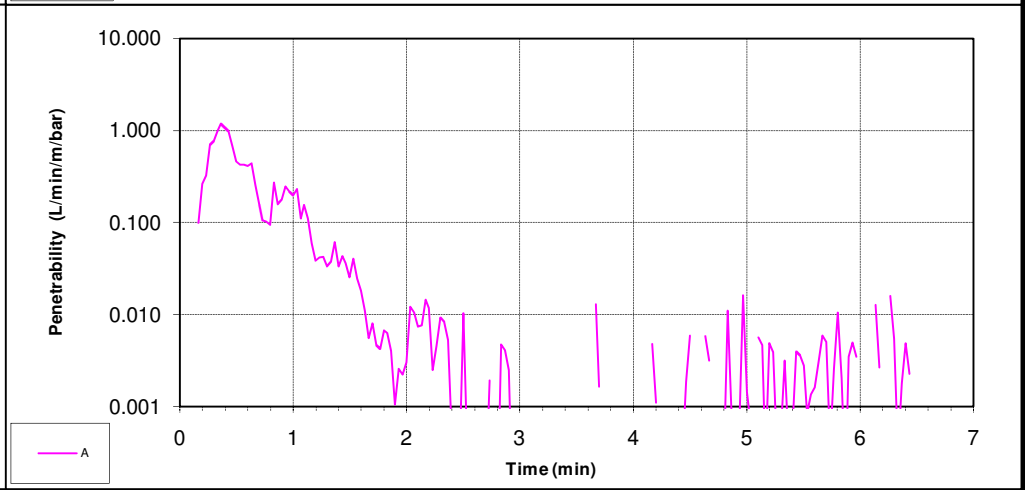
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	29-05-09	Hole ID:	60+466	Top Interval:	11.40	Mix Type:	A	Comments:
Grout Plant:	C-216	Starting Time:	15:26:56	Bottom Interval:	16.00	Pfinal (bar):	3.3	
Inj. Method:	Single packer	Finishing Time:	15:33:24	Interval Length:	4.60	Qfinal (L/min):	0.0	
Injection Type:	Rock	Total Time:	00:06:28	Stage:	2	Vtotal (L):	2.1	









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MEADOWBANK GOLD PROJECT
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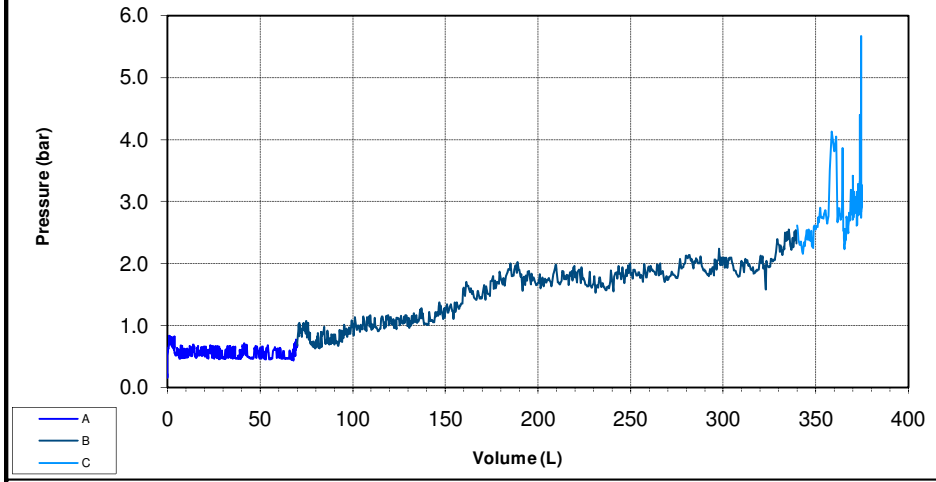
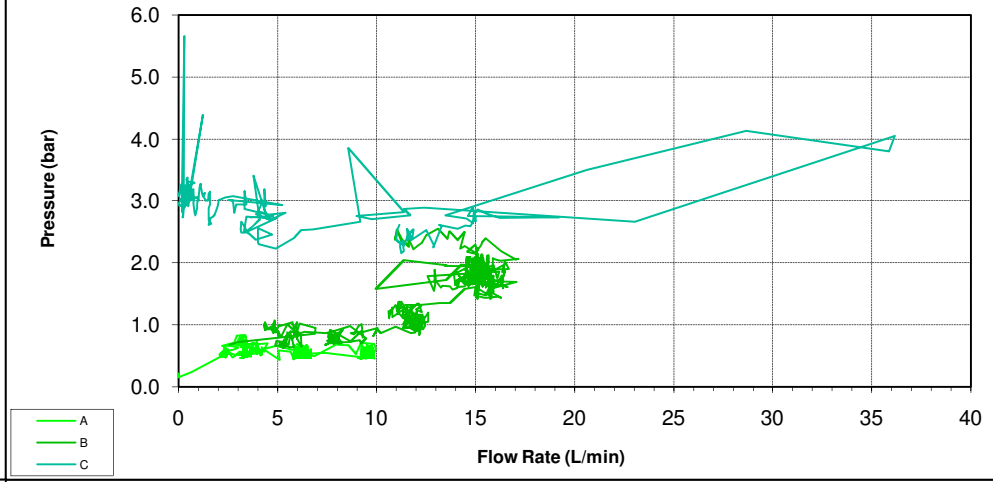
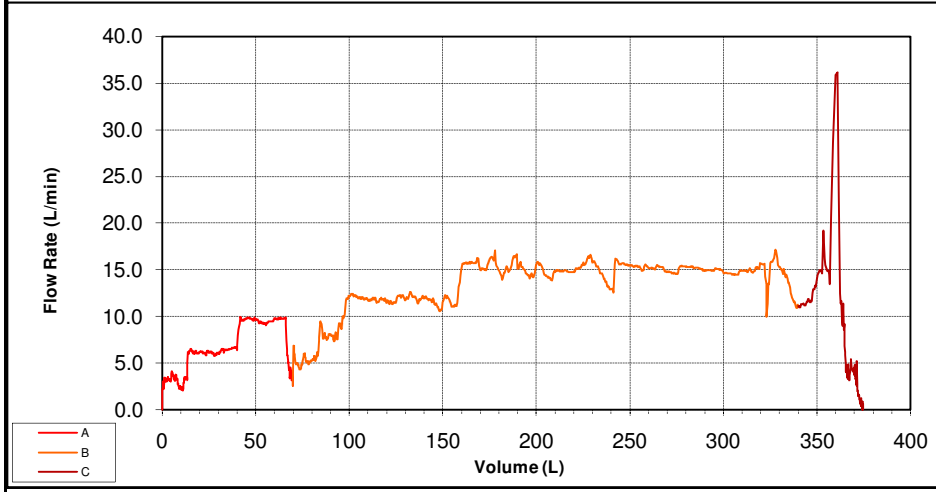
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

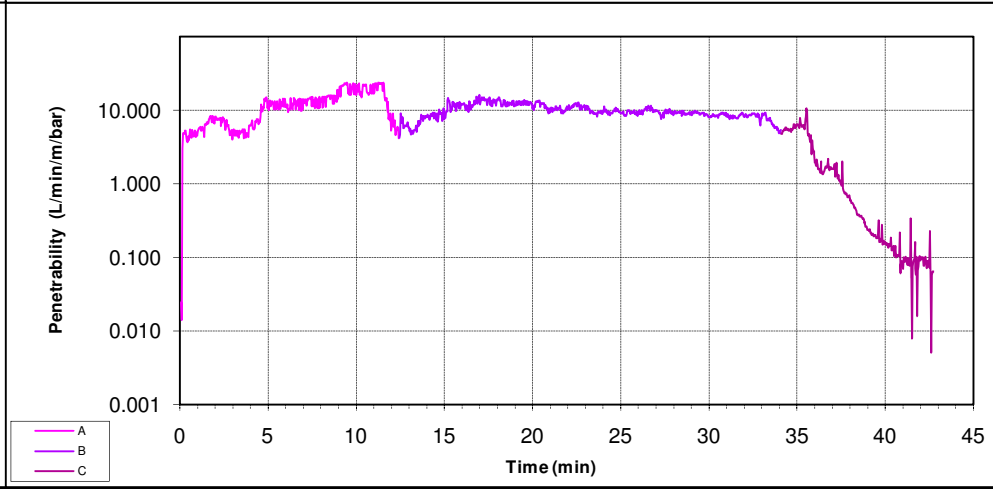
Title:	Injection Report - East Dike Contingency Grouting						
Date:	29-05-09	Hole ID:	60+466	Top Interval:	10.50	Mix Type:	A-C
Grout Plant:	C-216	Starting Time:	15:36:36	Bottom Interval:	11.40	Pfinal (bar):	3.2
Inj. Method:	Single packer	Finishing Time:	16:19:18	Interval Length:	0.90	Qfinal (L/min):	0.2
Injection Type:	Rock	Total Time:	00:42:42	Stage:	3	Vtotal (L):	374.7

Comments:









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AGNICO EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
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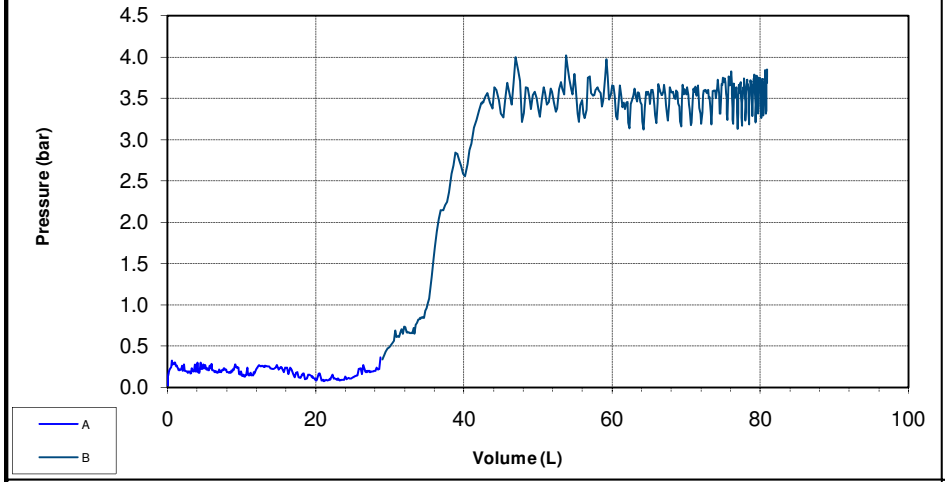
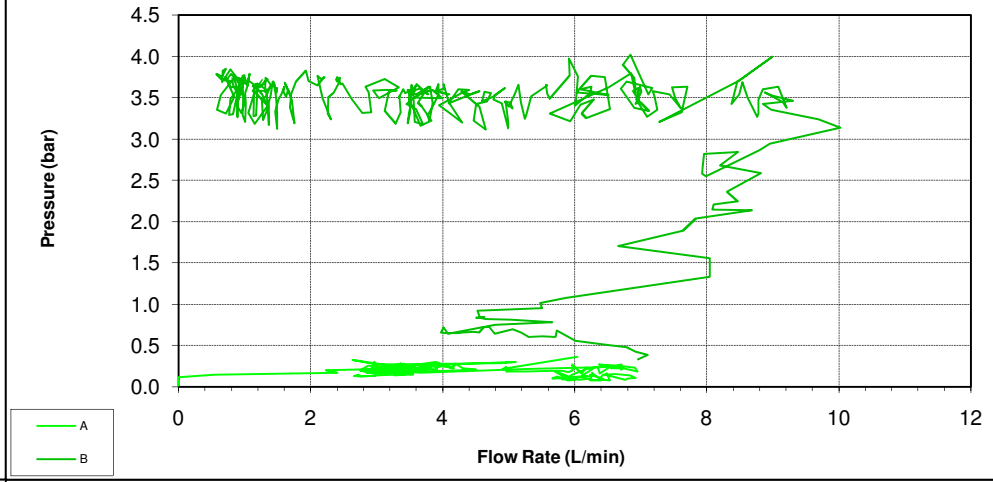
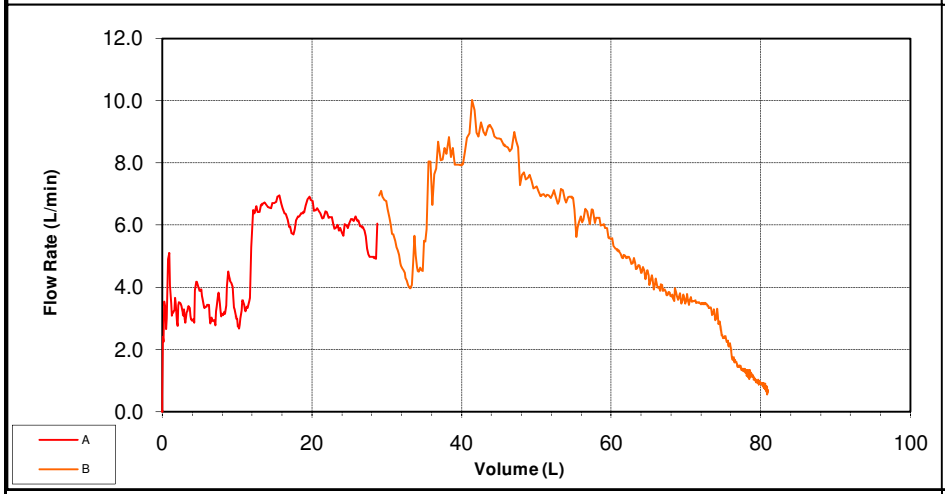
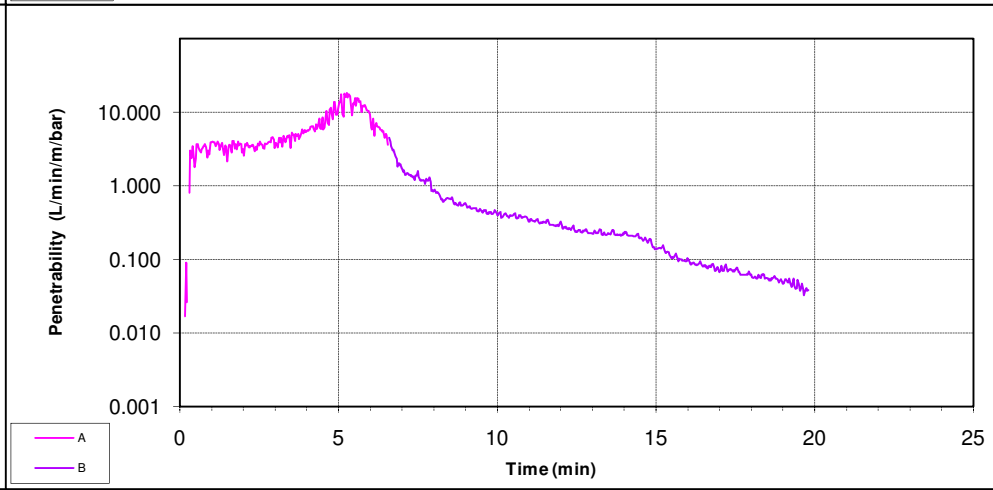
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	29-05-09	Hole ID:	60+469	Top Interval:	12.90	Mix Type:	A-B	Comments:
Grout Plant:	C-216	Starting Time:	17:12:58	Bottom Interval:	17.50	Pfinal (bar):	3.7	
Inj. Method:	Single packer	Finishing Time:	17:32:46	Interval Length:	4.60	Qfinal (L/min):	0.7	
Injection Type:	Rock	Total Time:	00:19:48	Stage:	2	Vtotal (L):	80.9	









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AGNICO EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
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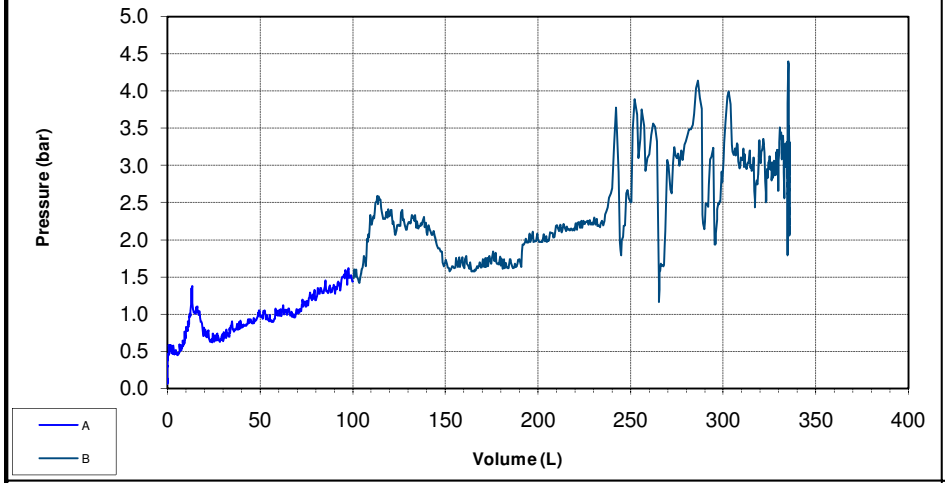
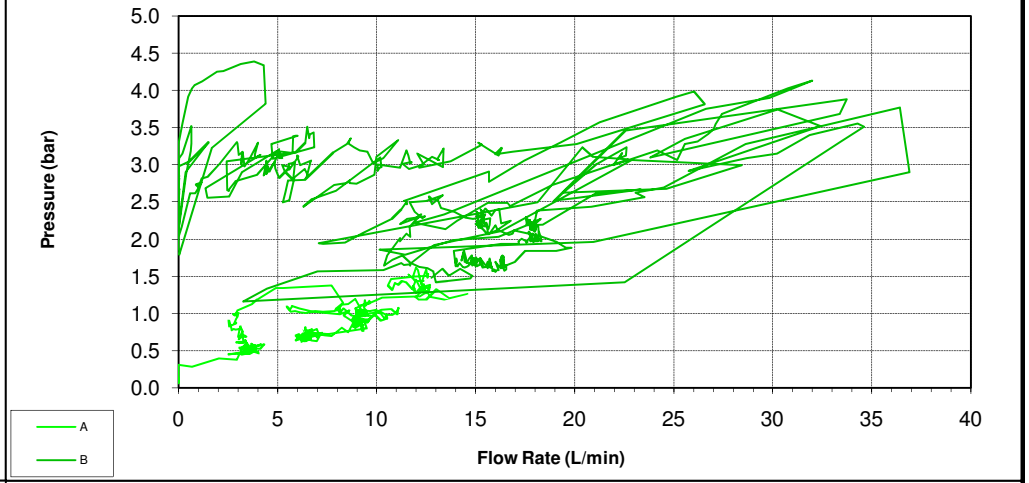
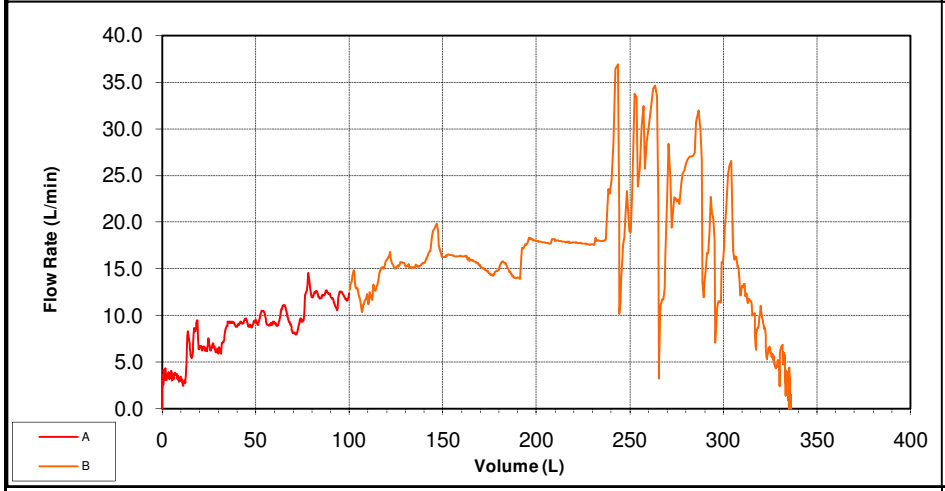
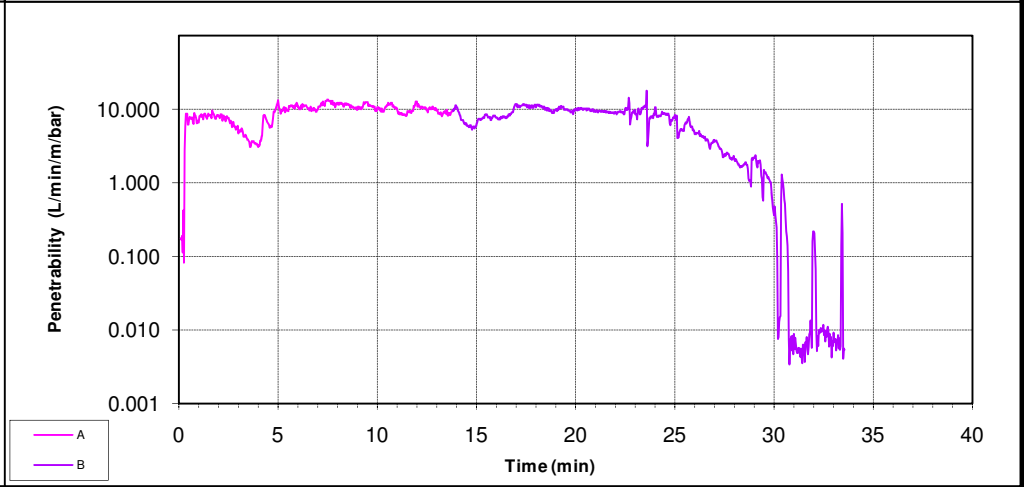
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	29-05-09	Hole ID:	60+469	Top Interval:	12.00	Mix Type:	A-B	Comments:
Grout Plant:	C-216	Starting Time:	17:41:48	Bottom Interval:	12.90	Pfinal (bar):	2.9	
Inj. Method:	Single packer	Finishing Time:	18:15:22	Interval Length:	0.90	Qfinal (L/min):	0.0	
Injection Type:	Rock	Total Time:	00:33:34	Stage:	3	Vtotal (L):	335.8	









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MEADOWBANK GOLD PROJECT
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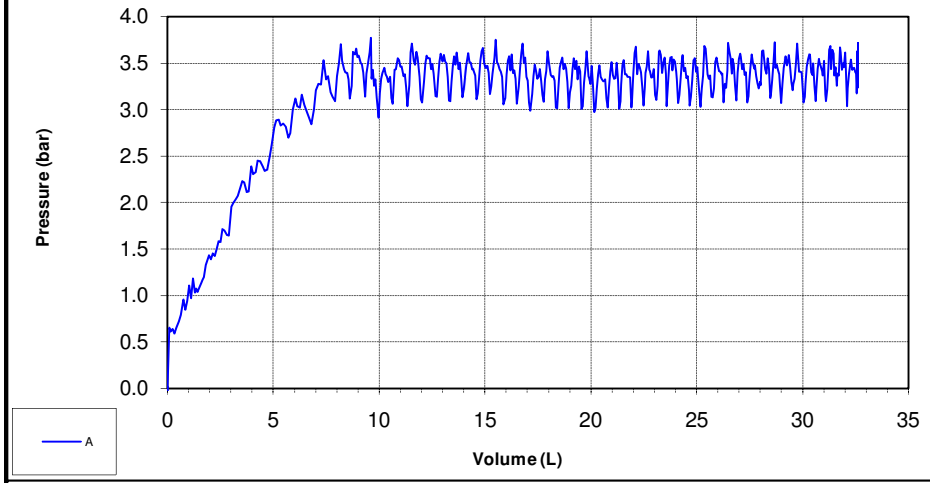
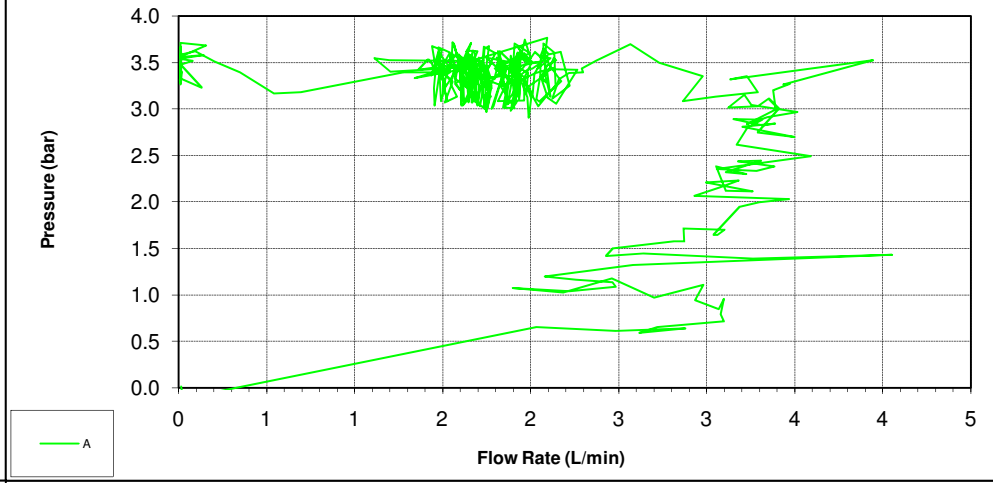
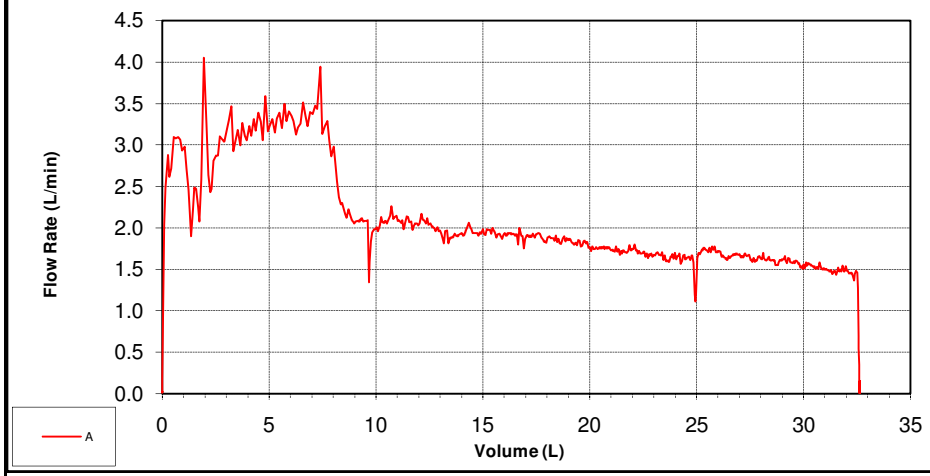
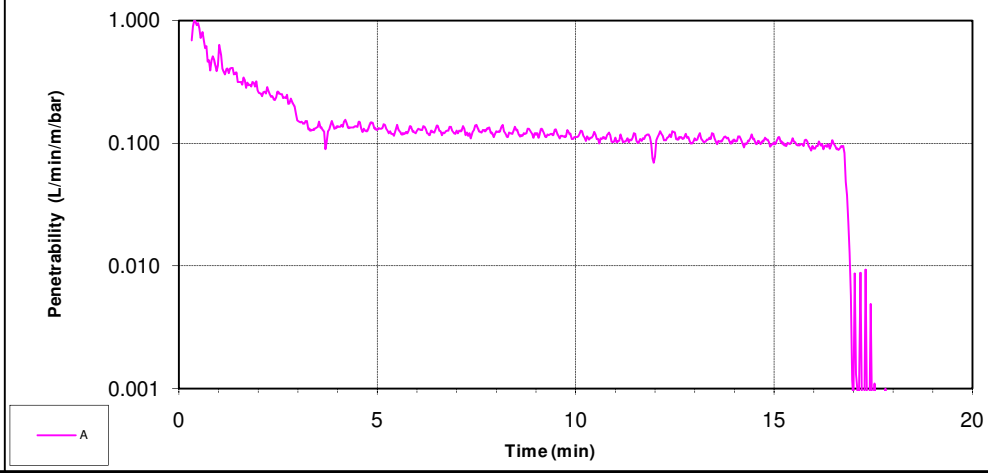
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	31-05-09	Hole ID:	60+472	Top Interval:	12.60	Mix Type:	A	Comments:
Grout Plant:	C-216	Starting Time:	10:49:26	Bottom Interval:	17.10	Pfinal (bar):	3.3	
Inj. Method:	Single packer	Finishing Time:	11:07:18	Interval Length:	4.50	Qfinal (L/min):	0.0	
Injection Type:	Rock	Total Time:	00:17:52	Stage:	2	Vtotal (L):	32.6	









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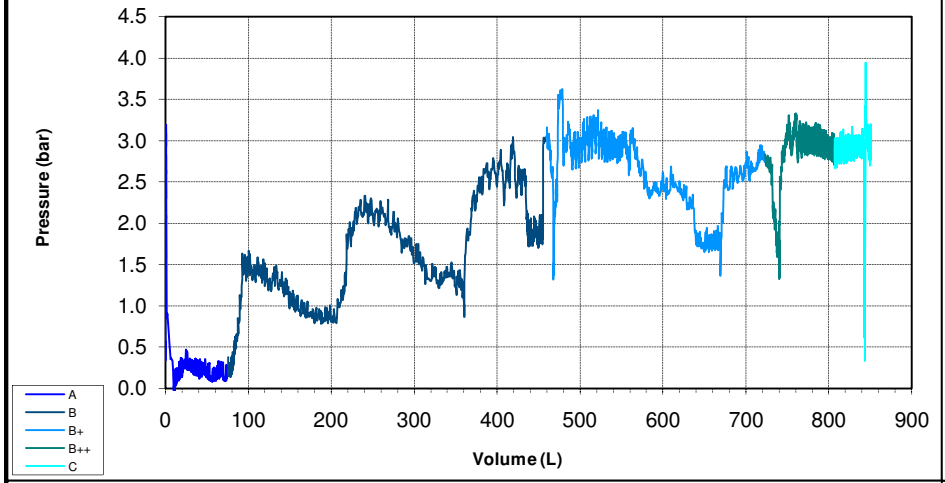
AGNICO EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

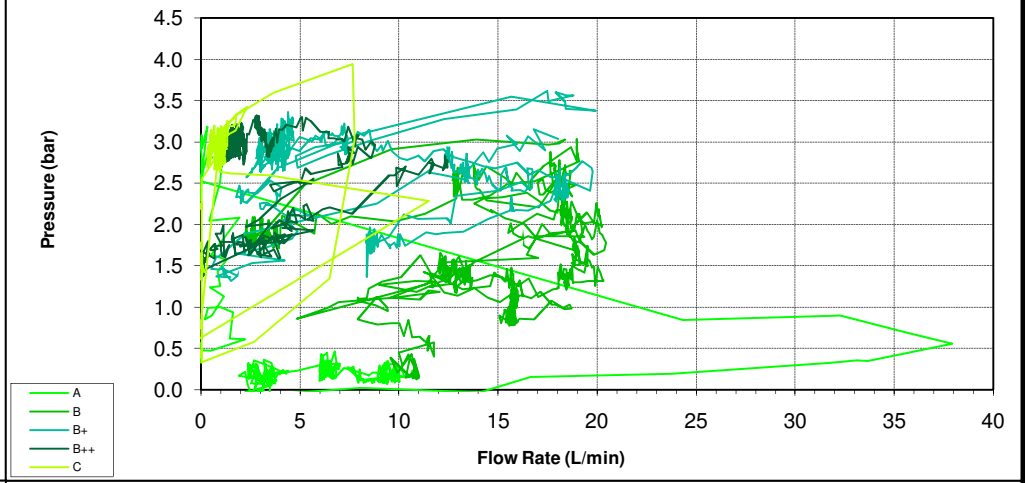
Golder Associates

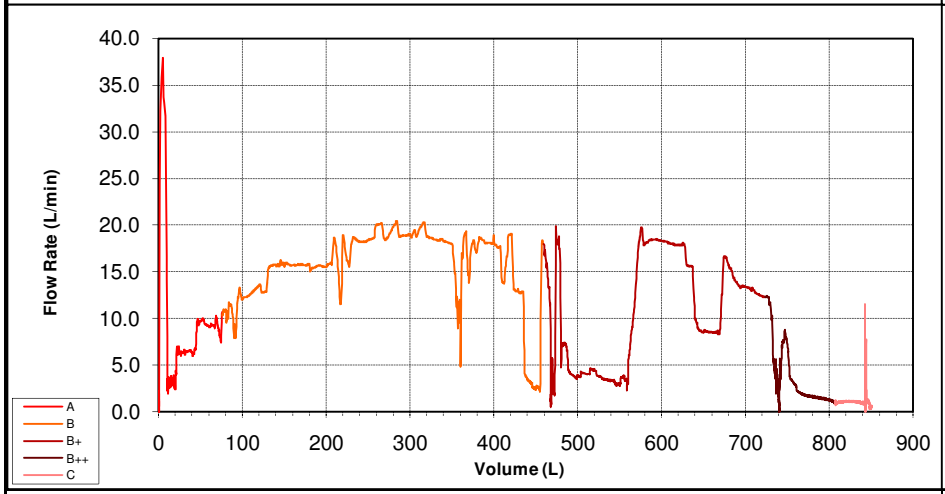
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

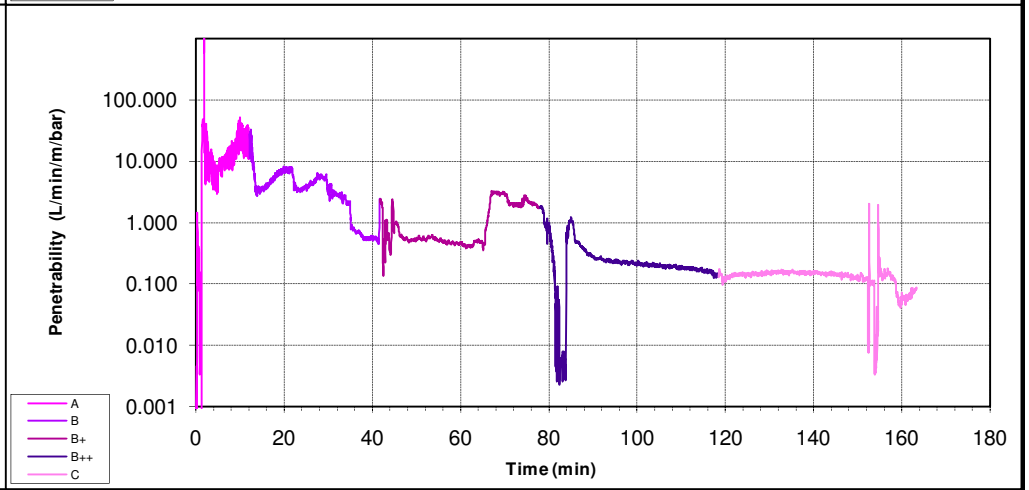
Title:	Injection Report - East Dike Contingency Grouting						
Date:	31-05-09	Hole ID:	60+472	Top Interval:	10.10	Mix Type:	A-C
Grout Plant:	C-216	Starting Time:	14:18:48	Bottom Interval:	12.60	Pfinal (bar):	3.1
Inj. Method:	Single packer	Finishing Time:	17:02:14	Interval Length:	2.50	Qfinal (L/min):	0.6
Injection Type:	Rock	Total Time:	02:43:26	Stage:	3	Vtotal (L):	850.0

Comments:









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MEADOWBANK GOLD PROJECT
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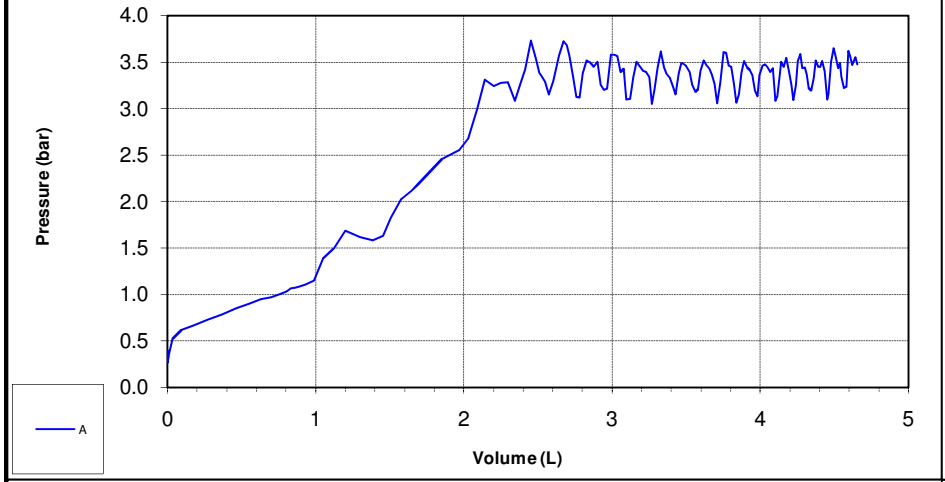
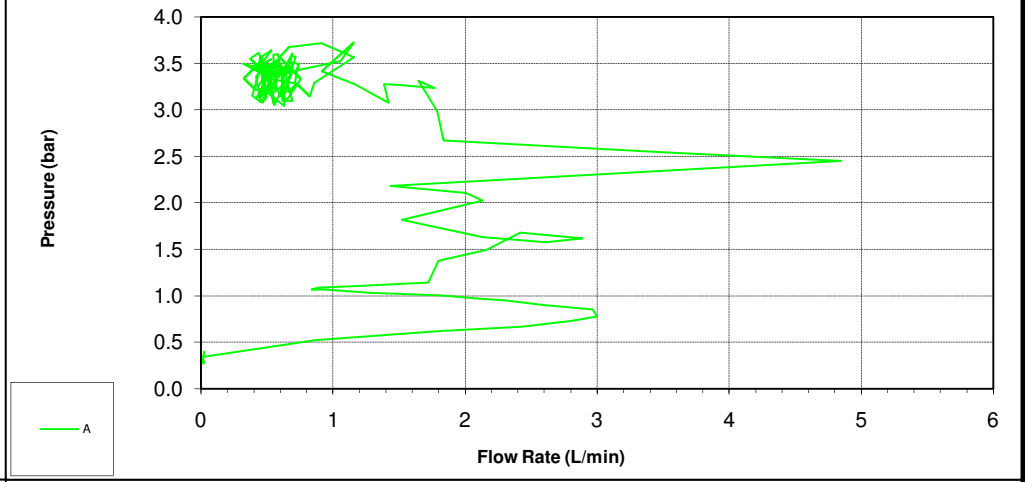
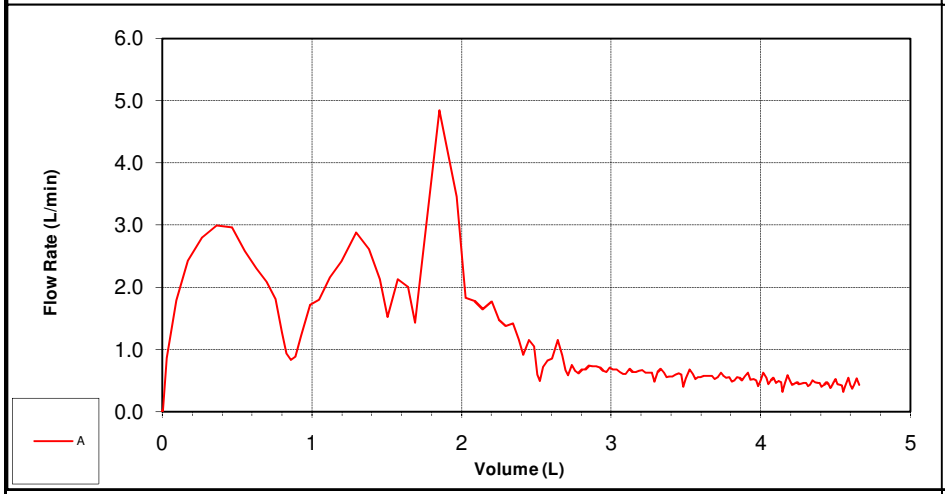
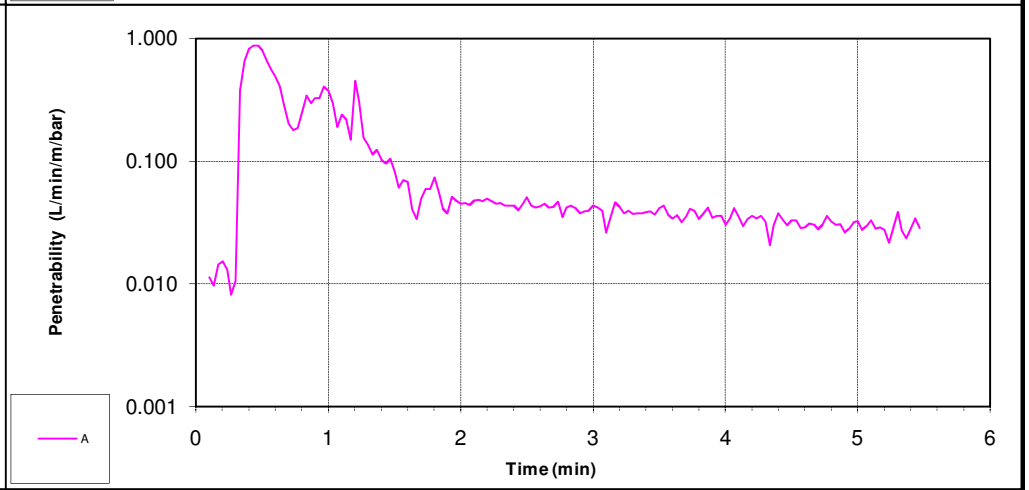
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	30-05-09	Hole ID:	60+475	Top Interval:	12.60	Mix Type:	A	Comments:
Grout Plant:	C-216	Starting Time:	08:40:46	Bottom Interval:	17.00	Pfinal (bar):	3.5	
Inj. Method:	Single packer	Finishing Time:	08:46:58	Interval Length:	4.40	Qfinal (L/min):	0.4	
Injection Type:	Rock	Total Time:	00:06:12	Stage:	2	Vtotal (L):	4.7	









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MEADOWBANK GOLD PROJECT
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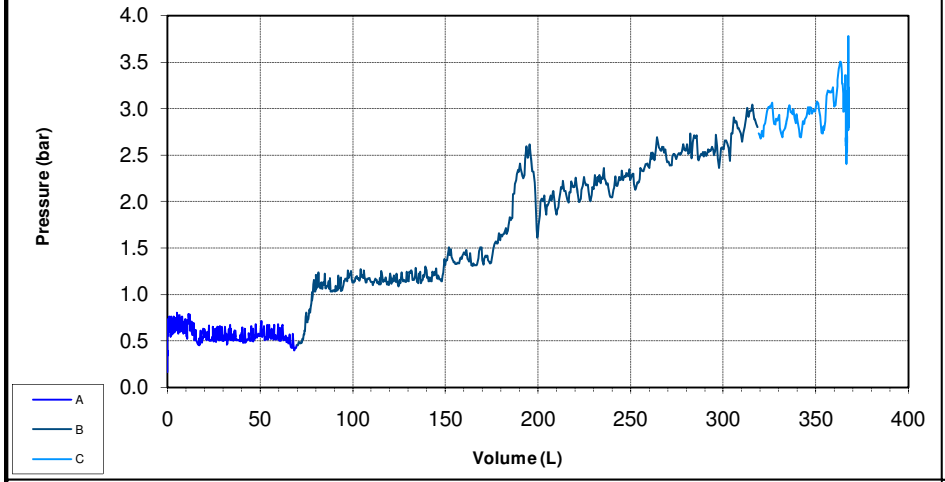
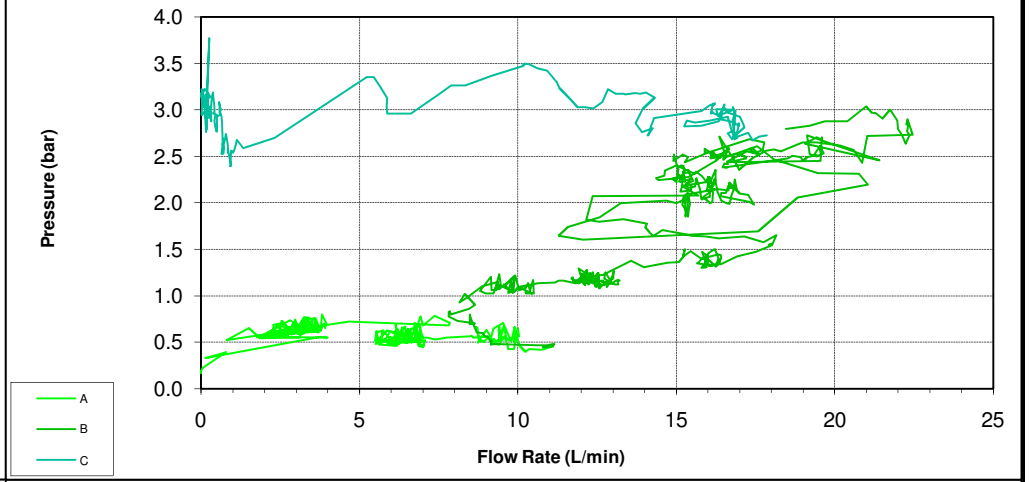
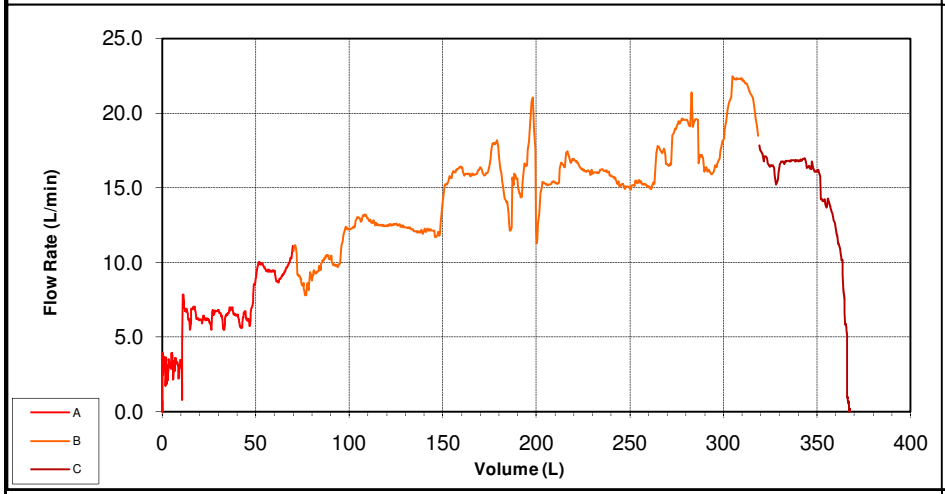
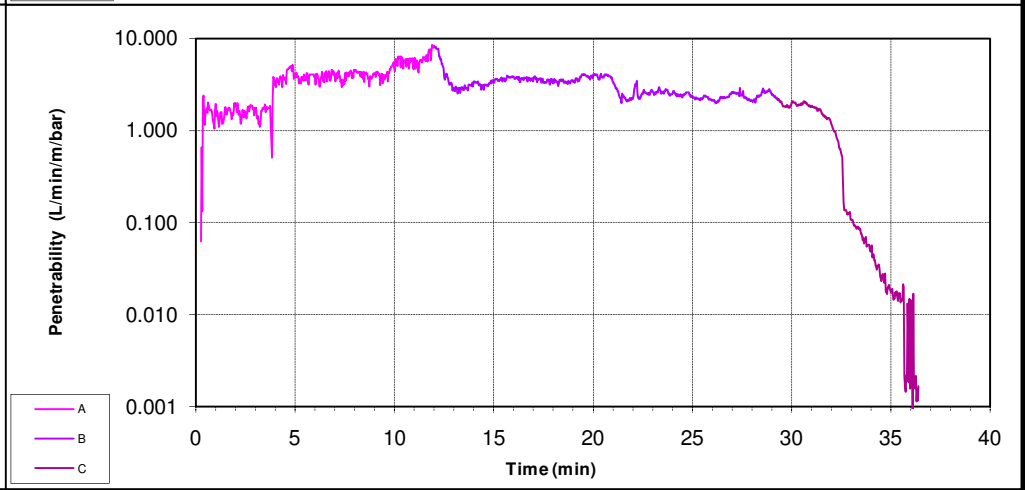
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	30-05-09	Hole ID:	60+475	Top Interval:	9.60	Mix Type:	A-C	Comments:
Grout Plant:	C-216	Starting Time:	11:20:40	Bottom Interval:	12.60	Pfinal (bar):	3.2	
Inj. Method:	Single packer	Finishing Time:	11:57:04	Interval Length:	3.00	Qfinal (L/min):	0.0	
Injection Type:	Rock	Total Time:	00:36:24	Stage:	3	Vtotal (L):	367.5	









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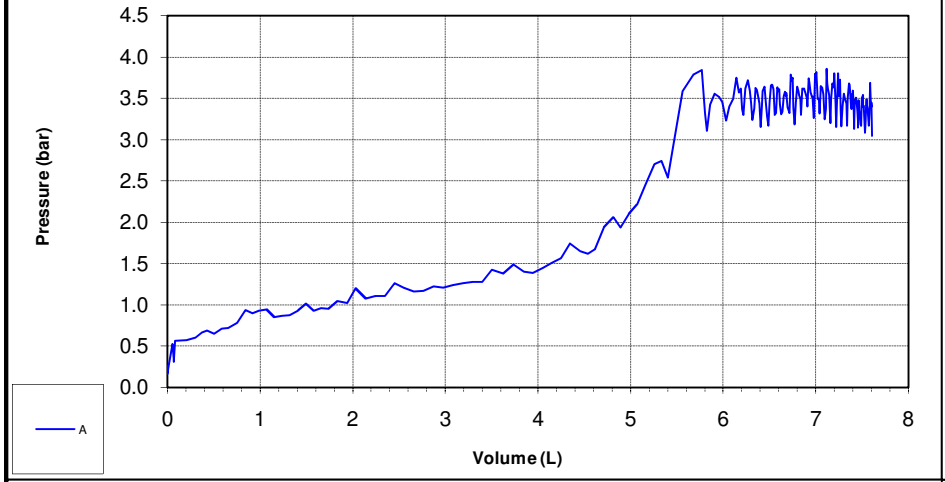
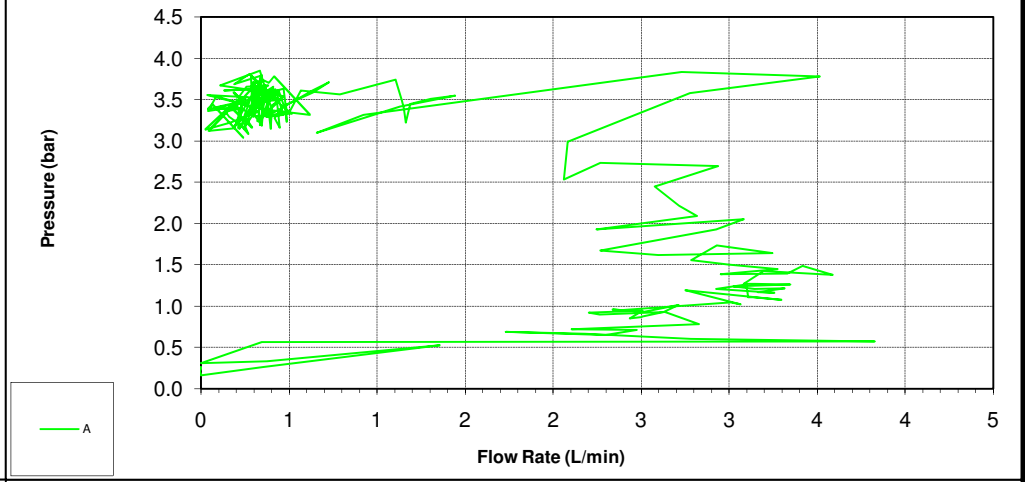
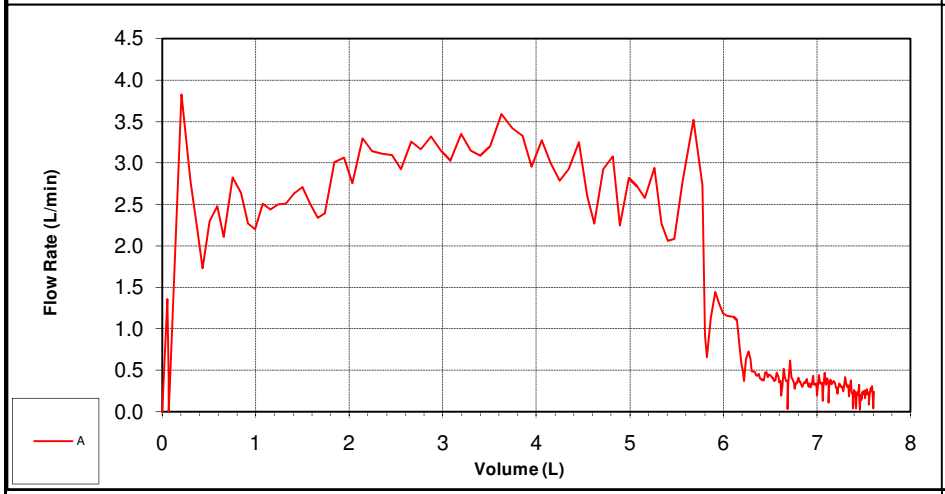
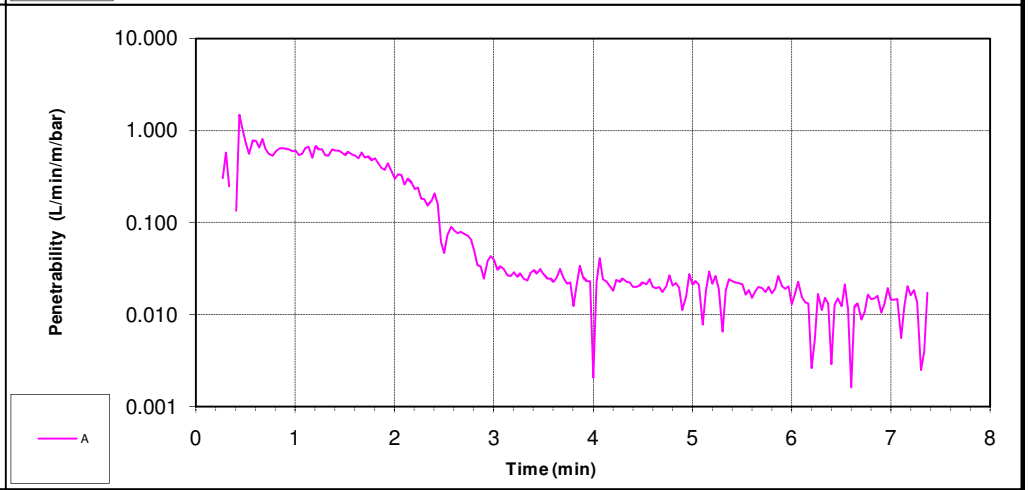
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	01-06-09	Hole ID:	60+478	Top Interval:	12.70	Mix Type:	A	Comments:
Grout Plant:	C-216	Starting Time:	07:15:52	Bottom Interval:	17.20	Pfinal (bar):	3.0	
Inj. Method:	Single packer	Finishing Time:	07:23:14	Interval Length:	4.50	Qfinal (L/min):	0.2	
Injection Type:	Rock	Total Time:	00:07:22	Stage:	2	Vtotal (L):	7.6	









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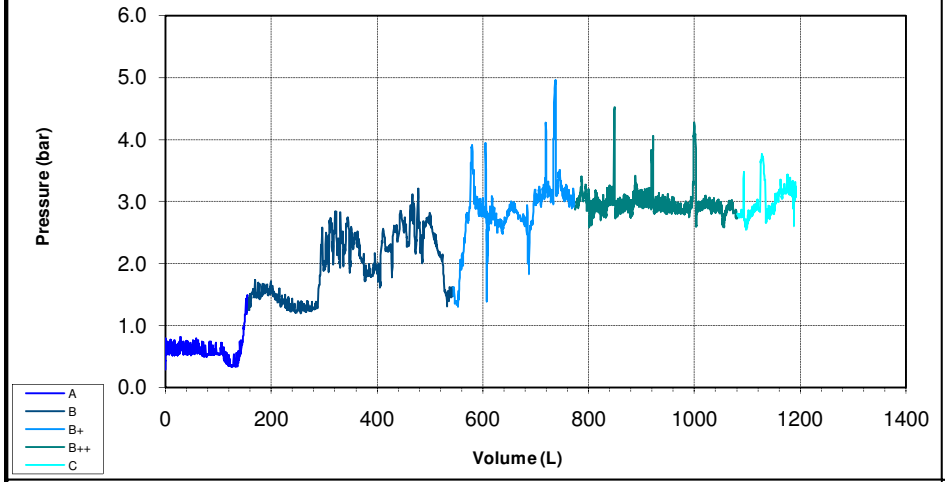
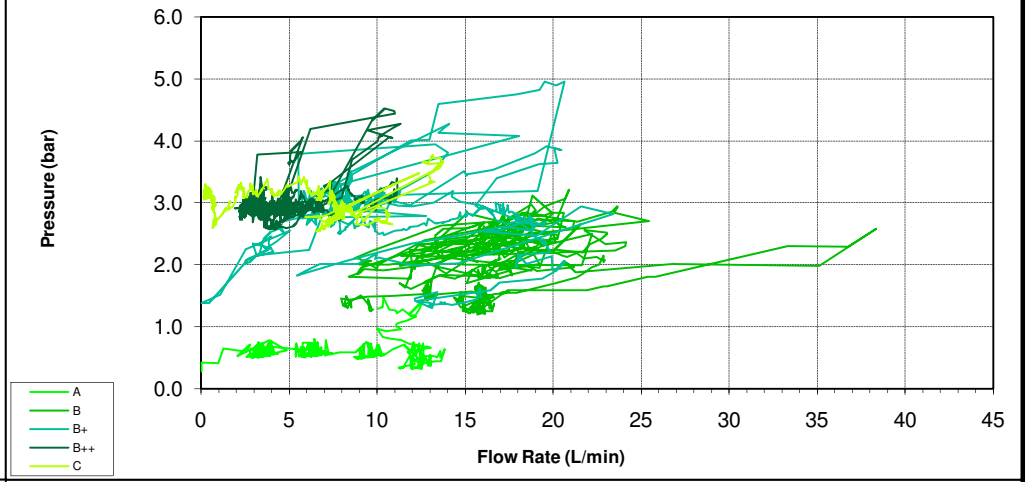
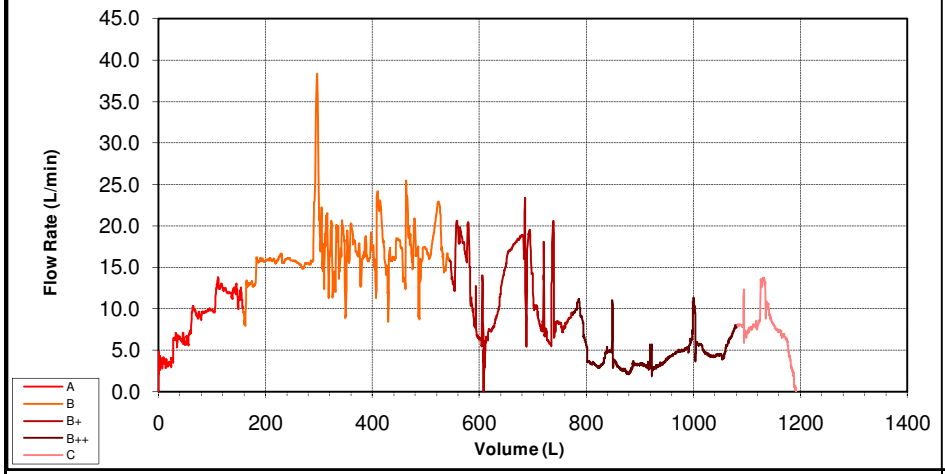
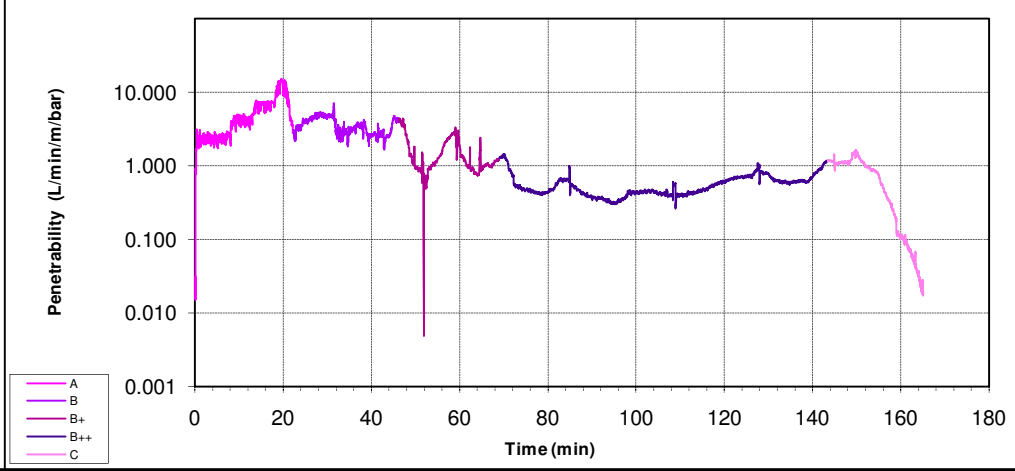
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	01-06-09	Hole ID:	60+478	Top Interval:	10.20	Mix Type:	A-C	Comments:
Grout Plant:	C-216	Starting Time:	08:30:04	Bottom Interval:	12.70	Pfinal (bar):	3.1	
Inj. Method:	Single packer	Finishing Time:	11:15:06	Interval Length:	2.50	Qfinal (L/min):	0.1	
Injection Type:	Rock	Total Time:	02:45:02	Stage:	3	Vtotal (L):	1191.0	









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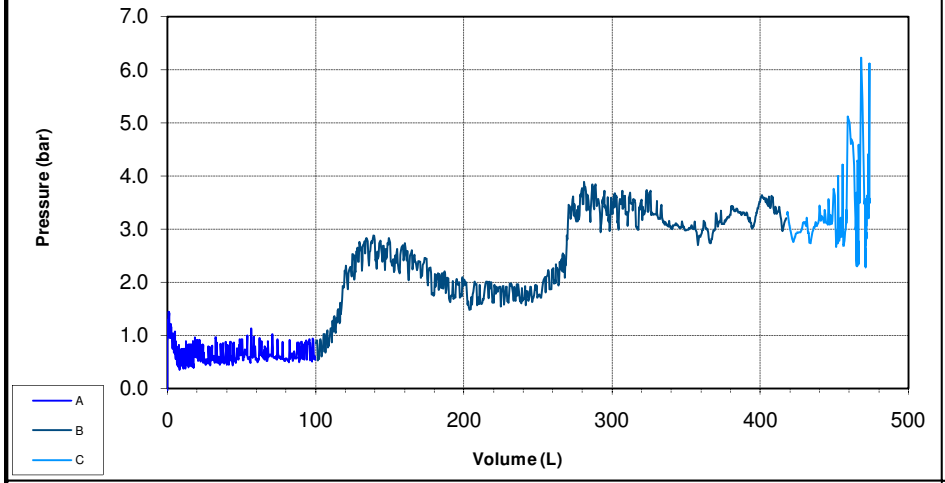
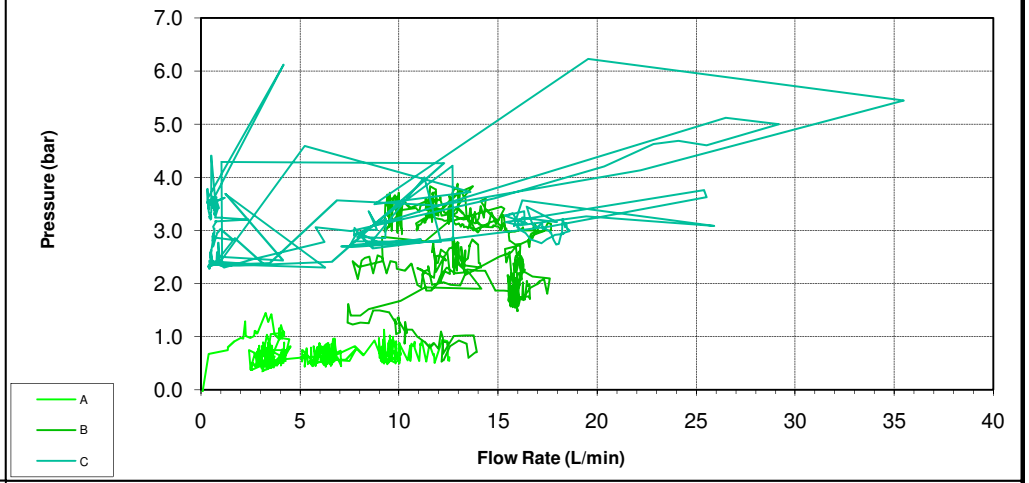
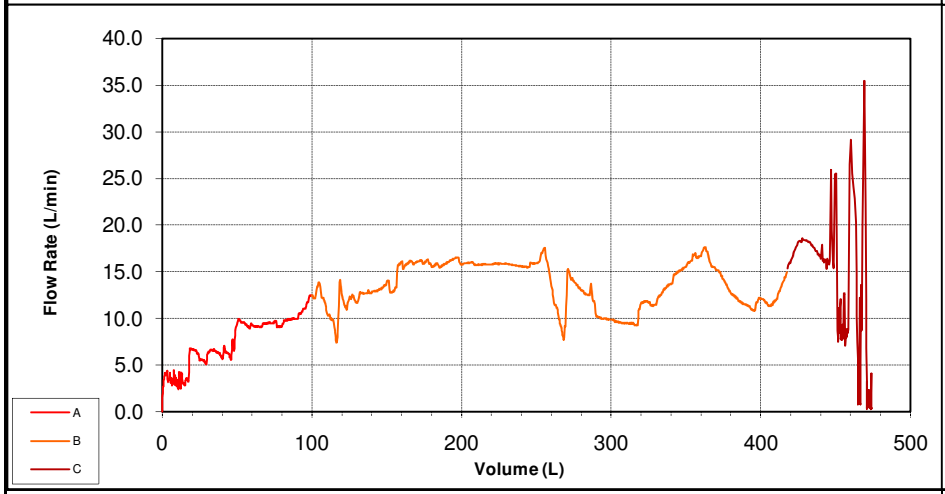
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

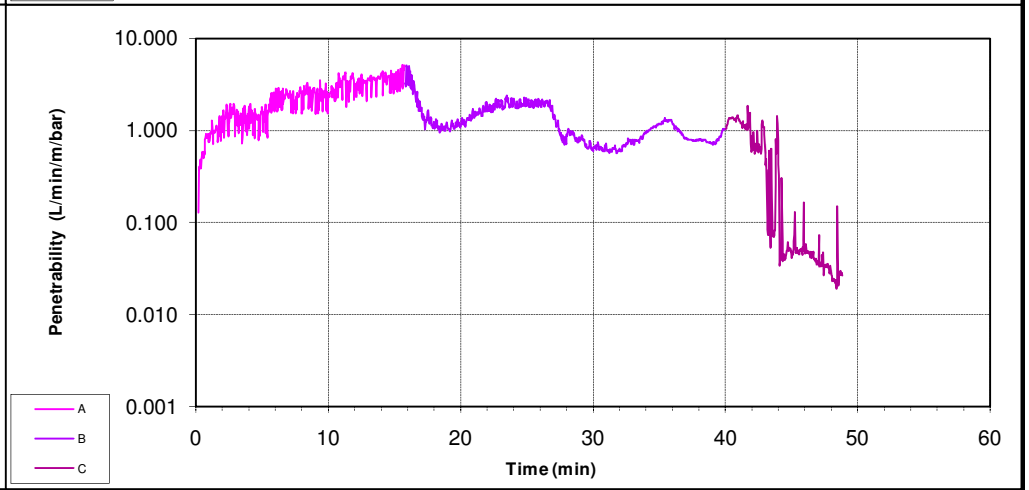
Title:	Injection Report - East Dike Contingency Grouting						
Date:	31-05-09	Hole ID:	60+481	Top Interval:	11.60	Mix Type:	A-C
Grout Plant:	C-216	Starting Time:	08:56:32	Bottom Interval:	16.10	Pfinal (bar):	3.5
Inj. Method:	Single packer	Finishing Time:	09:45:22	Interval Length:	4.50	Qfinal (L/min):	0.4
Injection Type:	Rock	Total Time:	00:48:50	Stage:	2	Vtotal (L):	473.8

Comments:









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MEADOWBANK GOLD PROJECT
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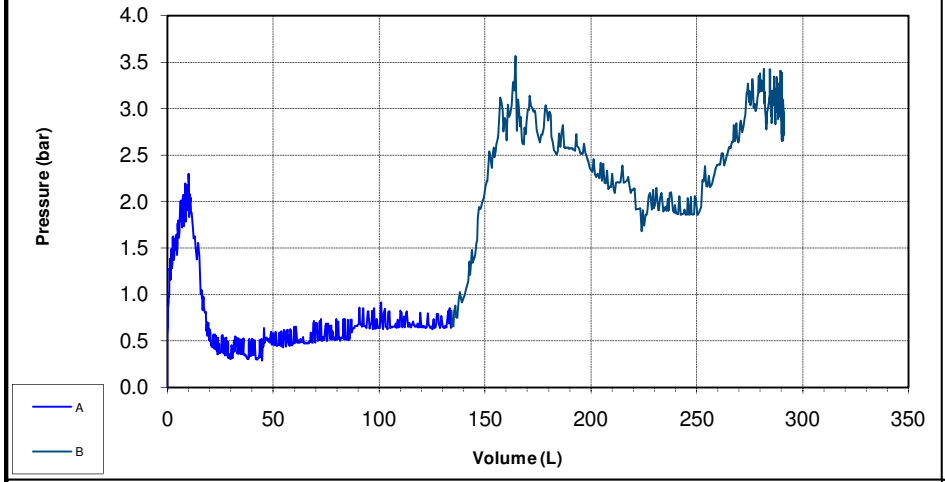
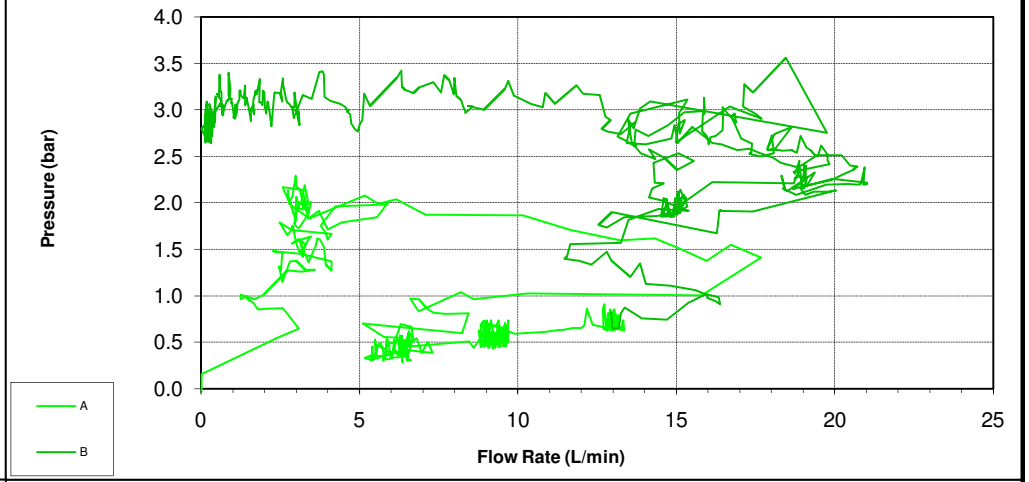
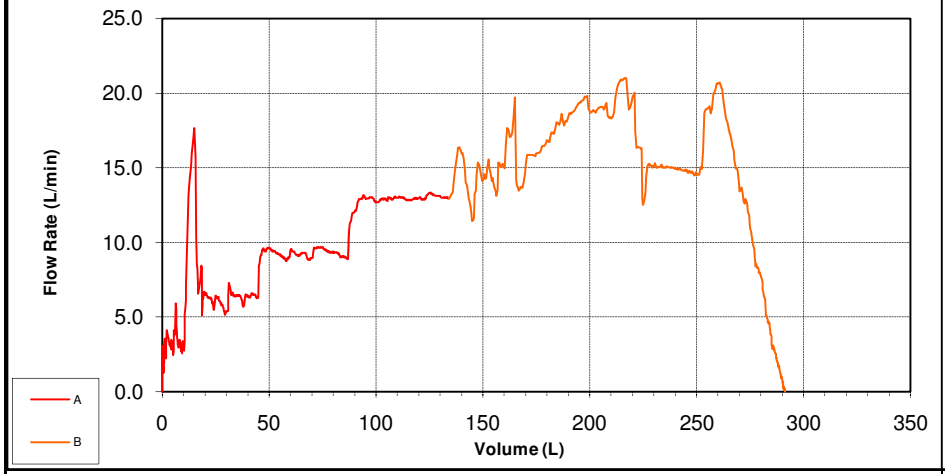
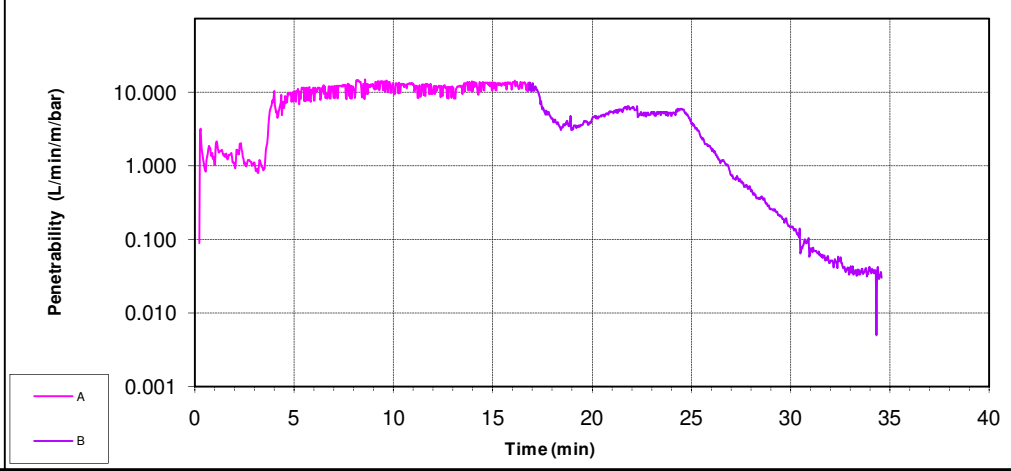
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	31-05-09	Hole ID:	60+481	Top Interval:	10.10	Mix Type:	A-B	Comments:
Grout Plant:	C-216	Starting Time:	11:20:34	Bottom Interval:	11.60	Pfinal (bar):	2.8	
Inj. Method:	Single packer	Finishing Time:	11:55:08	Interval Length:	1.50	Qfinal (L/min):	0.1	
Injection Type:	Rock	Total Time:	00:34:34	Stage:	3	Vtotal (L):	291.2	









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MEADOWBANK GOLD PROJECT
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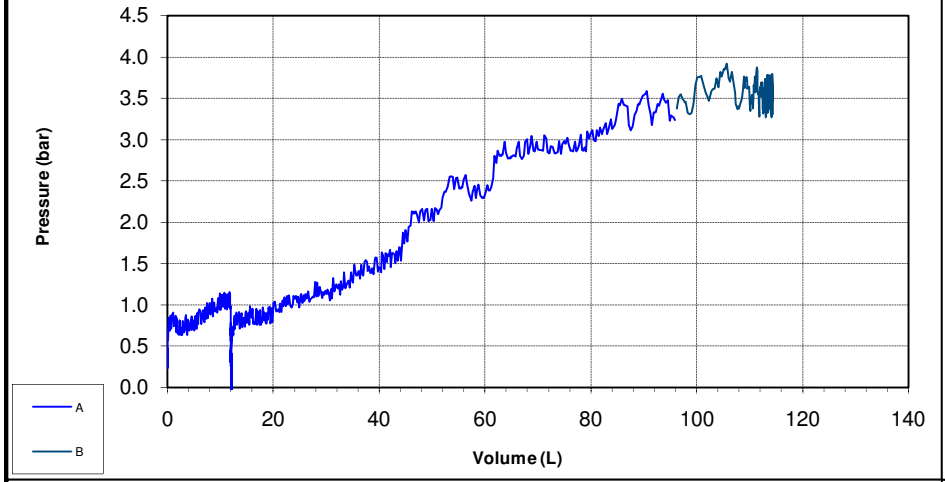
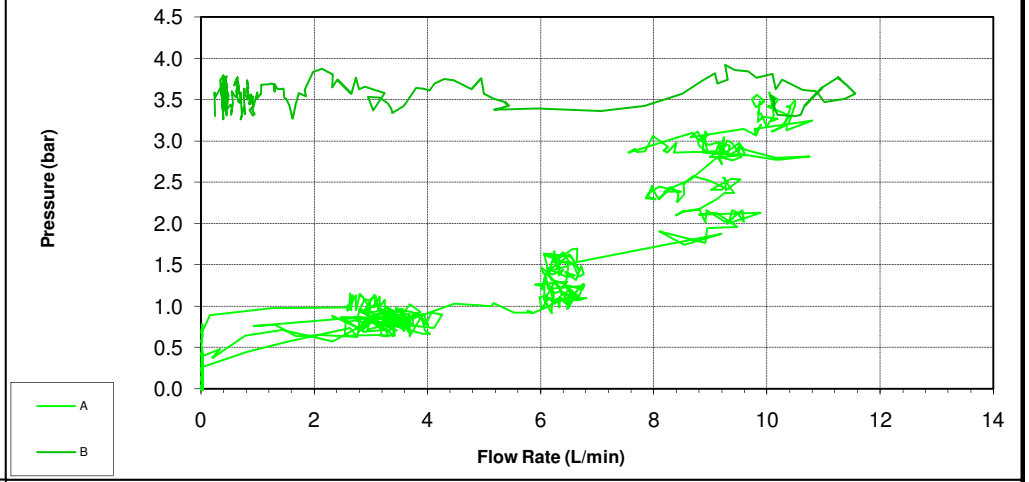
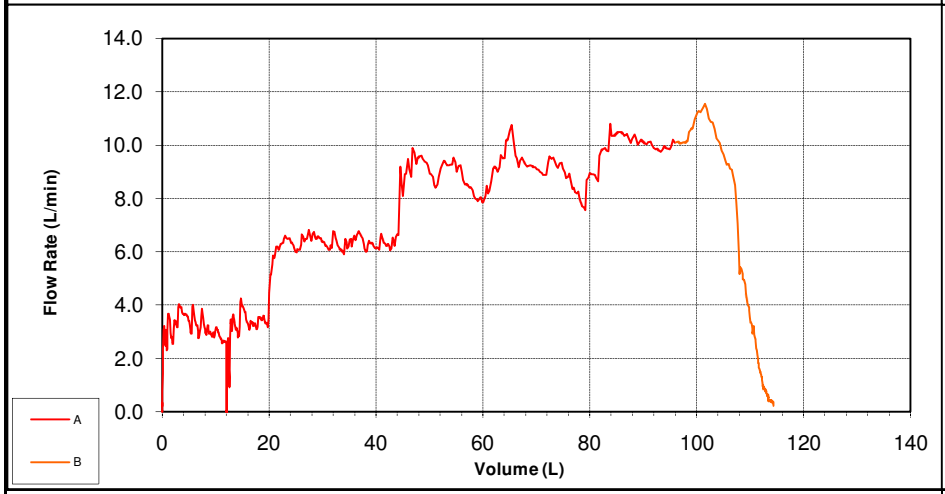
PROJECT No. 07-1413-0074		Phase/Task No. 2700/****	
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

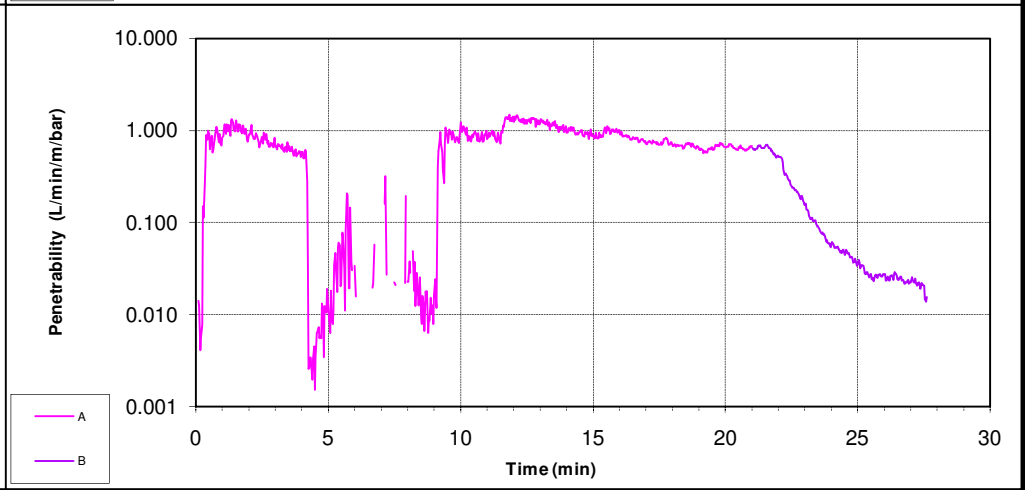
Title:	Injection Report - East Dike Contingency Grouting						
Date:	30-05-09	Hole ID:	60+484	Top Interval:	13.60	Mix Type:	A-B
Grout Plant:	C-216	Starting Time:	15:27:40	Bottom Interval:	18.20	Pfinal (bar):	3.3
Inj. Method:	Single packer	Finishing Time:	15:55:16	Interval Length:	4.60	Qfinal (L/min):	0.2
Injection Type:	Rock	Total Time:	00:27:36	Stage:	2	Vtotal (L):	114.4

Comments:









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MEADOWBANK GOLD PROJECT
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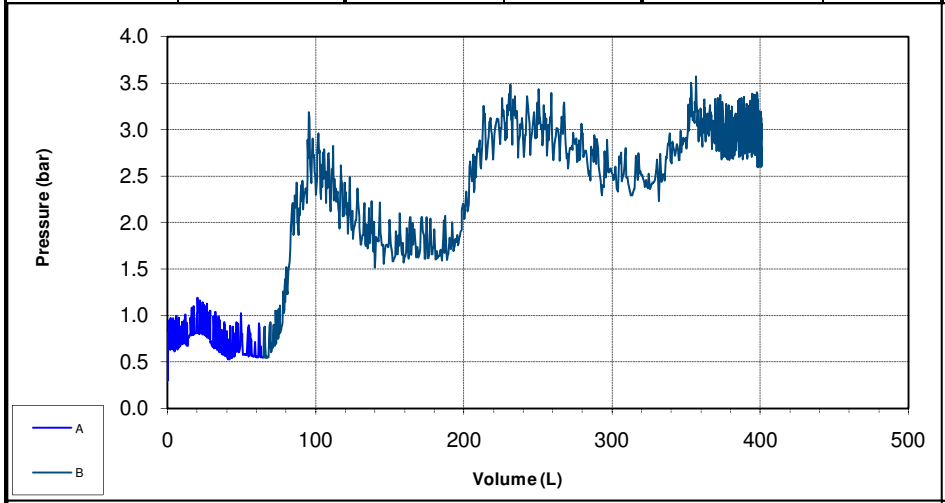
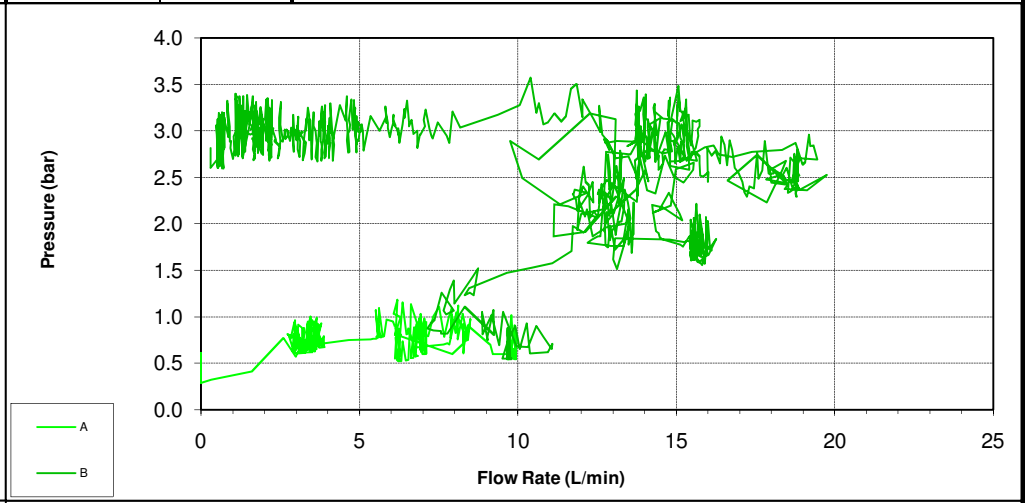
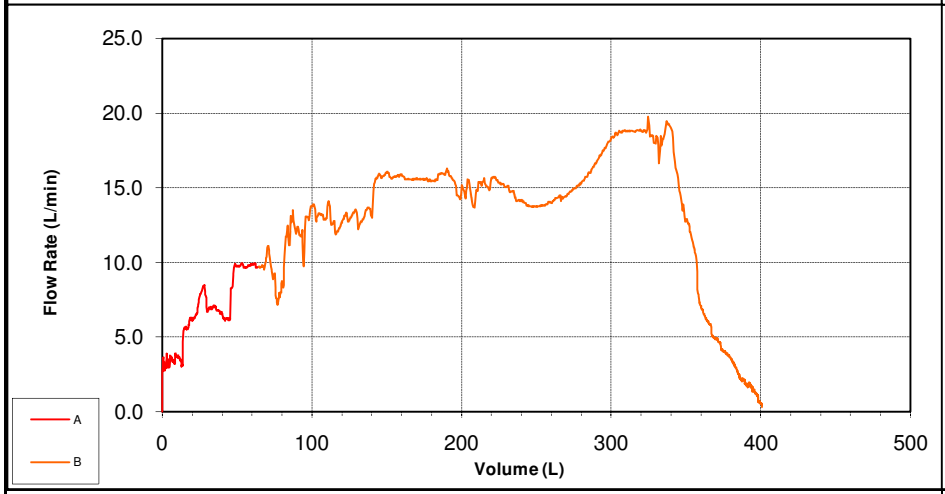
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

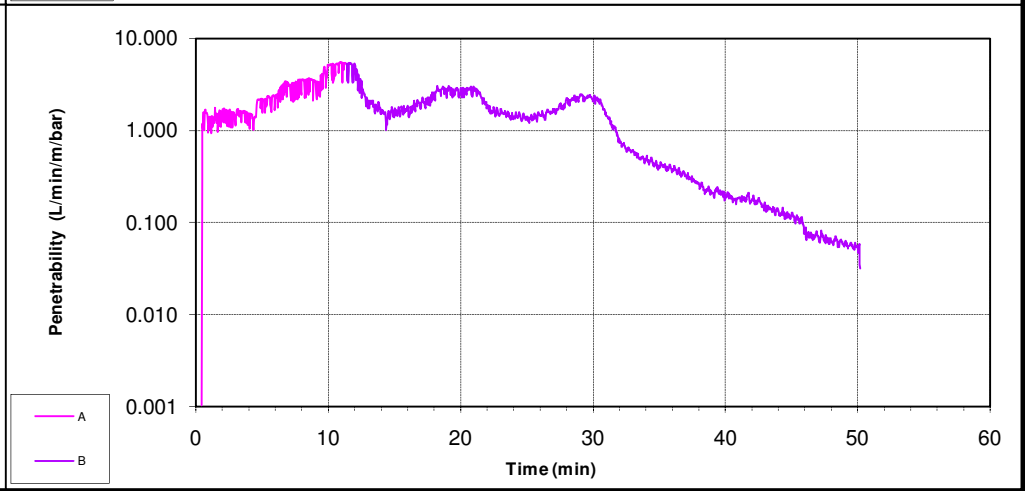
Title:	Injection Report - East Dike Contingency Grouting						
Date:	31-05-09	Hole ID:	60+484	Top Interval:	10.30	Mix Type:	A-B
Grout Plant:	C-216	Starting Time:	07:30:02	Bottom Interval:	13.60	Pfinal (bar):	2.8
Inj. Method:	Single packer	Finishing Time:	08:20:20	Interval Length:	3.30	Qfinal (L/min):	0.3
Injection Type:	Rock	Total Time:	00:50:18	Stage:	3	Vtotal (L):	400.8

Comments:









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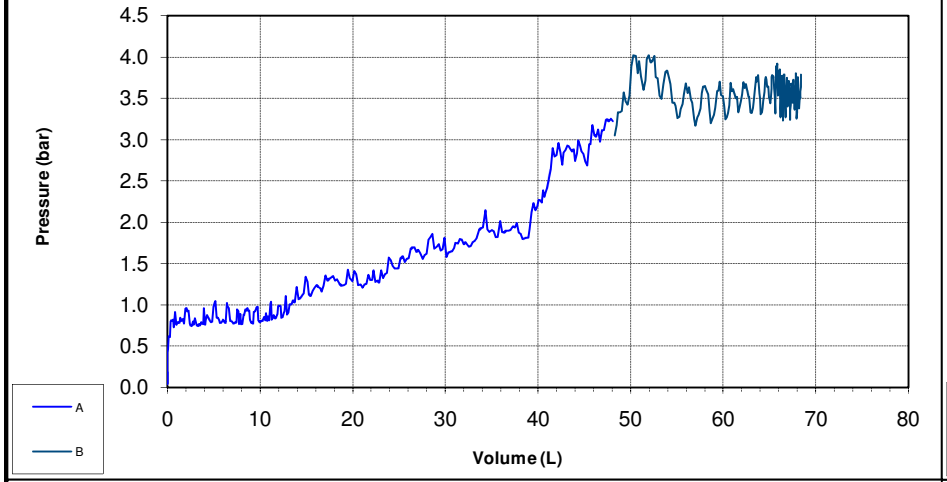
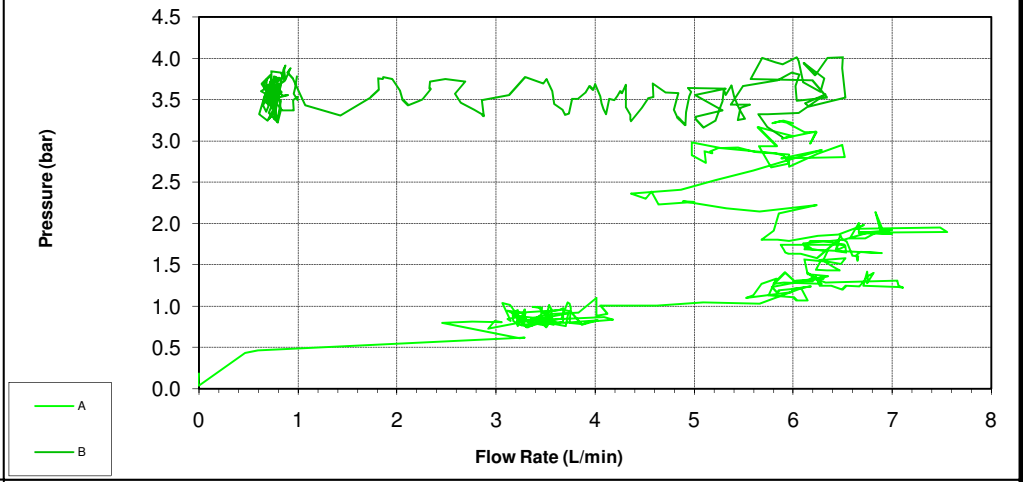
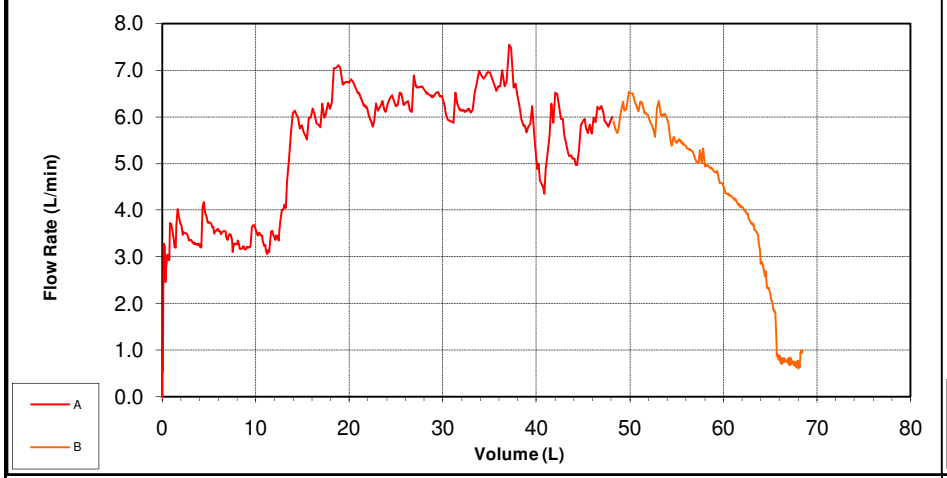
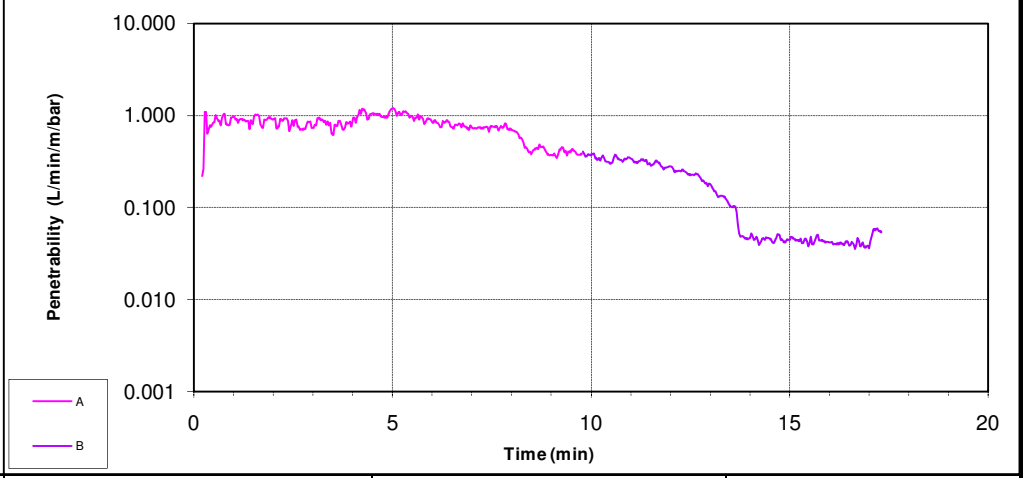
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	30-05-09	Hole ID:	60+487	Top Interval:	12.60	Mix Type:	A-B	Comments:
Grout Plant:	C-216	Starting Time:	14:40:08	Bottom Interval:	17.40	Pfinal (bar):	3.8	
Inj. Method:	Single packer	Finishing Time:	14:57:26	Interval Length:	4.80	Qfinal (L/min):	1.0	
Injection Type:	Rock	Total Time:	00:17:18	Stage:	2	Vtotal (L):	68.4	









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AGNICO EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
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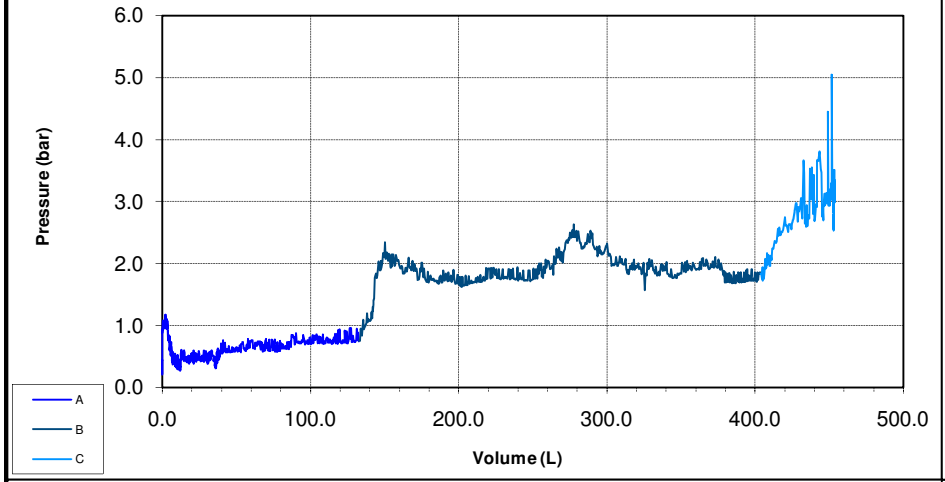
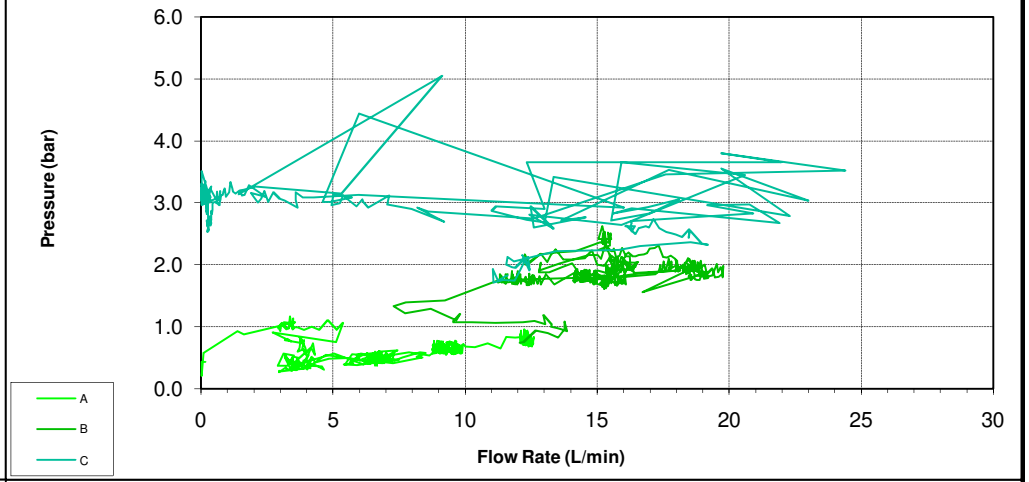
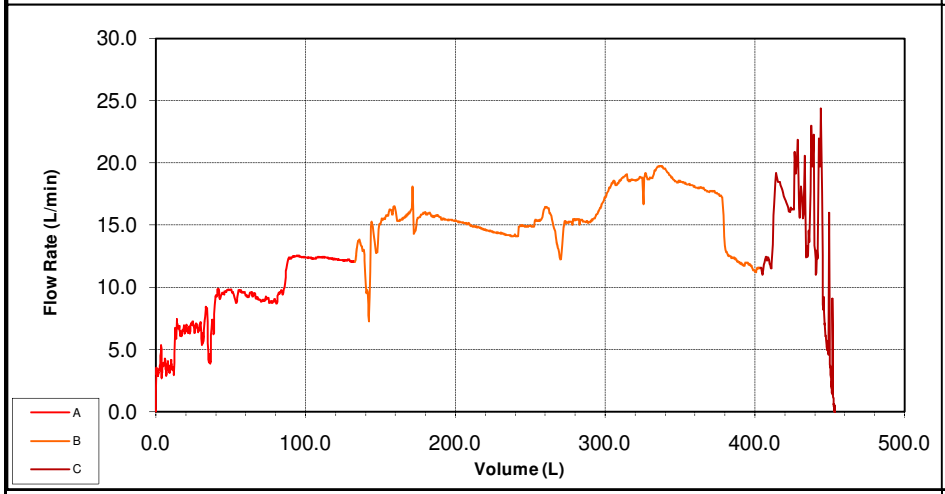
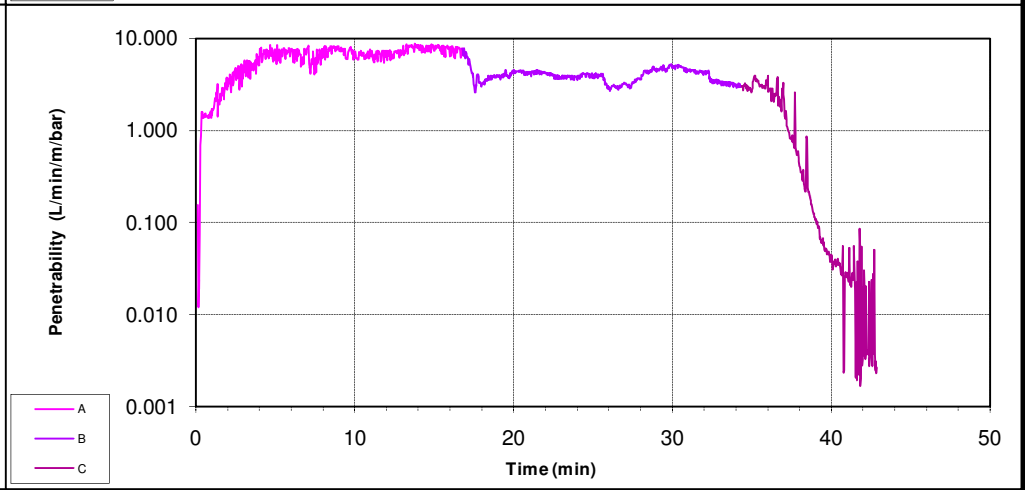
PROJECT No. 07-1413-0074		Phase/Task No. 2700/****	
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	30-05-09	Hole ID:	60+487	Top Interval:	10.50	Mix Type:	A-C	Comments:
Grout Plant:	C-216	Starting Time:	16:14:12	Bottom Interval:	12.60	Pfinal (bar):	3.2	
Inj. Method:	Single packer	Finishing Time:	16:57:04	Interval Length:	2.10	Qfinal (L/min):	0.0	
Injection Type:	Rock	Total Time:	00:42:52	Stage:	3	Vtotal (L):	453.7	









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MEADOWBANK GOLD PROJECT
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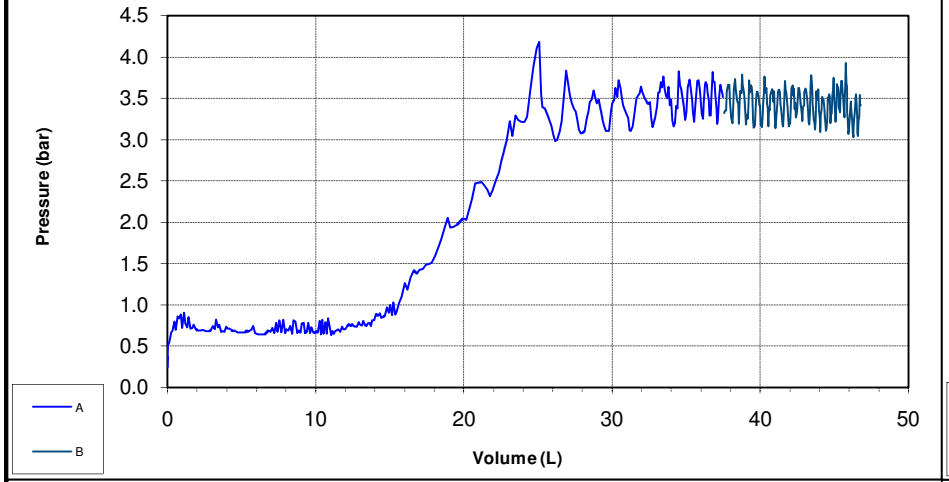
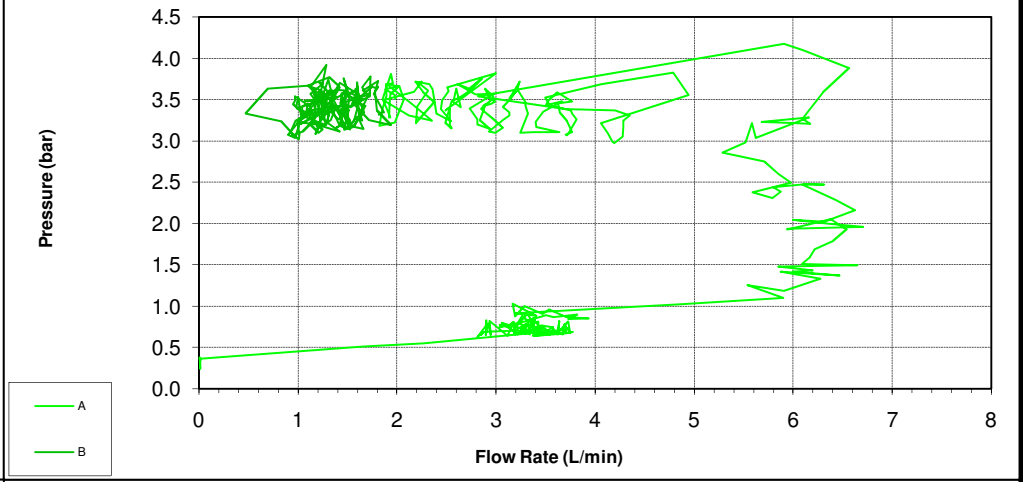
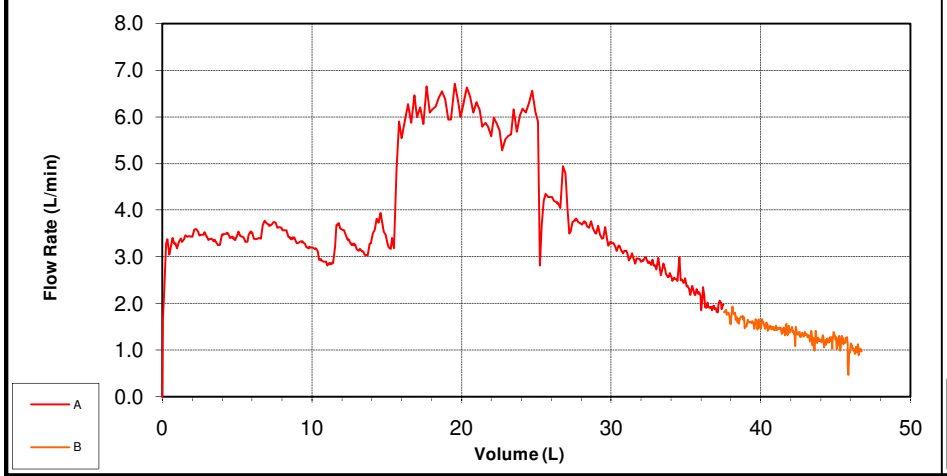
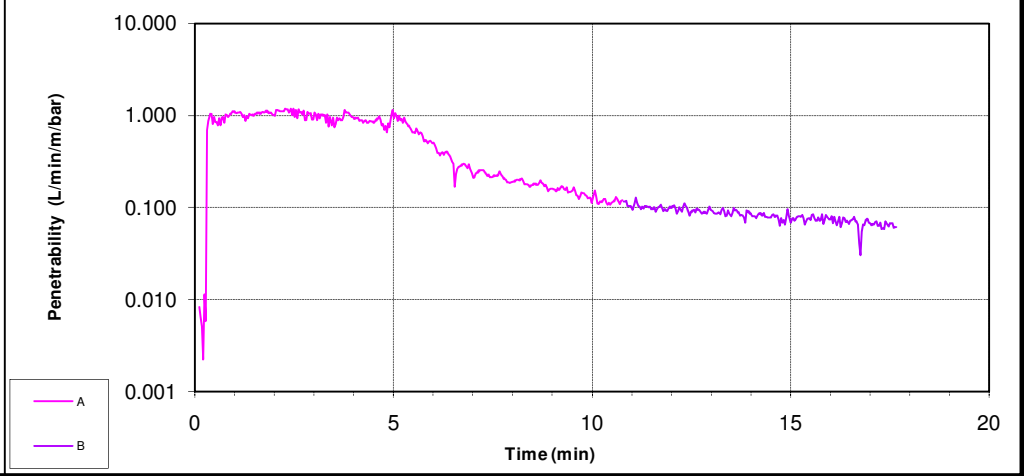
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	01-06-09	Hole ID:	60+491	Top Interval:	12.50	Mix Type:	A-B	Comments:
Grout Plant:	C-216	Starting Time:	07:54:46	Bottom Interval:	17.20	Pfinal (bar):	3.4	
Inj. Method:	Single packer	Finishing Time:	08:12:26	Interval Length:	4.70	Qfinal (L/min):	1.0	
Injection Type:	Rock	Total Time:	00:17:40	Stage:	2	Vtotal (L):	46.8	









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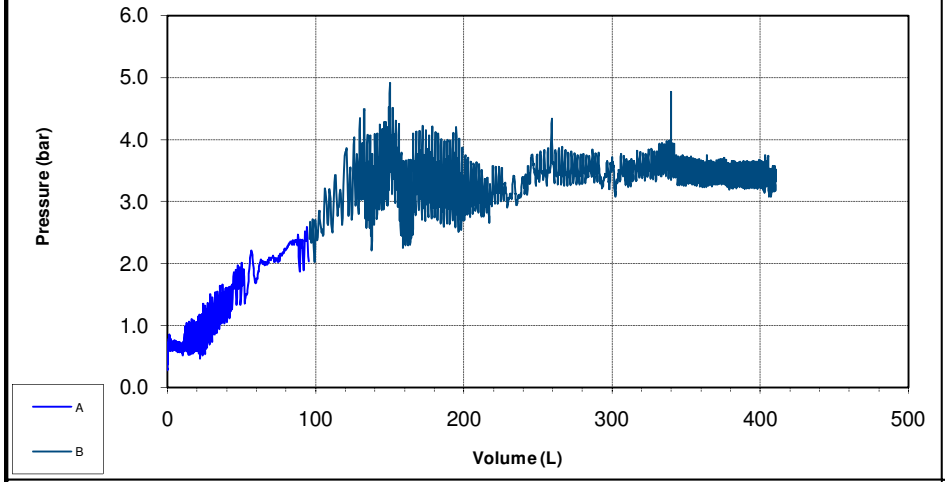
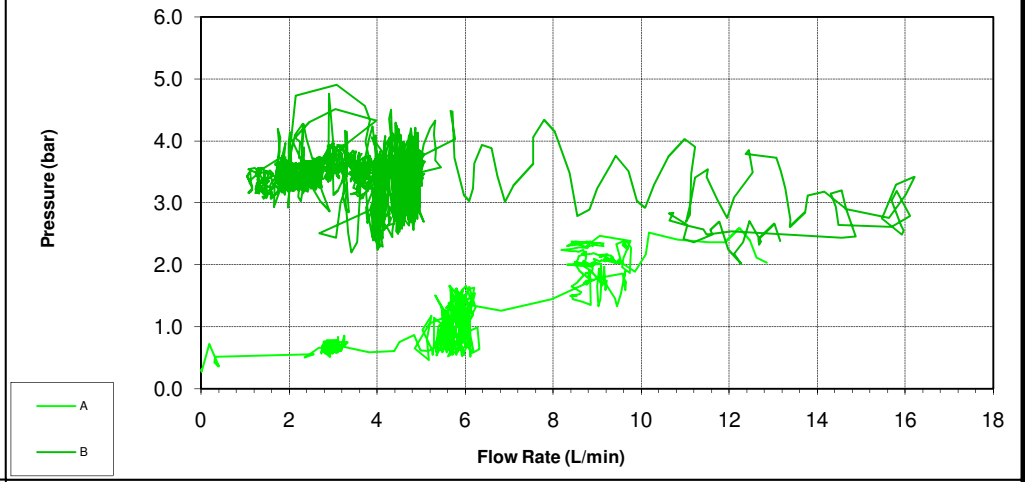
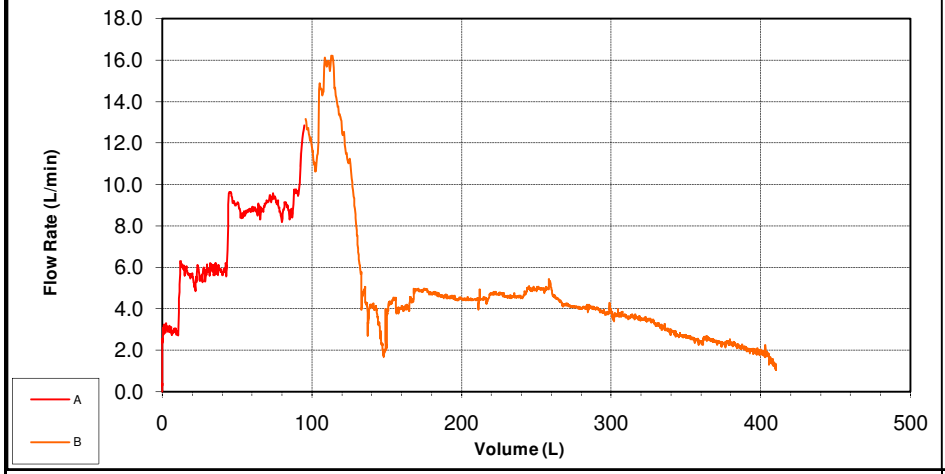
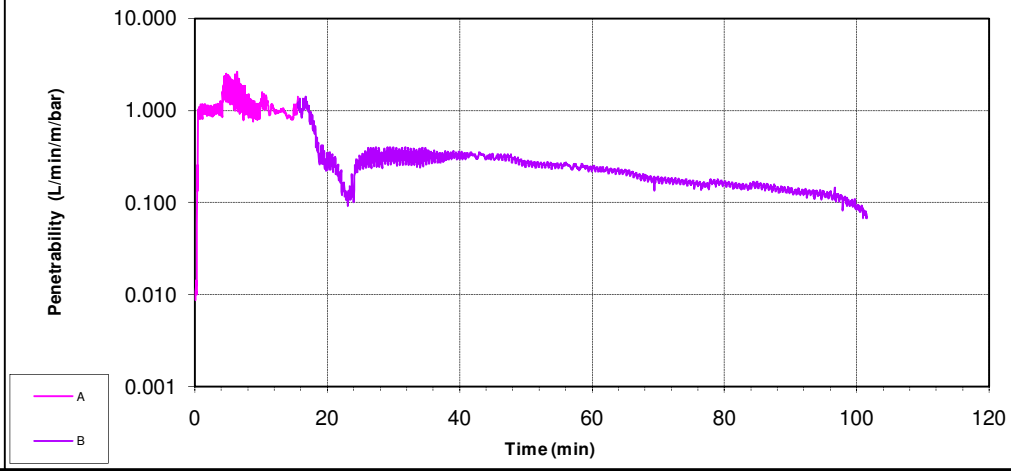
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	01-06-09	Hole ID:	60+493	Top Interval:	12.20	Mix Type:	A-B	Comments:
Grout Plant:	C-216	Starting Time:	13:45:48	Bottom Interval:	16.70	Pfinal (bar):	3.5	
Inj. Method:	Single packer	Finishing Time:	15:27:12	Interval Length:	4.50	Qfinal (L/min):	1.1	
Injection Type:	Rock	Total Time:	01:41:24	Stage:	2	Vtotal (L):	410.3	









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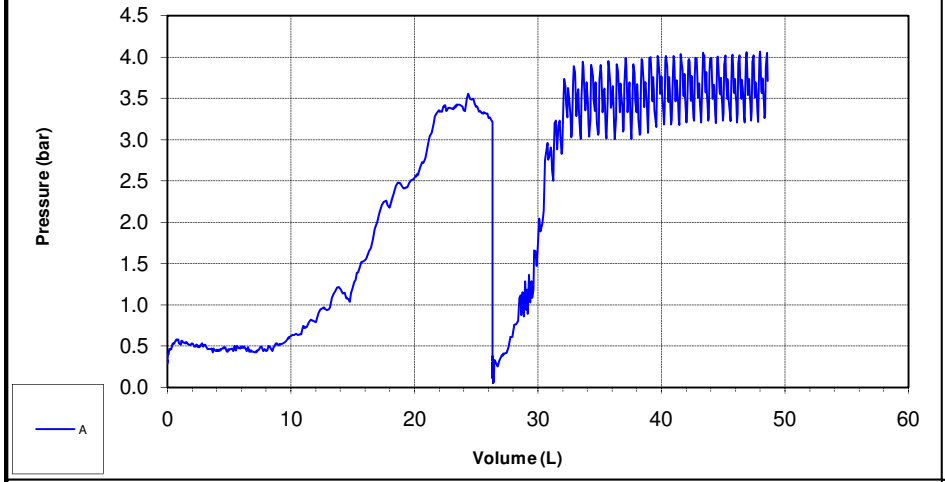
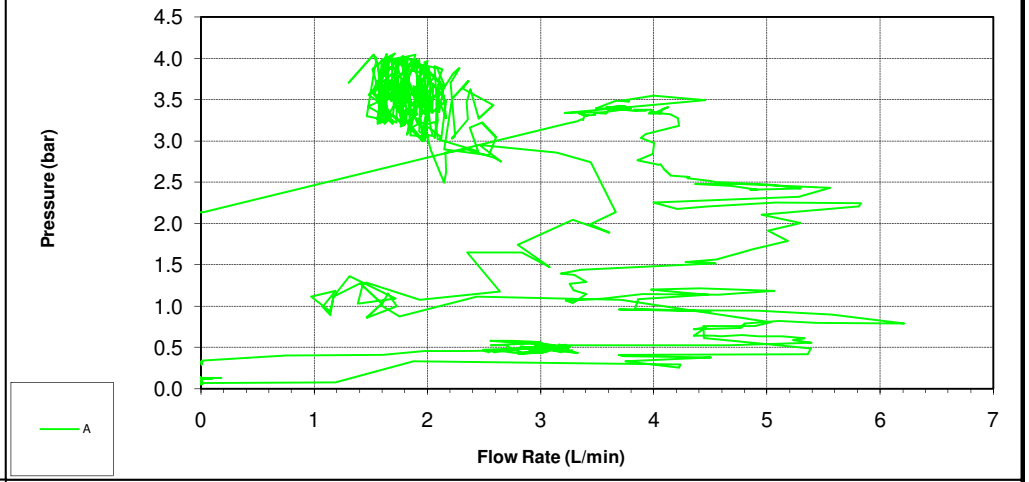
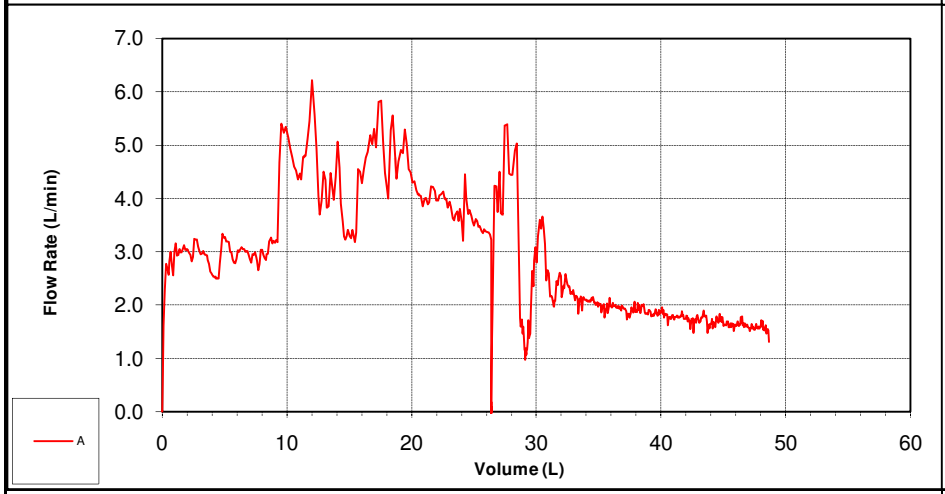
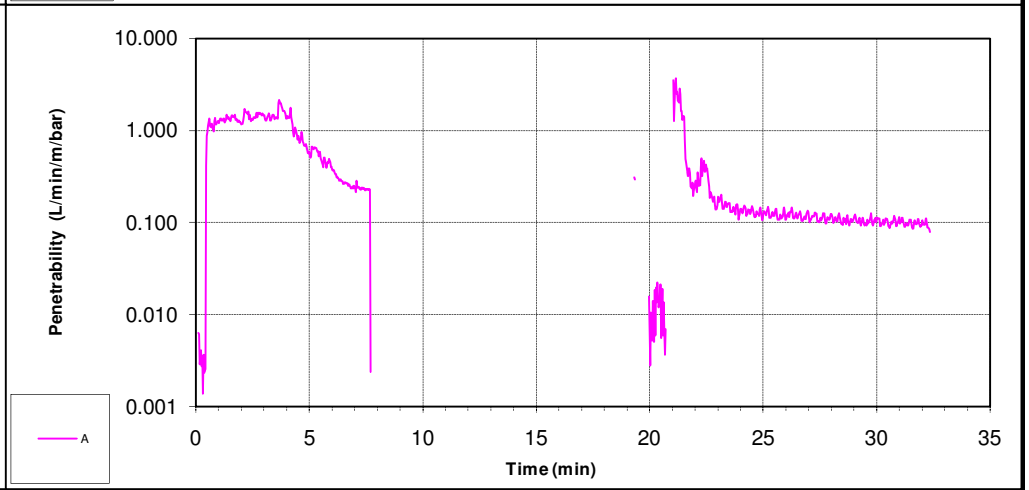
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	01-06-09	Hole ID:	60+496	Top Interval:	13.00	Mix Type:	A	Comments:
Grout Plant:	C-216	Starting Time:	12:57:52	Bottom Interval:	17.50	Pfinal (bar):	3.7	
Inj. Method:	Single packer	Finishing Time:	13:30:12	Interval Length:	4.50	Qfinal (L/min):	1.3	
Injection Type:	Rock	Total Time:	00:32:20	Stage:	2	Vtotal (L):	48.6	









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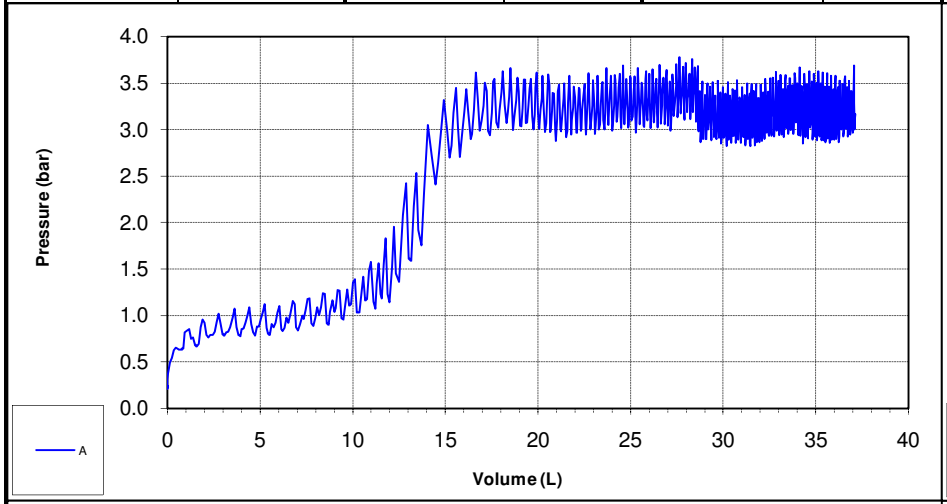
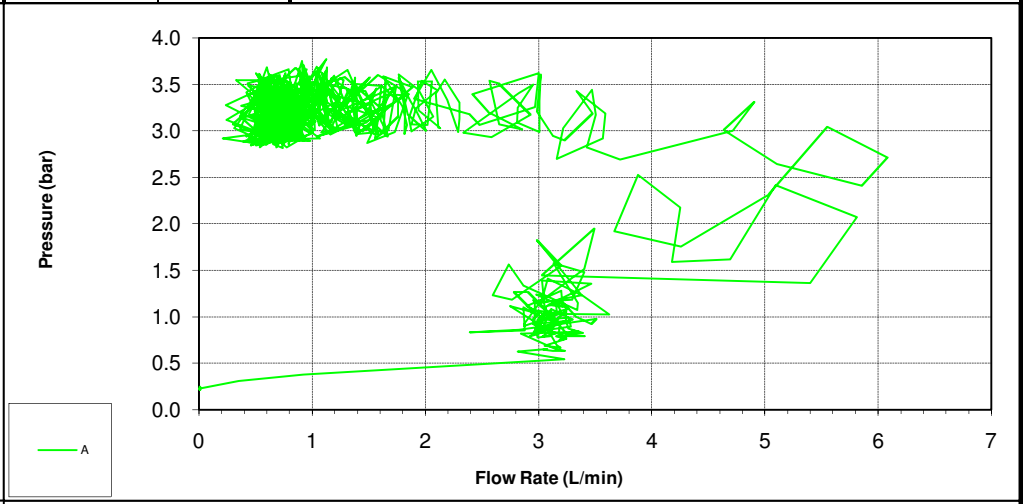
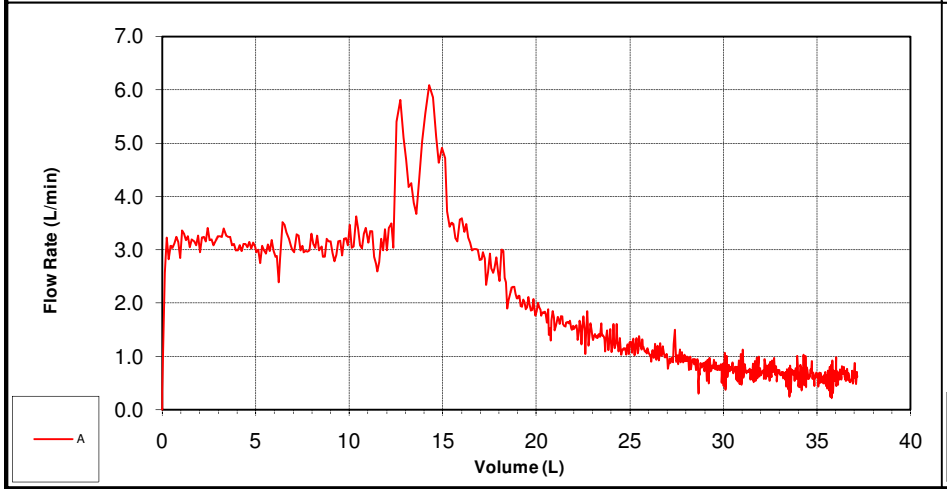
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

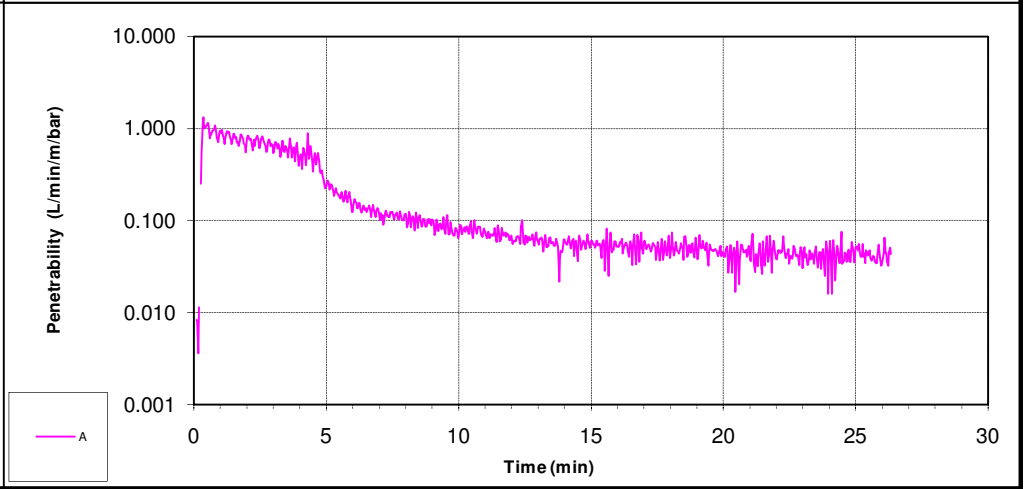
Title:	Injection Report - East Dike Contingency Grouting						
Date:	31-05-09	Hole ID:	60+499	Top Interval:	12.50	Mix Type:	A
Grout Plant:	C-216	Starting Time:	15:13:24	Bottom Interval:	17.00	Pfinal (bar):	3.2
Inj. Method:	Single packer	Finishing Time:	15:39:44	Interval Length:	4.50	Qfinal (L/min):	0.6
Injection Type:	Rock	Total Time:	00:26:20	Stage:	2	Vtotal (L):	37.1

Comments:









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MEADOWBANK GOLD PROJECT
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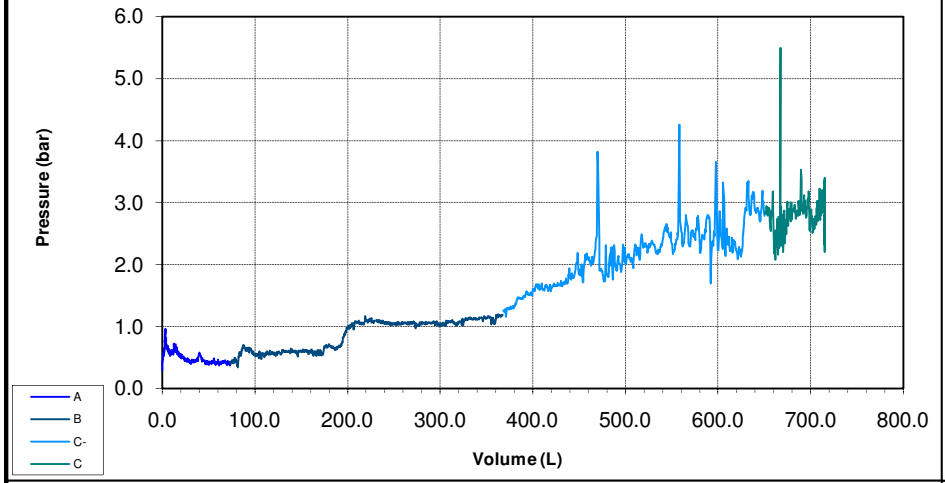
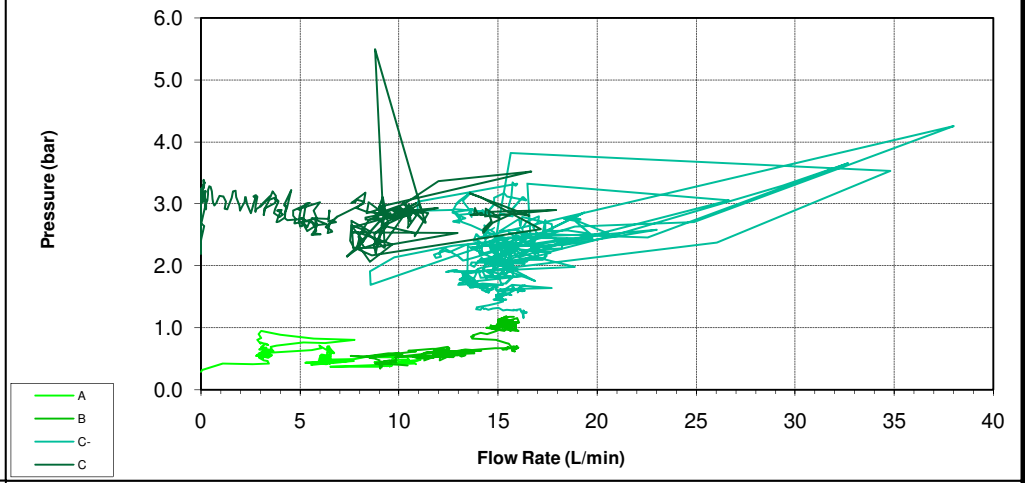
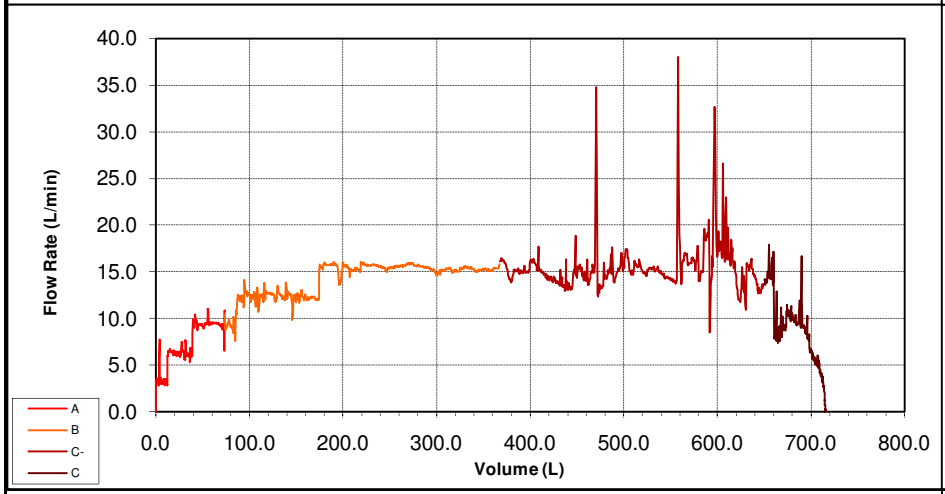
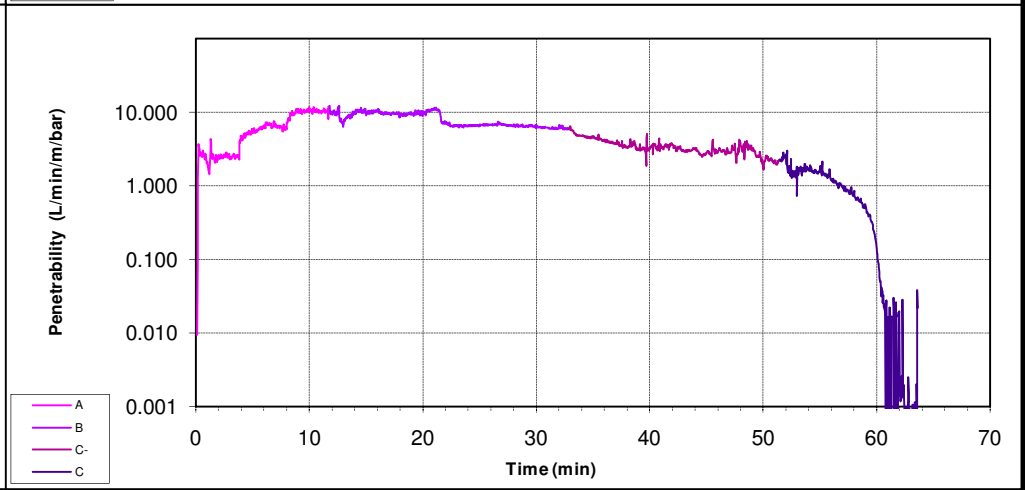
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	01-06-09	Hole ID:	60+499	Top Interval:	10.30	Mix Type:	A-C	Comments:
Grout Plant:	C-216	Starting Time:	09:06:38	Bottom Interval:	12.50	Pfinal (bar):	3.1	
Inj. Method:	Single packer	Finishing Time:	10:10:16	Interval Length:	2.20	Qfinal (L/min):	0.2	
Injection Type:	Rock	Total Time:	01:03:38	Stage:	3	Vtotal (L):	715.1	









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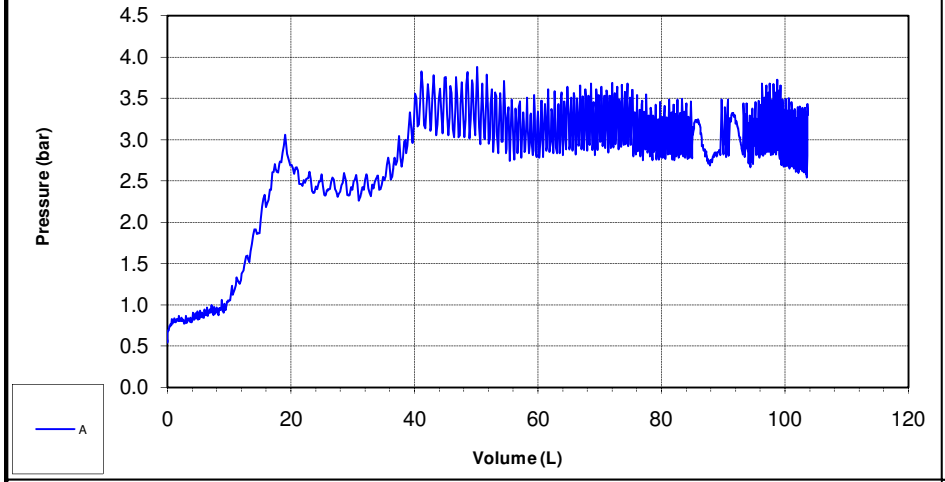
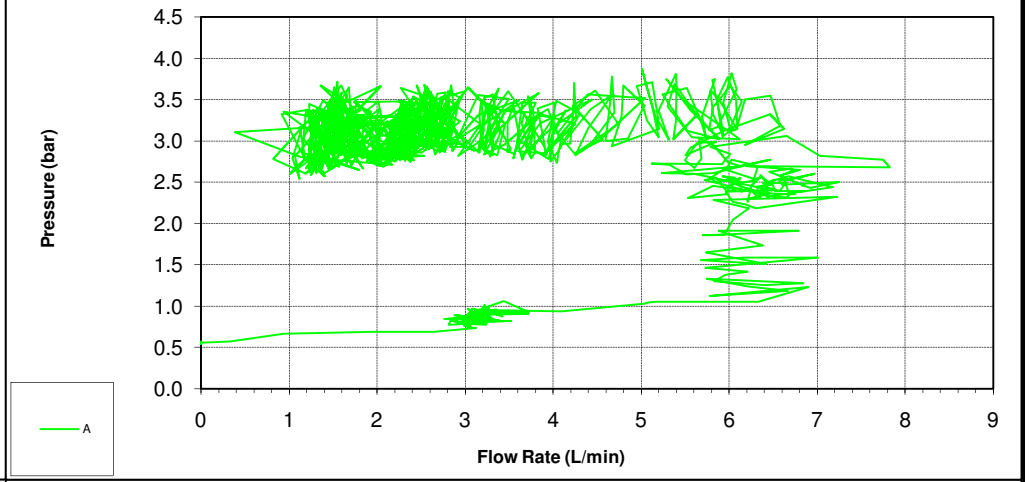
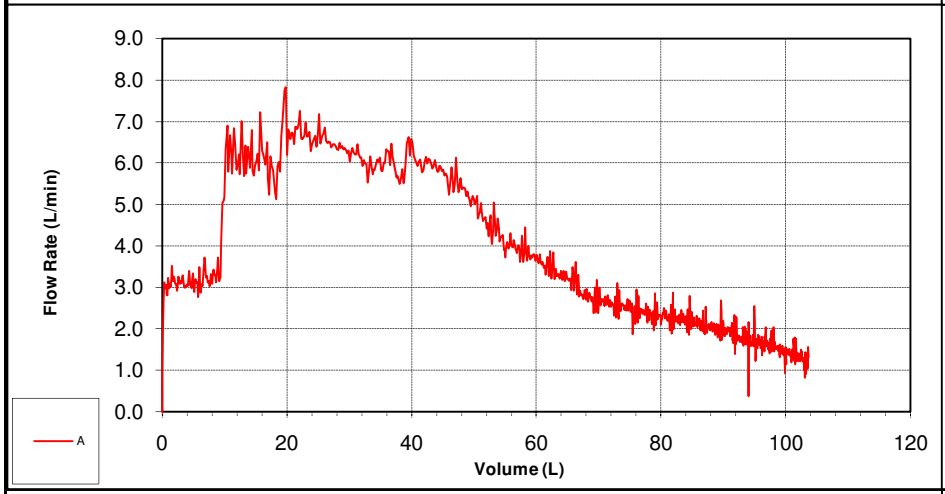
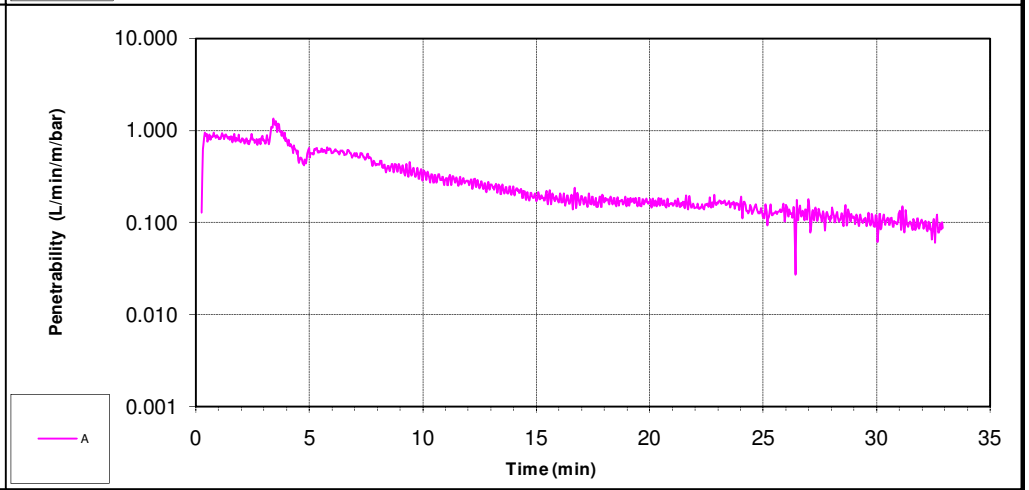
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	31-05-09	Hole ID:	60+502	Top Interval:	12.10	Mix Type:	A	Comments:
Grout Plant:	C-216	Starting Time:	14:27:26	Bottom Interval:	16.60	Pfinal (bar):	3.3	
Inj. Method:	Single packer	Finishing Time:	15:00:20	Interval Length:	4.50	Qfinal (L/min):	1.3	
Injection Type:	Rock	Total Time:	00:32:54	Stage:	2	Vtotal (L):	103.7	









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MEADOWBANK GOLD PROJECT
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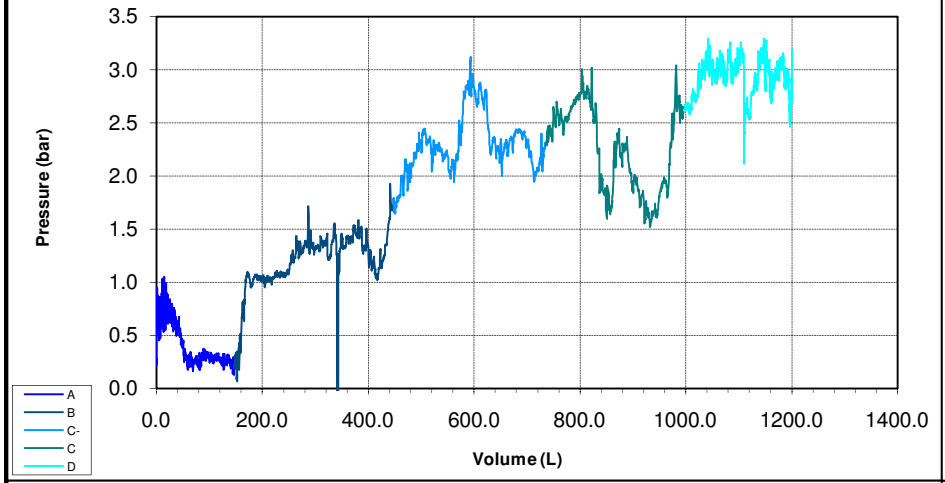
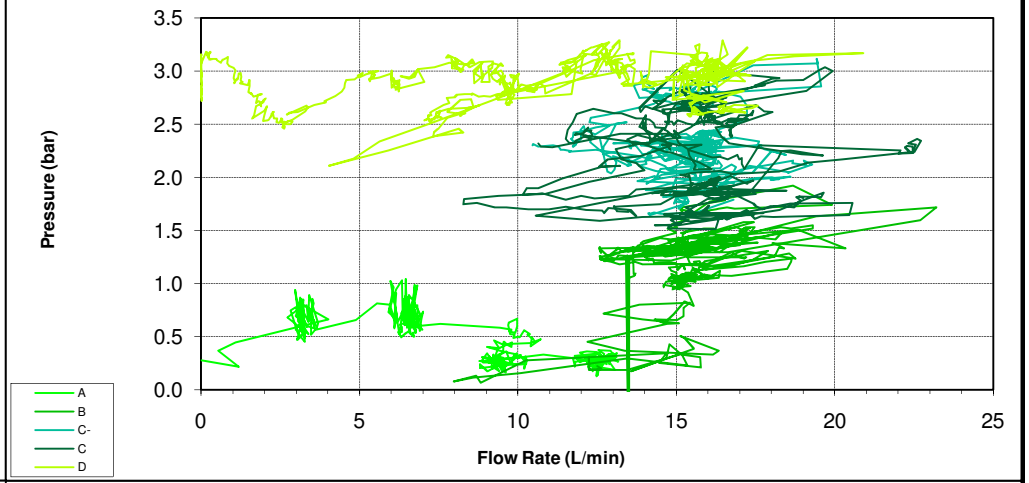
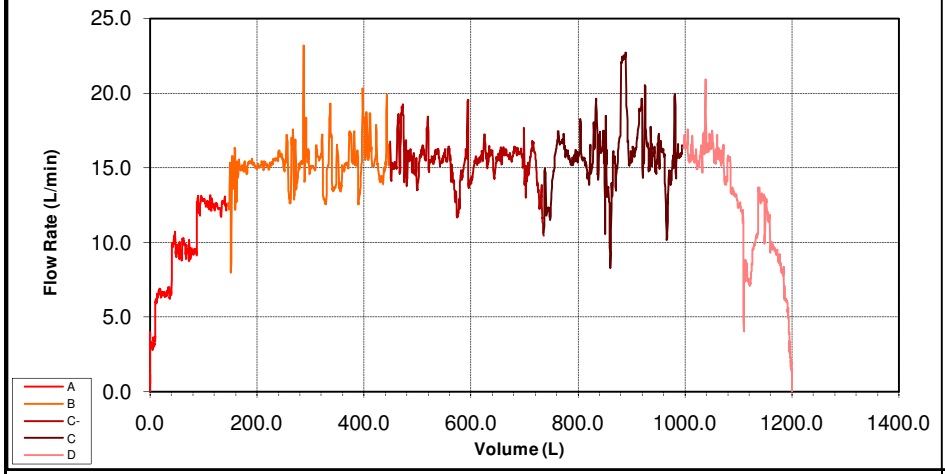
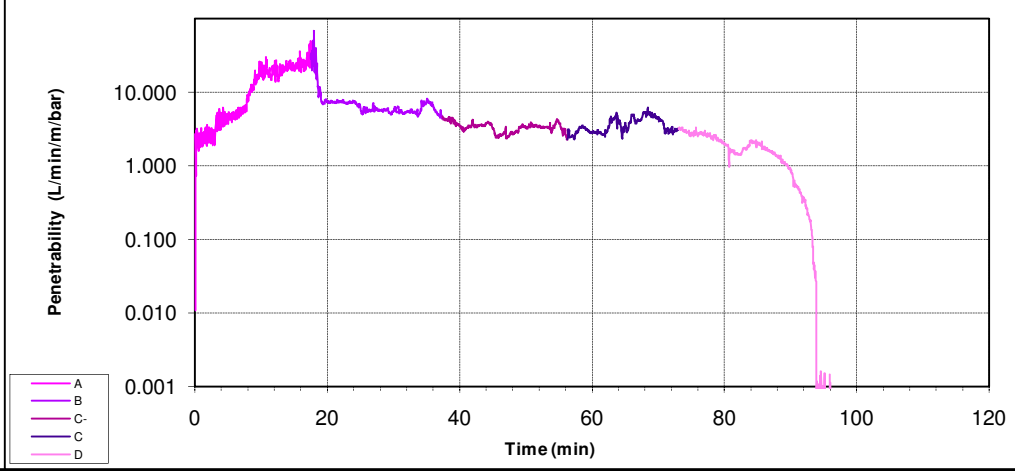
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	31-05-09	Hole ID:	60+502	Top Interval:	10.10	Mix Type:	A-D	Comments:
Grout Plant:	C-216	Starting Time:	15:50:52	Bottom Interval:	12.10	Pfinal (bar):	3.0	
Inj. Method:	Single packer	Finishing Time:	17:26:50	Interval Length:	2.00	Qfinal (L/min):	0.0	
Injection Type:	Rock	Total Time:	01:35:58	Stage:	3	Vtotal (L):	1201.0	









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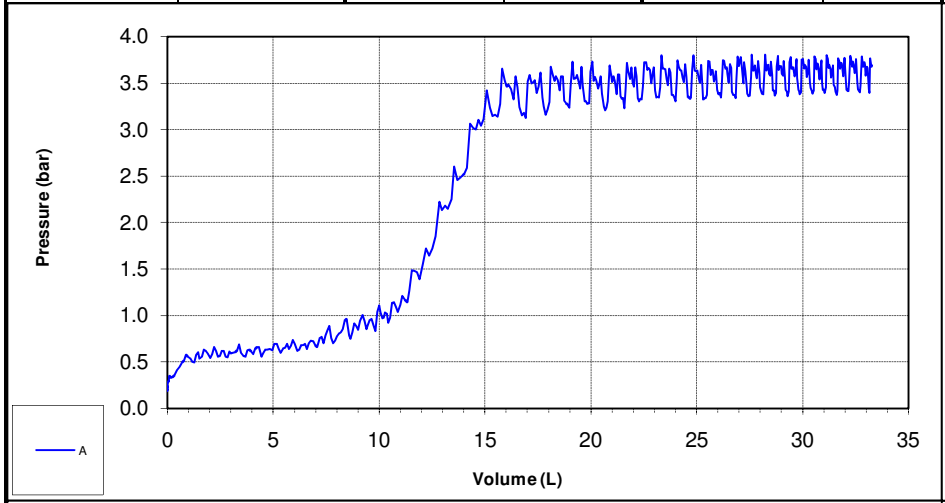
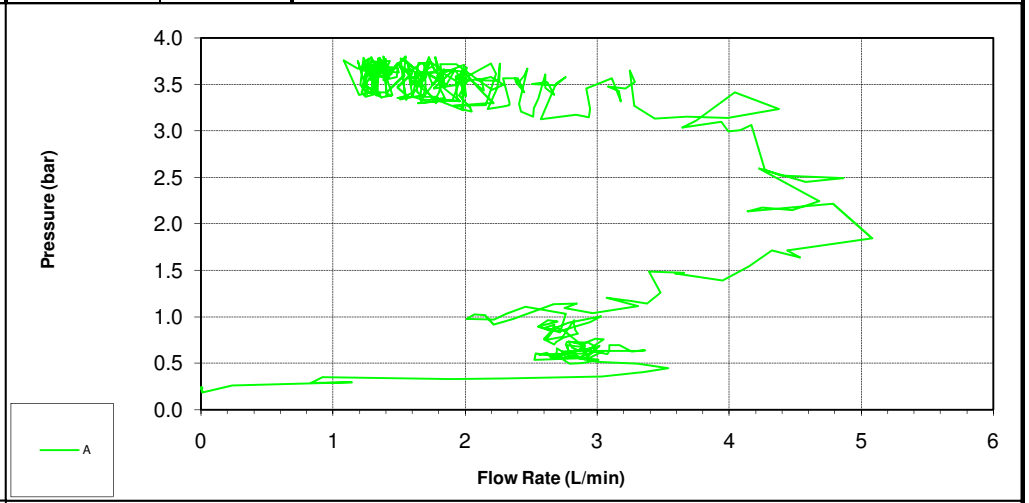
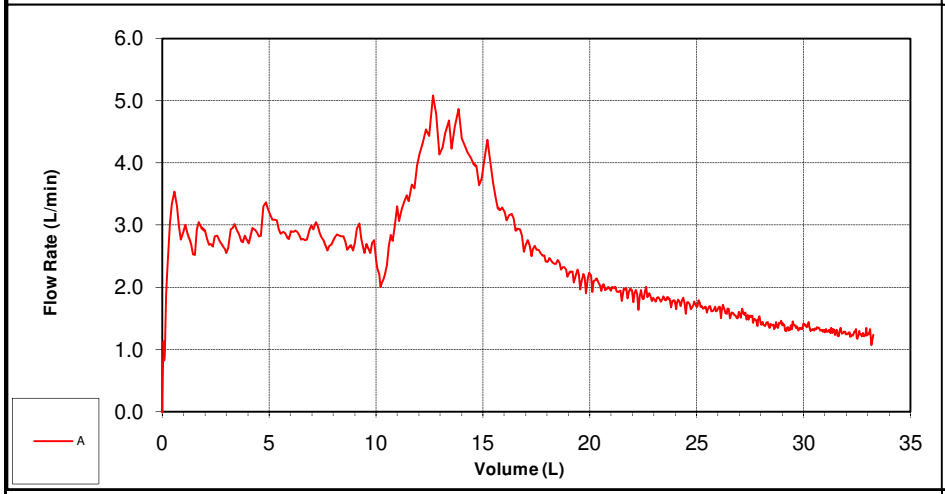
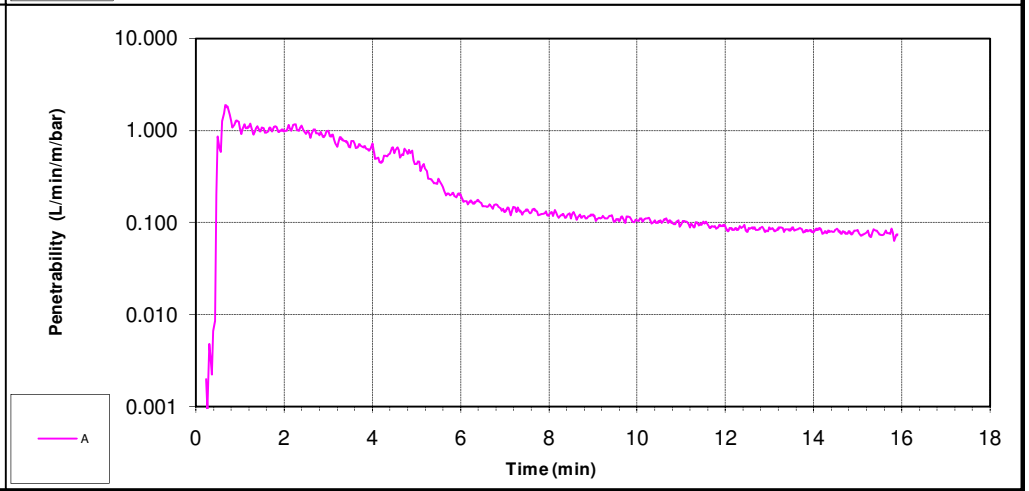
PROJECT No. 07-1413-0074		Phase/Task No. 2700/****	
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	30-05-09	Hole ID:	60+505	Top Interval:	11.40	Mix Type:	A	Comments:
Grout Plant:	C-216	Starting Time:	17:09:36	Bottom Interval:	15.90	Pfinal (bar):	3.7	
Inj. Method:	Single packer	Finishing Time:	17:25:38	Interval Length:	4.50	Qfinal (L/min):	1.2	
Injection Type:	Rock	Total Time:	00:16:02	Stage:	2	Vtotal (L):	33.3	









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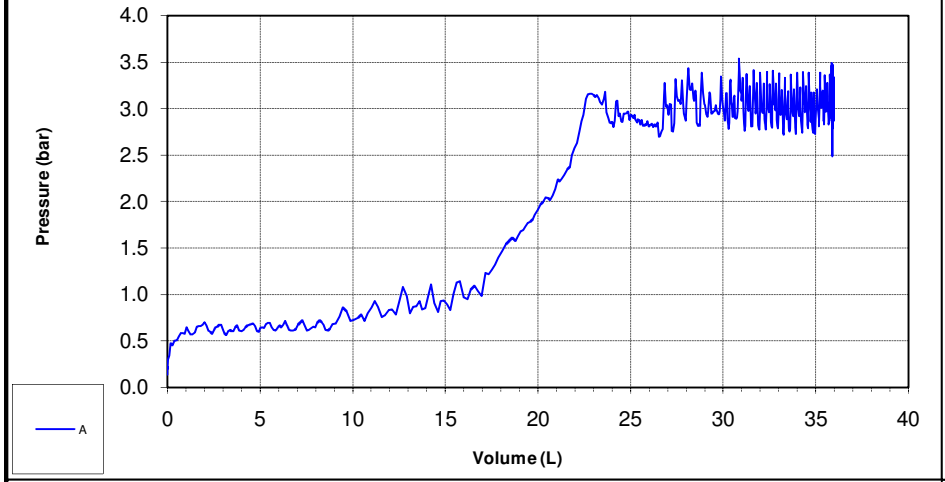
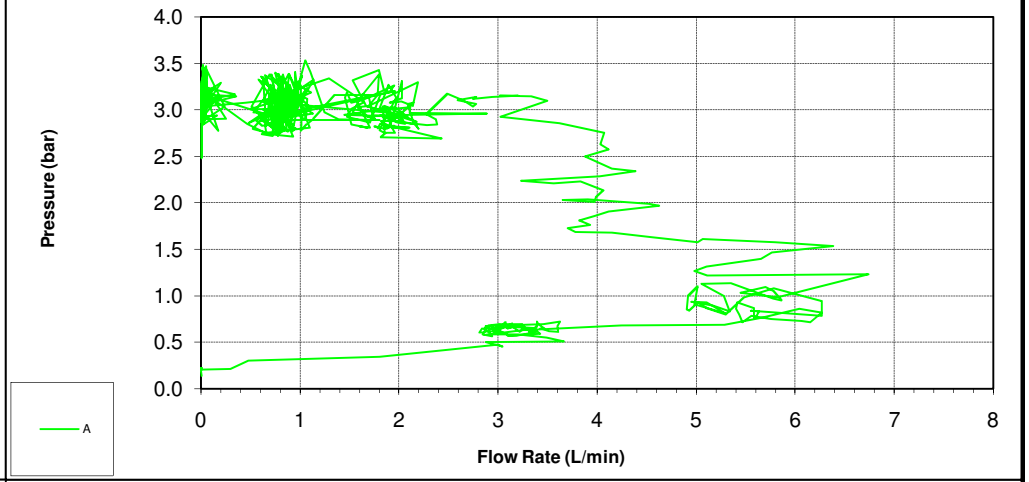
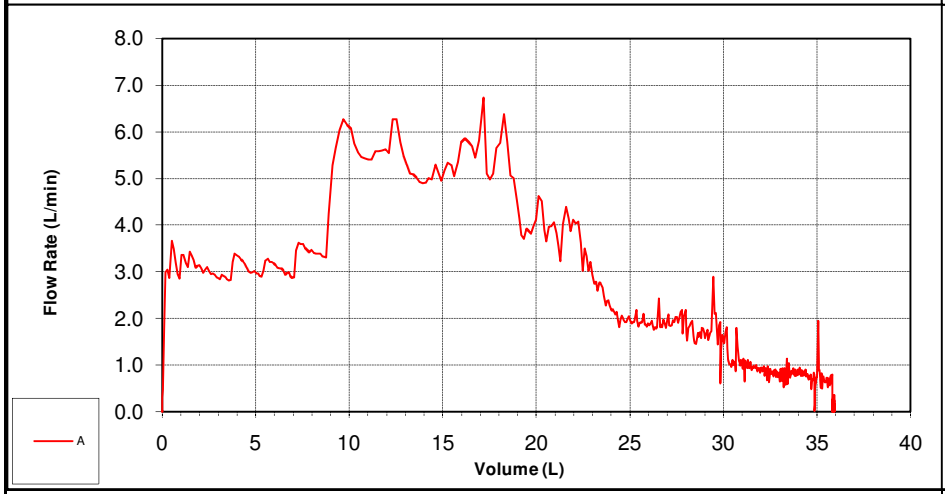
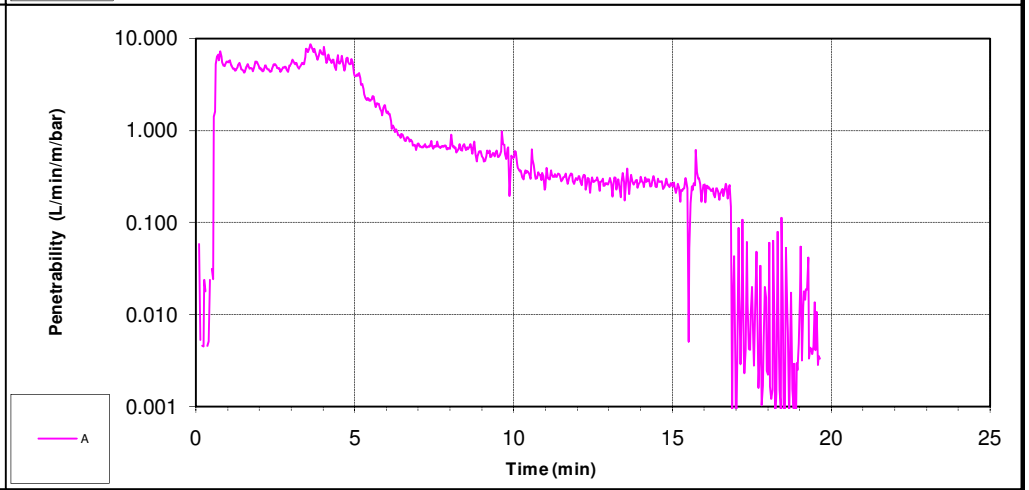
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	30-05-09	Hole ID:	60+505	Top Interval:	10.40	Mix Type:	A	Comments:
Grout Plant:	C-216	Starting Time:	17:29:26	Bottom Interval:	11.40	Pfinal (bar):	3.0	
Inj. Method:	Single packer	Finishing Time:	17:50:58	Interval Length:	1.00	Qfinal (L/min):	0.0	
Injection Type:	Rock	Total Time:	00:21:32	Stage:	3	Vtotal (L):	36.0	









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AGNICO EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
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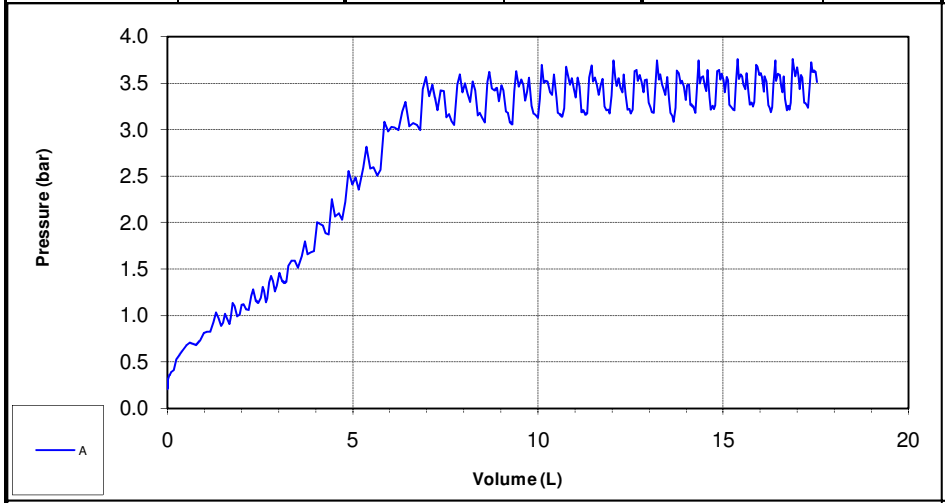
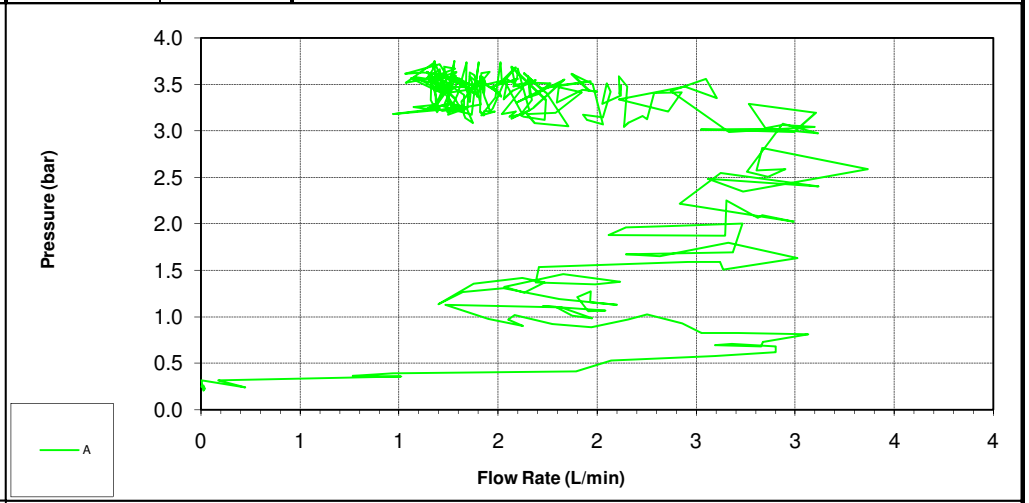
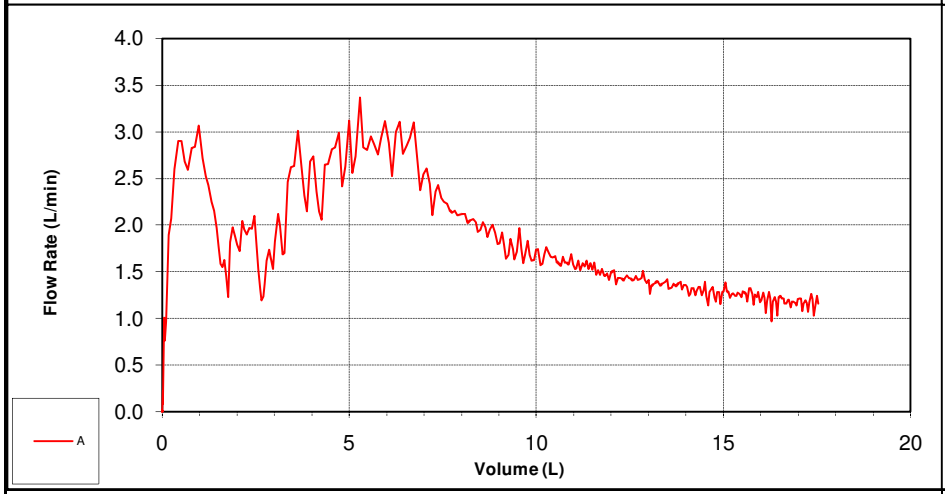
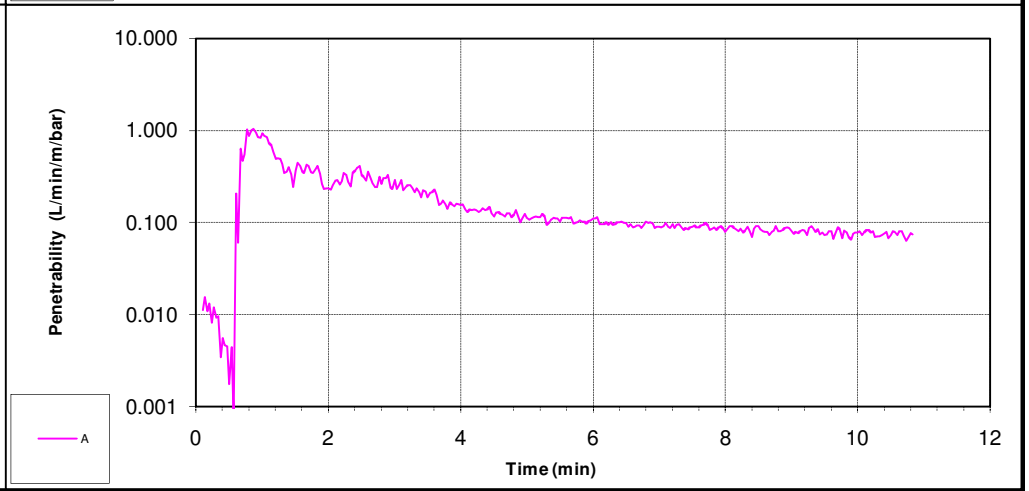
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	30-05-09	Hole ID:	60+508	Top Interval:	11.50	Mix Type:	A	Comments:
Grout Plant:	C-216	Starting Time:	16:39:12	Bottom Interval:	16.00	Pfinal (bar):	3.5	
Inj. Method:	Single packer	Finishing Time:	16:50:02	Interval Length:	4.50	Qfinal (L/min):	1.2	
Injection Type:	Rock	Total Time:	00:10:50	Stage:	2	Vtotal (L):	17.5	









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MEADOWBANK GOLD PROJECT
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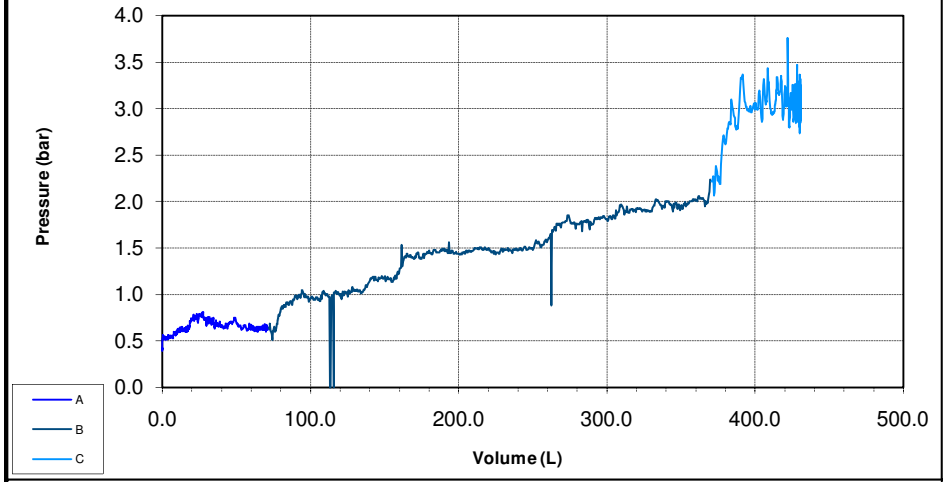
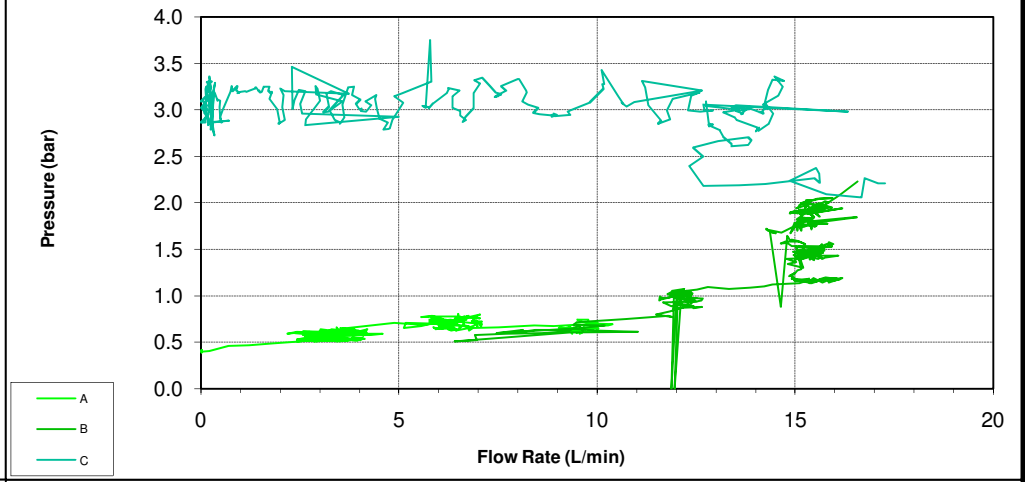
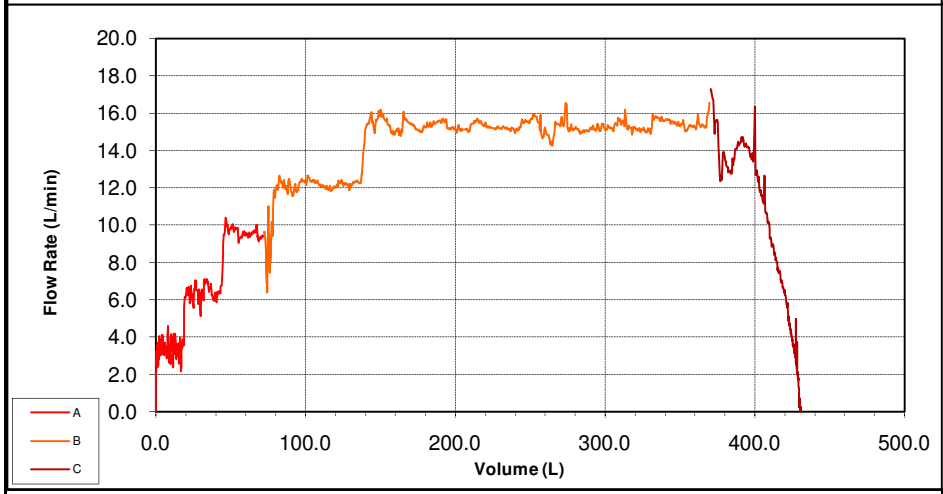
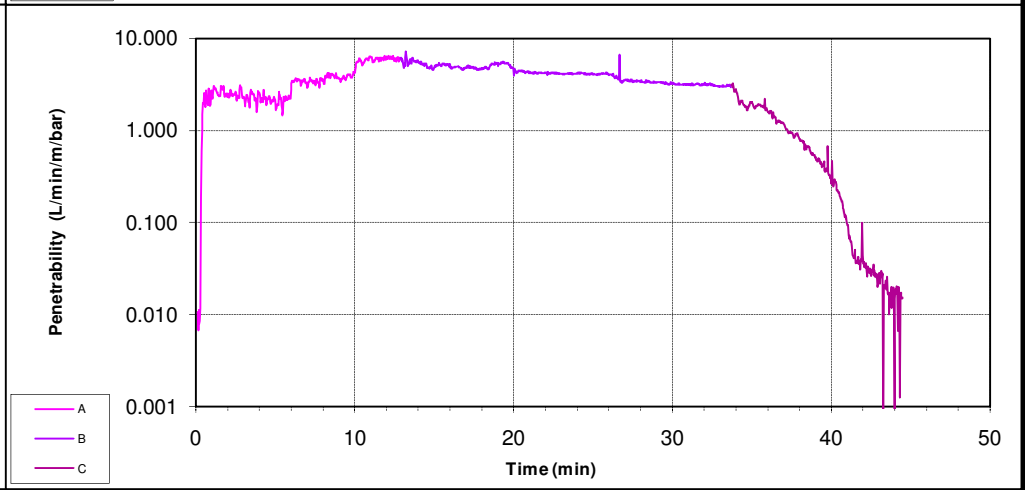
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	31-05-09	Hole ID:	60+508	Top Interval:	9.00	Mix Type:	A-C	Comments:
Grout Plant:	C-216	Starting Time:	11:22:36	Bottom Interval:	11.50	Pfinal (bar):	3.3	
Inj. Method:	Single packer	Finishing Time:	12:07:04	Interval Length:	2.50	Qfinal (L/min):	0.1	
Injection Type:	Rock	Total Time:	00:44:28	Stage:	3	Vtotal (L):	430.6	









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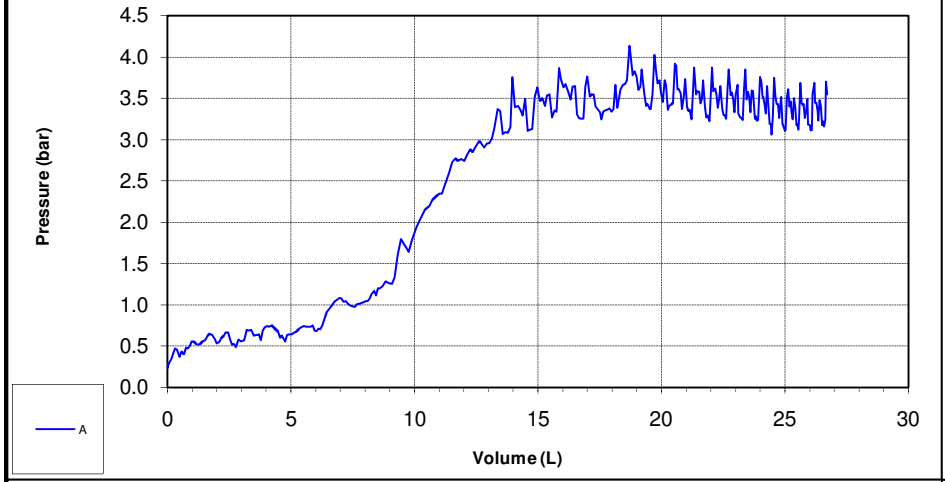
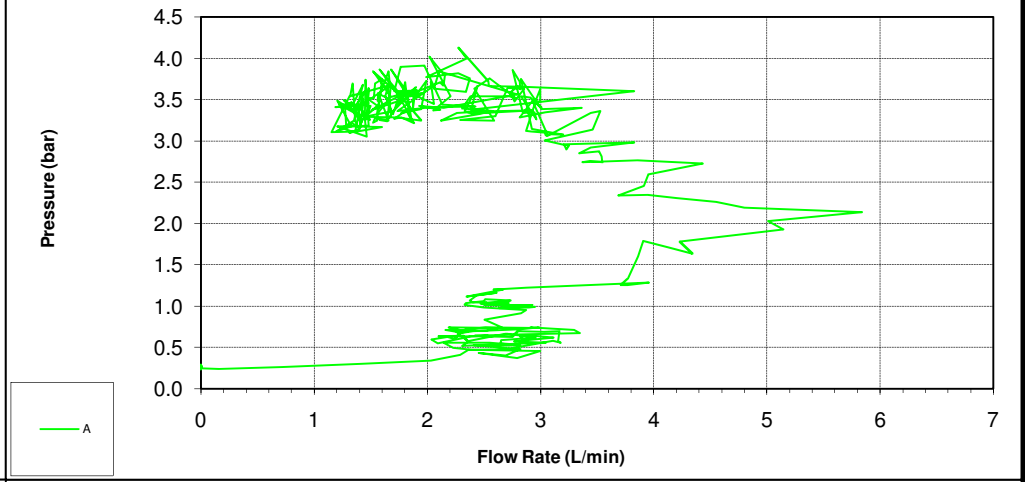
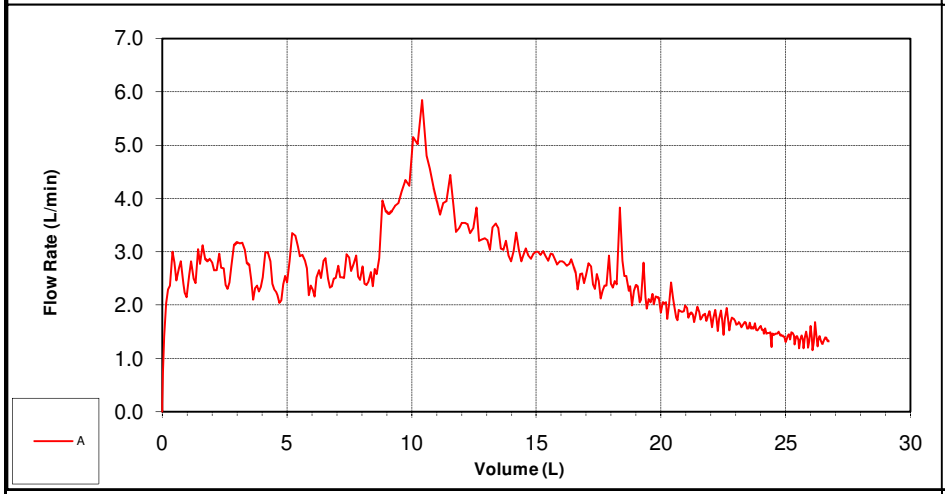
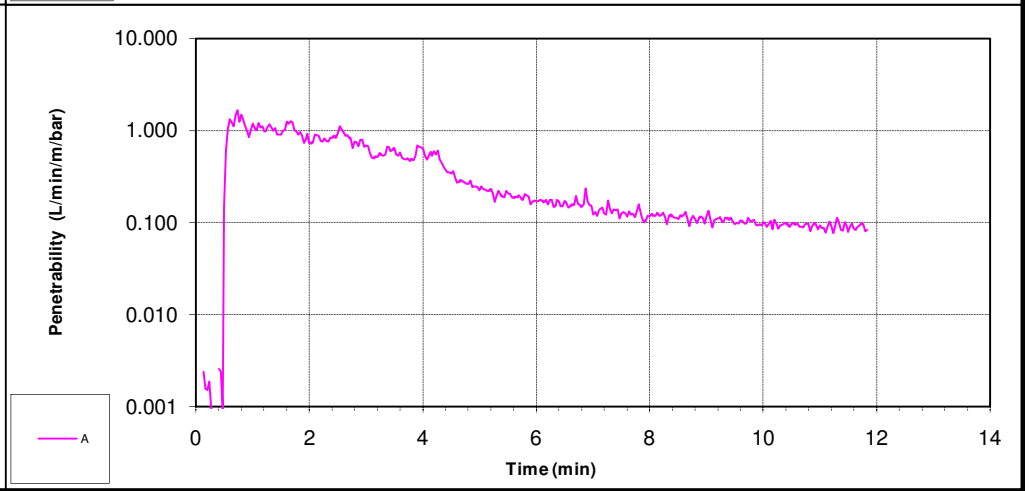
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	30-05-09	Hole ID:	60+511	Top Interval:	11.50	Mix Type:	A	Comments:
Grout Plant:	C-216	Starting Time:	16:18:12	Bottom Interval:	16.00	Pfinal (bar):	3.5	
Inj. Method:	Single packer	Finishing Time:	16:30:02	Interval Length:	4.50	Qfinal (L/min):	1.3	
Injection Type:	Rock	Total Time:	00:11:50	Stage:	2	Vtotal (L):	26.7	









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MEADOWBANK GOLD PROJECT
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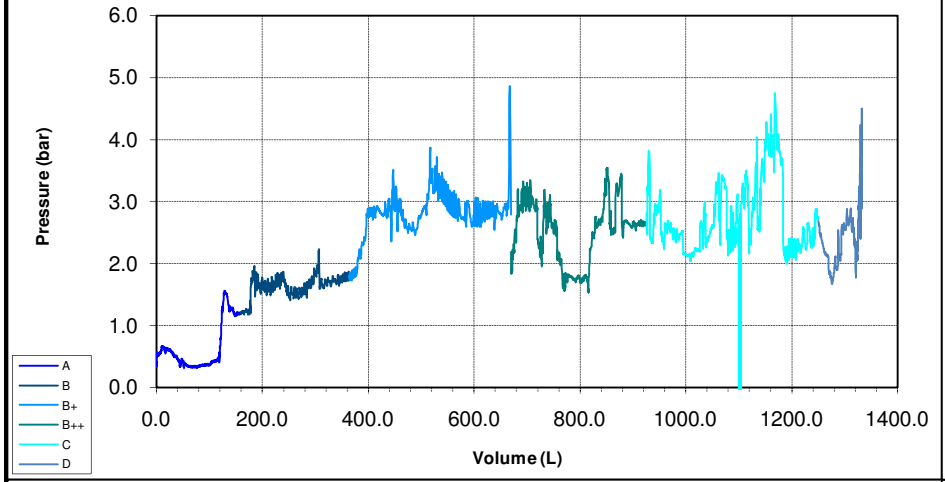
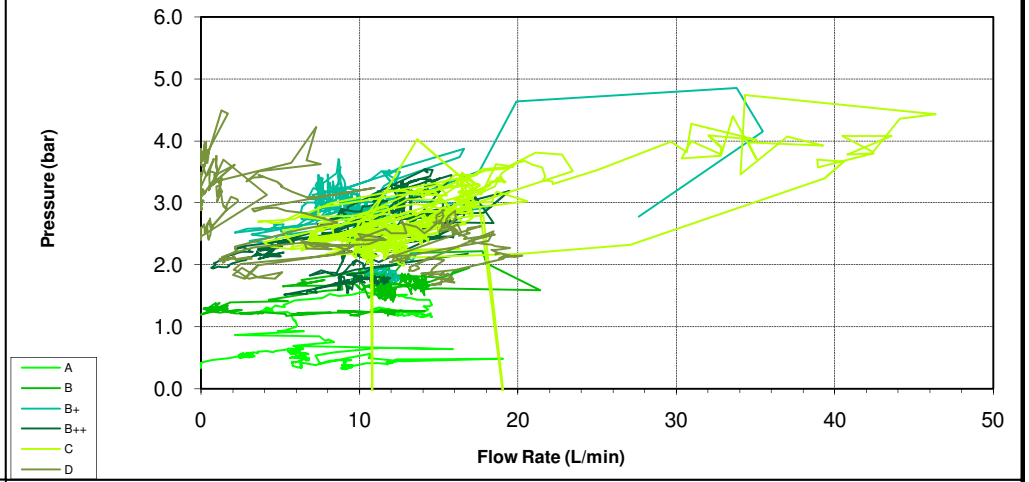
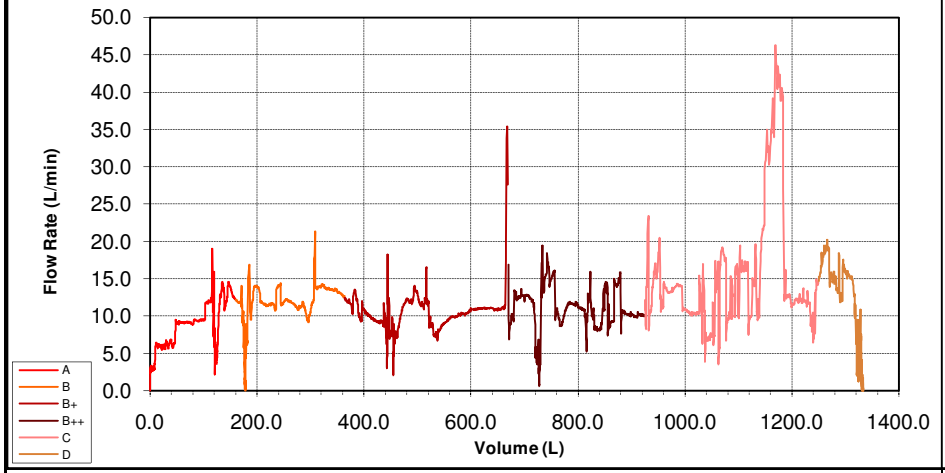
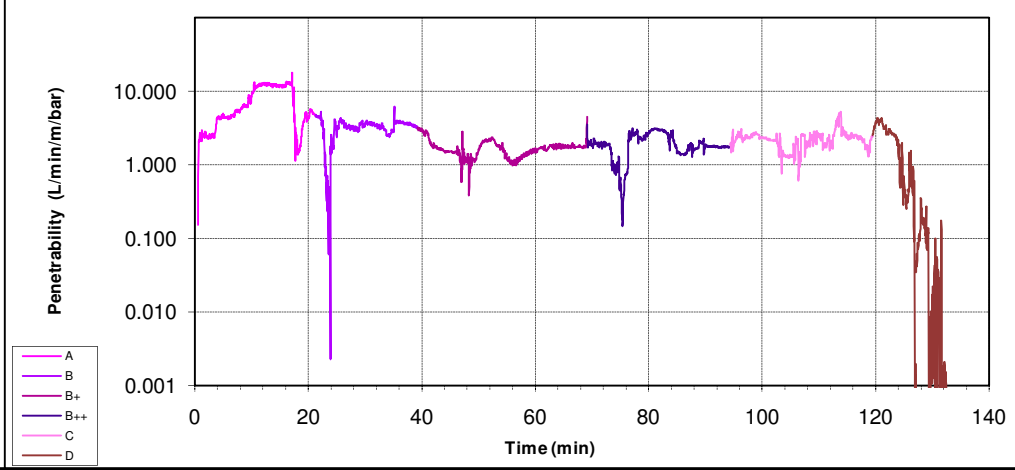
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	31-05-09	Hole ID:	60+511	Top Interval:	9.30	Mix Type:	A-D	Comments:
Grout Plant:	C-216	Starting Time:	07:45:40	Bottom Interval:	11.50	Pfinal (bar):	3.3	
Inj. Method:	Single packer	Finishing Time:	09:58:08	Interval Length:	2.20	Qfinal (L/min):	0.0	
Injection Type:	Rock	Total Time:	02:12:28	Stage:	3	Vtotal (L):	1333.0	









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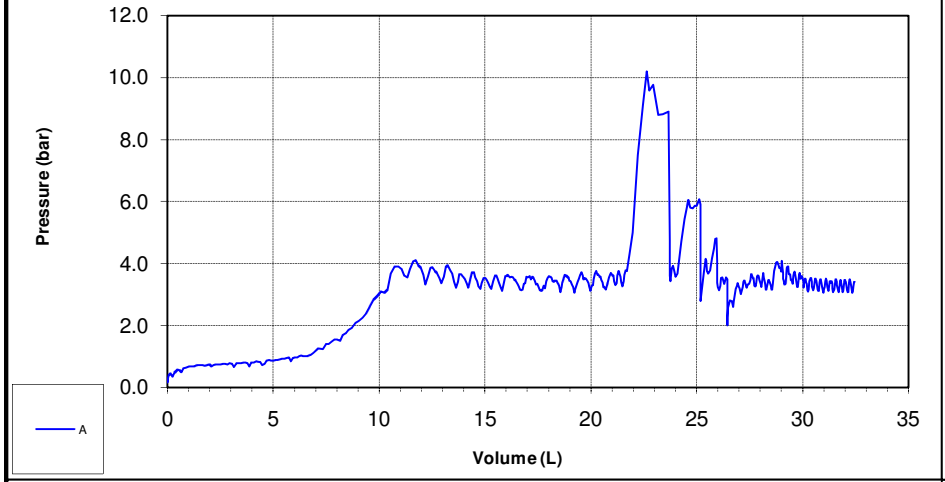
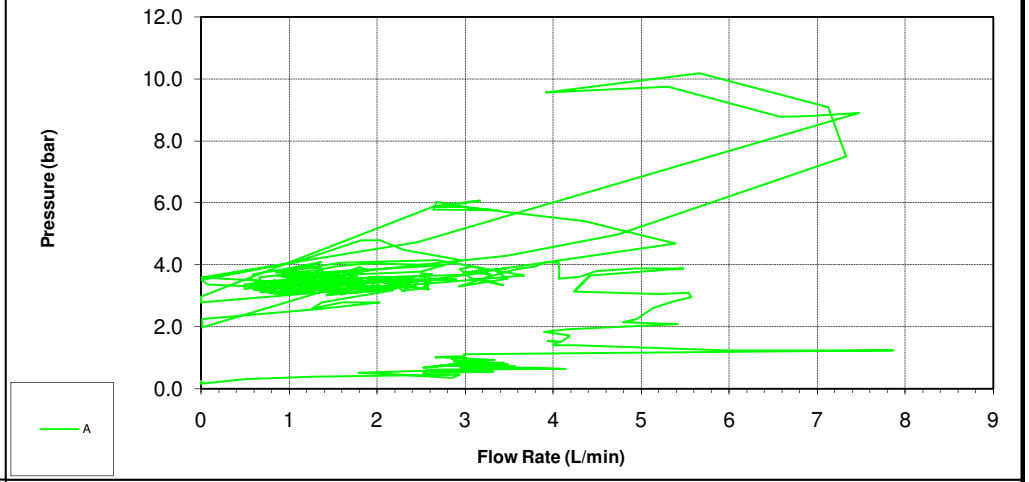
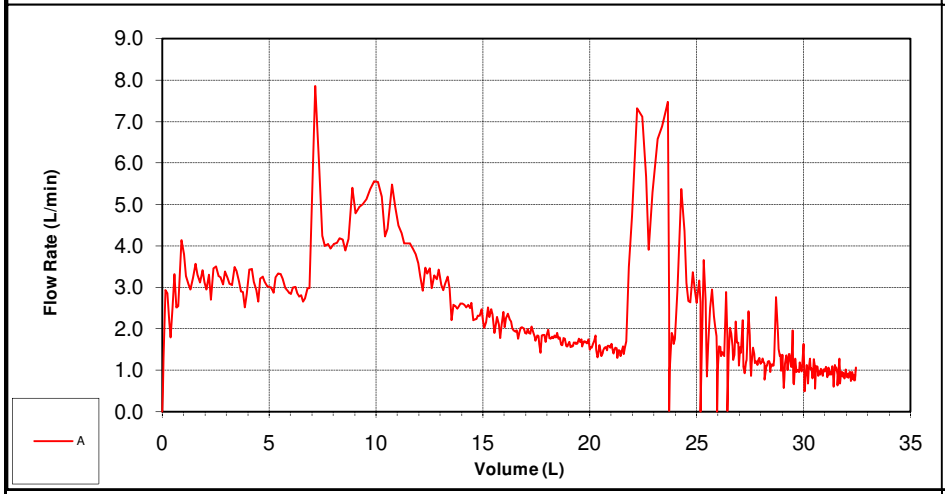
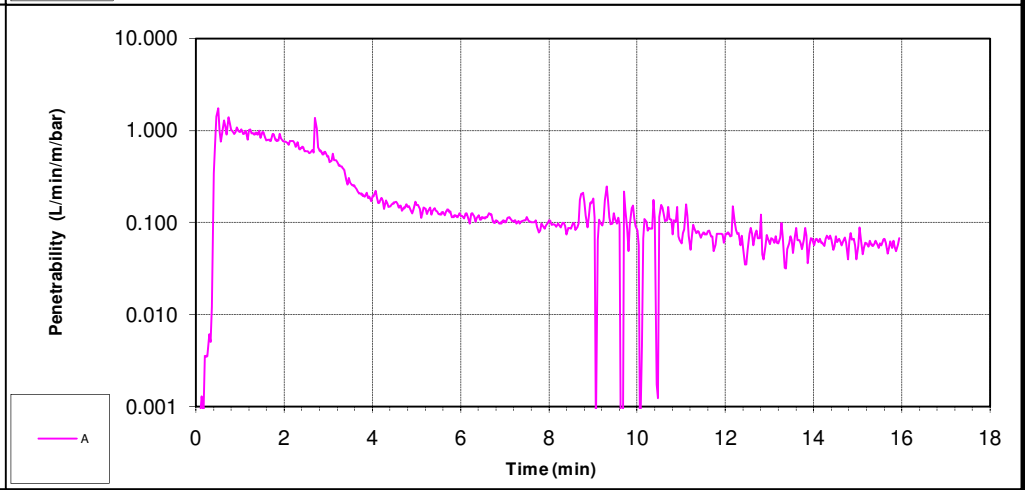
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	29-05-09	Hole ID:	60+514	Top Interval:	10.40	Mix Type:	A	Comments:
Grout Plant:	C-216	Starting Time:	16:33:24	Bottom Interval:	15.00	Pfinal (bar):	3.4	
Inj. Method:	Single packer	Finishing Time:	16:49:20	Interval Length:	4.60	Qfinal (L/min):	1.1	
Injection Type:	Rock	Total Time:	00:15:56	Stage:	2	Vtotal (L):	32.5	









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MEADOWBANK GOLD PROJECT
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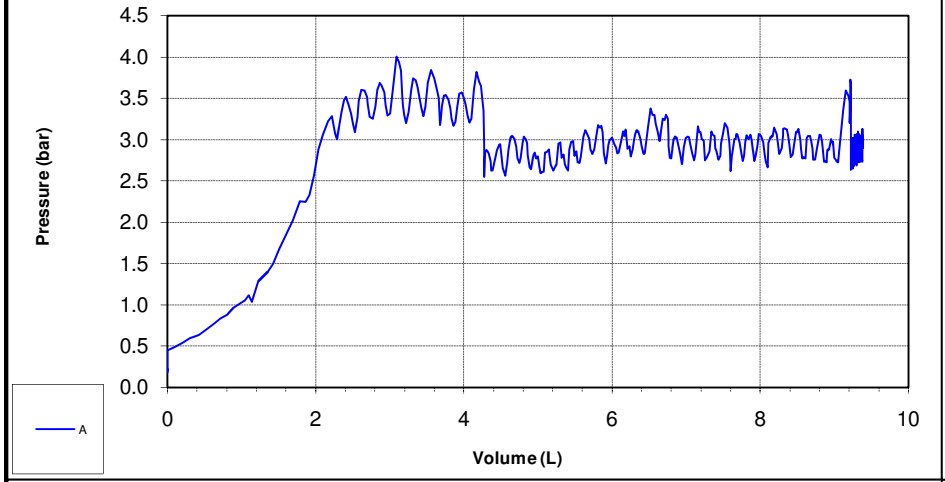
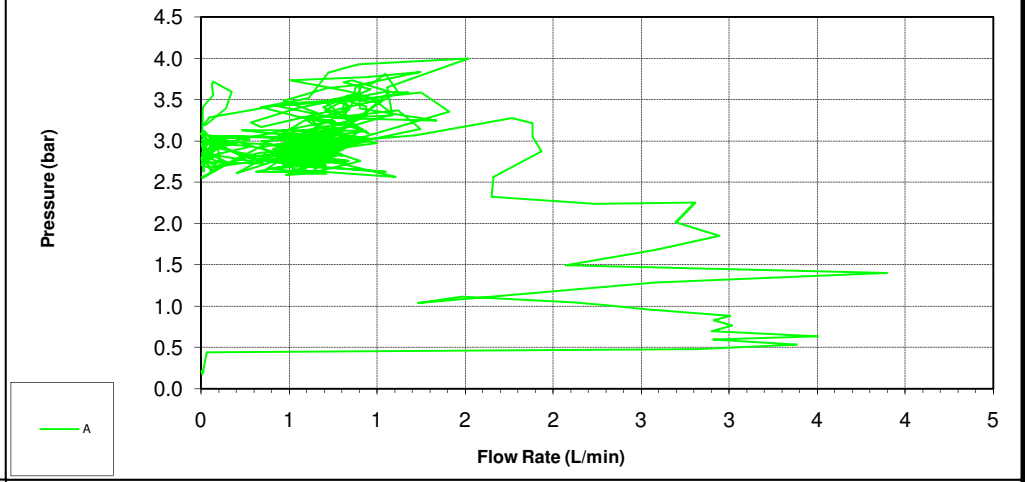
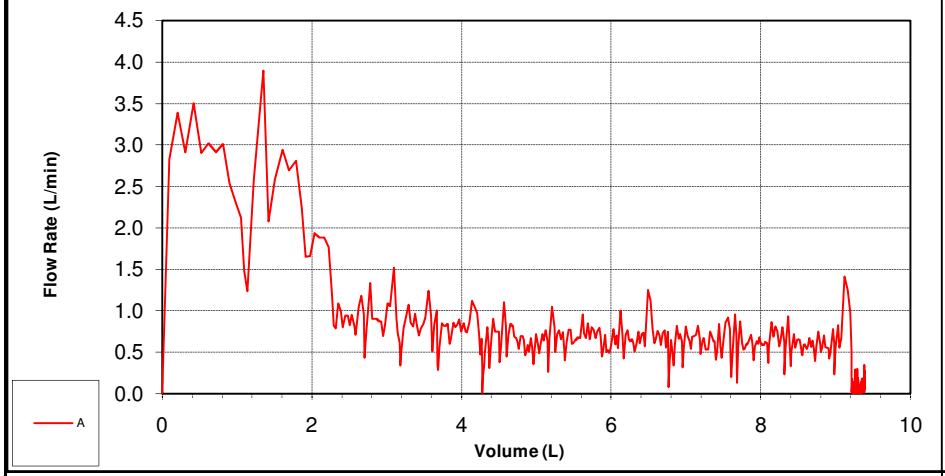
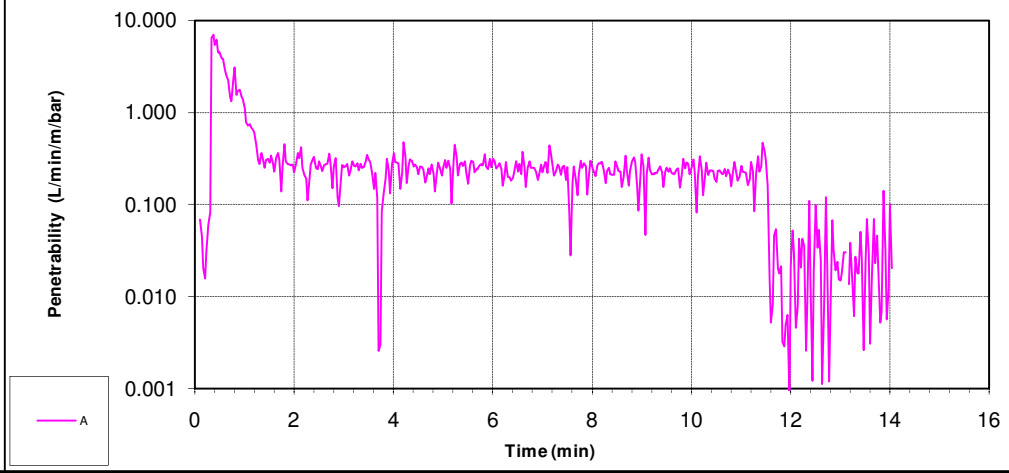
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	29-05-09	Hole ID:	60+514	Top Interval:	9.50	Mix Type:	A	Comments:
Grout Plant:	C-216	Starting Time:	16:55:08	Bottom Interval:	10.40	Pfinal (bar):	2.9	
Inj. Method:	Single packer	Finishing Time:	17:09:10	Interval Length:	0.90	Qfinal (L/min):	0.1	
Injection Type:	Rock	Total Time:	00:14:02	Stage:	3	Vtotal (L):	9.4	









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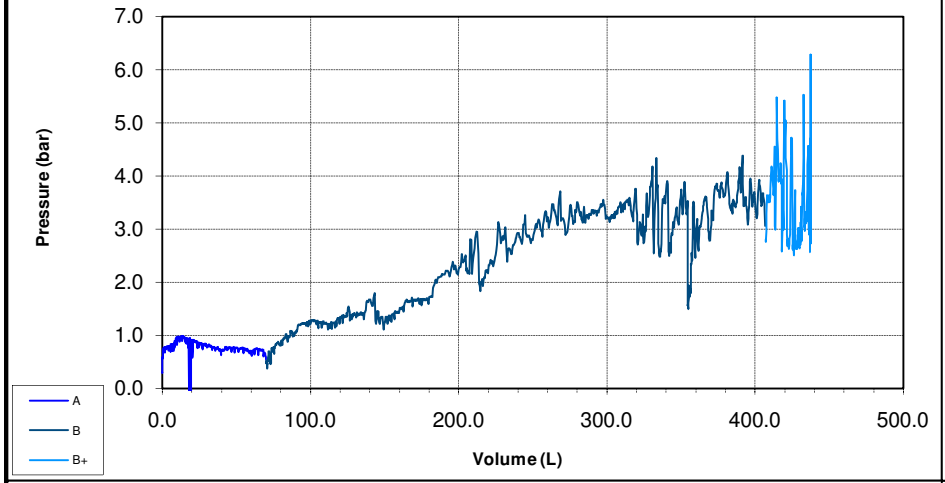
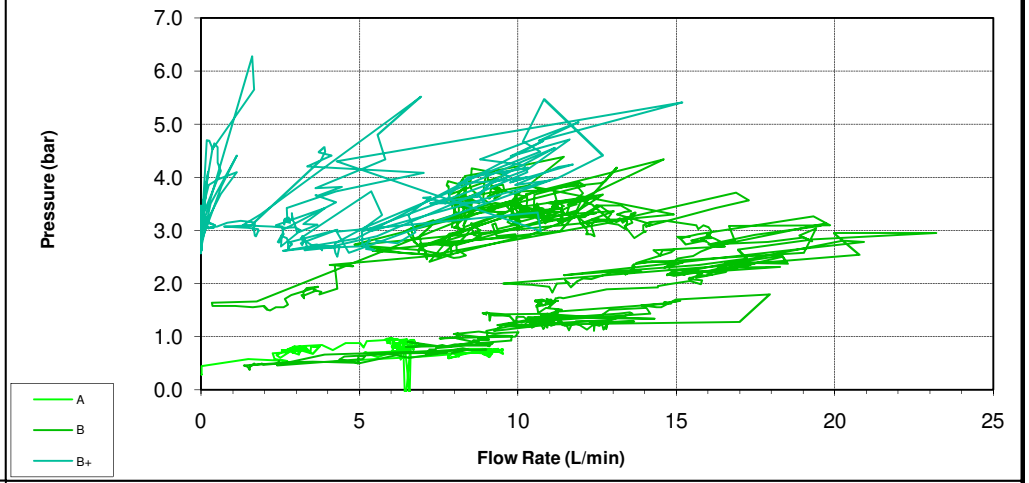
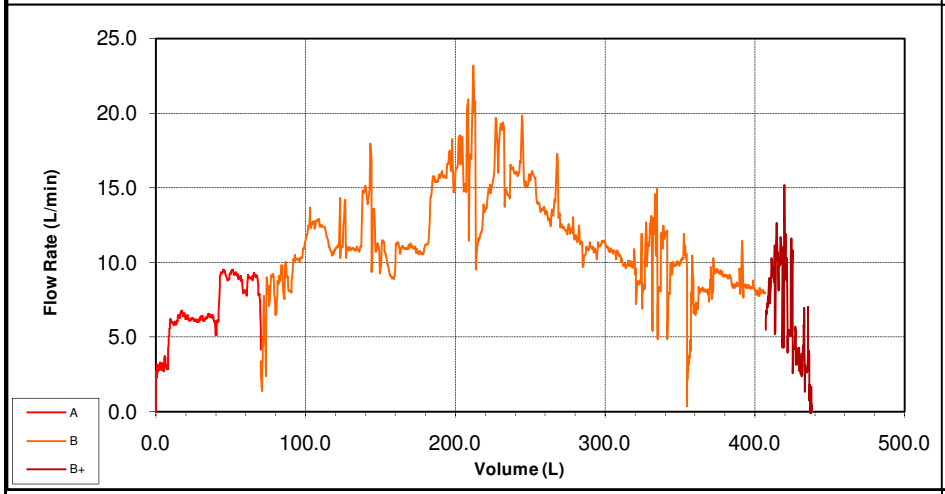
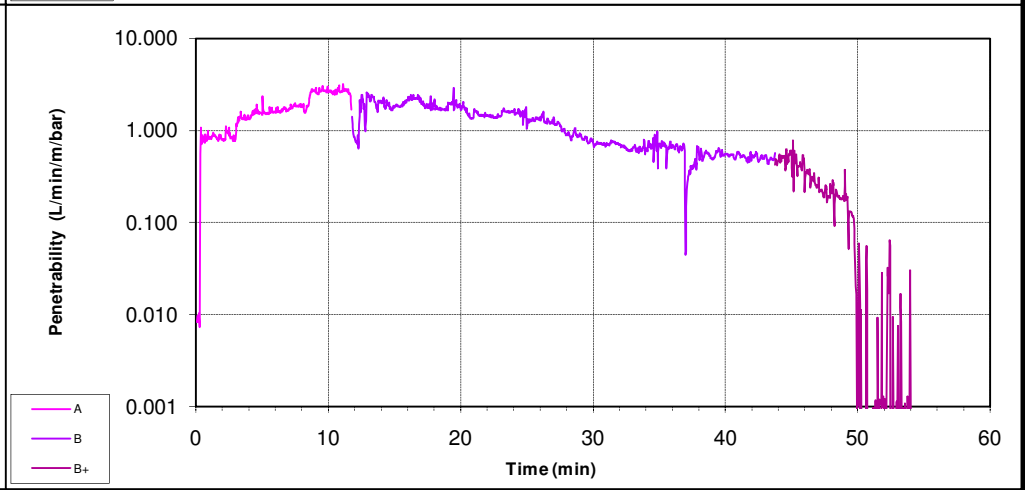
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	29-05-09	Hole ID:	60+517	Top Interval:	10.40	Mix Type:	A-C	Comments:
Grout Plant:	C-216	Starting Time:	17:18:10	Bottom Interval:	15.00	Pfinal (bar):	3.2	
Inj. Method:	Single packer	Finishing Time:	18:12:54	Interval Length:	4.60	Qfinal (L/min):	0.0	
Injection Type:	Rock	Total Time:	00:54:44	Stage:	2	Vtotal (L):	437.7	









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MEADOWBANK GOLD PROJECT
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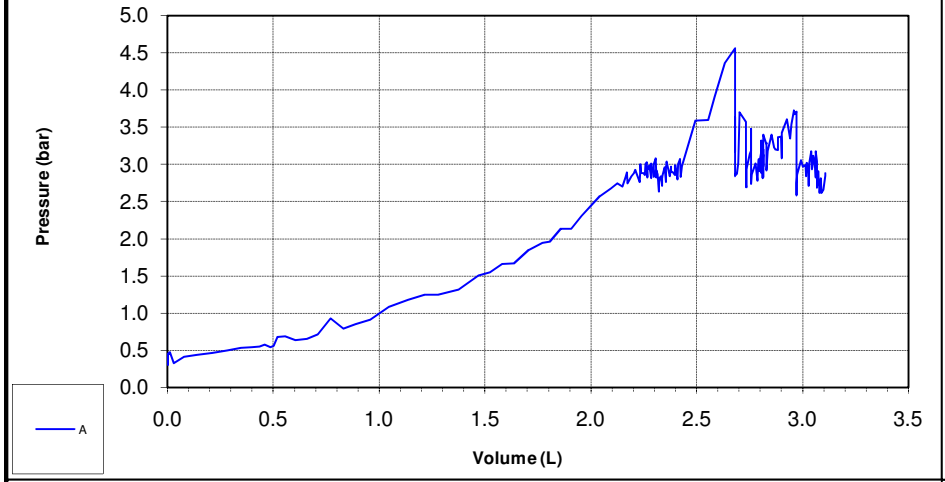
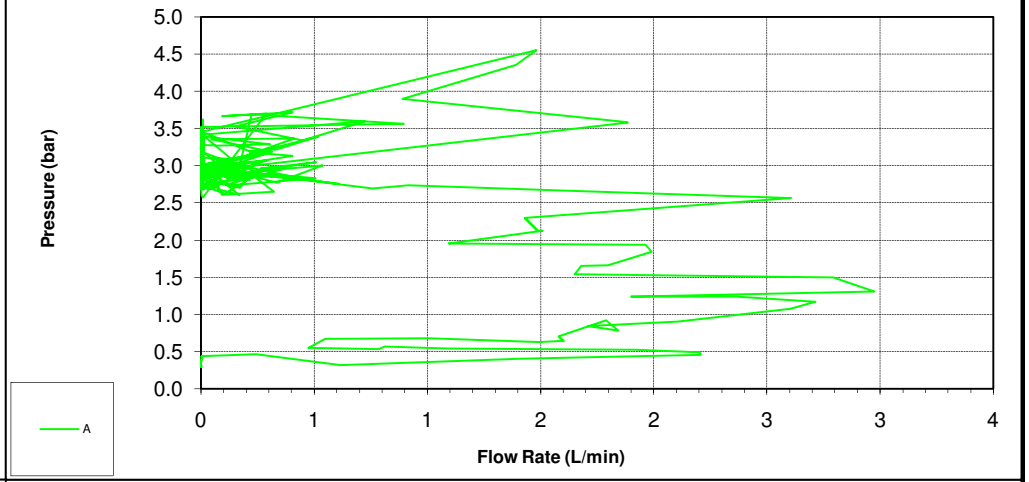
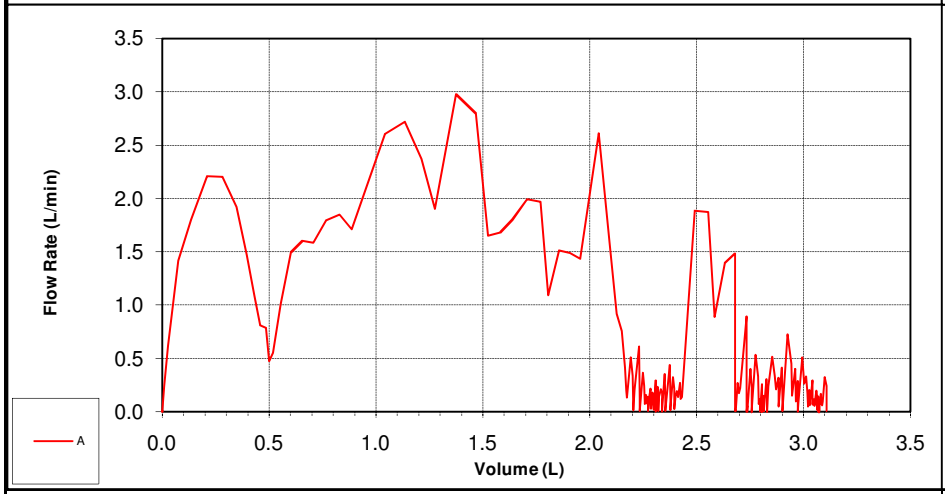
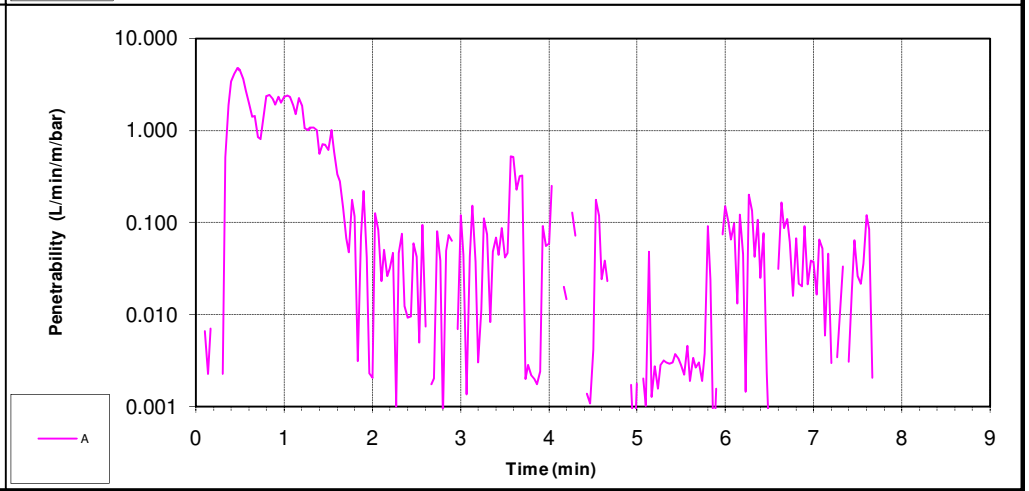
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	30-05-09	Hole ID:	60+517	Top Interval:	9.50	Mix Type:	A	Comments:
Grout Plant:	C-216	Starting Time:	07:38:18	Bottom Interval:	10.50	Pfinal (bar):	2.9	
Inj. Method:	Single packer	Finishing Time:	07:45:58	Interval Length:	1.00	Qfinal (L/min):	0.0	
Injection Type:	Rock	Total Time:	00:07:40	Stage:	3	Vtotal (L):	3.1	









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MEADOWBANK GOLD PROJECT
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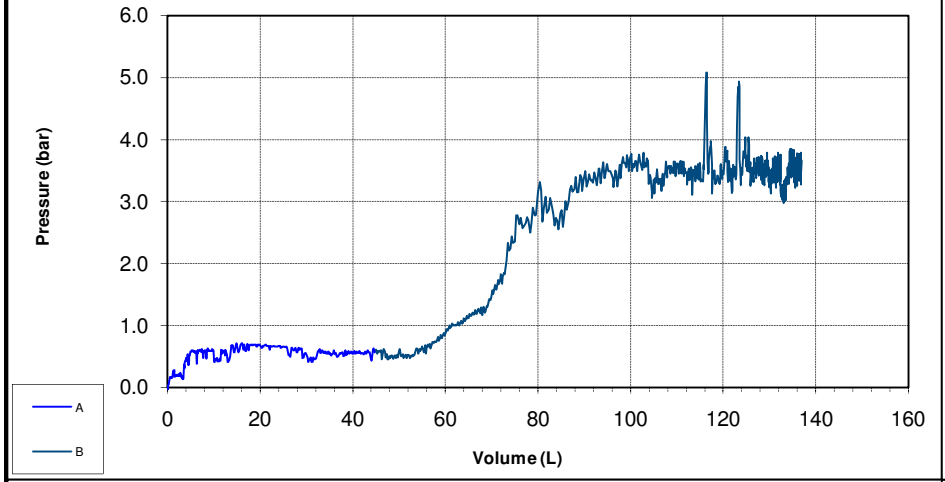
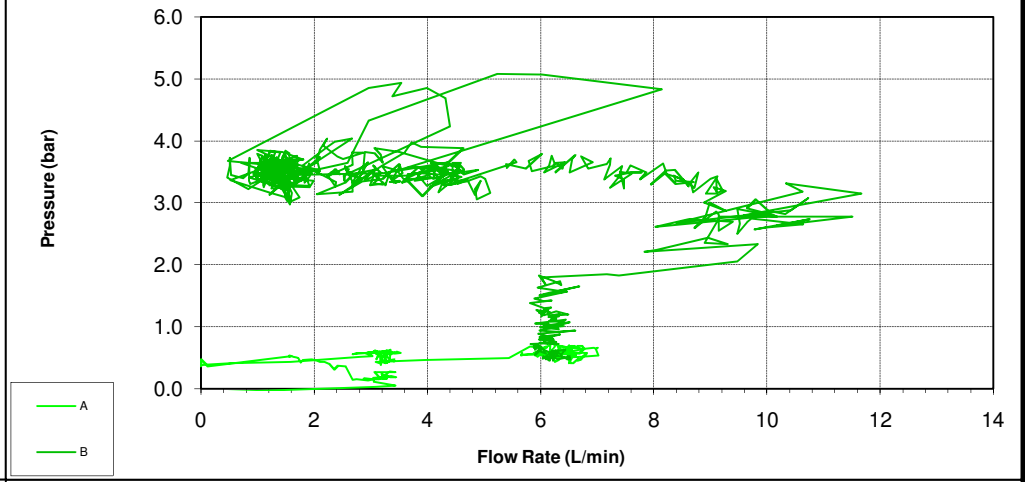
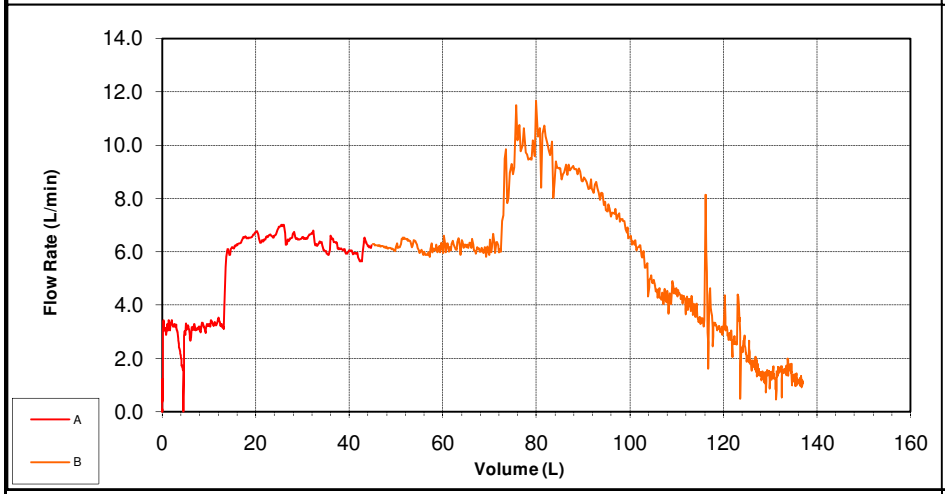
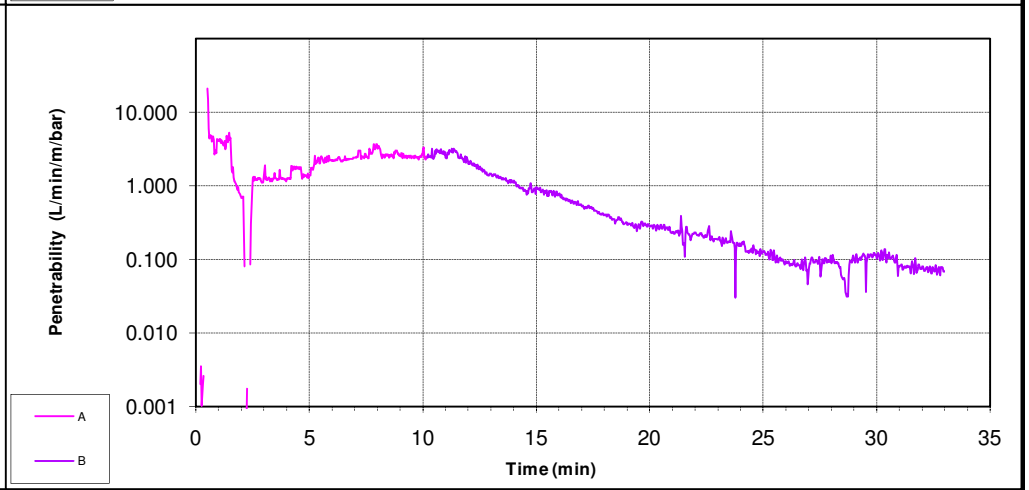
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	30-05-09	Hole ID:	60+520	Top Interval:	10.90	Mix Type:	A-B	Comments:
Grout Plant:	C-216	Starting Time:	08:11:18	Bottom Interval:	15.20	Pfinal (bar):	3.7	
Inj. Method:	Single packer	Finishing Time:	08:44:40	Interval Length:	4.30	Qfinal (L/min):	1.1	
Injection Type:	Rock	Total Time:	00:33:22	Stage:	2	Vtotal (L):	137.0	









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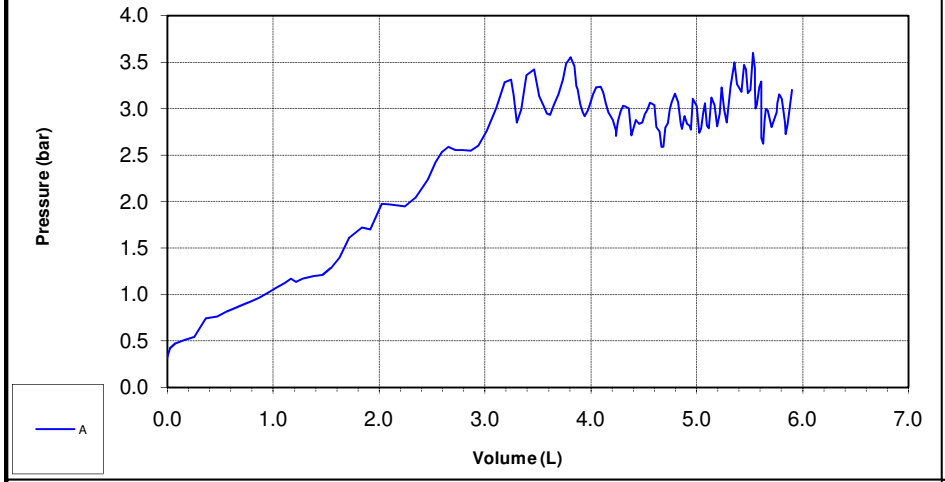
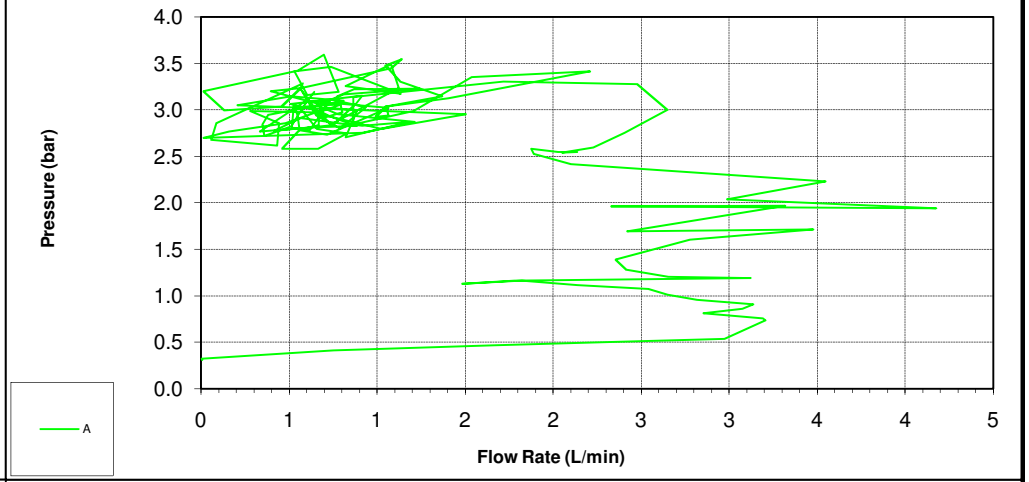
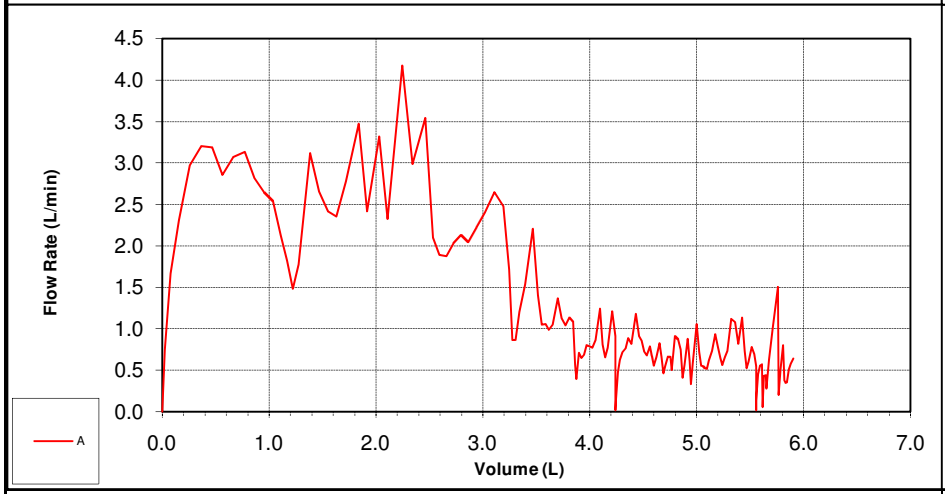
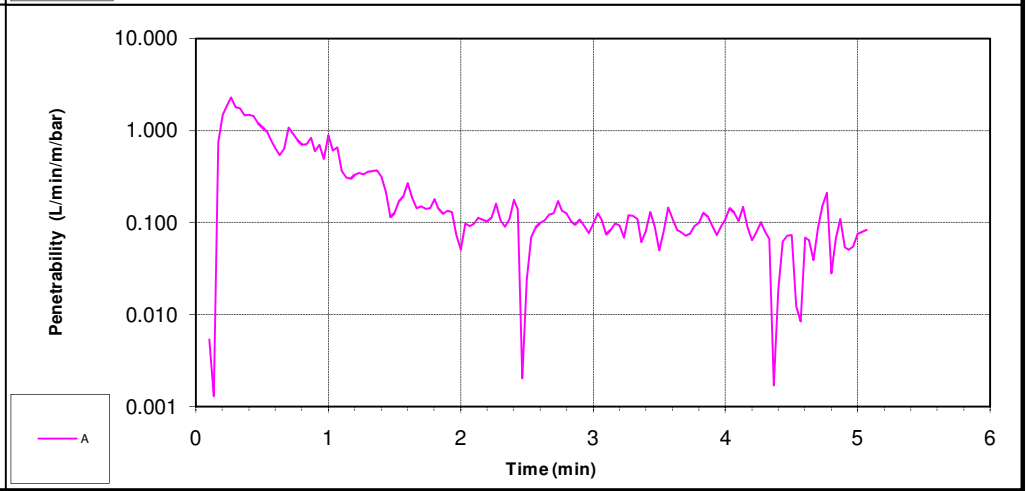
PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

Title:	Injection Report - East Dike Contingency Grouting							
Date:	30-05-09	Hole ID:	60+520	Top Interval:	8.50	Mix Type:	A	Comments:
Grout Plant:	C-216	Starting Time:	10:09:34	Bottom Interval:	10.90	Pfinal (bar):	3.2	
Inj. Method:	Single packer	Finishing Time:	10:14:38	Interval Length:	2.40	Qfinal (L/min):	0.6	
Injection Type:	Rock	Total Time:	00:05:04	Stage:	3	Vtotal (L):	5.9	









AEM

AGNICO EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

Golder Associates

PROJECT No.	07-1413-0074	Phase/Task No.	2700/****
DRAWN:	VTR	Scale: NTS	Rev.
CHECK:	GRB		

TECHNICAL MEMORANDUM

DATE August 18, 2009 **PROJECT No.** 07-1413-0074/1100 Doc. No. 925 Rev. 1

TO Eric Lamontagne and Gaston Blanchette
Agnico-Eagle Mines Limited Meadowbank Division

CC Dan Walker, John Cunning, Annie Beaulieu, Grant Bonin, Ben Wickland, Terry Eldridge

FROM Karine Doucet, Fiona Esford and Michel Julien **EMAIL** abeaulieu@golder.com

OBSERVATIONS AND COMMENTS FOLLOWING WORK CARRIED OUT ON EAST DIKE AUGUST 1, 2009 – MEADOWBANK GOLD PROJECT

This memorandum summarizes Golder's observations and some early recommendations following the appearance of a sinkhole in the East Dike at about Station 60+472 m on July 21, 2009.

It can be first recalled that a draft memorandum concerning the sinkhole was issued to AEM on July 30, 2009. This memorandum supersedes that earlier memorandum.

1.0 FIELD OBSERVATIONS

The sinkhole was identified by AEM staff on Tuesday, July 21, 2009 around 5:00 pm. Golder first inspected the sinkhole with AEM staff on Tuesday, July 21, 2009 around 8:30 pm.

The Meadowbank Dike Review Board (MDRB) was on site and was informed of the sinkhole on the morning of July 22nd around 6:30 am. A site inspection followed. The MDRB meeting agenda was modified to include an inspection and related discussions. It is expected that the MDRB will produce in their meeting summary report a series of observations and recommendations related to this particular matter.

Since July 21st, the sinkhole has been monitored on a regular basis (at least twice per day) to follow its progression. Golder's key observations can be summarized by the following:

- A sinkhole was observed immediately upstream of a series of casings installed during the emergency grouting works of May 2009, which were initiated following a reduction in dewatering rate believed to be the result of a significant leak occurring at East Dike around station 60+490.
- The presence of a potential leak was also corroborated by anomalies in data from piezometers and thermistors installed in proximity of station 60+490. Notably:
  - Piezometer P2-C located downstream of the cutoff wall near the bedrock and cutoff wall interface at 60+490 was identified as the most active during that period.
  - The thermistor located at 60+485 also showed unusual variation in temperature in comparison to other instruments installed within the dike.
- It can be recalled that the emergency grouting was completed approximately 1.0 m upstream of the cut-off wall.

- The sinkhole was located at the south end of a trench dug by AEM to repair damaged instrumentation cables required for the monitoring of the dike. The trench was about 1 m deep and 12 m in length.
- The sinkhole progressed during the period between July 21st and July 29th. It is noted that:
  - The sinkhole surface expression increased progressively from about 1.5 m by 1.5 m to about 2.5 m by 2.5 m during the period July 21 to July 29. It has since stabilized.
  - A void under the upper crust localized less than 1 m from the cut-off wall was progressively exposed as material unravelled.
  - The void surface expression appeared to be fairly vertical against the cutoff wall.
  - It was mentioned in the July 30th memo that it appeared that the cutoff wall did not look to have been impacted at the surface but confirmation was needed.
  - The sinkhole appeared to be located close to the Soil Bentonite Cutoff (SB cutoff) in the core backfill.
- A series of longitudinal fissures (or surface cracks) could be seen along the axis of the trench dug for the plastic pipes for the instrumentation cables. Minor settlement could be observed toward the upstream (locally exceeding 10 cm). These fissures seem to extend on either side of the sinkhole, parallel to the axis of the dike, for about 20 meters and appear to have been stable since monitoring of this area has started.
- Localized transversal fissures were also observed. They are limited in length and they tend to show some cracks and settlement of up to 10 centimetres. Some of these are related to settlement of the fill material placed following trench excavation for the replacement of the damaged instrumentation cables.
- Settlement and/or pop up was observed adjacent to casings installed for the remediation grouting.
- Turbid seepage flow downstream of the dike in this area was observed on July 21st. The clarity of the water has gradually improved. A separate memorandum on seepage flow monitoring was issued on July 27th. The temporary turbid flow was most likely linked to the excavation works of the ramp at the toe of East Dike.
- It should be noted that the East Dike is used as a haul road to access the Portage pit and to haul material to the Bay Goose Dike. The mine has been reporting some settlement along the haul road in the last few months and periodically materials have been added to the crest of the road.
- There is no evidence of surface instability on the downstream or upstream embankments of the dike, excluding minor sloughing on the downstream side which is related to the presence of ice buried as additional rockfill was placed during the winter on this side slope.
- Prior to arrival of the MDRB, removal of part of the ramp at the downstream toe of the East Dike was initiated. This ramp located at about station 40+490 was constructed and used to access the dewatering pumps in the downstream pool. The ramp was partly removed to expose the toe and allow the MDRB to view toe conditions and to allow a better monitoring of the seepage flows observed at the toe of this portion of the East Dike. This work was completed on July 21st and likely resulted in the turbidity observed in the water flowing at the toe as noted above.

2.0 ACTIONS TAKEN DURING THE PERIOD OF JULY 21ST TO JULY 29TH

A series of actions were undertaken during the period of July 21st to July 29th. These include:

- Definition of a safe zone around the sinkhole.
- Following removal of part of the ramp at the toe of East Dike, diversion of most of the flow from the North side of the ramp to the West side. A channel was excavated to permit the seepage flow to move

away from the dike toe and direct it toward the pool. From visual estimates, it appears that these works have resulted in redirection of about 80% of the flow south of the former ramp and 20% north. Prior to this modification, most of the flow appeared to be flowing on the north side of the ramp.

- Installation of a rectangular weir (July 24th) to monitor flow on the west side of the access ramp (see Figure 1). A separate memorandum (Doc 923 issued in draft on July 27th) provides the details of the installation, and measured flows. Measured flows have remained somewhat stable below 15 L/s since the monitoring program started (Figure 2). Observed variations in the measured flow are attributed to precipitation inflows and inherent errors in the flow measurement process. It is important to note that a measured flow rates shown in Figure 2 represent an estimated 80% of the total seepage inflow.

Figure 1: Rectangular weir constructed at the toe of the East Dike to monitor flow variations

- A tracer test was initiated on July 23rd at 13:15 using tracer Bright Dyes. This tracer was approved for use by the AEM environmental department. The tracer was prepared per supplier instructions by mixing 12 tablets with 12*30 gallons of water. The water with the dye becomes flashy pink in color. No evidence of the dye has been observed in the water either downstream or upstream of the dike.

- A similar test (12 tablets with 12*30 gallons of water) was carried out on July 29th at 08:00am. Once again, no evidence of the presence of dye has been observed on the upstream side or downstream side of the dike.

- A geocamera was mobilized to site on Tuesday July 28th for further visual inspection of the hole. An attempt was scheduled to occur on July 29th but had to be cancelled because of the collapse of a portion of the sinkhole side slopes that was over-hanging.

- The planning of a CPT investigation program is currently underway. This program intends to verify the condition of the cut-off wall. The CPT investigation program is scheduled to commence August 5th. This investigation is planned to test the continuity of the cut-off wall between approximately station 60+450 and 60+510 with test intervals between 3.0 m and 1.5 m. After pre-drilling the frozen cover, the CPT will be pushed to refusal, directly in the middle of the cut-off wall. This program is aimed at providing valuable information regarding the condition of the wall and the potential presence of gravelly pockets. It is expected that the program will be completed by August 10th.

- The planning and procurement of supplies and equipment has also been initiated to allow AEM to implement mitigation measures to restrict additional particle entrainment fairly rapidly, if necessary.

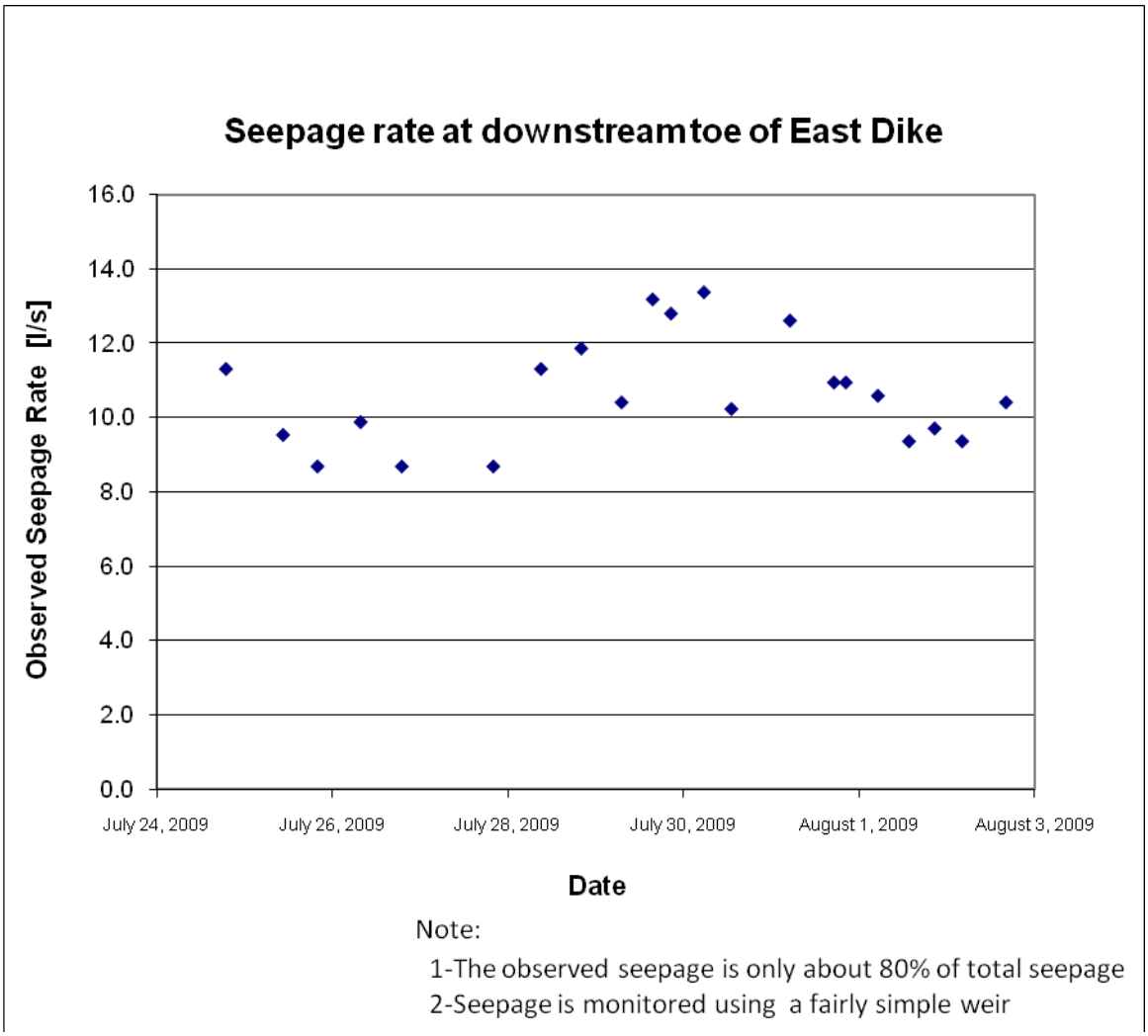


Figure 2: Seepage rate was monitored using rectangular weir at the toe of East Dike (around Sta. 60+490)

3.0 ADDITIONAL INFORMATION

Following the completion of the grouting program at the East Dike, in mid-March 2009, dewatering proceeded promptly. On about May 19th, as dewatering was progressing at peak pumping rate of about 60,000 m^3/day (700 L/s), the water level within the dewatering pool started to stabilize instead of continuing to decrease. This implied that a leak had developed within the East Dike, and that the magnitude of flow through the leak could have approached the available pumping capacity. Upon review, the piezometric and thermistor data were also indicated that flow was occurring (increase in pore pressure in piezometer 490-P2C). The following table summarizes the key dates:

Table 1: Summary of key dates

Action	Date started	Date completed
Incident reported	Tuesday, May 19	--
Initial contingency planning	Wednesday, May 20	Monday, May 25
Mobilization	Thursday, May 21	Tuesday, May 26
Upstream casing installation	Monday, May 25	Saturday, May 30
Downstream casing installation	Wednesday, May 27	Thursday, May 28
Bedrock drilling	Wednesday, May 27	Monday, June 1
Grouting	Thursday, May 28	Monday, June 1
D/S monitoring equipment arrived	Sunday, May 31	--
Additional piezometer installation	Thursday, June 4	Friday, June 5

Rapidly (within a few days), a grouting contingency program was developed to mobilize site staff, supplies and equipment in an attempt to plug the area of concern. The first step of the grouting contingency program was to install casings to the bedrock surface. It was during the pushing of the casings to bedrock, dewatering efficiency improved and therefore a significant reduction in the seepage flow rate apparently occurred. The grouting that followed casing installation did not result in any noticeable immediate seepage flow reduction. A separate report has been prepared summarizing the contingency grouting work (Doc. No. 916 “Meadowbank East Dike Grouting Response Plan – Completed Works, dated July 14, 2009).

3.1 Works carried out on August 1st 2009

On August 1st, a test pit was excavated to investigate the extent of the sinkhole and possible cavities identified at Station 60+472. A photographic summary is appended to this document (see photographs 1 to 22).

The excavation was carried out using a large shovel (CAT 345). The work was completed under the supervision of AEM representative M. Gaston Blanchette. Golder representatives (Michel Julien and Karine Doucet) were present and observed the entire excavation and backfilling process. Backfilling was completed to the level of the instrumentation conduit pipe in order to protect the instrumentation cables.

As mentioned above, the sinkhole was identified in an existing trench, dug to repair some cables for the instrumentation. To protect these cables, the excavation was divided in 2 parts: east of the plastic casing (Lake side) and west of the plastic casing (Pit side). The sinkhole was located on the west side of the plastic casings.

3.2 Excavation on East side of plastic casings used to protect the instrumentation cables

The excavation on the east side (Lake Side) of the casings installed to protect the instrumentation cables proceeded smoothly to about lake level (see photos1 to 5). No evidence of a void or sinkhole was identified. The key observations can be summarized as follows:

- No direct evidence of a sinkhole or significant material entrainment was seen.
- Depth of frozen materials clearly varies along the excavation. At about Station 60+472 around the sinkhole, no evidence of frozen materials was found.
- No evidence of displaced materials was observed.
- The base of the excavation was characterised by core backfill material (0-3/4'' minus material) that did not appear to have been remobilized but did appear to be comparatively less compacted than would have been anticipated.

3.3 Excavation on West side of Plastic Casings used to Protect the Instrumentation Cables

The excavation on the west (Pit side) between the casings to protect the instrumentation cables and the cut-off wall proceeded after the east side excavation was completed (see photos 5 to 20).

During this excavation, the following observations were made:

- The area where the sinkhole was identified was excavated to lake level. Below lake level, no evidence of extension of the sinkhole could be identified. As soon as lake level was reached, water inflow occurred, as expected. It was difficult to assess the relative density of materials at lake level but the materials did not seem dense.
- Within 1.0 m of sinkhole area, the frozen surface could be identified easily.
- A cavity or void was progressively uncovered during excavations. The geocamera available on site was not used because this feature was extending laterally and could be inspected quite easily from the crest of the dike.
- The roof of the cavity was essentially frozen materials. The walls appear to be locally frozen varying from cutoff material to Core Backfill.
- The cavity or void extended laterally toward the cutoff wall and reached it. From probing completed in the cavity, the cutoff appeared unfrozen and had not been fully penetrated. Nevertheless, the observations did indicate that the cavity reached the cutoff wall.
- The cavity has been roughly estimated to be about 6.0 m long, less than 3.0 m wide and with a maximum height of 1.0 m. The estimated volume of the cavity is about 18 m^3. Photos 13, 14, 15 and 16 provide a good view of the cavity. It is difficult to determine whether the cavity exceeded 1.0 m in height. The progressive infilling of the cavity with thawed material is readily apparent from Photo 13. Figure 3 shows a simplified image of the cavity with respect to the cutoff wall. Detailed surveying of the excavation has been performed (Figure 4). .
- Following the full exposure of the cavity or void, thawing of frozen materials was accelerated and sloughing could be seen at the base of the excavation in the unfrozen materials. As such, the decision was taken to backfill promptly using good till material excavated from the Stormwater Dike (see photos 18 to 22).

From what could be observed on site, the sinkhole is essentially a surface expression resulting from the progressive collapse of thawed materials in the roof over an existing void at the base of the frozen cover.

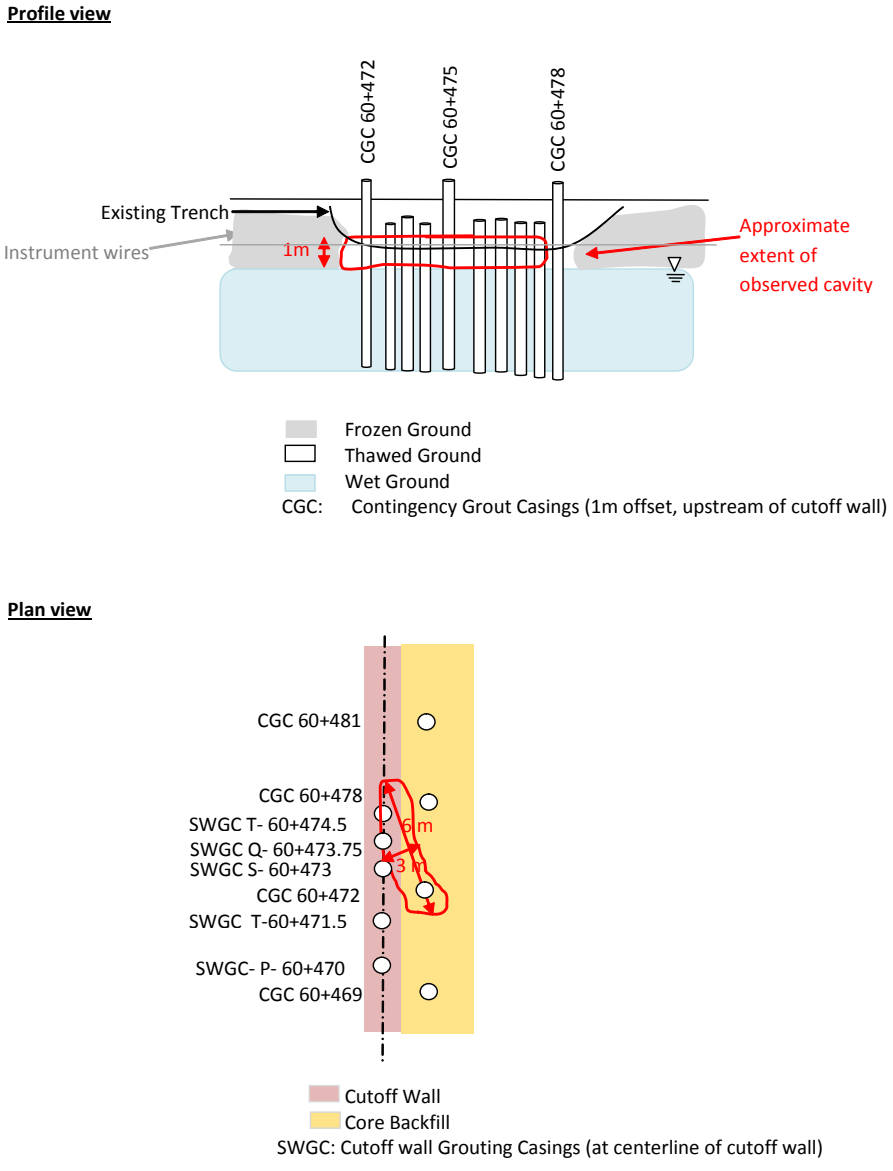


Figure 3: Schematic representation of the void with respect to the cutoff wall

3.4 Seepage rate

As mentioned earlier, the seepage rate at the toe of East Dike, while significant (about 15 L/s), appears to be stable. No noticeable changes have been noted in the past 12 days. Backfilling of the cavity and sinkhole at Station 60+472 have not resulted in any noticeable change in the seepage rate (see Figure 2).

4.0 CURRENT INTERPRETATION

The upcoming CPT investigation (scheduled to begin on August 5th) and continued monitoring will help to better understand the condition of the East Dike cutoff wall, possible failure mechanisms, mitigation measures required for the East Dike, and possible modifications to the construction sequence or design for the Bay Goose Dike. Nevertheless, it is prudent to initiate a discussion on the failure mechanism and rationale in order to target some future mitigation measures.

One the fundamental questions about this area is the current level of activity of the sinkhole and associated conduits where material loss occurred.

Rapid localized settlements have been occurring in a fairly localized zone. The observed movement on surface is linked to a thawing phenomenon that induces progressive in-filling of the existing void under the frozen cap. When the cover material becomes either unfrozen or too thin to support load, collapse occurs.

Based on observations of seepage flow at the dike toe (stable flow and no obvious signs of material entrainment), the current level of activity is considered minor compared to the significant seepage flow event inferred to have occurred in May 2009. If such concentrated flows did occur, significant piping and particle entrainment would likely have resulted.

The actual volume of materials that may have been displaced from the East Dike may be greater than the 18 m^3 void identified in the vicinity of Station 60+472 for the following reasons:

- Other voids or cavities may exist elsewhere within the dike.
- The bulking of materials as it got entrained downward during a large flow event have resulted in a loss of relative density of the Core Backfill by the bulking of materials to fill the void. Since no direct measurements of the in-situ compaction (density) of the material were made before and after the May event, it is difficult to assess the extent of the loss of compaction of existing materials. This bulking phenomenon could easily result in an increase in volume of more than 20% from a so-called dense dilatant state to a loose contractant state.

It is nevertheless too early to clearly define the events which lead to the development of the sinkhole or if it is currently inactive (or stable) even if the recent observations may suggest so. Further monitoring is required to provide some insights on this issue.

Flow rates that are currently being measured appear somewhat stable (estimated around 15 L/s) as shown on Figure 2, and far from the inferred peak in May that may have reached almost 700L/s (60,000m^3/day). The episode of May 2009 required rapid intervention. If it were not for this intervention, significantly more material loss may have occurred.

It is evident from the sinkhole location that Core Backfill material has been displaced, and it appears that the cutoff wall has also been impacted. Based on site observations, the path of displaced materials was most likely more vertical that lateral. The upcoming CPT investigation is aimed at determining where material has migrated and if the cutoff wall is relatively intact. At this stage, it appears unlikely that a large window has been created in the cutoff wall since a more complete failure of the wall would likely have occurred even with the grouting contingency works carried out in May.

It is hypothesized that the major seepage flow occurred either at the interface of the cutoff wall and bedrock, or more likely through joints or fissures in the upper surface bedrock. Bedrock is known in these areas to be highly fractured with open joints often filled with infilling material. The washout of materials in joints following build-up of gradient could have resulted in rapid flow and induced piping.

Assuming it can be demonstrated that the seepage mechanism is currently less active and that the leak has occurred in the joint system at depth in the bedrock, serious consideration should be given to possible modification of the Bay Goose Dike design as it relates to the grouting strategy and features to lower the risks of piping failure.

5.0 RECOMMENDATIONS

Upon review of the current conditions, the following recommendations are provided:

- Develop a formal emergency response plan in case of increased flow or evidence of anomalous behaviour.
- Make sure all supplies needed for emergency grouting are available on site and access to staff resources and equipment can proceed promptly if required. Recommended supplies include (see attachment A for potential suppliers and B for sample specification sheets):
  - Approximately 30 tonnes of cement Type GU in bulk bags and 18 tonnes of Type HE cement (15 pallets of 40 kg bags) to prepare the pumpcrete (excess capacity is important here).
  - 4 barrels of Rheomac UW450 (2 barrels to start, 2 barrels at a later date).
  - Adequate quantity of Glenium 3030NS; and
  - At least 300 m of 5'' ID casing.
- Proceed with detailed CPT investigation as planned to assess the current integrity of the cut-off wall.
- Continue close monitoring of instrumentation data and weir flows.
- Proceed with further mitigation grouting in anomalous behaviour zones. Previous emergency mitigation program was stopped because of the difficulty to assess actual gains. Mitigation grouting has to be resumed and planned for end of September or early October 2009, so the potential impact on the seepage rate can be better assessed prior to the onset of winter conditions.
- Revisit some fundamental issues with respect to currently planned Bay-Goose Dike construction activities:
  - The requirement to have an assessment of the level of compaction of Core Backfill to be able to compare relative density of dike construction material before and after compaction. This assessment is essential to be able to assess if material bulking has occurred following material entrainment.
  - The need to reduce uncertainties about the quality and the nature of the foundations. Any inconsistencies in bathymetric data need to be resolved before fill materials are placed.
  - The need to ensure proper foundation preparation is achieved prior to any placement of backfill materials.
  - The grouting strategy needs to be revisited in light of what has been accomplished in the upper bedrock with the previous program. Some modifications may be warranted to further reduce the risks of possible washout of infill material.
  - Revisit the question of the need for a less erosive cutoff wall.
  - Review the need for providing downstream drainage to relieve the potential for piping.

Yours very truly,

GOLDER ASSOCIATES LTD.

ORIGINAL SIGNED

Karine Doucet, B.Sc., P.Eng.
Geotechnical Engineer

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Fiona Esford, M.Sc., P.Eng.
Geotechnical Engineer

ORIGINAL SIGNED

Michel Julien, P.Eng.
Project Director, Principal

KD/FE/MJ/DRW/lw

Attachments: Figure 4: East Dike Sinkhole Excavation
Photographs 1 through 22
Attachment A: Potential Suppliers
Attachment B: Specification Reference Sheets

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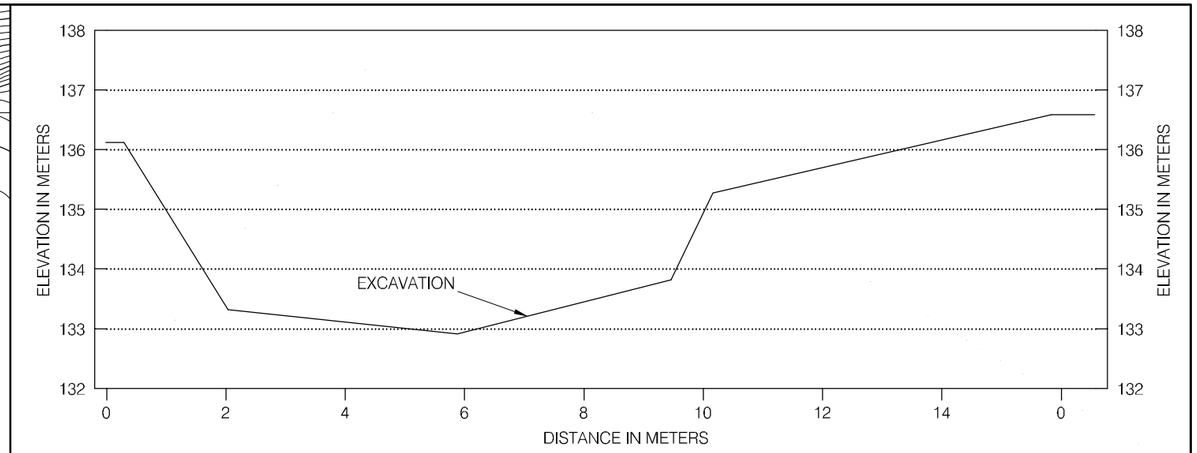
LEGEND:

- 120 — BATHYMETRIC MAJOR CONTOURS INTERVAL 2m
- BATHYMETRIC MINOR CONTOURS INTERVAL 0.5m



SINKHOLE EXCAVATION CROSS-SECTION

SCALE: 1:100

SECOND PORTAGE LAKE

TH842

SINKHOLE EXCAVATION

EAST DIKE

639400 E

60+650

60+600

60+550

60+500

60+450

7214400 N

7214200 N

7214000 N

7213800 N

NOTE: SURVEY DATA PROVIDED BY AEM.

0 25 50 75 100 m

PROJECT

AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE

EAST DIKE
SINKHOLE EXCAVATION

STAMP

2100-17	INSTRUMENTATION TYPICAL SECTION AND GROUTING PLAN							
DRAWING NO.	REFERENCES	REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW

Golder Associates

PROJECT No.		08-1428-0029	FILE No.	0814280028-4200-B-01
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REVISION DATE:09/08/04 11:30AM By: SDunsmoor

PHOTO 1: Excavation on east side of sinkhole (looking North- East) – beginning of works.

PHOTO 2: Excavation on East side of sinkhole (looking South East) – beginning of the works

PHOTO 3: Exposition of ¾'' frozen crushed stone material – depth of frozen materials decreases closer to sinkhole

PHOTO 4: Excavation of ¾ '' crushed stones material – materials appear intact next to sinkhole but no frozen material visible

PHOTO 5: Completion of excavation on East side of sinkhole – no evidence of transported materials

PHOTO 6: Start of excavation West of instrumentation cables in the area where sinkhole has occurred – frozen zones encountered quicker as excavation moves away from sinkhole

PHOTO 7: Frozen material around sinkhole – presence of casings for grouting - easy to break when in frozen ground.

PHOTO 8: Exposed sinkhole area being cleared of materials and casings.

PHOTO 9: Exposing progressively the sinkhole (looking West)

PHOTO 10: Edge of Sinkhole (looking West). Sinkhole or cavity is becoming obvious at the interface of frozen material and appears to have penetrated slurry wall.

PHOTO 11: Gap between frozen and unfrozen materials creating the cavity.

PHOTO 12: Progressive exposition of the cavity.

PHOTO 13: Excavation progressively opens area where the cavity or void located where sinkhole was observed.

PHOTO 14: Interior of Sinkhole looking West – penetrates partly the slurry wall – no explicit evidence of having crossed it – about 1.5m to reach end of cavity.

PHOTO 15: View from inside cavity – 0-3/4'' material accumulating at the base.

PHOTO 16 – Other view of cavity – It did penetrate slurry wall but stop into it from manual probing carried out.

PHOTO 17: Continuation of excavation of cavity to reach frozen materials.

PHOTO 18: Completion of cleaning up oz zone where sinkhole and cavity was located – needs to backfill since frozen material is thawing and sloughing quite quickly.

PHOTO 19: Final excavation on East side of instrumentation cable

PHOTO 20: Final excavation on West side of instrumentation cables where sinkhole was located has reached water level. Base is fairly solid.

PHOTO 21: Backfilling cleaned sinkhole area with till.

PHOTO 22: Completion of backfilling with till looking North. Backfilling done to level of cables of instruments.

BASF CANADA INC

Winnipeg

1 Research Rd Unit 600
Winnipeg, MB.
R3T 6E3
204-985-1888

Montreal

162 Barr Street
Montreal, QC H4T 1Y4
Tel. (514) 341-5411 (514) 341-5411
Fax. (514) 340-1248

PRODUCTS:

- Rheomac UW450
- Glenium 3030NS

ALTERNATIVE SUPPLIERS

THE EUCLID CHEMICAL COMPANY

19218 Redwood Road
Cleveland, OH 44110-2799
(216)-531-9222

PRODUCTS:

- Eucon AWA (anti-washout admixture);
- Eucon 37 (superplasticizer, naphthalene sulfonate based but compatible and recommended with AWA); and
- Plastol 5000 (superplasticizer, polycarboxylate based as alternative to Eucon; should check with manufacturer to ensure it is compatible however).

DISTRIBUTORS:

- **Wearing William Limited**
  725 Century Street
  Winnipeg, Manitoba R3H 0M2
  Phone: 204-786-8881

- **Specialty Construction**
  77 Paquin Road
  Winnipeg, Manitoba R2J 3V9
  Phone: 204-661-6738

- **Specialites Pierre Martin Incorporated**
  972 Frontenac
  Cap de la Madeleine, Quebec G8V 1G5
  Phone: 819-378-2889

- **Distributions Thermo-Fibres**
  1125, Manic
  Chicoutimi, Quebec G7K 1A1
  Phone: 418-543-1853

- **Geroquip Inc.**
  4795 Louis B. Mayer
  Laval, Quebec H7P 6G5
  Phone: 450-978-0200

- **Sico Inc.**
  2505 De La Metropole
  Entrepot "B"
  Longueuil, Quebec J4G 1E5
  Phone: 450-442-7999

- **Geroquip Inc.**
  2930 Watt
  Bureau 115
  Quebec, Quebec G1X 4G3
  Phone: 418-650-0900

SIKA COPORATION

201 Polito Avenue
Lyndhurst, NJ 07071

PRODUCTS:

- Sika Stabilizer VMA (anti-washout); and
- Sika Viscocrete 2100 (superplasticizer; polycarboxylate based; 4100 and 6100 as alternatives, should check with manufacturer to ensure it is compatible).

DISTRIBUTORS:

- **Brock White Construction Materials**
  450 Sheppard Street
  Winnipeg, MB R2X 2P8
  Tel.: 204-694-3600

- **National Concrete Accessories**
  542 Plinquet Street
  Winnipeg, MB R2J 2W6
  Tel.: 204-694-3600

- **Entreprises Givesco Inc.**
  841 du Royaume ouest
  Chicoutimi, QC G7H 5B1
  Tel.: 418-545-1945

- **Lefebvre & Benoit s.e.c.**
  120 Montée-du-Moulin
  Laval, QC H7N 3Y6
  Tel.: 450-667-6000

- **Entreprises Givesco Inc.**
  175 avenue St-Sacrement
  Québec, QC G1N 3X4
  Tel.: 418-871-3377

- **Produits & Services de la Construction (Québec) Inc.**
  1920 rue Léon-Harmel
  Québec, QC G1N 4K3
  Tel.: 418-687-2310

- **Produits de Béton Val d'Or Ltée**
  1281 5e rue
  Val d'Or, QC J9P 4A1
  Tel.: 819-824-3697

+MANY OTHERS IN QUEBEC

W.R. GRACE AND COMPANY

7237 East Gage Ave.
Los Angeles, CA 90040

PRODUCTS:

- V-MAR3 (anti-washout); and
- ADVA 100 (superplasticizer; polycarboxylated Polyether based, should check with manufacturer to ensure it is compatible).

DISTRIBUTORS:

- **National Concrete Accessories**
  542 Plinquet Street
  Winnipeg, MB
  phone : 204-233-4107

- **Givesco Inc.**
  175 St Sacrement
  Quebec city, QC
  phone : 418-871-3377

- **Groupe Bedard**
  13,145 Prince Arthur
  Montreal , QC
  phone : 514-642-8699

- **Givesco Inc.**
  9495 Pascal - Gagnon
  St-Leonard, QC
  phone : 514-327-7175

- **Givesco Inc.**
  150 Freeman
  Hull, QC
  phone : 819-770-5582

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ATTACHMENT B

SPECIFICATION REFERENCE SHEETS

Description

Rheomac UW 450 anti-washout admixture is a patented, ready-to-use, liquid cellulose-based admixture that is specially developed for underwater concrete applications. Concrete containing Rheomac UW 450 admixture exhibits superior resistance to washout of cement and fines, while impeding the blending of external water into the plastic concrete.

Applications

Recommended for use in:

- All types of underwater concreting where conventional concrete or placing techniques would result in a high percentage of material loss due to washout
- Mortar and grouting applications where mixtures are typically more fluid and have a higher potential for washout

RHEOMAC® UW 450

Anti-Washout Admixture

Features

- Reduction in washout of cement and fines
- Reduction in segregation, even with highly fluid, high water-to-cementitious materials ratio concrete mixtures
- Thixotropic action that provides concrete stiffening after placement
- Reduction or elimination of concrete bleeding

Benefits

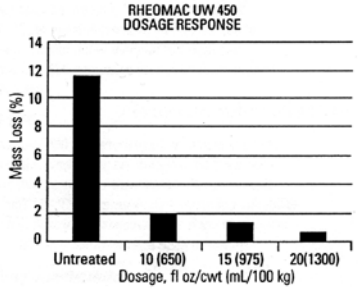
- Superior and predictable in-place concrete properties
- Dewatering costs reduced/eliminated
- Environmental impact of cement washout in water minimized
- Flexibility in batching procedures

Performance Characteristics

Washout Resistance: Washout is determined by Army Corps of Engineers CRD-C 61, "Test Method for Determining the Resistance of Freshly Mixed Concrete to Washing Out in Water". Test results show that the addition of Rheomac UW 450 anti-washout admixture to concrete significantly reduces the washout of cement and fines, compared to untreated concrete

Concrete Mixture Data (Non-Air-Entrained Concrete)

Cement Content	650 lb/yd^3 (386 kg/m^3)
Water–Cement Ratio	0.49
Slump	4 ± 0.5 in. (100 ± 10 mm)



Slump: Concrete that is designed for underwater placement applications is typically batched at an 8-10 in. (200-250 mm) slump. After Rheomac UW 450 admixture is added, a decrease in slump will be noted. It may be necessary to add additional high-range water-reducing admixture to achieve the slump required for placement. Slump evaluations for a 60 minute period show that Rheomac UW 450 admixture does not adversely affect concrete slump retention.

Air Content: A slightly higher dosage of air-entraining admixture may be required to achieve the desired air content when using Rheomac UW 450 admixture.

Setting Time: Rheomac UW 450 admixture has little to no effect on concrete setting time at commonly used dosages of 4-12 fl oz/cwt (260-780 mL/100 kg). Slight retardation of setting time may be experienced at dosages over 12 fl oz/cwt (780 mL/100 kg).

Compressive Strength: Using test specimens that are cast in air, concrete containing Rheomac UW 450 admixture may obtain slightly lower compressive strength when compared to untreated concrete. However, when strength is evaluated using test

specimens that are cast underwater, concrete containing Rheomac UW 450 admixture achieves higher strength because washout is minimized. In addition, most underwater concrete mixtures that are proportioned in accordance with ACI 304R, "Guide for Measuring, Mixing, Transporting, and Placing Concrete", exceed compressive strengths that are required for underwater applications. If necessary, a lower water-to-cementitious materials ratio may be used to achieve the desired results.

Guidelines for Use

Dosage: Rheomac UW 450 admixture is recommended for use at a dosage range of 4-20 fl oz/100 cwt (260-1300 mL/100 kg) of cementitious materials for most concrete mixtures. Because of variations in concrete materials, jobsite conditions and/or applications, dosages outside of the recommended range may be required.

Mixing: For underwater concrete placements, ACI 304R, Chapter 8, “Concrete Placed Underwater” provides certain basic mixture proportions such as:

- A minimum total cementitious material content of 600 lb/yd^3 (356 kg/m^3)
- Use of pozzolans approximately 15% by mass of cementitious materials
- A maximum water-to-cementitious materials ratio of 0.45
- Fine aggregate contents of 45-55% by volume of total aggregate
- Air contents of up to 5% are listed as desirable
- A slump of 6-9 in. (150-230 mm) is generally necessary and occasionally a slightly higher slump range is needed

Rheomac UW 450 admixture should be added with a water-reducing admixture, such as BASF Construction Chemicals PolyHeed® or Pozzolith® admixture lines. For achieving high slump concrete, use Rheomac UW 450 admixture in conjunction with a Glenium® high-range water-reducing admixture. This combination will produce a high-performance, flowing concrete that exhibits superior resistance to washout of cement and fines. Rheomac UW 450 admixture should be added after all other concreting ingredients have been batched and thoroughly mixed, either at the batch plant or at the jobsite.

Concrete Placement: Concrete containing Rheomac UW 450 admixture is easily pumped throughout the typical slump ranges that are used for underwater concreting. It is recommended that concrete containing Rheomac UW 450 admixture is placed by pump or tremie. Concrete placement should be continuous and without interruption. Keep the discharge point of the placement device immersed in the fresh concrete during placement.

It is not recommended that concrete containing Rheomac UW 450 admixture be allowed to free-fall through water during placement.

Product Notes

Compatibility: **Do not use Rheomac UW 450 admixture with naphthalene-based high-range water-reducing admixtures.** Erratic behaviors in slump, pumpability and washout may be experienced.

Storage and Handling

Storage Temperature: Rheomac UW 450 admixture must be stored at temperatures above 44 °F (7 °C) to avoid dispensing difficulties due to thickening. Do not allow Rheomac UW 450 admixture to freeze since it cannot be reconstituted after thawing.

Handling: Contact with water in hoses, pumps, tanks or receiving vessels must be avoided to prevent gelling when transferring Rheomac UW 450 admixture to other containers.

Shelf Life: Rheomac UW 450 admixture has a minimum shelf life of 12 months. Depending on storage conditions, the shelf life may be greater than stated. Please contact your BASF Construction Chemicals representative regarding suitability for use and dosage recommendations if the shelf life of Rheomac UW 450 admixture has been exceeded.

Dispensing: Consult your local BASF Construction Chemicals sales representative for the proper dispensing equipment for Rheomac UW 450 admixture. If dispensing directly from the 55 gal (208 L) drum, it is recommended that the larger 2 in. (50 mm) opening be used.

Packaging

Rheomac UW 450 admixture is supplied in 55 gal (208 L) drums, and 275 gal (1040 L) totes.

Related Documents

Material Safety Data Sheets: Rheomac UW 450 admixture.

Additional Information

For additional information on Rheomac UW 450 admixture or its use in developing concrete mixtures with special performance characteristics, contact your BASF Construction Chemicals representative.

The Admixture Systems business of BASF Construction Chemicals is a leading provider of innovative additives for specialty concrete used in the ready mix, precast, manufactured concrete products, underground construction and paving markets throughout the NAFTA region. The Company’s respected Master Builders brand products are used to improve the placing, pumping, finishing, appearance and performance characteristics of concrete.

BASF Construction Chemicals, LLC
Admixture Systems

www.masterbuilders.com
United States 23700 Chagrin Boulevard, Cleveland, Ohio 44122-5544 ■ Tel: 800 628-9990 ■ Fax: 216 839-8821
Canada 1800 Clark Boulevard, Brampton, Ontario L6T 4M7 ■ Tel: 800 387-5862 ■ Fax: 905 792-0651

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BASF
The Chemical Company

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Product Data
Cast-in-Place Concrete
Precast Concrete
Mass Concrete
Masonry Grouting

Description

Glenium 3030 NS ready-to-use full-range water-reducing admixture is a patented new generation of admixture based on polycarboxylate chemistry. Glenium 3030 NS admixture is very effective in producing concretes with different levels of workability including applications that require the use of Rheodynamic® Self-Consolidating Concrete (SCC). Glenium 3030 NS admixture meets ASTM C 494/C 494M requirements for Type A, water-reducing, and Type F, high-range water-reducing, admixtures.

Applications

Recommended for use in:

- Concrete where high flowability, high-early and ultimate strengths and increased durability are needed
- Self-consolidating concrete
- Concrete where normal, mid-range, or high-range water-reduction is desired
- Concrete where normal setting times are required
- 4x4™ Concrete for fast track construction
- Pervious Concrete
- Self-consolidating grout

GLENIUM® 3030 NS

Full-Range Water-Reducing Admixture

Features

- Reduced water content for a given slump
- Dosage flexibility for normal, mid and high-range water reduction
- Produces cohesive and non-segregating concrete mixture
- Increased compressive strength and flexural strength performance at all ages
- Providing faster setting times and strength development
- Enhanced finishability and pumpability

Benefits

- Providing economic benefits to the entire construction team through higher productivity and reduced variable costs

Performance Characteristics

Mixture Data: 600 lb/yd^3 of Type I cement (360 kg/m^3); slump, 8.5-9.25 in. (210-235 mm); non-air-entrained concrete; dosage rate adjusted to obtain 25-30% water reduction.

Setting Time

Mixture	Initial Set (h:min)	Difference (h:min)
Plain	4:24	–
Conventional Superplasticizer	6:00	+ 1.36
Glenium 3030 NS admixture	5:00	+0.36

Compressive Strength

Mixture	1 day		7 days	
psi	psi	MPa	psi	MPa
Plain	1700	12	4040	28
Conventional Superplasticizer	3460	24	6380	44
Glenium 3030 NS admixture	4120	28	7580	52

Slump Retention - in. (mm)

Mixture	Minutes		
	15	30	45
Plain	8.5 (215)	8.5 (215)	7.5 (200)
Conventional Superplasticizer	8.5 (215)	4.25 (110)	3.5 (90)
Glenium 3030 NS admixture	9.25 (235)	9.25 (235)	8.25 (210)

Master Builders

Product Data: GLENIUM® 3030 NS

Rate of Hardening: Glenium 3030 NS admixture is formulated to produce normal setting characteristics throughout its recommended dosage range. Setting time of concrete is influenced by the chemical and physical composition of the basic ingredients of the concrete, temperature of the concrete and ambient conditions. Trial mixtures should be made with actual job materials to determine the dosage required for a specified setting time and a given strength requirement.

Guidelines for Use

Dosage: Glenium 3030 NS admixture has a recommended dosage range of up to 3 fl oz/cwt (195 mL/100 kg) for Type A applications, 3-6 fl oz/cwt (195-390 mL/100 kg) for mid-range use and up to 18 fl oz/cwt (1,170 mL/100 kg) for Type F applications. The dosage range is applicable to most concrete mixtures using typical concrete ingredients. However, variations in job conditions and concrete materials, such as silica fume, may require dosages outside the recommended range. In such cases, contact your local BASF Construction Chemicals representative.

Mixing: Glenium 3030 NS admixture can be batched with the initial mixing water or as a delayed addition. However, optimum water reduction is generally obtained with a delayed addition.

Product Notes

Corrosivity – Non-Chloride, Non-Corrosive: Glenium 3030 NS admixture will neither initiate nor promote corrosion of reinforcing steel embedded in concrete, prestressed concrete or of galvanized steel floor and roof systems. Neither calcium chloride nor other chloride-based ingredients are used in the manufacture of Glenium 3030 NS admixture.

Compatibility: Glenium 3030 NS admixture is compatible with most admixtures used in the production of quality concrete, including normal, mid-range and high-range water-reducing admixtures, air-entrainers, accelerators, retarders, extended set control admixtures, corrosion inhibitors, and shrinkage reducers.

Do not use Glenium 3030 NS admixture with admixtures containing beta-naphthalene-sulfonate. Erratic behaviors in slump, slump flow, and pumpability may be experienced.

For directions on the proper evaluation of Glenium 3030 NS admixture in specific applications, contact your BASF Construction Chemicals representative.

Storage and Handling

Storage Temperature: If Glenium 3030 NS admixture freezes, thaw at 45 °F (7 °C) or above and completely reconstitute by mild mechanical agitation. ***Do not use pressurized air for agitation.***

Shelf Life: Glenium 3030 NS admixture has a minimum shelf life of 12 months. Depending on storage conditions, the shelf life may be greater than stated. Please contact your BASF Construction Chemicals representative regarding suitability for use and dosage recommendations if the shelf life of Glenium 3030 NS admixture has been exceeded.

Packaging

Glenium 3030 NS admixture is supplied in 55 gal (208 L) drums, 275 gal (1040 L) totes and by bulk delivery.

Related Documents

Material Safety Data Sheets: Glenium 3030 NS admixture.

Additional Information

For additional information on Glenium 3030 NS admixture or its use in developing concrete mixes with special performance characteristics, contact your BASF Construction Chemicals representative.

The Admixture Systems business of BASF Construction Chemicals is a leading provider of innovative admixtures for specialty concrete used in the ready-mixed, precast, manufactured concrete products, underground construction and paving markets throughout the North American region. The Company's respected Master Builders brand products are used to improve the placing, pumping, finishing, appearance and performance characteristics of concrete.

BASF Construction Chemicals
Admixture Systems

www.masterbuilders.com
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Canada 1800 Clark Boulevard, Brampton, Ontario L6T 4M7 ● Tel: 800 387-5862 ● Fax: 905 792-0651

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NSF Certified to NSF/ANSI 61

Master Builders

THE EUCLID CHEMICAL COMPANY
19218 REDWOOD ROAD • Cleveland, OH 44110
(216) 531-9222 • (800) 321-7628 • FAX (216) 531-9596
www.euclidchemical.com

EUCON AWA

ANTI-WASHOUT ADMIXTURE

✕ENG.SPECS ◆CATALOG INDEX
◆MSDS ◆SECTION INDEX
◆FRENCH ◆PRINT
✕SPANISH ◆EXIT CATALOG

EUCON AWA is a ready to use liquid admixture designed to prevent the loss of cement and fine aggregate during the placement of underwater concrete. EUCON AWA provides superior slump retention while greatly reducing the environmental impact due to cement wash out in below water applications.

PRIMARY APPLICATIONS

- Underwater bridge repair
- Dam repair below the waterline
- Underwater grouting and mortar application
- Damming underground rivers/lakes in mining operations
- Anti-segregation aid for use with lightweight and heavyweight aggregates
- Reduction or elimination of concrete bleed water for use with fast track construction

FEATURES / BENEFITS

- Minimal environmental impact due to cement washout
- Eliminates the need for expensive de-watering during underwater construction
- Greatly reduces or eliminates concrete bleed water
- Superior slump retention
- Does not effect water demand when slump is maintained
- Easily metered with standard admixture dispensing equipment

APPEARANCE

EUCON AWA is a medium viscosity, dark brown liquid which will not discolor concrete.

PACKAGING

EUCON AWA is packaged in 55 gallon (208 liter) drums and 5 gallon (18.9 liter) pails.

DIRECTIONS FOR USE

Underwater Applications:

To reduce the washout of cement and fine aggregates when placing concrete underwater, 10-32 oz per 100 lb (0.65-2.1 L/100 kg) of cement is recommended. The concrete should be batched and the slump adjusted with either water or a superplasticizer prior to the addition of EUCON AWA.

At a dosage rate of 25 oz per 100 lb of cement (1.6 L/100 kg), set retardation may be 6-10 hours.

Do not use water to adjust slump after EUCON AWA has been dispensed, instead, adjust slump through the use of a superplasticizer such as EUCON 37. Contact Euclid Chemical for a product recommendation.

If air entrainment is desired, the addition of the air entraining admixture should be added before EUCON AWA.

For further recommendations on underwater concreting and underwater concrete mix designs, please consult the ACI Manual of Concrete Practice 304 R, Chapter 8.

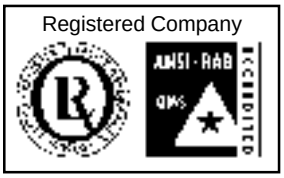
Anti-Segregation Application:

To reduce segregation in a concrete mix containing lightweight or heavyweight aggregates, 1-15 oz per 100 lb (0.07-0.98 L/100 kg) of cement is recommended. Air entraining admixtures should be added before the addition of EUCON AWA.

PRECAUTIONS / LIMITATIONS

- Do not allow material to freeze
- Air entraining agents must be added last
- Superplasticizers must be used to increase slump after the addition of EUCON AWA
- Significant set retardation may occur with the use of this product

Registered Company



Form Eucon AWA - 8.00

WARRANTY: The Euclid Chemical Company ("Euclid") solely and expressly warrants that its products shall be free from defects in materials and workmanship for six (6) months from the date of purchase. Unless authorized in writing by an officer of Euclid, no other representations or statements made by Euclid or its representatives, in writing or orally, shall alter this warranty. EUCLID MAKES NO WARRANTIES, IMPLIED OR OTHERWISE, AS TO THE MERCHANTABILITY OR FITNESS FOR ORDINARY OR PARTICULAR PURPOSES OF ITS PRODUCTS AND EXCLUDES THE SAME. If any Euclid product fails to conform with this warranty, Euclid will replace the product at no cost to Buyer. Replacement of any product shall be the sole and exclusive remedy available and buyer shall have no claim for incidental or consequential damages. Any warranty claim must be made within one (1) year from the date of the claimed breach. Euclid does not authorize anyone on its behalf to make any written or oral statements which in any way alter Euclid's installation information or instructions in its product literature or on its packaging labels. Any installation of Euclid products which fails to conform with such installation information or instructions shall void this warranty. Product demonstrations, if any, are done for illustrative purposes only and do not constitute a warranty or warranty alteration of any kind. Buyer shall be solely responsible for determining the suitability of Euclid's products for the Buyer's intended purposes.

EUCON 37

High Range Water Reducer - Superplasticizer

Euclid Concrete Admixtures

Description

EUCON 37 is a high range water-reducing admixture. It may be added to the concrete at the job site or at the ready mix concrete plant. No chlorides are used in its formulation; consequently, it is recommended for prestressed concrete. It is also very compatible with air-entraining agents, water proofing agents, calcium chloride and many other admixtures; however, each material should be added to the concrete separately.

Primary Applications

- High performance concrete
- General ready mix concrete
- Heavily reinforced concrete
- Flatwork and mass concrete
- Minimum water content concrete
- Low water/cement ratio concrete
- High slump, flowable concrete

Features/Benefits

- Produces low water content and low water/cement ratio concrete allowing higher strengths
- Produces flowing concrete with better than normal strengths
- Aids in concrete placement and reduces labor cost
- When used in precast work with Type I cement will produce the high early strengths

Technical Information

Typical Engineering Data
The following results were developed under laboratory conditions.

Compressive Strength % of Control

	Specification	Control	Eucon 37 Mix
1 day	Min 140	100	169.7
3 days	Min 125	100	161.4
7 days	Min 115	100	151.8
28 days	Min 110	100	153.8
6 months	Min 100	100	151.4

Flexural Strength % of Control

3 days	Min 110	100	144.2
7 days	Min 100	100	126.2
28 days	Min 100	100	117.1

Relative Durability

Factor	Min 80%	97.93%	96.79%

Appearance
EUCON 37 is a dark brown, free flowing liquid which when added to concrete, does not change the concrete's natural appearance.

Rate of Slump Loss
Concrete treated with EUCON 37 retains its plastic consistency for 30 to 60 minutes after dosing depending on the initial/final slumps and dosage rates. EUCON 37 can be added at the ready mix plant or at the job site from field dispensers.
Use EUCON 537 as a replacement for EUCON 37 when placing concrete in hot weather [>90°F (32°C)].

Typical Slump Loss at 70°F (21°C)
Initial Slump..... Slump after 30 minutes
8 1/2" (216 mm)..... 7" (178 mm)
9 1/2" (241 mm)..... 8" (203 mm)

Packaging

EUCON 37 is packaged in bulk, 275 gal (1041 L) totes, 55 gal (208 L) drums and 5 gal (18.9 L) pails.

Shelf Life

2 years in original, unopened package.

Specifications/Compliances

- Fully complies with the requirements of ASTM C 494, Types A & F admixtures.
- Fully complies with the requirements of AASHTO M 194.
- ANSI/NSF STD 61

The Euclid Chemical Company
19218 Redwood Rd. • Cleveland, OH 44110
Phone: [216] 531-9222 • Toll-free: [800] 321-7628 • Fax: [216] 531-9596
www.euclidchemical.com
An RPM Company

UL REGISTERED FIRM ISO 9001:2000 File#A5129

Directions for Use

Add EUCON 37 to the sand and water. It should not come into contact with dry cement.

High Strength Concrete

Dosage: Charge all concrete material in the proper order into the mixer with about 70% of the mixing water and mix five (5) minutes or 70 revolutions. Add additional water carefully to obtain the required slump and mix for three (3) additional minutes.

Use EUCON 37 at the rate of 10 to 15 oz per 100 lb (625 to 940 ml/100 kg) of cement.

The following low water/cement ratio mixes can be placed at slumps of 6 to 9" (152 to 229 mm).

Placeable Concrete

Charge all concrete material in the proper order into the mixer and mix five (5) minutes or 70 revolutions for a typical 3" (76 mm) slump mix. Add EUCON 37 and mix an additional one (1) minute.

Dosage: Use at the rate of 6 to 8 oz/100 lb (375 to 500 ml/100 kg) of cement.

The initial slump is generally 2" to 3" (51 to 76 mm). These mixes, with a water/cement ratio of 0.45 to 0.50 are often used in floor and slab mixes, to minimize water content, shrinkage and cracking.

Flowable Concrete

Charge all concrete material in the proper order into the mixer and mix five (5) minutes or 70 revolutions for a typical 3" (7.6 cm) slump mix. Add EUCON 37 and mix an additional three (3) minute.

Dosage: Use EUCON 37 at the rate of 10 to 12 oz/100 lb (625 to 750 ml/100 kg) of cement on conventional 3" (76 mm) slump concrete to achieve a flowable mix. The mix design must be proportioned on the basis of temperature, type of cement, and rate of slump loss required. The following table shows approximate quantities to be added for flowable concrete.

Initial Slump in(mm)	Dosage Cement oz/cwt (mL/100 kg)
4" (102)	8 to 10 (500 to 625)
3" (76)	10 to 12 (625 to 750)
2 1/2"(64)	12 to 14 (750 to 875)
2"(51)	14 to 16 (875 to 1000)
1 1/2"(38)	16 to 18 (1000 to 1125)

Placement: Concrete treated with EUCON 37 may be placed in the same fashion as conventional concrete.

Formwork: Forms for walls or narrow sections must be watertight, strong and have good bracing. During the "flowing period", when the concrete is at a slump of 7" to 9" (178 to 229 mm), the concrete will exert a higher pressure at the base of the form than conventional concrete. Formwork for slabs is the same as for conventional concrete.

Curing & Sealing: Proper curing procedures are important to ensure the durability and quality of concrete. To prevent surface cracking, cure flatwork with a high solids curing compound, such as SUPER AQUA-CURE VOX or SUPER REZ-SEAL.

Precautions/Limitations

- Care should be taken to maintain EUCON 37 above freezing; however, freezing and subsequent thawing will not harm the material if thoroughly agitated. Never agitate with air or an air lance.
- Test batches/mix designs/sample slabs may be required due to variations in local cement and aggregates.
- Keep concrete from freezing until a minimum strength of 1000 psi (7 MPa) is reached.
- Add to mix independent of other admixtures.
- In all cases consult the Material Safety Data Sheet before use.

WARRANTY: The Euclid Chemical Company ("Euclid") solely and expressly warrants that its products shall be free from defects in materials and workmanship for one (1) year from the date of purchase. Unless authorized in writing by an officer of Euclid, no other representations or statements made by Euclid or its representatives, in writing or orally, shall alter this warranty. EUCLID MAKES NO WARRANTIES, IMPLIED OR OTHERWISE, AS TO THE MERCHANTABILITY OR FITNESS FOR ORDINARY OR PARTICULAR PURPOSES OF ITS PRODUCTS AND EXCLUDES THE SAME. If any Euclid product fails to conform with this warranty, Euclid will replace the product at no cost to Buyer. Replacement of any product shall be the sole and exclusive remedy available and buyer shall have no claim for incidental or consequential damages. Any warranty claim must be made within one (1) year from the date of the claimed breach. Euclid does not authorize anyone on its behalf to make any written or oral statements which in any way alter Euclid's installation information or instructions in its product literature or on its packaging labels. Any installation of Euclid products which fails to conform with such installation information or instructions shall void this warranty. Product demonstrations, if any, are done for illustrative purposes only and do not constitute a warranty or warranty alteration of any kind. Buyer shall be solely responsible for determining the suitability of Euclid's products for the Buyer's intended purposes.

PLASTOL 5000

High Range Water Reducing Admixture

Euclid Concrete Admixtures

Description

PLASTOL 5000 is a ready to use polycarboxylate based, high range water-reducing admixture for concrete. PLASTOL 5000 increases early concrete strength as well as ultimate strength. PLASTOL 5000 can be used to produce increased concrete slump or to significantly reduce water demand for a specific slump. PLASTOL 5000 can be added at the plant or jobsite and is compatible with other admixtures. PLASTOL 5000 contains no added chlorides.

Primary Applications

- High performance concrete
- Self-compacting concrete
- Precast concrete
- Low water/cement ratio concrete
- High early strength applications

Features/Benefits

- Low water/cement ratio reduces water demand
- Self-compacting concrete reduces labor costs
- High early strength reduces energy costs
- Controlled setting times reduces labor costs

Technical Information

Typical Engineering Data

The following results were developed under laboratory conditions.

Compressive Strength psi (Mpa)

	Control Mix	PLASTOL 5000
1 day	1720 (11.9)	2610 (18)
3 days	3070 (21.2)	4260 (29.4)
7 days	3660 (25.2)	5420 (37.4)
28 days	4640 (32.0)	6200 (42.7)
6 months	5570 (38.4)	7560 (52.1)
1 year	5880 (40.5)	8010 (55.2)

Flexural Strength psi (Mpa)

	Control Mix	PLASTOL 5000
3 days	475 (3.2)	665 (4.6)
7 days	585 (4.0)	730 (5.0)
28 days	630 (4.3)	790 (5.4)

Time of Set

	Control Mix	PLASTOL 5000
Initial Set	4:49	4:30
Final Set	6:19	5:54

Relative Durability Factor 101.9%

Packaging

PLASTOL 5000 is packaged in bulk, 275 gal (1041 L) totes, 55 gal (208 L) drums and 5 gal (18.9 L) pails.

Shelf Life

2 years in original, unopened container.

Specifications/Compliances

Fully complies with the requirements of:

- ASTM C 494, Type F admixture and AASHTO M 194 Type F admixture.
- ASTM C 1017 as a Type I admixture.
- ANSI/NSF STD 61 registered

Directions for Use

PLASTOL 5000 can be used at dosage rates of 3 to 15 oz./100 lbs. (196 to 978 mL/100 kg) of cementitious material. After the addition of PLASTOL 5000, the concrete should be mixed for a minimum of five minutes. PLASTOL 5000 should be stored at temperatures above 32°F (0°C).

Compatibility: PLASTOL 5000 can be used with most other concrete admixtures. Contact your Euclid Chemical representative for recommendations when combining other admixtures with Plastol 5000.

The Euclid Chemical Company
19218 Redwood Rd. • Cleveland, OH 44110
Phone: [216] 531-9222 • Toll-free: [800] 321-7628 • Fax: [216] 531-9596
www.euclidchemical.com

An RPM Company

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Self-Consolidating Concrete

PLASTOL 5000 can be used to make self consolidating concrete in mixes with .30 or higher water/cement ratios. Contact your local Euclid Chemical representative for assistance with mix design adjustments and the optimization of dosages rates using a viscosity modifer such as VISCTROL or EUCON ABS. Typical PLASTOL 5000 dosages of 6 to12 oz/100 lbs of cement (391 to 782 mL/100 kg) will give required flow.

Precautions / Limitations

- PLASTOL 5000 should be added to the concrete independently of other admixtures and never directly on cement.
- Test should be conducted when using PLASTOL 5000 with air entrainment. Dosages of air-entraining admixtures may need to be lowered to achieve desired air content.
- In all cases consult the Material Safety Data Sheet before use.

WARRANTY: The Euclid Chemical Company ("Euclid") solely and expressly warrants that its products shall be free from defects in materials and workmanship for one (1) year from the date of purchase. Unless authorized in writing by an officer of Euclid, no other representations or statements made by Euclid or its representatives, in writing or orally, shall alter this warranty. EUCLID MAKES NO WARRANTIES, IMPLIED OR OTHERWISE, AS TO THE MERCHANTABILITY OR FITNESS FOR ORDINARY OR PARTICULAR PURPOSES OF ITS PRODUCTS AND EXCLUDES THE SAME. If any Euclid product fails to conform with this warranty, Euclid will replace the product at no cost to Buyer. Replacement of any product shall be the sole and exclusive remedy available and buyer shall have no claim for incidental or consequential damages. Any warranty claim must be made within one (1) year from the date of the claimed breach. Euclid does not authorize anyone on its behalf to make any written or oral statements which in any way alter Euclid's installation information or instructions in its product literature or on its packaging labels. Any installation of Euclid products which fails to conform with such installation information or instructions shall void this warranty. Product demonstrations, if any, are done for illustrative purposes only and do not constitute a warranty or warranty alteration of any kind. Buyer shall be solely responsible for determining the suitability of Euclid's products for the Buyer's intended purposes.

Product Data Sheet
Edition 12.2003
Identification no. 149-540
Sika Stabilizer VMA

Construction

Sika® Stabilizer VMA

Viscosity Modifying Admixture

Description	Sika Stabilizer VMA is ready to use liquid polymer-based viscosity regulating admixture.
Applications	Sika Stabilizer VMA is suitable for usage in cases when: ■ Higher viscosity is required ■ Improved stability during transportation is required ■ Lean and harsh concrete mix designs are used for SCC production ■ Manufactured sand and “Gap-graded” coarse aggregate is used ■ Lower pumping pressure is required
Advantages	■ Enhance stability of concrete mixture ■ Improve distribution of aggregate in the concrete mixture ■ Increase the cohesiveness of lean and harsh mix designs ■ Reduce segregation and bleeding ■ Decreases pumping pressures ■ Improve surface finishability ■ Reduces pumping pressure Sika Stabilizer VMA within the recommended dosage, has no negative influence on compressive strengths. Sika Stabilizer VMA is not a water-reducing admixture. Recommended for production of Self Consolidating Concrete where high flow and improved cohesiveness of the concrete mix design are required. Sika Stabilizer VMA increases the workability, finishability and pumpability of concrete. Sika VMA does not contain calcium chloride or any other intentionally added chlorides. Sika VMA does not initiate or promote the corrosion of steel in contact with the concrete. The effect of Sika Stabilizer VMA on the bond strength of prestressed and post-tensioning strands is unknown and requires further investigation.

How to Use

Dosage	Dosage rates will vary according to materials used, ambient conditions and the requirements of a specific project. Sika recommends dosage at 2-10 fl.oz. per 100 lbs. (130-650 ml./100 kg.) of cementitious for general concrete applications.

Construction

Mixing

For best results Sika Stabilizer VMA should be added into concrete in the end of the batching cycle, after all admixtures have been introduced and properly mixed.

Sika Stabilizer VMA may also be dispensed into freshly mixed concrete in a ready mix truck at the concrete plant or at the job site.

Compatibility with other Admixtures: Sika Stabilizer VMA is highly effective in combination with Sika's ViscoCrete product line.

Sika Stabilizer VMA can be used in combination with Sika's full admixture range.

Packaging

Sika Stabilizer VMA is available in 55 gallon (208 liter) drums or 275 gallon (1040 liter) totes.

Storage and Shelf Life

Sika Stabilizer VMA should be stored at above 40°F (5°C). If frozen, thaw and agitate thoroughly to return to normal state.

Shelf life when stored in dry warehouse conditions between 50°F and 80°F (10°C and 27°C) is one year minimum.

Typical Data

Appearance	Clear, light Green liquid.
Specific Gravity	Approx. 1.0

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KEEP OUT OF REACH OF CHILDREN
NOT FOR INTERNAL CONSUMPTION
FOR INDUSTRIAL USE ONLY
CONSULT MATERIAL SAFETY DATA SHEET FOR MORE INFORMATION

Sika warrants this product for one year from date of installation to be free from manufacturing defects and to meet the technical properties on the current technical data sheet if used as directed within shelf life. User determines suitability of product for intended use and assumes all risks. Buyer's sole remedy shall be limited to the purchase price or replacement of product exclusive of labor or cost of labor.

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Visit our website at www.sikausa.com **1-800-933-SIKA NATIONWIDE**

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Product Data Sheet
Edition 12.2005
Identification no. 781-540
Sika ViscoCrete 2100

Sika ViscoCrete® Technology

Sika® ViscoCrete® 2100

High Range Water Reducing Admixture

Construction

Description

Sika ViscoCrete 2100 is a high range water reducing and superplasticizing admixture utilizing Sika's 'ViscoCrete' polycarboxylate polymer technology.

Sika ViscoCrete 2100 meets the requirements for ASTM C-494 Types A and F.

Applications

Sika ViscoCrete 2100 may be used in both ready mix and precast applications, as a plant added high range water reducer to provide excellent plasticity while maintaining slump for up to 90 minutes. Controlled set times make Sika ViscoCrete 2100 ideal for horizontal and vertical applications.

Sika ViscoCrete 2100 is ideal for production of Self Consolidating Concrete (SCC).

Advantages

Water Reduction: Sika ViscoCrete 2100 can be dosed in small amounts to obtain water reduction from 10-15%, and will achieve water reduction up to 45% at high dosage rates.

Sika ViscoCrete 2100 is suitable for all levels of water reduction.

High Plasticity: The superplasticizing action of Sika ViscoCrete 2100 provides high-slump, flowing concrete that maintains excellent workability and may be placed with minimal vibration even at very low water cement ratio's as low as 0.25.

Sika ViscoCrete 2100 plasticized concrete is highly fluid while maintaining complete cohesion within the concrete matrix to eliminate excessive bleeding or segregation.

Extended Slump Life and Set Control: Sika ViscoCrete 2100 has been formulated to provide controlled and predictable extended slump life for periods of 60 to 90 minutes with normal set times.

The combined high range water reduction and superplasticizing action of Sika ViscoCrete 2100 provide the following benefits in hardened concrete:

- Higher ultimate strengths allow for greater engineering design flexibility and structural economies.
- Reduced water cement ratios produce more durable, dense concrete with reduced permeability.
- Highly effective plasticizer reduces surface defects in concrete elements and improves aesthetic appearance.

It has been formulated to provide maximum water reduction and extended slump retention at low dosages.

How to Use

Dosage

Dosage rates will vary according to materials used, ambient conditions and the requirements of a specific project. Sika recommends dosage at 2-6 fl. oz. per 100 lbs. (130-390 ml/100 kg) of cementitious for conventional concrete applications. If high slump or Self Consolidating Concrete (SCC) is required, dosage from 6-12 fl.oz./100 lbs. (390-780 ml/100 kg.) of cementitious may be used.

Dosage rates outside the recommended range may be used where specialized materials such as microsilica are specified, extreme ambient conditions are encountered or unusual project conditions require special consideration. In thi case, Please contact your local regional Sika office or Sika Technical Service Department 1-800- 933-7452 for more information and assistance.

Sika®

Construction

Mixing	For best superplasticizing results, add Sika ViscoCrete 2100 directly to freshly mixed concrete in the concrete mixer at the end of the batching cycle. Sika ViscoCrete 2100 may also be dispensed as an integral material during the regular admixture batching cycle or into freshly mixed concrete in a Ready-Mix truck at the concrete plant. To optimize the superplasticizing effect, after the addition Sika ViscoCrete 2100 Sika recommends that the combined materials be mixed for 80-100 revolutions, either in the concrete mixer or in the Ready-Mix truck. **Combination with other admixtures:** Sika ViscoCrete 2100 is highly effective as single admixture or in combination with other admixtures in the Sika System. If used in combination with certain Sikament high range water reducers it may affect the plastic properties of fresh concrete. Please contact a Sika representative for further information. **Combination with microsilica:** Sika ViscoCrete 2100 is particularly well suited for use with microsilica because of its water reduction capability and superior slump control.
Packaging	Sika ViscoCrete 2100 is available in 55 gallon drum (208 liter), 275 gallon totes (1040 liters) drums and bulk delivery.
Storage and Shelf-life	Sika ViscoCrete 2100 should be stored at above 35°F (2°C). If frozen, thaw and agitate thoroughly to return to normal state. Shelf life when stored in dry warehouse conditions between 50°F and 80°F (10°C - 27°C) is one year.

Typical Data

Appearance	Light Blue liquid.
Specific Gravity	Approx. 1.1
CAUTION: IRRITANT	Contains aqueous polymer solution (CAS: Mixture). May cause eye/skin/respiratory irritation. May be harmful if swallowed.
Handling and Storage	Avoid direct contact. Wear personal protective equipment (chemical resistant goggles/gloves/clothing) to prevent direct contact with skin and eyes. Use only in well ventilated areas. Wash thoroughly with soap and water after use. Remove contaminated clothing and launder before reuse.
First Aid	**Eyes:** Hold eyelids apart and flush thoroughly with water for 15 minutes. **Skin:** Remove contaminated clothing. Wash skin thoroughly for 15 minutes with soap and water. **Inhalation:** Remove person to fresh air. **Ingestion:** Do not induce vomiting. Dilute with water. Contact physician. **In all cases contact a physician immediately if symptoms persist.**
Clean Up	Use personal protective equipment (chemical resistant goggles/gloves/clothing). Without direct contact, remove spilled or excess product and place in suitable sealed container. Dispose of excess product and container in accordance with applicable environmental regulations.

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Quality Certification Numbers: Lyndhurst: FM 69711 (ISO 9000), FM 70421 (QS 9000), Marion: FM 69715, Kansas City: FM 69107, Santa Fe Springs: FM 69408

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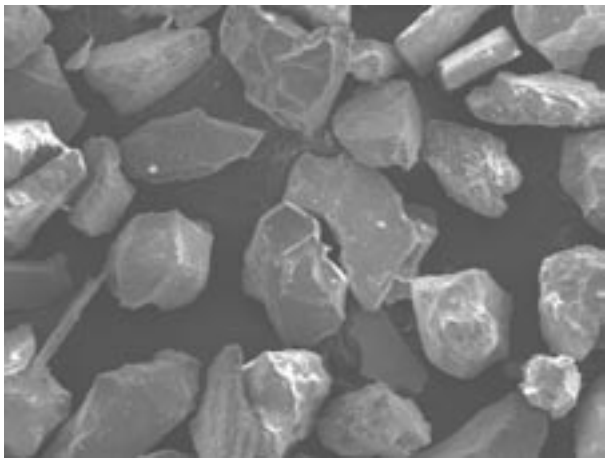
TECHNICAL BULLETIN TB-1402

Using V-MAR® 3 (Rheology Modifying Admixture) to Reduce Concrete Pump Pressure



The successful pumping of concrete is dependent on a number of factors including having a suitable concrete mix. Fine, naturally-rounded sand is ideal for producing pumpable concrete, but as the supply of fine, naturally rounded sand decreases, concrete producers are forced to utilize materials such as manufactured sands that are often coarse, angular, and gap-graded. Use of these materials can lead to segregation while pumping, and increased pump pressure. The fundamental reason coarse angular sands do not perform as well as naturally-rounded sand is due to their inability to "flow" within the concrete matrix.

V-MAR® 3 has a unique polymeric structure that, under the influence of energy (e.g. vibration or pumping), aligns itself and allows coarse angular sand to flow similarly to naturally-rounded sand. At this point the polymers slide over each other in the direction of flow and reduce the yield stress of the concrete, essentially lubricating the pump hose, reducing internal friction, and reducing the pressure necessary to pump the concrete. As energy is removed, the polymers interlock leaving the concrete as it was before movement.

Stationary Concrete Polymers Interlocked

Moving Concrete Polymers Aligned

Stationary Concrete Polymers Interlocked

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VMAR 3 has been shown to have a neutral effect on most concrete properties, as evidenced by the setting time, air entrainment, and compressive strength data in Table 1 below.

Table 1 – Neutral Effect of V-MAR 3 on Concrete Properties (SI Units)

Cement, kg/m^3	335	335	335	335	335
Stone, kg/m^3	798	798	798	798	798
Total Sand, kg/m^3	1026	1026	1026	1026	1026
Total Mix Water, kg/m^3	193	193	193	193	193
HRWR Admixture, mL/100 kg	300	300	300	300	300
V-MAR 3, mL/100 kg	**—**	**60**	**110**	**170**	**220**
Air, %	1.1	1.5	1.3	1.4	1.6
Initial Set, hrs:min	4:10	3:55	4:10	4:15	4:25
Compressive Strength @ 1 Day, MPa	11.0	10.3	10.9	10.9	10.8
Compressive Strength @ 7 Days, MPa	24.5	25.4	24.9	26.3	27.9
Compressive Strength @ 28 Days, MPa	31.2	32.7	32.5	33.1	35.6

Table 1 – Neutral Effect of V-MAR 3 on Concrete Properties (English Units)

Cement, lb/yd^3	564	564	564	564	564
Stone, lb/yd^3	1345	1345	1345	1345	1345
Total Sand, lb/yd^3	1730	1730	1730	1730	1730
Total Mix Water, lb/yd^3	325	325	325	325	325
HRWR Admixture, oz/cwt	4.6	4.6	4.6	4.6	4.6
V-MAR 3, oz/cwt	**—**	**0.9**	**1.7**	**2.6**	**3.4**
Air, %	1.1	1.5	1.3	1.4	1.6
Initial Set, hrs:min	4:10	3:55	4:10	4:15	4:25
Compressive Strength @ 1 Day, lb/in.^{2}	1600	1500	1580	1580	1560
Compressive Strength @ 7 Days, lb/in.^{2}	3560	3680	3610	3820	4040
Compressive Strength @ 28 Days, lb/in.^{2}	4530	4740	4720	4800	5170

The following examples show how the incorporation of manufactured sand in pumped concrete was made possible by utilizing V-MAR 3 as a pumping aid. The addition of V-MAR 3 to the concretes led to pump pressures being maintained at levels equal to or below the pressures produced by the control concrete, which did not contain manufactured sand.

Example 1 – Portland Cement Concrete (SI Units)

Manufactured Sand Content	**0%**	**40%**	**40%**	**60%**	**60%**
Cement, kg/m^3	274	282	272	275	271
Stone, kg/m^3	964	979	957	946	955
Total Sand, kg/m^3	883	905	914	921	907
Total Mix Water, kg/m^3	196	201	201	206	201
WR Admixture, mL/100 kg	190	190	190	190	190
V-MAR 3, mL/100 kg	**—**	**—**	**185**	**—**	**185**
Slump, mm	114	95	127	114	127
Air, %	1.1	0.8	0.8	0.8	0.8
Pump Pressure, MPa	**6.5**	**7.6**	**6.5**	**10.9**	**4.8**

Example 1 – Portland Cement Concrete (English Units)

Manufactured Sand Content	**0%**	**40%**	**40%**	**60%**	**60%**
Cement, lb/yd^3	462	475	459	464	457
Stone, lb/yd^3	1625	1651	1613	1594	1611
Total Sand, lb/yd^3	1488	1526	1542	1553	1530
Total Mix Water, lb/yd^3	330	338	340	347	339
WR Admixture, oz/cwt	3	3	3	3	3
V-MAR 3, oz/cwt	**—**	**—**	**2.8**	**—**	**2.8**
Slump, in.	4.50	3.75	5.00	4.50	5.00
Air, %	1.1	0.8	0.8	0.8	0.8
Pump Pressure, lb/in.^{2}	**950**	**1100**	**950**	**1580**	**700**

It must be noted that these are examples only. The use of manufactured sand from different sources and/or in different amounts will have different effects on pumping pressure, and the V-MAR 3 requirements will also vary. Tests must be conducted on the various mix designs, replacement amounts of manufactured sand, and dosage rates of V-MAR 3 before the start of a project. An improper mix design, although pumpable, may still be harsh and difficult to place.

Example 2 – Portland Cement/Fly Ash Concrete (SI Units)

Manufactured Sand Content	0%	40%	40%	60%	60%	80%*	80%*
Cement, kg/m^3	248	248	252	253	243	246	244
Fly Ash, kg/m^3	65	65	66	66	64	66	64
Stone, kg/m^3	967	968	970	939	926	917	922
Total Sand, kg/m^3	887	899	880	926	926	931	935
Total Mix Water, kg/m^3	178	181	180	177	182	180	186
WR Admixture, mL/100 kg	260	260	260	260	260	260	260
V-MAR 3, mL/100 kg	**—**	**—**	**165**	**—**	**165**	**—**	**165**
Slump, mm	127	115	140	127	127	115	115
Air, %	1.1	0.8	0.9	1.3	0.9	0.8	0.8
Pump Pressure, MPa	**7.6**	**8.6**	**7.6**	**9.0**	**7.6**	**19.3**	**7.9**

Example 2 – Portland Cement/Fly Ash Concrete (English Units)

Manufactured Sand Content	0%	40%	40%	60%	60%	80%*	80%*
Cement, lb/yd^3	417	418	425	427	410	415	411
Fly Ash, lb/yd^3	110	110	111	111	108	111	108
Stone, lb/yd^3	1630	1632	1636	1583	1562	1547	1555
Total Sand, lb/yd^3	1496	1515	1483	1560	1562	1570	1577
Total Mix Water, lb/yd^3	300	305	303	298	306	304	313
WR Admixture, oz/cwt	4	4	4	4	4	4	4
V-MAR 3, oz/cwt	**—**	**—**	**2.5**	**—**	**2.5**	**—**	**2.5**
Slump, in.	5.0	4.5	5.5	5.0	5.0	4.5	4.5
Air, %	1.1	0.8	0.9	1.3	0.9	0.8	0.8
Pump Pressure, lb/in.^{2}	**1100**	**1250**	**1100**	**1300**	**1100**	**2800**	**1150**

* *In the extreme case of using 80% manufactured sand in these lean mixes, the untreated concrete segregated during the pumping process, and pump pressures rose to unsustainable levels. However, even though the use of V-MAR 3 reduced the pump pressure to "normal" levels, and the concrete was placeable, it remained more difficult to place than the control mix.*

Conclusion:

The use of V-MAR 3 in pumped concretes incorporating different levels of manufactured sand reduced the resultant pumping pressures back to the same level as the control concrete, which did not contain manufactured sand.

Since V-MAR 3 is treating the free water in the mix and not the cement (as most admixtures do), dosage rates were originally quoted based on the free water in the concrete. Although accurate, this nomenclature has proved confusing to those used to the more familiar dosage units for admixtures. Thus, typical V-MAR 3 dosages required for pumping applications are found in the range of 1.95 - 3.90 mL/L (¼ - ½ fl oz/gal) of water in the concrete, or 96 - 160 mL/100 kg (1½ - 2½ fl oz/100 lbs) of cementitious materials.

North American Customer Service: 1-877-4AD-MIX1 (1-877-423-6491)

Visit our web site at www.graceconstruction.com

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GRACE Construction Products

TECHNICAL BULLETIN TB-1602

Using V-MAR® 3 (Rheology Modifying Admixture) to Place Underwater Concrete

The ability to directly place concrete underwater is desirable because the concrete can be placed by tremie, pump or free dump into areas covered with water, without the need to dewater the site, thus lowering construction costs.

In the past, environmental agencies have expressed concern about the effects of alkalis and washed-out cement particles on aquatic life. One way to at least partially address these concerns is by using antiwashout concrete admixtures.

The successful placement of concrete underwater is dependent on a number of factors including having a suitable concrete mix. A highly flowable, low water to cement ratio concrete, manufactured with relatively high amounts of fine sand is usually a minimum requirement. Additional recommendations for underwater concrete mix proportioning and placement can be found in ACI 304R (Guide for Measuring, Mixing, Transporting, and Placing Concrete) and ACI 546.2R (Guide to Underwater Repair of Concrete).

The U.S. Army Corps of Engineers has been instrumental in developing tools to aid the industry in the development of suitable mixtures for placing concrete underwater. The two key documents produced to date are CRD-C 61-89A Test Method for Determining the Resistance of Freshly Mixed Concrete to Washing Out in Water (issued 12/01/1989) and CRD-C 661-06 Specification for Antiwashout Admixtures for Concrete (issued 03/01/2006).

V-MAR® 3 has a unique polymeric structure that, under the influence of energy (e.g. vibration, mixing or pumping), aligns itself and allows concrete to easily flow. At this point the polymers slide over each other in the direction of flow and reduce the yield stress of the concrete. As energy is removed, the polymers interlock leaving the concrete as it was before movement. These properties make V-MAR 3 an ideal candidate for use as an Antiwashout Admixture.

Typical specifications call for 5–8% maximum washout to reduce laitance. Although these limits are relatively easy to achieve in the lab, under field conditions such limits are rather difficult to achieve. The use of an antiwashout admixture, such as V-MAR 3, can simplify the approach to developing a mix design with the required level of washout resistance. Although an actual washout of 5–8% sounds like a large amount of material to be discharged into a body of water, Fig. 1 shows that such a weight loss can have a rather negligible effect on the make-up of the concrete mixture being placed.

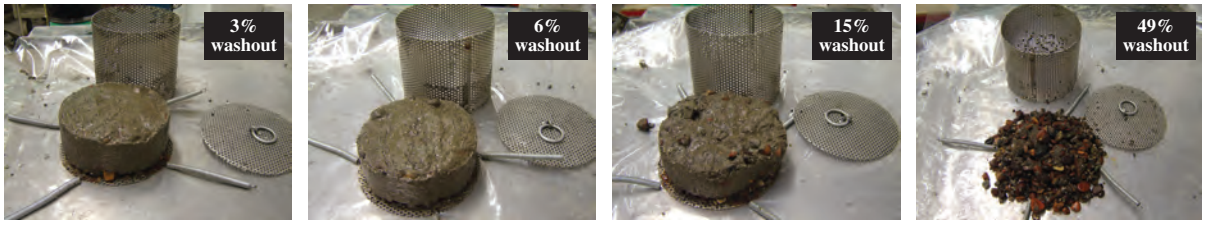

Figure 1. Visual representation of the effect of various levels of washout resistance.

The negligible effect of a 5–8% washout can also be surmised from the data in Table 1, which clearly illustrates how the use of V-MAR 3 can significantly reduce the amount of washout from concrete without much of an impact on the other physical properties of the concrete. We can see that it has no measurable effect on time of set, and an insignificant impact on air entrainment and strength development.

GRACE Construction Products

Table 1. V-MAR 3 Performance in Tests Done According to CRD-C 661-06

Materials/Properties	English Units				SI Units			
Cement	lbs/yd^3	675	675	675	kg/m^3	400	400	400
Stone	lbs/yd^3	1565	1565	1565	kg/m^3	929	929	929
Total Sand	lbs/yd^3	1565	1565	1565	kg/m^3	929	929	929
Total Mix Water	lbs/yd^3	270	270	270	kg/m^3	160	160	160
ADVA® 360	oz/100 lbs	4.75	5.00	5.25	mL/100 kg	180	190	200
V-MAR 3	**oz/100 lbs**	**–**	**8.0**	**9.0**	**mL/100 kg**	**–**	**310**	**350**
Slump	in.	6.25	6.75	7.00	mm	160	170	180
Air	%	3.4	2.8	3.9	%	3.4	2.8	3.9
Initial Set	hrs:min	3:40	3:40	3:40	hrs:min	3:40	3:40	3:40
Compressive Strength @ 3 Days	lbs/in.^{2}	5100	5040	4850	MPa	35.2	34.8	33.4
Compressive Strength @ 7 Days	lbs/in.^{2}	6060	6190	5820	MPa	41.8	42.7	40.1
Compressive Strength @ 28 Days	lbs/in.^{2}	7490	7600	7210	MPa	51.6	52.4	49.7
Shrinkage Increase over Control	%	–	-0.009	-0.002	%	–	-0.009	-0.002
Washout	**%**	**14.9**	**5.8**	**3.1**	**%**	**14.9**	**5.8**	**3.1**

CRD-C 661-06 requires that a control mix design be chosen that exhibits 10–20% weight loss (washout). The test mixture (concrete containing the antiwashout admixture) must then be able to reduce the amount of washout to 50%, or less, of the control to be classified as an antiwashout admixture. As with other concrete standards, such as ASTM C494, this specification is designed to ascertain whether a product exhibits performance characteristics suitable for use as an antiwashout admixture, and not to provide a universal underwater concrete mix design.

For specific projects, maximum washout specifications will influence how the concrete is proportioned. Maximum antiwashout limits are typically 5–8%, depending on the perceived threat to the environment. The concrete will typically have a high cementitious content, 600 lbs/yd^3 (356 kg/m^3) or higher, and a maximum w/cm of 0.45 or less. Pozzolans are frequently used to improve flow characteristics and reduce potential for laitance. Fine aggregate contents are in the 45–55% range by volume of total aggregate, and slumps run 6–9 in. (150–230 mm) or even higher, if long flows are required. Air entrainment should be avoided unless the concrete will be exposed to freezing and thawing cycles.

Final mixture selection should be based, if possible, on test placements made under water in a placement box or in a pit that can be dewatered after placement. Test placements should be examined for concrete surface flatness, amount of laitance present, quality of concrete at the extreme flow distance, and flow around embedded items, if appropriate.

Concrete placed under water can be expected to be of excellent quality, as curing conditions will be excellent and the compressive strengths of the rich mixtures will often range from 4000 to 8000 psi (28 to 55 MPa).

Conclusion

V-MAR 3 has been shown to exhibit adequate antiwashout properties when tested according to CRD-C 661-06. However, since antiwashout performance is very dependent on mix proportions, fineness of materials, w/c ratio, and slump, potential mix designs for a specific project should be tested, with actual job materials, to ensure that the antiwashout performance of the chosen concrete design will meet the actual project specification.

North American Customer Service: 1-877-4AD-MIX1 (1-877-423-6491)

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GRACE Construction Products

December 15, 2009

REPORT ON

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

Submitted to:
Agnico-Eagle Mines Limited
Meadowbank Division
P.O. Box 540
Baker Lake, Nunavut
X0C 0A0

REPORT

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CD of Report

List of Acronyms and Abbreviations

%	percent
^{o}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 or 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 4.6×10^{-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 1×10^{-8} m/s and 2.8×10^{-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.

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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.

VAULT LAKE

VAULT PIT

PHASER LAKE

VAULT ROCK STORAGE FACILITY

TURN LAKE

DRILL TAIL LAKE

VAULT HAUL ROAD

SECOND PORTAGE LAKE

W.L. 133.1 ±

THIRD PORTAGE LAKE

W.L. 134.1 ±

EAST DIKE

BAY-GOOSE DIKE (FUTURE DEVELOPMENT)

PORTAGE PIT

CENTRAL DIKE

WEST CHANNEL DIKE

TEARDROP LAKE

PORTAGE ROCK STORAGE FACILITY

TAILINGS STORAGE FACILITY (FUTURE DEVELOPMENT)

ROM PILE

FUEL STORAGE

GOOSE ISLAND PIT

STORMWATER DIKE

AIRSTRIP

PLANT SITE

SOUTH SADDLE DAM

WATER INTAKE

THIRD PORTAGE LAKE

ALL-WEATHER PRIVATE ACCESS ROAD

7212500 N
7215000 N
7217500 N
7218250 N
7215000 N
7213750 N
620000 E
635000 E
637500 E

LEGEND:

120 — 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.

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.

0 200 400 600 800 1000

Scale in Metres

PROJECT

AEM

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	Figure 1		
CHECK	-	-			
REVIEW	-	-			

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

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

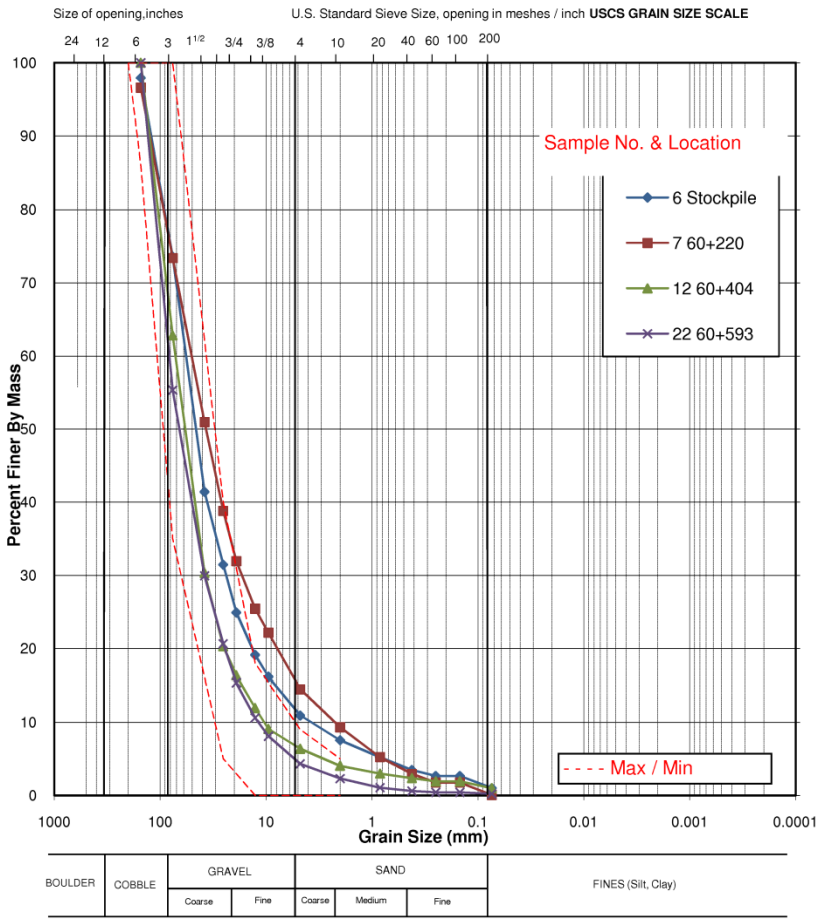
PARTICLE SIZE ANALYSIS OF SOILS

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	**Other:**	see comment
	x	**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)	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: 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 Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C8

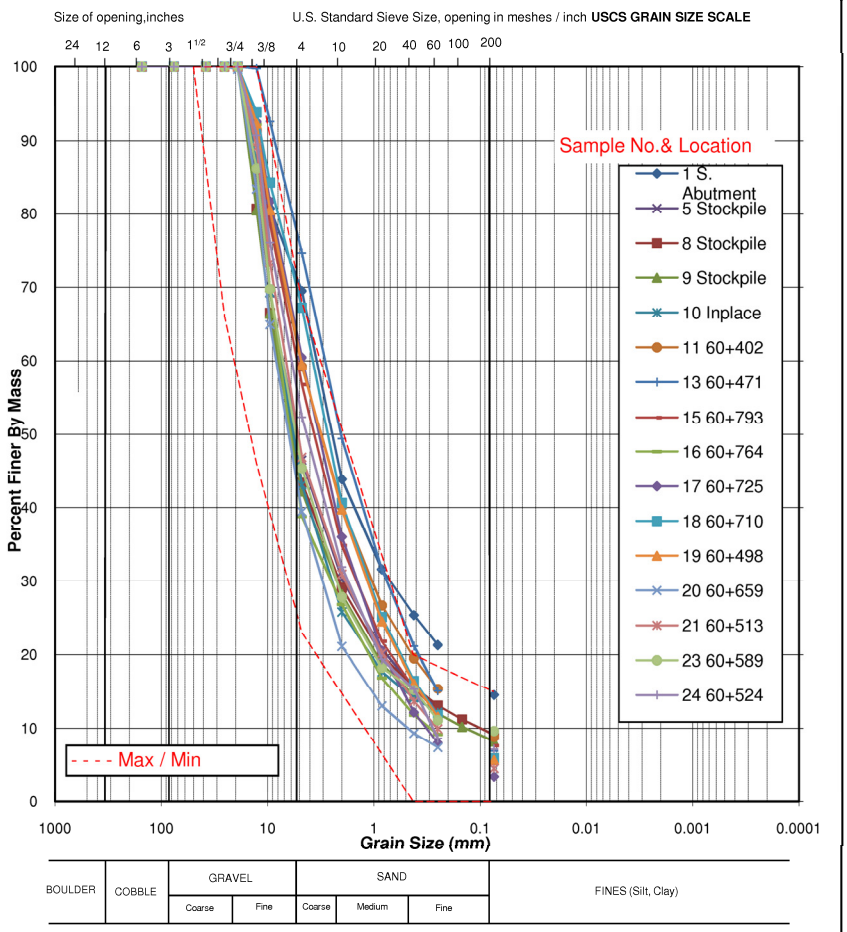
PARTICLE SIZE ANALYSIS OF SOILS

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 :	Core Backfill	**Other:**	see comment
	x	**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

AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE

GRADATION SUMMARY CORE BACKFILL

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

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

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

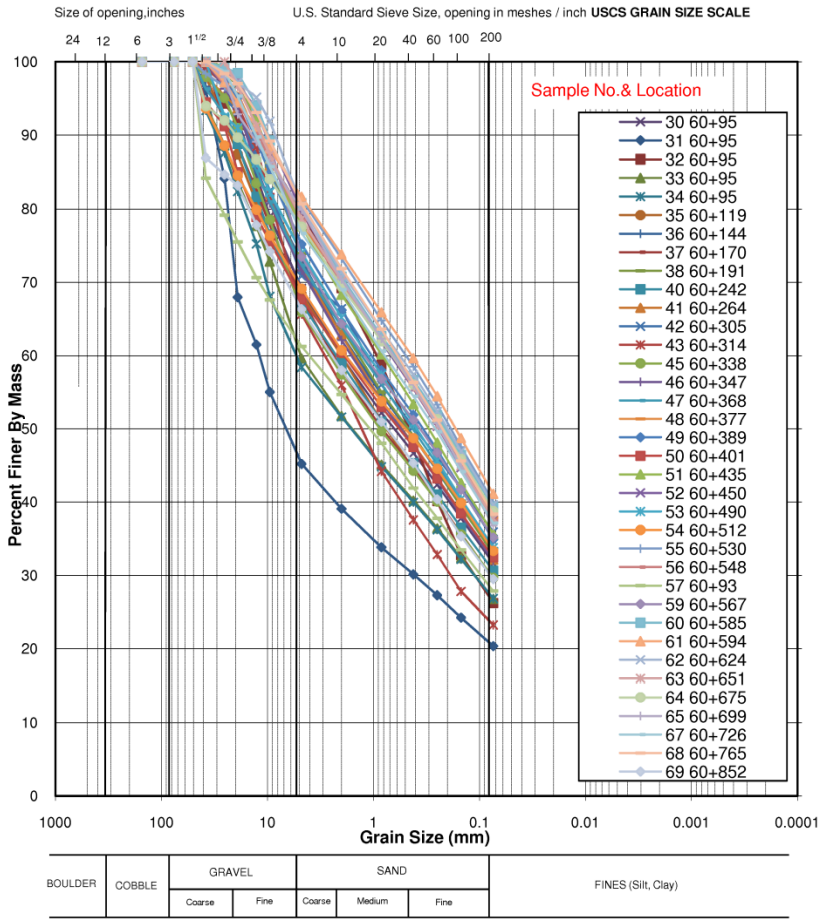
PARTICLE SIZE ANALYSIS OF SOILS

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)	Sieve Size (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	



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

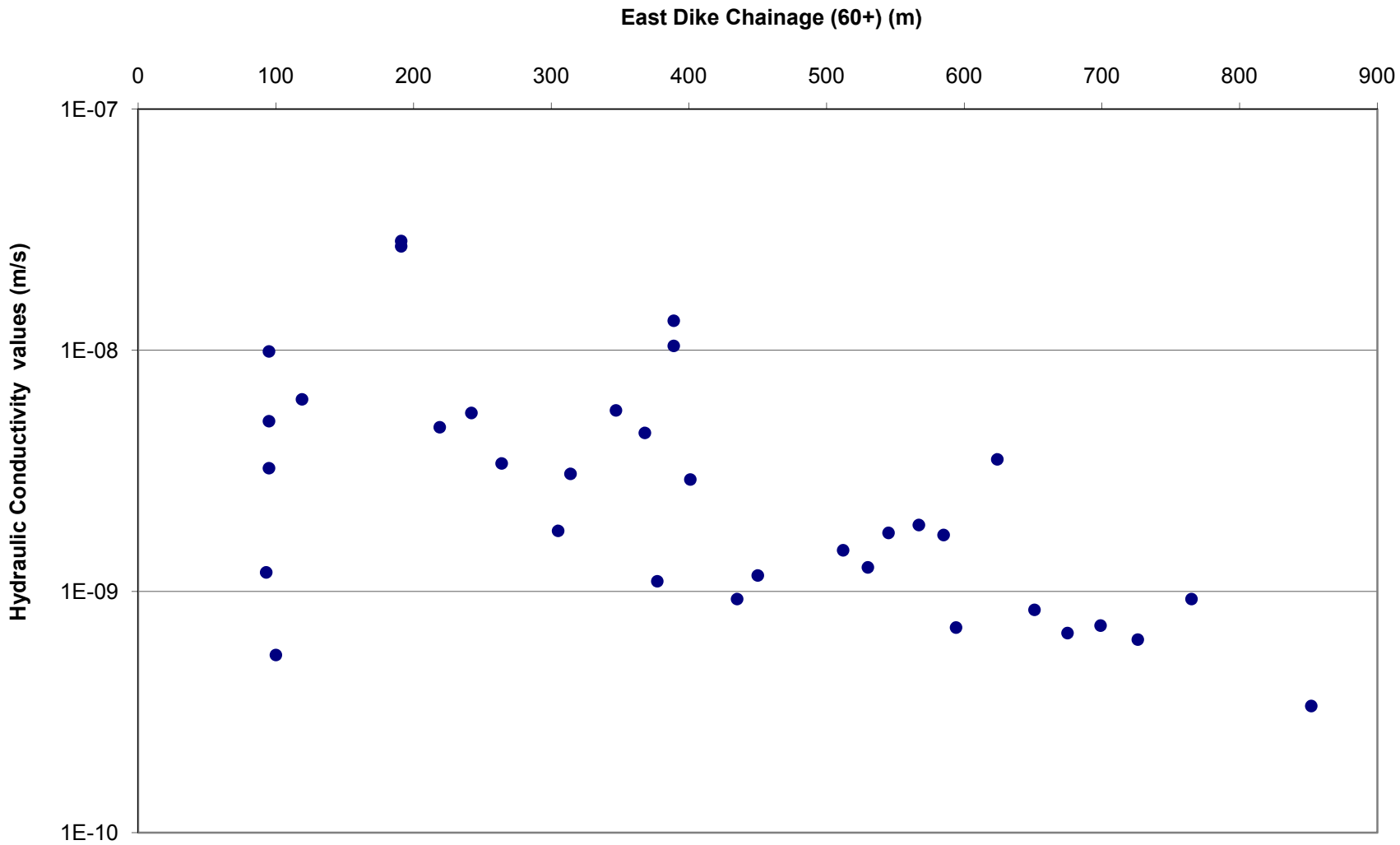
PROJECT: AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE: GRADATION SUMMARY
SOIL-BENTONITE BACKFILL

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					

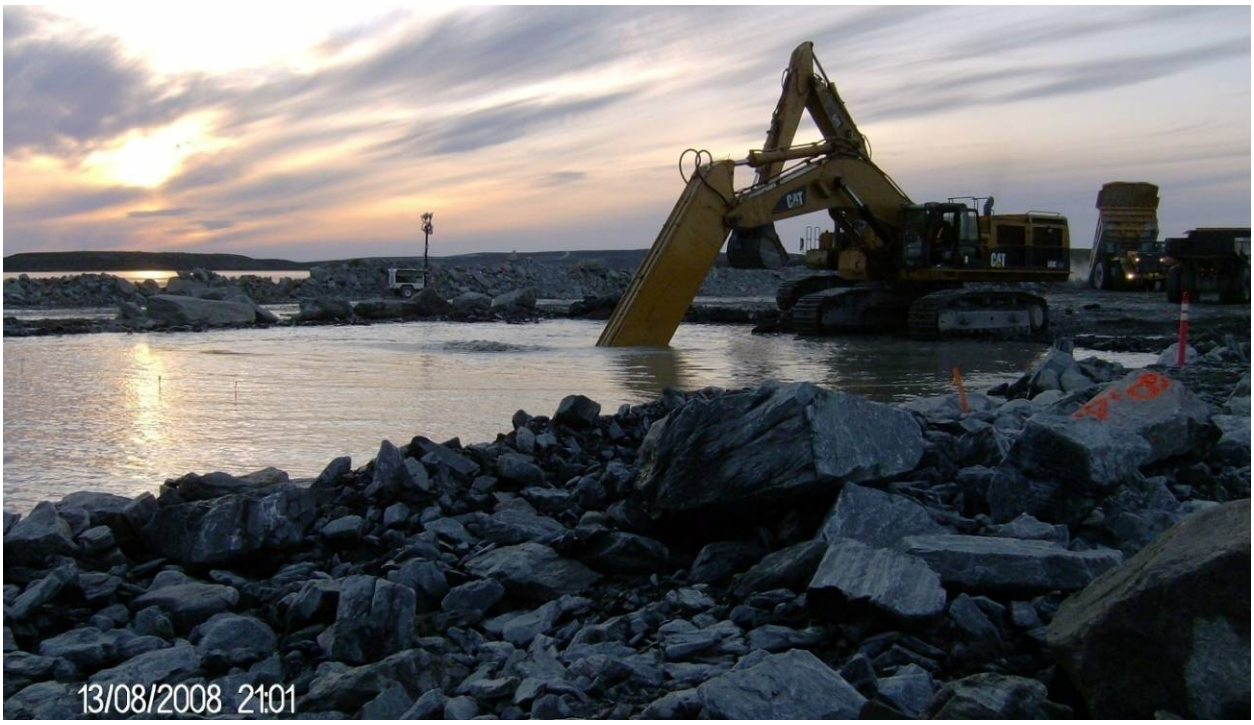
APPENDIX A

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

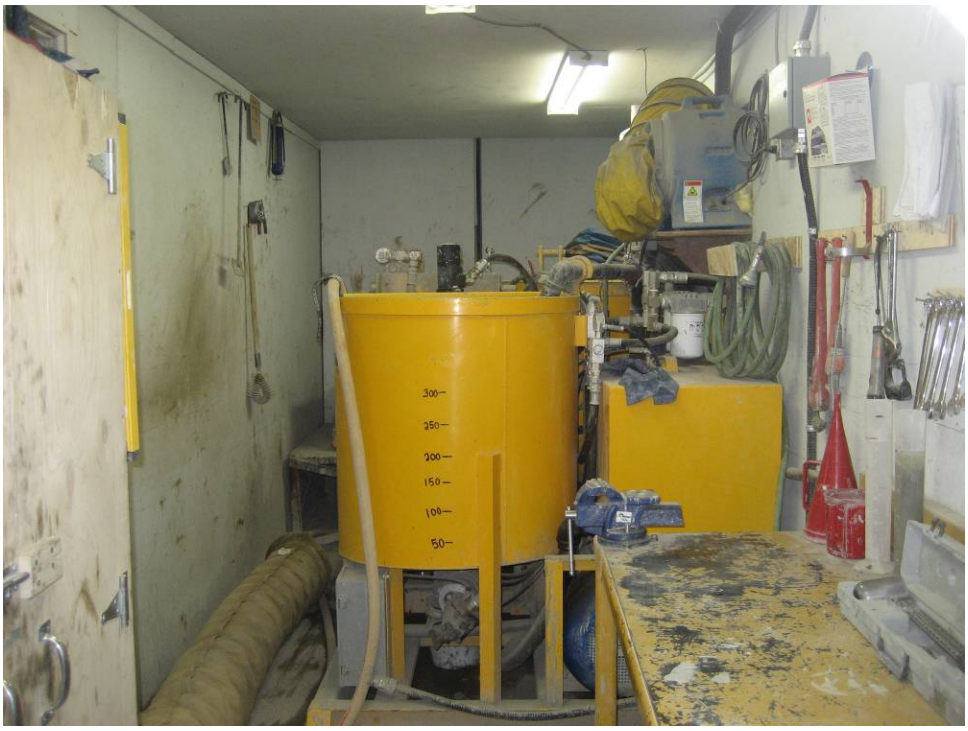
Photograph 73: Tamrock 996 Top Hammer Drill Rig for Bedrock Drilling – October 16, 2008

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

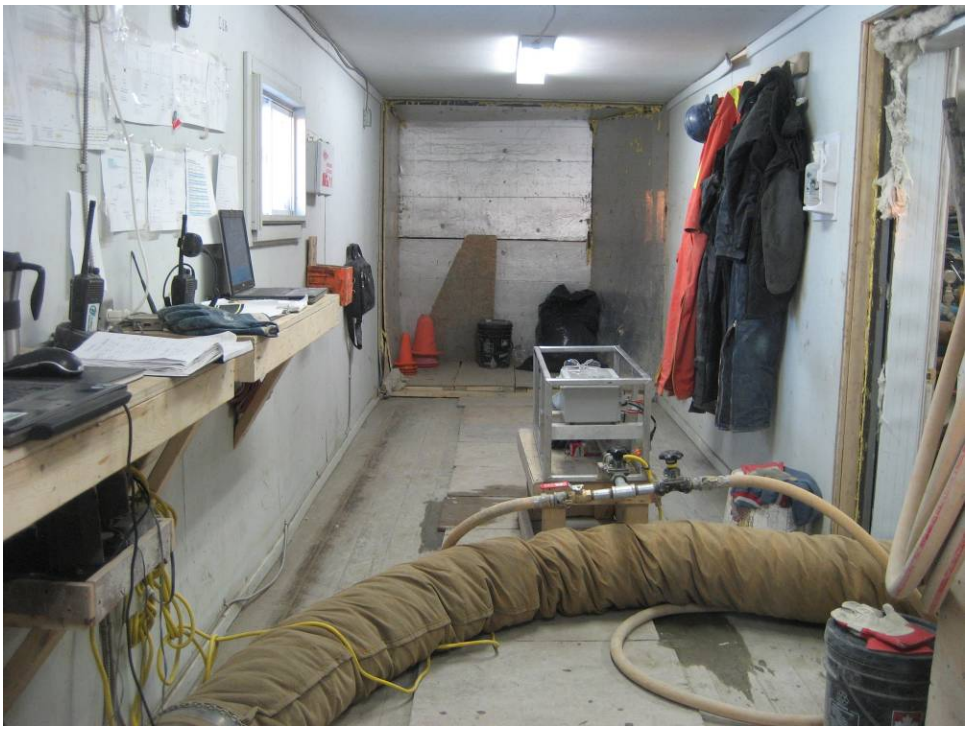
Photograph 75: Holte Perforator Tool – January 19, 2009

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

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

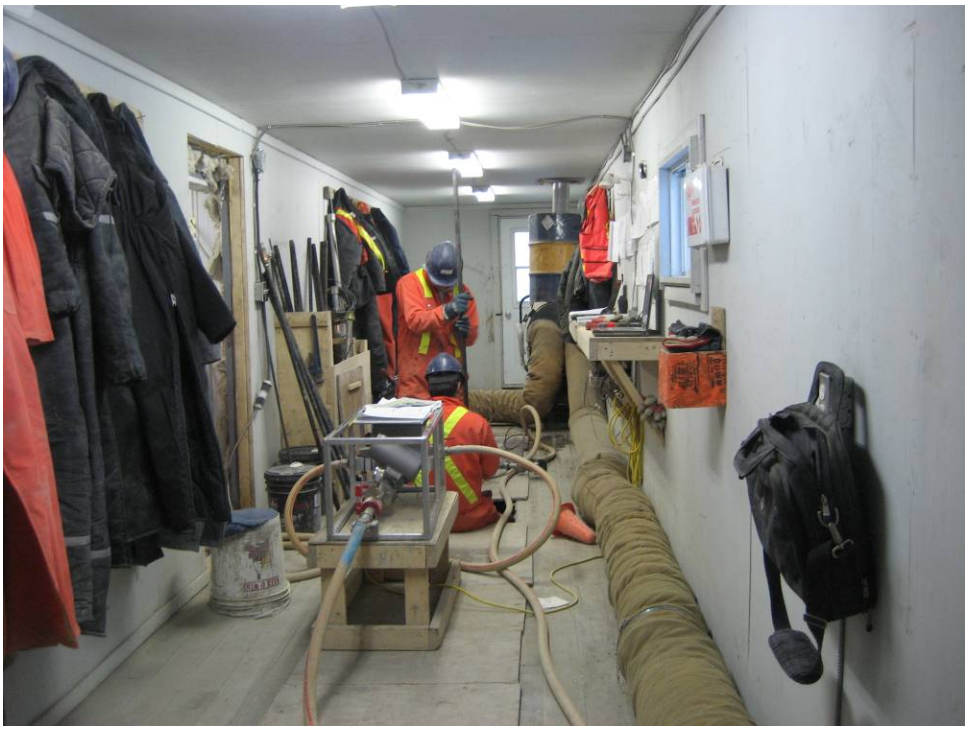


Photograph 78: Mobile Grout Plant, Mixing Side – January 17, 2009



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

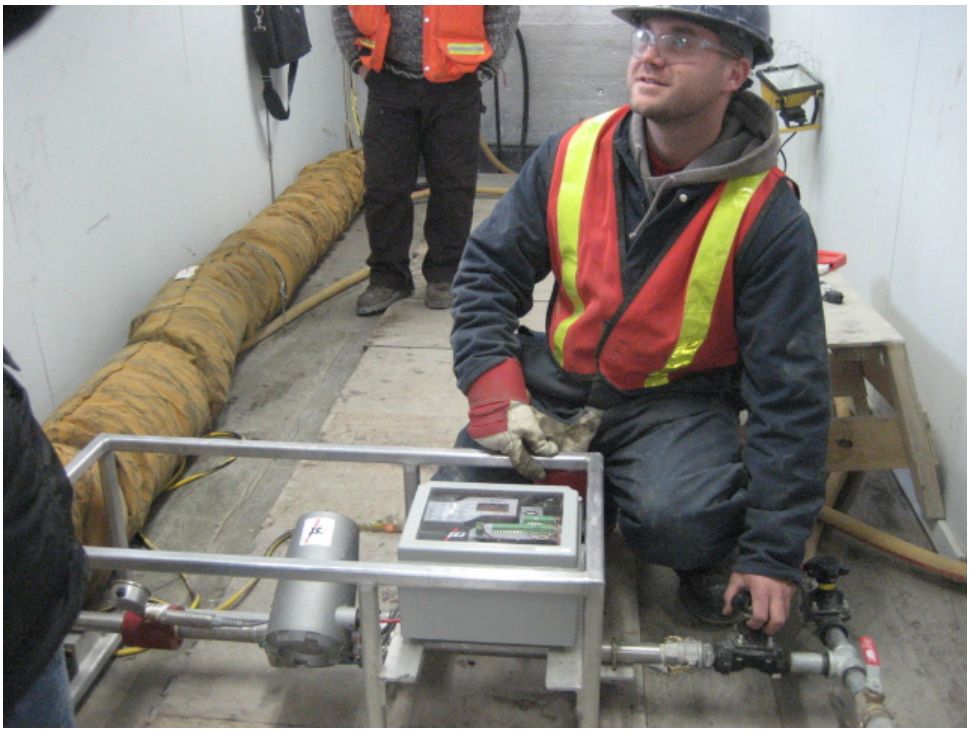
Photograph 80: Grout Plant Heater – January 17, 2009



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

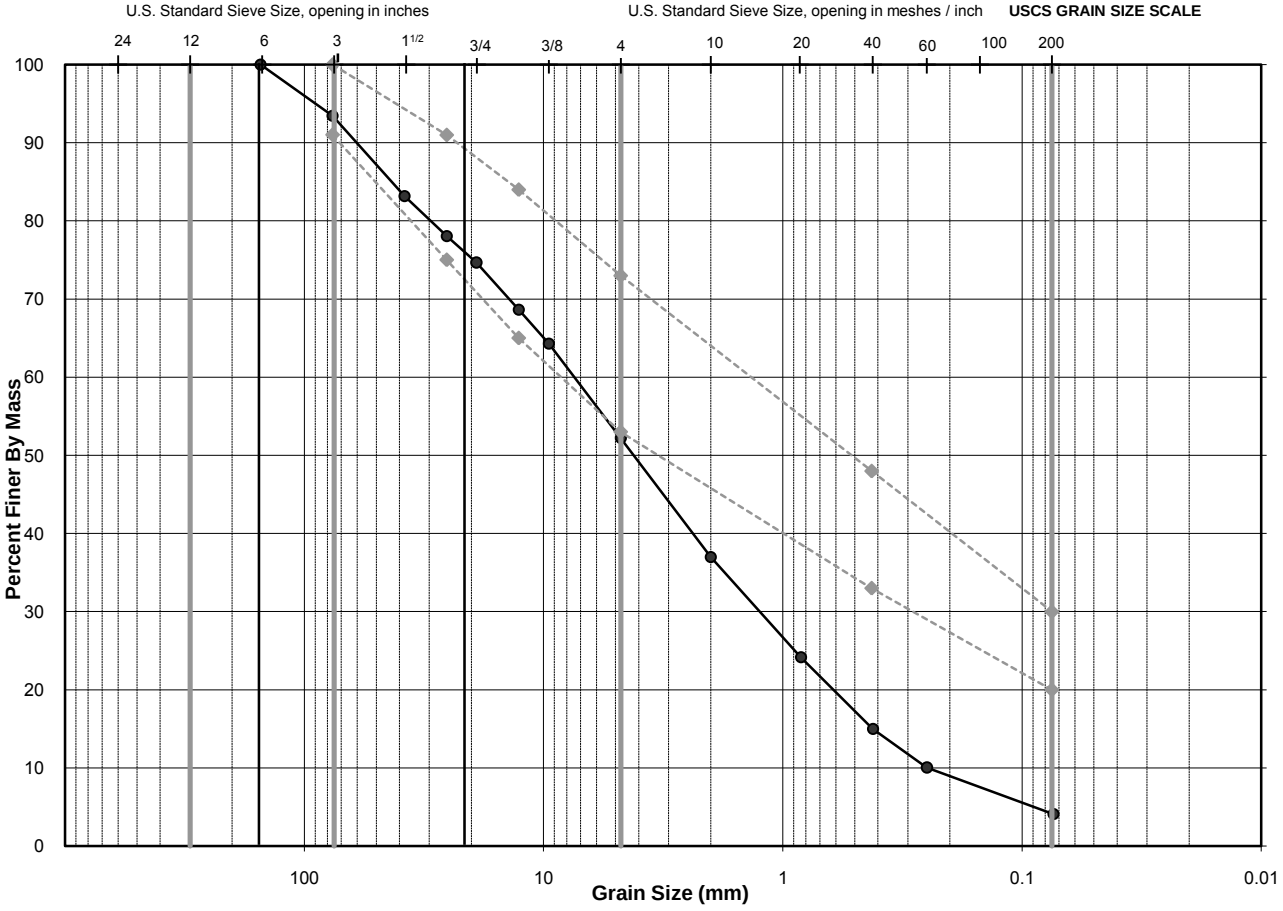
Laboratory Test Results and Soil-bentonite Wall Daily Construction Reports (provided by Inquip Associates Inc.)

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



BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

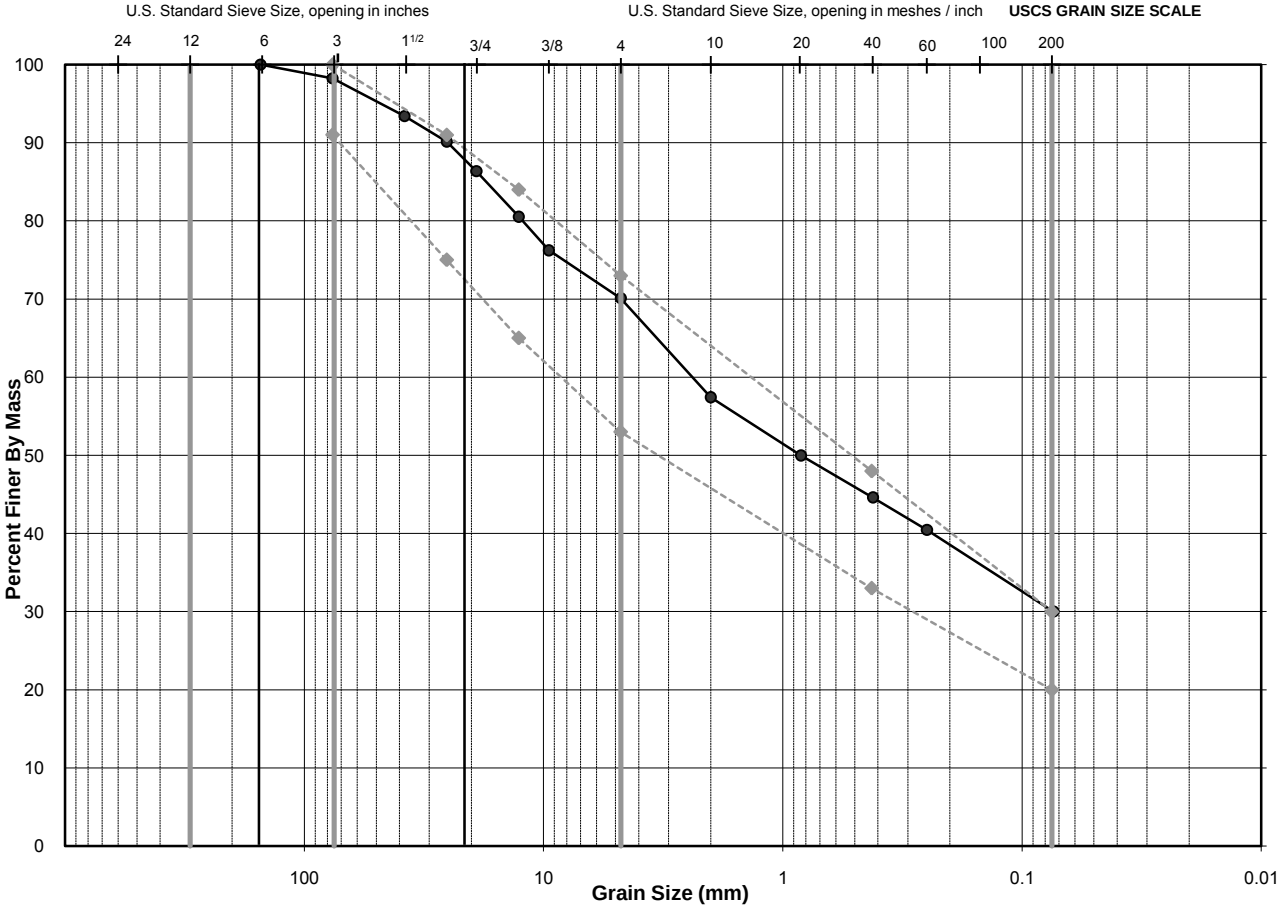
CS	15-Aug-08	JEK	04-Sep-08
TESTED BY	DATE	CHECKED BY	DATE

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.:**	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



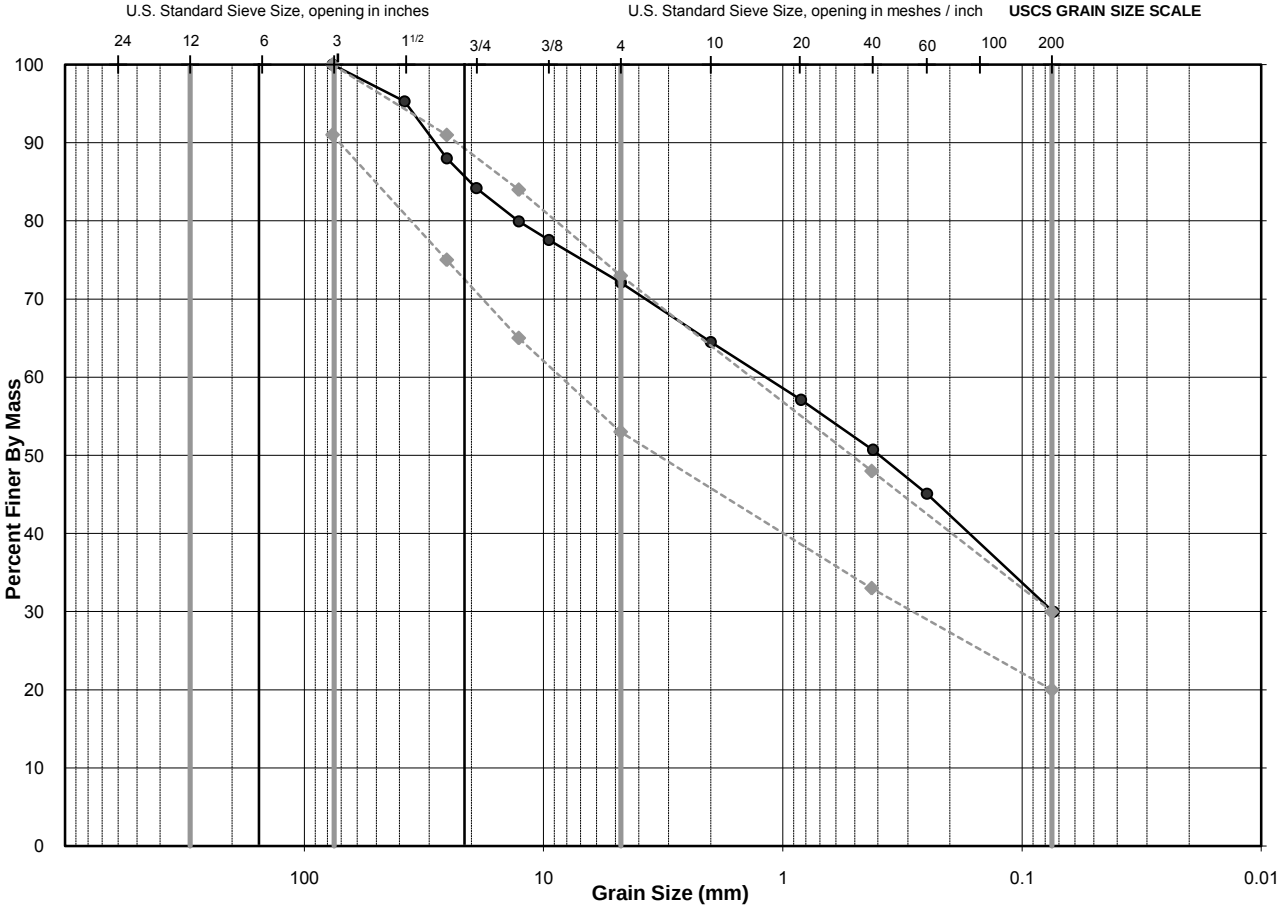
RB	25-Aug-08	JCC	02-Sep-08
TESTED BY	DATE	CHECKED BY	DATE

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.:**	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



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

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

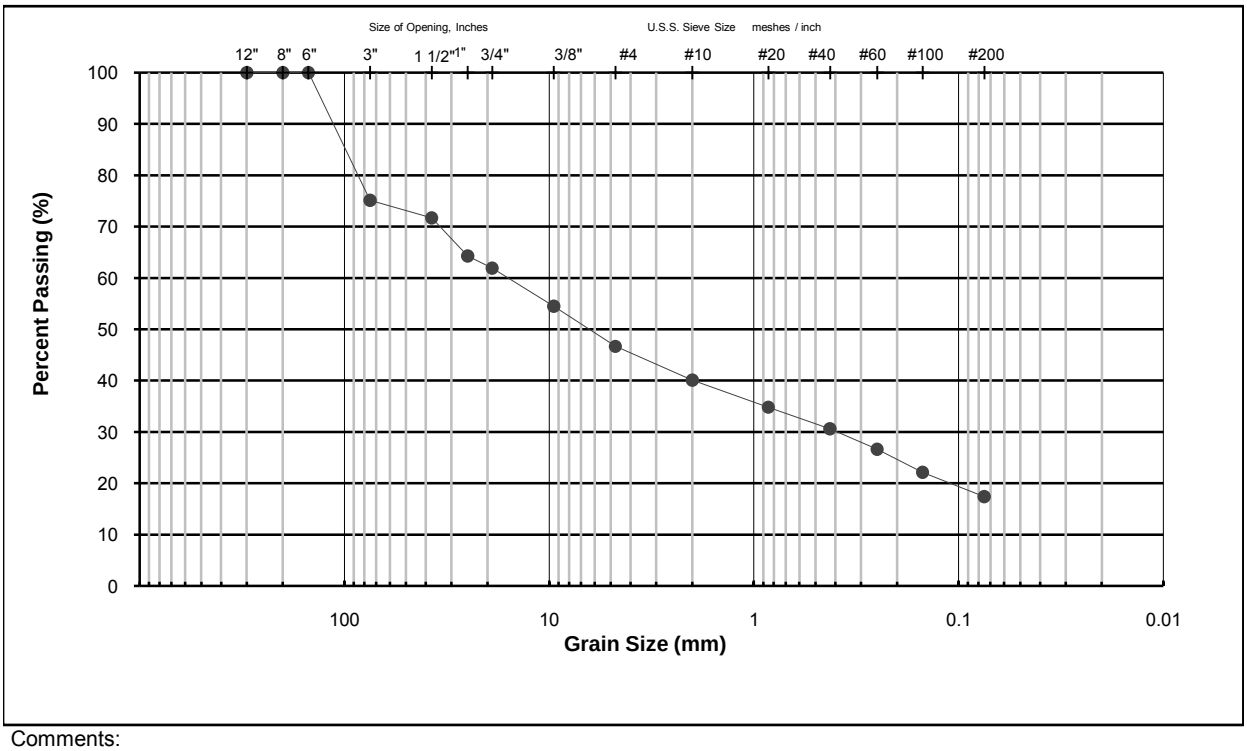
ASTM D422 & D1140 (no Hydrometer)

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

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	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			

MATERIAL SPECIFICATION:
Till



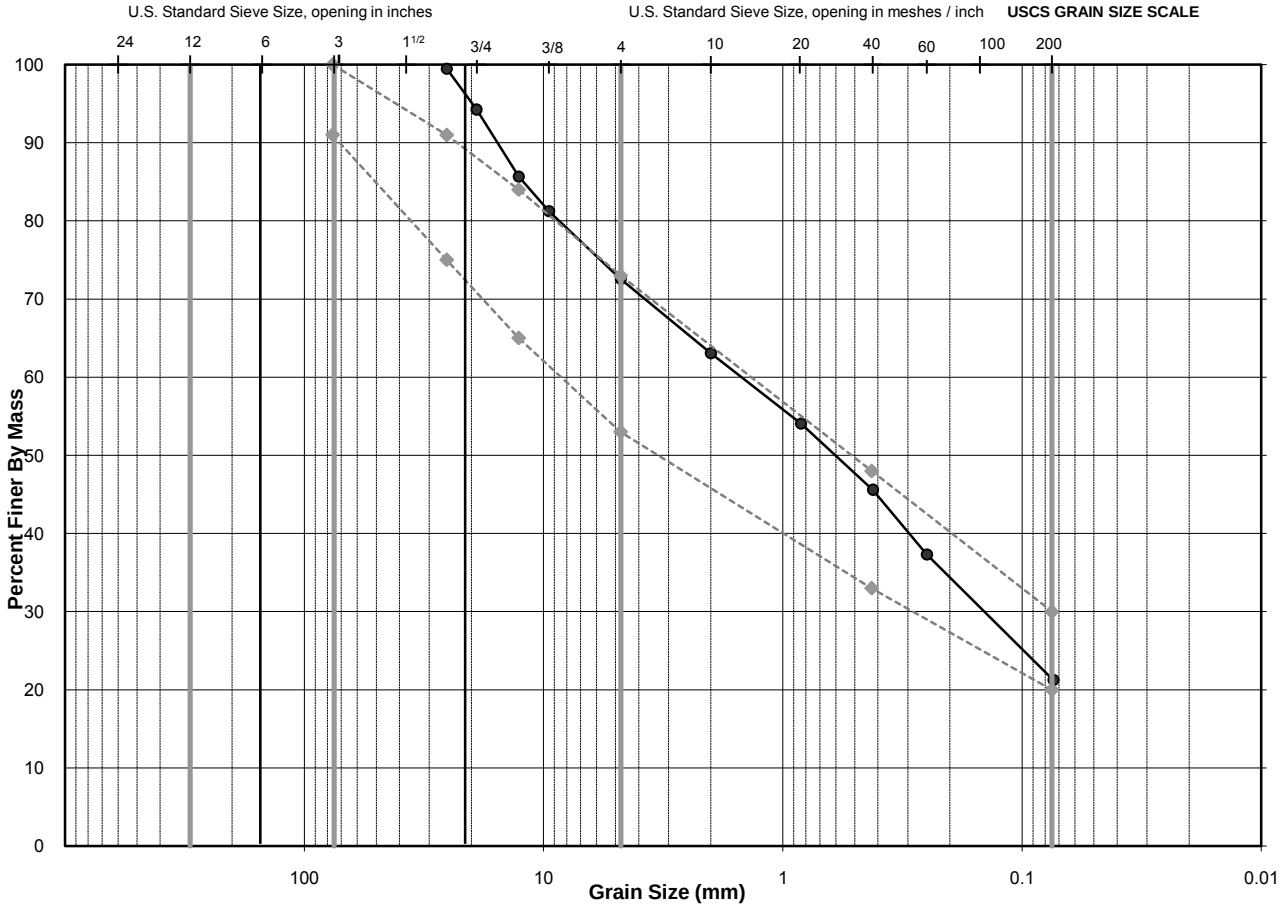
Comments:

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.:**	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



TESTED BY	DATE	CHECKED BY	DATE
TS	04-Sep-08	JEK	04-Feb-09

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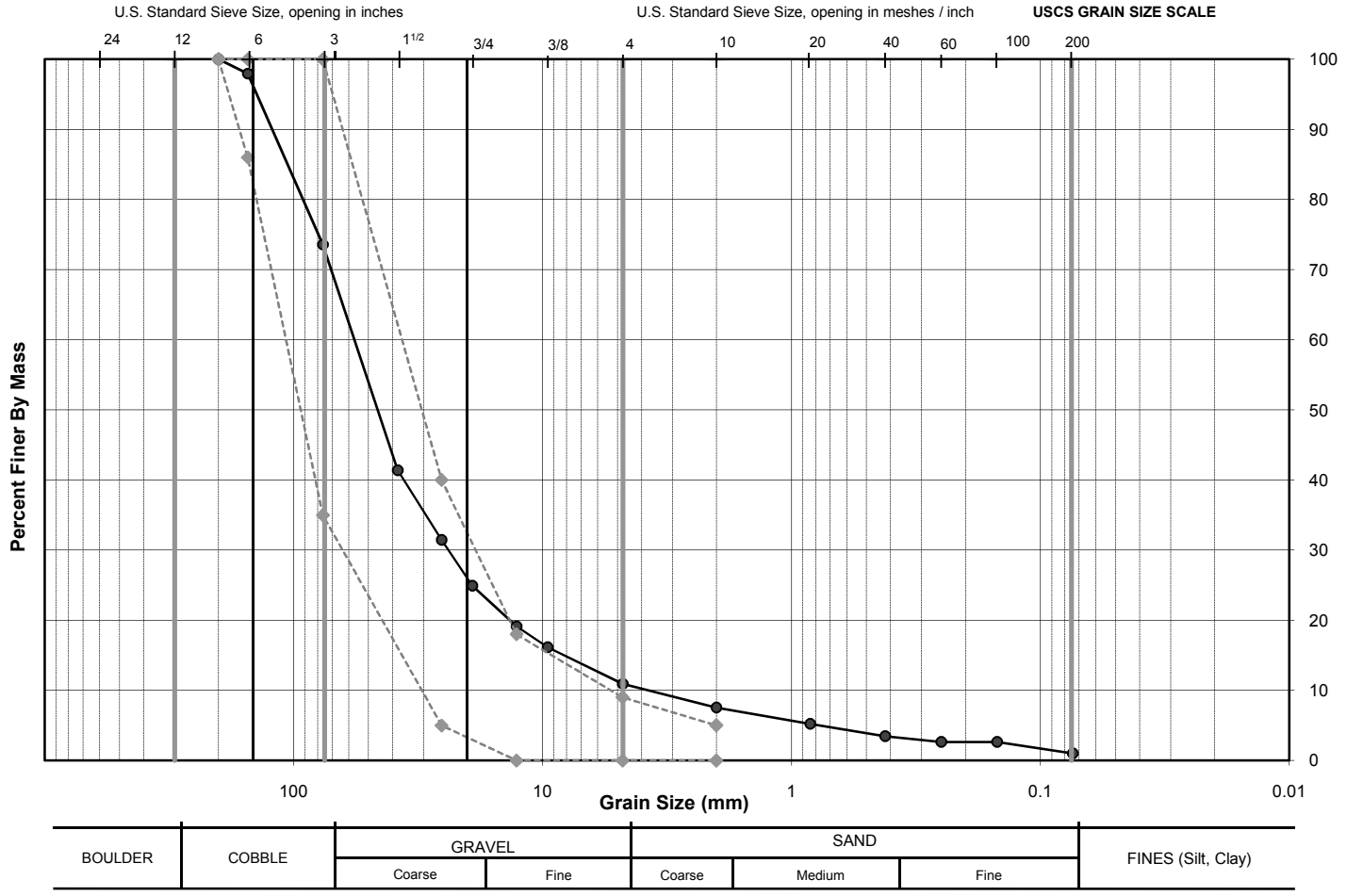
Particle Size Analysis of Soils

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	Coarse Filter	**Other**	see comment
Description:	x	**Remarks:**	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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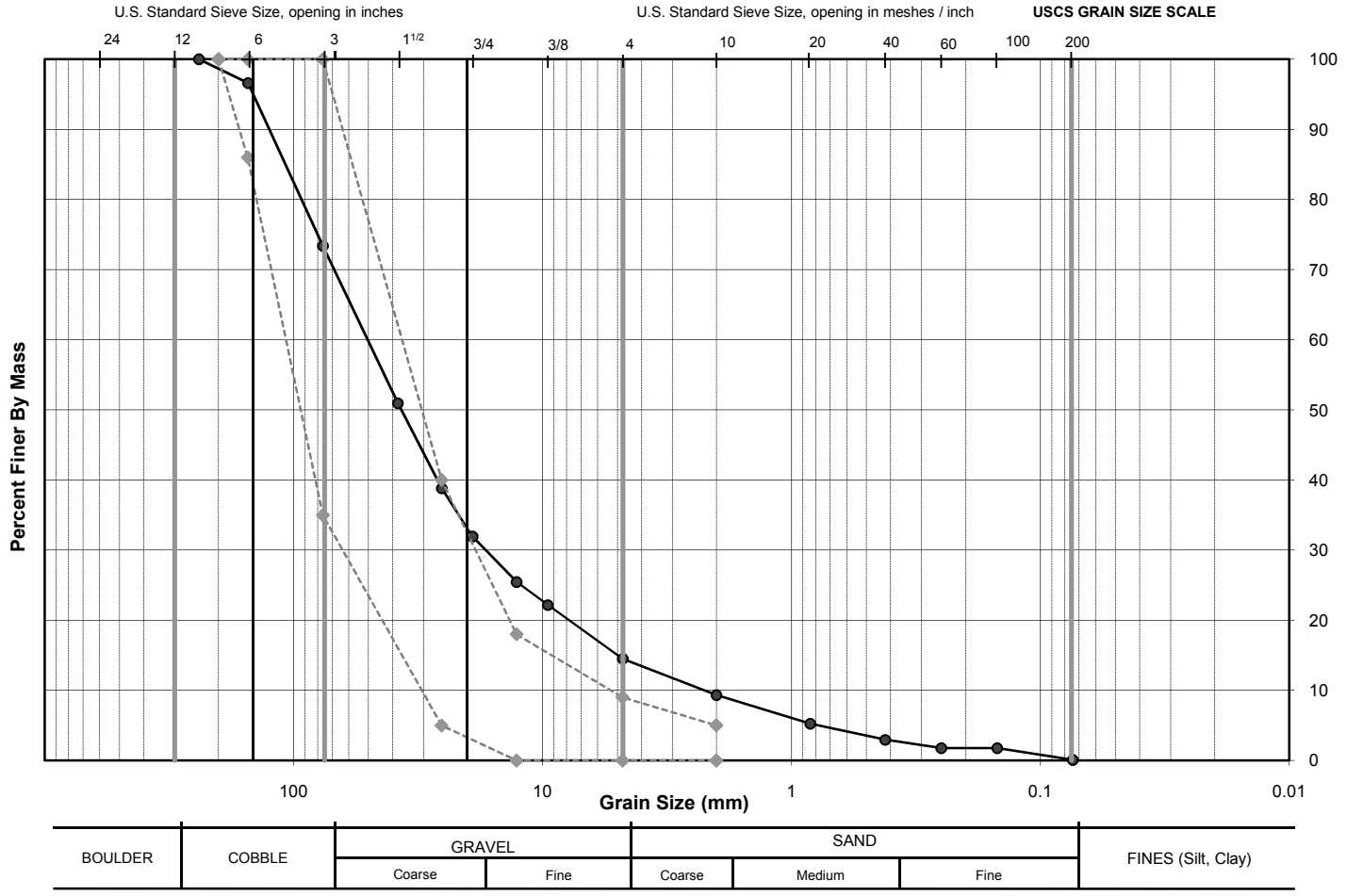
Particle Size Analysis of Soils

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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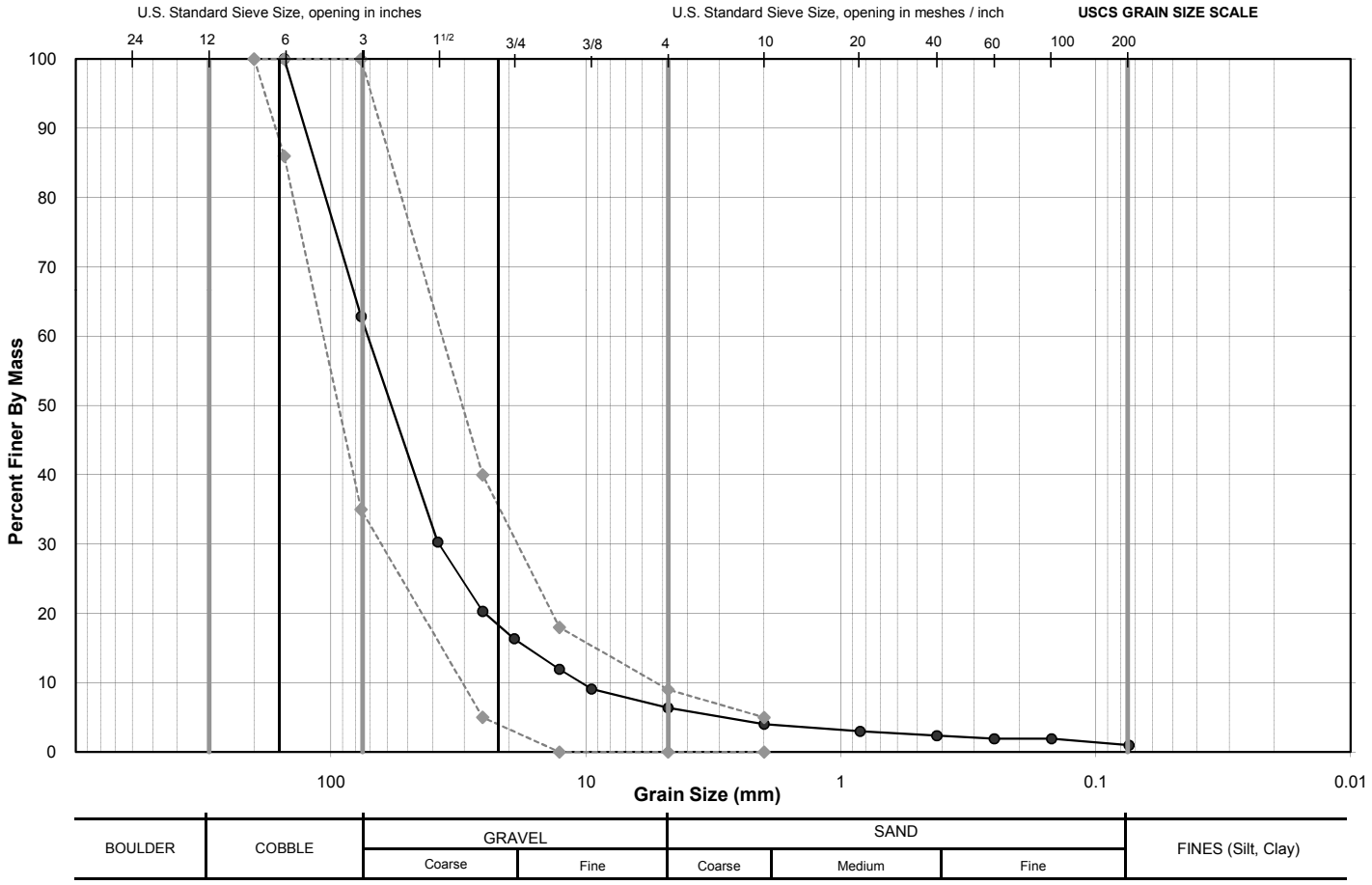
Particle Size Analysis of Soils

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



TESTED BY	DATE	CHECKED BY	DATE
RB	23-Aug-08	JEK	05-Feb-09

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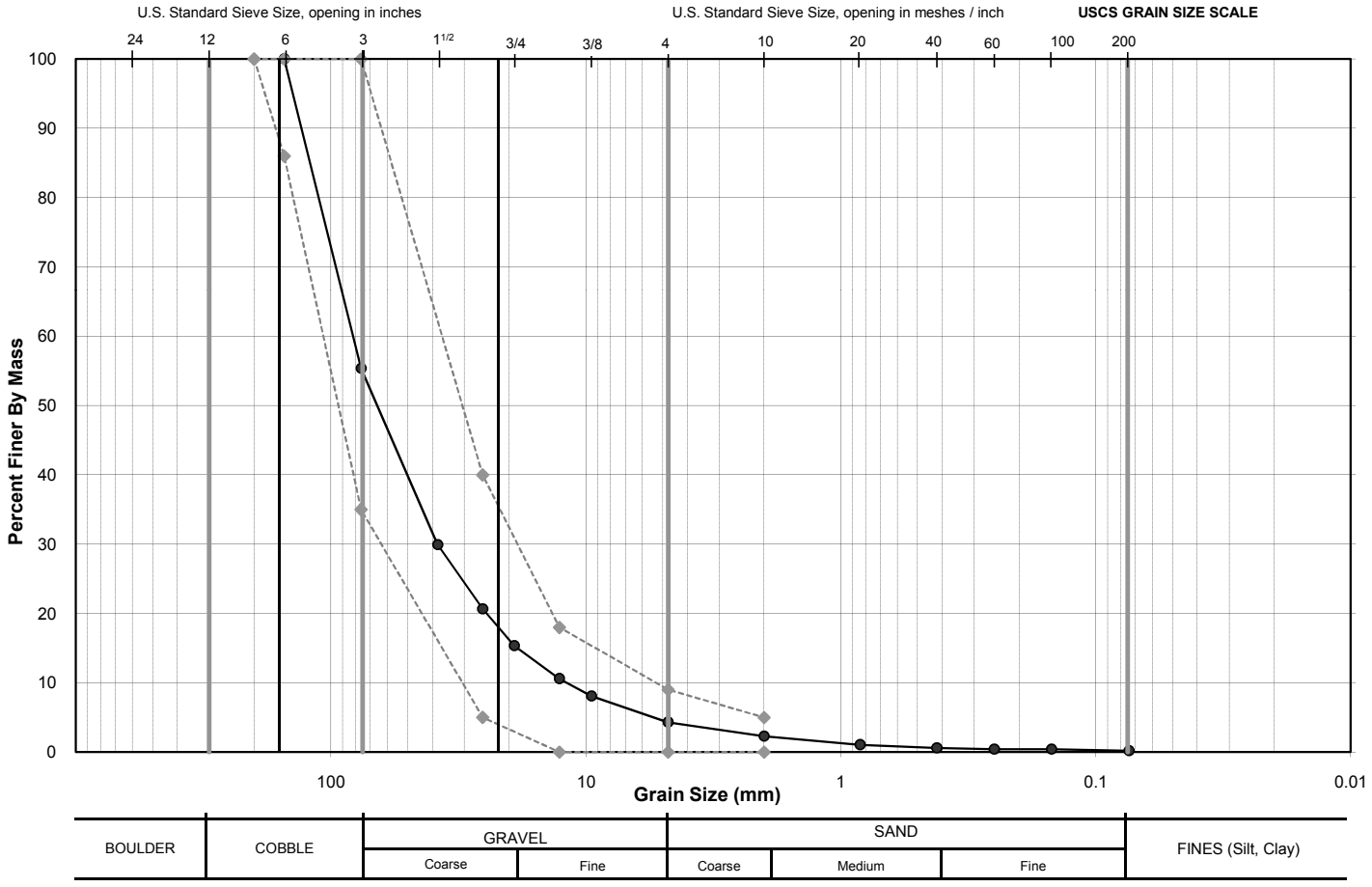
Particle Size Analysis of Soils

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
TESTED BY	DATE	CHECKED BY	DATE

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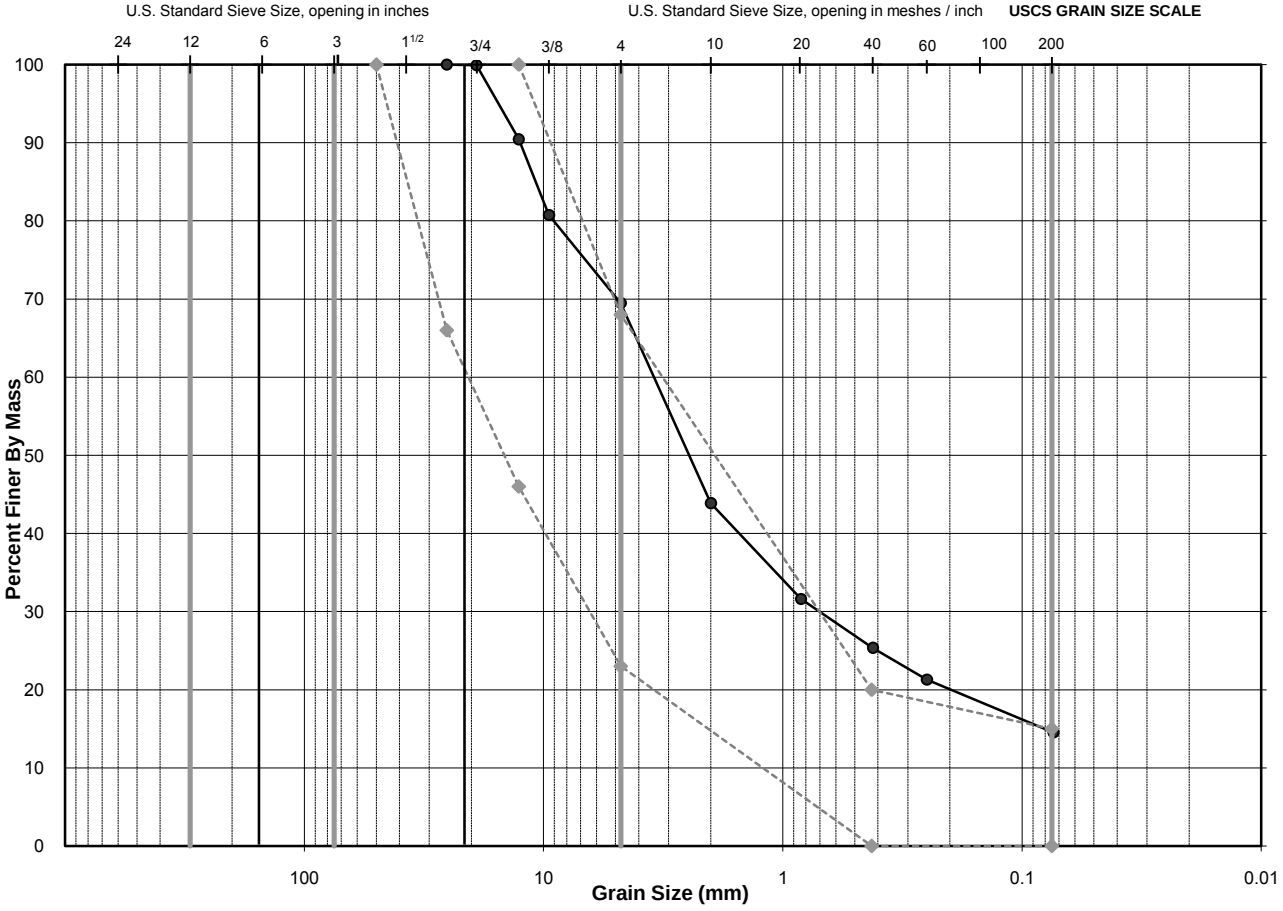
Particle Size Analysis of Soils

Reference
ASTM D 422-63 (2007)

Client:	Agnico-Eagle Mines	**Sample No.:**	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



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

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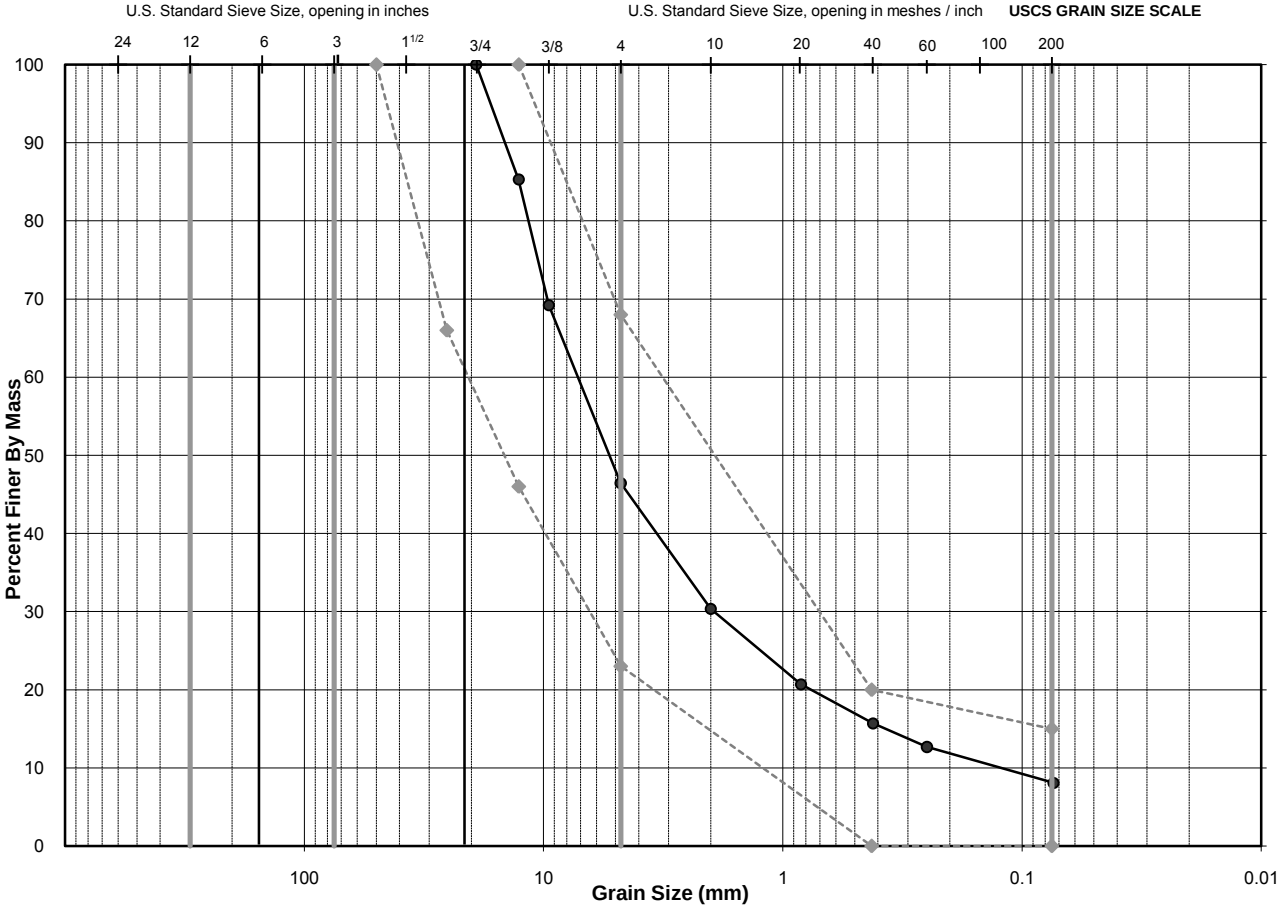
Particle Size Analysis of Soils

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

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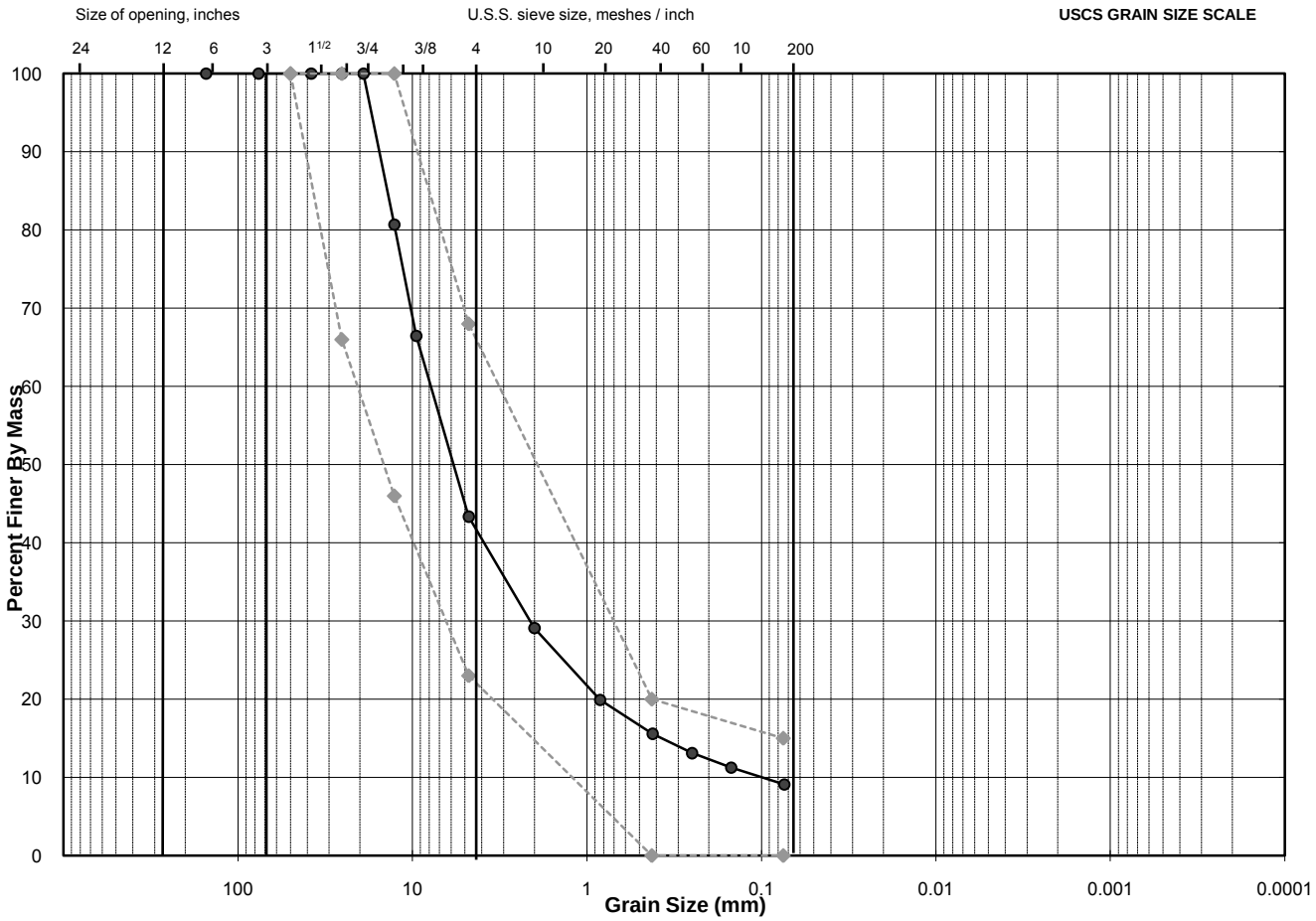
Particle Size Analysis of Soils

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

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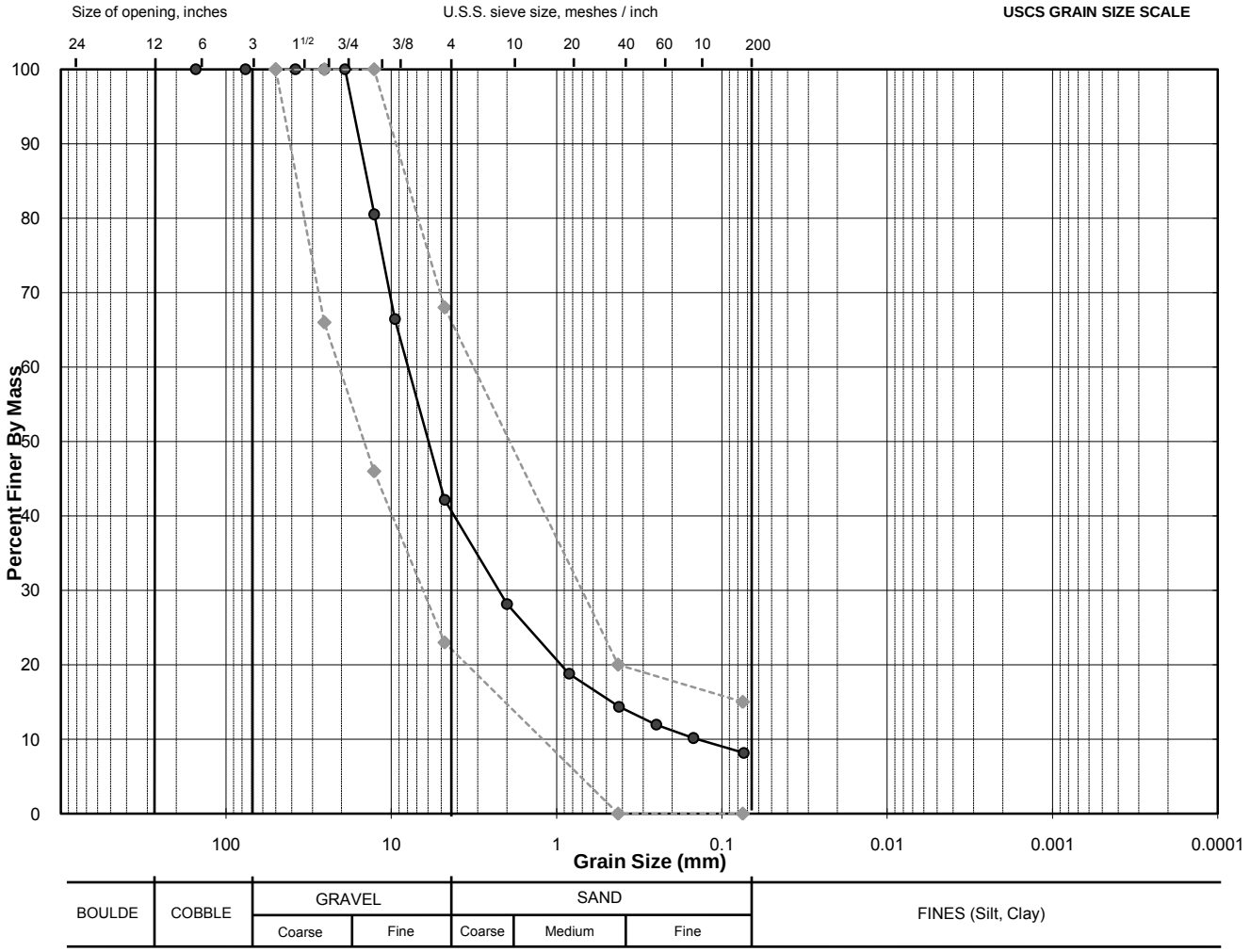
Particle Size Analysis of Soils

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

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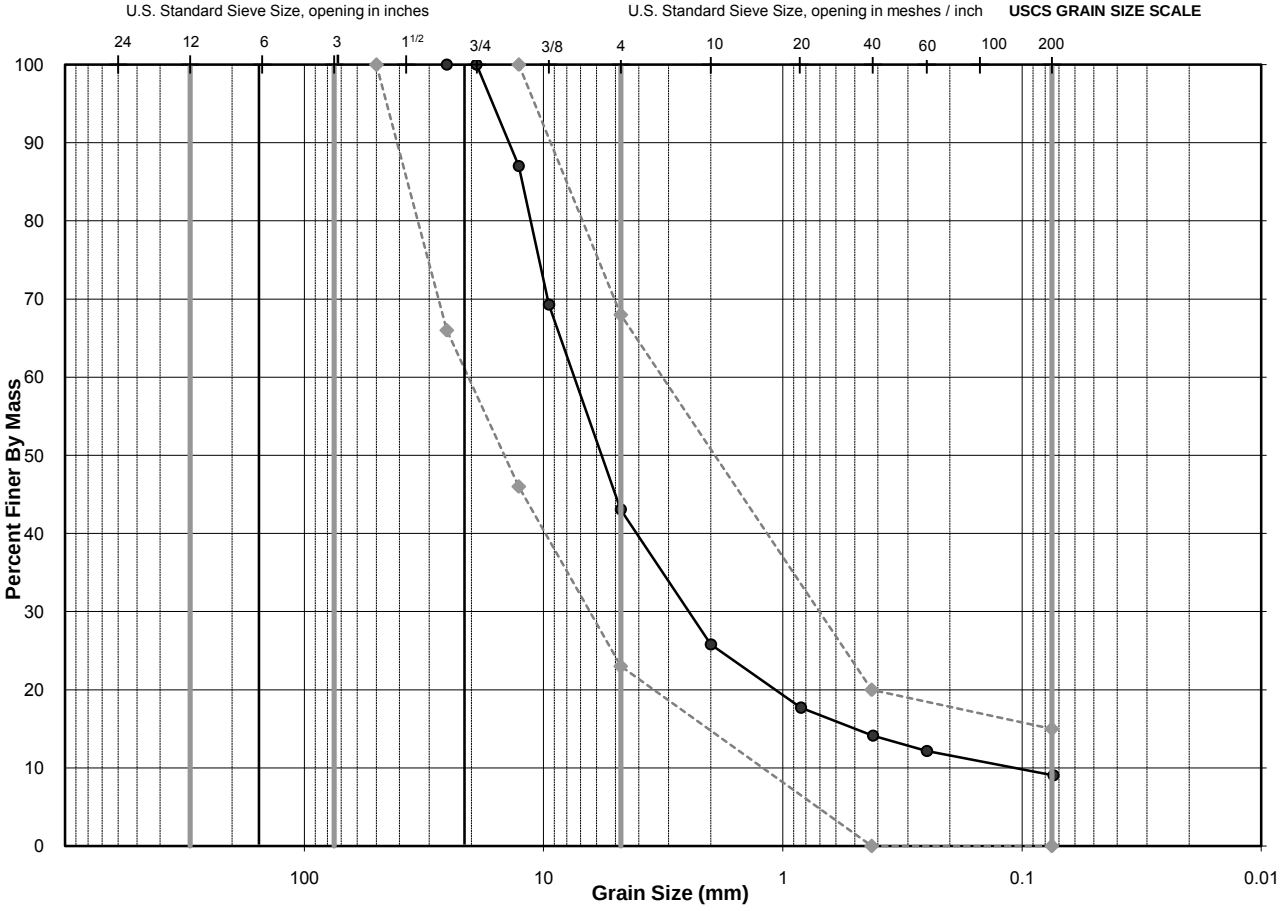
Particle Size Analysis of Soils

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



BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

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

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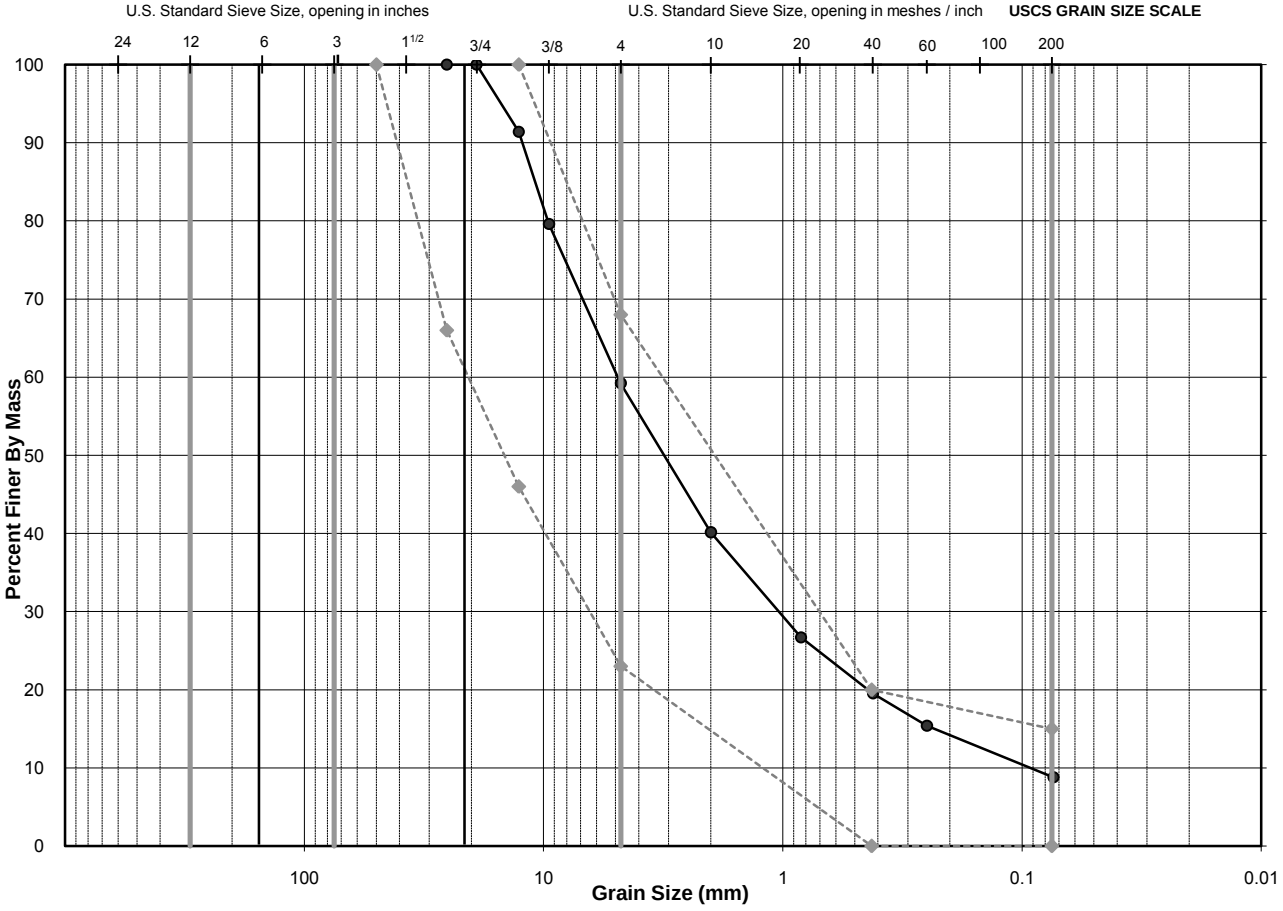
Particle Size Analysis of Soils

Reference
ASTM D 422-63 (2007)

Client:	Agnico-Eagle Mines	**Sample No.:**	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



BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

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

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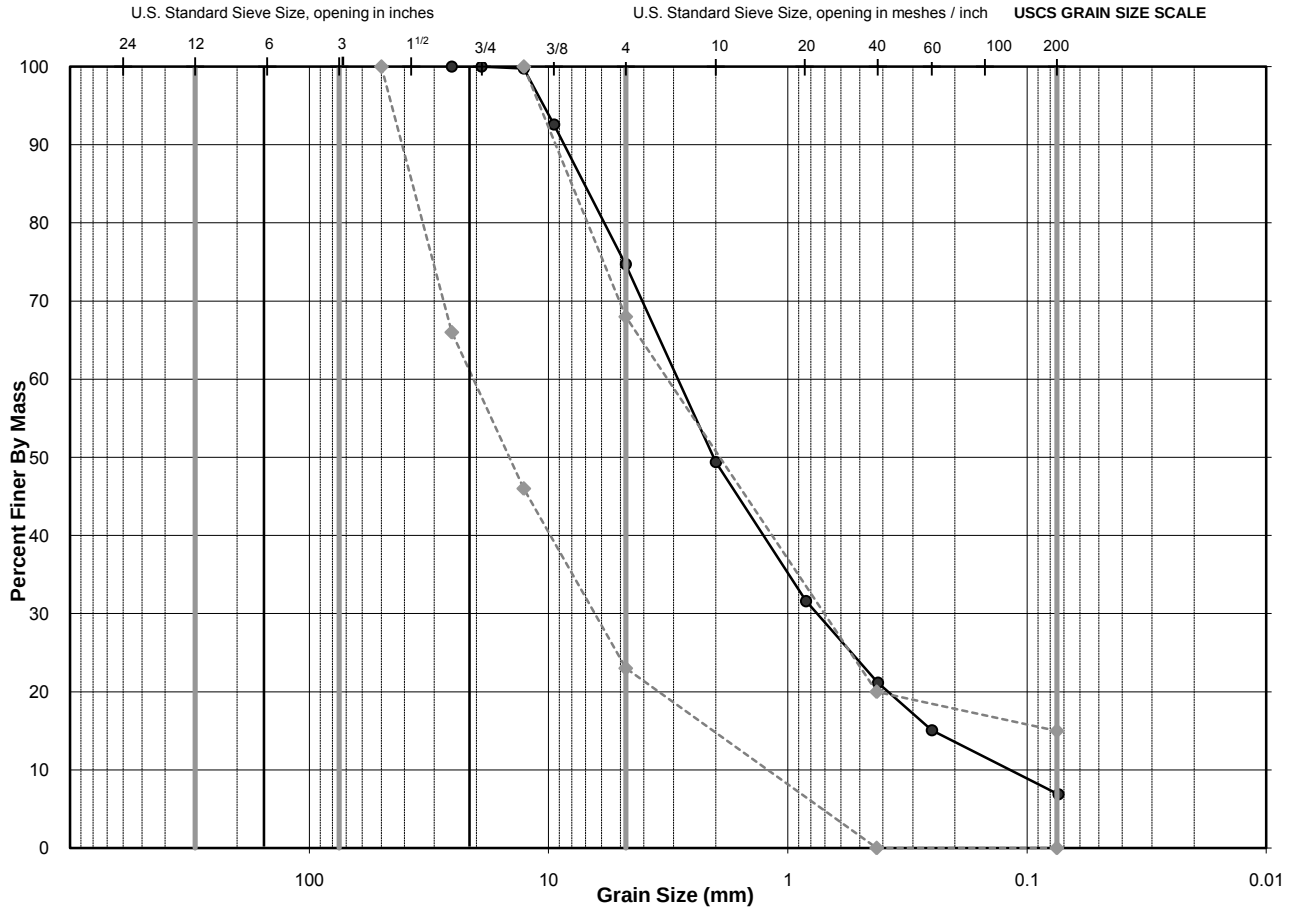
Particle Size Analysis of Soils

Reference
ASTM D 422-63 (2007)

Client:	Agnico-Eagle Mines	**Sample No.:**	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

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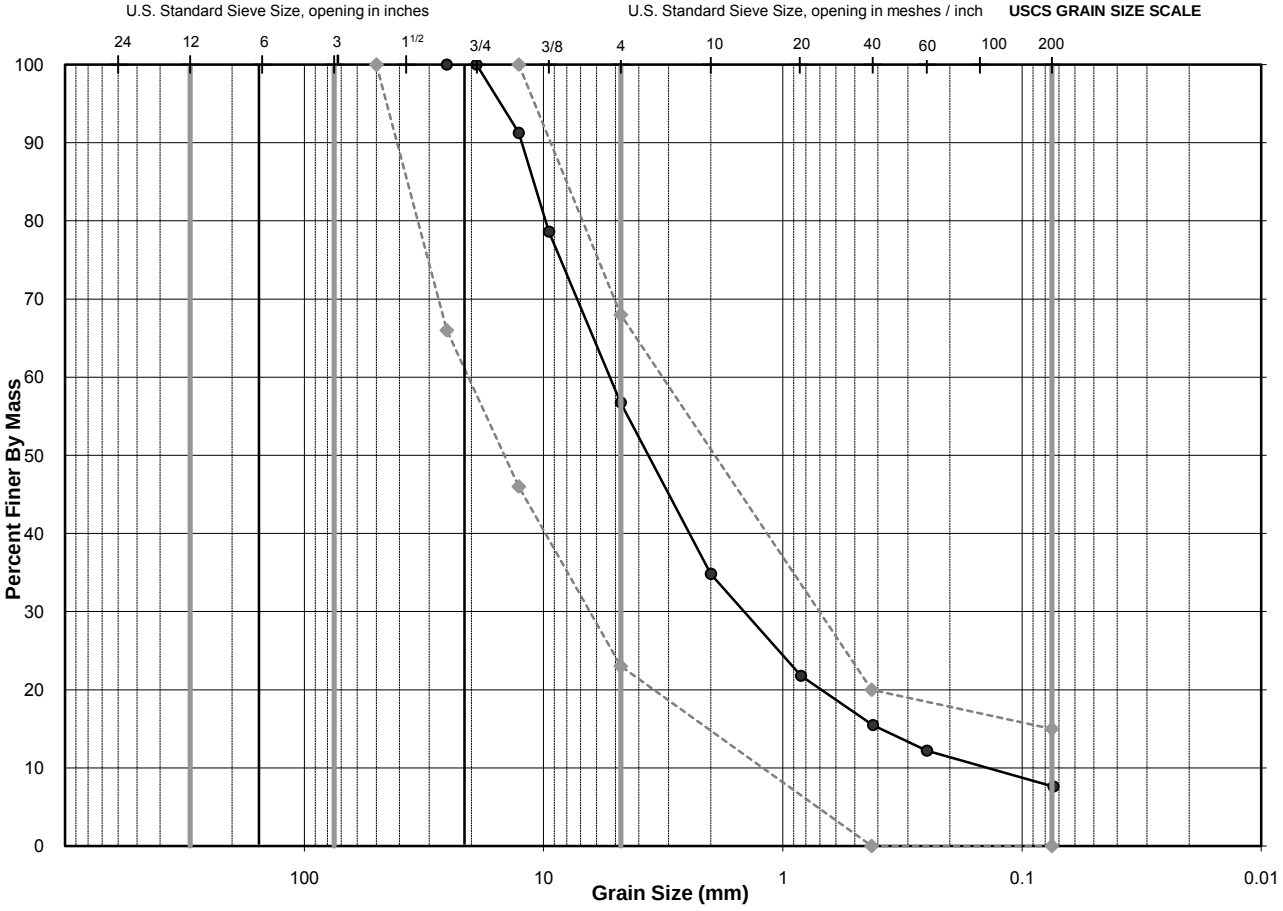
Particle Size Analysis of Soils

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

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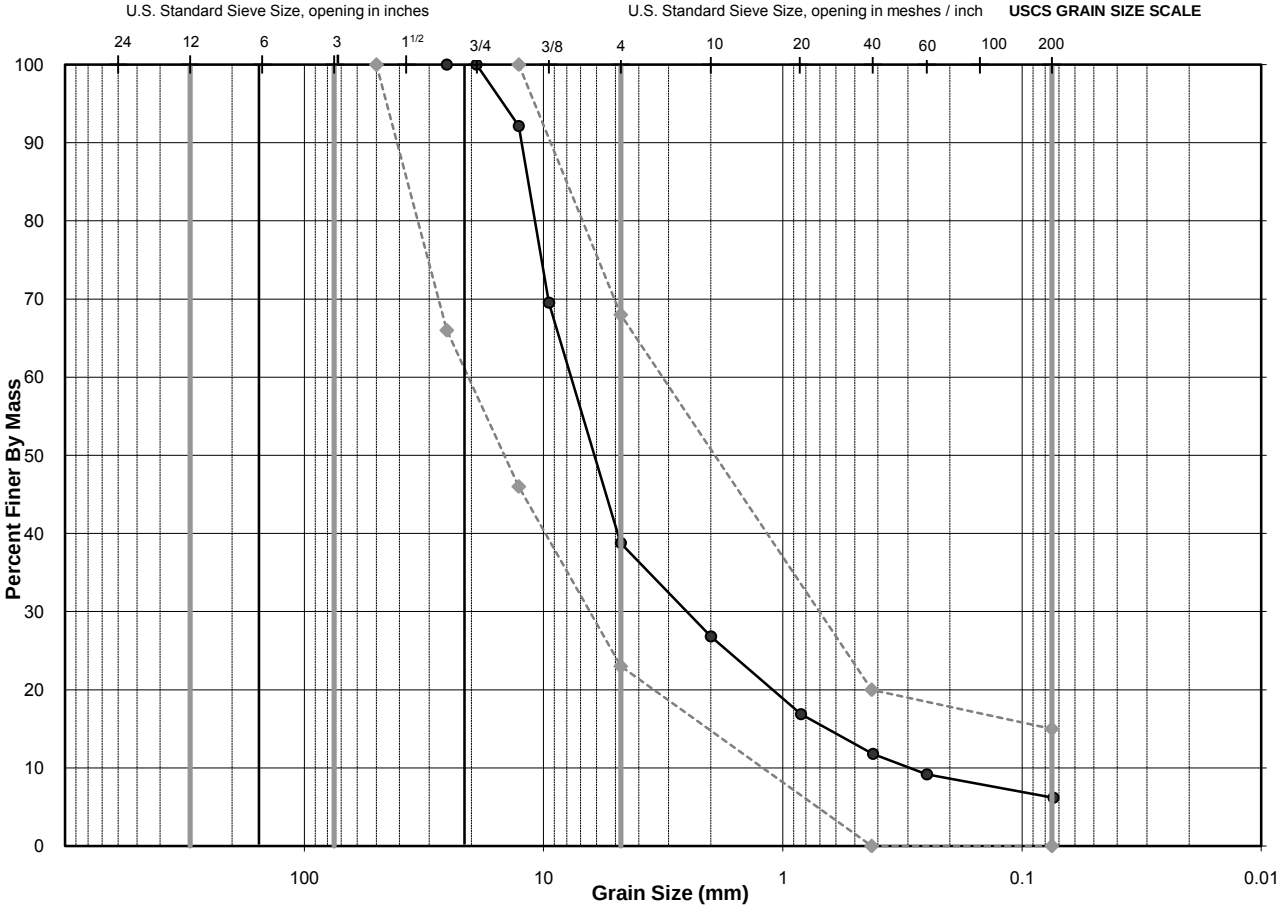
Particle Size Analysis of Soils

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

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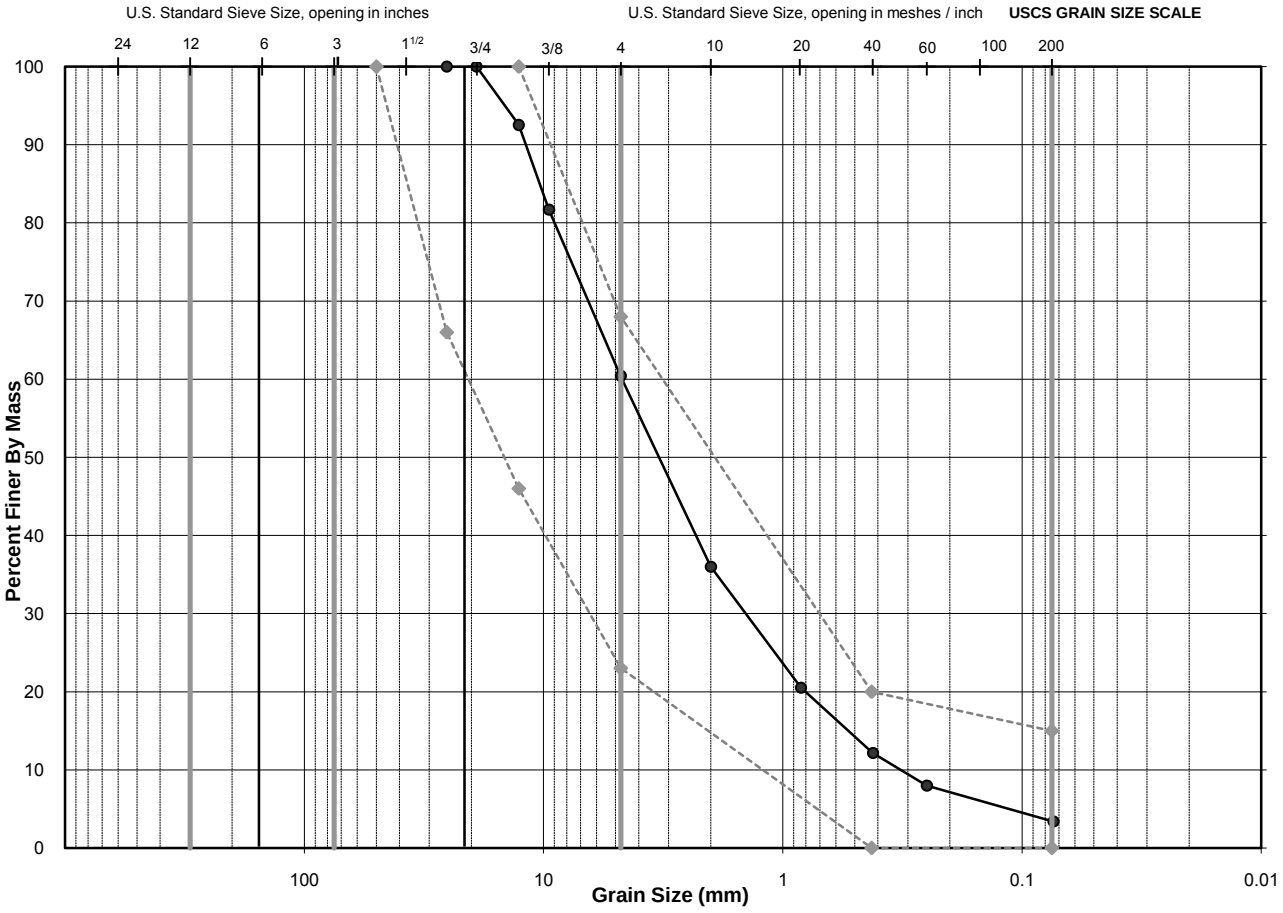
Particle Size Analysis of Soils

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
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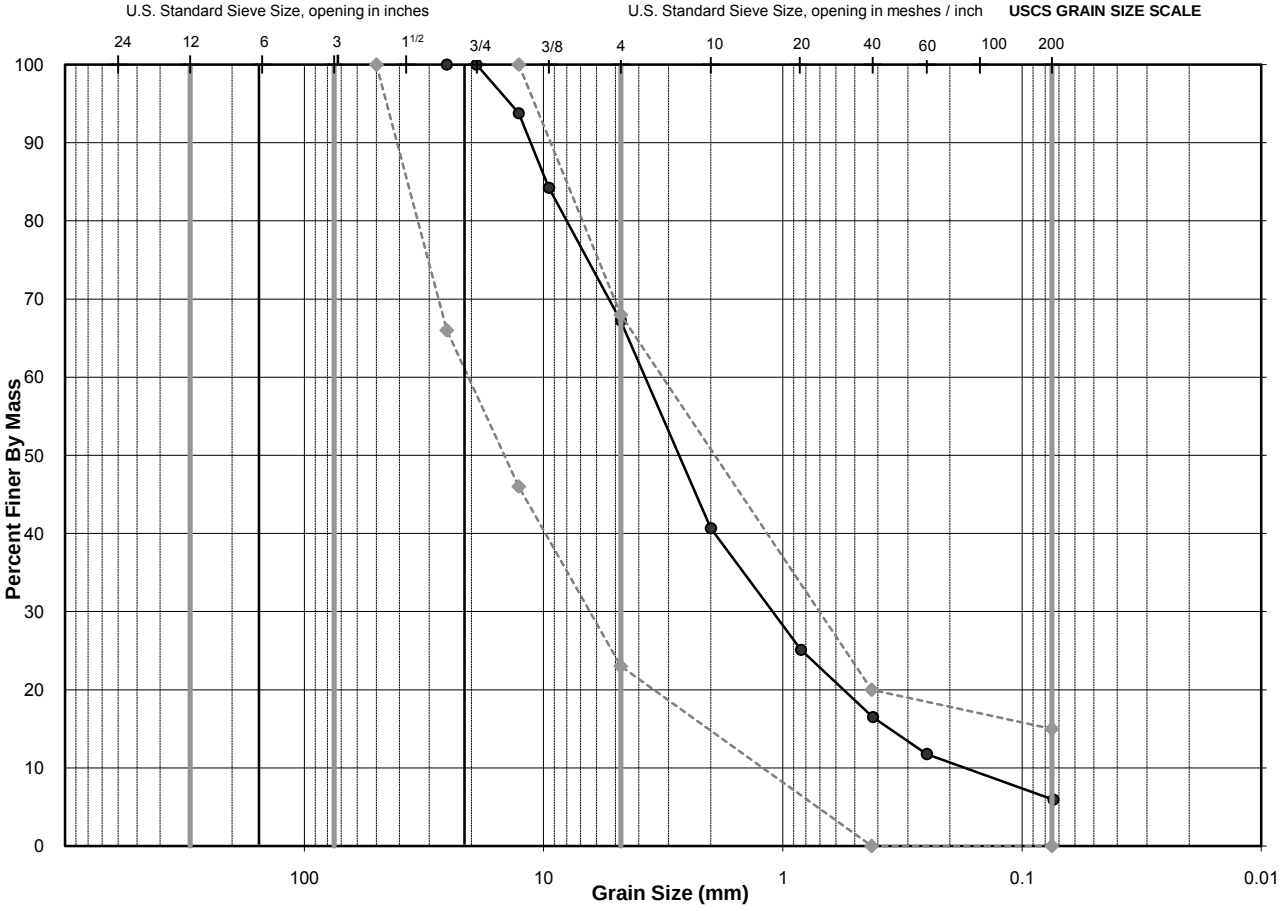
Particle Size Analysis of Soils

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



BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

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

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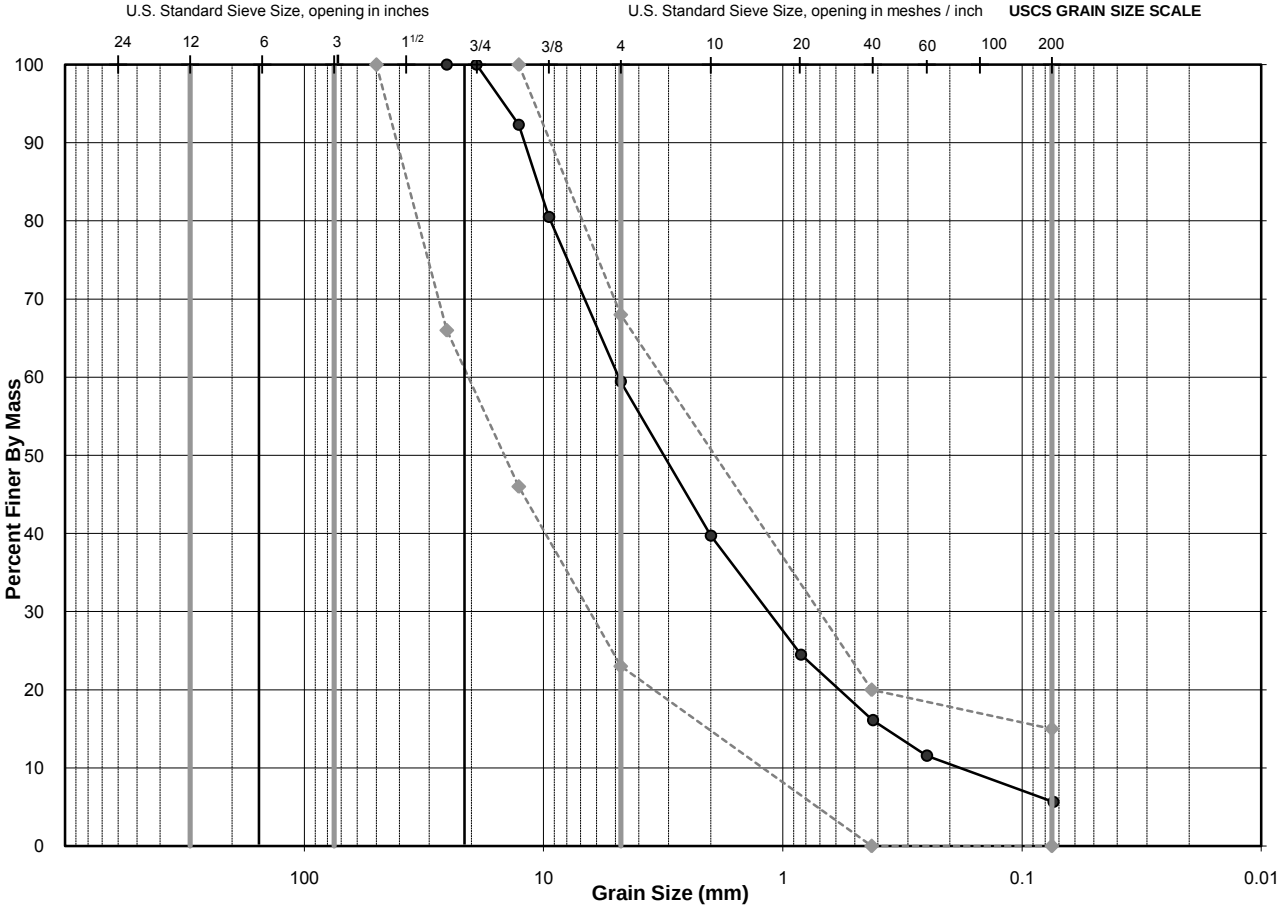
Particle Size Analysis of Soils

Reference
ASTM D 422-63 (2007)

Client:	Agnico-Eagle Mines	**Sample No.:**	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

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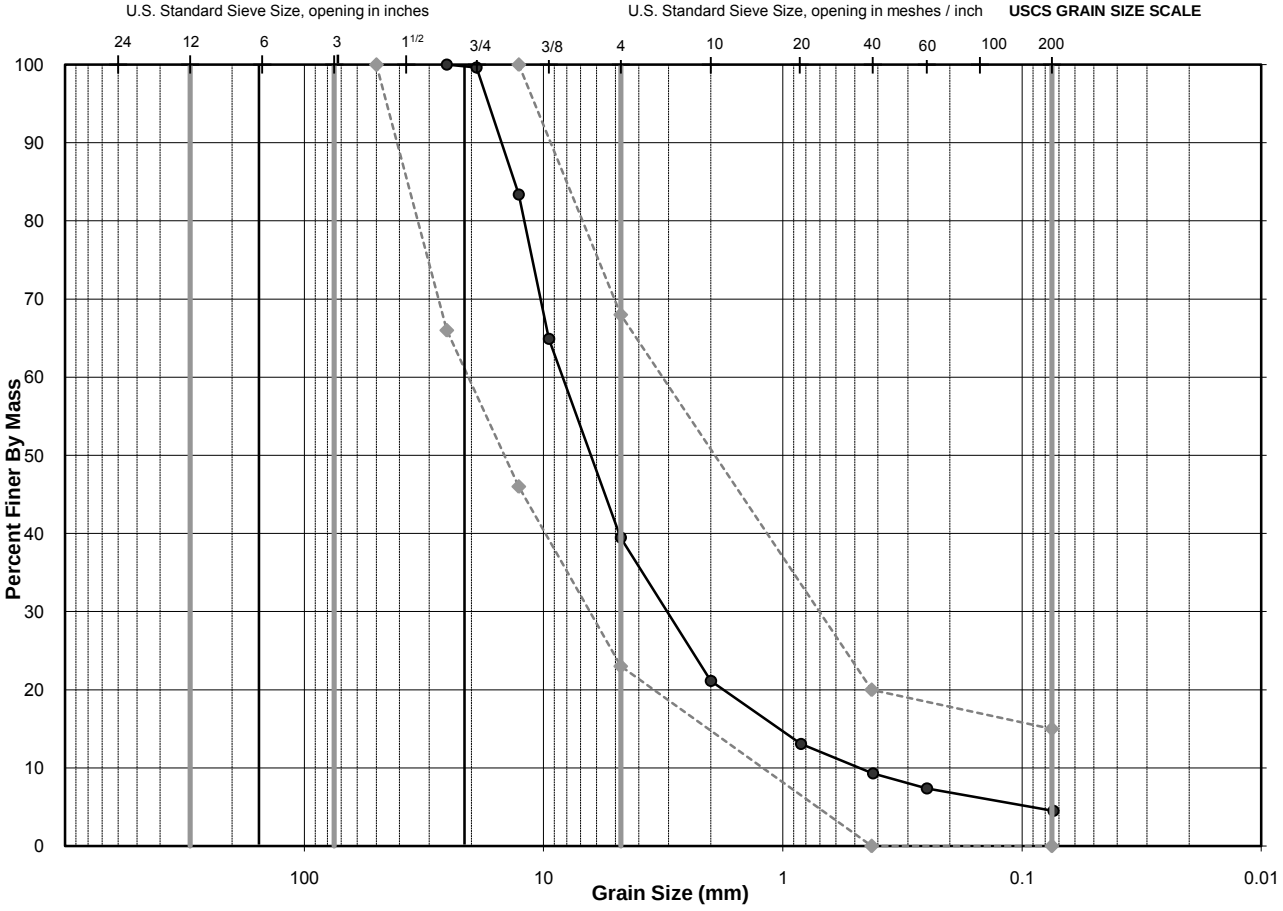
Particle Size Analysis of Soils

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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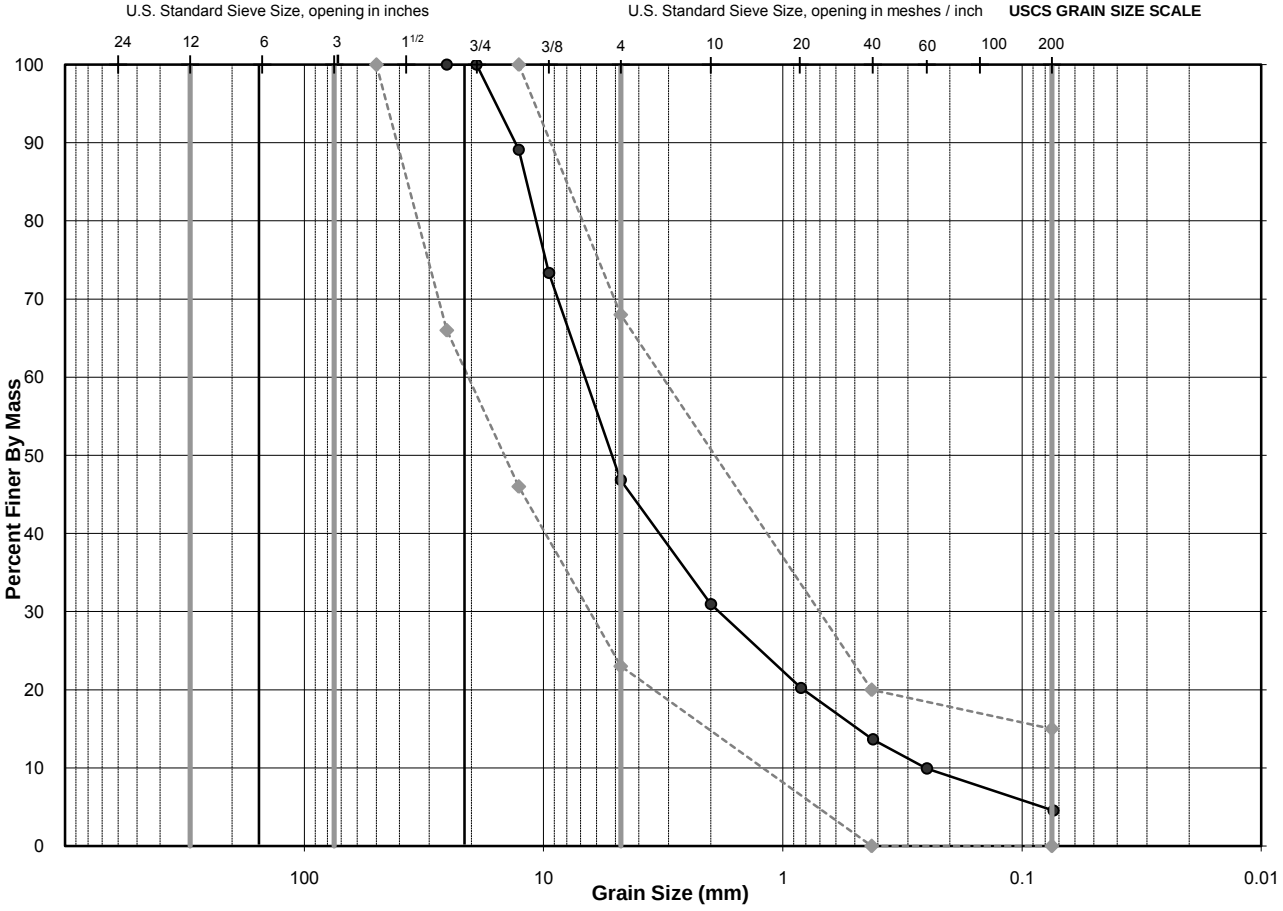
Particle Size Analysis of Soils

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



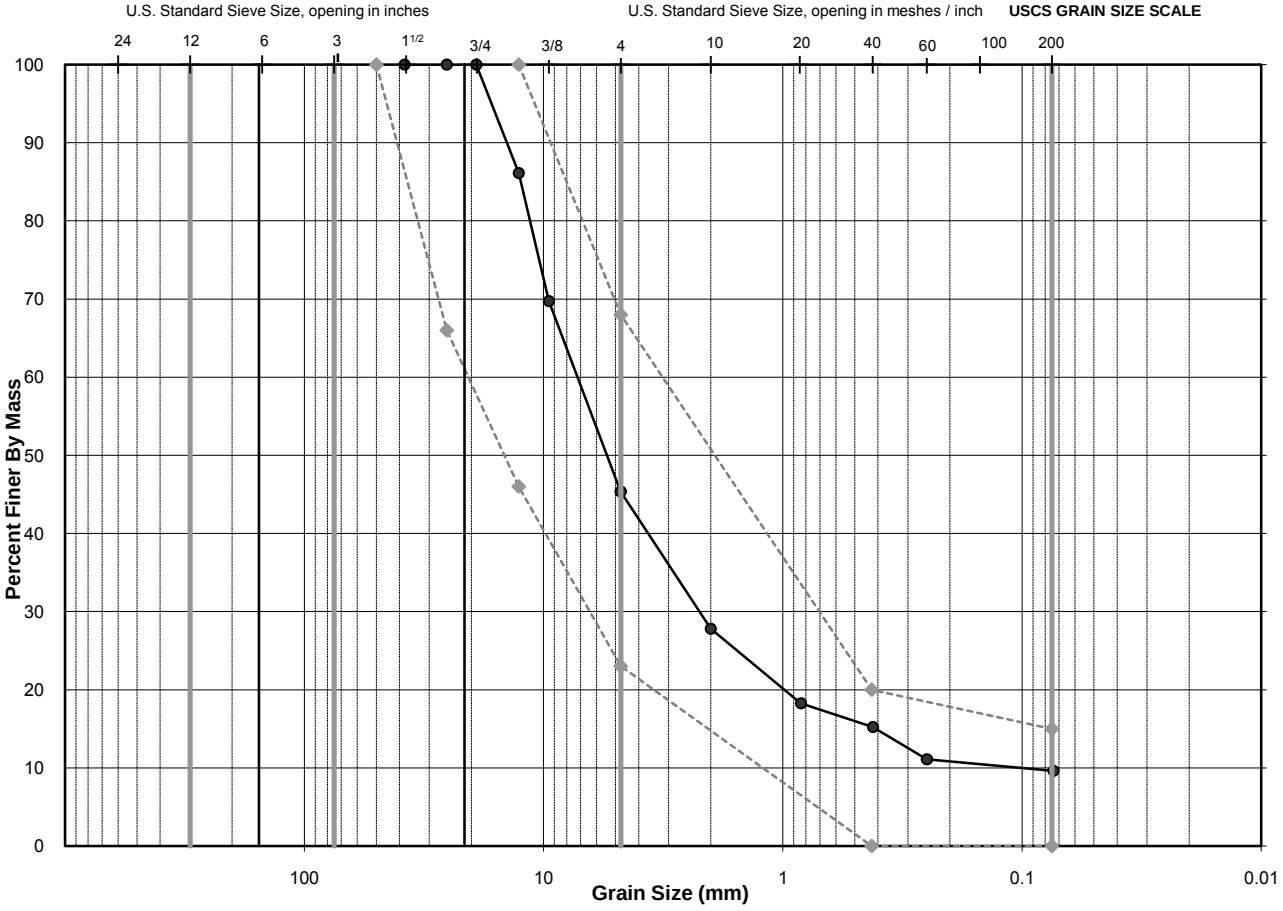
RMB	30-Aug-08	JEK	16-Sep-08
TESTED BY	DATE	CHECKED BY	DATE

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.:**	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



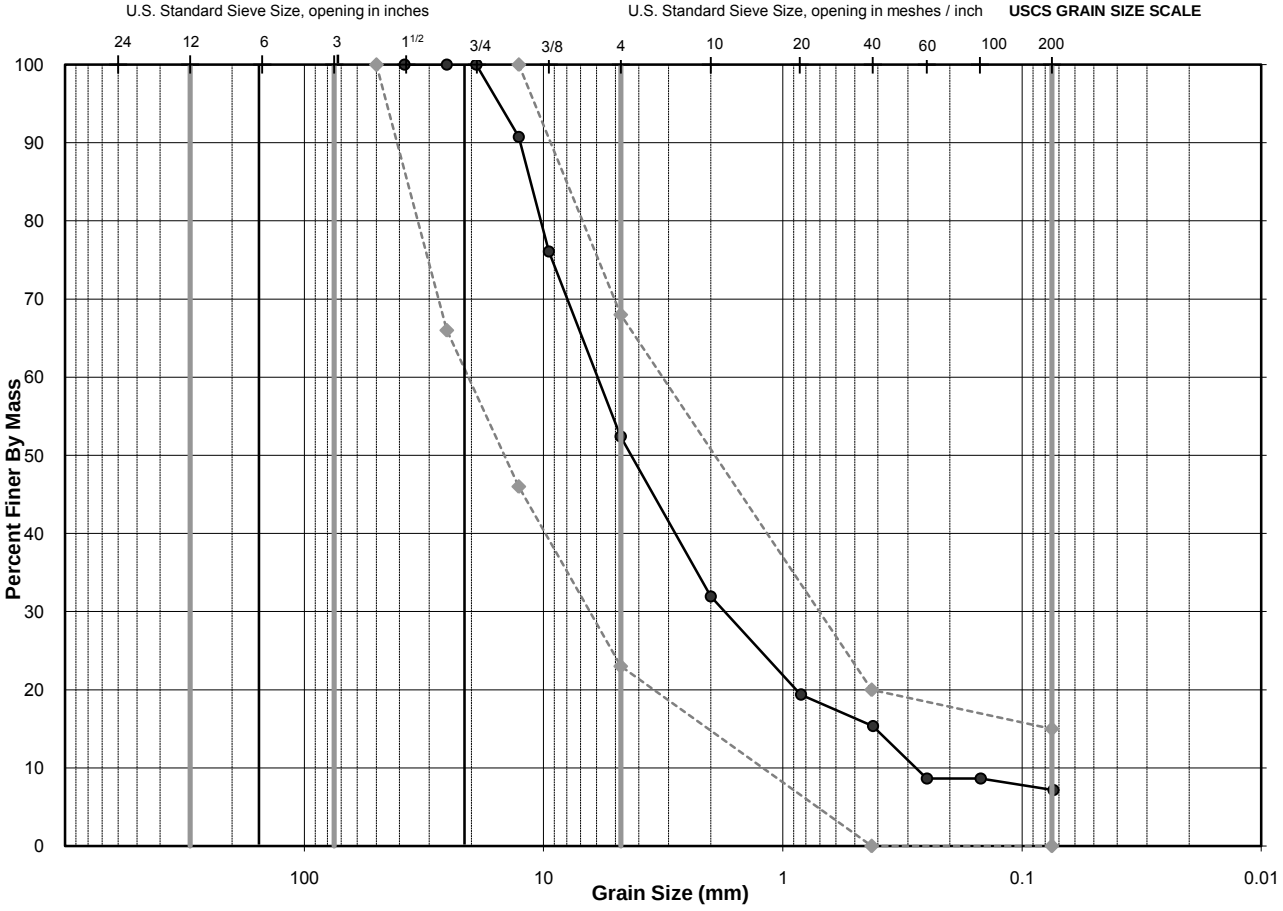
TESTED BY	DATE	CHECKED BY	DATE
RMB	30-Aug-08	KD	15-Sep-08

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.:**	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

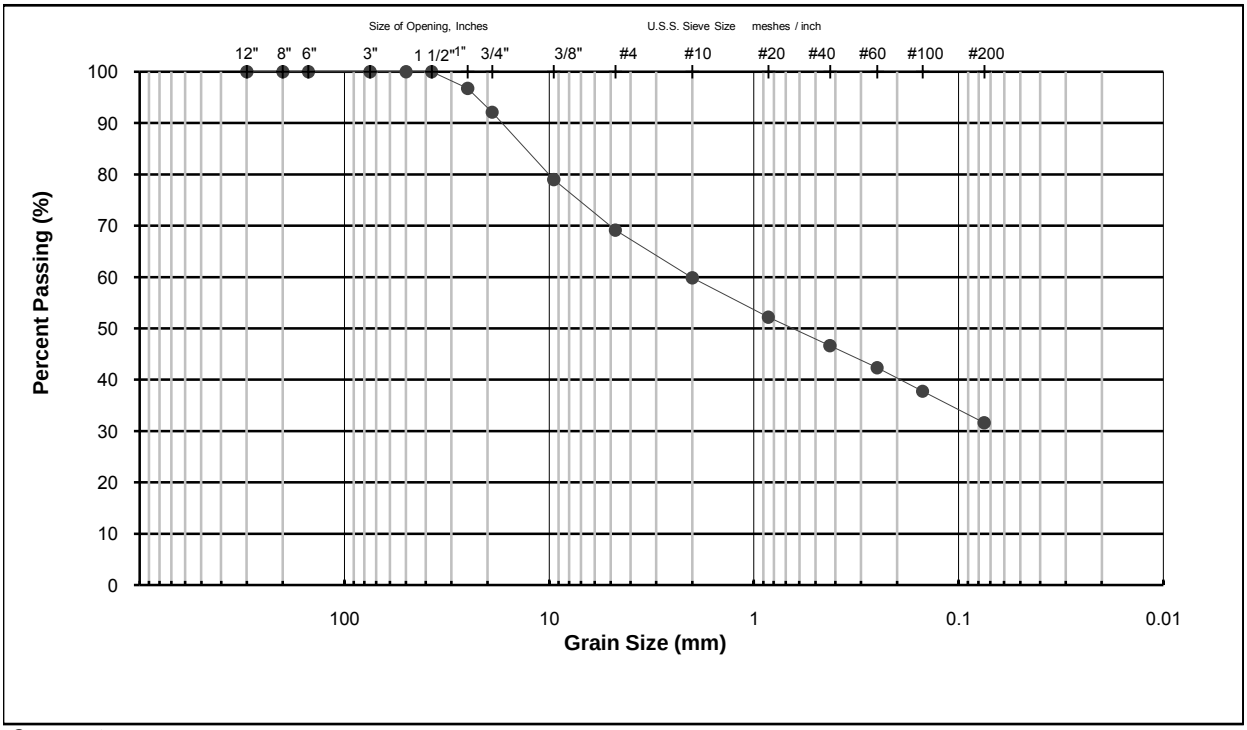
ASTM D422 & D1140 (no Hydrometer)

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

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	3.2	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			

MATERIAL SPECIFICATION:
SB Backfill



Comments:

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

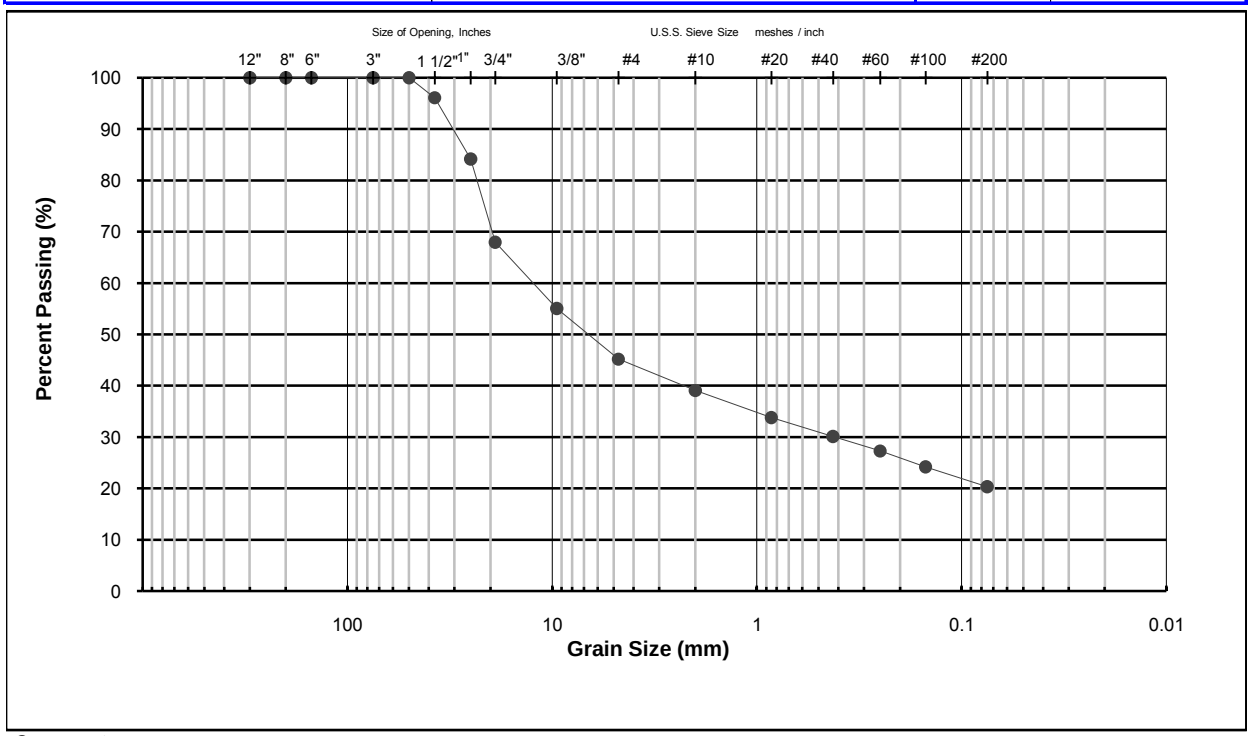
ASTM D422 & D1140 (no Hydrometer)

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	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	3.9	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

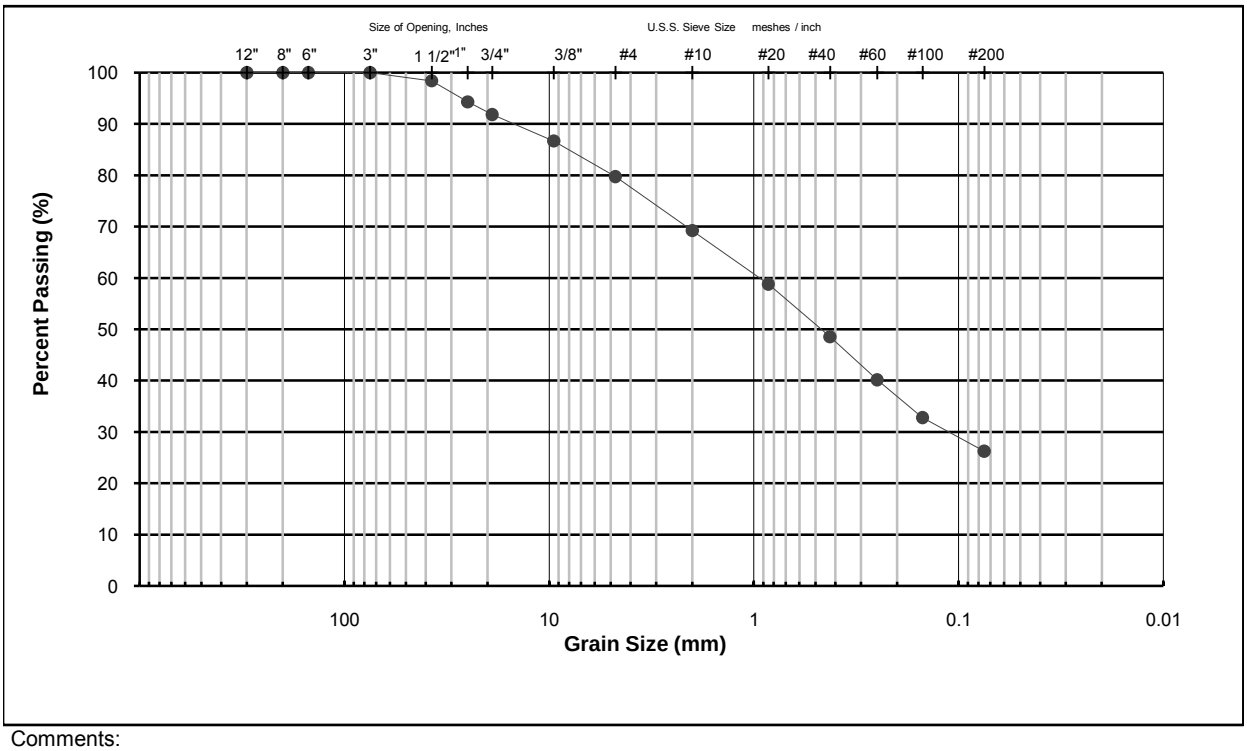
ASTM D422 & D1140 (no Hydrometer)

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

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	
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

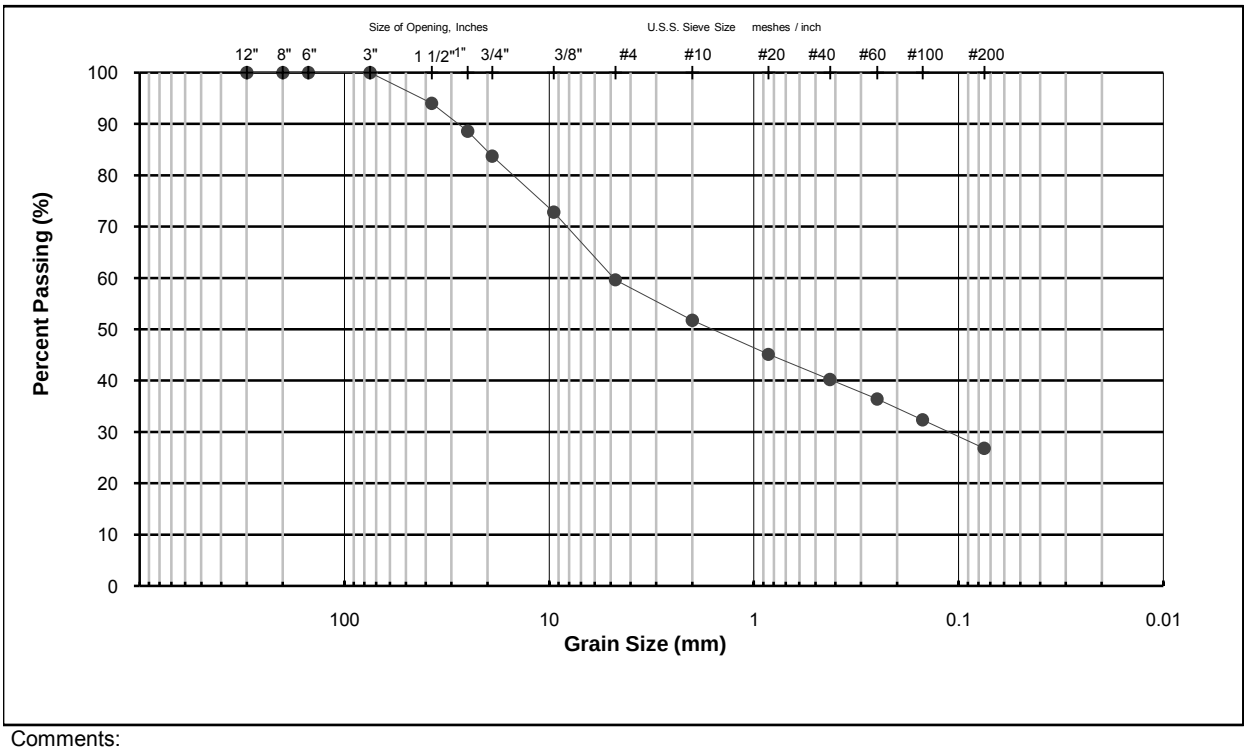
ASTM D422 & D1140 (no Hydrometer)

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

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	
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			



Comments:

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

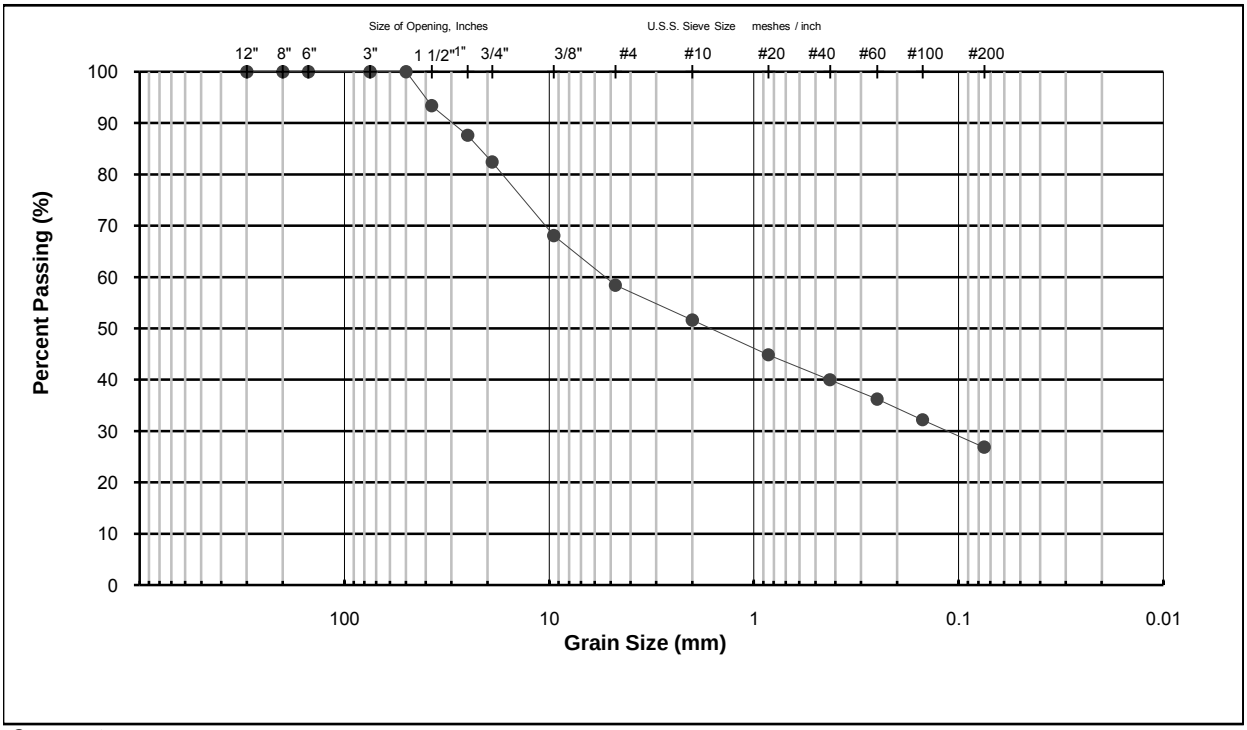
ASTM D422 & D1140 (no Hydrometer)

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

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	6.6	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			

MATERIAL SPECIFICATION:
SB Backfill



Comments:

- SB Backfill.

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

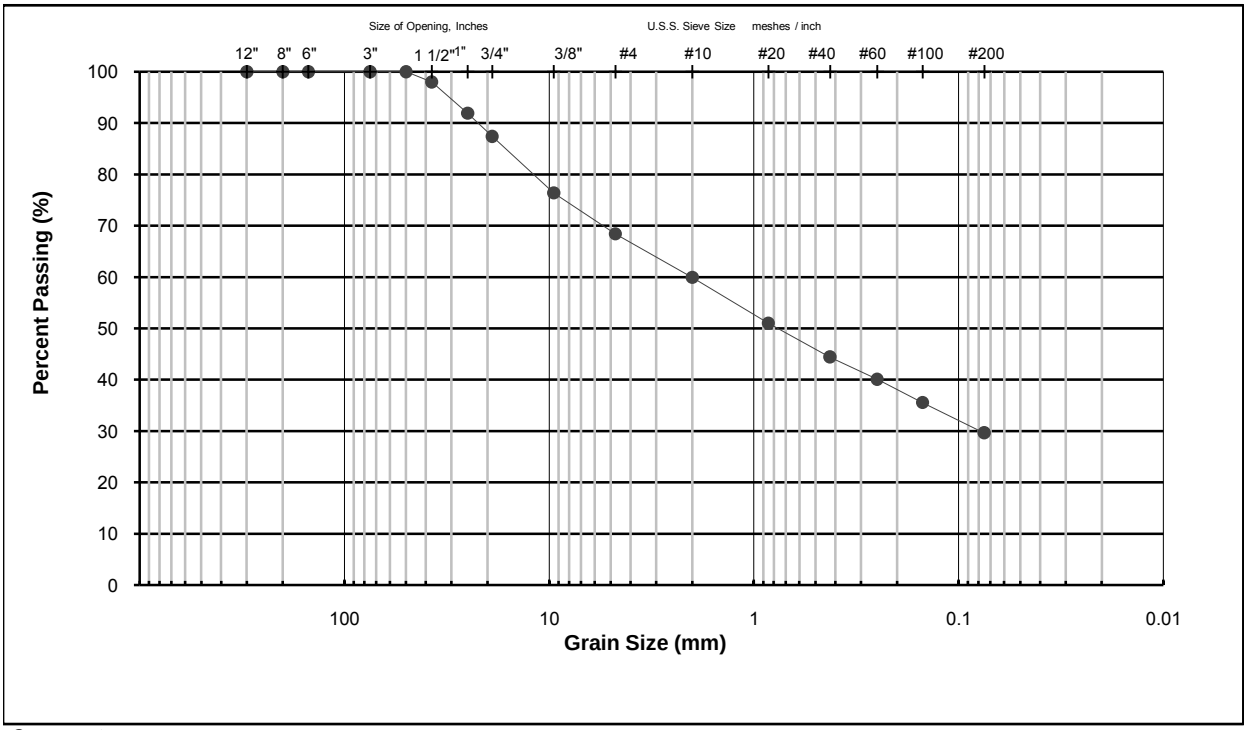
ASTM D422 & D1140 (no Hydrometer)

Project #	07-1413-0074-2200	**Station**	60+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
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			

MATERIAL SPECIFICATION:
SB Backfill



Comments:

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

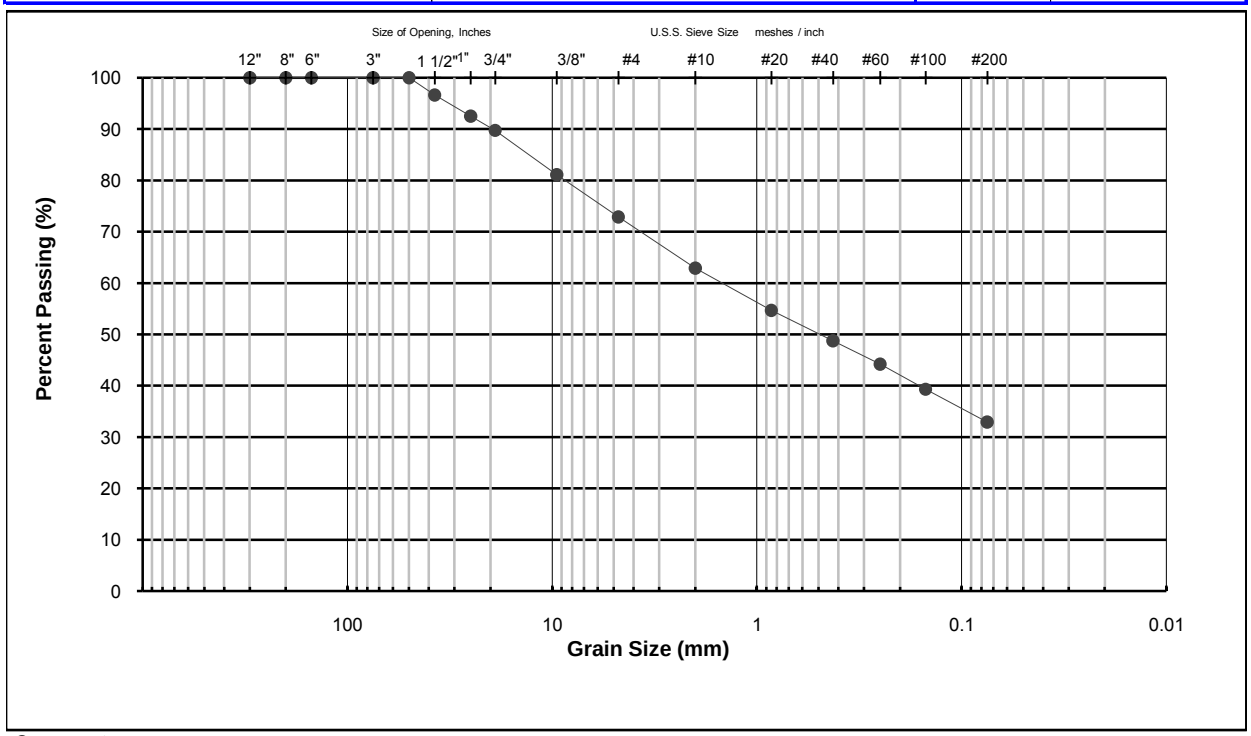
ASTM D422 & D1140 (no Hydrometer)

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

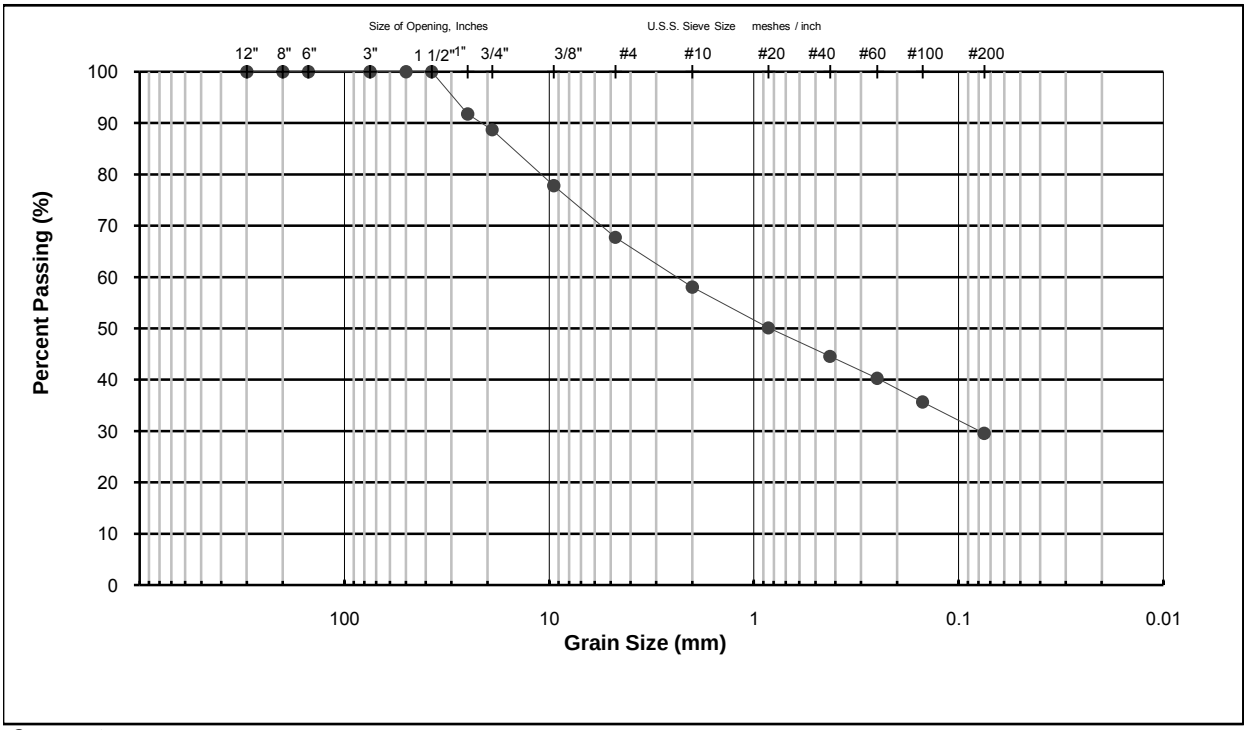
ASTM D422 & D1140 (no Hydrometer)

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

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	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			

MATERIAL SPECIFICATION:
SB Backfill



Comments:

- SB Backfill.

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

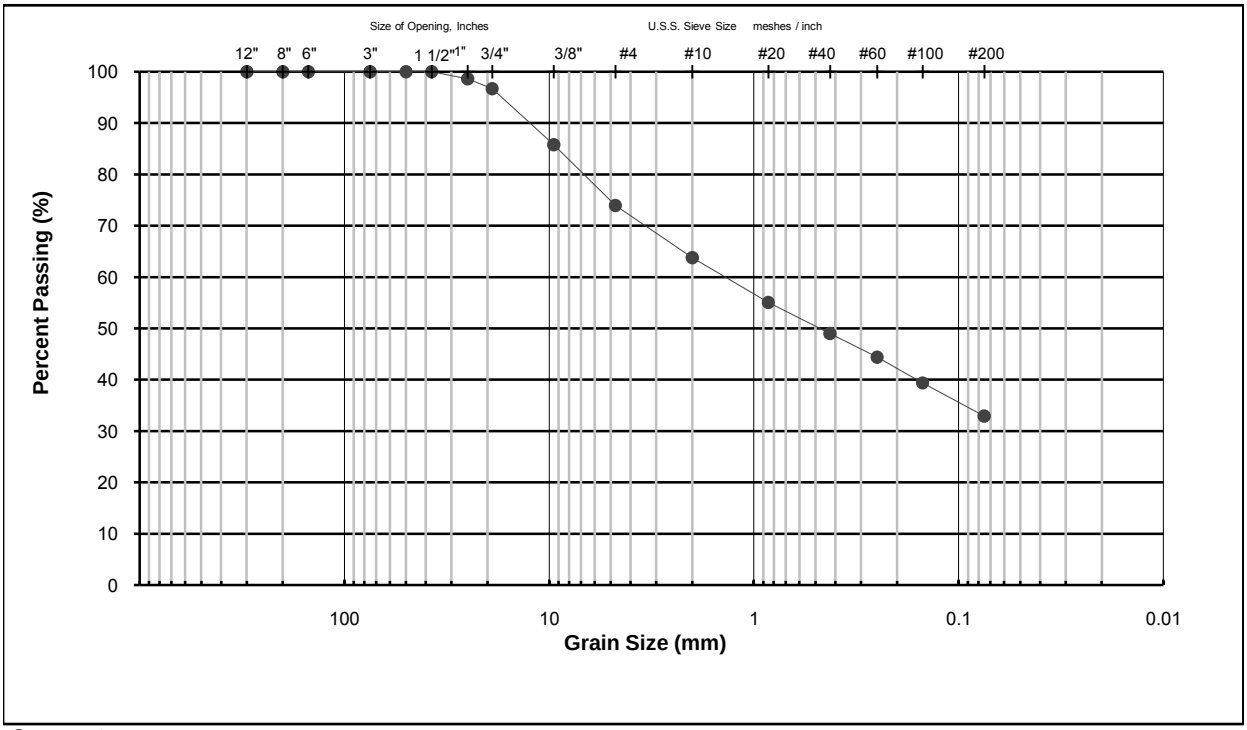
ASTM D422 & D1140 (no Hydrometer)

Project #	07-1413-0074-2200	**Station**	60+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

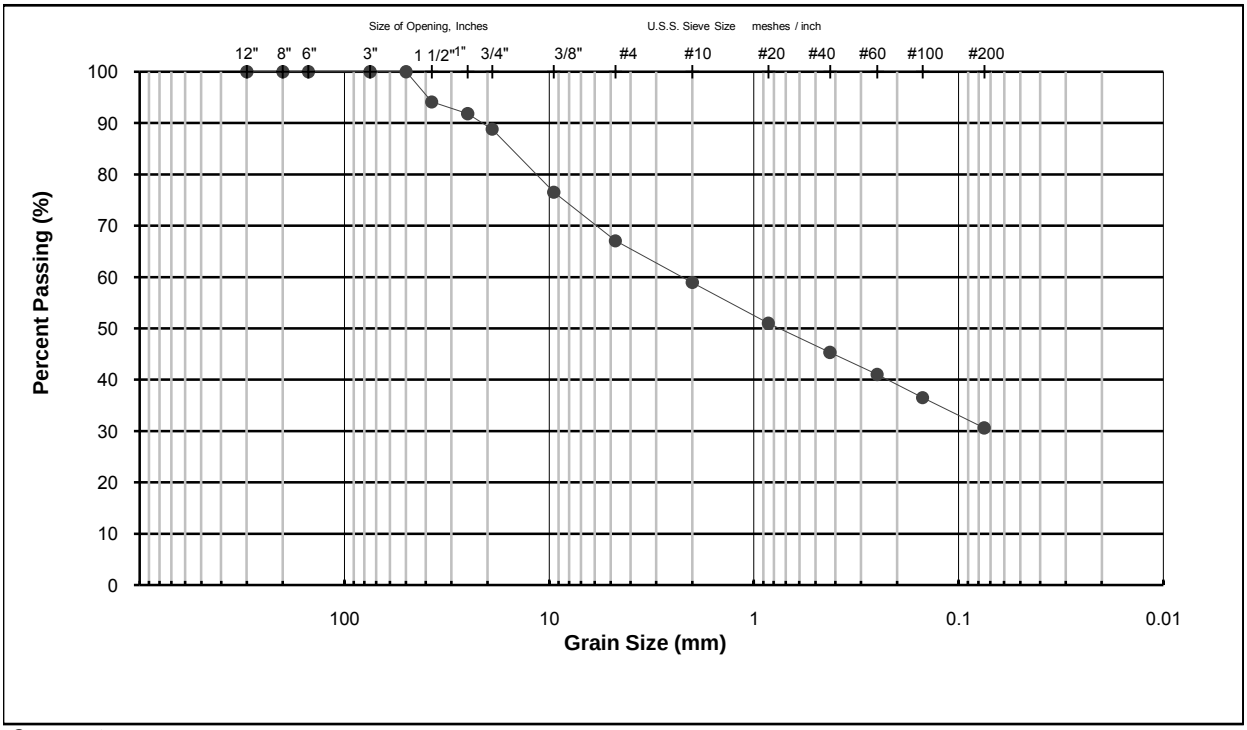
ASTM D422 & D1140 (no Hydrometer)

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	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	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

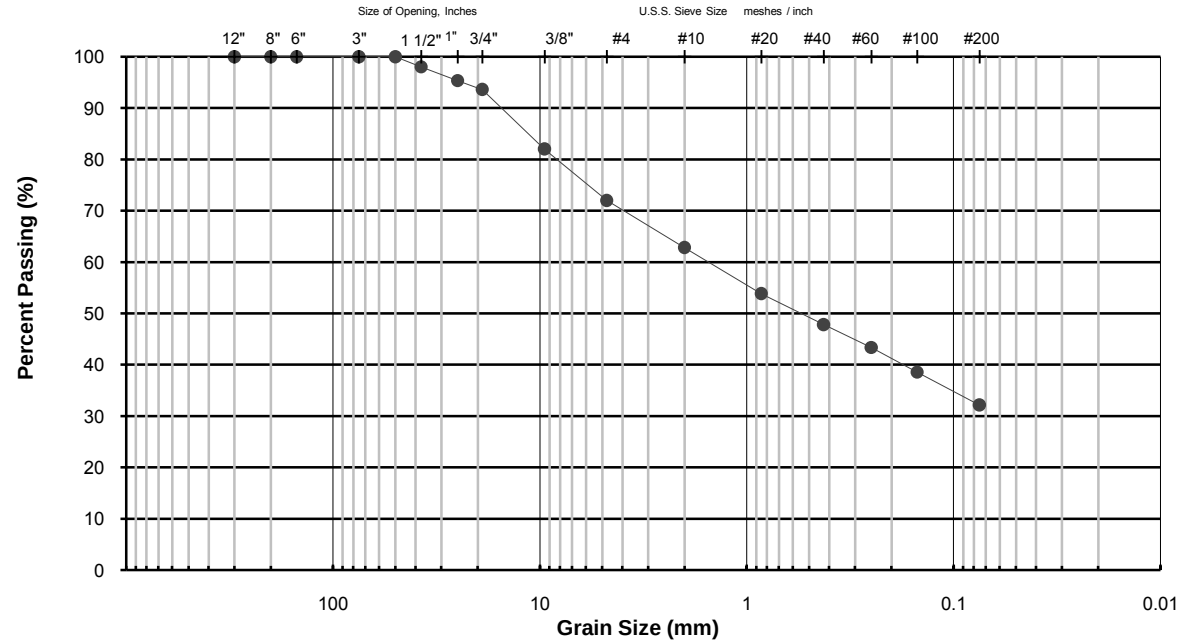
ASTM D422 & D1140 (no Hydrometer)

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

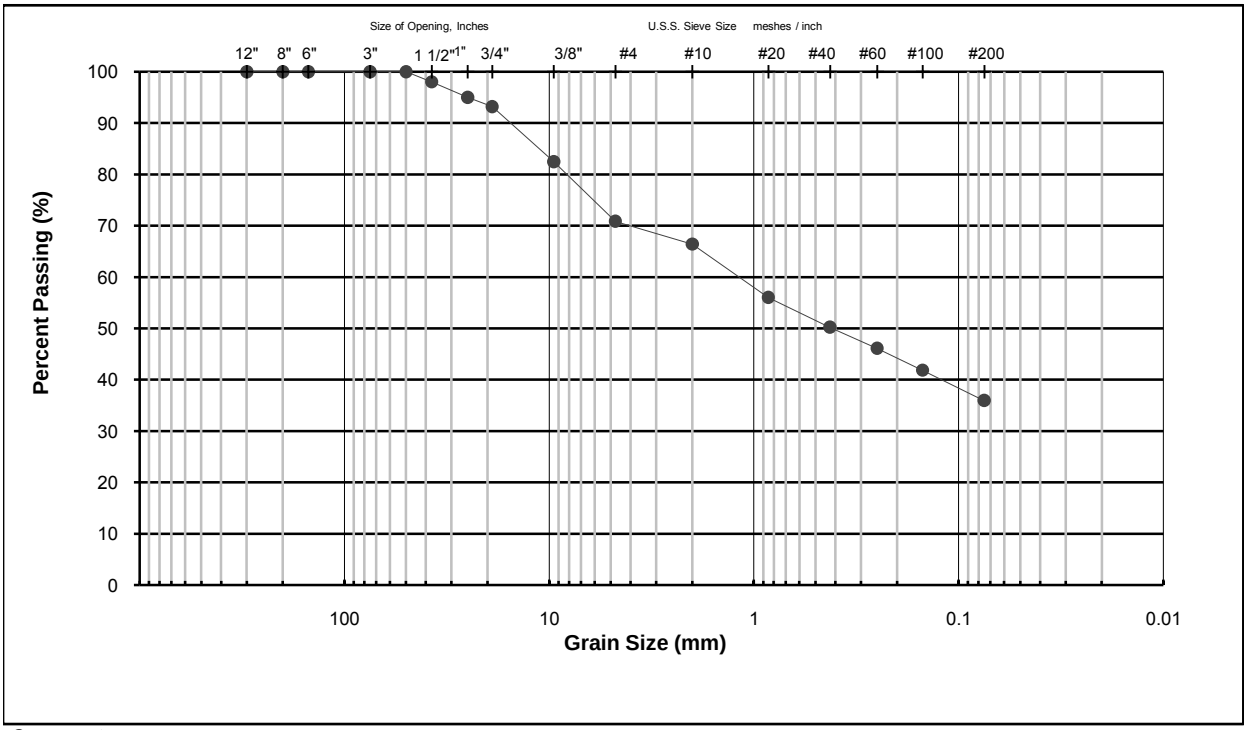
ASTM D422 & D1140 (no Hydrometer)

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

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	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			

MATERIAL SPECIFICATION:
SB Backfill



Comments:

- SB Backfill.

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

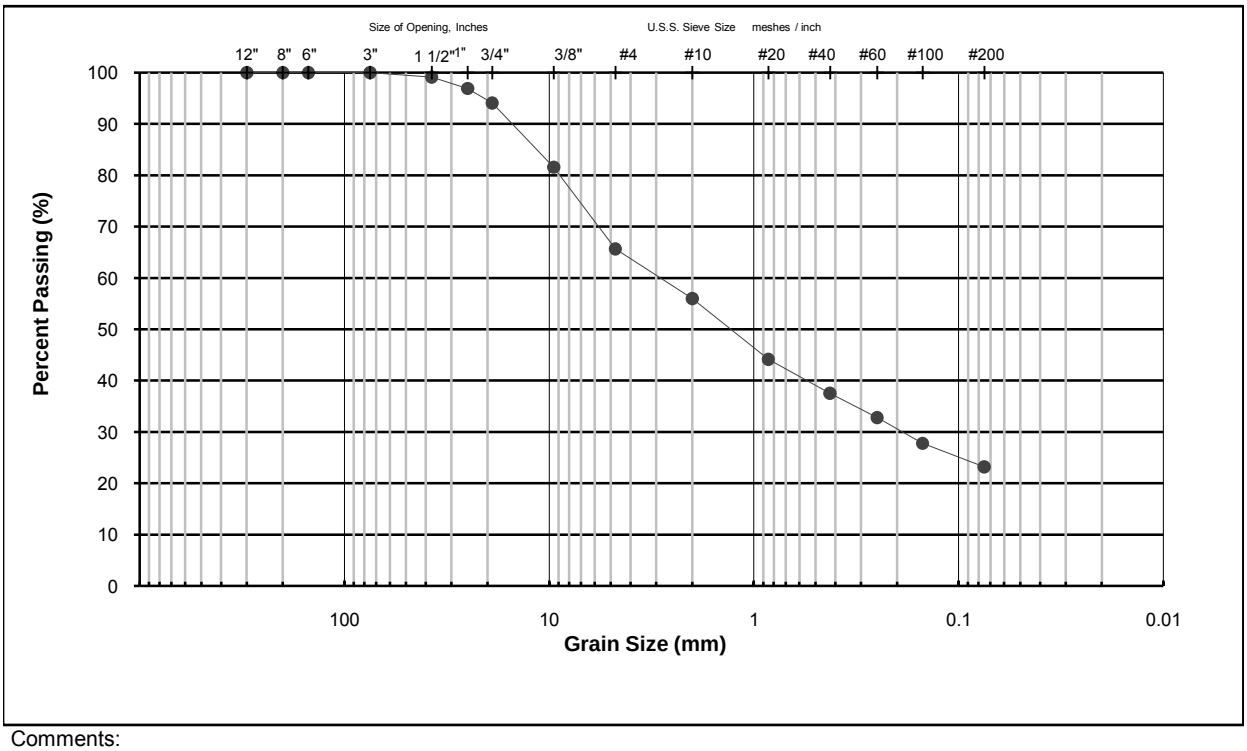
ASTM D422 & D1140 (no Hydrometer)

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

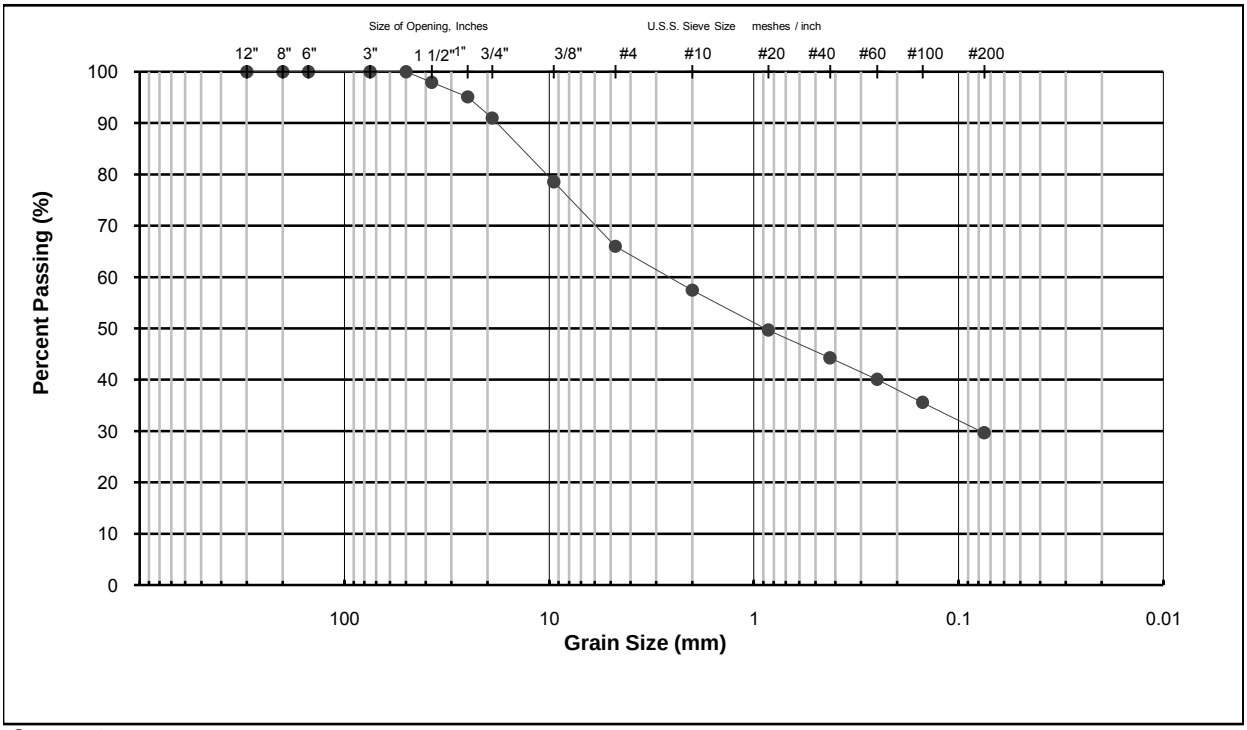
ASTM D422 & D1140 (no Hydrometer)

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

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			

MATERIAL SPECIFICATION:
SB Backfill



Comments:

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

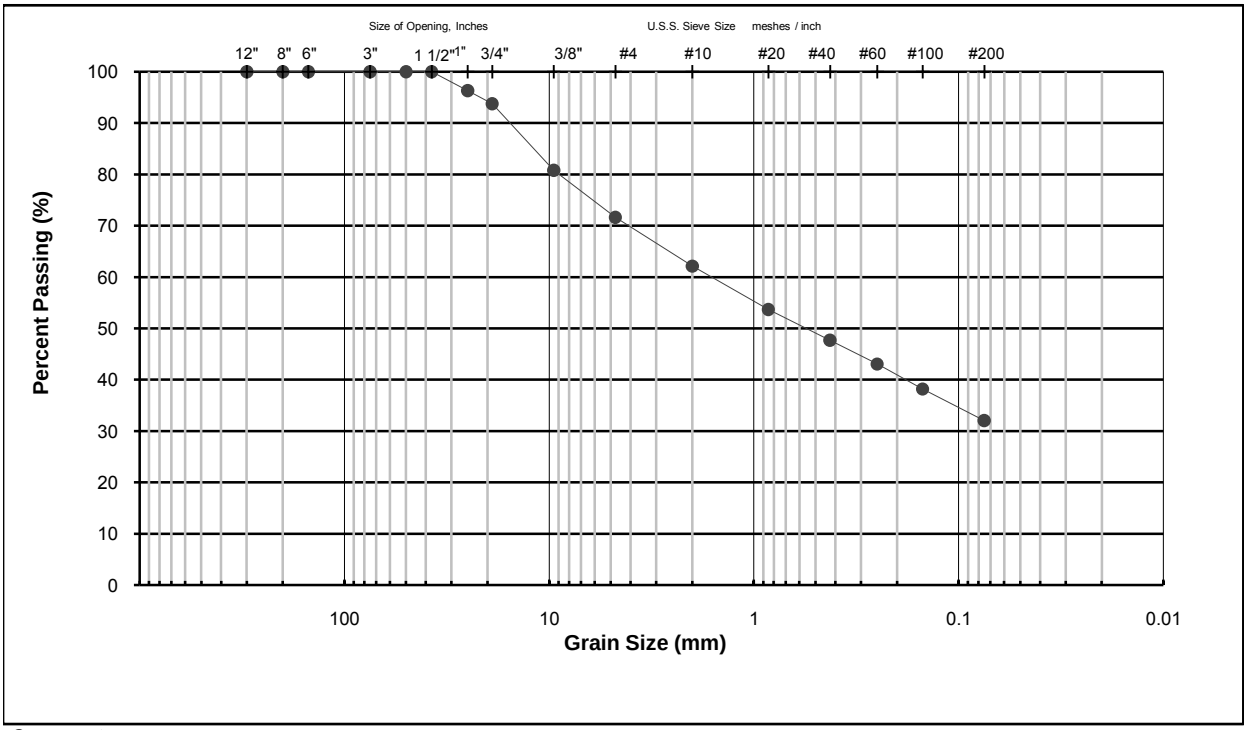
ASTM D422 & D1140 (no Hydrometer)

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

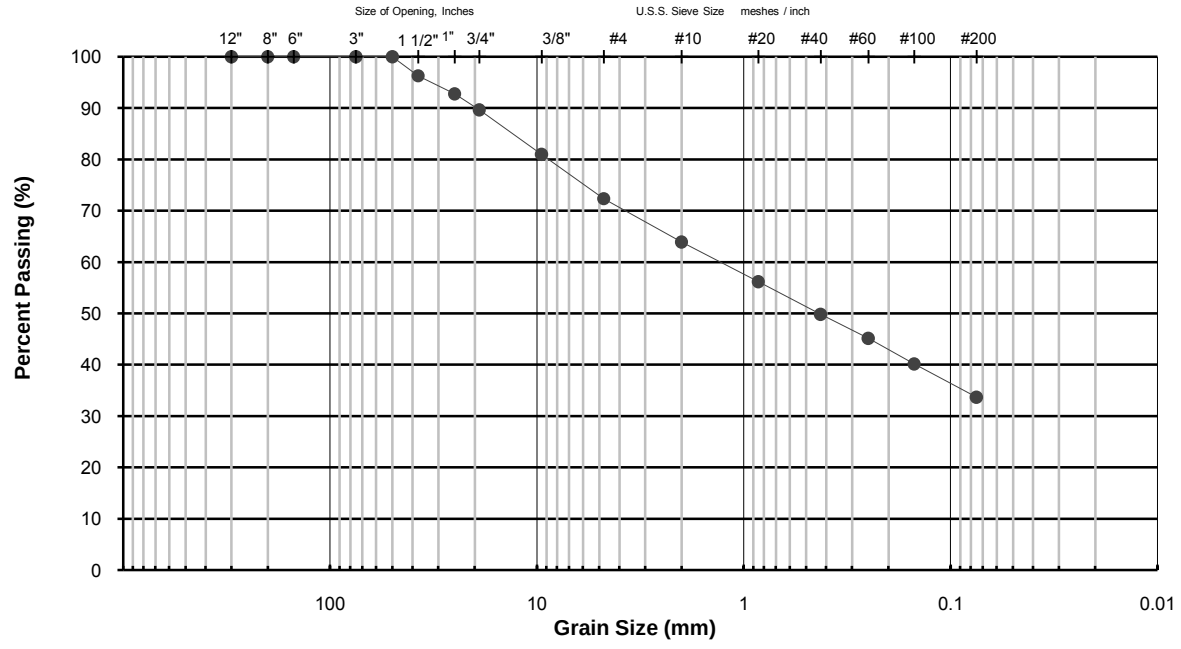
ASTM D422 & D1140 (no Hydrometer)

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

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			

MATERIAL SPECIFICATION:
SB Backfill



Comments:

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

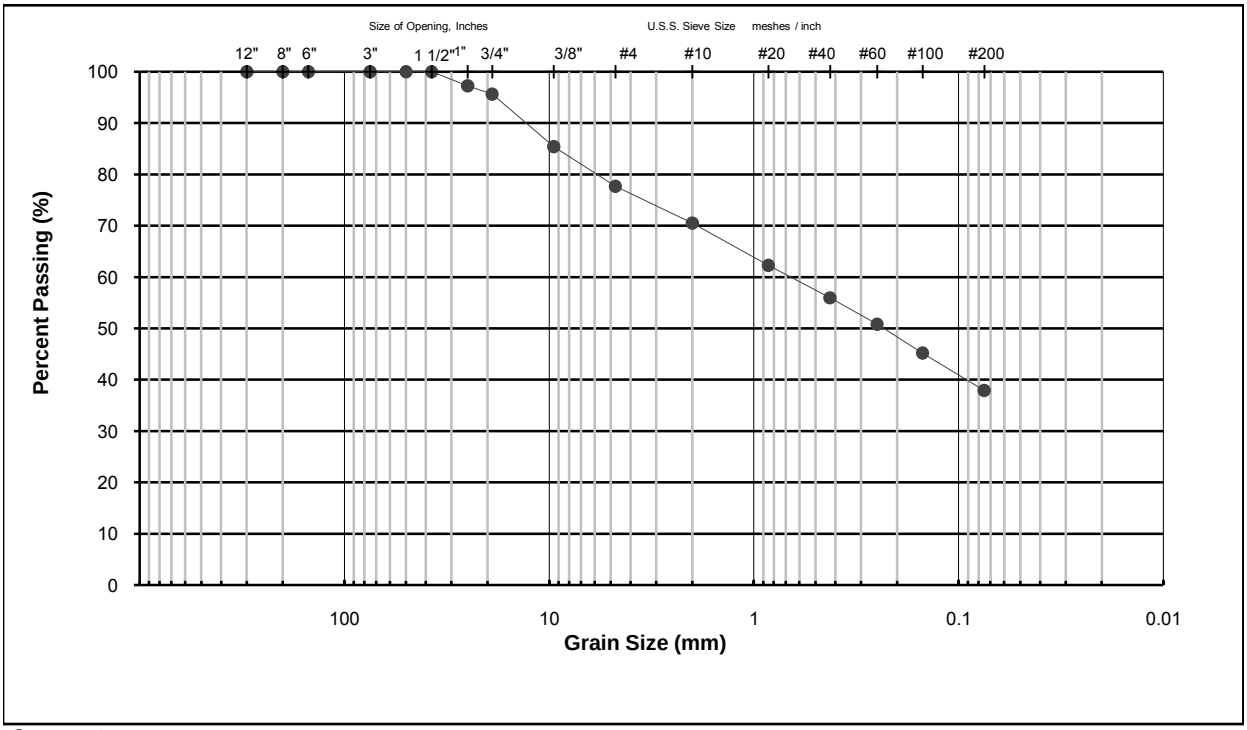
ASTM D422 & D1140 (no Hydrometer)

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

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	2.8	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			

MATERIAL SPECIFICATION:
SB Backfill



Comments:

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

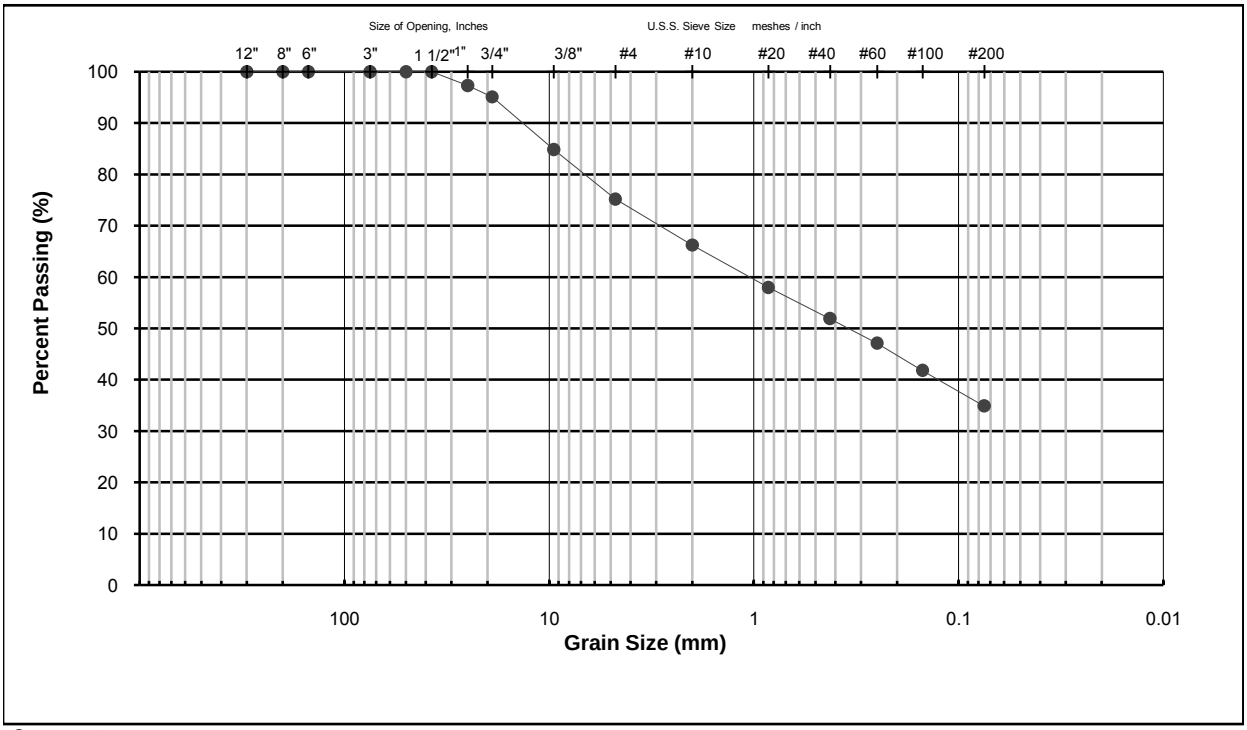
ASTM D422 & D1140 (no Hydrometer)

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

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			

MATERIAL SPECIFICATION:
SB Backfill



Comments:

- SB Backfill.

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

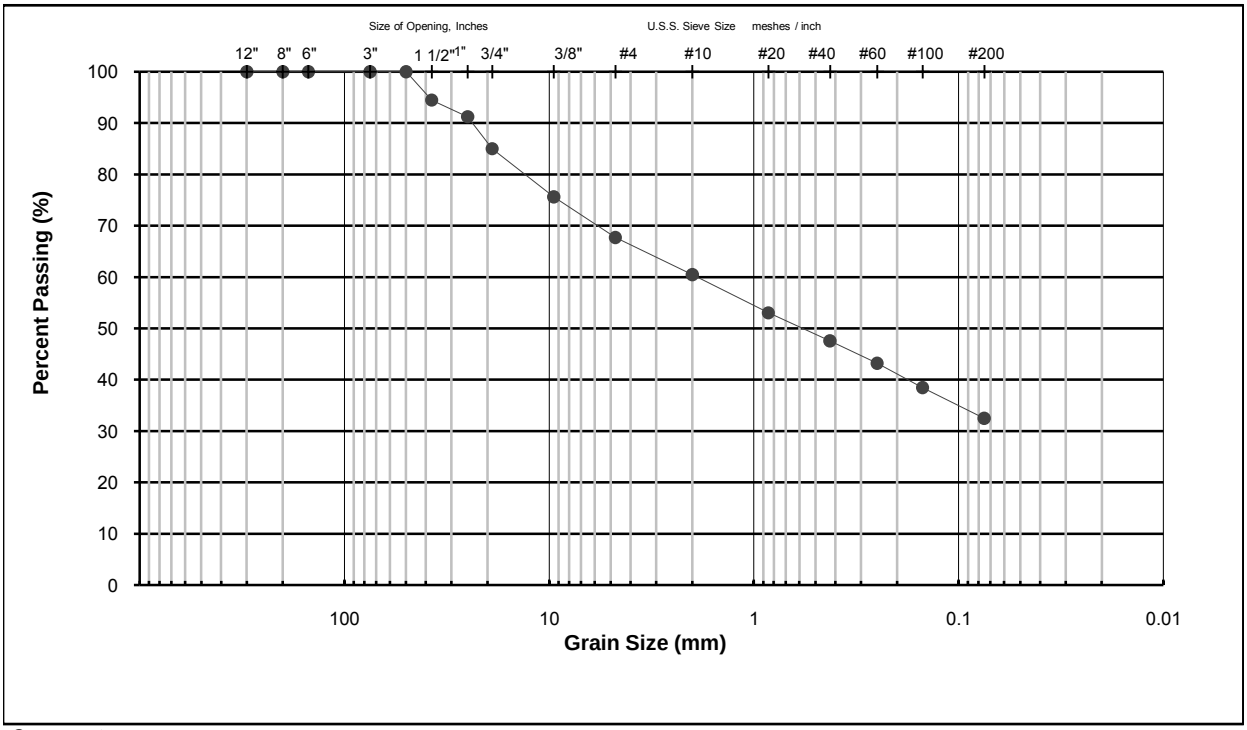
ASTM D422 & D1140 (no Hydrometer)

Project #	07-1413-0074-2200	**Station**	60+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

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	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			

MATERIAL SPECIFICATION:
SB Backfill



Comments:

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

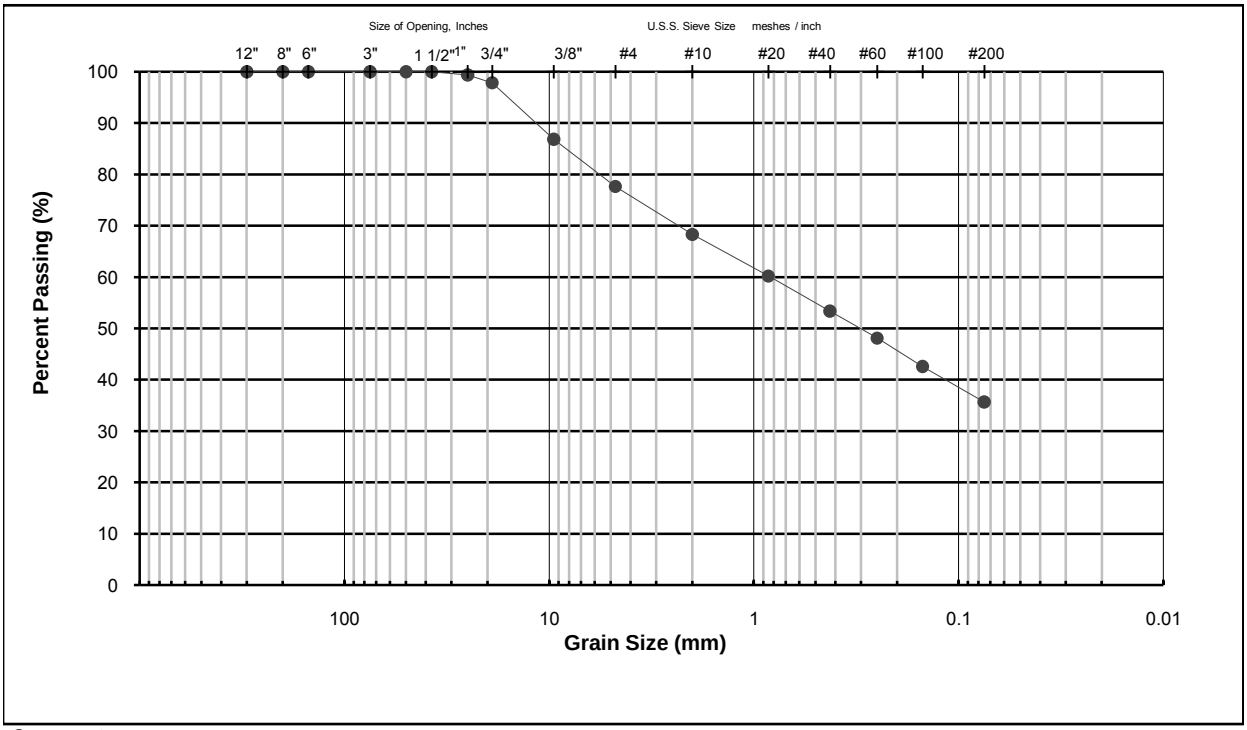
ASTM D422 & D1140 (no Hydrometer)

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	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	0.6	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

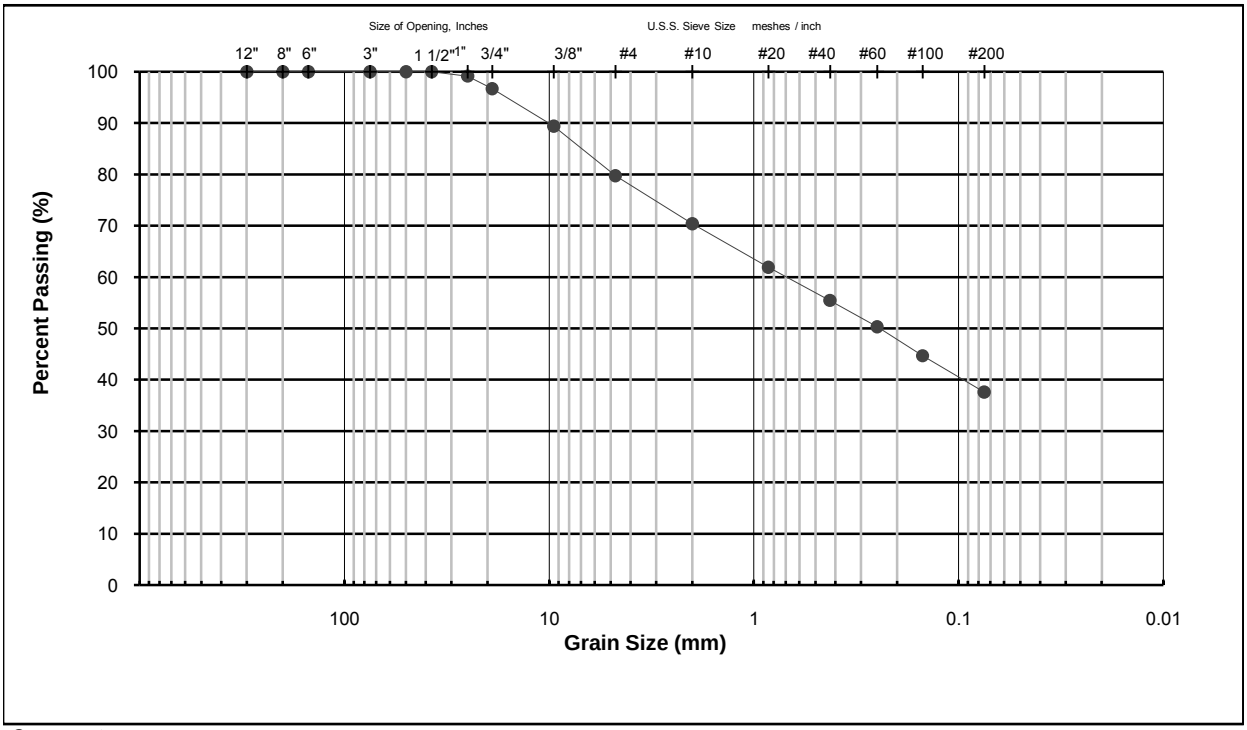
ASTM D422 & D1140 (no Hydrometer)

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

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	0.8	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			

MATERIAL SPECIFICATION:
SB Backfill



Comments:

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

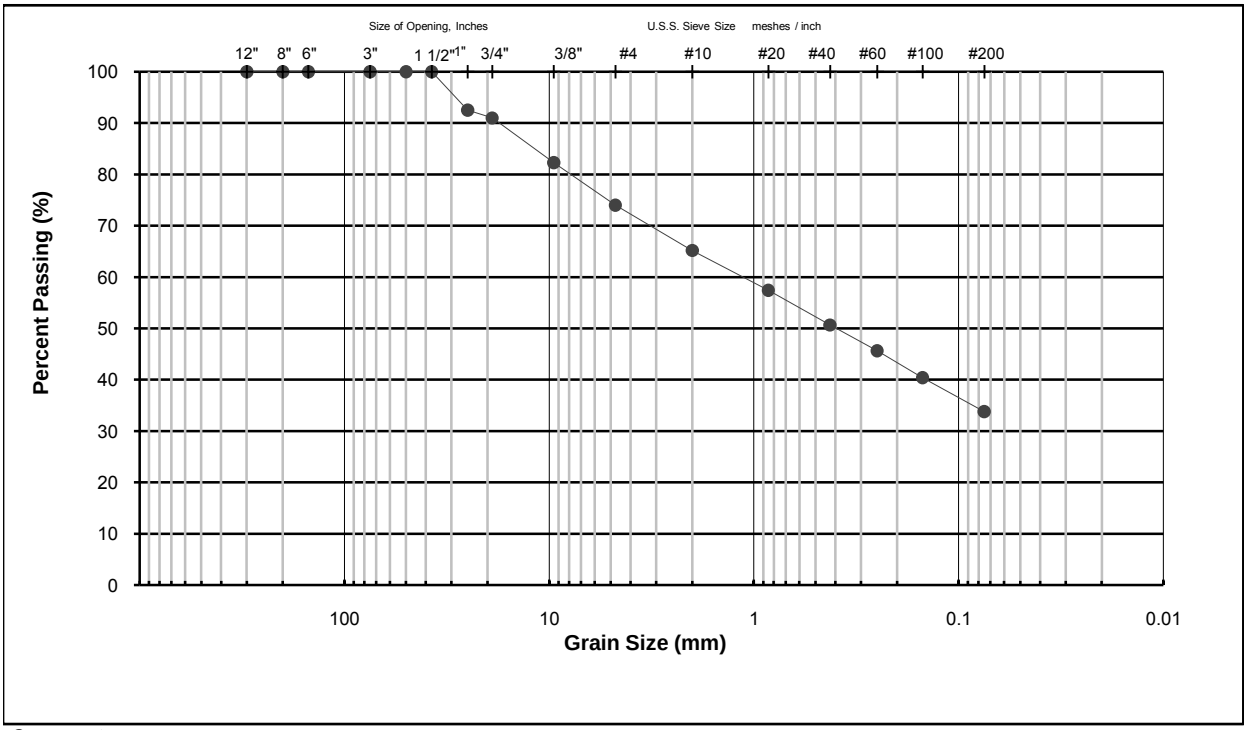
ASTM D422 & D1140 (no Hydrometer)

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

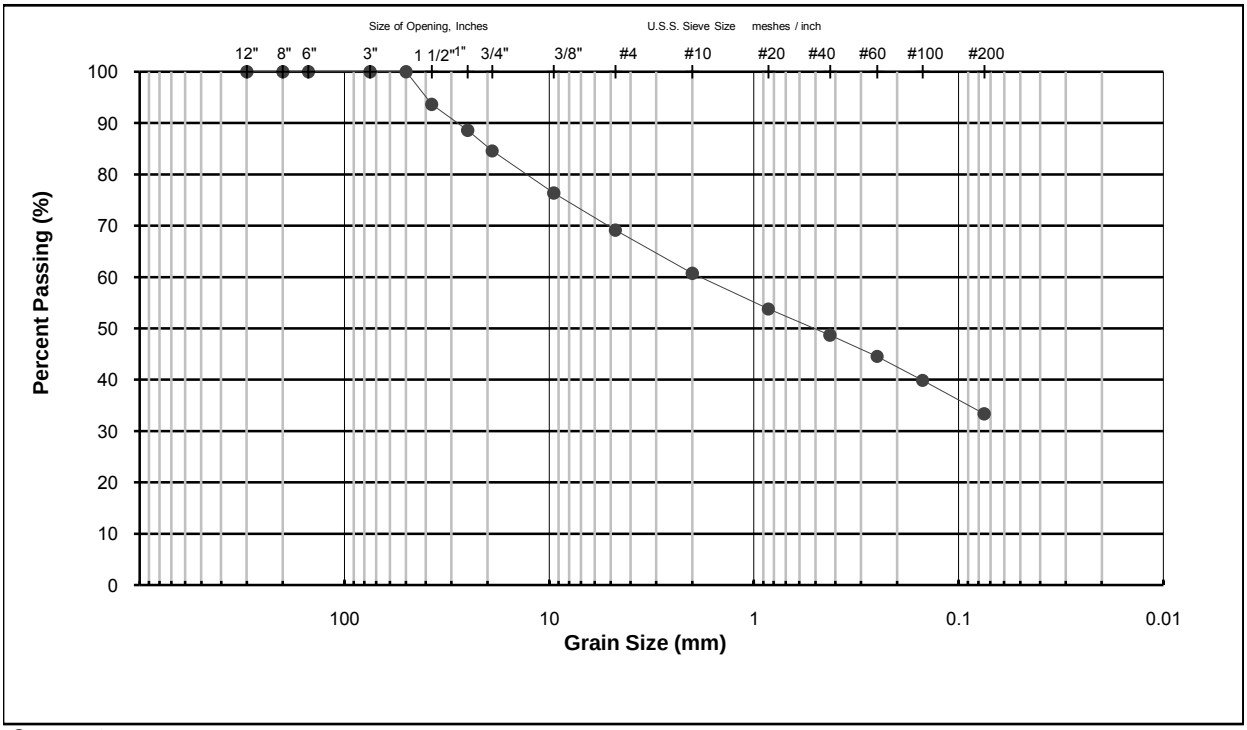
ASTM D422 & D1140 (no Hydrometer)

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

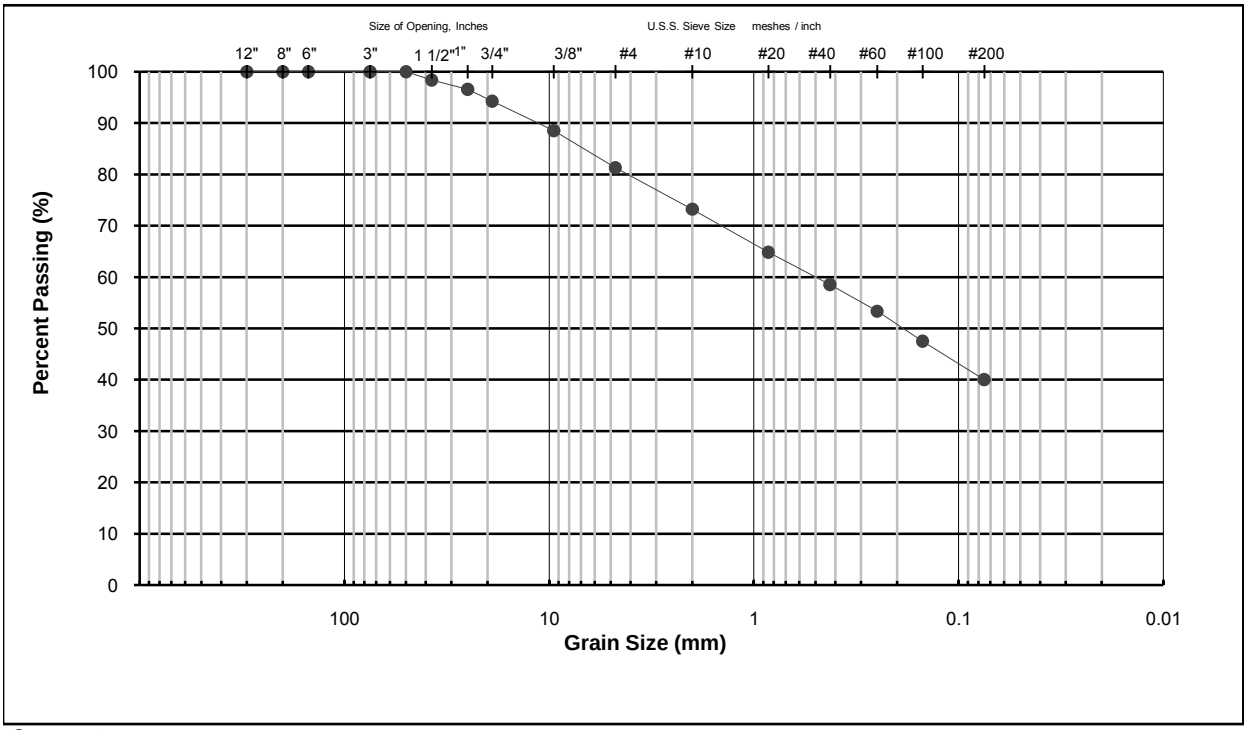
ASTM D422 & D1140 (no Hydrometer)

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

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	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			

MATERIAL SPECIFICATION:
SB Backfill



Comments:

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

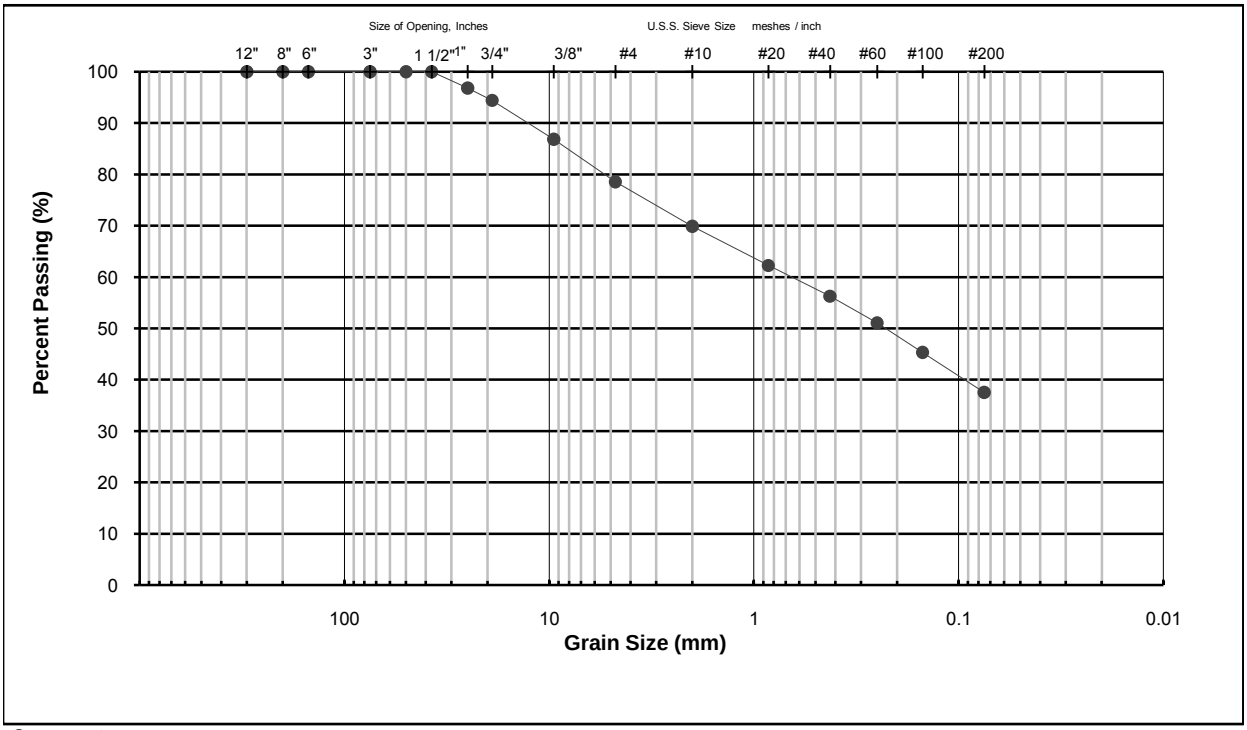
ASTM D422 & D1140 (no Hydrometer)

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

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	3.2	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			

MATERIAL SPECIFICATION:
SB Backfill



Comments:

- SB Backfill.

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

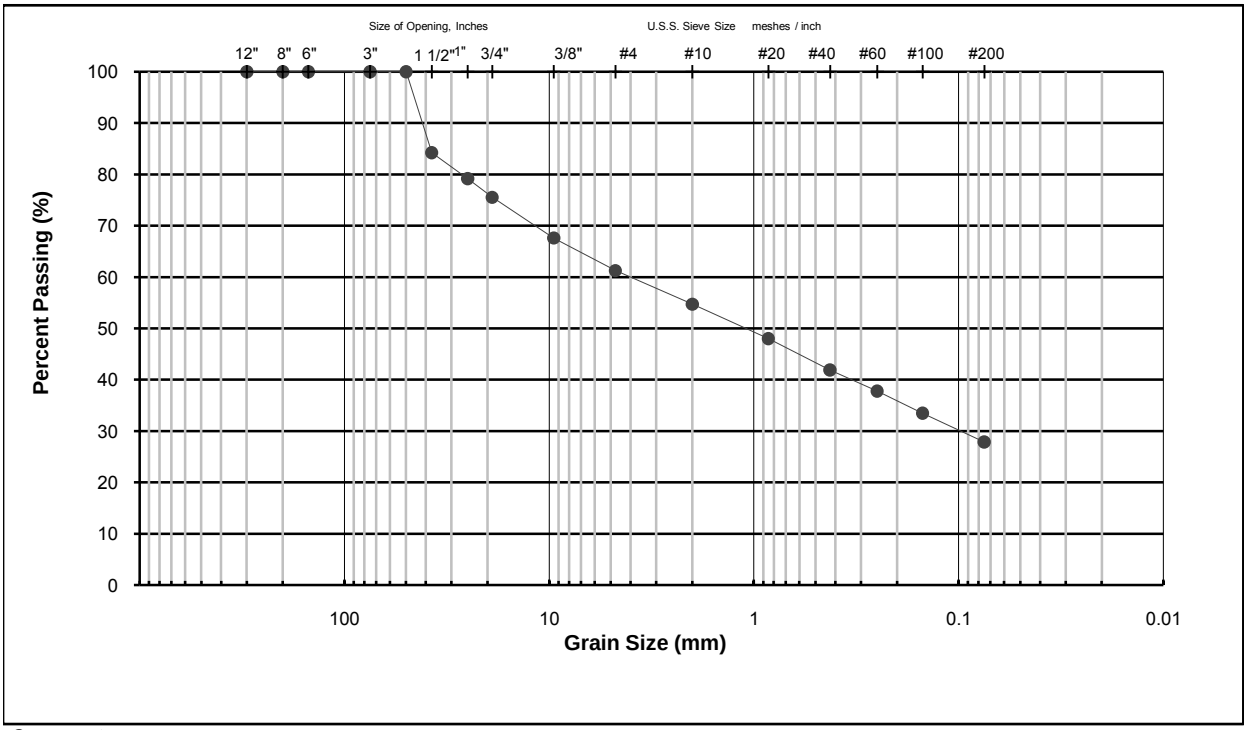
ASTM D422 & D1140 (no Hydrometer)

Project #	07-1413-0074-2200	**Station**	60+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
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			

MATERIAL SPECIFICATION:
SB Backfill



Comments:

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

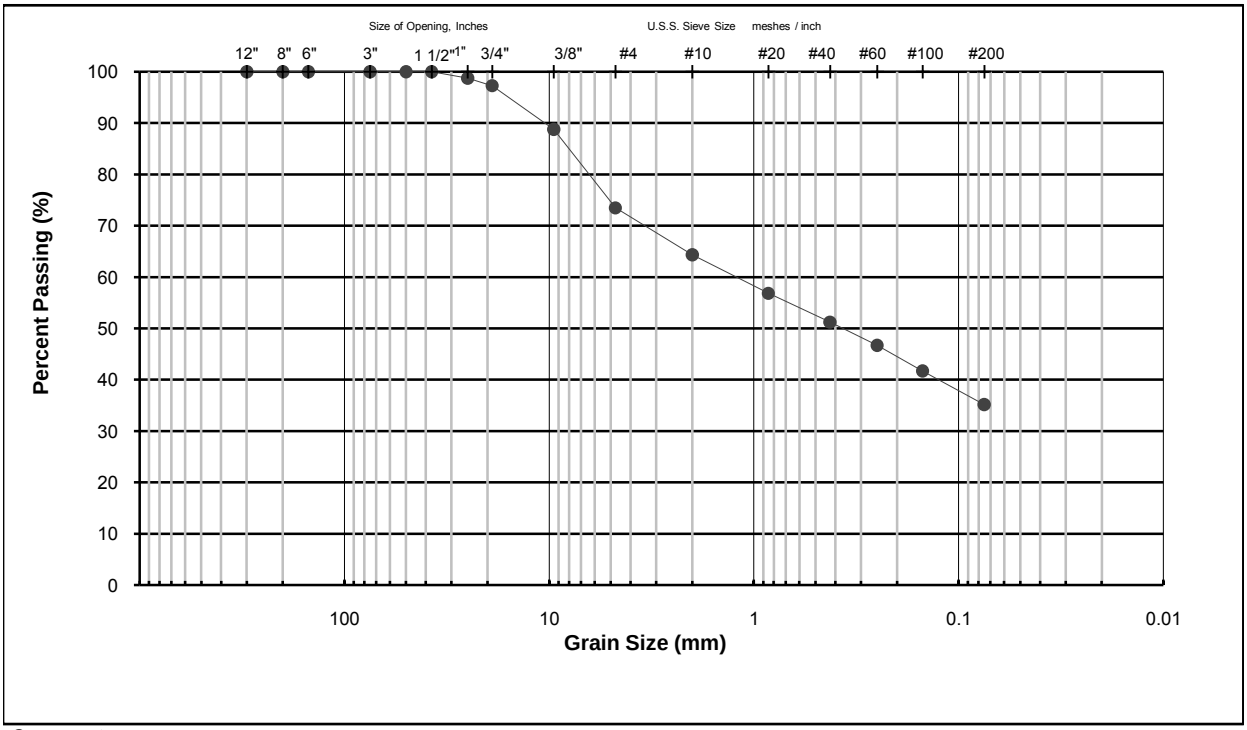
ASTM D422 & D1140 (no Hydrometer)

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

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	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			



Comments:

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

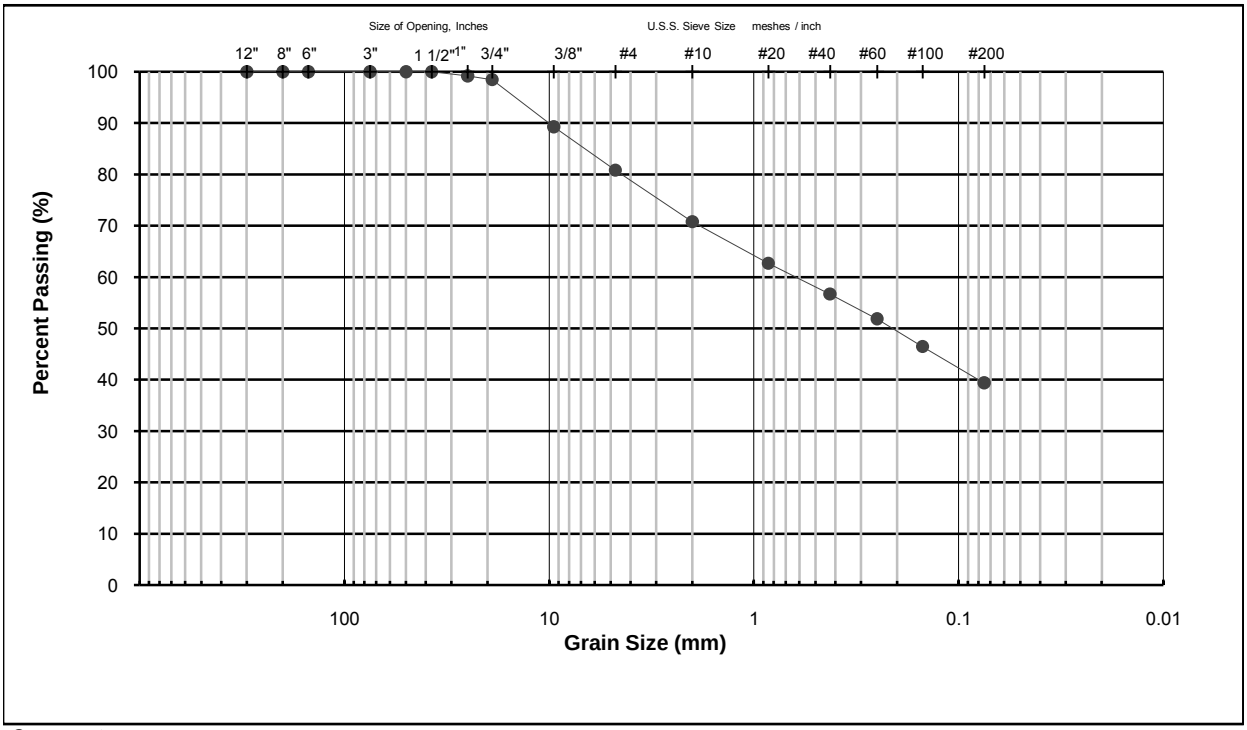
ASTM D422 & D1140 (no Hydrometer)

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

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	0.8	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			

MATERIAL SPECIFICATION:
SB Backfill



Comments:

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

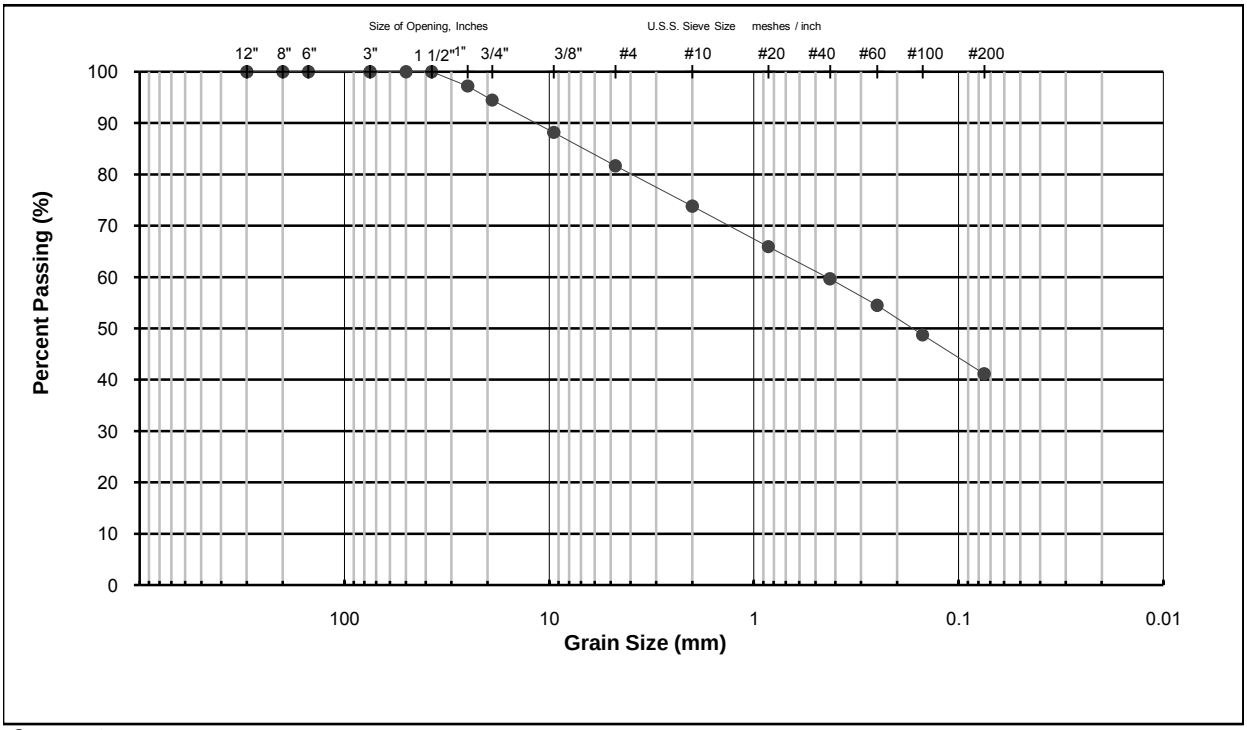
ASTM D422 & D1140 (no Hydrometer)

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

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	2.8	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			

MATERIAL SPECIFICATION:
SB Backfill



Comments:

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

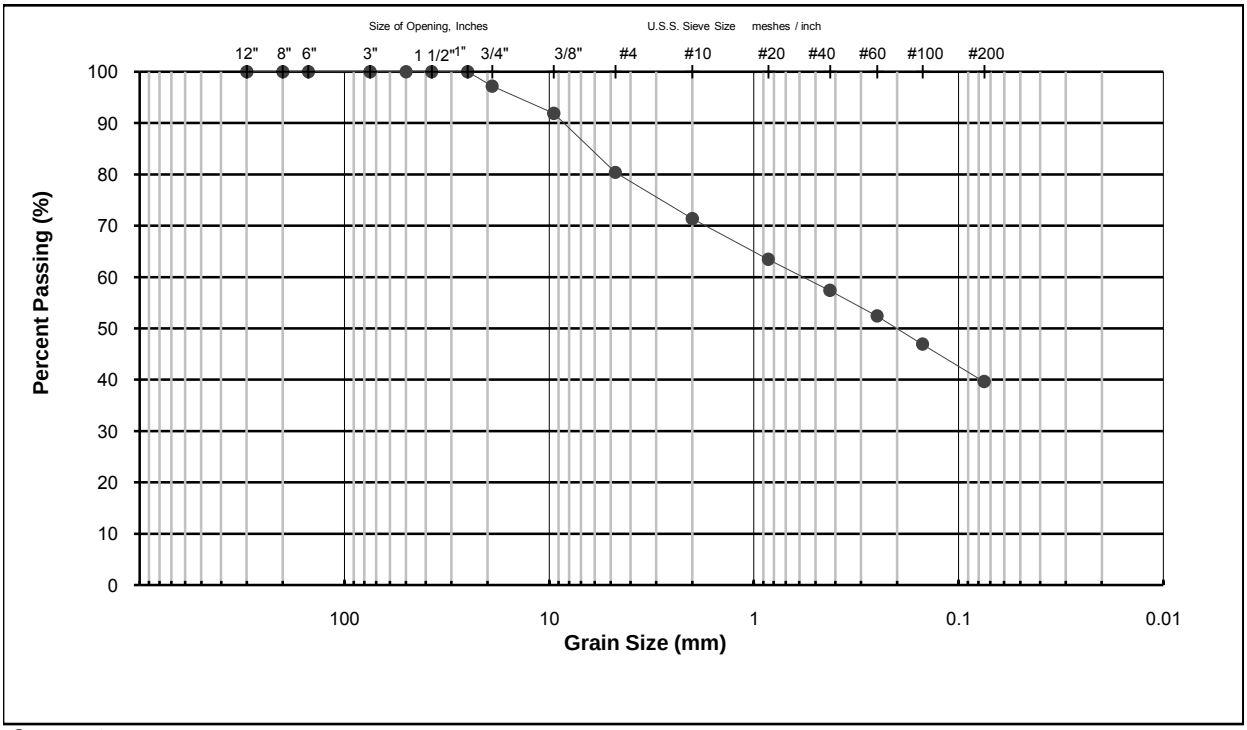
ASTM D422 & D1140 (no Hydrometer)

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

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			

MATERIAL SPECIFICATION:
SB Backfill



Comments:

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

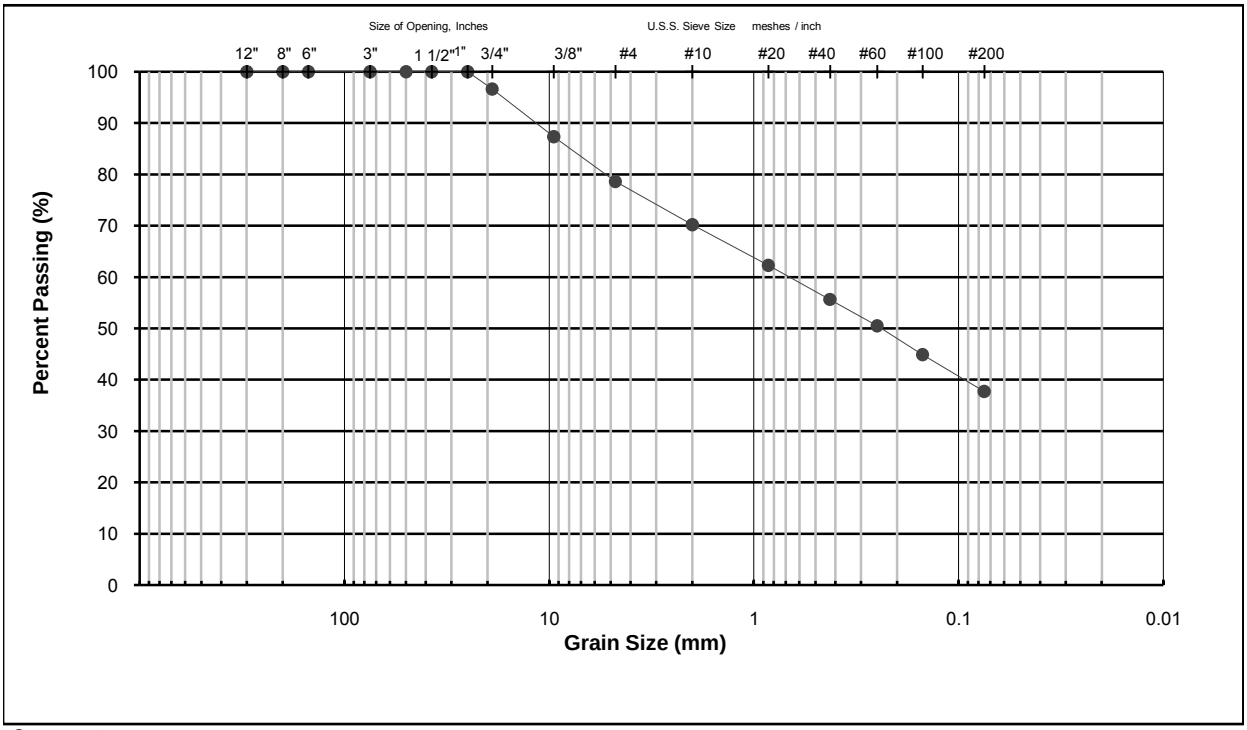
ASTM D422 & D1140 (no Hydrometer)

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

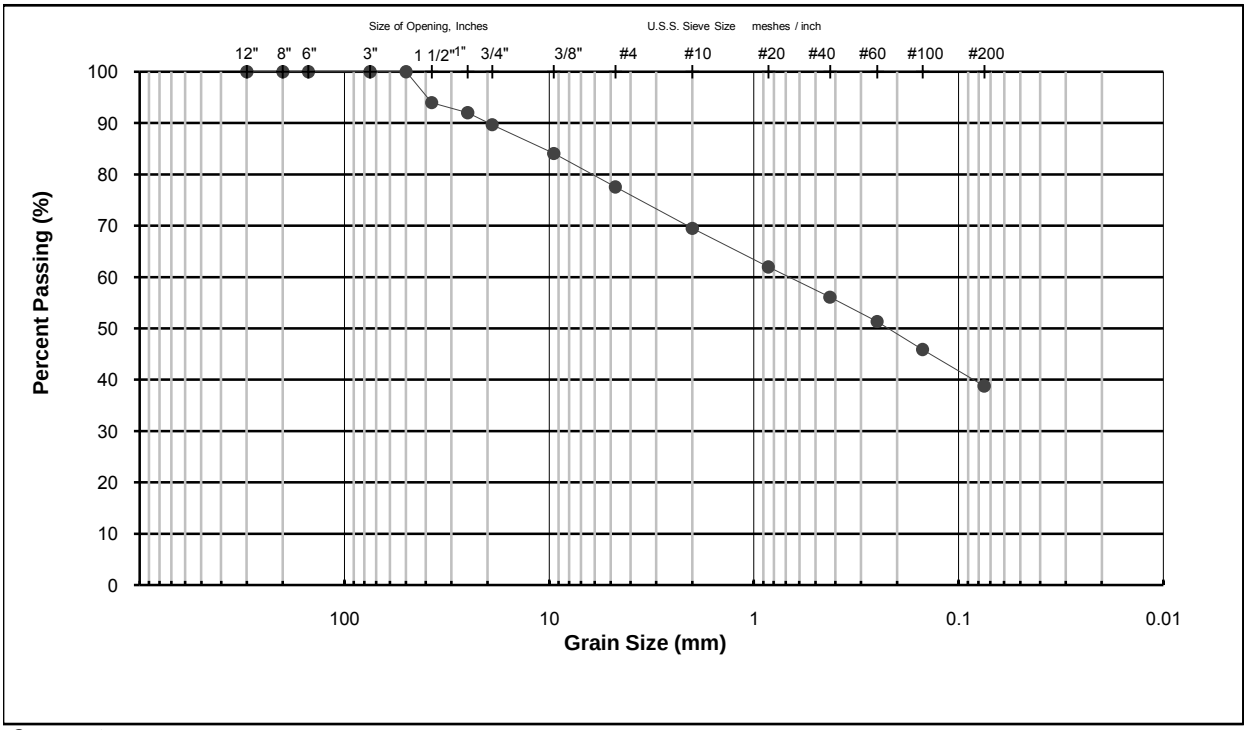
ASTM D422 & D1140 (no Hydrometer)

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

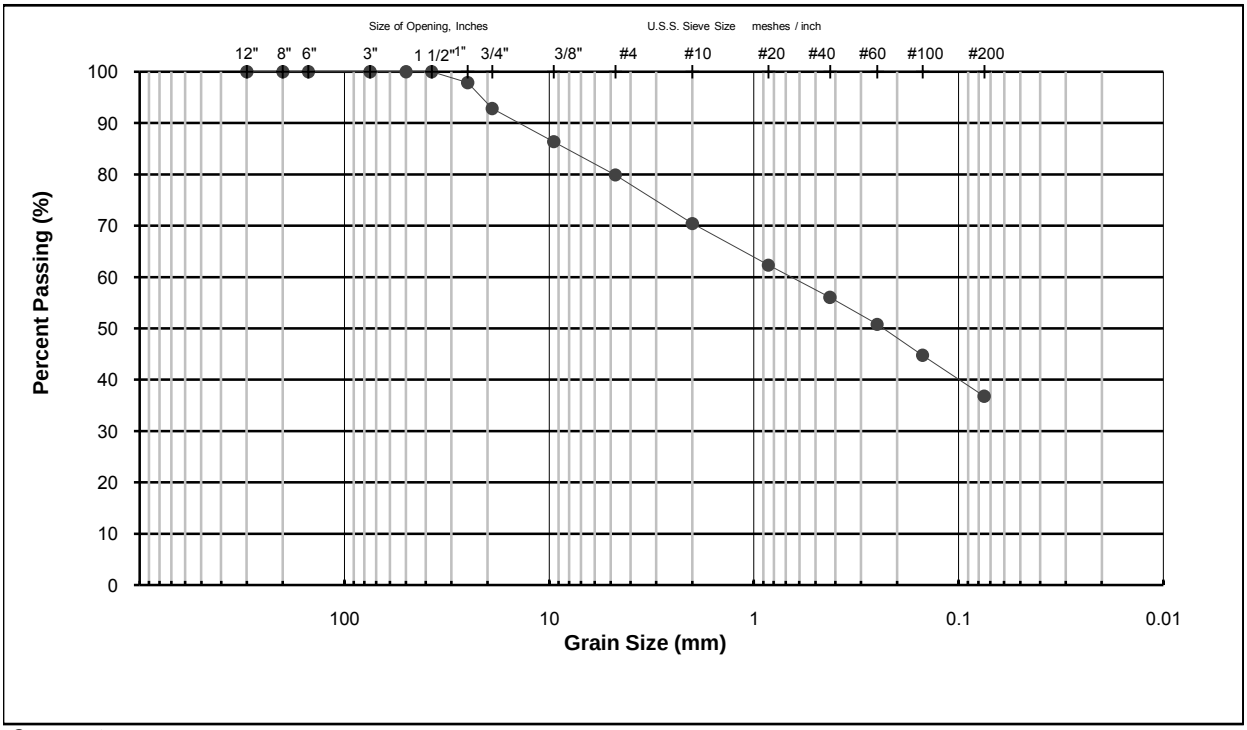
ASTM D422 & D1140 (no Hydrometer)

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

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	2.1	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			



Comments:

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

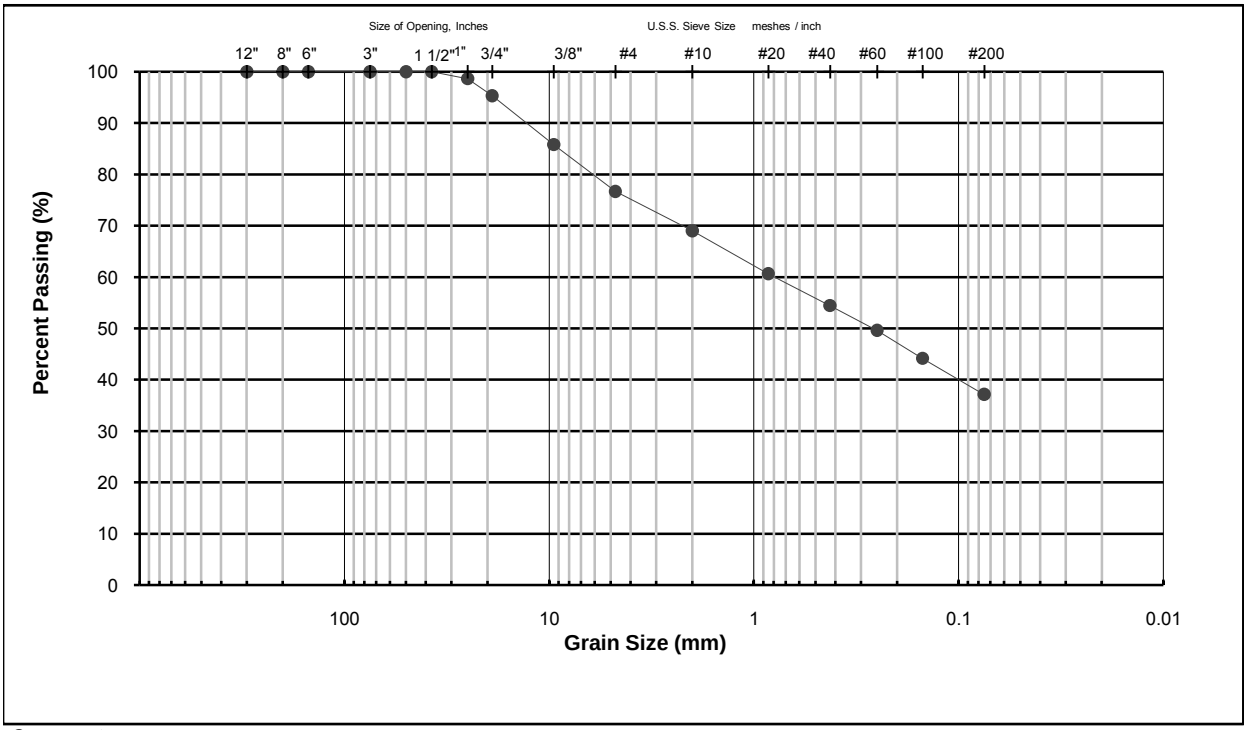
ASTM D422 & D1140 (no Hydrometer)

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 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	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

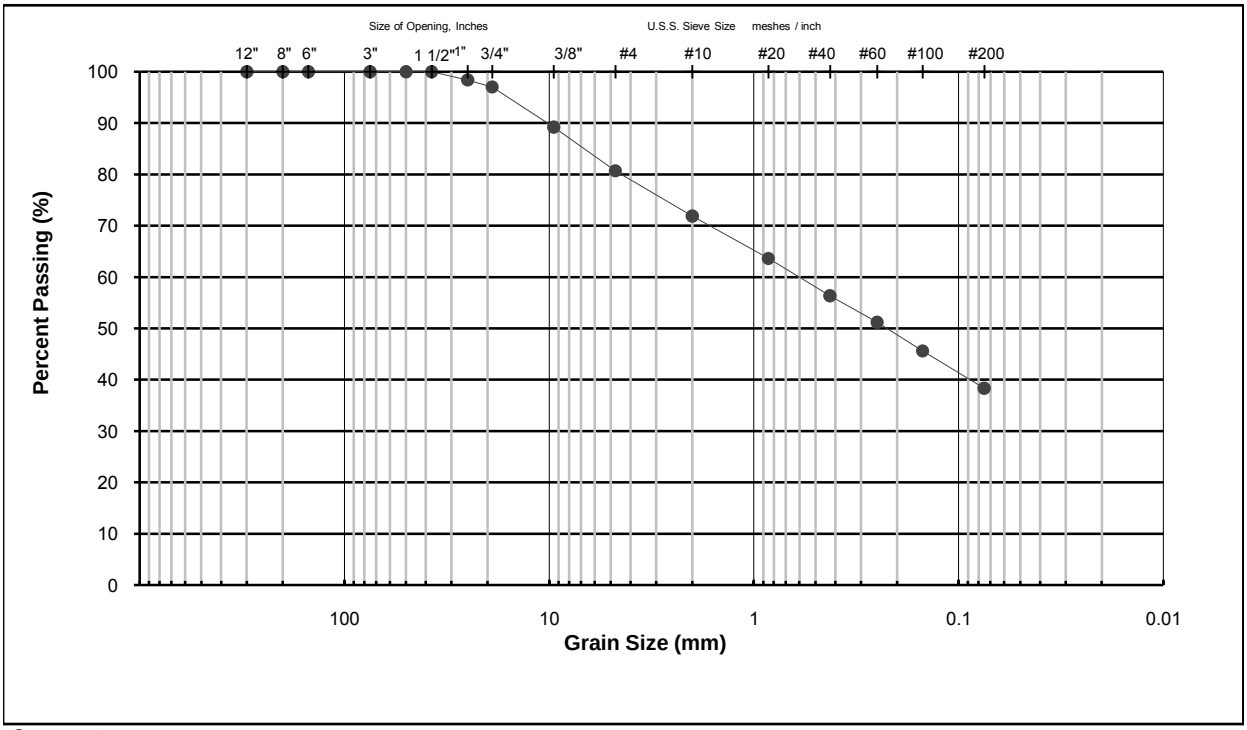
ASTM D422 & D1140 (no Hydrometer)

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

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	1.6	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			

MATERIAL SPECIFICATION:
SB Backfill



Comments:

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

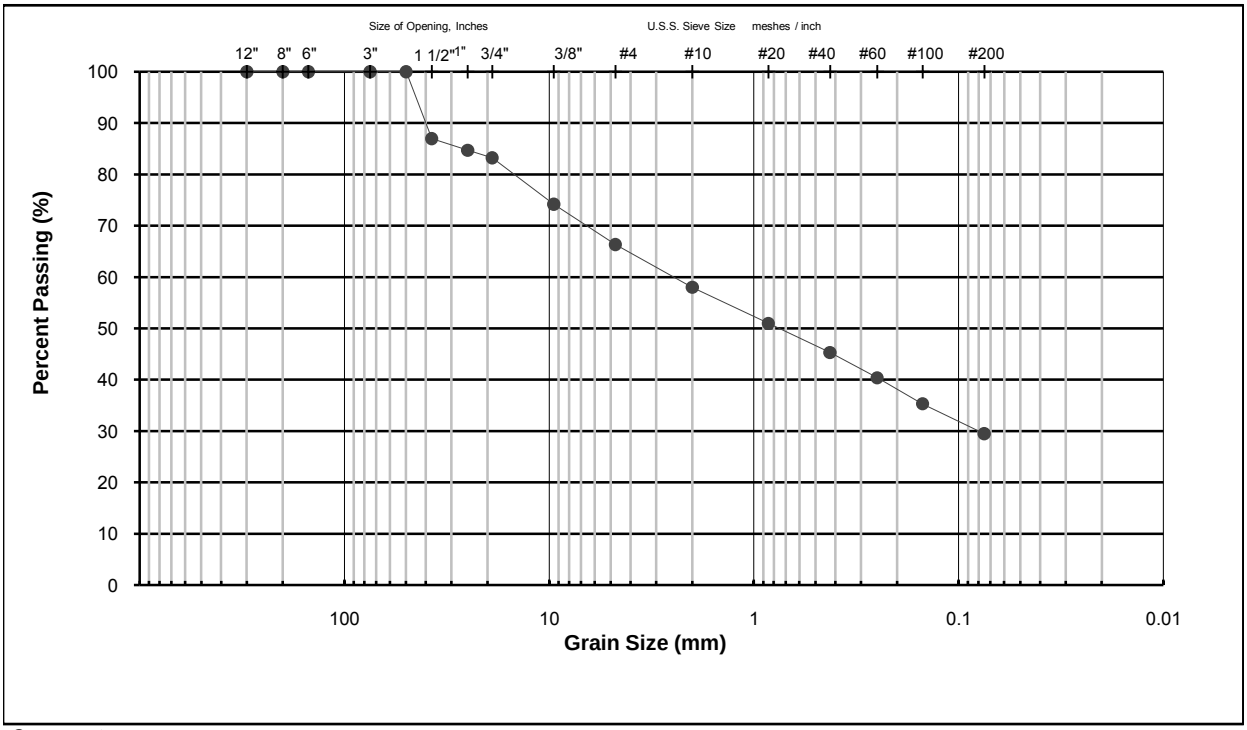
ASTM D422 & D1140 (no Hydrometer)

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

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	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			

MATERIAL SPECIFICATION:
SB Backfill



Comments:

Daily Construction Report
SOIL BENTONITE WALL

INQUIP Associates, Inc.

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

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

Daily Construction Report
SOIL BENTONITE WALL

INQUIP Associates, Inc.

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

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

PROJECT: 0808 MEDOWBANK GOLD PROJECT-EAST DIKE	GENERAL:F.GILBERT/AGNICO EAGLE MINES	Date:	9/8/08
		Report No:	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	6.85					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:	9/9/08 08 TUES
Weather; pt/cloudy / SHOWERS	Temperature (Degrees C):	Ground Conditions: WET	
	High: 3 Low:-2		

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:	9/9/08
		Report No:	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_____

Daily Construction Report
SOIL BENTONITE WALL

INQUIP Associates, Inc.

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:	~~9/9/08~~
		Report No:	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:	9/11/08
		Report No:	10 THUR
Weather; pt/cloudy / flurry/wind	Temperature (Degrees C):		Ground Conditions: WET
	High: -3	Low:-5	

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:	9/11/08
		Report No:	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):	Ground Conditions: dry	
	High: -3 Low:-6		

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:	9/12/08
		Report No:	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	Onsite	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:	9/13/08
		Report No:	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:	9/14/08
		Report No:	14 SUN
Weather; pt/cloudy / WET SNOW	Temperature (Degrees C):	Ground Conditions: WET	
	High: -3 Low:-6		

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:	9/14/08
		Report No:	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

PROJECT: 0808 MEDOWBANK GOLD PROJECT-EAST DIKE	GENERAL:F.GILBERT/AGNICO EAGLE MINES	Date:	9/15/08
		Report No:	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:	9/16/08
		Report No:	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):	Ground Conditions: WET	
	High: -3 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+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:	9/17/08
		Report No:	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:	9/18/08
		Report No:	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:	9/18/08
		Report No:	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_____

Daily Construction Report
SOIL BENTONITE WALL

INQUIP Associates, Inc.

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

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:	9/19/08
		Report No:	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):	Ground Conditions: WET	
	High: -3 Low:-5		

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:	9/20/08
		Report No:	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:	9/21/08
		Report No:	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 0 KARINE

PROJECT:#0808 MEDOWBANK GOLDPROJECT-EAST DIKE	GENERAL: F.GILBERT/AGNICO EAGLE MINES	Date:	9/22/08
		Report No:	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:	9/22/08
		Report No:	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: Robert Marc	NAME: Karine Duval	NAME: G. BLANCHETTE
SIGNATURE : Robert	SIGNATURE :	SIGNATURE : G Blanchette
DATE 15/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		KD
2.	Storage areas planned for disposal of removed materials		KD
3.	Occurrence of snow and ice removal method in place		KD
4.	Occurrence of boulders and removal method in place		KD
5.	Occurrence of hummocks and scalping method in place		KD
6.	Occurrence of surface and ground water and its impact mitigation in place		KD
7.	Presence of other unsuitable materials and removal method in place		KD
8.	Soil frozen or thawed and measures taken		KD
9.	Blasting requirement to remove unsuitable material and safety measure checked		KD
10.	Adjustment made to suit design in field		KD
11.	Final walkover inspection before re-sloping or fill placement		KD
12.	"As-excavated" survey conducted * see remarks		KD
13.	Final sounding conducted of lake bottom surface		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 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: CABOT MARC	NAME: Karine Duval	NAME: G. BLANCHETTE
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. 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+160 to 60+320 Beau... DATE OF RECTIFICATION : Shelves under and Bedrock during dive with

SURVEY VERIFICATION	ACCEPTED BY QA Manager :	ACCEPTED BY OWNER :
NAME: Karl Manzer	NAME: Karine Doyet	NAME: G. BLANCHETTE
SIGNATURE :	SIGNATURE : Karine Doyet	SIGNATURE :
DATE Aug. 21/2008	DATE Aug 17 2008	DATE AUGUST 18, 2008

Foundation Preparation and Excavation

EAST DIKE CONSTRUCTION CHECKLIST - FOUNDATION PREPARATION and EXCAVATION

From Sta. 60+475 Offset	SHIFT: NIGHT :☐ DAY :☑	DATE : Aug 18 2008	SHEET 1 OF 1
To Sta. 60+610 Offset	LOCATION: : East Dike		
EQUIPMENT:			
DESCRIPTION find 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 performed between the final clean-up of trench bottom and zone 2 downstream slope due to slope stability issues. The bathymetry performed before and after coarse filter placement will not have been 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 Daoust	NAME: G. BLANCHETTE
SIGNATURE : Karl Manzer	SIGNATURE : Karine Daoust	SIGNATURE : G. Blanchette
DATE Aug. 21 2008	DATE Aug 19 08	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 Doyet	NAME: Y. Jalbert
SIGNATURE :	SIGNATURE :	SIGNATURE :
DATE [illegible]	DATE Aug 15 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 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	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 centerline 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 (4s to 4) clean slide @ 719 (4s to 4) 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 coarse filter placement

DATE OF RECTIFICATION : Aug 24 2008

SURVEY VERIFICATION	ACCEPTED BY QA Manager :	ACCEPTED BY OWNER :
NAME: Karl Manzer	NAME: Karine Duvet	NAME: V. Jolbert
SIGNATURE : Karl Manzer	SIGNATURE : Karine Duvet	SIGNATURE :
DATE Aug. 25/2008.	DATE Aug 24 2008	DATE 29/08/08

Foundation Preparation and Excavation

EAST DIKE CONSTRUCTION CHECKLIST - FOUNDATION PREPARATION and EXCAVATION

From Sta. 60+640 Offset	SHIFT: NIGHT :☐ DAY :☒	DATE : Aug 24 2008	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 centerline 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 (4's to 4) clean slush @ 719 (9's to 6) clean slush

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 Duval	NAME: Y. Jalbert
SIGNATURE : Karl Manzer	SIGNATURE : Karine Duval	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.	✓
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: 820 TO BE 1.0m THICK AND TIE INTO NORTH ABUTMENT AT STA 60+840
60+ 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 5/08	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: CABOT MINE	NAME: Karine Duval	NAME: G. BLANCHETTE
SIGNATURE : Cabot	SIGNATURE : Karine Duval	SIGNATURE : G Blanchette
DATE 17/AUG/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+165 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 Provost	NAME: G. BLANCHETTE
SIGNATURE :	SIGNATURE :	SIGNATURE :
DATE Aug 21/2008	DATE Aug 17 2008	DATE AUGUST 01, 2008

Foundation Preparation and Excavation

EAST DIKE CONSTRUCTION CHECKLIST - FOUNDATION PREPARATION and EXCAVATION

From Sta. 0+195 Offset -	SHIFT: NIGHT :☐ DAY :☒	DATE : Aug 18 2008	SHEET 1 OF 1
To Sta. 0+420 Offset -	LOCATION: : East Dike		
EQUIPMENT:			

DESCRIPTION Find preparation before placement of ore 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 does agreed by Golder and AEM that ore backfill can be place in this section without sonar survey. A detail clean-up

DEVIATIONS : (Attach list if necessary) of the bedrock surface at bottom of trench will be done prior ore backfill placement

DATE OF RECTIFICATION :

SURVEY VERIFICATION	ACCEPTED BY QA Manager :	ACCEPTED BY OWNER :
NAME: Karl Manzer	NAME: Karine Doucet	NAME: G. BLANCHETTE
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+315 Offset	LOCATION: : East Dike		
EQUIPMENT:			

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

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	~~K~~ 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 Duret	NAME: V. Jalbert
SIGNATURE :	SIGNATURE : Karine Duret	SIGNATURE :
DATE	DATE Aug 21 2008	DATE 22/8/08

Foundation Preparation and Excavation

EAST DIKE CONSTRUCTION CHECKLIST - FOUNDATION PREPARATION and EXCAVATION

From Sta. 600+[redacted]318 Offset	SHIFT: NIGHT :☐ DAY :☒	DATE: Aug 21 2008	SHEET 1 OF 1
To Sta. 600+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: J. Talbot
SIGNATURE : Karl Manzer	SIGNATURE : Karine Dessert	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+~~400~~ 350 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 Duval	NAME: G. Jalbert
SIGNATURE : Karl Manzer	SIGNATURE : Karine Duval	SIGNATURE :
DATE Aug. 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 Final Preparation before ore 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	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 : Bathymetry ~~shall~~ will be performed before placement of ore and coarse backfill since some rocks were removed ~~late~~ 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 Doucet	NAME: G. Talbot
SIGNATURE : Karl Manzer	SIGNATURE : Karine Doucet	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	LOCATION: : East Dike		
EQUIPMENT:			

DESCRIPTION: End 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~~, ~~6~~

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

DATE OF RECTIFICATION : Aug 23 2008

SURVEY VERIFICATION	ACCEPTED BY QA Manager :	ACCEPTED BY OWNER :
NAME: Karl Manzer	NAME: Karine Dubet	NAME: Y. Jalbert
SIGNATURE : Karl Manzer	SIGNATURE : Karine Dubet	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 c/l u/s
Sta 447 to 453, clean from u/s edge to d/s edge
Sta 455; clean push from c/l 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:
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+~~[illegible]~~ ~~Offset~~ ~~[illegible]~~ 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 Dorval	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+~~780~~ Offset 763	LOCATION: : East Dike		
EQUIPMENT:			

DESCRIPTION Final preparation prior to ice 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.S.	✓
2.	Storage areas planned for disposal of removed materials	B.S.	✓
3.	Occurrence of snow and ice removal method in place	B.S.	✓
4.	Occurrence of boulders and removal method in place	B.S.	✓
5.	Occurrence of hummocks and scalping method in place	B.S.	✓
6.	Occurrence of surface and ground water and its impact mitigation in place	B.S.	✓
7.	Presence of other unsuitable materials and removal method in place	B.S.	Daw ✓
8.	Soil frozen or thawed and measures taken	B.S.	✓
9.	Blasting requirement to remove unsuitable material and safety measure checked	B.S.	✓
10.	Adjustment made to suit design in field	B.S.	Kim ✓
11.	Final walkover inspection before re-sloping or fill placement	B.S.	✓
12.	"As-excavated" survey conducted	B.S.	✓
13.	Final sounding conducted of lake bottom surface	B.S.	✓

REMARKS : Golder has to be present when clearing @ 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 Manzer	NAME: Karine Duval	NAME: G. Talbert
SIGNATURE : Karl Manzer	SIGNATURE : Karine Duval	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 Dorlet	NAME: Y. Gilbert
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 : ☐ DAY SHIFT	DATE : AUG 27/08	SHEET 1 OF 1
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+645, 664 TO 668, 706-710 (CL - BOTH), 725 (U/S WALL), 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 : Karl Manzer	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 AND ~~6~~ 6" MINUS		
EQUIPMENT: —			
DESCRIPTION FOUNDATION PREPARATION PRIOR TO 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	B.C.	
2.	Storage areas planned for disposal of removed materials	B.C.	
3.	Occurrence of snow and ice removal method in place	B.C.	
4.	Occurrence of boulders and removal method in place	B.C.	
5.	Occurrence of hummocks and scalping method in place	B.C.	
6.	Occurrence of surface and ground water and its impact mitigation in place	B.C.	
7.	Presence of other unsuitable materials and removal method in place	B.C.	
8.	Soil frozen or thawed and measures taken	B.C.	
9.	Blasting requirement to remove unsuitable material and safety measure checked	B.C.	
10.	Adjustment made to suit design in field	B.C.	
11.	Final walkover inspection before re-sloping or fill placement	B.C.	
12.	"As-excavated" survey conducted	B.C.	
13.	Final sounding conducted of lake bottom surface	B.C.	

REMARKS : POST FILTER SURVEY + OBSERVATION OF UPSTREAM SLOPE SHOWS V 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 : Karl Manzer	SIGNATURE : J Kwok	SIGNATURE : G Blanchette
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 [illegible]	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" 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	C.P.	[illegible]
2.	Storage areas planned for disposal of removed materials	C.P.	[illegible]
3.	Occurrence of snow and ice removal method in place	C.P.	[illegible]
4.	Occurrence of boulders and removal method in place	C.P.	[illegible]
5.	Occurrence of hummocks and scalping method in place	C.P.	[illegible]
6.	Occurrence of surface and ground water and its impact mitigation in place	C.P.	[illegible]
7.	Presence of other unsuitable materials and removal method in place	C.P.	[illegible]
8.	Soil frozen or thawed and measures taken	C.P.	[illegible]
9.	Blasting requirement to remove unsuitable material and safety measure checked	C.P.	[illegible]
10.	Adjustment made to suit design in field	C.P.	[illegible]
11.	Final walkover inspection before re-sloping or fill placement	C.P.	[illegible]
12.	"As-excavated" survey conducted	C.P.	[illegible]
13.	Final sounding conducted of lake bottom surface	C.P.	[illegible]

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 Menzer	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.C.	
2.	Storage areas planned for disposal of removed materials	B.C.	
3.	Occurrence of snow and ice removal method in place	B.C.	
4.	Occurrence of boulders and removal method in place	B.C.	
5.	Occurrence of hummocks and scalping method in place	B.C.	
6.	Occurrence of surface and ground water and its impact mitigation in place	B.C.	
7.	Presence of other unsuitable materials and removal method in place	B.C.	
8.	Soil frozen or thawed and measures taken	B.C.	
9.	Blasting requirement to remove unsuitable material and safety measure checked	B.C.	
10.	Adjustment made to suit design in field	B.C.	
11.	Final walkover inspection before re-sloping or fill placement	B.C.	
12.	"As-excavated" survey conducted	B.C.	
13.	Final sounding conducted of lake bottom surface	B.C.	

REMARKS : BASED ON ENGR. 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 1.0m CROSS-SECTION SPACING SURVEY TO BE DONE.

DEVIATIONS : (Attach list if necessary)
GOLDER PERFORM ENGR. 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 Munzer	NAME: JEFFREY KUNCK	NAME: G. BLANCHETTE
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 CORE BACKFILL +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.S.	
2.	Storage areas planned for disposal of removed materials	B.S.	
3.	Occurrence of snow and ice removal method in place	B.S.	
4.	Occurrence of boulders and removal method in place	B.S.	
5.	Occurrence of hummocks and scalping method in place	B.S.	
6.	Occurrence of surface and ground water and its impact mitigation in place	B.S.	
7.	Presence of other unsuitable materials and removal method in place	B.S.	
8.	Soil frozen or thawed and measures taken	B.S.	
9.	Blasting requirement to remove unsuitable material and safety measure checked	B.S.	
10.	Adjustment made to suit design in field	B.S.	
11.	Final walkover inspection before re-sloping or fill placement	B.S.	
12.	"As-excavated" survey conducted	B.S.	
13.	Final sounding conducted of lake bottom surface	B.S.	

REMARKS : BASED ON BATHYMETRY SURVEY CLEANING OF BOTTOM BEDROCK SURFACE AT 60+580, 60+570 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, CO, 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 :
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 COARSE 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	G.S.	
2.	Storage areas planned for disposal of removed materials	G.S.	
3.	Occurrence of snow and ice removal method in place	G.S.	
4.	Occurrence of boulders and removal method in place	G.S.	
5.	Occurrence of hummocks and scalping method in place	G.S.	
6.	Occurrence of surface and ground water and its impact mitigation in place	G.S.	
7.	Presence of other unsuitable materials and removal method in place	G.S.	
8.	Soil frozen or thawed and measures taken	G.S.	
9.	Blasting requirement to remove unsuitable material and safety measure checked	G.S.	
10.	Adjustment made to suit design in field	G.S.	
11.	Final walkover inspection before re-sloping or fill placement	G.S.	
12.	"As-excavated" survey conducted	G.S.	
13.	Final sounding conducted of lake bottom surface	G.S.	

REMARKS : CLEANING OF TRENCH BOTTOM FOUNDATION AT ~60+550 TO BE OBSERVED BY GOLDER KNC.

DEVIATIONS : (Attach list if necessary) GOLDER KNC 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. KWAK	NAME: G. BLANCHETTE
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+830 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 ALONG REQUIRED ALIGNMENT	B.P.	

REMARKS : PRE FILTER SURVEY CONDUCTED. NO ROCK 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 :

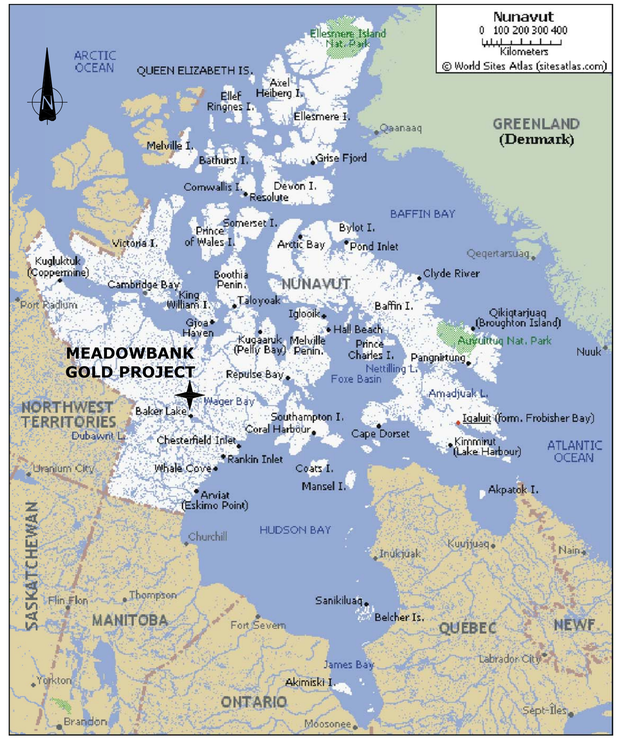
SURVEY VERIFICATION	ACCEPTED BY QA Manager :	ACCEPTED BY OWNER :
NAME: _____	NAME: JEFFREY KWOK	NAME: G. BLANCHETTE
SIGNATURE : _____	SIGNATURE :	SIGNATURE :
DATE _____	DATE SEPT 3/08	DATE SEPT 05, 2008

APPENDIX D

As-Built Drawings, East Dike - Meadowbank Gold Project

AGNICO-EAGLE MINES LIMITED
MEADOWBANK DIVISION
MEADOWBANK GOLD PROJECT
EAST DIKE

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



LOCATION PLAN

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.

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.

REVISION	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
1	30OCT09	JEK	AS-BUILT	MSH		
0	01AUG08	BW	ISSUED FOR CONSTRUCTION	EA	BW	TLE

DRAWING NO. | REFERENCES

STAMP: **ORIGINAL SIGNED AND SEALED**

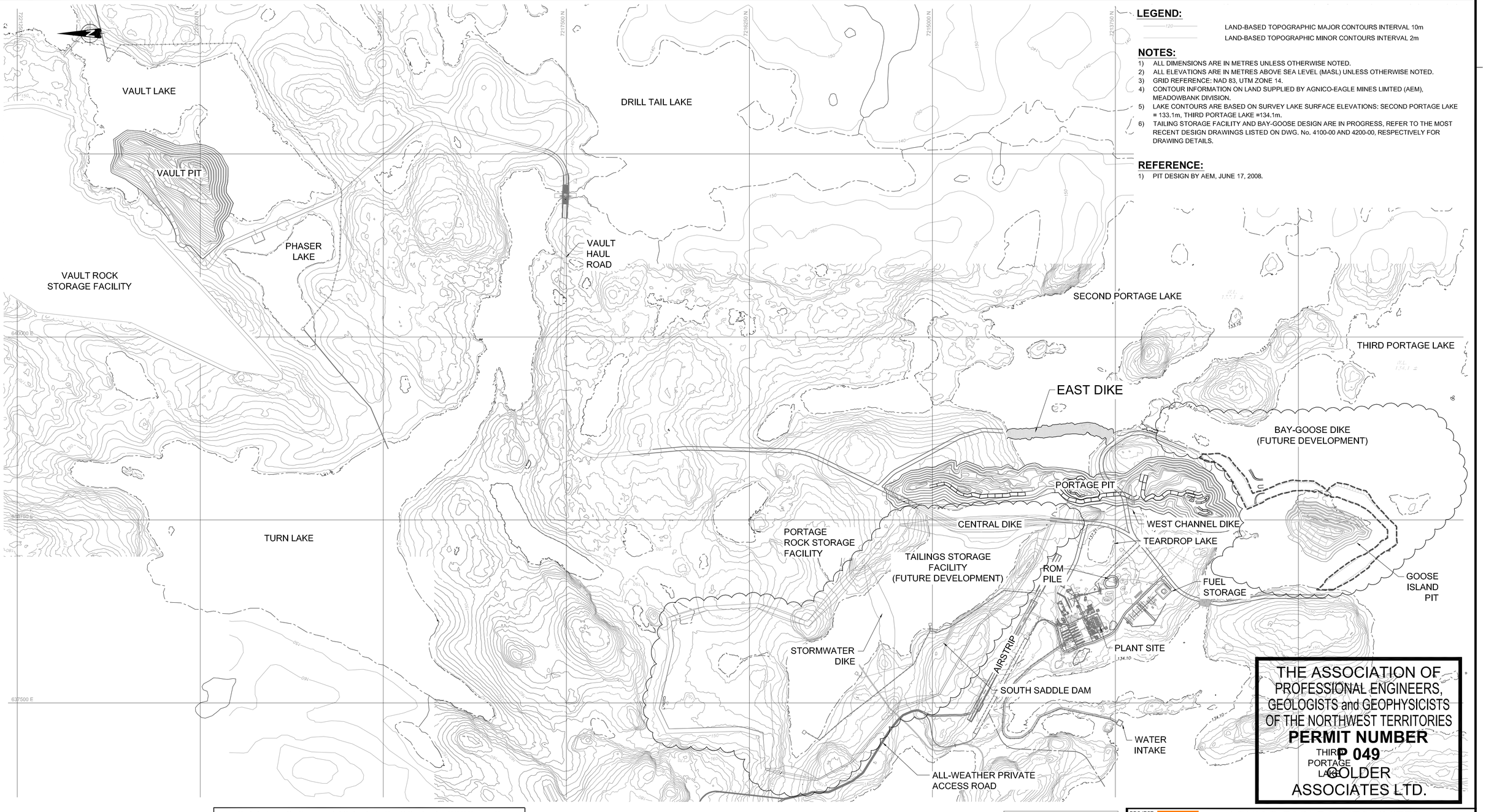
PROJECT: AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE: **EAST DIKE LOCATION MAP AND DRAWING INDEX**

Golder Associates

PROJECT No.	07-1413-0074/2800		FILE No.	0814280028-4200-ASBUILT-00	
DESIGN	BW	04JUL08	SCALE	AS SHOWN	REV. 1
CADD	MJH	04JUL08	2100-00		
CHECK	BW	25JUL08			
REVIEW	TLE	25JUL08			

REVISION DATE: 09/11/27 11:09AM By: jkownacki CADD FILE: N:\Burr-Graphics\Projects\2007\1413\07-1413-0074\Drafting\2800-As-Built\Apr2009\0814280028-4200-ASBUILT-00.dwg



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 LIMTED (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.

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REDUCED SIZE NOT TO SCALE

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

STAMP: **ORIGINAL SIGNED AND SEALED**

PROJECT No.	07-1413-0074/2800	FILE No.	814280028-4200-ASBUILT-01
DESIGN	BW 04JUL08	SCALE	AS SHOWN REV. 1
CADD	MJH 04JUL08		2100-01
CHECK	BW 25JUL08		
REVIEW	TLE 25JUL08		

Golder Associates

REVISION DATE: 09/11/27 02:00PM By: jkownocki
CADD FILE: N:\Bur-Graphics\Projects\2007\1413\07-1413-0074\Drafting\2800-As-Built\Apr2009\0814280028-4200-ASBUILT-01.dwg

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

7214600 N
7214800 N
7214400 N
7214200 N
7214000 N
7213800 N
7213600 N
639600 E
639400 E
639200 E
639000 E
A' 14
A 14
APPROX. TOE LOCATION AT LAKEBED
ACCESS ROAD (DESIGN BY OTHERS)
INITIAL ROCKFILL CREST
EAST DIKE CUTOFF WALL CENTRELINE
ACCESS ROAD (DESIGN BY OTHERS)
PIT RIM (APPROX.)
PORTAGE PIT (FUTURE DEVELOPMENT)
03GT-SE-1 4.6
03GT-SE-2 1.5
03GT-SPEC-F2 1.6
08-MB-GD-01 3.5
08-MB-GD-13 3.8
08-MB-GD-02 0.7
08-MB-GD-14 3.2
08-MB-GD-15 4.2
08-MB-GD-03 2.4
08-MB-GD-04 3.4
08-MB-GD-05 2.5
08-MB-GD-20 1.8
08-MB-GD-06 1.6
08-MB-GD-21 4.6
08-MB-GD-07 1.0
08-MB-GD-17 0.8
08-MB-GD-08 0.3
08-MB-GD-22 1.1
08-MB-GD-10 4.5
08-MB-GD-11 0.4
08-MB-GD-18 0.1
08-MB-GD-19 1.0
08-MB-GD-16 1.5
02GT-01 5.1
02GT-02A 2.7
02GT-02B 3.1
02GT-03 2.3
02GT-04 3.9
NP02-412
NP02-401
GNP02-01
GNP02-02
GNP02-03
TPMET-01
TPMET-02
TPMET-03
GTP02-01
GTP02-02
0 20 40 60 80 100
SCALE 1:2000

THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS and GEOPHYSICISTS OF THE NORTHWEST TERRITORIES
PERMIT NUMBER P.049
GOLDER ASSOCIATES LTD.

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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

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
1	30OCT09	JEK	AS-BUILT	SWD		
0	01AUG08	BW	ISSUED FOR CONSTRUCTION	EA	BW	TLE

2100-14 — DRAWING NO.
CENTRELINE PROFILE — REFERENCES

Golder Associates

PROJECT No.	07-1413-0074/2800	FILE No.	0814280028-4200-ASBUILT-02
DESIGN	BW 04JUL08	SCALE	AS SHOWN REV. 1
CADD	MJH 04JUL08		2100-02
CHECK	BW 25JUL08		
REVIEW	TLE 25JUL08		

REVISION DATE: 09/10/30 11:00AM By: jkowonski
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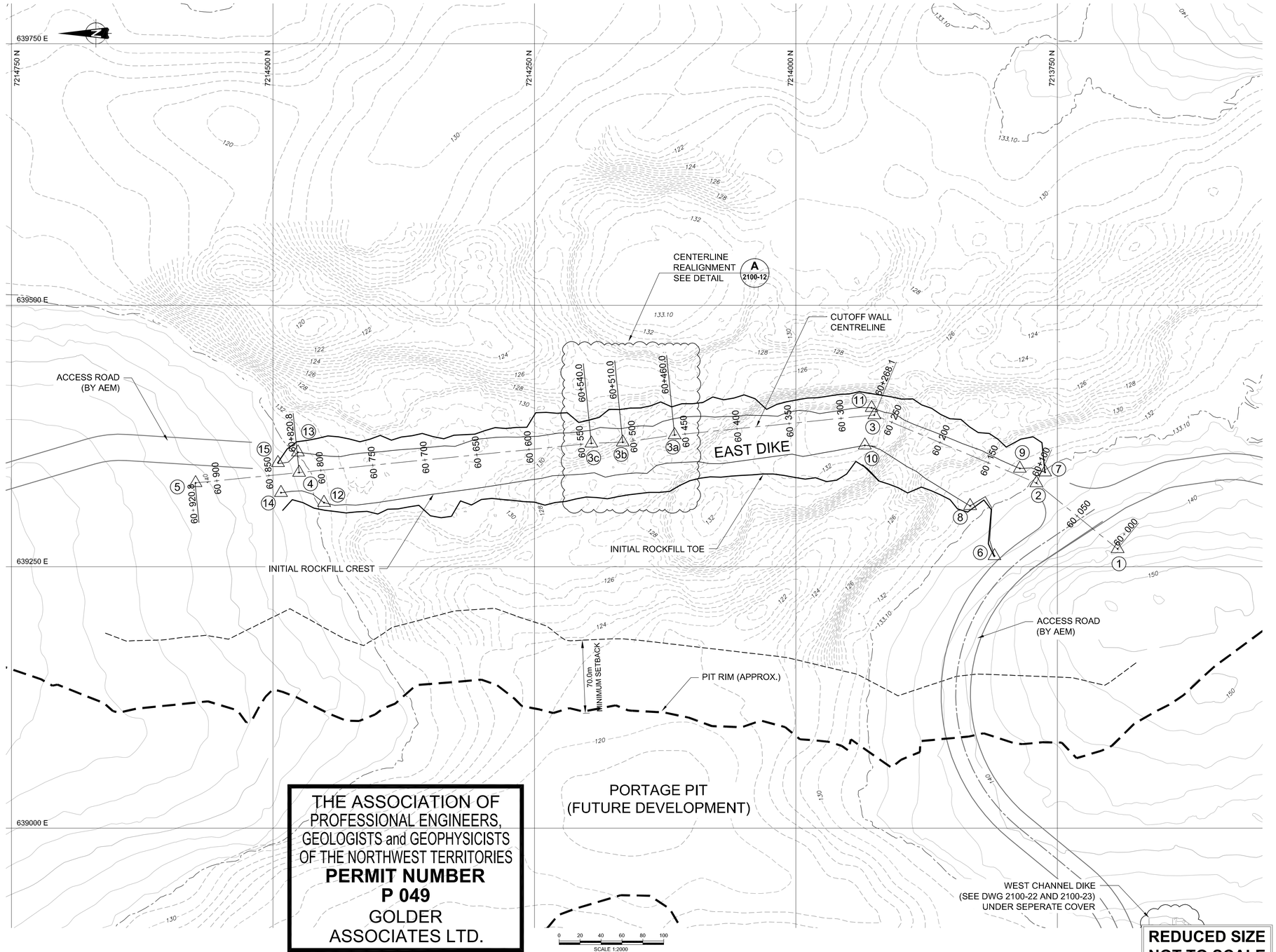

LEGEND:

- 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

THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS and GEOPHYSICISTS OF THE NORTHWEST TERRITORIES
PERMIT NUMBER P 049
GOLDER ASSOCIATES LTD.

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REDUCED SIZE NOT TO SCALE

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

2100-01 SITE PLAN
DRAWING NO. REFERENCES

STAMP

ORIGINAL SIGNED AND SEALED

PROJECT

AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE

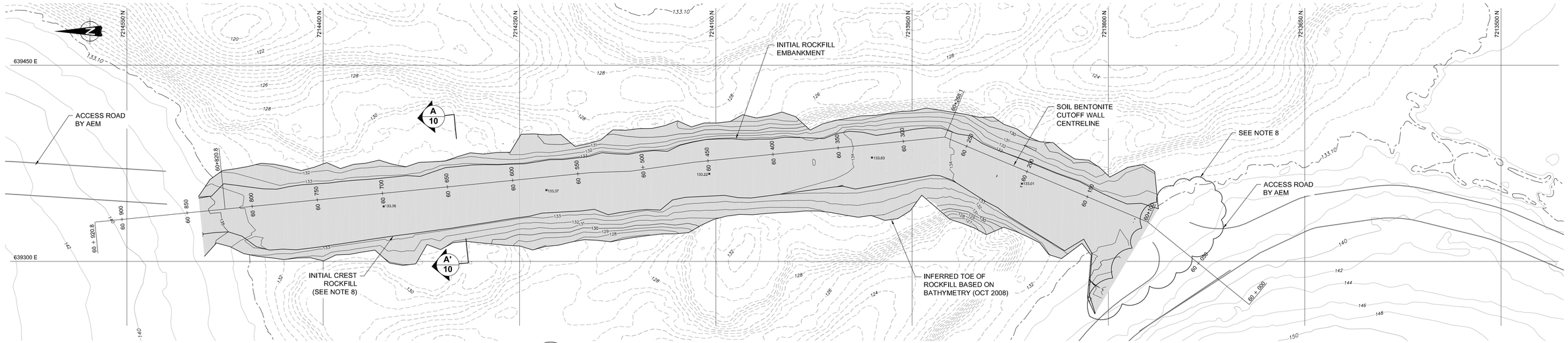
EAST DIKE ROCKFILL SETOUT PLAN

Golder Associates

PROJECT No.	07-1413-0074/2800		FILE No.	0814280028-4200-ASBUILT-03	
DESIGN	JEK	14APR09	SCALE	AS SHOWN	REV. 2
CADD	MJH	04JUL08			
CHECK	BW	25JUL08			
REVIEW	TLE	25JUL08			

2100-03

REVISION DATE: 09/10/30 11:03AM By: jkowanocki CADD FILE: N:\Bur-Graphics\Projects\2007\1413\07-1413-0074\Drafting\2800-As-Built\Apr2009\0814280028-4200-ASBUILT-03.dwg



A - INITIAL ROCKFILL EMBANKMENT PLACEMENT PLAN

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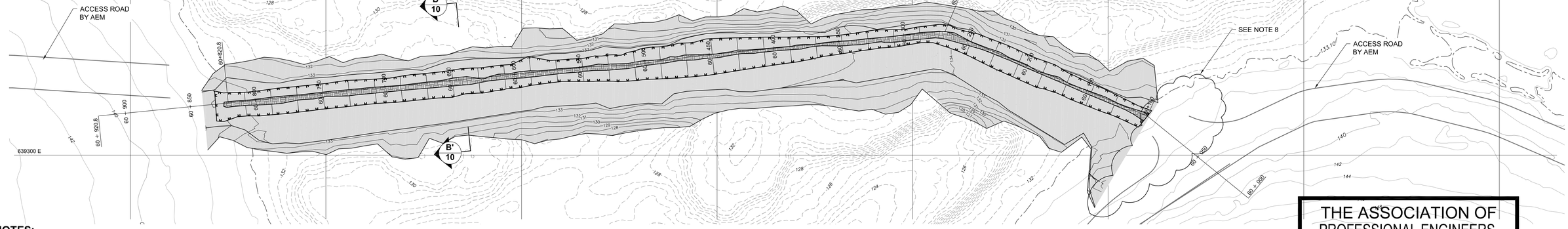
SCALE 1:1500



B - EXCAVATION TO BEDROCK PLAN

0 15 30 45 60 75
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

REDUCED SIZE NOT TO SCALE

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.

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)

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
1	30OTC09	JEK	AS-BUILT	SWD		
0	01AUG08	BW	ISSUED FOR CONSTRUCTION	EA	BW	TLE

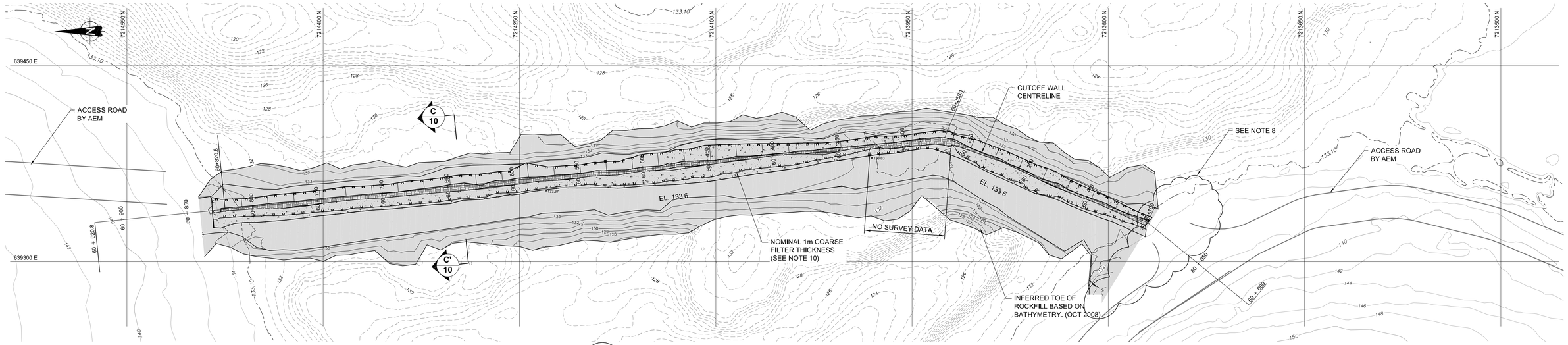
STAMP: ORIGINAL SIGNED AND SEALED

DRAWING NO.	REFERENCES
2100-10	TYPICAL SECTIONS AND DETAILS

PROJECT No.	07-1413-0074/2800	FILE No.	0814280028-4200-ASBUILT-04
DESIGN	BW 04JUL08	SCALE	AS SHOWN REV. 1
CADD	MJH 04JUL08		2100-04
CHECK	BW 25JUL08		
REVIEW	TLE 25JUL08		

Golder Associates

REVISION DATE: 09/10/30 11:06AM By: jkowalski CADD FILE: N:\Bur-Graphics\Projects\2007\1413\07-1413-0074\Drafting\2800-As-Built\Apr2009\0814280028-4200-ASBUILT-04.dwg



C - COARSE FILTER PLACEMENT PLAN

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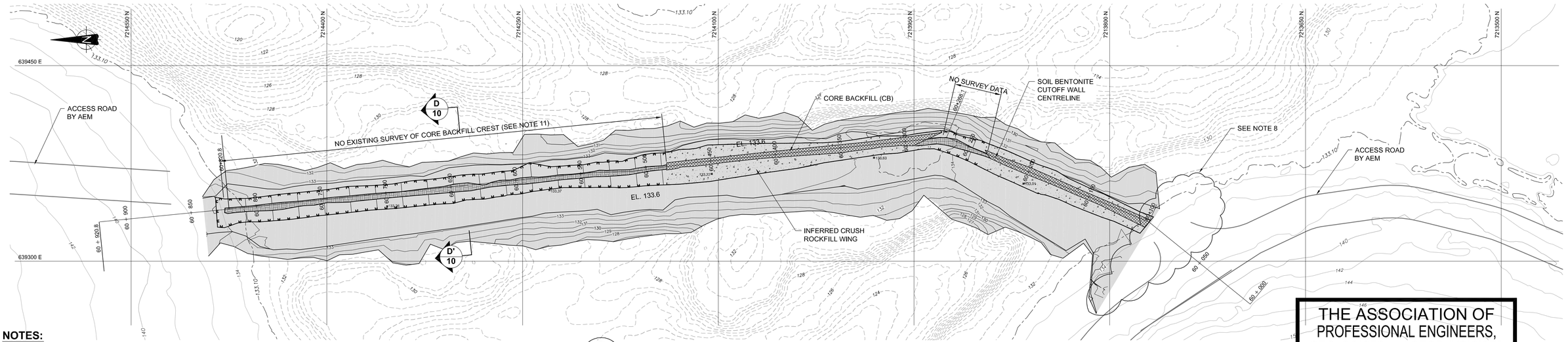
SCALE 1:1500



D - CORE BACKFILL PLACEMENT PLAN

0 15 30 45 60 75
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) 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

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 (2 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

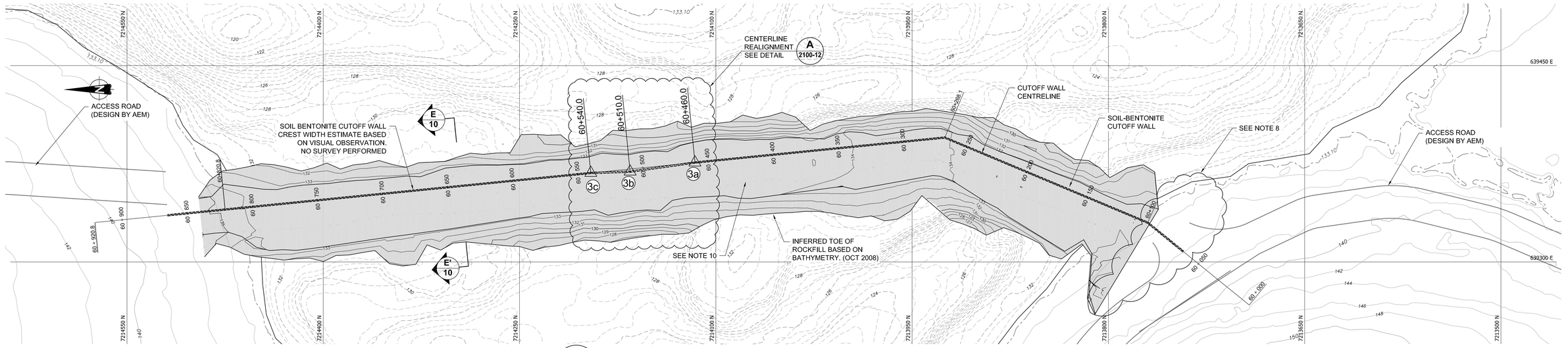
STAMP: **ORIGINAL SIGNED AND SEALED**

DRAWING NO.	REFERENCES
2100-10	TYPICAL SECTIONS AND DETAILS

Golder Associates

PROJECT No.	07-1413-0074/2800	FILE No.	0814280028-4200-ASBUILT-05
DESIGN	BW 04JUL08	SCALE	AS SHOWN REV. 1
CADD	MJH 04JUL08		2100-05
CHECK	BW 25JUL08		
REVIEW	TLE 25JUL08		

REVISION DATE: 09/10/30 11:10AM By: jkowanski CADD FILE: N:\Bur-Graphics\Projects\2007\1413\07-1413-0074\Drafting\2800-As-Built\Apr2009\0814280028-4200-ASBUILT-05.dwg



E - GRANULAR CAP AND CUTOFF WALL PLACEMENT PLAN

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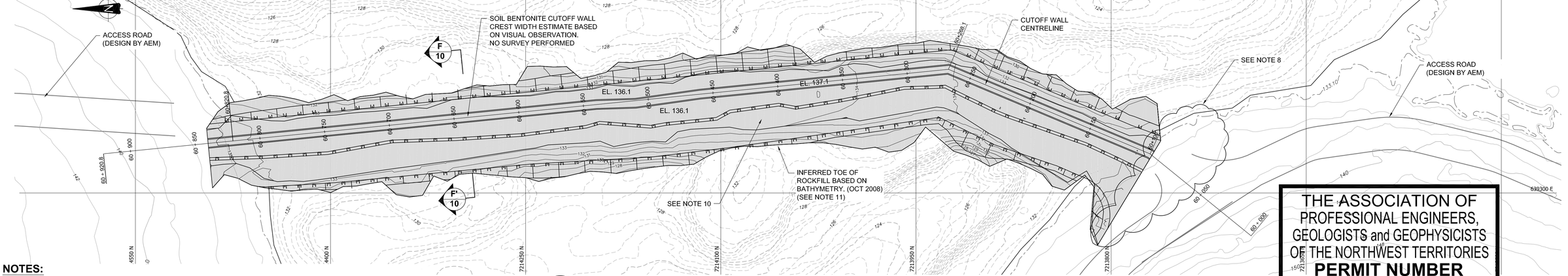
SCALE 1:1500



F - ROCKFILL SURFACING AND THERMAL CAP PLACEMENT PLAN

0 15 30 45 60 75
SCALE 1:1500

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 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) 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

THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS and GEOPHYSICISTS OF THE NORTHWEST TERRITORIES
PERMIT NUMBER P 049
GOLDER ASSOCIATES LTD.

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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

STAMP

ORIGINAL SIGNED AND SEALED

PROJECT
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE
EAST DIKE
ROCKFILL LAYOUT PLAN (3 OF 3)

Golder Associates

PROJECT No.	07-1413-0074/2800		FILE No.	0814280028-4200-ASBUILT-06	
DESIGN	BW	04JUL08	SCALE	AS SHOWN	REV. 1
CADD	MJH	04JUL08	2100-06		
CHECK	BW	25JUL08			
REVIEW	TLE	25JUL08			

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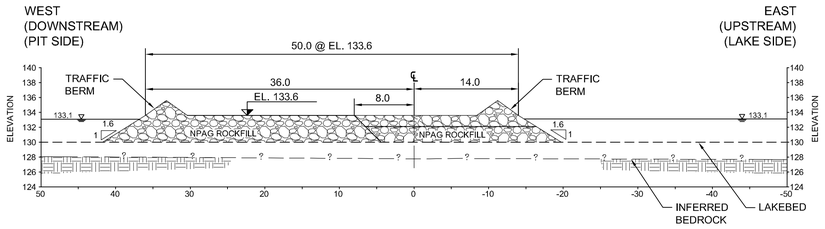
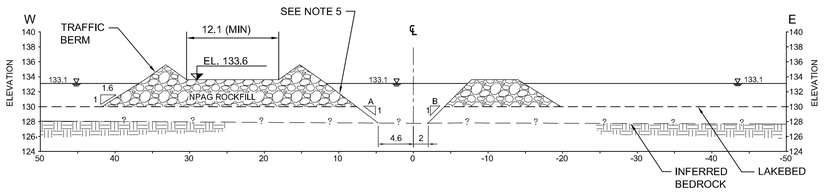


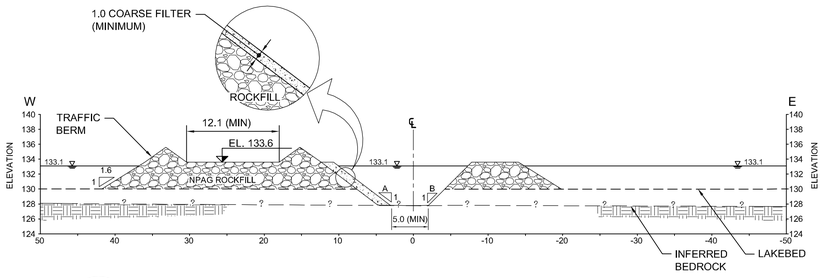
A 04 INITIAL ROCKFILL EMBANKMENT PLACEMENT SECTION

SCALE 1:400



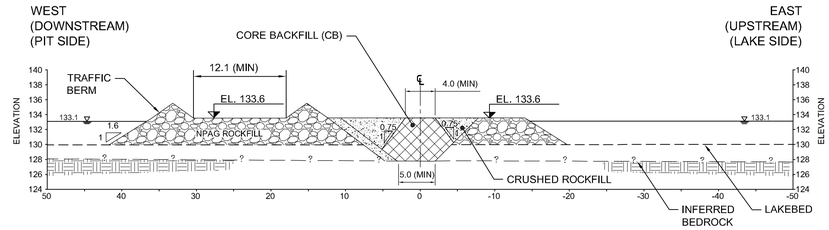
B 04 EXCAVATION TO BEDROCK SECTION

SCALE 1:400



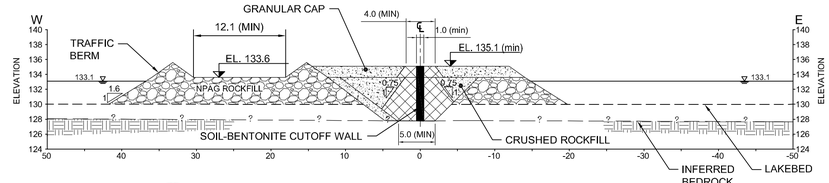
C 05 COARSE FILTER PLACEMENT SECTION

SCALE 1:400



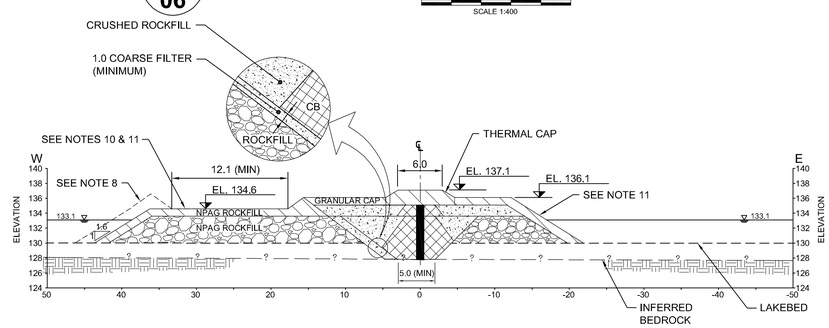
D 05 CORE BACKFILL PLACEMENT SECTION

SCALE 1:400



E 06 GRANULAR CAP AND CUTOFF WALL 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.

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REDUCED SIZE NOT TO SCALE

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

STAMP

ORIGINAL SIGNED AND SEALED

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

Golder Associates

PROJECT No.	07-1413-0074/2800	FILE No.	0814280028-4200-ASBUILT-10
DESIGN	BW 16JUN08	SCALE	AS SHOWN
CADD	MJH 04JUL08	REV.	1
CHECK	BW 25JUL08		2100-10
REVIEW	TLE 25JUL08		

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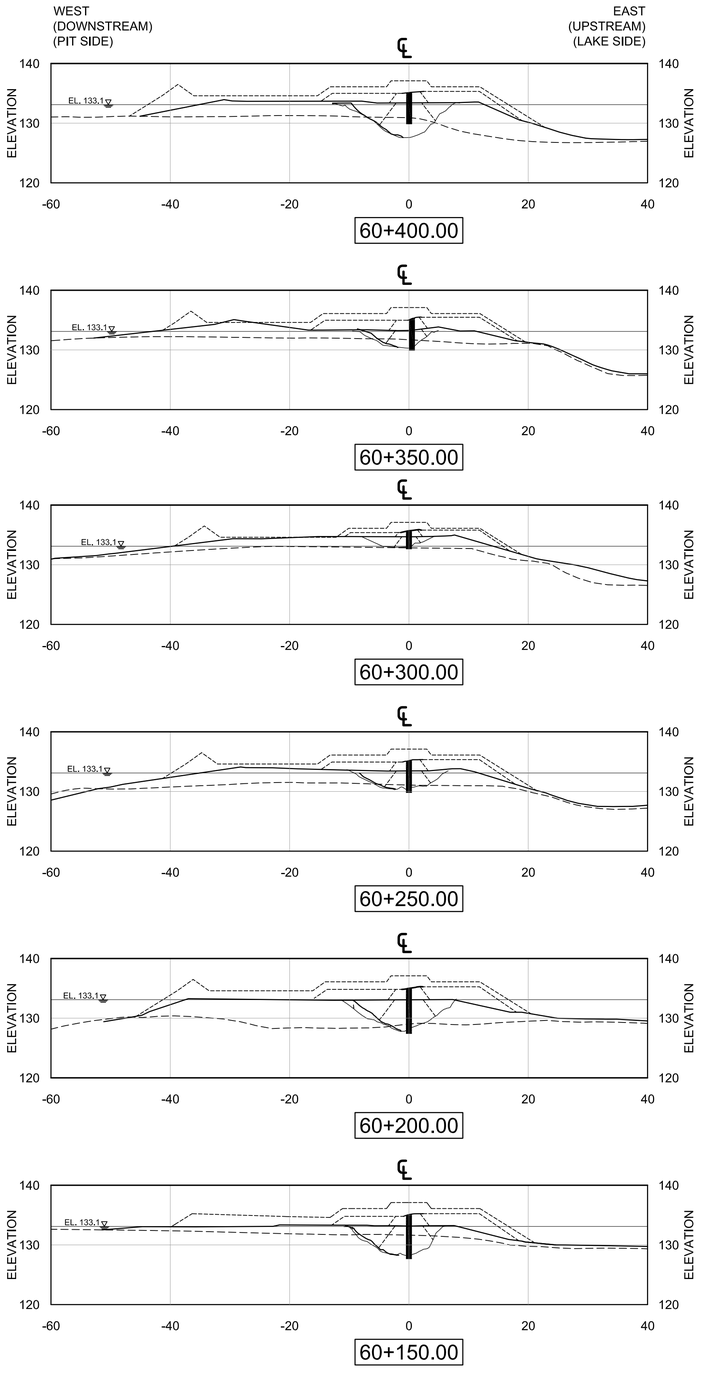

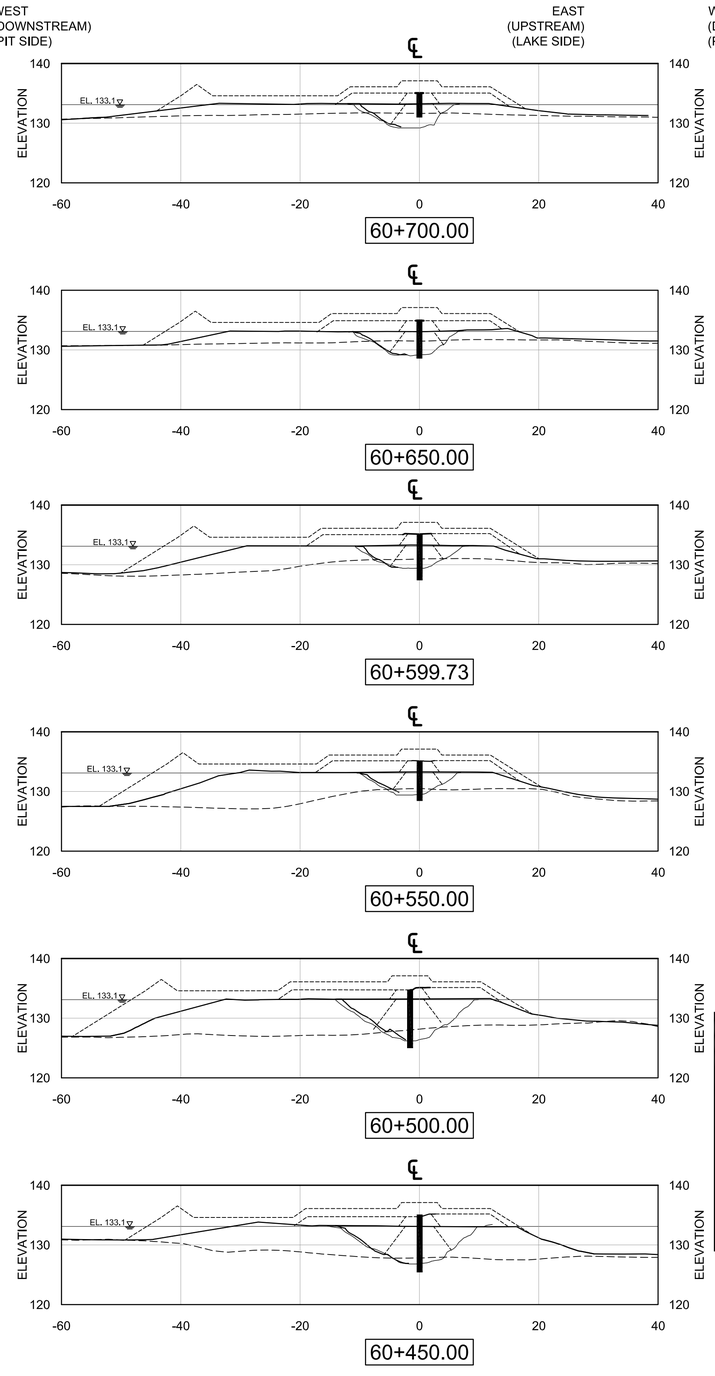

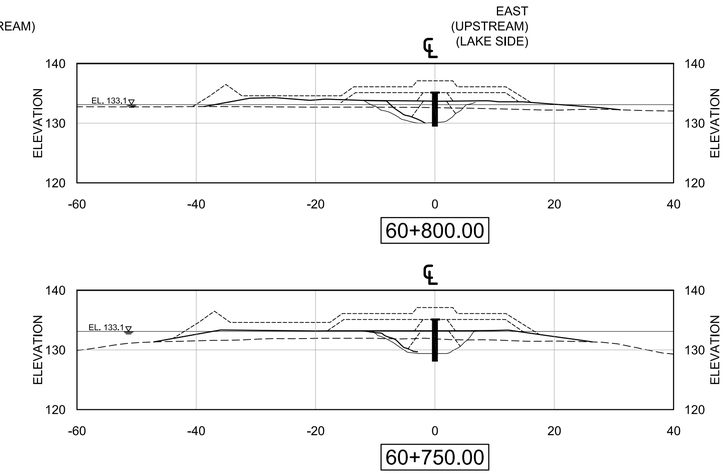

LEGEND:

- 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

0 5 10 15 20 25
SCALE 1:500

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.

PROJECT
AEM
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE
EAST DIKE CROS SECTIONS

STAMP
ORIGINAL SIGNED AND SEALED

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

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			

CADD FILE: N:\Bur-Graphics\Projects\2007\1413\07-1413-0074\Drafting\2800-As-Built\Apr2009\0814280028-4200-ASBUILT-11.dwg
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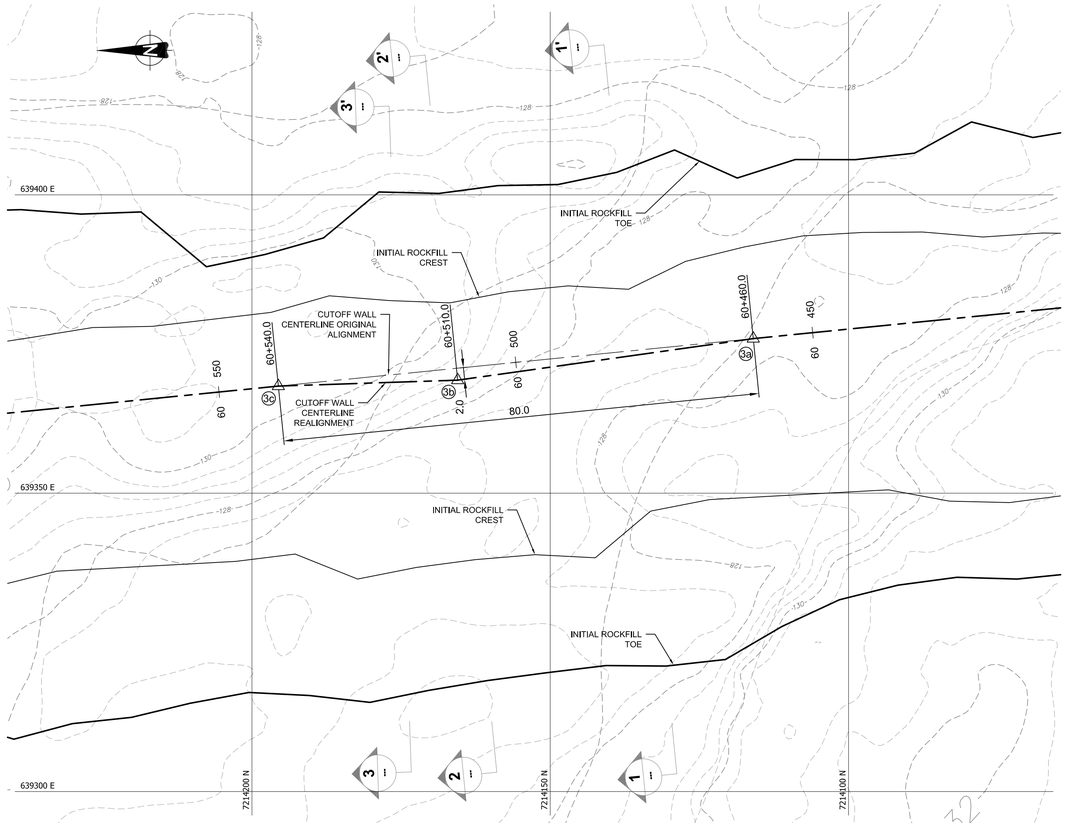
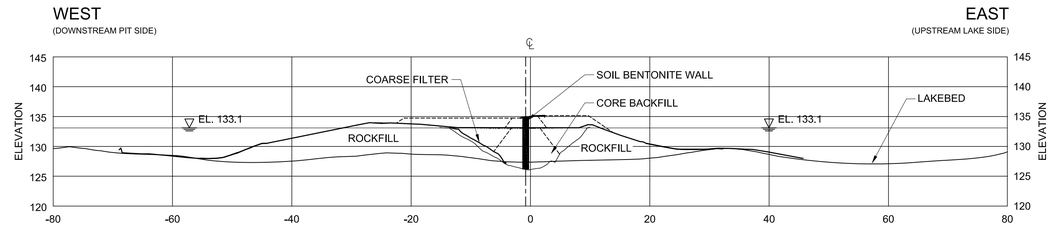
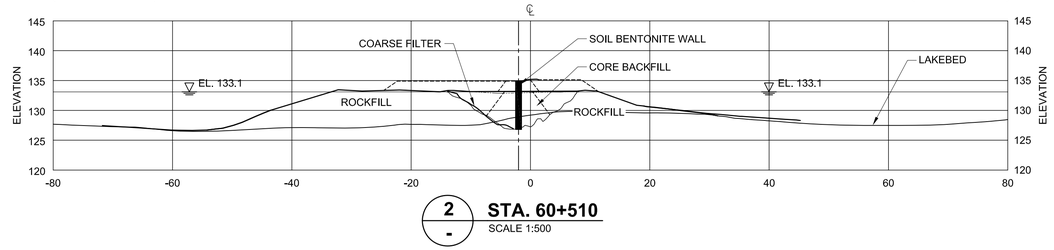


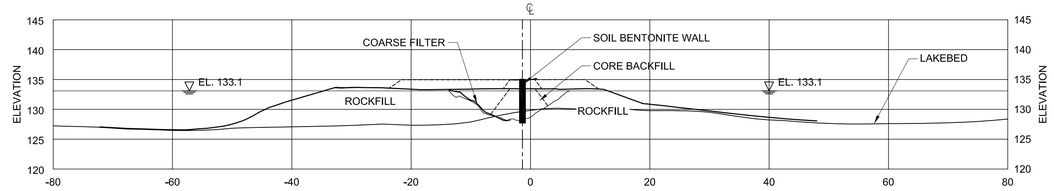
A / **2100-03** — **CENTERLINE REALIGNMENT**
SCALE 1:500



1 / **-** — **STA. 60+480**
SCALE 1:500



2 / **-** — **STA. 60+510**
SCALE 1:500



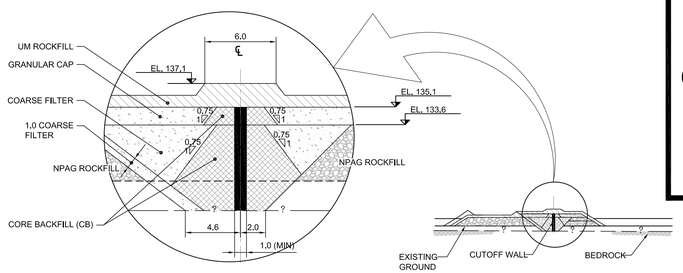
3 / **-** — **STA. 60+520**
SCALE 1:500

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 ASSOICATES 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

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REDUCED SIZE NOT TO SCALE

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

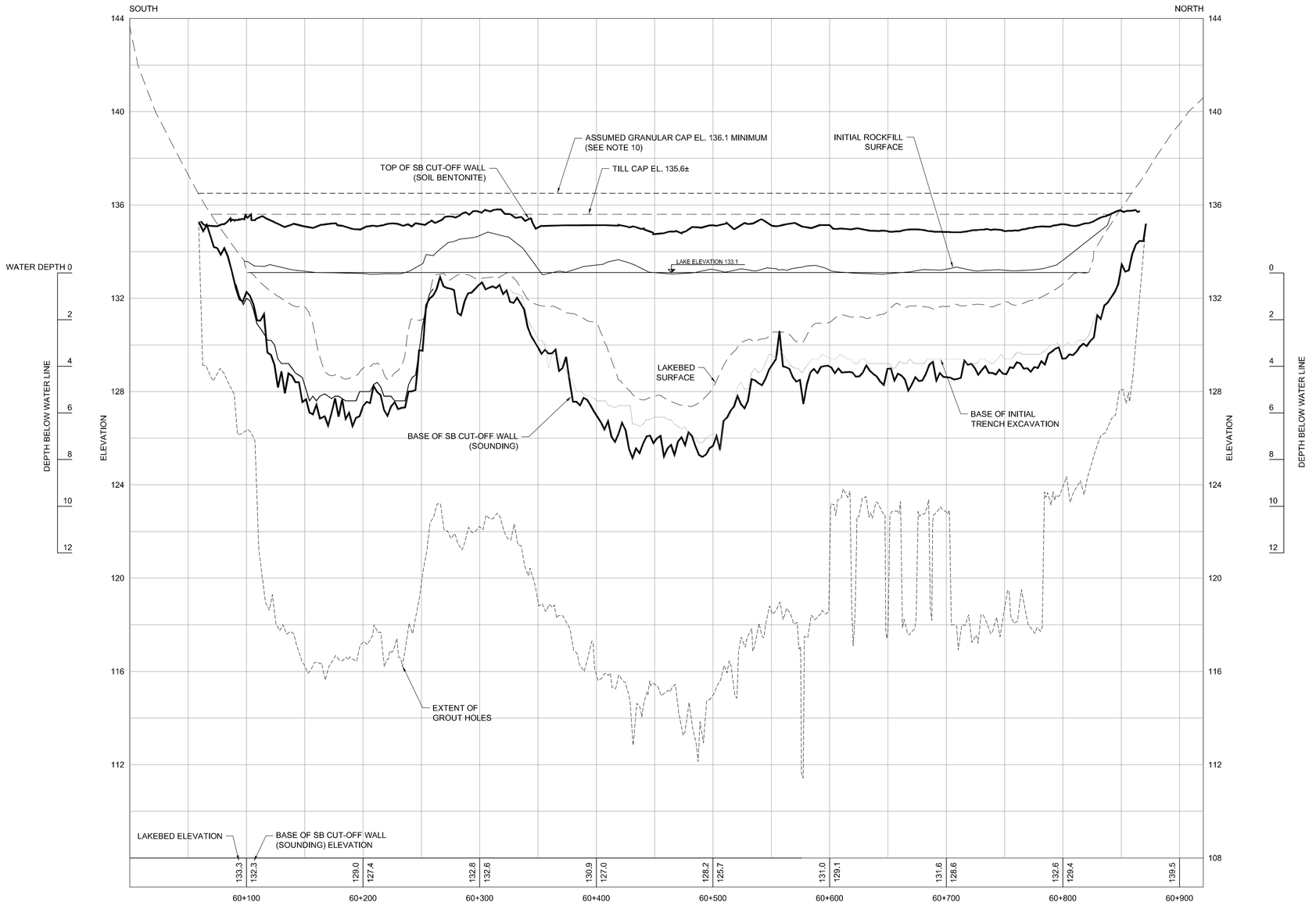
PROJECT
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE
EAST DIKE CENTRELINE REALIGNMENT

Golder Associates

PROJECT No.	07-1413-0074/2800		FILE No.	0814280074-2800-ASBUILT-12	
DESIGN	JEK	16APR09	SCALE	AS SHOWN	REV. 0
CADD	MJH	04JUL08	2100-12		
CHECK	BW	25JUL08			
REVIEW	TLE	25JUL08			

REVISION DATE: 09/10/30 04:04PM By: jkownacki CADD FILE: N:\Bur-Graphics\Projects\2007\1413\07-1413-0074\Drafting\2800-As-Built\Apr2009\0814280028-4200-ASBUILT-12.dwg



A-A'
2100-02

CENTRELINE PROFILE

HORIZONTAL SCALE 1:2000 (0 20 40 60 80 100)

VERTICAL SCALE 1:100 (0 1 2 3 4 5)

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.

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REDUCED SIZE NOT TO SCALE

PROJECT: AEM — AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE: **EAST DIKE CENTRELINE PROFILE**

REVISION	DATE	BY	DESCRIPTION	CADD	CHK	RVW
1	30OCT09	JEK	AS-BUILT	SWD		
0	01AUG08	BW	ISSUED FOR CONSTRUCTION	EA	BW	TLE

2100-02 — BOREHOLE LOCATION PLAN
DRAWING NO. — REFERENCES

STAMP: **ORIGINAL SIGNED AND SEALED**

Golder Associates

PROJECT No.	07-1413-0074/2800		FILE No.	0814280028-4200-ASBUILT-14	
DESIGN	BW	04JUL08	SCALE	AS SHOWN	REV. 1
CADD	MJH	04JUL08	2100-14		
CHECK	BW	25JUL08			
REVIEW	TLE	25JUL08			

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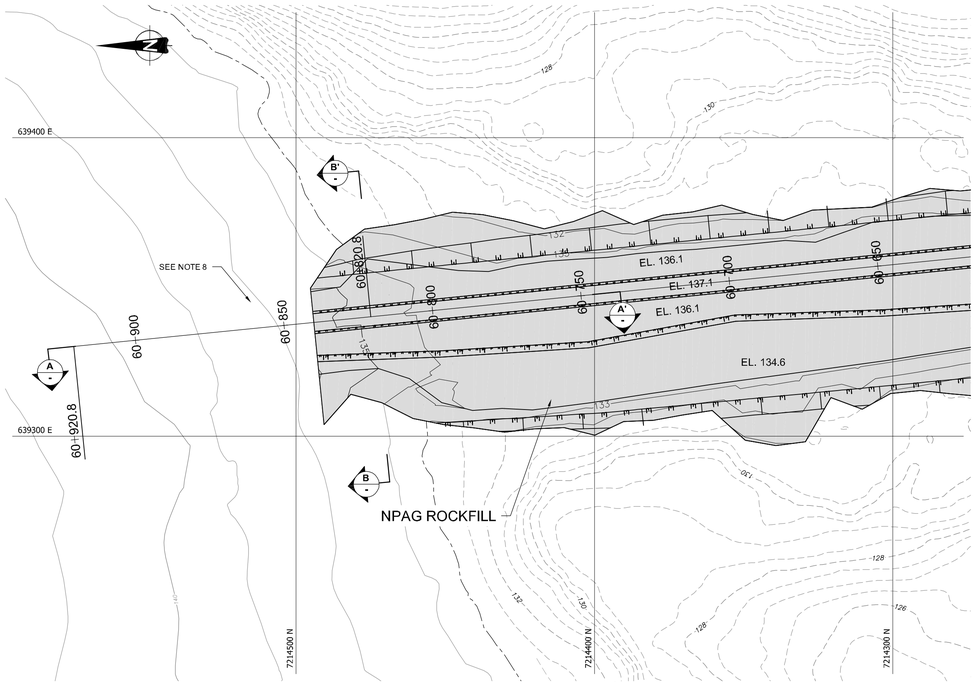
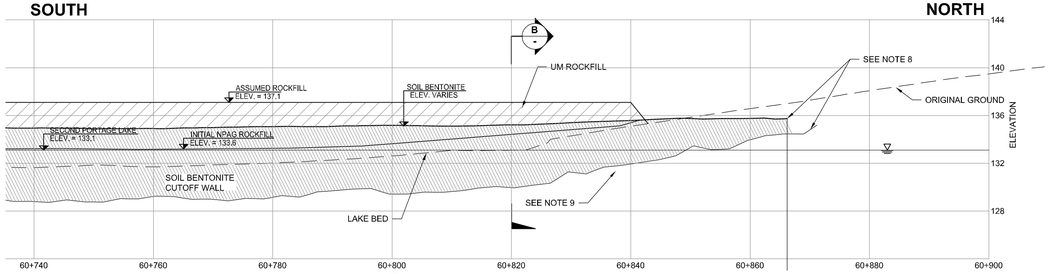
REVISION DATE: 09/10/30 04:02PM By: jkowanski



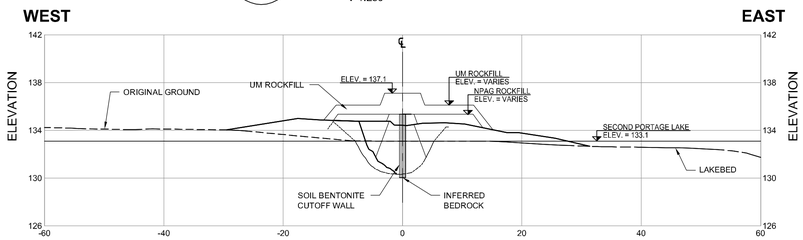
NORTH ABUTMENT PLAN

SCALE 1:1000



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

LEGEND:

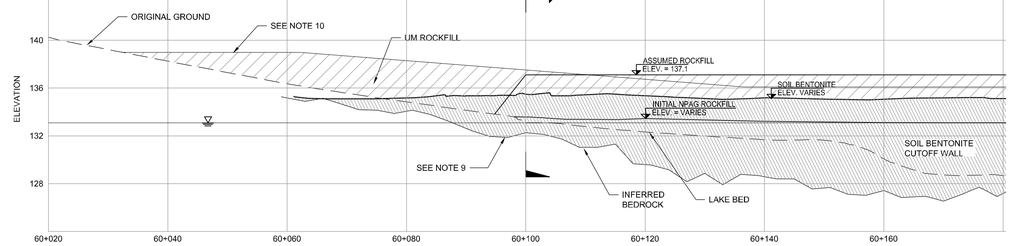
- LAND-BASED TOPOGRAPHIC MAJOR CONTOURS INTERVAL 10m
- LAND-BASED TOPOGRAPHIC MINOR CONTOURS INTERVAL 2m
- BATHYMETRIC MAJOR CONTOURS INTERVAL 2m
- BATHYMETRIC MINOR CONTOURS INTERVAL 0.5m
- SHORE LINE

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.

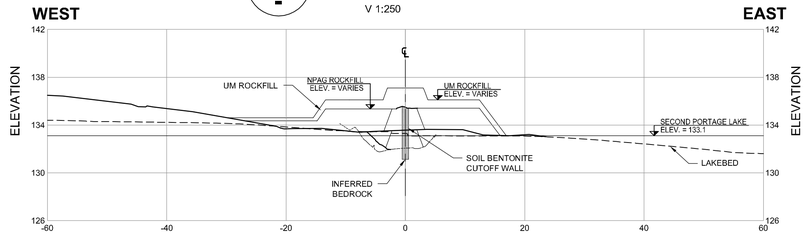
SOUTH ABUTMENT PLAN

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

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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 ABUTMENT DETAIL

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
1	30OCT09	JEK	EAST DIKE	SWD		
0	01AUG08	BW	ISSUED FOR CONSTRUCTION	EA	BW	TLE

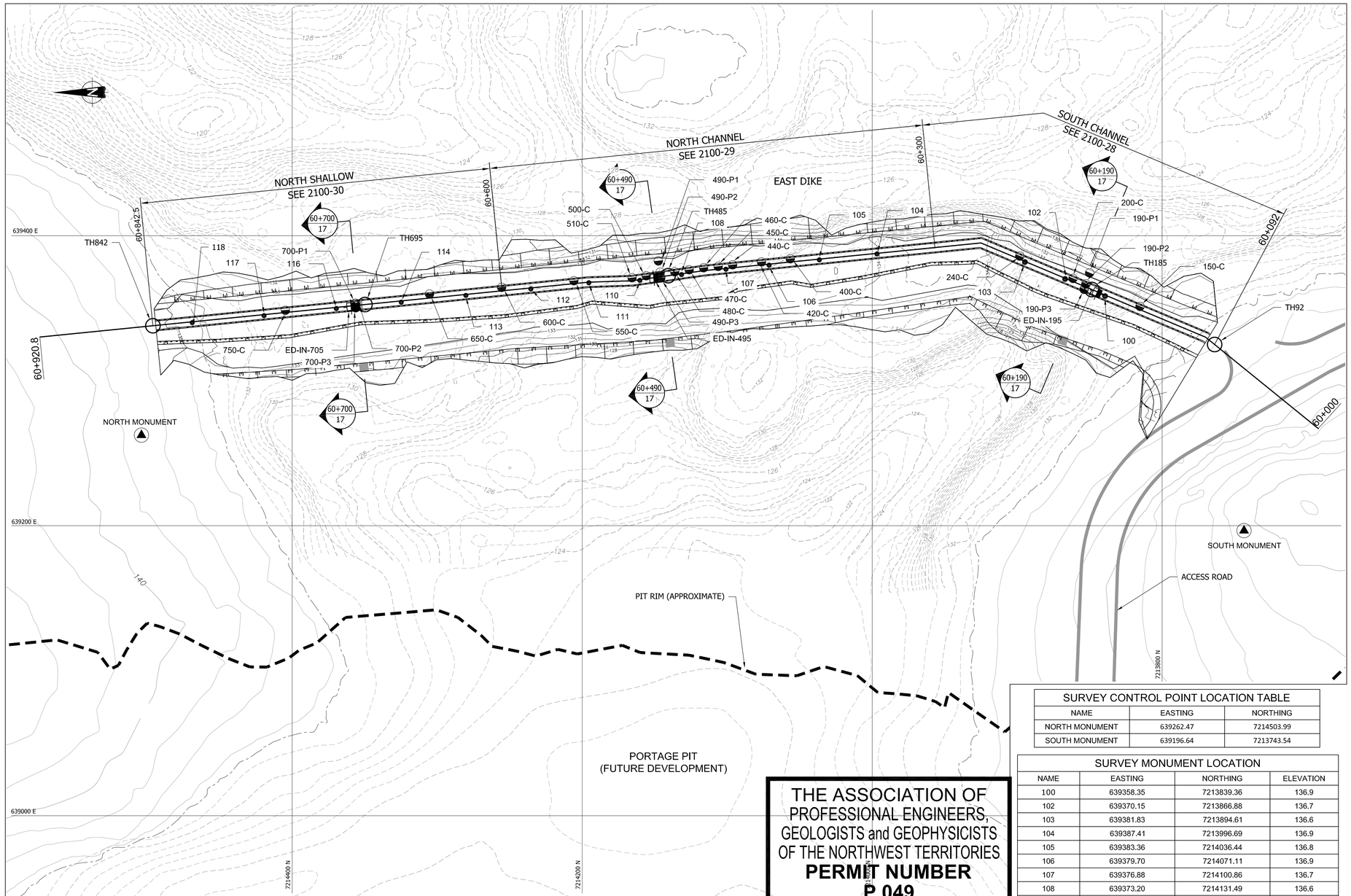
DRAWING NO. | REFERENCES

STAMP: **ORIGINAL SIGNED AND SEALED**

Golder Associates

PROJECT No.	07-1413-0074/2800		FILE No.	0814280028-4200-ASBUILT-15	
DESIGN	BW	16JUN08	SCALE	AS SHOWN	REV. 1
CADD	MJH	04JUL08	2100-15		
CHECK	BW	25JUL08			
REVIEW	TLE	25JUL08			

REVISION DATE: 09/10/30 11:29AM By: jkownacki CADD FILE: N:\Bur-Graphics\Projects\2007\1413\07-1413-0074\Drafting\2800-As-Built\Apr2009\0814280028-4200-ASBUILT-15.dwg



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

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

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

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 15 30 45 60 75
SCALE: 1:1500

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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			

DRAWING DATE: 09/11/22 12:33PM By: bwarnock
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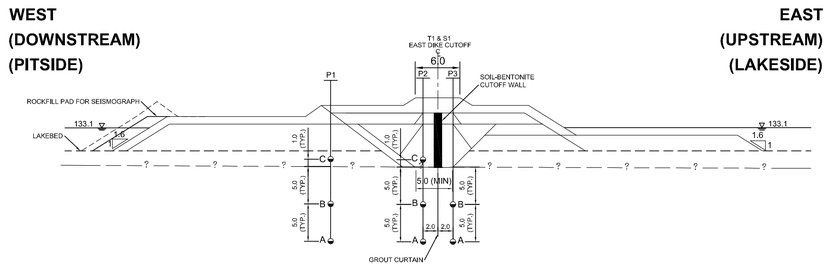
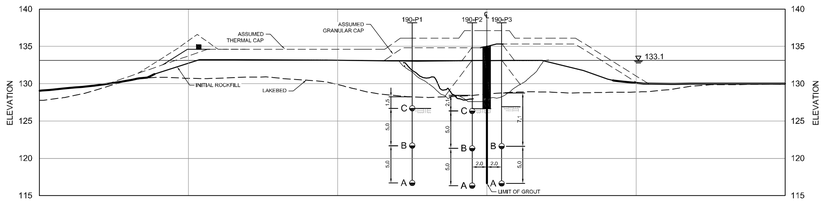
REVISION DATE:09/10/30 11:37AM By: jkownacki CADD FILE: N:\Bur-Graphics\Projects\2007\1413\07-1413-0074\Drafting\2800-As-Built\Apr2009\0814280028-4200-ASBUILT-17.dwg



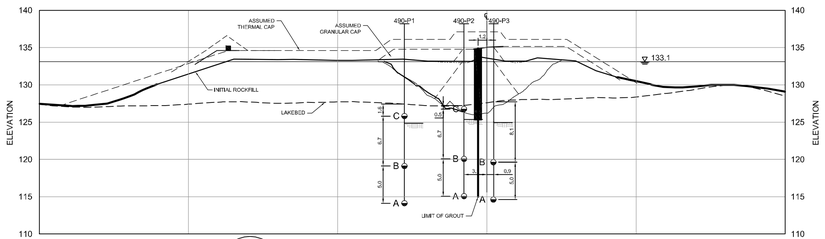
A - TYPICAL SECTION - INSTRUMENTATION

SCALE 1:400



1 - SECTION - INSTRUMENTATION STA: 60+190

SCALE 1:400



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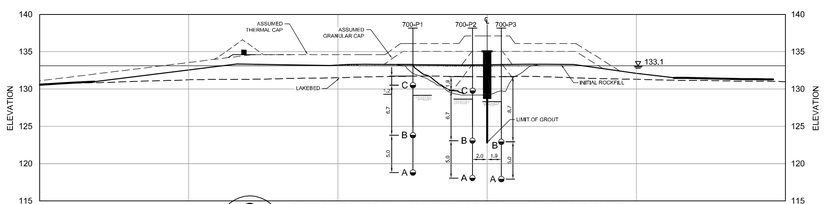
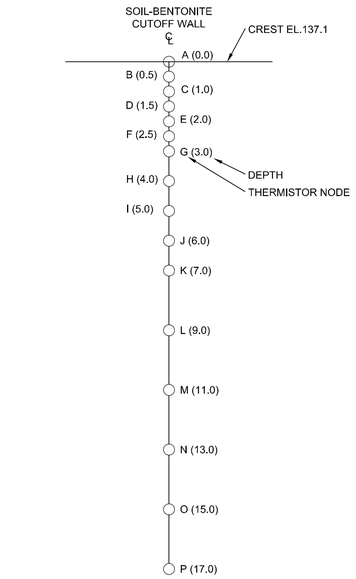
SCALE 1:400



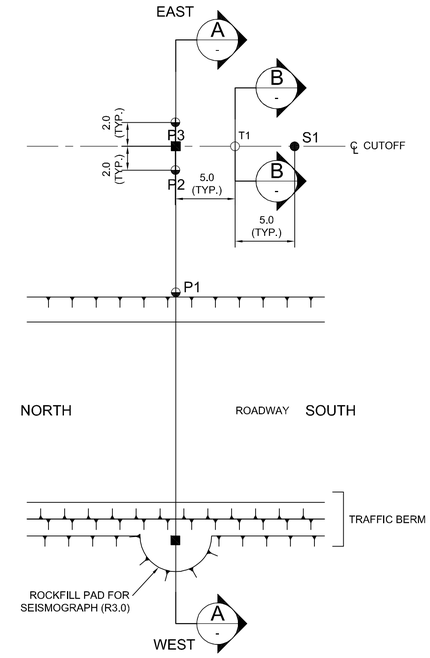
3 - SECTION - INSTRUMENTATION STA: 60+700

SCALE 1:400



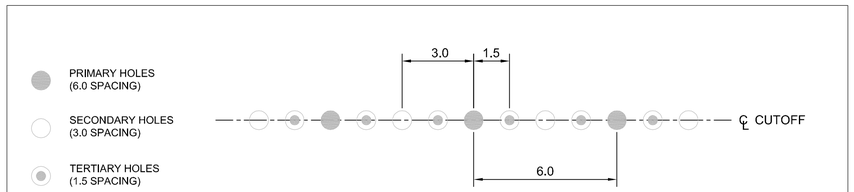
B - TYPICAL THERMISTOR SECTION

SCALE 1:100



TYPICAL EAST DIKE DETAIL INSTRUMENTATION PLAN

NOT TO SCALE



GROUTING PLAN

NOT TO SCALE

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.

THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS and GEOPHYSICISTS OF THE NORTHWEST TERRITORIES
PERMIT NUMBER P 049
GOLDER ASSOCIATES LTD.

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

PROJECT: AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE: **EAST DIKE INSTRUMENTATION TYPICAL SECTION AND GROUTING PLAN**

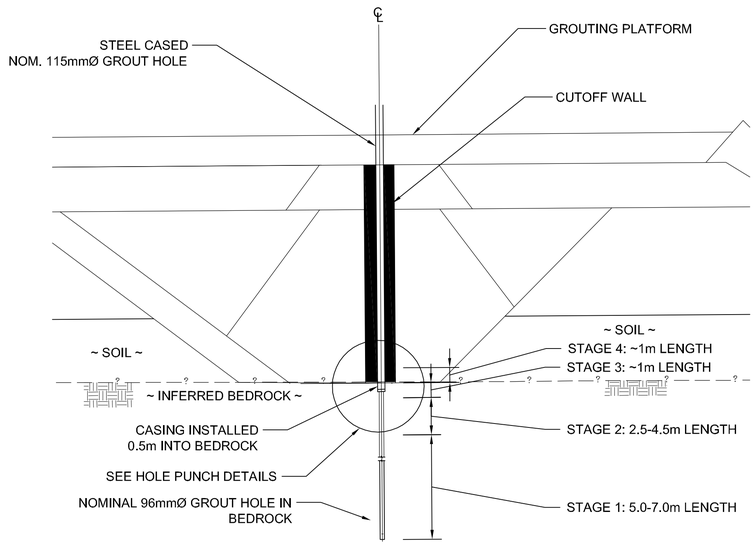
REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
1	30OCT09	JEK	AS-BUILT	SWD		
0	01AUG08	BW	ISSUED FOR CONSTRUCTION	EA	BW	TLE

STAMP: **ORIGINAL SIGNED AND SEALED**

2100-16	INSTRUMENTATION PLAN
DRAWING NO.	REFERENCES

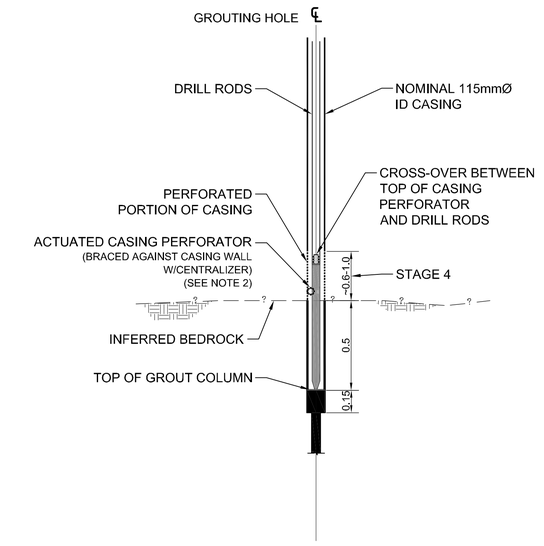
Golder Associates

PROJECT No.	07-1413-0074/2800		FILE No. 0814280028-4200-ASBUILT-17
DESIGN	BW	16JUN08	SCALE AS SHOWN REV. 1
CADD	MJH	04JUL08	2100-17
CHECK	BW	25JUL08	
REVIEW	TLE	25JUL08	



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

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.

REVISION	DATE	By: jkownacki	CADD FILE: N:\Bur-Graphics\Projects\2007\1413\07-1413-0074\Drafting\2800-As-Built\Apr2009\0814280028-4200-ASBUILT-24.dwg

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
0	30OCT09	VTR	AS-BUILT	SWD		

STAMP: ORIGINAL SIGNED AND SEALED

DRAWING NO.	REFERENCES
2100-17	INSTRUMENTATION TYPICAL SECTION AND GROUTING PLAN

PROJECT: AEM — AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE: **EAST DIKE GROUTING DETAILS**

Golder Associates

PROJECT No.	07-1413-0074/2800		FILE No.	0814280028-4200-ASBUILT-24	
DESIGN	VTR	28MAY09	SCALE	AS SHOWN	REV. 0
CADD	SWD	28MAY09			
CHECK	JEK	30OCT09			
REVIEW	TLE	30OCT09			

2100-24

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

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.

PROJECT
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE
EAST DIKE DENSIFICATION PLAN PHASE 1 AND PHASE 2

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
0	30OCT09	JEK	AS-BUILT	MSH		

DRAWING NO. | REFERENCES

STAMP
ORIGINAL SIGNED AND SEALED

Golder Associates

PROJECT No.	07-1413-0074/2800		FILE No.	0814280028-4200-ASBUILT-25	
DESIGN	JEK	30OCT09	SCALE	1:250	REV. 0
CADD	MSH	30OCT09	2100-25		
CHECK	JEK	30OCT09			
REVIEW	JCC	30OCT09			

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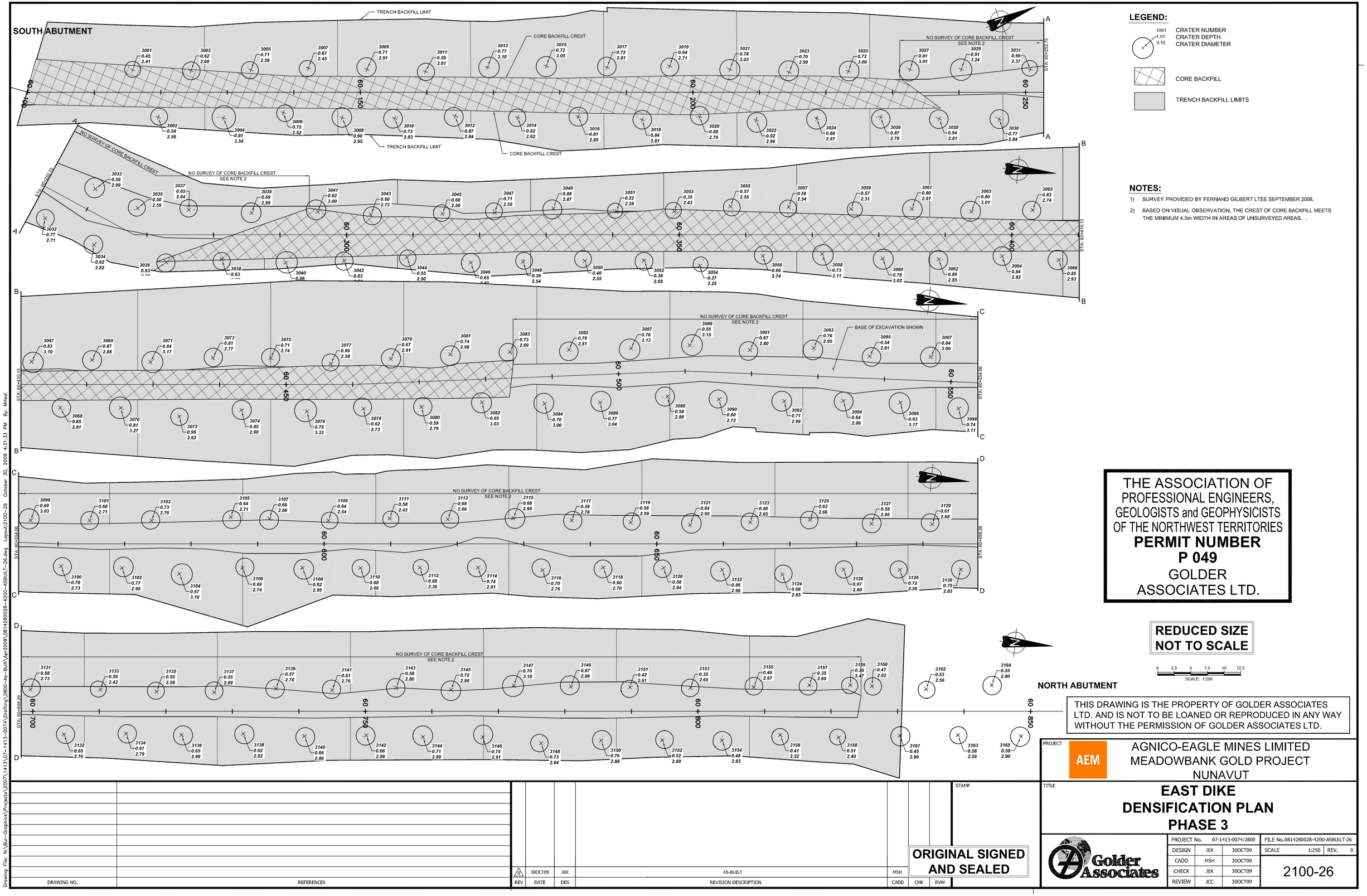


LEGEND:

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

0 2.5 5 7.5 10 12.5
SCALE: 1:250

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.

PROJECT: AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE: **EAST DIKE DENSIFICATION PLAN PHASE 3**

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
0	30OCT09	JEK	AS-BUILT	MSH		

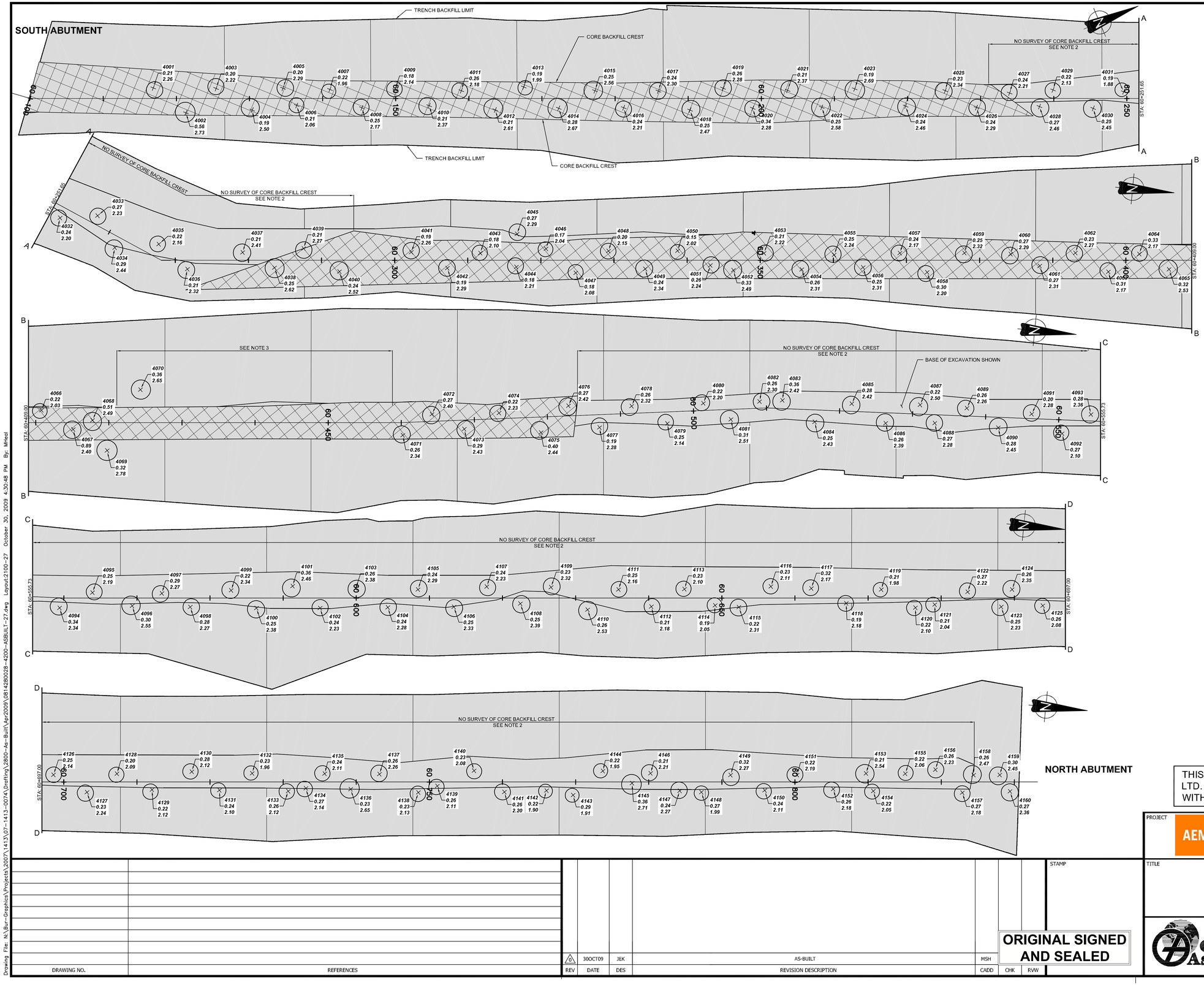
STAMP: ORIGINAL SIGNED AND SEALED

PROJECT No.	07-1413-0074/2800		FILE No. 0814280028-4200-ASBUILT-26
DESIGN	JEK	30OCT09	SCALE 1:250 REV. 0
CADD	MSH	30OCT09	
CHECK	JEK	30OCT09	2100-26
REVIEW	JCC	30OCT09	

Golder Associates

DRAWING NO. | REFERENCES

Drawing File: N:\Bur-Graphics\Projects\2007\1413\07-1413-0074\Drafting\2800-As-Built\Apr2009\0814280028-4200-ASBUILT-26.dwg Layout:2100-26 October 30, 2009 4:31:33 PM By: MHeel



LEGEND:

1001 CRATER NUMBER
1.01 CREATER 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.
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

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.

PROJECT
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE
EAST DIKE DENSIFICATION PLAN PHASE 4

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
0	30OCT09	JEK	AS-BUILT	MSH		

DRAWING NO. | REFERENCES

STAMP
ORIGINAL SIGNED AND SEALED

Golder Associates

PROJECT No.	07-1413-0074/2800		FILE No.	0814280028-4200-ASBUILT-27	
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CHECK	JEK	30OCT09			
REVIEW	JCC	30OCT09			

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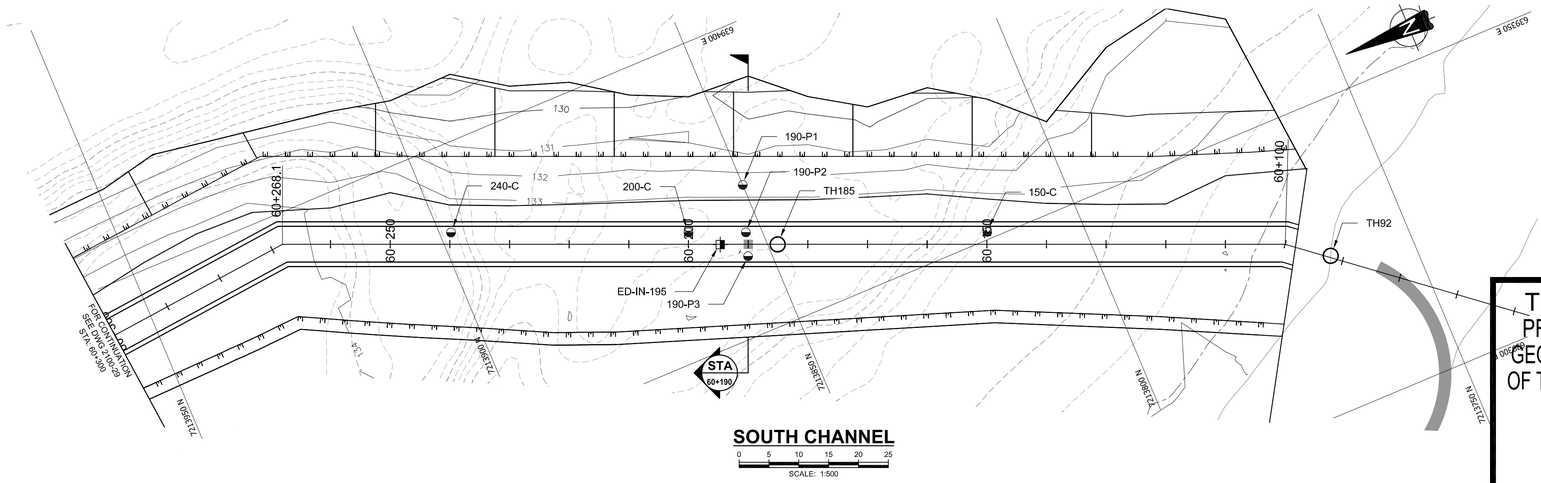


SOUTH CHANNEL

0 5 10 15 20 25

SCALE: 1:500

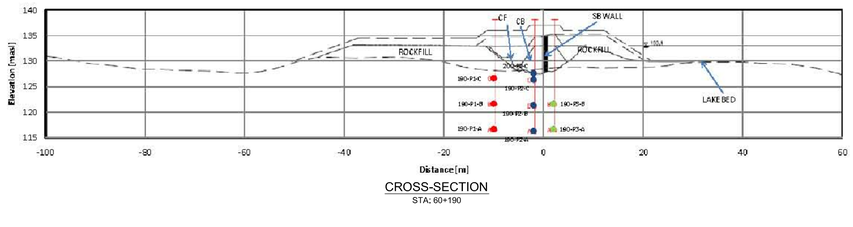
LEGEND

- 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

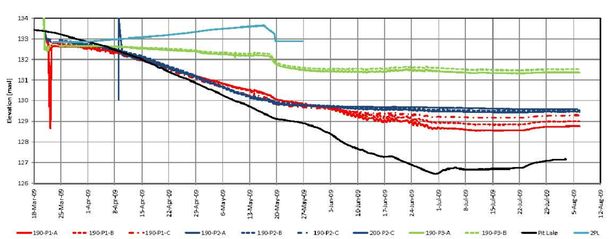
NOTES

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.

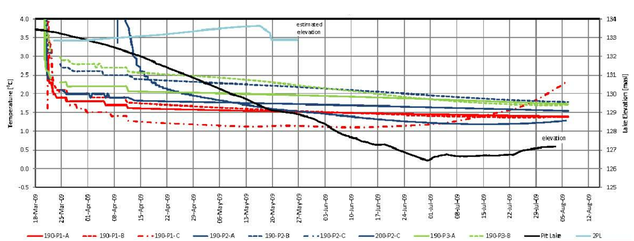
THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS and GEOPHYSICISTS OF THE NORTHWEST TERRITORIES
PERMIT NUMBER P 049
GOLDER ASSOCIATES LTD.



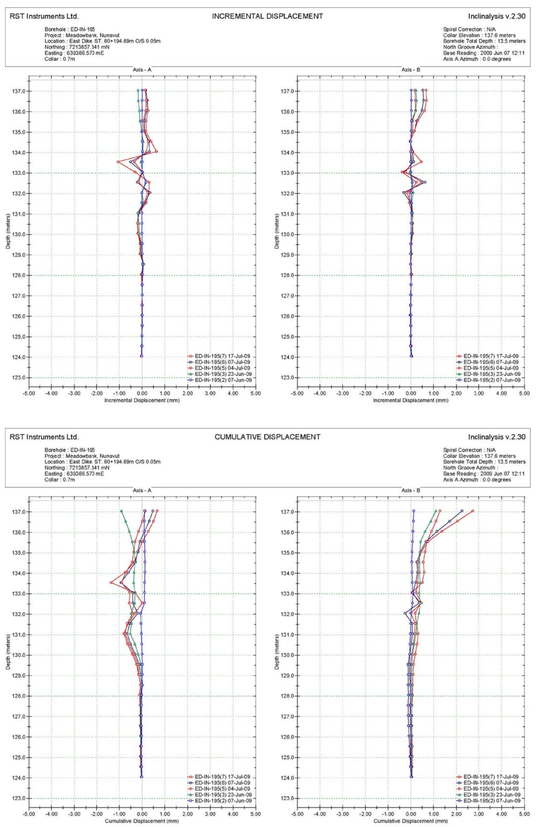
CROSS-SECTION
STA: 60+190

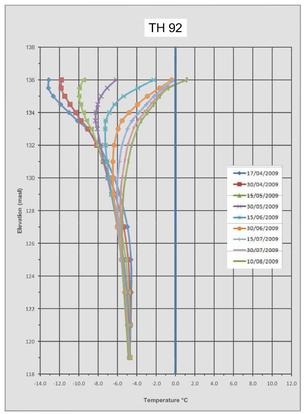


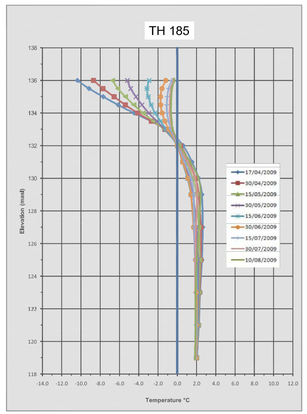
Piezometers - Total Head at Sta: 60+190



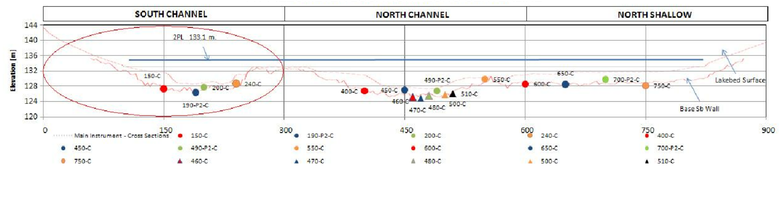
Piezometers - Temperature at Sta: 60+190

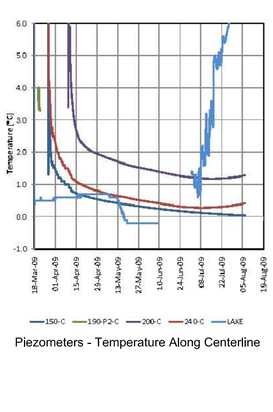




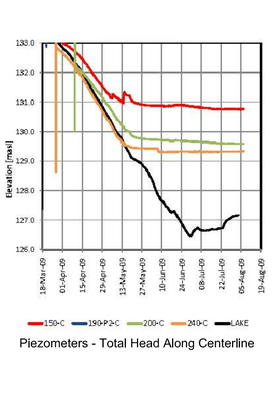


EAST DIKE PROFILE
VW PIEZOMETER LOCATION ALONG CENTERLINE





Piezometers - Temperature Along Centerline



Piezometers - Total Head Along Centerline

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REDUCED SIZE NOT TO SCALE

PROJECT

AEM

AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

STAMP

ORIGINAL SIGNED AND SEALED

TITLE

EAST DIKE SOUTH CHANNEL INSTRUMENTATION DETAILS

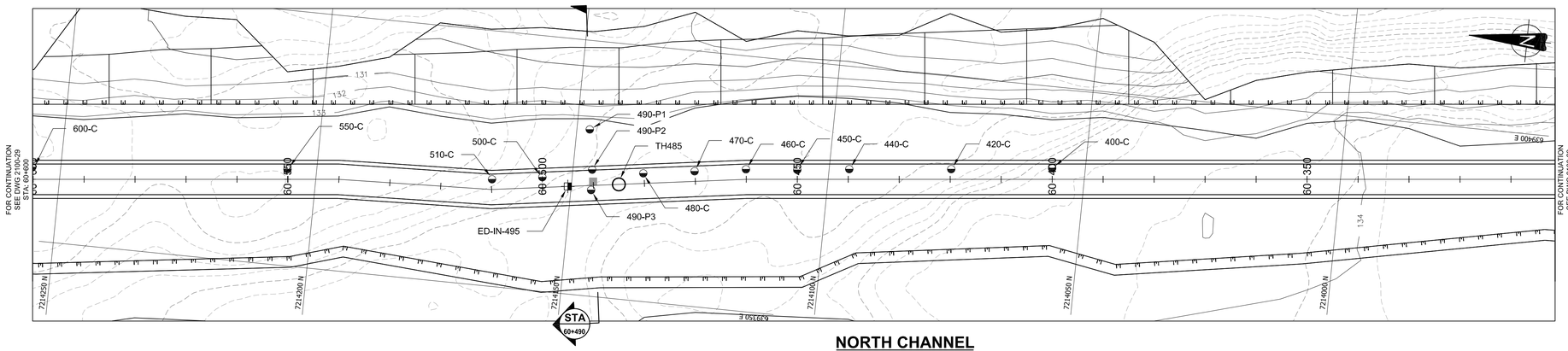
REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
0	30OCT09	JEK	AS-BUILT	MSH		

2100-16 — DRAWING NO.
INSTRUMENTATION PLAN — REFERENCES

Golder Associates

PROJECT No.	07-1413-0074/2800		FILE No.	0814280028-4200-ASBUILT-28	
DESIGN	JEK	30OCT09	SCALE	AS SHOWN	REV. 0
CADD	MSH	30OCT09			
CHECK	JEK	30OCT09		2100-28	
REVIEW	JCC	30OCT09			

Drawing File: N:\Burnaby\Graphics\Projects\2007\1413\07-1413-0074\Drafting\2800-4a-BuiltUpg\2009\0814280028-4200-ASBUILT-28.dwg Layout:2100-28 October 30, 2009 3:43:37 PM By: bsamsoe



NORTH CHANNEL

0 5 10 15 20 25

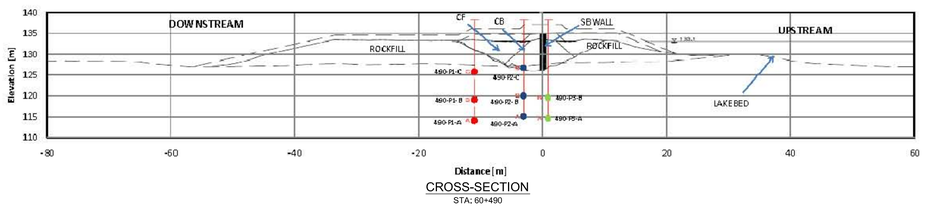
SCALE: 1:500

LEGEND

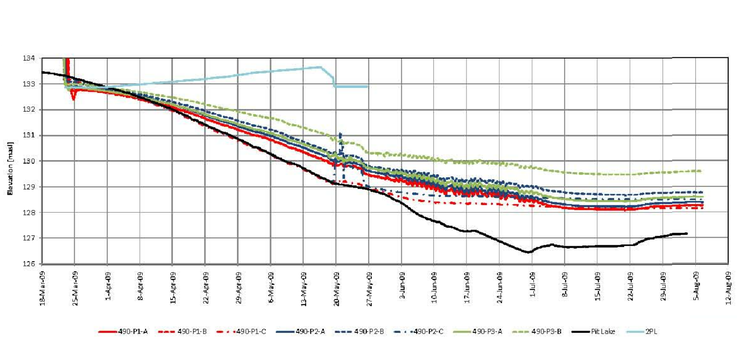
- LAND-BASED TOPOGRAPHIC MAJOR CONTOURS INTERVAL 10m
- LAND-BASED TOPOGRAPHIC MINOR CONTOURS INTERVAL 2m
- BATHYMETRIC MAJOR CONTOURS INTERVAL 2m
- BATHYMETRIC MINOR CONTOURS INTERVAL 0.5m
- SHORE LINE
- PIT FOOTPRINT
- EXISTING THERMISTOR
- INCLINOMETER
- PENDING SEISMOGRAPH LOCATION
- PIEZOMETER

NOTES

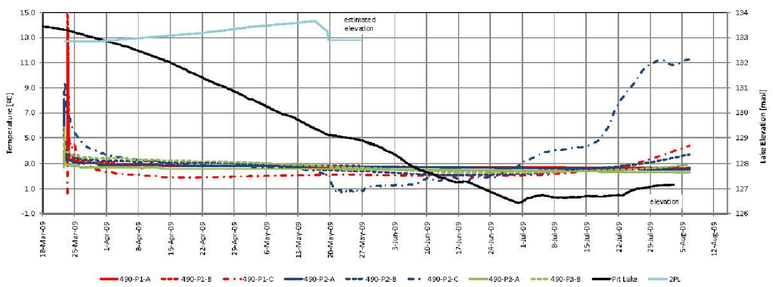
1) ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED. COORDINATE SYSTEM IS NAD83 UTM ZONE 14.
2) LAKEBED SURFACE INTERPOLATED FROM 2006 BATHYMETRY DATA. DETAILED BATHYMETRY (0.5m INTERVAL) BASED ON 2008 SURVEY.
3) AS-BUILT INSTRUMENTATION LOCATION PROVIDED BY AEM.
4) PENDING SURVEY MONUMENT LOCATIONS NOT SHOWN. DRAWING TO BE UPDATED UPON INSTALLATION AND AS-BUILT SURVEY COMPLETED.



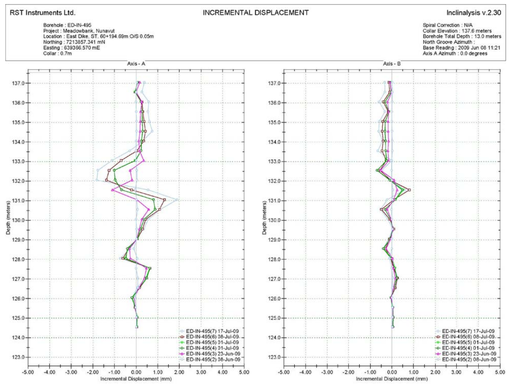
CROSS-SECTION
STA: 60+490

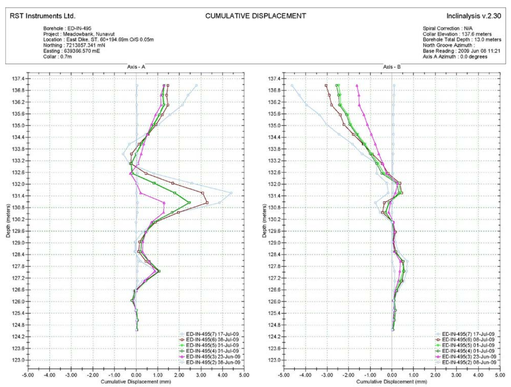


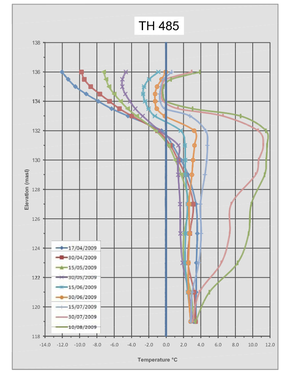
Piezometers - Total Head at Sta: 60+490



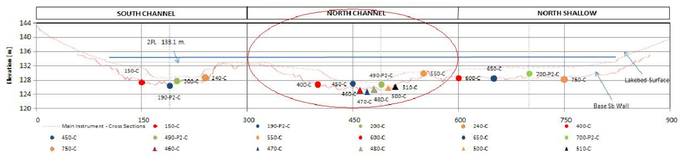
Piezometers - Temperature at Sta: 60+490

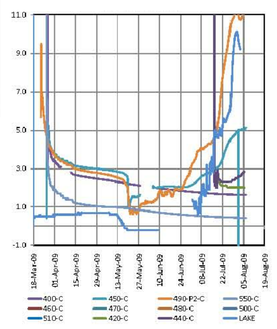




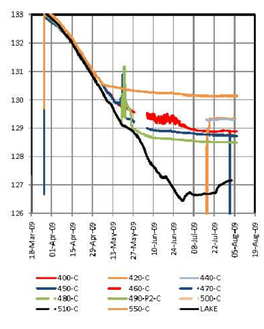


EAST DIKE PROFILE
VW PIEZOMETER LOCATION ALONG CENTERLINE





Piezometers - Temperature Along Centerline



Piezometers - Total Head Along Centerline

THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS and GEOPHYSICISTS OF THE NORTHWEST TERRITORIES
PERMIT NUMBER P 049
GOLDER ASSOCIATES LTD.

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REDUCED SIZE NOT TO SCALE

ORIGINAL SIGNED AND SEALED

STAMP

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
1	30OCT09	JEK	AS-BUILT	MSH		

2100-16 — DRAWING NO.
INSTRUMENTATION PLAN — REFERENCES

PROJECT
AEM
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE
EAST DIKE
NORTH CHANNEL
INSTRUMENTATION DETAILS

Golder Associates

PROJECT No.	07-1413-0074/2800		FILE No.	0814280028-4200-ASBUILT-29	
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CHECK	JEK	30OCT09			
REVIEW	JCC	30OCT09			

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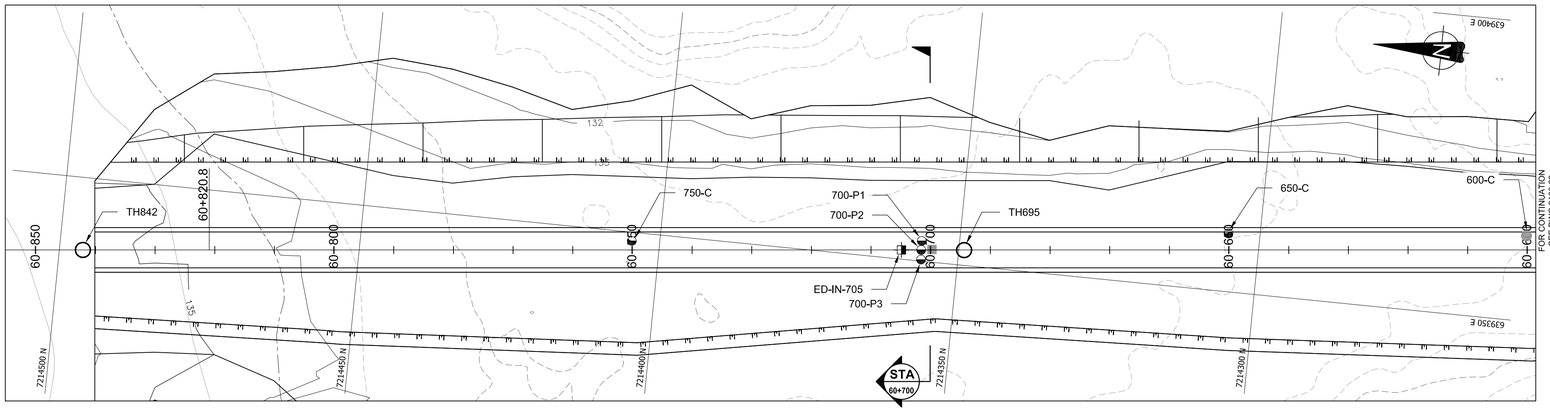


NORTH SHALLOW

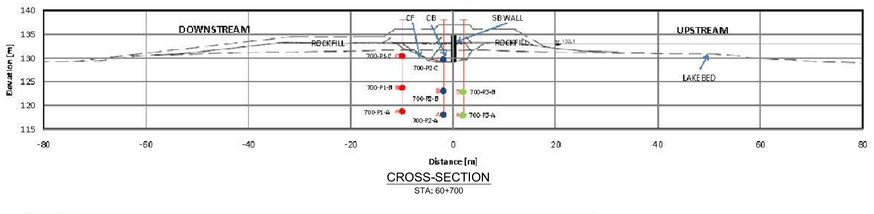
SCALE: 1:500

LEGEND

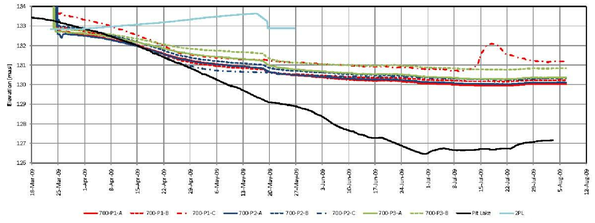
- LAND-BASED TOPOGRAPHIC MAJOR CONTOURS INTERVAL 10m
- LAND-BASED TOPOGRAPHIC MINOR CONTOURS INTERVAL 2m
- BATHYMETRIC MAJOR CONTOURS INTERVAL 2m
- BATHYMETRIC MINOR CONTOURS INTERVAL 0.5m
- SHORE LINE
- PIT FOOTPRINT
- EXISTING THERMISTOR
- INCLINOMETER
- PENDING SEISMOGRAPH LOCATION
- PEIZOMETER

NOTES

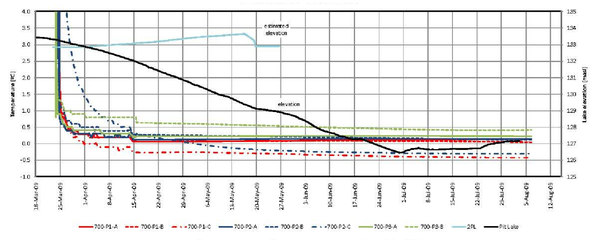
1) ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED. COORDINATE SYSTEM IS NAD83 UTM ZONE 14.
2) LAKEBED SURFACE INTERPOLATED FROM 2006 BATHYMETRY DATA. DETAILED BATHYMETRY (0.5m INTERVAL) BASED ON 2008 SURVEY.
3) AS-BUILT INSTRUMENTATION LOCATION PROVIDED BY AEM.
4) PENDING SURVEY MONUMENT LOCATIONS NOT SHOWN. DRAWING TO BE UPDATED UPON INSTALLATION AND AS-BUILT SURVEY COMPLETED.



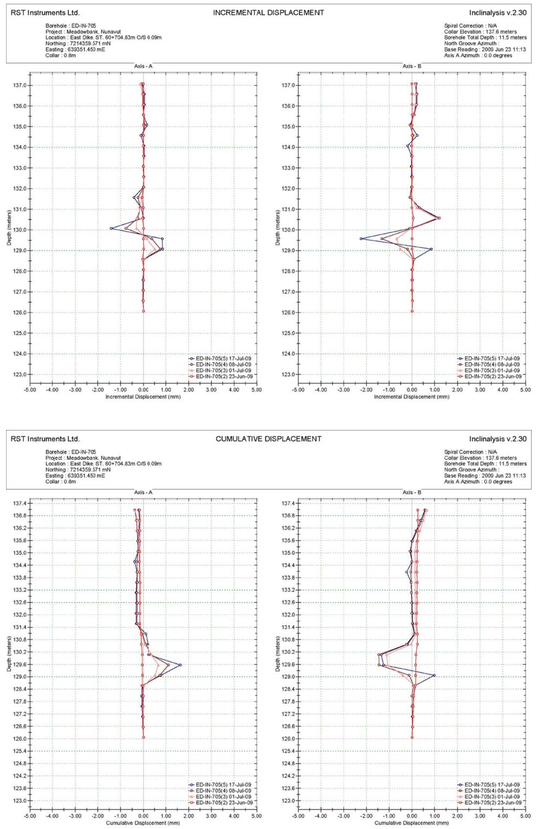
CROSS-SECTION
STA: 60+700

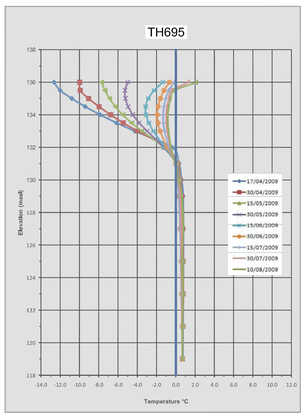


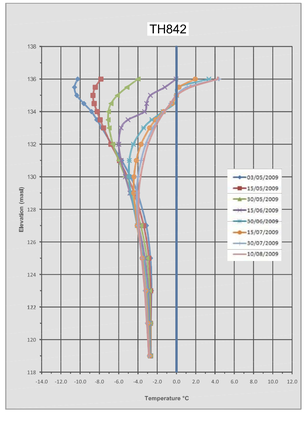
Peizometer - Total Head at Sta: 60+700



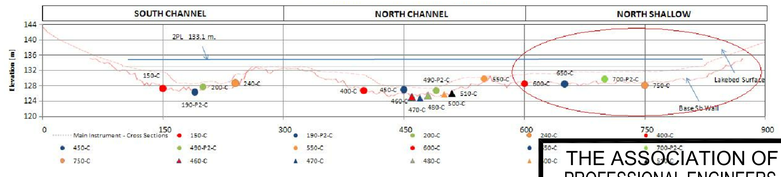
Peizometer - Temperature at Sta: 60+700

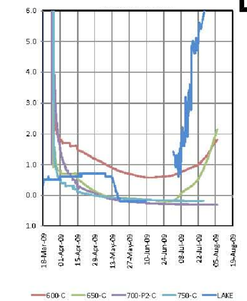




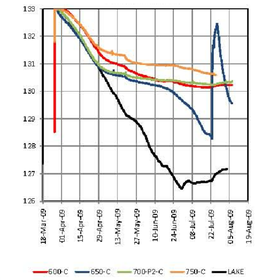


EAST DIKE PROFILE
VW PIEZOMETER LOCATION ALONG CENTERLINE





Peizometer - Temperature Along Centerline



Peizometer - Total Head Along Centerline

THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS and GEOPHYSICISTS OF THE NORTHWEST TERRITORIES
PERMIT NUMBER P 049
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REDUCED SIZE NOT TO SCALE

PROJECT: AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE: **EAST DIKE NORTH SHALLOW INSTRUMENTATION DETAILS**

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
1	30OCT09	JEK	AS-BUILT	MSH		

STAMP: **ORIGINAL SIGNED AND SEALED**

DRAWING NO.	2100-16
REFERENCES	INSTRUMENTATION PLAN

PROJECT No.	07-1413-0074/2800	FILE No.	0814280028-4200-ASBUILT-30
DESIGN	JEK 30OCT09	SCALE	AS SHOWN REV. 0
CADD	MSH 30OCT09		2100-30
CHECK	JEK 30OCT09		
REVIEW	JCC 30OCT09		

Golder Associates

Drawing File: N:\Env--Graphics\Projects\2000's\1413\07-1413-0074\Drafting\2800-4x-Built\Vol2\2000\0814280028-4200-ASBUILT-30.dwg Layout:2100--30 October 30, 2009 3:45:11 PM By: jmarriott

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							Type 30	Water	Dry Bentonite		Additive		Marsh	Density	Bleed (%)	Approx. Initial Set	Notes / Observations
		Cement (°C)	Water (°C)	Ambient (°C)	SuperP (°C)	Bentonite (°C)	Pozzutec (°C)	Mix (°C)	(Kg)	(L)	(%)	(gr)	(%)	(ml)	(seg)	(gr/cc)	2 hour	(hrs)	
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							Microfine	Water	Dry Bentonite		Additive		Marsh	Density	Bleed (%)	Approx. Initial Set	Notes / Observations
		Cement (°C)	Water (°C)	Ambient (°C)	SuperP (°C)	Bentonite (°C)	Pozzutec (°C)	Mix (°C)	(Kg)	(L)	(%)	(gr)	(%)	(ml)	(seg)	(gr/cc)	2 hour	(hrs)	
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

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+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 By-Pass
		08-Feb-09	3	3.1	2.1	1	A*	43.7	43.7	43.7	22:20	22:33	2.2	0	0	-	-	-	-	-	-	-	-	-	-	
		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

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+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	-	-	-	-	-	-	-	-	-	-	

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+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	-	-	-	-	-	-	-	

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+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

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+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	

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+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

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	-	-	-	-	-	-	-	-	-	-	

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+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	-	-	-	-	-	-	-	-	-	-	

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+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

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+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

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	-	-	-	-	-	-	-	-	-	-	

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+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

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+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

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+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

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+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	

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+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	-	-	-	-	-	-	-	-	-	-	

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+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

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 Mix B calculated manually.
		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	
		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	

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+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	-	-	-	-	-	-	-	-	-	-	

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+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

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+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				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+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

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

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+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

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+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	-	-	-	-	-	-	-	-	-	-	

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				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+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	

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+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	-	-	-	-	-	-	-	-	-	-	

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+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

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+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	-	-	-	-	-	-	-	-	-	-	

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+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

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+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

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+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

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	-	-	-	-	-	-	-	-	-	-	

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+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	

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+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	

TABLE E2-1
SUMMARY OF EAST DIKE QA AND QUANTITIES

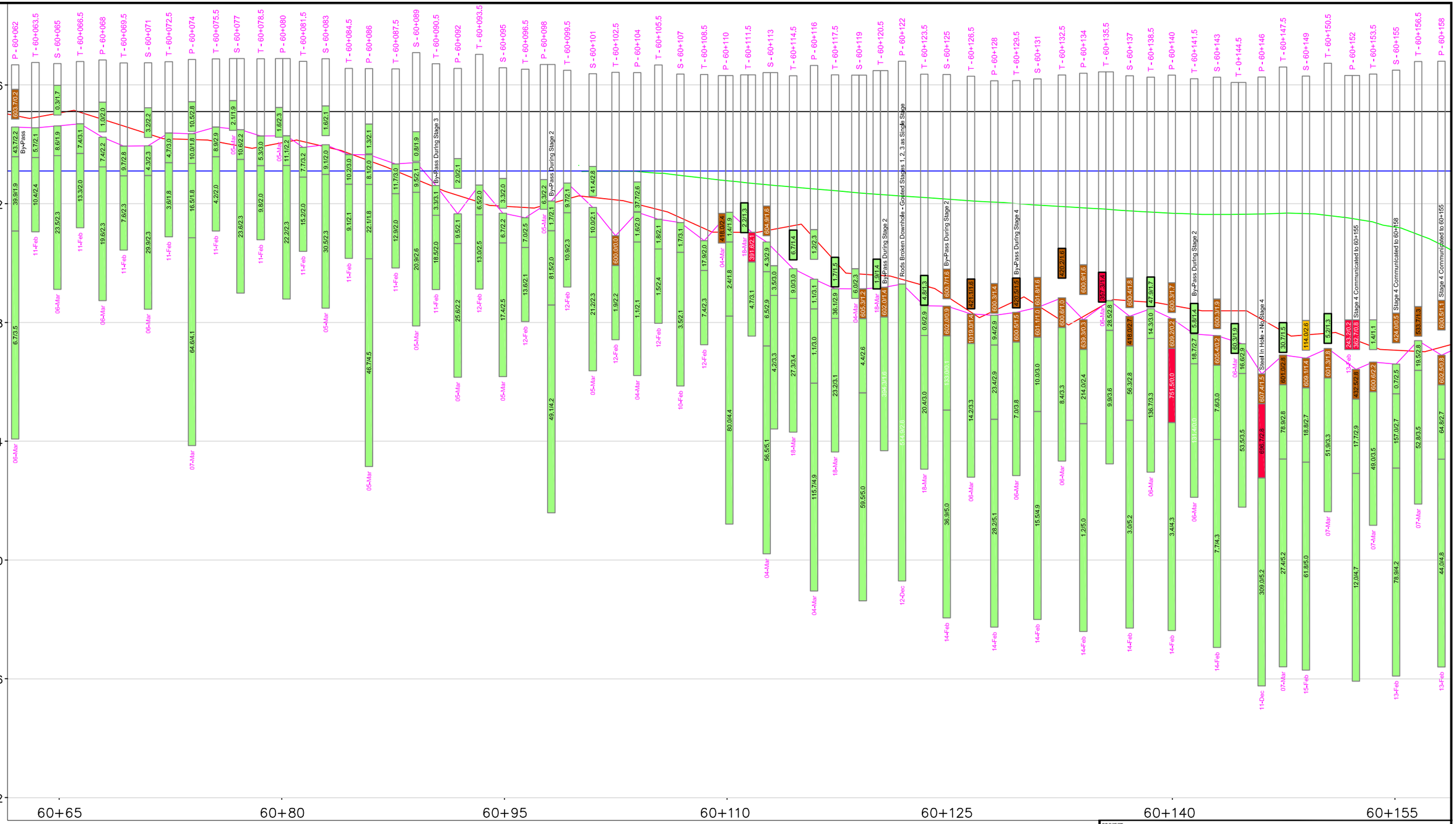
Hole	Order (P, S, T, Q)	Date	Stage				Take				Duration		Termination			QA			Temperatures							Comments
			Stage #	From	To	Length	Mix	Volume	V_{TOTAL}	Take	Start	End	P_{FINAL}	Q_{FINAL}	Penetrab	Marsh	Bleed	Specific Gravity	Cement	Water	Ambient	Glenium	Pozzutec	Bentonite	Mix	
		(dd-mmm-yy)		(m)	(m)	(m)		(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+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

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	

Drawing File: G:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2800 As-Built Report\Appendix E - East Dike Grouting\E3 - Grouting Progress Cross Section.dwg October 23, 2009 11:01:35 AM By: Vbrambough



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
AEM
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

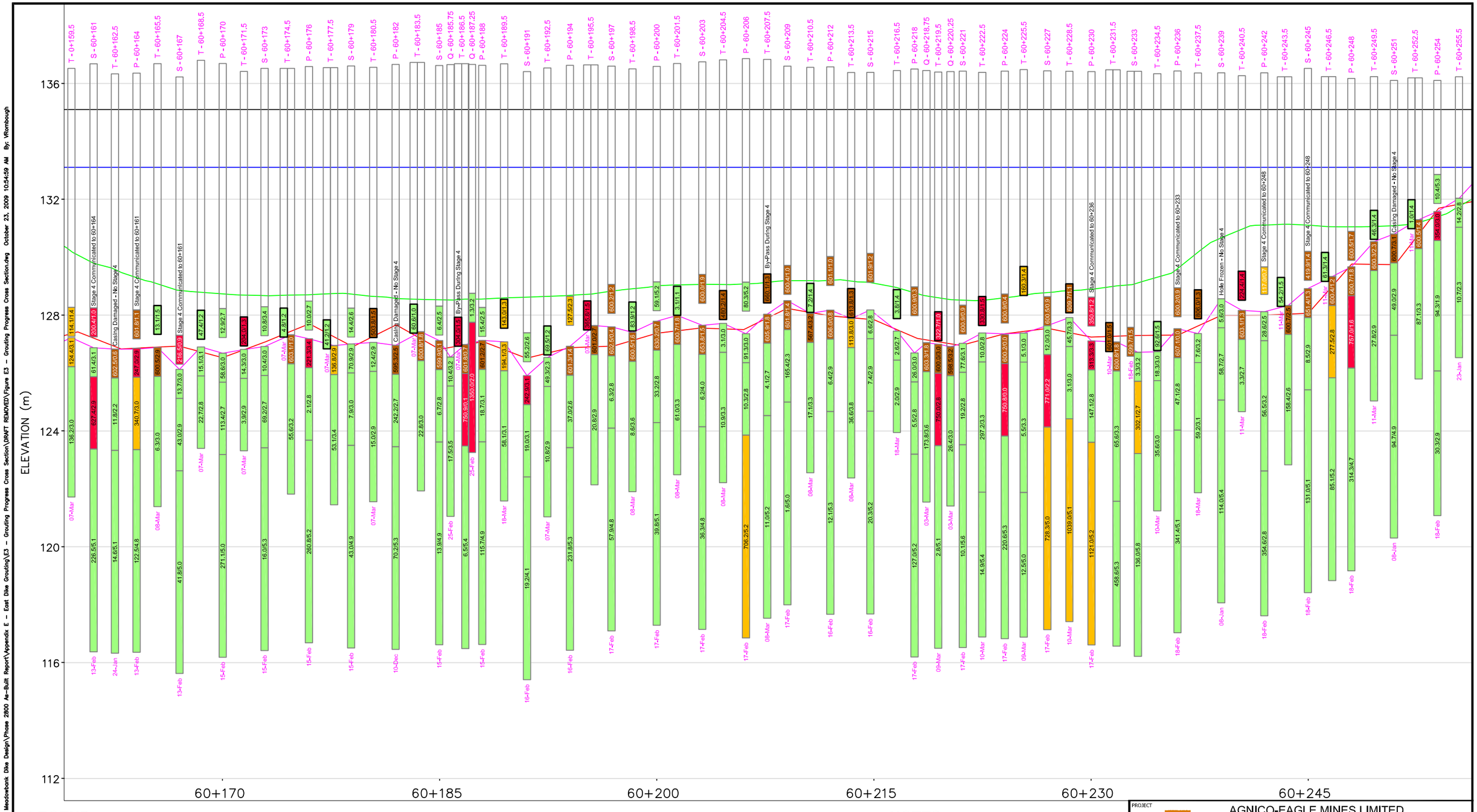
TITLE
EAST DIKE
GROUTING PROGRESS CROSS SECTION

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 - 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.dwg October 23, 2009 10:54:59 AM By: VRambough



LEGEND:

BOREHOLE NAME
P-PRIMARY
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Q-QUATERNARY

PRESSURE OBTAINED (BARS)

DD-MMM 3.3/2.0 P - 60+104

START OF FINAL GROUTING FOR GIVEN GROUT HOLE

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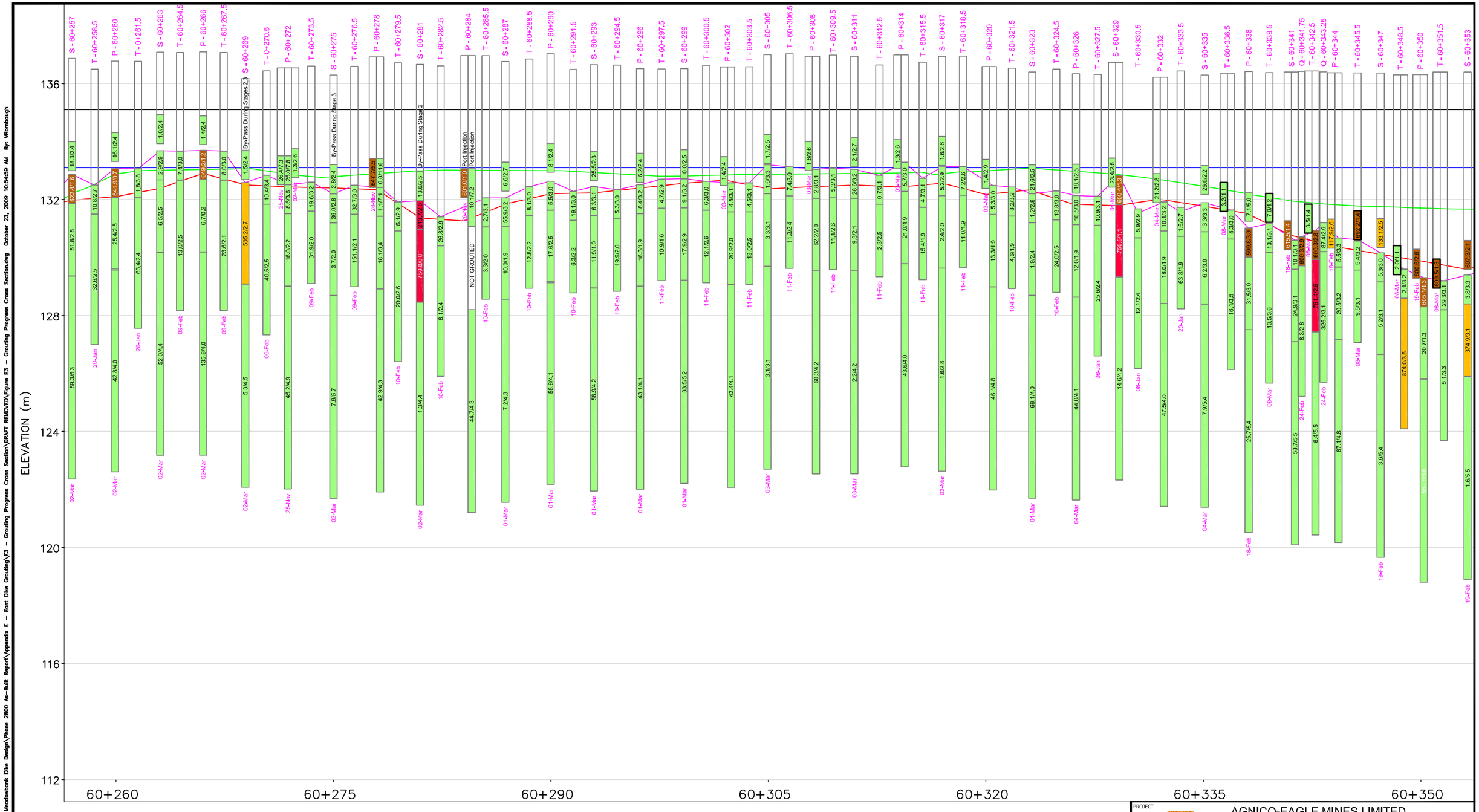
PROJECT No.		07-1413-0074	FILE No.		
DESIGN	VTR	APR09	SCALE	AS SHOWN	REV. 0
CADD	VTR	APR09			
CHECK	GRB	APR09			
REVIEW	-	-			

FIGURE E3 - 2



LEGEND:

BOREHOLE NAME
P-PRIMARY
S-SECONDARY
T-TERTIARY
Q-QUATERNARY

PRESSURE OBTAINED (BARS)

P - 60+104
3.3/2.0
DD-MMM

START OF FINAL GROUTING FOR GIVEN GROUT HOLE

VOLUME INJECTED (L)

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BASE OF SB CUT-OFF WALL (SOUNDING)
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0 1 2 3 4 5
VERTICAL SCALE IN METRES

0 2 4 6 8 10
HORIZONTAL SCALE IN METRES

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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

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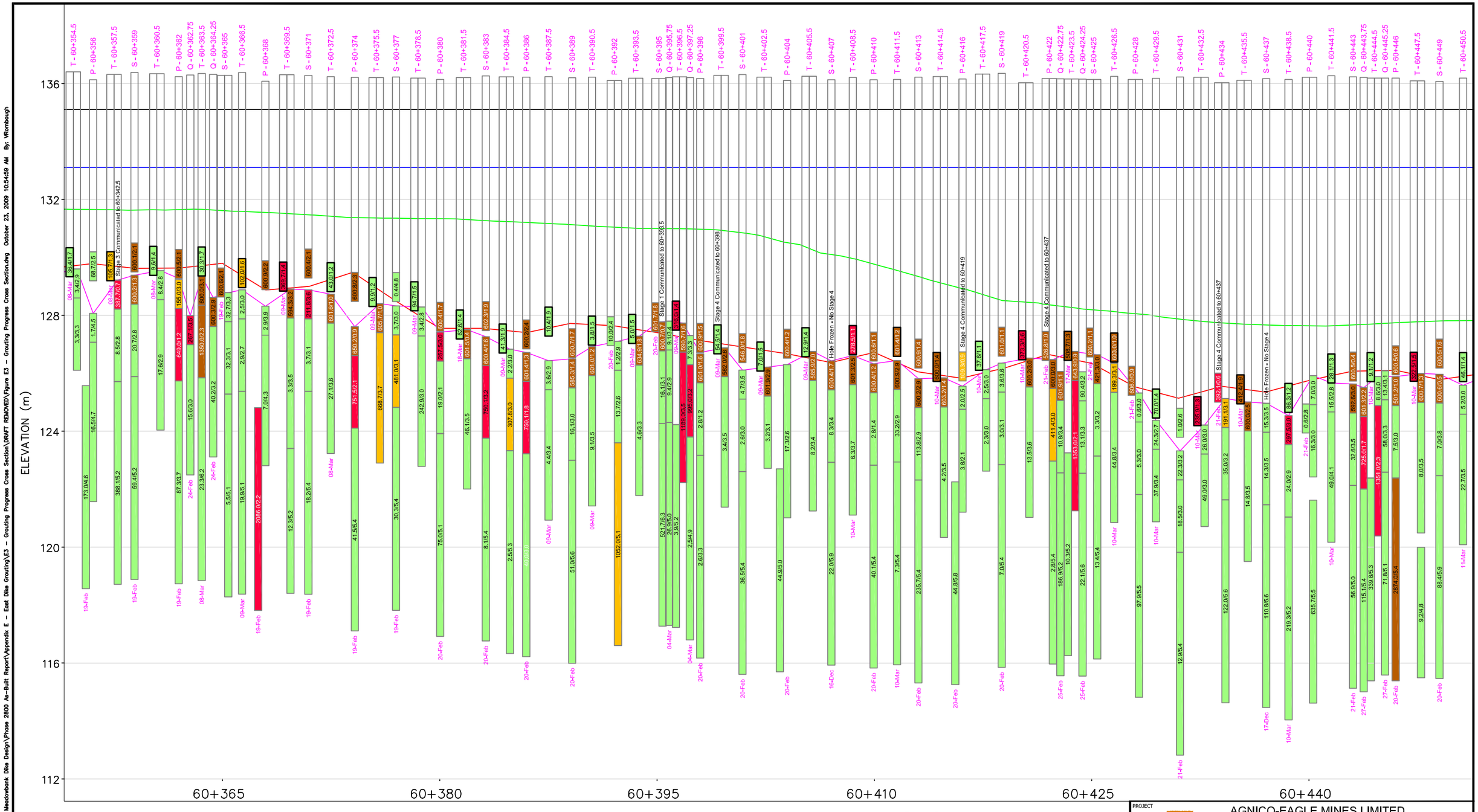

LEGEND:

BOREHOLE NAME
P-PRIMARY
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Q-QUATERNARY

PRESSURE OBTAINED (BARS)

P - 60+104

3.3/2.0

DD-MMM

START OF FINAL GROUTING FOR GIVEN GROUT HOLE

VOLUME INJECTED (L)

		TAKE: L/m
VOL / P	LOW	< 100
VOL / P	M.HIGH	100< >200
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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

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NUNAVUT

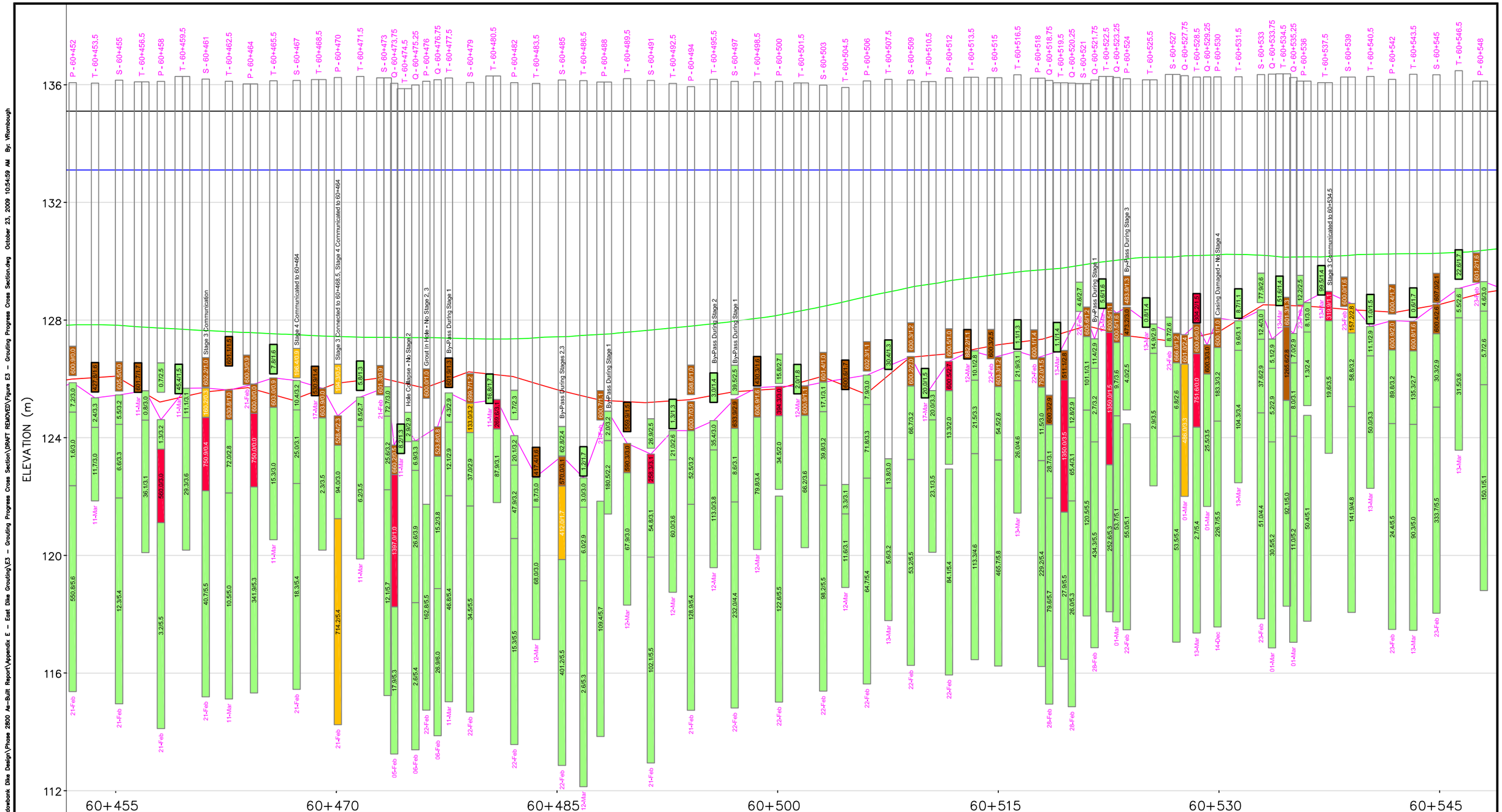
TITLE

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 - 4



LEGEND:

BOREHOLE NAME
P-PRIMARY
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P - 60+104 — PRESSURE OBTAINED (BARS)

3.3/2.0 — VOLUME INJECTED (L)

DD-MMM — START OF FINAL GROUTING FOR GIVEN GROUT HOLE

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VOL / P	M.HIGH	100< >200
VOL / P	HIGH	200< >400
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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

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HORIZONTAL SCALE IN METRES

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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 - 5		
REVIEW	-	-			

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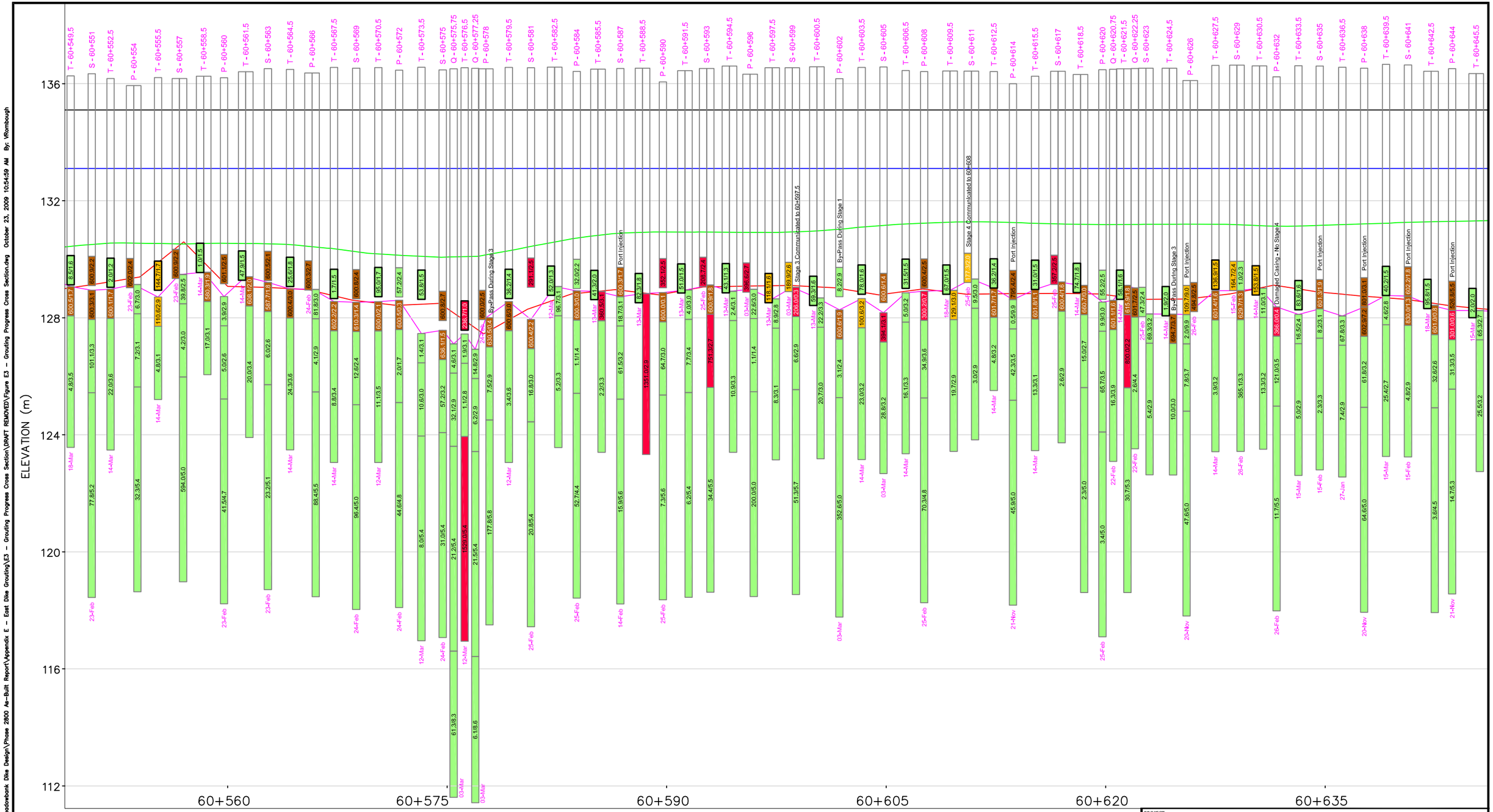

LEGEND:

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P - 60+104 — PRESSURE OBTAINED (BARS)

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VOL / P	HIGH	200< >400
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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

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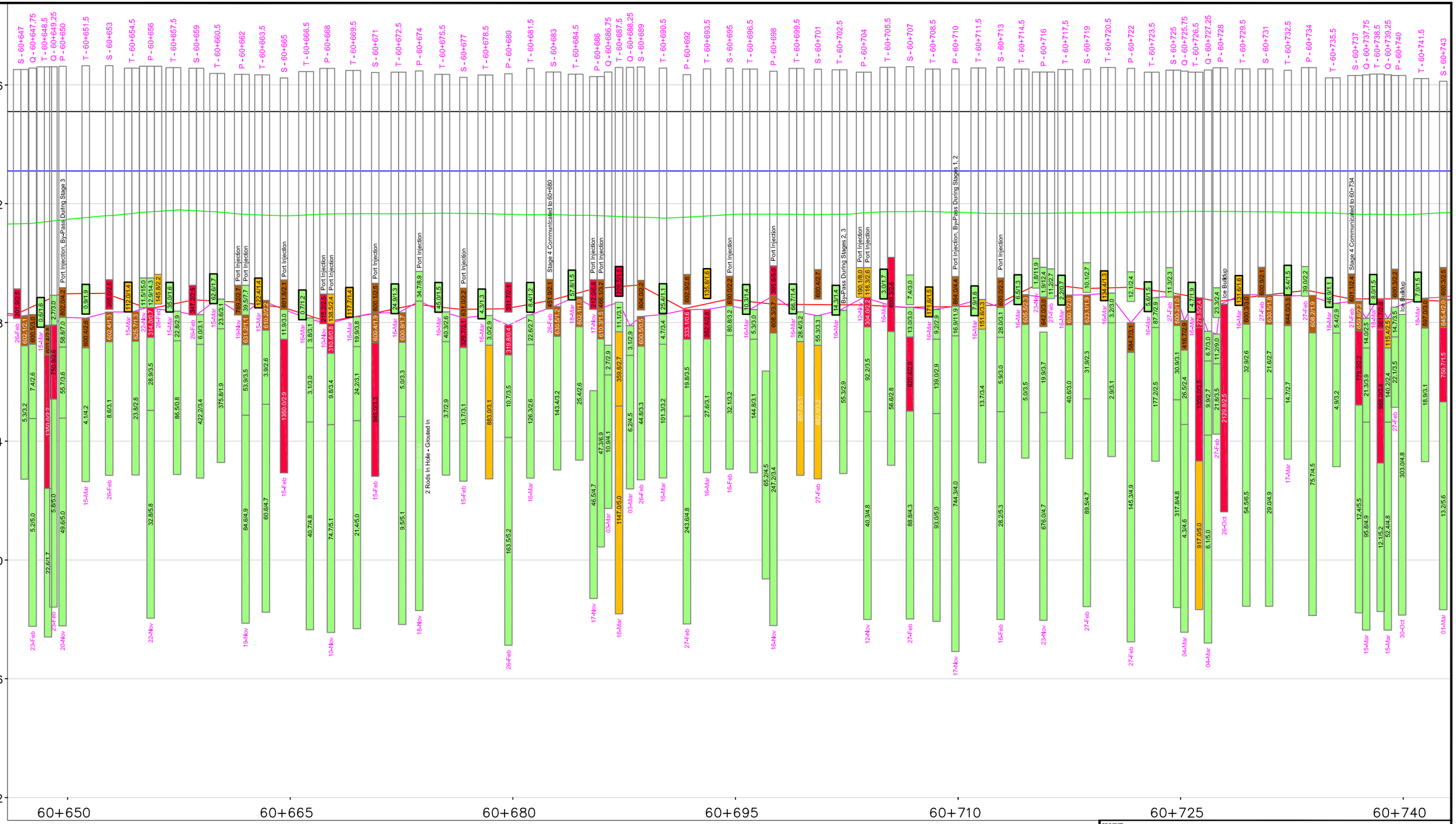
PROJECT
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

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 — VOLUME INJECTED (L)

DD-MMM — START OF FINAL GROUTING FOR GIVEN GROUT HOLE

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LAKEBED

BASE OF SB CUT-OFF WALL (SOUNDING)

INFERRED BEDROCK BASED ON CASING INSTALLATION RECORDS

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VERTICAL SCALE IN METRES

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PROJECT

AEM

AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

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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 - 7

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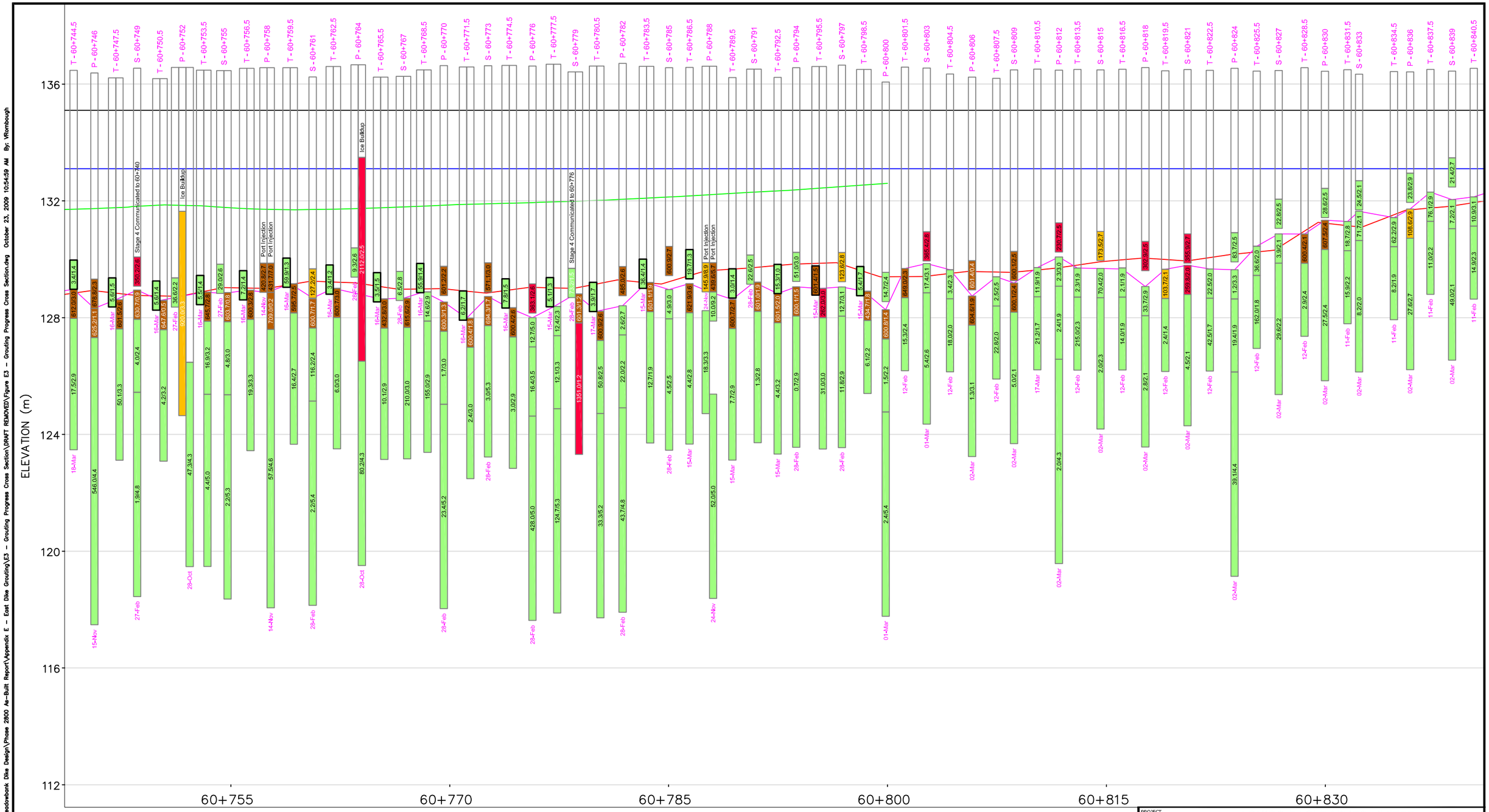

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NUNAVUT

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EAST DIKE
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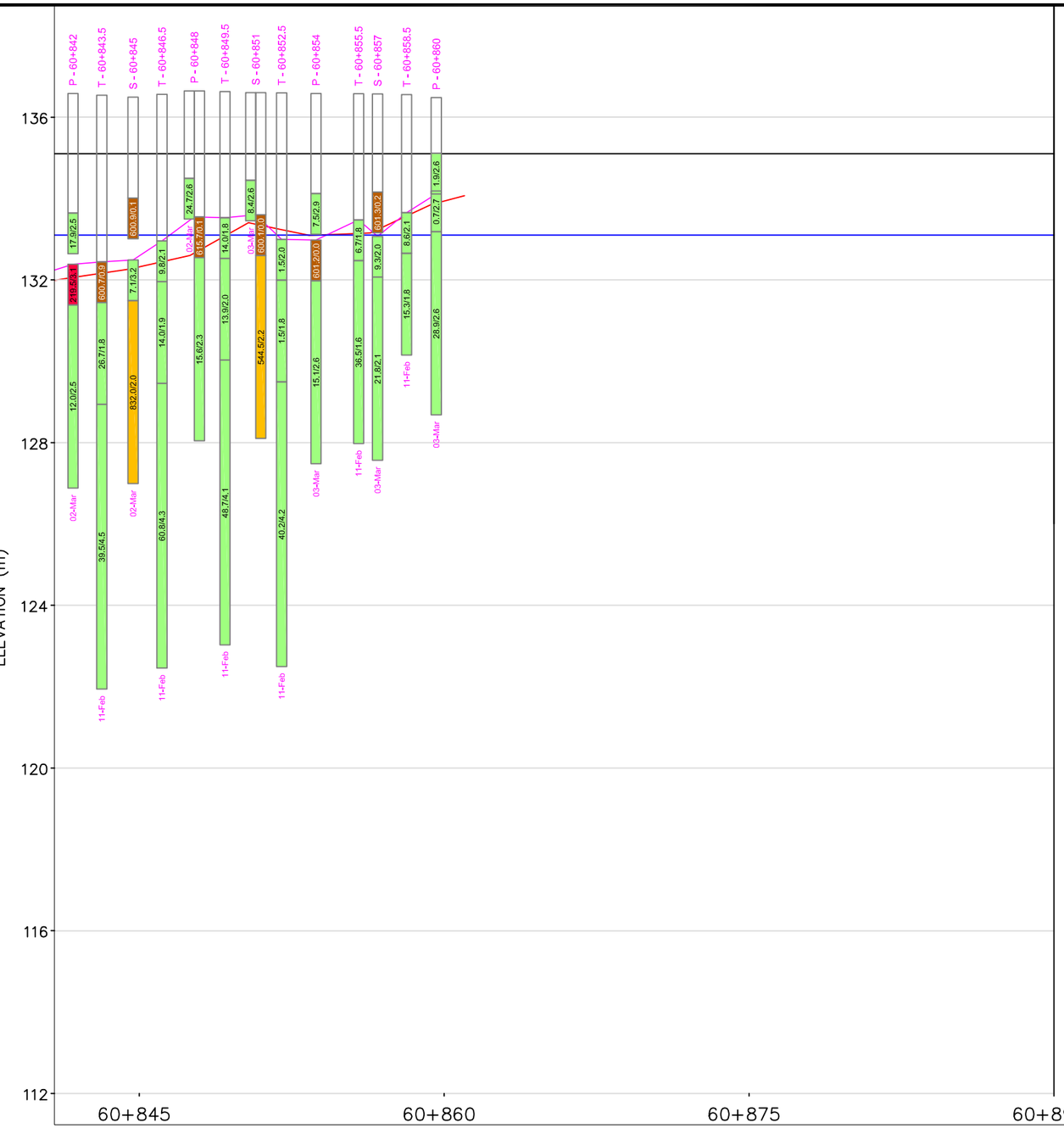
Golder Associates

PROJECT No.		07-1413-0074	FILE No.		
DESIGN	VTR	APR09	SCALE	AS SHOWN	REV. 0
CADD	VTR	APR09			
CHECK	GRB	APR09			
REVIEW	-	-			

FIGURE E3 - 8



LEGEND:

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EAST DIKE
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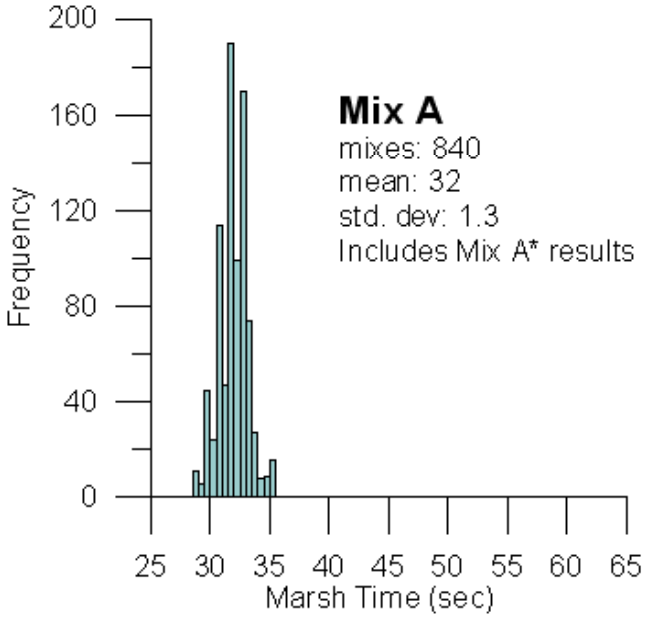
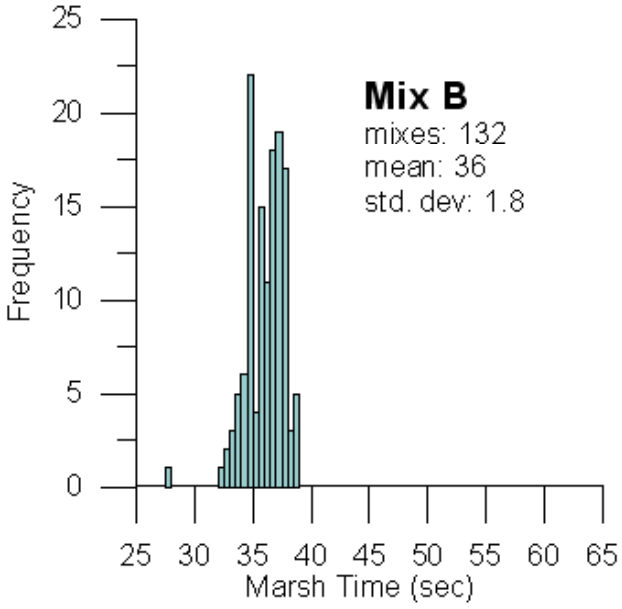
Golder Associates

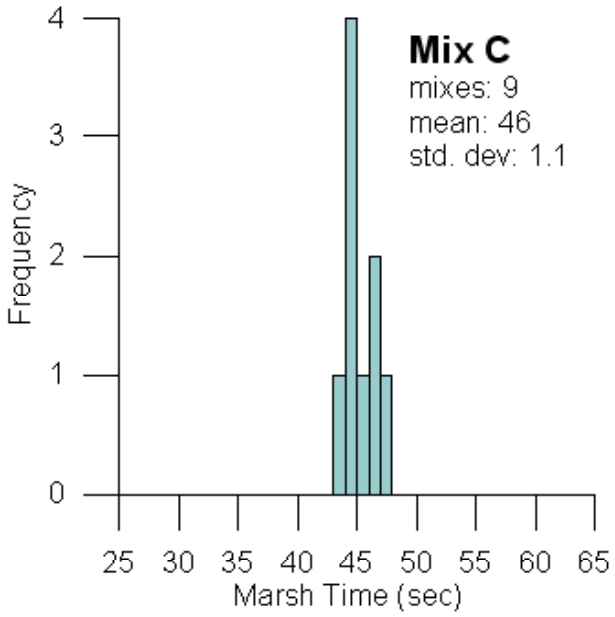
PROJECT No.		07-1413-0074	FILE No.		
DESIGN	VTR	APR09	SCALE	AS SHOWN	REV. 0
CADD	VTR	APR09			
CHECK	GRB	APR09			
REVIEW	-	-			

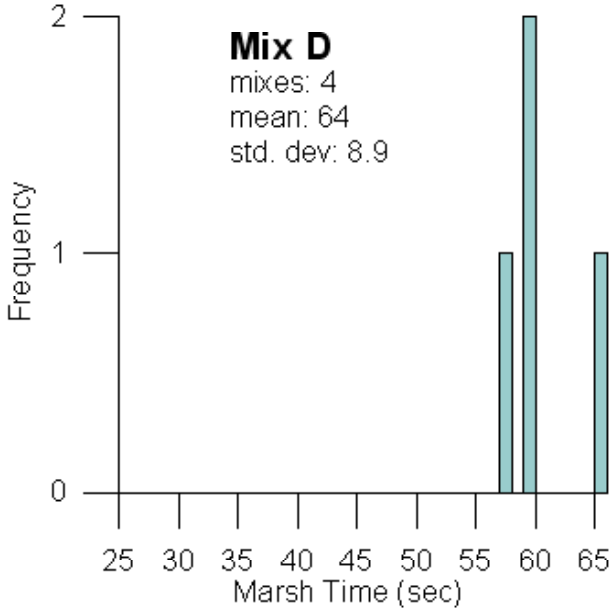
FIGURE E3 - 9

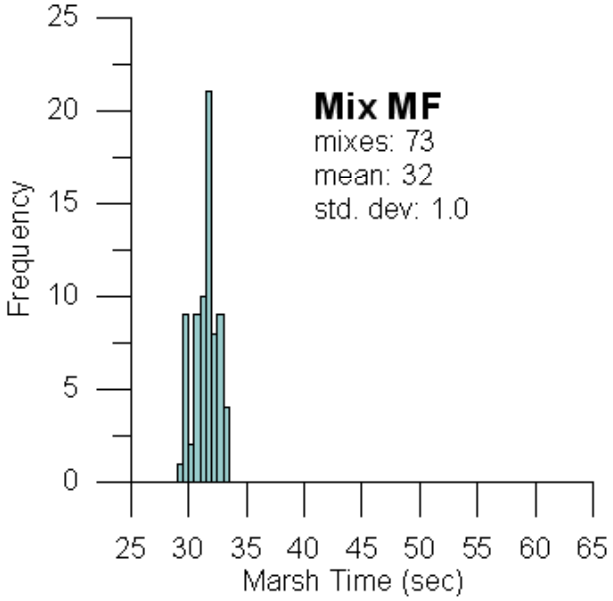
Drawing File: G:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2800 As-Built Report\Appendix E - East Dike Grouting\E3 - Grouting Progress Cross Section\DRAFT REMOVED\Figure E3 - Grouting Progress Cross Section.dwg October 23, 2009 10:54:59 AM By: VRambough











PROJECT

AEM

AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

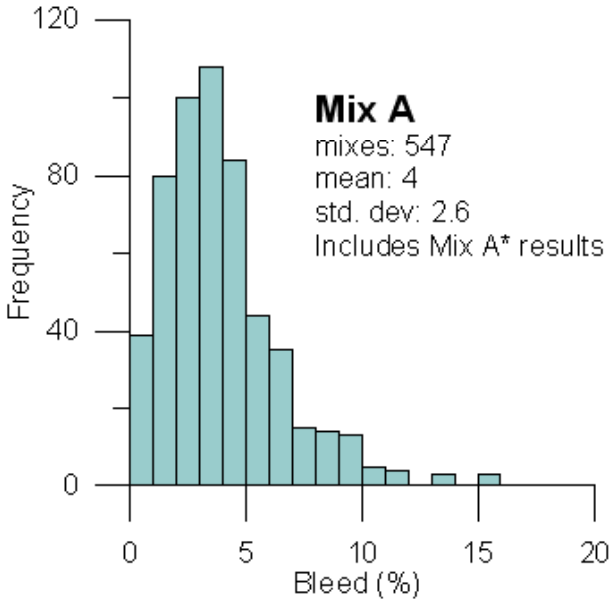
TITLE

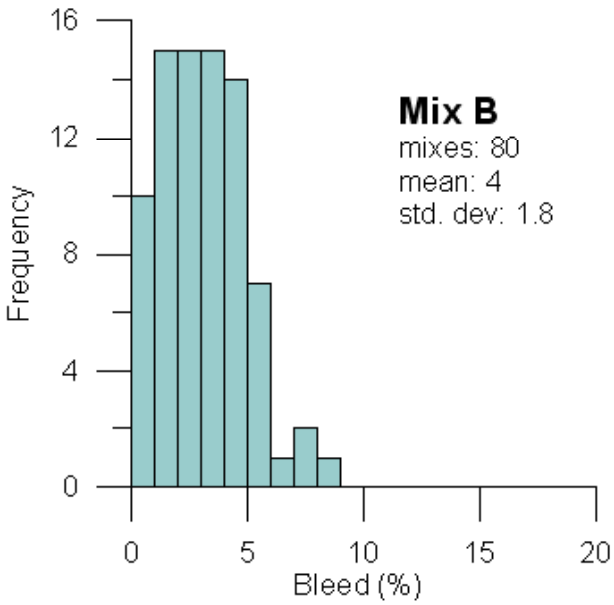
MARSH TIME RESULTS

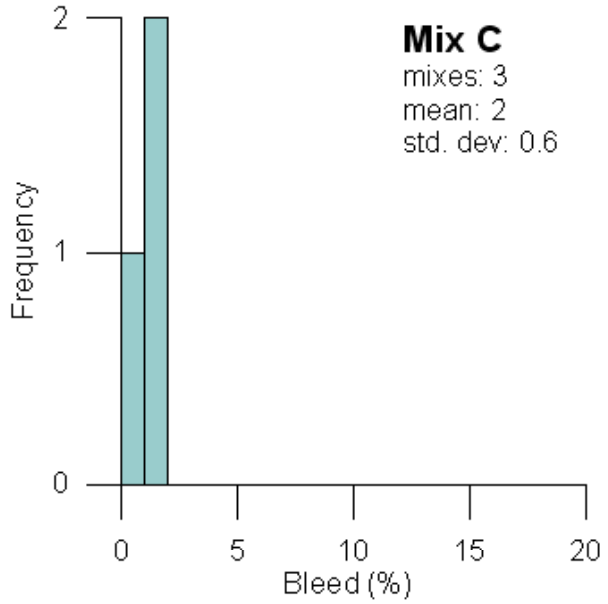
Golder Associates

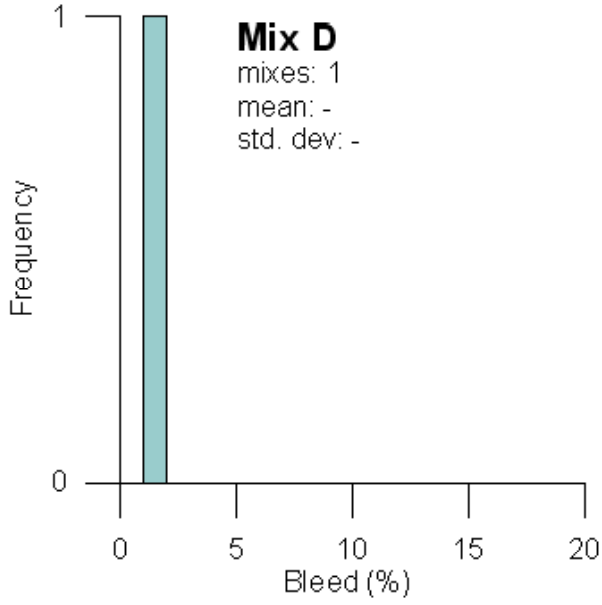
PROJECT No. 07-1413-0074			PHASE / TASK No. 2800	
DESIGN	VTR	22MAY09	SCALE NTS	REV. 0
CADD	VTR	22MAY09		
CHECK	GRB	22MAY09		
REVIEW				

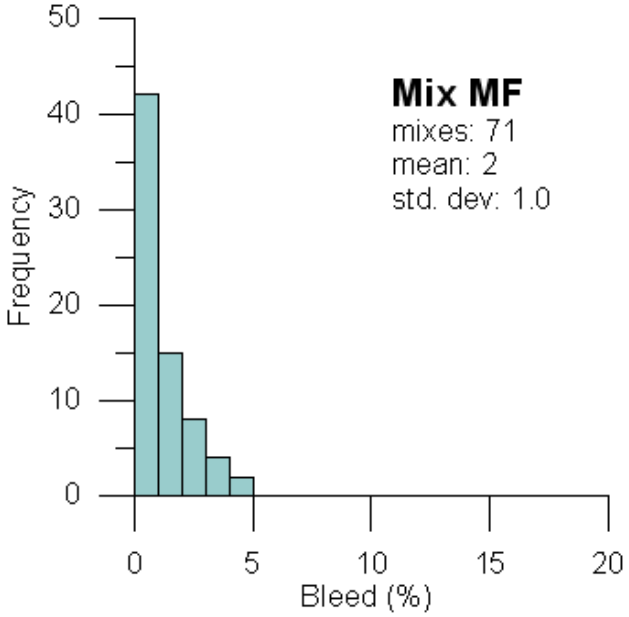
FIGURE E4-1











PROJECT

AEM

AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

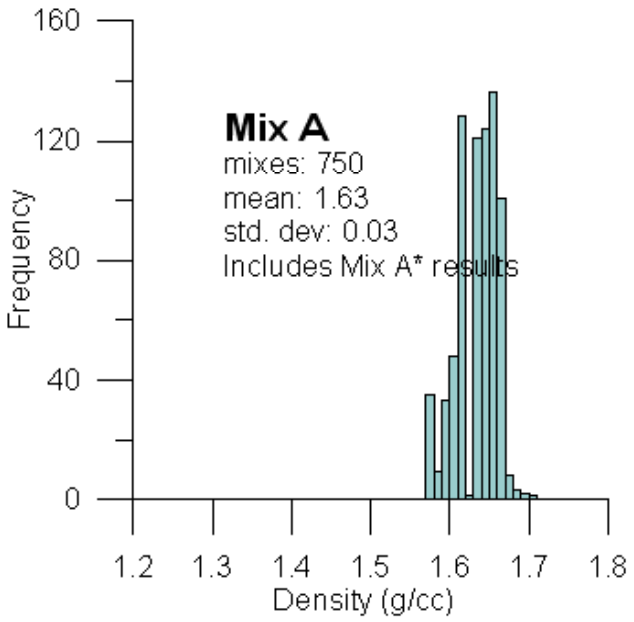
TITLE

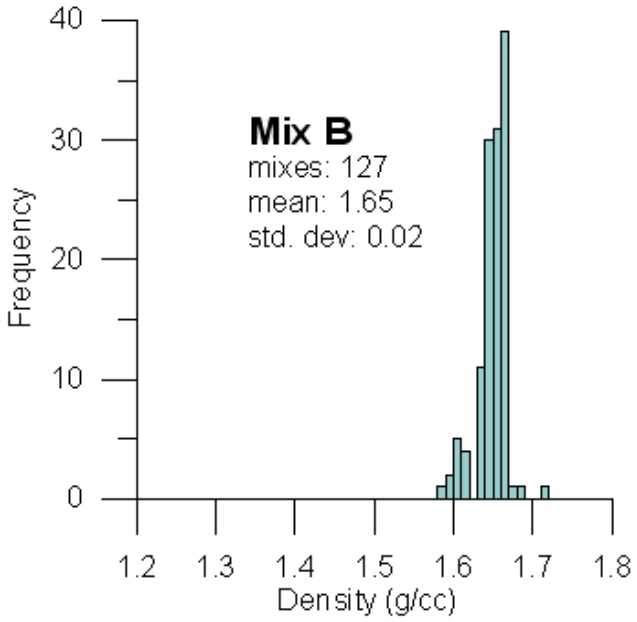
BLEED RESULTS

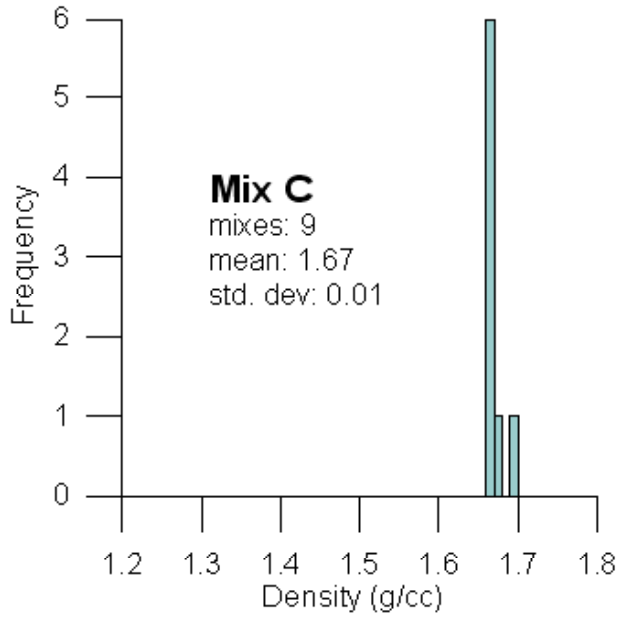
Golder Associates

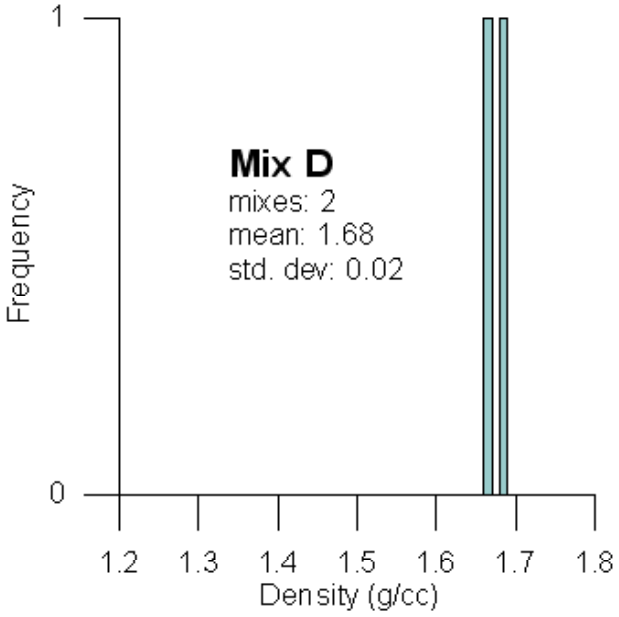
PROJECT No. 07-1413-0074			PHASE / TASK No. 2800	
DESIGN	VTR	22MAY09	SCALE NTS	REV. 0
CADD	VTR	22MAY09		
CHECK	GRB	22MAY09		
REVIEW				

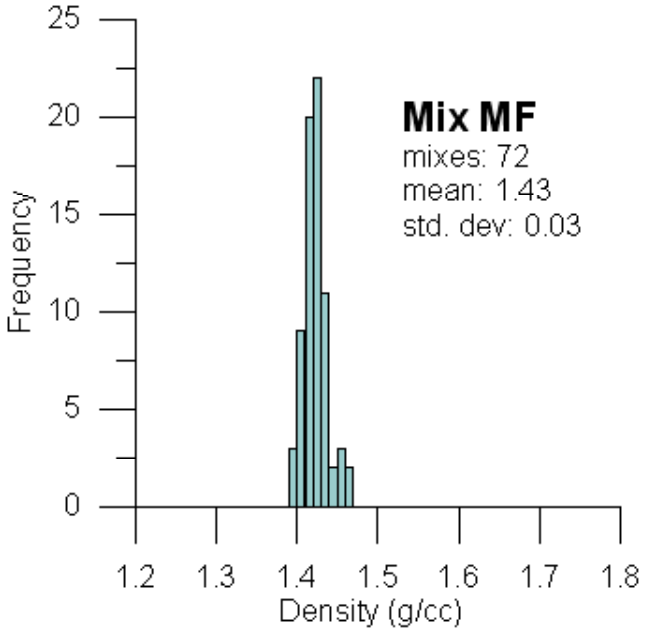
FIGURE E4-2











PROJECT

AEM

AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

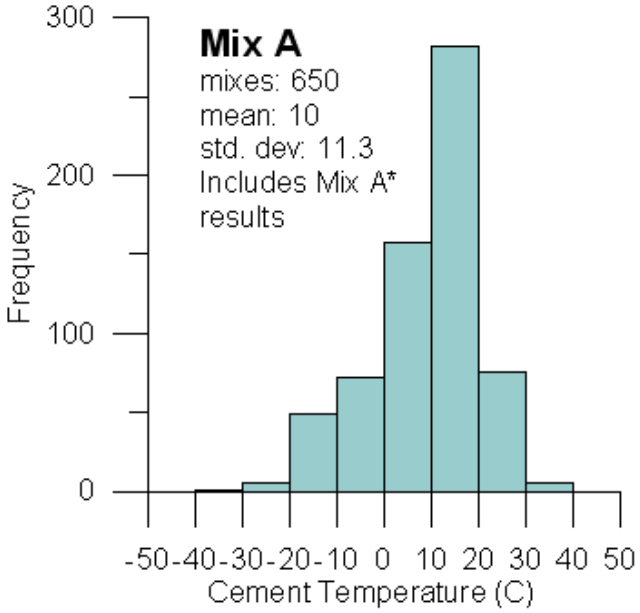
TITLE

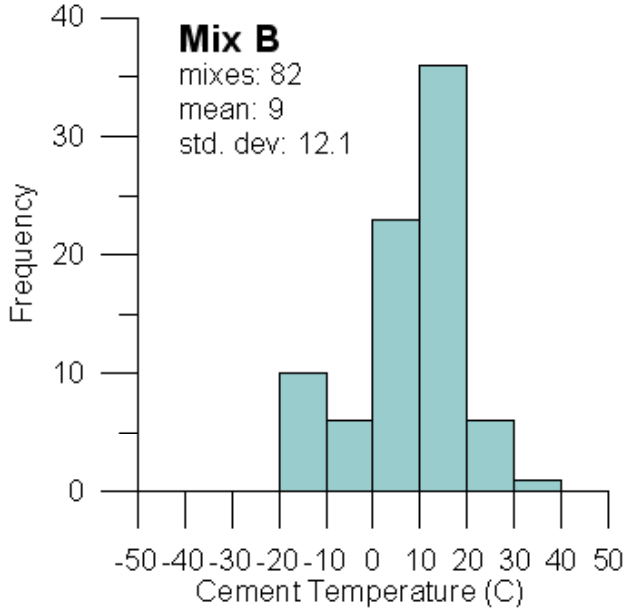
SPECIFIC GRAVITY RESULTS

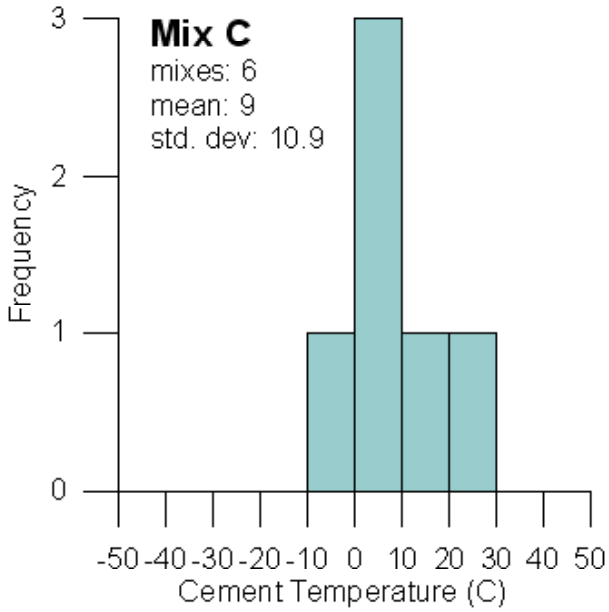
Golder Associates

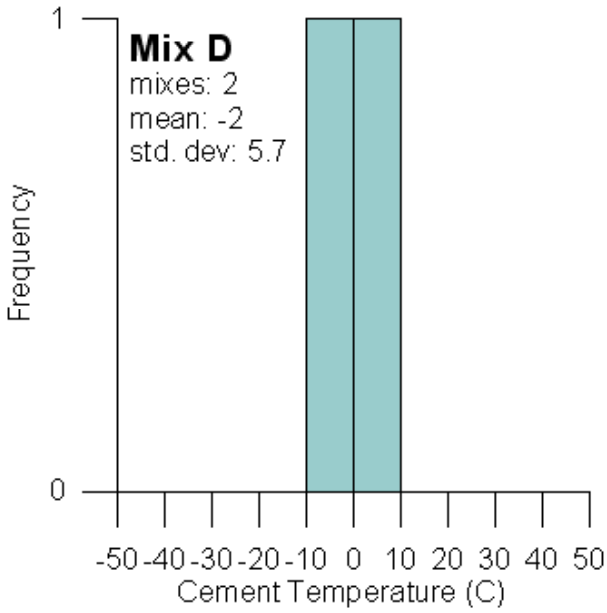
PROJECT No. 07-1413-0074			PHASE / TASK No. 2800	
DESIGN	VTR	22MAY09	SCALE NTS	REV. 0
CADD	VTR	22MAY09		
CHECK	GRB	22MAY09		
REVIEW				

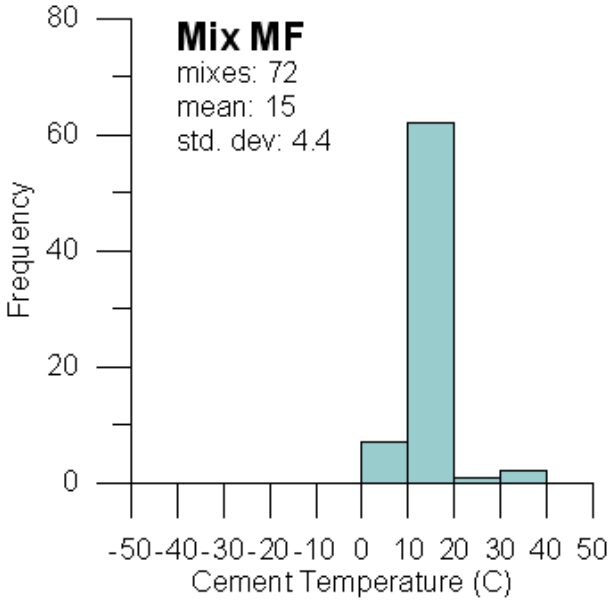
FIGURE E4-3











PROJECT

AEM

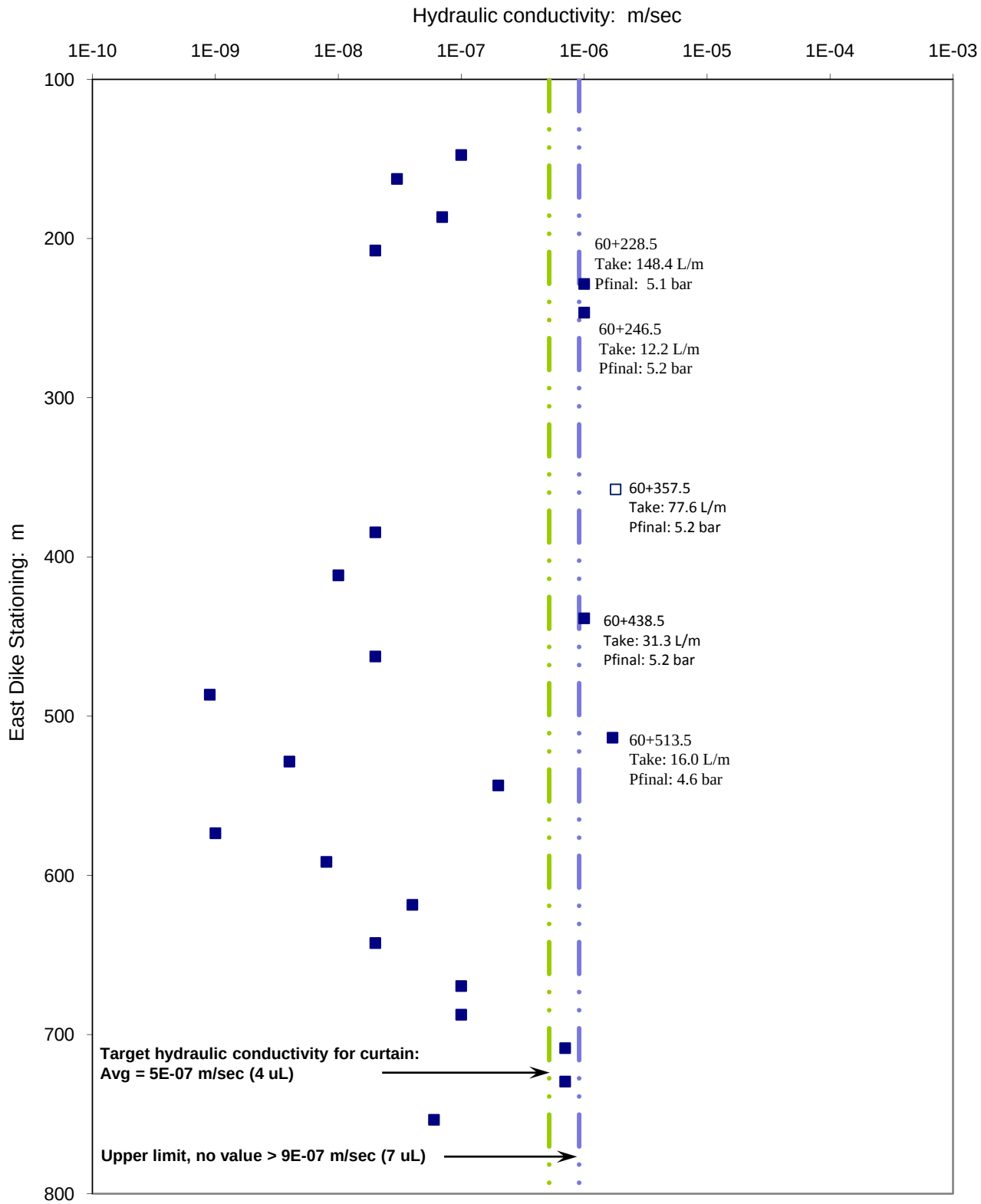
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

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

AEM

AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE

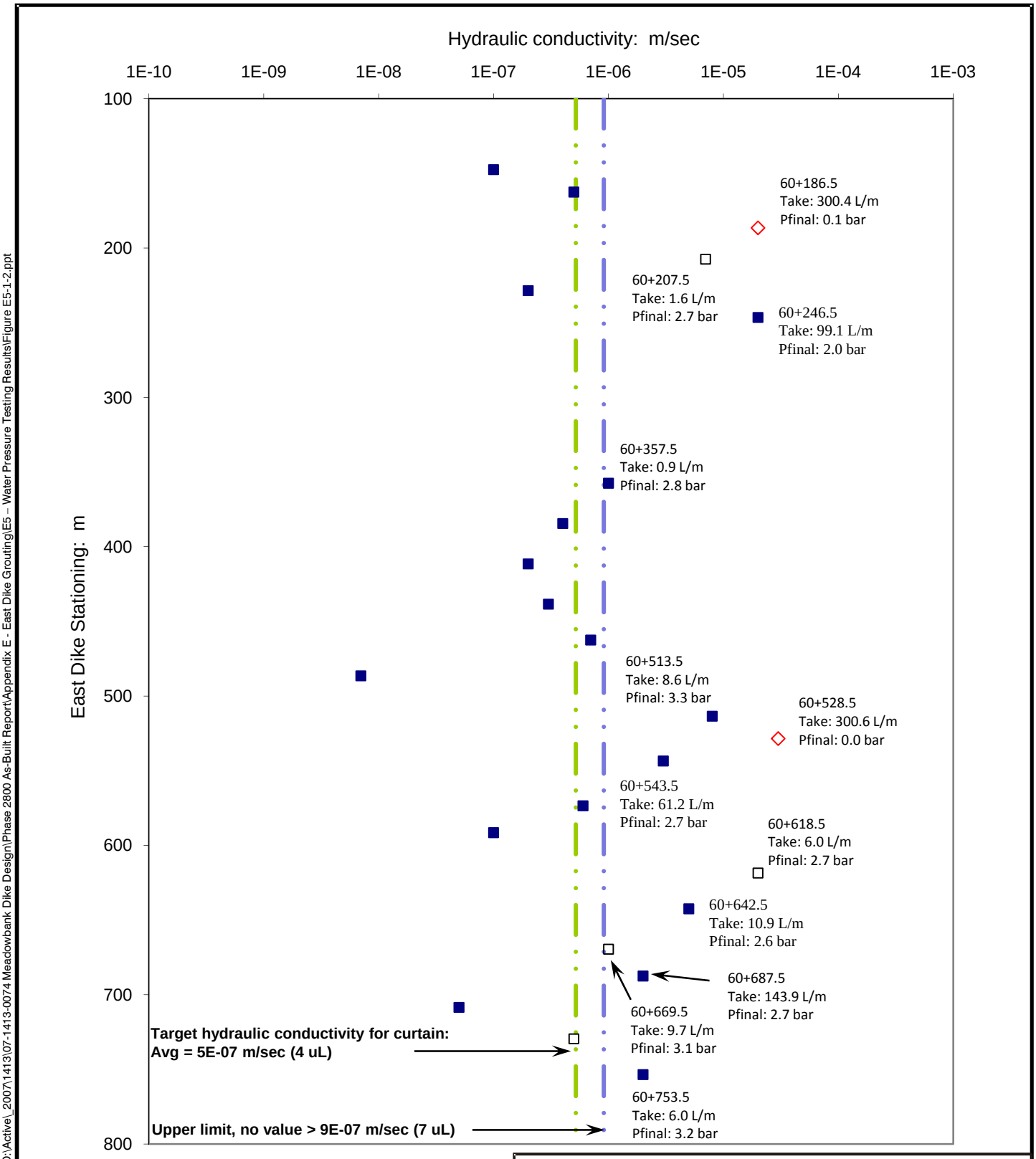
WATER PRESSURE TEST RESULTS STAGE 1

Golder Associates

PROJECT No. 07-1413-0074			PHASE / TASK No.	
DESIGN	GRB	01JUN09	SCALE NTS	REV.
CADD	VTR	01JUN09		
CHECK	GRB	01JUN09		
REVIEW				

FIGURE E5-1

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

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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		
CHECK	GRB	01JUN09		
REVIEW				

FIGURE E5-2

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

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		Approx. Depth b.c.		Water Table Depth (m)	Analysis	Stage	Lugeons	Hydraulic Conductivity	Final Mix	Final Volume	Final Pressure	Final Penetrability	Final Flow Rate	
				From (m)	To (m)	From (m)	To (m)				(uL)	(m/sec)	(type)	(L)	(bar)	(L/min/m/bar)	(L/min)	
Tertiary	60+147.5	Bedrock	23-Jan-09	13.2 10.7	20.2 13.2	3 0.5	10 3	3.05 3.05	Laminar Laminar	1 2	0.8 1	1.0E-07 1.0E-07	A A	27.4 78.9	5.2 2.8	0.02 0.04	0.6 0.3	
	60+162.5	Bedrock	24-Jan-09	13 10.5	26 13	3 0.5	10 3	3.5 3.5	Low Flow Dilation	1 2	0.2 5	3.0E-08 5.0E-07	A A	14.6 11.8	5.1 2.3	0.02 0.08	0.8 0.5	
	60+186.5	Bedrock	25-Jan-09	13.2 10.7	20.2 13.2	3 0.5	10 3	3.3 3.3	Laminar Washout	1 2	0.5 238	7.0E-08 2.0E-05	A B	6.5 750.9	5.4 0.1	0.01 92.8	0.5 15.7	
	60+207.5	Bedrock	26-Jan-09	12.3 9.8	19.3 12.3	3 0.5	10 3	3.5 3.5	Low Flow Washout	1 2	0.2 71	2.0E-08 7.0E-06	A A	11 4.1	5.2 2.7	0.01 0.02	0.4 0.2	
	60+228.5	Bedrock	26-Jan-09	12 9.5	19 12	3 0.5	10 3	10.7 10.7	Laminar Dilation	1 2	8 1	1.0E-06 2.0E-07	B A	1039 3.1	5.1 3	0.03 0.06	0 0.4	
	60+246.5	Bedrock	21-Jan-09	10.4 7.9	17.4 10.7	3 0.5	10 3	2.6 2.6	Turbulent Turbulent	1 2	9 157	1.0E-06 2.0E-05	A A	85.1 277.5	5.2 2.8	0.03 0.05	1.2 0.3	
	60+357.5	Bedrock	9-Jan-09	12.6 8.1	17.6 17.6	3 0.5	10 3	2.73 2.73	Washout Turbulent	1 2	15 7	1.8E-06 1.0E-06	A A	388.1 8.5	5.2 2.8	0.03 0.05	1.2 0.3	
	60+384.5	Bedrock	9-Jan-09	12.56 10.4	19.9 13.2	3 0.5	10 3	2.8 2.8	Low Flow Laminar	1 2	0.1 4	2.0E-08 4.0E-07	A A	2.5 307.8	5.3 3.0	0.01 0.01	0 0.1	
	60+411.5	Bedrock	10-Jan-09	13.2 10.7	20.2 13.5	3 0.5	10 3	2.6 2.6	Low Flow Laminar	1 2	0.1 2	1.0E-08 2.0E-07	A A	7.3 33.2	5.4 2.9	0.01 0.06	0.3 0.4	
	60+438.5	Bedrock	16-Jan-09	15.1 12.6	22.1 15.4	3 0.5	10 3	2.78 2.78	Turbulent Turbulent	1 2	8 3	1.0E-06 3.0E-07	A A	219.3 24	5.2 2.9	0.05 0.04	1.8 0.3	
	60+462.5	Bedrock	14-Jan-09	14 11.5	20 14.3	3 0.5	10 3	2.6 2.6	Low Flow Laminar	1 2	0.1 7	2.0E-08 7.0E-07	A A	10.5 72	5.0 2.8	0.02 0.08	0.8 0.5	
	60+486.5	Bedrock	15-Jan-09	17 14.5	24 17	3 0.5	10 3	2.56 2.56	Low Flow Low Flow	1 2	0 0.1	9.0E-10 7.0E-09	A A	2.6 6	5.3 2.9	0 0.02	0.1 0.2	
	60+513.5	Bedrock	18-Jan-09	12.7 10.3	19.8 12.8	3 0.5	10 3	2.9 2.9	Turbulent Turbulent	1 2	13 72	1.7E-06 8.0E-06	A A	113.3 21.5	4.6 3.31	0.01 0.03	0.5 0.3	
	60+528.5	Bedrock	28-Jan-09	11.9 9.4	18.9 11.9	3 0.5	10 3	2.6 2.6	Low Flow/No Flow Washout	1 2	0 243	4.0E-09 3.0E-05	A A	2.7 751.6	5.4 0	0.01 Infinity	0.2 12.8	
	60+543.5	Bedrock	29-Jan-09	11.9 9.4	18.9 11.9	3 0.5	10 3	3.2 3.2	Laminar Turbulent	1 2	1 29	2.0E-07 3.0E-06	A A	90.3 153	5.0 2.7	0 0.02	0.1 0.1	
	60+573.5	Bedrock	29-Jan-09	12.6 9.6	19.6 12.6	3 0.5	10 3	3.1 3.1	Low Flow Washout	1 2	0.0 6	1.0E-09 6.0E-07	A A	8 10.6	5.4 3	0 0	0.1 0	
	60+591.5	Bedrock	29-Jan-09	11 8	18 11	3 0.5	10 3	2.14 2.14	Low Flow Dilation	1 2	0.1 0.9	8.0E-09 1.0E-07	A A	6.2 7.7	5.4 3.4	0 0.02	0.1 0.2	
	60+618.5	Bedrock	28-Jan-09	10.7 8.2	17.7 10.7	3 0.5	10 3	2.82 2.82	Laminar Washout	1 2	0.3 205	4.0E-08 2.0E-05	A A	2.3 15	5.0 2.7	0 0.04	0 0.3	
	60+642.5	Bedrock	27-Jan-09	11.5 8.5	18.5 11.5	3 0.5	10 3	2.3 2.3	Dialation Void Filling	1 2	0.1 47	2.0E-08 5.0E-06	A A	3.6 32.6	4.5 2.6	0 0	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 9.3	18.8 11.8	3 0.5	10 3	2.1 2.1	Laminar Washout	1 2	0.7 11	1.0E-07 1.0E-06	A A	21.4 24.2	5.0 3.1	0.01 0.01	0.4 0.1	
	60+687.5	Bedrock	24-Jan-09	11.4 8.9	18.4 11.4	3 0.5	10 3	3.39 3.39	Laminar Turbulent	1 2	1 18	1.0E-07 2.0E-06	A A	1147 359.8	5 2.7	0.09 0.08	3.3 1.2	
	60+708.5	Bedrock	23-Jan-09	11.6 9.1	18.6 11.6	3 0.5	10 3	2.62 2.62	Turbulent Low Flow	1 2	6 0.5	7.0E-07 5.0E-08	A A	93 139	5 2.9	0.03 0.08	1.1 0.6	
	60+729.5	Bedrock	21-Jan-09	11.1 8.6	18.1 11.4	3 0.5	10 3	3.2 3.2	Laminar Washout	1 2	5 4	7.0E-07 5.0E-07	A A	54.5 32.9	6.5 2.6	0.02 0.05	1 0.3	
	60+753.5	Bedrock	18-Jan-09	8.6 6.1	16.9 8.9	3 0.5	10 3	3.1 3.1	Low Flow Dilation	1 2	0.4 15	6.0E-08 2.0E-06	A A	4.4 16.9	5.0 3.2	0.01 0.05	0.2 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

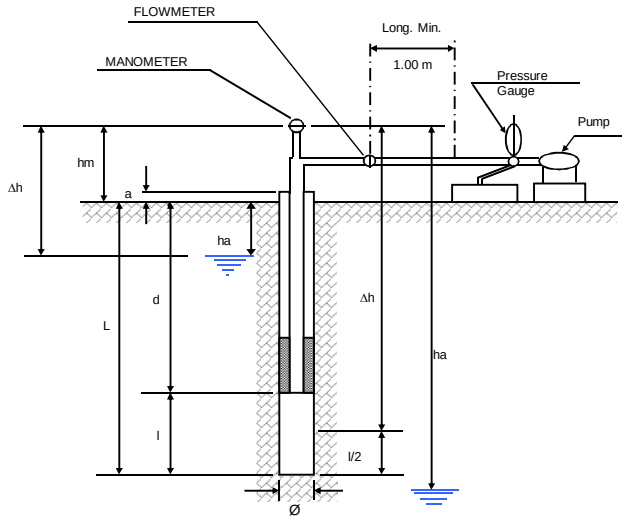
NOTE: 1) b.g.s: below ground surface
2) b.c: below casing

CHECK: GRB

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

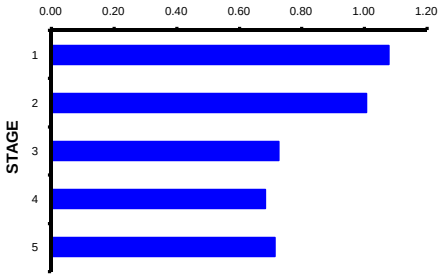
HOLE Nº	60+147.5	**TEST Nº**	1	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	13.20 **TO** 20.20 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	23/01/2009 **START:** 22:30 **FINISH:** 23:08	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 38	**GROUND 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	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



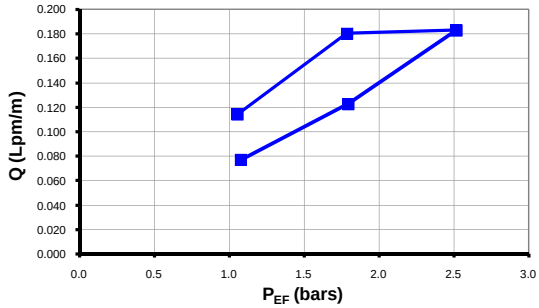
SELECTED LUGEON UNIT : 0.8 **uL**

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

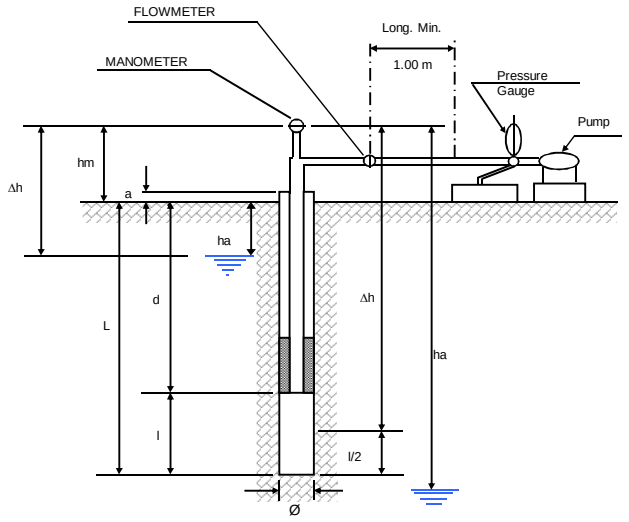
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

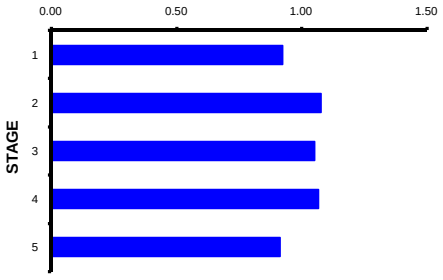
HOLE Nº	60+147.5	**TEST Nº**	2	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	10.70 **TO** 13.20 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	23/01/2009 **START:** *23:38* **FINISH:** *0:19*	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 41	**GROUND 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})		

	Bars		Bars		Bars		Bars		Bars	
	1/3P_M =	0.38	2/3P_M =	0.79	P_M =	1.20	2/3P_M =	0.80	1/3P_M =	0.39
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		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



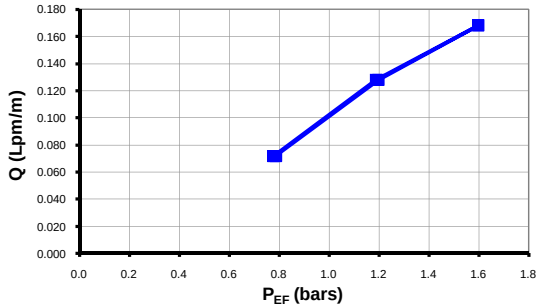
SELECTED LUGEON UNIT : 1.0 **uL**

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

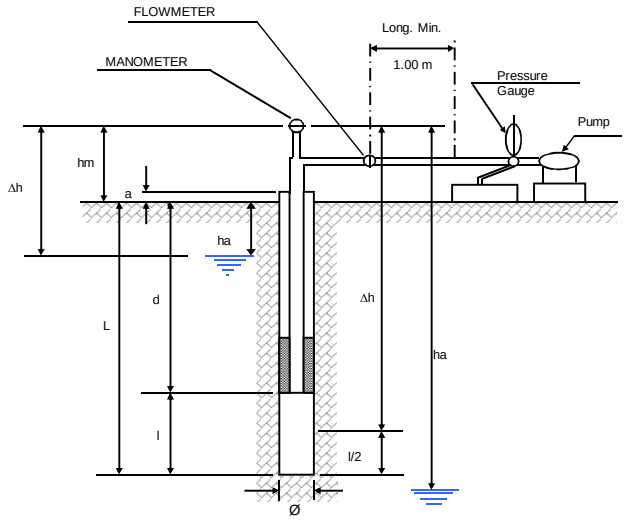
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

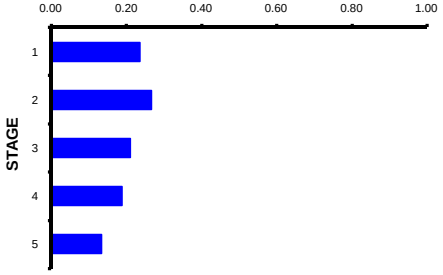
HOLE Nº	60+162.5	**TEST Nº**	1	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	13.0 **TO** 26.0 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	24/01/2009 **START:** 15:07 **FINISH:** 15:50	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 43	**GROUND LEVEL:** (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	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 =	**Bars** 0.87	**2/3P_M =**	**Bars** 1.41	**P_M =**	**Bars** 2.12	**2/3P_M =**	**Bars** 1.45	**1/3P_M =**	**Bars** 0.72
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

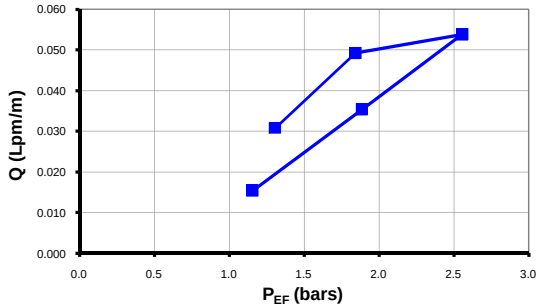


SELECTED LUGEON UNIT : 0.2 **uL**

K (PERMEABILITY) : 3E-08 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ $\quad uL = Pent\ (L/min/m) \times 10 / P_{EF}\ (bars)$ $\quad K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Low flow

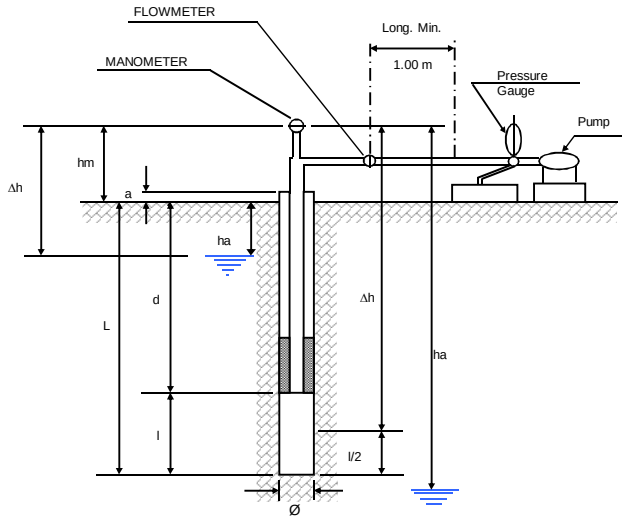
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

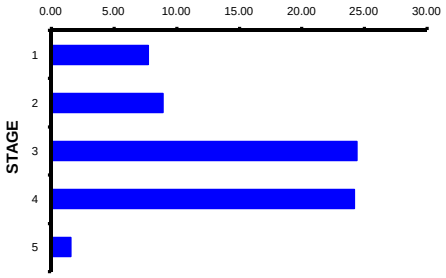
HOLE Nº	60+162.5	**TEST Nº**	2	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	10.50 **TO** 13.00 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	24/01/2009 **START:** 16:01 **FINISH:** 16:40	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 39	**GROUND 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})		

	Bars		Bars		Bars		Bars		Bars
	1/3P_M =	0.40	2/3P_M =	0.84	P_M =	1.20	2/3P_M =	0.80	1/3P_M =	0.39
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



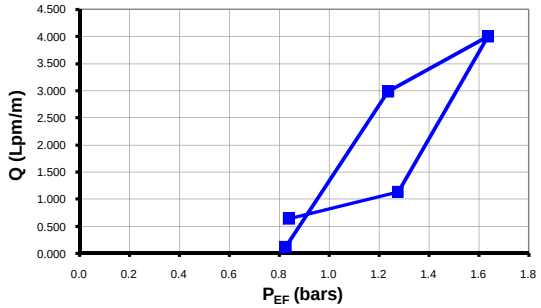
SELECTED LUGEON UNIT : 4.6 **uL**

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

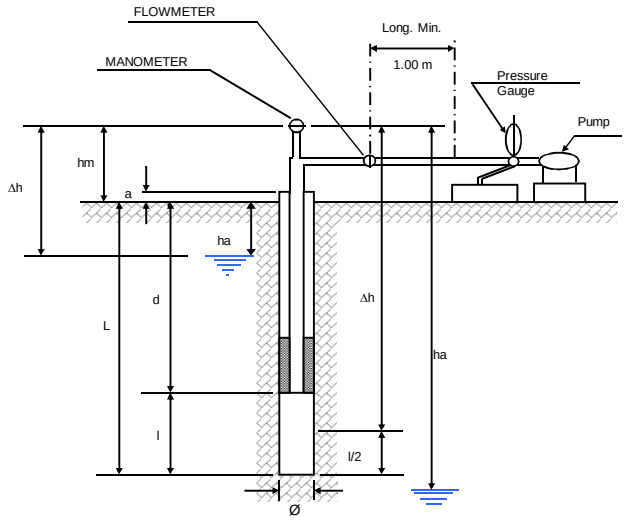
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

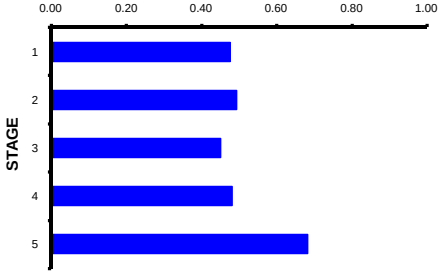
HOLE Nº	60+186.5	**TEST Nº**	1	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	13.20 **TO** 20.20 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	25/01/2009 **START:** *15:45* **FINISH:** *16:18*	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 33	**GROUND LEVEL:** (m.s.n.m.)	
		INTERVAL LITHOLOGY :			



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})		

	Bars		Bars		Bars		Bars		Bars	
	1/3P_M =	0.70	**2/3P_M =**	1.41	**P_M =**	2.10	**2/3P_M =**	1.40	**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	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

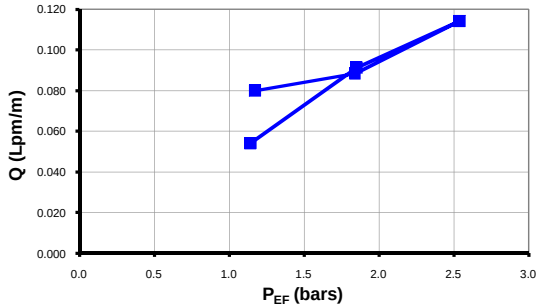


SELECTED LUGEON UNIT : 0.5 **uL**

K (PERMEABILITY) : 7E-08 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ $\quad uL = Pent\ (L/min/m) \times 10 / P_{EF}\ (bars)$ $\quad K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Laminar

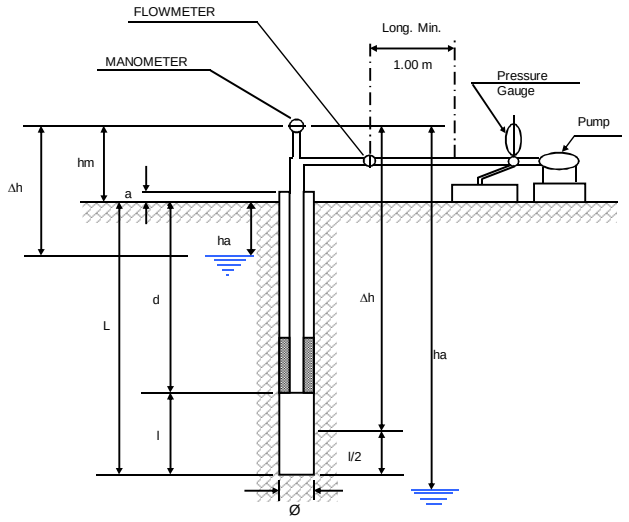
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

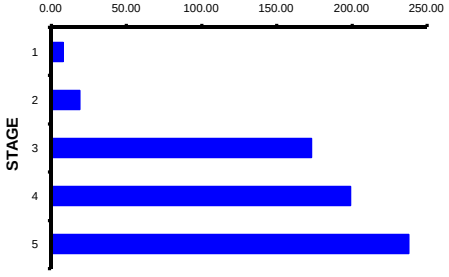
HOLE Nº	60+186.5	**TEST Nº**	2	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	10.70 **TO** 13.20 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	25/01/2009 **START:** 16:36 **FINISH:** 17:16	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 40	**GROUND 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})		

	Bars		Bars		Bars		Bars		Bars
	1/3P_M =	0.40	**2/3P_M =**	0.80	**P_M =**	1.18	**2/3P_M =**	0.81	**1/3P_M =**	0.41
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



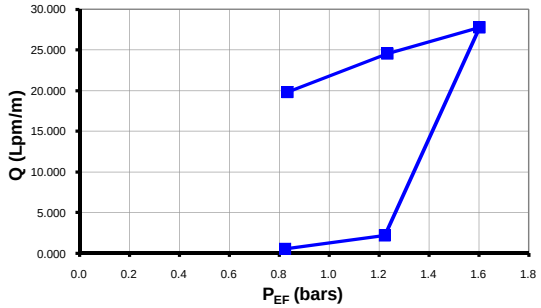
SELECTED LUGEON UNIT : 238 **uL**

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

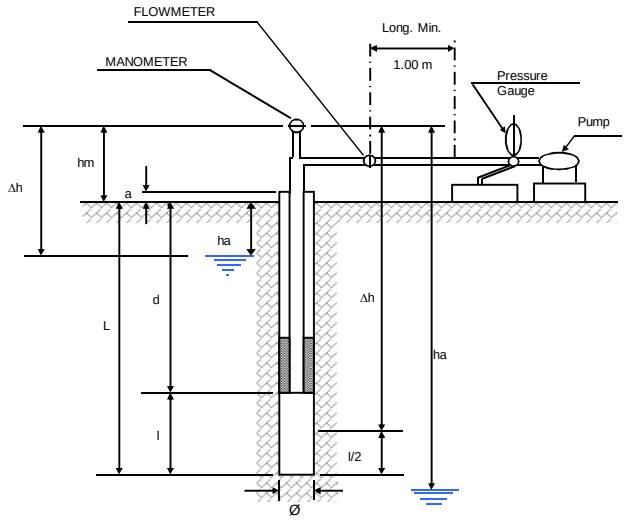
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

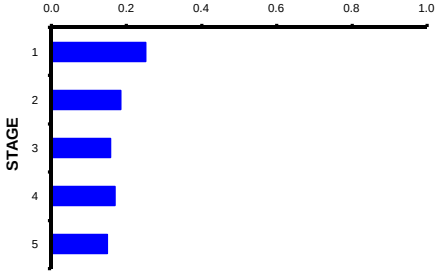
HOLE Nº	60+207.5	**TEST Nº**	1	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	12.30 **TO** 19.30 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	26/01/2009 **START:** 13:26 **FINISH:** 13:58	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 32	**GROUND 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 = Bars	0.69	2/3P_M = Bars	1.41	P_M = Bars	2.10	2/3P_M = Bars	1.41	1/3P_M = Bars	0.71
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



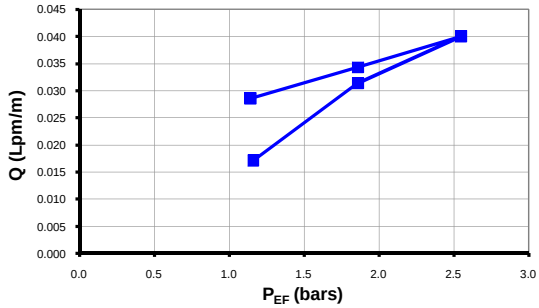
SELECTED LUGEON UNIT : 0.2 **uL**

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)**

$$K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Low Flow

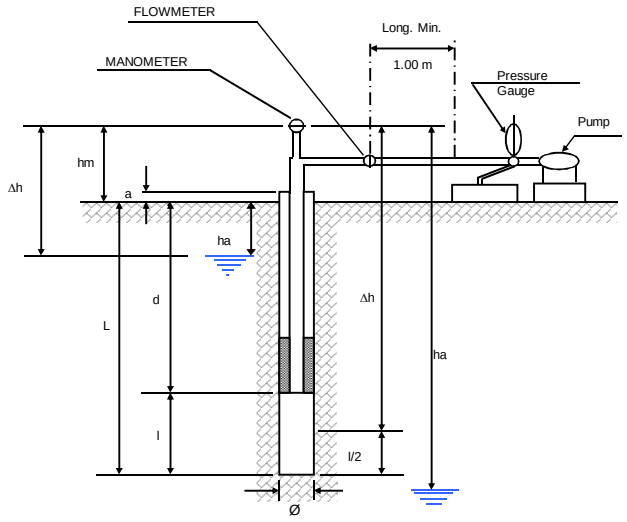
VTR Analysis

GRB Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

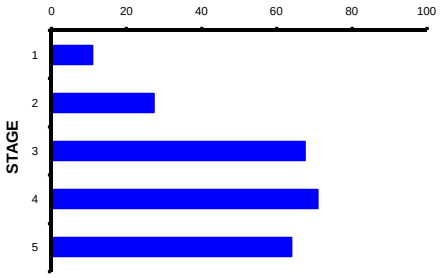
HOLE Nº	60+207.5	**TEST Nº**	2	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	9.80 **TO** 12.30 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	26/01/2009 **START:** *14:21* **FINISH:** *14:52*	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 31	**GROUND LEVEL:** (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	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})		

		Bars		Bars		Bars		Bars		Bars
	1/3P_M =	0.39	**2/3P_M =**	0.78	**P_M =**	1.18	**2/3P_M =**	0.81	**1/3P_M =**	0.41
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

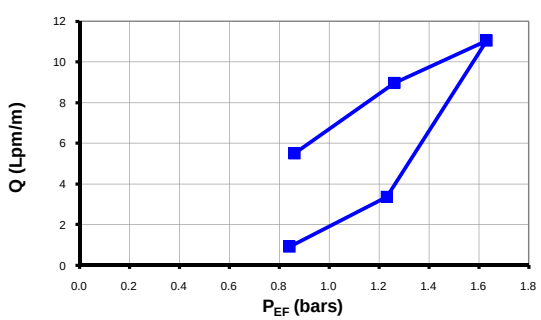


SELECTED LUGEON UNIT : 71 **uL**

K (PERMEABILITY) : 7E-06 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ $\quad uL = Pent\ (L/min/m) \times 10 / P_{EF}\ (bars)$ $\quad K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Washout

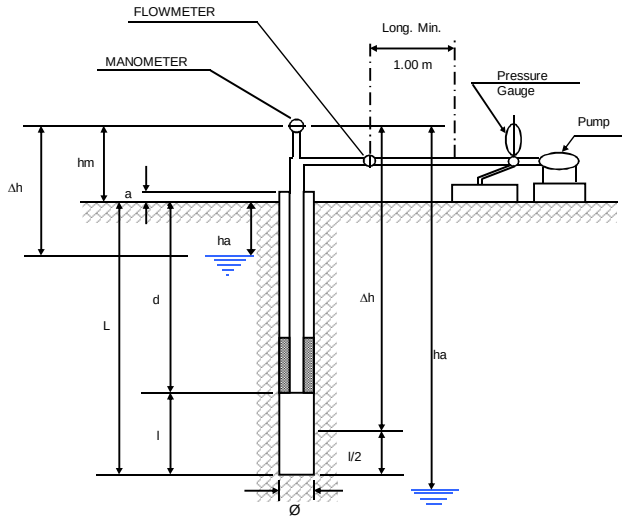
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

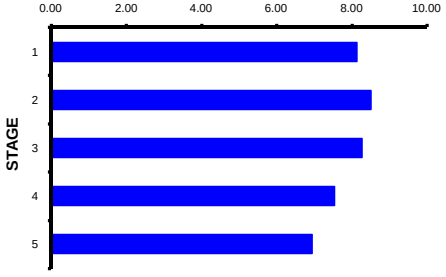
HOLE Nº	60+228.5	**TEST Nº**	1	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	12.00 **TO** 19.00 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	26/01/2009 **START:** 4:23 **FINISH:** 4:55	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 32	**GROUND LEVEL:** (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	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})		

	Bars		Bars		Bars		Bars		Bars	
	1/3P_M =	0.73	2/3P_M =	1.41	P_M =	2.12	2/3P_M =	1.41	1/3P_M =	0.70
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



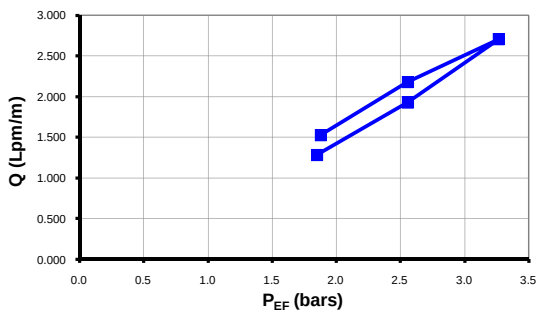
SELECTED LUGEON UNIT : 7.9 **uL**

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

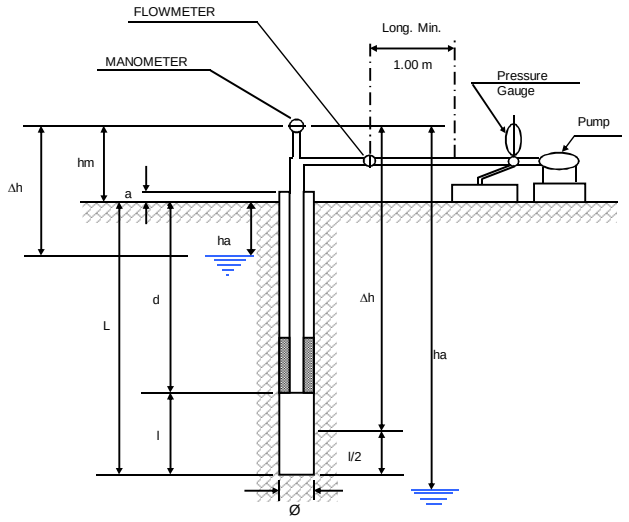
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

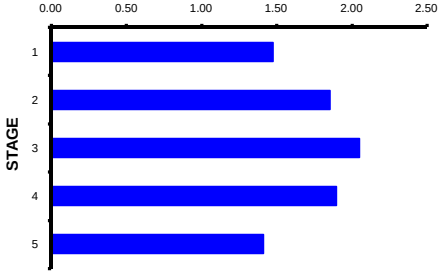
HOLE Nº	60+228.5	**TEST Nº**	2	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	9.50 **TO** 12.00 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	26/01/2009 **START:** 5:14 **FINISH:** 5:48	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 34	**GROUND LEVEL:** (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})		

	Bars		Bars		Bars		Bars		Bars
	1/3P_M =	0.37	2/3P_M =	0.79	P_M =	1.19	2/3P_M =	0.79	1/3P_M =	0.38
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

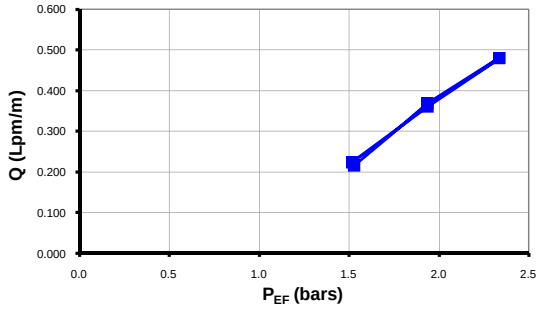


SELECTED LUGEON UNIT : 1.4 **uL**

K (PERMEABILITY) : 2E-07 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ $\quad uL = Pent\ (L/min/m) \times 10 / P_{EF}\ (bars)$ $\quad K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Dilation

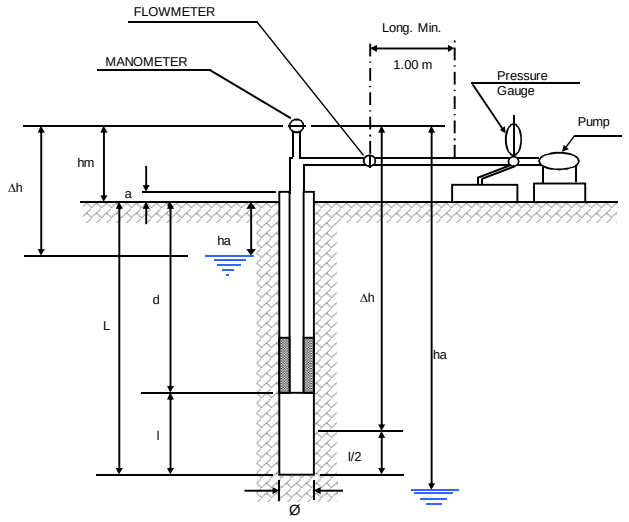
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

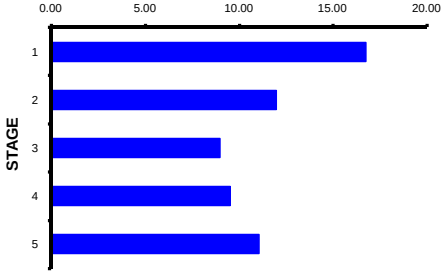
HOLE Nº	60+246.5	**TEST Nº**	1	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	10.40 **TO** 17.40 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	21/01/2009 **START:** 20:45 **FINISH:** 21:20	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 35	**GROUND 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 =	Bars 0.71	2/3P_M =	Bars 1.41	P_M =	Bars 2.12	2/3P_M =	Bars 1.40	1/3P_M =	Bars 0.71
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



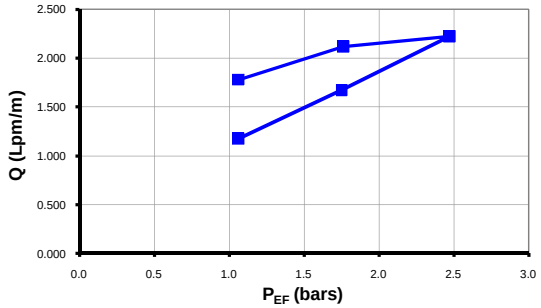
SELECTED LUGEON UNIT : 9.0 **uL**

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

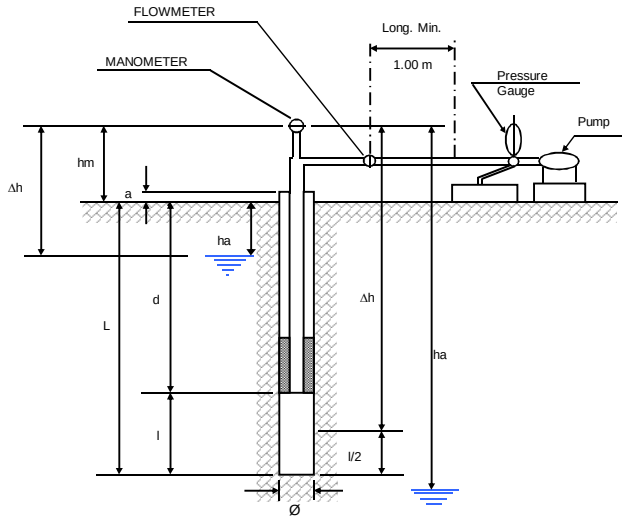
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

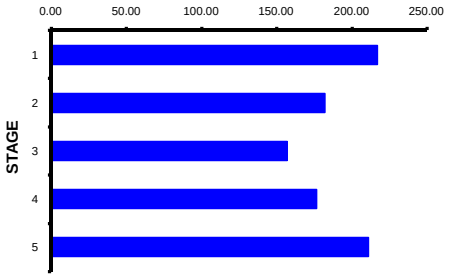
HOLE Nº	60+246.5	**TEST Nº**	2	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	7.90 **TO** 10.70 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	21/01/2009 **START:** 23:30 **FINISH:** 23:35	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 5	**GROUND 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})		

		Bars		Bars		Bars		Bars		Bars
	1/3P_M =	0.39	2/3P_M =	0.80	P_M =	1.20	2/3P_M =	0.80	1/3P_M =	0.40
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	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



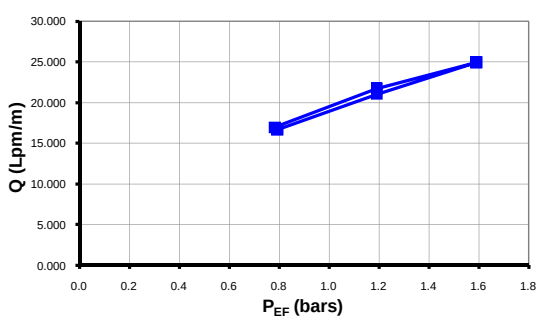
SELECTED LUGEON UNIT : 157 **uL**

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

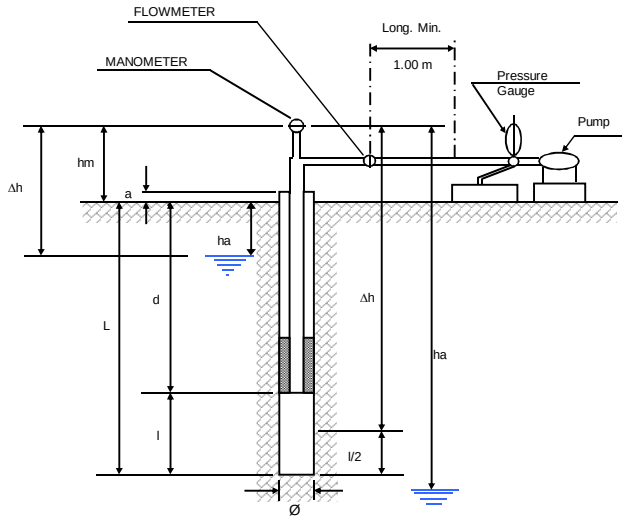
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

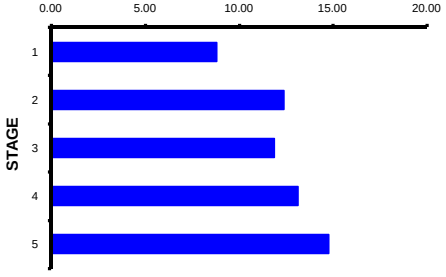
HOLE Nº	60+357.5	**TEST Nº**	1	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	12.60 **TO** 17.60 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	09/01/2009 **START:** 4:10 **FINISH:** 4:51	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 41	**GROUND 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})		

		Bars		Bars		Bars		Bars		Bars
	$1/3P_M$ =	0.90	$2/3P_M$ =	1.60	P_M =	2.40	$2/3P_M$ =	1.50	$1/3P_M$ =	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	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
uL



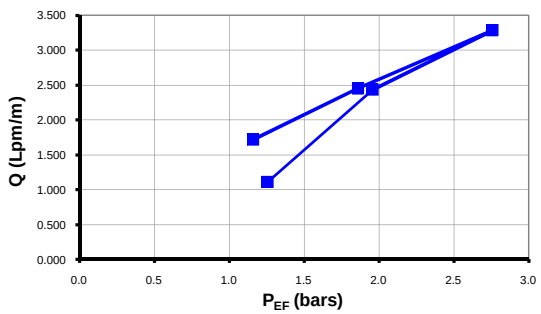
SELECTED LUGEON UNIT : 14.79 **uL**

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

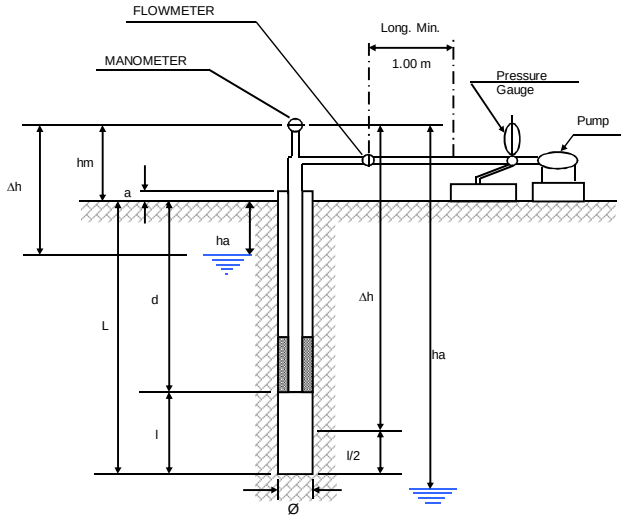
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

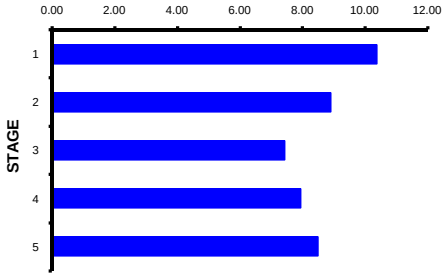
HOLE Nº	60+357.5	**TEST Nº**	2	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	8.10 **TO** 17.60 m.	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	09/01/2009 **START:** 5:07 **FINISH:** 5:41	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 34	**GROUND LEVEL:** (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})		

	Bars		Bars		Bars		Bars		Bars	
	1/3P_M =	0.80	2/3P_M =	1.20	P_M =	2.00	2/3P_M =	1.30	1/3P_M =	0.70
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

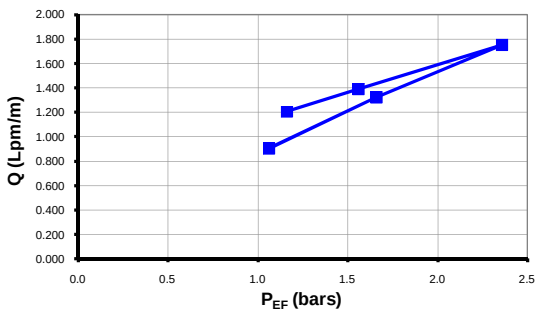


SELECTED LUGEON UNIT : 7.4 uL

K (PERMEABILITY) : 1E-06 m/s

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ $\quad uL = Pent\ (L/min/m) \times 10 / P_{EF}\ (bars)$ $\quad K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$

GRAPHICAL REPRESENTATION



OBSERVATIONS: turbulent

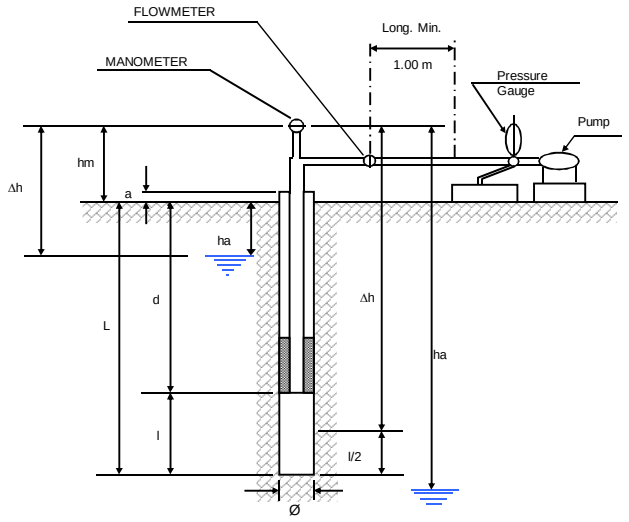
VTR Analysis

GRB Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

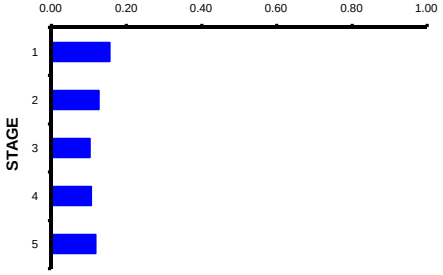
HOLE Nº	60+384.5	**TEST Nº**	1	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	12.56 **TO** 19.90 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	09/01/2009 **START:** 15:05 **FINISH:** 15:38	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 33	**GROUND 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



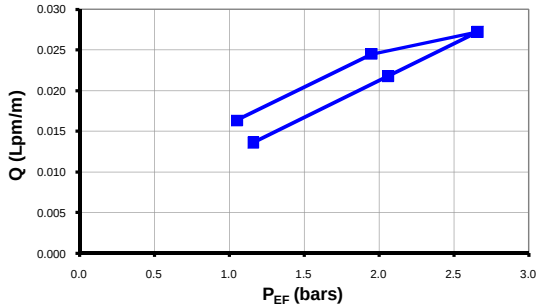
SELECTED LUGEON UNIT : 0.1 **uL**

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

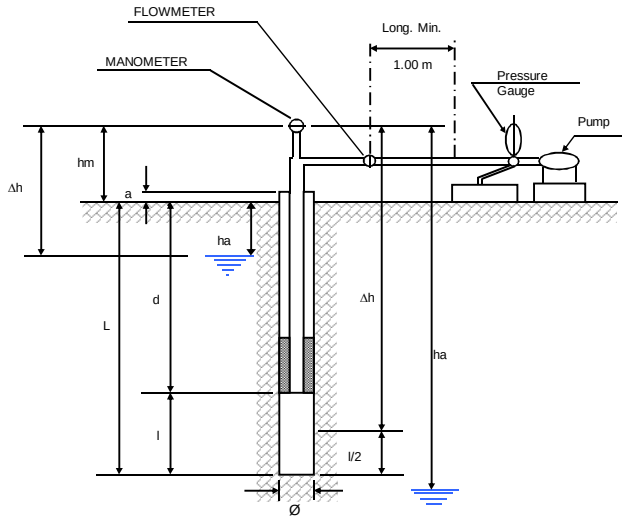
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

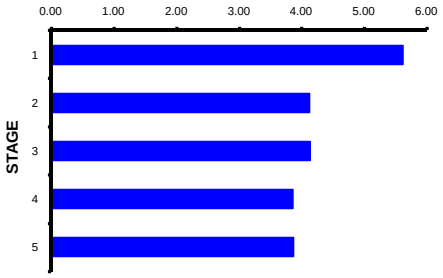
HOLE Nº	60+384.5	**TEST Nº**	2	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	10.40 **TO** 13.20 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	09/01/2009 **START:** 16:14 **FINISH:** 16:57	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 43	**GROUND 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})		

	Bars		Bars		Bars		Bars		Bars	
	1/3P_M =	0.57	2/3P_M =	0.95	P_M =	1.38	2/3P_M =	0.95	1/3P_M =	0.54
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

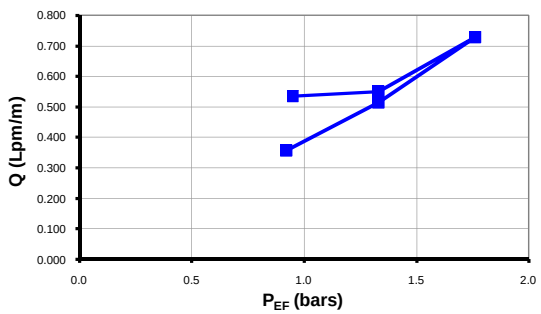


SELECTED LUGEON UNIT : 4.0 **uL**

K (PERMEABILITY) : 4E-07 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ $\quad uL = Pent\ (L/min/m) \times 10 / P_{EF}\ (bars)$ $\quad K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$

GRAPHICAL REPRESENTATION



OBSERVATIONS: laminar

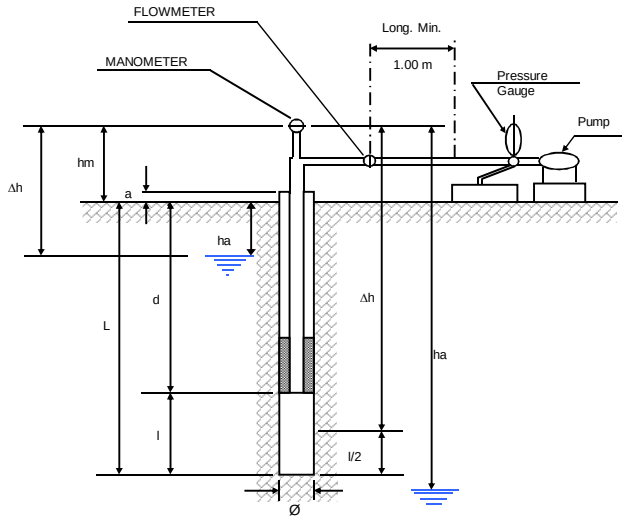
VTR Analysis

GRB Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

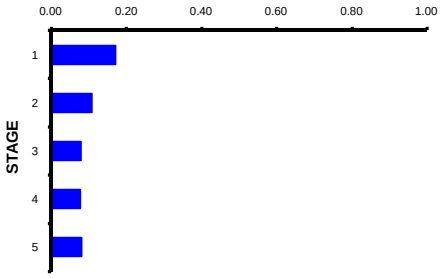
HOLE Nº	60+411.5	**TEST Nº**	1	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	13.20 **TO** 20.20 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	10/01/2009 **START:** *23:11* **FINISH:** *23:46*	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 35	**GROUND 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 =	Bars 0.65	2/3P_M =	Bars 1.50	P_M =	Bars 2.20	2/3P_M =	Bars 1.50	1/3P_M =	Bars 0.70
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

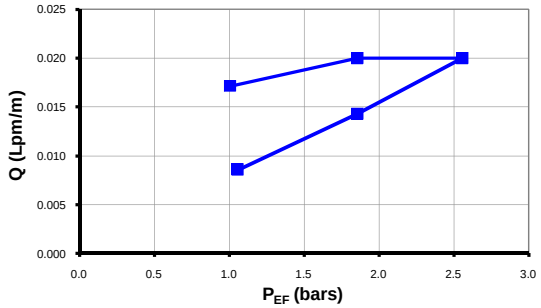


SELECTED LUGEON UNIT : 0.1 **uL**

K (PERMEABILITY) : 1E-08 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ $\quad uL = Pent\ (L/min/m) \times 10 / P_{EF}\ (bars)$ $\quad K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$

GRAPHICAL REPRESENTATION



OBSERVATIONS: low flow

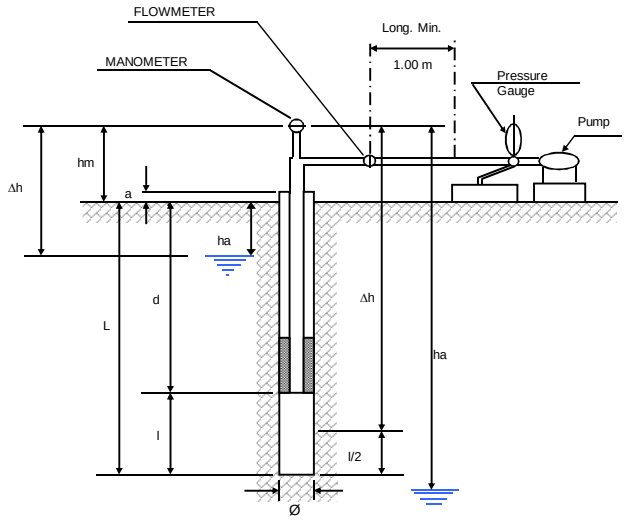
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

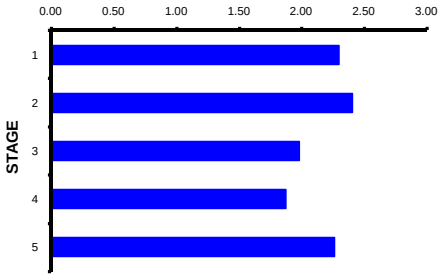
HOLE Nº	60+411.5	**TEST Nº**	2	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	10.70 **TO** 13.50 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	10/01/2009 **START:** *0:22* **FINISH:** *0:55*	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 33	**GROUND 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})		

	Bars		Bars		Bars		Bars		Bars	
	1/3P_M =	0.45	**2/3P_M =**	0.80	**P_M =**	1.30	**2/3P_M =**	0.90	**1/3P_M =**	0.40
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	22.7		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

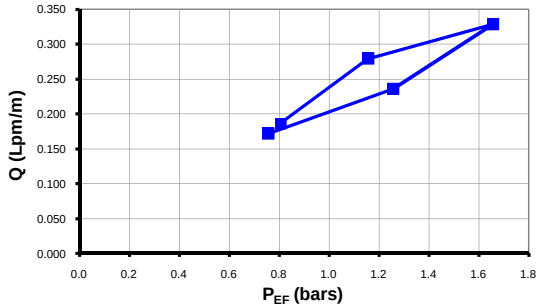


SELECTED LUGEON UNIT : 2.2 **uL**

K (PERMEABILITY) : 2E-07 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ $\quad uL = Pent\ (L/min/m) \times 10 / P_{EF}\ (bars)$ $\quad K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$

GRAPHICAL REPRESENTATION



OBSERVATIONS: laminar

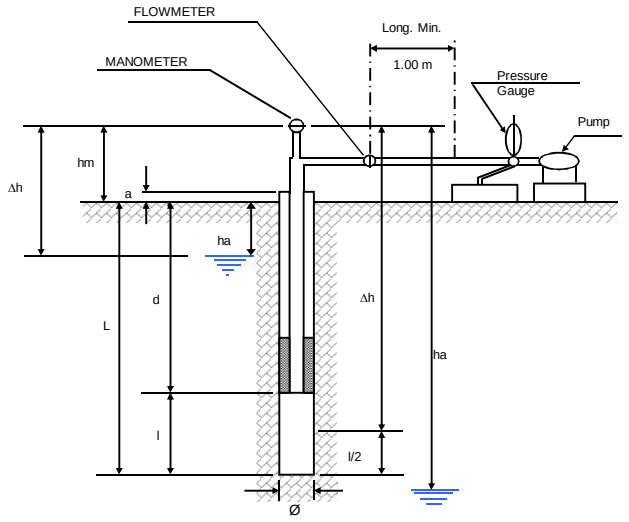
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

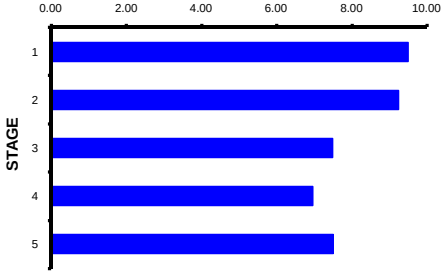
HOLE Nº	60+438.5	**TEST Nº**	1	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	15.10 **TO** 22.10 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	16/01/2009 **START:** 21:00 **FINISH:** 21:45	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 45	**GROUND 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})		

	Bars		Bars		Bars		Bars		Bars	
	1/3P_M =	0.75	2/3P_M =	1.50	P_M =	2.20	2/3P_M =	1.50	1/3P_M =	0.70
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	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



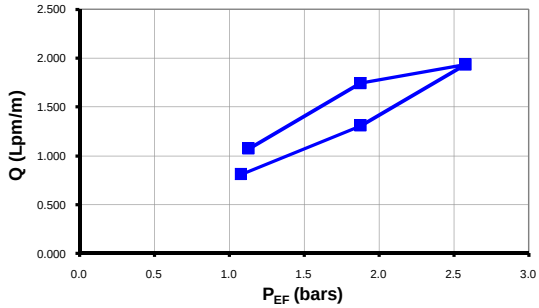
SELECTED LUGEON UNIT : 7.5 **uL**

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

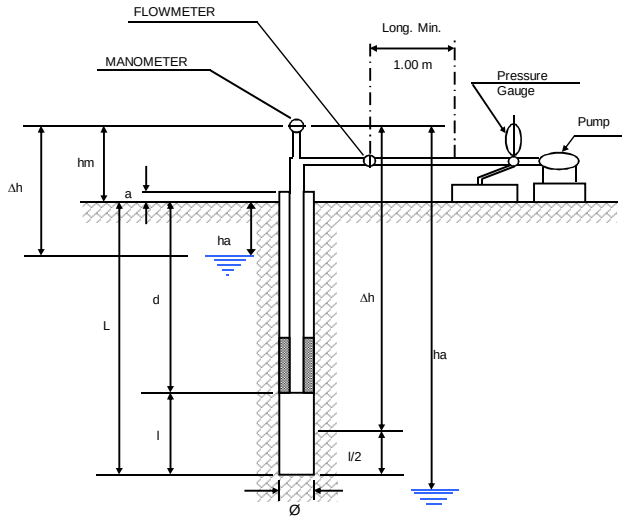
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

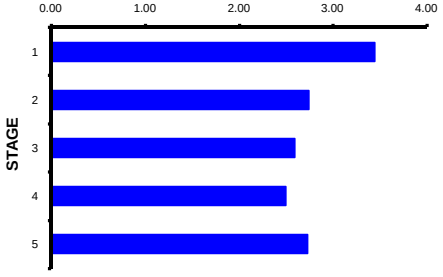
HOLE Nº	60+438.5	**TEST Nº**	2	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	12.60 **TO** 15.40 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	15/01/2009 **START:** 22:50 **FINISH:** 23:25	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 35	**GROUND 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})		

		Bars		Bars		Bars		Bars		Bars
	1/3P_M =	0.32	2/3P_M =	0.97	P_M =	1.38	2/3P_M =	1.02	1/3P_M =	0.43
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



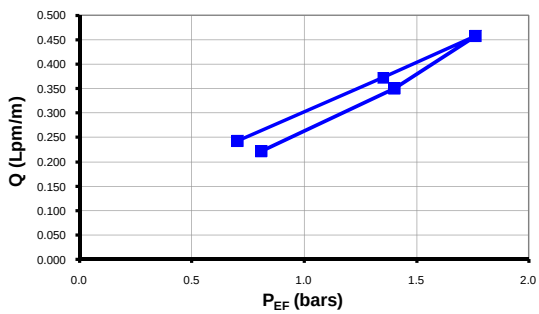
SELECTED LUGEON UNIT : 2.6 **uL**

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

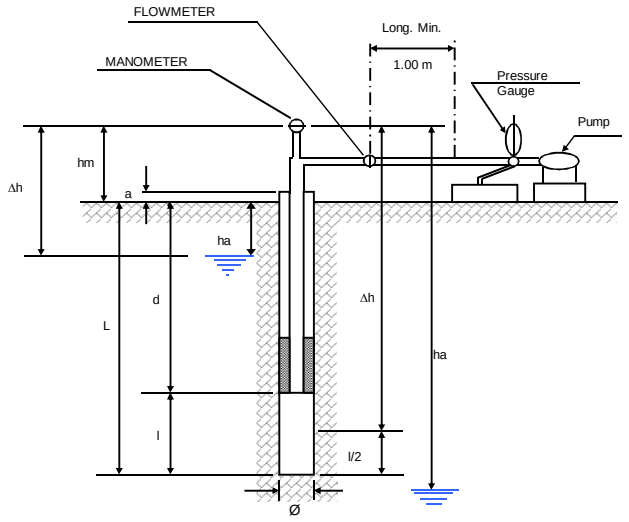
VTR — Analysis

GRB — Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

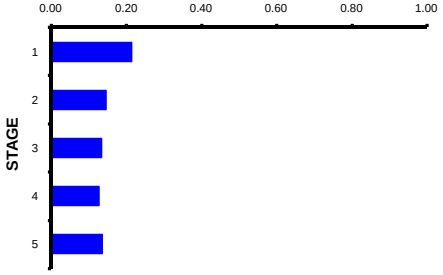
HOLE Nº	60+462.5	**TEST Nº**	1	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	14.00 **TO** 20.00 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	14/01/2009 **START:** *19:45* **FINISH:** *20:@0*	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 255	**GROUND 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 =	Bars 0.60	2/3P_M =	Bars 1.50	P_M =	Bars 2.40	2/3P_M =	Bars 1.50	1/3P_M =	Bars 0.90
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



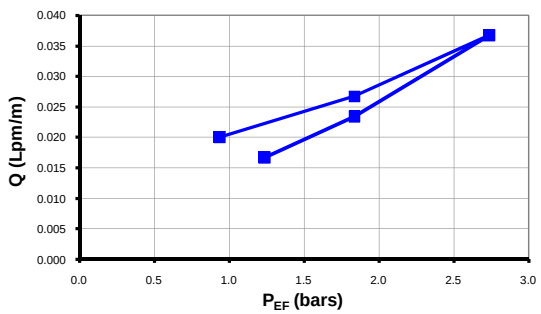
SELECTED LUGEON UNIT : 0.1 **uL**

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

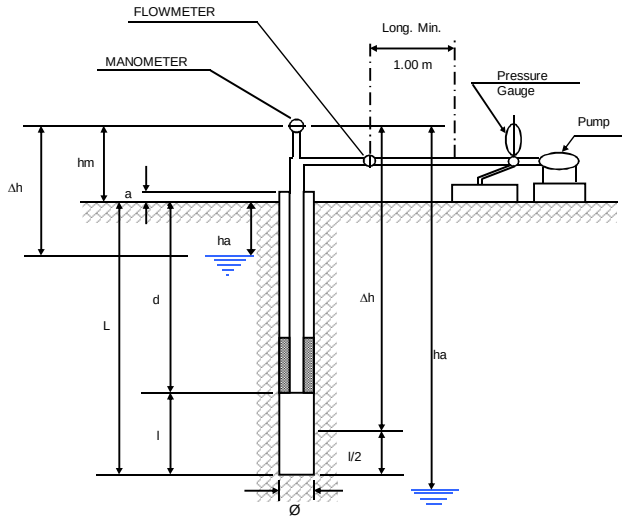
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

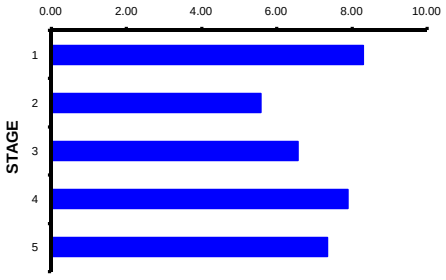
HOLE Nº	60+462.5	**TEST Nº**	2	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	11.50 **TO** 14.30 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	14/01/2009 **START:** 21:05 **FINISH:** 21:43	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 38	**GROUND LEVEL:** (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	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 = Bars 0.40		2/3P_M = Bars 1.30		P_M = Bars 1.50		2/3P_M = Bars 0.80		1/3P_M = Bars 0.40	
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

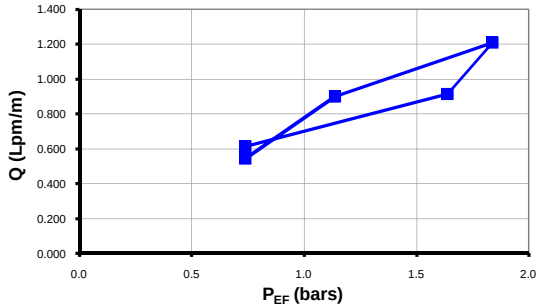


SELECTED LUGEON UNIT : 6.9 **uL**

K (PERMEABILITY) : 7E-07 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ $\quad uL = Pent\ (L/min/m) \times 10 / P_{EF}\ (bars)$ $\quad K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Laminar

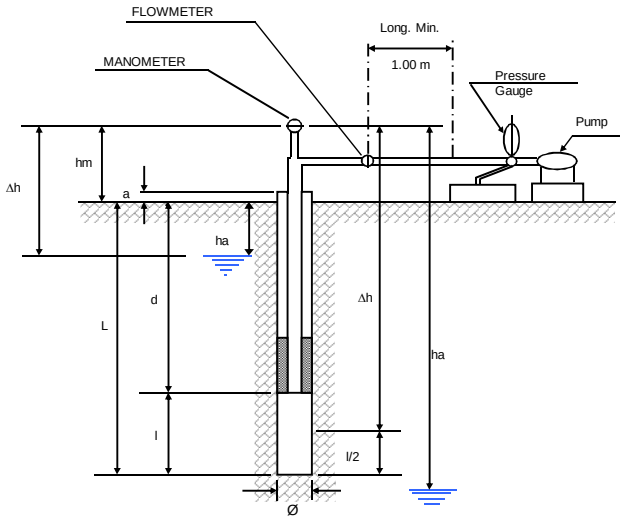
VTR Analysis

GRB Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

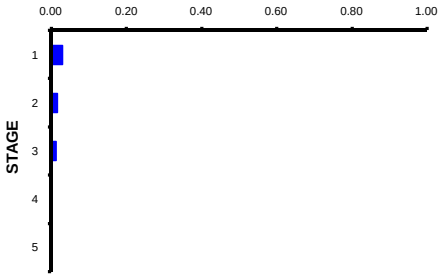
HOLE Nº	60+486.5	**TEST Nº**	1	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	17.00 **TO** 24.00 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	15/01/2009 **START:** 3:43:00 PM **FINISH:** 14:17:00 PM	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 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})		

		Bars		Bars		Bars		Bars		Bars
	1/3P_M =	0.64	2/3P_M =	1.49	P_M =	2.20	2/3P_M =	1.60	1/3P_M =	0.81
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	0.9		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

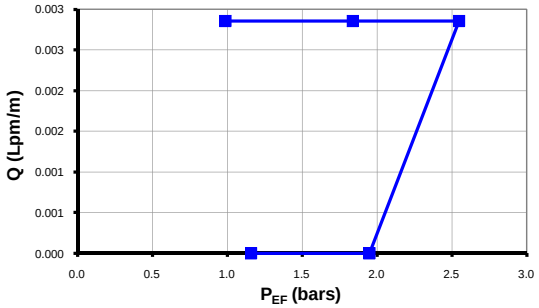


SELECTED LUGEON UNIT : 0.0 **uL**

K (PERMEABILITY) : 9E-10 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ $\quad uL = Pent\ (L/min/m) \times 10 / P_{EF}\ (bars)$ $\quad K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$

GRAPHICAL REPRESENTATION



OBSERVATIONS: low flow

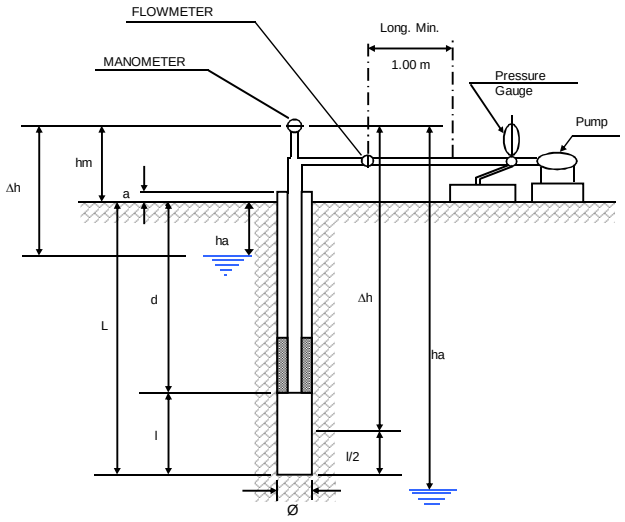
VTR Analysis

GRB Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

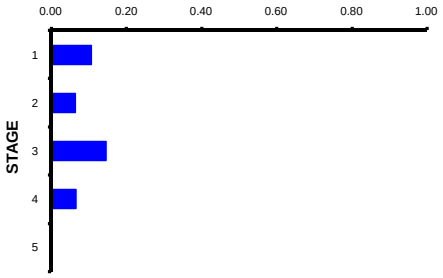
HOLE Nº	60+486.5	**TEST Nº**	2	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	14.50 **TO** 17.00 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	15/01/2009 **START:** 4:44:00 PM **FINISH:** 15:15:00 PM	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 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})		

	Bars		Bars		Bars		Bars		Bars
	1/3P_M =	0.40	2/3P_M =	0.92	P_M =	1.30	2/3P_M =	0.87	1/3P_M =	0.43
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	0.2		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

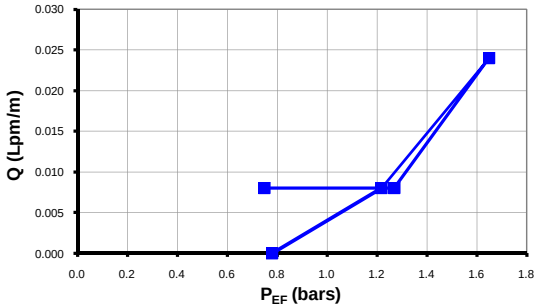


SELECTED LUGEON UNIT : 0.1 **uL**

K (PERMEABILITY) : 7E-09 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ $\quad uL = Pent\ (L/min/m) \times 10 / P_{EF}\ (bars)$ $\quad K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$

GRAPHICAL REPRESENTATION



OBSERVATIONS: low flow

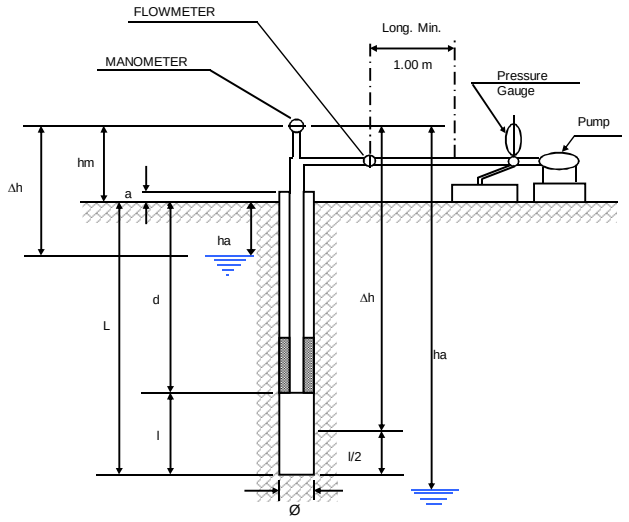
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

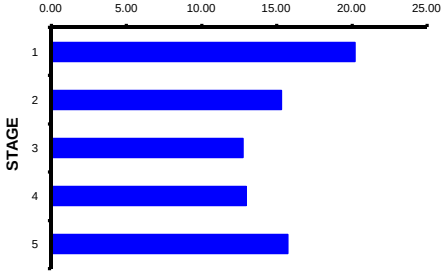
HOLE Nº	60+513.5	**TEST Nº**	1	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	12.70 **TO** 19.80 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	18/01/2009 **START:** 16:09 **FINISH:** 16:42	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 33	**GROUND LEVEL:** (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	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})		

		Bars		Bars		Bars		Bars		Bars
	$1/3P_M$ =	0.75	$2/3P_M$ =	1.55	P_M =	2.15	$2/3P_M$ =	1.56	$1/3P_M$ =	0.72
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	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



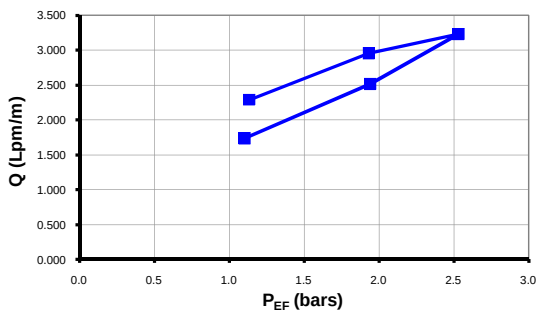
SELECTED LUGEON UNIT : 12.8 **uL**

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

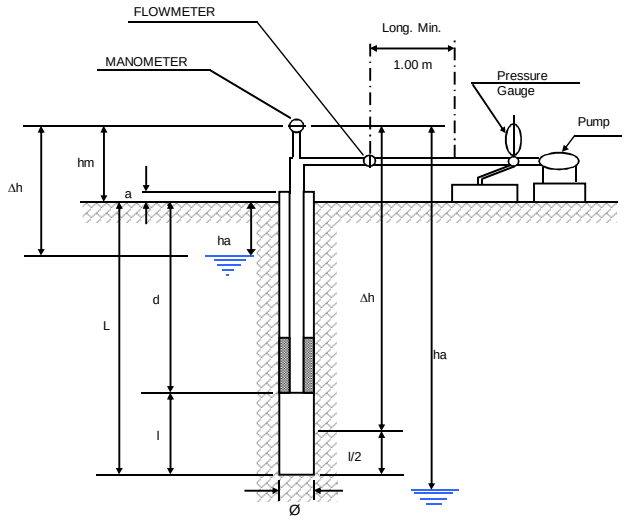
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

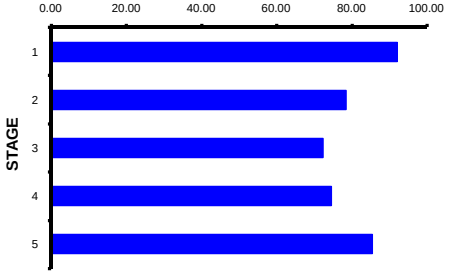
HOLE Nº	60+513.5	**TEST Nº**	2	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	10.30 **TO** 12.80 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	18/01/2009 **START:** 17:00 **FINISH:** 17:31	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 31	**GROUND 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})		

	Bars		Bars		Bars		Bars		Bars	
	1/3P_M =	0.48	2/3P_M =	0.91	P_M =	1.35	2/3P_M =	0.94	1/3P_M =	0.40
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

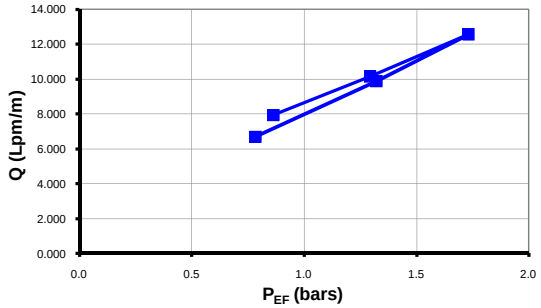


SELECTED LUGEON UNIT : 72.4 **uL**

K (PERMEABILITY) : 8E-06 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ $\quad uL = Pent\ (L/min/m) \times 10 / P_{EF}\ (bars)$ $\quad K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Turbulent Flow

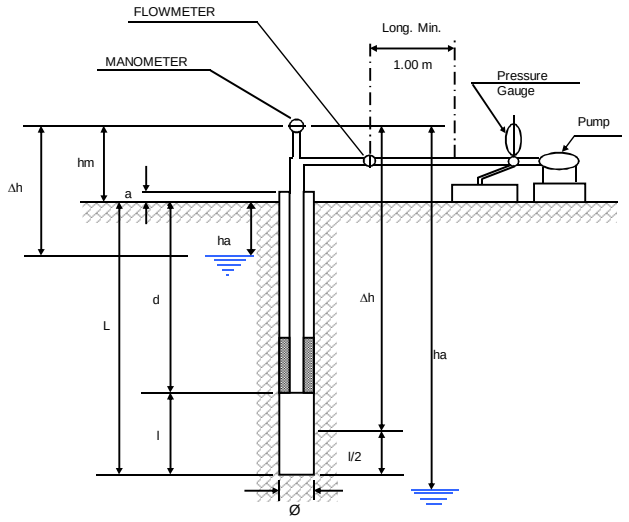
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

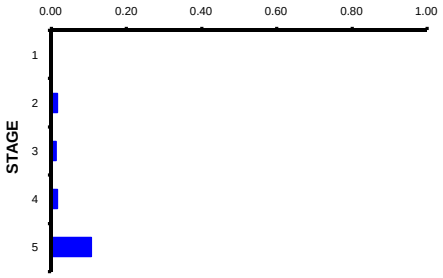
HOLE Nº	60+528.5	**TEST Nº**	1	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	11.90 **TO** 18.90 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	28/01/2009 **START:** 9:56 **FINISH:** 10:26	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 30	**GROUND LEVEL:** (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	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})		

	1/3P_M =	Bars 0.74	2/3P_M =	Bars 1.46	P_M =	Bars 2.21	2/3P_M =	Bars 1.43	1/3P_M =	Bars 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
uL



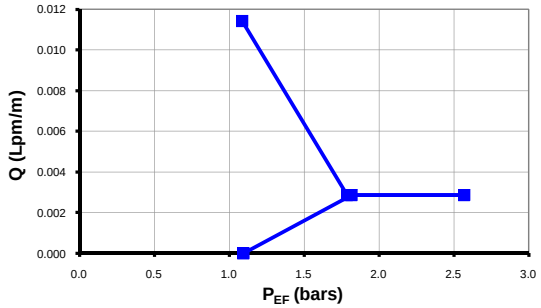
SELECTED LUGEON UNIT : 0.0 **uL**

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

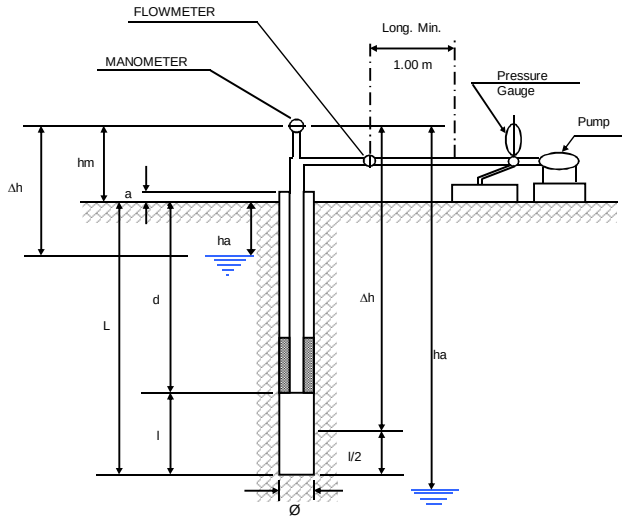
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

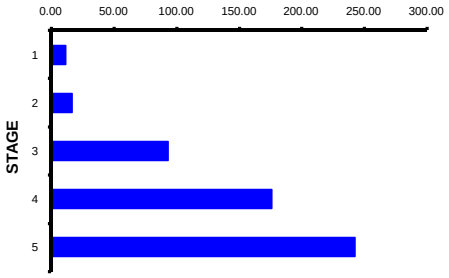
HOLE Nº	60+528.5	**TEST Nº**	2	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	9.40 **TO** 11.90 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	28/01/2009 **START:** *10:49* **FINISH:** *11:19*	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 30	**GROUND 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})		

		Bars		Bars		Bars		Bars		Bars
	1/3P_M =	0.44	**2/3P_M =**	0.84	**P_M =**	1.18	**2/3P_M =**	0.87	**1/3P_M =**	0.43
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
uL

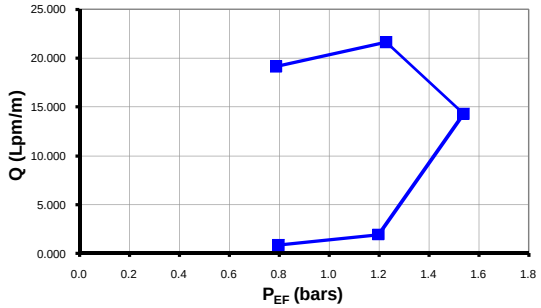


SELECTED LUGEON UNIT : 243 **uL**

K (PERMEABILITY) : 3E-05 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ $\quad uL = Pent\ (L/min/m) \times 10 / P_{EF}\ (bars)$ $\quad K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Washout

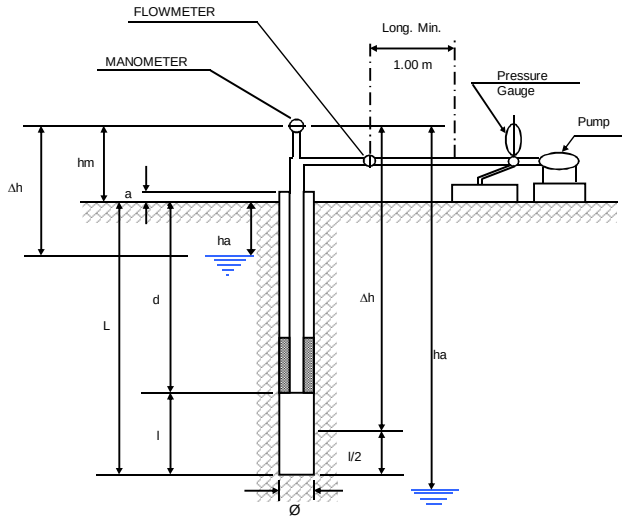
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

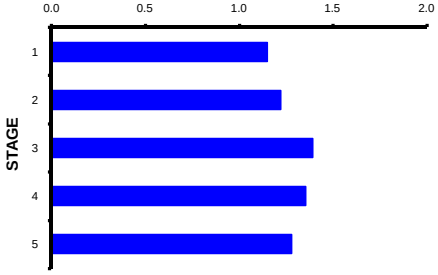
HOLE Nº	60+543.5	**TEST Nº**	1	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	11.90 **TO** 18.90 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	29/01/2009 **START:** *19:07* **FINISH:** *19:44*	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 37	**GROUND 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	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})		

		Bars		Bars		Bars		Bars		Bars
	1/3P_M =	0.71	**2/3P_M =**	1.48	**P_M =**	2.20	**2/3P_M =**	1.47	**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	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
uL

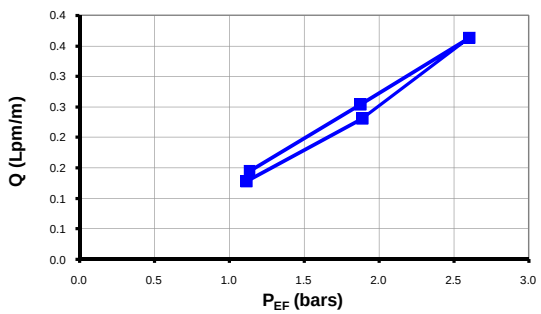


SELECTED LUGEON UNIT : **1.3** **uL**

K (PERMEABILITY) : **2E-07** **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ $\quad uL = Pent\ (L/min/m) \times 10 / P_{EF}\ (bars)$ $\quad K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Laminar

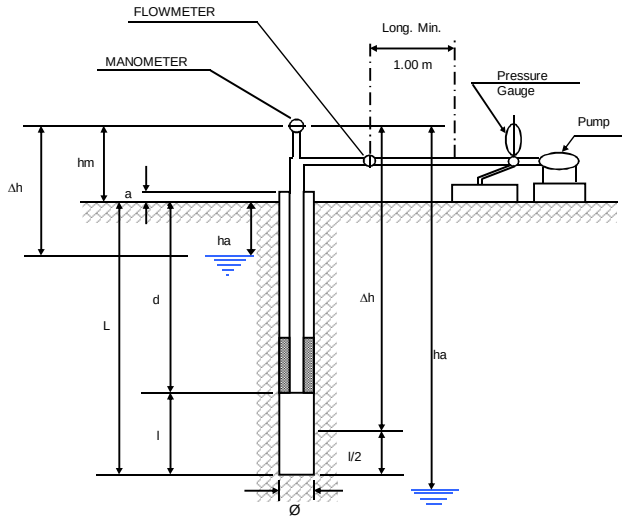
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

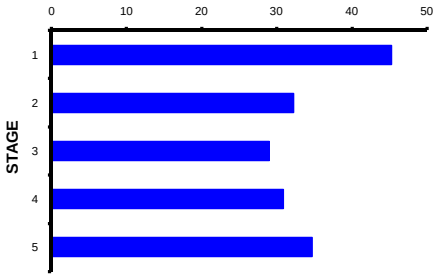
HOLE Nº	60+543.5	**TEST Nº**	2	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	9.40 **TO** 11.90 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	29/01/2009 **START:** 20:24 **FINISH:** 20:57	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 33	**GROUND 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})		

		Bars		Bars		Bars		Bars		Bars
	1/3P_M =	0.44	2/3P_M =	0.88	P_M =	1.31	2/3P_M =	0.87	1/3P_M =	0.44
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	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

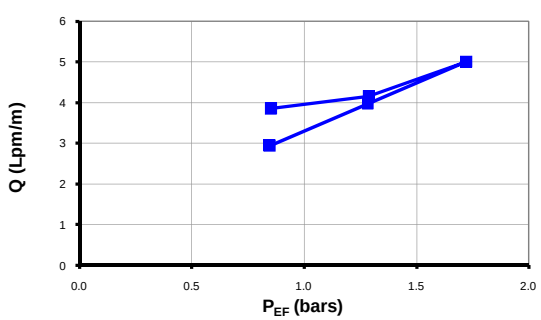


SELECTED LUGEON UNIT : 29.0 **uL**

K (PERMEABILITY) : 3E-06 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ $\quad uL = Pent\ (L/min/m) \times 10 / P_{EF}\ (bars)$ $\quad K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Turbulent

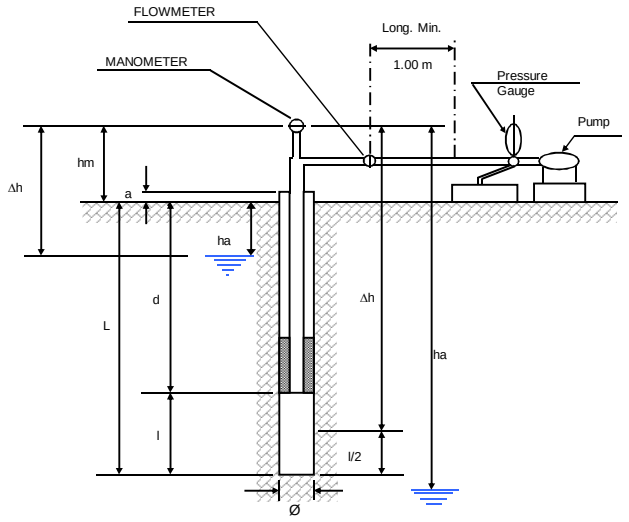
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

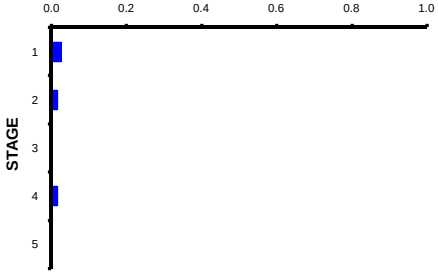
HOLE Nº	60+573.5	**TEST Nº**	1	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	12.60 **TO** 19.60 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	29/01/2009 **START:** 13:37 **FINISH:** 14:18	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 41	**GROUND 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})		

		Bars		Bars		Bars		Bars		Bars
	1/3P_M =	0.73	**2/3P_M =**	1.46	**P_M =**	2.19	**2/3P_M =**	1.47	**1/3P_M =**	0.74
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



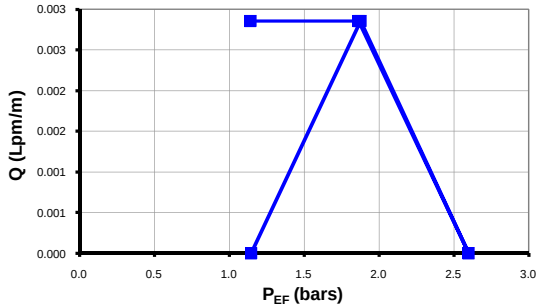
SELECTED LUGEON UNIT : 0.01 **uL**

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

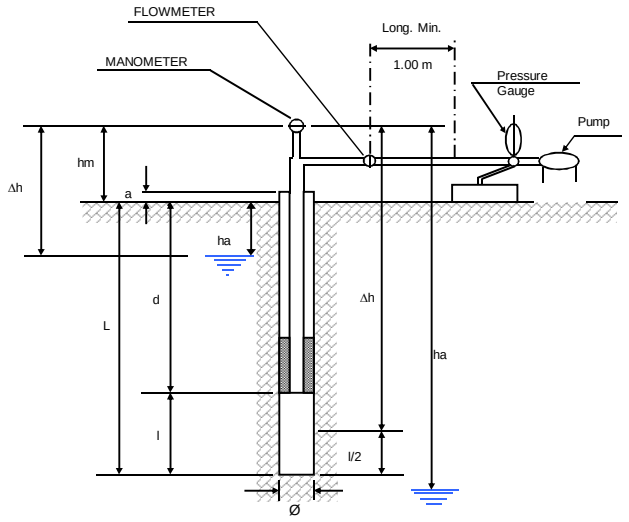
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

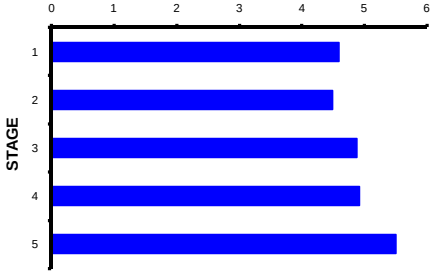
HOLE Nº	60+573.5	**TEST Nº**	2	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	9.60 **TO** 12.60 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	29/01/2009 **START:** *14:40* **FINISH:** *15:13*	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 33	**GROUND LEVEL:** (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	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})		

	Bars		Bars		Bars		Bars		Bars
	1/3P_M =	0.42	2/3P_M =	0.87	P_M =	1.31	2/3P_M =	0.86	1/3P_M =	0.44
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

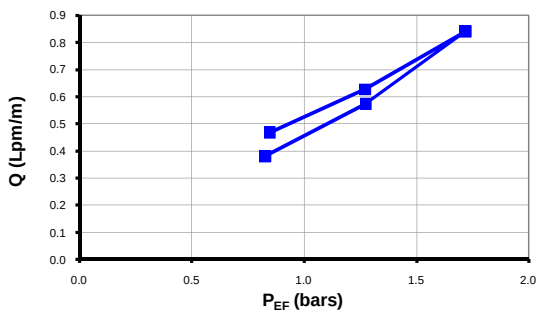


SELECTED LUGEON UNIT : 5.5 **uL**

K (PERMEABILITY) : 6E-07 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ $\quad uL = Pent\ (L/min/m) \times 10 / P_{EF}\ (bars)$ $\quad K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$

GRAPHICAL REPRESENTATION



OBSERVATIONS: wash out

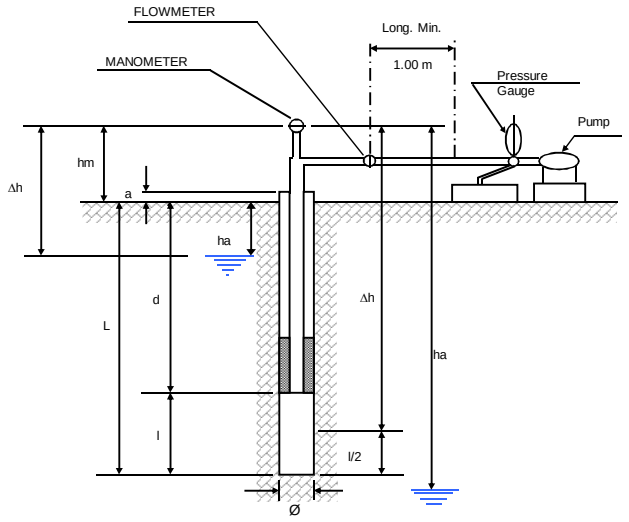
VTR — Analysis

GRB — Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

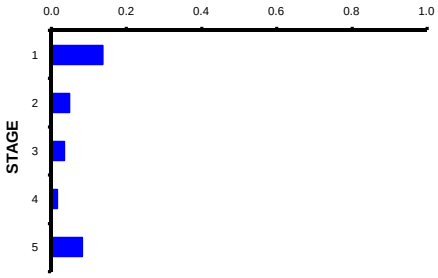
HOLE Nº	60+591.5	**TEST Nº**	1	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	11.00 **TO** 18.00 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	29/01/2009 **START:** 7:54 **FINISH:** 8:30	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 36	**GROUND 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})		

	Bars		Bars		Bars		Bars		Bars
	1/3P_M =	0.74	**2/3P_M =**	1.47	**P_M =**	2.19	**2/3P_M =**	1.46	**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	0.8		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
uL

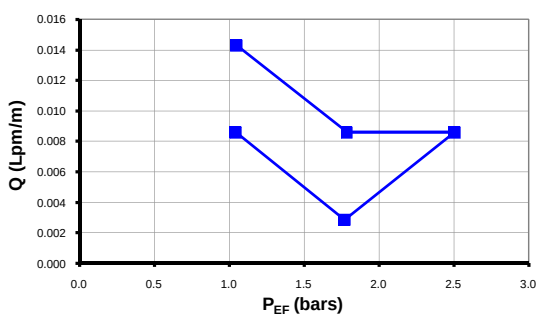


SELECTED LUGEON UNIT : 0.1 **uL**

K (PERMEABILITY) : 8E-09 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ $\quad uL = Pent\ (L/min/m) \times 10 / P_{EF}\ (bars)$ $\quad K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Low Flow

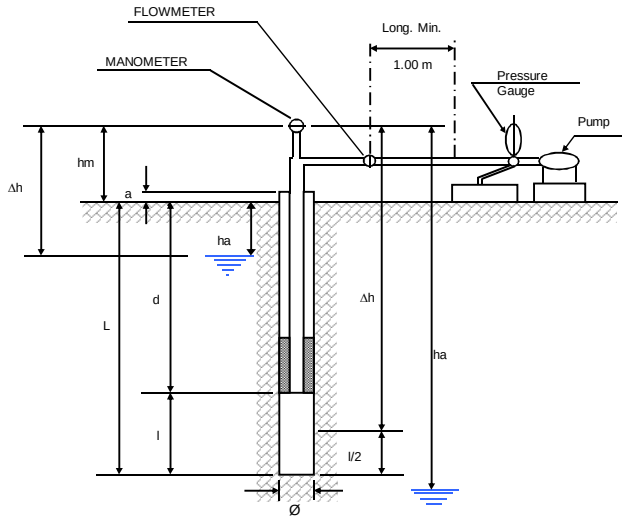
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

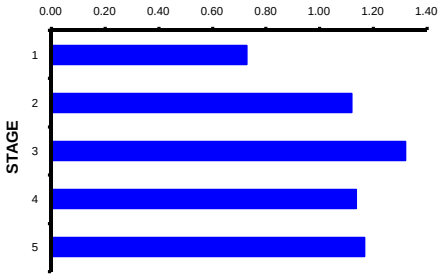
HOLE Nº	60+591.5	**TEST Nº**	2	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	8.00 **TO** 11.00 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	29/01/2009 **START:** 8:54 **FINISH:** 9:37	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 43	**GROUND LEVEL:** (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})		

	Bars		Bars		Bars		Bars		Bars	
	1/3P_M =	0.42	2/3P_M =	0.88	P_M =	1.30	2/3P_M =	0.86	1/3P_M =	0.43
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



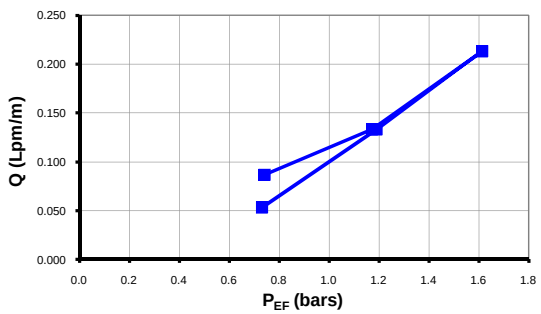
SELECTED LUGEON UNIT : 0.9 **uL**

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

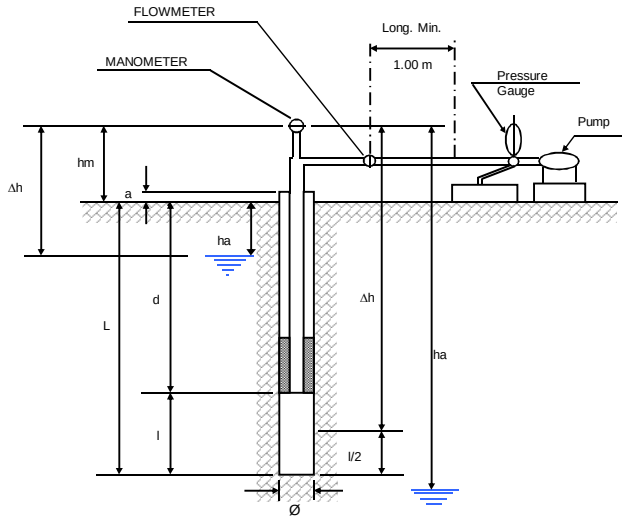
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

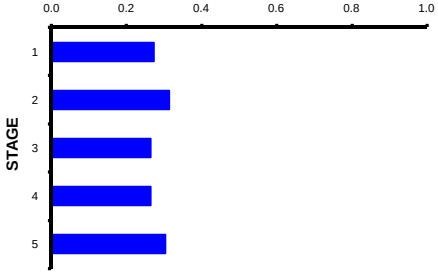
HOLE Nº	60+618.5	**TEST Nº**	1	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	10.70 **TO** 17.70 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	28/01/2009 **START:** *8:04* **FINISH:** *8:38*	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 34	**GROUND 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})		

	1/3P_M =	**Bars** 0.66	**2/3P_M =**	**Bars** 1.34	**P_M =**	**Bars** 1.99	**2/3P_M =**	**Bars** 1.34	**1/3P_M =**	**Bars** 0.65
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		1.9		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

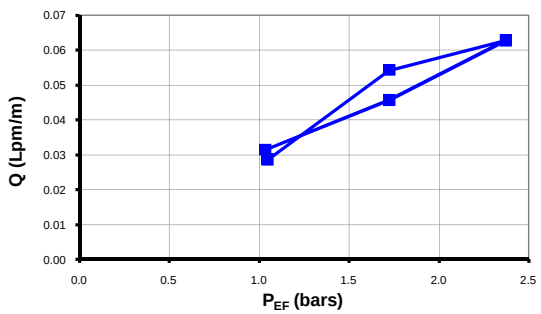


SELECTED LUGEON UNIT : 0.3 **uL**

K (PERMEABILITY) : 4E-08 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ $\quad uL = Pent\ (L/min/m) \times 10 / P_{EF}\ (bars)$ $\quad K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Laminar

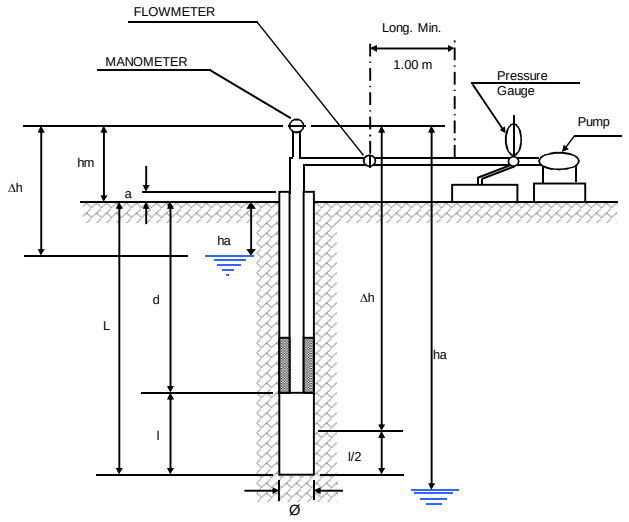
VTR Analysis

GRB Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

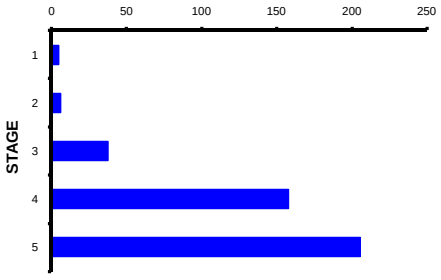
HOLE Nº	60+618.5	**TEST Nº**	2	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	8.20 **TO** 10.70 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	28/01/2009 **START:** 9:01 **FINISH:** 9:36	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 35	**GROUND LEVEL:** (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 =	Bars 0.34	2/3P_M =	Bars 0.73	P_M =	Bars 1.10	2/3P_M =	Bars 0.72	1/3P_M =	Bars 0.35
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

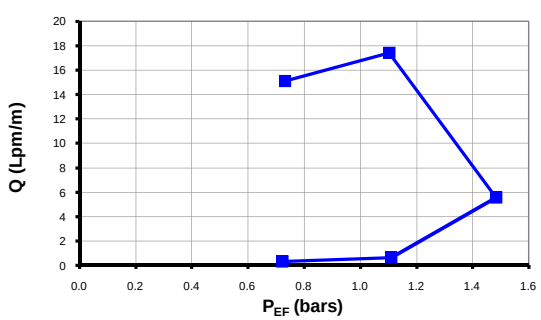


SELECTED LUGEON UNIT : 205 **uL**

K (PERMEABILITY) : 2E-05 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ $\quad uL = Pent\ (L/min/m) \times 10 / P_{EF}\ (bars)$ $\quad K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Washout

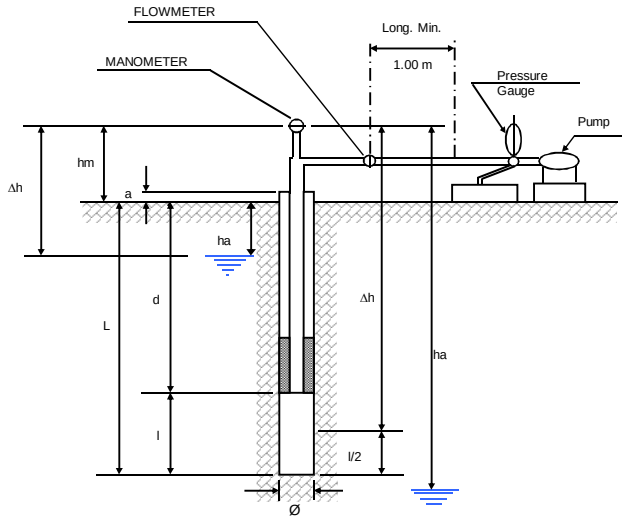
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

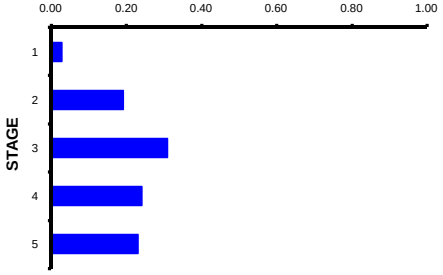
HOLE Nº	60+642.5	**TEST Nº**	1	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	11.50 **TO** 18.50 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	27/01/2009 **START:** 10:21 **FINISH:** 10:55	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 34	**GROUND LEVEL:** (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	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})		

	1/3P_M = Bars 0.70		2/3P_M = Bars 1.32		P_M = Bars 1.99		2/3P_M = Bars 1.33		1/3P_M = Bars 0.66	
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		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

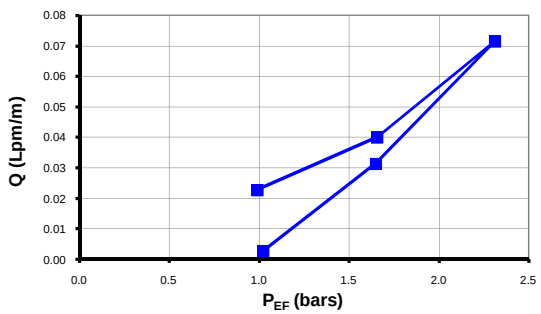


SELECTED LUGEON UNIT : 0.1 **uL**

K (PERMEABILITY) : 2E-08 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ $\quad uL = Pent\ (L/min/m) \times 10 / P_{EF}\ (bars)$ $\quad K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Dilation

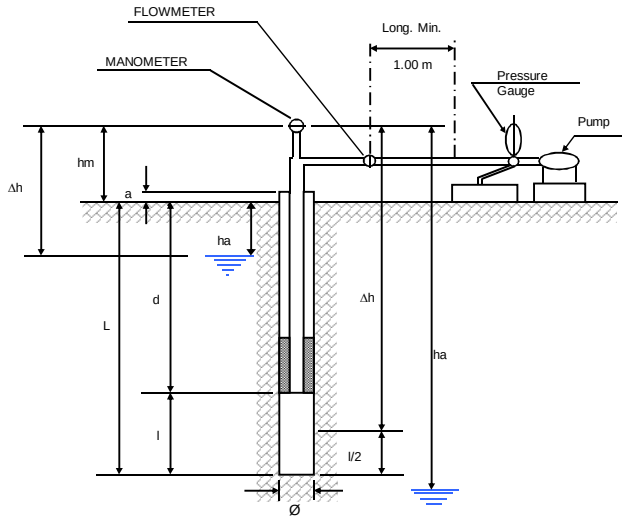
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

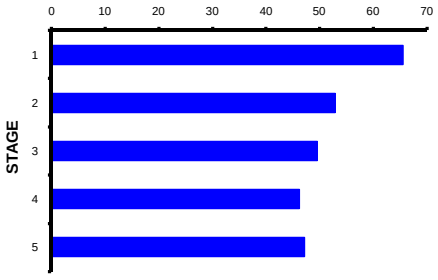
HOLE Nº	60+642.5	**TEST Nº**	2	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	8.50 **TO** 11.50 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	27/01/2009 **START:** 11:13 **FINISH:** 11:47	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 34	**GROUND 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})		

	Bars		Bars		Bars		Bars		Bars	
	1/3P_M =	0.35	2/3P_M =	0.74	P_M =	1.11	2/3P_M =	0.75	1/3P_M =	0.33
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

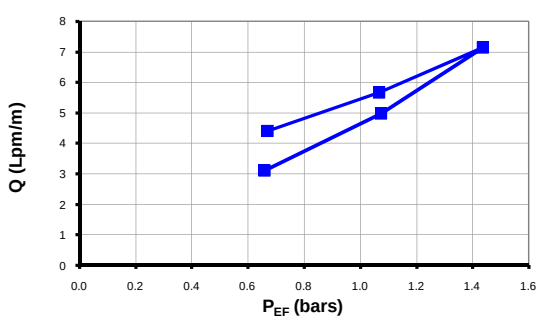


SELECTED LUGEON UNIT : 47 **uL**

K (PERMEABILITY) : 5E-06 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ $\quad uL = Pent\ (L/min/m) \times 10 / P_{EF}\ (bars)$ $\quad K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Void Filling

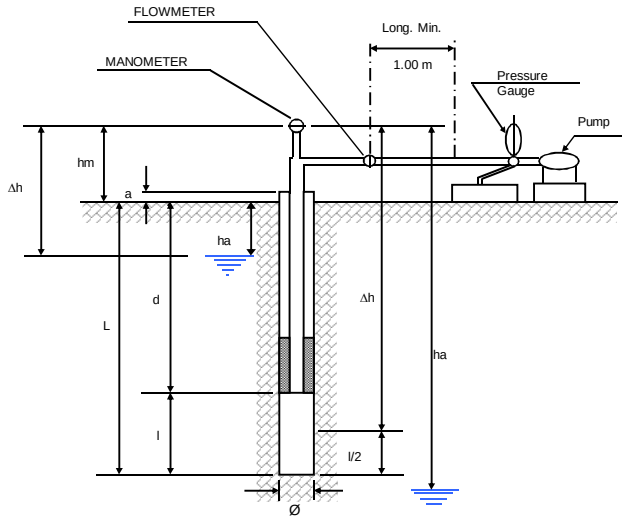
VTR — Analysis

GRB — Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

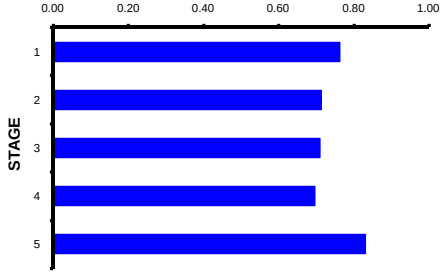
HOLE Nº	60+669.5	**TEST Nº**	1	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	11.80 **TO** 18.80 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	25/01/2009 **START:** 22:27 **FINISH:** 23:02	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 35	**GROUND 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 =	Bars 0.66	2/3P_M =	Bars 1.33	P_M =	Bars 2.02	2/3P_M =	Bars 1.33	1/3P_M =	Bars 0.65
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

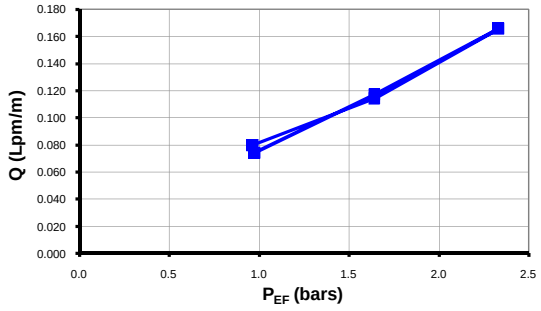


SELECTED LUGEON UNIT : 0.7 **uL**

K (PERMEABILITY) : 1E-07 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ $\quad uL = Pent\ (L/min/m) \times 10 / P_{EF}\ (bars)$ $\quad K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Laminar

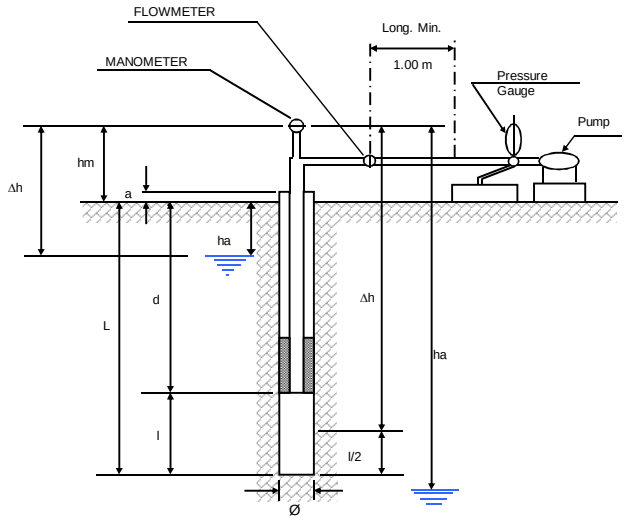
VTR Analysis

GRB Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

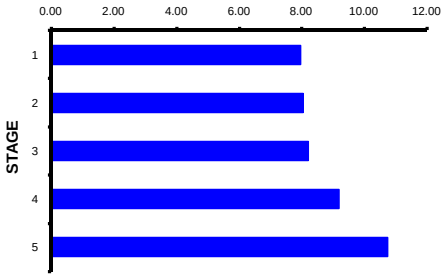
HOLE Nº	60+669.5	**TEST Nº**	2	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	9.30 **TO** 11.80 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	25/01/2009 **START:** *23:19* **FINISH:** *0:03*	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 44	**GROUND 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})		

		Bars		Bars		Bars		Bars		Bars
	1/3P_M =	0.41	2/3P_M =	0.72	P_M =	1.11	2/3P_M =	0.74	1/3P_M =	0.35
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	3.0		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



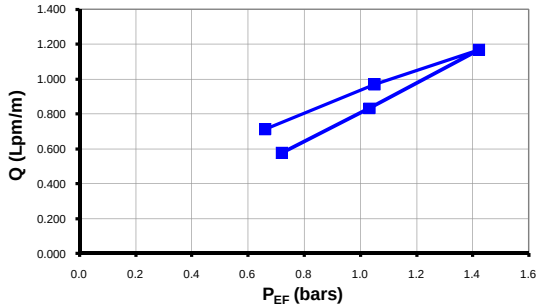
SELECTED LUGEON UNIT : 10.7 **uL**

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

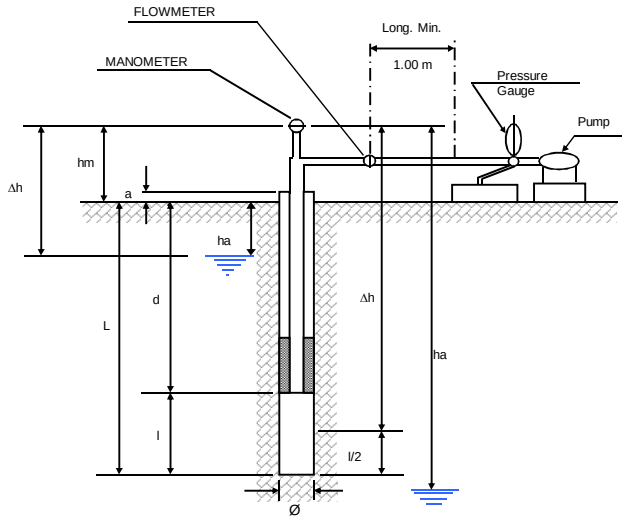
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

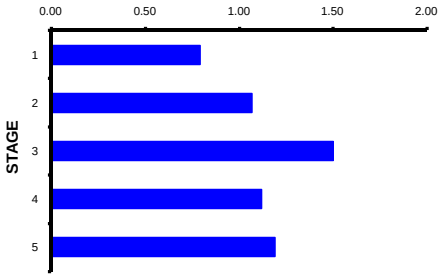
HOLE Nº	60+687.5	**TEST Nº**	1	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	11.40 **TO** 18.40 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	24/01/2009 **START:** 20:10 **FINISH:** 20:45	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 35	**GROUND 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 =	**Bars** 0.65	**2/3P_M =**	**Bars** 1.33	**P_M =**	**Bars** 2.00	**2/3P_M =**	**Bars** 1.33	**1/3P_M =**	**Bars** 0.67
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
uL



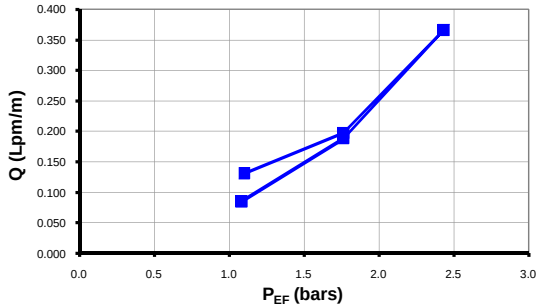
SELECTED LUGEON UNIT : 1.1 **uL**

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

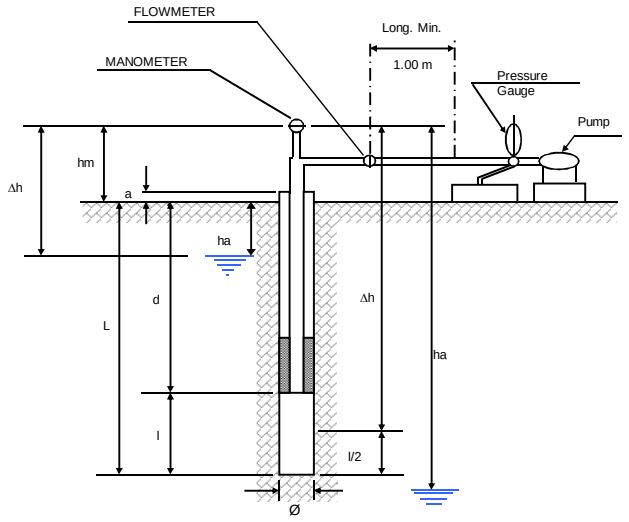
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

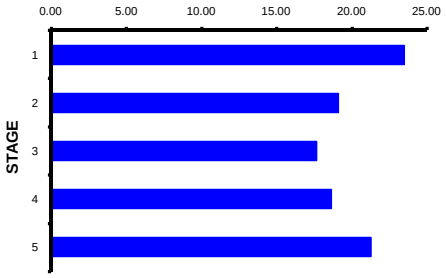
HOLE Nº	60+687.5	**TEST Nº**	2	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	8.90 **TO** 11.40 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	24/01/2009 **START:** 21:07 **FINISH:** 21:55	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 48	**GROUND 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})		

	Bars		Bars		Bars		Bars		Bars	
	1/3P_M =	0.36	2/3P_M =	0.75	P_M =	1.09	2/3P_M =	0.73	1/3P_M =	0.36
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

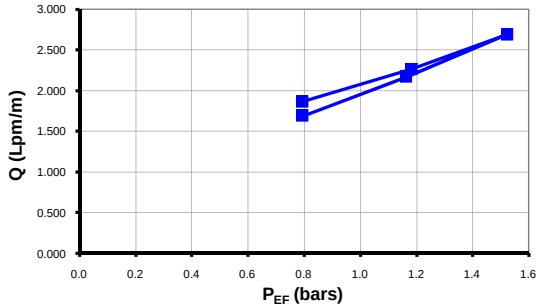


SELECTED LUGEON UNIT : 17.6 **uL**

K (PERMEABILITY) : 2E-06 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ $\quad uL = Pent\ (L/min/m) \times 10 / P_{EF}\ (bars)$ $\quad K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Turbulent

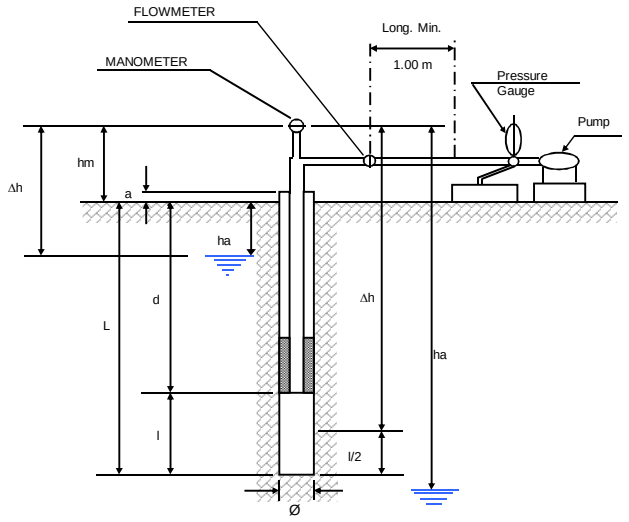
VTR — Analysis

GRB — Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

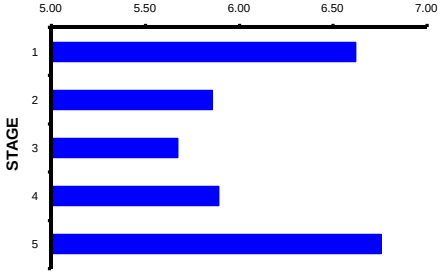
HOLE Nº	60+708.5	**TEST Nº**	1	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	11.60 **TO** 18.60 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	23/01/2009 **START:** 14:22 **FINISH:** 14:54	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 32	**GROUND LEVEL:** (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	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})		

	1/3P_M =	**Bars** 0.66	**2/3P_M =**	**Bars** 1.34	**P_M =**	**Bars** 2.00	**2/3P_M =**	**Bars** 1.31	**1/3P_M =**	**Bars** 0.69
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	5.8		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

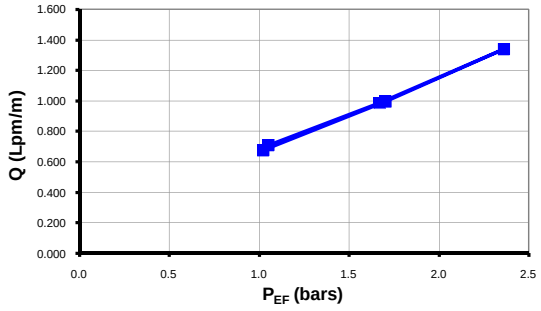


SELECTED LUGEON UNIT : 5.7 **uL**

K (PERMEABILITY) : 7E-07 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ $\quad uL = Pent\ (L/min/m) \times 10 / P_{EF}\ (bars)$ $\quad K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Turbulent

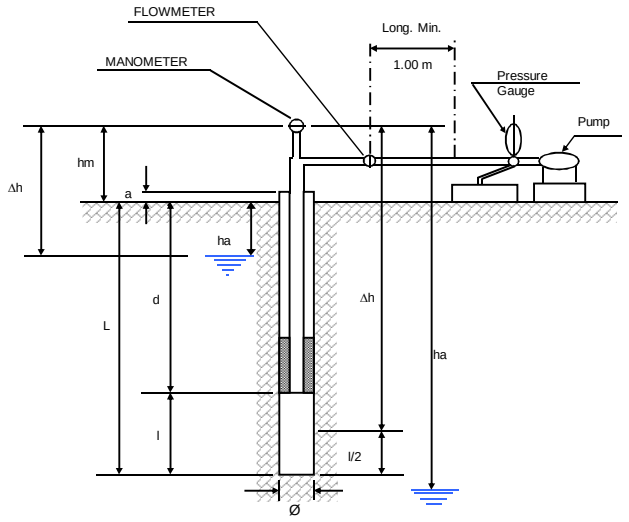
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

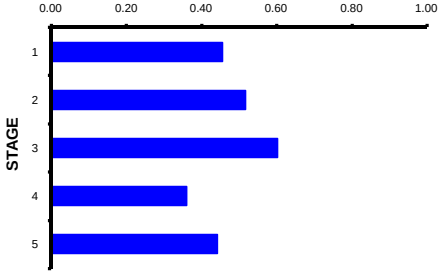
HOLE Nº	60+708.5	**TEST Nº**	2	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	9.10 **TO** 11.60 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	23/01/2009 **START:** 15:13 **FINISH:** 15:48	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 35	**GROUND 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 =	**Bars** 0.34	**2/3P_M =**	**Bars** 0.72	**P_M =**	**Bars** 1.10	**2/3P_M =**	**Bars** 0.75	**1/3P_M =**	**Bars** 0.36
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

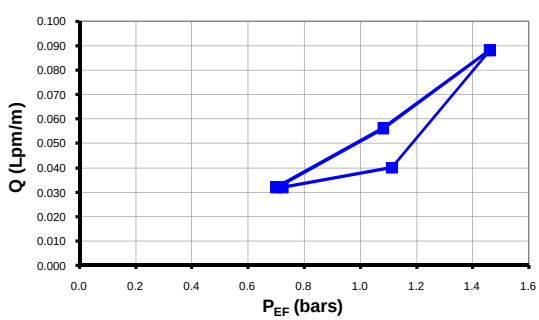


SELECTED LUGEON UNIT : 0.5 **uL**

K (PERMEABILITY) : 5E-08 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ $\quad uL = Pent\ (L/min/m) \times 10 / P_{EF}\ (bars)$ $\quad K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Low Flow

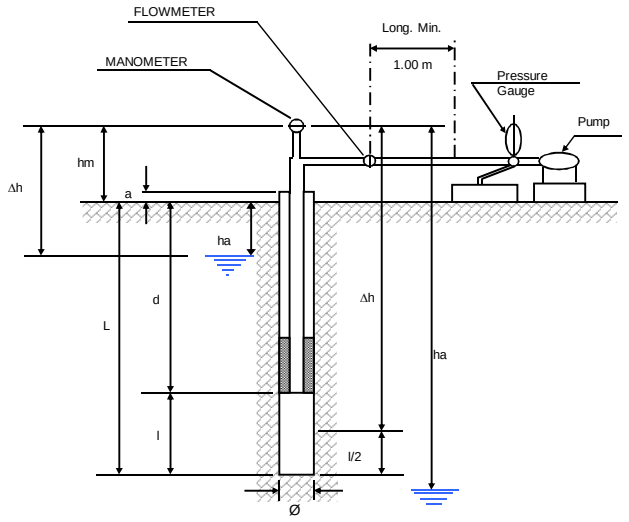
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

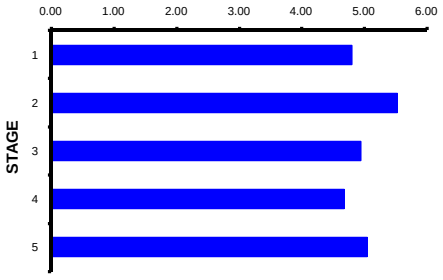
HOLE Nº	60+729.5	**TEST Nº**	1	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	11.10 **TO** 18.10 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	21/01/2009 **START:** 20:50 **FINISH:** 21:20	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 30	**GROUND LEVEL:** (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	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})		

	1/3P_M =	**Bars** 0.89	**2/3P_M =**	**Bars** 1.31	**P_M =**	**Bars** 2.02	**2/3P_M =**	**Bars** 1.28	**1/3P_M =**	**Bars** 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	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

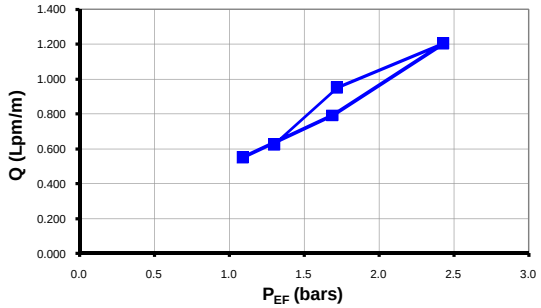


SELECTED LUGEON UNIT : 5.0 **uL**

K (PERMEABILITY) : 7E-07 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ $\quad uL = Pent\ (L/min/m) \times 10 / P_{EF}\ (bars)$ $\quad K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$

GRAPHICAL REPRESENTATION



OBSERVATIONS: laminar

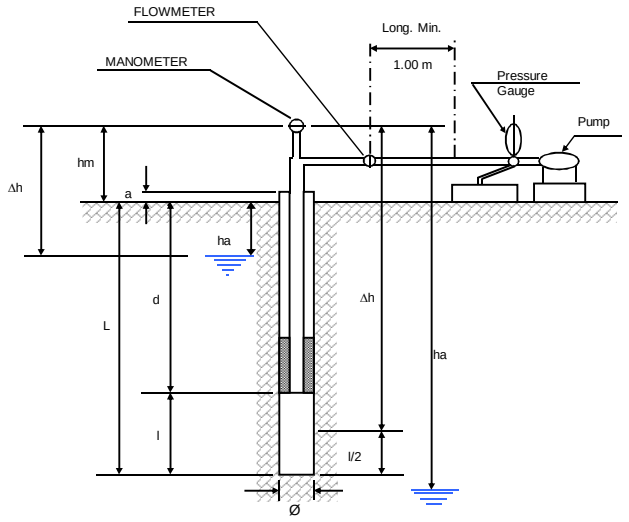
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

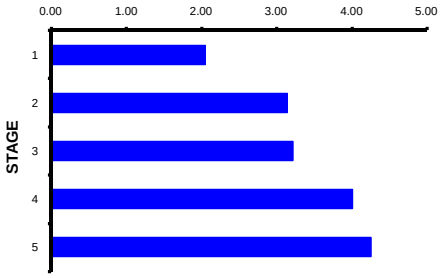
HOLE Nº	60+729.5	**TEST Nº**	2	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	8.60 **TO** 11.40 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	21/01/2009 **START:** 21:50 **FINISH:** 22:25	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 35	**GROUND 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})		

		Bars		Bars		Bars		Bars		Bars
	1/3P_M =	0.32	2/3P_M =	0.68	P_M =	1.12	2/3P_M =	0.71	1/3P_M =	0.36
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	1.2		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



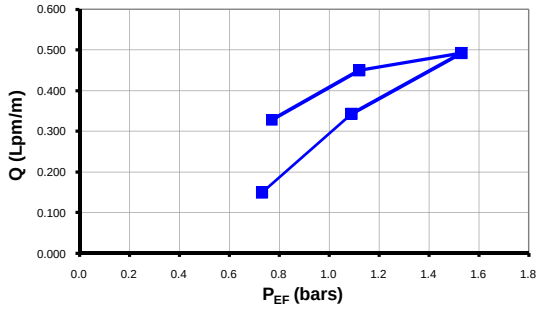
SELECTED LUGEON UNIT : 4.3 **uL**

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

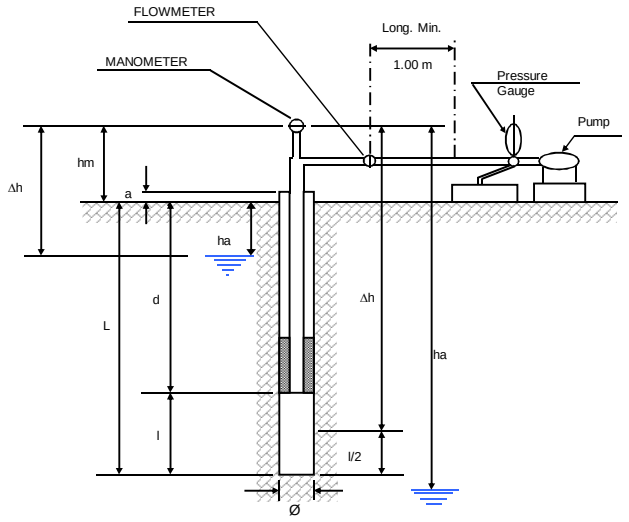
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

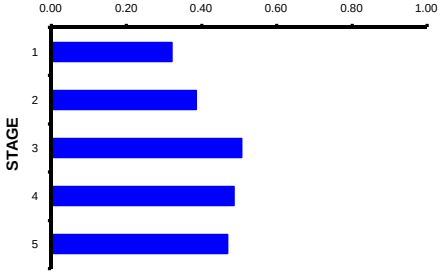
HOLE Nº	60+753.5	**TEST Nº**	1	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	8.60 **TO** 16.90 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	18/01/2009 **START:** 2:15 **FINISH:** 2:45	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 30	**GROUND LEVEL:** (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	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})		

	Bars		Bars		Bars		Bars		Bars
	1/3P_M =	0.72	**2/3P_M =**	1.47	**P_M =**	2.21	**2/3P_M =**	1.48	**1/3P_M =**	0.72
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	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

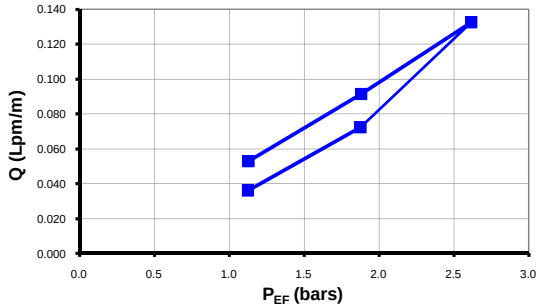


SELECTED LUGEON UNIT : 0.4 **uL**

K (PERMEABILITY) : 6E-08 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ $\quad uL = Pent\ (L/min/m) \times 10 / P_{EF}\ (bars)$ $\quad K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$

GRAPHICAL REPRESENTATION



OBSERVATIONS: low flow

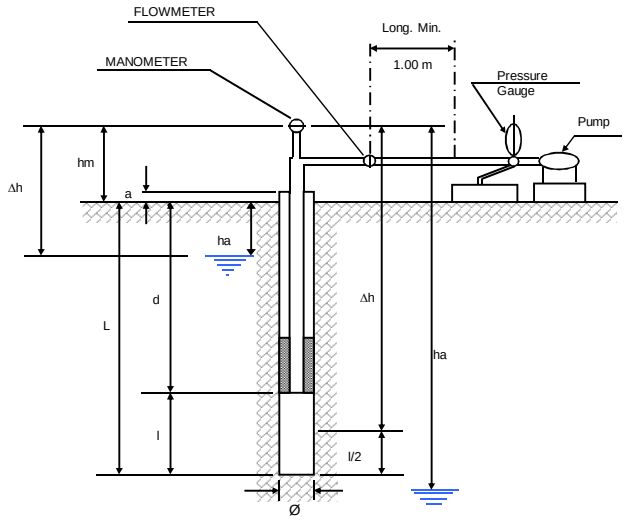
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST
LUGEON TYPE

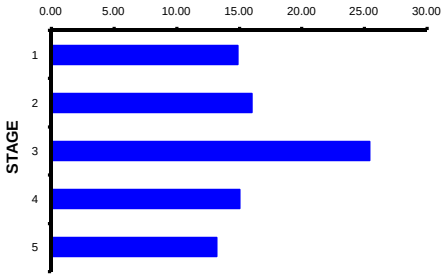
HOLE Nº	60+753.5	**TEST Nº**	2	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	6.10 **TO** 8.90 **m.**	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	18/01/2009 **START:** 2:15 **FINISH:** 2:45	**INCLINATION:**	90
PROJECT Nº :	07-1413-0074 / 2200 / ****		**Minutes:** 30	**GROUND LEVEL:** (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 =	**Bars** 0.44	**2/3P_M =**	**Bars** 0.89	**P_M =**	**Bars** 1.31	**2/3P_M =**	**Bars** 0.85	**1/3P_M =**	**Bars** 0.41
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
uL

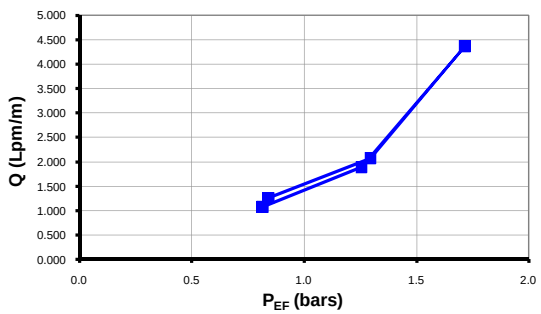


SELECTED LUGEON UNIT : 14.8 **uL**

K (PERMEABILITY) : 2E-06 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$ $\quad uL = Pent\ (L/min/m) \times 10 / P_{EF}\ (bars)$ $\quad K = \frac{q[m^3/sec] \times LN(l[m] / (Ø[m]/2))}{2 \times \Pi \times l[m] \times P_{EF}[mH2O]}$

GRAPHICAL REPRESENTATION



OBSERVATIONS: Dilation

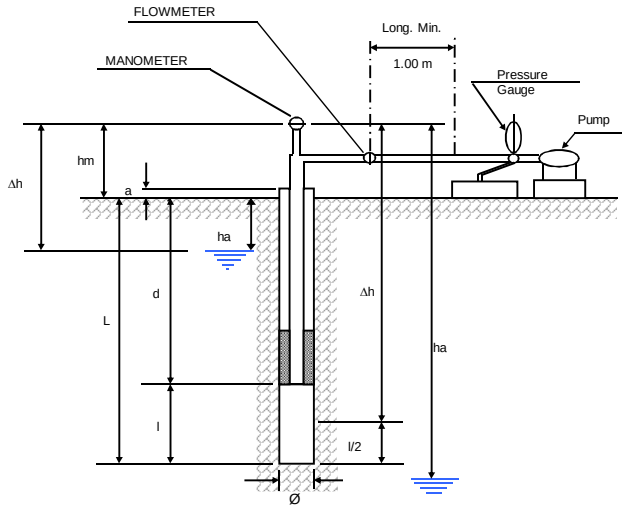
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST CONFIRMATION

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:** (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	9.56	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 =	**Bars** 1.00	**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

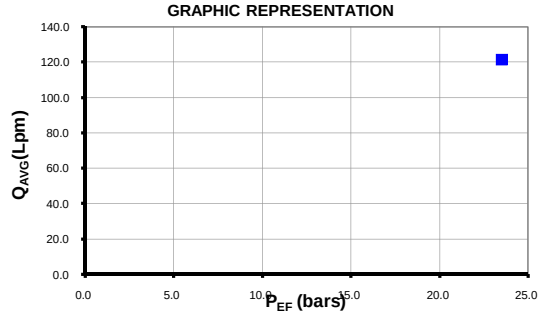
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : 3.6E-05 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$

GRAPHIC REPRESENTATION



OBSERVATIONS:

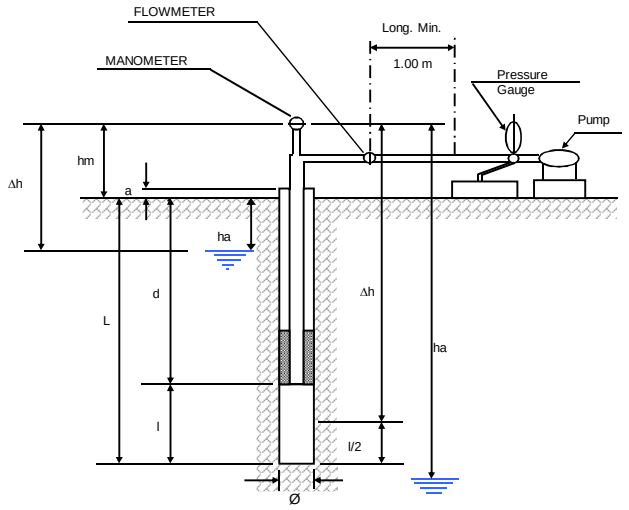
VTR
Analysis

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 = Bars	1.00	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

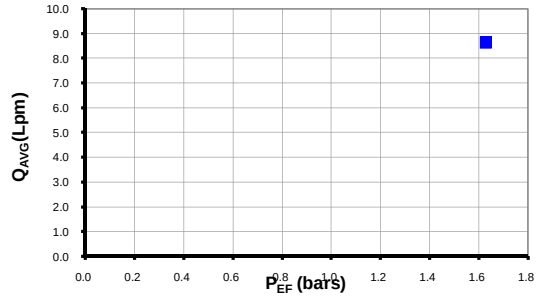
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : 2.5E-06 **m/s**

$$P_{EF} = P_M - \Delta p + \Delta h / 10.197$$

GRAPHIC REPRESENTATION



OBSERVATIONS:

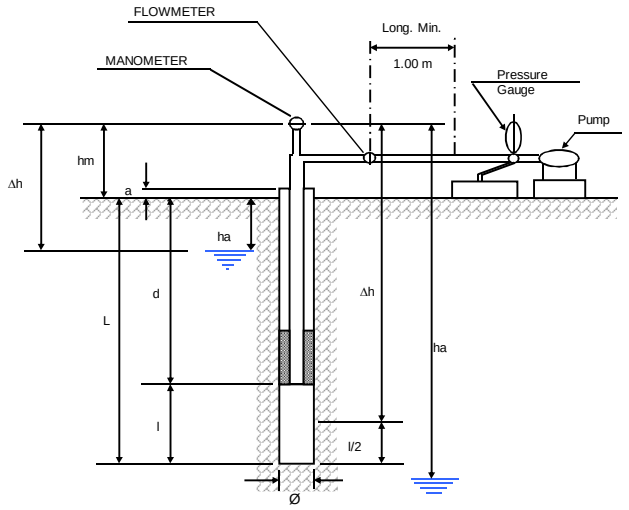
VTR — Analysis

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 = Bars 1.00		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

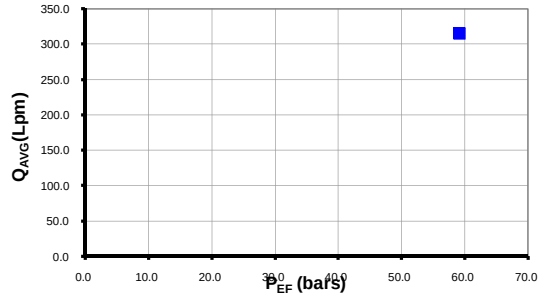
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : 9.2E-05 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$

GRAPHIC REPRESENTATION



OBSERVATIONS:

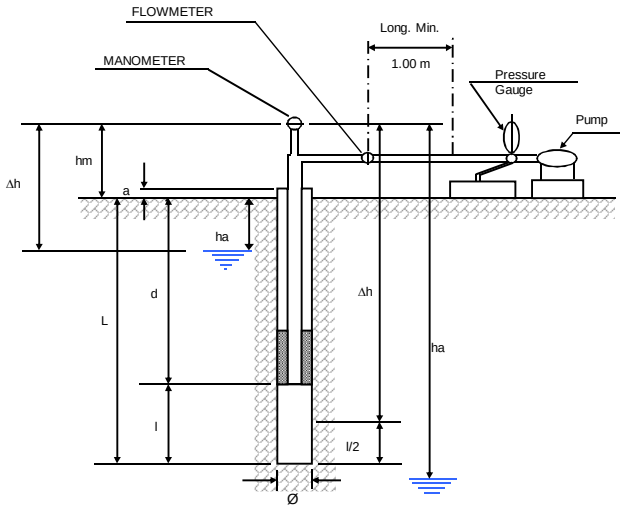
VTR
Analysis

GRB
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:** (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	9.16	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 = Bars 1.00		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**

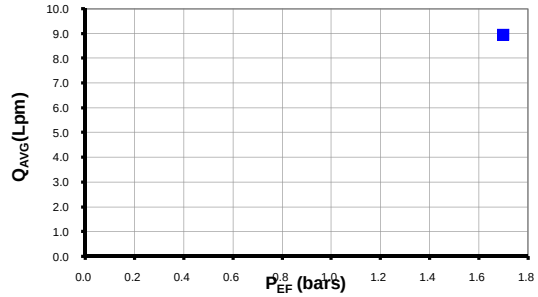
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

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:

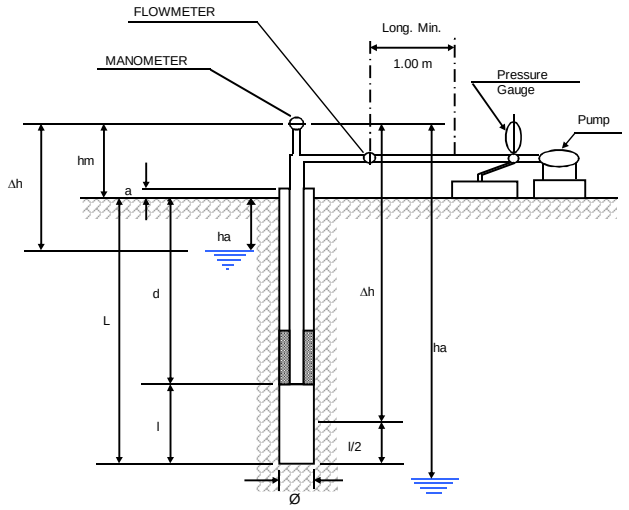
VTR — Analysis

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 = Bars 1.00		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**

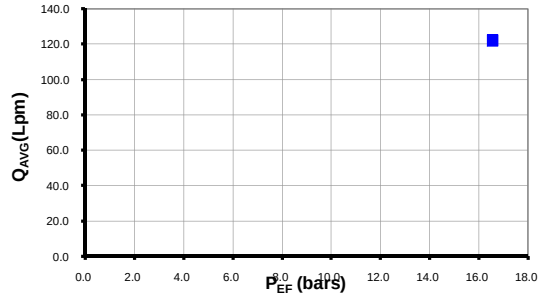
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : **3.6E-05** **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$

GRAPHIC REPRESENTATION



OBSERVATIONS:

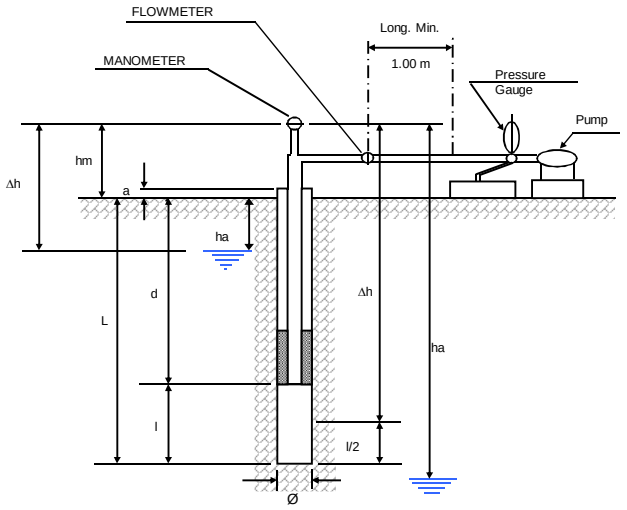
VTR — Analysis

GRB — 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:** (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 = Bars 1.00		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**

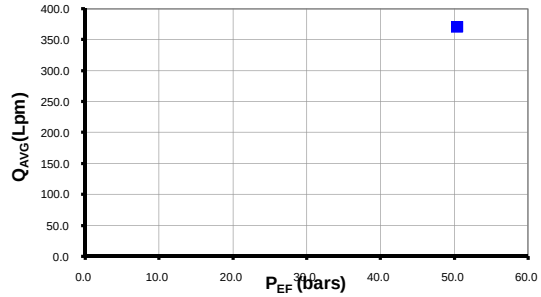
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : **1.1E-04** **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$

GRAPHIC REPRESENTATION



OBSERVATIONS:

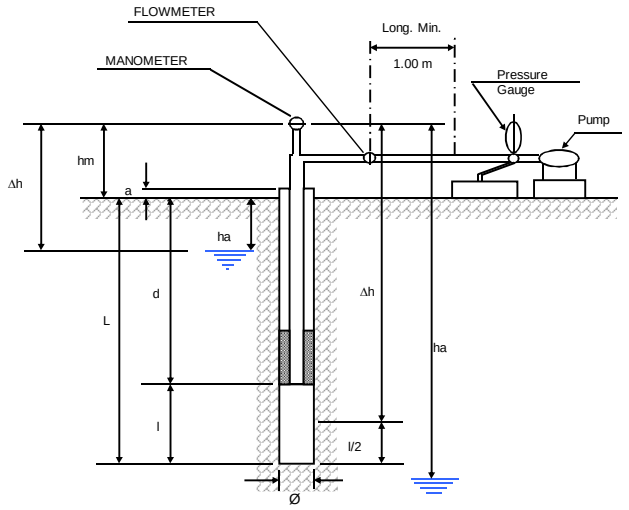
VTR — Analysis

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 =	Bars 1.00	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**

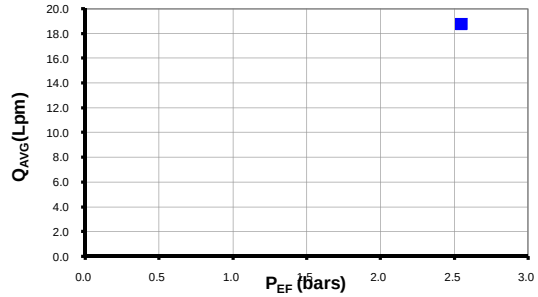
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : **5.5E-06** **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$

GRAPHIC REPRESENTATION



OBSERVATIONS:

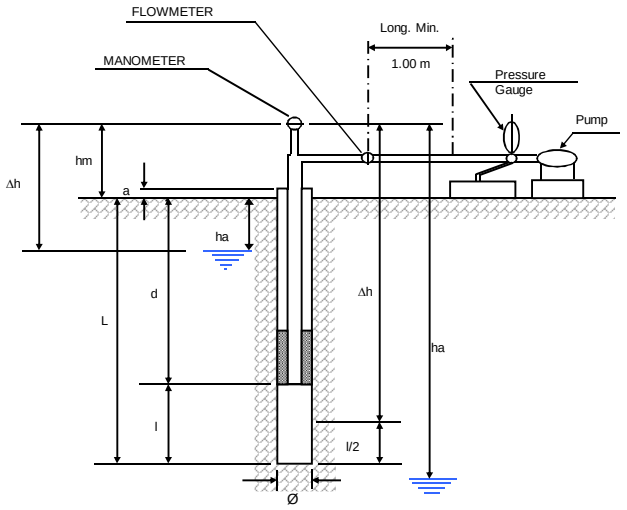
VTR — Analysis

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:** (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	7.28	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 =	Bars 0.34	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

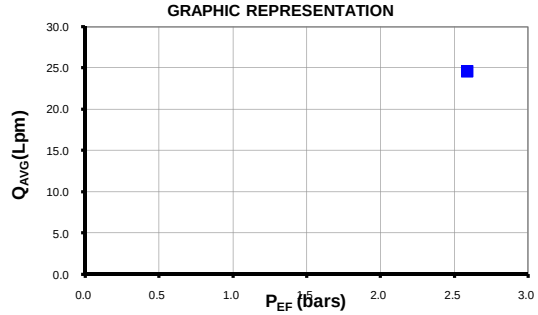
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : 7.2E-06 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$

GRAPHIC REPRESENTATION



OBSERVATIONS:

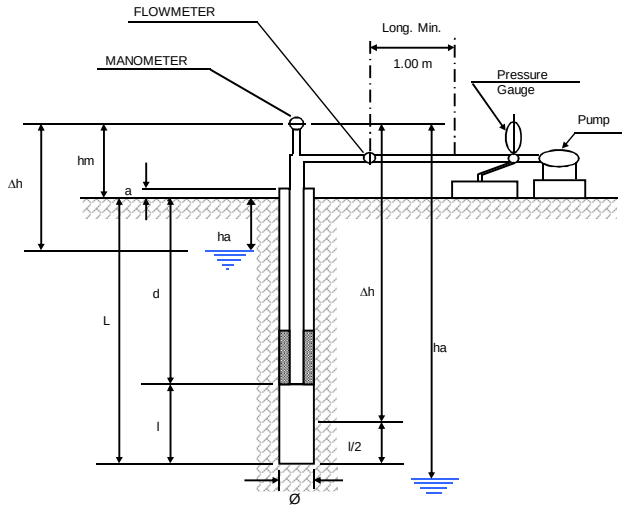
VTR — Analysis

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 =	Bars 0.34	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**

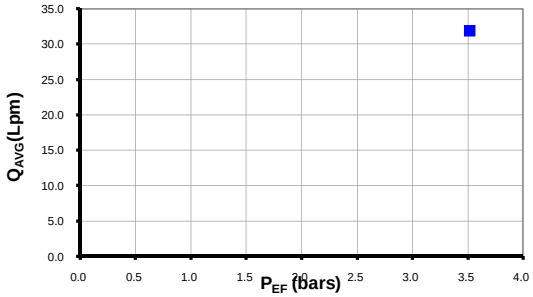
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : **9.3E-06** **m/s**

$$P_{EF} = P_M - \Delta p + \Delta h / 10.197$$

GRAPHIC REPRESENTATION



OBSERVATIONS:

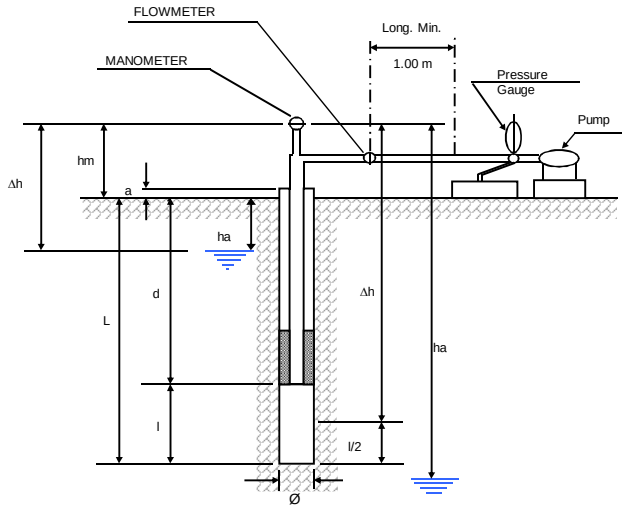
VTR
Analysis

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 =	Bars 0.34	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**

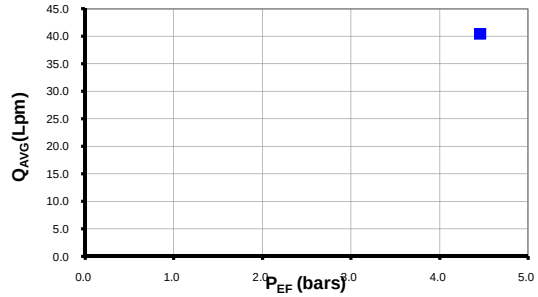
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : **1.2E-05** **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$

GRAPHIC REPRESENTATION



OBSERVATIONS:

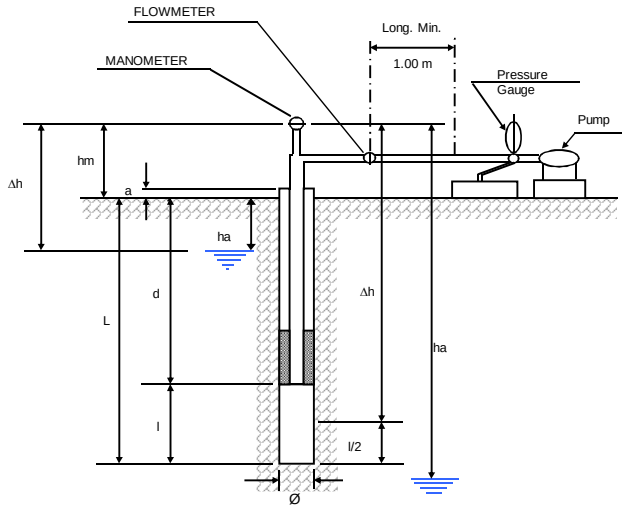
VTR
Analysis

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 =	Bars 0.34	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

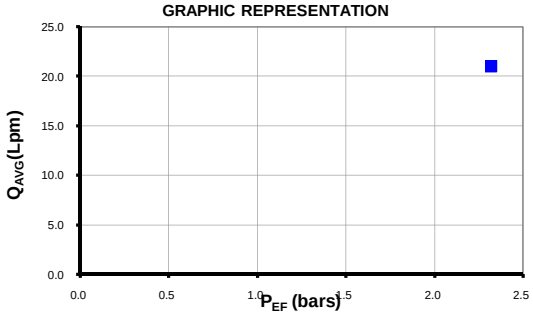
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : 6.2E-06 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$

GRAPHIC REPRESENTATION



OBSERVATIONS:

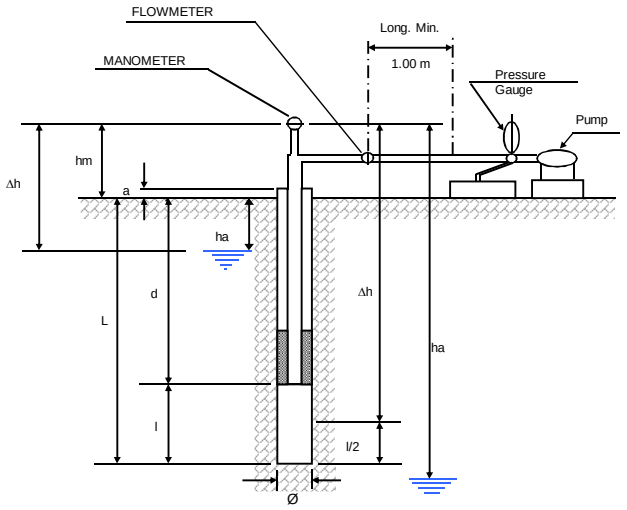
VTR
Analysis

GRB
Check

Golder Associates Limited

WATER PRESSURE TEST CONFIRMATION

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})		

	Bars		Bars		Bars		Bars		Bars	
	$1/3P_M$ =	1.10	$2/3P_M$ =		P_M =		$2/3P_M$ =		$1/3P_M$ =	
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

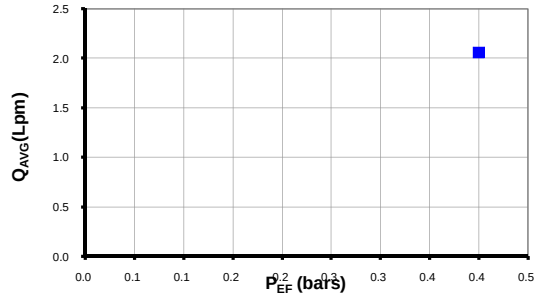
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : 6.0E-07 **m/s**

$$P_{EF} = P_M - \Delta p + \Delta h / 10.197$$

GRAPHIC REPRESENTATION



OBSERVATIONS:

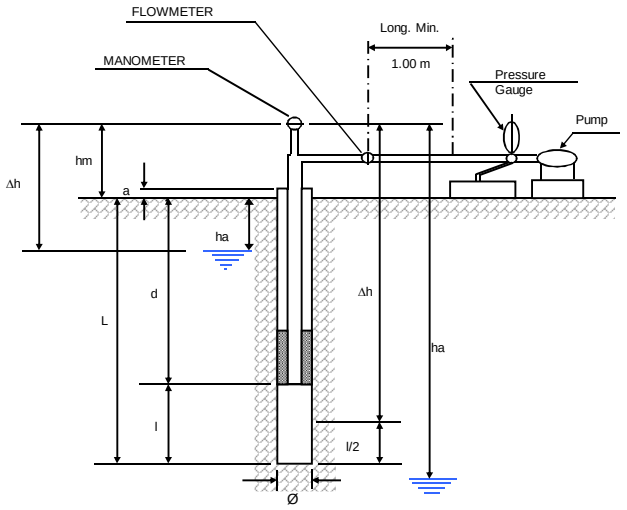
VTR — Analysis

GRB — 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:** (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	6.40	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 = Bars 1.15		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

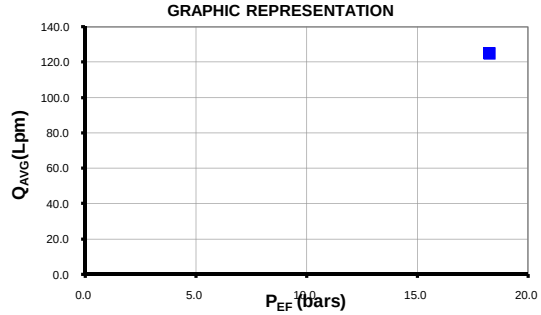
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : 3.7E-05 **m/s**

$$P_{EF} = P_M - \Delta p + \Delta h / 10.197$$

GRAPHIC REPRESENTATION



OBSERVATIONS:

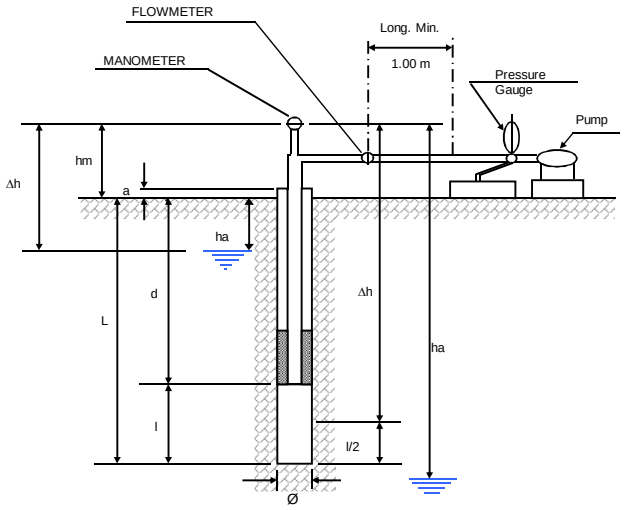
VTR — Analysis

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 = Bars 1.15		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

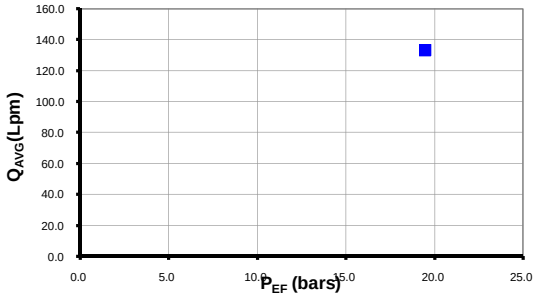
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : 3.9E-05 m/s

$$P_{EF} = P_M - \Delta p + \Delta h / 10.197$$

GRAPHIC REPRESENTATION



OBSERVATIONS:

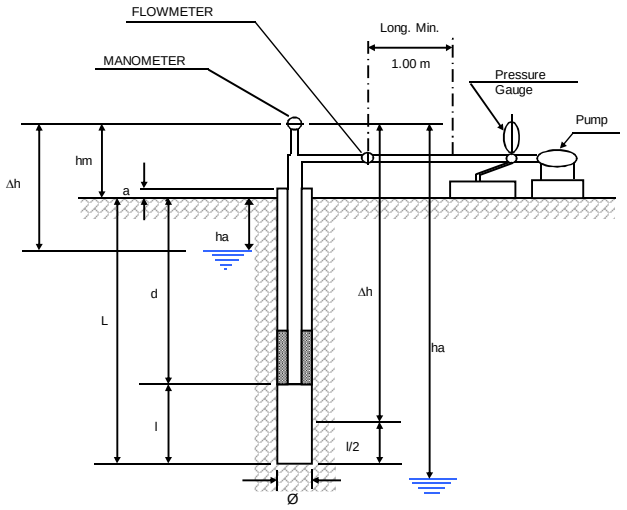
VTR — Analysis

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:** (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	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})		

	Bars		Bars		Bars		Bars		Bars	
	P_M =	1.04	$2/3P_M$ =		P_M =		$2/3P_M$ =		$1/3P_M$ =	
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

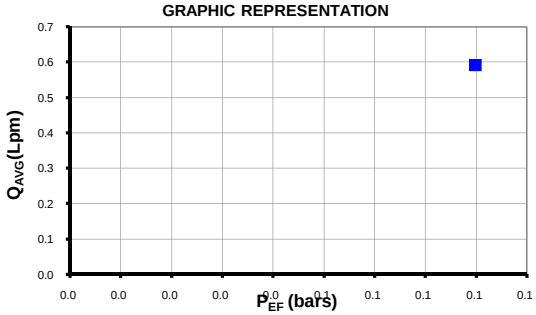
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : 1.7E-07 **m/s**

$$P_{EF} = P_M - \Delta p + \Delta h / 10.197$$

GRAPHIC REPRESENTATION



OBSERVATIONS:

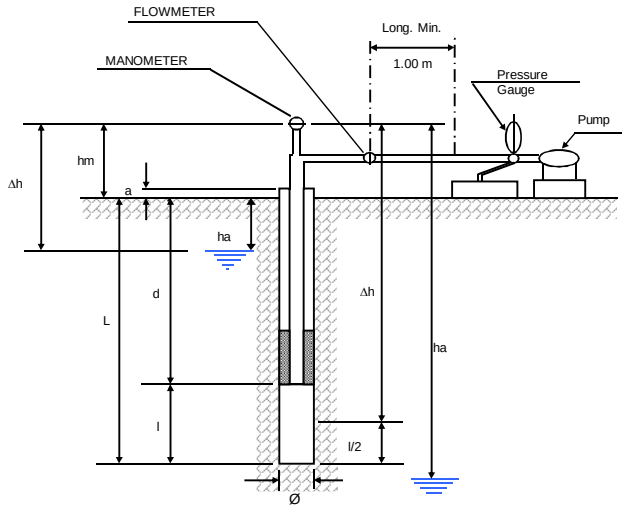
VTR — Analysis

GRB — Check

Golder Associates Limited

WATER PRESSURE TEST
CONTACT - PRIOR TO INJECTION

HOLE Nº	60+168.5	**TEST Nº**	1	**North. COORD:**	
PROJECT :	East Dike Grouting	**TEST DEPTH :**	8.20 to 9.20 m.	**East. COORD:**	
LOCATION:	Meadowbank	**DATE:**	07/03/2009	**START:** 8:40 **FINISH:** 8:53	**INCLINATION:** 90
PROJECT Nº :	07-1413-0074 / 2200 / ****			**Minutes:** 0:13	**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	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})		

	Bars		Bars		Bars		Bars		Bars	
	P_M =	1.04	2/3P_M =		P_M =		2/3P_M =		1/3P_M =	
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

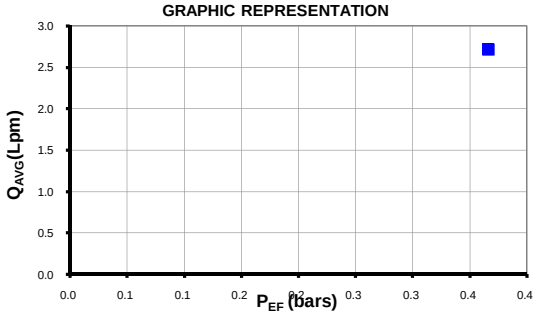
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : 7.9E-07 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$

GRAPHIC REPRESENTATION



OBSERVATIONS:

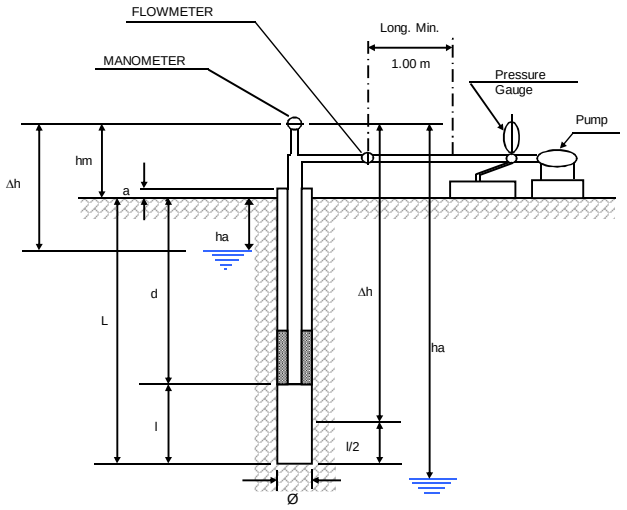
VTR
Analysis

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:** (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	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 =	Bars 1.04	**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

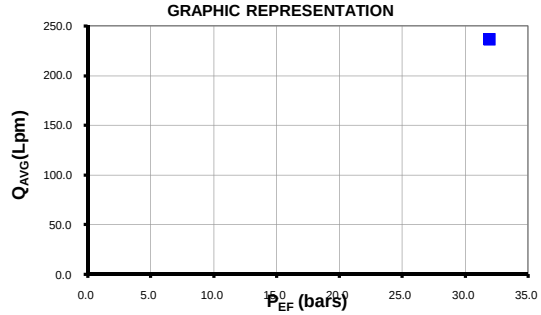
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : 6.9E-05 m/s

$$P_{EF} = P_M - \Delta p + \Delta h / 10.197$$

GRAPHIC REPRESENTATION



OBSERVATIONS:

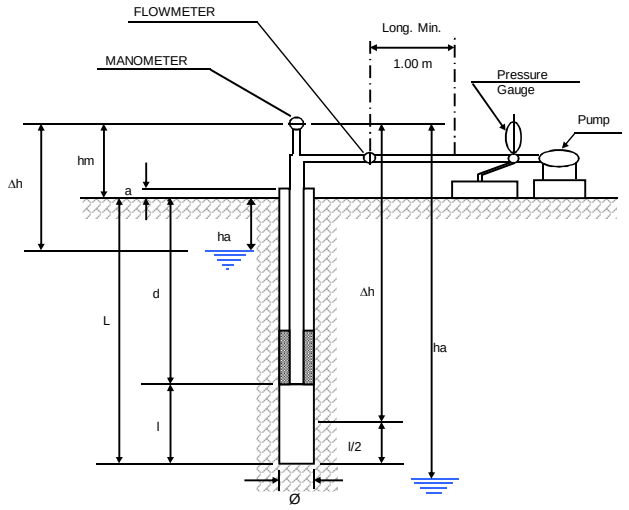
VTR — Analysis

GRB — 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:** (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	7.70	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})		

	Bars		Bars		Bars		Bars		Bars	
	P_M =	1.02	2/3P_M =		P_M =		2/3P_M =		1/3P_M =	
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

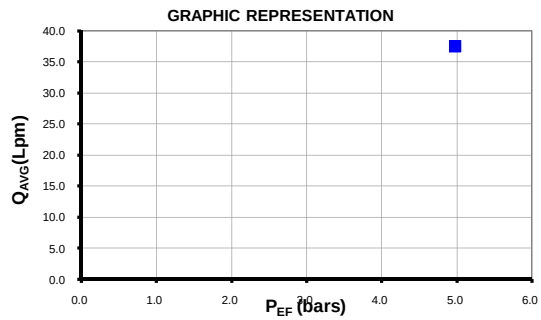
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : 1.1E-05 **m/s**

$$P_{EF} = P_M - \Delta p + \Delta h / 10.197$$

GRAPHIC REPRESENTATION



OBSERVATIONS:

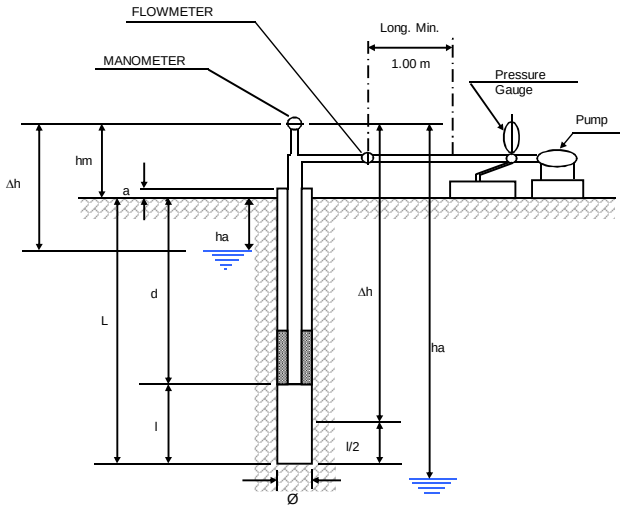
VTR
Analysis

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})		

	Bars		Bars		Bars		Bars		Bars
	P_M = 1.02		$2/3P_M$ =		P_M =		$2/3P_M$ =		$1/3P_M$ =
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

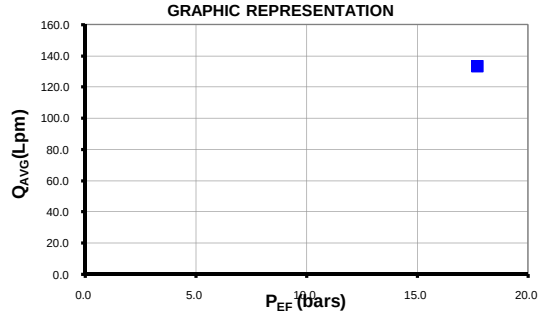
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : 3.9E-05 m/s

$$P_{EF} = P_M - \Delta p + \Delta h / 10.197$$

GRAPHIC REPRESENTATION



OBSERVATIONS:

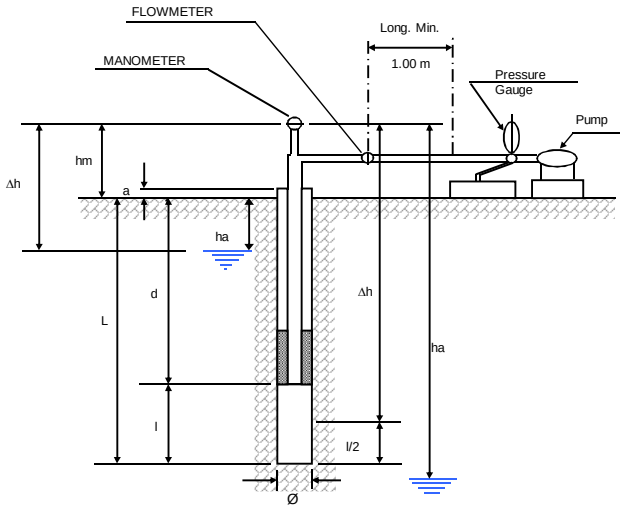
VTR — Analysis

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 = Bars 1.10		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

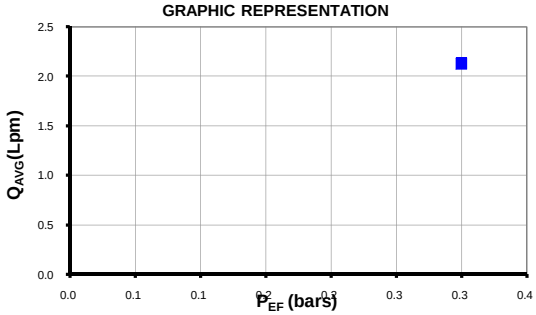
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : 6.2E-07 **m/s**

$$P_{EF} = P_M - \Delta p + \Delta h / 10.197$$

GRAPHIC REPRESENTATION



OBSERVATIONS:

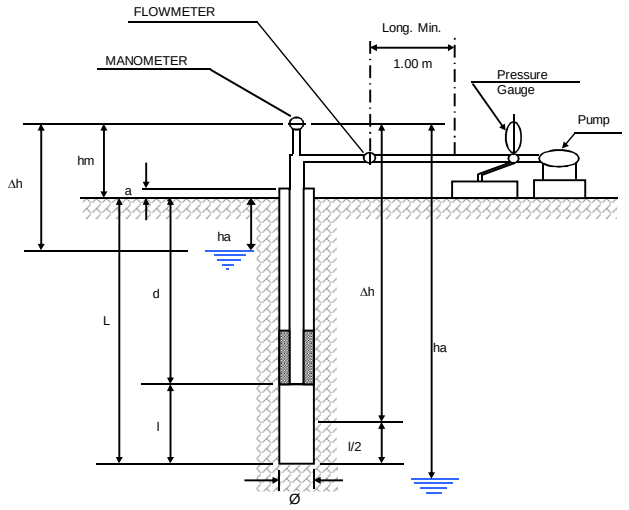
VTR
Analysis

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 to 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:** (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	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 = Bars 1.04		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

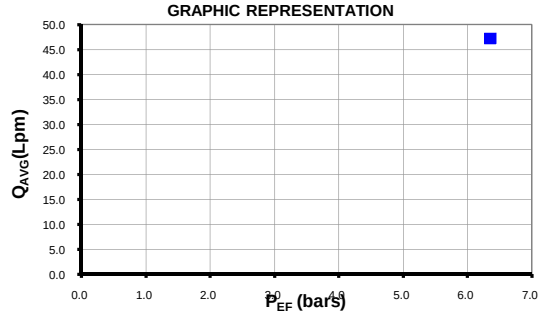
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : 1.4E-05 **m/s**

$P_{EF} = P_M - \Delta p + \Delta h / 10.197$

GRAPHIC REPRESENTATION



OBSERVATIONS:

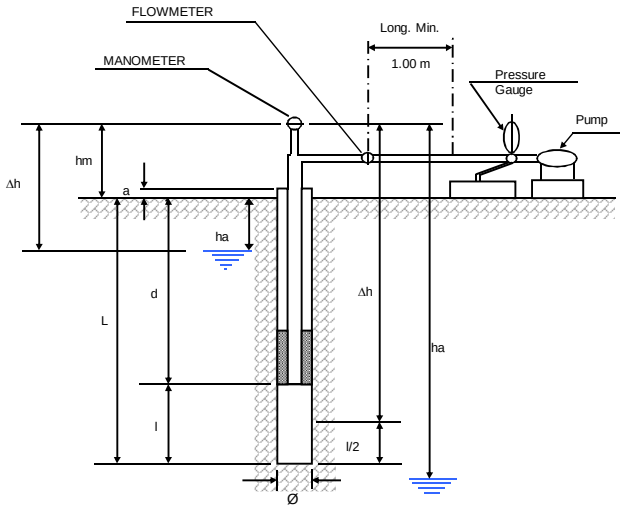
VTR — Analysis

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:** (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	6.00	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 =	Bars 1.03	**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

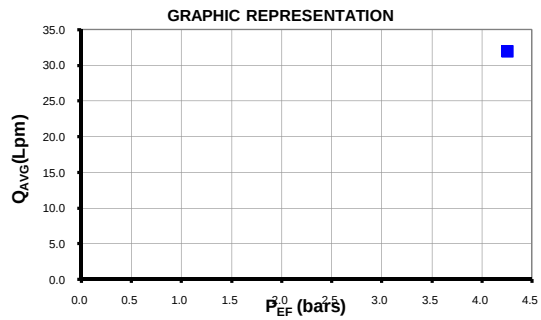
$$K\ (m/s) = \frac{1.634E^{-4} \times Q\ (Lpm) \times 1m}{2\pi \times Ø(cm) \times P_{EF}\ (bar) \times l\ (m)}$$

$$\text{where: } 1.634E^{-4} = \frac{1000cm^3 \times min \times bar \times m}{60sec \times L \times 1019.7162\ cmH_2O \times 100cm}$$

K (PERMEABILITY) : 9.3E-06 m/s

$$P_{EF} = P_M - \Delta p + \Delta h / 10.197$$

GRAPHIC REPRESENTATION



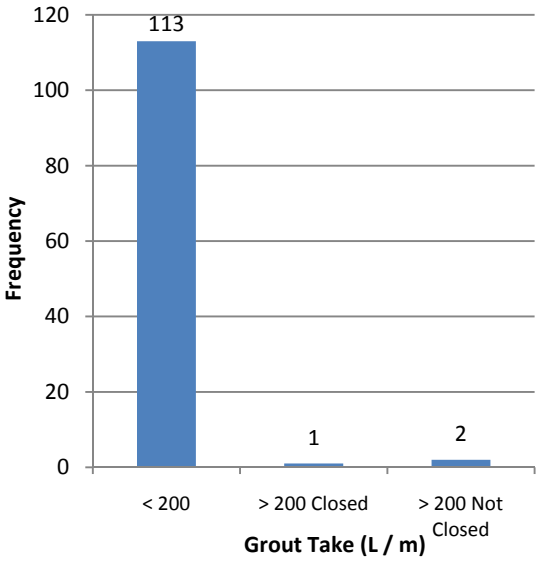
OBSERVATIONS:

VTR — Analysis

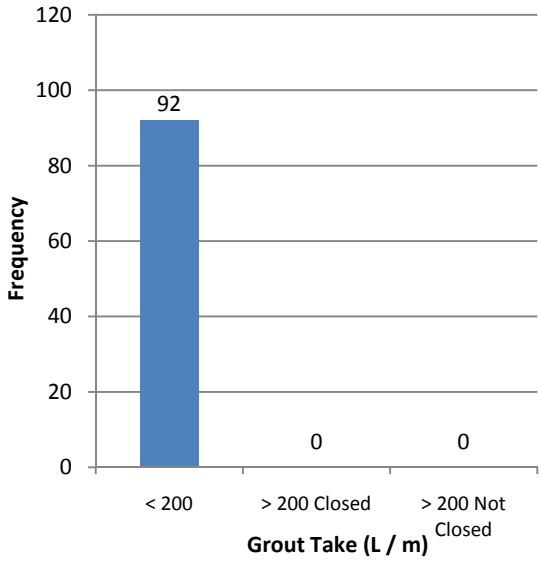
GRB — Check

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

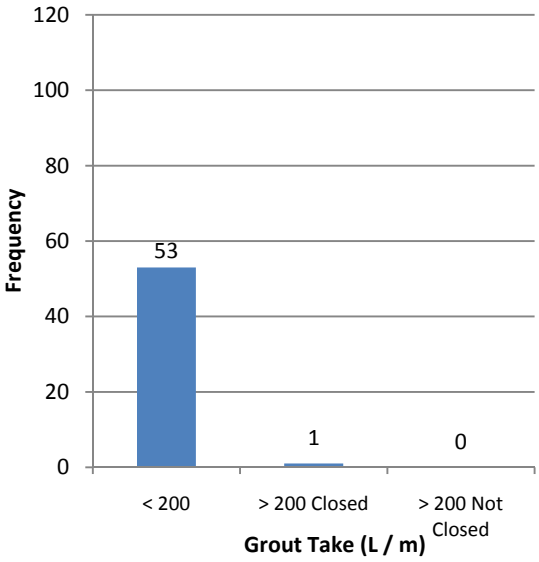
PRIMARY: STAGE 1



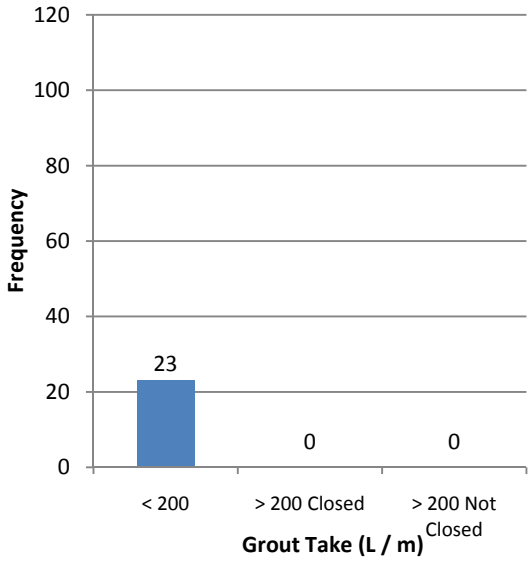
SECONDARY: STAGE 1



TERTIARY: STAGE 1



QUATERNARY: STAGE 1



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) 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

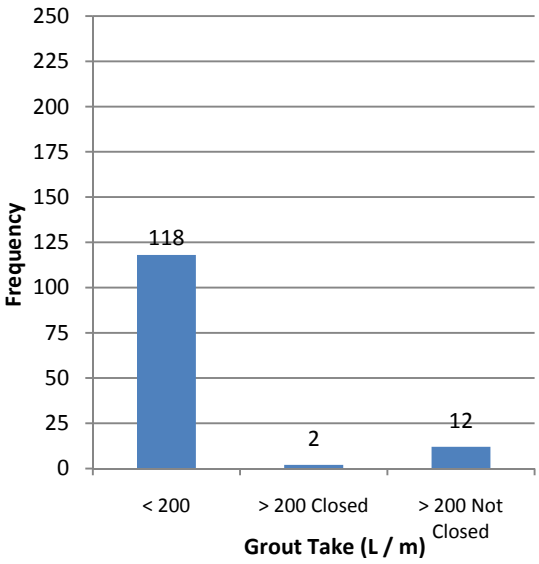
GROUND IMPROVEMENT ACHIEVED EAST DIKE - STAGE 1

Golder Associates

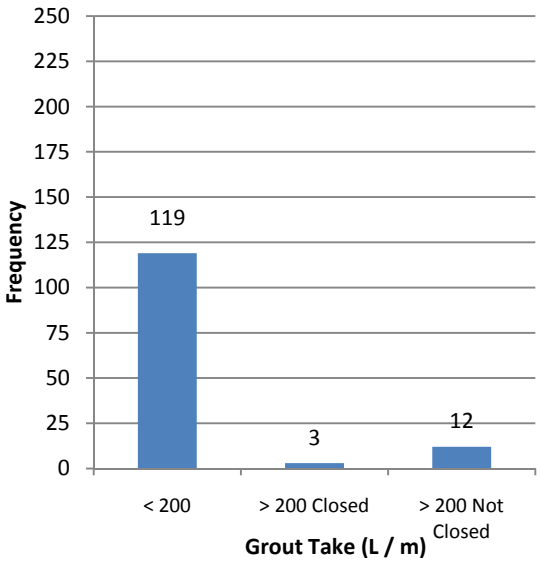
PROJECT No. 07-1413-0074			PHASE / TASK No.		
DESIGN	GRB	21MAY09	SCALE NTS		REV.
CADD	RCHU	21MAY09			
CHECK	GRB	21MAY09			
REVIEW					

FIGURE E6-1

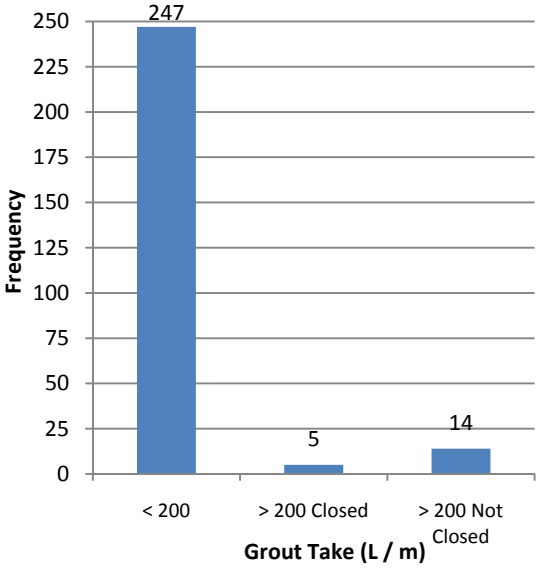
PRIMARY: STAGE 2



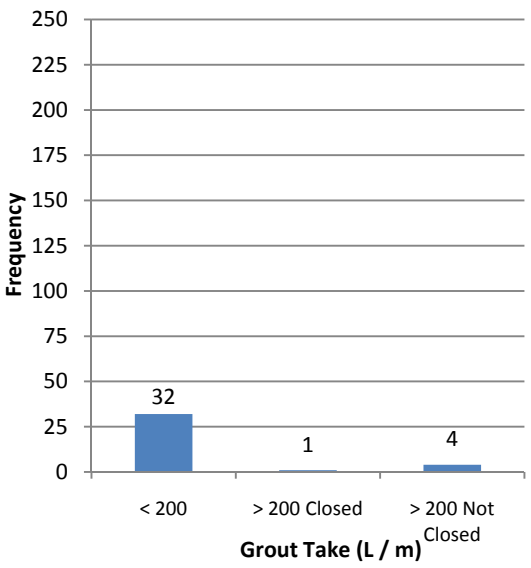
SECONDARY: STAGE 2



TERTIARY: STAGE 2



QUATERNARY: STAGE 2



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) 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

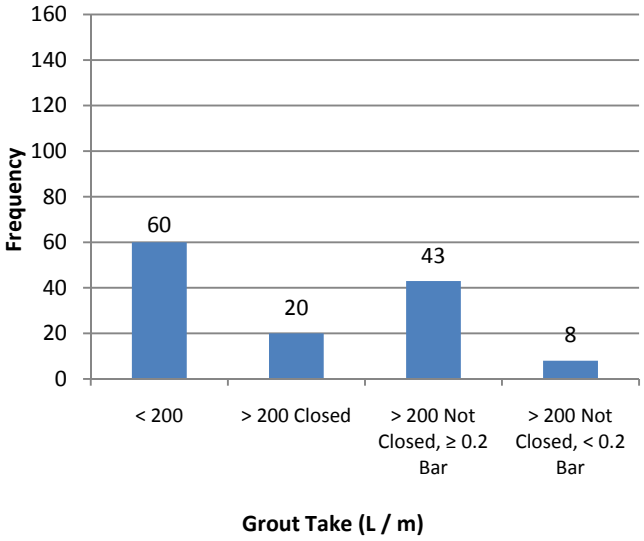
Golder Associates

PROJECT No. 07-1413-0074			PHASE / TASK No.	
DESIGN	GRB	21MAY09	SCALE NTS	REV.
CADD	RCHU	21MAY09		
CHECK	GRB	21MAY09	FIGURE E6-2	
REVIEW				

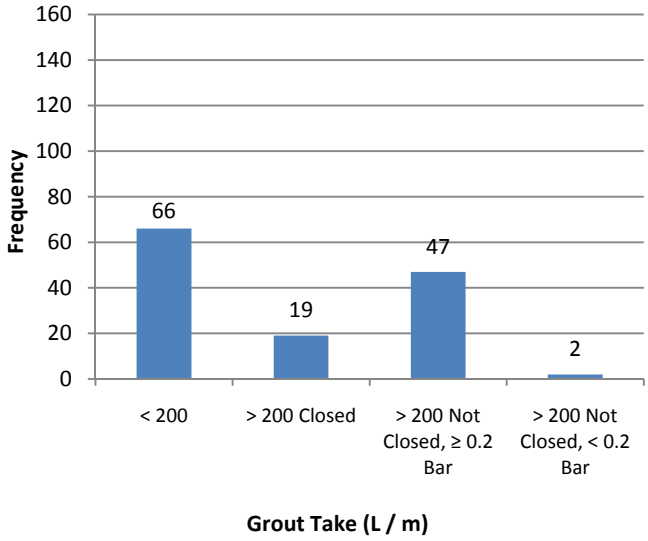
REVISION DATE: 21 / 05 / 09 BY: RCHU FILE: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2800 As-Built Report\Appendix E - East Dike Grouting\E6 - Ground Improvement Achieved\Figure E6-1-4.ppt

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

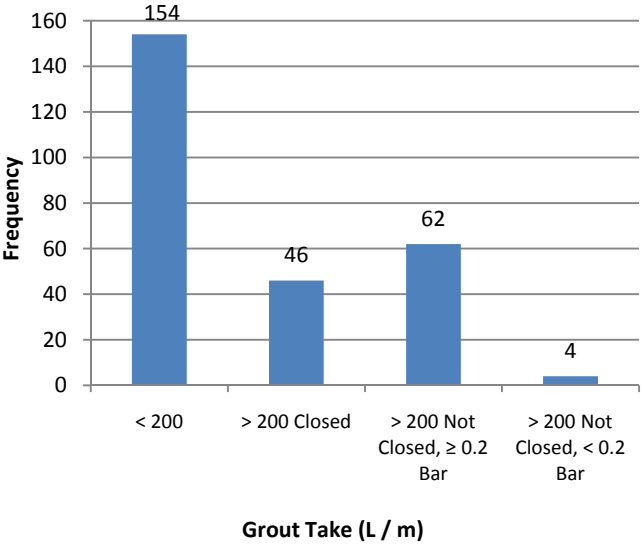
PRIMARY: STAGE 3



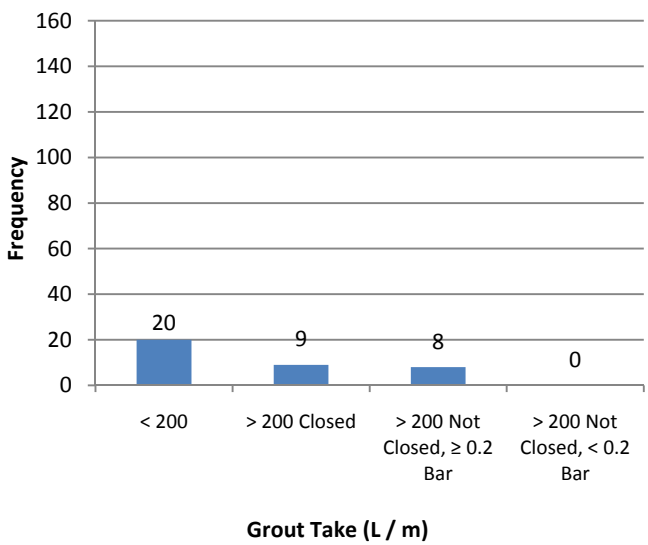
SECONDARY: STAGE 3



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

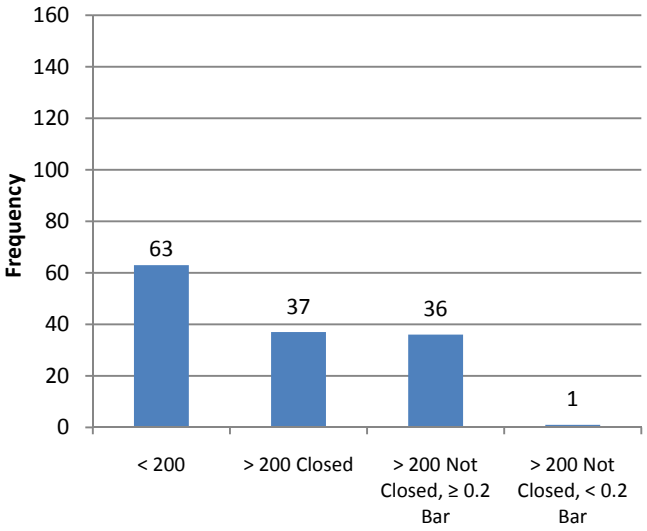
TITLE

GROUND IMPROVEMENT ACHIEVED EAST DIKE - STAGE 3

Golder Associates

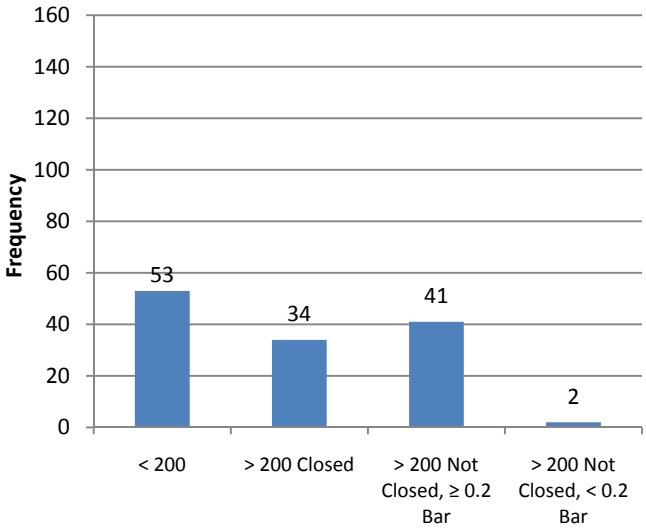
PROJECT No. 07-1413-0074			PHASE / TASK No.	
DESIGN	GRB	21MAY09	SCALE NTS	REV.
CADD	RCHU	21MAY09		
CHECK	GRB	21MAY09	FIGURE E6-3	
REVIEW				

PRIMARY: STAGE 4



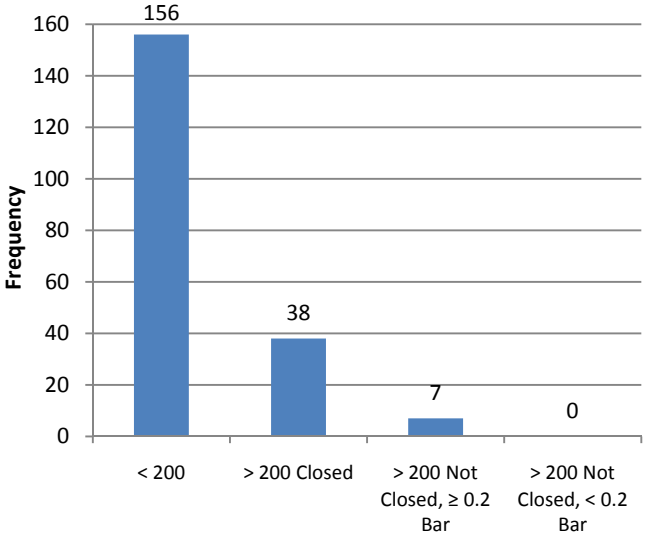
Grout Take (L / m)

SECONDARY: STAGE 4



Grout Take (L / m)

TERTIARY: STAGE 4



Grout Take (L / m)

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	FIGURE E6-4		
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

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

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AScT

Document Number.: ELL0130I

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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 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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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 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
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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-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

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-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 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
2272A
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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-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

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Certified Science Technologists and Technicians of British Columbia Applied
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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-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, $P(kPa) = C.F. \times (Li - Lc) - [Tk (Ti - Tc)] + [0.10 (Bi - Bc)]$
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	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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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
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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. 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	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 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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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:	**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, $P(kPa) = C.F. \times (Li - Lc) - [Tk (Ti - Tc)] + [0.10 (Bi - Bc)]$
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	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

Applied Science Technologists and Technicians of British Columbia 22724 A.C. ALCULLEY 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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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:	**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

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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-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 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 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-1-2**	
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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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-1-3**	
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

Certified 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-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

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

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-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
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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-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. 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	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 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:	**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 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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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-3-2
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 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:	**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 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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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 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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Document Number.: ELL0130I

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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:	**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

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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 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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Document Number.: ELL0130I

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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-2-2**	
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 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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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-2-3**	
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 Date: 23-Feb-09

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Document Number.: ELL0130I

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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:		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 Date: 23-Feb-09

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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

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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:	**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 Date: 23-Feb-09

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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 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-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

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This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Document Number.: ELL0130I

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-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 Date: 23-Feb-09

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Applied Technologists and Technicians of British Columbia
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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-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 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
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-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. 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	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 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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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 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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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 Date: 23-Feb-09

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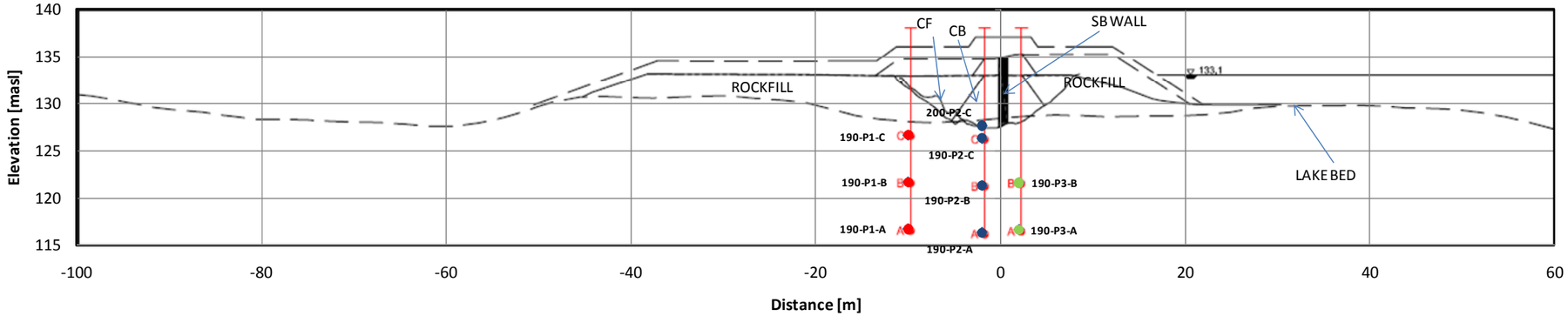
This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

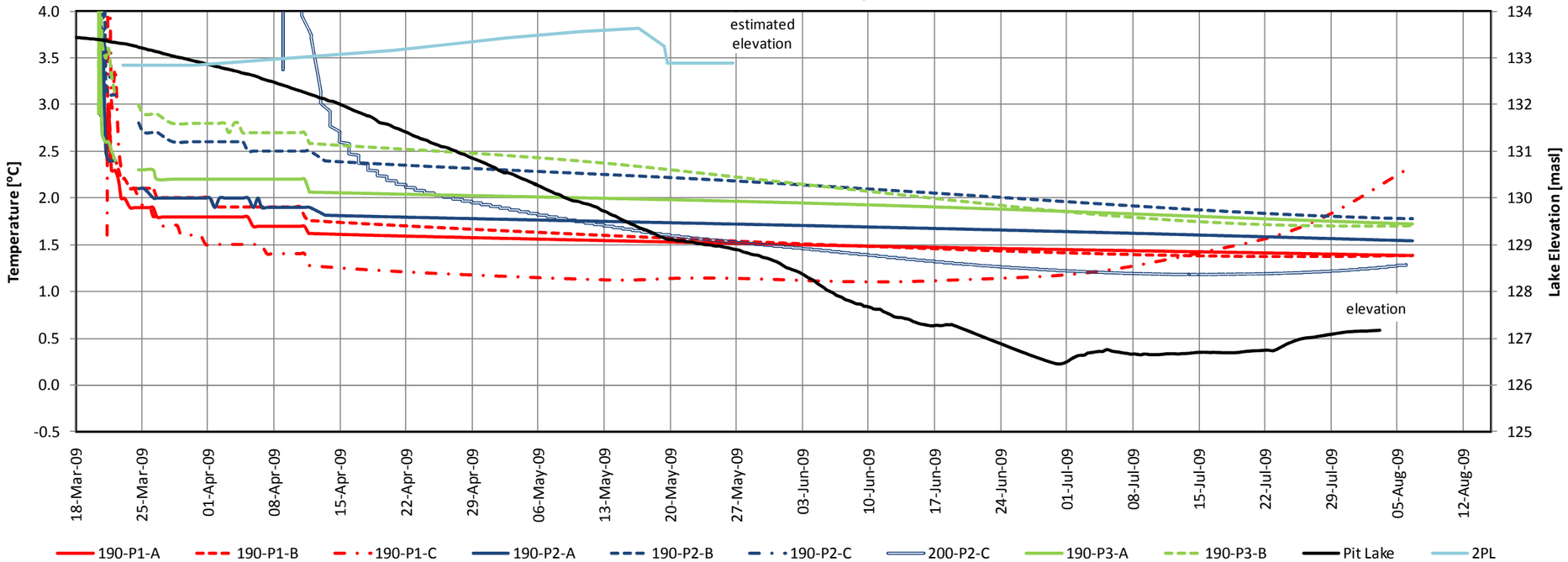
Document Number.: ELL0130I

MIG0106A

East Dike - Section 60+190
VW Piezometer Locations



East Dike - Section 60+190
VW Piezometer - Temperature



Note: Data provided by Agnico-Eagle Mines Limited.

PROJECT: AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

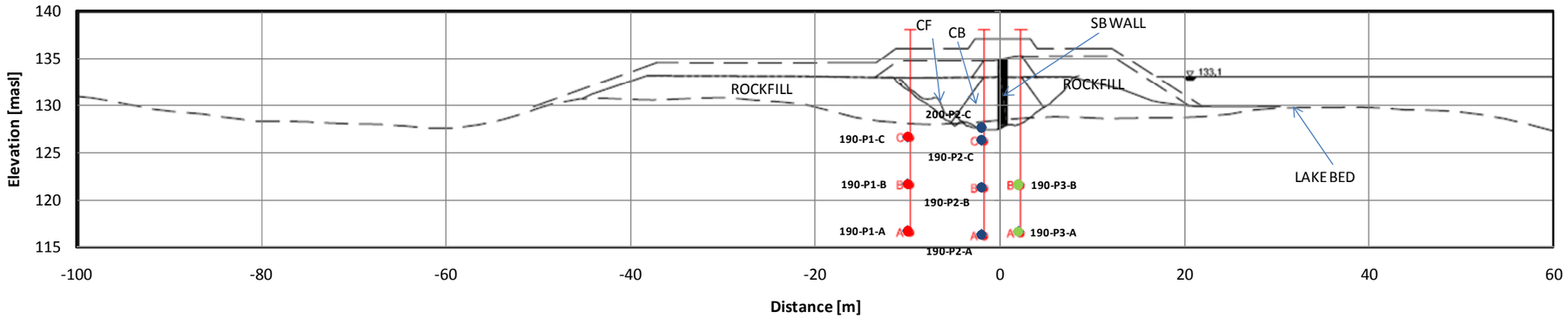
TITLE: EAST DIKE-SECION 60+190
VW PIEZOMETER-TEMPERATURE

Golder Associates

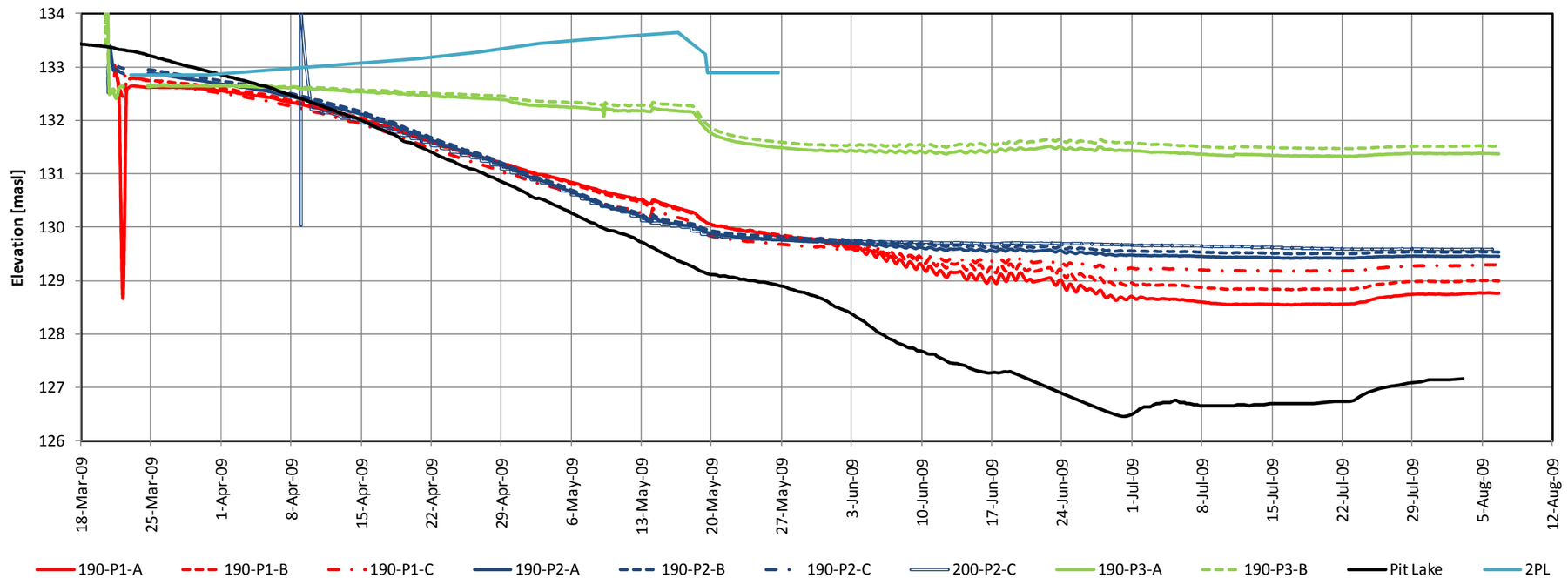
PROJECT No. 07-1413-0074			FILE No. ----	
DESIGN	BEW	10AUG09	SCALE NTS	REV.
CADD	JFC	10AUG09		
CHECK	--		FIGURE F-1	
REVIEW				

REVISION DATE: BY: FILE: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2200 East Dike Construction QAQC\FIELD DATA

East Dike - Section 60+190
VW Piezometer Locations



East Dike - Section 60+190
VW Piezometer - Total Head



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

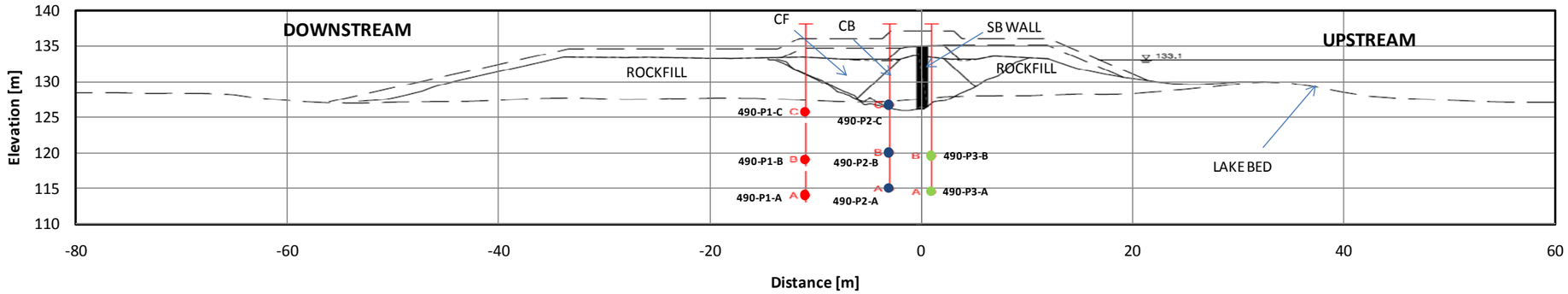
Golder Associates

PROJECT No. 07-1413-0074			FILE No. ----	
DESIGN	BEW	10AUG09	SCALE NTS	REV.
CADD	JFC	10AUG09		
CHECK	--			
REVIEW				

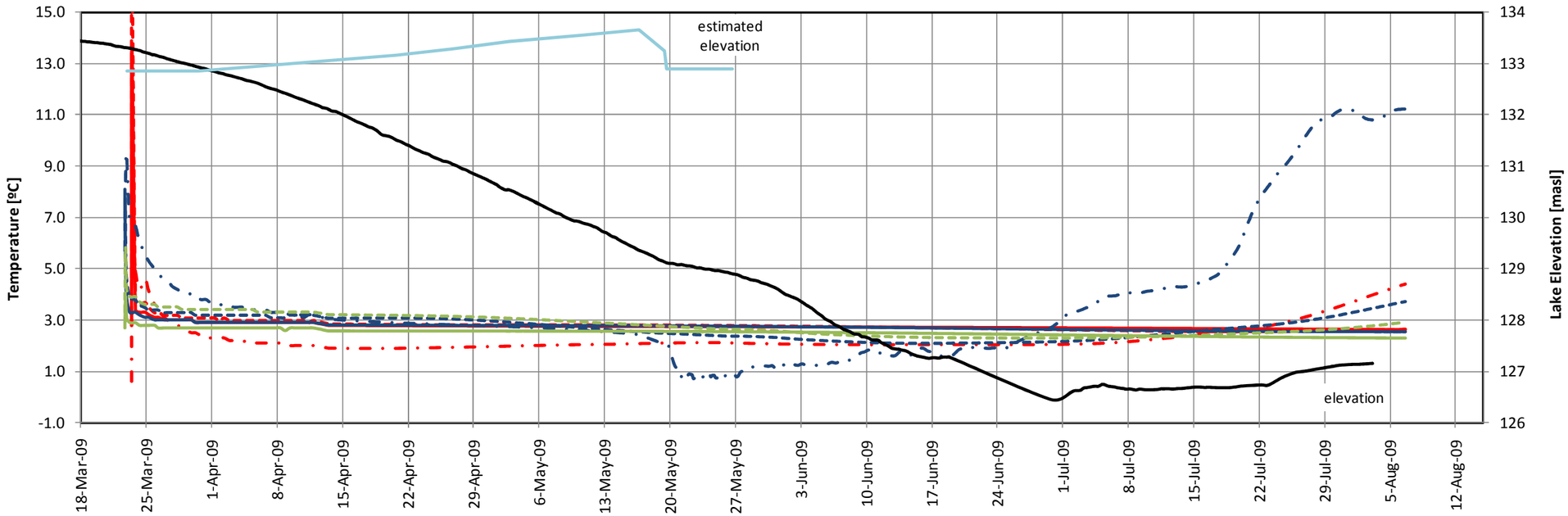
FIGURE F-2

REVISION DATE: BY: FILE: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2200 East Dike Construction QAQC\FIELD DATA

East Dike - Section 60+490
VW Piezometer Locations



East Dike - Section 60+490
VW Piezometer - Temperature



Note: Data provided by Agnico-Eagle Mines Limited.

PROJECT: AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

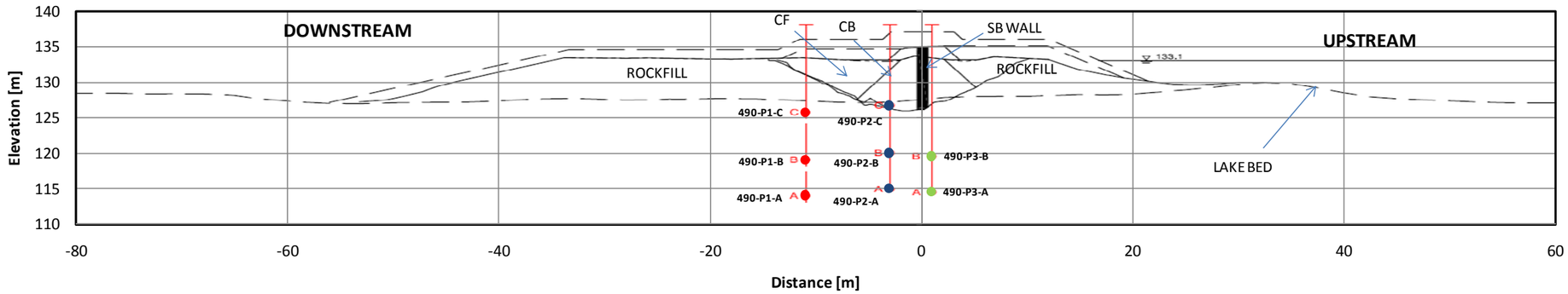
TITLE: EAST DIKE-SECION 60+490
VW PIEZOMETER-TEMPERATURE

PROJECT No. 07-1413-0074			FILE No. ----		
DESIGN	BEW	10AUG09	SCALE NTS		REV.
CADD	JFC	10AUG09	FIGURE F-3		
CHECK	--				
REVIEW					

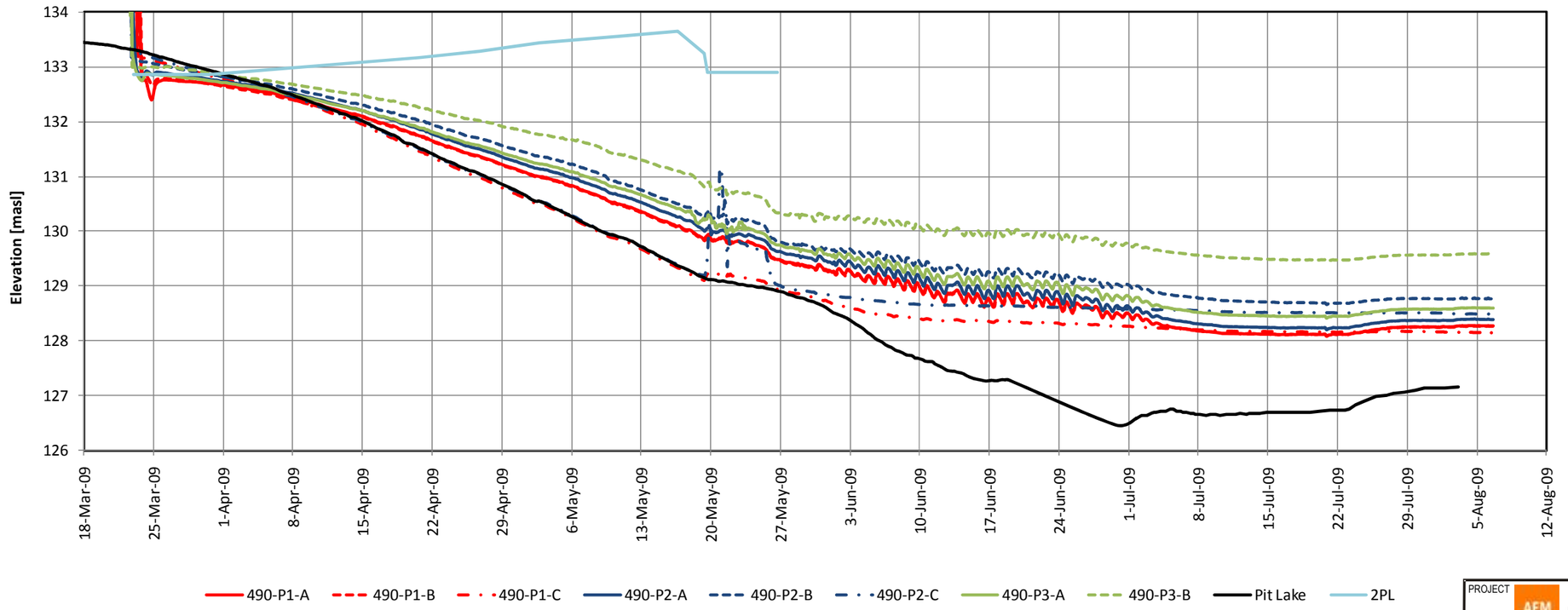
Golder Associates

REVISION DATE: BY: FILE: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2200 East Dike Construction QAQC\FIELD DATA

East Dike - Section 60+490
VW Piezometer Locations



East Dike - Section 60+490
VW Piezometer - Total Head



Note: Data provided by Agnico-Eagle Mines Limited.

PROJECT: AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

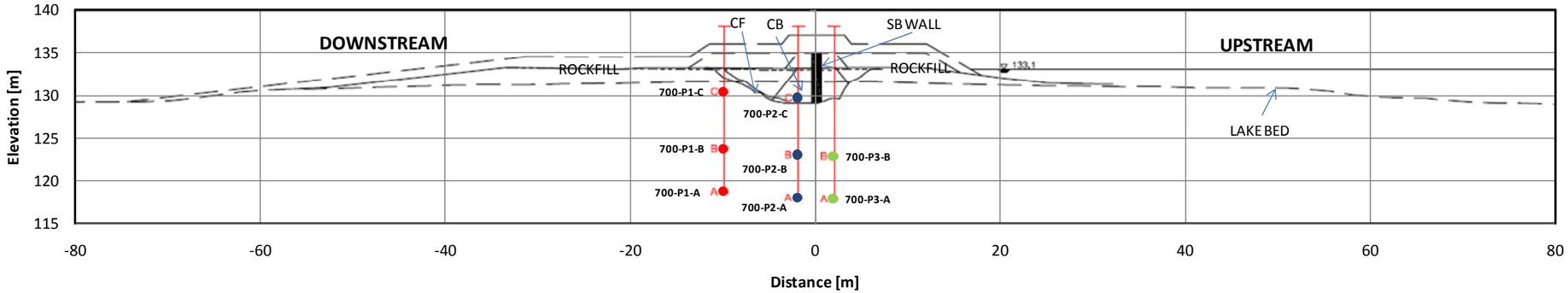
TITLE: EAST DIKE-SECION 60+490
VW PIEZOMETER-TOTAL HEAD

Golder Associates

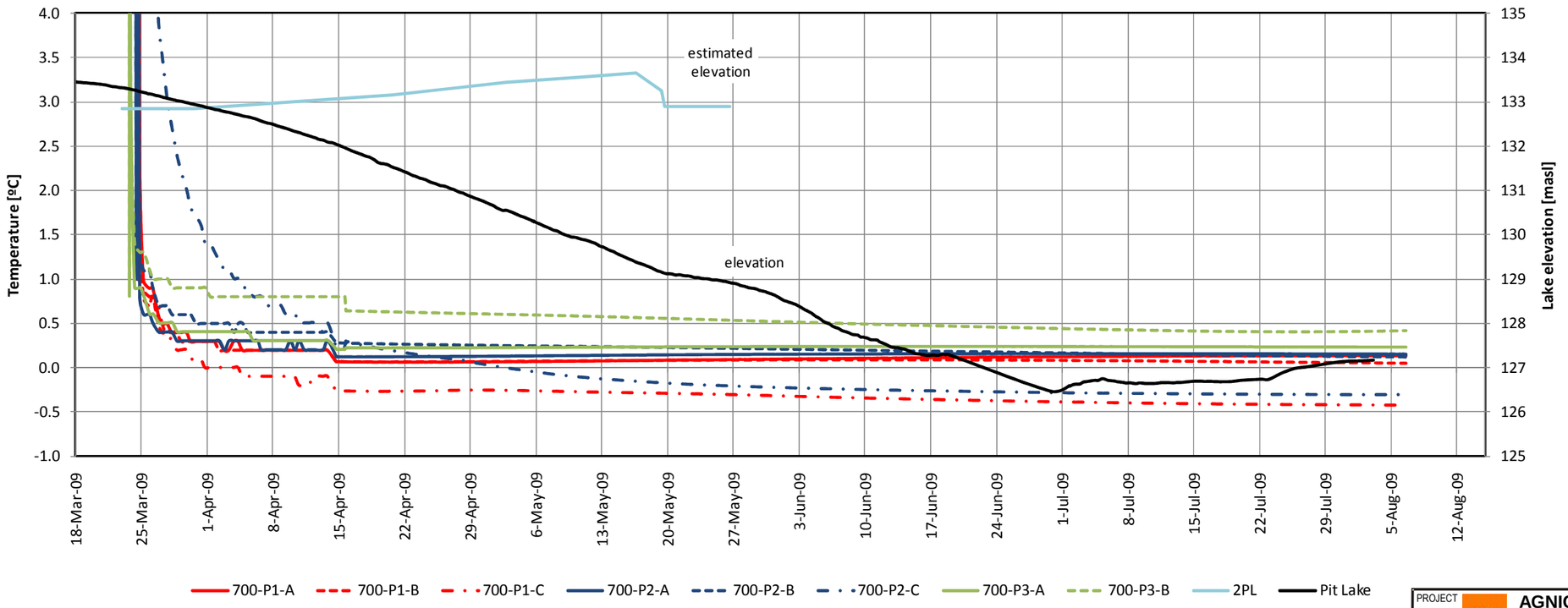
PROJECT No. 07-1413-0074			FILE No. ----	
DESIGN	BEW	10AUG09	SCALE NTS	REV.
CADD	JFC	10AUG09		
CHECK	--		FIGURE F-4	
REVIEW				

REVISION DATE: BY: FILE: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2200 East Dike Construction QAQC\FIELD DATA

East Dike - Section 60+700
VW Piezometer Locations



East Dike - Section 60+700
VW Piezometer - Temperature



Note: Data provided by Agnico-Eagle Mines Limited.

PROJECT: AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

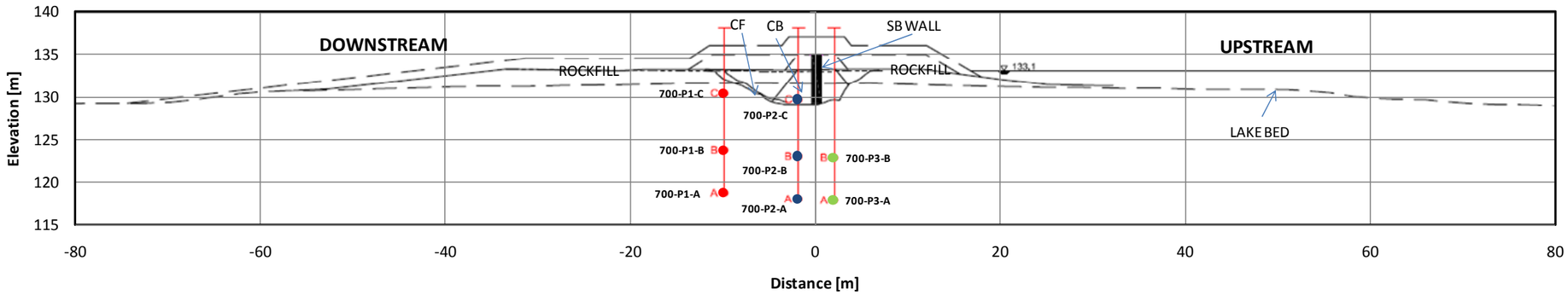
TITLE: EAST DIKE-SECION 60+700
VW PIEZOMETER-TEMPERATURE

PROJECT No. 07-1413-0074			FILE No. ----		
DESIGN	BEW	10AUG09	SCALE NTS	REV.	
CADD	JFC	10AUG09			
CHECK	--				
REVIEW					

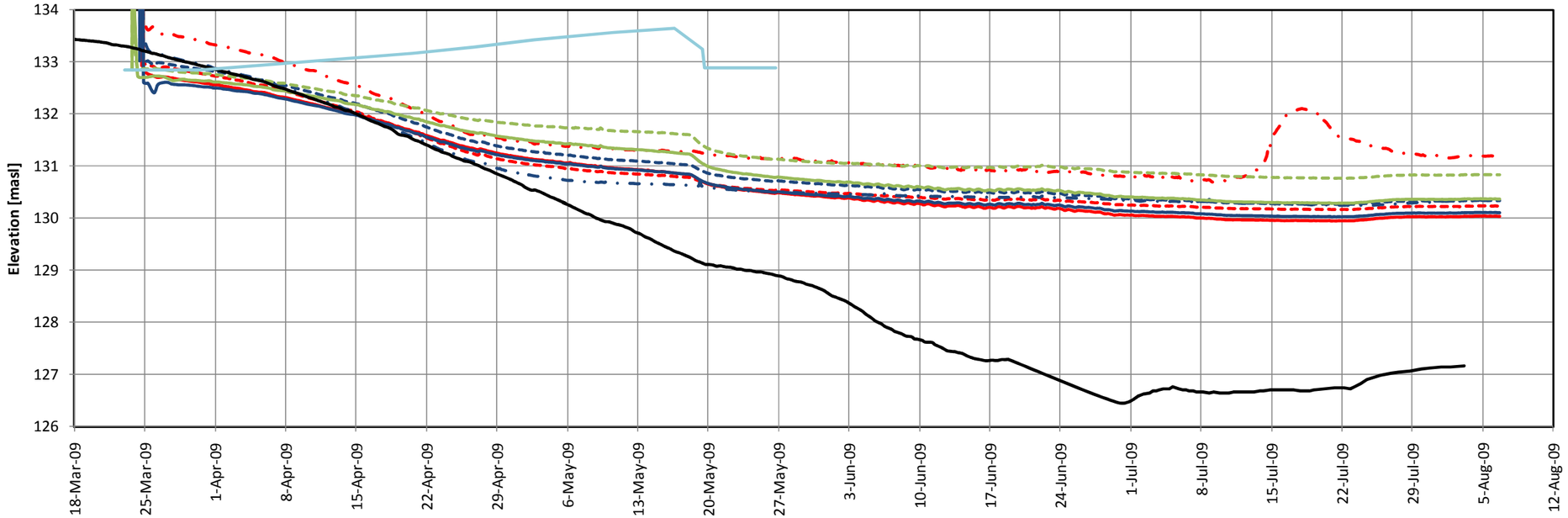
FIGURE F-5

REVISION DATE: BY: FILE: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2200 East Dike Construction QAQC\FIELD DATA

East Dike - Section 60+700
VW Piezometer Locations



East Dike Section 60+700
VW Piezometer - Total Head



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

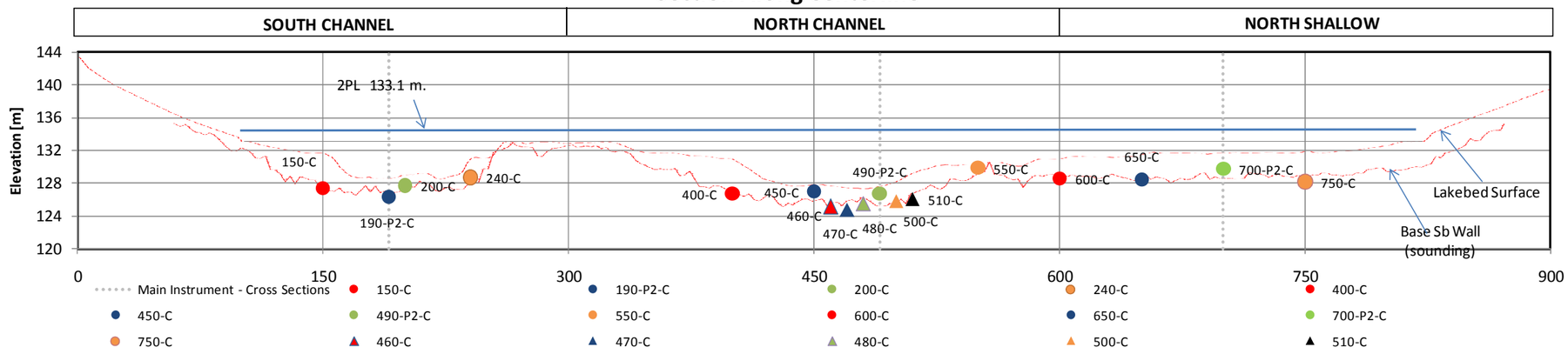
Golder Associates

PROJECT No. 07-1413-0074			FILE No. ----	
DESIGN	BEW	10AUG09	SCALE NTS	REV.
CADD	JFC	10AUG09		
CHECK	--			
REVIEW				

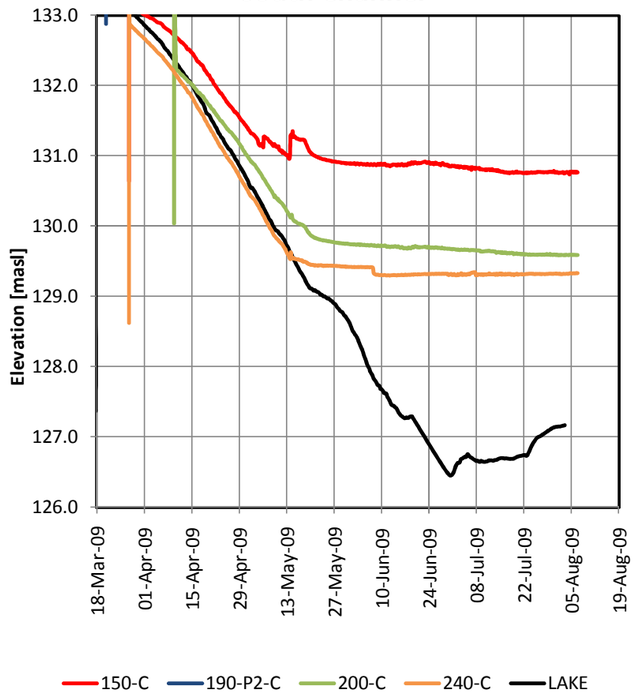
FIGURE F-6

REVISION DATE: BY: FILE: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2200 East Dike Construction QAQC\FIELD DATA

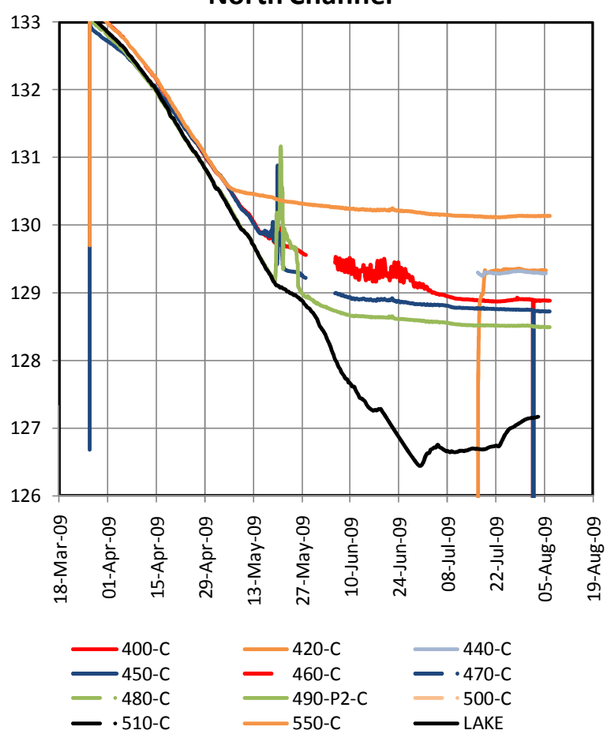
Section Along Centerline



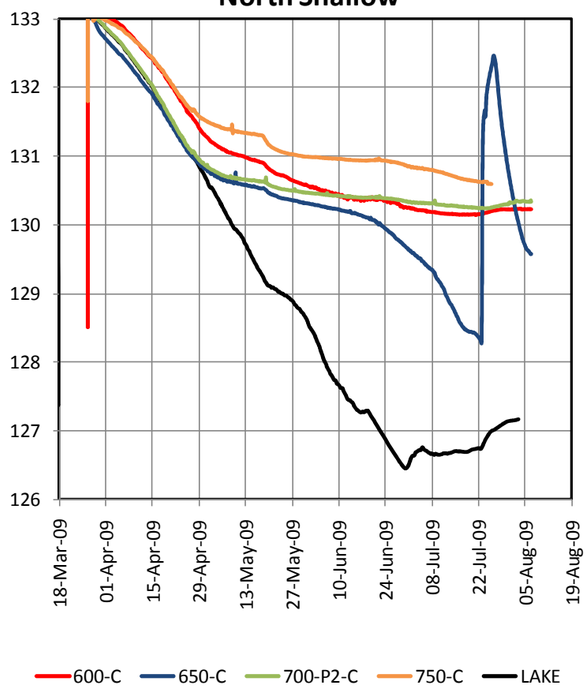
Total Head Along Centerline South Channel



Total Head Along Centerline North Channel



Total Head Along Centerline North Shallow



Note: Data provided by Agnico-Eagle Mines Limited.

PROJECT
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE
EAST DIKE
TOTAL HEAD ALONG CENTERLINE

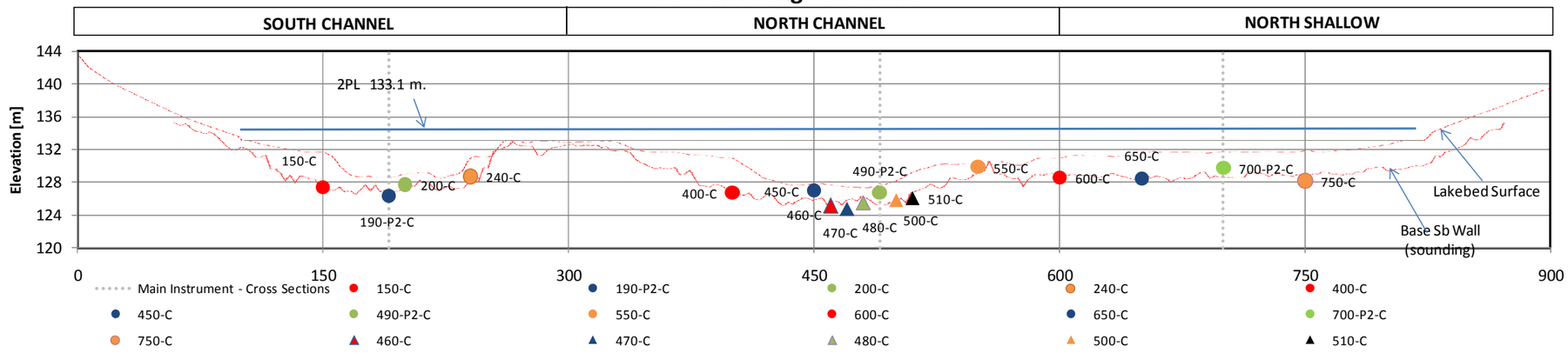
Golder Associates

PROJECT No. 07-1413-0074			FILE No. ----	
DESIGN	BEW	10AUG09	SCALE NTS	REV.
CADD	JFC	10AUG09		
CHECK	--			
REVIEW				

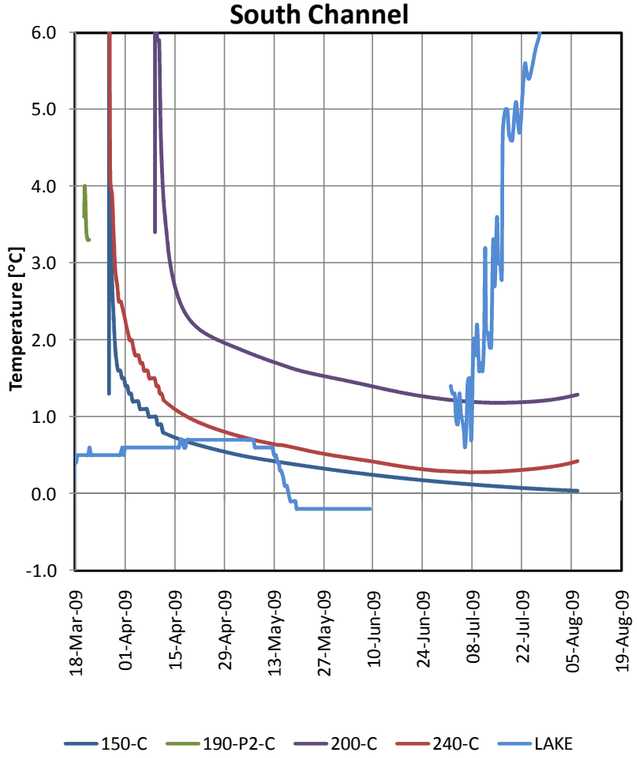
FIGURE F-7

REVISION DATE: BY: FILE: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2200 East Dike Construction QAQC\FIELD DATA

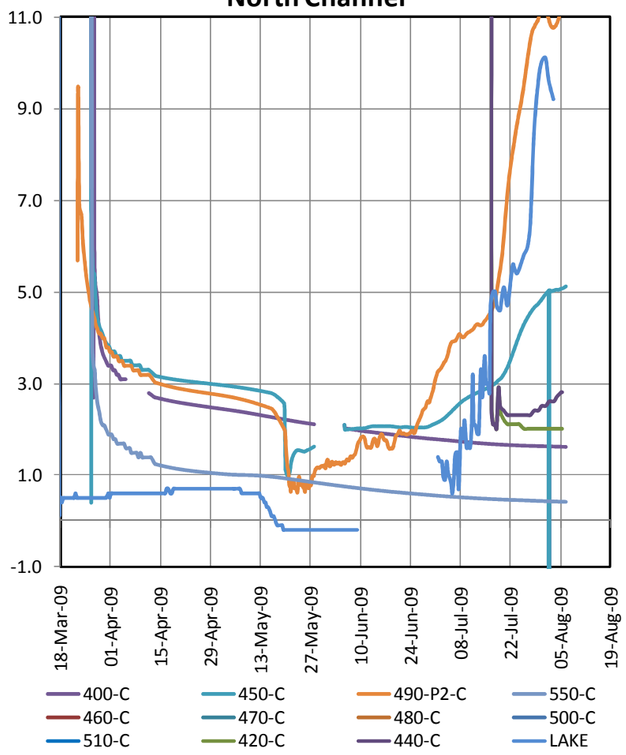
Section Along Centerline



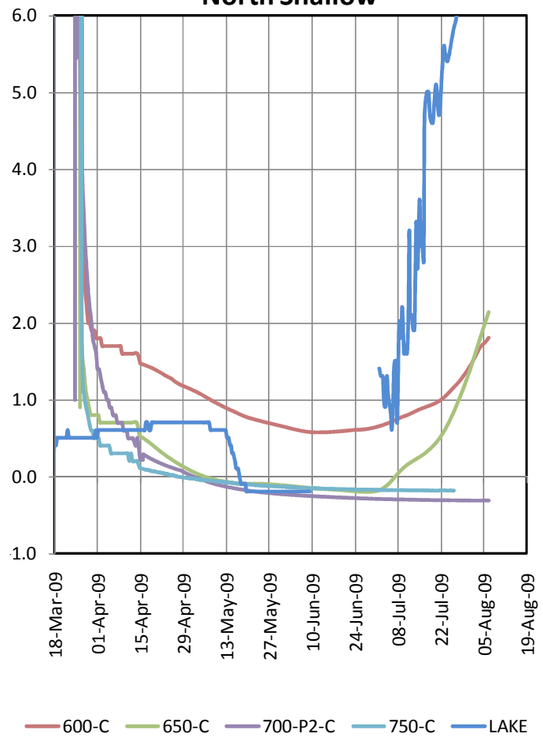
Temperature Along Centerline South Channel



Termperature Along Centerline North Channel



Temperature Along Centerline North Shallow



Note: Data provided by Agnico-Eagle Mines Limited.

PROJECT
AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

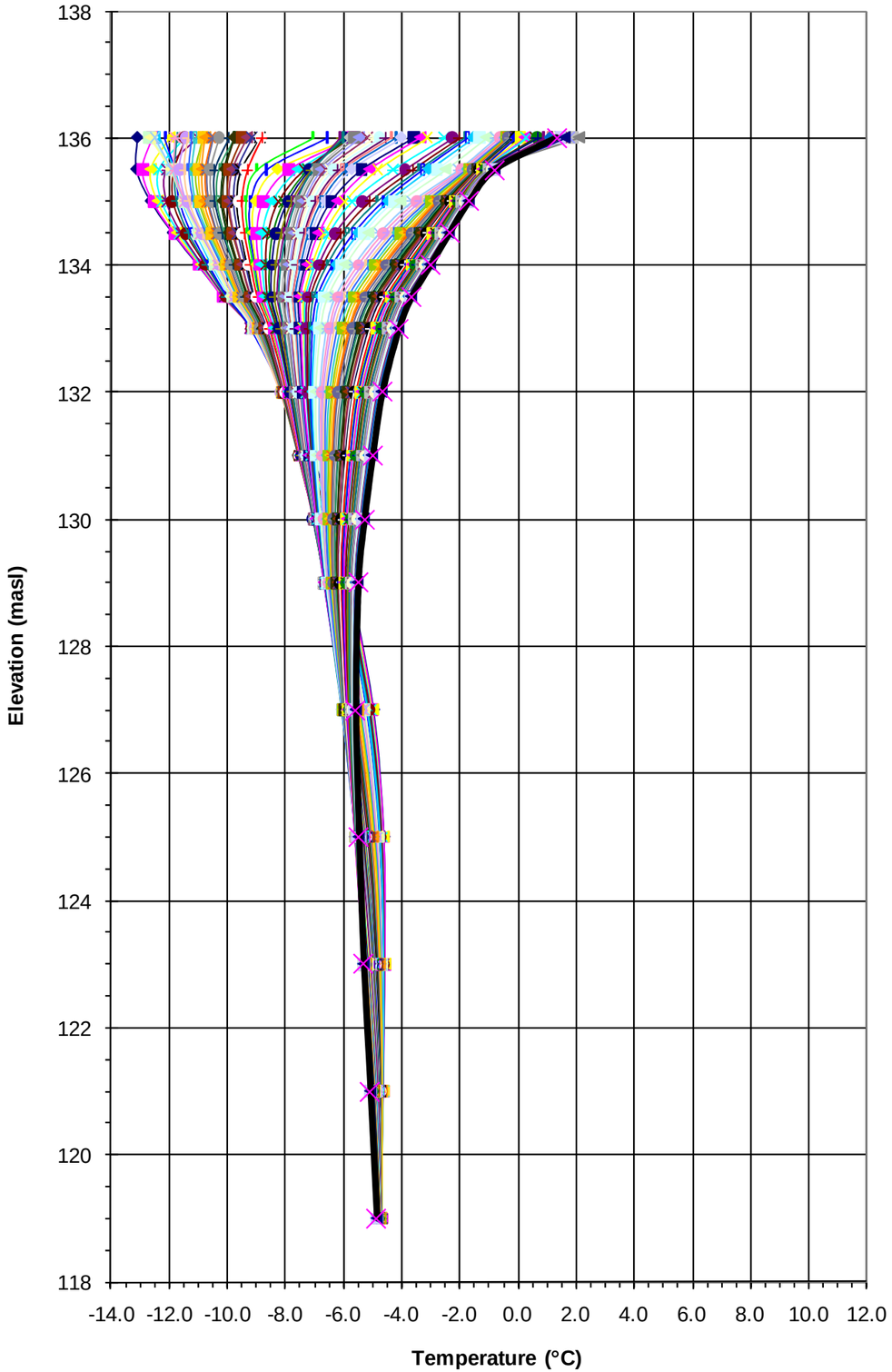
TITLE
EAST DIKE
TEMPERATURE ALONG CENTERLINE

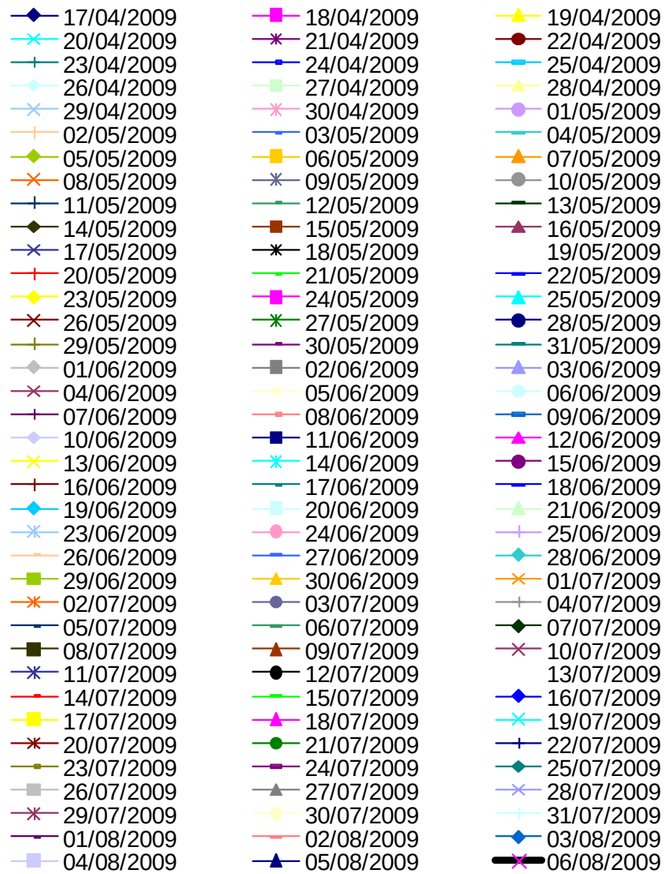
Golder Associates

PROJECT No. 07-1413-0074			FILE No. ----	
DESIGN	BEW	10AUG09	SCALE NTS	REV.
CADD	JFC	10AUG09		
CHECK	--			
REVIEW				

FIGURE F-8

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

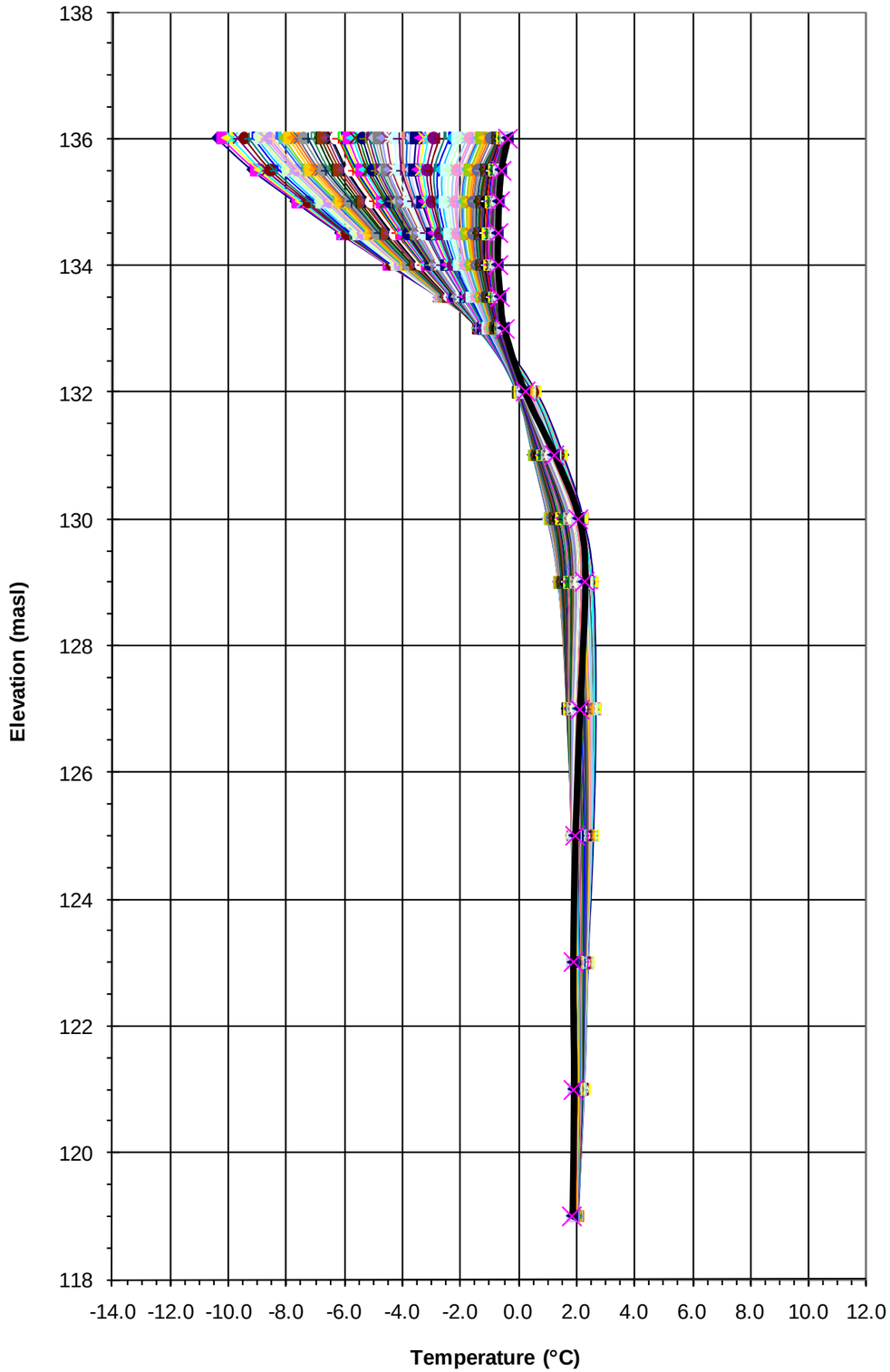
EAST DIKE
THERMISTOR DATA – TH92

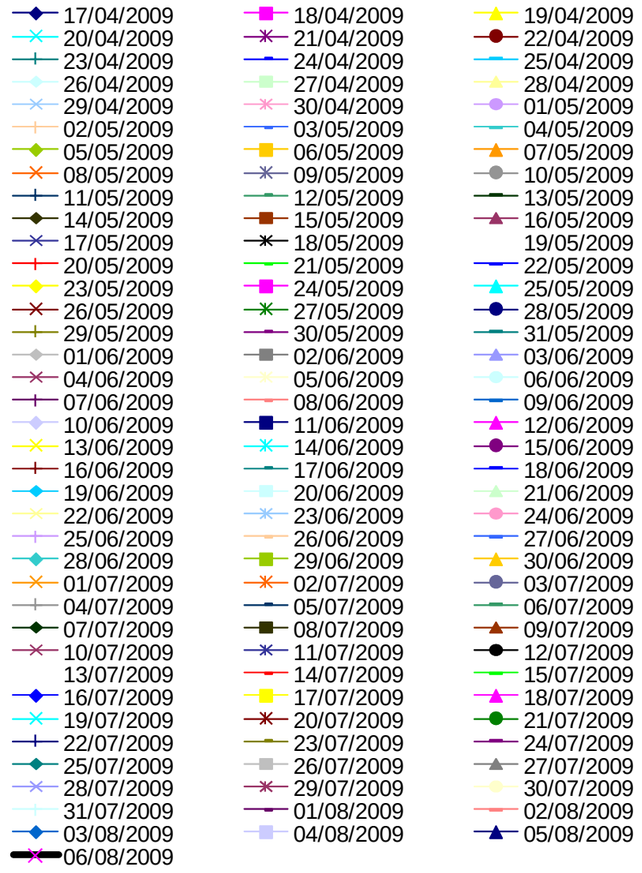
Golder Associates

PROJECT No. 07-1413-0074			FILE No. ----		
DESIGN	BEW	10AUG09	SCALE NTS		REV.
CADD	JFC	10AUG09			
CHECK	--				
REVIEW					

FIGURE F-9

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

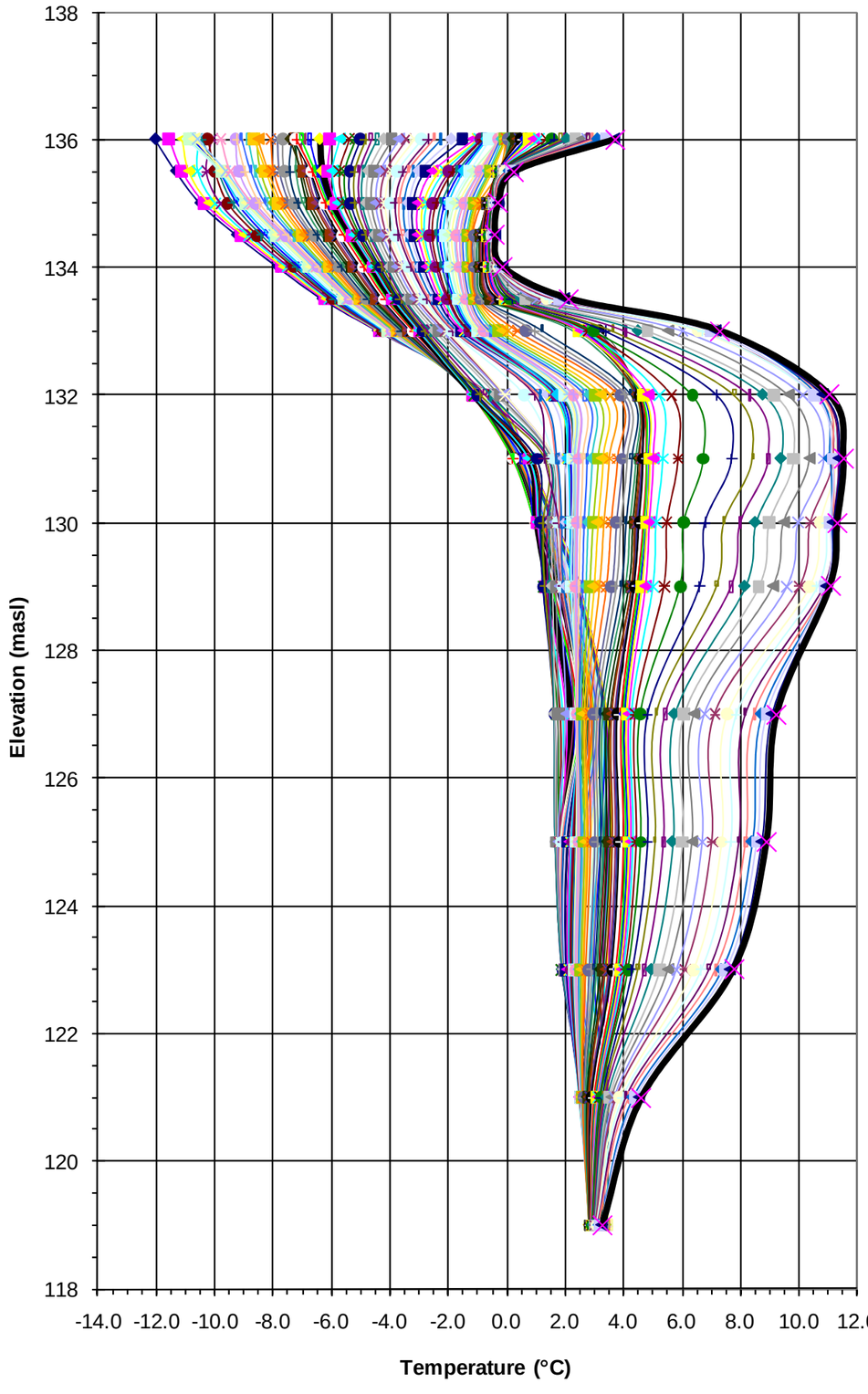
TITLE
EAST DIKE
THERMISTOR DATA – TH185

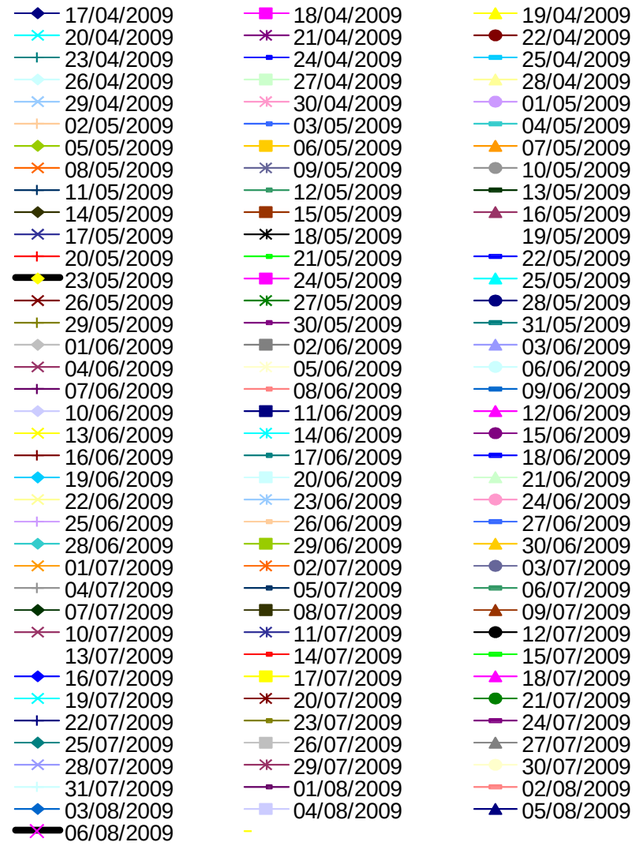
Golder Associates

PROJECT No. 07-1413-0074			FILE No. ----	
DESIGN	BEW	10AUG09	SCALE NTS	REV.
CADD	JFC	10AUG09		
CHECK	--			
REVIEW				

FIGURE F-10

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

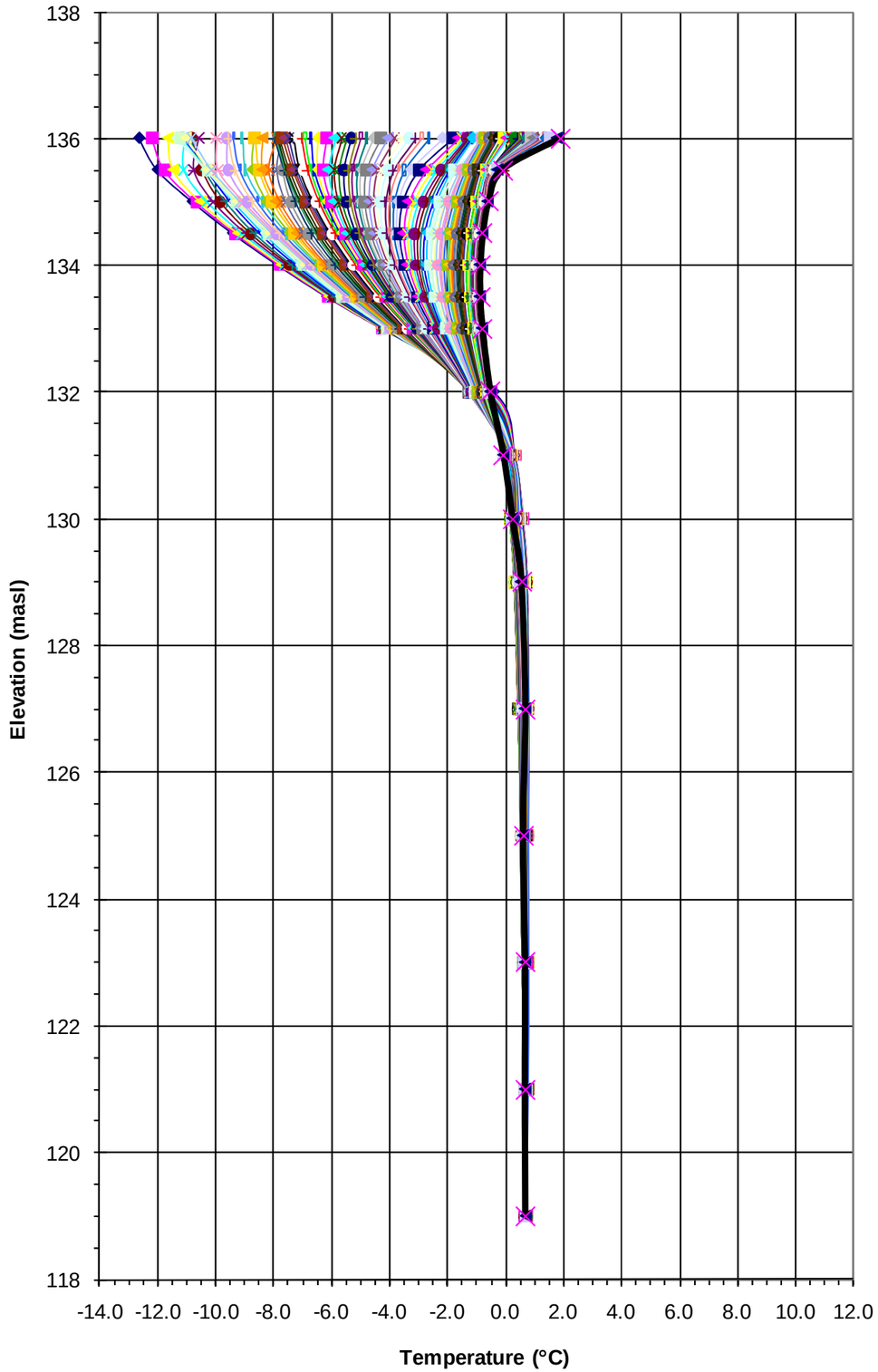
EAST DIKE
THERMISTOR DATA – TH485

Golder Associates

PROJECT No. 07-1413-0074			FILE No. ----		
DESIGN	BEW	10AUG09	SCALE NTS		REV.
CADD	JFC	10AUG09			
CHECK	--				
REVIEW					

FIGURE F-11

REVISION DATE: BY: FILE: O:\Active_2007\1413\07-1413-0074 Meadowbank Dike Design\Phase 2200 East Dike Construction QAQC\FIELD DATA



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Note: Data provided by Agnico-Eagle Mines Limited.

PROJECT

AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

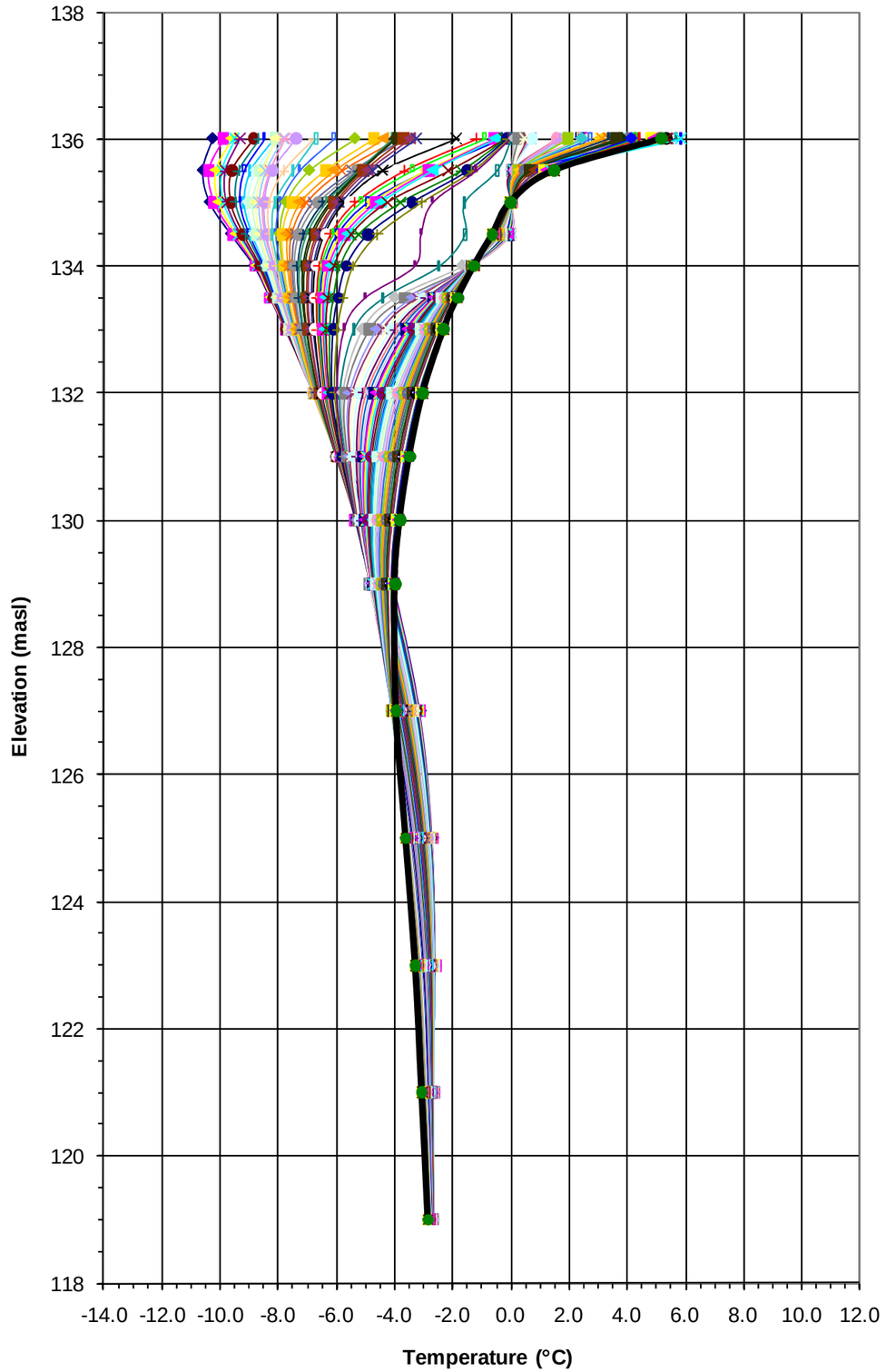
TITLE

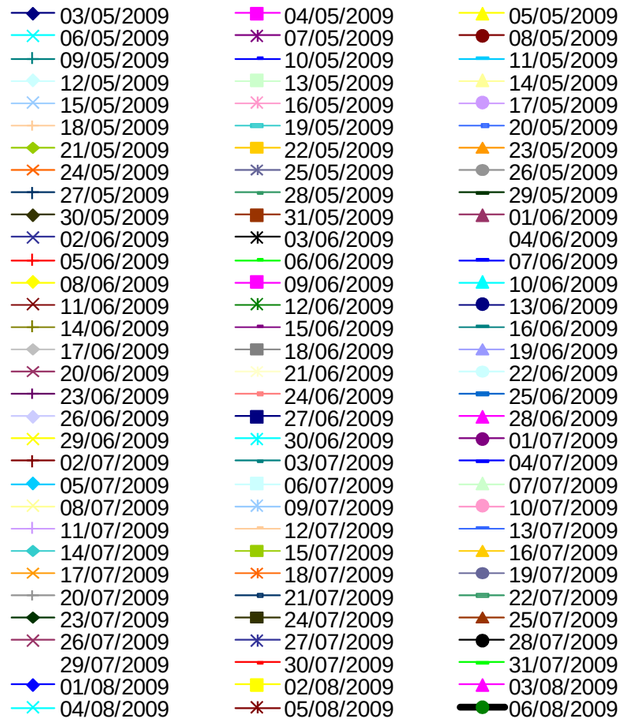
EAST DIKE
THERMISTOR DATA – TH695

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

AEM

AGNICO-EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT

TITLE

EAST DIKE
THERMISTOR DATA – TH842

Golder Associates

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

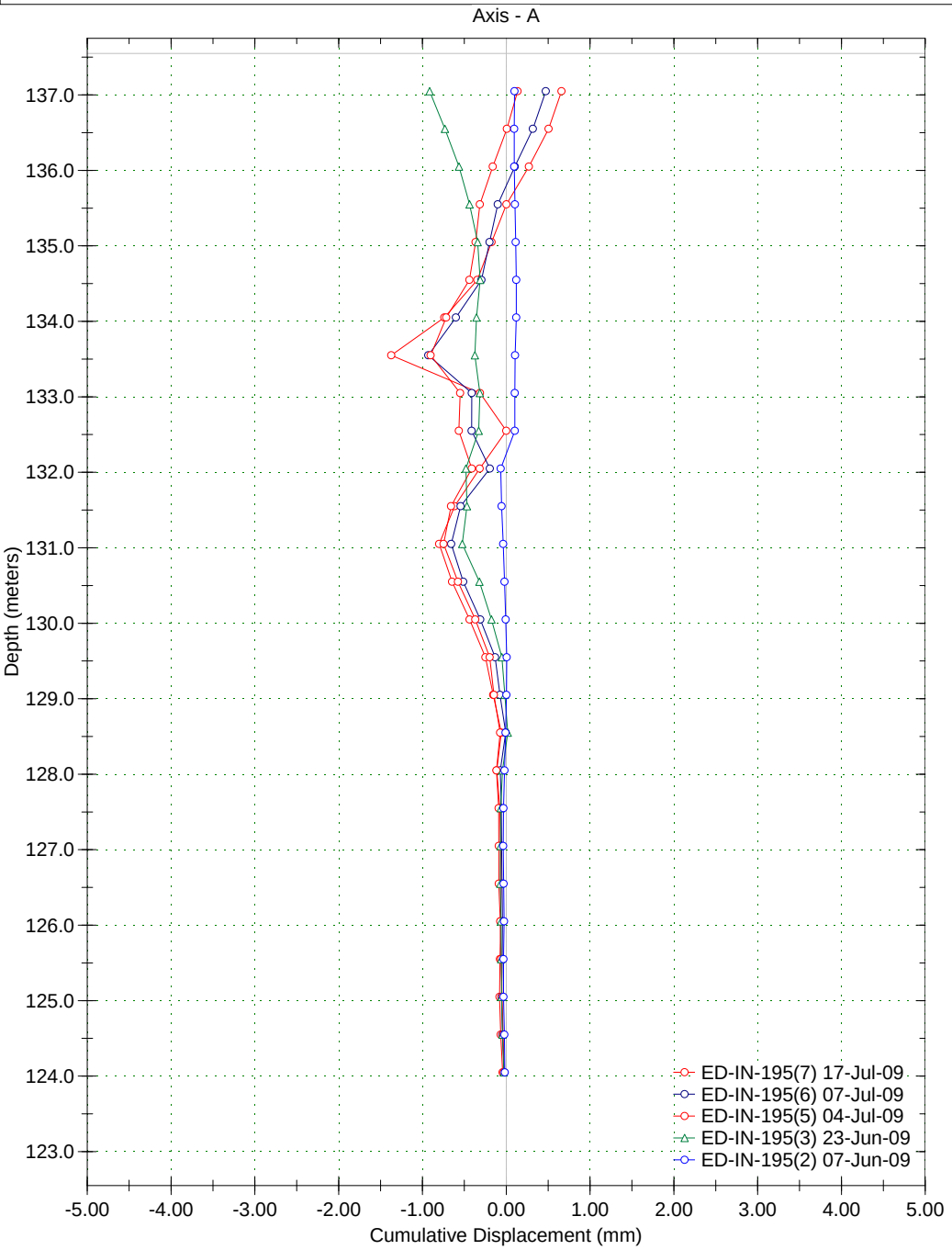
RST Instruments Ltd.

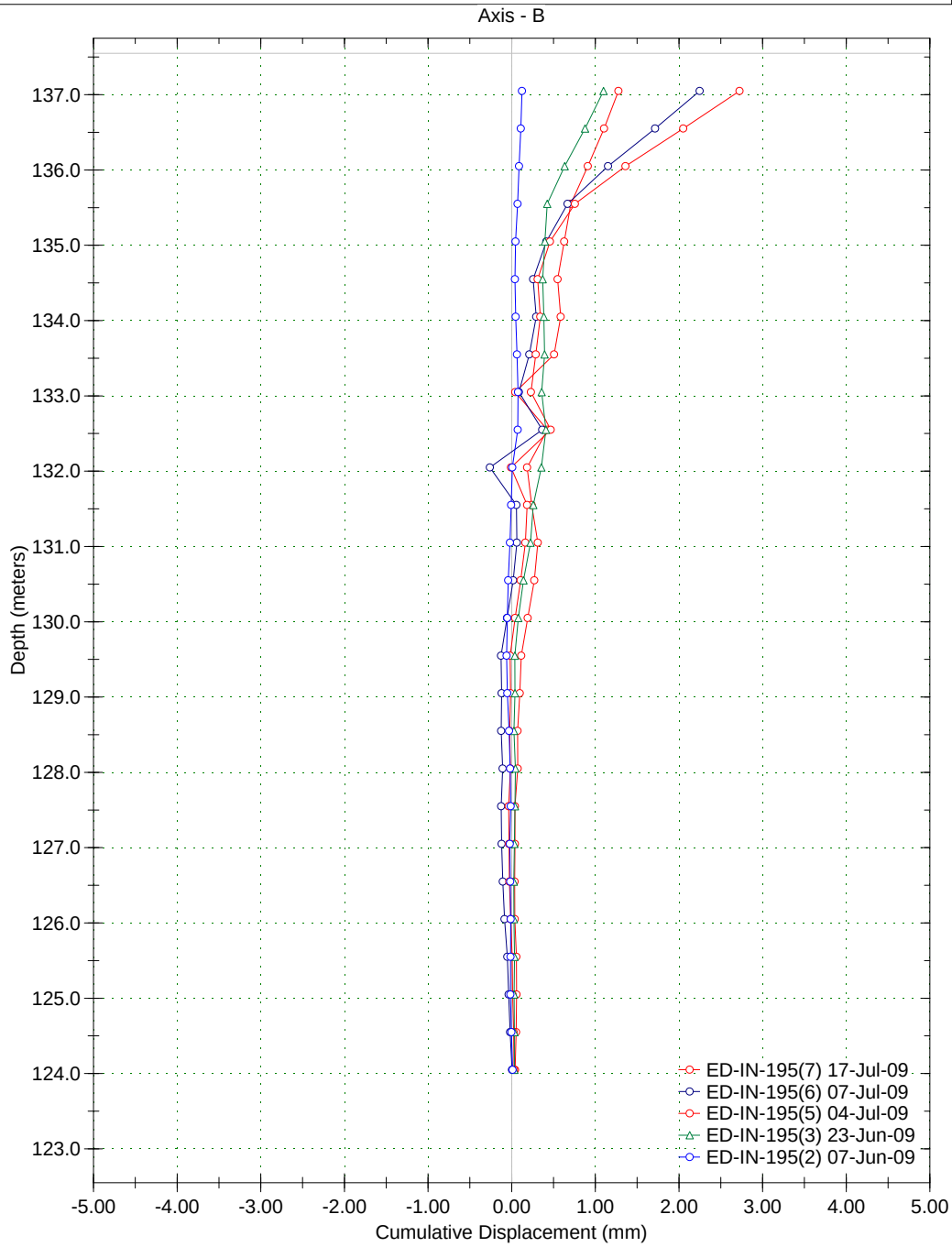
CUMULATIVE DISPLACEMENT

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





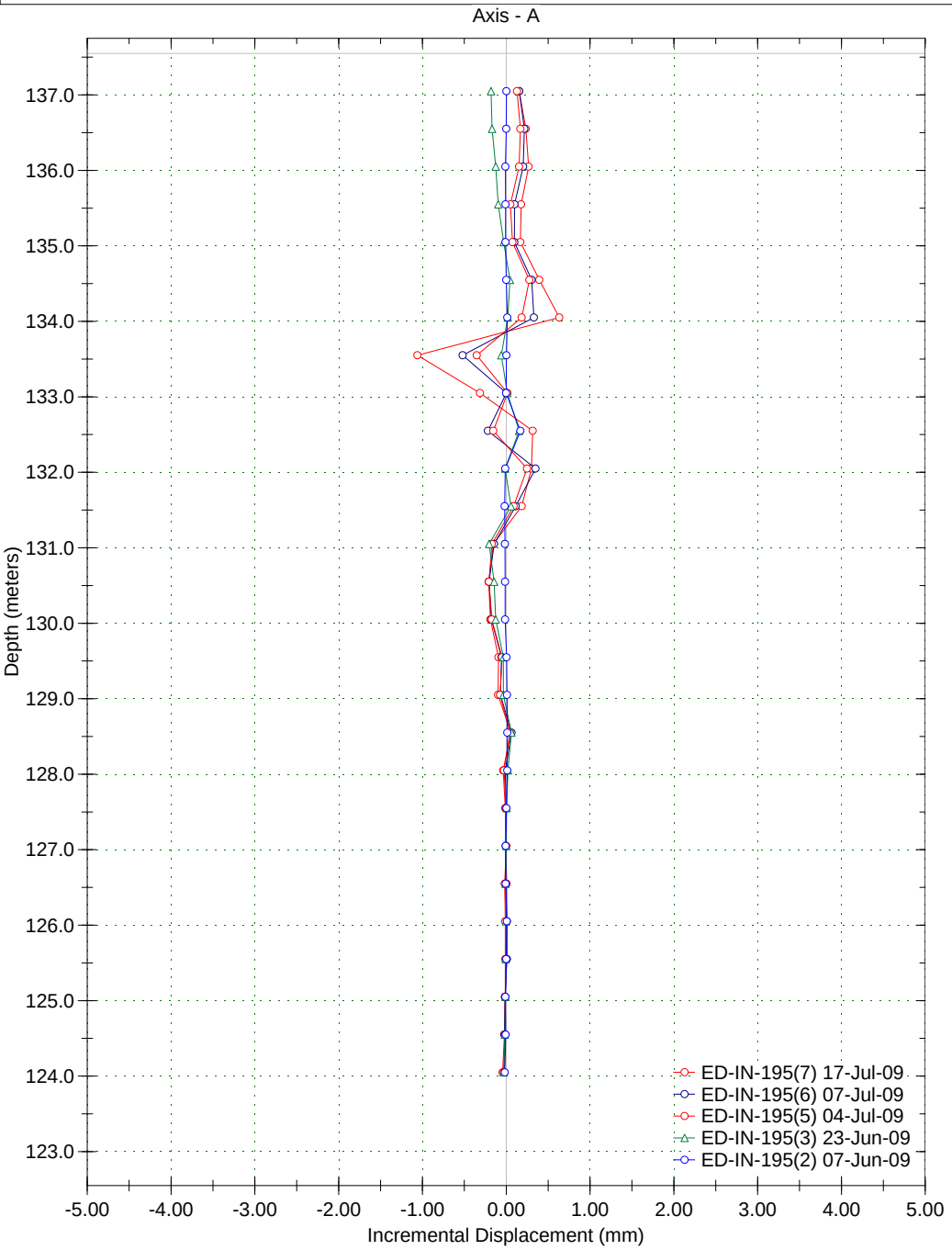
RST Instruments Ltd.

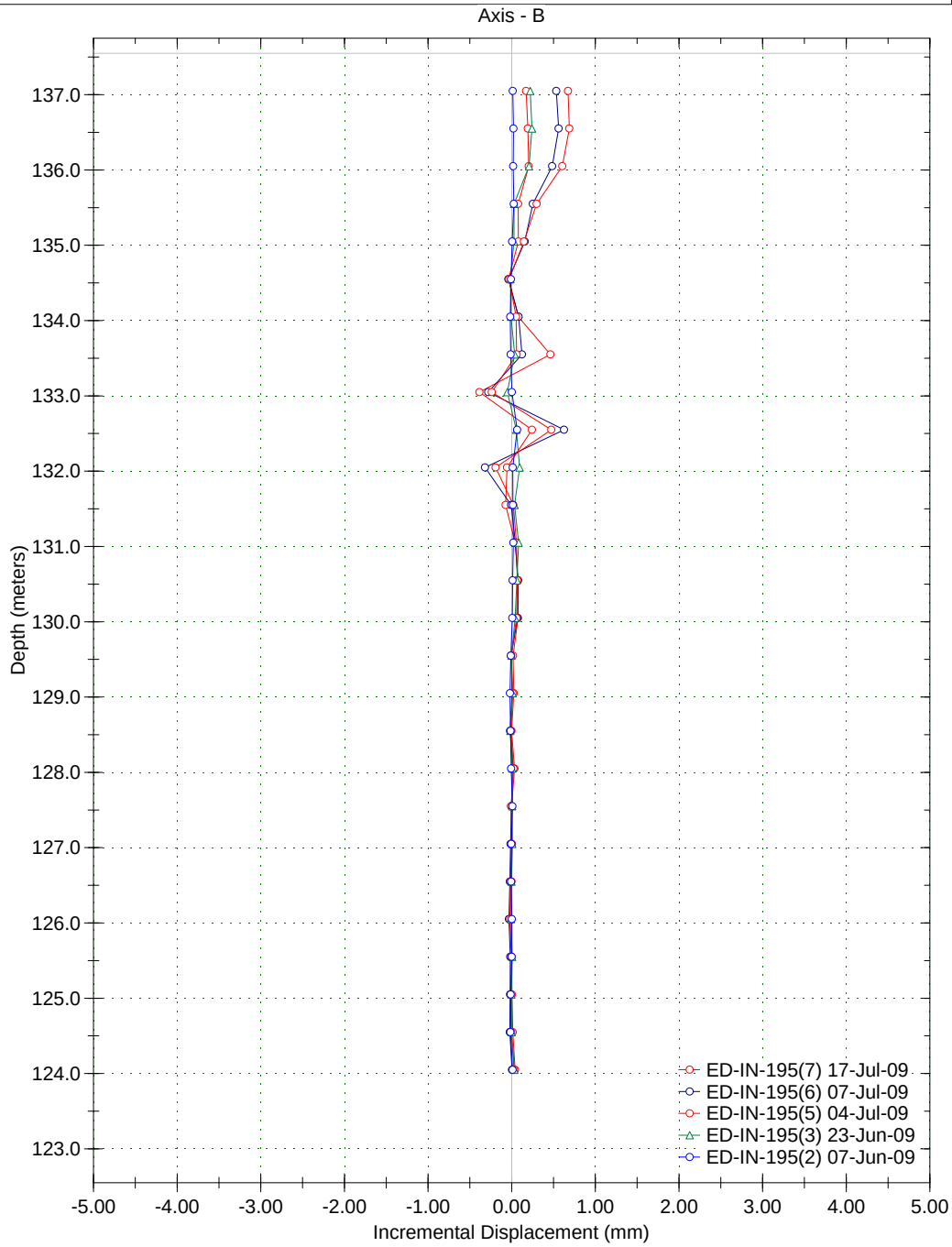
INCREMENTAL DISPLACEMENT

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





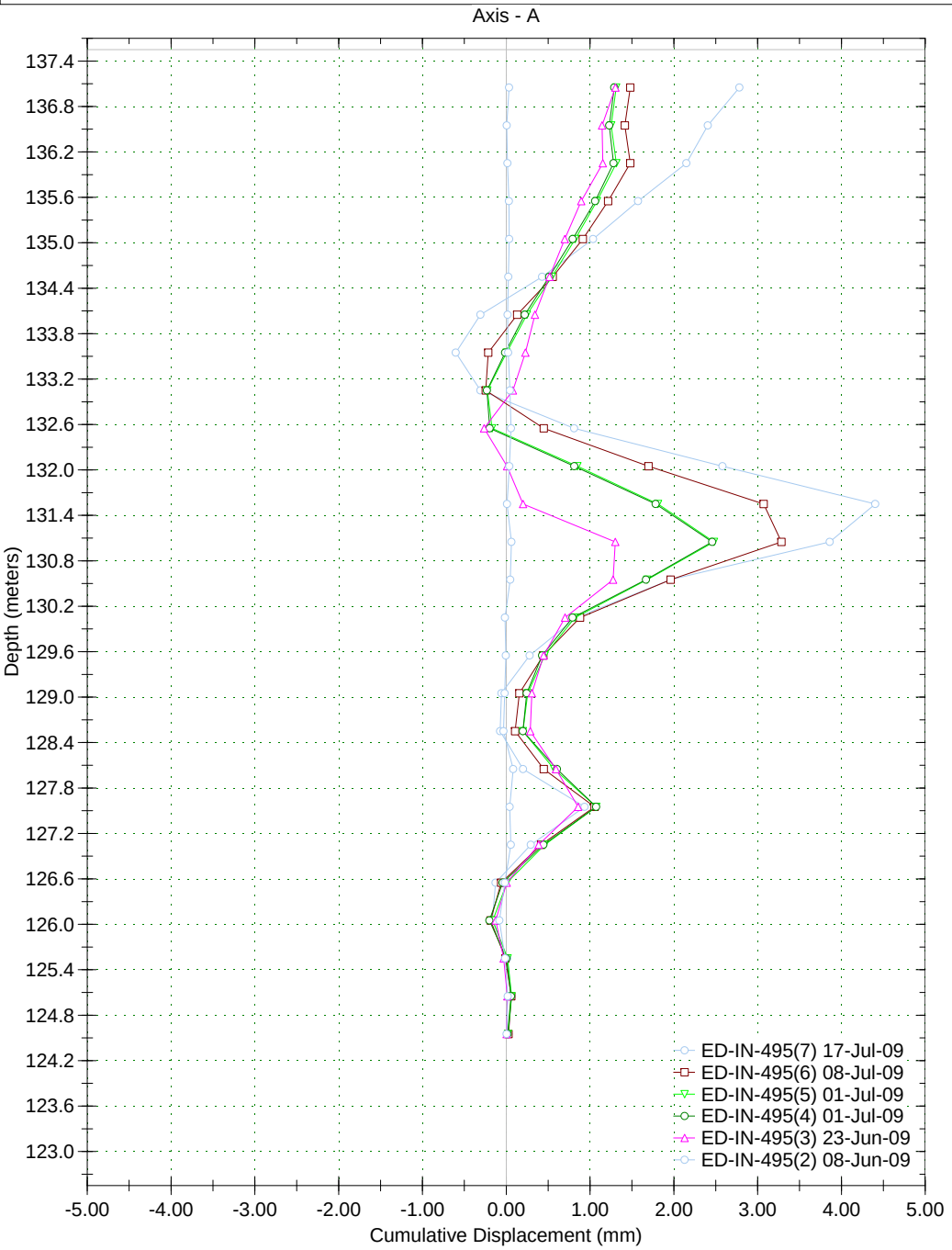
RST Instruments Ltd.

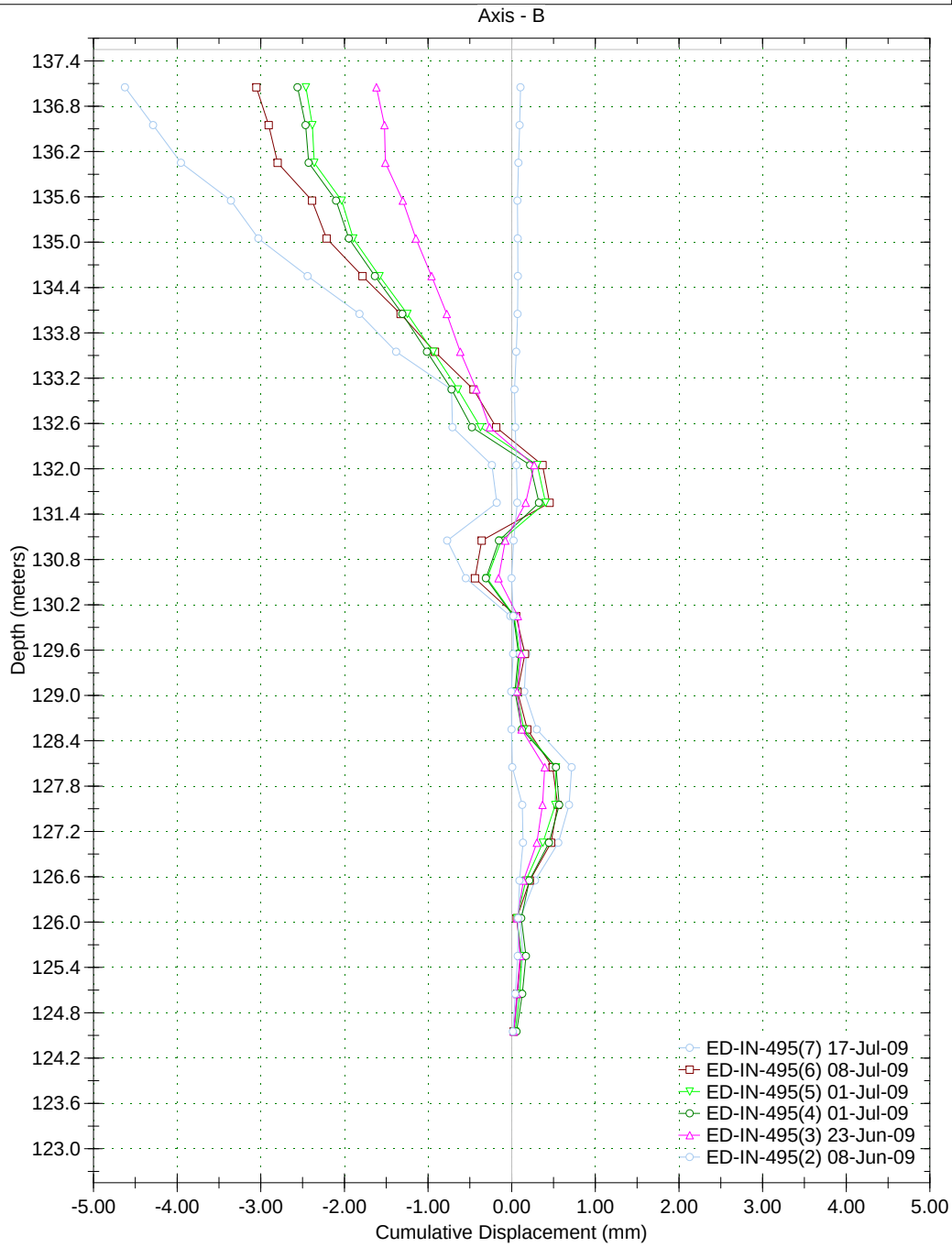
CUMULATIVE DISPLACEMENT

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





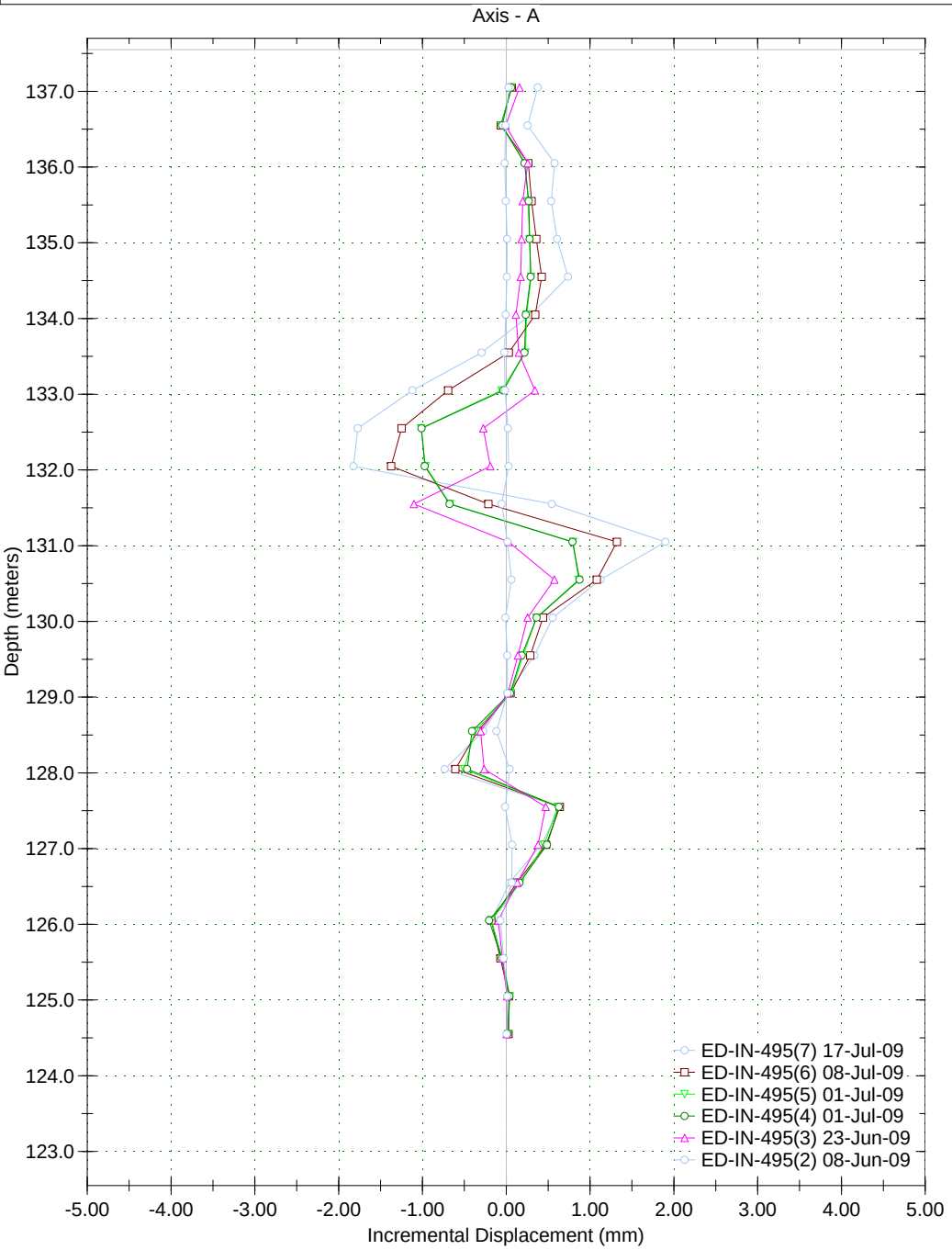
RST Instruments Ltd.

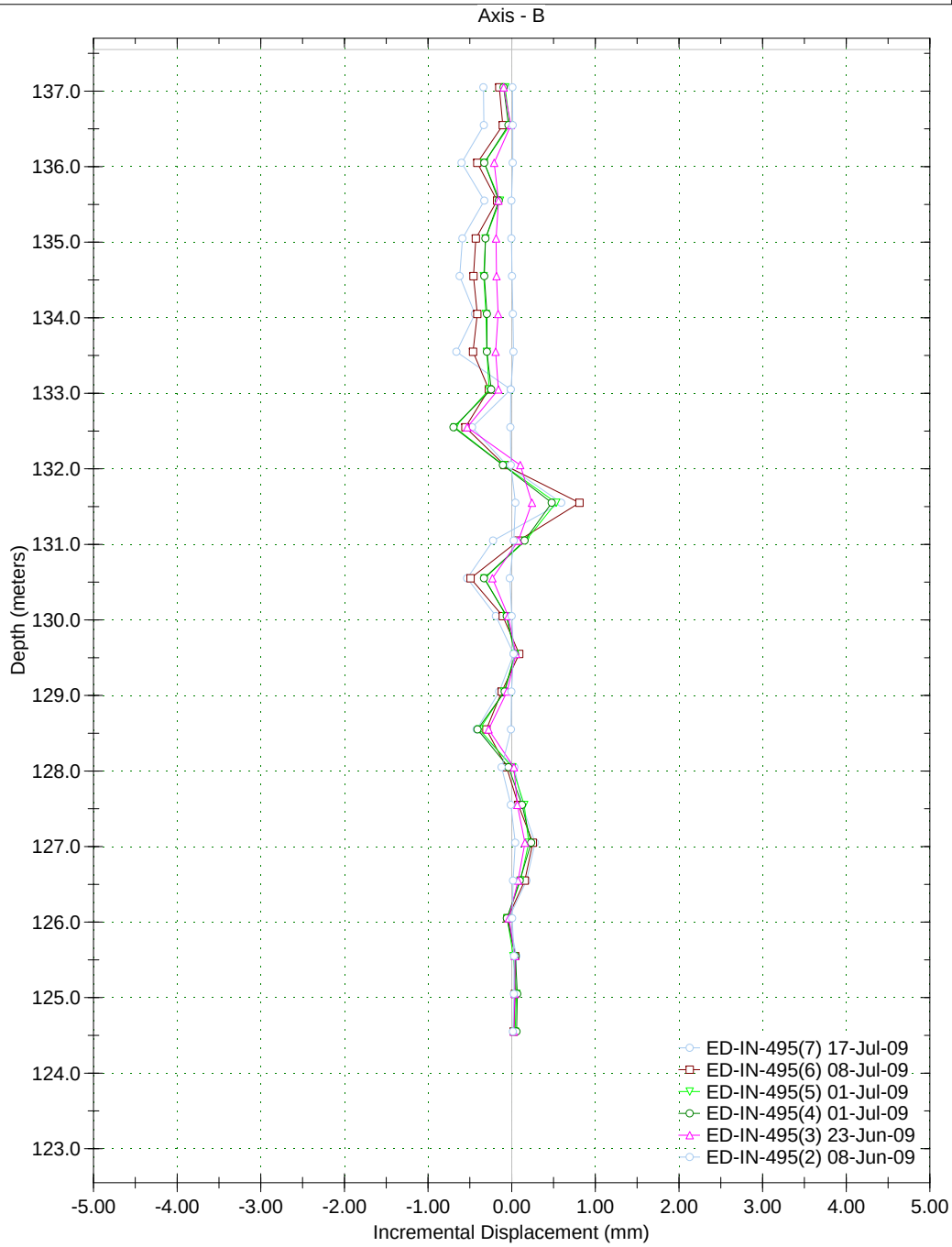
INCREMENTAL DISPLACEMENT

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





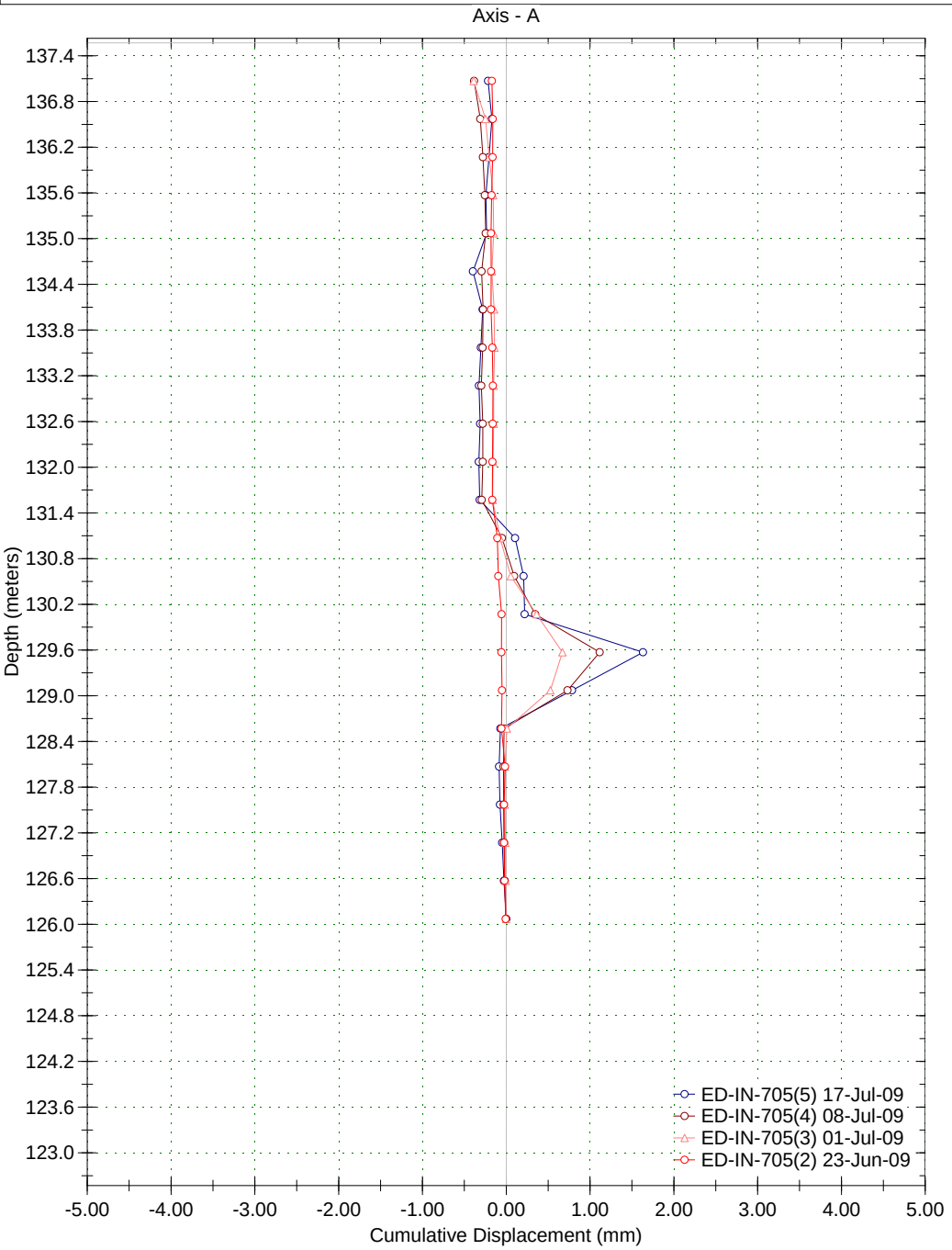
RST Instruments Ltd.

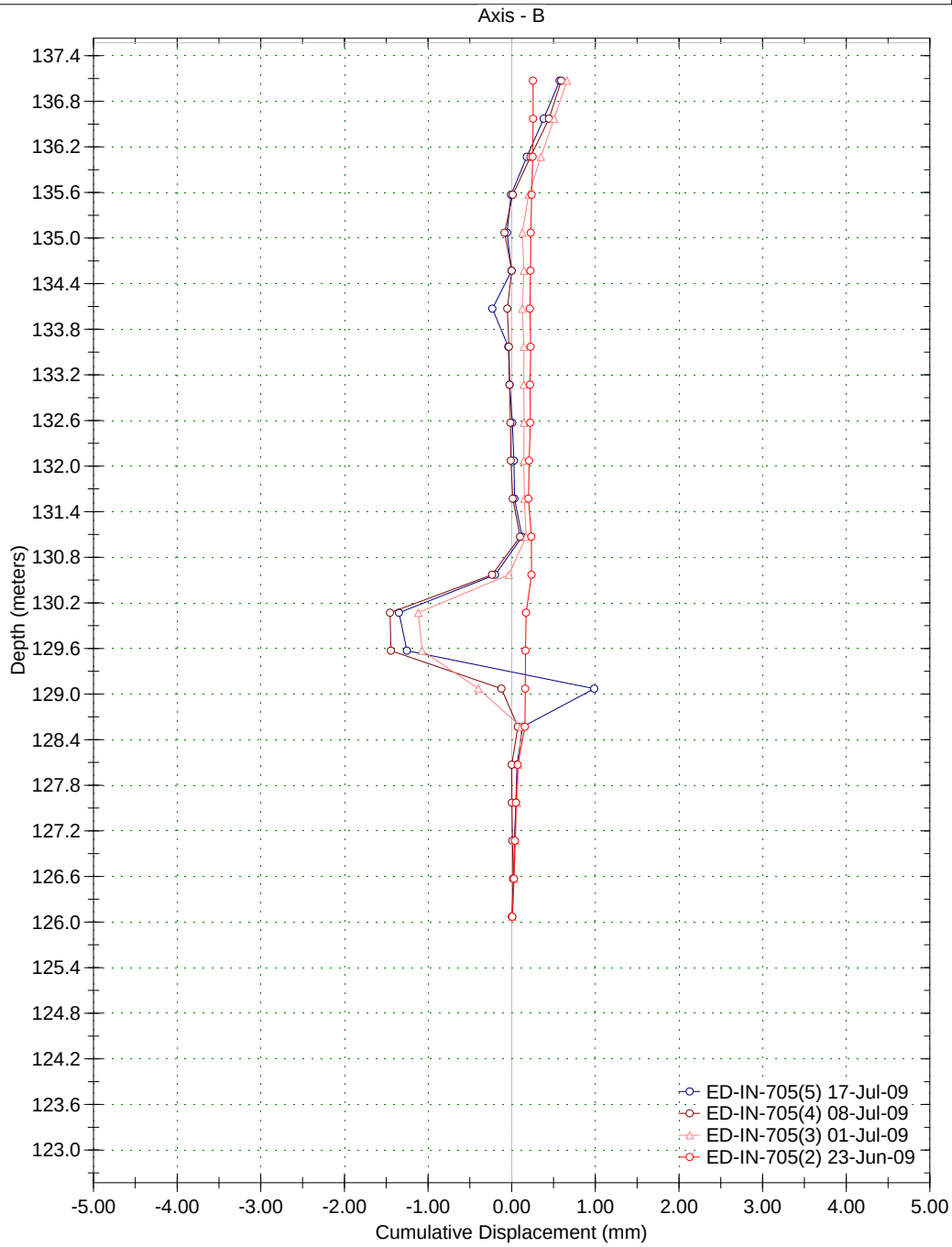
CUMULATIVE DISPLACEMENT

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
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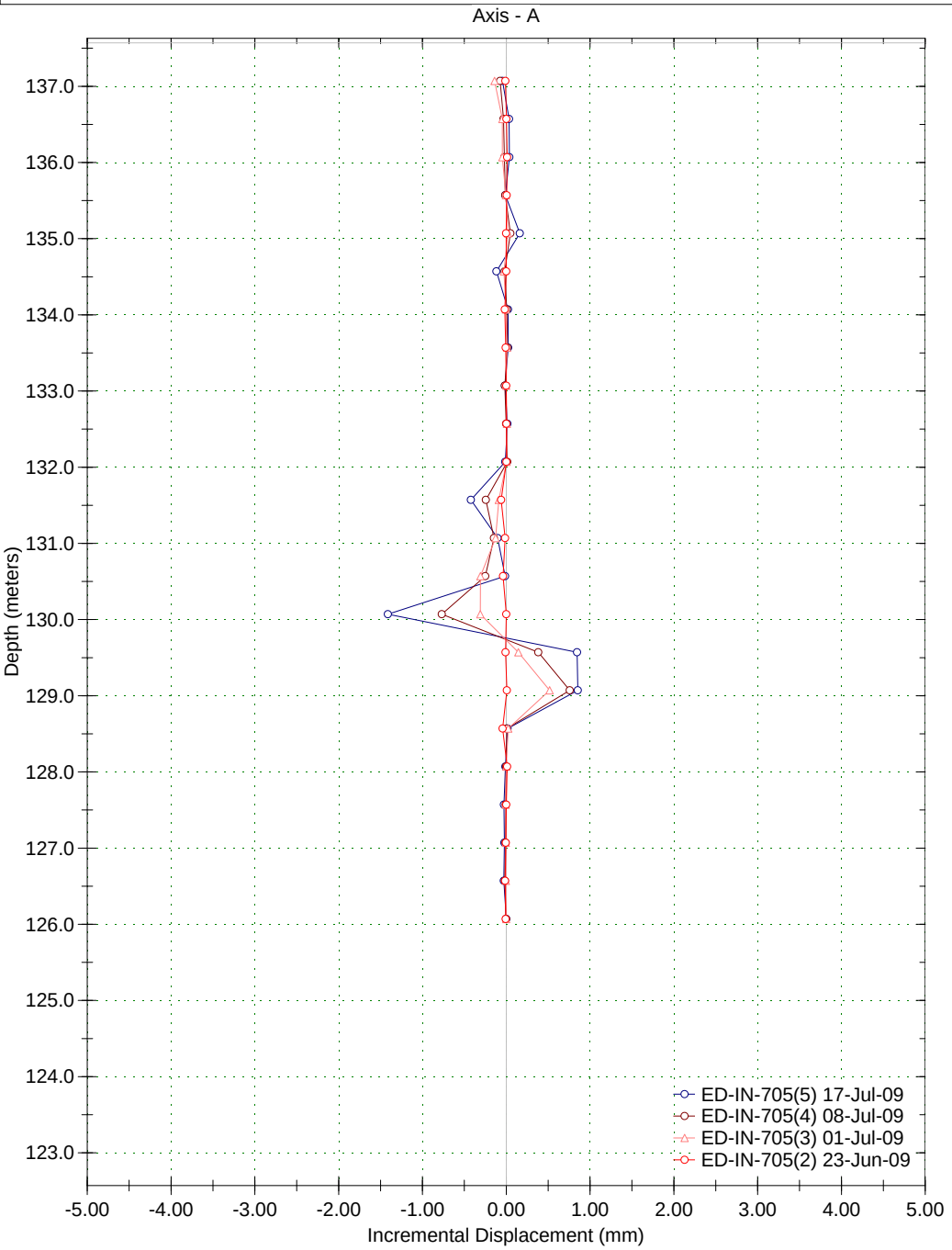

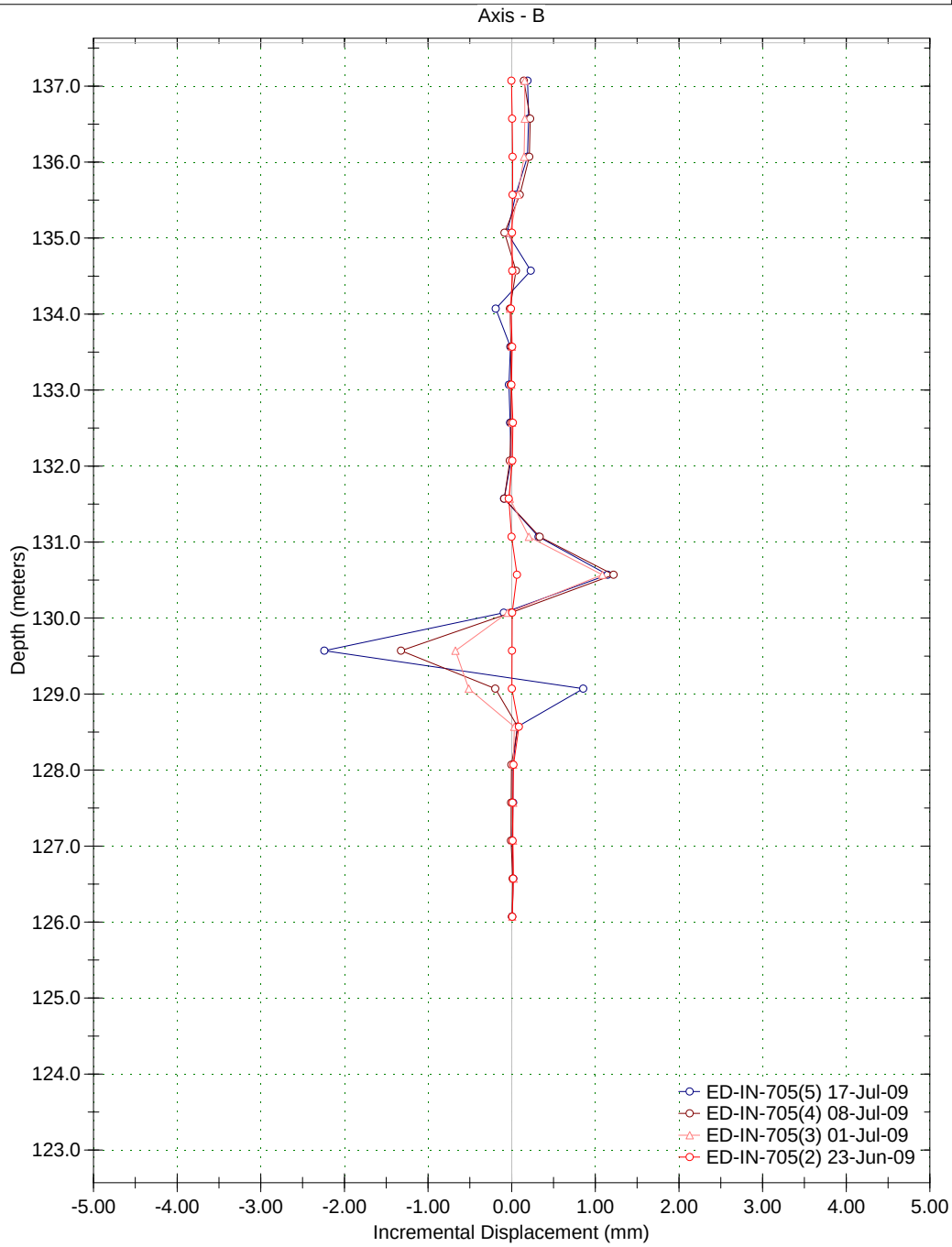

APPENDIX G

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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