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FINAL REPORT ON

**PIT SLOPE DESIGN CRITERIA
FOR THE PORTAGE AND GOOSE ISLAND
DEPOSITS
MEADOWBANK PROJECT, NUNAVUT
VOLUME 2**

Submitted to:

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06-1413-089/5000
Doc No. 449 Ver. 0



APPENDIX I

SUMMARY OF GEOTECHNICAL INVESTIGATIONS

The geotechnical studies on which the respective pit slope and underground design criteria have been formulated are based on the collection of both oriented and non-oriented geotechnical data from drill core. The collection of non-oriented geotechnical data from exploration drill holes was implemented during the 1995 summer drilling program, and has continued through to 2006, although not every year. Cumberland geologists and geotechnicians under the direction of Golder have undertaken the collection of geotechnical data from non-oriented drill holes. Golder personnel trained Cumberland staff in geotechnical data collection procedures, and their work has been reviewed periodically and found to be generally acceptable. The exception is the work done in 1996 by Cumberland staff whereby an incorrect index length for recording rock quality designation was used; this is described below.

The following briefly summarizes the field investigations carried out annually.

1995 Geotechnical Field Investigations

Preliminary non-oriented geotechnical data collection from exploration drill holes was initiated at the Third Portage site during 1995. The results of the preliminary non-oriented data collection program formed the basis for preliminary pit slope configurations presented in early 1996 (Golder, 1996c).

1996 Geotechnical Field Investigations

Preliminary oriented geotechnical data collection was initiated at the Third Portage project site during the 1996 summer drilling investigations. Drill core from drill holes TP96-154 and TP96-155 was oriented and geotechnically logged in detail in the field by a Golder staff member. The results of the preliminary oriented data collection program formed the basis for revised pit slope configurations in 1996 (Golder, 1996a).

4.1.2.1 Note on 1996 RQD Records

Values for RQD recorded by Cumberland during the 1996 exploration drilling program were based incorrectly on a 15 cm index length, rather than the accepted 10 cm length. Consequently, these values have been excluded from the analyses for the Third Portage project area. Due to the substantial database collected at Third Portage, the effect of this exclusion in the evaluation and classification of the overall rock types is inconsequential.

1997 Geotechnical Field Investigations

Oriented drill holes TP97-194 and TP97-202, drilled during 1997, were periodically oriented and logged by Cumberland personnel. A thermistor was installed in drill hole TP97-196. The results of the oriented data collection program resulted in revisions to the pit slope configurations within certain Design Sectors, as presented in Golder's 1997 report (Golder, 1997a).

1998 Geotechnical Field Investigations

During 1998, three oriented drill holes (TP98-258, TP98-261, and TP98-265) were drilled during the spring drilling program, and two oriented drill holes (TP98-312 and TP98-313) were drilled during the summer drilling program. The factual reporting of the field investigations were presented in Golder (1998b).

Holes TP98-258, TP98-261, and TP98-265 were oriented and logged continuously at the drill site by Golder engineers working 12-hour shifts in conjunction with the drilling contractor. Permeability testing was carried out on the three drill holes. A thermistor was installed in drill hole TP98-261. The two holes drilled during the 1998 summer drilling program were oriented and logged continuously at the drill site by a Golder engineer and a Cumberland geologist and geotechnician.

Holes TP98-258 and TP98-265 were collared within the Bay Zone, and extended across the Bay Fault to the east. Hole TP98-261 was collared on the mainland east of the Bay Fault, and was drilled across the fault, terminating in the rocks of the Third Portage peninsula. Hole TP98-312 was collared at the north-east edge of the deposit area to provide further oriented geotechnical information in this area relating to the east pit wall stability. Drill hole TP98-313 was collared in the central portion of the deposit area, along the eastern margin, to provide detailed oriented data regarding the east pit wall stability through this structurally complex area of the deposit.

2002 Winter Geotechnical Field Investigations

The purpose of the field study was to acquire geotechnical and hydrogeological data relating to the foundation conditions in areas that have been proposed for construction of de-watering dykes and a haul road causeway between the Third Portage Deposit and the North Portage Deposit. In addition to these investigations, a lake bottom bathymetric survey was carried out. The factual reporting of the field investigations was presented in

Golder (2002e and 2002c). The results of these investigations will be used to support feasibility level engineering studies.

The collection of oriented core geotechnical data was also undertaken from two exploration boreholes.

The following summarizes the work that was completed during the 2002 winter field investigations.

- Collected oriented core geotechnical, and hydrogeological data from two inclined exploration boreholes drilled from the ice surface between the north end of the Third Portage Deposit, and the north shore of the Second Portage Lake (North Portage Deposit/Connector Zone).
- Collected geotechnical and hydrogeological data from two short vertical geotechnical boreholes drilled from the ice along the east dyke alignment, and from two, 30 m inclined holes drilled at the north and south abutments of the east dyke. Thermistor cables were installed in each of the inclined boreholes drilled at the abutment areas to collect ground temperature data.
- Collected geotechnical and hydrogeological data from two short vertical geotechnical boreholes drilled from the ice along the west dyke alignment, and from two, 30 m long inclined boreholes drilled at the north and south abutments of the west dyke. Thermistor cables were installed in each of the inclined boreholes drilled at the abutment areas to collect ground temperature data.
- Collected geotechnical, and hydrogeological data from two vertical boreholes drilled from the ice along the alignment of a proposed causeway connecting the south and north shores of Second Portage Lake to allow haulage access to the Vault Deposit area.
- Collected bathymetric data from the following areas, to be used to support detailed engineering design studies:
 - Second Portage Lake
 - Third Portage Lake/Goose Island
 - Third Portage Lake Arm
 - Additional Storage Areas Third Portage Lake
 - Vault Lake

- Collected geotechnical and hydrogeological data from boreholes drilled along proposed dike alignments, and at abutments. Thermistors were installed in selected abutment holes. The following dike approximate dike alignments were drilled:
 - Stormwater dike
 - Tailings Dike
 - East Dike
 - Bay Zone Dike
 - Goose Island Dike

An electro-magnetic survey was carried out in the general area of the plant site to identify areas of potential ground ice.

Three oriented geotechnical boreholes were drilled in the Vault deposit area.

2002 Summer Geotechnical Field Investigations

The primary objective of the 2002 Summer field program was the characterization of rock strength/structure in the area of the proposed open pits for the Vault, North Portage, and Third Portage deposit. Information obtained from this field program will supplement previously collected data. In addition to geotechnical investigation, hydrogeological investigations were carried out in the North Portage deposit. Thermistor cables were installed at the North Portage and Vault Deposits. The factual reporting of the field investigations was presented in Golder (2002b).

The data obtained from the field program were used for feasibility level geotechnical engineering and mine design studies for the Meadowbank Project.

The following summarizes the work that was completed during the 2002 summer field program:

- Collection of oriented core geotechnical data from three inclined boreholes drilled at the Vault Deposit.
- Collection of oriented core geotechnical data from three holes drilled at the North Portage Deposit.
- Collection of hydrogeological data from hydraulic conductivity testing in two of the three geotechnical holes drilled at the North Portage Deposit.

- Collection of oriented core geotechnical data from two inclined boreholes drilled at the Third Portage Deposit.

2003 Geotechnical Field Investigations

The purpose of the field investigations was to acquire geotechnical, thermal, and hydrogeological data to assess:

- foundation and abutment conditions along the alignments of proposed open pit de-watering dykes;
- foundation and abutment conditions along the proposed tailings dyke and causeway access to the North Portage Deposit and Vault Deposit areas;
- foundation conditions at the proposed plant site;
- foundation conditions at the proposed airstrip and fuel tank farm;
- geotechnical conditions associated with specific linear features in the area of Second Portage Lake;
- geotechnical conditions for the proposed Goose Island open pit;

The results of these investigations will be used in feasibility level engineering studies. The factual reporting of the field investigations are contained in Golder (2003g).

The following summarizes the work that was completed during the 2003 spring field investigations.

- Collect oriented core, geotechnical, thermal, and hydrogeological data from inclined boreholes drilled at the Goose Island deposit.
- Collect geotechnical and hydrogeological data from seven short vertical geotechnical boreholes drilled from the ice along the proposed Goose Island dyke alignment, and from one, 50 m inclined hole drilled at the east abutment of the proposed dyke. A thermistor cable was installed in the 50 m inclined borehole drilled at the south abutment of the dyke to collect ground temperature data. Oriented core data was also obtained from the dyke abutment borehole.

- Collect geotechnical and hydrogeological data from four short vertical geotechnical boreholes drilled from the ice along the proposed Bay Zone dyke alignment.
- Collect geotechnical, and hydrogeological data from two vertical boreholes drilled from the ice along the alignment of the proposed de-watering dyke at the southeast end of Second Portage Lake, extending from the Third Portage Peninsula northward to the North Portage Deposit area.
- Collect oriented geotechnical, and hydrogeological data from an inclined borehole drilled from the ice along the alignment of the proposed de-watering dyke at the southeast end of Second Portage Lake.
- Collect oriented geotechnical, and thermal data from an inclined borehole drilled to intersect an east-west trending linear feature near the northwest end of Second Portage Lake.
- Collect geotechnical, and hydrogeological data from five short vertical geotechnical boreholes drilled from the ice along the proposed tailings dyke/causeway located between the Third Portage and North Portage Deposits, and from one, 50 m inclined borehole drilled at the north abutment of the dyke. A thermistor cable was installed in the 50 m inclined borehole to collect ground temperature data. Oriented geotechnical data was obtained from the 50 m inclined borehole.
- Collect geotechnical and thermal data from 11 vertical geotechnical boreholes drilled at the proposed plant site. Two thermistor cables were installed.
- Collect additional bathymetric data from areas of Third Portage Lake for use in mine waste site selection studies.
- Collect geophysical data relating to the potential for ground ice formation at the proposed plant site, airstrip, and fuel tank farm.
- Collect geotechnical information from an additional oriented drill hole at the Vault Deposit.

Additional bathymetry surveys were carried out in portions of Second and Third Portage Lakes.

2006 Geotechnical Field Investigations

In 2006, in response to a specific request from the Nunavut Impact Review Board to obtain additional geotechnical, thermal, and hydrogeological information to characterize the Second Portage fault zone in the area of the tailings dike, three additional boreholes were drilled, and thermistors and vibrating wire piezometers installed. The factual results of the field investigations are presented in Golder (2006b).

Bathymetry surveys for the remaining portions of Second and Third Portage Lake were completed. Bathymetry surveys for Turn Lake, Wally Lake, and Drilltrail Lake were completed. A bedrock profiling seismic survey was completed in the foundation areas of the East Dike, Bay Zone Dike, Goose Dike, and Tailings Dike. The factual results of the field investigations are presented in Golder (2006a).

APPENDIX II

LABORATORY TESTING

ROCK LABORATORY TESTING

UNIAXIAL COMPRESSIVE STRENGTH TESTING

**TABLE II-1:
Unconfined Compressive Strength Testing Results**

Borehole No.	Sample	Hole Location	Unconfined Compressive Strength (MPa)	Mode of Failure*	Point Load Index (Dia.) (MPa)	Point Load Index (Ax.) (Mpa)	Rock Type ⁺
02GT-02	1	East Dike	119.3	3			Intermediate Volcanic (Average UCS=94 MPa)
	2	East Dike	115.9	1			
02GT-04	1	East Dike	111.0	4			
	2	East Dike	148.3	2			
02GT-10	1	Stormwater	51.0	2			
	2	Stormwater	43.6	4			
GT02-VLT-2	1	Vault	86.0	2			
GT02-VLT-3	1	Vault	128.6	5			
GT02-NP-3	1	North Portage	62.2	1			
TP98-261	4	Third Portage	117.3 80.0	1 1	8.6	6.3	
03GT-PS-8	1	Plant Site	68.9	2			
03GT-GPIT-3	2	Goose Island	106.7	1			
03GT-PS-1	1	Plant Site	99.8	1			
03GT-PS-2		Plant Site	49.5	5			
03GT-PS-7		Plant Site	62.0	4			
TP98-263	1	Third Portage	64.8 67.7	1 1	3.9	5.4	
TP98-258	1	Third Portage	248.3	2	10.2	16.7	Iron Formation (Average UCS=174.5 MPa)
TP98-261	1	Third Portage	137.1 138.4	2 2	7.5	9.9	
02GT-07	1	Stormwater	67.5	4			Quartzite (Average UCS=107 MPa)
	3	Stormwater	112.7	5			
02GT-08	1	Stormwater	140.1	1-5			
03GT-TD-1		Tailings Dike	88.4	5			
02GT-09	1	Stormwater	69.5	1			

02GT-11 (UMA)	1	Tailings Basin	67.9	4			Ultramafic volcanic (Average UCS=66 MPa)
GT02-NP-2 (UMA)	2	North Portage	12.6	4	0.93 1.14	3.22	
03GT-BZ-5	1	Bay Zone	9.2	4			
03GT-GPIT-3	1	Goose Island	40.2	1			
03GT-GPIT-1	1	Goose Island	21.6	4			
03GT-GPIT-1	2	Goose Island	33.7	4			
TP98-261 (UMV)	3	Third Portage	91.6	1	5.7	9.1	Ultramafic (serpentinized)
TP98-261 (UMS)	2	Third Portage	24.4 24.0	4 4	1.9	3.9	
TP98-258 (UMV/UMS)	2	Third Portage	30.5 27.3	4 4	3.2	2.3	

+ Samples that failed along foliation have been excluded from average rock type UCS calculations

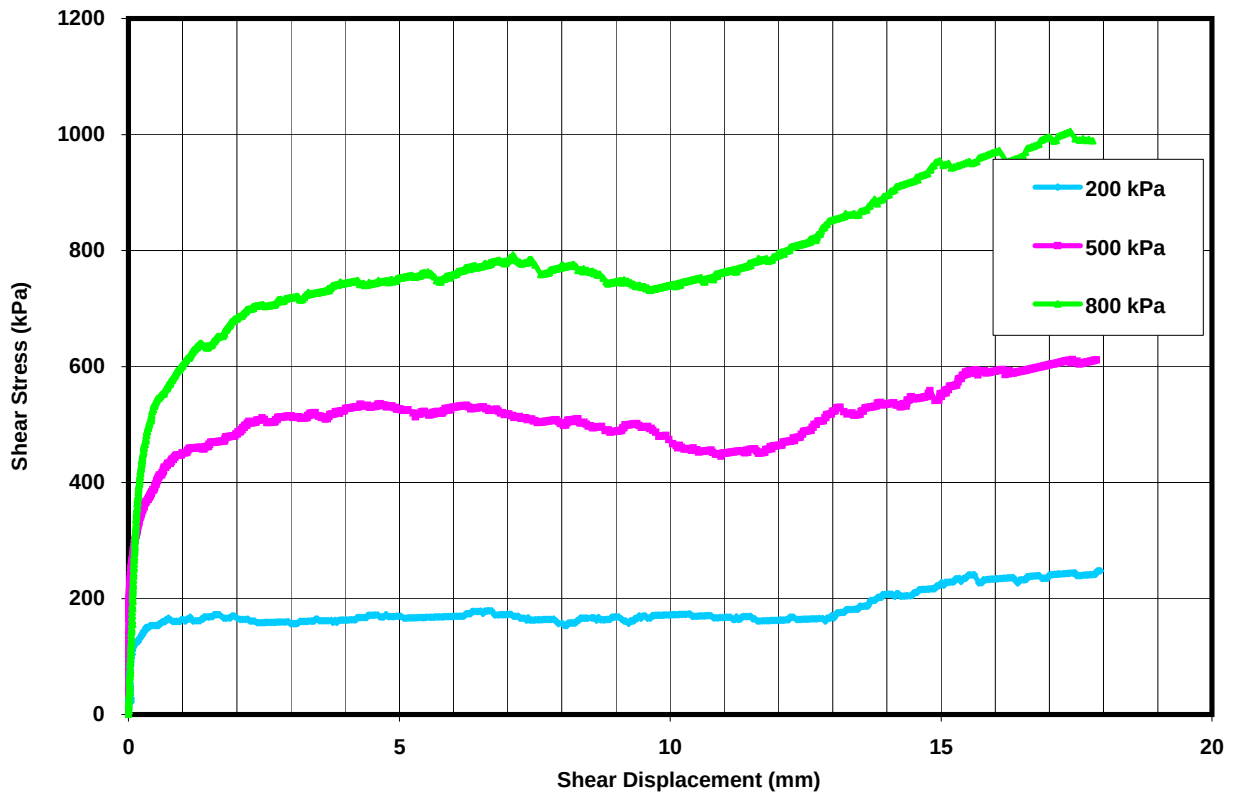
* Failure Mode:

- 1 – Single diagonal shear plane
- 2 – multi-vertical fracture
- 3 – vertical splitting
- 4 – shear along foliation or joint
- 5 – conical

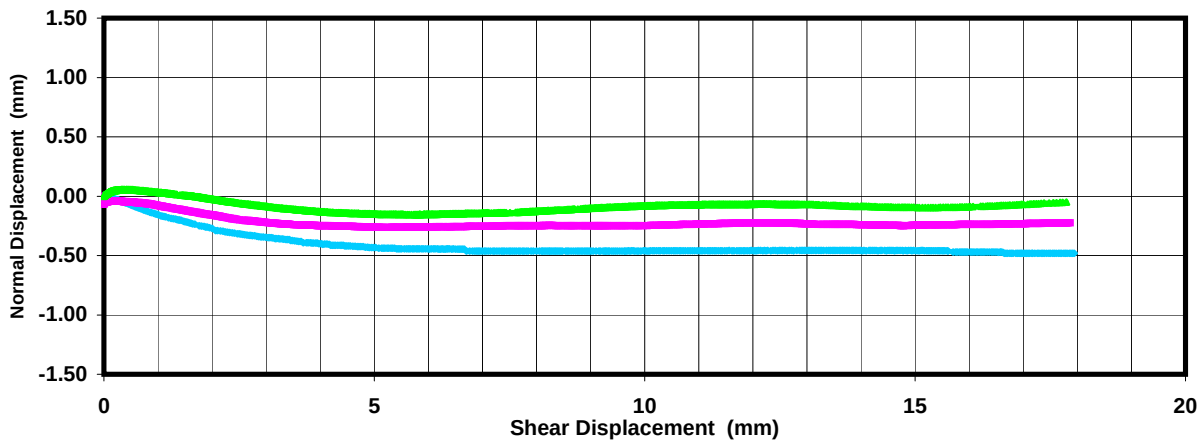
Laboratory Determination of Direct Shear Strength
ISRM 1981 (135-137)

Borehole :	TP99-354 A	Sch #	7	Project # :	06-1413-089/5000
Sample :	13	Tested By:	LP	Client :	CUMBERLAND
Depth (m)	29.9			Project :	MEADOWBANK SHEAR TESTING
				Location :	BURNABY LAB

Shear Displacement vs. Shear Stress



Shear Displacement vs. Normal Displacement

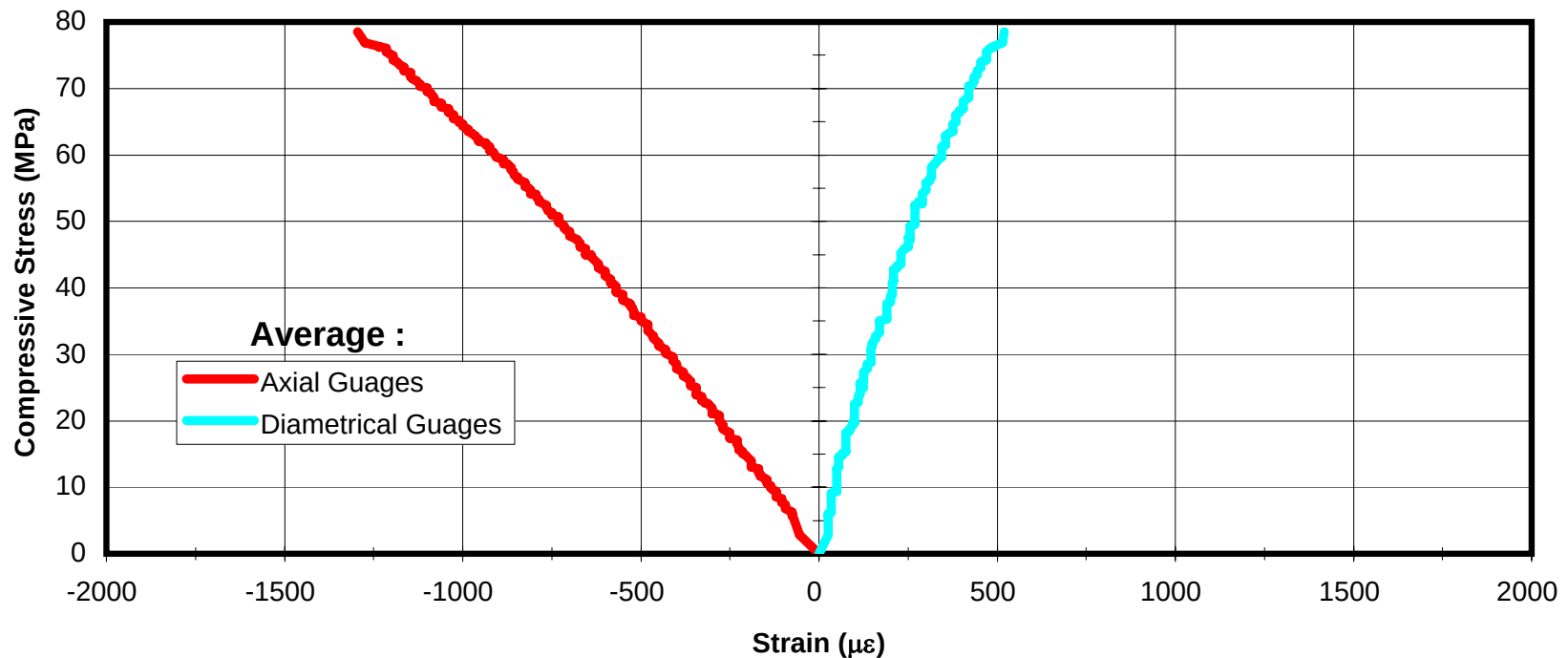


2007 MODULUS TESTING

Table II-2: 2007 Plant Site Modulus Testing Results

Borehole No.	Sample Depth (m)	Dry Density (Kg/m3)	σ (MPa)	Secant Modulus (Gpa)	Poisson's Ratio	Rock Type	Failure Mode Type * (deg)	
NP02-434	16.00	2724	78.52	69.0	0.36	IVcs	3	
NP02-425	24.10	2748	96.34	64.1	0.29	IVcs	1	68
NP02-432	21.20	2781	66.25	60.7	0.25	IVchl	5	
NP96-148	14.20	2690	60.87	22.5	0.25	IVchl	5	
NP98-309	10.20	2707	52.22	48.2	0.27	IV	3	
TP99-345	10.17	2742	106.76	55.7	0.18	IV	3	
TP99-338	8.41	2772	102.48	67.8	0.29	IV	1	65
TP98-265	23.89	2712	153.62	75.4	0.24	IV	3	
* 1 = Single diagonal shear plane, 2 = Multi-vertical splitting, 3 = Vertical splitting, 4 = Shear along foliation or joint, 5 = Conical								

Stress vs. Strain



ELASTIC MODULI OF INTACT ROCK CORE IN UNIAXIAL COMPRESSION - ASTM D3148-93



Borehole: NP02-434

Corrected σ_{peak} =

78.5 Mpa

Box: - -

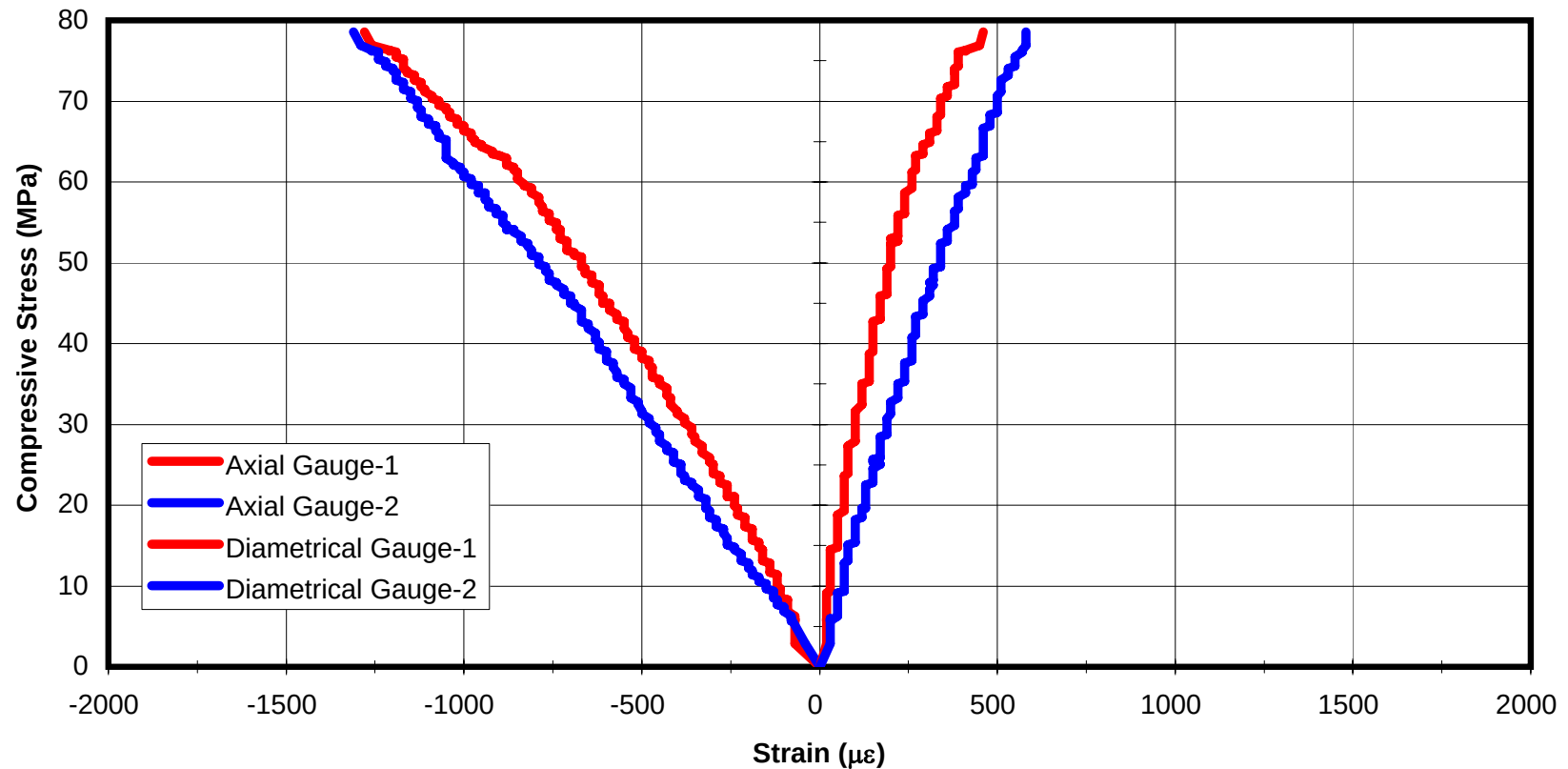
Project Number : 06-1413-089/5000

Depth : 6.05-23.56

Technician :

LP

Stress vs. Strain



ELASTIC MODULI OF INTACT ROCK CORE IN UNIAXIAL COMPRESSION - ASTM D3148-93



Borehole: NP02-434

Corrected σ_{peak} = 78.50 Mpa

Box: - -

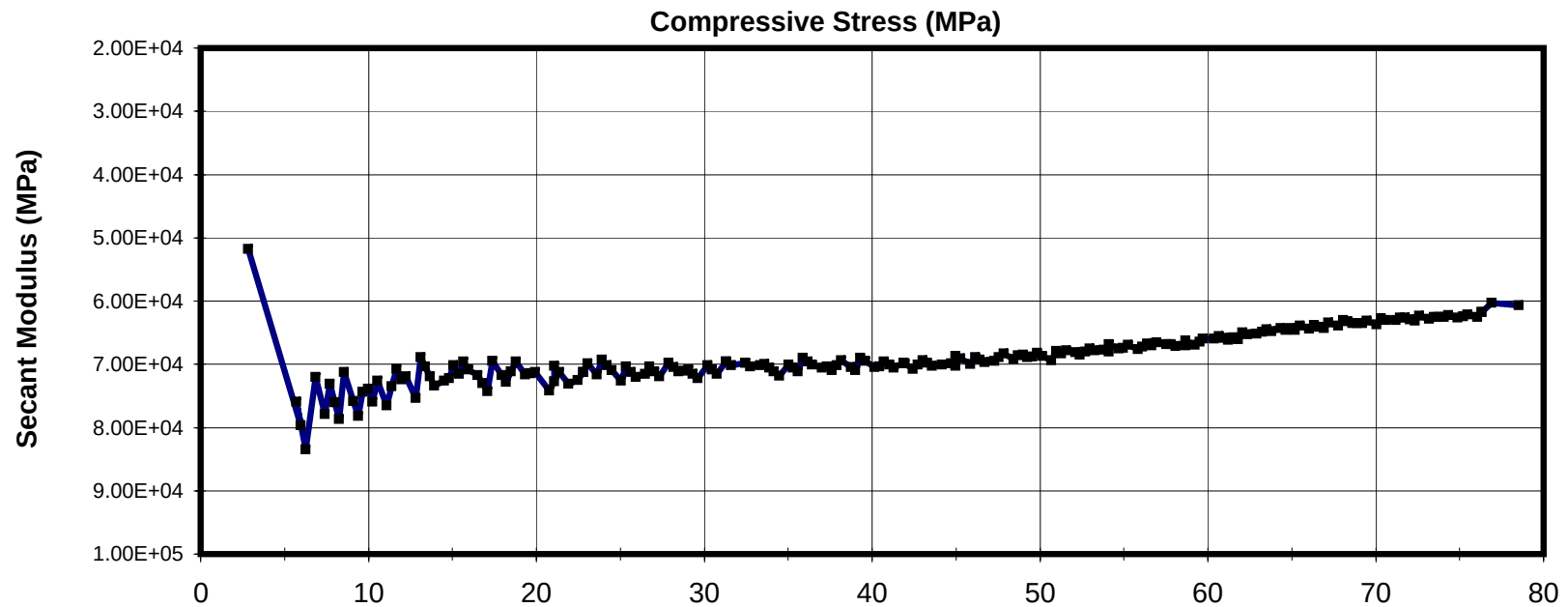
Project Number : 06-1413-089/5000

Depth : 6.05-23.56

Technician :

LP

Secant Modulus



ELASTIC MODULI OF INTACT ROCK CORE IN UNIAXIAL COMPRESSION - ASTM D3148-93



Borehole: NP02-434

E₅₀ (Secant Modulus) = 6.90E+04 Mpa

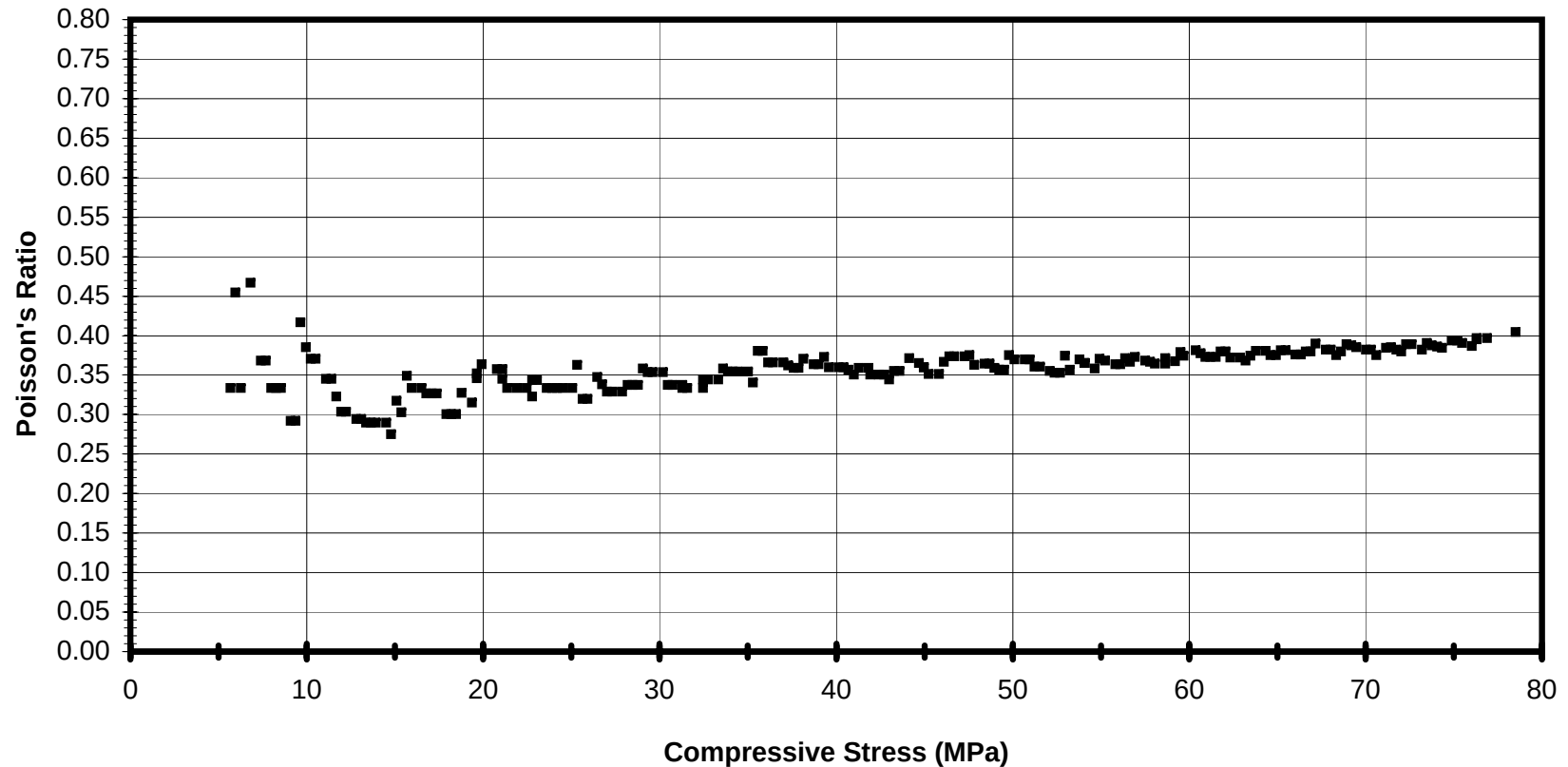
Box: - -

Project Number : 06-1413-089/5000

Depth : 6.05-23.56

Technician : LP

Poisson's Ratio



ELASTIC MODULI OF INTACT ROCK CORE IN UNIAXIAL COMPRESSION - ASTM D3148-93



Borehole: NP02-434

v_{50} (Poisson's Ratio) =

0.36

Box: - -

Project Number :

06-1413-089/5000

Depth : 6.05-23.56

Technician :

LP



PROJECT #	06-1413-089/5000
BOREHOLE	NP02-434
DEPTH(m)	6.05-23.56

Before

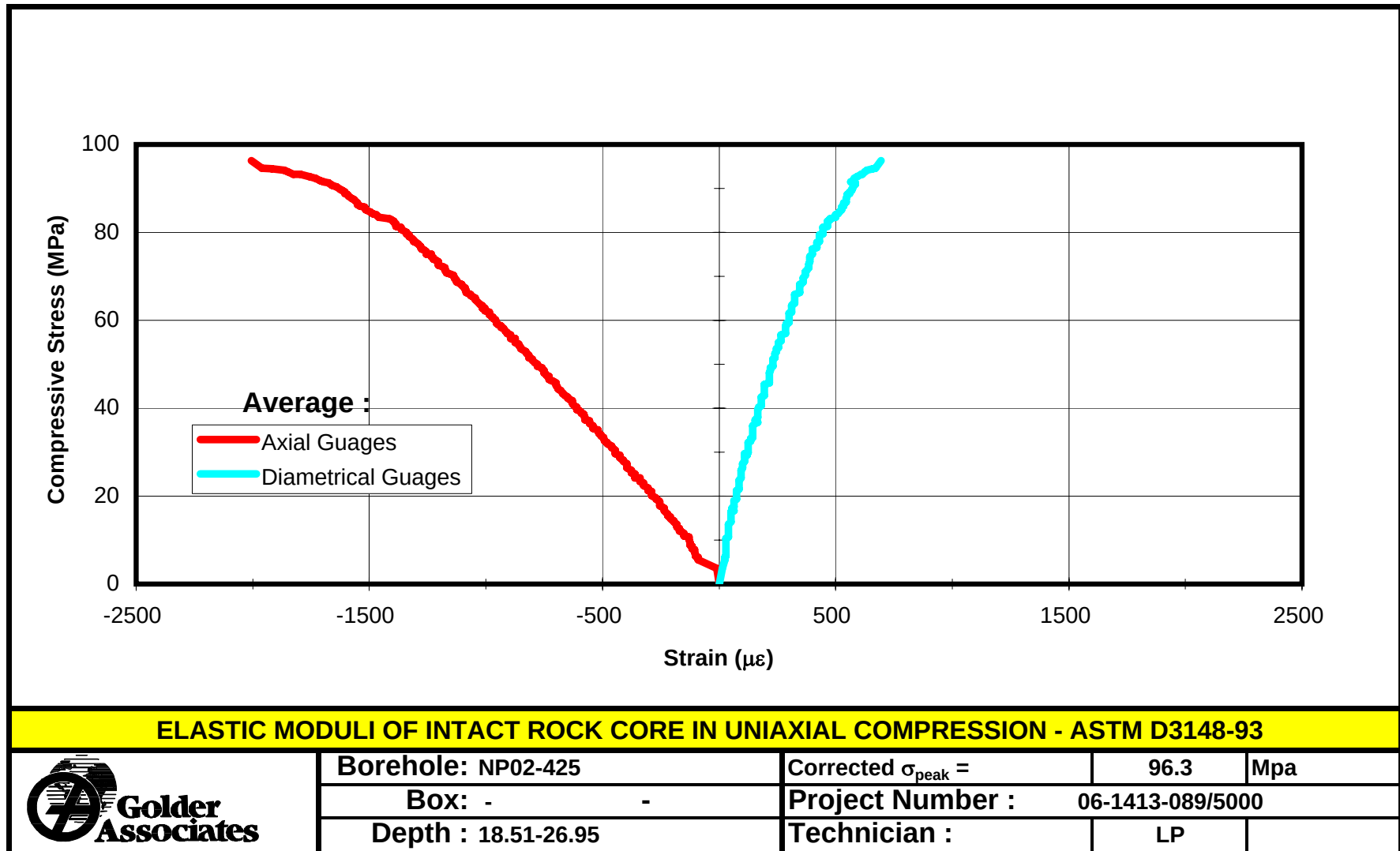


PROJECT #	06-1413-089/5000
BOREHOLE	NP02-434
DEPTH(m)	6.05-23.56

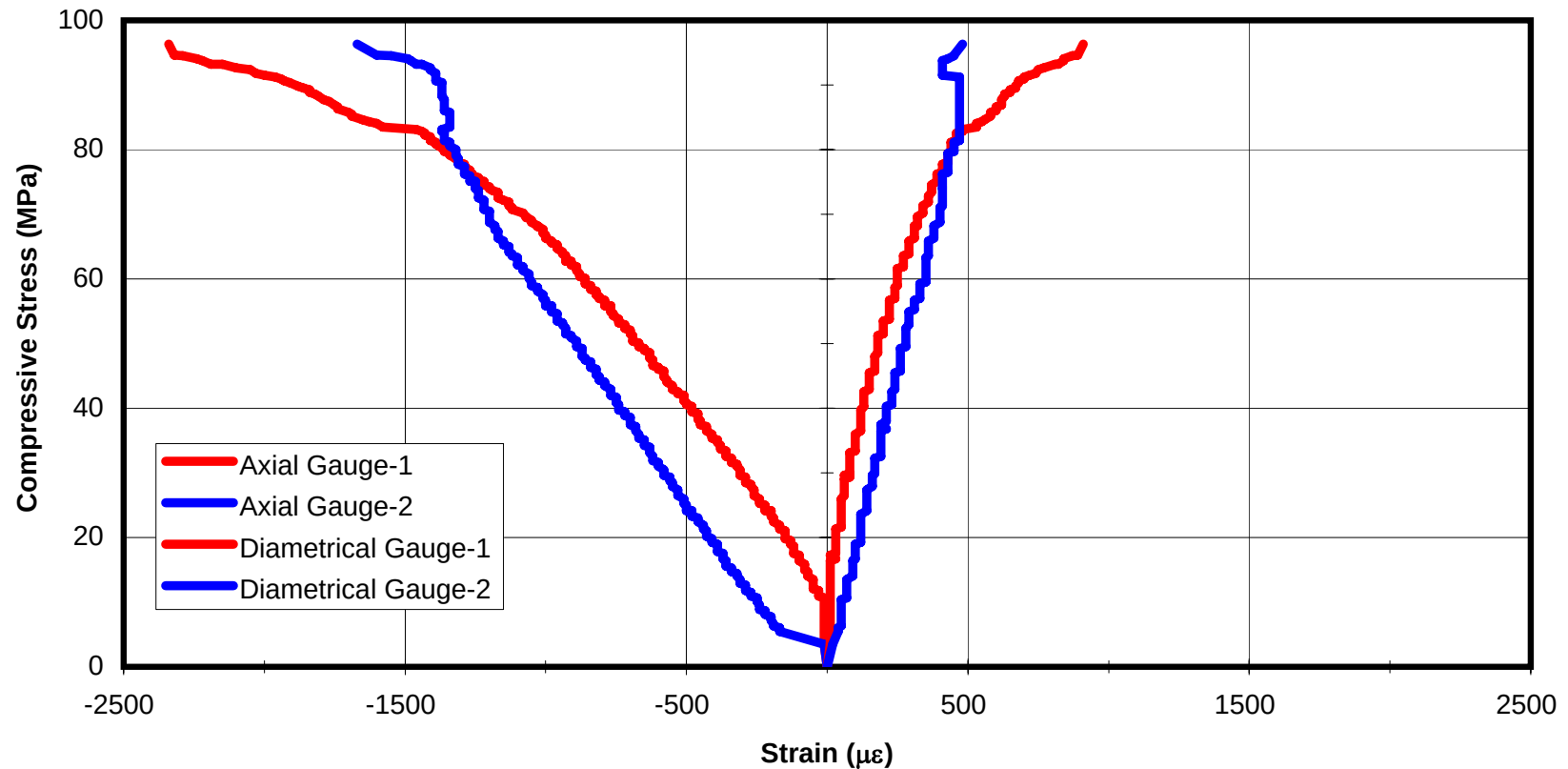
After

PROJECT		MEADOWBANK MINING CORPORATION			
TITLE		MODULUS TESTING NP02-434 AT 16.00m			
		PROJECT No. 06-1413-089		FILE No. Modulus Testing	
		DESIGN	JFG	22MAR07	SCALE NTS
		CADD	AS	22MAR07	REV.
		CHECK			
		REVIEW			
					FIGURE II-1

Stress vs. Strain



Stress vs. Strain



ELASTIC MODULI OF INTACT ROCK CORE IN UNIAXIAL COMPRESSION - ASTM D3148-93



Borehole: NP02-425

Corrected σ_{peak} = 96.30 Mpa

Box: - -

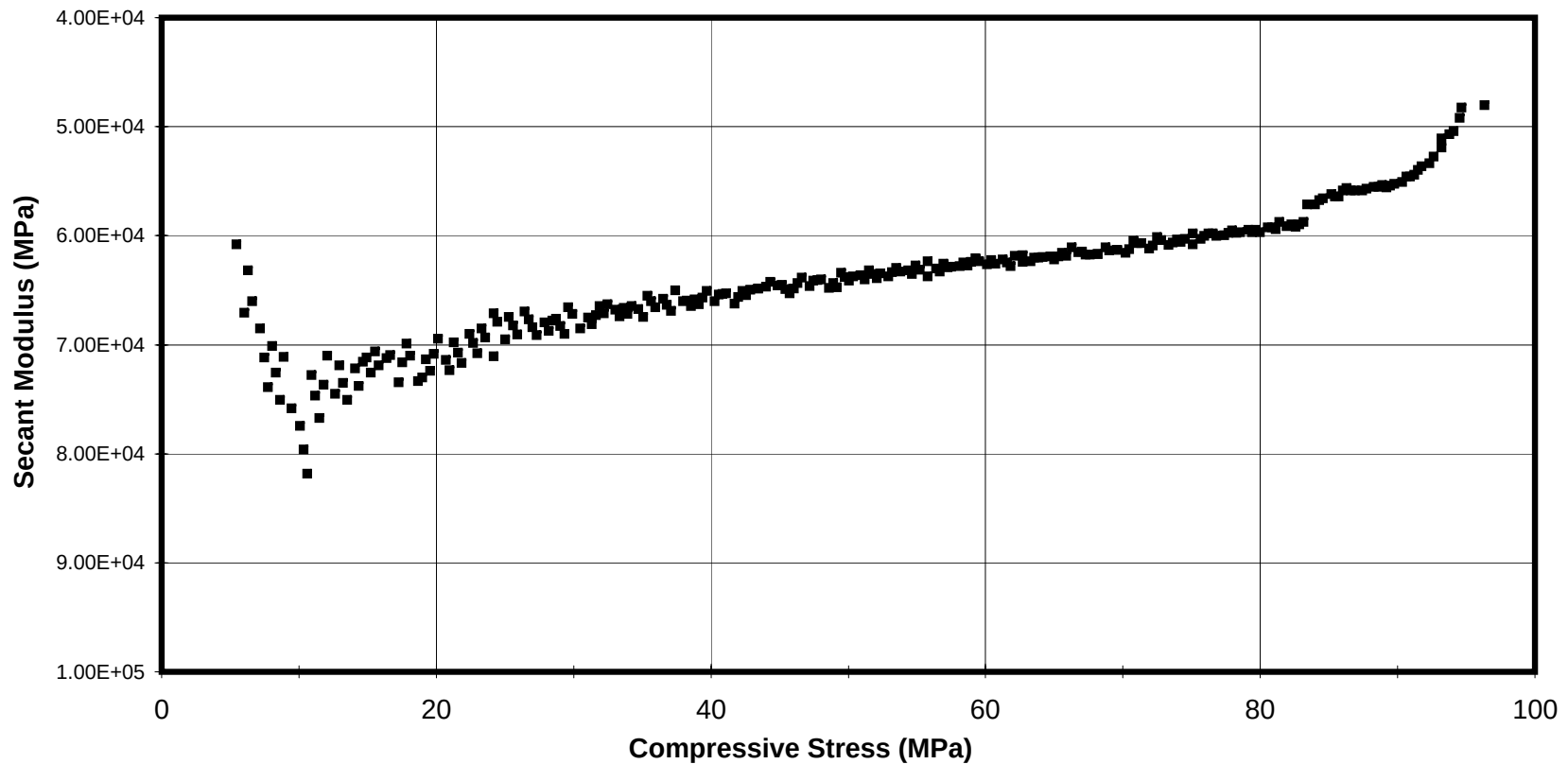
Project Number : 06-1413-089/5000

Depth : 18.51-26.95

Technician :

LP

Secant Modulus



ELASTIC MODULI OF INTACT ROCK CORE IN UNIAXIAL COMPRESSION - ASTM D3148-93



Borehole: NP02-425

E₅₀ (Secant Modulus) = 6.41E+04 Mpa

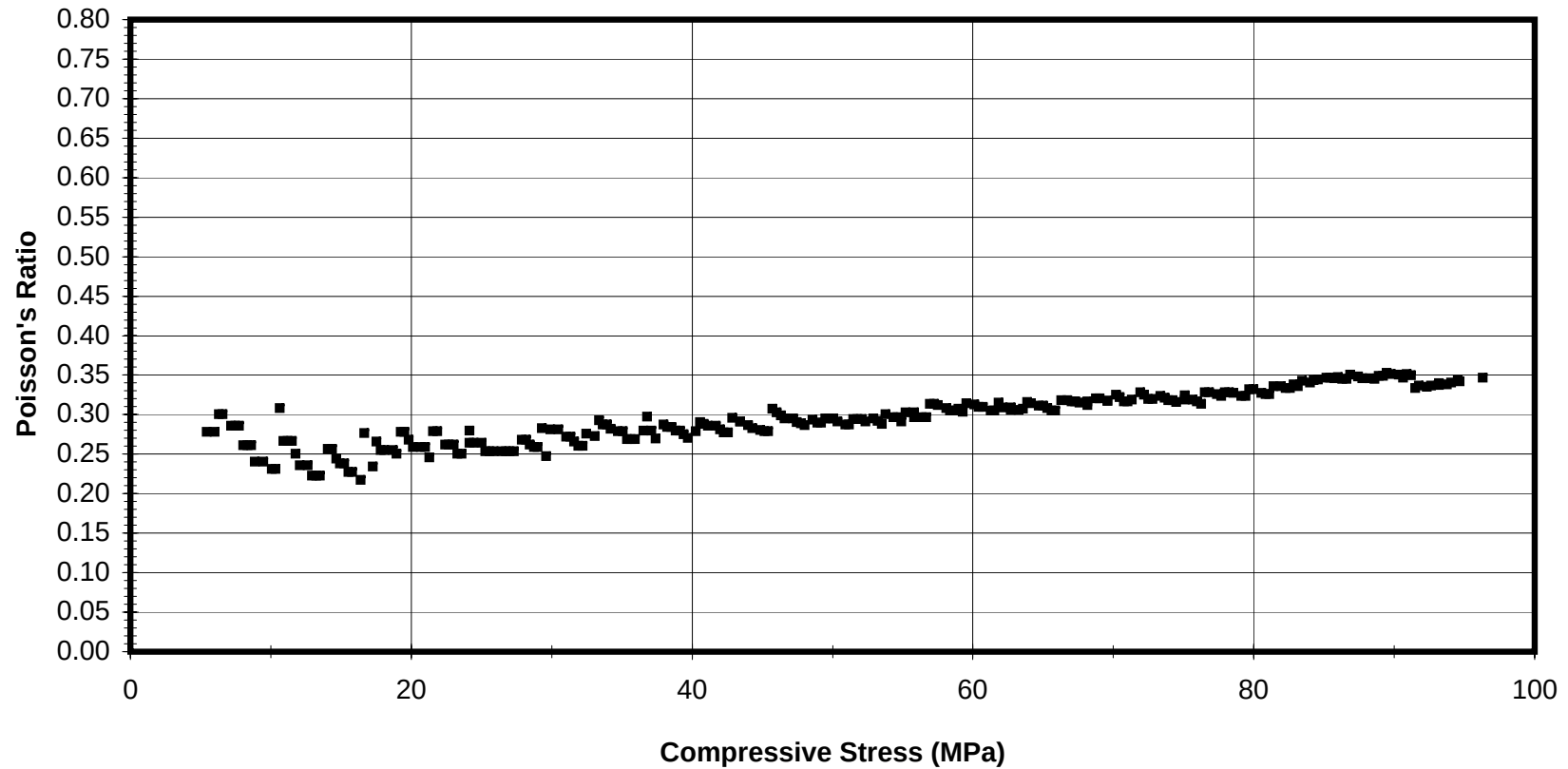
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Project Number : 06-1413-089/5000

Depth : 18.51-26.95

Technician : LP

Poisson's Ratio



ELASTIC MODULI OF INTACT ROCK CORE IN UNIAXIAL COMPRESSION - ASTM D3148-93



Borehole: NP02-425

v_{50} (Poisson's Ratio) =

0.29

Box: - -

Project Number : 06-1413-089/5000

Depth : 18.51-26.95

Technician :

LP



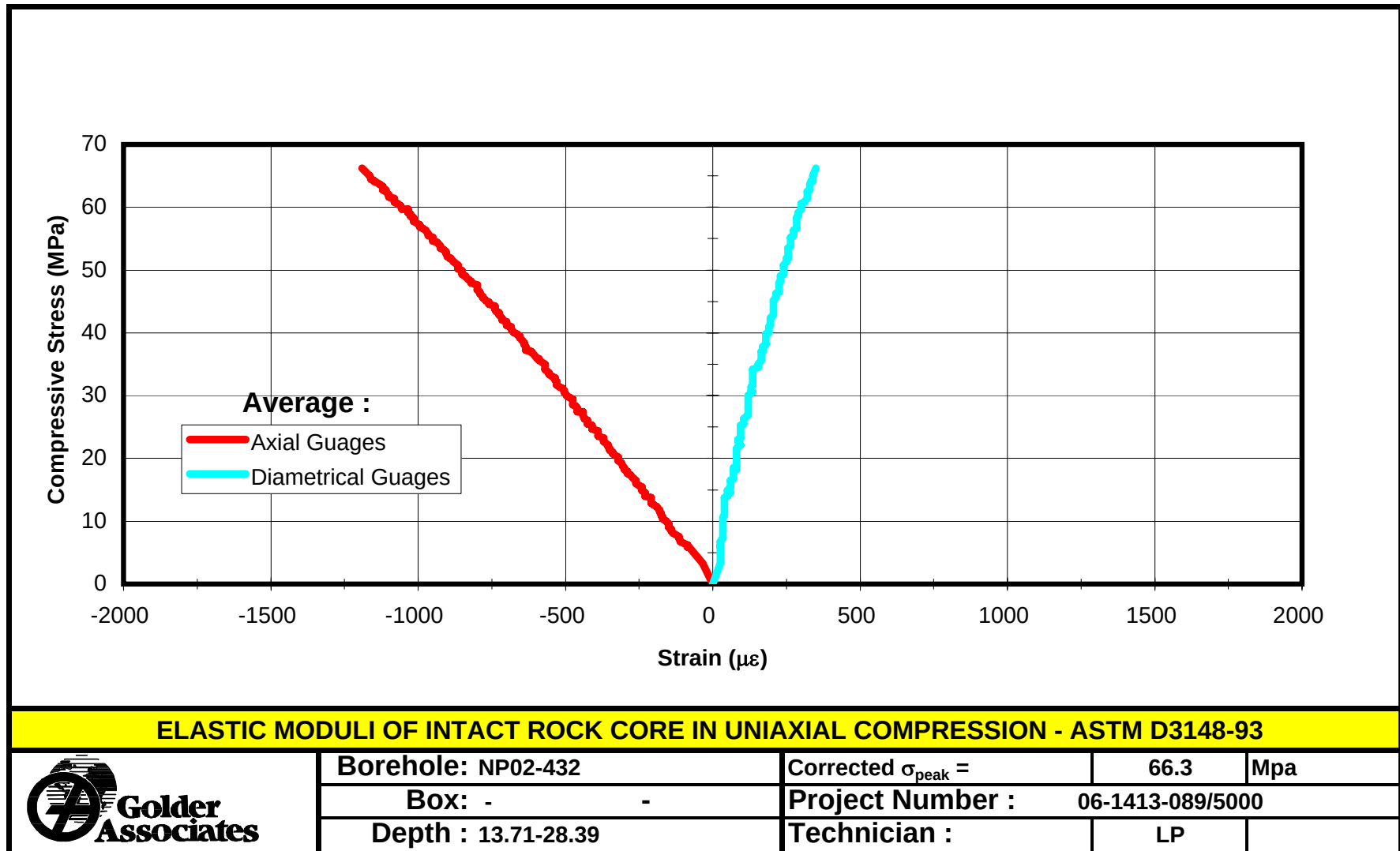
Before



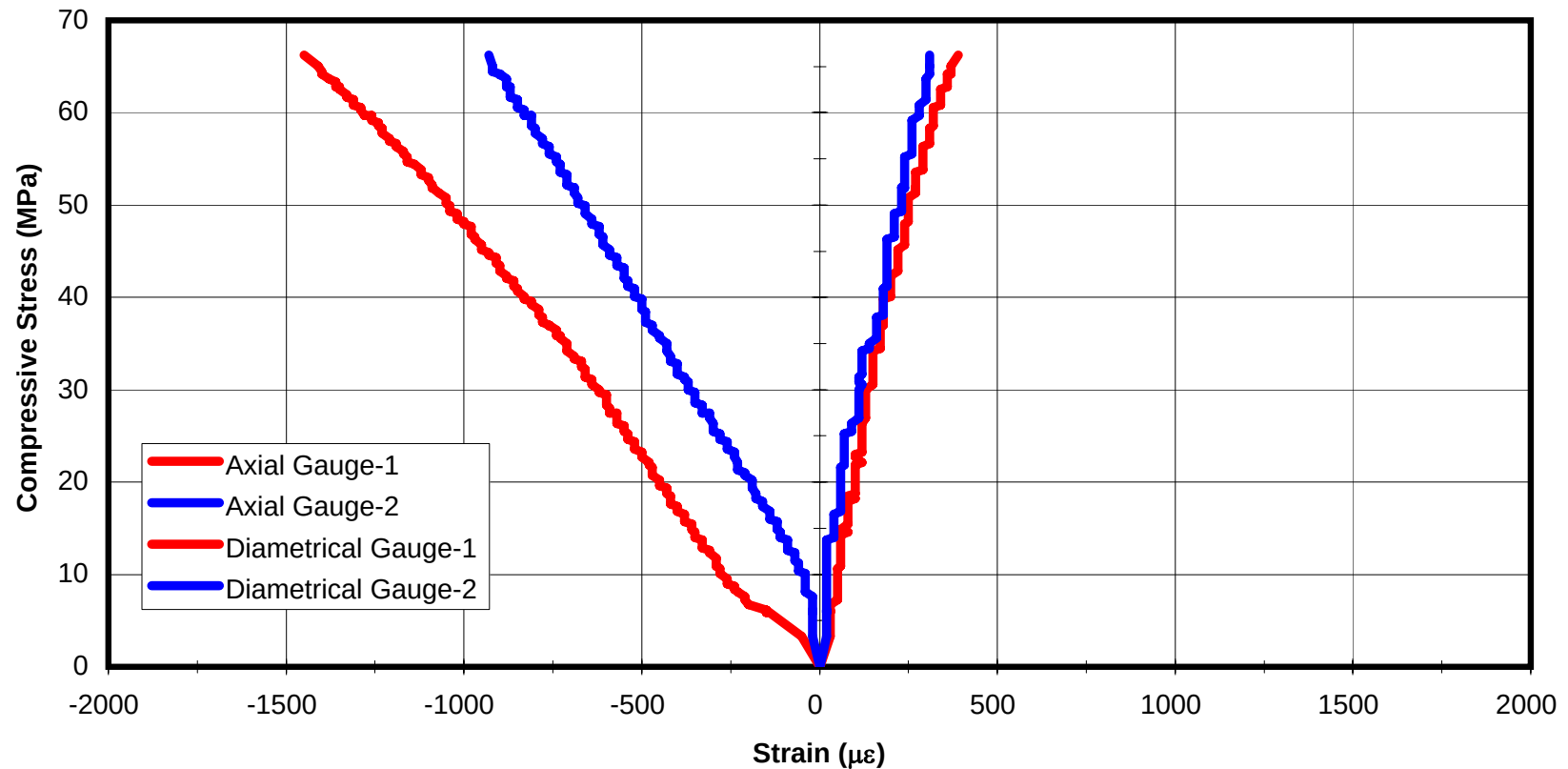
After

PROJECT		MEADOWBANK MINING CORPORATION					
TITLE		MODULUS TESTING NP02-425 AT 24.10m					
	PROJECT No.		06-1413-089		FILE No.	Modulus Testing	
	DESIGN	JFG	22MAR07		SCALE	NTS	REV.
	CADD	AS	22MAR07		FIGURE II-2		
	CHECK						
	REVIEW						

Stress vs. Strain



Stress vs. Strain



ELASTIC MODULI OF INTACT ROCK CORE IN UNIAXIAL COMPRESSION - ASTM D3148-93



Borehole: NP02-432

Corrected σ_{peak} = 66.30 Mpa

Box: - -

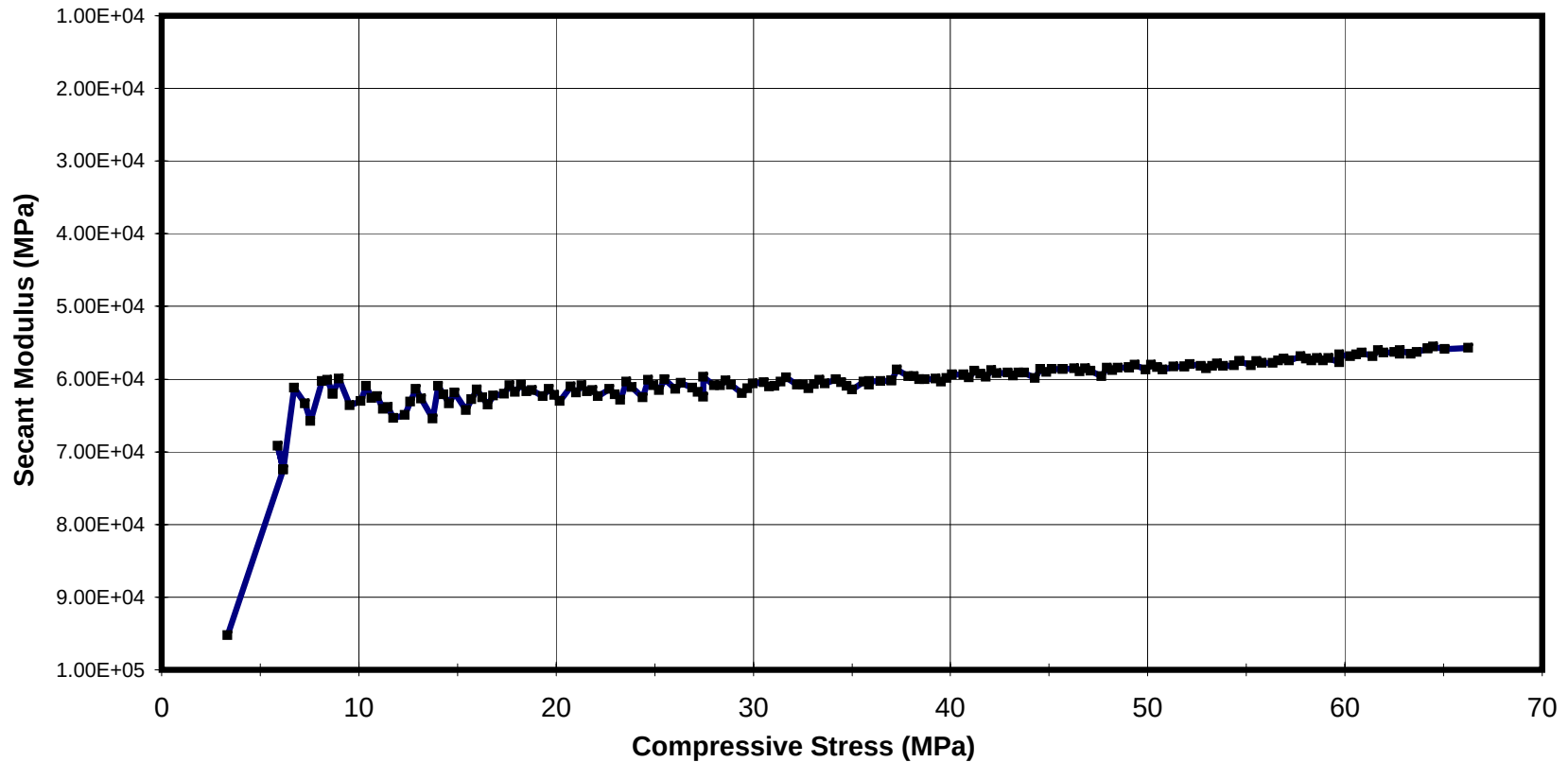
Project Number : 06-1413-089/5000

Depth : 13.71-28.39

Technician :

LP

Secant Modulus



ELASTIC MODULI OF INTACT ROCK CORE IN UNIAXIAL COMPRESSION - ASTM D3148-93



Borehole: NP02-432

E₅₀ (Secant Modulus) = 6.07E+04 Mpa

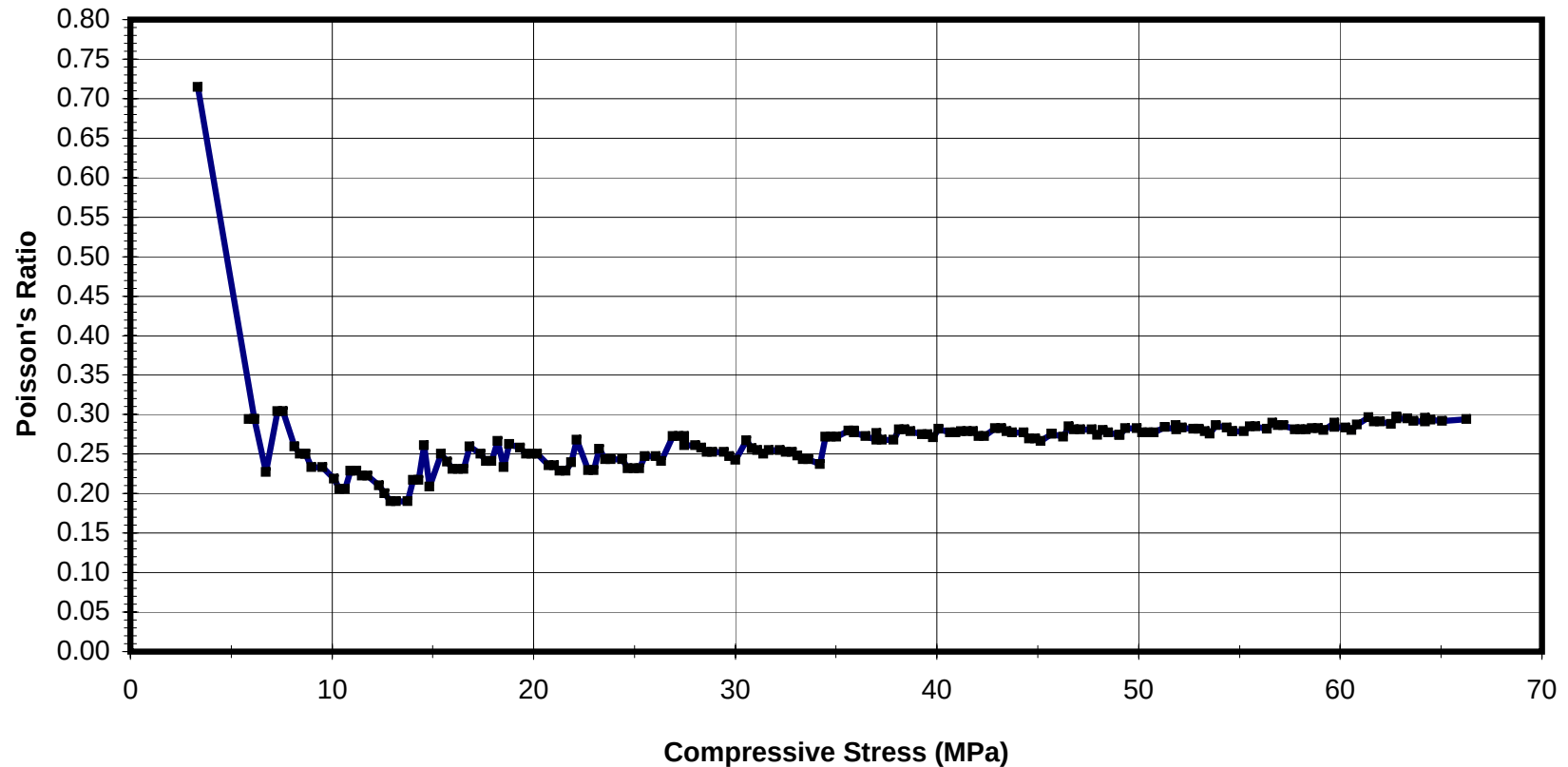
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Project Number : 06-1413-089/5000

Depth : 13.71-28.39

Technician : LP

Poisson's Ratio



ELASTIC MODULI OF INTACT ROCK CORE IN UNIAXIAL COMPRESSION - ASTM D3148-93



Borehole: NP02-432

ν_{50} (Poisson's Ratio) =

0.25

Box: - -

Project Number :

06-1413-089/5000

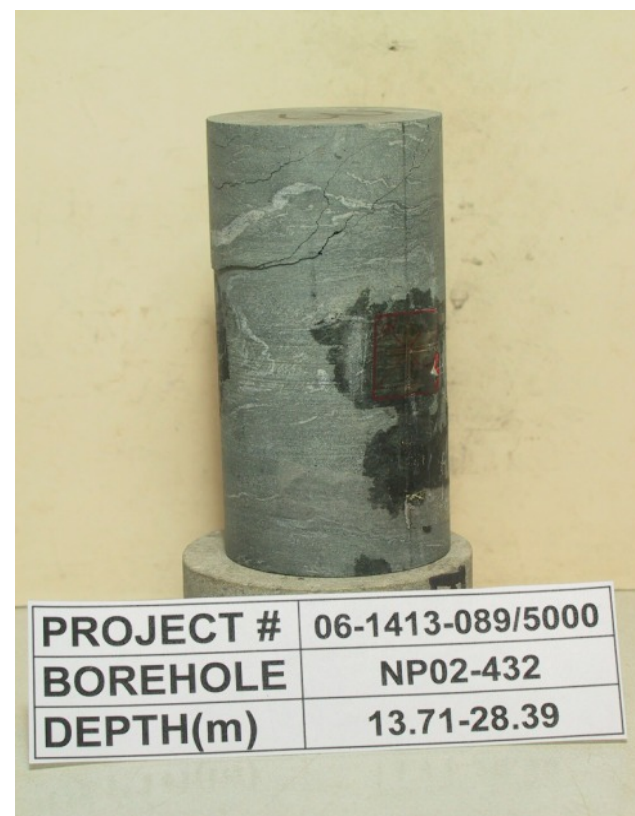
Depth : 13.71-28.39

Technician :

LP



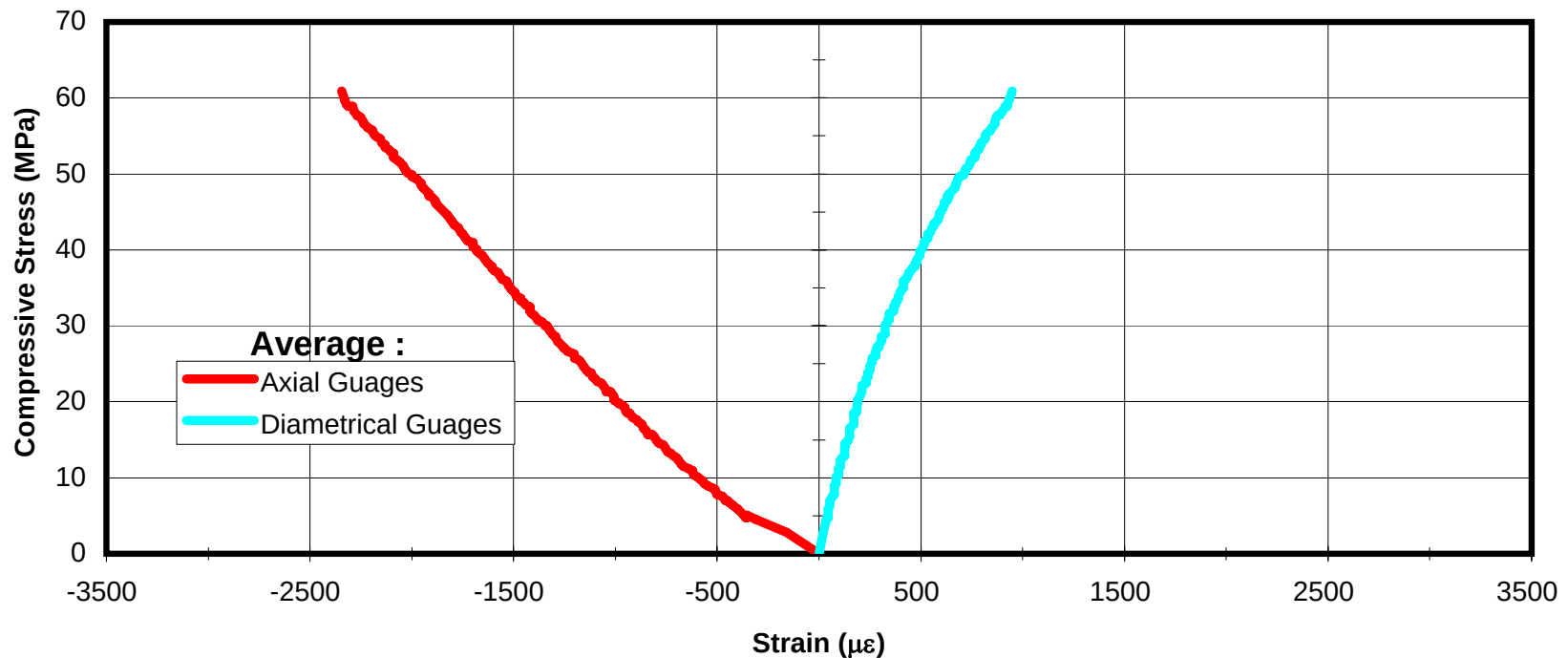
Before



After

PROJECT		MEADOWBANK MINING CORPORATION					
TITLE		MODULUS TESTING NP02-432 AT 21.20m					
	PROJECT No.		06-1413-089		FILE No.	Modulus Testing	
	DESIGN	JFG	22MAR07		SCALE	NTS	REV.
	CADD	AS	22MAR07		FIGURE II-3		
	CHECK						
	REVIEW						

Stress vs. Strain



ELASTIC MODULI OF INTACT ROCK CORE IN UNIAXIAL COMPRESSION - ASTM D3148-93



Borehole: NP96-148

Corrected σ_{peak} = 60.9 Mpa

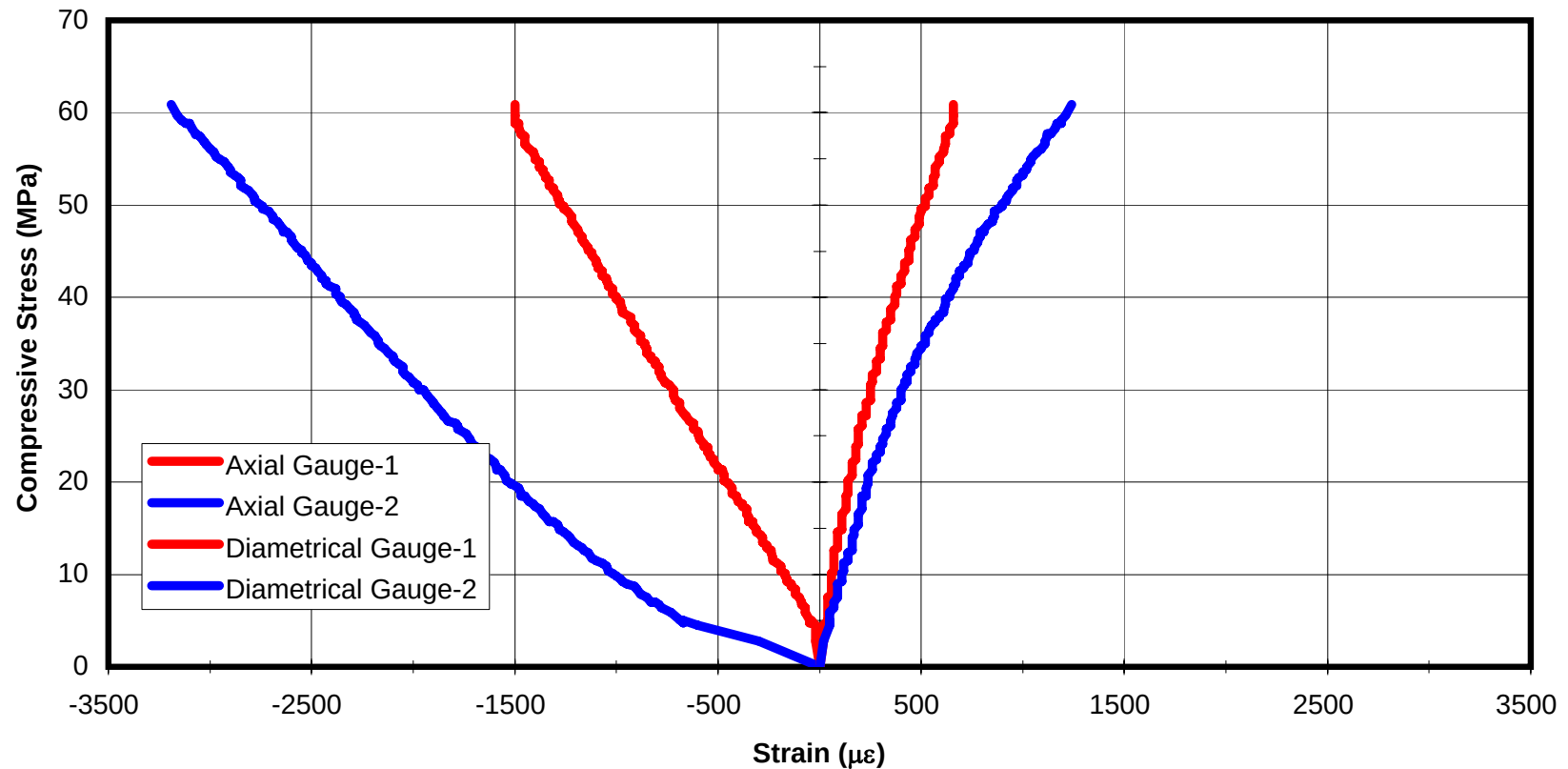
Box: - -

Project Number : 06-1413-089/5000

Depth : 6.0-27.50

Technician : LP

Stress vs. Strain



ELASTIC MODULI OF INTACT ROCK CORE IN UNIAXIAL COMPRESSION - ASTM D3148-93



Borehole: NP96-148

Corrected σ_{peak} = 60.90 Mpa

Box: - -

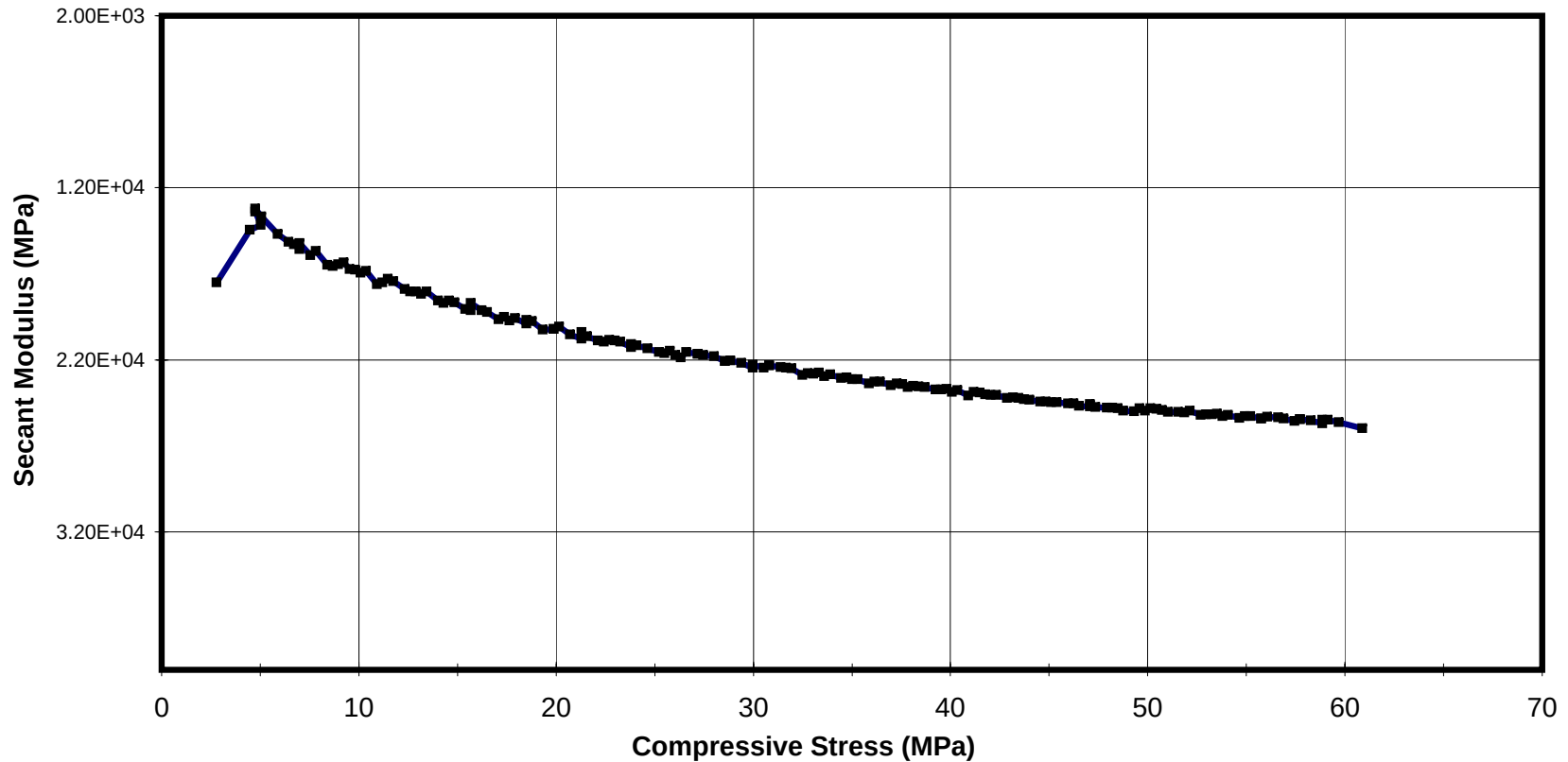
Project Number : 06-1413-089/5000

Depth : 6.0-27.50

Technician :

LP

Secant Modulus



ELASTIC MODULI OF INTACT ROCK CORE IN UNIAXIAL COMPRESSION - ASTM D3148-93



Borehole: NP96-148

Box: - -

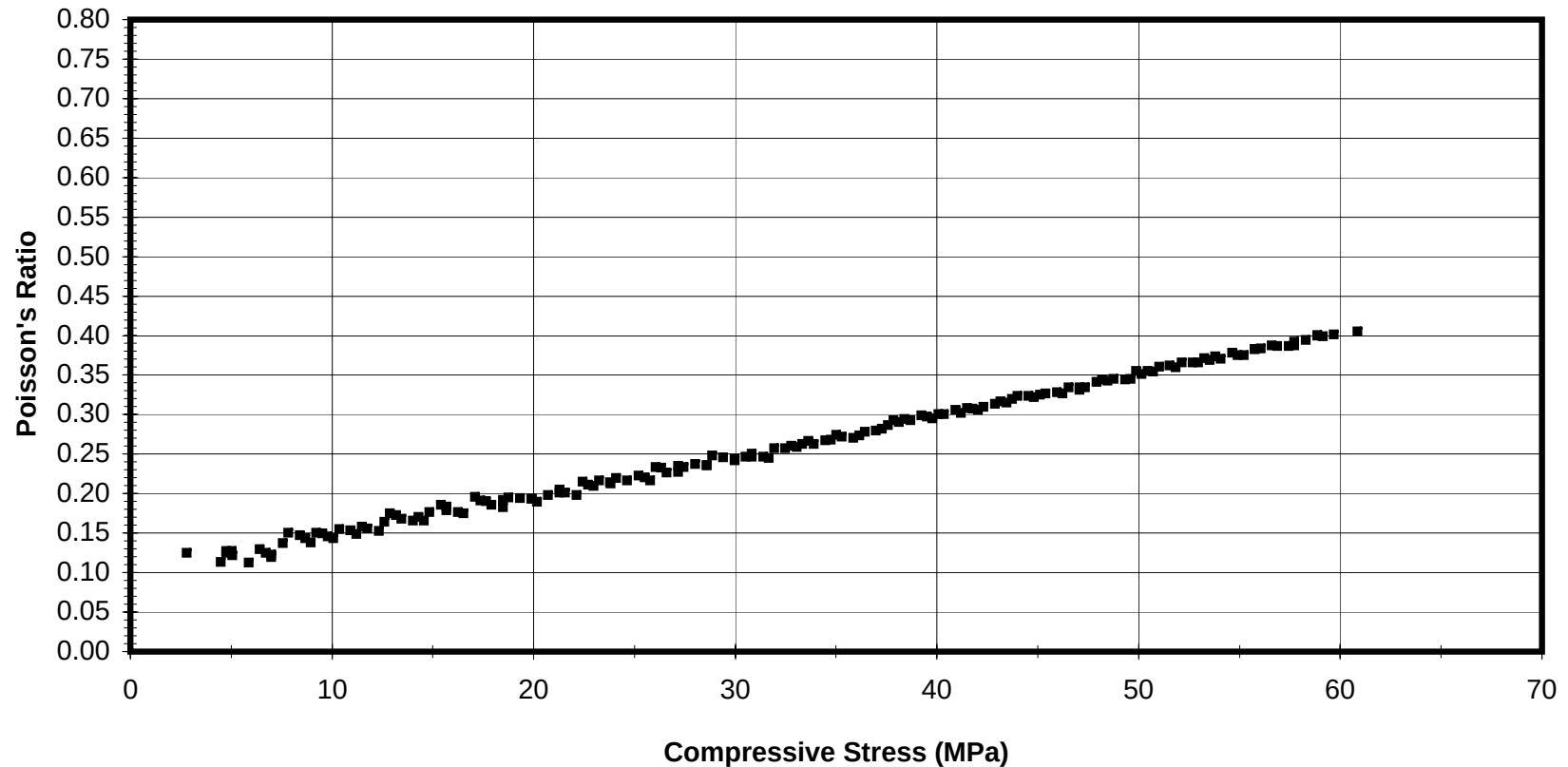
Depth : 6.0-27.50

E_{50} (Secant Modulus) = 2.25E+04 Mpa

Project Number : 06-1413-089/5000

Technician : LP

Poisson's Ratio



ELASTIC MODULI OF INTACT ROCK CORE IN UNIAXIAL COMPRESSION - ASTM D3148-93



Borehole: NP96-148

ν_{50} (Poisson's Ratio) = 0.25

Box: - -

Project Number : 06-1413-089/5000

Depth : 6.0-27.50

Technician : LP



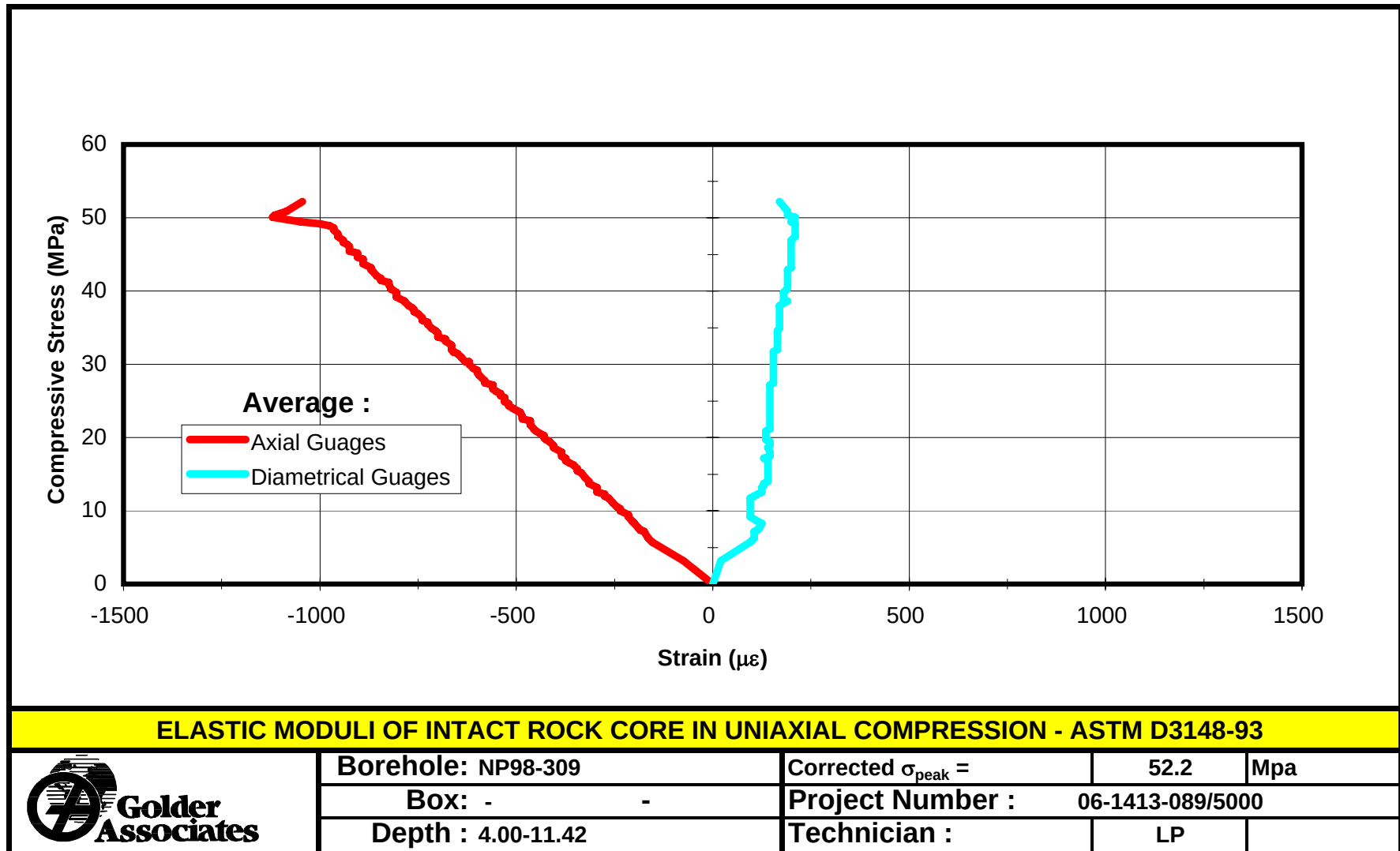
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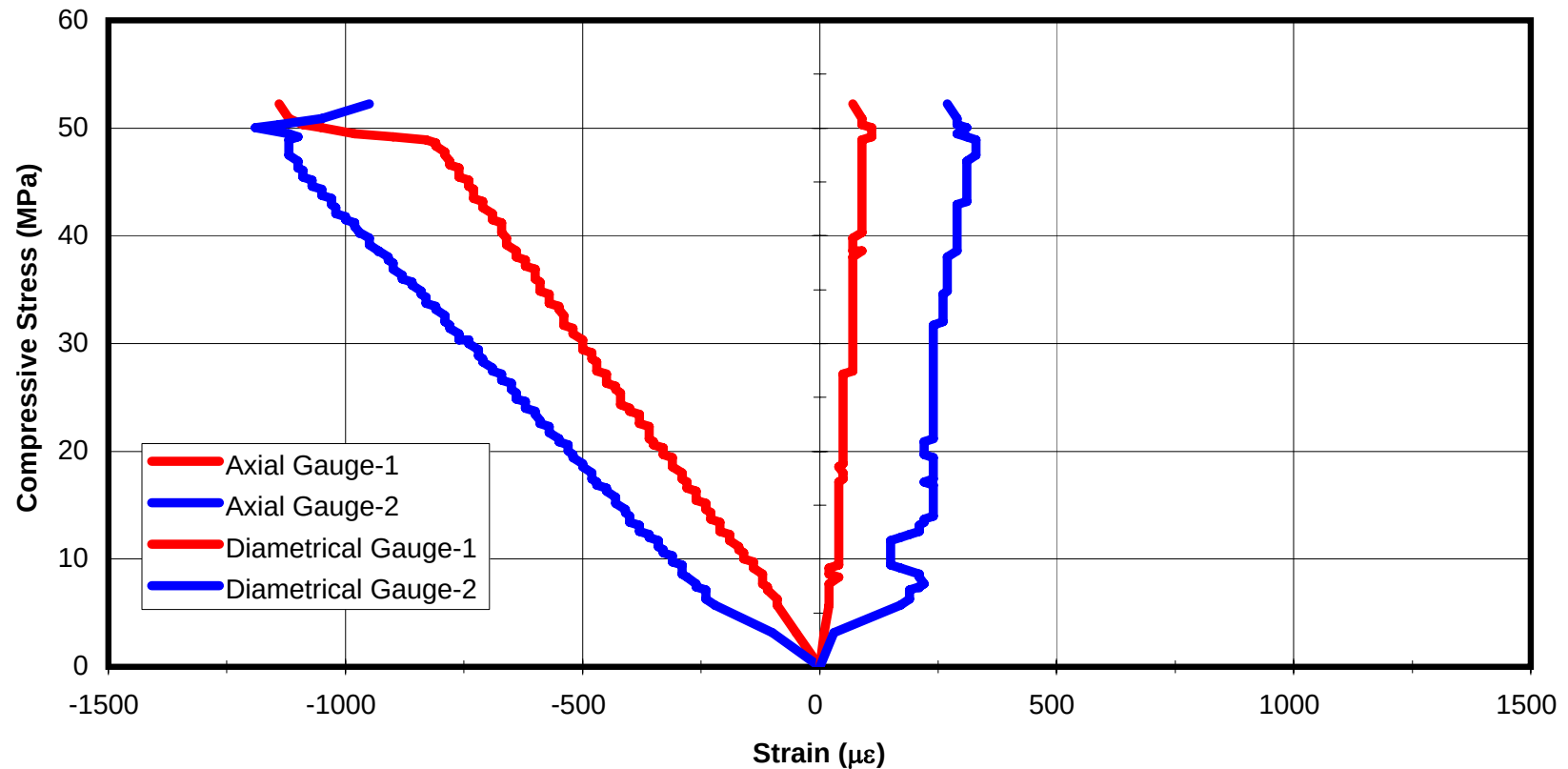
After

PROJECT		MEADOWBANK MINING CORPORATION			
TITLE		MODULUS TESTING NP96-148 AT 14.20m			
	PROJECT No.		06-1413-089		FILE No. Modulus Testing
	DESIGN	JFG	22MAR07		SCALE NTS
	CADD	AS	22MAR07		REV.
	CHECK				FIGURE II-4
	REVIEW				

Stress vs. Strain



Stress vs. Strain



ELASTIC MODULI OF INTACT ROCK CORE IN UNIAXIAL COMPRESSION - ASTM D3148-93



Borehole: NP98-309

Corrected σ_{peak} = 52.20 Mpa

Box: - -

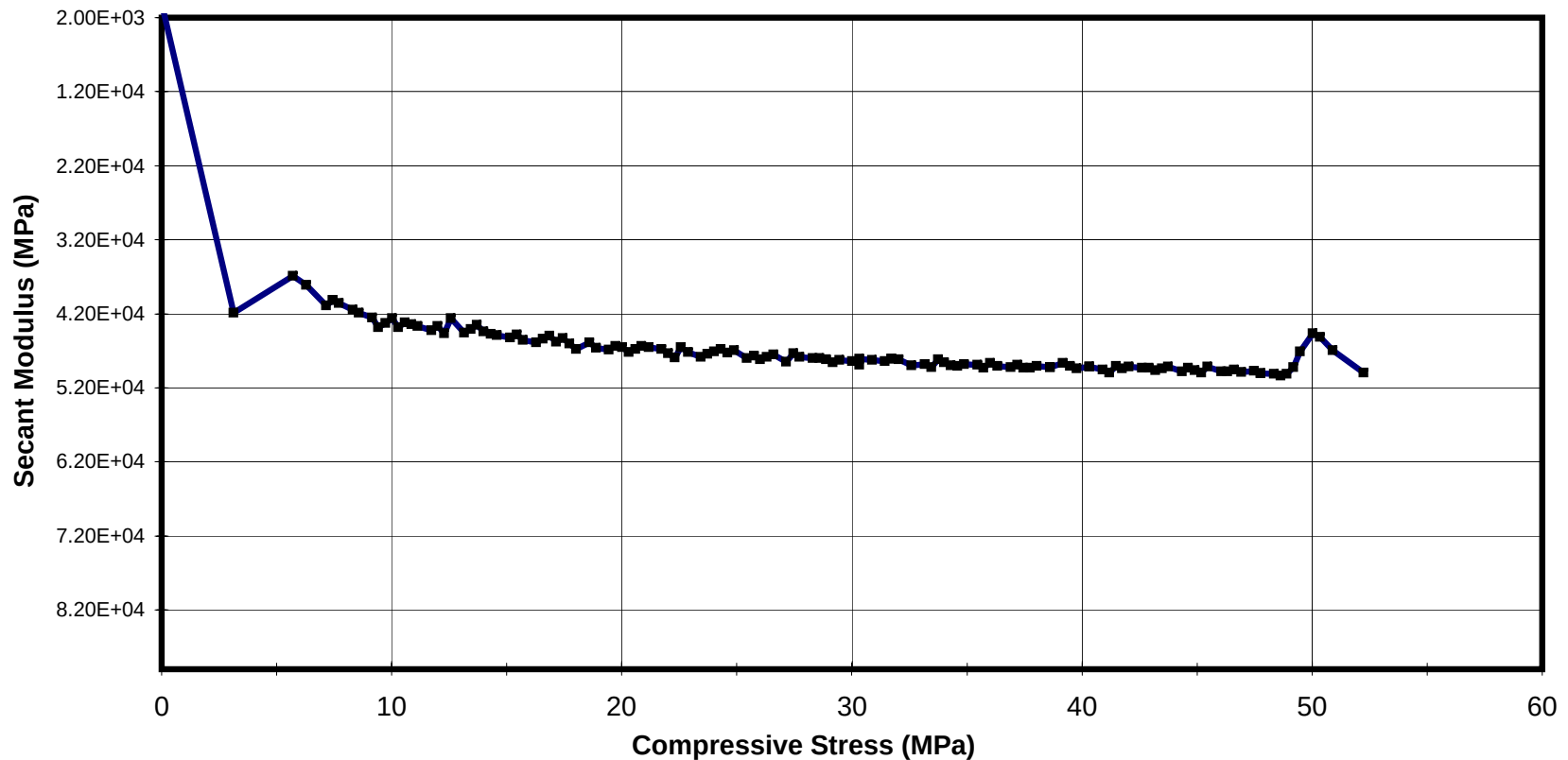
Project Number : 06-1413-089/5000

Depth : 4.00-11.42

Technician :

LP

Secant Modulus



ELASTIC MODULI OF INTACT ROCK CORE IN UNIAXIAL COMPRESSION - ASTM D3148-93



Borehole: NP98-309

E₅₀ (Secant Modulus) = 4.82E+04 Mpa

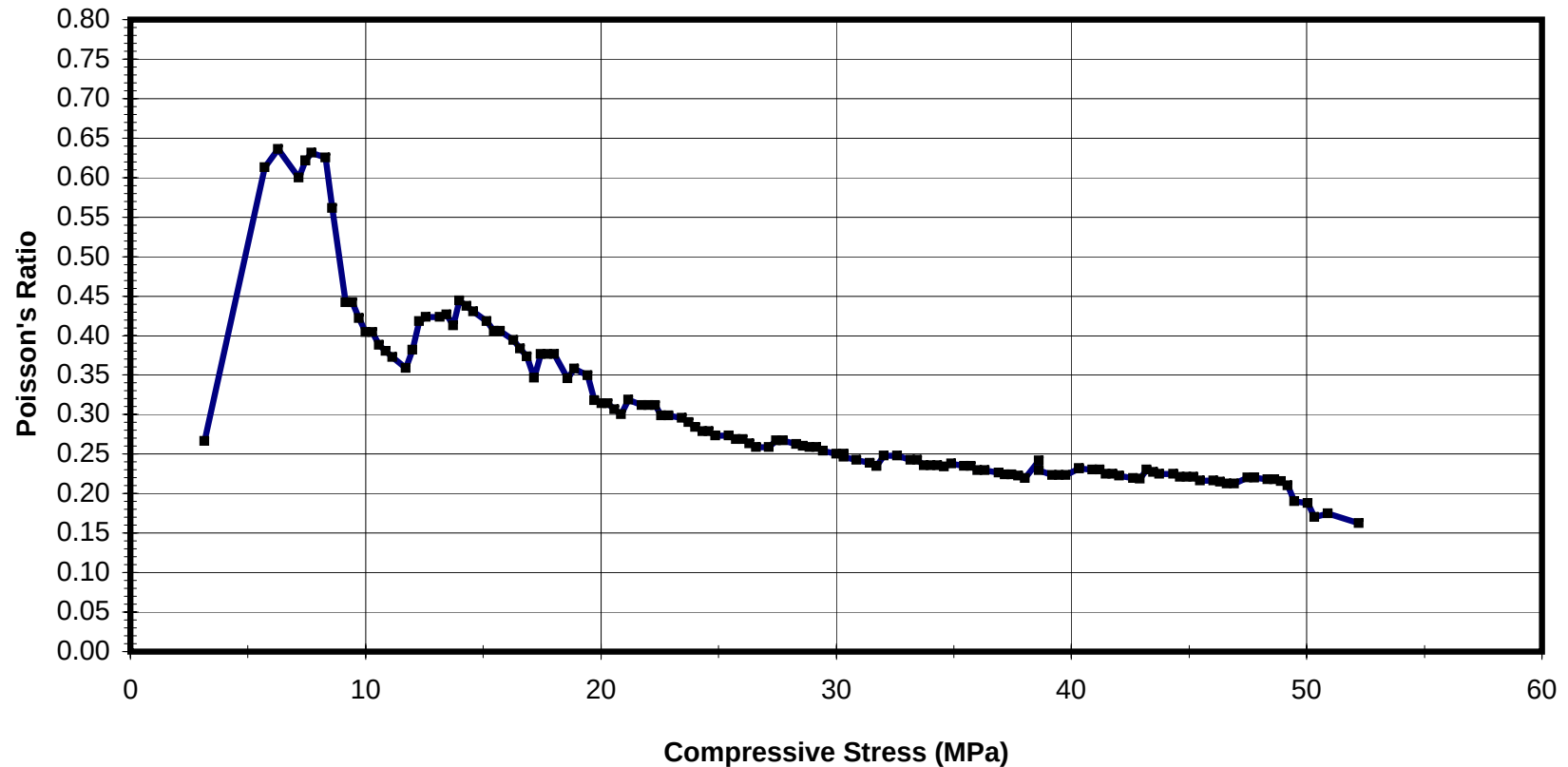
Box: - -

Project Number : 06-1413-089/5000

Depth : 4.00-11.42

Technician : LP

Poisson's Ratio



ELASTIC MODULI OF INTACT ROCK CORE IN UNIAXIAL COMPRESSION - ASTM D3148-93



Borehole: NP98-309

v_{50} (Poisson's Ratio) =

0.27

Box: - -

Project Number :

06-1413-089/5000

Depth : 4.00-11.42

Technician :

LP



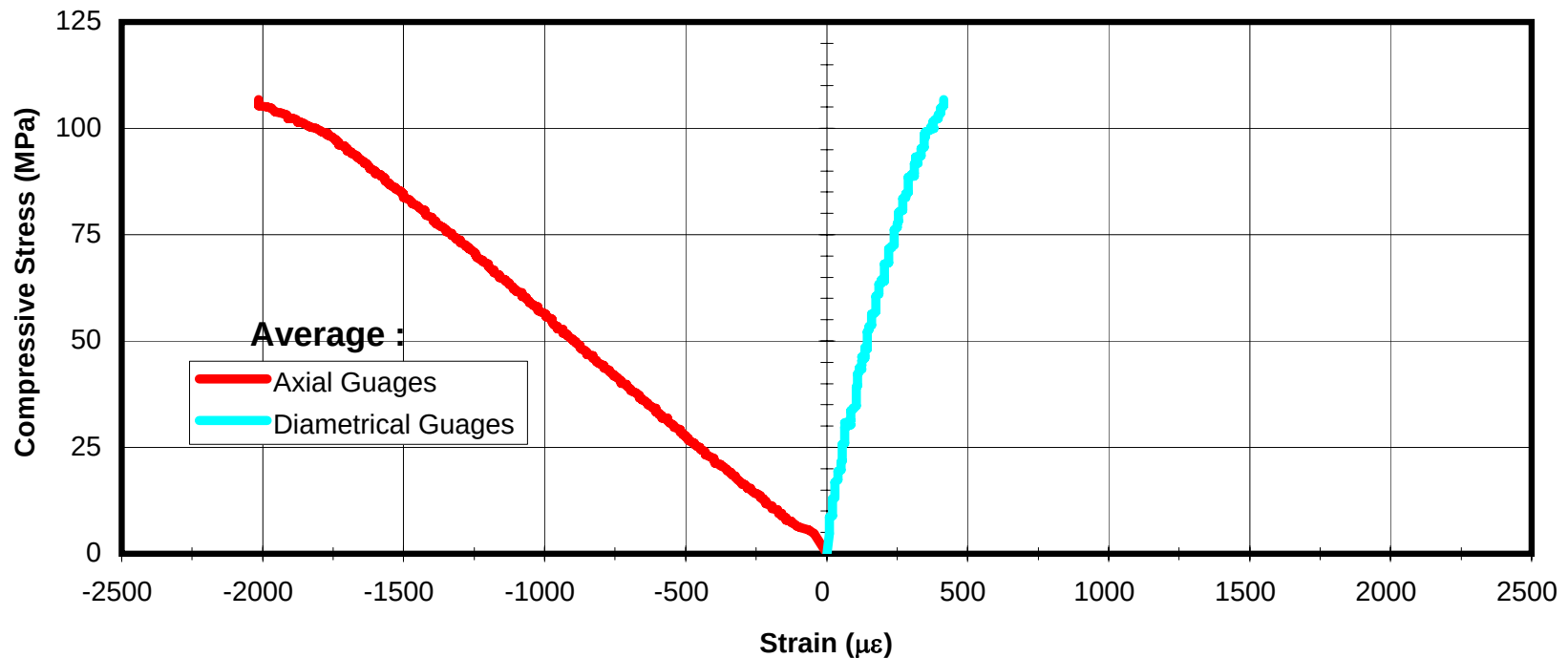
Before



After

PROJECT		MEADOWBANK MINING CORPORATION			
TITLE		MODULUS TESTING NP98-309 AT 10.20m			
		PROJECT No. 06-1413-089		FILE No. Modulus Testing	
		DESIGN	JFG	22MAR07	SCALE NTS
		CADD	AS	22MAR07	REV.
		CHECK			
		REVIEW			
					FIGURE II-5

Stress vs. Strain



ELASTIC MODULI OF INTACT ROCK CORE IN UNIAXIAL COMPRESSION - ASTM D3148-93



Borehole: TP99-345

Corrected σ_{peak} =

106.8

Mpa

Box: -

-

Project Number :

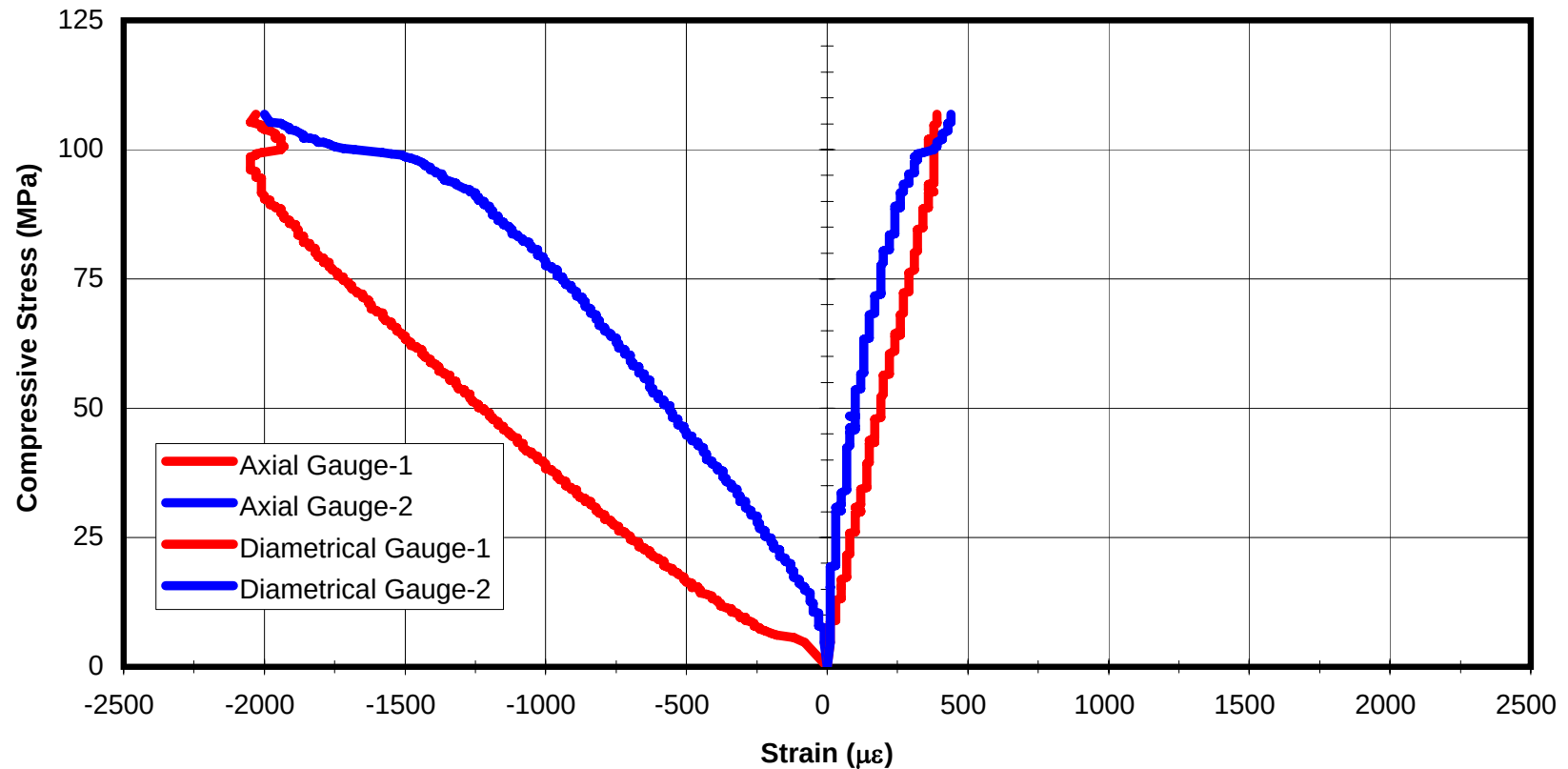
06-1413-089/5000

Depth : 8.65-14.55

Technician :

LP

Stress vs. Strain



ELASTIC MODULI OF INTACT ROCK CORE IN UNIAXIAL COMPRESSION - ASTM D3148-93



Borehole: TP99-345

Corrected σ_{peak} = 106.80 Mpa

Box: - -

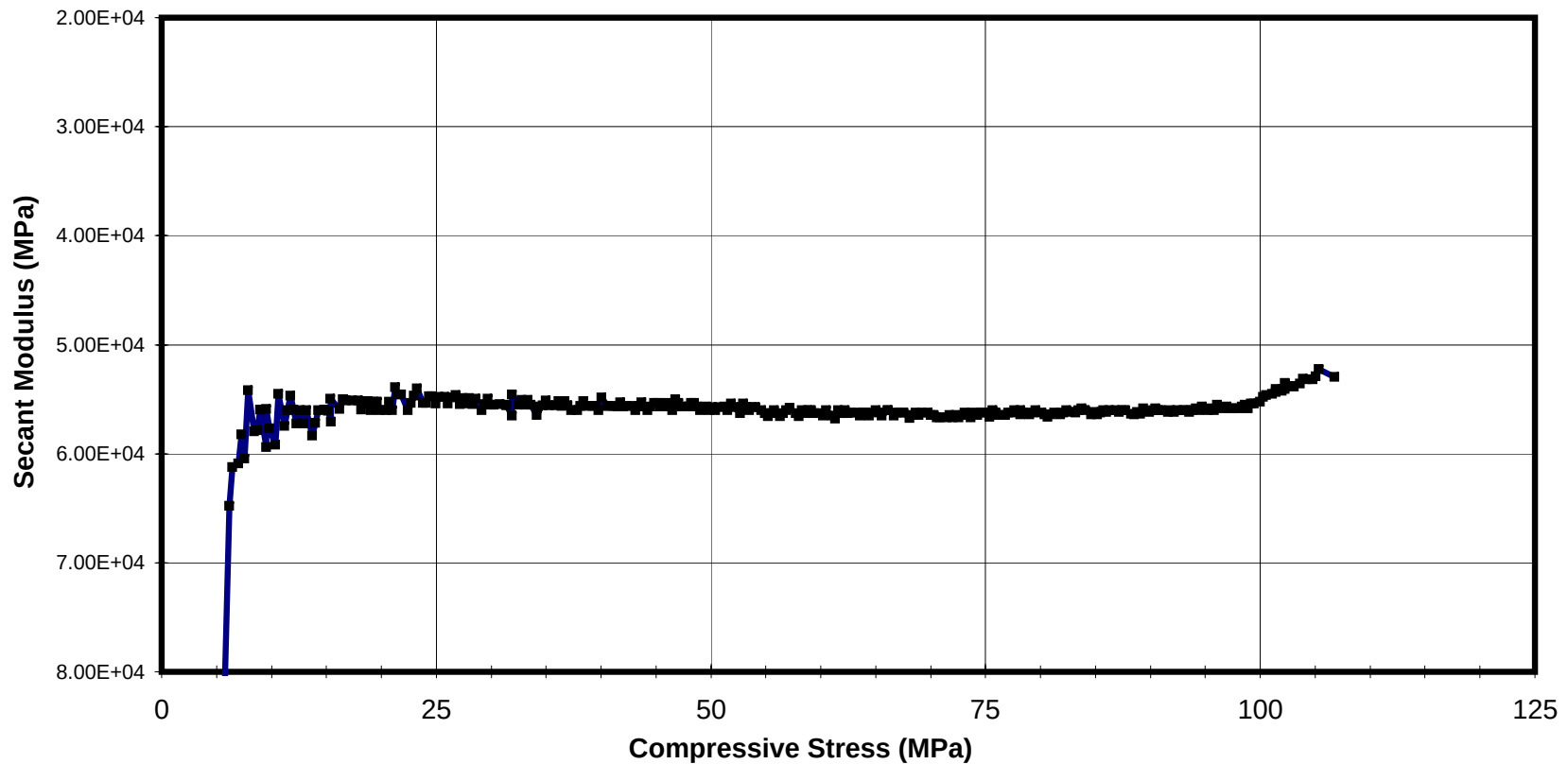
Project Number : 06-1413-089/5000

Depth : 8.65-14.55

Technician :

LP

Secant Modulus



ELASTIC MODULI OF INTACT ROCK CORE IN UNIAXIAL COMPRESSION - ASTM D3148-93



Borehole: TP99-345

E₅₀ (Secant Modulus) = 5.57E+04 Mpa

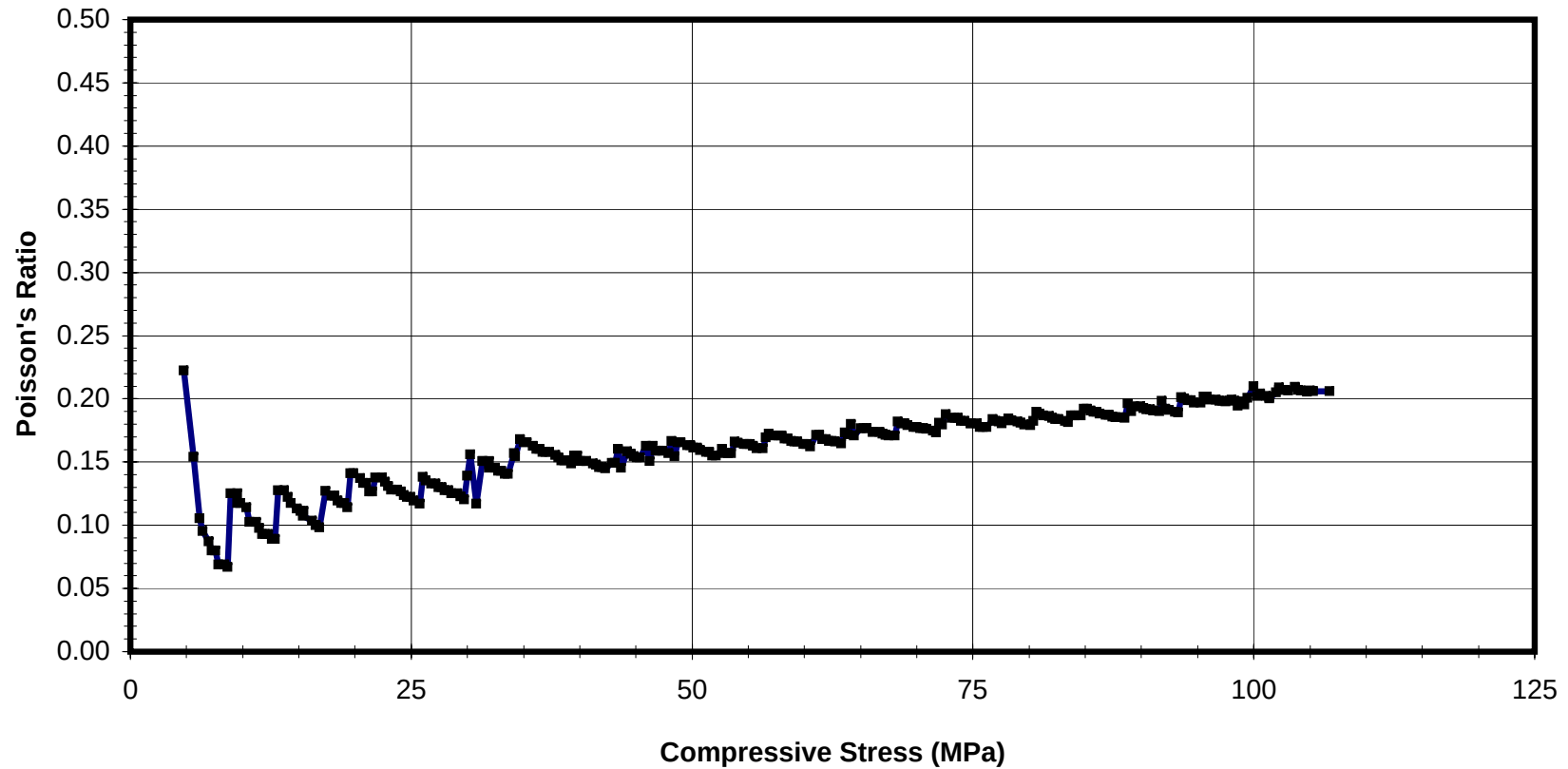
Box: - -

Project Number : 06-1413-089/5000

Depth : 8.65-14.55

Technician : LP

Poisson's Ratio



ELASTIC MODULI OF INTACT ROCK CORE IN UNIAXIAL COMPRESSION - ASTM D3148-93



Borehole: TP99-345

v_{50} (Poisson's Ratio) = 0.16

Box: - -

Project Number : 06-1413-089/5000

Depth : 8.65-14.55

Technician :

LP



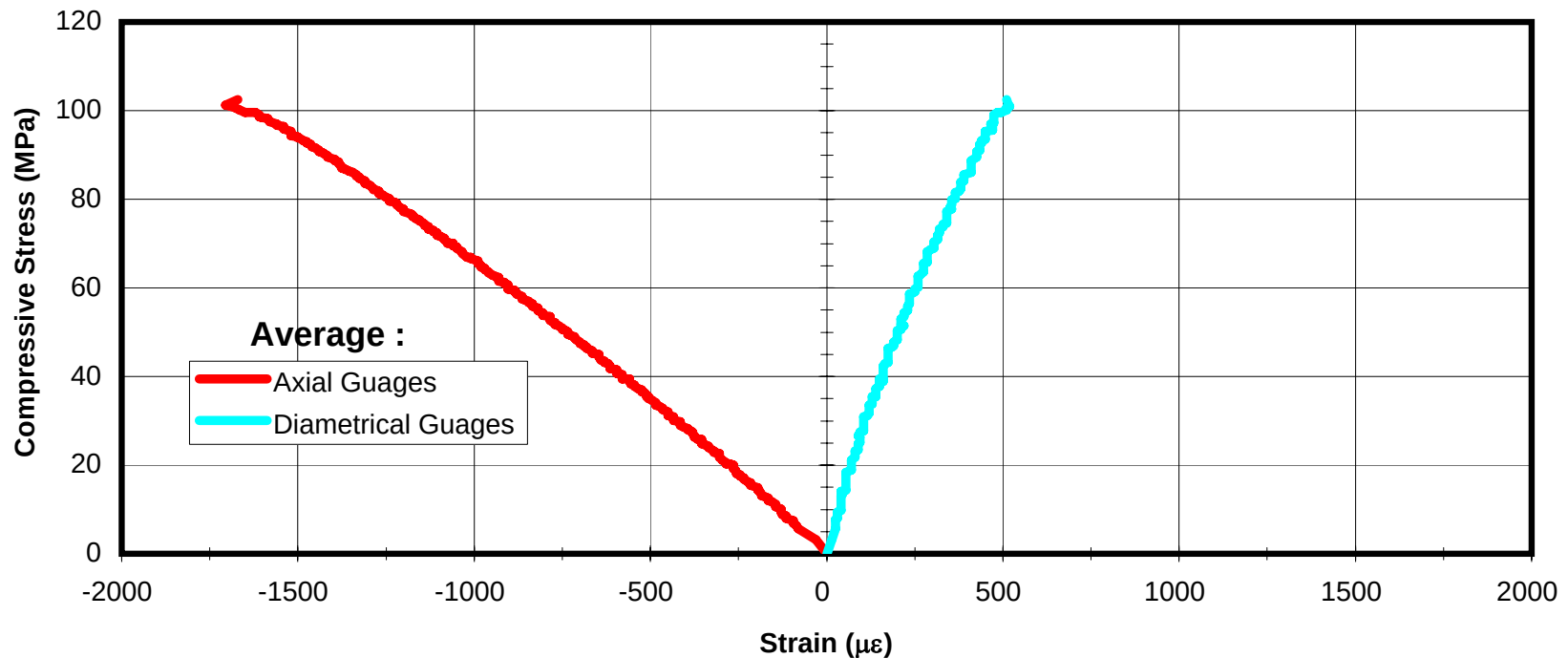
Before



After

PROJECT		MEADOWBANK MINING CORPORATION			
TITLE		MODULUS TESTING TP99-345 AT 10.17m			
	PROJECT No. 06-1413-089			FILE No. Modulus Testing	
	DESIGN	JFG	22MAR07	SCALE	NTS
	CADD	AS	22MAR07	REV.	
	CHECK			FIGURE II-6	
	REVIEW				

Stress vs. Strain



ELASTIC MODULI OF INTACT ROCK CORE IN UNIAXIAL COMPRESSION - ASTM D3148-93



Borehole: TP99-338

Corrected σ_{peak} =

102.5

Mpa

Box: -

-

Project Number :

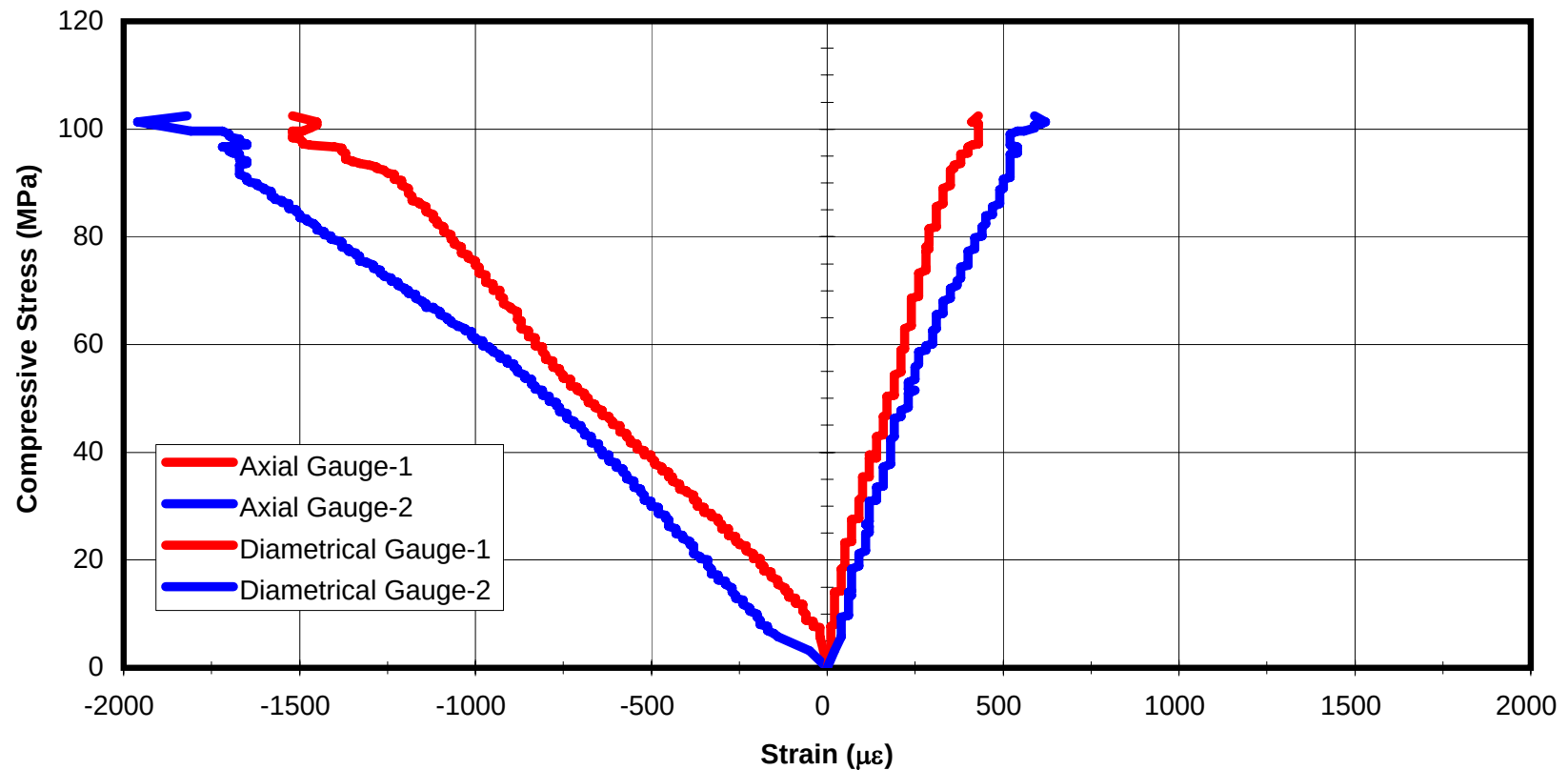
06-1413-089/5000

Depth : 5.00-11.65

Technician :

LP

Stress vs. Strain



ELASTIC MODULI OF INTACT ROCK CORE IN UNIAXIAL COMPRESSION - ASTM D3148-93



Borehole: TP99-338

Corrected σ_{peak} = 102.50 Mpa

Box: - -

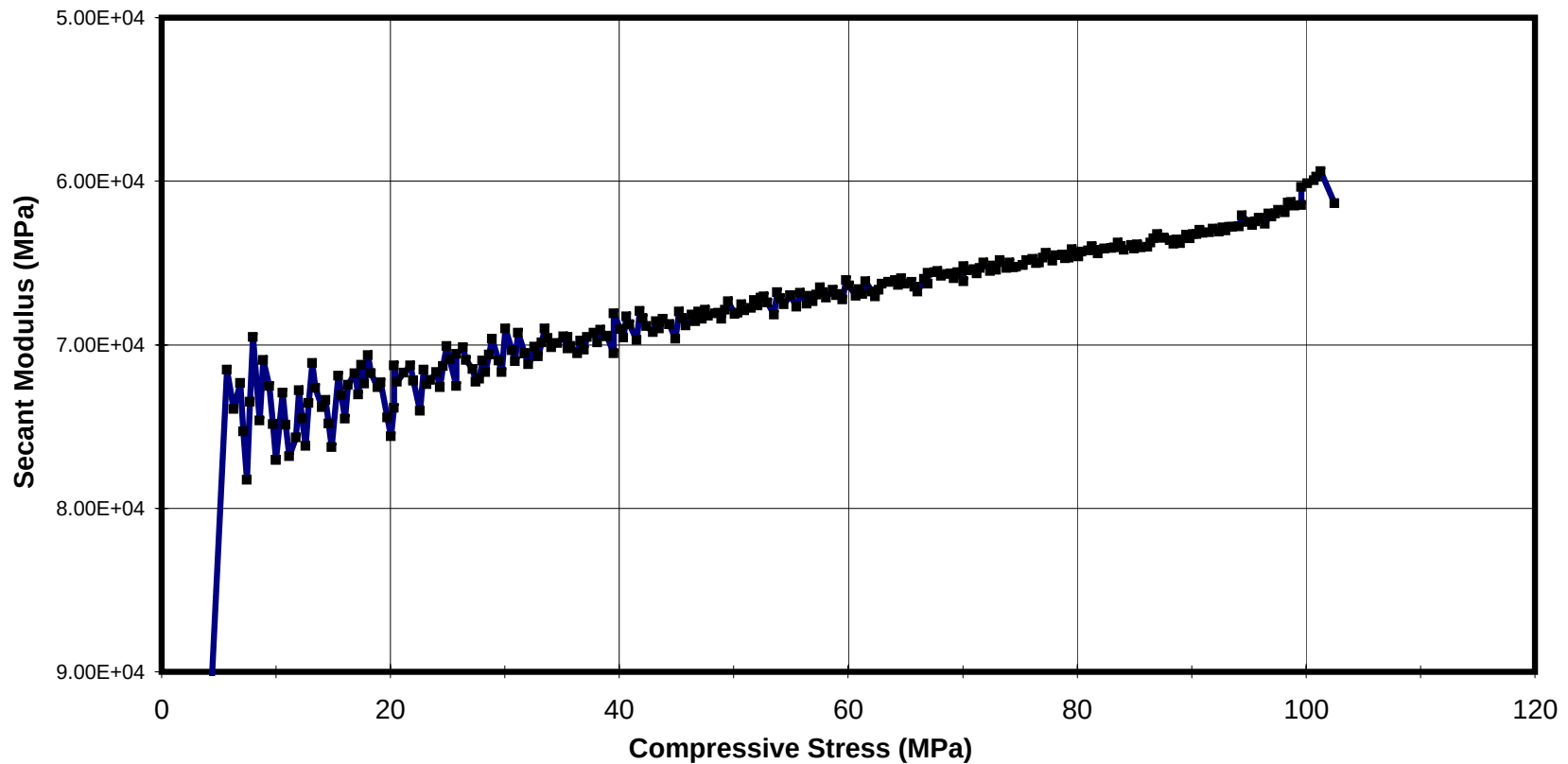
Project Number : 06-1413-089/5000

Depth : 5.00-11.65

Technician :

LP

Secant Modulus



ELASTIC MODULI OF INTACT ROCK CORE IN UNIAXIAL COMPRESSION - ASTM D3148-93



Borehole: TP99-338

E₅₀ (Secant Modulus) = 6.78E+04 Mpa

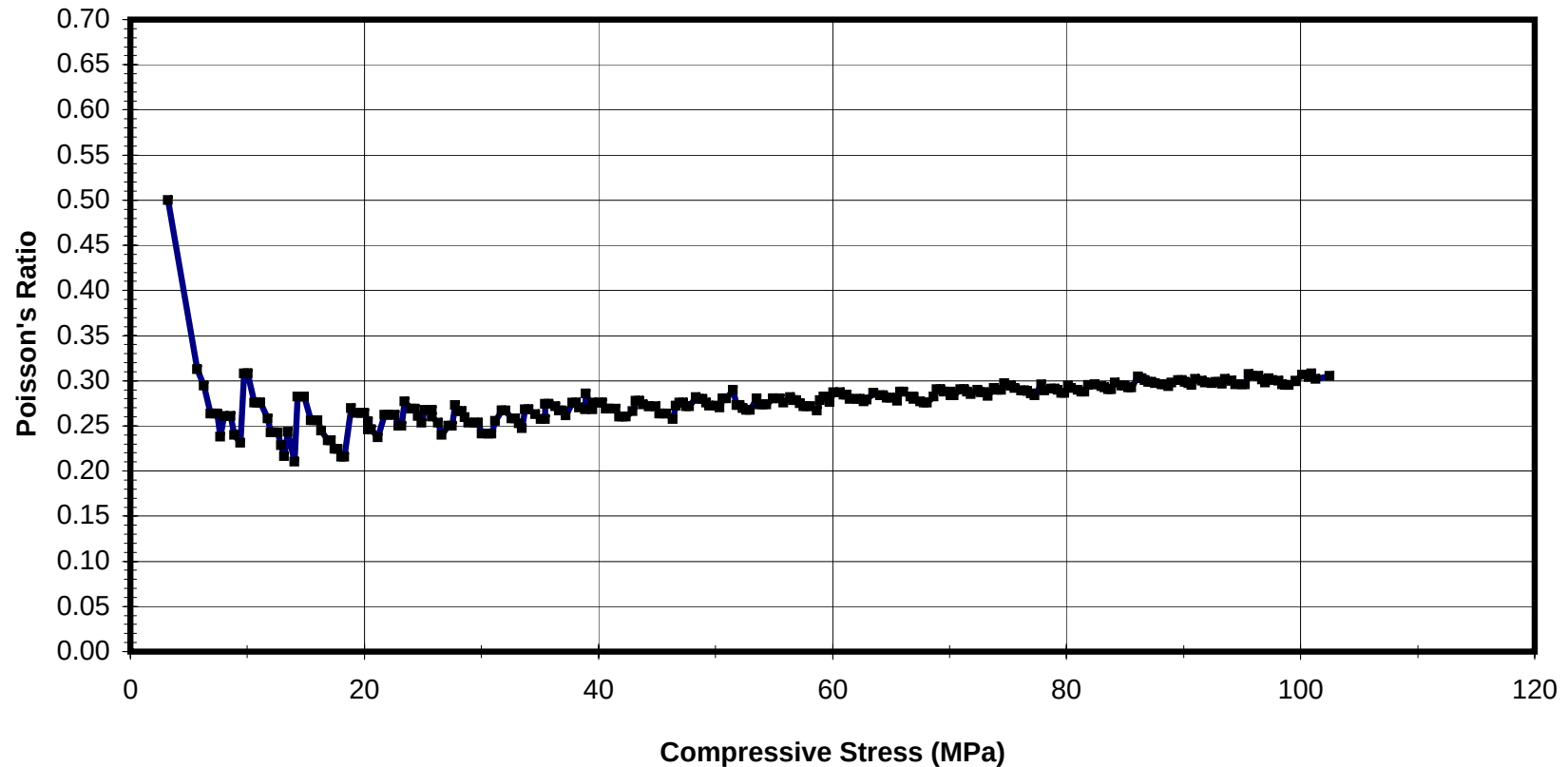
Box: - -

Project Number : 06-1413-089/5000

Depth : 5.00-11.65

Technician : LP

Poisson's Ratio



ELASTIC MODULI OF INTACT ROCK CORE IN UNIAXIAL COMPRESSION - ASTM D3148-93



Borehole: TP99-338

ν_{50} (Poisson's Ratio) =

0.29

Box: - -

Project Number :

06-1413-089/5000

Depth : 5.00-11.65

Technician :

LP



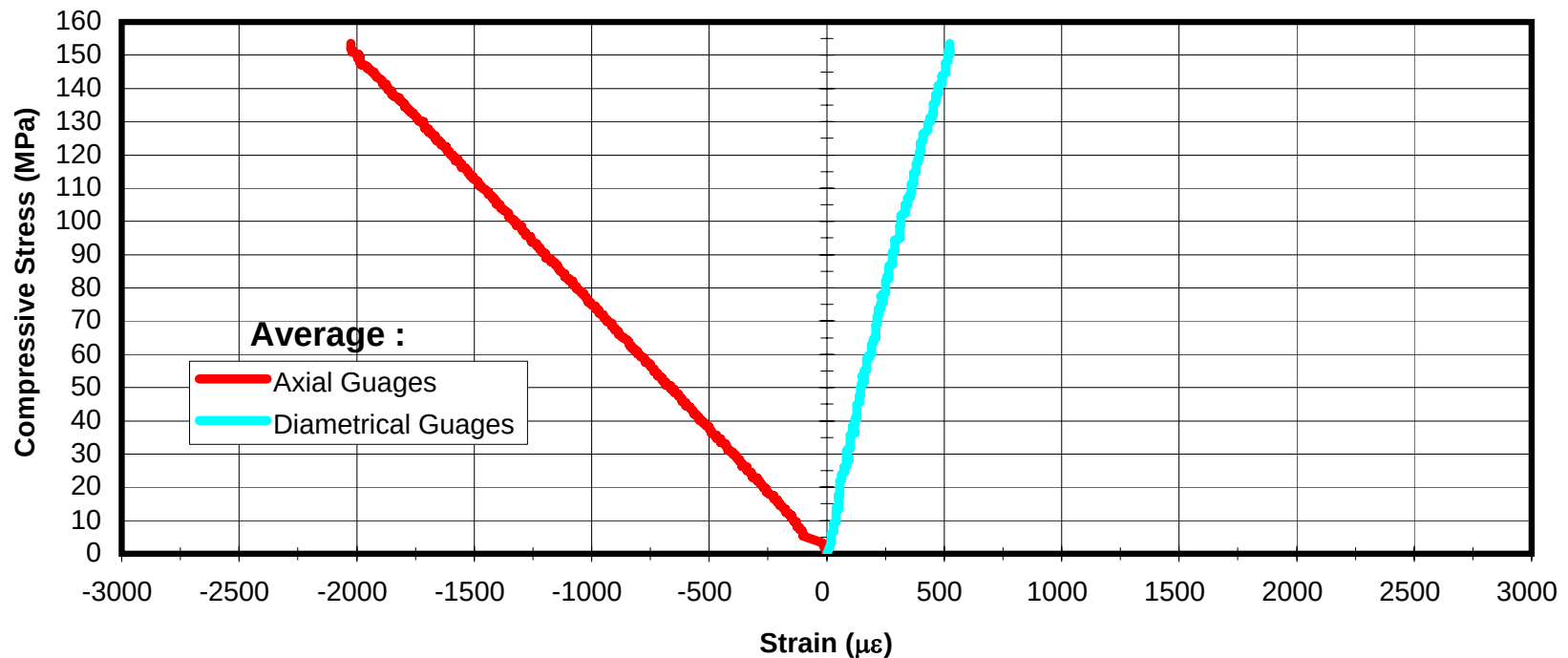
Before



After

PROJECT		MEADOWBANK MINING CORPORATION			
TITLE		MODULUS TESTING TP99-338 AT 8.41m			
		PROJECT No. 06-1413-089		FILE No. Modulus Testing	
		DESIGN	JFG	22MAR07	SCALE NTS
		CADD	AS	22MAR07	REV.
		CHECK			
		REVIEW			
					FIGURE II-7

Stress vs. Strain



ELASTIC MODULI OF INTACT ROCK CORE IN UNIAXIAL COMPRESSION - ASTM D3148-93



Borehole: TP98-265

Corrected σ_{peak} =

153.6

Mpa

Box: - -

Project Number :

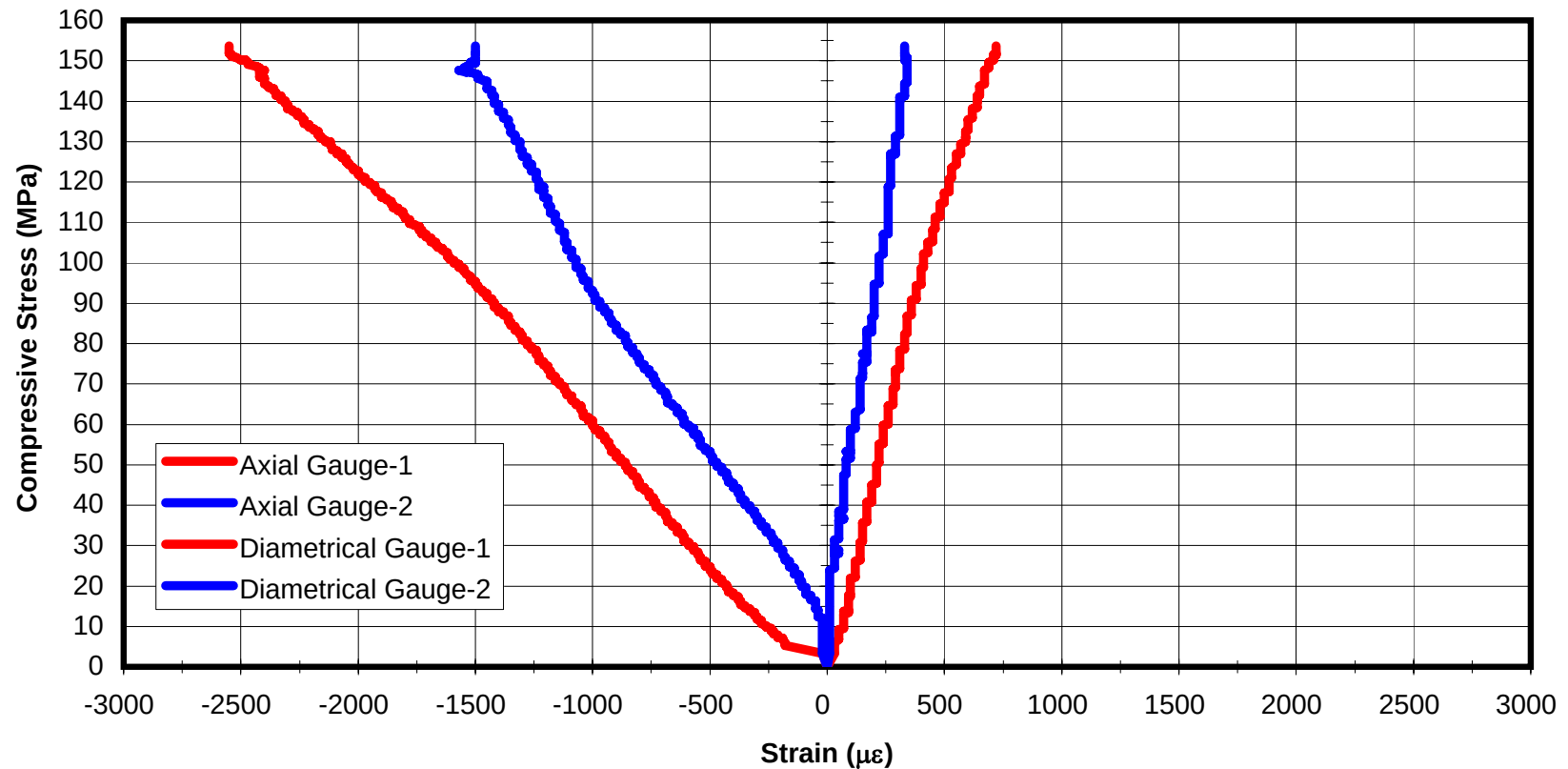
06-1413-089/5000

Depth : 21.50-32.00

Technician :

LP

Stress vs. Strain



ELASTIC MODULI OF INTACT ROCK CORE IN UNIAXIAL COMPRESSION - ASTM D3148-93



Borehole: TP98-265

Corrected σ_{peak} = 153.60 Mpa

Box: - -

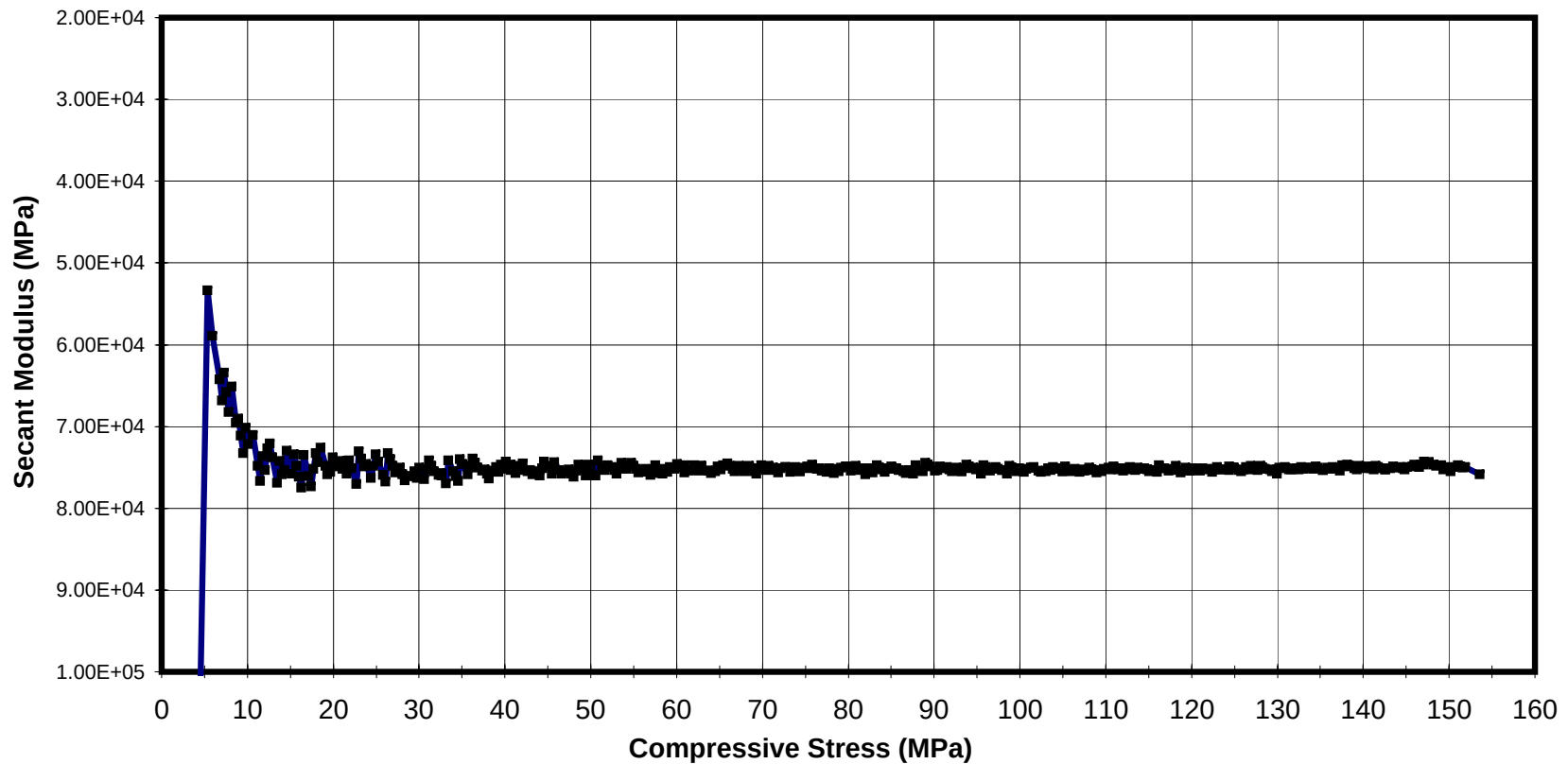
Project Number : 06-1413-089/5000

Depth : 21.50-32.00

Technician :

LP

Secant Modulus



ELASTIC MODULI OF INTACT ROCK CORE IN UNIAXIAL COMPRESSION - ASTM D3148-93



Borehole: TP98-265

E₅₀ (Secant Modulus) = 7.54E+04 Mpa

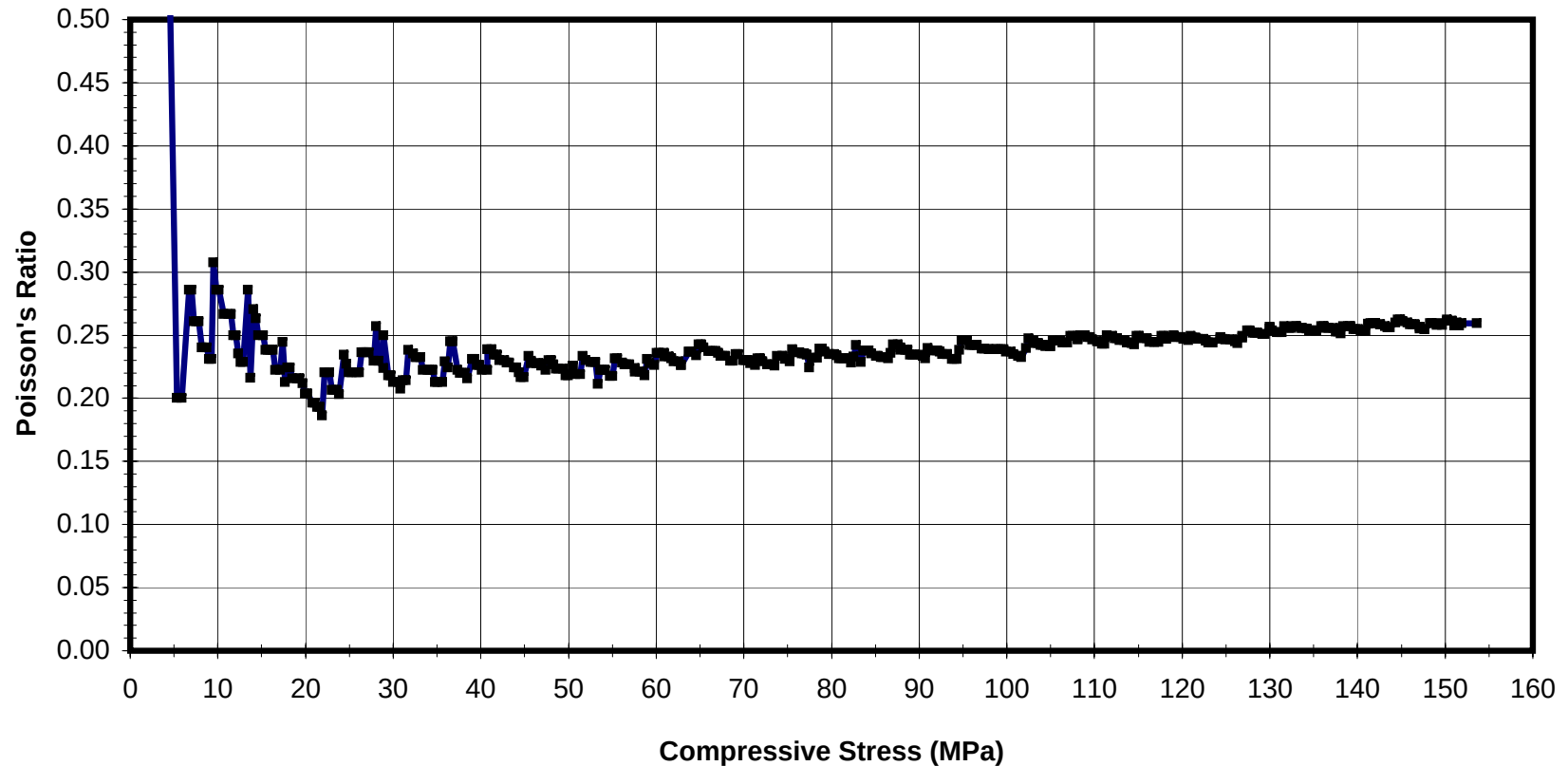
Box: - -

Project Number : 06-1413-089/5000

Depth : 21.50-32.00

Technician : LP

Poisson's Ratio



ELASTIC MODULI OF INTACT ROCK CORE IN UNIAXIAL COMPRESSION - ASTM D3148-93



Borehole: TP98-265

v_{50} (Poisson's Ratio) =

0.24

Box: - -

Project Number :

06-1413-089/5000

Depth : 21.50-32.00

Technician :

LP



Before



After

PROJECT		MEADOWBANK MINING CORPORATION				
TITLE		MODULUS TESTING TP98-265 AT 23.89m				
	PROJECT No.		06-1413-089		FILE No.	Modulus Testing
	DESIGN	JFG	22MAR07		SCALE	NTS
	CADD	AS	22MAR07			REV.
	CHECK				FIGURE II-8	
	REVIEW					

2007 DIRECT SHEAR TESTING

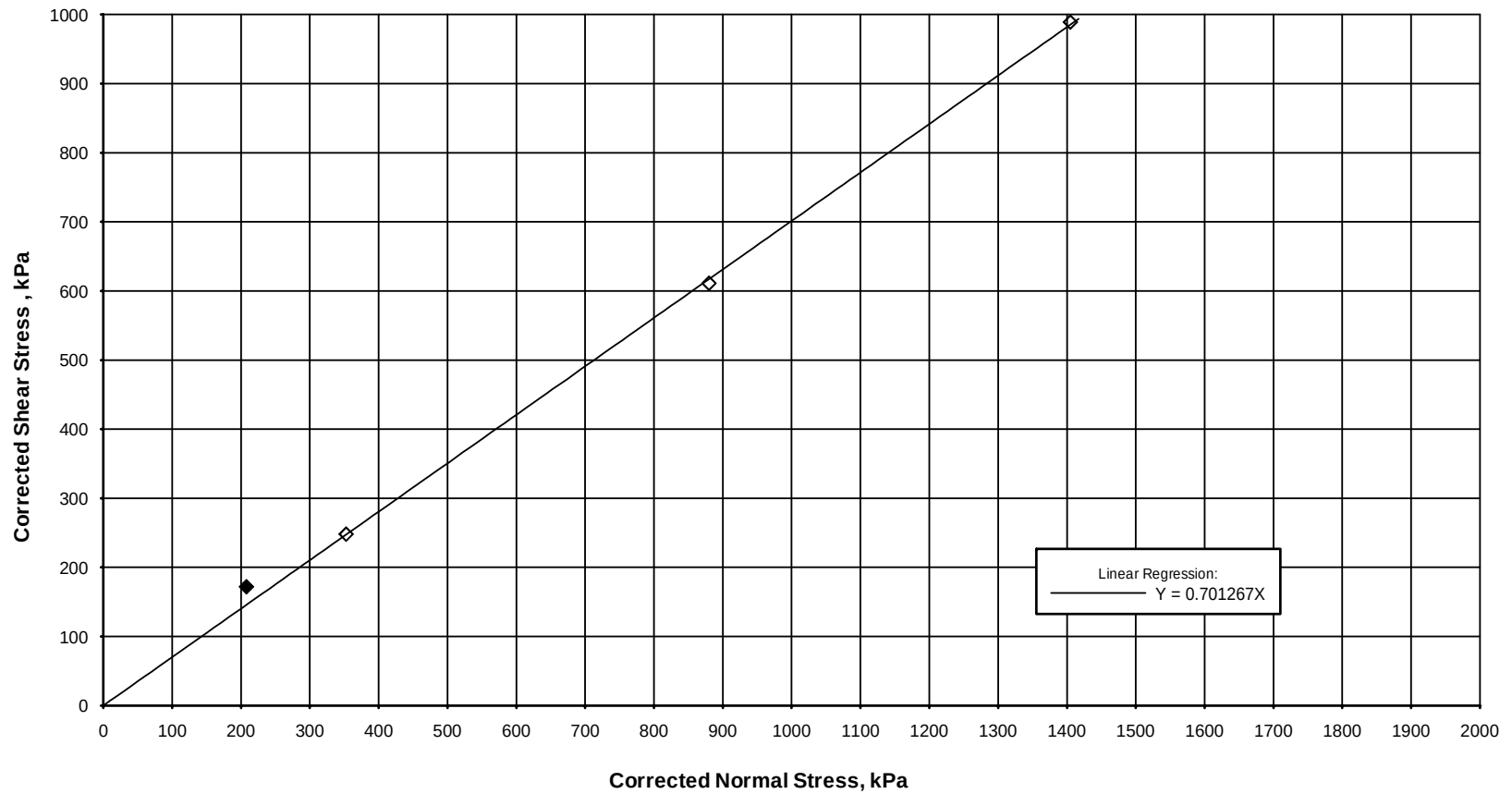
TABLE II-3: 2007 Direct Shear Testing Results of Intermediate Volcanic Rock Types

Sample	From m	To m	Lith	Kpa	Peak Stress		Residual Stress		Break Type
					σ_n Kpa	τ Kpa	σ_n Kpa	τ Kpa	
TP99-354a	25.1	36.2	IV	200	208	172	353	248	Hammer or Mechanically broken along a foliation
							880	611	
							1405	989	
TP99-354b	25.1	36.2	IV	500	504	478	343	181	Hammer or Mechanically broken along a foliation
							856	480	
							1363	752	
TP96-121	29	40.15	IV	800	818	728	318	214	Hammer or Mechanically broken along a foliation
							833	506	
							1262	796	
G04-512	80	90	IVbio	200	201	308	346	184	Mechanical Break
							872	448	
							1482	751	
NP98-249a	35.3	40.5	IVcl	200	201	366	281	154	Fresh Joint
							700	429	
							1118	725	
NP98-249b	35.3	40.5	IVcl	500	502	784	292	203	Fresh Joint
							730	424	
							1162	851	
TP02-395	28.6	32.6	IVcl	800	814	1596	330	180	Fresh Joint
							824	518	
							1315	672	
NP02-398	71.8	77	IVcs	200	299	226	320	230	Joint
							796	558	
							1269	944	
NP98-322	30	50	IVcs	500	502	435	375	210	Joint - possibly mechanically broken in handling
							956	471	
							1495	845	
VLT02-059	27	29.2	IVcs	800	821	782	374	259	Joint
							937	645	
							1489	1007	

TABLE II-4: 2007 Direct Shear Testing Results of Ultra-Mafic Rock Types

Sample	From m	To m	Lith	Kpa	Peak Stress		Residual Stress		Break Type
					σ_n Kpa	τ Kpa	σ_n Kpa	τ Kpa	
G04-517	17.3	20.04	UMa	200	201	242	352	159	Mechanical Break
							874	417	
							1396	721	
G04-509	50	70	UMs	200	201	205	340	169	Fresh or Mechanically broken
							851	421	
							1356	661	
G04-514	4.34	13.81	UMs	200	205	249	307	199	Fresh or Mechanically broken
							765	467	
							1222	723	
TP97-209	25	35	UMs	200	201	386	366	270	Fresh or Mechanically broken
							912	568	
							1497	923	
TP99-354	36.2	49	UMs	500	588	263	373	159	Natural joint
							931	377	
							1485	619	
NP96-139	73.25	89.6	UMs	800	811	1061	371	279	Fresh or Mechanically broken along a foliation
							927	592	
							1475	1093	
G02-502	9.73	18.3	UMv	200	202	324	271	181	Hammer Break
							674	437	
							1077	720	

Laboratory Determination of Direct Shear Strength
ISRM 1981 (pp. 135-137)



Project #	06-1413-089/5000	Joint Type :	OPEN			Peak Stress		Residual Stress		
DH :	TP99-354 A	Joint Angle :	20	deg		σ_n	τ	σ_n	τ	Remarks :
Sample :	13	(from core axis)			Stage	(kPa)	(kPa)	(kPa)	(kPa)	
Depth (m)	29.9				1	208	172	353	248	Open
Sch#	7	Test Conditions :			2			880	611	Open
					3			1405	989	Open
					4					



Before

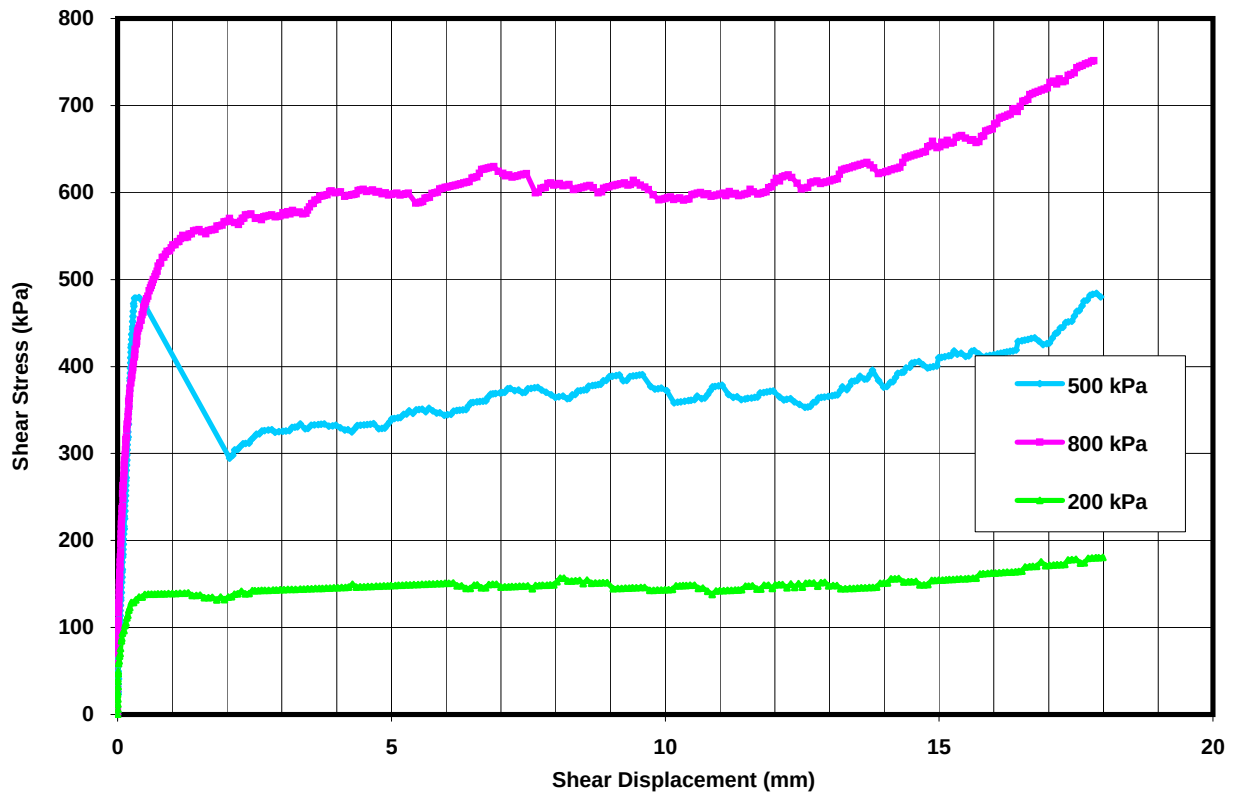
After

PROJECT		MEADOWBANK MINING CORPORATION			
TITLE		DIRECT SHEAR TESTING TP99-354 AT 29.90m A			
		PROJECT No. 06-1413-089		FILE No. Testing	
		DESIGN	JFG	22MAR07	SCALE NTS
		CADD	AS	22MAR07	REV.
		CHECK			
					FIGURE II-9

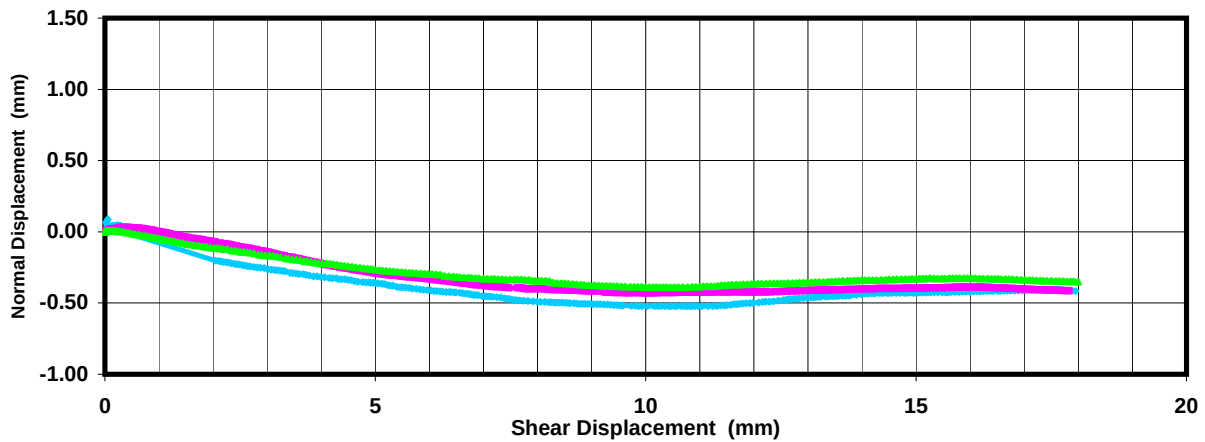
Laboratory Determination of Direct Shear Strength
ISRM 1981 (135-137)

Borehole :	TP99-354 B	Sch #	7	Project # :	06-1413-089/5000
Sample :	14	Tested By:	LP	Client :	CUMBERLAND
Depth (m)	29.9			Project :	MEADOWBANK SHEAR TESTING
				Location :	BURNABY LAB

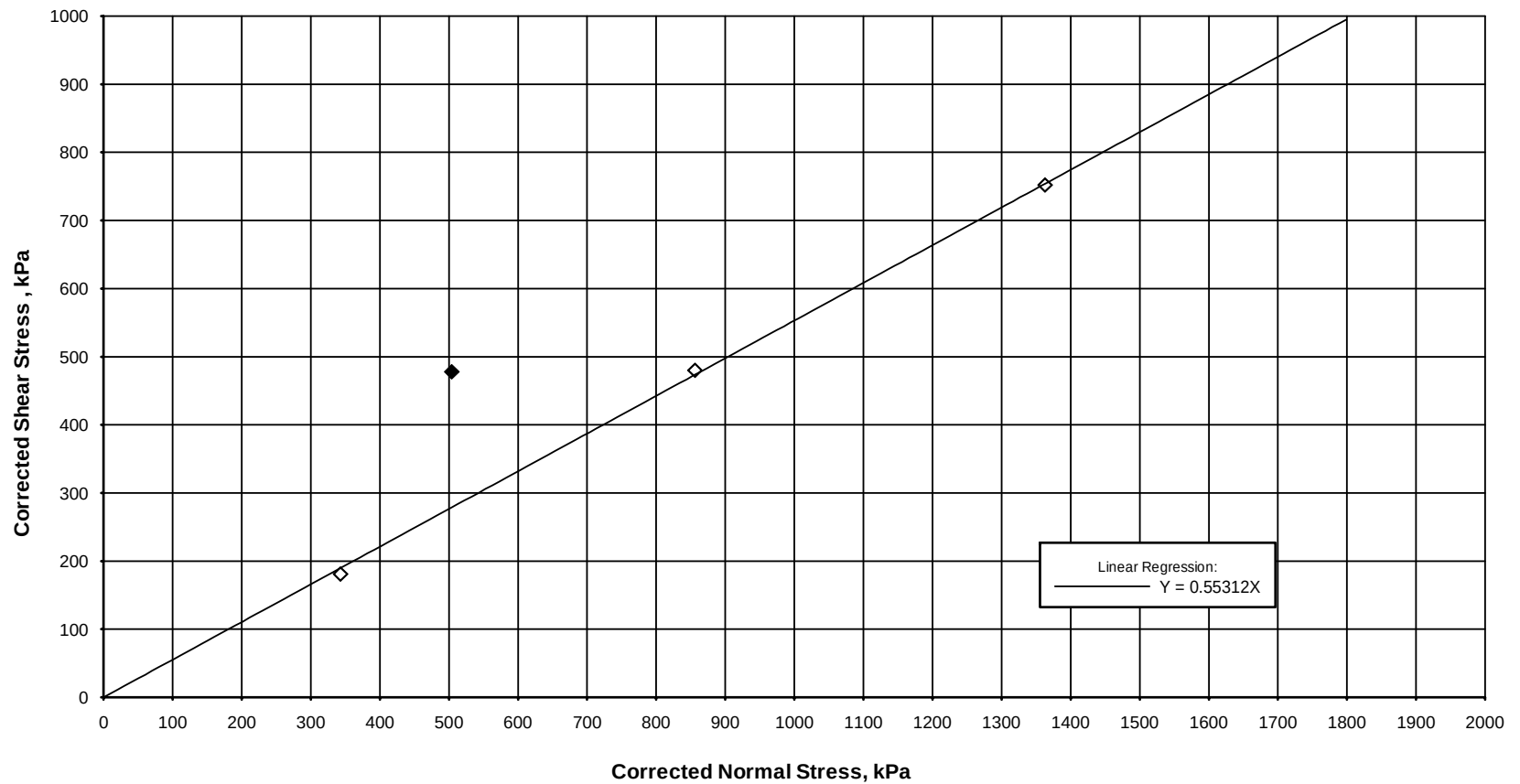
Shear Displacement vs. Shear Stress



Shear Displacement vs. Normal Displacement



Laboratory Determination of Direct Shear Strength
ISRM 1981 (pp. 135-137)



Project #	06-1413-089/5000	Joint Type :	OPEN			Peak Stress		Residual Stress		
DH :	TP99-354 B	Joint Angle :	23	deg		σ_n	τ	σ_n	τ	
Sample :	14	(from core axis)			Stage	(kPa)	(kPa)	(kPa)	(kPa)	Remarks :
Depth (m)	29.9				1	504	478	856	480	Open
Sch#	7	Test Conditions :			2			1363	752	Open
					3			343	181	Open
					4					



Before

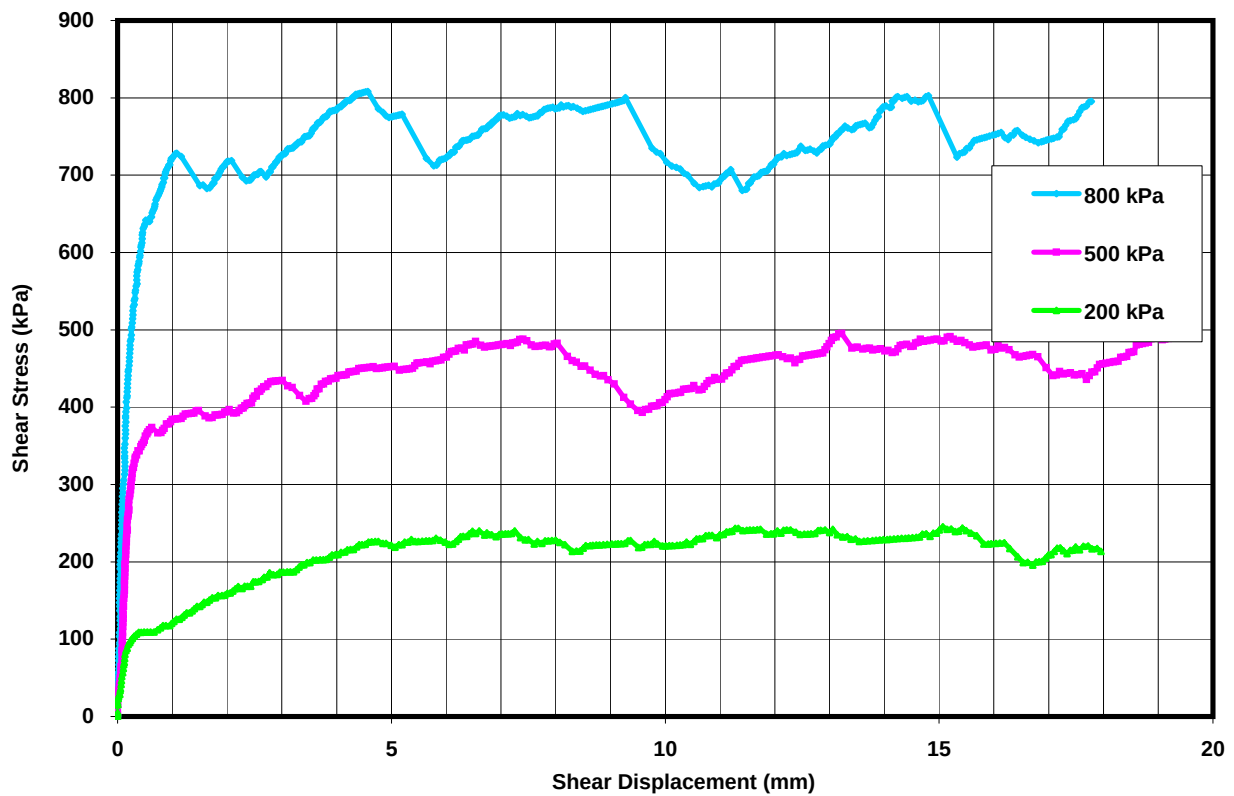
After

PROJECT		MEADOWBANK MINING CORPORATION			
TITLE		DIRECT SHEAR TESTING TP99-354 AT 29.90m B			
		PROJECT No. 06-1413-089		FILE No. Testing	
		DESIGN	JFG	22MAR07	SCALE NTS
		CADD	AS	22MAR07	REV.
		CHECK			
		REVIEW			
					FIGURE II-10

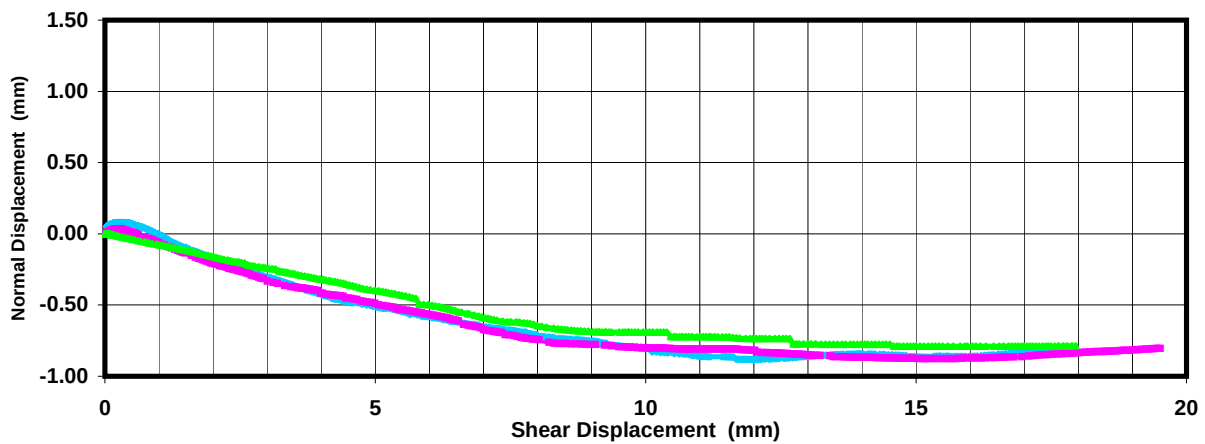
Laboratory Determination of Direct Shear Strength
ISRM 1981 (135-137)

Borehole :	TP96-121	Sch #	7	Project # :	06-1413-089/5000
Sample :	15	Tested By:	LP	Client :	CUMBERLAND
Depth (m)	39.10			Project :	MEADOWBANK SHEAR TESTING
				Location :	BURNABY LAB

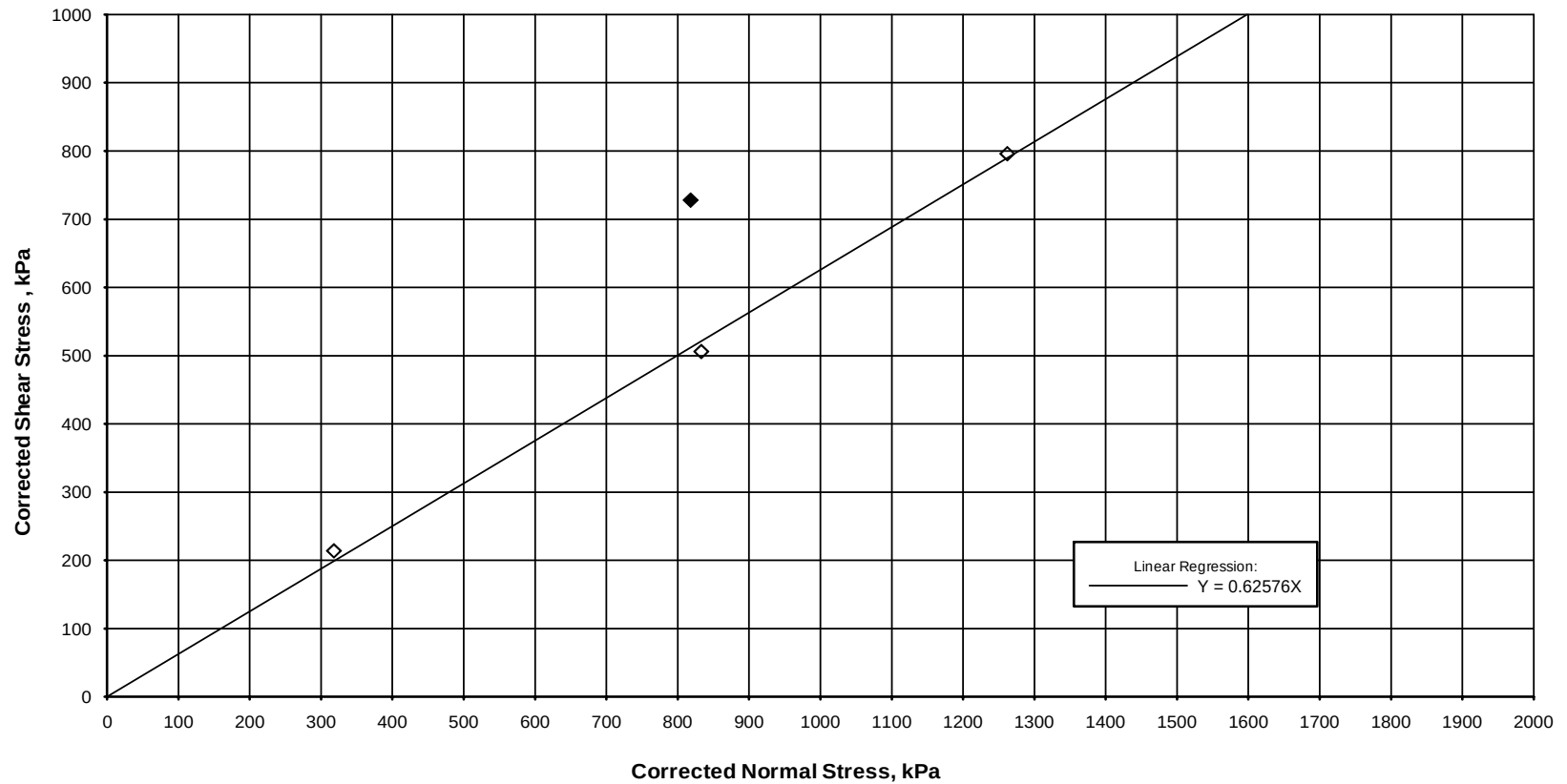
Shear Displacement vs. Shear Stress



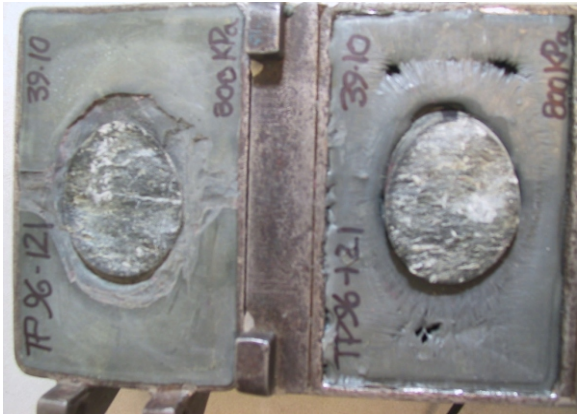
Shear Displacement vs. Normal Displacement



Laboratory Determination of Direct Shear Strength
ISRM 1981 (pp. 135-137)



Project #	06-1413-089/5000	Joint Type :	OPEN			Peak Stress		Residual Stress		
DH :	TP96-121	Joint Angle :	38	deg		σ_n	τ	σ_n	τ	Remarks :
Sample :	15	(from core axis)			Stage	(kPa)	(kPa)	(kPa)	(kPa)	
Depth (m)	39.10				1	818	728	1262	796	Open
Sch#	7	Test Conditions :			2			833	506	Open
					3			318	214	Open
					4					



Before



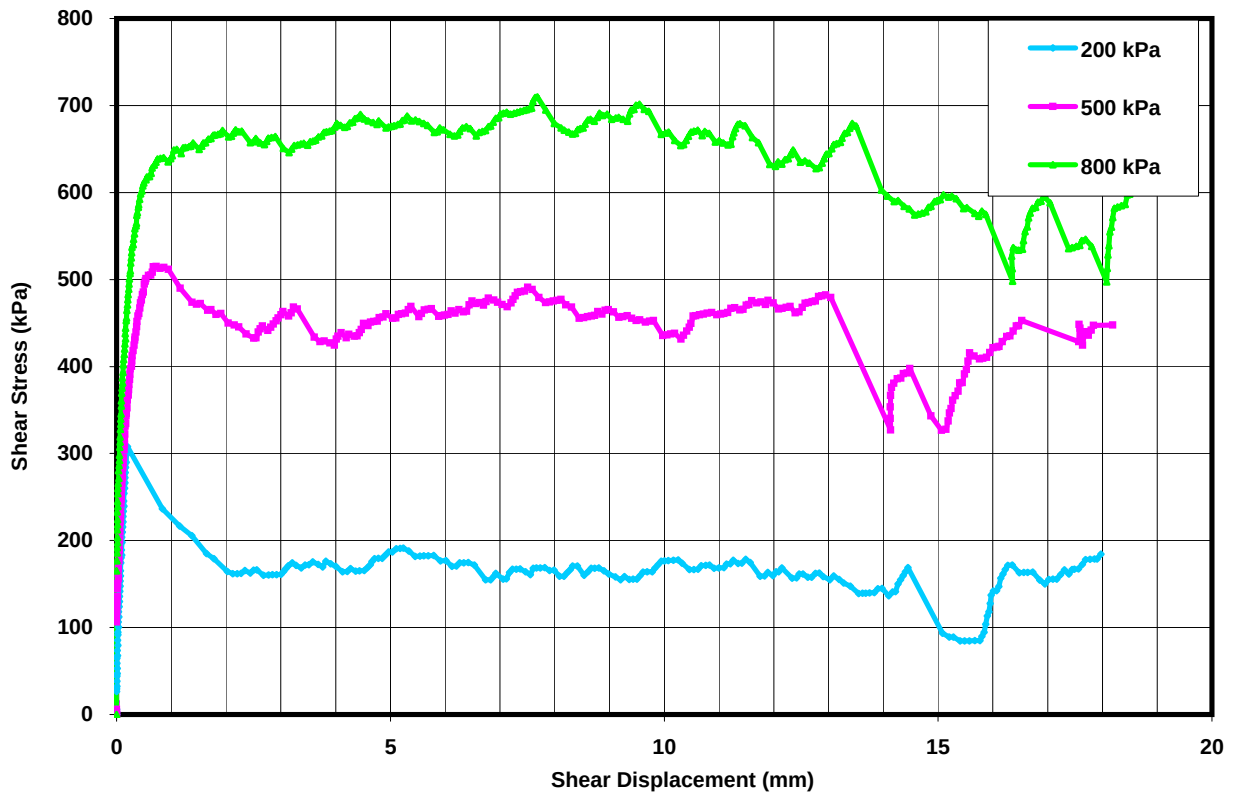
After

PROJECT		MEADOWBANK MINING CORPORATION			
TITLE		DIRECT SHEAR TESTING TP96-121 AT 39.10m			
		PROJECT No. 06-1413-089		FILE No. Testing	
		DESIGN	JFG	22MAR07	SCALE NTS
		CADD	AS	22MAR07	REV.
		CHECK			FIGURE II-11
		REVIEW			

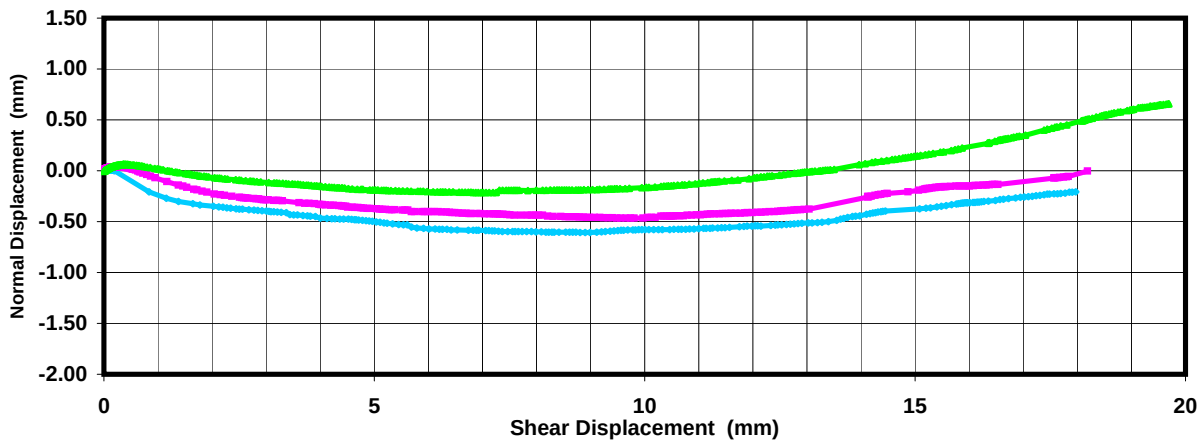
Laboratory Determination of Direct Shear Strength
ISRM 1981 (135-137)

Borehole :	G04-512	Sch #	7	Project # :	06-1413-089/5000
Sample :	7	Tested By:	LP	Client :	CUMBERLAND
Depth (m)	85.34			Project :	MEADOWBANK SHEAR TESTING
				Location :	BURNABY LAB

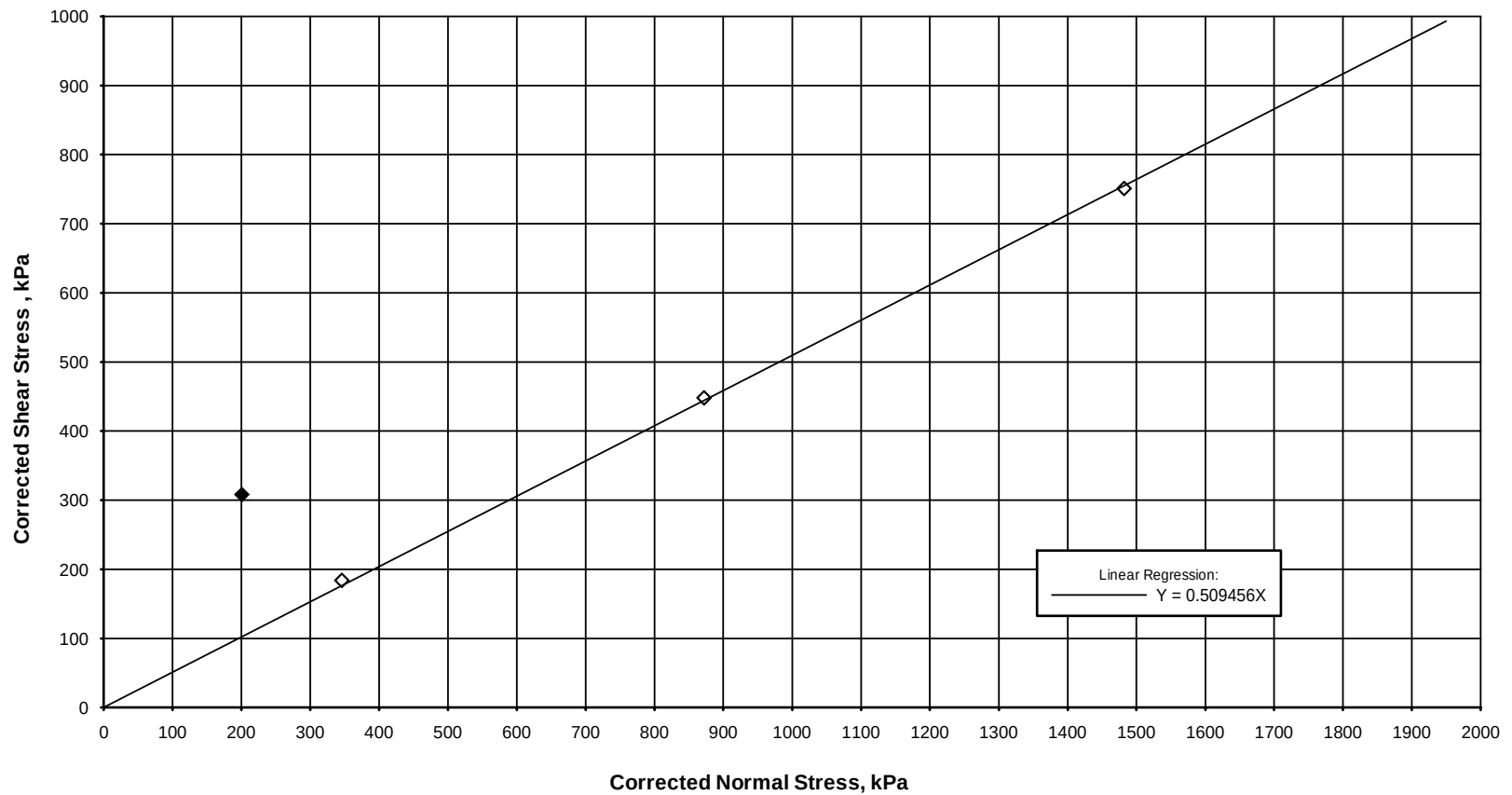
Shear Displacement vs. Shear Stress



Shear Displacement vs. Normal Displacement



Laboratory Determination of Direct Shear Strength
ISRM 1981 (pp. 135-137)



Project #	06-1413-089/5000	Joint Type :	OPEN			Peak Stress		Residual Stress		
DH :	G04-512	Joint Angle :	28	deg		σ_n	τ	σ_n	τ	
Sample :	7	(from core axis)			Stage	(kPa)	(kPa)	(kPa)	(kPa)	Remarks :
Depth (m)	85.34				1	201	308	346	184	Open
Sch#	7	Test Conditions :			2			872	448	Open
					3			1482	751	Open
					4					



Before

After

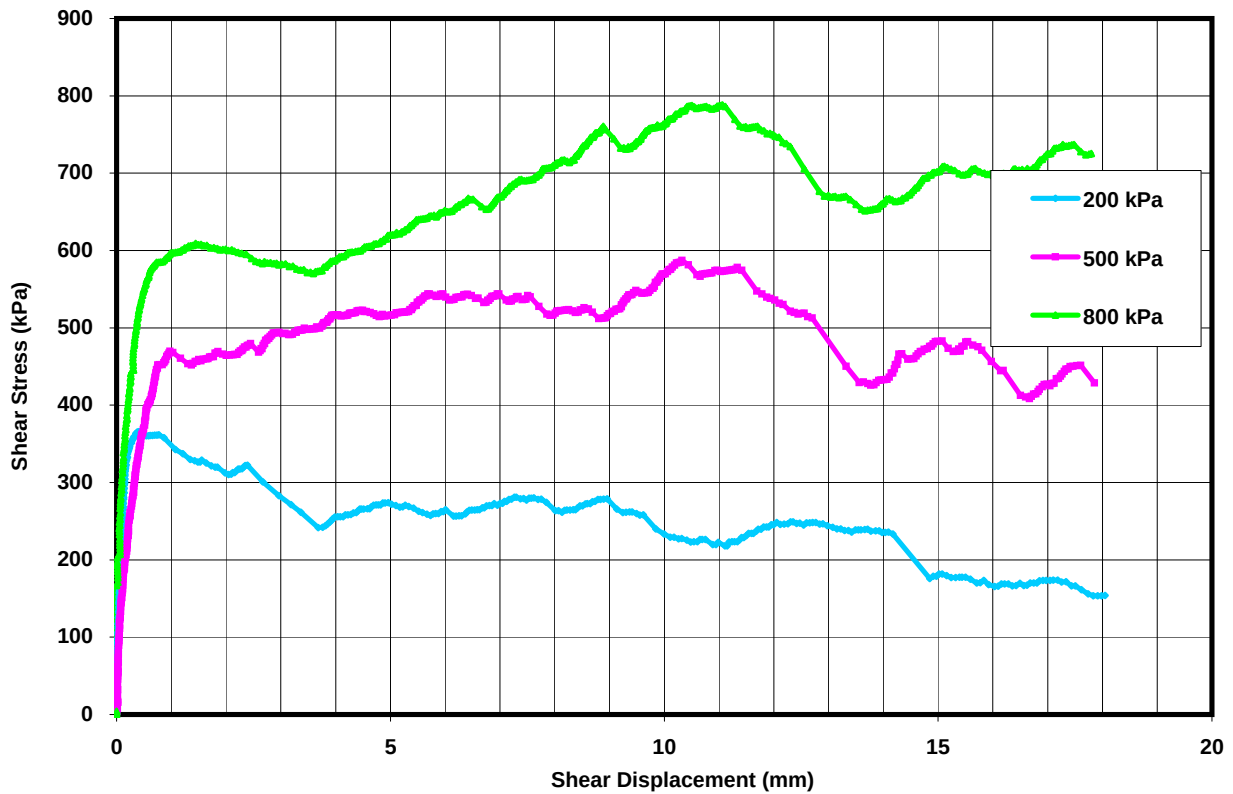
PROJECT		MEADOWBANK MINING CORPORATION			
TITLE		DIRECT SHEAR TESTING G04-512 AT 85.34m			
		PROJECT No. 06-1413-089		FILE No. Testing	
		DESIGN	JFG	22MAR07	SCALE NTS
		CADD	AS	22MAR07	REV.
		CHECK			
					FIGURE II-12

Laboratory Determination of Direct Shear Strength

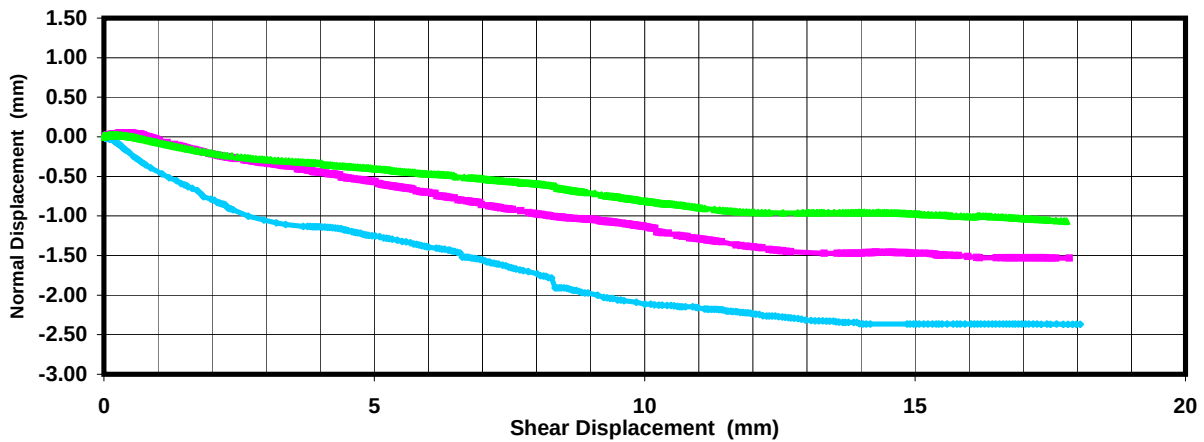
ISRM 1981 (135-137)

Borehole :	NP98-249	Sch #	7	Project # :	06-1413-089/5000
Sample :	4 A	Tested By:	LP	Client :	CUMBERLAND
Depth (m)	38.30			Project :	MEADOWBANK SHEAR TESTING
				Location :	BURNABY LAB

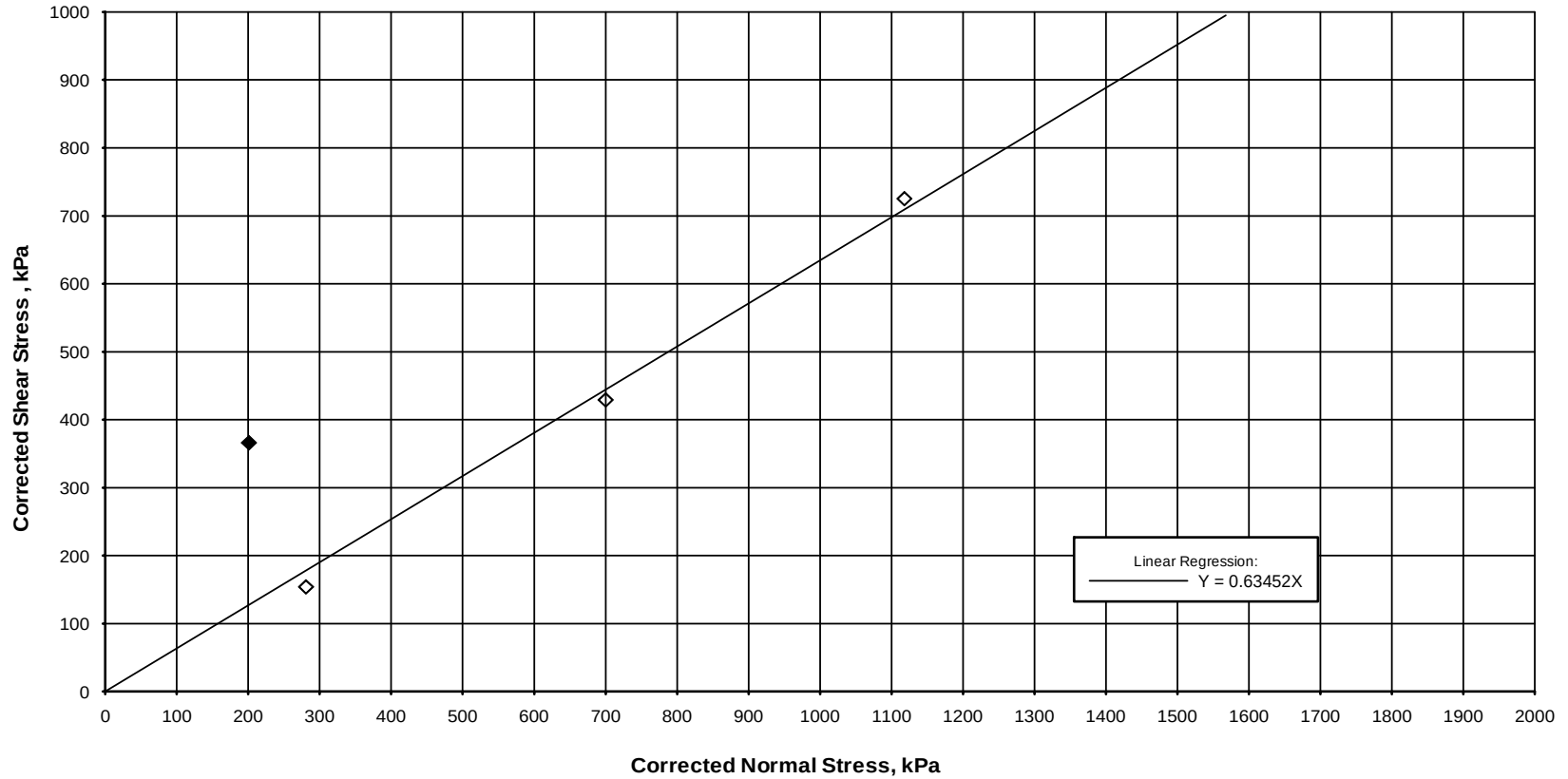
Shear Displacement vs. Shear Stress



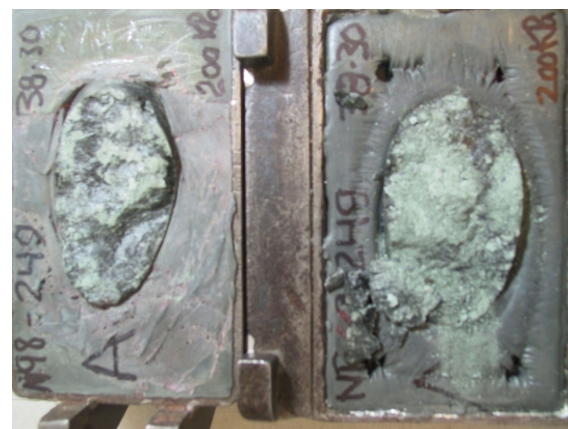
Shear Displacement vs. Normal Displacement



Laboratory Determination of Direct Shear Strength
ISRM 1981 (pp. 135-137)



Project #	06-1413-089/5000	Joint Type :	OPEN			Peak Stress		Residual Stress		
DH :	NP98-249	Joint Angle :	54	deg		σ_n	τ	σ_n	τ	
Sample :	4 A	(from core axis)			Stage	(kPa)	(kPa)	(kPa)	(kPa)	Remarks :
Depth (m)	38.30				1	201	366	281	154	Open
Sch#	7	Test Conditions :			2			700	429	Open
					3			1118	725	Open
					4					



Before

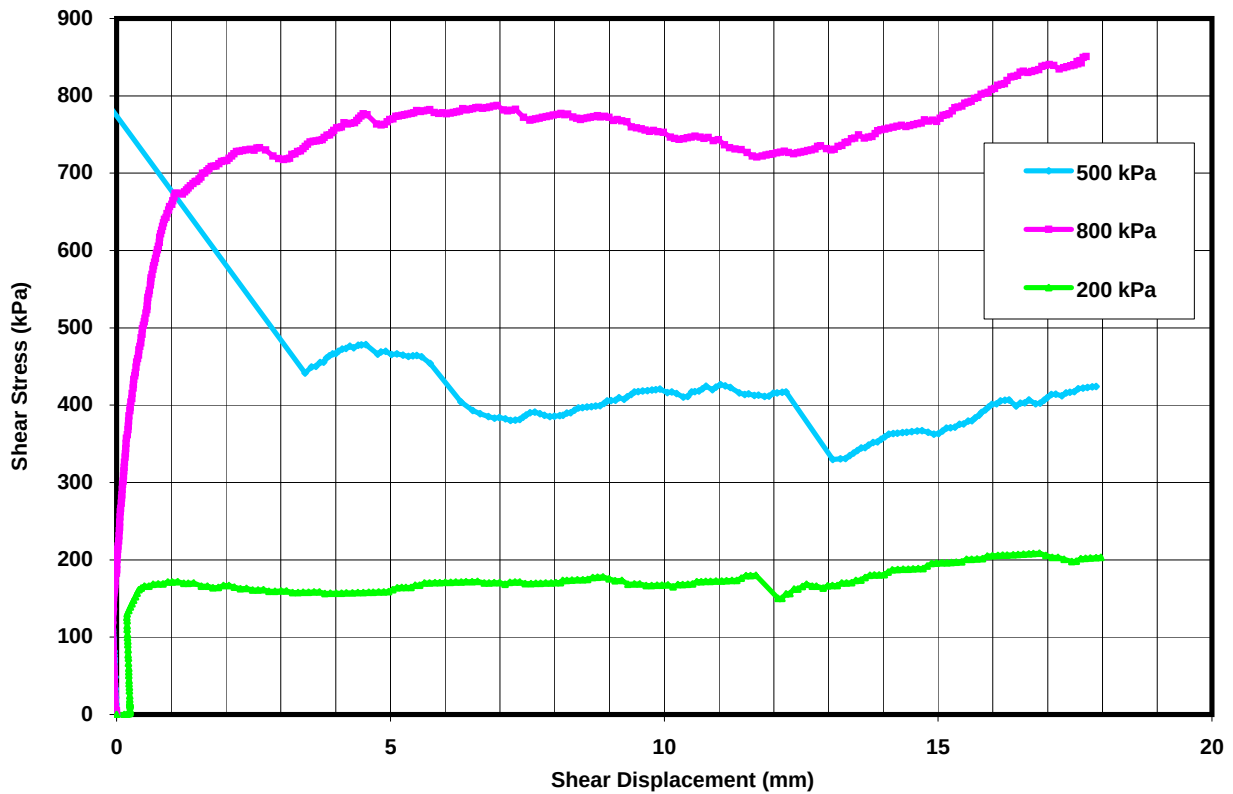
After

PROJECT		MEADOWBANK MINING CORPORATION			
TITLE		DIRECT SHEAR TESTING NP98-249 AT 38.30m A			
		PROJECT No. 06-1413-089		FILE No. Testing	
		DESIGN	JFG	22MAR07	SCALE NTS
		CADD	AS	22MAR07	REV.
		CHECK			
		REVIEW			
					FIGURE II-13

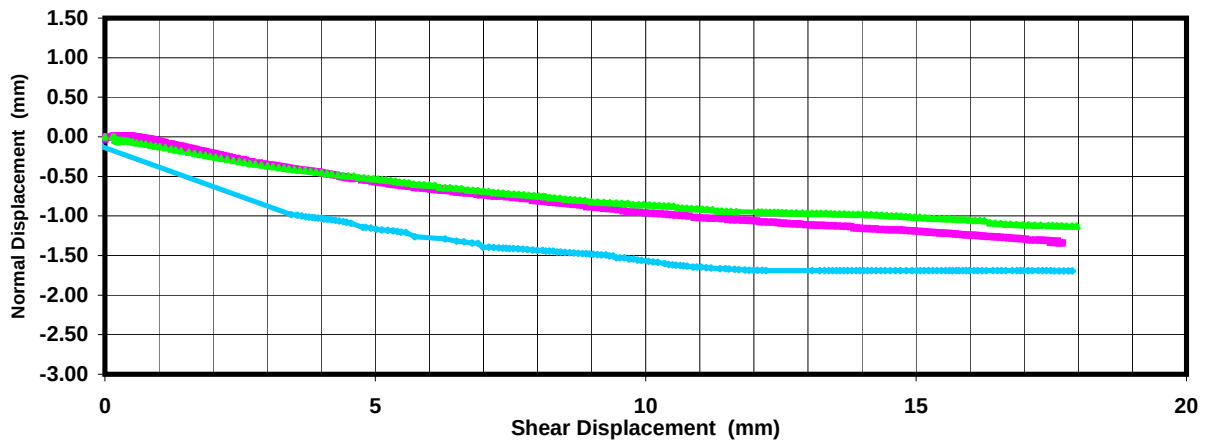
Laboratory Determination of Direct Shear Strength
ISRM 1981 (135-137)

Borehole :	NP98-249	Sch #	7	Project # :	06-1413-089/5000
Sample :	5 B	Tested By:	LP	Client :	CUMBERLAND
Depth (m)	38.30			Project :	MEADOWBANK SHEAR TESTING
				Location :	BURNABY LAB

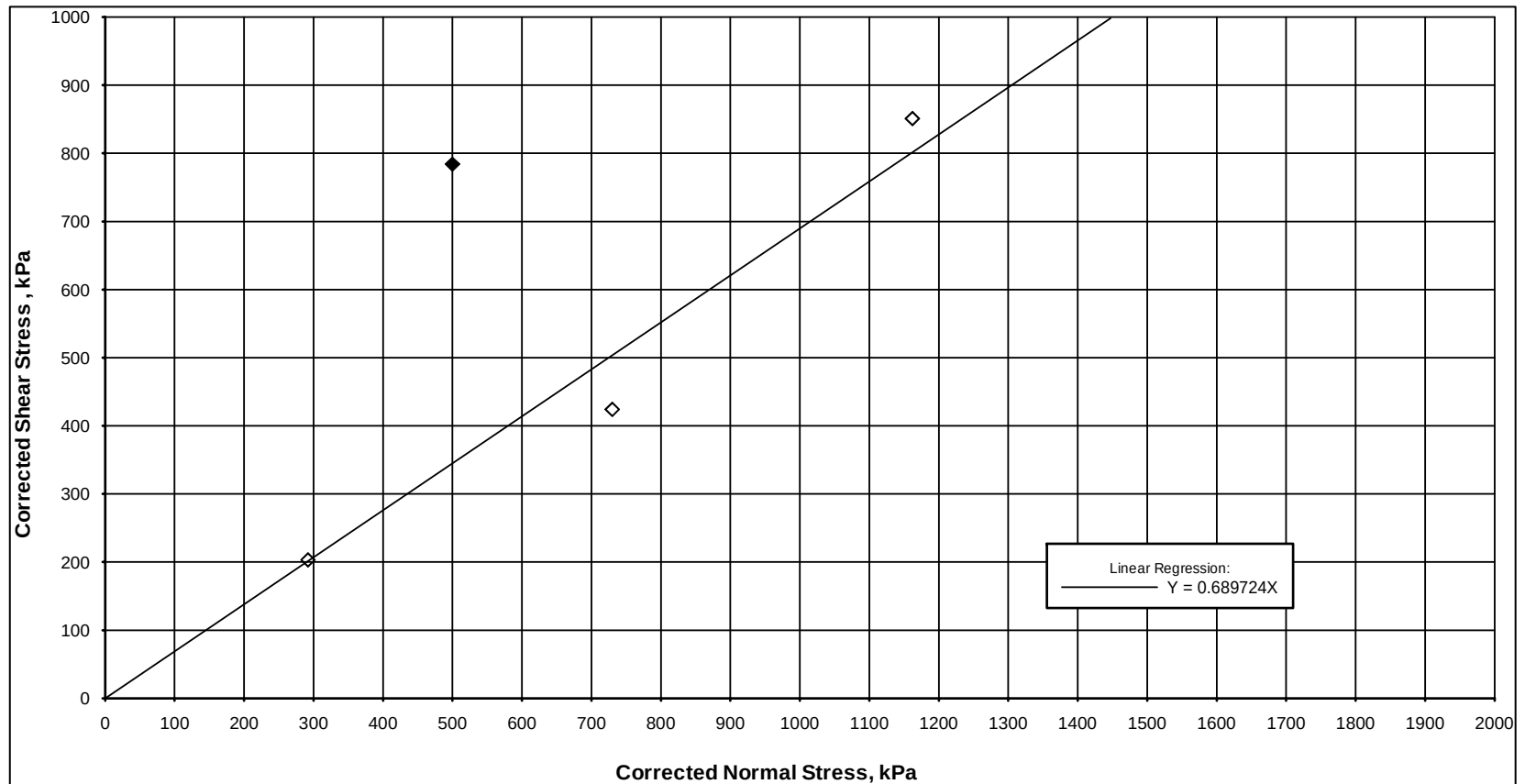
Shear Displacement vs. Shear Stress



Shear Displacement vs. Normal Displacement



Laboratory Determination of Direct Shear Strength
ISRM 1981 (pp. 135-137)



Project #	06-1413-089/5000	Joint Type :	OPEN			Peak Stress		Residual Stress		
DH :	NP98-249	Joint Angle :	52	deg		σ_n	τ	σ_n	τ	
Sample :	5 B	(from core axis)			Stage	(kPa)	(kPa)	(kPa)	(kPa)	Remarks :
Depth (m)	38.30				1	502	784	730	424	Open
Sch#	7	Test Conditions :			2			1162	851	Open
					3			202	203	Open
					4					



Before



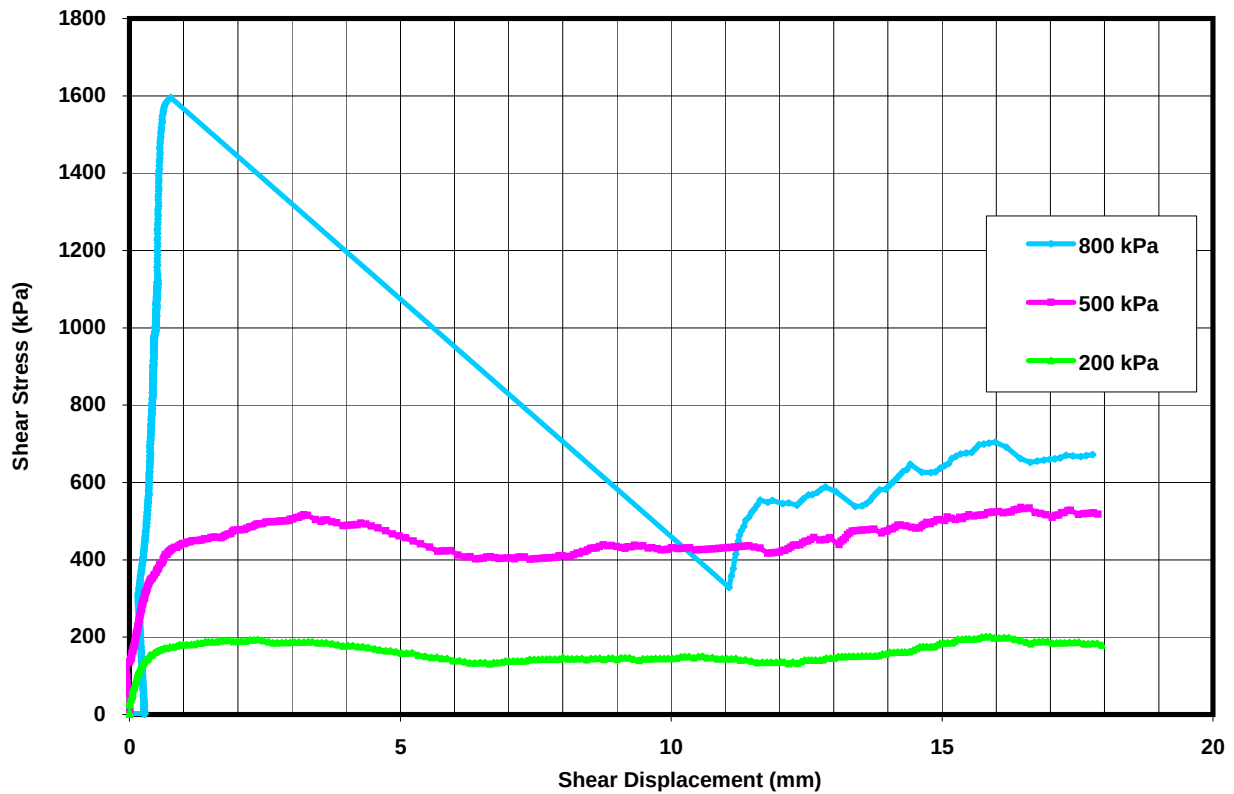
After

PROJECT		MEADOWBANK MINING CORPORATION			
TITLE		DIRECT SHEAR TESTING NP98-249 AT 38.30m B			
		PROJECT No. 06-1413-089		FILE No. Testing	
		DESIGN	JFG	22MAR07	SCALE NTS
		CADD	AS	22MAR07	REV.
		CHECK			
		REVIEW			
					FIGURE II-14

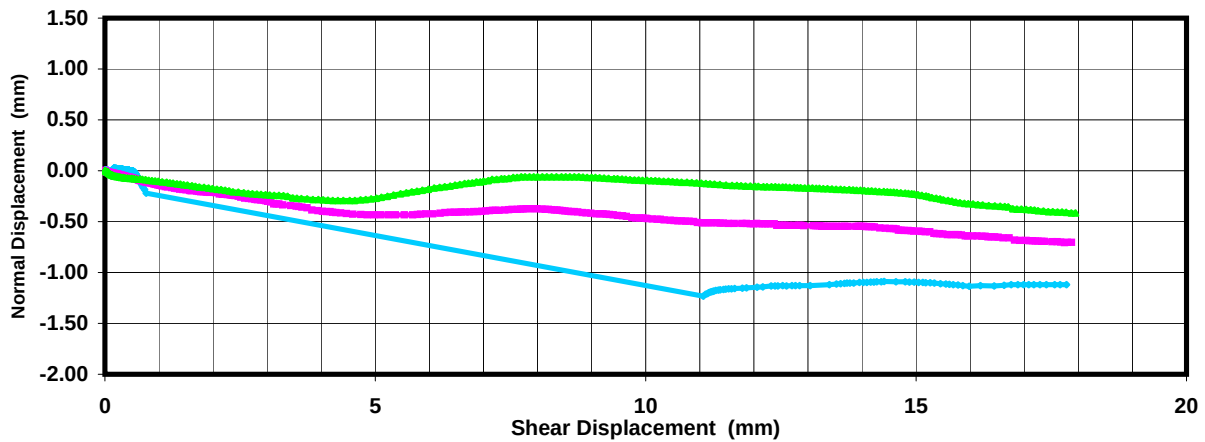
Laboratory Determination of Direct Shear Strength
ISRM 1981 (135-137)

Borehole :	TP02-395	Sch #	7	Project # :	06-1413-089/5000
Sample :	6	Tested By:	LP	Client :	CUMBERLAND
Depth (m)	31.0			Project :	MEADOWBANK SHEAR TESTING
				Location :	BURNABY LAB

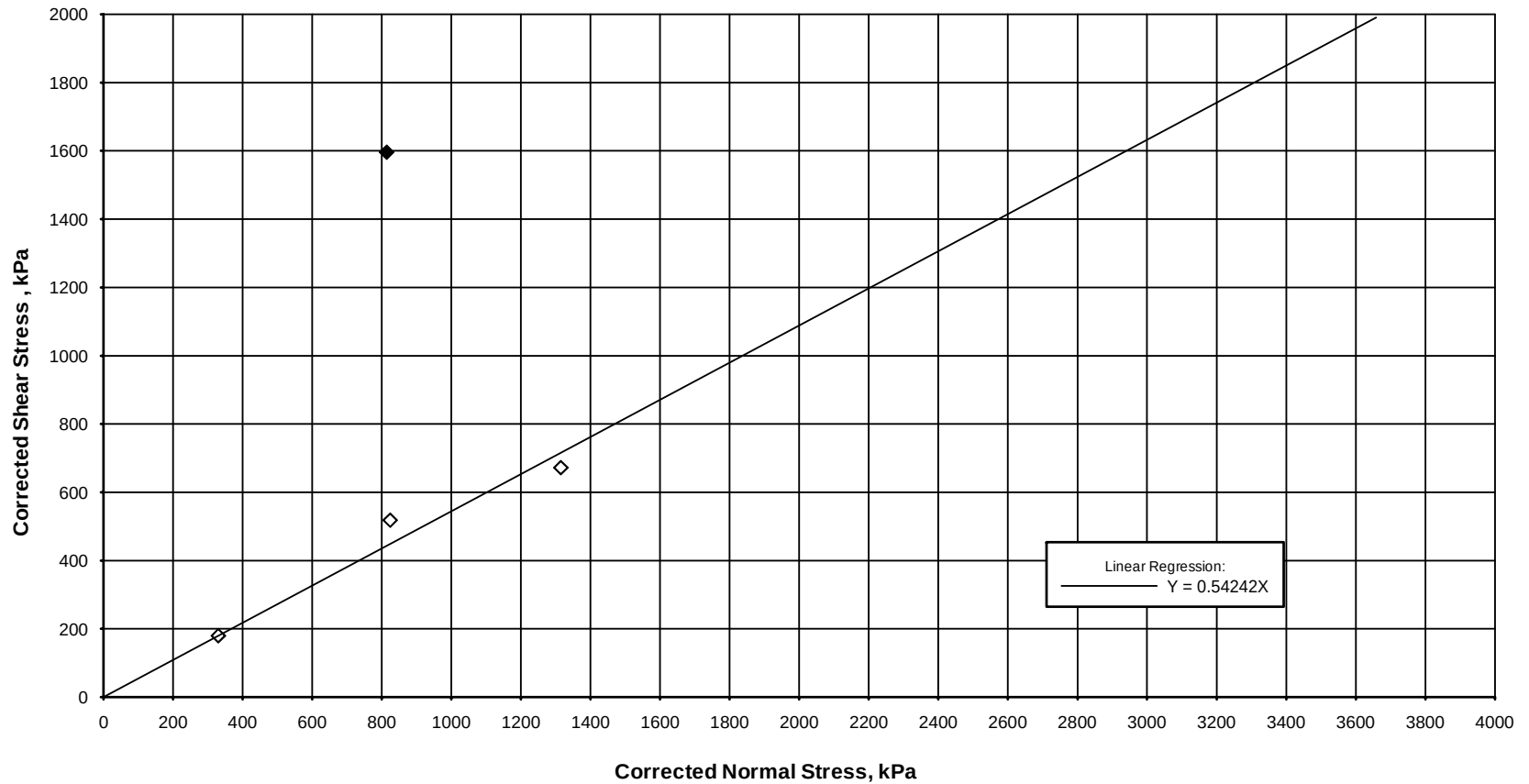
Shear Displacement vs. Shear Stress



Shear Displacement vs. Normal Displacement



**Laboratory Determination of Direct Shear Strength
ISRM 1981 (pp. 135-137)**



Project #	06-1413-089/5000	Joint Type :	OPEN			Peak Stress		Residual Stress		
DH :	TP02-395	Joint Angle :	55	deg		σ_n	τ	σ_n	τ	
Sample :	6	(from core axis)			Stage	(kPa)	(kPa)	(kPa)	(kPa)	Remarks :
Depth (m)	31.0				1	814	1596	1315	672	Open
Sch#	7	Test Conditions :			2			824	518	Open
					3			330	180	Open
					4					



Before



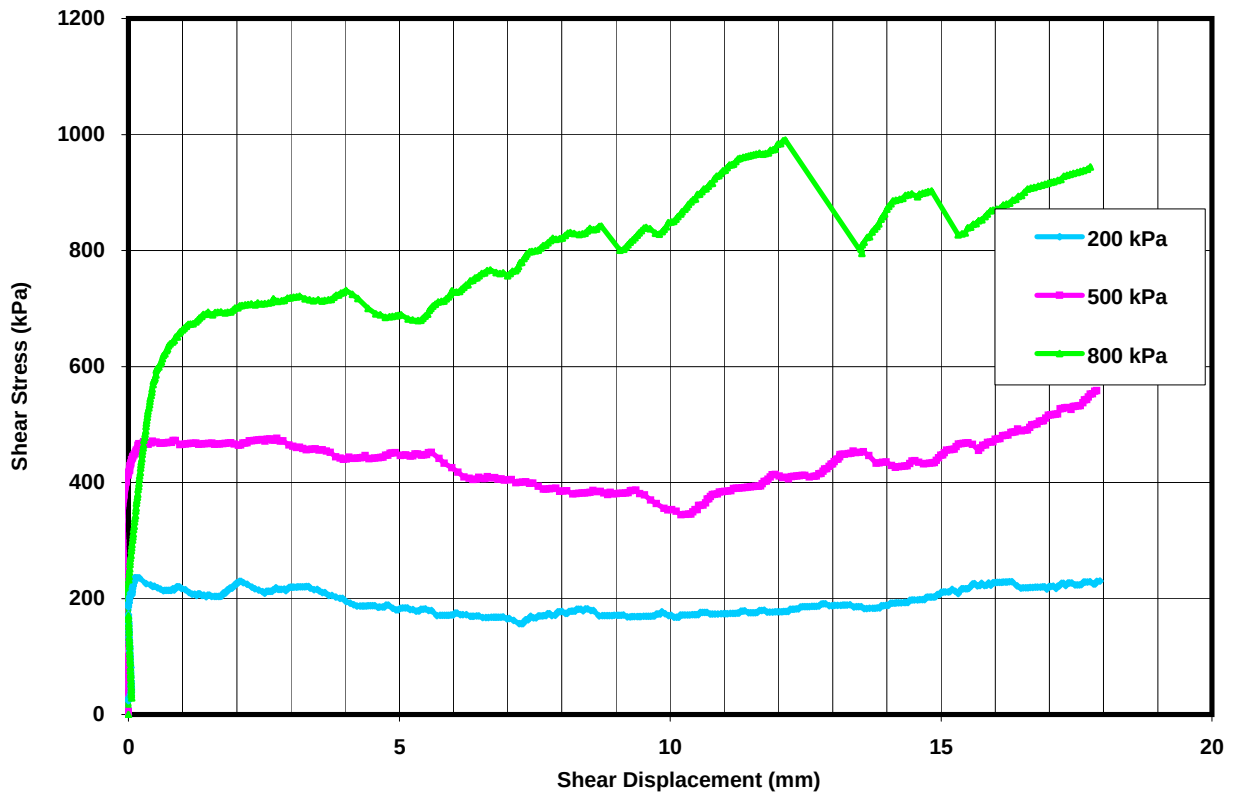
After

PROJECT		MEADOWBANK MINING CORPORATION			
TITLE		DIRECT SHEAR TESTING TP02-395 AT 31.00m			
	PROJECT No.	06-1413-089		FILE No.	Testing
	DESIGN	JFG	22MAR07	SCALE	NTS
	CADD	AS	22MAR07	REV.	
	CHECK			FIGURE II-15	
REVIEW					

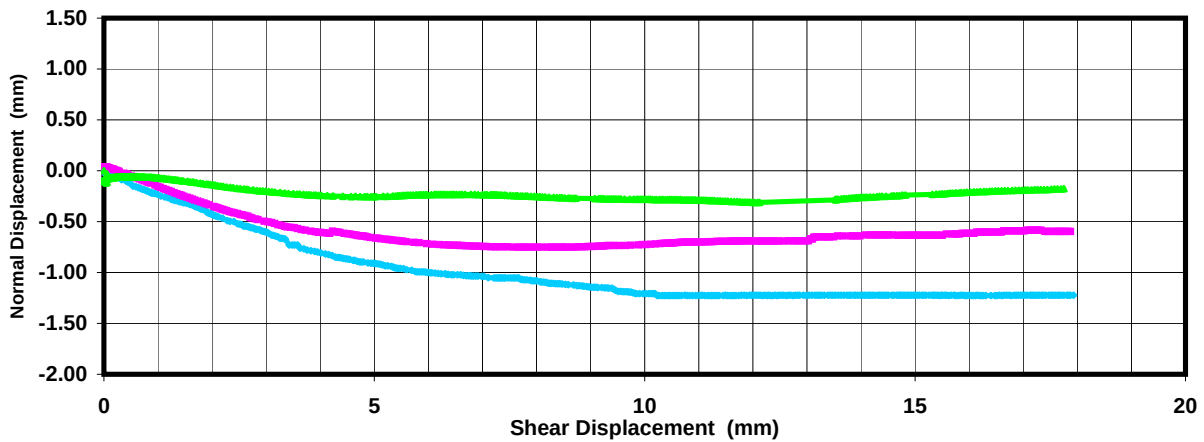
Laboratory Determination of Direct Shear Strength
ISRM 1981 (135-137)

Borehole :	NP02-398	Sch #	7	Project # :	06-1413-089/5000
Sample :	1	Tested By:	LP	Client :	CUMBERLAND
Depth (m)	75.80			Project :	MEADOWBANK SHEAR TESTING
				Location :	BURNABY LAB

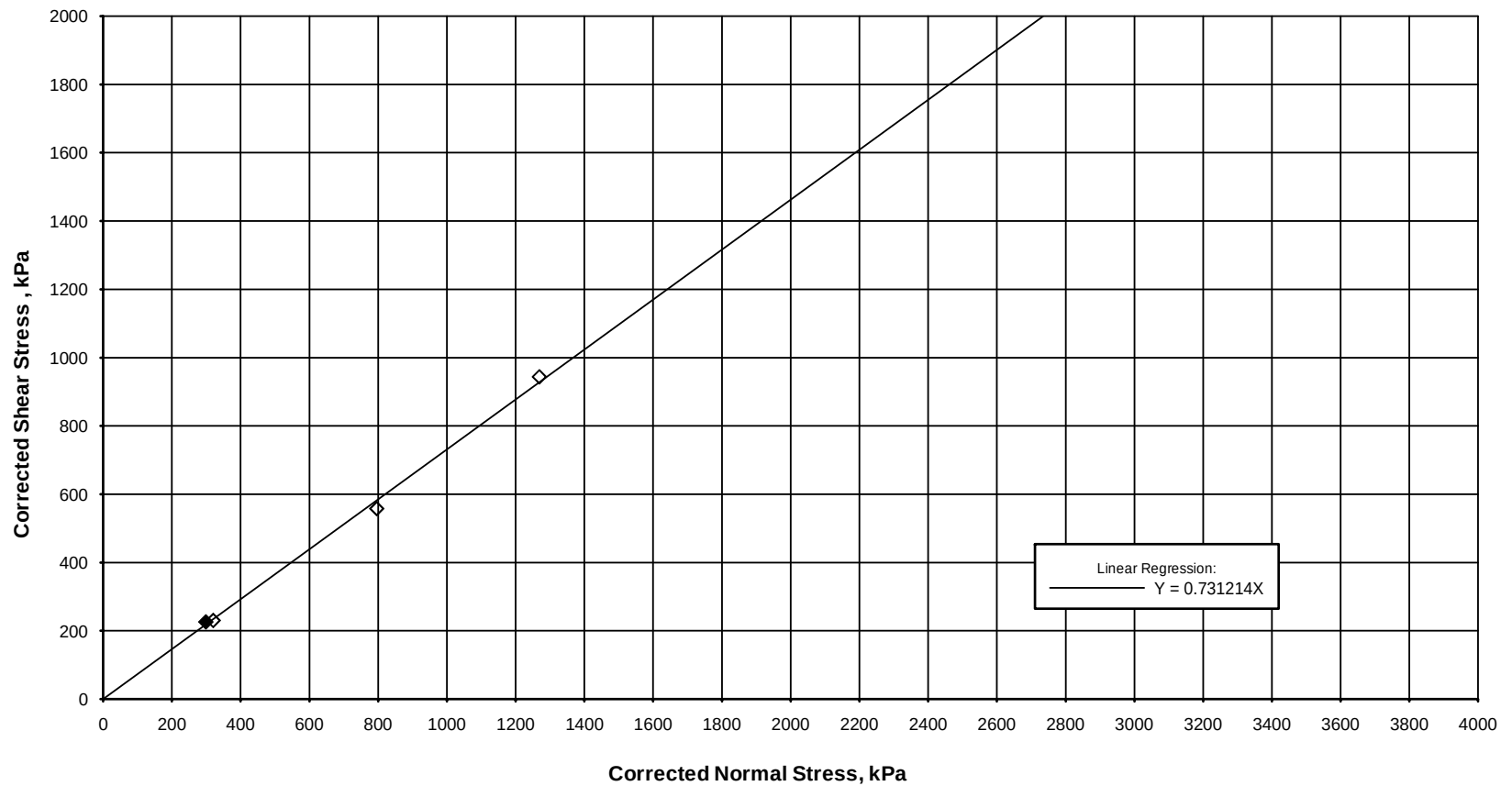
Shear Displacement vs. Shear Stress



Shear Displacement vs. Normal Displacement



Laboratory Determination of Direct Shear Strength
ISRM 1981 (pp. 135-137)

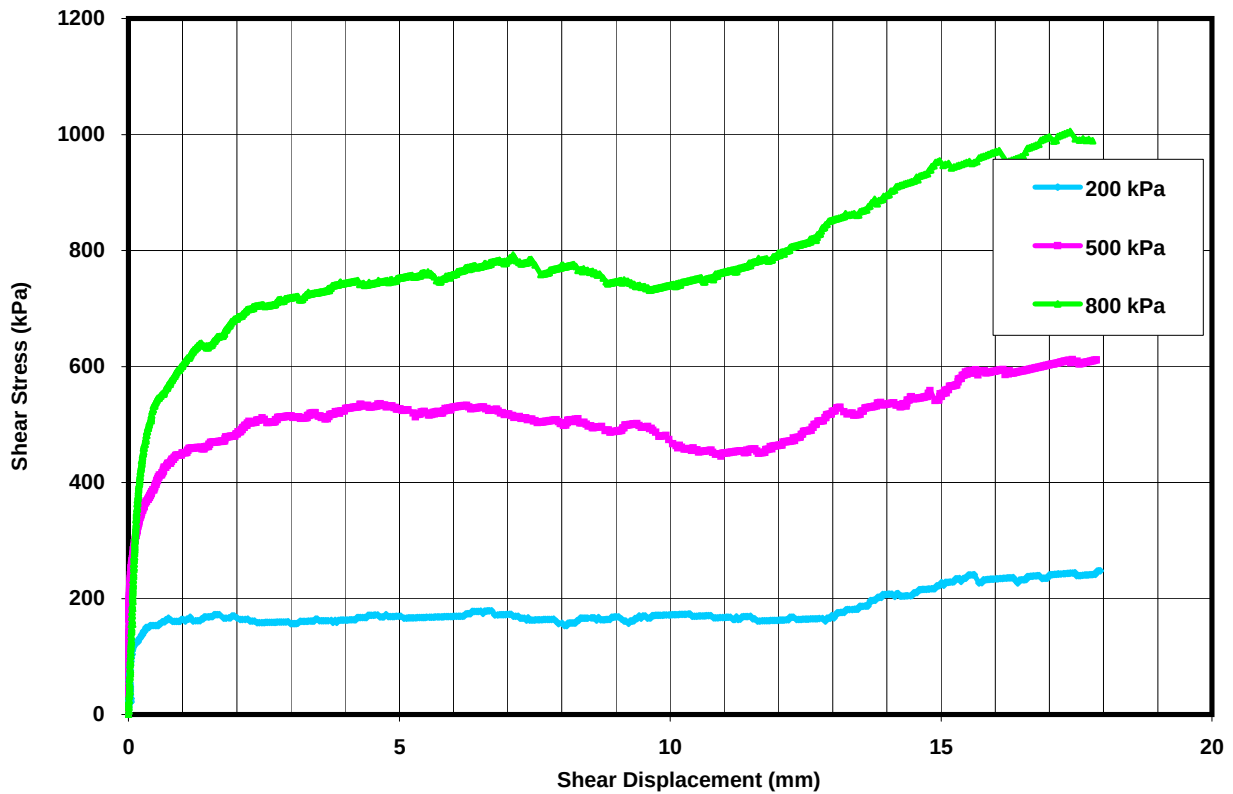


Project #	06-1413-089/5000	Joint Type :	OPEN			Peak Stress		Residual Stress		
DH :	NP02-398	Joint Angle :	36	deg		σ_n	τ	σ_n	τ	
Sample :	1	(from core axis)			Stage	(kPa)	(kPa)	(kPa)	(kPa)	Remarks :
Depth (m)	75.80				1	299	226	320	230	Open
Sch#	7	Test Conditions :			2			796	558	Open
					3			1268	944	Open
					4					

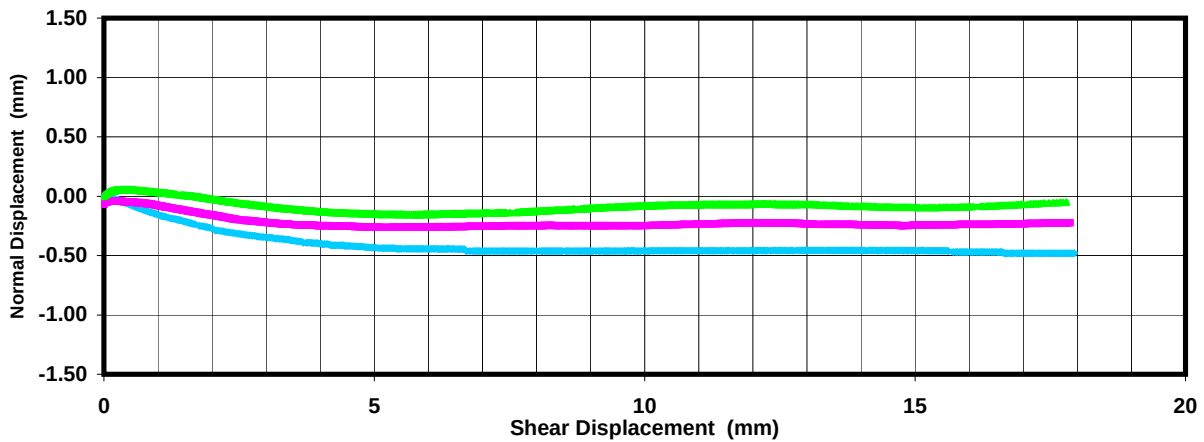
Laboratory Determination of Direct Shear Strength
ISRM 1981 (135-137)

Borehole :	TP99-354 A	Sch #	7	Project # :	06-1413-089/5000
Sample :	13	Tested By:	LP	Client :	CUMBERLAND
Depth (m)	29.9			Project :	MEADOWBANK SHEAR TESTING
				Location :	BURNABY LAB

Shear Displacement vs. Shear Stress



Shear Displacement vs. Normal Displacement





Before



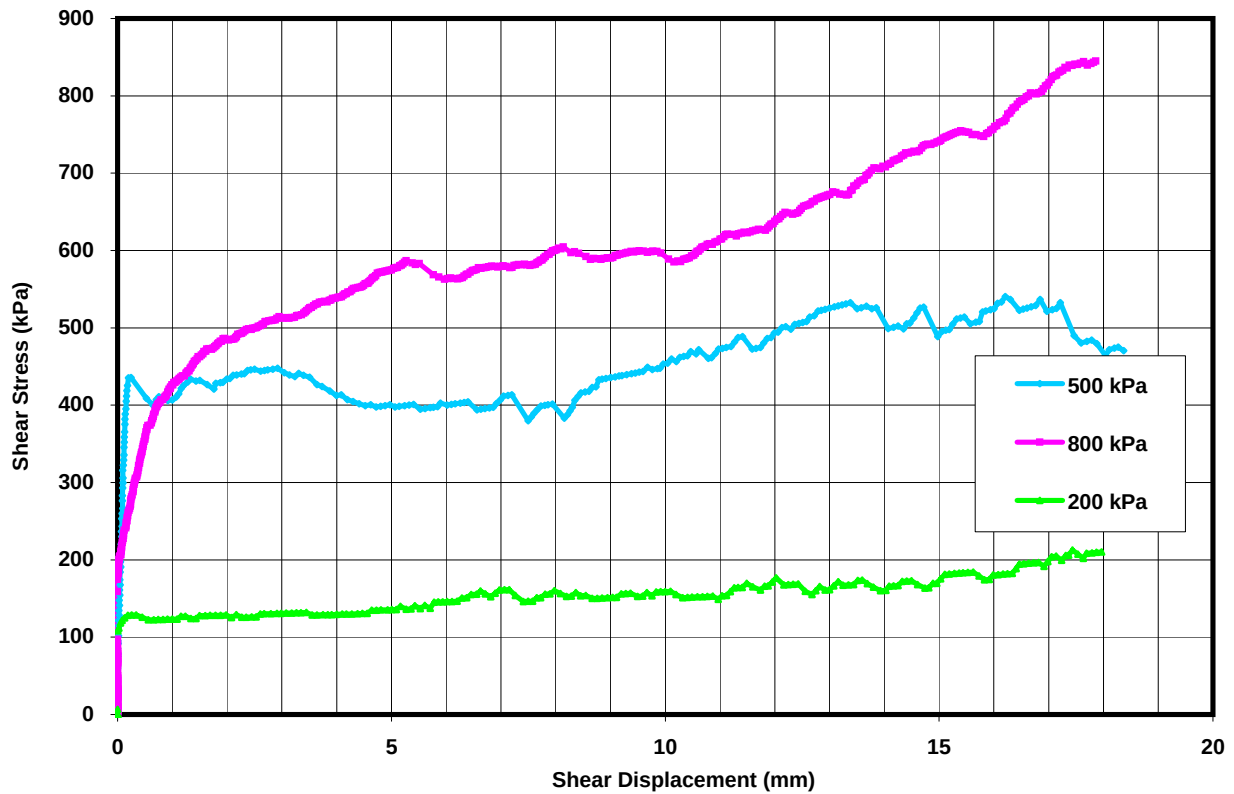
After

PROJECT		MEADOWBANK MINING CORPORATION			
TITLE		DIRECT SHEAR TESTING NP02-398 AT 75.80m			
		PROJECT No. 06-1413-089		FILE No. Testing	
		DESIGN	JFG	22MAR07	SCALE NTS
		CADD	AS	22MAR07	REV.
		CHECK			
					FIGURE II-16

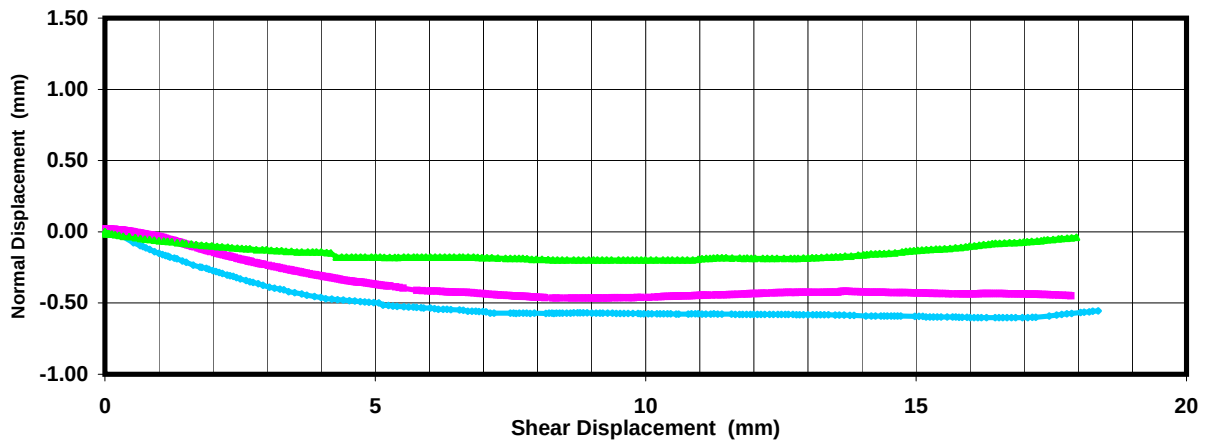
Laboratory Determination of Direct Shear Strength
ISRM 1981 (135-137)

Borehole :	NP98-322	Sch #	7	Project # :	06-1413-089/5000
Sample :	2	Tested By:	LP	Client :	CUMBERLAND
Depth (m)	39.30			Project :	MEADOWBANK SHEAR TESTING
				Location :	BURNABY LAB

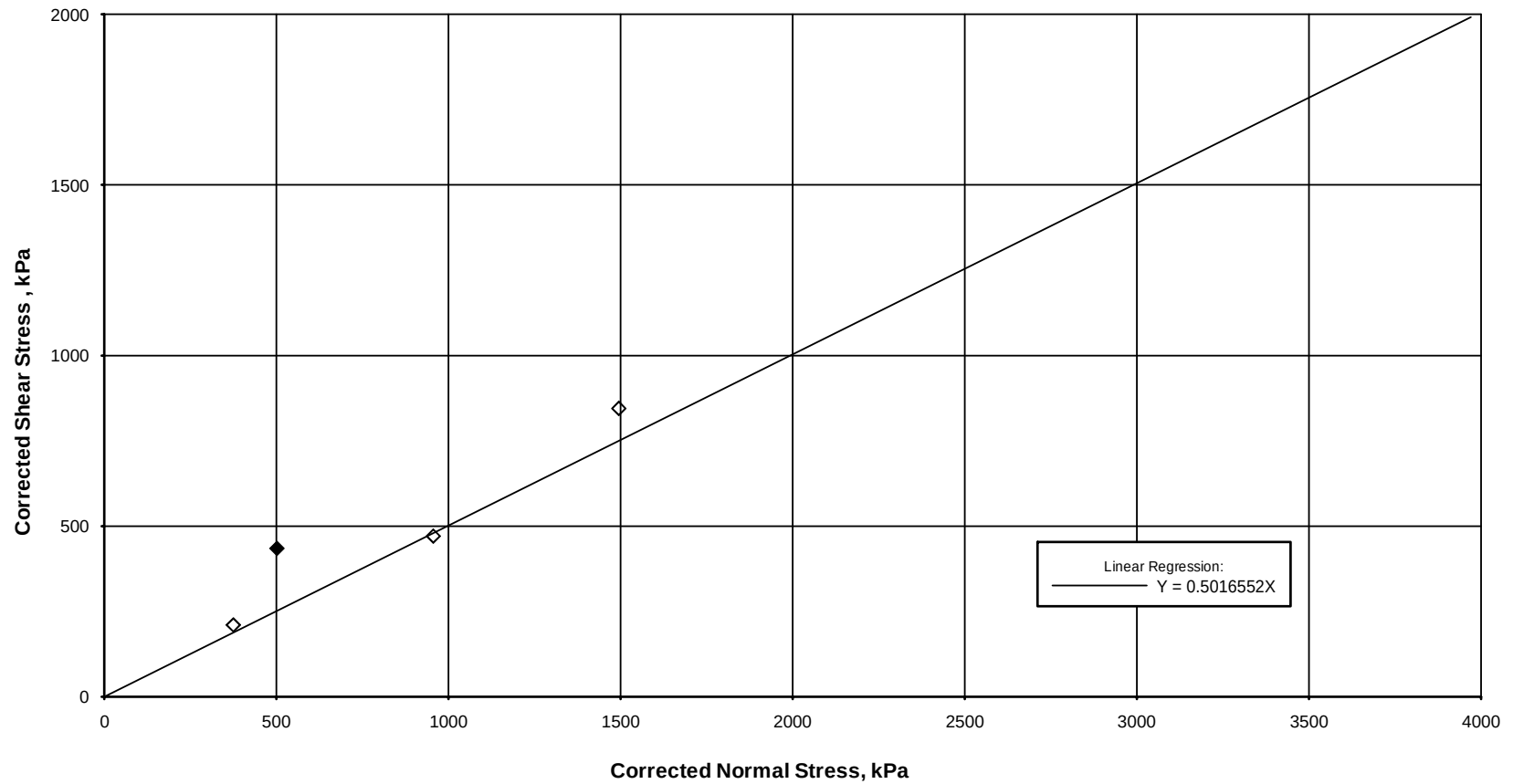
Shear Displacement vs. Shear Stress



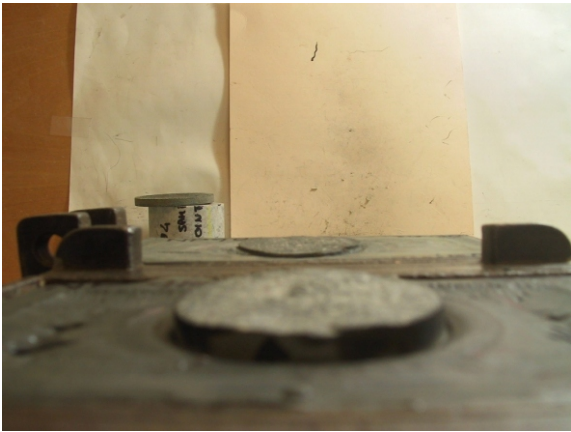
Shear Displacement vs. Normal Displacement



Laboratory Determination of Direct Shear Strength
ISRM 1981 (pp. 135-137)



Project #	06-1413-089/5000	Joint Type :	OPEN			Peak Stress		Residual Stress		
DH :	NP98-322	Joint Angle :	2	deg		σ_n	τ	σ_n	τ	
Sample :	2	(from core axis)			Stage	(kPa)	(kPa)	(kPa)	(kPa)	Remarks :
Depth (m)	39.30				1	502	435	956	471	Open
Sch#	7	Test Conditions :			2			1495	845	Open
					3			375	210	Open
					4					



Before

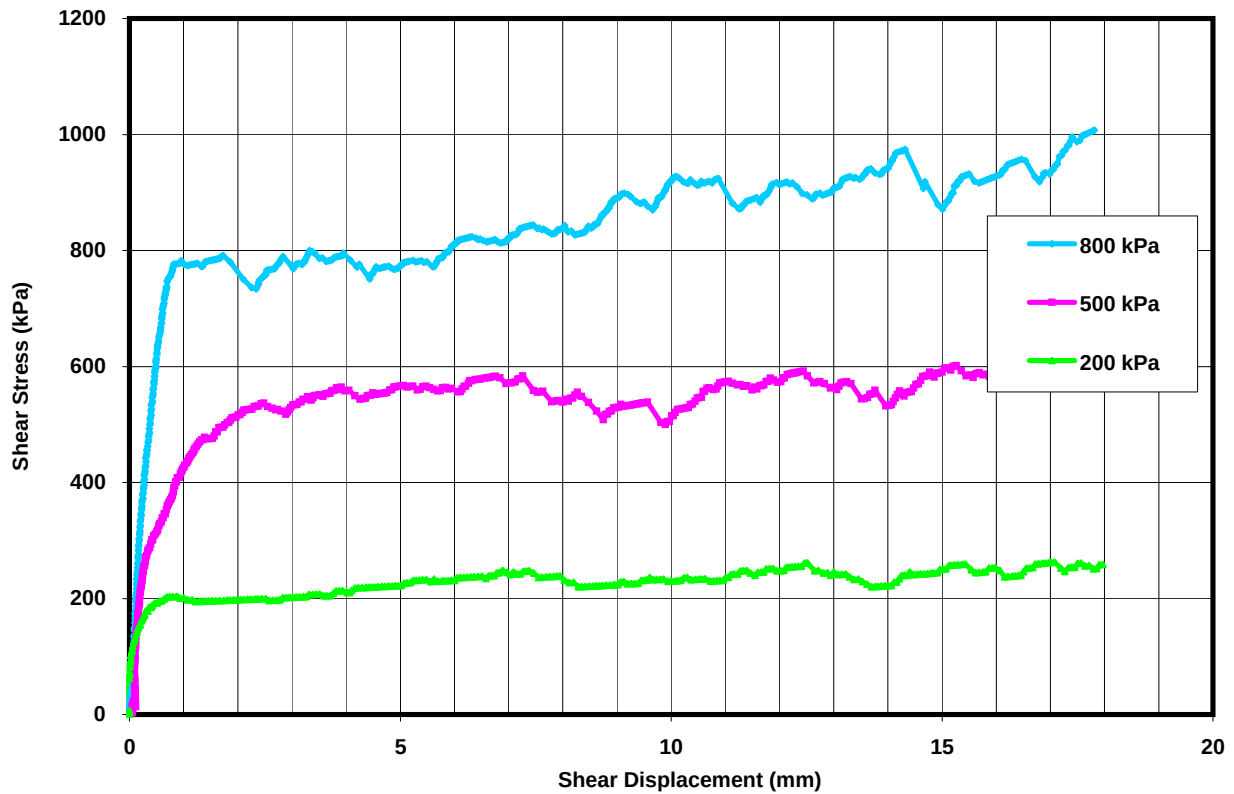
After

PROJECT		MEADOWBANK MINING CORPORATION			
TITLE		DIRECT SHEAR TESTING NP98-322 AT 39.30m			
	PROJECT No.	06-1413-089		FILE No.	Testing
	DESIGN	JFG	22MAR07	SCALE	NTS
	CADD	AS	22MAR07	REV.	
	CHECK			FIGURE II-17	
REVIEW					

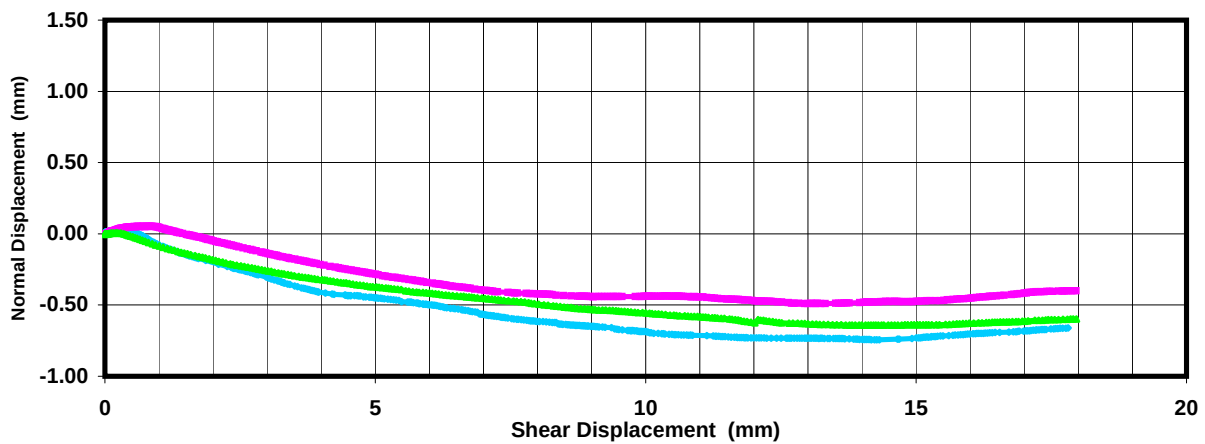
Laboratory Determination of Direct Shear Strength
ISRM 1981 (135-137)

Borehole :	VLT02-059	Sch #	7	Project # :	06-1413-089/5000
Sample :	3	Tested By:	LP	Client :	CUMBERLAND
Depth (m)	20.02			Project :	MEADOWBANK SHEAR TESTING
				Location :	BURNABY LAB

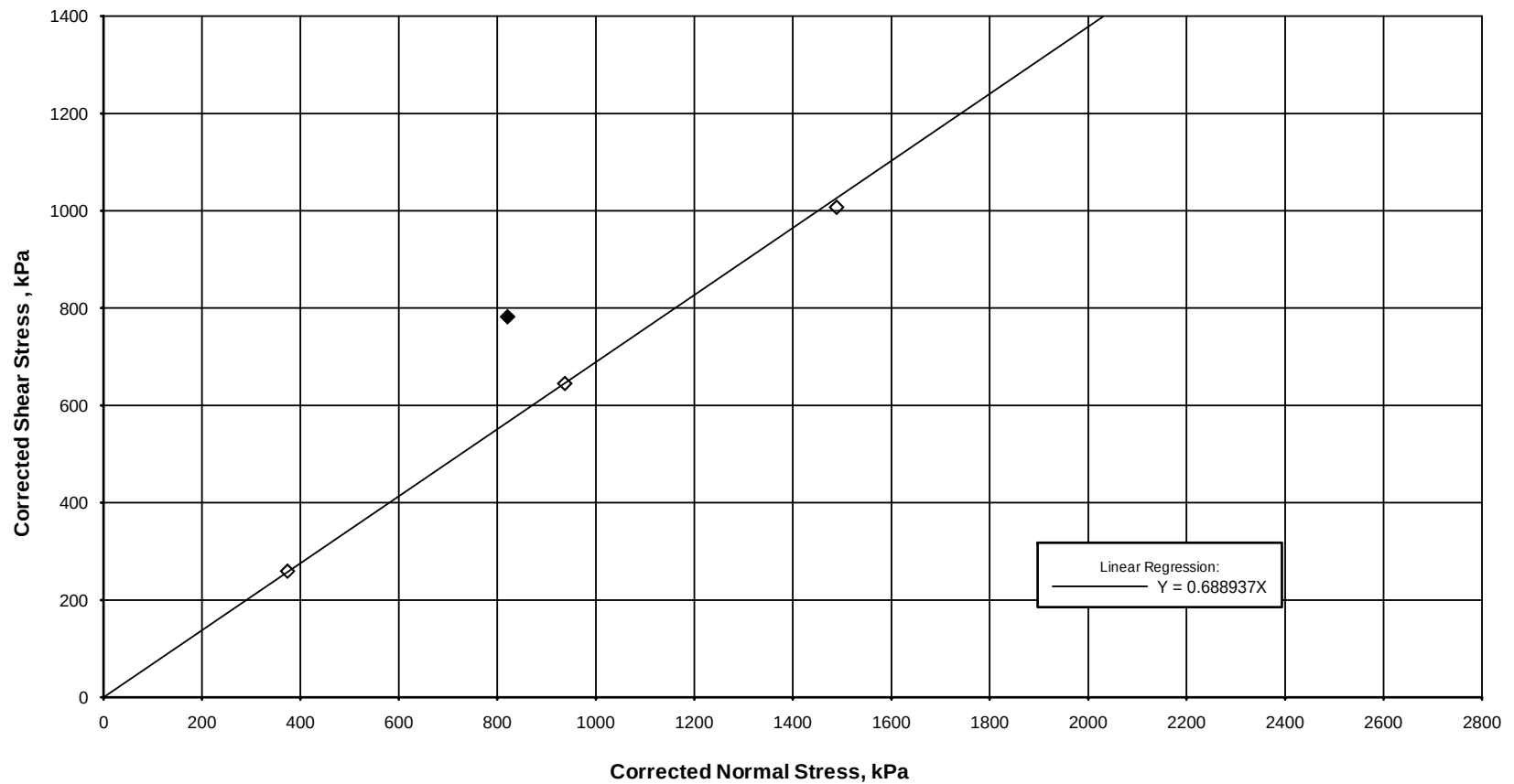
Shear Displacement vs. Shear Stress



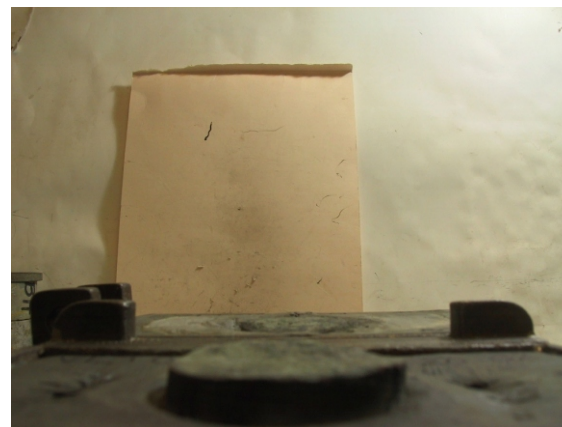
Shear Displacement vs. Normal Displacement



Laboratory Determination of Direct Shear Strength
ISRM 1981 (pp. 135-137)



Project #	06-1413-089/5000	Joint Type :	OPEN			Peak Stress		Residual Stress		
DH :	VLT02-059	Joint Angle :	4	deg		σ_n	τ	σ_n	τ	
Sample :	3	(from core axis)			Stage	(kPa)	(kPa)	(kPa)	(kPa)	Remarks :
Depth (m)	20.02				1	821	782	1489	1007	Open
Sch#	7	Test Conditions :			2			937	645	Open
					3			374	259	Open
					4					



Before

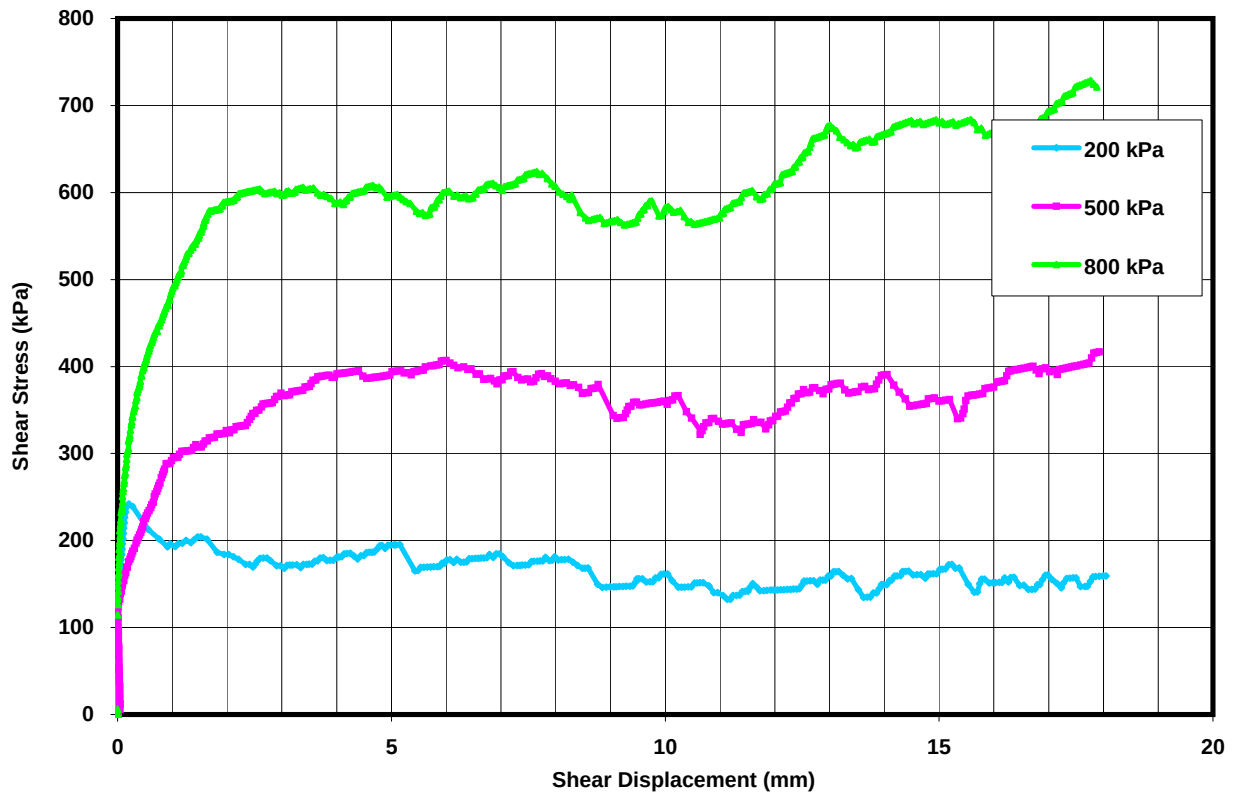
After

PROJECT		MEADOWBANK MINING CORPORATION			
TITLE		DIRECT SHEAR TESTING VLT02-059 AT 20.02m			
		PROJECT No. 06-1413-089		FILE No. Testing	
		DESIGN	JFG	22MAR07	SCALE NTS
		CADD	AS	22MAR07	REV.
		CHECK			
REVIEW					FIGURE II-18

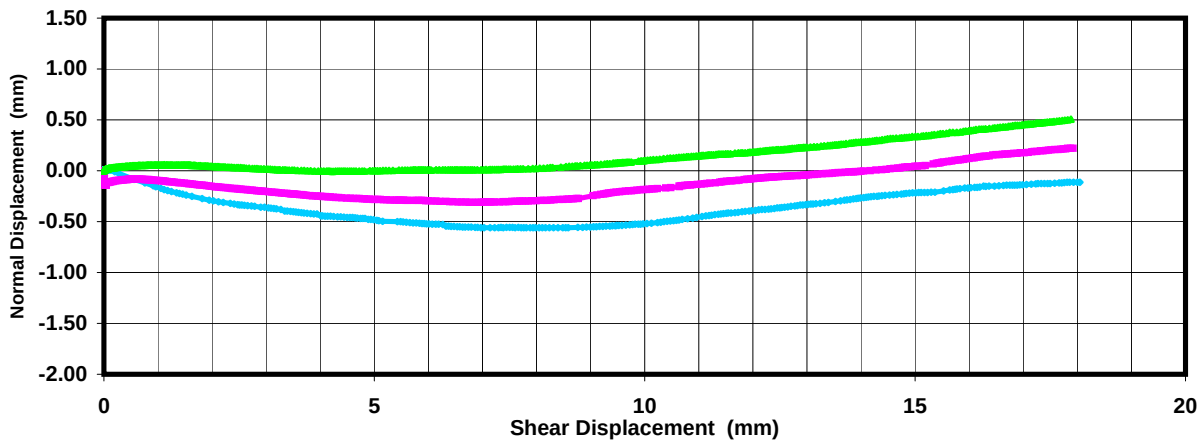
Laboratory Determination of Direct Shear Strength
ISRM 1981 (135-137)

Borehole :	G04-517	Sch #	7	Project # :	06-1413-089/5000
Sample :	12	Tested By:	LP	Client :	CUMBERLAND
Depth (m)	18.60			Project :	MEADOWBANK SHEAR TESTING
				Location :	BURNABY LAB

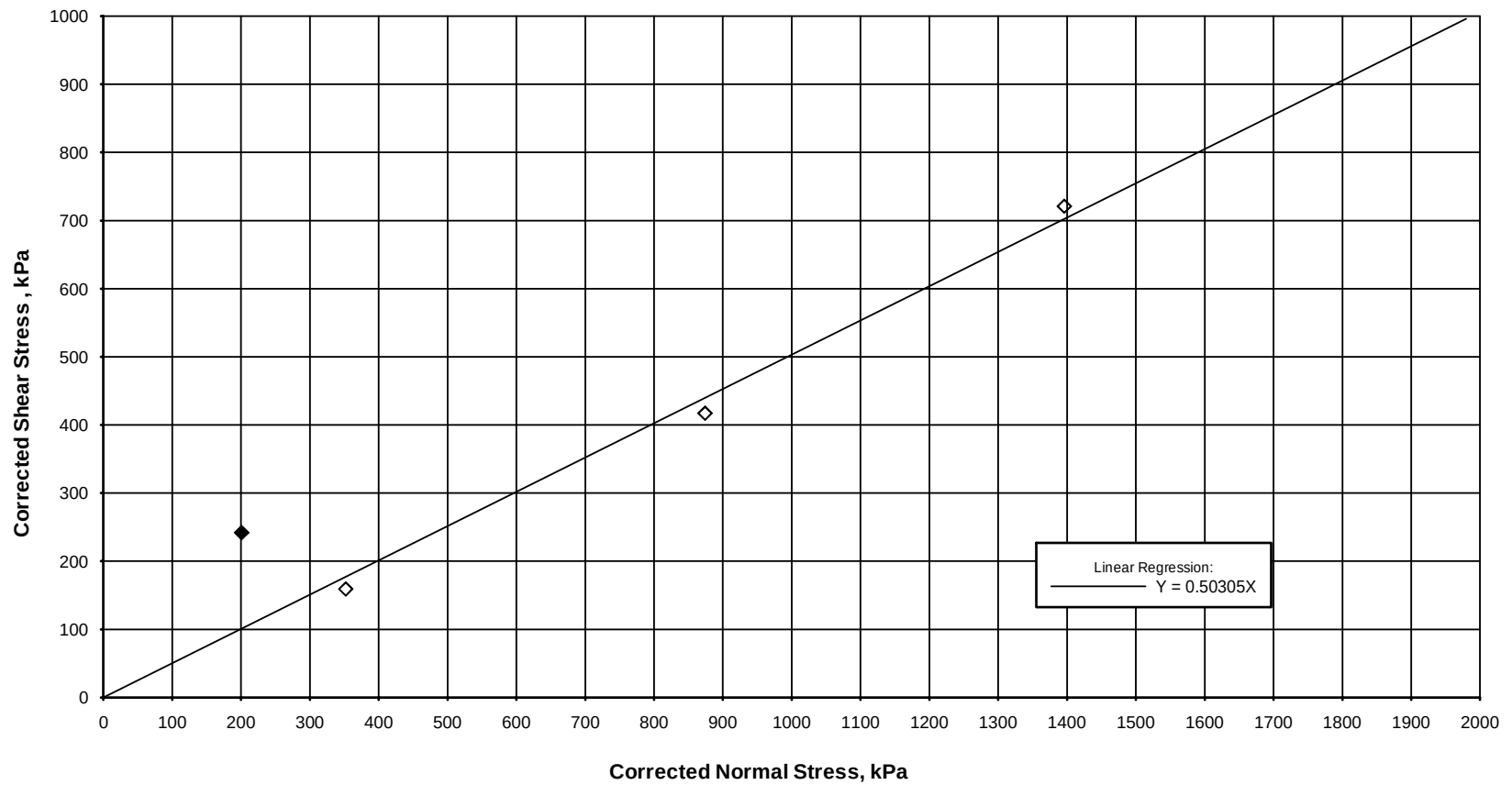
Shear Displacement vs. Shear Stress



Shear Displacement vs. Normal Displacement



Laboratory Determination of Direct Shear Strength
ISRM 1981 (pp. 135-137)



Project #	06-1413-089/5000	Joint Type :	OPEN			Peak Stress		Residual Stress		
DH :	G04-517	Joint Angle :	25	deg		σ_n	τ	σ_n	τ	Remarks :
Sample :	12	(from core axis)			Stage	(kPa)	(kPa)	(kPa)	(kPa)	
Depth (m)	18.60				1	201	242	352	159	Open
Sch#	7	Test Conditions :			2			874	417	Open
					3			1396	721	Open
					4					



Before

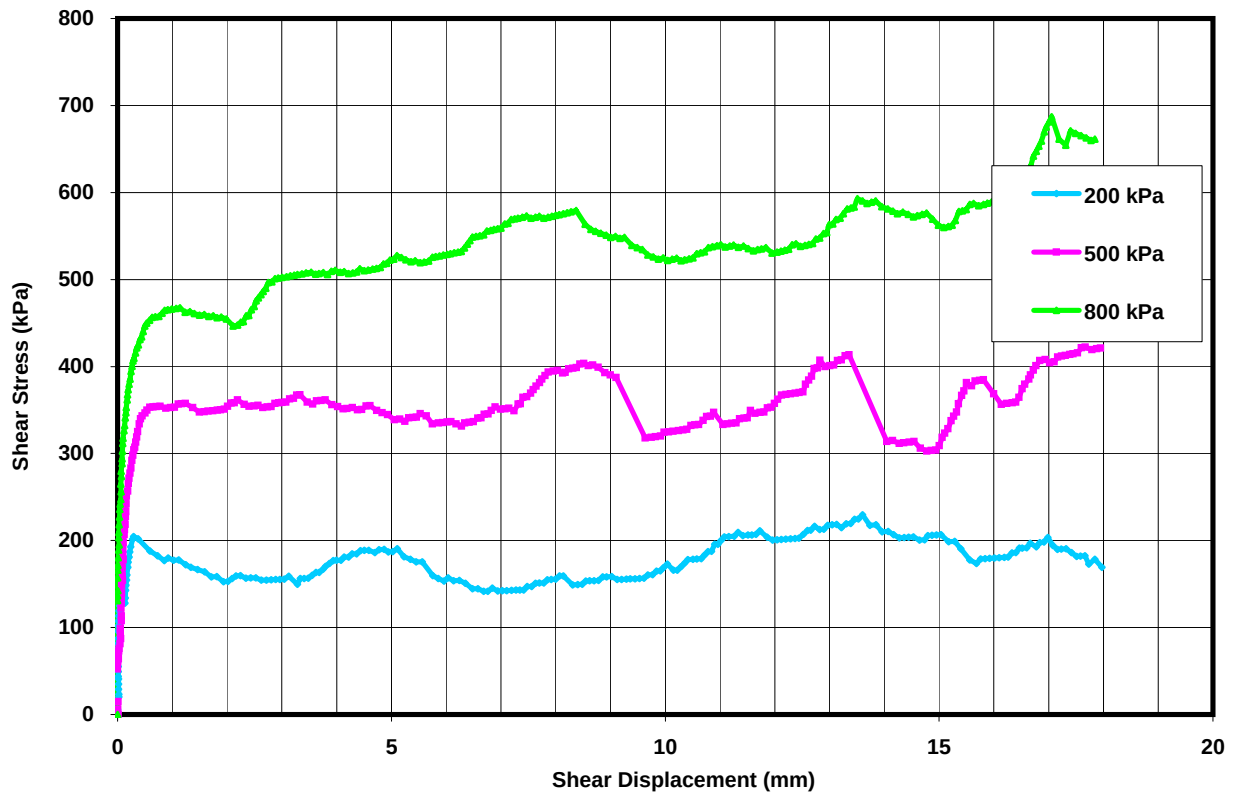
After

PROJECT		MEADOWBANK MINING CORPORATION			
TITLE		DIRECT SHEAR TESTING G04-517 AT 18.60m			
		PROJECT No. 06-1413-089		FILE No. Testing	
		DESIGN	JFG	22MAR07	SCALE NTS
		CADD	AS	22MAR07	REV.
		CHECK			
REVIEW					FIGURE II-19

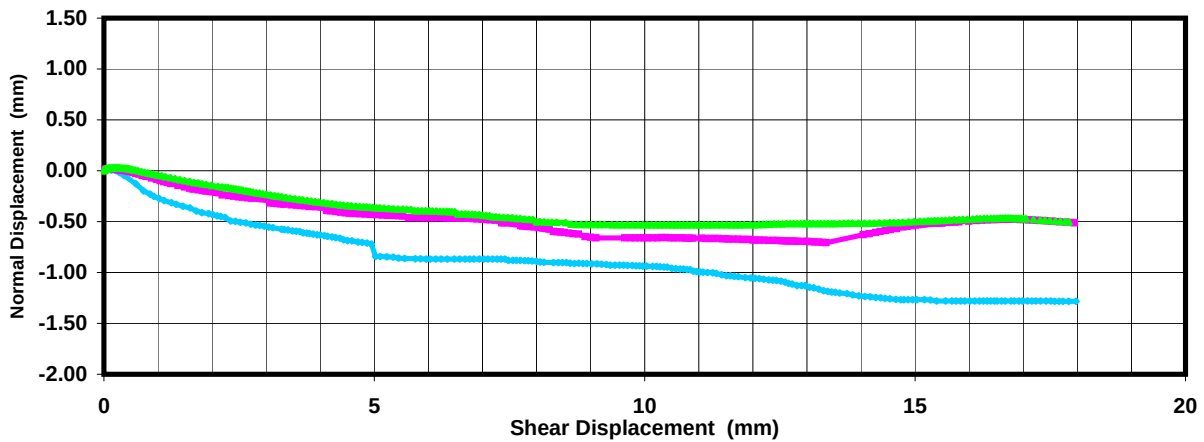
Laboratory Determination of Direct Shear Strength
ISRM 1981 (135-137)

Borehole :	G04-509	Sch #	7	Project # :	06-1413-089/5000
Sample :	9	Tested By:	LP	Client :	CUMBERLAND
Depth (m)	59.80			Project :	MEADOWBANK SHEAR TESTING
				Location :	BURNABY LAB

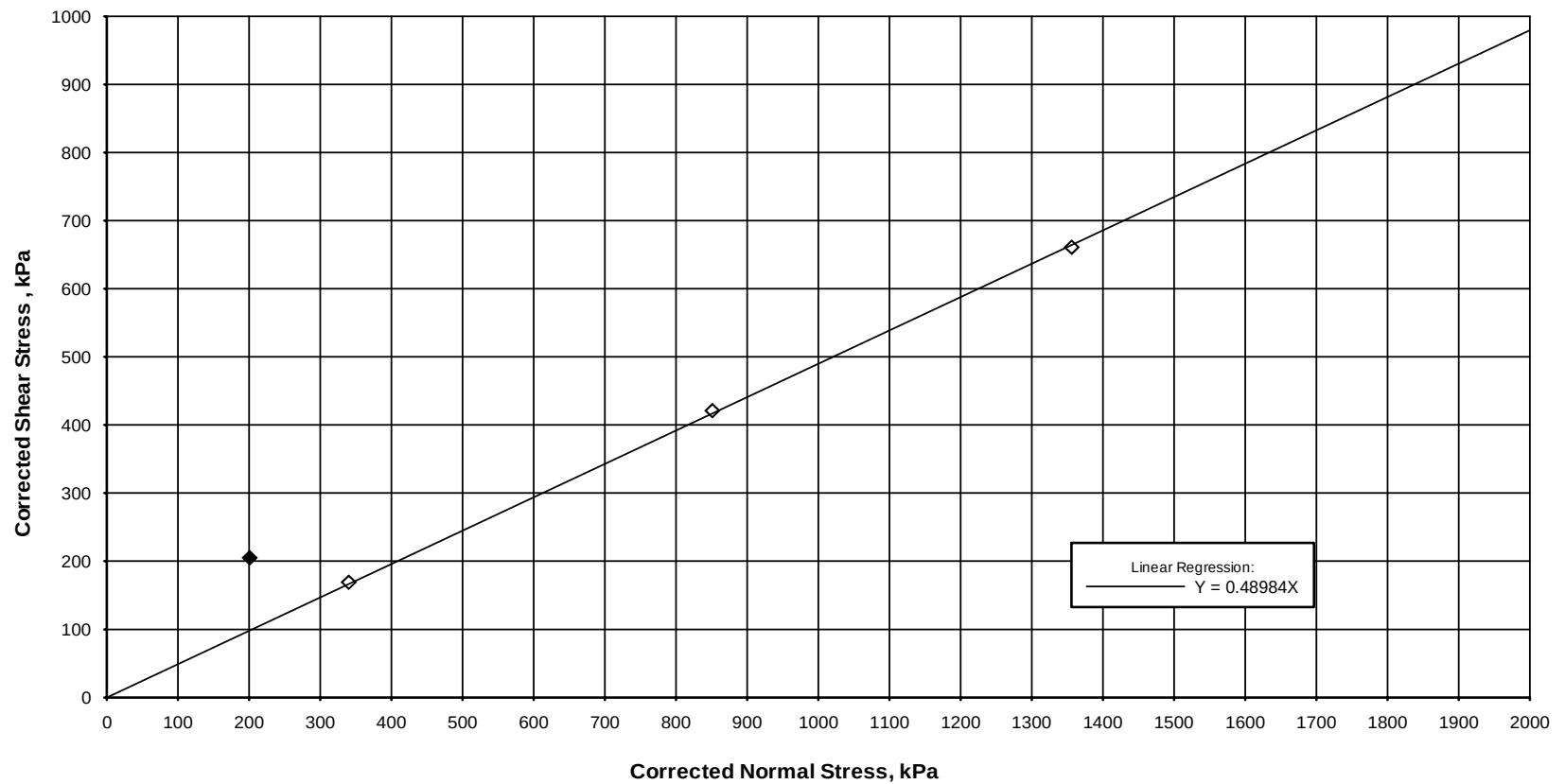
Shear Displacement vs. Shear Stress



Shear Displacement vs. Normal Displacement



Laboratory Determination of Direct Shear Strength
ISRM 1981 (pp. 135-137)



Project #	06-1413-089/5000	Joint Type :	OPEN			Peak Stress		Residual Stress		
DH :	G04-509	Joint Angle :	30	deg		σ_n	τ	σ_n	τ	Remarks :
Sample :	9	(from core axis)			Stage	(kPa)	(kPa)	(kPa)	(kPa)	
Depth (m)	59.80				1	201	205	340	169	Open
Sch#	7	Test Conditions :			2			851	421	Open
					3			1356	661	Open
					4					



Before



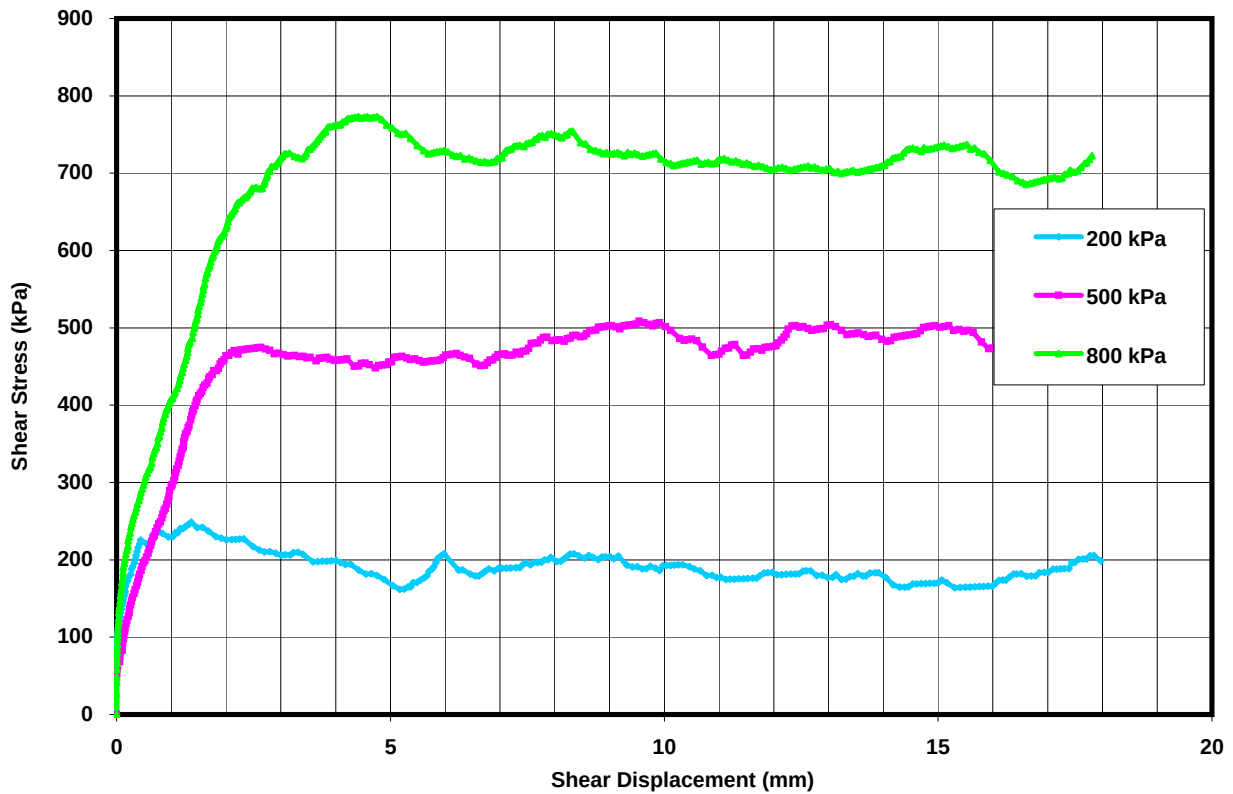
After

PROJECT		MEADOWBANK MINING CORPORATION			
TITLE		DIRECT SHEAR TESTING G04-509 AT 59.80m			
	PROJECT No.		06-1413-089		FILE No. Testing
	DESIGN	JFG	22MAR07		SCALE NTS
	CADD	AS	22MAR07		REV.
	CHECK				FIGURE II-20
	REVIEW				

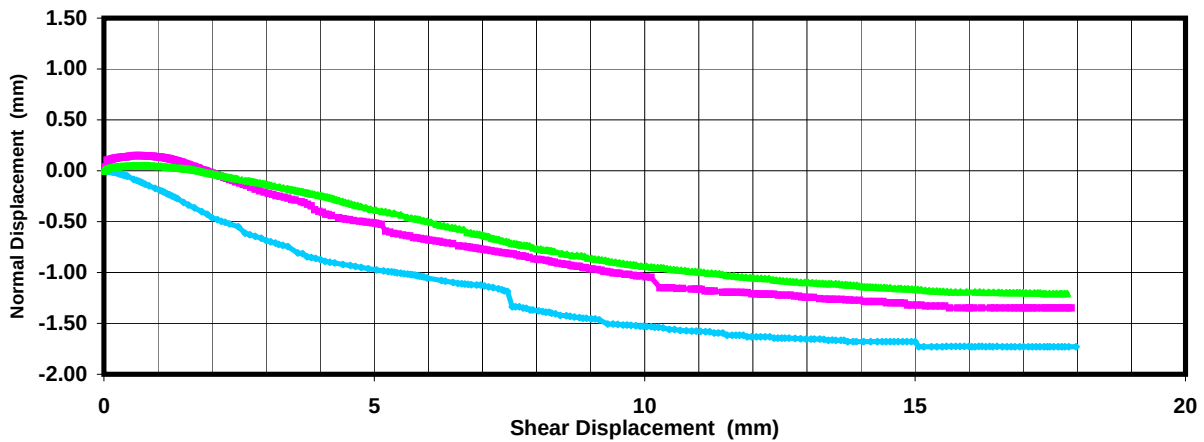
Laboratory Determination of Direct Shear Strength
ISRM 1981 (135-137)

Borehole :	G04-514	Sch #	7	Project # :	06-1413-089/5000
Sample :	10	Tested By:	LP	Client :	CUMBERLAND
Depth (m)	8.15			Project :	MEADOWBANK SHEAR TESTING
				Location :	BURNABY LAB

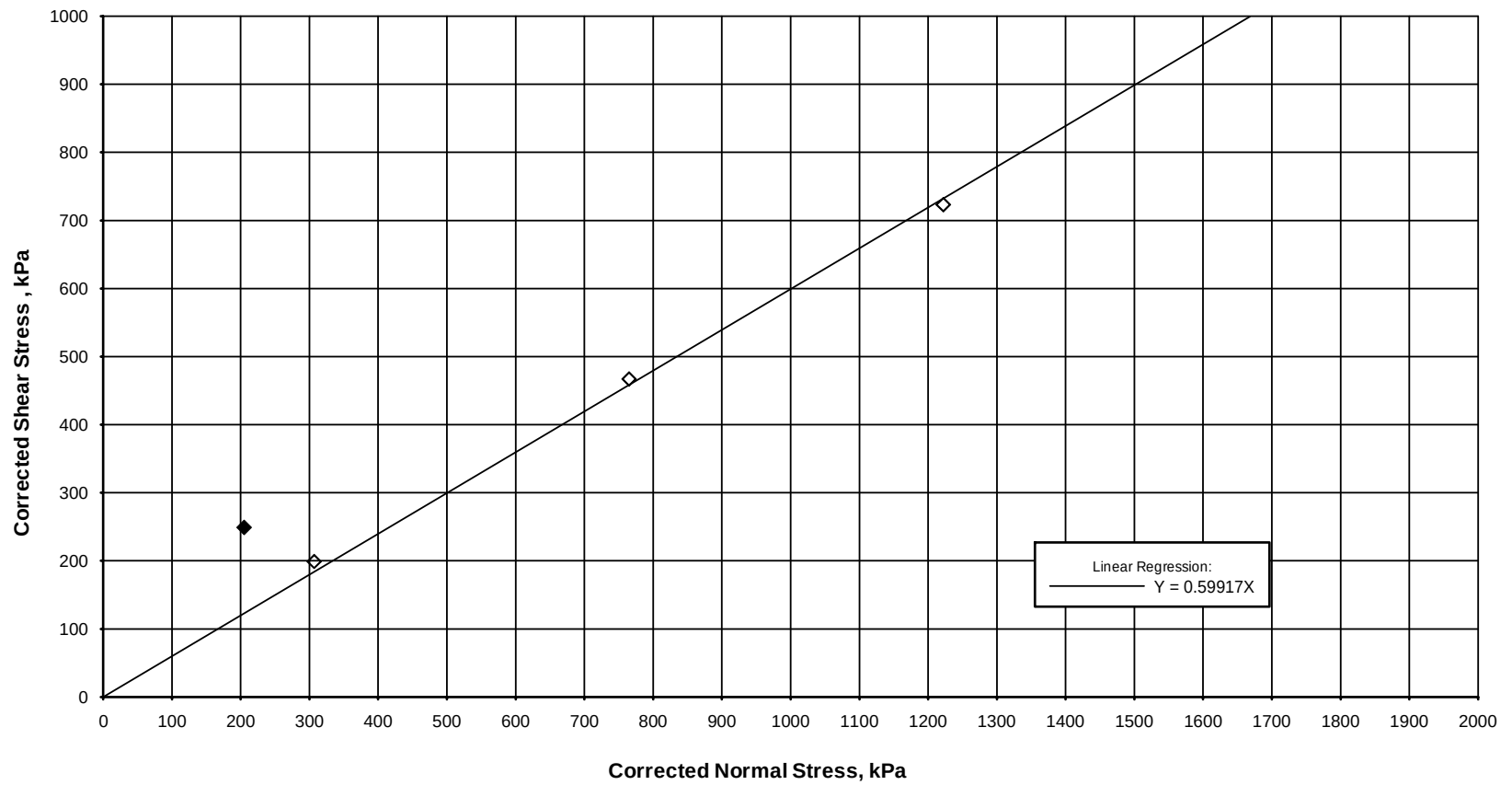
Shear Displacement vs. Shear Stress



Shear Displacement vs. Normal Displacement



Laboratory Determination of Direct Shear Strength
ISRM 1981 (pp. 135-137)



Project #	06-1413-089/5000	Joint Type :	OPEN			Peak Stress		Residual Stress		
DH :	G04-514	Joint Angle :	40	deg		σ_n	τ	σ_n	τ	Remarks :
Sample :	10	(from core axis)			Stage	(kPa)	(kPa)	(kPa)	(kPa)	
Depth (m)	8.15				1	205	249	307	199	Open
Sch#	7	Test Conditions :			2			765	467	Open
					3			1222	723	Open
					4					



Before

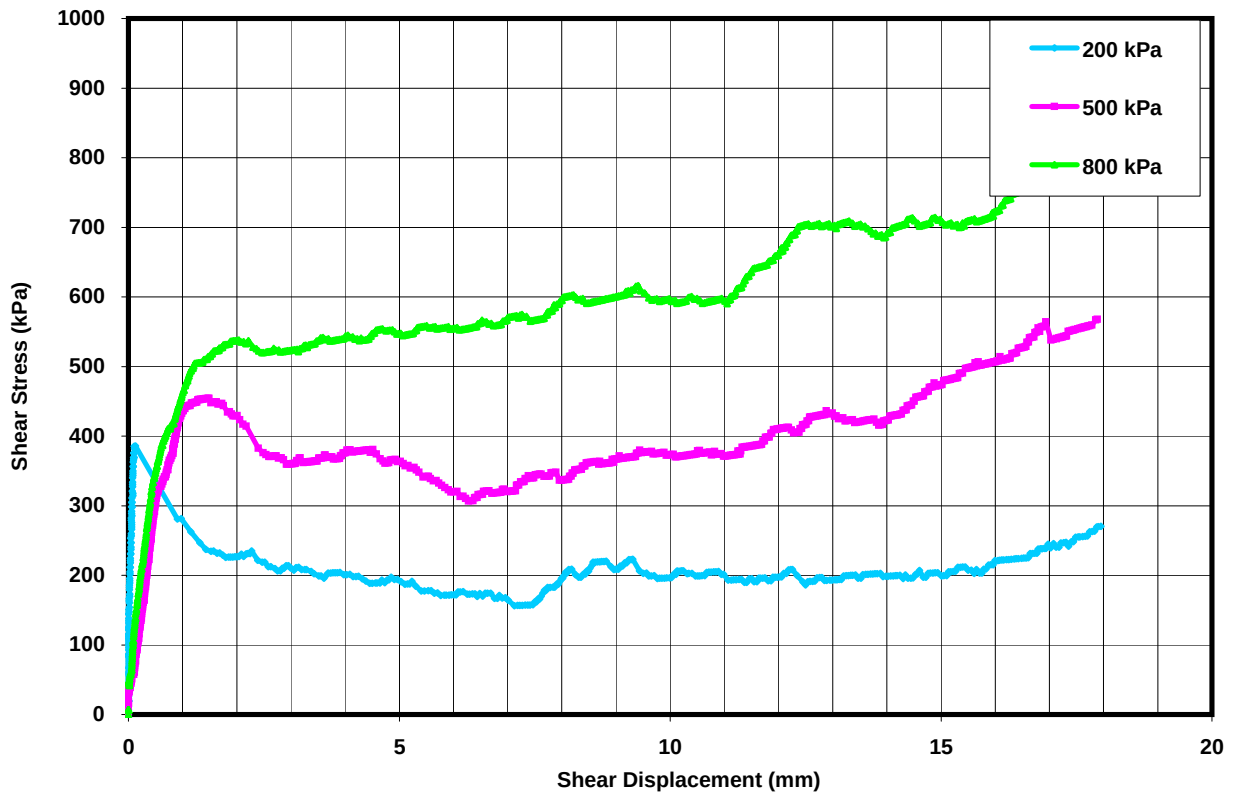
After

PROJECT		MEADOWBANK MINING CORPORATION			
TITLE		DIRECT SHEAR TESTING G04-514 AT 8.15m			
		PROJECT No. 06-1413-089		FILE No. Testing	
		DESIGN	JFG	22MAR07	SCALE NTS
		CADD	AS	22MAR07	REV.
		CHECK			
					FIGURE II-21

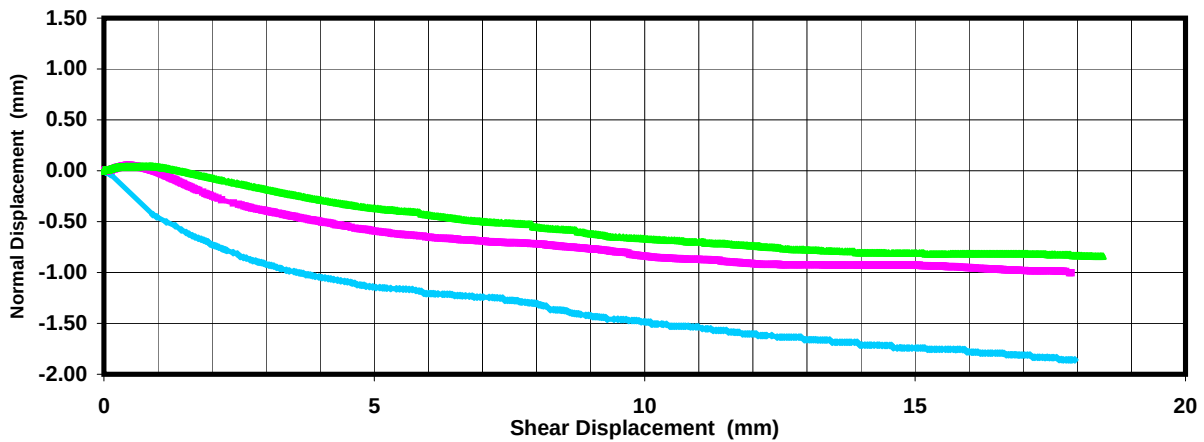
Laboratory Determination of Direct Shear Strength
ISRM 1981 (135-137)

Borehole :	TP97-209	Sch #	7	Project # :	06-1413-089/5000
Sample :	11	Tested By:	LP	Client :	CUMBERLAND
Depth (m)	28.50			Project :	MEADOWBANK SHEAR TESTING
				Location :	BURNABY LAB

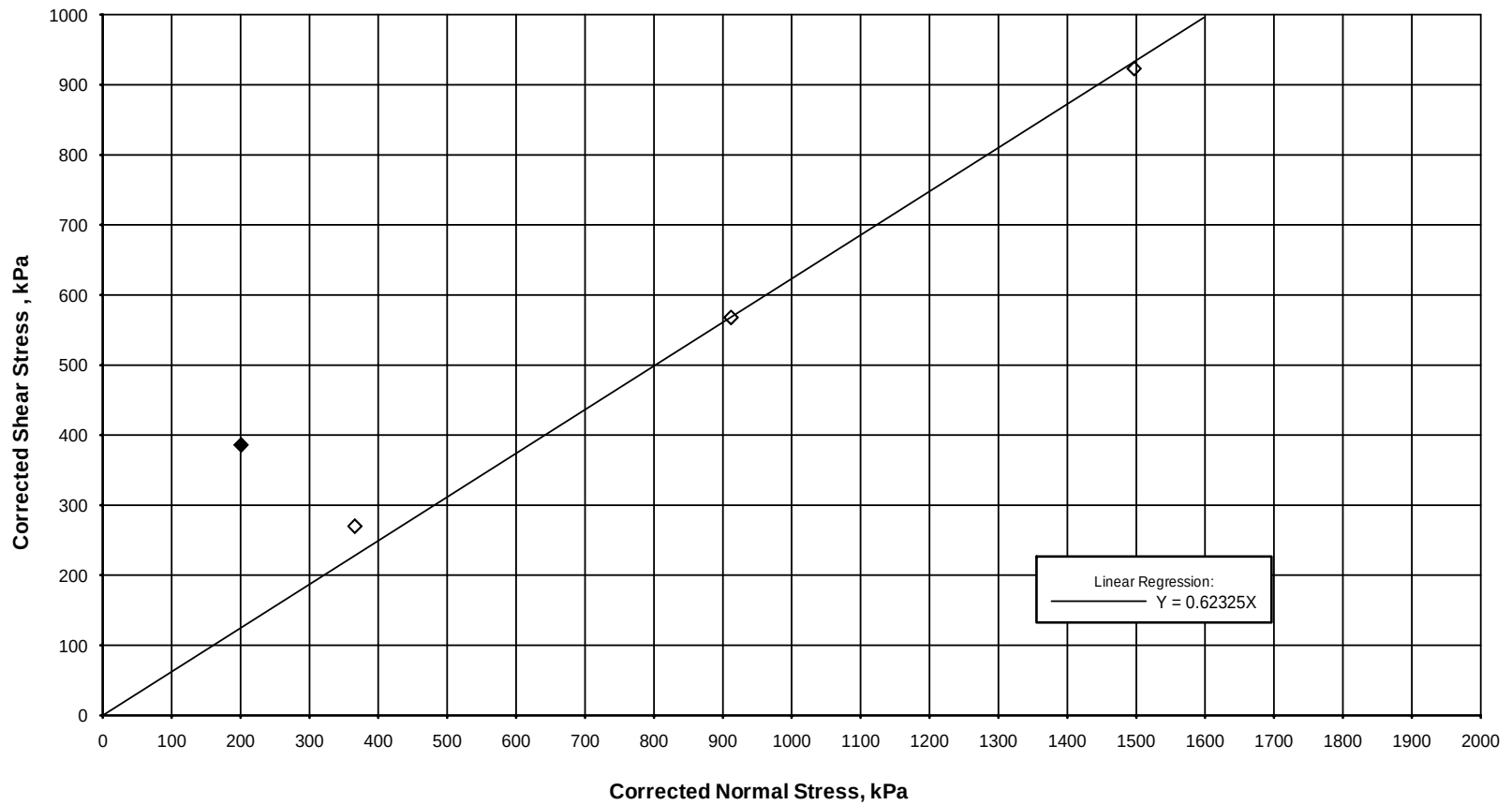
Shear Displacement vs. Shear Stress



Shear Displacement vs. Normal Displacement



Laboratory Determination of Direct Shear Strength
ISRM 1981 (pp. 135-137)



Project #	06-1413-089/5000	Joint Type :	OPEN			Peak Stress		Residual Stress		
DH :	TP97-209	Joint Angle :	20	deg		σ_n	τ	σ_n	τ	Remarks :
Sample :	11	(from core axis)			Stage	(kPa)	(kPa)	(kPa)	(kPa)	
Depth (m)	28.50				1	201	386	366	270	Open
Sch#	7	Test Conditions :			2			912	568	Open
					3			1497	923	Open
					4					



Before

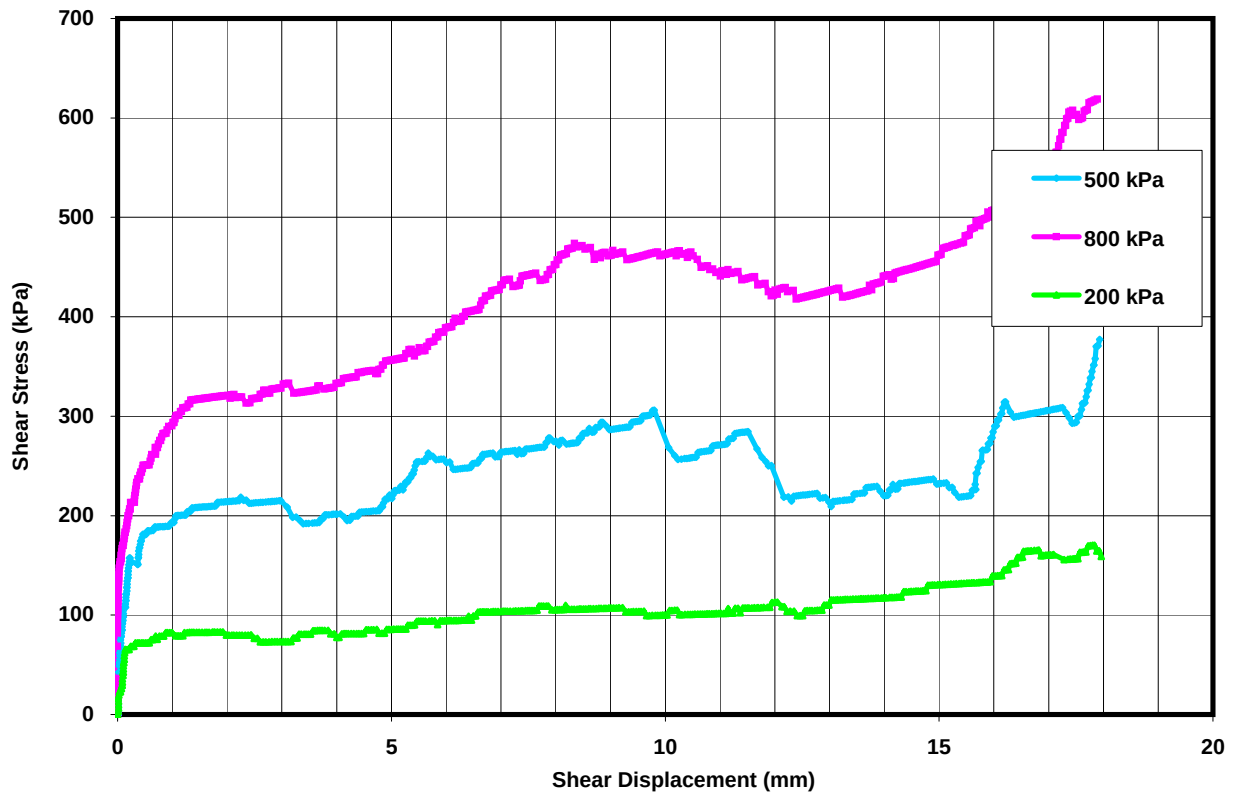
After

PROJECT		MEADOWBANK MINING CORPORATION			
TITLE		DIRECT SHEAR TESTING TP97-209 AT 28.50m			
	PROJECT No.	06-1413-089		FILE No.	Testing
	DESIGN	JFG	22MAR07	SCALE	NTS
	CADD	AS	22MAR07	REV.	
	CHECK			FIGURE II-22	
	REVIEW				

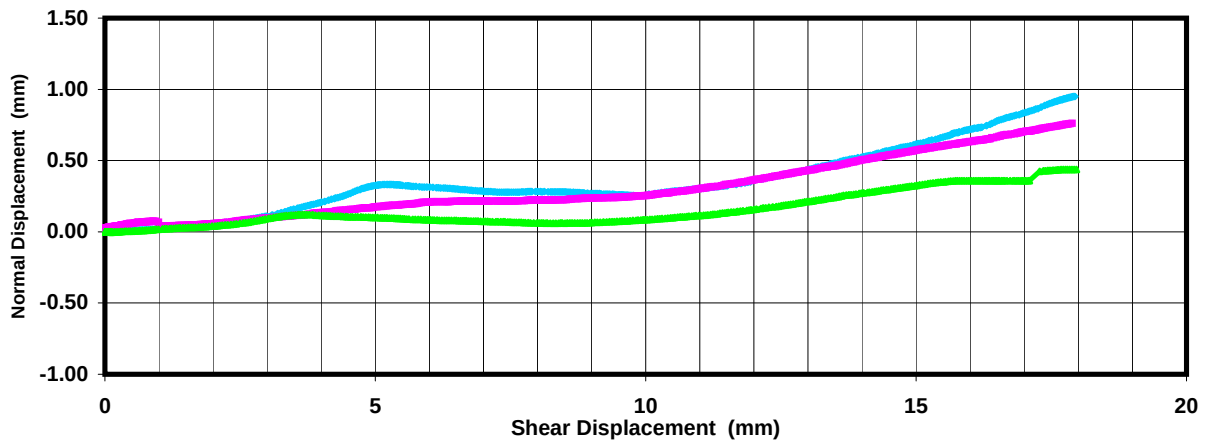
Laboratory Determination of Direct Shear Strength
ISRM 1981 (135-137)

Borehole :	TP99-354	Sch #	7	Project # :	06-1413-089/5000
Sample :	16	Tested By:	LP	Client :	CUMBERLAND
Depth (m)	46.88			Project :	MEADOWBANK SHEAR TESTING
				Location :	BURNABY LAB

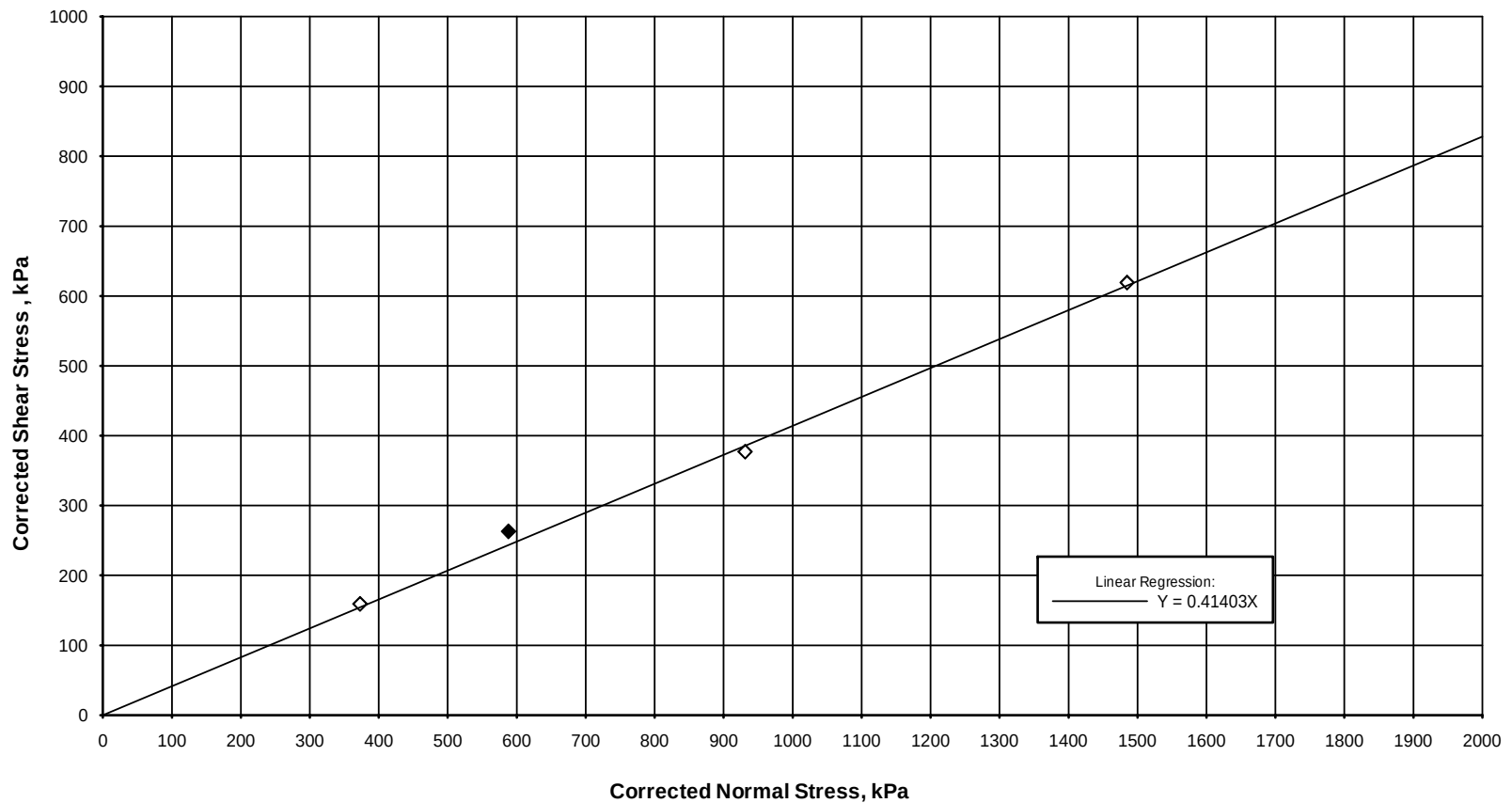
Shear Displacement vs. Shear Stress



Shear Displacement vs. Normal Displacement



Laboratory Determination of Direct Shear Strength
ISRM 1981 (pp. 135-137)



Project #	06-1413-089/5000	Joint Type :	OPEN			Peak Stress		Residual Stress		
DH :	TP99-354	Joint Angle :	12	deg		σ_n	τ	σ_n	τ	
Sample :	16	(from core axis)			Stage	(kPa)	(kPa)	(kPa)	(kPa)	Remarks :
Depth (m)	46.88				1	588	263	931	377	Open
Sch#	7	Test Conditions :			2			1485	619	Open
					3			373	159	Open
					4					



Before

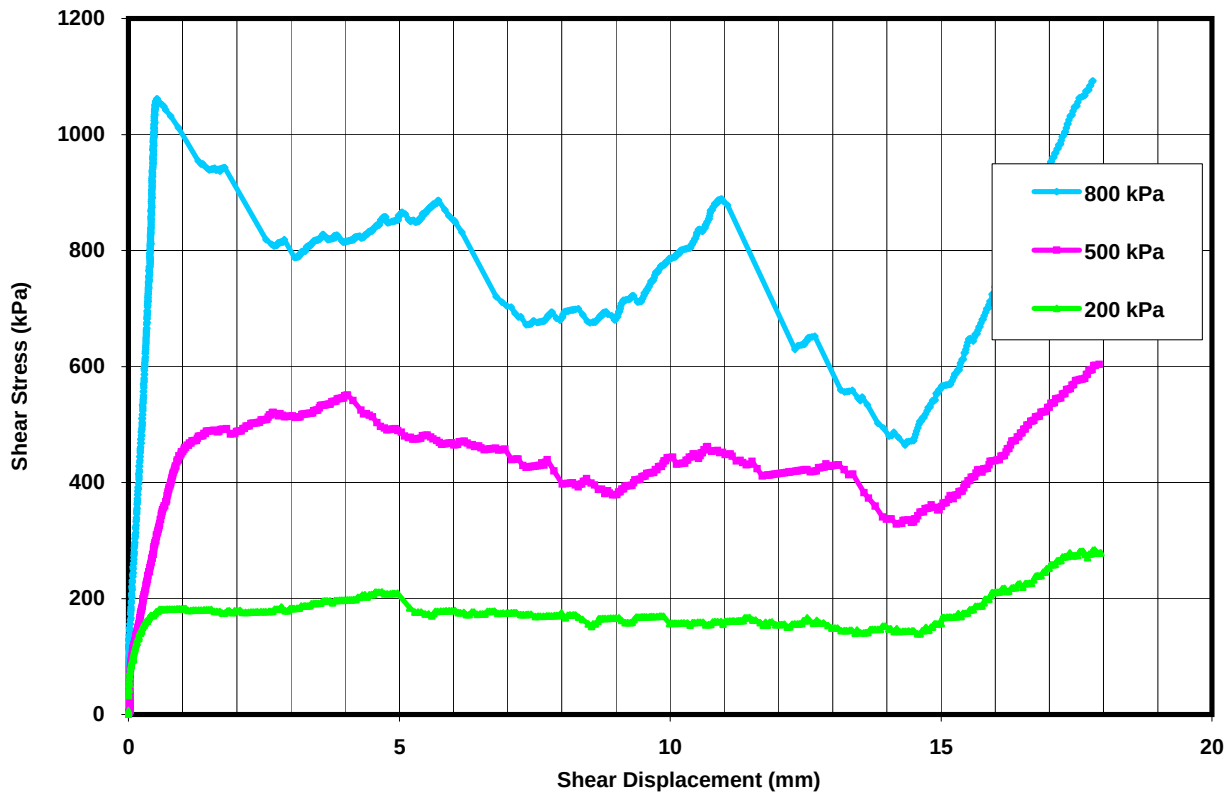
After

PROJECT		MEADOWBANK MINING CORPORATION			
TITLE		DIRECT SHEAR TESTING TP99-354 AT 46.88m			
	PROJECT No.	06-1413-089		FILE No.	Testing
	DESIGN	JFG	22MAR07	SCALE	NTS
	CADD	AS	22MAR07	REV.	
	CHECK			FIGURE II-23	
REVIEW					

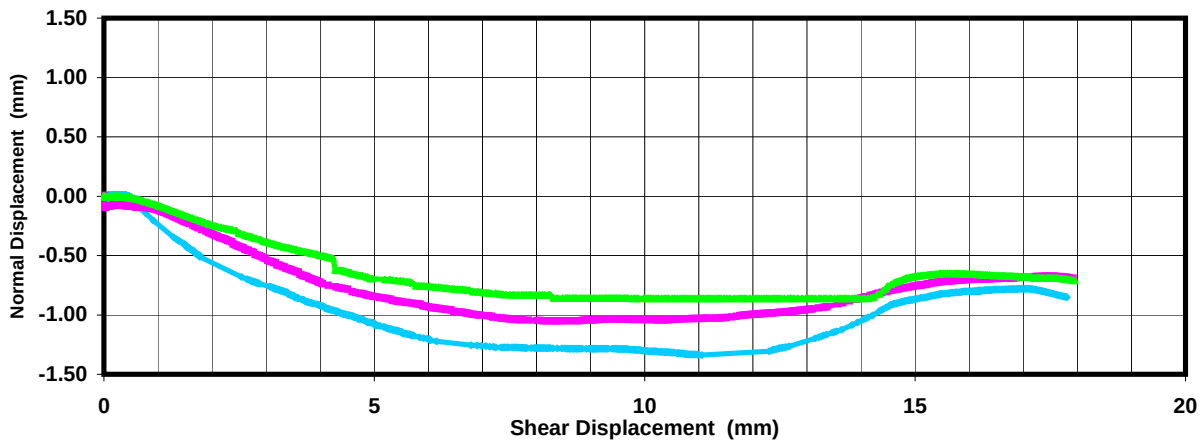
Laboratory Determination of Direct Shear Strength
ISRM 1981 (135-137)

Borehole :	NP96-139	Sch #	7	Project # :	06-1413-089/5000
Sample :	17	Tested By:	LP	Client :	CUMBERLAND
Depth (m)	85.60			Project :	MEADOWBANK SHEAR TESTING
				Location :	BURNABY LAB

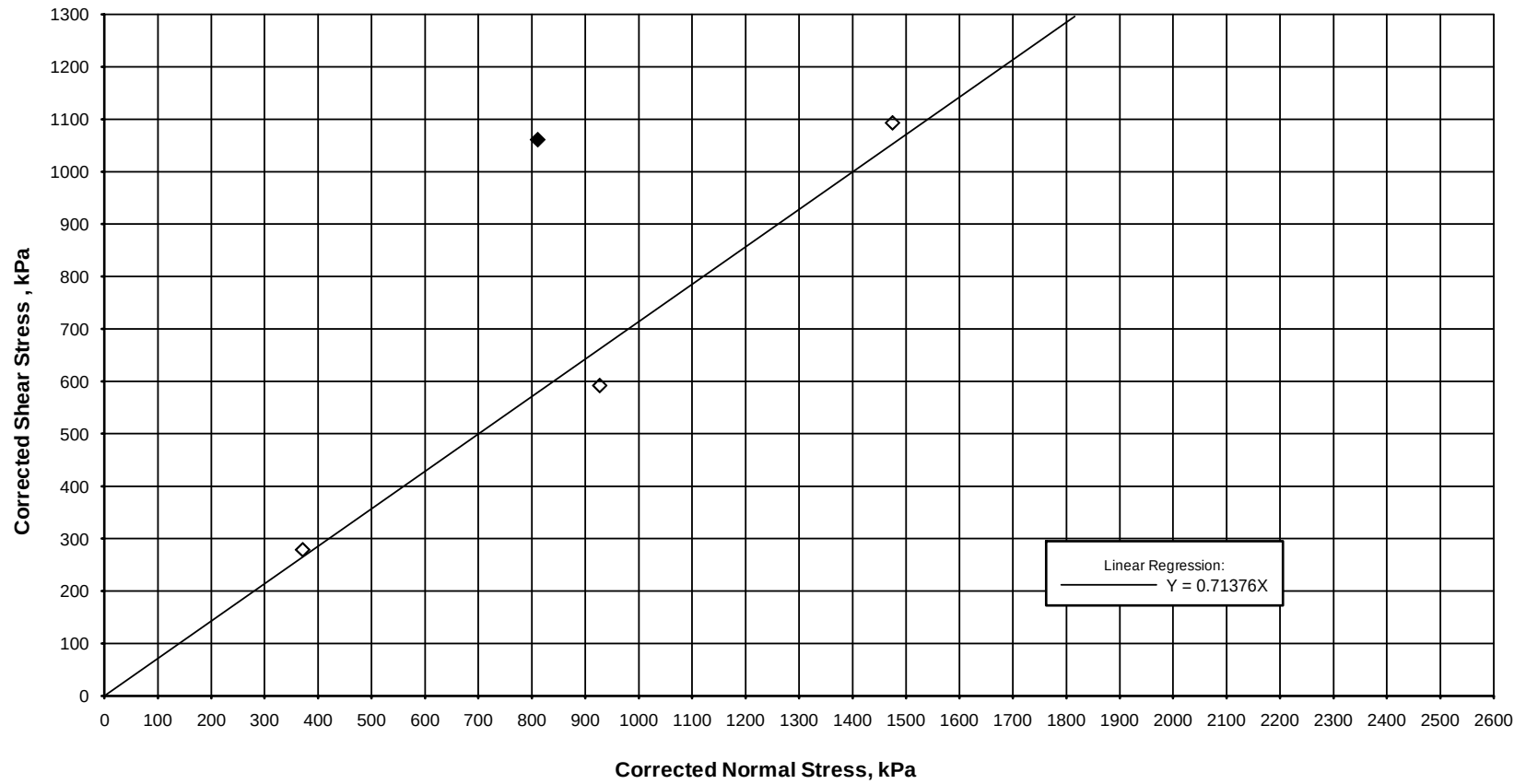
Shear Displacement vs. Shear Stress



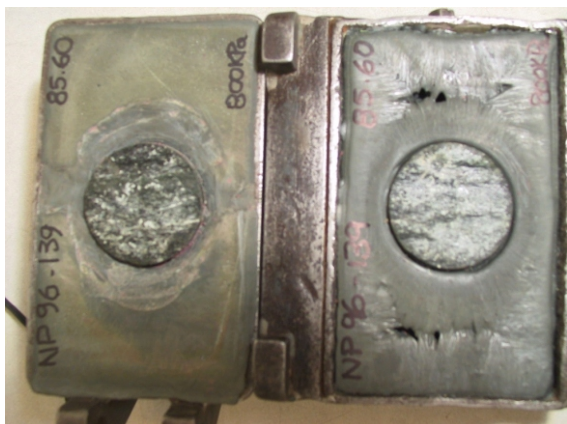
Shear Displacement vs. Normal Displacement



Laboratory Determination of Direct Shear Strength
ISRM 1981 (pp. 135-137)



Project #	06-1413-089/5000	Joint Type :	OPEN			Peak Stress		Residual Stress		
DH :	NP96-139	Joint Angle :	10	deg		σ_n	τ	σ_n	τ	
Sample :	17	(from core axis)			Stage	(kPa)	(kPa)	(kPa)	(kPa)	Remarks :
Depth (m)	85.60				1	811	1061	1475	1093	Open
Sch#	7	Test Conditions :			2			927	592	Open
					3			371	279	Open
					4					



Before

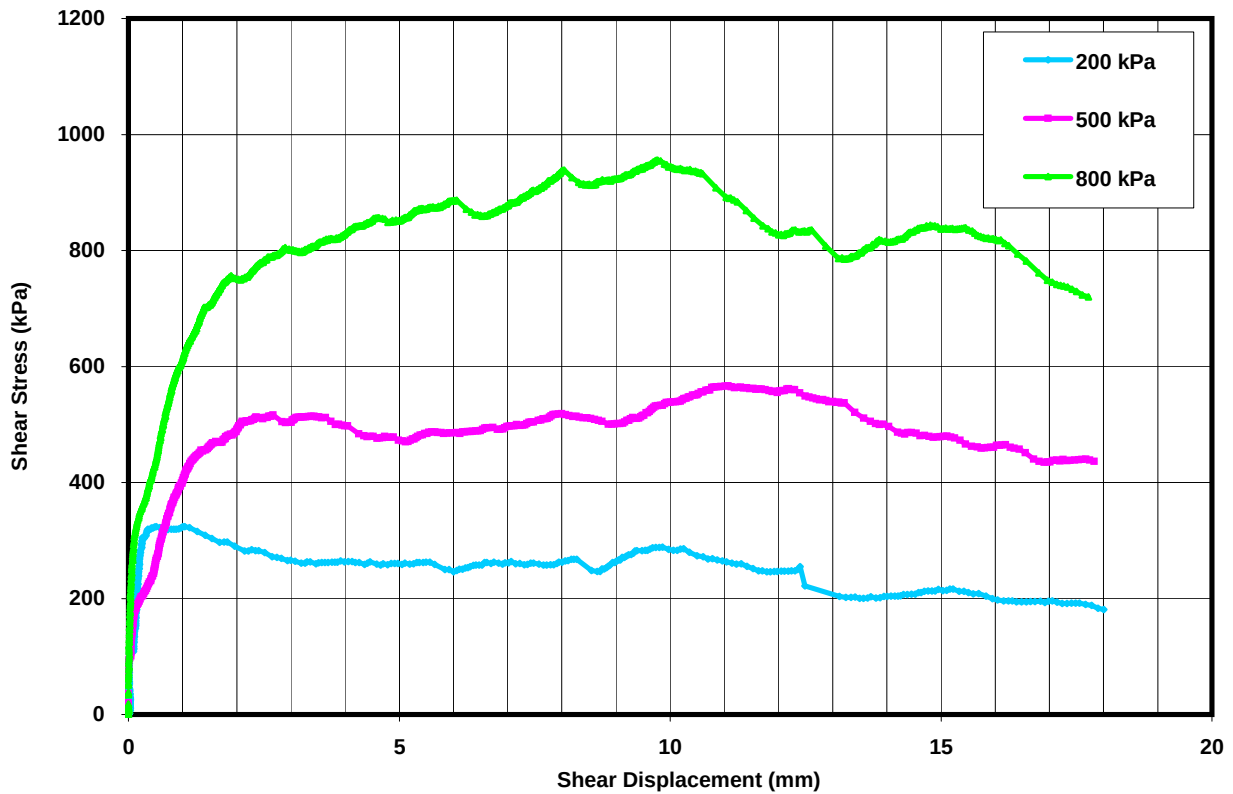
After

PROJECT		MEADOWBANK MINING CORPORATION			
TITLE		DIRECT SHEAR TESTING NP96-139 AT 85.60m			
		PROJECT No. 06-1413-089		FILE No. Testing	
		DESIGN	JFG	22MAR07	SCALE
		CADD	AS	22MAR07	REV.
		CHECK			
					FIGURE II-24

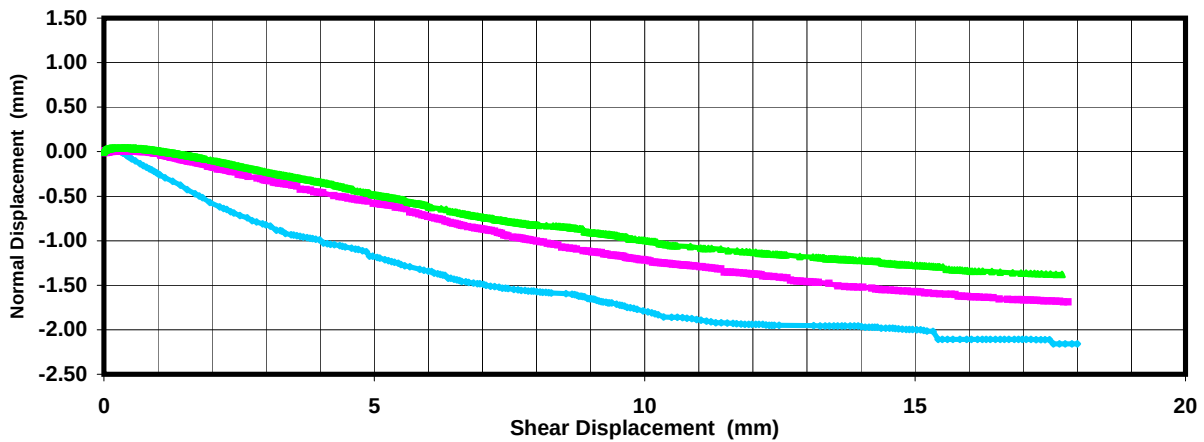
Laboratory Determination of Direct Shear Strength
ISRM 1981 (135-137)

Borehole :	G04-502	Sch #	7	Project # :	06-1413-089/5000
Sample :	8	Tested By:	LP	Client :	CUMBERLAND
Depth (m)	12.69			Project :	MEADOWBANK SHEAR TESTING
				Location :	BURNABY LAB

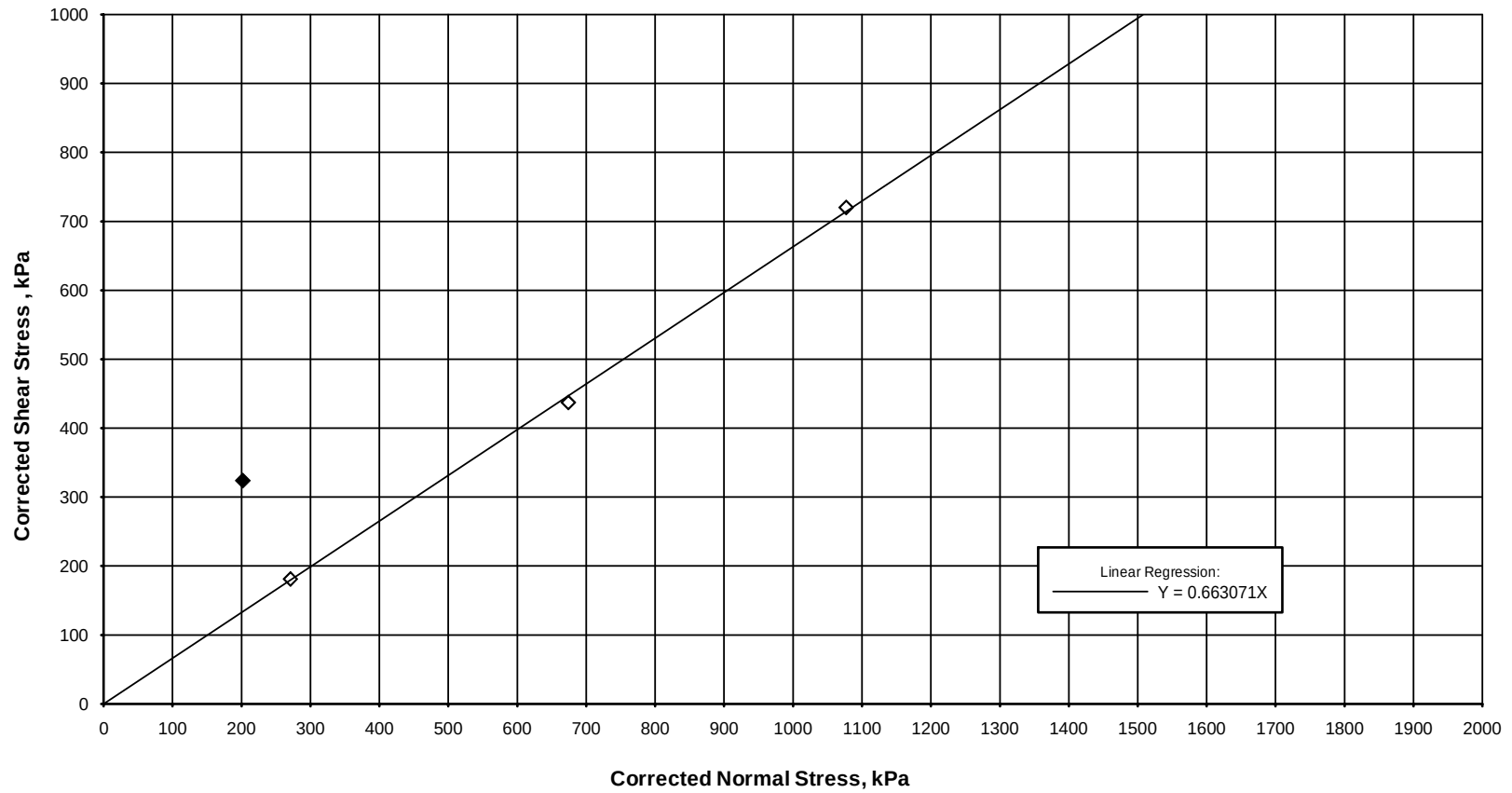
Shear Displacement vs. Shear Stress



Shear Displacement vs. Normal Displacement



Laboratory Determination of Direct Shear Strength
ISRM 1981 (pp. 135-137)



Project #	06-1413-089/5000	Joint Type :	OPEN			Peak Stress		Residual Stress		
DH :	G04-502	Joint Angle :	57	deg		σ_n	τ	σ_n	τ	
Sample :	8	(from core axis)			Stage	(kPa)	(kPa)	(kPa)	(kPa)	Remarks :
Depth (m)	12.69				1	202	324	271	181	Open
Sch#	7	Test Conditions :			2			674	437	Open
					3			1077	720	Open
					4					



Before



After

PROJECT		MEADOWBANK MINING CORPORATION					
TITLE		DIRECT SHEAR TESTING G04-502 AT 12.67m					
	PROJECT No.		06-1413-089		FILE No.	Testing	
	DESIGN	JFG	22MAR07		SCALE	NTS	REV.
	CADD	AS	22MAR07				
	CHECK				FIGURE II-25		
	REVIEW						

SOILS LABORATORY TESTING

TILL SPECIFIC GRAVITY

SPECIFIC GRAVITY OF SOLIDS

Project No. :	06-1413-089	Client :	Meadowbank Mining Corporation	Borehole :	Trench Area Till
Sch No.	277	Project :	Dike Design	Sample Number :	1
Lab Work:	SK	Location:	Meadowbank Gold Project	Depth :	
Test ID:	Test 1			Date :	Nov 22 2006

Specific Gravity of Fine Fraction (ASTM D 854-02)

Percentage Passing #4 Sieve		55.5	
Test Number		1	2
Flask Number		1	2
Air Removal Method		Vacuum	Vacuum
Mass of Flask (g)	M_p	179.44	172.65
Mass of Flask + Dry Soil (g)		279.90	273.09
Mass of Dry Soil (g)		100.46	100.44
Mass of Flask + Soil + Water (g)	$M_{pws,t}$	739.30	732.84
Test Temperature (g)	T_t	28.6	29.5
Mass of Flask + Water (g)	$M_{pw,t}$	677.05	670.01
Number of Evaporating Dish		1	2
Mass of Dish + Dry Soil (g)		117.45	117.53
Mass of Dish (g)		16.99	17.09
Mass of Oven Dry Soil (g)	M_s	100.46	100.44
Temperature Coefficient	K	0.9979	0.9976
Density of Solids (g/cm ³)	ρ_s	2.63	2.67
Specific Gravity at Test Temperature	G_t	2.64	2.68
Specific Gravity at 20°C	$G_{20^\circ C}$	2.6	2.7
AVERAGE SPECIFIC GRAVITY		2.7	

Specific Gravity of Coarse Fraction (ASTM C 127-88)

Percentage Retained on #4 Sieve		44.5
Mass of Sample in Water (g)	A	430.6
Mass of Sample @ SSD (g)	B	690.7
Mass of Oven Dried Sample (g)	C	686.5
Bulk G (Oven Dry)	C/(B-A)	2.64
Bulk G (SSD)	B/(B-A)	2.66
Apparent	C/(C-A)	2.68
Absorbion (%)	(B-C)/C	0.01

Specific Gravity of Total Sample

COMBINED SPECIFIC GRAVITY	$G_{avg@20^\circ C}$	2.67
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Remarks: _____

Method used: Method A Procedure for Moist Specimens _____

Sample Description: _____

SPECIFIC GRAVITY OF SOLIDS

Project No. :	06-1413-089	Client :	Meadowbank Mining Corporation	Borehole :	Trench Area Till
Sch No.	277	Project :	Dike Design	Sample Number :	2
Lab Work:	SK	Location:	Meadowbank Gold Project	Depth :	
Test ID:	Test 1			Date :	

Specific Gravity of Fine Fraction (ASTM D 854-02)

Percentage Passing #4 Sieve		64.7	
Test Number		1	2
Flask Number		1	2
Air Removal Method		Vacuum	Vacuum
Mass of Flask (g)	M_p	179.44	172.65
Mass of Flask + Dry Soil (g)		280.18	278.84
Mass of Dry Soil (g)		100.74	106.19
Mass of Flask + Soil + Water (g)	$M_{pws,t}$	740.60	737.22
Test Temperature (g)	T_t	23.3	23.6
Mass of Flask + Water (g)	$M_{pw,t}$	677.72	670.70
Number of Evaporating Dish		1	2
Mass of Dish + Dry Soil (g)		117.54	123.05
Mass of Dish (g)		16.80	16.86
Mass of Oven Dry Soil (g)	M_s	100.74	106.19
Temperature Coefficient	K	0.9993	0.9992
Density of Solids (g/cm ³)	ρ_s	2.66	2.68
Specific Gravity at Test Temperature	G_t	2.67	2.68
Specific Gravity at 20°C	$G_{20^\circ C}$	2.7	2.7
AVERAGE SPECIFIC GRAVITY		2.7	

Specific Gravity of Coarse Fraction (ASTM C 127-88)

Percentage Retained on #4 Sieve		35.3
Mass of Sample in Water (g)	A	523.3
Mass of Sample @ SSD (g)	B	821.8
Mass of Oven Dried Sample (g)	C	816.1
Bulk G (Oven Dry)	C/(B-A)	2.73
Bulk G (SSD)	B/(B-A)	2.75
Apparent	C/(C-A)	2.79
Absorbion (%)	(B-C)/C	0.01

Specific Gravity of Total Sample

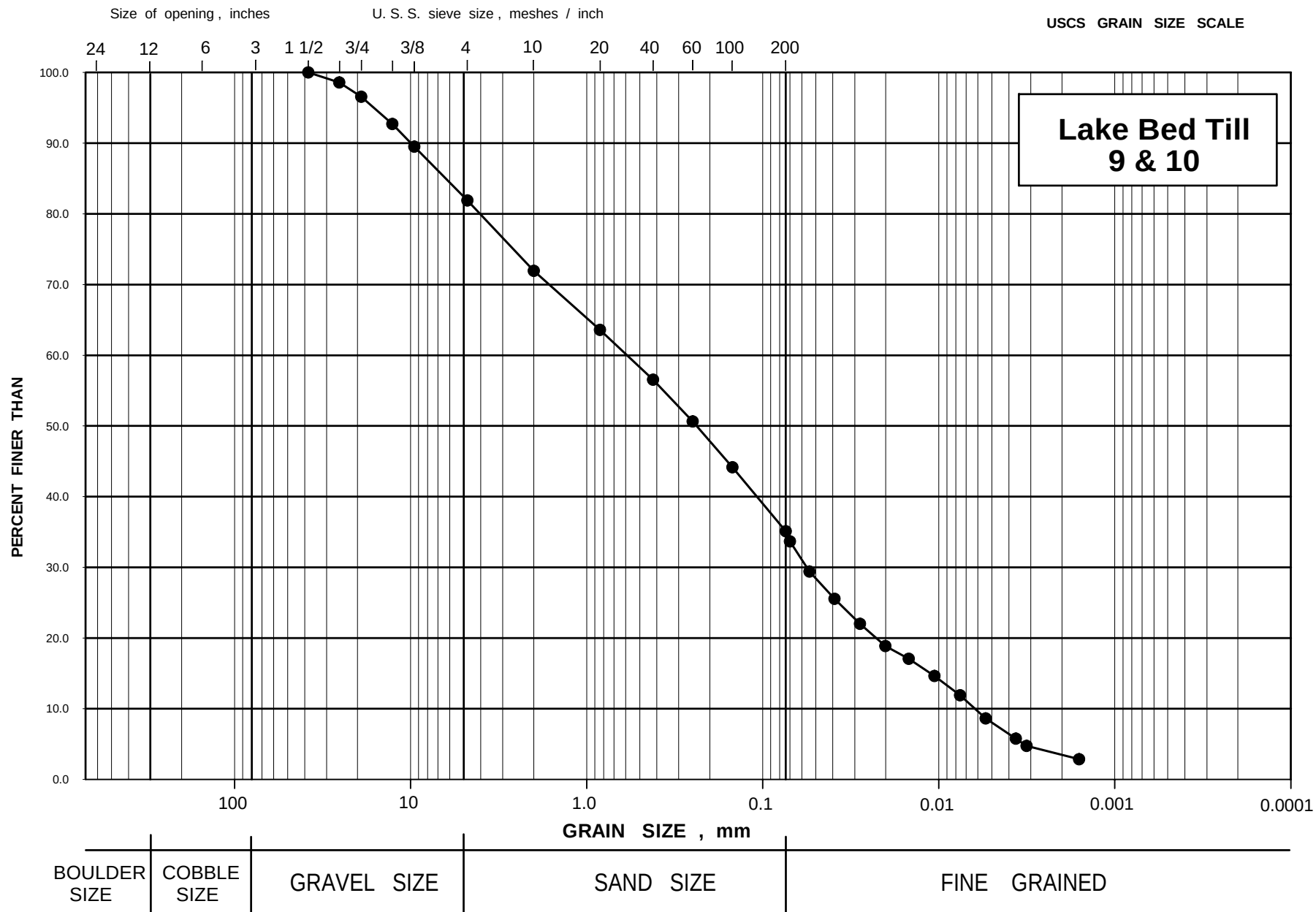
COMBINED SPECIFIC GRAVITY	$G_{avg@20^\circ C}$	2.71
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Remarks: _____

Method used: Method A Procedure for Moist Specimens _____

Sample Description: _____

TILL GRADATION AND HYDROMETER



Project No. 06-1413-089
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GRAIN SIZE DISTRIBUTION
 Meadowbank Mining Corporation
 Meadowbank Gold Project

Figure II-26

PARTICLE SIZE ANALYSIS OF SOILS ASTM D 422-63

Project No. :	06-1413-089	Client :	Meadowbank Mining Corporation	BH :	Lake Bed Till
Sch#	277	Project :	Dike Design	Sample :	9 & 10
Lab Work:	TM	Location:	Meadowbank Gold Project		

First Sieving	Hydrometer: (Minus #10)	Residual No. 200 (g) =	0.3
Total Weight (g) = 13210.9	Before Wash (g) = 50.0	Total minus 200 (g) =	24.4
	After Wash (g) = 25.9	Gs (assumed) =	2.70

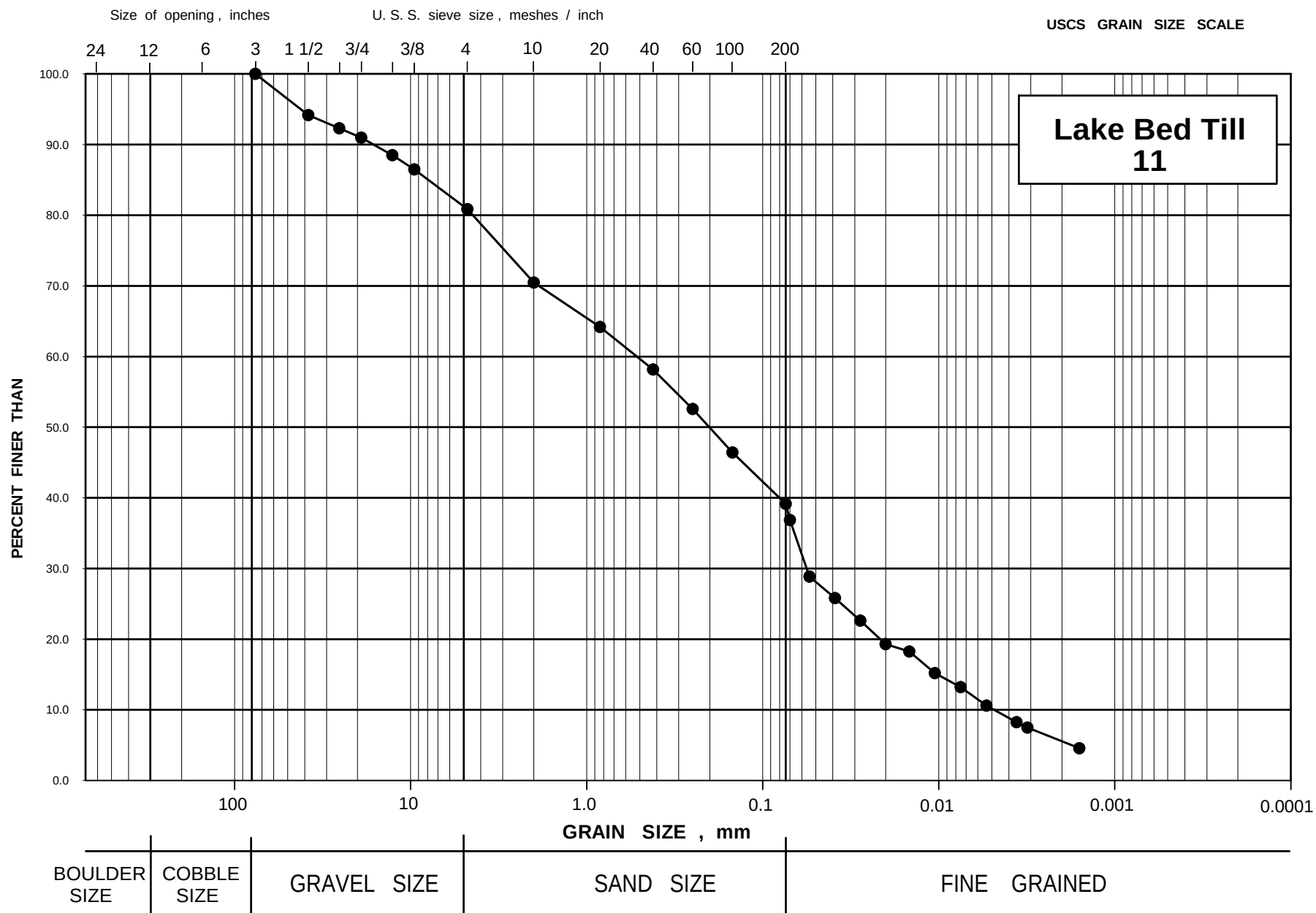
Size (USS)	Weight Retained (g)	Retained (%)	Weight Retained (g)	Retained (%)	% Retained Total	Diameter (mm)	% Passing
							100.0
6"	0.0					152.4	100.0
3"	0.0					76.2	100.0
1 1/2"	0.0					38.1	100.0
1"	185.5	1.4			1.4	25.4	98.6
3/4"	268.2	2.0			2.0	19.1	96.6
1/2"	509.4	3.9			3.9	12.7	92.7
3/8"	423.2	3.2			3.2	9.52	89.5
#4	1005.7	7.6			7.6	4.76	81.9
#10	1316.3	10.0			10.0	2.00	71.9
#20			5.8	11.6	8.3	0.840	63.6
#40			4.9	9.8	7.0	0.420	56.5
#60			4.1	8.2	5.9	0.250	50.6
#100			4.5	9.0	6.5	0.149	44.2
#200			6.3	12.6	9.1	0.074	35.1
Pan			24.4	48.8	35.1		

HYDROMETER ANALYSIS

Hydrometer No.: 87024 Dispersion Method: Stirring Dispersion Period (min):

Comments:

Time (min)	Hydrometer Reading	Temperature (°C)		Composite Correction	Corrected Reading	Diameter (mm)	Percentage Passing
0.5	27.0	19.0		-3.33	23.7	0.0700	33.7
1	24.0	19.0		-3.33	20.7	0.0543	29.4
2	21.3	19.0		-3.33	18.0	0.0391	25.6
4	18.8	19.0		-3.33	15.5	0.0281	22.0
8	16.6	19.0		-3.33	13.3	0.0201	18.9
15	15.0	20.0		-3.00	12.0	0.0148	17.1
30	13.3	20.0		-3.00	10.3	0.0106	14.7
60	11.2	20.5		-2.83	8.4	0.0076	11.9
120	8.9	20.5		-2.83	6.1	0.0054	8.6
270	6.9	20.5		-2.83	4.1	0.0037	5.8
360	6.0	21.0		-2.67	3.3	0.0032	4.7
1440	6.0	17.0		-3.99	2.0	0.0016	2.9



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GRAIN SIZE DISTRIBUTION
 Meadowbank Mining Corporation
 Meadowbank Gold Project

Figure

II-27

PARTICLE SIZE ANALYSIS OF SOILS ASTM D 422-63

Project No. :	06-1413-089	Client :	Meadowbank Mining Corporation	BH :	Lake Bed Till
Sch#	277	Project :	Dike Design	Sample :	11
Lab Work:	TM	Location:	Meadowbank Gold Project		

First Sieving	Hydrometer: (Minus #10)	Residual No. 200 (g) =	0.7
Total Weight (g) = 15616.4	Before Wash (g) = 50.4	Total minus 200 (g) =	28.0
	After Wash (g) = 23.1	Gs (assumed) =	2.70

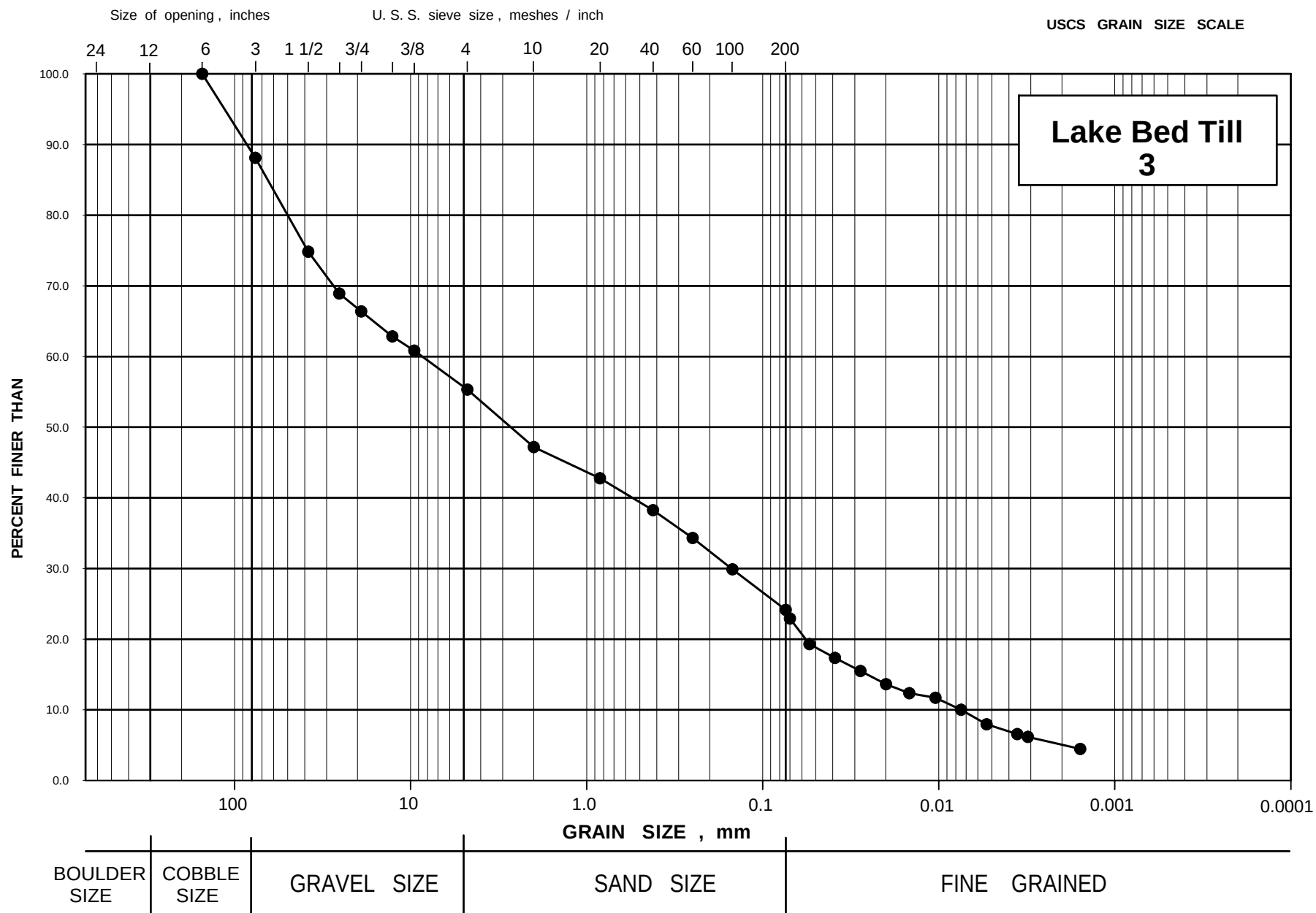
Size (USS)	Weight Retained (g)	Retained (%)	Weight Retained (g)	Retained (%)	% Retained Total	Diameter (mm)	% Passing
							100.0
6"	0.0					152.4	100.0
3"	0.0					76.2	100.0
1 1/2"	911.4	5.8			5.8	38.1	94.2
1"	291.6	1.9			1.9	25.4	92.3
3/4"	206.9	1.3			1.3	19.1	91.0
1/2"	388.5	2.5			2.5	12.7	88.5
3/8"	312.9	2.0			2.0	9.52	86.5
#4	879.9	5.6			5.6	4.76	80.8
#10	1620.2	10.4			10.4	2.00	70.5
#20			4.5	8.9	6.3	0.840	64.2
#40			4.3	8.5	6.0	0.420	58.2
#60			4.0	7.9	5.6	0.250	52.6
#100			4.4	8.7	6.2	0.149	46.4
#200			5.2	10.3	7.3	0.074	39.2
Pan			28.0	55.6	39.2		

HYDROMETER ANALYSIS

Hydrometer No.: 87024 Dispersion Method: Stirring Dispersion Period (min):

Comments:

Time (min)	Hydrometer Reading	Temperature (°C)		Composite Correction	Corrected Reading	Diameter (mm)	Percentage Passing
0.5	30.0	19.0		-3.33	26.7	0.0700	36.9
1	24.2	19.0		-3.33	20.9	0.0542	28.9
2	22.0	19.0		-3.33	18.7	0.0389	25.8
4	19.7	19.0		-3.33	16.4	0.0279	22.6
8	17.3	19.0		-3.33	14.0	0.0200	19.3
15	16.2	20.0		-3.00	13.2	0.0147	18.3
30	14.0	20.0		-3.00	11.0	0.0105	15.2
60	12.4	20.5		-2.83	9.6	0.0075	13.2
120	10.5	20.5		-2.83	7.7	0.0054	10.6
270	8.8	20.5		-2.83	6.0	0.0036	8.2
360	8.1	21.0		-2.67	5.4	0.0031	7.5
1440	7.3	17.0		-3.99	3.3	0.0016	4.6



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GRAIN SIZE DISTRIBUTION
 Meadowbank Mining Corporation
 Meadowbank Gold Project

Figure II-28

PARTICLE SIZE ANALYSIS OF SOILS ASTM D 422-63

Project No. :	06-1413-089	Client :	Meadowbank Mining Corporation	BH :	Lake Bed Till
Sch#	277	Project :	Dike Design	Sample :	3
Lab Work:	TM	Location:	Meadowbank Gold Project		

First Sieving	Hydrometer: (Minus #10)	Residual No. 200 (g) =	0.4
Total Weight (g) = 11381.4	Before Wash (g) = 50.2	Total minus 200 (g) =	25.7
	After Wash (g) = 24.9	Gs (assumed) =	2.70

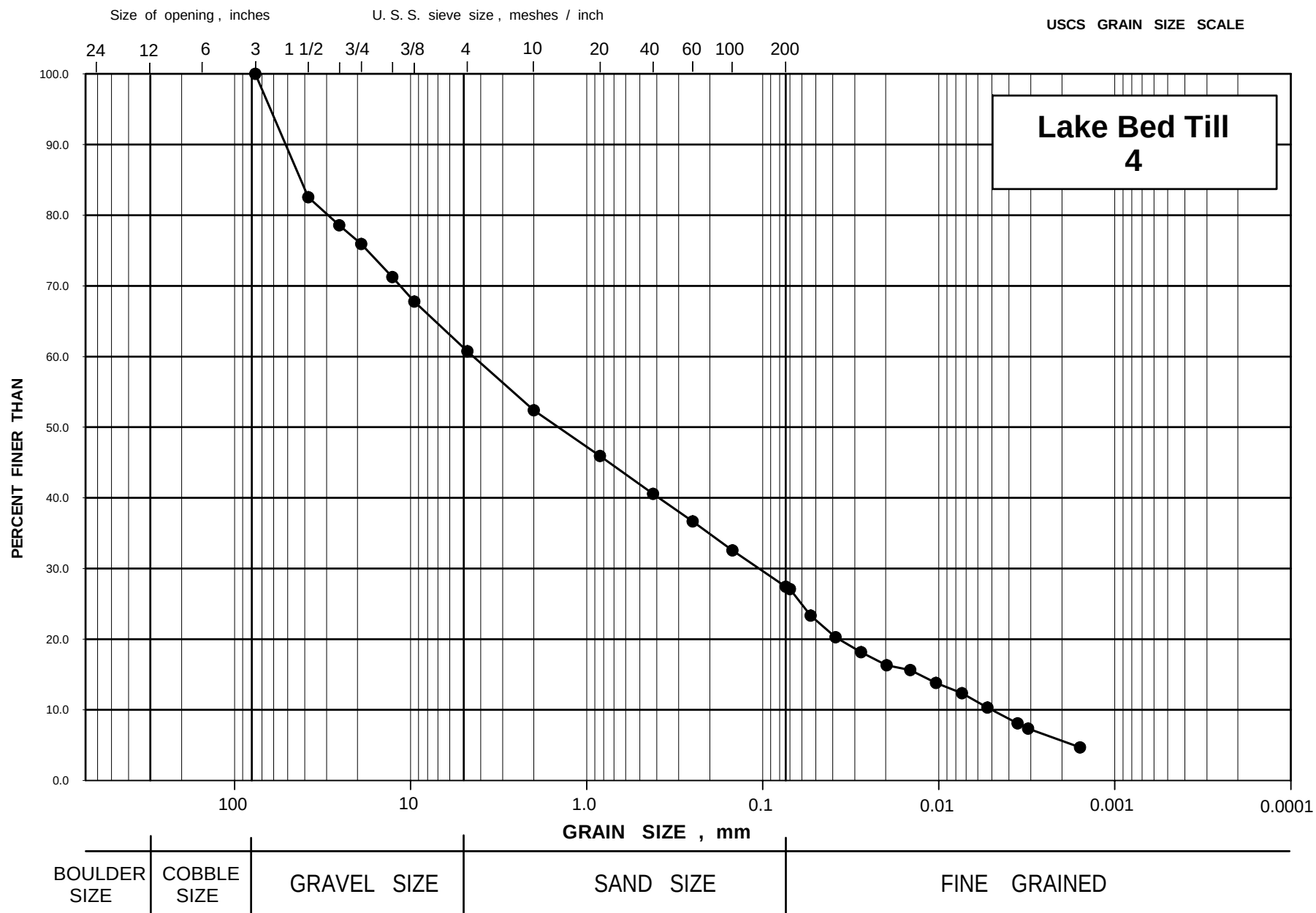
Size (USS)	Weight Retained (g)	Retained (%)	Weight Retained (g)	Retained (%)	% Retained Total	Diameter (mm)	% Passing
							100.0
6"	0.0					152.4	100.0
3"	1354.0	11.9			11.9	76.2	88.1
1 1/2"	1510.3	13.3			13.3	38.1	74.8
1"	672.1	5.9			5.9	25.4	68.9
3/4"	288.8	2.5			2.5	19.1	66.4
1/2"	401.9	3.5			3.5	12.7	62.9
3/8"	230.4	2.0			2.0	9.52	60.8
#4	627.4	5.5			5.5	4.76	55.3
#10	926.4	8.1			8.1	2.00	47.2
#20			4.7	9.4	4.4	0.840	42.8
#40			4.8	9.6	4.5	0.420	38.3
#60			4.2	8.4	3.9	0.250	34.3
#100			4.7	9.4	4.4	0.149	29.9
#200			6.1	12.2	5.7	0.074	24.2
Pan			25.7	51.2	24.2		

HYDROMETER ANALYSIS

Hydrometer No.: 87024 Dispersion Method: Stirring Dispersion Period (min):

Comments:

Time (min)	Hydrometer Reading	Temperature (°C)		Composite Correction	Corrected Reading	Diameter (mm)	Percentage Passing
0.5	28.0	19.0		-3.33	24.7	0.0700	22.9
1	24.1	19.0		-3.33	20.8	0.0543	19.3
2	22.0	19.0		-3.33	18.7	0.0389	17.4
4	20.0	19.0		-3.33	16.7	0.0279	15.5
8	18.0	19.0		-3.33	14.7	0.0200	13.6
15	16.3	20.0		-3.00	13.3	0.0147	12.4
30	15.6	20.0		-3.00	12.6	0.0104	11.7
60	13.6	20.5		-2.83	10.8	0.0075	10.0
120	11.4	20.5		-2.83	8.6	0.0053	8.0
270	9.9	20.5		-2.83	7.1	0.0036	6.6
360	9.3	21.0		-2.67	6.6	0.0031	6.2
1440	8.8	17.0		-3.99	4.8	0.0016	4.5



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GRAIN SIZE DISTRIBUTION
 Meadowbank Mining Corporation
 Meadowbank Gold Project

Figure II-29

PARTICLE SIZE ANALYSIS OF SOILS ASTM D 422-63

Project No. :	06-1413-089	Client :	Meadowbank Mining Corporation	BH :	Lake Bed Till
Sch#	277	Project :	Dike Design	Sample :	4
Lab Work:	TM	Location:	Meadowbank Gold Project		

First Sieving	Hydrometer: (Minus #10)	Residual No. 200 (g) =	0.0
Total Weight (g) = 10768.1	Before Wash (g) = 51.0	Total minus 200 (g) =	26.7
	After Wash (g) = 24.3	Gs (assumed) =	2.70

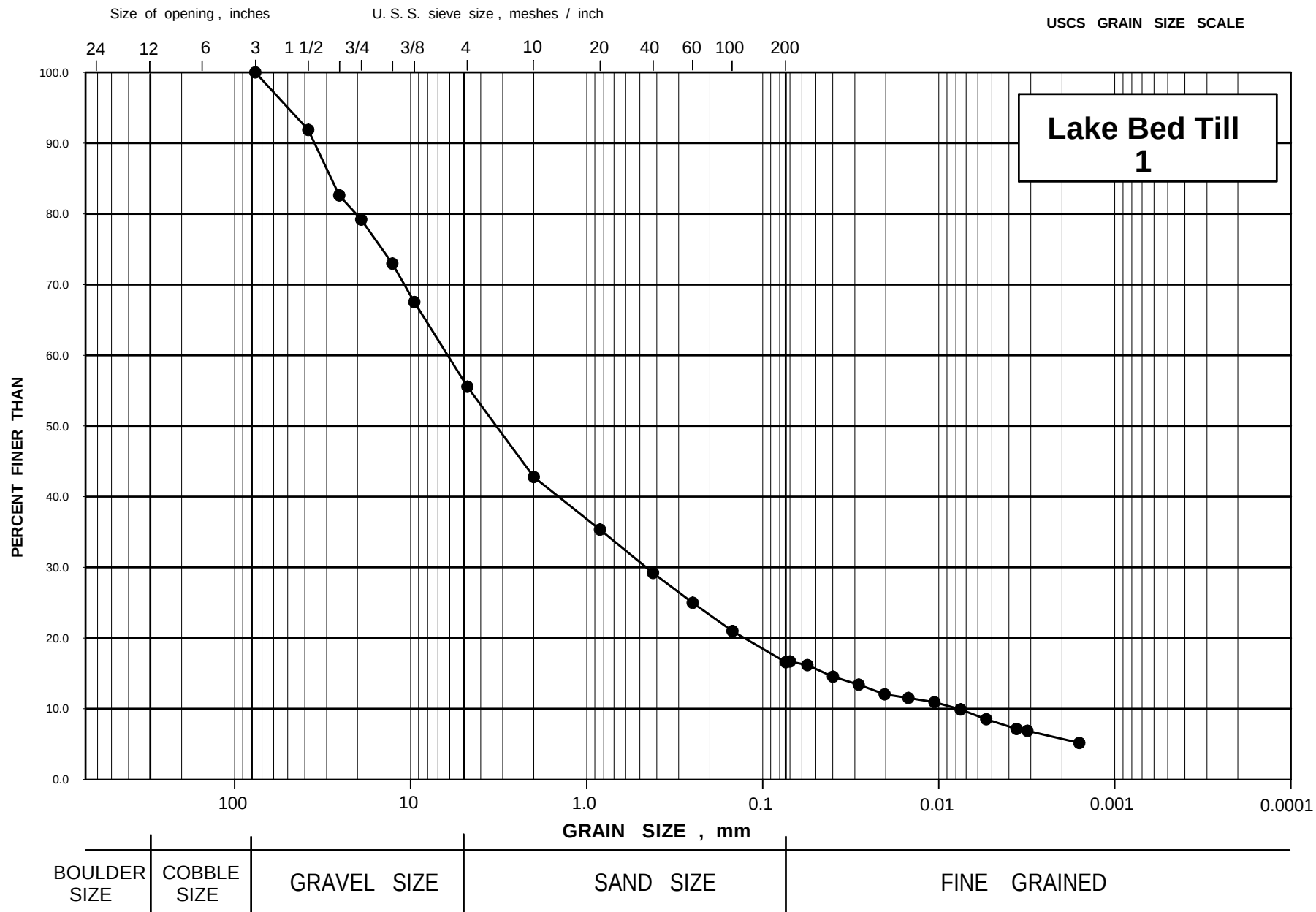
Size (USS)	Weight Retained (g)	Retained (%)	Weight Retained (g)	Retained (%)	% Retained Total	Diameter (mm)	% Passing
							100.0
6"	0.0					152.4	100.0
3"	0.0					76.2	100.0
1 1/2"	1881.5	17.5			17.5	38.1	82.5
1"	425.4	4.0			4.0	25.4	78.6
3/4"	284.2	2.6			2.6	19.1	75.9
1/2"	506.1	4.7			4.7	12.7	71.2
3/8"	372.7	3.5			3.5	9.52	67.8
#4	756.3	7.0			7.0	4.76	60.8
#10	901.1	8.4			8.4	2.00	52.4
#20			6.3	12.4	6.5	0.840	45.9
#40			5.2	10.2	5.3	0.420	40.6
#60			3.8	7.5	3.9	0.250	36.7
#100			4.0	7.8	4.1	0.149	32.6
#200			5.0	9.8	5.1	0.074	27.4
Pan			26.7	52.4	27.4		

HYDROMETER ANALYSIS

Hydrometer No.: 87024 Dispersion Method: Stirring Dispersion Period (min):

Comments:

Time (min)	Hydrometer Reading	Temperature (°C)		Composite Correction	Corrected Reading	Diameter (mm)	Percentage Passing
0.5	30.0	19.0		-3.33	26.7	0.0700	27.1
1	26.3	19.0		-3.33	23.0	0.0534	23.3
2	23.3	19.0		-3.33	20.0	0.0386	20.3
4	21.2	19.0		-3.33	17.9	0.0277	18.1
8	19.4	19.0		-3.33	16.1	0.0198	16.3
15	18.4	20.0		-3.00	15.4	0.0145	15.6
30	16.6	20.0		-3.00	13.6	0.0104	13.8
60	15.0	20.5		-2.83	12.2	0.0074	12.4
120	13.0	20.5		-2.83	10.2	0.0053	10.3
270	10.8	20.5		-2.83	8.0	0.0036	8.1
360	9.9	21.0		-2.67	7.2	0.0031	7.3
1440	8.6	17.0		-3.99	4.6	0.0016	4.7



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GRAIN SIZE DISTRIBUTION
 Meadowbank Mining Corporation
 Meadowbank Gold Project

Figure II-30

PARTICLE SIZE ANALYSIS OF SOILS ASTM D 422-63

Project No. :	06-1413-089	Client :	Meadowbank Mining Corporation	BH :	Lake Bed Till
Sch#	277	Project :	Dike Design	Sample :	1
Lab Work:	TM	Location:	Meadowbank Gold Project		

First Sieving	Hydrometer: (Minus #10)	Residual No. 200 (g) =	0.0
Total Weight (g) = 10410.8	Before Wash (g) = 49.5	Total minus 200 (g) =	19.2
	After Wash (g) = 30.3	Gs =	2.67

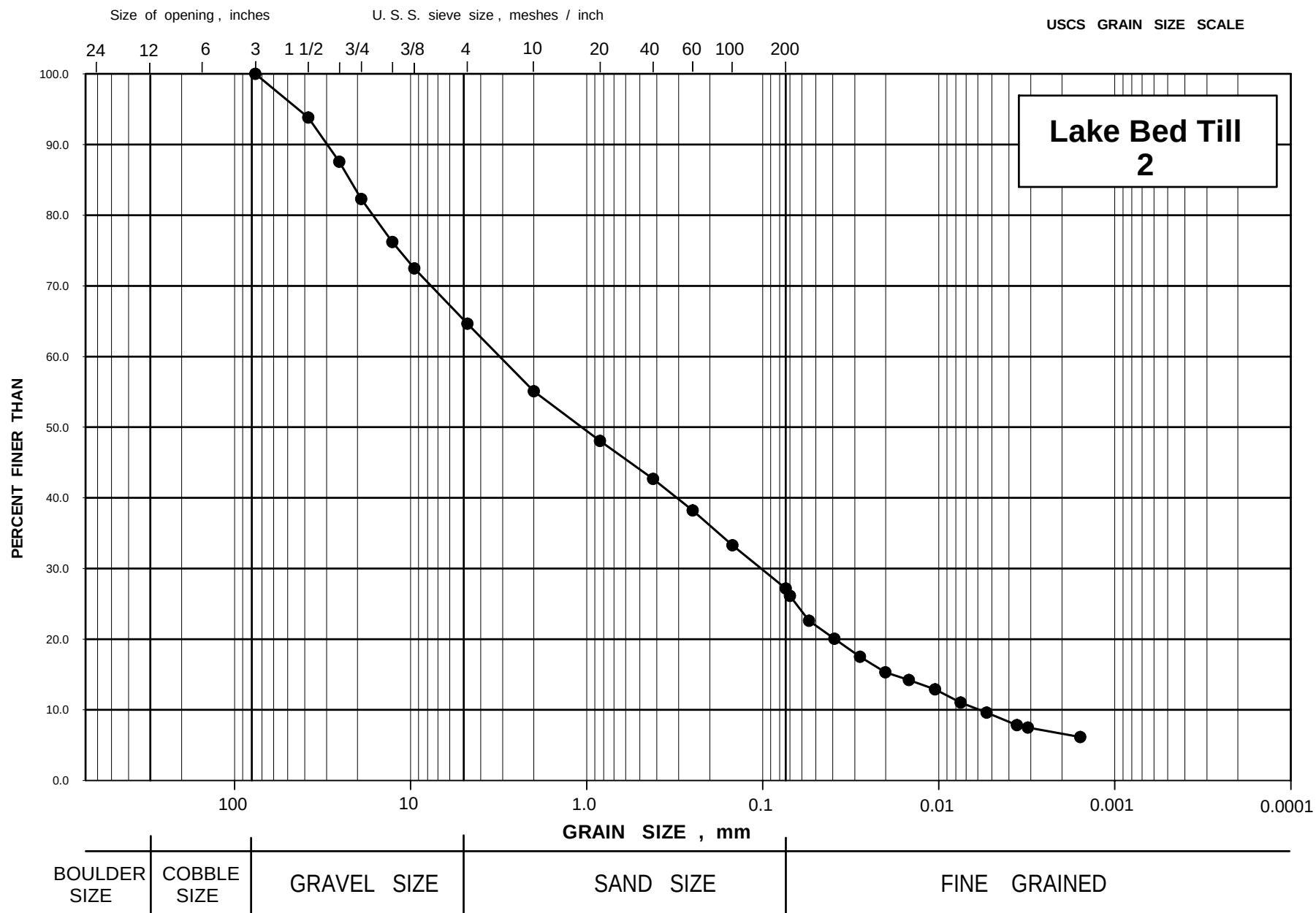
Size (USS)	Weight Retained (g)	Retained (%)	Weight Retained (g)	Retained (%)	% Retained Total	Diameter (mm)	% Passing
							100.0
6"	0.0					152.4	100.0
3"	0.0					76.2	100.0
1 1/2"	848.0	8.1			8.1	38.1	91.9
1"	962.2	9.2			9.2	25.4	82.6
3/4"	356.7	3.4			3.4	19.1	79.2
1/2"	646.9	6.2			6.2	12.7	73.0
3/8"	565.8	5.4			5.4	9.52	67.5
#4	1249.1	12.0			12.0	4.76	55.5
#10	1327.6	12.8			12.8	2.00	42.8
#20			8.6	17.4	7.4	0.840	35.4
#40			7.1	14.3	6.1	0.420	29.2
#60			4.9	9.9	4.2	0.250	25.0
#100			4.6	9.3	4.0	0.149	21.0
#200			5.1	10.3	4.4	0.074	16.6
Pan			19.2	38.8	16.6		

HYDROMETER ANALYSIS

Hydrometer No.: 8589 Dispersion Method: Stirring Dispersion Period (min):

Comments:

Time (min)	Hydrometer Reading	Temperature (°C)		Composite Correction	Corrected Reading	Diameter (mm)	Percentage Passing
0.5	21.7	19.0		-2.30	19.4	0.0700	16.7
1	21.1	19.0		-2.30	18.8	0.0558	16.2
2	19.2	19.0		-2.30	16.9	0.0400	14.5
4	17.9	19.0		-2.30	15.6	0.0285	13.4
8	16.3	19.0		-2.30	14.0	0.0203	12.0
15	15.5	20.0		-2.10	13.4	0.0149	11.5
30	14.8	20.0		-2.10	12.7	0.0106	10.9
60	13.5	20.5		-2.00	11.5	0.0075	9.9
120	11.9	20.5		-2.00	9.9	0.0054	8.5
270	10.3	20.5		-2.00	8.3	0.0036	7.1
360	9.9	21.0		-1.90	8.0	0.0031	6.9
1440	8.7	17.0		-2.71	6.0	0.0016	5.2



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GRAIN SIZE DISTRIBUTION
 Meadowbank Mining Corporation
 Meadowbank Gold Project

Figure II-31

PARTICLE SIZE ANALYSIS OF SOILS ASTM D 422-63

Project No. :	06-1413-089	Client :	Meadowbank Mining Corporation	BH :	Lake Bed Till
Sch#	277	Project :	Dike Design	Sample :	2
Lab Work:	TM	Location:	Meadowbank Gold Project		

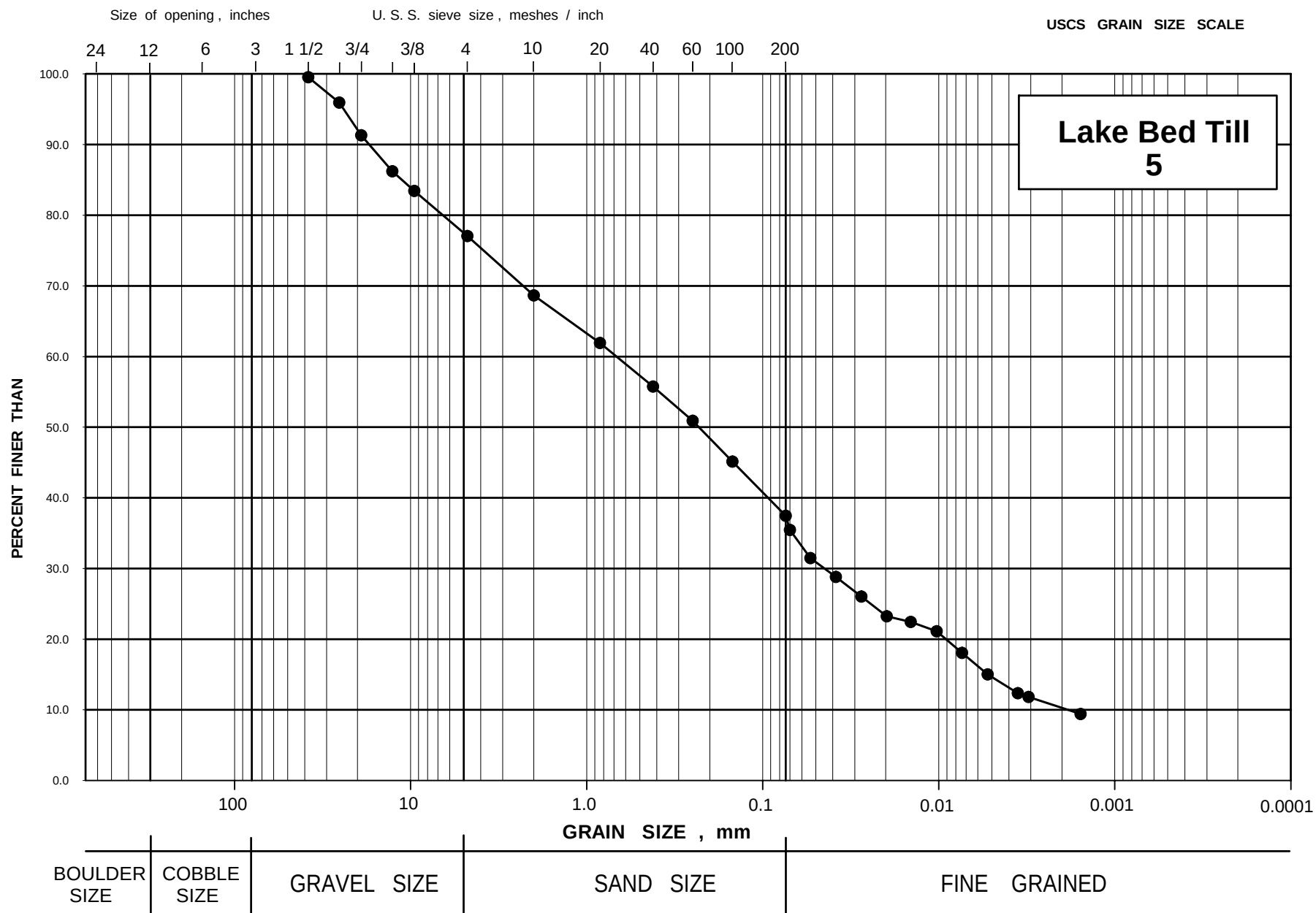
First Sieving	Hydrometer: (Minus #10)	Residual No. 200 (g) =	0.0
Total Weight (g) = 11026.2	Before Wash (g) = 49.3	Total minus 200 (g) =	24.3
	After Wash (g) = 25.0	Gs =	2.71

Size (USS)	Weight Retained (g)	Retained (%)	Weight Retained (g)	Retained (%)	% Retained Total	Diameter (mm)	% Passing
							100.0
6"	0.0					152.4	100.0
3"	0.0					76.2	100.0
1 1/2"	681.2	6.2			6.2	38.1	93.8
1"	688.3	6.2			6.2	25.4	87.6
3/4"	583.1	5.3			5.3	19.1	82.3
1/2"	671.8	6.1			6.1	12.7	76.2
3/8"	410.4	3.7			3.7	9.52	72.5
#4	861.7	7.8			7.8	4.76	64.7
#10	1054.4	9.6			9.6	2.00	55.1
#20			6.3	12.8	7.0	0.840	48.1
#40			4.8	9.7	5.4	0.420	42.7
#60			4.0	8.1	4.5	0.250	38.2
#100			4.4	8.9	4.9	0.149	33.3
#200			5.5	11.2	6.1	0.074	27.2
Pan			24.3	49.3	27.2		

HYDROMETER ANALYSIS

Hydrometer No.:	8589	Dispersion Method:	Stirring	Dispersion Period (min):	
Comments:					

Time (min)	Hydrometer Reading	Temperature (°C)		Composite Correction	Corrected Reading	Diameter (mm)	Percentage Passing
0.5	26.0	19.0		-2.30	23.7	0.0700	26.1
1	22.8	19.0		-2.30	20.5	0.0546	22.6
2	20.5	19.0		-2.30	18.2	0.0392	20.1
4	18.2	19.0		-2.30	15.9	0.0281	17.5
8	16.2	19.0		-2.30	13.9	0.0201	15.3
15	15.0	20.0		-2.10	12.9	0.0148	14.2
30	13.8	20.0		-2.10	11.7	0.0105	12.9
60	12.0	20.5		-2.00	10.0	0.0075	11.0
120	10.7	20.5		-2.00	8.7	0.0053	9.6
270	9.1	20.5		-2.00	7.1	0.0036	7.8
360	8.7	21.0		-1.90	6.8	0.0031	7.5
1440	8.3	17.0		-2.71	5.6	0.0016	6.2



Project No. 06-1413-089
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 Date 04/04/07



GRAIN SIZE DISTRIBUTION
 Meadowbank Mining Corporation
 Meadowbank Gold Project

Figure II-32

PARTICLE SIZE ANALYSIS OF SOILS ASTM D 422-63

Project No. :	06-1413-089	Client :	Meadowbank Mining Corporation	BH :	Lake Bed Till
Sch#	277	Project :	Dike Design	Sample :	5
Lab Work:	TM	Location:	Meadowbank Gold Project		

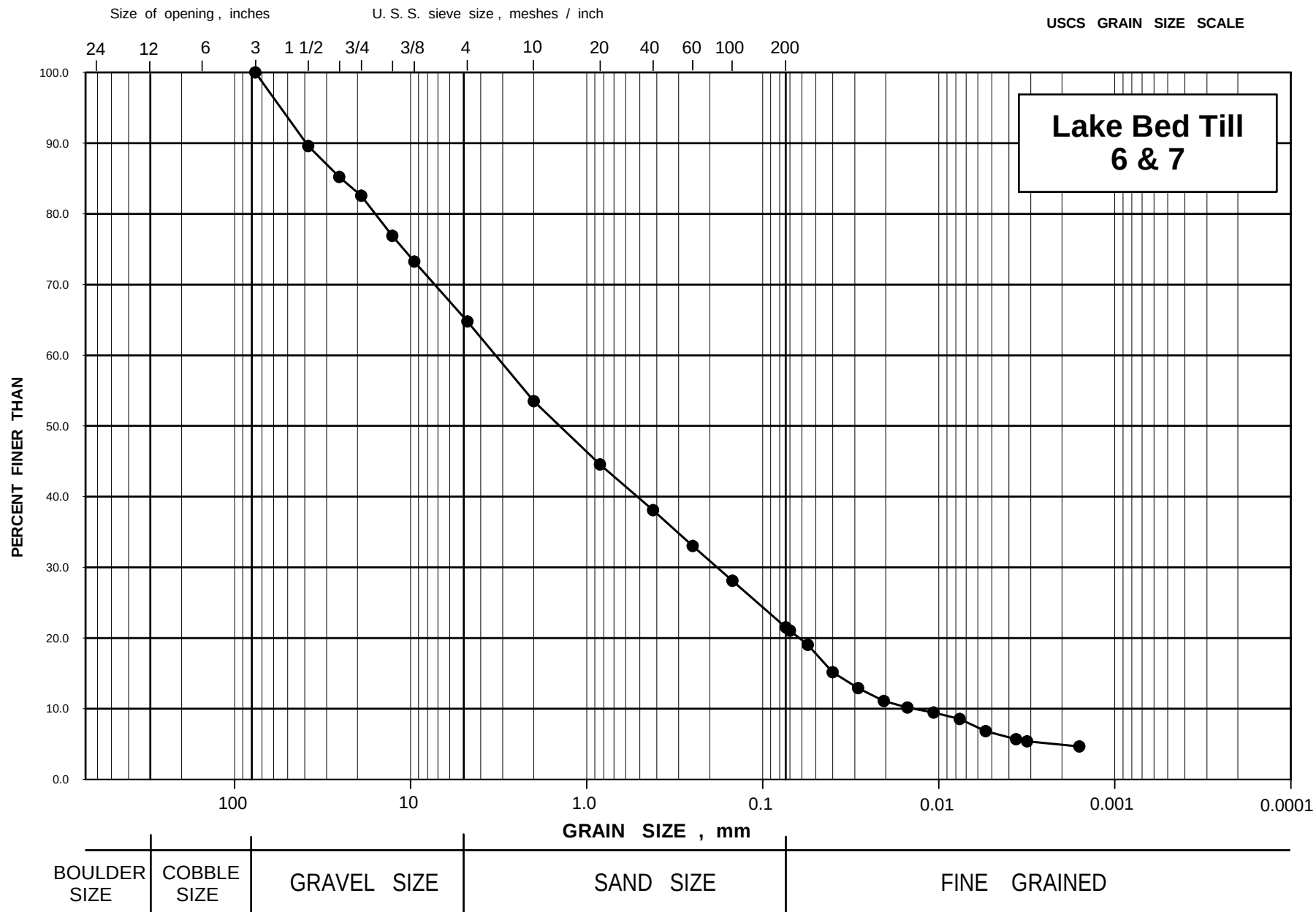
First Sieving	Hydrometer: (Minus #10)	Residual No. 200 (g) =	0.5
Total Weight (g) = 10816.6	Before Wash (g) = 51.1	Total minus 200 (g) =	27.9
	After Wash (g) = 23.7	Gs (assumed) =	2.70

Size (USS)	Weight Retained (g)	Retained (%)	Weight Retained (g)	Retained (%)	% Retained Total	Diameter (mm)	% Passing
							100.0
6"	0.0					152.4	100.0
3"	0.0					76.2	100.0
1 1/2"	51.6	0.5			0.5	38.1	99.5
1"	389.2	3.6			3.6	25.4	95.9
3/4"	499.5	4.6			4.6	19.1	91.3
1/2"	551.4	5.1			5.1	12.7	86.2
3/8"	300.4	2.8			2.8	9.52	83.4
#4	689.0	6.4			6.4	4.76	77.1
#10	911.2	8.4			8.4	2.00	68.6
#20			5.0	9.8	6.7	0.840	61.9
#40			4.6	9.0	6.2	0.420	55.7
#60			3.6	7.0	4.8	0.250	50.9
#100			4.3	8.4	5.8	0.149	45.1
#200			5.7	11.2	7.7	0.074	37.5
Pan			27.9	54.6	37.5		

HYDROMETER ANALYSIS

Hydrometer No.:	8589	Dispersion Method:	Stirring	Dispersion Period (min):	
Comments:					

Time (min)	Hydrometer Reading	Temperature (°C)		Composite Correction	Corrected Reading	Diameter (mm)	Percentage Passing
0.5	29.0	19.0		-2.30	26.7	0.0700	35.5
1	26.0	19.0		-2.30	23.7	0.0536	31.5
2	24.0	19.0		-2.30	21.7	0.0384	28.8
4	21.9	19.0		-2.30	19.6	0.0275	26.0
8	19.8	19.0		-2.30	17.5	0.0197	23.2
15	19.0	20.0		-2.10	16.9	0.0145	22.4
30	18.0	20.0		-2.10	15.9	0.0103	21.1
60	15.6	20.5		-2.00	13.6	0.0074	18.1
120	13.3	20.5		-2.00	11.3	0.0053	15.0
270	11.3	20.5		-2.00	9.3	0.0036	12.4
360	10.8	21.0		-1.90	8.9	0.0031	11.8
1440	9.8	17.0		-2.71	7.1	0.0016	9.4



Project No. 06-1413-089
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GRAIN SIZE DISTRIBUTION
Meadowbank Mining Corporation
Meadowbank Gold Project

Figure II-33

PARTICLE SIZE ANALYSIS OF SOILS ASTM D 422-63

Project No. :	06-1413-089	Client :	Meadowbank Mining Corporation	BH :	Lake Bed Till
Sch#	277	Project :	Dike Design	Sample :	6 & 7
Lab Work:	TM	Location:	Meadowbank Gold Project		

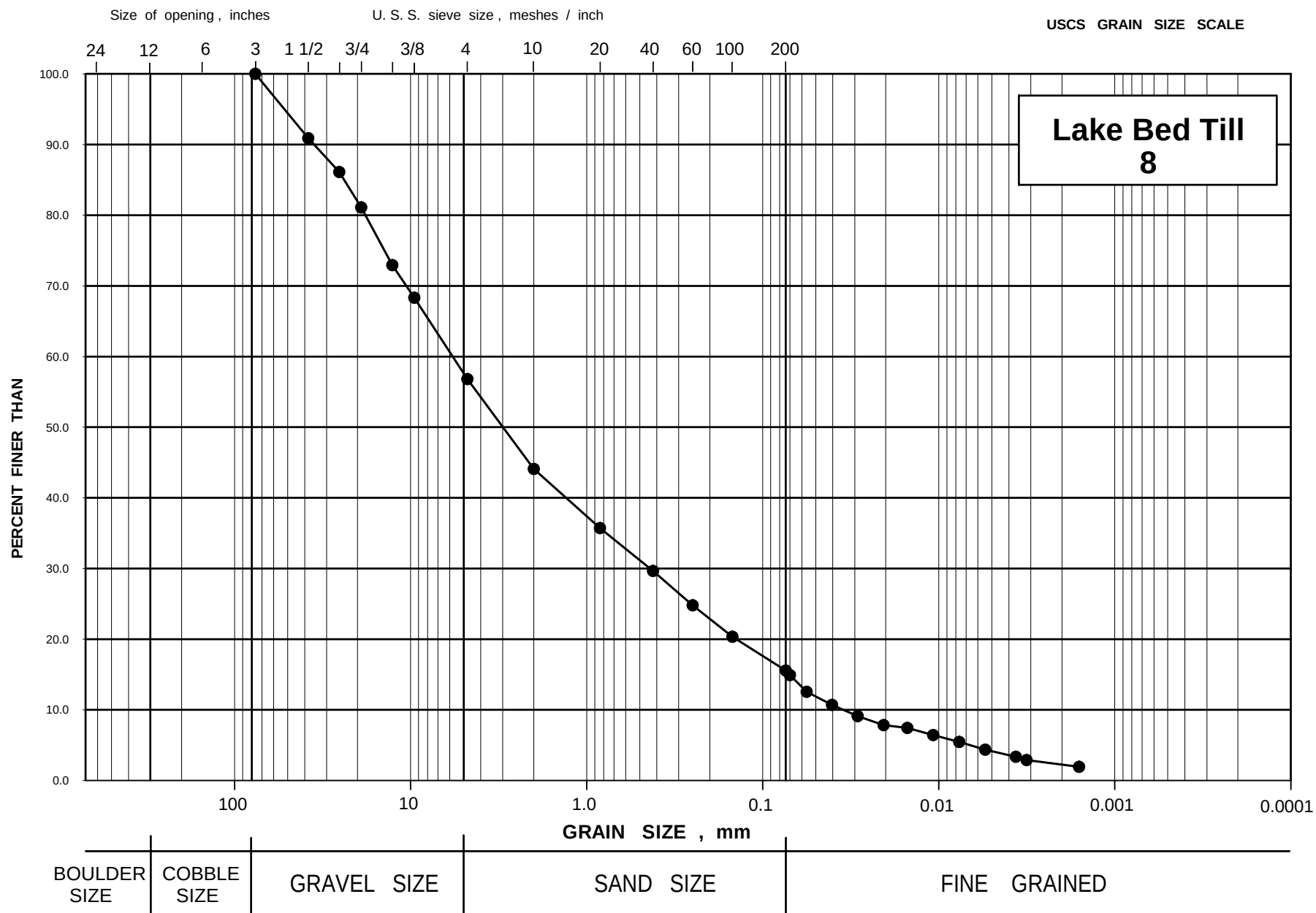
First Sieving	Hydrometer: (Minus #10)	Residual No. 200 (g) =	0.3
Total Weight (g) = 16491.9	Before Wash (g) = 52.0	Total minus 200 (g) =	20.9
	After Wash (g) = 31.4	Gs (assumed) =	2.70

Size (USS)	Weight Retained (g)	Retained (%)	Weight Retained (g)	Retained (%)	% Retained Total	Diameter (mm)	% Passing
							100.0
6"	0.0					152.4	100.0
3"	0.0					76.2	100.0
1 1/2"	1718.2	10.4			10.4	38.1	89.6
1"	721.2	4.4			4.4	25.4	85.2
3/4"	438.5	2.7			2.7	19.1	82.5
1/2"	934.6	5.7			5.7	12.7	76.9
3/8"	599.2	3.6			3.6	9.52	73.2
#4	1398.0	8.5			8.5	4.76	64.8
#10	1857.6	11.3			11.3	2.00	53.5
#20			8.7	16.7	9.0	0.840	44.6
#40			6.3	12.1	6.5	0.420	38.1
#60			4.9	9.4	5.0	0.250	33.0
#100			4.8	9.2	4.9	0.149	28.1
#200			6.4	12.3	6.6	0.074	21.5
Pan			20.9	40.2	21.5		

HYDROMETER ANALYSIS

Hydrometer No.:	8589	Dispersion Method:	Stirring	Dispersion Period (min):	
Comments:					

Time (min)	Hydrometer Reading	Temperature (°C)		Composite Correction	Corrected Reading	Diameter (mm)	Percentage Passing
0.5	23.0	19.0		-2.30	20.7	0.0700	21.1
1	21.0	19.0		-2.30	18.7	0.0554	19.0
2	17.2	19.0		-2.30	14.9	0.0401	15.2
4	15.0	19.0		-2.30	12.7	0.0287	12.9
8	13.2	19.0		-2.30	10.9	0.0205	11.1
15	12.1	20.0		-2.10	10.0	0.0151	10.2
30	11.4	20.0		-2.10	9.3	0.0107	9.5
60	10.4	20.5		-2.00	8.4	0.0076	8.6
120	8.7	20.5		-2.00	6.7	0.0054	6.8
270	7.6	20.5		-2.00	5.6	0.0036	5.7
360	7.2	21.0		-1.90	5.3	0.0032	5.4
1440	7.3	17.0		-2.71	4.6	0.0016	4.7



Project No. 06-1413-089
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GRAIN SIZE DISTRIBUTION
 Meadowbank Mining Corporation
 Meadowbank Gold Project

Figure II-34

PARTICLE SIZE ANALYSIS OF SOILS ASTM D 422-63

Project No. :	06-1413-089	Client :	Meadowbank Mining Corporation	BH :	Lake Bed Till
Sch#	277	Project :	Dike Design	Sample :	8
Lab Work:	TM	Location:	Meadowbank Gold Project		

First Sieving	Hydrometer: (Minus #10)	Residual No. 200 (g) =	0.7
Total Weight (g) = 12741.8	Before Wash (g) = 51.6	Total minus 200 (g) =	18.2
	After Wash (g) = 34.1	Gs (assumed) =	2.70

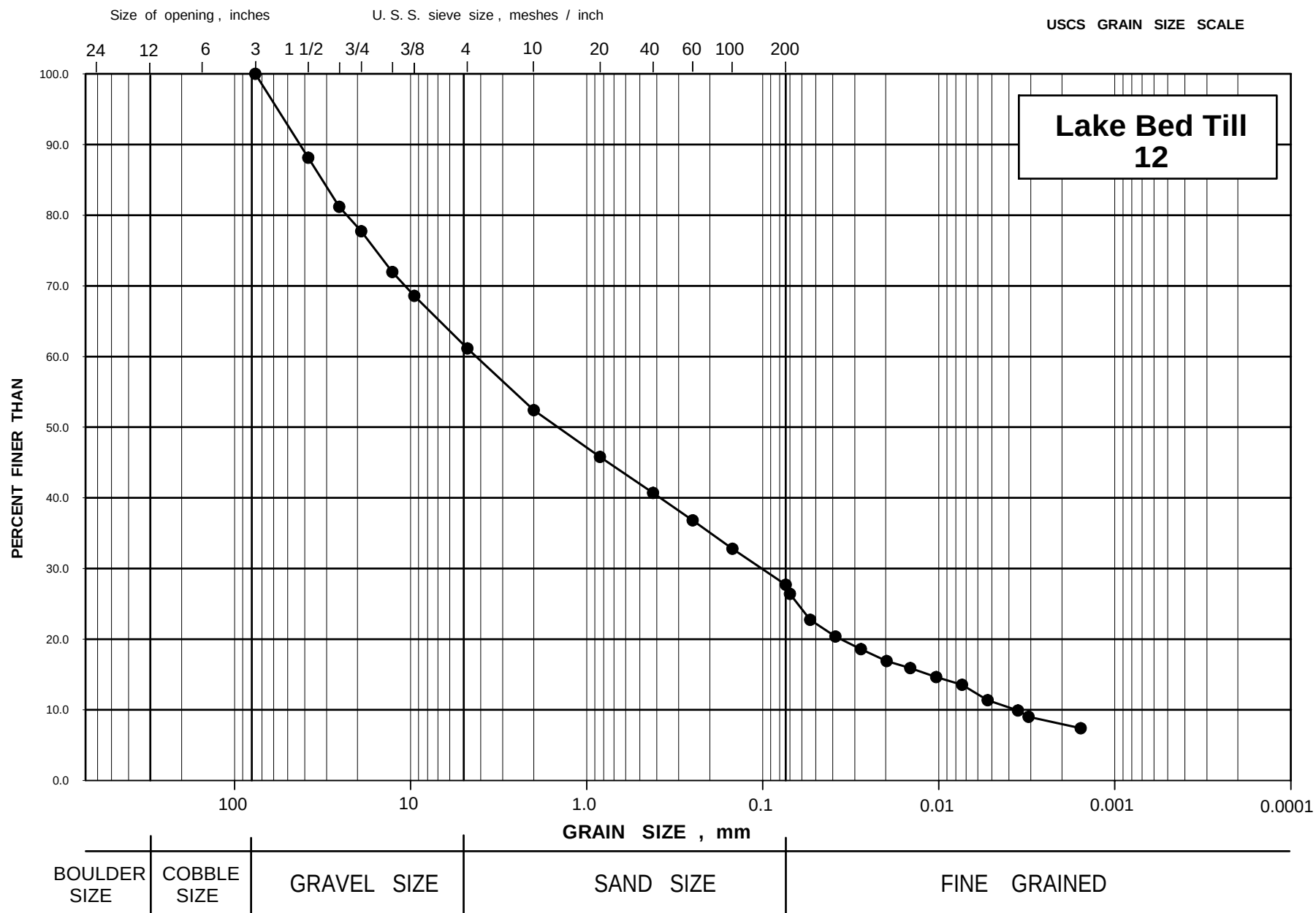
Size (USS)	Weight Retained (g)	Retained (%)	Weight Retained (g)	Retained (%)	% Retained Total	Diameter (mm)	% Passing
							100.0
6"	0.0					152.4	100.0
3"	0.0					76.2	100.0
1 1/2"	1160.6	9.1			9.1	38.1	90.9
1"	609.7	4.8			4.8	25.4	86.1
3/4"	636.2	5.0			5.0	19.1	81.1
1/2"	1042.6	8.2			8.2	12.7	72.9
3/8"	586.1	4.6			4.6	9.52	68.3
#4	1466.3	11.5			11.5	4.76	56.8
#10	1621.7	12.7			12.7	2.00	44.1
#20			9.8	19.0	8.4	0.840	35.7
#40			7.1	13.8	6.1	0.420	29.7
#60			5.7	11.0	4.9	0.250	24.8
#100			5.2	10.1	4.4	0.149	20.3
#200			5.6	10.9	4.8	0.074	15.6
Pan			18.2	35.3	15.6		

HYDROMETER ANALYSIS

Hydrometer No.: 87024 Dispersion Method: Stirring Dispersion Period (min):

Comments:

Time (min)	Hydrometer Reading	Temperature (°C)		Composite Correction	Corrected Reading	Diameter (mm)	Percentage Passing
0.5	21.0	19.0		-3.33	17.7	0.0700	14.9
1	18.2	19.0		-3.33	14.9	0.0564	12.6
2	16.0	19.0		-3.33	12.7	0.0404	10.7
4	14.1	19.0		-3.33	10.8	0.0289	9.1
8	12.6	19.0		-3.33	9.3	0.0206	7.8
15	11.8	20.0		-3.00	8.8	0.0151	7.4
30	10.6	20.0		-3.00	7.6	0.0107	6.4
60	9.3	20.5		-2.83	6.5	0.0076	5.5
120	8.0	20.5		-2.83	5.2	0.0054	4.4
270	6.8	20.5		-2.83	4.0	0.0037	3.4
360	6.1	21.0		-2.67	3.4	0.0032	2.9
1440	6.3	17.0		-3.99	2.3	0.0016	1.9



Project No. 06-1413-089
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GRAIN SIZE DISTRIBUTION
 Meadowbank Mining Corporation
 Meadowbank Gold Project

Figure II-35

PARTICLE SIZE ANALYSIS OF SOILS ASTM D 422-63

Project No. :	06-1413-089	Client :	Meadowbank Mining Corporation	BH :	Lake Bed Till
Sch#	277	Project :	Dike Design	Sample :	12
Lab Work:	TM	Location:	Meadowbank Gold Project		

First Sieving	Hydrometer: (Minus #10)	Residual No. 200 (g) =	0.5
Total Weight (g) = 16782.5	Before Wash (g) = 52.4	Total minus 200 (g) =	27.7
	After Wash (g) = 25.2	Gs (assumed) =	2.70

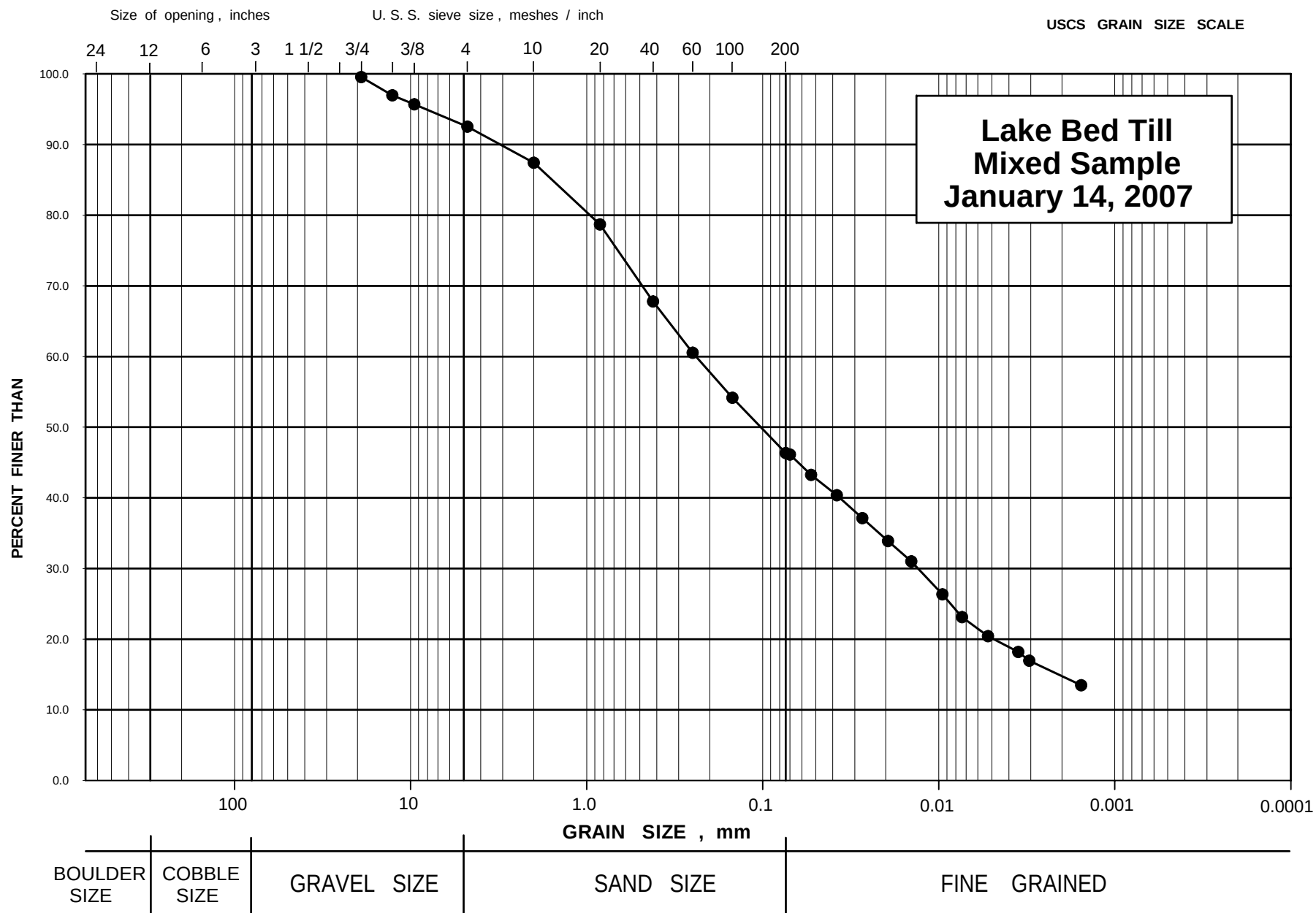
Size (USS)	Weight Retained (g)	Retained (%)	Weight Retained (g)	Retained (%)	% Retained Total	Diameter (mm)	% Passing
							100.0
6"	0.0					152.4	100.0
3"	0.0					76.2	100.0
1 1/2"	1992.1	11.9			11.9	38.1	88.1
1"	1166.2	6.9			6.9	25.4	81.2
3/4"	578.3	3.4			3.4	19.1	77.7
1/2"	969.0	5.8			5.8	12.7	72.0
3/8"	565.8	3.4			3.4	9.52	68.6
#4	1248.8	7.4			7.4	4.76	61.1
#10	1466.3	8.7			8.7	2.00	52.4
#20			6.6	12.6	6.6	0.840	45.8
#40			5.1	9.7	5.1	0.420	40.7
#60			3.9	7.4	3.9	0.250	36.8
#100			4.0	7.6	4.0	0.149	32.8
#200			5.1	9.7	5.1	0.074	27.7
Pan			27.7	52.9	27.7		

HYDROMETER ANALYSIS

Hydrometer No.: 8589 Dispersion Method: Stirring Dispersion Period (min):

Comments:

Time (min)	Hydrometer Reading	Temperature (°C)		Composite Correction	Corrected Reading	Diameter (mm)	Percentage Passing
0.5	29.0	19.0		-2.30	26.7	0.0700	26.4
1	25.3	19.0		-2.30	23.0	0.0538	22.7
2	22.9	19.0		-2.30	20.6	0.0387	20.4
4	21.1	19.0		-2.30	18.8	0.0277	18.6
8	19.4	19.0		-2.30	17.1	0.0198	16.9
15	18.2	20.0		-2.10	16.1	0.0145	15.9
30	16.9	20.0		-2.10	14.8	0.0104	14.6
60	15.7	20.5		-2.00	13.7	0.0074	13.6
120	13.5	20.5		-2.00	11.5	0.0053	11.4
270	12.0	20.5		-2.00	10.0	0.0036	9.9
360	11.0	21.0		-1.90	9.1	0.0031	9.0
1440	10.2	17.0		-2.71	7.5	0.0016	7.4



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GRAIN SIZE DISTRIBUTION
 Meadowbank Mining Corporation
 Meadowbank Gold Project

Figure
II-36

PARTICLE SIZE ANALYSIS OF SOILS ASTM D 422-63

Project No. :	06-1413-089	Client :	Meadowbank Mining Corporation	Sample :	Lake Bed Till Mixed Samples
Sch#	288	Project :	Dike Design		January 14, 2007
Lab Work:	TM	Location:	Meadowbank Gold Project		

First Sieving Total Weight (g) = 3840.3	Hydrometer: (Minus #10) Before Wash (g) = 48.1 After Wash (g) = 22.7	Residual No. 200 (g) = 0.1 Total minus 200 (g) = 25.5 Gs (assumed) = 2.70
---	---	---

Size (US)	Weight Retained (g)	Retained (%)	Weight Retained (g)	Retained (%)	% Retained Total	Diameter (mm)	% Passing
							100.0
6"	0.0					152.4	100.0
3"	0.0					76.2	100.0
1 1/2"	0.0					38.1	100.0
1"	0.0					25.4	100.0
3/4"	17.8	0.5			0.5	19.1	99.5
1/2"	99.1	2.6			2.6	12.7	97.0
3/8"	48.8	1.3			1.3	9.52	95.7
#4	120.9	3.1			3.1	4.76	92.5
#10	196.6	5.1			5.1	2.00	87.4
#20			4.8	10.0	8.7	0.840	78.7
#40			6.0	12.5	10.9	0.420	67.8
#60			4.0	8.3	7.3	0.250	60.5
#100			3.5	7.3	6.4	0.149	54.2
#200			4.3	8.9	7.8	0.074	46.3
Pan			25.5	53.0	46.3		

HYDROMETER ANALYSIS

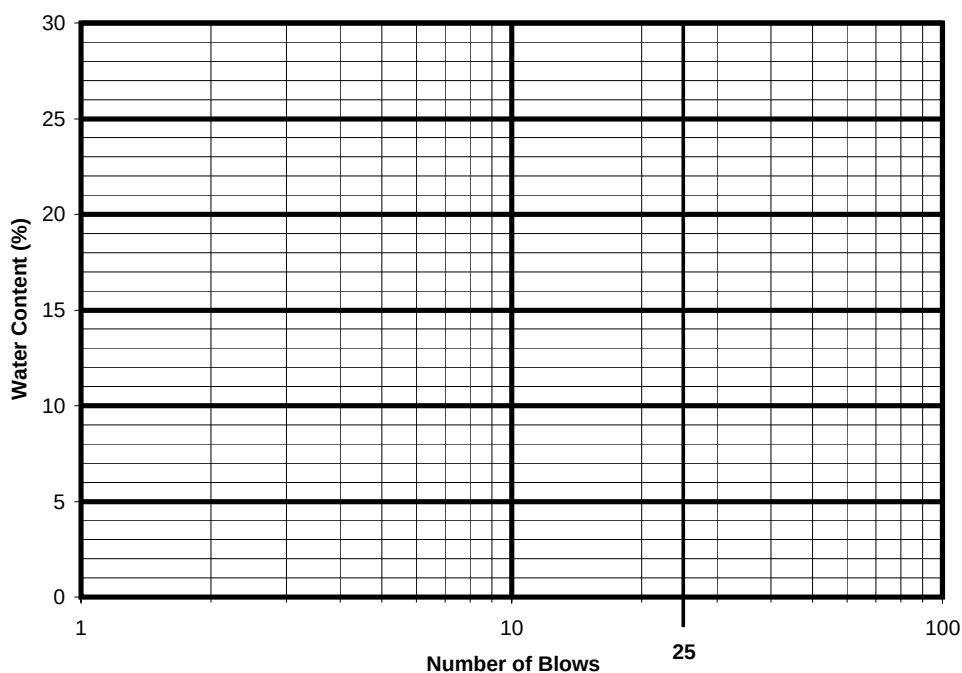
Hydrometer No.: 87024 Dispersion Method: Stirring Dispersion Period (min): _____
 Comments: _____

Time (min)	Hydrometer Reading	Temperature (°C)		Composite Correction	Corrected Reading	Diameter (mm)	Percentage Passing
0.5	28.0	22.0		-2.34	25.7	0.0700	46.1
1	26.4	22.0		-2.34	24.1	0.0531	43.2
2	24.8	22.0		-2.34	22.5	0.0380	40.4
4	23.0	22.0		-2.34	20.7	0.0272	37.1
8	21.2	22.0		-2.34	18.9	0.0194	33.9
15	19.6	22.0		-2.34	17.3	0.0143	31.0
35	17.0	22.0		-2.34	14.7	0.0095	26.4
60	15.2	22.0		-2.34	12.9	0.0074	23.1
120	13.7	22.0		-2.34	11.4	0.0053	20.4
270	12.3	22.5		-2.17	10.1	0.0035	18.2
360	11.6	22.5		-2.17	9.4	0.0031	16.9
1440	10.5	20.0		-3.00	7.5	0.0016	13.5

TILL ATTERBERG LIMITS

Liquid Limit, Plastic Limit and Plasticity Index of Soils
ASTM D 4318-93

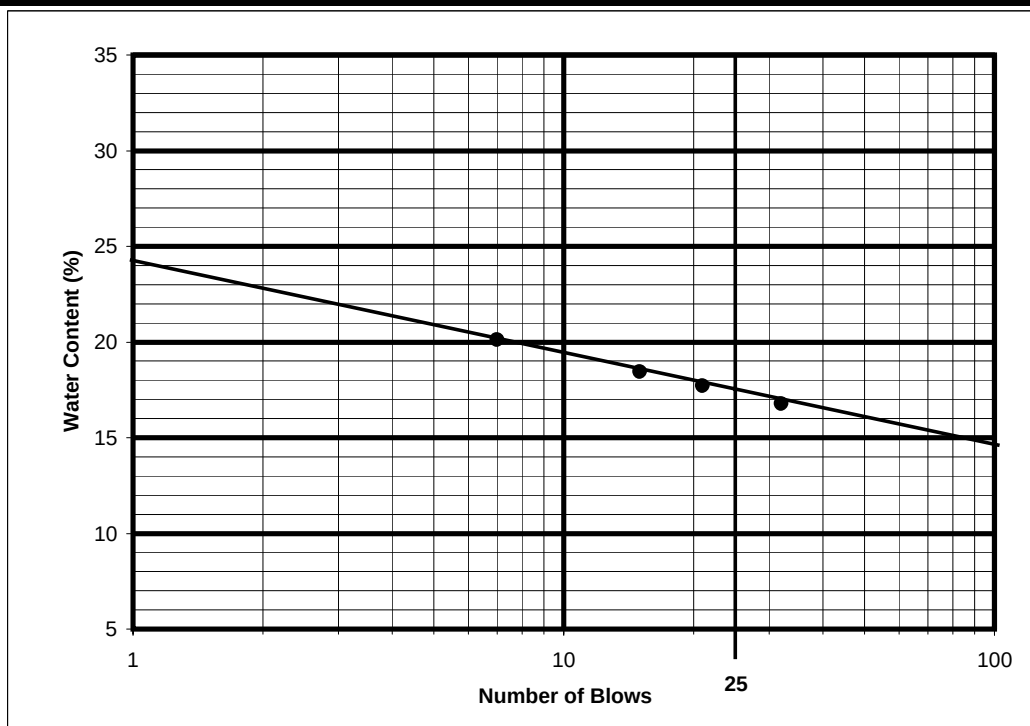
TYPE OF TEST	LL	LL	LL	LL		W% Nat.
CONTAINER NUMBER						
NUMBER OF BLOWS						
MASS WET SOIL + TARE						15848.80
MASS DRY SOIL + TARE						14909.60
MASS OF WATER						939.20
MASS OF CONTAINER						1472.60
MASS OF DRY SOIL						13437.0
WATER CONTENT W (%)						7.0
TYPE OF TEST	PL	PL	BOREHOLE NO.		Trench Area Till	
CONTAINER NUMBER			SAMPLE		9 & 10	
MASS WET SOIL + TARE			DEPTH			
MASS DRY SOIL + TARE			LIQUID LIMIT (%)		NA	
MASS OF WATER			PLASTIC LIMIT (%)		NA	
MASS OF CONTAINER			PLASTICITY INDEX (%)		NA	
MASS OF DRY SOIL			W% Natural (%)		7.0	
WATER CONTENT W (%)			LIQUIDITY INDEX		NA	

**SAMPLE DESCRIPTION :****Non Plastic Result****Could not achieve 25 blows**

Meadowbank Mining Corporation
Meadowbank Gold Project

Liquid Limit, Plastic Limit and Plasticity Index of Soils
ASTM D 4318-93

TYPE OF TEST	LL	LL	LL	LL		W% Nat.
CONTAINER NUMBER						
NUMBER OF BLOWS	7	15	21	32		
MASS WET SOIL + TARE	45.93	50.04	43.27	47.60		18746.30
MASS DRY SOIL + TARE	43.05	47.06	40.95	44.88		17042.30
MASS OF WATER	2.88	2.98	2.32	2.72		1704.00
MASS OF CONTAINER	28.73	30.89	27.85	28.66		1425.90
MASS OF DRY SOIL	14.32	16.17	13.10	16.22		15616.4
WATER CONTENT W (%)	20.1	18.4	17.7	16.8		10.9
TYPE OF TEST	PL	PL	BOREHOLE NO.		Trench Area Till	
CONTAINER NUMBER			SAMPLE		11	
MASS WET SOIL + TARE	36.56	19.18	DEPTH			
MASS DRY SOIL + TARE	35.45	18.21	LIQUID LIMIT (%)		17.5	
MASS OF WATER	1.11	0.97	PLASTIC LIMIT (%)		16.8	
MASS OF CONTAINER	28.66	12.57	PLASTICITY INDEX (%)		0.7	
MASS OF DRY SOIL	6.79	5.64	W% Natural (%)		10.9	
WATER CONTENT W (%)	16.3	17.2	LIQUIDITY INDEX		-8.06	

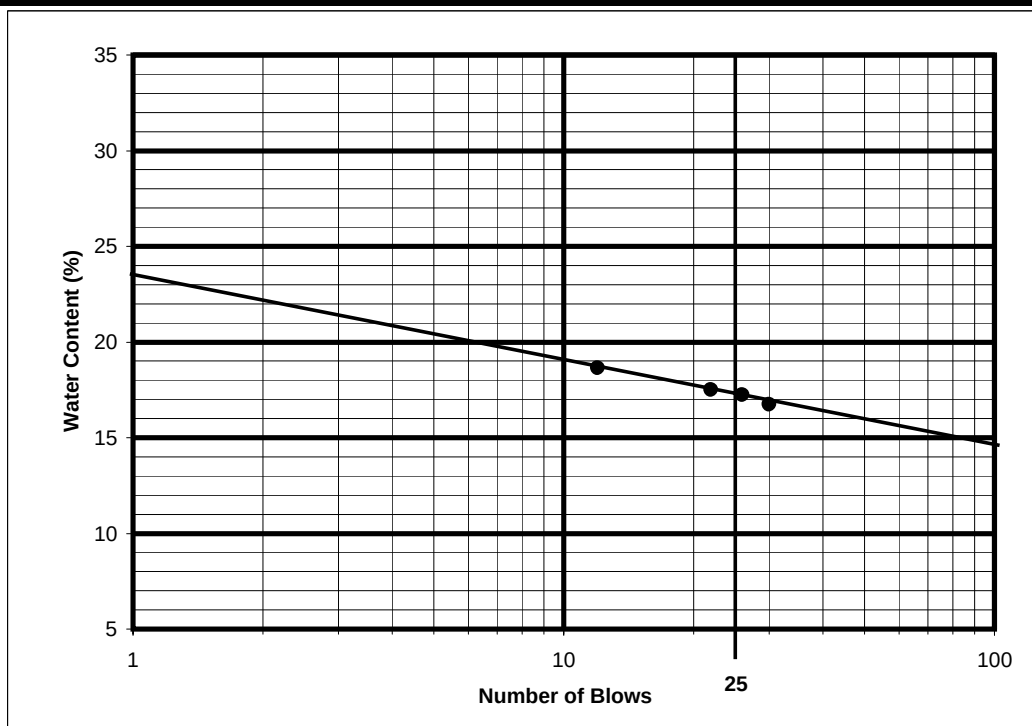


SAMPLE DESCRIPTION : CL

Meadowbank Mining Corporation
Meadowbank Gold Project

Liquid Limit, Plastic Limit and Plasticity Index of Soils
ASTM D 4318-93

TYPE OF TEST	LL	LL	LL	LL		W% Nat.
CONTAINER NUMBER						
NUMBER OF BLOWS	30	26	22	12		
MASS WET SOIL + TARE	43.57	51.84	46.59	50.31		13376.30
MASS DRY SOIL + TARE	41.39	48.76	43.92	46.92		12704.80
MASS OF WATER	2.18	3.08	2.67	3.39		671.50
MASS OF CONTAINER	28.36	30.88	28.67	28.75		1269.60
MASS OF DRY SOIL	13.03	17.88	15.25	18.17		11435.2
WATER CONTENT W (%)	16.7	17.2	17.5	18.7		5.9
TYPE OF TEST	PL	PL	BOREHOLE NO.		Trench Area Till	
CONTAINER NUMBER			SAMPLE		3	
MASS WET SOIL + TARE	38.72	40.86	DEPTH			
MASS DRY SOIL + TARE	37.25	39.43	LIQUID LIMIT (%)		17.2	
MASS OF WATER	1.47	1.43	PLASTIC LIMIT (%)		16.0	
MASS OF CONTAINER	27.97	30.57	PLASTICITY INDEX (%)		1.2	
MASS OF DRY SOIL	9.28	8.86	W% Natural (%)		5.9	
WATER CONTENT W (%)	15.8	16.1	LIQUIDITY INDEX		-8.36	

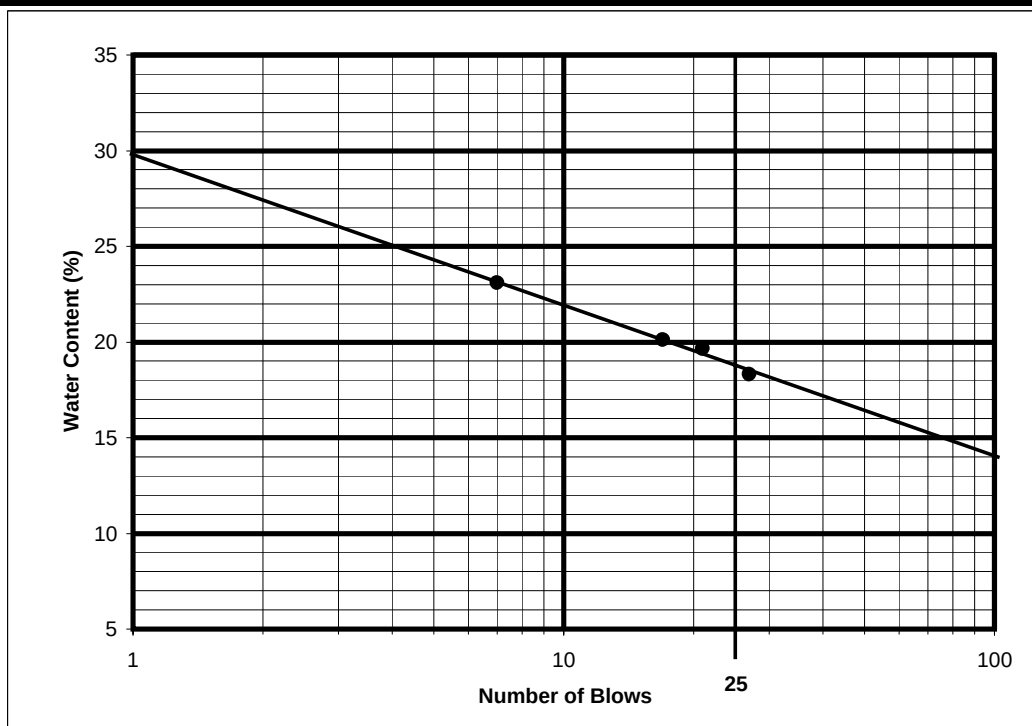


SAMPLE DESCRIPTION : CL

Meadowbank Mining Corporation
Meadowbank Gold Project

Liquid Limit, Plastic Limit and Plasticity Index of Soils
ASTM D 4318-93

TYPE OF TEST	LL	LL	LL	LL		W% Nat.
CONTAINER NUMBER						
NUMBER OF BLOWS	7	17	21	27		
MASS WET SOIL + TARE	44.13	43.24	46.86	47.16		13779.60
MASS DRY SOIL + TARE	41.27	40.70	43.86	44.26		12164.40
MASS OF WATER	2.86	2.54	3.00	2.90		1615.20
MASS OF CONTAINER	28.89	28.07	28.58	28.41		1269.60
MASS OF DRY SOIL	12.38	12.63	15.28	15.85		10894.8
WATER CONTENT W (%)	23.1	20.1	19.6	18.3		14.8
TYPE OF TEST	PL	PL	BOREHOLE NO.		Trench Area Till	
CONTAINER NUMBER			SAMPLE		4	
MASS WET SOIL + TARE	42.47	40.03	DEPTH			
MASS DRY SOIL + TARE	40.56	38.37	LIQUID LIMIT (%)		18.8	
MASS OF WATER	1.91	1.66	PLASTIC LIMIT (%)		18.0	
MASS OF CONTAINER	29.95	29.17	PLASTICITY INDEX (%)		0.8	
MASS OF DRY SOIL	10.61	9.20	W% Natural (%)		14.8	
WATER CONTENT W (%)	18.0	18.0	LIQUIDITY INDEX		-4.11	

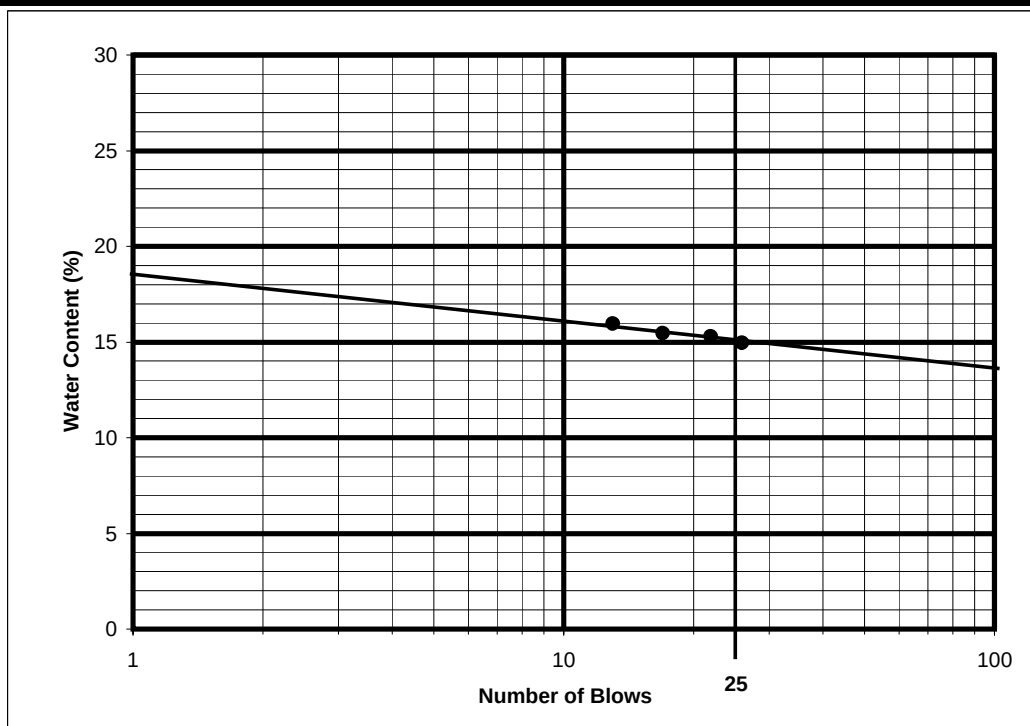


SAMPLE DESCRIPTION : CL

Meadowbank Mining Corporation
Meadowbank Gold Project

Liquid Limit, Plastic Limit and Plasticity Index of Soils
ASTM D 4318-93

TYPE OF TEST	LL	LL	LL	LL		W% Nat.
CONTAINER NUMBER						
NUMBER OF BLOWS	26	22	17	13		
MASS WET SOIL + TARE	28.97	46.92	44.32	50.34		12396.00
MASS DRY SOIL + TARE	26.86	44.50	42.06	47.34		11936.70
MASS OF WATER	2.11	2.42	2.26	3.00		459.30
MASS OF CONTAINER	12.76	28.67	27.42	28.53		1492.00
MASS OF DRY SOIL	14.10	15.83	14.64	18.81		10444.7
WATER CONTENT W (%)	15.0	15.3	15.4	15.9		4.4
TYPE OF TEST	PL	PL	BOREHOLE NO.		LTrench Area Till	
CONTAINER NUMBER			SAMPLE		1	
MASS WET SOIL + TARE	31.27	38.04	DEPTH			
MASS DRY SOIL + TARE	30.27	36.81	LIQUID LIMIT (%)		15.0	
MASS OF WATER	1.00	1.23	PLASTIC LIMIT (%)		15.1	
MASS OF CONTAINER	23.68	28.65	PLASTICITY INDEX (%)		---	
MASS OF DRY SOIL	6.59	8.16	W% Natural (%)		4.4	
WATER CONTENT W (%)	15.2	15.1	LIQUIDITY INDEX		---	

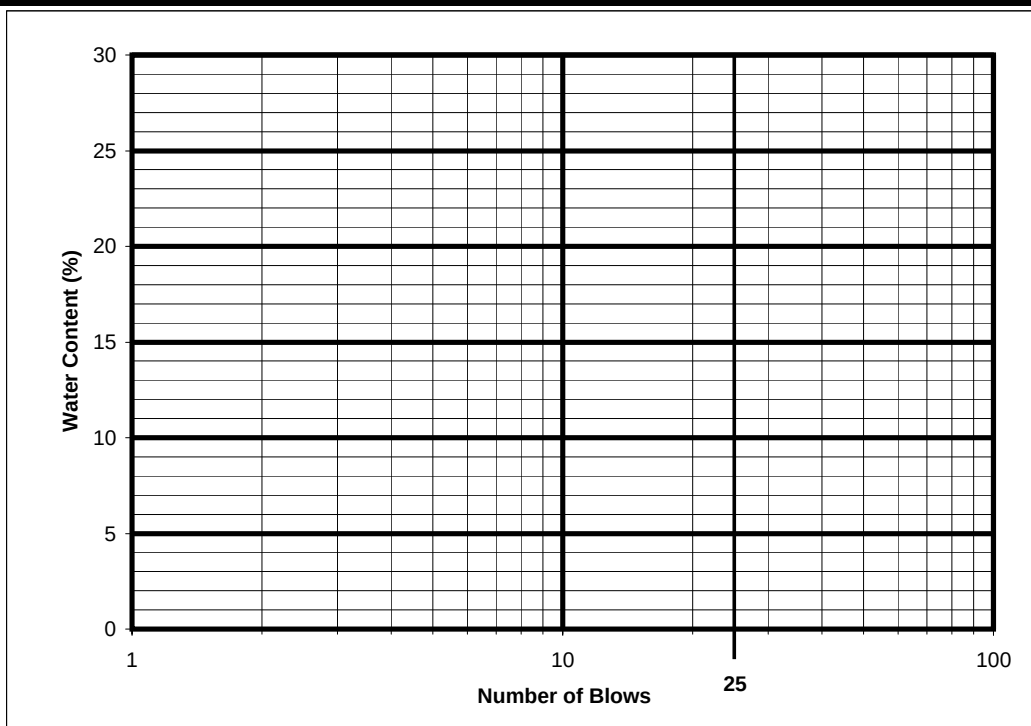


SAMPLE DESCRIPTION : Non Plastic Result

Meadowbank Mining Corporation
Meadowbank Gold Project

Liquid Limit, Plastic Limit and Plasticity Index of Soils
ASTM D 4318-93

TYPE OF TEST	LL	LL	LL	LL		W% Nat.
CONTAINER NUMBER						
NUMBER OF BLOWS						
MASS WET SOIL + TARE						12923.40
MASS DRY SOIL + TARE						12295.40
MASS OF WATER						628.00
MASS OF CONTAINER						1234.60
MASS OF DRY SOIL						11060.8
WATER CONTENT W (%)						5.7
TYPE OF TEST	PL	PL	BOREHOLE NO.		Trench Area Till	
CONTAINER NUMBER			SAMPLE		2	
MASS WET SOIL + TARE			DEPTH			
MASS DRY SOIL + TARE			LIQUID LIMIT (%)		NA	
MASS OF WATER			PLASTIC LIMIT (%)		NA	
MASS OF CONTAINER			PLASTICITY INDEX (%)		NA	
MASS OF DRY SOIL			W% Natural (%)		5.7	
WATER CONTENT W (%)			LIQUIDITY INDEX		NA	

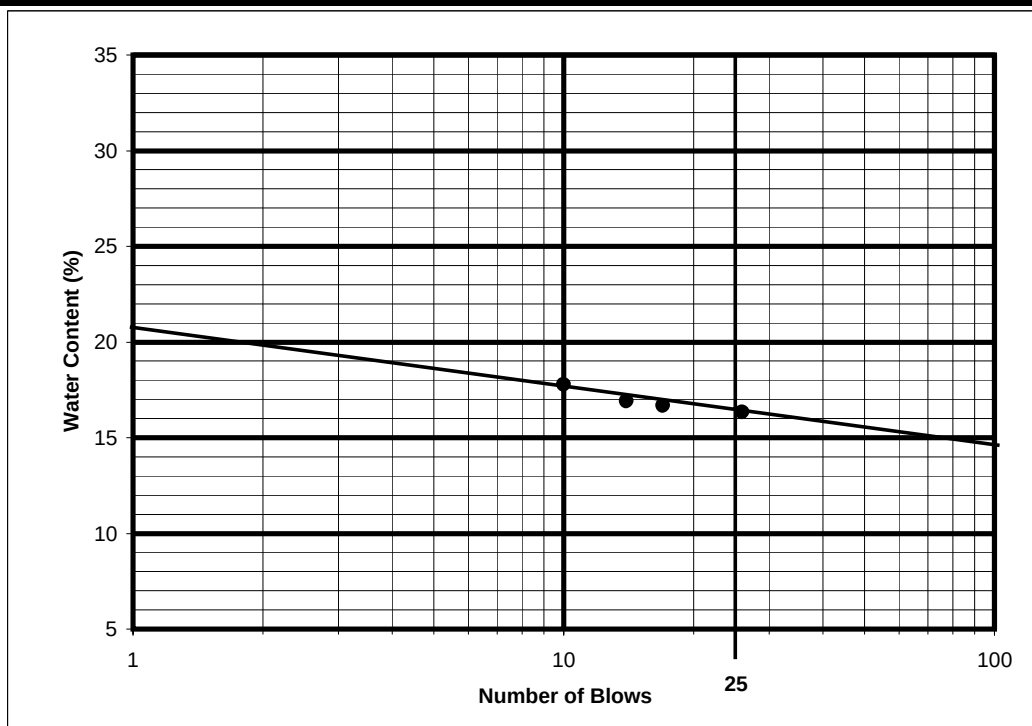
**SAMPLE DESCRIPTION :****Non Plastic Result****Could not achieve 25 blows**

Meadowbank Mining Corporation
Meadowbank Gold Project

Golder Associates
Appendix II

Liquid Limit, Plastic Limit and Plasticity Index of Soils
ASTM D 4318-93

TYPE OF TEST	LL	LL	LL	LL		W% Nat.
CONTAINER NUMBER						
NUMBER OF BLOWS	26	17	14	10		
MASS WET SOIL + TARE	16.96	21.93	19.36	19.59		12648.00
MASS DRY SOIL + TARE	14.79	19.01	16.78	16.86		12072.40
MASS OF WATER	2.17	2.92	2.58	2.73		575.60
MASS OF CONTAINER	1.50	1.49	1.51	1.50		1230.10
MASS OF DRY SOIL	13.29	17.52	15.27	15.36		10842.3
WATER CONTENT W (%)	16.3	16.7	16.9	17.8		5.3
TYPE OF TEST	PL	PL	BOREHOLE NO.		Trench Area Till	
CONTAINER NUMBER			SAMPLE		5	
MASS WET SOIL + TARE	11.61	9.40	DEPTH			
MASS DRY SOIL + TARE	10.26	8.32	LIQUID LIMIT (%)		16.3	
MASS OF WATER	1.35	1.08	PLASTIC LIMIT (%)		15.8	
MASS OF CONTAINER	1.54	1.60	PLASTICITY INDEX (%)		0.5	
MASS OF DRY SOIL	8.72	6.72	W% Natural (%)		5.3	
WATER CONTENT W (%)	15.5	16.1	LIQUIDITY INDEX		-20.00	

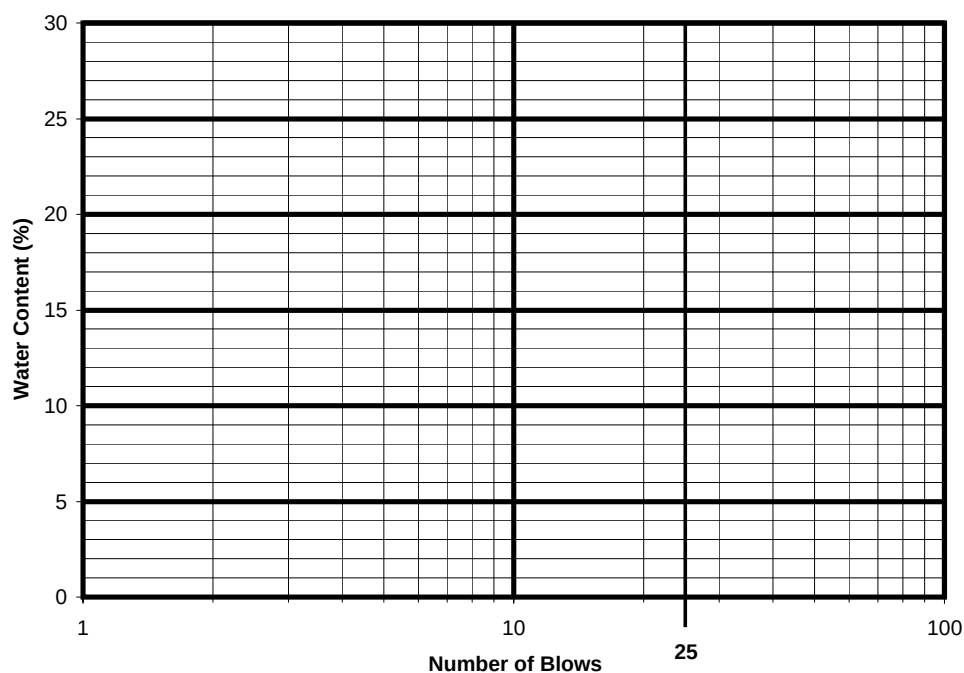


SAMPLE DESCRIPTION : CL

Meadowbank Mining Corporation
Meadowbank Gold Project

Liquid Limit, Plastic Limit and Plasticity Index of Soils
ASTM D 4318-93

TYPE OF TEST	LL	LL	LL	LL		W% Nat.
CONTAINER NUMBER						
NUMBER OF BLOWS						
MASS WET SOIL + TARE						18496.00
MASS DRY SOIL + TARE						17672.50
MASS OF WATER						823.50
MASS OF CONTAINER						1134.70
MASS OF DRY SOIL						16537.8
WATER CONTENT W (%)						5.0
TYPE OF TEST	PL	PL	BOREHOLE NO.		Trench Area Till	
CONTAINER NUMBER			SAMPLE		6 & 7	
MASS WET SOIL + TARE			DEPTH			
MASS DRY SOIL + TARE			LIQUID LIMIT (%)		NA	
MASS OF WATER			PLASTIC LIMIT (%)		NA	
MASS OF CONTAINER			PLASTICITY INDEX (%)		NA	
MASS OF DRY SOIL			W% Natural (%)		5.0	
WATER CONTENT W (%)			LIQUIDITY INDEX		NA	

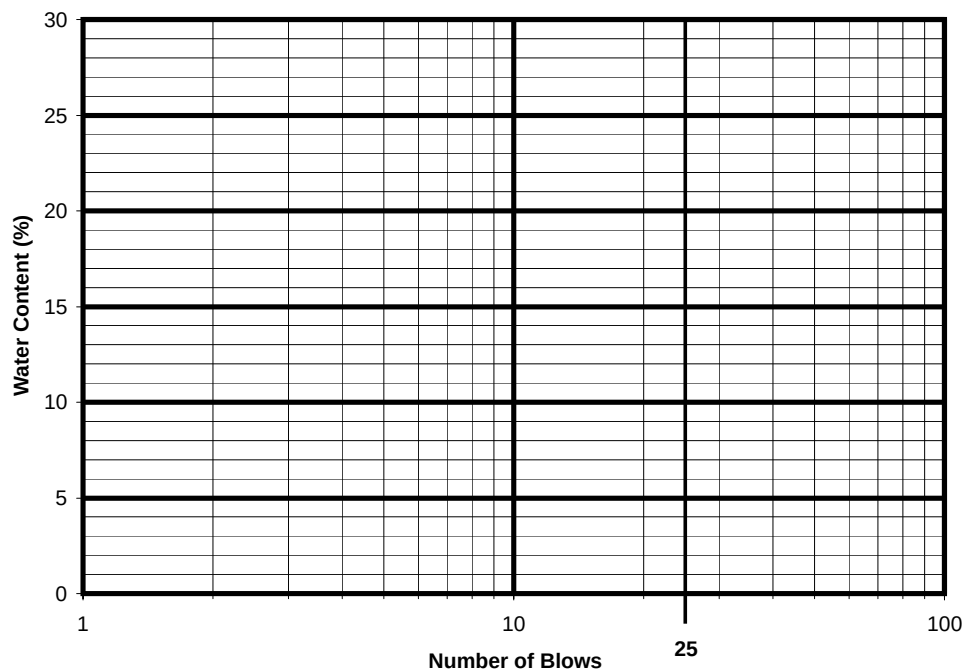
**SAMPLE DESCRIPTION :****Non Plastic Result****Could not achieve 25 blows**

Meadowbank Mining Corporation
Meadowbank Gold Project

Golder Associates
Appendix II

Liquid Limit, Plastic Limit and Plasticity Index of Soils
ASTM D 4318-93

TYPE OF TEST	LL	LL	LL	LL		W% Nat.
CONTAINER NUMBER						
NUMBER OF BLOWS						
MASS WET SOIL + TARE						14752.30
MASS DRY SOIL + TARE						14213.90
MASS OF WATER						538.40
MASS OF CONTAINER						1425.90
MASS OF DRY SOIL						12788.0
WATER CONTENT W (%)						4.2
TYPE OF TEST	PL	PL	BOREHOLE NO.		Trenc Area Till	
CONTAINER NUMBER			SAMPLE		8	
MASS WET SOIL + TARE			DEPTH			
MASS DRY SOIL + TARE			LIQUID LIMIT (%)		NA	
MASS OF WATER			PLASTIC LIMIT (%)		NA	
MASS OF CONTAINER			PLASTICITY INDEX (%)		NA	
MASS OF DRY SOIL			W% Natural (%)		4.2	
WATER CONTENT W (%)			LIQUIDITY INDEX		NA	



SAMPLE DESCRIPTION : Non Plastic Result
Could not achieve 25 blows

Meadowbank Mining Corporation
Meadowbank Gold Project

Golder Associates
Appendix II

Liquid Limit, Plastic Limit and Plasticity Index of Soils
ASTM D 4318-93

TYPE OF TEST	LL	LL	LL	LL		W% Nat.
CONTAINER NUMBER						
NUMBER OF BLOWS	7	17	26	41		
MASS WET SOIL + TARE	46.50	46.20	45.36	46.10		19462.20
MASS DRY SOIL + TARE	43.34	43.47	42.62	43.31		18083.10
MASS OF WATER	3.16	2.73	2.74	2.79		1379.10
MASS OF CONTAINER	28.87	29.95	28.42	28.05		1218.20
MASS OF DRY SOIL	14.47	13.52	14.20	15.26		16864.9
WATER CONTENT W (%)	21.8	20.2	19.3	18.3		8.2
TYPE OF TEST	PL	PL	BOREHOLE NO.		Trench Area Till	
CONTAINER NUMBER			SAMPLE		12	
MASS WET SOIL + TARE	36.42	37.44	DEPTH			
MASS DRY SOIL + TARE	35.44	36.11	LIQUID LIMIT (%)		19.4	
MASS OF WATER	0.98	1.33	PLASTIC LIMIT (%)		17.6	
MASS OF CONTAINER	29.85	28.57	PLASTICITY INDEX (%)		1.8	
MASS OF DRY SOIL	5.59	7.54	W% Natural (%)		8.2	
WATER CONTENT W (%)	17.5	17.6	LIQUIDITY INDEX		-5.18	



SAMPLE DESCRIPTION : CL

Meadowbank Mining Corporation
Meadowbank Gold Project

TILL WATER CONTENT

Project Number : **06-1413-089**

Tech : **TM**

Laboratory Determination of Water Content of Soil and Rock
ASTM D 2216-92

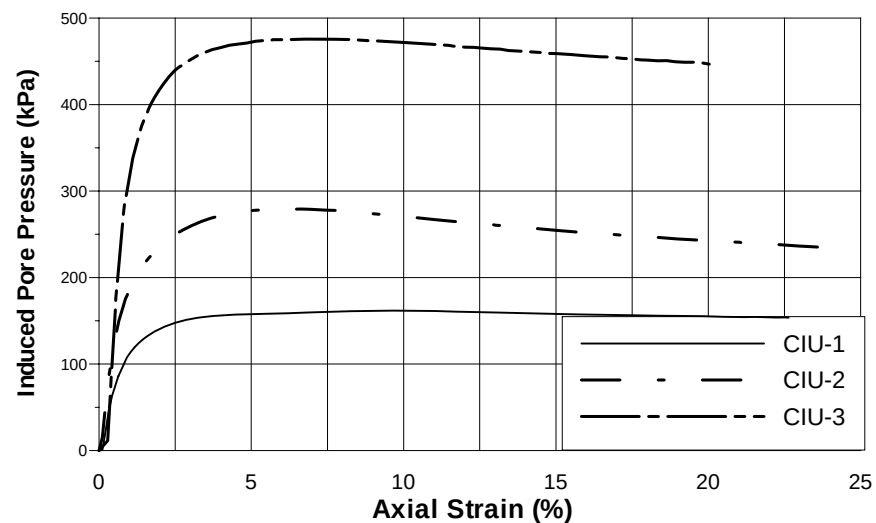
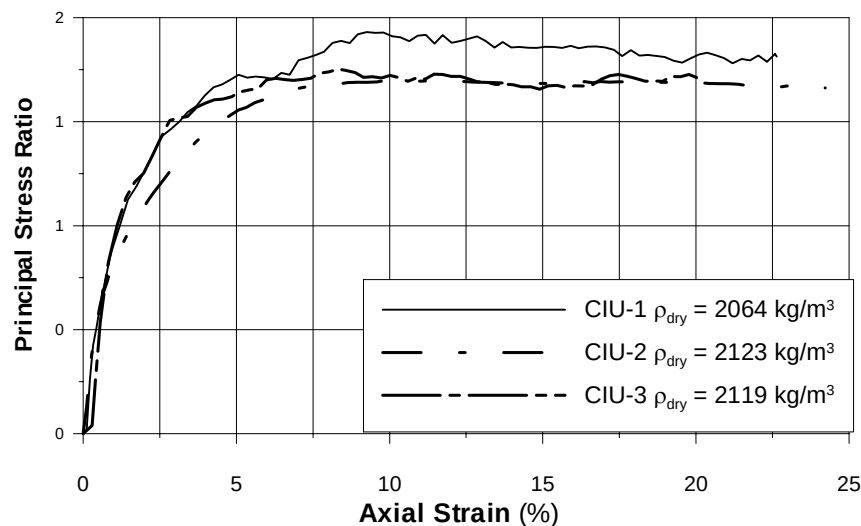
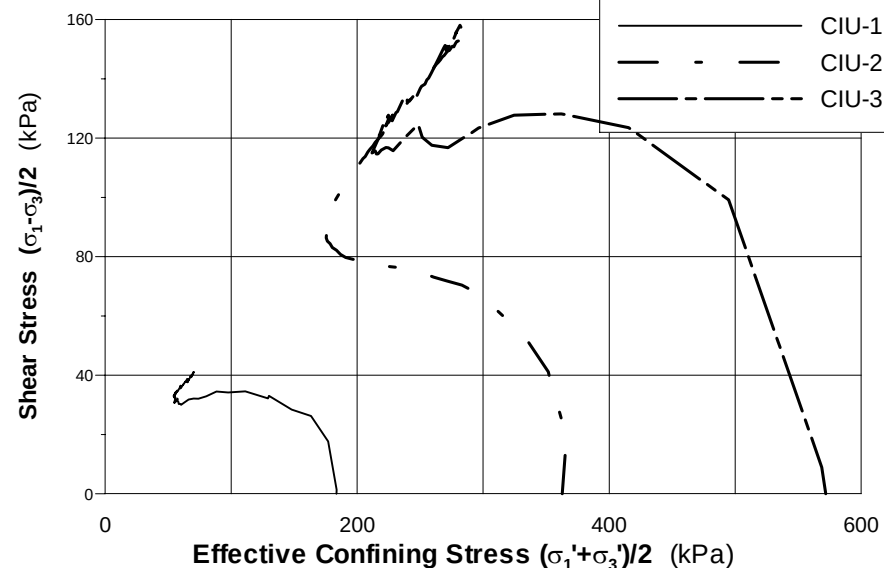
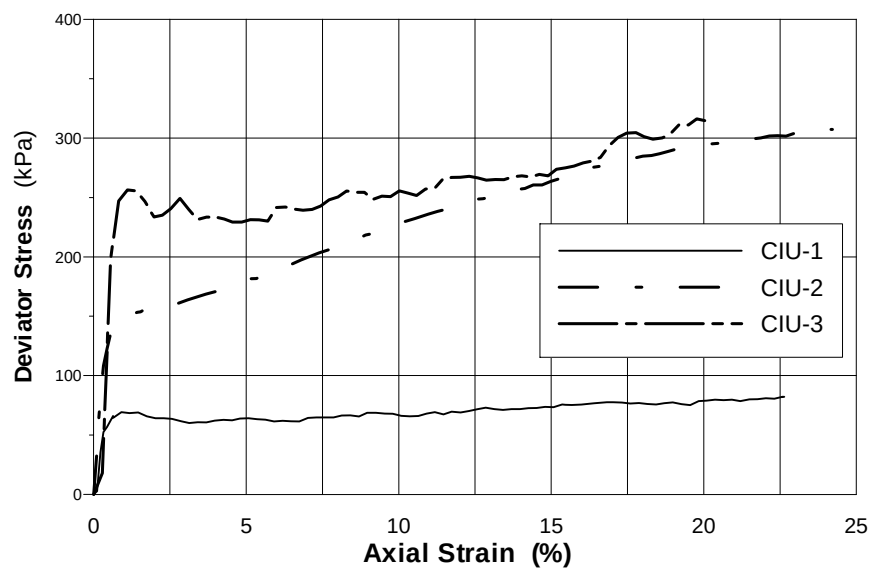
Borehole	Till Spoil	Till Spoil	Till	Till, Grassland	Till Spoil	Till Spoil
Sample Number	1	2	3	4	5	6 & 7
Depth (m)						
CONTAINER NUMBER						
MASS WET SOIL + TARE	12396.0	12923.4	13376.3	13779.6	12648.0	18496.0
MASS DRY SOIL + TARE	11936.7	12295.4	12704.8	12164.4	12072.4	17672.5
MASS OF WATER	459.3	628.0	671.5	1615.2	575.6	823.5
MASS OF CONTAINER	1492.0	1234.6	1269.6	1216.8	1230.1	1134.7
MASS OF DRY SOIL	10444.7	11060.8	11435.2	10947.6	10842.3	16537.8
Water Content W (%)	4.4	5.7	5.9	14.8	5.3	5.0

Borehole	Till Spoil			Till, Trenches		
Sample Number	8	9 & 10	11	12		
Depth (m)						
CONTAINER NUMBER						
MASS WET SOIL + TARE	14752.3	15848.8	18746.3	19462.2		
MASS DRY SOIL + TARE	14213.9	14909.6	17042.3	18083.1		
MASS OF WATER	538.4	939.2	1704.0	1379.1		
MASS OF CONTAINER	1425.9	1472.6	1425.9	1218.2		
MASS OF DRY SOIL	12788.0	13437.0	15616.4	16864.9		
Water Content W (%)	4.2	7.0	10.9	8.2		

Borehole						
Sample Number						
Depth (m)						
CONTAINER NUMBER						
MASS WET SOIL + TARE						
MASS DRY SOIL + TARE						
MASS OF WATER						
MASS OF CONTAINER						
MASS OF DRY SOIL						
Water Content W (%)						

Meadowbank Mining Corporation
Meadowbank Gold Project

TILL TRIAXIAL



Project No. ...06-1413-089
 DrawnAS.....
 Reviewed
 Date04/04/07.....

CONSOLIDATED ISOTROPIC UNDRAINED TRIAXIAL TEST
TILL SAMPLES 3, 6 AND 7 COMPOSITE
 Meadowbank Mining Corporation
 Meadowbank Gold Project

Figure II-37

Undrained Triaxial Compression Test

Project No. :	06-1413-089/4000	Client :	Meadowbank Mining Corporation	Location :	
Sch No.		Project :	Dike Design	Type :	Trench Area Till
Lab Work:	ROB	Location:	Meadowbank Gold Project	Depth :	
Test ID:	CIU - 1				

Equipment	Specimen Geometry	Phase Relationships	Strength Results
Machine: Trautwein	Initial Final	Initial Final	q_{MAX} (kPa) = 82.2
Chamber: C2	Height (mm) = 128.13 99.13	$e = 0.32 0.32$	Strain @ = 22.63
Load Cell: 205856	Diameter (mm) = 73.05 83.05	ρ_{sat} (kg/m ³) = 2308 2308	$\eta_{MAX} = 1.54$
Axial DCDT: LP-175	Area (cm ²) = 41.91 54.17	ρ_{dry} (kg/m ³) = 2064 2064	Strain @ = 9.25
Cell Pressure: PS-3118	Volume (cm ³) = 537.02 537.02	$G_s = 2.73$	B Value 0.96
Back Pressure: PS-3125			Target Mean Effective Stress (kPa) 183.55
Pore Pressure: PS-2232			

Axial Strain (%)	Load (kN)	ΔU (kPa)	Cell Pressure (kPa)	Pore Pressure (kPa)	A_c (cm ²)	σ_1' (kPa)	σ_3' (kPa)	p' (kPa)	q (kPa)	Stress ratio η		
0.00	0.00	0.00	955.98	772.4	41.9	183.6	183.6	183.6	0.0	0.00		
0.11	0.01	0.92	955.55	773.3	42.0	185.0	182.2	183.1	2.8	0.02		
0.22	0.15	23.72	955.42	796.1	42.0	194.7	159.3	171.1	35.4	0.21		
0.32	0.22	46.31	955.86	818.7	42.0	189.6	137.1	154.6	52.5	0.34		
0.44	0.24	63.63	955.68	836.1	42.1	176.4	119.6	138.6	56.8	0.41		
0.63	0.28	86.38	955.85	858.8	42.2	163.0	97.0	119.0	66.0	0.55		
0.63	0.27	86.21	955.75	858.6	42.2	161.5	97.1	118.6	64.4	0.54		
0.91	0.29	106.71	955.63	879.1	42.3	145.7	76.5	99.6	69.2	0.70		
1.18	0.29	119.71	955.53	892.1	42.4	131.8	63.4	86.2	68.4	0.79		
1.46	0.29	129.23	955.37	901.7	42.5	122.7	53.7	76.7	69.0	0.90		
1.74	0.28	135.89	955.52	908.3	42.7	113.1	47.2	69.2	65.9	0.95		
2.03	0.27	141.34	955.57	913.8	42.8	106.0	41.8	63.2	64.2	1.02		
2.30	0.28	145.24	955.67	917.7	42.9	102.2	38.0	59.4	64.2	1.08		
2.57	0.27	148.61	955.42	921.0	43.0	97.9	34.4	55.6	63.6	1.14		
2.87	0.27	150.98	955.44	923.4	43.2	93.7	32.0	52.6	61.7	1.17		
3.14	0.26	152.87	955.40	925.3	43.3	90.2	30.1	50.1	60.1	1.20		
3.41	0.26	154.13	955.44	926.6	43.4	89.7	28.9	49.2	60.8	1.24		
3.69	0.26	155.52	955.91	928.0	43.5	88.7	28.0	48.2	60.7	1.26		
3.97	0.27	156.01	955.50	928.4	43.6	89.2	27.1	47.8	62.1	1.30		
4.25	0.27	156.88	955.48	929.3	43.8	88.8	26.2	47.1	62.7	1.33		
4.54	0.27	157.34	955.45	929.8	43.9	88.1	25.7	46.5	62.5	1.34		
4.79	0.28	157.57	955.63	930.0	44.0	89.5	25.6	46.9	63.8	1.36		
5.08	0.28	157.87	955.44	930.3	44.2	89.4	25.1	46.6	64.2	1.38		
5.36	0.28	157.92	955.53	930.3	44.3	88.6	25.2	46.3	63.4	1.37		
5.63	0.28	158.24	955.52	930.7	44.4	87.8	24.8	45.8	62.9	1.37		
5.91	0.27	158.60	955.42	931.0	44.5	85.9	24.4	44.9	61.5	1.37		
6.19	0.28	158.66	955.85	931.1	44.7	86.6	24.8	45.4	61.9	1.36		
6.47	0.28	158.99	955.32	931.4	44.8	85.6	23.9	44.5	61.7	1.39		
6.74	0.28	159.35	955.81	931.8	44.9	85.5	24.0	44.5	61.4	1.38		
7.02	0.29	159.70	955.46	932.1	45.1	87.6	23.3	44.8	64.3	1.44		
7.30	0.29	160.27	955.98	932.7	45.2	88.2	23.3	44.9	64.9	1.44		
7.57	0.29	160.58	955.91	933.0	45.3	87.7	22.9	44.5	64.8	1.46		
7.86	0.29	160.61	955.56	933.0	45.5	87.3	22.5	44.1	64.8	1.47		
8.13	0.30	161.09	955.63	933.5	45.6	88.6	22.1	44.3	66.5	1.50		
8.42	0.30	161.11	955.41	933.5	45.8	88.4	21.9	44.1	66.6	1.51		
8.70	0.30	161.50	955.72	933.9	45.9	87.4	21.8	43.7	65.6	1.50		
8.96	0.32	161.28	955.54	933.7	46.0	90.6	21.8	44.7	68.7	1.54		
9.25	0.32	161.89	955.89	934.3	46.2	90.3	21.6	44.5	68.7	1.54		
9.54	0.32	161.80	955.72	934.2	46.3	89.6	21.5	44.2	68.1	1.54		
9.80	0.32	161.92	955.77	934.3	46.5	89.4	21.4	44.1	68.0	1.54		
10.08	0.31	161.99	955.63	934.4	46.6	87.3	21.2	43.2	66.1	1.53		
10.36	0.31	161.78	955.46	934.2	46.8	87.1	21.3	43.2	65.8	1.52		
10.64	0.31	161.31	955.48	933.7	46.9	87.8	21.7	43.8	66.0	1.51		
10.91	0.32	161.40	955.59	933.8	47.0	89.8	21.8	44.4	68.0	1.53		
11.18	0.33	160.94	955.39	933.4	47.2	91.2	22.0	45.1	69.2	1.53		
11.47	0.32	160.58	955.45	933.0	47.3	89.9	22.5	44.9	67.4	1.50		
11.73	0.33	160.78	955.43	933.2	47.5	91.9	22.2	45.5	69.7	1.53		
12.03	0.33	160.40	955.73	932.8	47.6	91.9	22.9	45.9	69.0	1.50		
12.30	0.34	160.17	955.69	932.6	47.8	93.3	23.1	46.5	70.2	1.51		
12.57	0.34	159.98	955.68	932.4	47.9	94.8	23.3	47.1	71.6	1.52		
12.85	0.35	159.68	955.55	932.1	48.1	96.5	23.4	47.8	73.0	1.53		
13.14	0.35	159.47	955.53	931.9	48.3	95.5	23.6	47.6	71.8	1.51		
13.42	0.34	159.33	955.97	931.8	48.4	95.4	24.2	47.9	71.2	1.48		
13.70	0.35	158.95	955.09	931.4	48.6	95.4	23.7	47.6	71.7	1.51		
13.97	0.35	158.72	955.55	931.1	48.7	96.2	24.4	48.4	71.8	1.49		

Axial Strain (%)	Load (kN)	ΔU (kPa)	Cell Pressure (kPa)	Pore Pressure (kPa)	A_c (cm ²)	σ_1' (kPa)	σ_3' (kPa)	p' (kPa)	q (kPa)	Stress ratio η		
14.25	0.35	158.60	955.66	931.0	48.9	97.2	24.6	48.8	72.6	1.49		
14.52	0.36	158.40	955.60	930.8	49.0	97.6	24.8	49.0	72.8	1.48		
14.80	0.36	158.04	955.58	930.5	49.2	98.8	25.1	49.7	73.7	1.48		
15.07	0.36	158.09	955.39	930.5	49.4	98.3	24.9	49.4	73.4	1.49		
15.36	0.37	157.71	955.81	930.1	49.5	101.4	25.7	50.9	75.7	1.49		
15.63	0.37	157.41	955.47	929.8	49.7	100.9	25.6	50.7	75.2	1.48		
15.91	0.38	157.56	955.50	930.0	49.8	101.2	25.5	50.8	75.7	1.49		
16.18	0.38	157.12	955.49	929.5	50.0	102.0	25.9	51.3	76.0	1.48		
16.47	0.39	156.98	955.46	929.4	50.2	103.1	26.1	51.7	77.0	1.49		
16.75	0.39	156.94	955.55	929.4	50.3	103.6	26.2	52.0	77.4	1.49		
17.03	0.39	156.75	955.53	929.2	50.5	103.9	26.4	52.2	77.5	1.49		
17.32	0.39	156.49	955.52	928.9	50.7	103.9	26.6	52.4	77.3	1.48		
17.59	0.39	156.15	955.75	928.6	50.9	103.7	27.2	52.7	76.5	1.45		
17.87	0.39	156.47	955.42	928.9	51.0	103.5	26.5	52.2	77.0	1.48		
18.15	0.39	156.20	955.63	928.6	51.2	103.2	27.0	52.4	76.2	1.45		
18.43	0.39	155.76	954.92	928.2	51.4	102.4	26.7	52.0	75.7	1.46		
18.70	0.40	155.86	955.54	928.3	51.6	104.1	27.3	52.9	76.8	1.45		
18.98	0.40	155.55	955.64	928.0	51.7	105.2	27.7	53.5	77.5	1.45		
19.27	0.39	155.55	955.61	928.0	51.9	103.6	27.6	53.0	76.0	1.43		
19.56	0.39	155.30	955.32	927.7	52.1	102.7	27.6	52.6	75.1	1.43		
19.83	0.41	155.31	955.99	927.7	52.3	106.9	28.3	54.5	78.6	1.44		
20.10	0.41	155.16	955.41	927.6	52.5	106.8	27.8	54.1	79.0	1.46		
20.37	0.42	155.00	955.28	927.4	52.6	107.6	27.9	54.5	79.8	1.47		
20.65	0.42	154.76	955.27	927.2	52.8	107.5	28.1	54.5	79.4	1.46		
20.92	0.42	154.31	955.34	926.7	53.0	108.3	28.6	55.2	79.7	1.44		
21.20	0.42	154.28	955.70	926.7	53.2	107.6	29.0	55.2	78.6	1.42		
21.50	0.43	154.28	955.53	926.7	53.4	108.8	28.8	55.5	80.0	1.44		
21.77	0.43	154.17	955.70	926.6	53.6	109.2	29.1	55.8	80.1	1.44		
22.04	0.44	154.33	955.47	926.8	53.8	109.8	28.7	55.7	81.0	1.45		
22.31	0.43	153.67	955.59	926.1	54.0	110.1	29.5	56.4	80.6	1.43		
22.58	0.44	154.01	955.29	926.4	54.1	110.9	28.9	56.2	82.1	1.46		
22.63	0.45	153.84	955.53	926.3	54.2	111.4	29.3	56.7	82.2	1.45		

Undrained Triaxial Compression Test

Project No. :	06-1413-089/4000	Client :	Meadowbank Mining Corporation	Location :	
Sch No.		Project :	Dike Design	Type :	Trench Area Till
Lab Work:	ROB	Location:	Meadowbank Gold Project	Depth :	
Test ID:	CIU - 2				

Equipment	Specimen Geometry	Phase Relationships	Strength Results
Machine: Trautwein	Initial Final	Initial Final	q_{MAX} (kPa) = 308.2
Chamber: C1	Height (mm) = 118.39 89.72	$e = 0.29 0.29$	Strain @ = 23.80
Load Cell: 205858	Diameter (mm) = 69.53 79.87	ρ_{sat} (kg/m ³) = 2345 2345	$\eta_{MAX} = 1.36$
Axial DCDT: LP-175	Area (cm ²) = 37.97 50.10	ρ_{dry} (kg/m ³) = 2123 2123	Strain @ = 11.10
Cell Pressure: PS-3118	Volume (cm ³) = 449.50 449.50	$G_s = 2.73$	
Back Pressure: PS-3125			B Value 0.95
Pore Pressure: PS-2232			Target Mean Effective Stress (kPa) 362.69

Axial Strain (%)	Load (kN)	ΔU (kPa)	Cell Pressure (kPa)	Pore Pressure (kPa)	A_c (cm ²)	σ_1' (kPa)	σ_3' (kPa)	p' (kPa)	q (kPa)	Stress ratio η		
0.00	0.00	0.00	1090.60	727.9	38.0	362.7	362.7	362.7	0.0	0.00		
0.11	0.14	15.48	1090.64	743.4	38.0	385.0	347.3	359.8	37.7	0.10		
0.21	0.31	52.34	1090.84	780.3	38.0	392.8	310.6	338.0	82.2	0.24		
0.32	0.41	85.55	1090.50	813.5	38.1	385.4	277.0	313.2	108.3	0.35		
0.44	0.47	112.21	1090.52	840.1	38.1	373.4	250.4	291.4	123.0	0.42		
0.55	0.51	133.35	1090.57	861.3	38.2	364.0	229.3	274.2	134.7	0.49		
0.66	0.54	150.02	1090.67	877.9	38.2	353.5	212.7	259.7	140.8	0.54		
0.77	0.55	163.57	1090.76	891.5	38.3	343.0	199.3	247.2	143.7	0.58		
0.87	0.56	175.27	1090.64	903.2	38.3	333.8	187.5	236.2	146.3	0.62		
0.99	0.57	184.74	1090.64	912.7	38.3	326.7	178.0	227.6	148.7	0.65		
1.10	0.58	193.31	1090.76	921.2	38.4	321.3	169.5	220.1	151.8	0.69		
1.21	0.58	200.38	1090.68	928.3	38.4	313.5	162.4	212.8	151.2	0.71		
1.32	0.59	207.02	1090.60	934.9	38.5	308.4	155.7	206.6	152.8	0.74		
1.43	0.59	213.10	1090.82	941.0	38.5	303.1	149.8	200.9	153.3	0.76		
1.53	0.59	218.41	1090.79	946.3	38.6	298.2	144.5	195.7	153.7	0.79		
1.65	0.60	223.08	1090.69	951.0	38.6	294.9	139.7	191.4	155.2	0.81		
1.77	0.60	227.69	1090.83	955.6	38.7	289.6	135.2	186.7	154.4	0.83		
1.88	0.60	231.52	1090.49	959.4	38.7	286.0	131.1	182.7	155.0	0.85		
1.98	0.61	235.05	1090.50	963.0	38.7	284.4	127.5	179.8	156.9	0.87		
2.10	0.61	238.98	1090.64	966.9	38.8	281.1	123.7	176.2	157.4	0.89		
2.21	0.61	242.07	1090.50	970.0	38.8	278.9	120.5	173.3	158.3	0.91		
2.31	0.61	244.83	1090.48	972.7	38.9	275.9	117.7	170.4	158.1	0.93		
2.58	0.62	251.60	1090.63	979.5	39.0	270.6	111.1	164.3	159.5	0.97		
2.85	0.63	256.86	1090.60	984.8	39.1	267.4	105.8	159.7	161.6	1.01		
3.13	0.64	261.45	1090.67	989.4	39.2	265.7	101.3	156.1	164.4	1.05		
3.40	0.65	265.47	1090.61	993.4	39.3	263.4	97.2	152.6	166.2	1.09		
3.69	0.67	268.71	1090.70	996.6	39.4	263.0	94.1	150.4	168.9	1.12		
3.96	0.67	271.36	1090.39	999.3	39.5	261.7	91.1	148.0	170.5	1.15		
4.22	0.68	273.60	1090.61	1001.5	39.6	261.8	89.1	146.6	172.7	1.18		
4.51	0.70	275.30	1090.78	1003.2	39.8	263.7	87.6	146.3	176.1	1.20		
4.78	0.71	276.48	1090.74	1004.4	39.9	264.5	86.4	145.7	178.1	1.22		
5.07	0.73	277.64	1090.82	1005.6	40.0	266.7	85.3	145.8	181.5	1.24		
5.33	0.73	278.39	1090.57	1006.3	40.1	266.0	84.3	144.9	181.8	1.25		
5.60	0.74	279.02	1090.64	1006.9	40.2	268.8	83.7	145.4	185.1	1.27		
5.88	0.76	279.06	1090.55	1007.0	40.3	271.3	83.6	146.1	187.7	1.28		
6.15	0.77	279.50	1090.93	1007.4	40.5	274.4	83.5	147.1	190.8	1.30		
6.43	0.78	279.23	1090.62	1007.1	40.6	276.6	83.5	147.9	193.2	1.31		
6.71	0.80	279.42	1090.66	1007.3	40.7	279.9	83.3	148.8	196.5	1.32		
6.98	0.81	278.78	1090.45	1006.7	40.8	282.9	83.8	150.1	199.1	1.33		
7.25	0.83	278.36	1090.63	1006.3	40.9	286.7	84.4	151.8	202.3	1.33		
7.52	0.84	278.09	1090.65	1006.0	41.1	288.9	84.6	152.7	204.3	1.34		
7.79	0.85	277.46	1090.68	1005.4	41.2	292.1	85.3	154.2	206.8	1.34		
8.08	0.87	276.50	1090.30	1004.4	41.3	296.1	85.9	156.0	210.2	1.35		
8.36	0.88	275.92	1090.67	1003.8	41.4	299.1	86.8	157.6	212.3	1.35		
8.62	0.89	274.92	1090.51	1002.8	41.6	302.5	87.7	159.3	214.8	1.35		
8.91	0.91	274.19	1090.72	1002.1	41.7	307.0	88.6	161.4	218.4	1.35		
9.18	0.92	273.26	1090.77	1001.2	41.8	309.7	89.6	163.0	220.1	1.35		
9.44	0.93	272.25	1090.70	1000.2	41.9	313.4	90.5	164.8	222.8	1.35		
9.73	0.95	271.25	1090.59	999.2	42.1	317.6	91.4	166.8	226.1	1.36		
10.00	0.96	270.42	1090.85	998.3	42.2	320.2	92.5	168.4	227.6	1.35		
10.28	0.98	269.63	1090.72	997.5	42.3	323.7	93.2	170.0	230.5	1.36		
10.56	0.99	268.71	1090.55	996.6	42.5	326.5	93.9	171.4	232.5	1.36		
10.83	1.00	267.67	1090.67	995.6	42.6	329.9	95.1	173.4	234.8	1.35		
11.10	1.01	266.86	1090.52	994.8	42.7	332.9	95.7	174.8	237.1	1.36		
11.38	1.02	265.93	1090.57	993.8	42.8	335.7	96.7	176.4	239.0	1.35		

Axial Strain (%)	Load (kN)	ΔU (kPa)	Cell Pressure (kPa)	Pore Pressure (kPa)	A_c (cm ²)	σ_1' (kPa)	σ_3' (kPa)	p' (kPa)	q (kPa)	Stress ratio η		
11.66	1.04	264.86	1090.68	992.8	43.0	339.1	97.9	178.3	241.1	1.35		
11.95	1.05	264.07	1090.60	992.0	43.1	341.4	98.6	179.5	242.7	1.35		
12.22	1.06	263.16	1090.69	991.1	43.3	345.5	99.6	181.6	245.9	1.35		
12.48	1.08	262.55	1091.04	990.5	43.4	348.8	100.6	183.3	248.2	1.35		
12.76	1.08	261.54	1090.59	989.5	43.5	350.1	101.1	184.1	249.0	1.35		
13.03	1.10	260.58	1090.57	988.5	43.7	353.1	102.1	185.8	251.1	1.35		
13.32	1.11	259.61	1090.49	987.5	43.8	355.9	103.0	187.3	252.9	1.35		
13.60	1.12	258.67	1090.67	986.6	43.9	359.2	104.1	189.1	255.1	1.35		
13.86	1.13	257.84	1090.55	985.8	44.1	361.6	104.8	190.4	256.8	1.35		
14.14	1.14	257.22	1090.61	985.1	44.2	363.0	105.5	191.3	257.5	1.35		
14.41	1.16	256.42	1090.65	984.3	44.4	367.0	106.3	193.2	260.7	1.35		
14.69	1.16	255.58	1090.17	983.5	44.5	367.3	106.7	193.5	260.6	1.35		
14.98	1.18	254.71	1090.50	982.6	44.7	371.4	107.9	195.7	263.5	1.35		
15.24	1.19	253.92	1090.44	981.8	44.8	374.2	108.6	197.1	265.6	1.35		
15.51	1.20	253.23	1090.54	981.1	44.9	375.6	109.4	198.1	266.2	1.34		
15.79	1.21	252.51	1090.52	980.4	45.1	377.9	110.1	199.4	267.8	1.34		
16.07	1.22	251.81	1090.54	979.7	45.2	381.0	110.8	200.9	270.1	1.34		
16.35	1.25	251.11	1090.64	979.0	45.4	387.0	111.6	203.4	275.4	1.35		
16.63	1.26	250.22	1090.70	978.1	45.5	388.9	112.6	204.7	276.3	1.35		
16.88	1.27	249.76	1090.50	977.7	45.7	391.2	112.8	205.6	278.4	1.35		
17.17	1.28	249.04	1090.55	976.9	45.8	393.2	113.6	206.8	279.6	1.35		
17.46	1.29	248.45	1090.44	976.4	46.0	395.4	114.1	207.8	281.3	1.35		
17.72	1.31	247.83	1090.48	975.7	46.1	397.8	114.7	209.1	283.0	1.35		
18.00	1.32	247.12	1090.68	975.0	46.3	400.5	115.6	210.6	284.9	1.35		
18.28	1.33	246.52	1090.63	974.4	46.5	401.5	116.2	211.3	285.3	1.35		
18.55	1.34	245.75	1090.43	973.7	46.6	403.5	116.8	212.3	286.8	1.35		
18.82	1.35	245.24	1090.63	973.2	46.8	406.2	117.5	213.7	288.7	1.35		
19.09	1.36	244.48	1090.63	972.4	46.9	408.9	118.2	215.1	290.6	1.35		
19.37	1.37	243.77	1090.56	971.7	47.1	410.0	118.9	215.9	291.1	1.35		
19.65	1.39	243.30	1090.83	971.2	47.3	412.8	119.6	217.3	293.1	1.35		
19.92	1.40	242.73	1090.66	970.6	47.4	414.2	120.0	218.1	294.2	1.35		
20.20	1.40	242.04	1090.38	969.9	47.6	415.6	120.4	218.8	295.2	1.35		
20.49	1.41	241.68	1090.57	969.6	47.8	416.6	121.0	219.5	295.7	1.35		
20.76	1.42	241.08	1090.64	969.0	47.9	418.7	121.6	220.7	297.1	1.35		
21.03	1.43	240.75	1090.72	968.7	48.1	420.2	122.1	221.4	298.1	1.35		
21.32	1.44	239.90	1090.56	967.8	48.3	421.9	122.7	222.5	299.1	1.34		
21.58	1.45	239.52	1090.95	967.4	48.4	422.7	123.5	223.2	299.1	1.34		
21.87	1.46	238.84	1090.68	966.8	48.6	424.2	123.9	224.0	300.2	1.34		
22.15	1.47	238.53	1090.93	966.4	48.8	426.3	124.5	225.1	301.8	1.34		
22.42	1.48	237.89	1090.88	965.8	48.9	427.0	125.1	225.7	302.0	1.34		
22.70	1.48	237.08	1090.70	965.0	49.1	427.4	125.7	226.3	301.7	1.33		
22.96	1.50	236.64	1090.55	964.5	49.3	430.0	126.0	227.3	304.0	1.34		
23.24	1.51	236.19	1090.62	964.1	49.5	431.7	126.5	228.2	305.2	1.34		
23.52	1.52	235.29	1090.53	963.2	49.6	432.9	127.3	229.2	305.6	1.33		
23.80	1.54	234.96	1090.52	962.9	49.8	435.9	127.6	230.4	308.2	1.34		
24.06	1.54	234.68	1090.80	962.6	50.0	435.4	128.2	230.6	307.2	1.33		
24.22	1.54	234.15	1090.76	962.1	50.1	436.1	128.7	231.2	307.4	1.33		

Undrained Triaxial Compression Test

Project No. :	06-1413-089/4000	Client :	Meadowbank Mining Corporation	Location :	
Sch No.		Project :	Dike Design	Type :	Trench Area Till
Lab Work:	ROB	Location:	Meadowbank Gold Project	Depth :	
Test ID:	CIU - 3				

Equipment	Specimen Geometry	Phase Relationships	Strength Results
Machine: Trautwein	Initial Final	Initial Final	q_{MAX} (kPa) = 316.2
Chamber: C1	Height (mm) = 121.90 97.49	$e = 0.29 0.29$	Strain @ = 19.77
Load Cell: 194249	Diameter (mm) = 67.74 75.75	ρ_{sat} (kg/m ³) = 2343 2343	$\eta_{MAX} = 1.40$
Axial DCDT: LP-175	Area (cm ²) = 36.04 45.07	ρ_{dry} (kg/m ³) = 2119 2119	Strain @ = 8.29
Cell Pressure: PS-3118	Volume (cm ³) = 439.36 439.36	$G_s = 2.73$	
Back Pressure: PS-3125			B Value 0.99
Pore Pressure: PS-2232			Target Mean Effective Stress (kPa) 572.02

Axial Strain (%)	Load (kN)	ΔU (kPa)	Cell Pressure (kPa)	Pore Pressure (kPa)	A_c (cm ²)	σ_1' (kPa)	σ_3' (kPa)	p' (kPa)	q (kPa)	Stress ratio η		
0.00	0.00	0.00	1440.36	868.3	36.0	572.0	572.0	572.0	0.0	0.00		
0.29	0.06	11.52	1439.64	879.9	36.1	577.6	559.8	565.7	17.9	0.03		
0.56	0.72	176.32	1440.34	1044.7	36.2	594.0	395.7	461.8	198.3	0.43		
0.82	0.90	279.87	1440.11	1148.2	36.3	539.0	291.9	374.3	247.1	0.66		
1.11	0.93	338.28	1440.42	1206.6	36.4	490.2	233.8	319.3	256.4	0.80		
1.39	0.93	374.53	1439.59	1242.9	36.6	452.2	196.7	281.9	255.5	0.91		
1.68	0.90	398.77	1439.93	1267.1	36.7	419.6	172.8	255.1	246.8	0.97		
1.97	0.86	416.28	1439.90	1284.6	36.8	388.8	155.3	233.1	233.6	1.00		
2.25	0.87	430.26	1440.30	1298.6	36.9	376.8	141.7	220.1	235.1	1.07		
2.53	0.89	440.69	1440.43	1309.0	37.0	372.0	131.4	211.6	240.6	1.14		
2.83	0.92	447.89	1439.99	1316.2	37.1	373.0	123.8	206.8	249.2	1.21		
3.12	0.89	454.39	1440.23	1322.7	37.2	357.5	117.5	197.5	240.0	1.22		
3.40	0.86	459.20	1440.18	1327.5	37.3	344.1	112.6	189.8	231.5	1.22		
3.70	0.87	463.33	1439.82	1331.7	37.4	341.6	108.1	186.0	233.4	1.26		
3.98	0.88	465.83	1440.04	1334.2	37.5	339.6	105.9	183.8	233.7	1.27		
4.28	0.87	468.42	1440.04	1336.8	37.7	335.2	103.3	180.6	231.9	1.28		
4.55	0.87	469.76	1439.79	1338.1	37.8	331.0	101.7	178.1	229.3	1.29		
4.85	0.87	471.19	1440.06	1339.5	37.9	329.9	100.5	177.0	229.3	1.30		
5.14	0.88	473.07	1440.22	1341.4	38.0	330.1	98.8	175.9	231.3	1.31		
5.43	0.88	473.98	1440.14	1342.3	38.1	329.1	97.8	174.9	231.3	1.32		
5.71	0.88	474.84	1439.79	1343.2	38.2	326.6	96.6	173.3	230.0	1.33		
5.99	0.93	474.99	1440.35	1343.3	38.3	338.6	97.0	177.5	241.6	1.36		
6.28	0.93	475.14	1439.93	1343.5	38.5	338.5	96.4	177.1	242.0	1.37		
6.58	0.93	475.54	1440.27	1343.9	38.6	336.6	96.4	176.4	240.2	1.36		
6.86	0.93	475.74	1440.51	1344.1	38.7	335.8	96.4	176.2	239.3	1.36		
7.16	0.93	475.63	1440.12	1344.0	38.8	336.1	96.1	176.1	240.0	1.36		
7.44	0.95	475.30	1440.34	1343.6	38.9	339.6	96.7	177.7	242.9	1.37		
7.72	0.97	475.61	1440.14	1344.0	39.1	344.2	96.2	178.9	248.1	1.39		
8.01	0.98	475.53	1440.50	1343.9	39.2	347.1	96.6	180.1	250.5	1.39		
8.29	1.00	475.00	1440.40	1343.3	39.3	352.6	97.1	182.2	255.5	1.40		
8.58	1.00	474.57	1440.16	1342.9	39.4	351.6	97.3	182.0	254.4	1.40		
8.88	1.01	473.64	1440.35	1342.0	39.6	352.8	98.4	183.2	254.4	1.39		
9.15	0.99	473.52	1440.31	1341.9	39.7	346.7	98.5	181.2	248.3	1.37		
9.45	1.00	473.08	1440.70	1341.4	39.8	350.4	99.3	183.0	251.1	1.37		
9.73	1.00	472.17	1440.14	1340.5	39.9	350.3	99.6	183.2	250.7	1.37		
10.02	1.02	471.66	1440.29	1340.0	40.1	355.9	100.3	185.5	255.6	1.38		
10.31	1.02	471.36	1440.44	1339.7	40.2	354.4	100.7	185.3	253.7	1.37		
10.59	1.01	470.32	1440.52	1338.7	40.3	353.6	101.9	185.8	251.7	1.35		
10.88	1.04	469.79	1440.39	1338.1	40.4	359.4	102.3	188.0	257.1	1.37		
11.17	1.05	468.97	1440.34	1337.3	40.6	360.8	103.0	188.9	257.8	1.36		
11.45	1.08	468.39	1440.26	1336.7	40.7	369.1	103.5	192.1	265.6	1.38		
11.72	1.09	467.16	1439.75	1335.5	40.8	371.1	104.3	193.2	266.9	1.38		
12.02	1.09	466.28	1439.95	1334.6	41.0	372.4	105.3	194.3	267.0	1.37		
12.31	1.10	466.02	1440.06	1334.4	41.1	373.5	105.7	195.0	267.8	1.37		
12.59	1.10	465.11	1439.93	1333.4	41.2	372.9	106.5	195.3	266.4	1.36		
12.87	1.10	464.46	1440.16	1332.8	41.4	372.1	107.4	195.6	264.7	1.35		
13.16	1.10	463.99	1440.00	1332.3	41.5	372.9	107.7	196.1	265.2	1.35		
13.45	1.10	462.50	1439.79	1330.8	41.6	373.9	108.9	197.3	264.9	1.34		
13.75	1.12	461.84	1440.19	1330.2	41.8	377.6	110.0	199.2	267.6	1.34		
14.03	1.12	461.31	1440.08	1329.7	41.9	378.7	110.4	199.9	268.3	1.34		
14.31	1.12	460.46	1440.02	1328.8	42.1	378.5	111.2	200.3	267.3	1.33		
14.61	1.14	459.94	1440.39	1328.3	42.2	381.6	112.1	201.9	269.5	1.33		
14.90	1.14	458.65	1440.02	1327.0	42.4	381.2	113.0	202.4	268.2	1.32		
15.17	1.16	458.82	1440.46	1327.2	42.5	387.0	113.3	204.5	273.7	1.34		
15.47	1.17	458.12	1440.09	1326.5	42.6	388.7	113.6	205.3	275.0	1.34		

Axial Strain (%)	Load (kN)	ΔU (kPa)	Cell Pressure (kPa)	Pore Pressure (kPa)	A_c (cm ²)	σ_1' (kPa)	σ_3' (kPa)	p' (kPa)	q (kPa)	Stress ratio η		
15.75	1.18	456.97	1440.87	1325.3	42.8	392.0	115.6	207.7	276.5	1.33		
16.04	1.20	456.22	1440.16	1324.6	42.9	394.9	115.6	208.7	279.3	1.34		
16.33	1.21	455.49	1440.15	1323.8	43.1	396.8	116.3	209.8	280.5	1.34		
16.61	1.23	455.07	1440.35	1323.4	43.2	400.7	116.9	211.5	283.7	1.34		
16.91	1.28	454.46	1440.55	1322.8	43.4	411.7	117.7	215.7	294.0	1.36		
17.19	1.31	453.44	1439.99	1321.8	43.5	418.8	118.2	218.4	300.6	1.38		
17.47	1.33	453.03	1440.13	1321.4	43.7	423.0	118.8	220.2	304.2	1.38		
17.77	1.34	451.69	1440.18	1320.0	43.8	424.8	120.1	221.7	304.7	1.37		
18.04	1.32	451.43	1439.90	1319.8	44.0	421.3	120.1	220.5	301.2	1.37		
18.34	1.32	450.59	1439.90	1318.9	44.1	420.1	121.0	220.7	299.1	1.36		
18.64	1.33	450.63	1440.11	1319.0	44.3	421.3	121.1	221.2	300.2	1.36		
18.91	1.35	449.33	1440.71	1317.7	44.4	427.1	123.0	224.4	304.1	1.36		
19.21	1.39	448.96	1440.29	1317.3	44.6	434.6	123.0	226.9	311.6	1.37		
19.50	1.39	448.88	1440.14	1317.2	44.8	433.9	122.9	226.6	311.0	1.37		
19.77	1.42	448.30	1440.13	1316.6	44.9	439.7	123.5	228.9	316.2	1.38		
20.03	1.42	446.66	1439.96	1315.0	45.1	439.8	125.0	229.9	314.8	1.37		

TILL CONSOLIDATION

One-Dimensional Consolidation Properties of Soils of Soils - ASTM D 2436 - 96

Project No. :	06-1413-089/4000	Client :	Meadowbank Mining Corporation	Borehole:	
Sch No.		Project :	Dike Design	Sample:	Lake Bed Till
Lab Work:	ROB/LL	Location:	Meadowbank Gold Project	Depth :	

Equipment

Machine: Sigma-1
Mach No. Station 1
Ring No. Large
Lever Arm Ratio 0.0
Drainage: Double-sided

Specimen Geometry

	Initial	Final
Height (mm) =	71.21	62.15
Diameter (mm) =	152.40	152.40
Area (cm ²) =	182.41	182.41
Volume (cm ³) =	1298.93	1133.65

Phase Relationships

	Initial	Final
Wet Wt (g) =	2701.80	2566.60
Dry Wt (g) =	2305.10	2305.10
w (%) =	17.21	11.34
e =	0.54	0.34
ρ_{wet} (kg/m ³) =	2080	2264
ρ_{dry} (kg/m ³) =	1775	2033
S (%) =	87.3	90.4

Remarks

ASTM Method: B - Constant Time Increment
Method for C_v : Casagrande
H_{avg} : Half the specimen height
Time Increment: _____

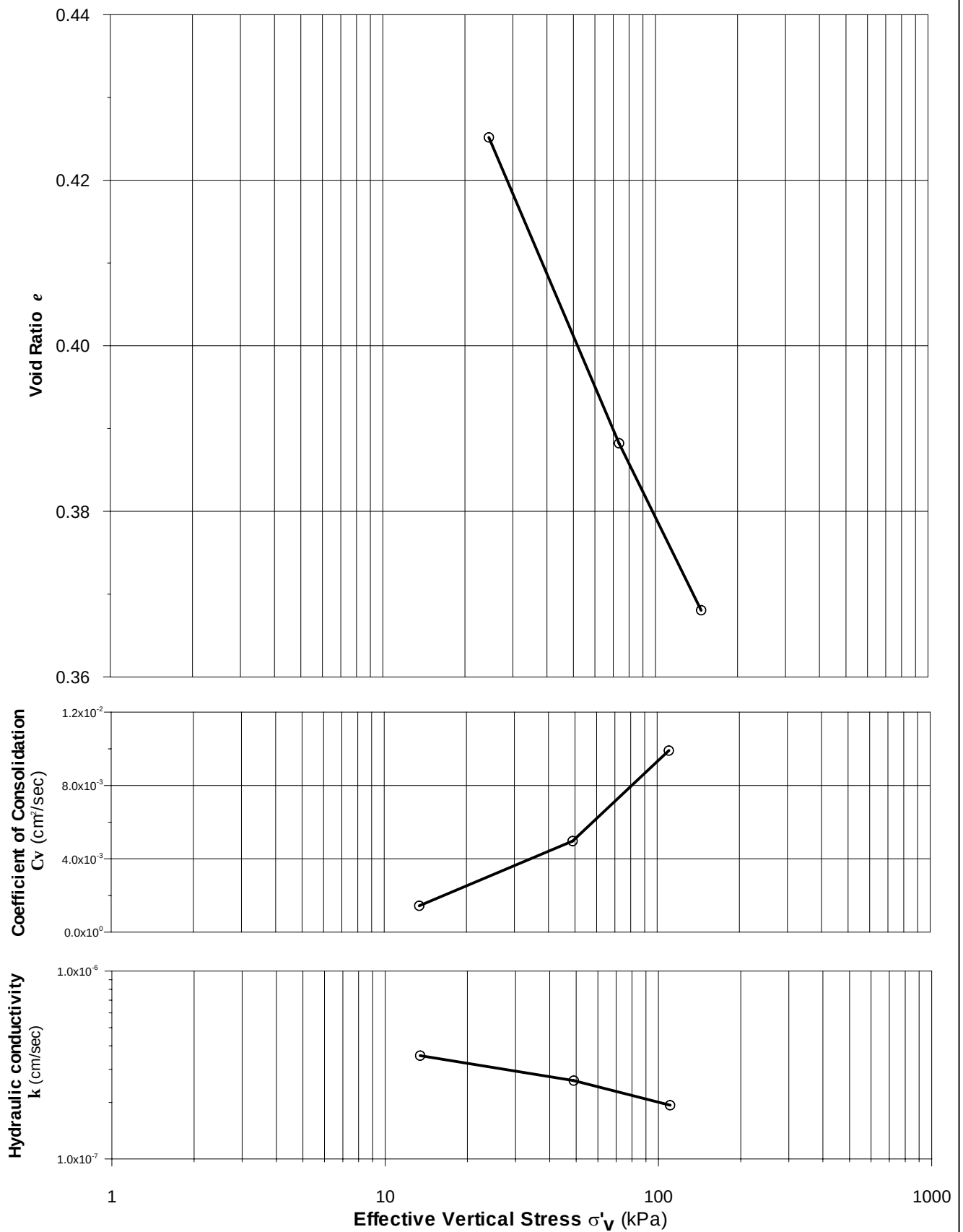
Sample Properties

G_s = 2.73 Calculated
H_s (mm) = 46.29

Stress (kPa)	ΔH (mm)	Corrected d _f (mm)	$\frac{\epsilon}{\Sigma \Delta H / H_o}$ (%)	H-H _s (mm)	e (H-H _s)/H _s	Stress _{avg} (kPa)	e _{avg}	H _{avg} (mm)	t 50 (min)	C _v (cm ² /sec)	k (cm/sec)
2.3	1.49	69.75	2.05	23.46	0.51						
24.5	4.25	65.97	7.36	19.68	0.43	13.4	0.47	67.86	105.000	1.4E-03	3.5E-07
73.5	2.01	64.26	9.76	17.97	0.39	49.0	0.41	65.11	28.000	5.0E-03	2.6E-07
147.0	1.11	63.32	11.07	17.04	0.37	110.2	0.38	63.79	13.500	9.9E-03	1.9E-07

Comments: _____

Sample Description : _____



TILL STANDARD PROCTOR

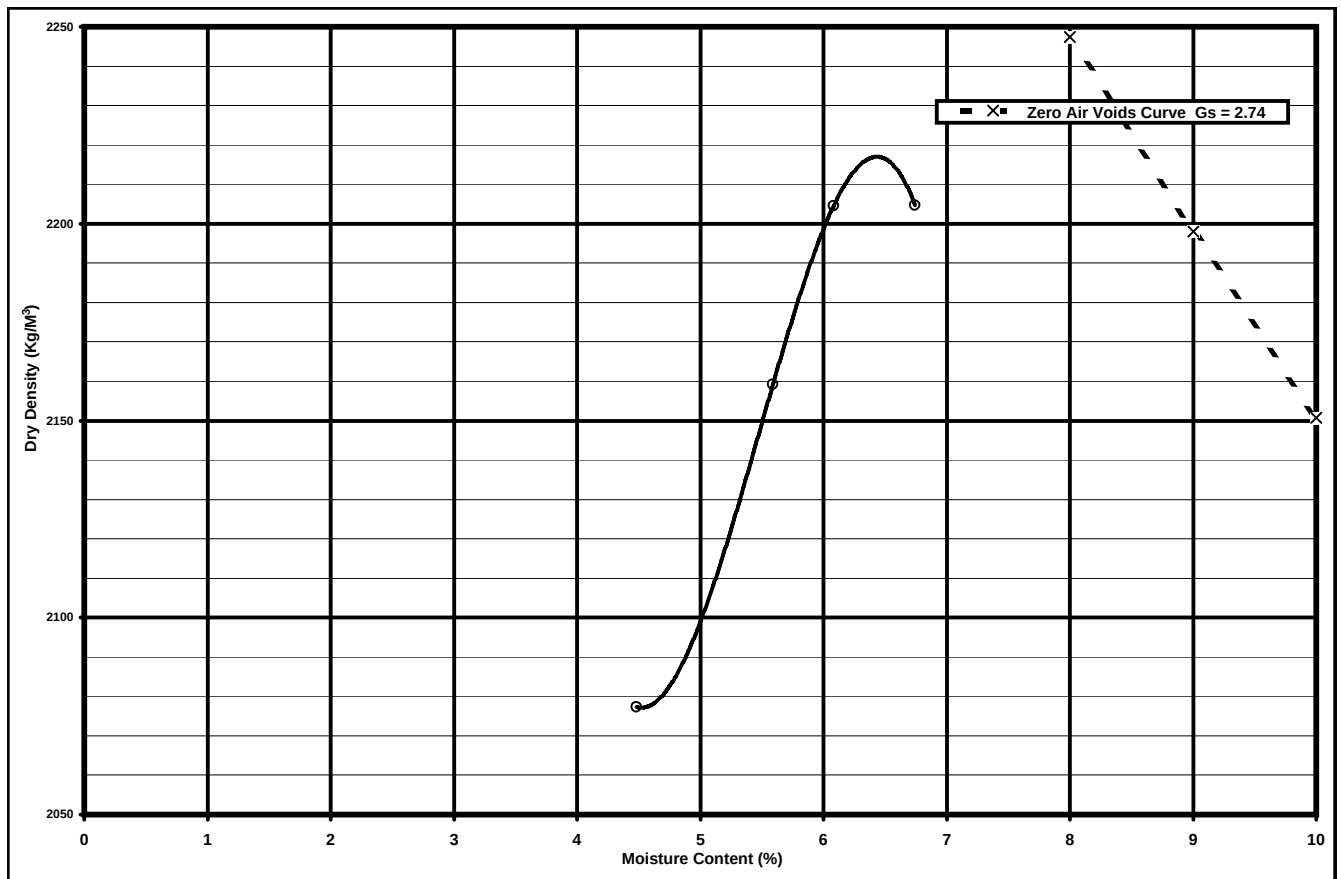
Test Method for Laboratory Compaction Characteristics of Soil

Project #	06-1413-089	Sample Identification :		ASTM D 698-91 Standard Proctor		
Client	Meadowbank Mining Corporation	Sample	1	Method	C	
Project	Dike Design		Second Portage, Lake Trench,	Optimum WC =	6.4	%
Location	Meadowbank Gold Project		Lake Bed Till	Max ρ_{dry} =	2217	Kg/M ³

Technician	TM	Sample Description :		ASTM D 4718-87		
Schedule #	13			Correction for oversize particles		
Proctor Type (S/M)	S			Optimum WC =	5.4	%
		Mould Volume =	0.002124 m ³	Max ρ_{dry} =	2309	Kg/M ³

TRIAL NO.	1	2	3	4			Percent Oversize :	
WT SOIL WET + MOULD	10252	10484	10609	10640			SCREEN SIZE :	19.00 mm
WEIGHT OF MOULD	5642	5642	5642	5642			Coarser Fraction	
WT OF SOIL WET	4610	4842	4967	4999			P_c =	20.8 %
WET DENSITY (Kg/M³)	2170	2280	2339	2353			G_s =	2.74 assumed
DRY DENSITY (Kg/M³)	2077	2159	2205	2205			W_c =	1.5 %

CONTAINER NO.							Finer Fraction	
WT OF WET SOIL + TARE	435.2	372.7	423.0	514.7			P_f =	79.2 %
WT OF DRY SOIL + TARE	425.6	358.9	404.8	494.4			G_s =	2.74 assumed
WEIGHT OF WATER	9.6	13.8	18.2	20.3			W_f =	6.4 %
TARE WEIGHT	211.5	112.0	105.6	193.4			Zero Air Voids Curve G_s = 2.74	
WEIGHT OF DRY SOIL	214.1	246.9	299.2	301.0			Bulk G_s =	2.74
MOISTURE CONTENT (%)	4.5	5.6	6.1	6.7			Saturation =	100.0 %



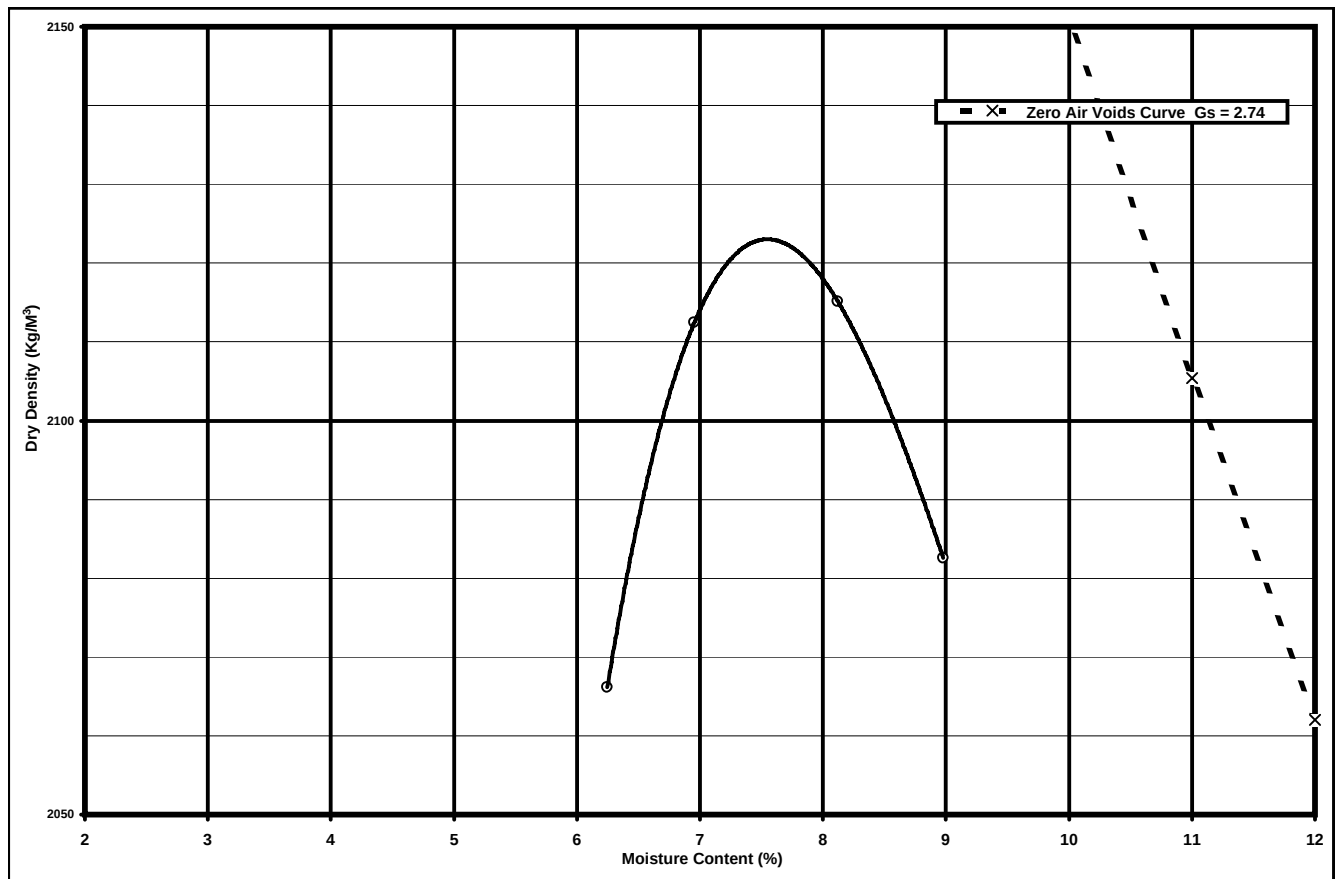
Test Method for Laboratory Compaction Characteristics of Soil

Project #	06-1413-089	Sample Identification :		ASTM D 698-91 Standard Proctor		
Client	Meadowbank Mining Corporation	Sample	2	Method	C	
Project	Dike Design		Second Portage, Trench,	Optimum WC =	7.5	%
Location	Meadowbank Gold Project		Lake Bed Till	Max ρ_{dry} =	2123	Kg/M ³

Technician	TM	Sample Description :		ASTM D 4718-87		
Schedule #	13			Correction for oversize particles		
Proctor Type (S/M)	S			Optimum WC =	6.4	%
		Mould Volume =	0.002124 m ³	Max ρ_{dry} =	2211	Kg/M ³

TRIAL NO.	1	2	3	4			Percent Oversize :	
WT SOIL WET + MOULD	10305	10441	10499	10462			SCREEN SIZE :	19.00 mm
WEIGHT OF MOULD	5642	5642	5642	5642			Coarser Fraction	
WT OF SOIL WET	4663	4799	4857	4821			P_c =	17.7 %
WET DENSITY (Kg/M ³)	2195	2259	2287	2270			G_s =	2.74 assumed
DRY DENSITY (Kg/M ³)	2066	2112	2115	2083			W_c =	1.5 %

CONTAINER NO.							Finer Fraction	
WT OF WET SOIL + TARE	394.3	552.9	510.1	481.2			P_f =	82.3 %
WT OF DRY SOIL + TARE	377.6	530.7	487.7	450.8			G_s =	2.74 assumed
WEIGHT OF WATER	16.7	22.2	22.4	30.4			W_f =	7.5 %
TARE WEIGHT	110.3	211.5	211.8	112.2			Zero Air Voids Curve G_s =	2.74
WEIGHT OF DRY SOIL	267.3	319.2	275.9	338.6			Bulk G_s =	2.74
MOISTURE CONTENT (%)	6.2	7.0	8.1	9.0			Saturation =	100.0 %



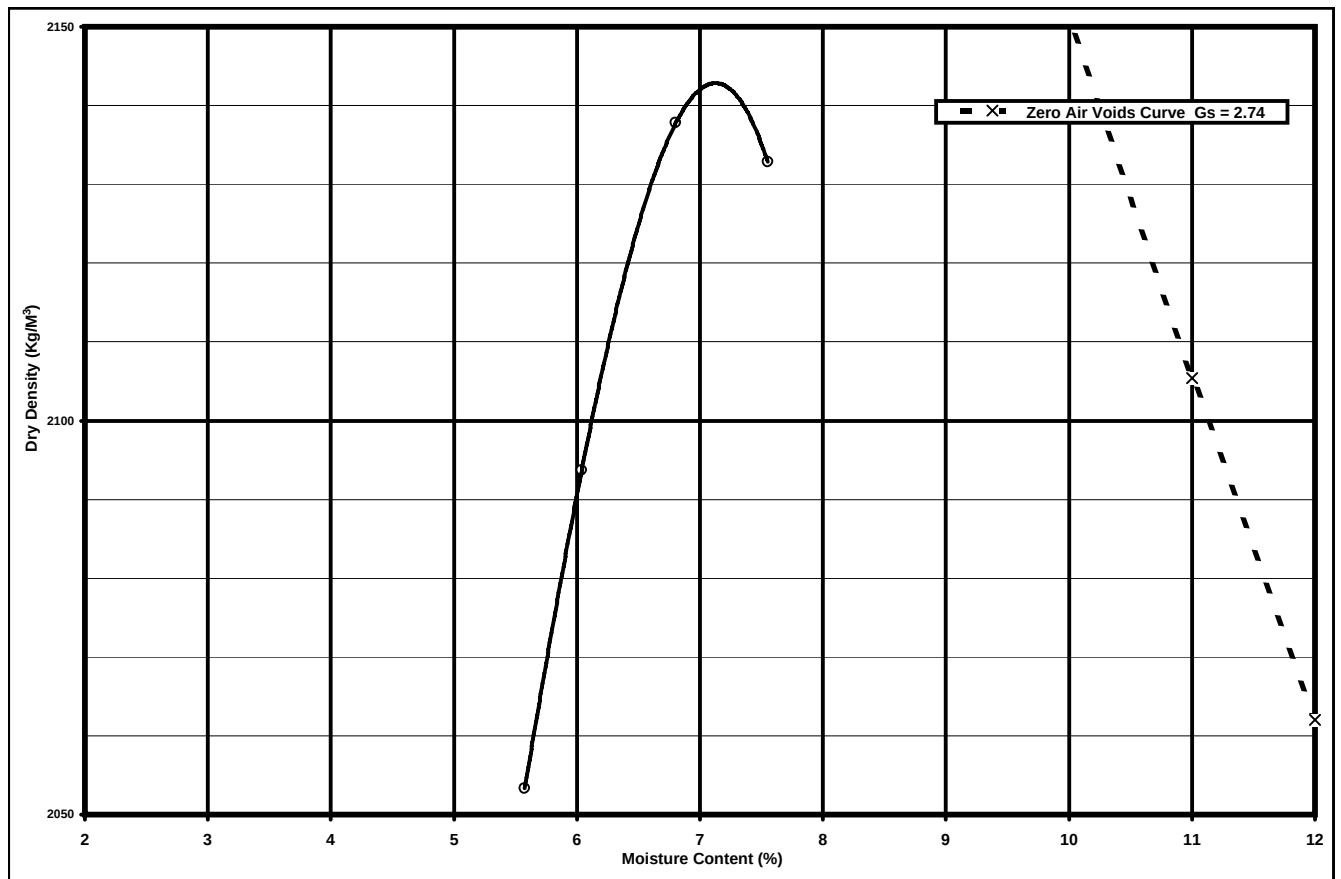
Test Method for Laboratory Compaction Characteristics of Soil

Project #	06-1413-089	Sample Identification :		ASTM D 698-91 Standard Proctor		
Client	Meadowbank Mining Corporation	Sample	3, 6 & 7 Combined	Method	C	
Project	Dike Design		Second Portage, Lake Trench,	Optimum WC =	7.1	%
Location	Meadowbank Gold Project		Lake Bed Till	Max ρ_{dry} =	2142	Kg/M ³

Technician	TM	Sample Description :		ASTM D 4718-87		
Schedule #	13			Correction for oversize particles		
Proctor Type (S/M)	S			Optimum WC =	5.6	%
		Mould Volume =	0.002124 m ³	Max ρ_{dry} =	2272	Kg/M ³

TRIAL NO.	1	2	3	4			Percent Oversize :	
WT SOIL WET + MOULD	10246	10357	10492	10514			SCREEN SIZE :	19.00 mm
WEIGHT OF MOULD	5642	5642	5642	5642			Coarser Fraction	
WT OF SOIL WET	4605	4716	4850	4872			P_c =	26.3 %
WET DENSITY (Kg/M ³)	2168	2220	2283	2294			G_s =	2.74 assumed
DRY DENSITY (Kg/M ³)	2053	2094	2138	2133			W_c =	1.5 %

CONTAINER NO.							Finer Fraction	
WT OF WET SOIL + TARE	339.3	475.1	349.1	546.4			P_f =	73.7 %
WT OF DRY SOIL + TARE	327.2	460.1	334.0	522.9			G_s =	2.74 assumed
WEIGHT OF WATER	12.1	15.0	15.1	23.5			W_f =	7.1 %
TARE WEIGHT	110.2	211.7	112.1	211.6			Zero Air Voids Curve G_s =	2.74
WEIGHT OF DRY SOIL	217.0	248.4	221.9	311.3			Bulk G_s =	2.74
MOISTURE CONTENT (%)	5.6	6.0	6.8	7.5			Saturation =	100.0 %



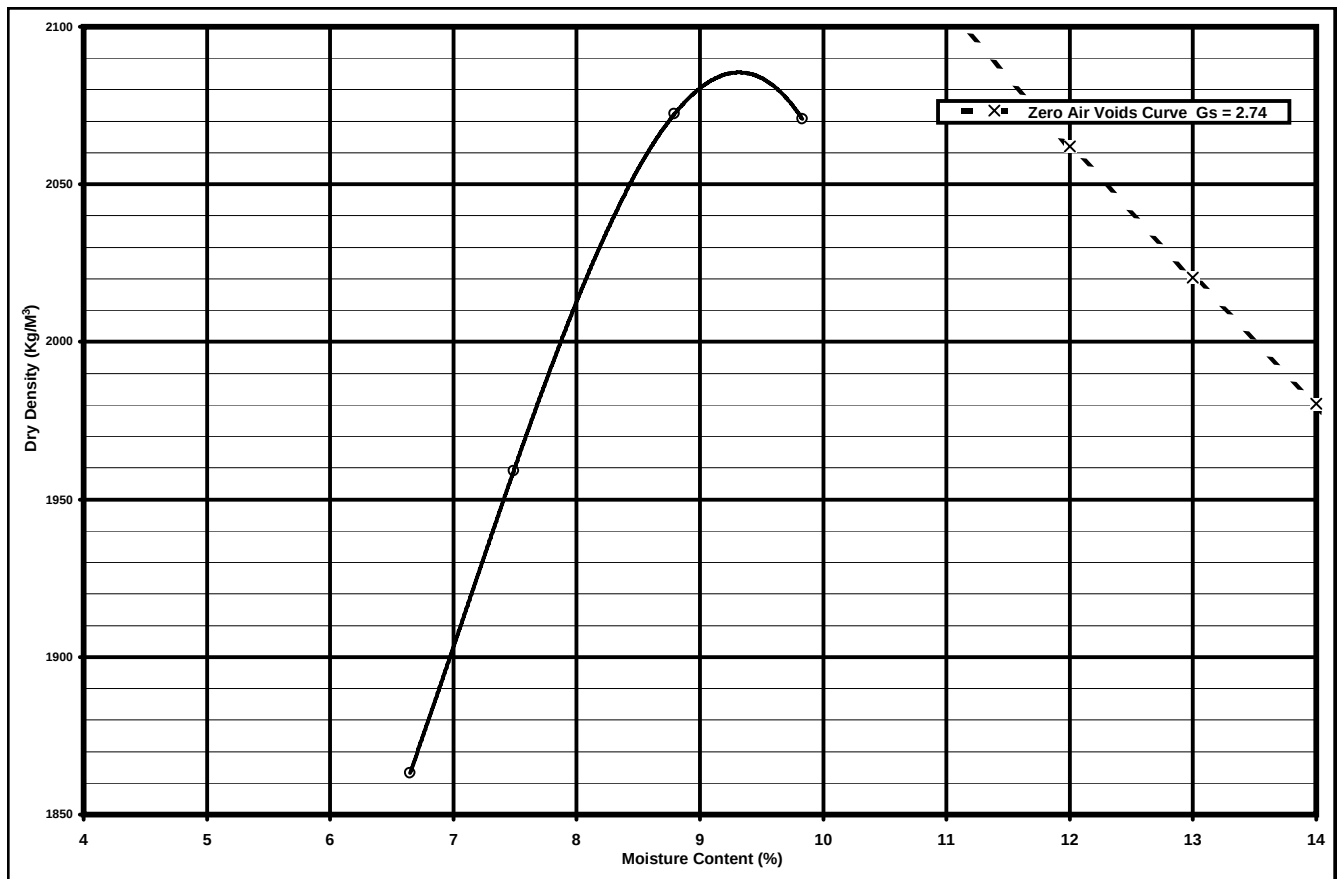
Test Method for Laboratory Compaction Characteristics of Soil

Project #	06-1413-089	Sample Identification :		ASTM D 698-91 Standard Proctor		
Client	Meadowbank Mining Corporation	Sample	4	Method	C	
Project	Dike Design		Second Portage, Lake Trench,	Optimum WC =	9.3	%
Location	Meadowbank Gold Project		Lake Bed Till	Max ρ_{dry} =	2085	Kg/M ³

Technician	TM	Sample Description :		ASTM D 4718-87		
Schedule #	13			Correction for oversize particles		
Proctor Type (S/M)	S			Optimum WC =	7.4	%
		Mould Volume =	0.002124 m ³	Max ρ_{dry} =	2212	Kg/M ³

TRIAL NO.	1	2	3	4			Percent Oversize :	
WT SOIL WET + MOULD	9862	10114	10431	10472			SCREEN SIZE :	19.00 mm
WEIGHT OF MOULD	5642	5642	5642	5642			Coarser Fraction	
WT OF SOIL WET	4221	4473	4789	4831			P _c =	24.1 %
WET DENSITY (Kg/M ³)	1987	2106	2255	2274			G _s =	2.74 assumed
DRY DENSITY (Kg/M ³)	1863	1959	2072	2071			W _c =	1.5 %

CONTAINER NO.							Finer Fraction	
WT OF WET SOIL + TARE	335.0	398.5	381.8	552.3			P _f =	75.9 %
WT OF DRY SOIL + TARE	320.7	378.4	360.0	520.2			G _s =	2.74 assumed
WEIGHT OF WATER	14.3	20.1	21.8	32.1			W _f =	9.3 %
TARE WEIGHT	105.6	110.0	112.1	193.6			Zero Air Voids Curve G _s = 2.74	
WEIGHT OF DRY SOIL	215.1	268.4	247.9	326.6			Bulk G _s =	2.74
MOISTURE CONTENT (%)	6.6	7.5	8.8	9.8			Saturation =	100.0 %



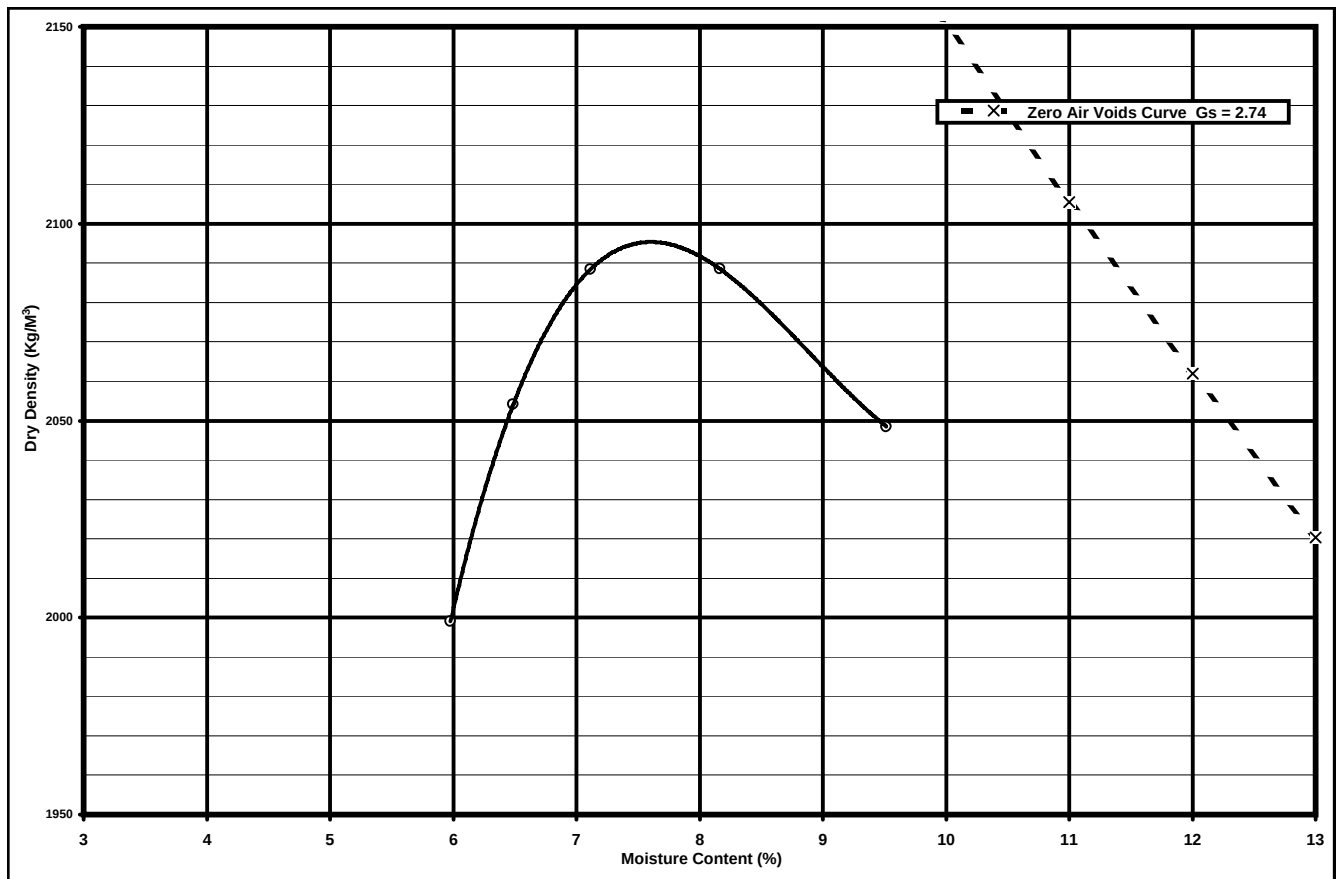
Test Method for Laboratory Compaction Characteristics of Soil

Project #	06-1413-089	Sample Identification :		ASTM D 698-91 Standard Proctor		
Client	Meadowbank Mining Corporation	Sample	5	Method	C	
Project	Dike Design		Second Portage, Lake Trench,	Optimum WC =	7.6	%
Location	Meadowbank Gold Project		Lake Bed Till	Max ρ_{dry} =	2095	Kg/M ³

Technician	TM	Sample Description :		ASTM D 4718-87		
Schedule #	13			Correction for oversize particles		
Proctor Type (S/M)	S			Optimum WC =	7.1	%
		Mould Volume =	0.002124 m ³	Max ρ_{dry} =	2139	Kg/M ³

TRIAL NO.	1	2	3	4	5		Percent Oversize :	
WT SOIL WET + MOULD	10142	10288	10440	10407	10393		SCREEN SIZE :	19.00 mm
WEIGHT OF MOULD	5642	5642	5642	5642	5642		Coarser Fraction	
WT OF SOIL WET	4500	4646	4798	4765	4751		P _c =	8.7 %
WET DENSITY (Kg/M ³)	2119	2187	2259	2243	2237		G _s =	2.74 assumed
DRY DENSITY (Kg/M ³)	1999	2054	2089	2049	2088		W _c =	1.5 %

CONTAINER NO.							Finer Fraction	
WT OF WET SOIL + TARE	503.6	540.7	621.6	666.0	542.2		P _f =	91.3 %
WT OF DRY SOIL + TARE	486.1	520.6	590.7	626.5	518.1		G _s =	2.74 assumed
WEIGHT OF WATER	17.5	20.1	30.9	39.5	24.1		W _f =	7.6 %
TARE WEIGHT	193.4	210.8	212.1	211.4	179.3		Zero Air Voids Curve G _s =	2.74
WEIGHT OF DRY SOIL	292.7	309.8	378.6	415.1	338.8		Bulk G _s =	2.74
MOISTURE CONTENT (%)	6.0	6.5	8.2	9.5	7.1		Saturation =	100.0 %



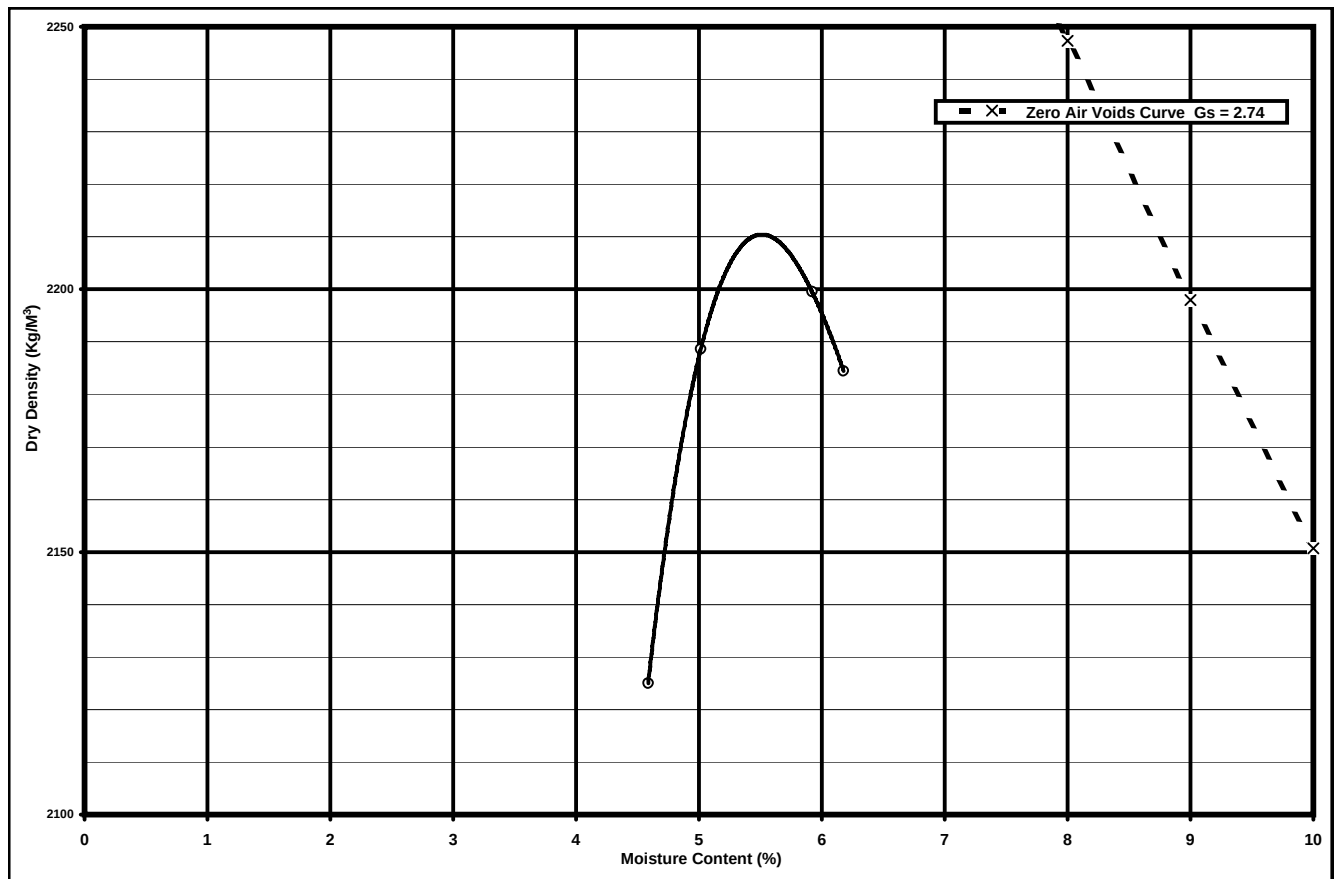
Test Method for Laboratory Compaction Characteristics of Soil

Project #	06-1413-089	Sample Identification :		ASTM D 698-91 Standard Proctor		
Client	Meadowbank Mining Corporation	Sample	8	Method	C	
Project	Dike Design		Second Portage, Lake Trench,	Optimum WC =	5.5	%
Location	Meadowbank Gold Project		Lake Bed Till	Max ρ_{dry} =	2211	Kg/M ³

Technician	TM	Sample Description :		ASTM D 4718-87		
Schedule #	13			Correction for oversize particles		
Proctor Type (S/M)	S			Optimum WC =	4.7	%
		Mould Volume =	0.002124 m ³	Max ρ_{dry} =	2295	Kg/M ³

TRIAL NO.	1	2	3	4			Percent Oversize :	
WT SOIL WET + MOULD	10362	10524	10590	10568			SCREEN SIZE :	19.00 mm
WEIGHT OF MOULD	5642	5642	5642	5642			Coarser Fraction	
WT OF SOIL WET	4721	4882	4949	4927			P _c =	18.9 %
WET DENSITY (Kg/M ³)	2222	2298	2330	2319			G _s =	2.74 assumed
DRY DENSITY (Kg/M ³)	2125	2189	2200	2185			W _c =	1.5 %

CONTAINER NO.							Finer Fraction	
WT OF WET SOIL + TARE	569.2	580.7	564.4	571.2			P _f =	81.1 %
WT OF DRY SOIL + TARE	553.5	563.1	544.7	548.4			G _s =	2.74 assumed
WEIGHT OF WATER	15.7	17.6	19.7	22.8			W _f =	5.5 %
TARE WEIGHT	211.2	212.2	211.9	179.3			Zero Air Voids Curve G _s =	2.74
WEIGHT OF DRY SOIL	342.3	350.9	332.8	369.1			Bulk G _s =	2.74
MOISTURE CONTENT (%)	4.6	5.0	5.9	6.2			Saturation =	100.0 %



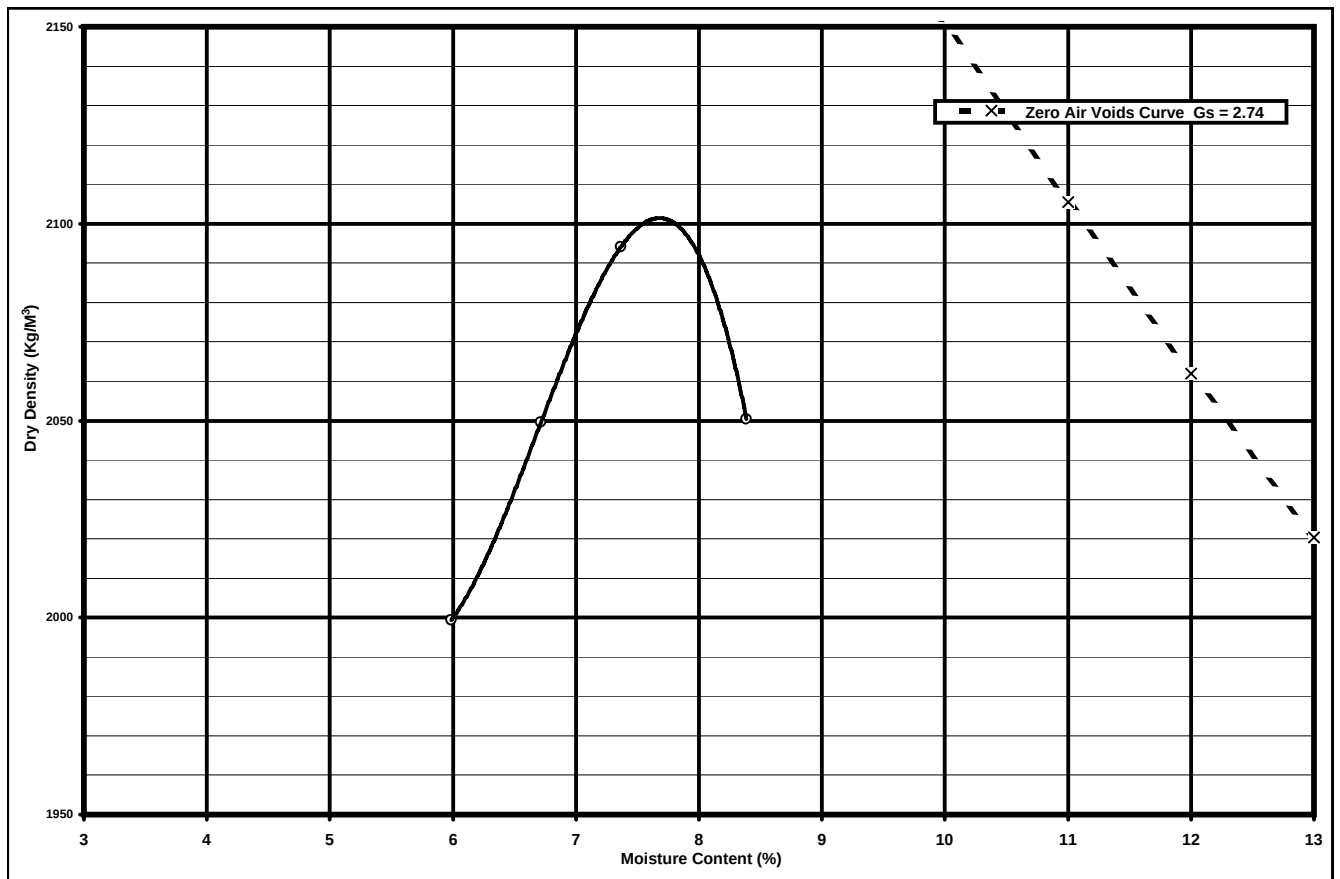
Test Method for Laboratory Compaction Characteristics of Soil

Project #	06-1413-089	Sample Identification :		ASTM D 698-91 Standard Proctor		
Client	Meadowbank Mining Corporation	Sample	9 & 10	Method	C	
Project	Dike Design		Second Portage, Lake Trench	Optimum WC =	7.7	%
Location	Meadowbank Gold Project		Lake Bed Till	Max ρ_{dry} =	2101	Kg/M ³

Technician	TM	Sample Description :		ASTM D 4718-87		
Schedule #	13			Correction for oversize particles		
Proctor Type (S/M)	S			Optimum WC =	7.5	%
		Mould Volume =	0.002124 m ³	Max ρ_{dry} =	2118	Kg/M ³

TRIAL NO.	1	2	3	4			Percent Oversize :	
WT SOIL WET + MOULD	10143	10287	10417	10362			SCREEN SIZE :	19.00 mm
WEIGHT OF MOULD	5642	5642	5642	5642			Coarser Fraction	
WT OF SOIL WET	4501	4646	4776	4720			P_c =	3.4 %
WET DENSITY (Kg/M ³)	2119	2187	2248	2222			G_s =	2.74 assumed
DRY DENSITY (Kg/M ³)	1999	2050	2094	2050			W_c =	1.5 %

CONTAINER NO.							Finer Fraction	
WT OF WET SOIL + TARE	384.9	471.5	597.6	342.3			P_f =	96.6 %
WT OF DRY SOIL + TARE	369.5	454.0	571.1	324.0			G_s =	2.74 assumed
WEIGHT OF WATER	15.4	17.5	26.5	18.3			W_f =	7.7 %
TARE WEIGHT	112.2	193.4	211.3	105.8			Zero Air Voids Curve G_s = 2.74	
WEIGHT OF DRY SOIL	257.3	260.6	359.8	218.2			Bulk G_s =	2.74
MOISTURE CONTENT (%)	6.0	6.7	7.4	8.4			Saturation =	100.0 %



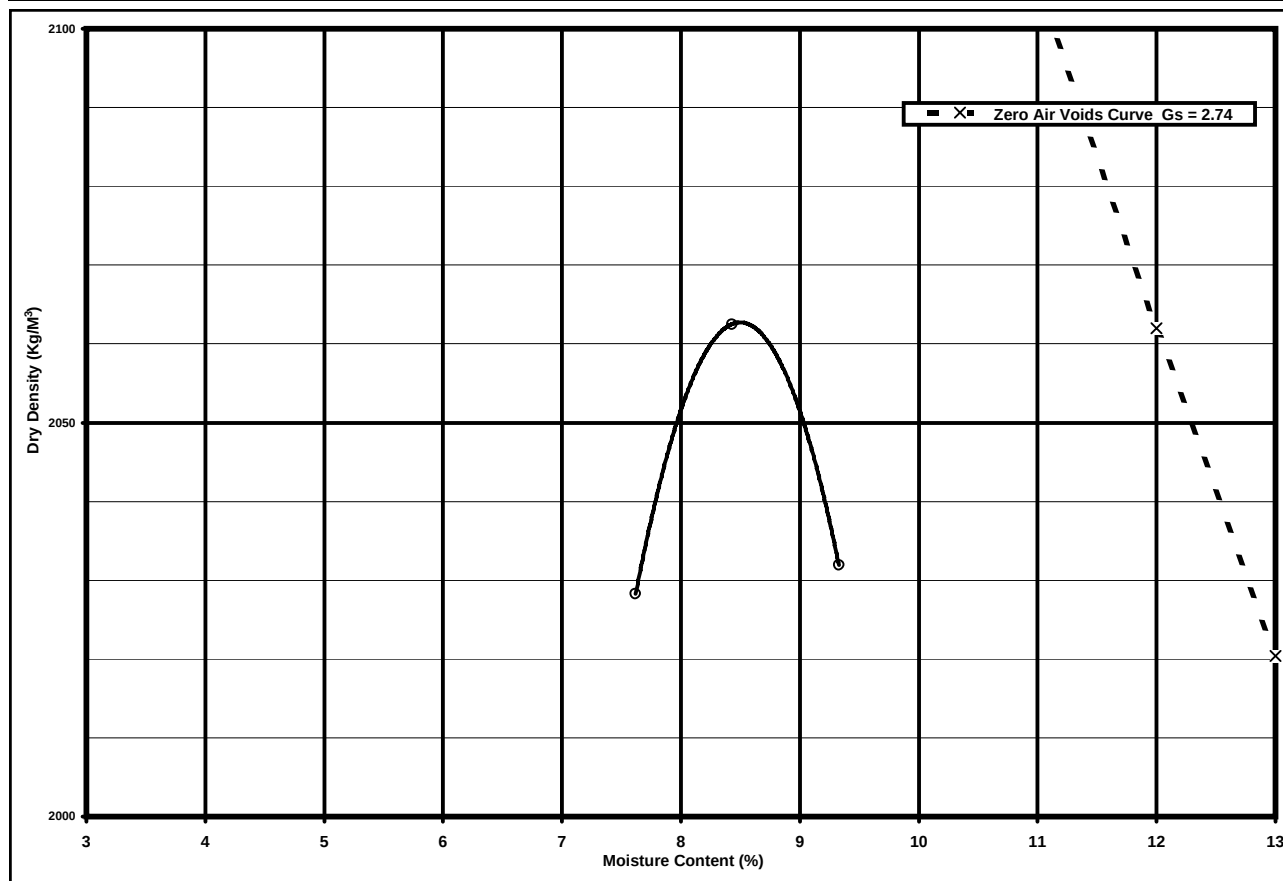
Test Method for Laboratory Compaction Characteristics of Soil

Project #	06-1413-089	Sample Identification :		ASTM D 698-91 Standard Proctor		
Client	Meadowbank Mining Corporation	Sample	11	Method	C	
Project	Dike Design		Lake Bed Till	Optimum WC =	8.5	%
Location	Meadowbank Gold Project			Max ρ_{dry} =	2062	Kg/M ³

Technician	TM	Sample Description :		ASTM D 4718-87		
Schedule #	13			Correction for oversize particles		
Proctor Type (S/M)	S			Optimum WC =	7.9	%
		Mould Volume =	0.002124 m ³	Max ρ_{dry} =	2109	Kg/M ³

TRIAL NO.	1	2	3				Percent Oversize :		
WT SOIL WET + MOULD	10278	10392	10360				SCREEN SIZE :	19.00	mm
WEIGHT OF MOULD	5642	5642	5642				Coarser Fraction		
WT OF SOIL WET	4636	4750	4718				P _c =	9.0	%
WET DENSITY (Kg/M ³)	2183	2236	2221				G _s =	2.74	assumed
DRY DENSITY (Kg/M ³)	2028	2063	2032				W _c =	1.5	%

CONTAINER NO.							Finer Fraction		
WT OF WET SOIL + TARE	400.2	305.4	442.0				P _f =	91.0	%
WT OF DRY SOIL + TARE	385.6	289.9	422.4				G _s =	2.74	assumed
WEIGHT OF WATER	14.6	15.5	19.6				W _f =	8.5	%
TARE WEIGHT	194.0	106.0	212.3				Zero Air Voids Curve G _s =	2.74	
WEIGHT OF DRY SOIL	191.6	183.9	210.1				Bulk G _s =	2.74	
MOISTURE CONTENT (%)	7.6	8.4	9.3				Saturation =	100.0	%



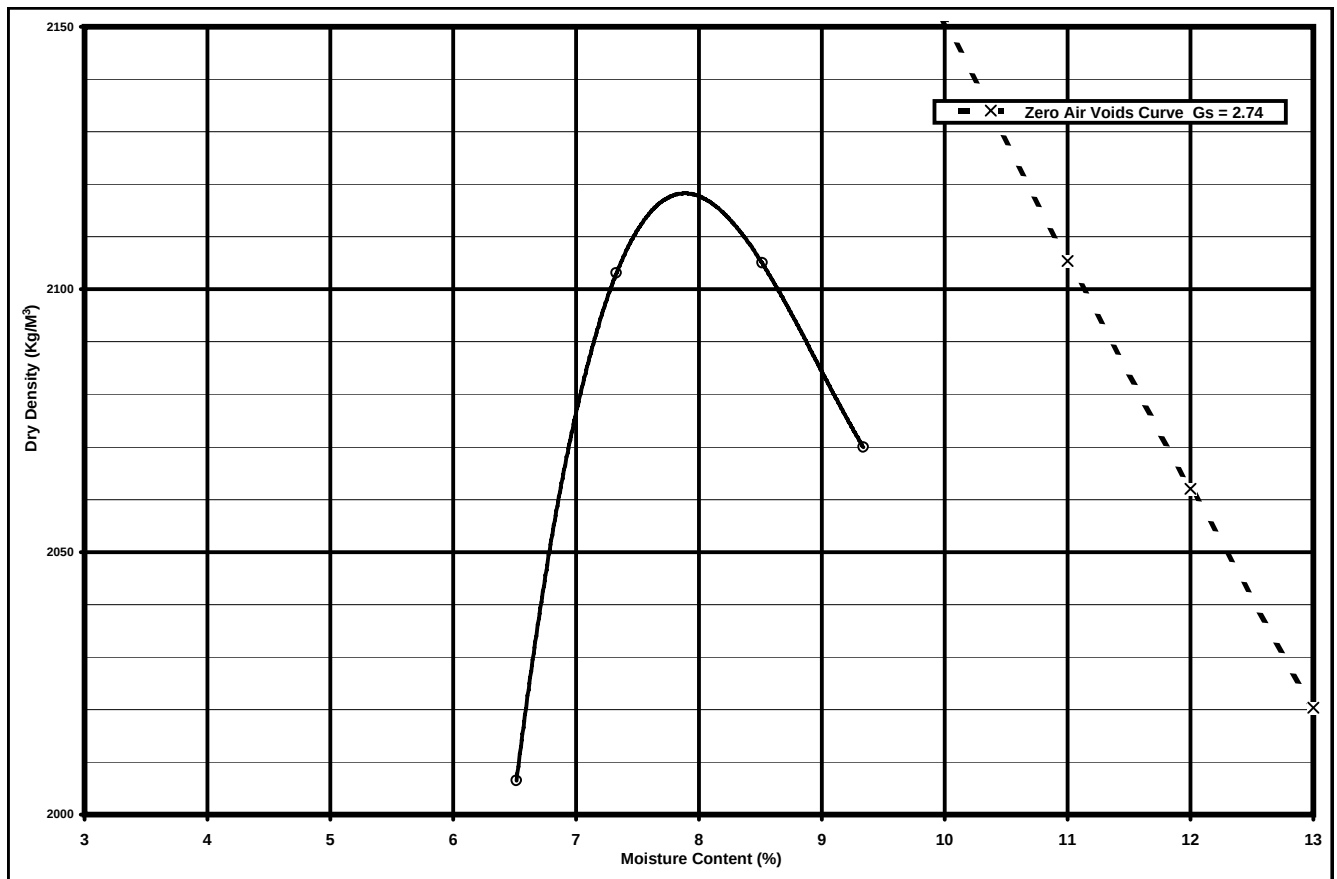
Test Method for Laboratory Compaction Characteristics of Soil

Project #	06-1413-089	Sample Identification :			ASTM D 698-91 Standard Proctor		
Client	Meadowbank Mining Corporation	Sample	12	Method	C		
Project	Dike Design		Second Portage, Lake Trench,	Optimum WC =	7.9	%	
Location	Meadowbank Gold Project		Lake Bed Till	Max ρ_{dry} =	2119	Kg/M ³	

Technician	TM	Sample Description :			ASTM D 4718-87		
Schedule #	13				Correction for oversize particles		
Proctor Type (S/M)	S				Optimum WC =	6.5	%
		Mould Volume =	0.002124	m ³	Max ρ_{dry} =	2232	Kg/M ³

TRIAL NO.	1	2	3	4			Percent Oversize :	
WT SOIL WET + MOULD	10181	10436	10494	10449			SCREEN SIZE :	19.00 mm
WEIGHT OF MOULD	5642	5642	5642	5642			Coarser Fraction	
WT OF SOIL WET	4540	4794	4852	4807			P_c =	22.3 %
WET DENSITY (Kg/M ³)	2137	2257	2284	2263			G_s =	2.74 assumed
DRY DENSITY (Kg/M ³)	2007	2103	2105	2070			W_c =	1.5 %

CONTAINER NO.							Finer Fraction	
WT OF WET SOIL + TARE	560.7	536.7	527.5	604.5			P_f =	77.7 %
WT OF DRY SOIL + TARE	539.4	507.6	502.7	569.4			G_s =	2.74 assumed
WEIGHT OF WATER	21.3	29.1	24.8	35.1			W_f =	7.9 %
TARE WEIGHT	212.5	110.5	211.4	193.5			Zero Air Voids Curve G_s =	2.74
WEIGHT OF DRY SOIL	326.9	397.1	291.3	375.9			Bulk G_s =	2.74
MOISTURE CONTENT (%)	6.5	7.3	8.5	9.3			Saturation =	100.0 %



LAKE BED SEDIMENTS SPECIFIC GRAVITY

SPECIFIC GRAVITY OF SOLIDS

Project No. :	06-1413-089	Client :	Meadowbank Mining Corporation	Sample Number :	WAL-1 & TPS-1
Sch No.	13	Project :	Dike Design	Date :	25/01/2007
Lab Work:	TM	Location:	Meadowbank Gold Project		

Specific Gravity of Fine Fraction (ASTM D 854-02)

Percentage Passing #4 Sieve		100	
Test Number		1	2
Flask Number		1	1
Air Removal Method		Vacuum	Vacuum
Mass of Flask (g)	M_p	179.42	179.42
Mass of Flask + Dry Soil (g)		213.12	212.61
Mass of Dry Soil (g)		33.70	33.19
Mass of Flask + Soil + Water (g)	$M_{pws,t}$	698.66	698.11
Test Temperature (g)	T_t	18.0	18.0
Mass of Flask + Water (g)	$M_{pw,t}$	678.22	678.22
Number of Evaporating Dish			
Mass of Dish + Dry Soil (g)		33.70	33.19
Mass of Dish (g)		0.00	0.00
Mass of Oven Dry Soil (g)	M_s	33.70	33.19
Temperature Coefficient	K	1.0004	1.0004
Density of Solids (g/cm ³)	ρ_s	2.54	2.50
Specific Gravity at Test Temperature	G_t	2.55	2.50
Specific Gravity at 20°C	$G_{20^\circ C}$	2.55	2.50
AVERAGE SPECIFIC GRAVITY		2.52	

Specific Gravity of Coarse Fraction (ASTM C 127-88)

Percentage Retained on #4 Sieve		0
Mass of Sample in Water (g)	A	
Mass of Sample @ SSD (g)	B	
Mass of Oven Dried Sample (g)	C	
Bulk G (Oven Dry)	$C/(B-A)$	
Bulk G (SSD)	$B/(B-A)$	
Apparent	$C/(C-A)$	
Absorbion (%)	$(B-C)/C$	

Specific Gravity of Total Sample

COMBINED SPECIFIC GRAVITY	$G_{avg@20^\circ C}$	2.52
---------------------------	----------------------	------

Remarks: _____

Method used: Method A Procedure for Moist Specimens _____

Sample Description: _____

SPECIFIC GRAVITY OF SOLIDS

Project No. :	06-1413-089	Client :	Meadowbank Mining Corporation	Sample :	TPN-1
Sch No.	288	Project :	Dike Design		INUG-1
Lab Work:	TM	Location:	Meadowbank Gold Project		SP-1 Sed
Test ID:	Test 1			Date :	07/12/2006

Specific Gravity of Fine Fraction (ASTM D 854-02)

Percentage Passing #4 Sieve		100	
Test Number		1	2
Flask Number		1	1
Air Removal Method		Vacuum	Vacuum
Mass of Flask (g)	M_p	179.44	179.44
Mass of Flask + Dry Soil (g)		245.01	245.29
Mass of Dry Soil (g)		97.32	97.23
Mass of Flask + Soil + Water (g)	$M_{pws,t}$	716.96	718.55
Test Temperature (g)	T_t	19.0	18.0
Mass of Flask + Water (g)	$M_{pw,t}$	678.14	678.22
Number of Evaporating Dish			
Mass of Dish + Dry Soil (g)		97.32	97.23
Mass of Dish (g)		0.00	0.00
Mass of Oven Dry Soil (g)	M_s	97.32	97.23
Temperature Coefficient	K	1.0002	1.0004
Density of Solids (g/cm ³)	ρ_s	1.66	1.71
Specific Gravity at Test Temperature	G_t	1.67	1.71
Specific Gravity at 20°C	$G_{20^\circ C}$	1.67	1.71
AVERAGE SPECIFIC GRAVITY		1.69	

Specific Gravity of Coarse Fraction (ASTM C 127-88)

Percentage Retained on #4 Sieve		0
Mass of Sample in Water (g)	A	
Mass of Sample @ SSD (g)	B	
Mass of Oven Dried Sample (g)	C	
Bulk G (Oven Dry)	C/(B-A)	
Bulk G (SSD)	B/(B-A)	
Apparent	C/(C-A)	
Absorbion (%)	(B-C)/C	

Specific Gravity of Total Sample

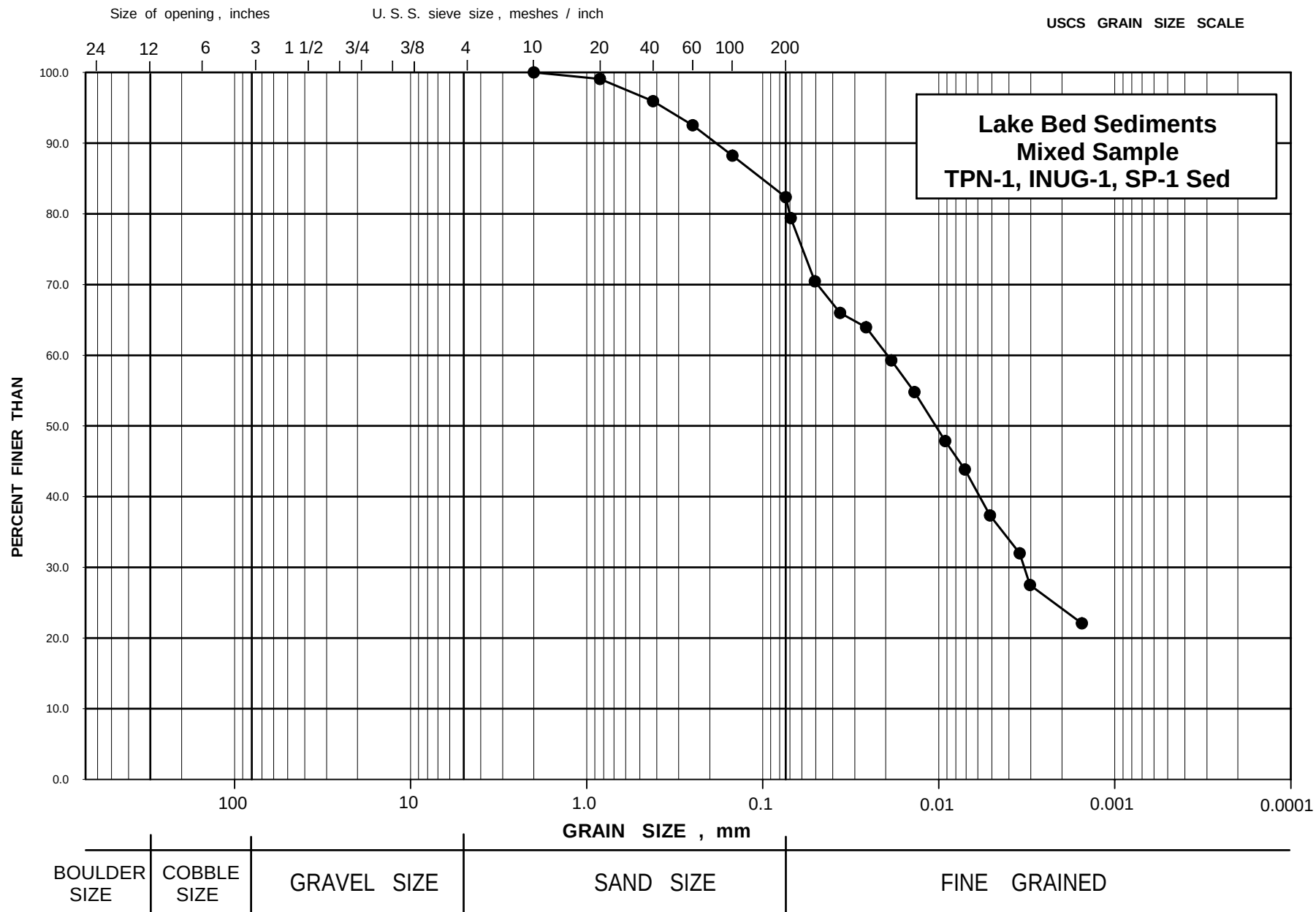
COMBINED SPECIFIC GRAVITY	$G_{avg@20^\circ C}$	1.69
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Remarks: _____

Method used: Method A Procedure for Moist Specimens _____

Sample Description: _____

LAKE BED SEDIMENTS GRADATION AND HYDROMETER



Project No. 06-1413-089
 Drawn PK
 Reviewed LL
 Date 04/04/07



GRAIN SIZE DISTRIBUTION
Meadowbank Mining Corporation
Meadowbank Gold Project

Figure II-39

PARTICLE SIZE ANALYSIS OF SOILS ASTM D 422-63

Project No. :	06-1413-089	Client :	Meadowbank Mining Corporation	Sample :	TPN-1
Sch#	288	Project :	Dike Design		INUG-1
Lab Work:	TM	Location:	Meadowbank Gold Project		SP-1 Sed

First Sieving	Hydrometer: (Minus #10)	Residual No. 200 (g) =	0.4
Total Weight (g) = 44.2	Before Wash (g) = 44.2	Total minus 200 (g) =	36.4
	After Wash (g) = 8.2	Gs (assumed) =	2.70

Size (USS)	Weight Retained (g)	Retained (%)	Weight Retained (g)	Retained (%)	% Retained Total	Diameter (mm)	% Passing
							100.0
6"	0.0					152.4	100.0
3"	0.0					76.2	100.0
1 1/2"	0.0					38.1	100.0
1"	0.0					25.4	100.0
3/4"	0.0					19.1	100.0
1/2"	0.0					12.7	100.0
3/8"	0.0					9.52	100.0
#4	0.0					4.76	100.0
#10	0.0					2.00	100.0
#20			0.4	0.9	0.9	0.840	99.1
#40			1.4	3.2	3.2	0.420	95.9
#60			1.5	3.4	3.4	0.250	92.5
#100			1.9	4.3	4.3	0.149	88.2
#200			2.6	5.9	5.9	0.074	82.4
Pan			36.4	82.4	82.4		

HYDROMETER ANALYSIS

Hydrometer No.: 8589 Dispersion Method: Stirring Dispersion Period (min):

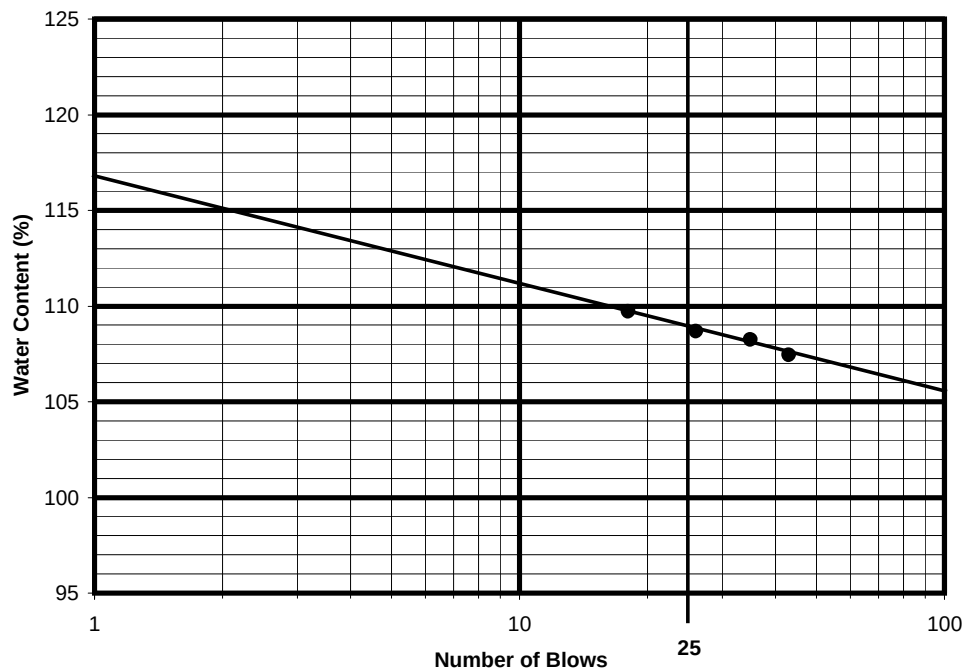
Comments:

Time (min)	Hydrometer Reading	Temperature (°C)		Composite Correction	Corrected Reading	Diameter (mm)	Percentage Passing
0.5	38.0	18.0		-2.51	35.5	0.0693	79.4
1	34.0	18.0		-2.51	31.5	0.0506	70.5
2	32.0	18.0		-2.51	29.5	0.0363	66.0
4	31.1	18.0		-2.51	28.6	0.0259	64.0
8	29.0	18.0		-2.51	26.5	0.0186	59.3
15	27.0	18.0		-2.51	24.5	0.0138	54.8
35	23.9	18.0		-2.51	21.4	0.0092	47.9
60	22.0	18.5		-2.41	19.6	0.0071	43.8
120	19.1	18.5		-2.41	16.7	0.0051	37.3
270	16.6	19.0		-2.30	14.3	0.0035	32.0
360	14.6	19.0		-2.30	12.3	0.0030	27.5
1440	13.0	15.0		-3.12	9.9	0.0015	22.1

LAKE BED SEDIMENTS ATTERBERG LIMITS

Liquid Limit, Plastic Limit and Plasticity Index of Soils
ASTM D 4318-93

TYPE OF TEST	LL	LL	LL	LL		W% Nat.
CONTAINER NUMBER						
NUMBER OF BLOWS	43	18	35	26		
MASS WET SOIL + TARE	35.45	30.39	35.48	35.09		491.90
MASS DRY SOIL + TARE	31.69	27.00	32.59	31.58		401.60
MASS OF WATER	3.76	3.39	2.89	3.51		90.30
MASS OF CONTAINER	28.19	23.91	29.92	28.35		372.10
MASS OF DRY SOIL	3.50	3.09	2.67	3.23		29.5
WATER CONTENT W (%)	107.4	109.7	108.2	108.7		306.1
TYPE OF TEST	PL	PL	SAMPLE		TPE-1 Sed	
CONTAINER NUMBER						
MASS WET SOIL + TARE	31.65	33.57				
MASS DRY SOIL + TARE	29.62	31.78	LIQUID LIMIT (%)		108.9	
MASS OF WATER	2.03	1.79	PLASTIC LIMIT (%)		103.2	
MASS OF CONTAINER	27.67	30.03	PLASTICITY INDEX (%)		5.7	
MASS OF DRY SOIL	1.95	1.75	W% Natural (%)		306.1	
WATER CONTENT W (%)	104.1	102.3	LIQUIDITY INDEX		35.56	



SAMPLE DESCRIPTION : OH

LAKE BED SEDIMENTS WATER CONTENT

Project Number : **06-1413-089**

Tech : **TM**

Laboratory Determination of Water Content of Soil and Rock
ASTM D 2216-92

Borehole						
Sample Number	WAL-1		TPS-1			
Depth (m)						
CONTAINER NUMBER						
MASS WET SOIL + TARE	232.1		267.6			
MASS DRY SOIL + TARE	125.4		147.0			
MASS OF WATER	106.7		120.6			
MASS OF CONTAINER	109.4		122.4			
MASS OF DRY SOIL	16.0		24.6			
Water Content W (%)	666.9		490.2			

Borehole						
Sample Number						
Depth (m)						
CONTAINER NUMBER						
MASS WET SOIL + TARE						
MASS DRY SOIL + TARE						
MASS OF WATER						
MASS OF CONTAINER						
MASS OF DRY SOIL						
Water Content W (%)						

Borehole						
Sample Number						
Depth (m)						
CONTAINER NUMBER						
MASS WET SOIL + TARE						
MASS DRY SOIL + TARE						
MASS OF WATER						
MASS OF CONTAINER						
MASS OF DRY SOIL						
Water Content W (%)						

Meadowbank Mining Corporation
Meadowbank Gold Project

LAKE BED SEDIMENTS ORGANIC CONTENT

Project Number : 06-1413-089

Tech : TM

Moisture, Ash and Organic Matter of Peat and Other Organic Soils
ASTM D 2974-87 Method C

Borehole						
Sample Number	Combined TPS-1 & WAL-1					
Depth (m)						
Tare Number						
Mass of Soil @ 105 ⁰ C + Tare	90.83					
Mass Soil @ 440 ⁰ C + Tare	84.30					
Mass of Organics	6.53					
Mass of Tare	51.14					
Mass of soil @ 105 ⁰ C	39.69					
Organic Content (%)	16.45					

Borehole						
Sample Number						
Depth (m)						
Tare Number						
Mass of Soil @ 105 ⁰ C + Tare						
Mass Soil @ 440 ⁰ C + Tare						
Mass of Organics						
Mass of Tare						
Mass of soil @ 105 ⁰ C						
Organic Content (%)						

Borehole						
Sample Number						
Depth (m)						
Tare Number						
Mass of Soil @ 105 ⁰ C + Tare						
Mass Soil @ 440 ⁰ C + Tare						
Mass of Organics						
Mass of Tare						
Mass of soil @ 105 ⁰ C						
Organic Content (%)						

Recommended Standard Furnace Time @ 440⁰ C for Different Soil Types

Sandy Soils	1 Hr
Clay Soils	2 Hr
Organic Soils	3 Hr
Peat	4 Hr

Meadowbank Mining Corporation
Meadowbank Gold Project

Project Number : 06-1413-089

Tech : TM

Moisture, Ash and Organic Matter of Peat and Other Organic Soils
ASTM D 2974-87 Method C

Borehole						
Sample Number	TE-1 Sed	TE-1 Sed				
Depth (m)						
Tare Number						
Mass of Soil @ 105 ⁰ C + Tare	41.87	43.05				
Mass Soil @ 440 ⁰ C + Tare	40.88	42.03				
Mass of Organics	0.99	1.02				
Mass of Tare	27.28	27.78				
Mass of soil @ 105 ⁰ C	14.59	15.27				
Organic Content (%)	6.79	6.68				

Borehole						
Sample Number						
Depth (m)						
Tare Number						
Mass of Soil @ 105 ⁰ C + Tare						
Mass Soil @ 440 ⁰ C + Tare						
Mass of Organics						
Mass of Tare						
Mass of soil @ 105 ⁰ C						
Organic Content (%)						

Borehole						
Sample Number						
Depth (m)						
Tare Number						
Mass of Soil @ 105 ⁰ C + Tare						
Mass Soil @ 440 ⁰ C + Tare						
Mass of Organics						
Mass of Tare						
Mass of soil @ 105 ⁰ C						
Organic Content (%)						

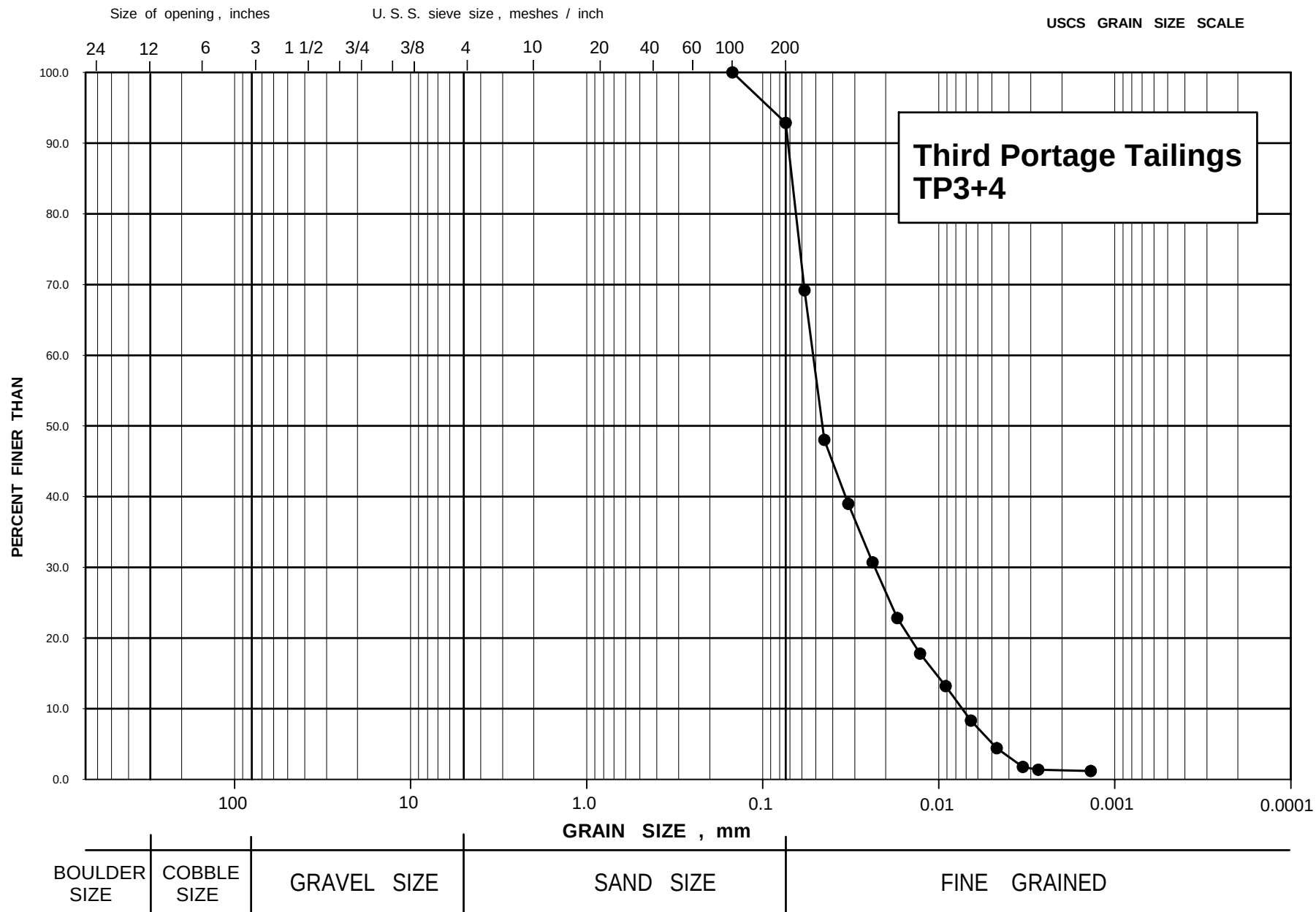
Recommended Standard Furnace Time @ 440⁰ C for Different Soil Types

Sandy Soils	1 Hr
Clay Soils	2 Hr
Organic Soils	3 Hr
Peat	4 Hr

Meadowbank Mining Corporation
Meadowbank Gold Project

TAILINGS GRADATIONS

HYDROMETER

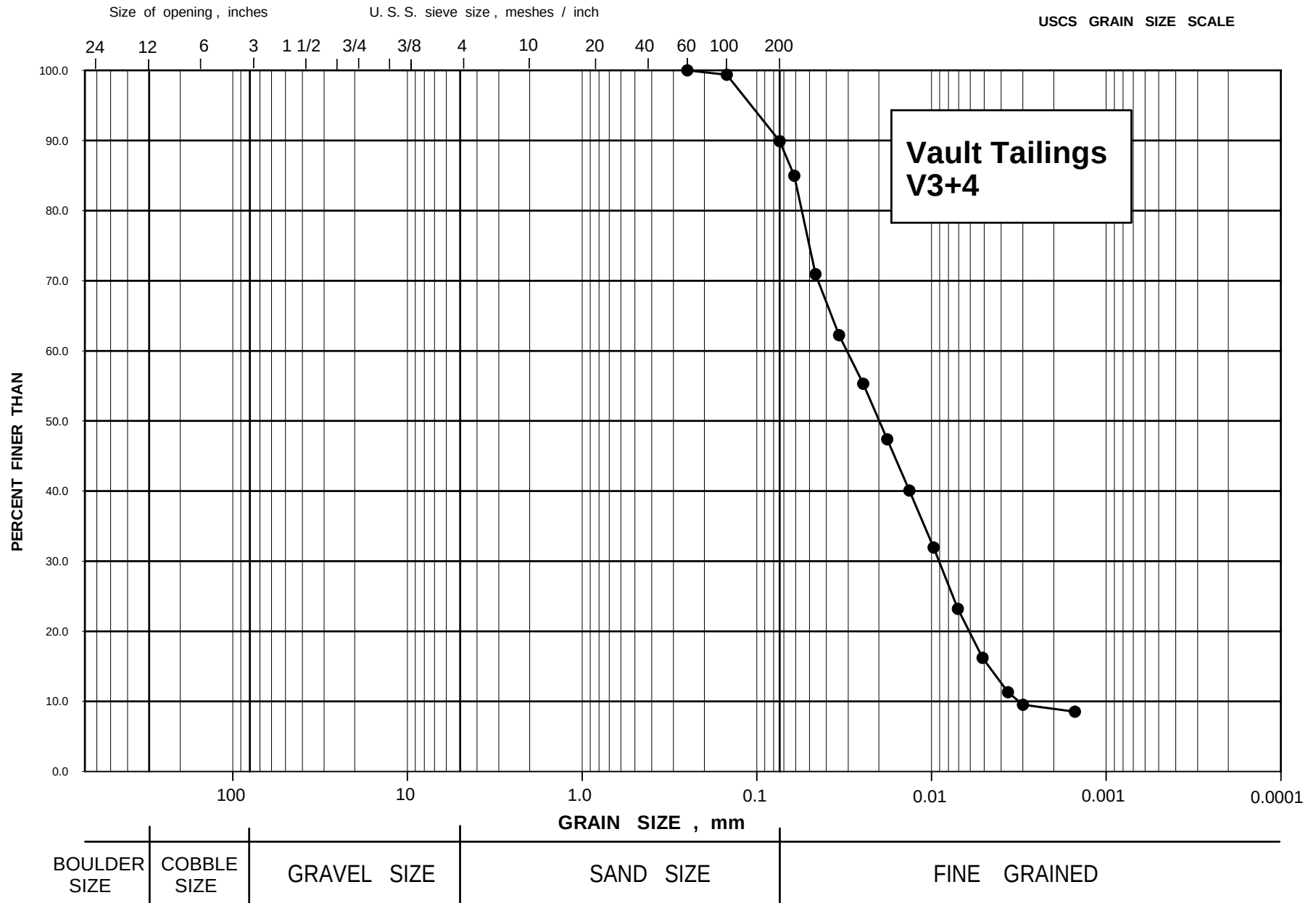


Project No. 06-1413-089
 Drawn
 Reviewed
 Date 04/04/07



GRAIN SIZE DISTRIBUTION

Figure II-40



Project No...06-1413-089.
 DrawnTM
 ReviewedLL
 Date04/04/07



GRAIN SIZE DISTRIBUTION

Figure
II-41

PARTICLE SIZE ANALYSIS OF SOILS ASTM D 422-63

Project No. :	06-1413-089	Client:	Meadowbank		Third Portage Tailings		
Sch#	25	Project :	Dike Design		TP3+4		
Lab Work:	TM	Location:	Meadowbank				
	1ST SIEVING		Hydrometer: (Minus #10)		Residual #200	1.9	
	Total Weight	46.2	Before Wash	46.2	Total -200	42.9	
			After Wash	5.2	Gs	3.34	
Size (USS)	Weight Retained	Retained (%)	Weight Retained	Retained (%)	% Retained Total	Diameter (mm)	% Passing
							100.0
6"	0.0					152.4	100.0
3"	0.0					76.2	100.0
1 1/2"	0.0					38.1	100.0
1"	0.0					25.4	100.0
3/4"	0.0					19.1	100.0
1/2"	0.0					12.7	100.0
3/8"	0.0					9.52	100.0
#4	0.0					4.76	100.0
#10	0.0					2.00	100.0
#20			0.0			0.840	100.0
#40			0.0			0.420	100.0
#60			0.0			0.250	100.0
#100			0.0			0.149	100.0
#200			3.3	7.1	7.1	0.074	92.9
Pan			42.9	92.9	92.9		
HYDROMETER ANALYSIS							
Time (min)	Hydrometer Reading	Temperature (°C)		Composite Correction	Hydrometer Corrected	Diameter (mm)	% Passing
0.5	40.0	18.0		-4.04	36.0	0.0580	69.2
1	29.0	18.0		-4.04	25.0	0.0447	48.0
2	24.3	18.0		-4.04	20.3	0.0327	39.0
4	20.0	18.0		-4.04	16.0	0.0238	30.7
8	15.9	18.0		-4.04	11.9	0.0172	22.8
15	13.1	19.5		-3.84	9.3	0.0128	17.8
30	10.7	19.5		-3.84	6.9	0.0092	13.2
60	8.1	20.0		-3.77	4.3	0.0066	8.3
120	6.0	20.5		-3.70	2.3	0.0047	4.4
240	4.4	22.0		-3.48	0.9	0.0033	1.8
360	4.2	22.0		-3.48	0.7	0.0027	1.4
1440	4.1	19.0		-3.48	0.6	0.0014	1.2

PARTICLE SIZE ANALYSIS OF SOILS ASTM D 422-63							
Project No. :	06-1413-089	Client :	Meadowbank		Vault Tailings		
Sch#	25	Project :	Dike Design		V3+4		
Lab Work:	TM	Location:	Meadowbank				
	1ST SIEVING		Hydrometer: (Minus #10)		Residual #200	2.4	
	Total Weight	48.5	Before Wash	48.5	Total -200	43.5	
			After Wash	7.4	Gs	2.85	
Size (USS)	Weight Retained	Retained (%)	Weight Retained	Retained (%)	% Retained Total	Diameter (mm)	% Passing
							100.0
6"	0.0					152.4	100.0
3"	0.0					76.2	100.0
1 1/2"	0.0					38.1	100.0
1"	0.0					25.4	100.0
3/4"	0.0					19.1	100.0
1/2"	0.0					12.7	100.0
3/8"	0.0					9.52	100.0
#4	0.0					4.76	100.0
#10	0.0					2.00	100.0
#20			0.0			0.840	100.0
#40			0.0			0.420	100.0
#60			0.0			0.250	100.0
#100			0.3	0.6	0.6	0.149	99.4
#200			4.6	9.5	9.5	0.074	89.9
Pan			43.5	89.7	89.7		
HYDROMETER ANALYSIS							
Time (min)	Hydrometer Reading	Temperature (°C)		Composite Correction	Hydrometer Corrected	Diameter (mm)	% Passing
0.5	47.0	18.0		-4.04	43.0	0.0612	85.0
1	39.9	18.0		-4.04	35.9	0.0461	70.9
2	35.5	18.0		-4.04	31.5	0.0338	62.2
4	32.0	18.0		-4.04	28.0	0.0246	55.3
8	28.0	18.0		-4.04	24.0	0.0179	47.4
15	24.1	19.5		-3.84	20.3	0.0134	40.1
30	20.0	19.5		-3.84	16.2	0.0097	32.0
60	15.5	20.0		-3.77	11.7	0.0071	23.2
120	11.9	20.5		-3.70	8.2	0.0051	16.2
240	9.2	22.0		-3.48	5.7	0.0037	11.3
360	8.3	22.0		-3.48	4.8	0.0030	9.5
1440	7.8	19.0		-3.48	4.3	0.0015	8.5

**TAILINGS SPECIFIC
GRAVITY**

SPECIFIC GRAVITY OF SOILS

ASTM D 854-92

Project # **06-1413-089**

Third Portage Tailings

TP3+4

Sch# : **25**

Tested By : **TM/RLD**

Calculated By : **TM/RLD**

Checked By : **LL**

TEST NUMBER			1	2		
BOTTLE NUMBER			2	3		
AIR REMOVAL METHOD			Vacuum	Vacuum		
WEIGHT OF BOTTLE , g.			172.69	173.97		
INITIAL WEIGHT OF BOTTLE + SOIL, g.			248.48	249.51		
INITIAL WEIGHT OF SOIL, g			75.79	75.54		
WEIGHT OF BOTTLE + SOIL + WATER, g.		W_1	723.73	724.89		
TEMPERATURE, °C		T	20.0	20.0		
WEIGHT OF BOTTLE + WATER, g.		W_2	671.24	672.39		
EVAPORATING DISH NUMBER			34	L3		
WEIGHT OF DISH + DRY SOIL, g.			430.42	421.31		
WEIGHT OF DISH, g.			355.41	346.48		
WEIGHT OF SOIL, g.		W_s	75.01	74.83		
Correction Factor @ Temperature T		G_k	1.0000	1.0000		
$G_k W_s$			75.01	74.83		
$W_1 - W_2$			52.49	52.50		
$W_s - (W_1 - W_2)$			22.52	22.33		
SPECIFIC GRAVITY OF SOIL		G_s	3.33	3.35		

$$G_s = (G_k \cdot W_s) / ((W_s - (W_1 - W_2))) = \underline{\underline{3.34}} \text{ (average value)}$$

REMARKS :

- (1) Method A - Oven Dried Procedure
- (2) Passing the #10 sieve (2.00 mm)

SPECIFIC GRAVITY OF SOILS

ASTM D 854-92

Project # **06-1413-089**
Vault Tailings
V3+4

Sch# : 25
Tested By : TM/RLD
Calculated By : TM/RLD
Checked By : LL

TEST NUMBER			1	2		
BOTTLE NUMBER			1	4		
AIR REMOVAL METHOD			Vacuum	Vacuum		
WEIGHT OF BOTTLE , g.			179.52	172.72		
INITIAL WEIGHT OF BOTTLE + SOIL, g.			253.28	254.29		
INITIAL WEIGHT OF SOIL, g			73.76	81.57		
WEIGHT OF BOTTLE + SOIL + WATER, g.	W₁		725.84	724.14		
TEMPERATURE, °C	T		20.0	20.0		
WEIGHT OF BOTTLE + WATER, g.	W₂		678.05	671.37		
EVAPORATING DISH NUMBER			27	20		
WEIGHT OF DISH + DRY SOIL, g.			425.56	441.73		
WEIGHT OF DISH, g.			351.94	360.46		
WEIGHT OF SOIL, g.	W_s		73.62	81.27		
Correction Factor @ Temperature T	G_k		1.0000	1.0000		
G _k W _s			73.62	81.27		
W ₁ - W ₂			47.79	52.77		
W _s -(W ₁ -W ₂)			25.83	28.50		
SPECIFIC GRAVITY OF SOIL	G_s		2.85	2.85		

$$G_s = (G_k \cdot W_s) / ((W_s - (W_1 - W_2))) = \underline{\underline{2.85}} \text{ (average value)}$$

REMARKS :

- (1) Method A - Oven Dried Procedure
- (2) Passing the #10 sieve (2.00 mm)

APPENDIX III
NGI ROCK MASS RATING METHOD

1.0 GENERAL

Empirical methods of design are based on observations of rock mass and support behavior in similar situations. Rock mass classification systems are used as a basis for empirical methods. These methods were developed for use in civil excavations where geometry is typically much simpler than in mines. Therefore, due care must be taken when applying them to excavation design in mining applications.

Many simplifying assumptions are inherent with the approach. It is generally accepted that empirical design methods provide a good starting point for support design, provided that sound engineering judgment is used. These assessments are most useful where preliminary design is necessary but only limited geotechnical data is available. The rock mass classification systems themselves provide a convenient way of comparing different rock mass conditions and relating support design experience.

The mining industry generally uses two schemes for classifying rock mass quality. These are Bieniawski's RMR system and Barton's Q system. Parameters for each system can be estimated from surface mapping and core logging, then verified as excavation proceeds. For the Meadowbank Project, geotechnical data have been collected based on Barton's Q system. This is because initially, consideration was being given to potentially mining of portions of the deposit using underground mining methods. The Q system is generally used for underground mining applications, and so this system was adopted for data collection. The Q system can be related to the RMR system based on the following empirical relationship:

$$\text{RMR} = 9 \ln(Q) + 44$$

Although the systems differ, they rely on similar data to be collected.

2.0 BARTON'S Q SYSTEM

Barton et al (1974) analyzed extensive data relating rock mass quality to the behavior and support requirements of underground excavations. In this scheme, the structure of the rock mass, the frictional characteristics of fractures and the stresses surrounding an opening are assessed and combined to give the Tunnelling Quality Index (Q). The system is based on 212 case records of excavations in igneous, metamorphic and sedimentary rocks. Opening spans ranged from 5 - 30 m, and depths ranged from very shallow (<50 m) to 500 m.

The system has the form:

$$Q = \frac{RQD}{J_n} \cdot \frac{J_r}{J_a} \cdot \frac{J_w}{SRF}$$

Where:

RQD = rock quality designation
 J_n = joint set number
 J_r = joint roughness number
 J_a = joint alteration number
 J_w = joint water reduction factor
 SRF = stress reduction factor

The physical significance of the Q value is that the term RQD/J_n represents the average block size of the mass; J_r/J_a the average total shearing strength of the joints; J_w the relative potential head of water; and SRF the presence of adverse features associated with high stress, squeezing, swelling, or loosening of the rock mass.

The value of Q ranges from 0.001 for exceptionally poor quality squeezing ground to 1,000 for exceptional good quality rock which is practically unjointed. A description of each parameter and procedures for determining them is provided as follows.

Rock Quality Designation (RQD)

The RQD is a quantitative index measured from diamond drill core. It incorporates only those pieces of hard, sound core which are 100 mm or greater in length. Shorter lengths are ignored. RQD is calculated as follows:

$$RQD(\%) = 100 \times \frac{\text{length of core in pieces 100 mm or longer}}{\text{length of core run}}$$

Core of at least 50 mm in diameter should be used. If core of lesser or greater diameters is to be used, the nominal length of 100 mm should be altered to correspond to two times the core diameter. The International Society of Rock Mechanics recommends that the length of individual core pieces should be assessed along the centre line of the core, so that the discontinuities that happen to parallel the drill hole will not unduly penalize the RQD values of an otherwise massive rock mass.

- It is important to distinguish between mechanical and natural breaks found in the core. A mechanical break caused by handling should not adversely affect the RQD index. The mechanical broken core segments should be approximated into a solid unit of core in order to arrive at an RQD value which reflects the in situ rock mass quality.
- RQD should be evaluated over an interval not less than 0.5 m. Typically 1.5 to 6 m intervals are used. When no core is available for determining RQD, it is possible to obtain an estimate from the mean discontinuity spacing. This estimate can be obtained from the graph presented in Figure 1. If the number of joints per unit volume is known (sum of the number of joints/metre for each joint set), the following relation can be used for the case of clay free rock masses (Hoek, 1980):
- $RQD = 115 - 3.3 (\text{joints/m}^3)$
- The RQD value is used directly in the Q classification system. Where RQD is less than 10%, a nominal value of 10 is used to compute the Q value.

Joint Set Number (J_N)

- A rating for the number of joint sets present is determined from the appropriate chart in Table 1. The parameter J_N will often be affected by foliation, schistosity, slaty cleavage or bedding. If strongly developed, these parallel "joints" should obviously be counted as a complete joint set. However, if there are few "joints" visible, or only occasional breaks in the core due to these features, then it will be more appropriate to count them as "random joints" when evaluating J_N .

Joint Roughness Number (J_r)

- A rating for average joint roughness is determined from the appropriate chart on Table 1. Where joint roughness varies the "worst case" surface on a major joint set should be utilized. If the mean spacing of the relevant joint set exceeds 3.0 m, add 1.0 to the value of J_r determined from Table 1.

Joint Alteration Number (J_a)

- Joint alteration rating is determined from the appropriate chart in Table 1. Both the separation between joint surfaces and joint infilling are considered. Where joint alteration varies, a value corresponding to the average of the "worst case" alteration on a major joint set should be used.
- The parameters J_r and J_a (representing shear strength) should be relevant to the *weakest significant joint set or clay filled discontinuity* in the given zone. However, if the joint set or discontinuity with the minimum value of (J_r/J_a) is favourably oriented for stability, then a second, less favourably oriented joint set or discontinuity may sometimes be more significant, and its higher value of J_r/J_a should be used when evaluating Q . *The value of J_r/J_a should in fact relate to the surface most likely to allow failure to initiate.*

Joint Water Reduction (J_w)

- Due to the extensive and interconnected geometry of underground openings, and the fractured nature of the rock mass immediately adjacent to these openings, it is usually assumed that the rock mass is in a drained condition ($J_w = 1.0$). In other situations, set $J_w = 1.0$ and consider the influence of water pressure in a separate analysis of stress acting on the rock mass.

Stress Reduction Factor (SRF)

- Hoek (1988) recommends setting $SRF = 1.0$, equivalent to medium stress conditions, and evaluating the influence of both groundwater and in situ stress using alternate methods of analysis. If desired, the stress reduction factor can be determined from the appropriate chart in Table 1. SRF accounts for adverse features associated with loosening, high stress, squeezing and swelling.
- When a rock mass contains clay, the factor SRF appropriate to *loosening loads* should be evaluated. In such cases the strength of the intact rock is of little interest. When jointing is minimal and clay is completely absent the strength of the intact rock may become the weakest link, and the stability will then depend on the ratio rock-stress/rock-strength. Numerical methods of analysis should be used in this case. A very conservative estimate of strength should be made for those rocks that deteriorate when exposed to moist or saturated conditions.

A significant background of experience has been built up with the Q system. Hoek and Brown (1980) use the system for evaluation of rock mass strength, and Mathews et al utilize it as a basis for assessing open stope design.

Given the variation in geologic structure and strength which is normally encountered in a rock mass, statistical methods of analysis should be used to evaluate rock mass quality. An example of statistical analysis of Q value for a large cavern excavation is expressed as histograms to indicate the characteristics of each population.

Successful application of the Q system has permitted development of ground support recommendations based on this system.

TABLE 1: Rating Guide for Barton's Q System

Parameter	Item and Description	Value
J_n	Number of Sets of Discontinuities	
	Massive	0.5
	One set	2.0
	One set plus random	3.0
	Two sets	4.0
	Two sets plus random	6.0
	Three sets	9.0
	Three sets plus random	12.0
	Four or more sets	15.0
	Crushed rock	20.0
J_r	Roughness of Discontinuities	
	Noncontinuous joints	4.0
	Rough and wavy	3.0
	Smooth and wavy	2.0
	Rough and planar	1.5
	Smooth and planar	1.0
	Slick and planar	0.5
	Filled discontinuities	1.0
J_a	Filling and Wall-Rock Alteration, Essentially Unfilled	
	Healed joints	0.75
	Staining only, no alteration	1.0
	Slightly altered joint walls	2.0
	Silty or sandy coatings	3.0
	Clay coatings	4.0
	Filling and Wall-Rock Alteration, Filled Joint	
	Sand or crushed rock filling	4.0
	Stiff clay filling less than 5 mm thick	6.0
	Soft clay filling less than 5 mm thick	8.0
	Swelling clay filling less than 5 mm thick	12.0
	Stiff clay filling more than 5 mm thick	10.0
	Soft clay filling more than 5 mm thick	15.0
	Swelling clay filling more than 5 mm thick	20.0
J_w	Water Conditions	
	Dry, or inflow < 5 litres/min. locally	1.0
	Medium water inflow	0.66
	Large inflow, unfilled joints	0.5
	Large inflow, filled joints with washout	0.33
	Large inflow, filled joints, high transient inflow	0.2 to 0.1
	Large inflow, filled joints, high continuous inflow	0.1 to 0.05
SRF	Stress Reduction Class	
	Loose rock with clay-filled discontinuities	10.0
	Loose rock with open discontinuities	5.0
	Shallow depth (50 m or less) rock with clay-filled discontinuities	2.5
	Rock with tight unfilled discontinuities, medium stress	1.0

Reference: Adapted from Hoek, 1980

APPENDIX IV
SUMMARY OF BOREHOLE QC REVIEW

Drillhole	File Name	Runs Checked (From - To)	Data Entry Check		Corrections	Initial
			Core Recovery	Discontinuity		
06GT-VLT-4	GINTemplate_Sept-12-03_complete.xls	7.5-8.0, 52.5-54.0, 81.0-82.5, 112.5-114.0, 147.0-148.5, 177.0-178.5	x	x	-Deleted Discontinuity entry in run 147.0 to 148.5, FO at depth 148.9 (duplicate) '-Depth 178.10, changed Jr in Discontinuity spreadsheet from 1.5 to 1.0	EMS (Data Entry Check)
03GT-TF-1	GINTemplate_Sept-12-03_complete.xls	4.5-6, 10.5-12	x	x	-In discontinuity spreadsheet, at 5.6 changed infilling from CH to CL, changed Ja from 1 to 6 '-In discontinuity spreadsheet, at 5.92 changed dip from 72 to 73. '-In discontinuity sheet, at 10.58 changed dip from 41 to 43 '-In recovery spreadsheet, changed all depths by -1m (see note on core log)	JFG (Data Entry Check)
03GT-BZ-4	GINTemplate_Sept-12-03_complete.xls	10.5-12, 27-28.5, 42-43.5	x	x	- In discontinuity spreadsheet at 43.00 changed I to IR '- In broken core spreadsheet changed depth 12.1-12.4 to 11.1-11.4 and changed 43.9-44 to 42.9-43 to match with -1m correction used in other spreadsheets	JFG (Data Entry Check)
03GT-BZ-1	GINTemplate_Sept-12-03_complete.xls	9-10.5, 25.5-27, 42-43.5	x	x	- In discontinuity spreadsheet at 26.8 changed dip direction from 080 to 060	JFG (Data Entry Check)
03GT-TD-5A	GINTemplate_Sept-12-03_complete.xls	13.5-15, 34.5-36, 46.5-48	Checked entire hole	x	- In recovery spreadsheet all Jn for runs 2-27 were shifted up one row. Fixed. '- In discontinuity spreadsheet, at 47.25 changed joint number from 2 to 3.	JFG (Data Entry Check)
03GT-TD-5					Not in electronic database, see 03GT-TD-5A	JFG (Data Entry Check)
03GT-TF-2	GINTemplate_Sept-12-03_complete.xls	4.5-6, 9-10.5	x	x		JFG (Data Entry Check)
03GT-GPIT-1	GINTemplate_Sept-12-03_complete.xls	28-29.5, 41.5-43, 64-65.5, 86.5-88, 88-89.5, 118-119.5, 137.5-139	x	x	- In discontinuity spreadsheet at 42.78 changed infill type from Ca to *blank* '- In discontinuity spreadsheet at 41.94 changed Jr from 3 to 1 and changed Jn from 1 to 3 '- In discontinuity spreadsheet at 87.92 FO and 88.60 FO deleted 2 duplicated lines '- In recovery spreadsheet split one run from 86.5-89.5 into 2 separate runs of 86.5-88 and 88-89.5 '- In discontinuity spreadsheet at 138.67 changed discontinuity number from *blank* to 2	JFG (Data Entry Check)

03GT-GPIT-2	GINTemplate_Sept-12-03_complete.xls	18-19.5, 42-43.5, 66-67.5, 88.5-90, 118.5-120, 138-139.5	x	x	- In discontinuity spreadsheet at 18.15 changed Jr and Ja from *blank* to 1.5 and 1 respectively '- In discontinuity spreadsheet at 18.66 changed Ja from *blank* to 4 '- In discontinuity spreadsheet at 89.21, 89.37 and 89.56 changed joint type from *blank* to JN, CJ and FO respectively '- In discontinuity spreadsheet at 138.35 changed Jr and Ja from 3 and 3 to 1.5 and 1	JFG (Data Entry Check)
03GT-GPIT-3	GINTemplate_Sept-12-03_complete.xls	43-44.5, 61-62.5, 80.5-82, 110.5-112, 143.5-145	x	x	- In discontinuity spreadsheet, added missing entry at 43.94 '- In discontinuity spreadsheet, at 144.92 changed Jr from 1 to 3	JFG (Data Entry Check)
03GT-GPIT-4	GINTemplate_Sept-12-03_complete.xls	27-28.5, 52-54, 70.5-72, 121.5-123, 133.5-135	x	x	- In recovery spreadsheet, at 27-28.5 changed RQD from 0.1 to 1.0 '- In recovery spreadsheet, at 121.5-123 changed RQD from 1.45 to 1.44 '- In discontinuity spreadsheet, at 134.35 changed infill type from *blank* to Ch	JFG (Data Entry Check)
03GT-SPEC-F1	GINTemplate_Sept-12-03_complete.xls	16.5-18, 34.5-36, 81-82.5, 99-100.5, 124.5-126, 150-151.5, 166.5-168, 172.5-174, 190.5-192	x	x	- In discontinuity spreadsheet changed depth from 81.39 to 81.89 '- In discontinuity spreadsheet at 173.72 changed discontinuity number from *blank* to 2 '- In discontinuity spreadsheet from 170.88 to 173.00 Jr was shifted up one row. Fixed '- In discontinuity spreadsheet at 170.88 changed Ja from 1 to *blank*	JFG (Data Entry Check)
03GT-SPEC-F2	GINTemplate_Sept-12-03_complete.xls	30-31.5, 52.5-54, 103.5-105, 124.5-126, 139.5-141, 156-157.5	x	x	- In discontinuity spreadsheet at 53.84 changed discontinuity number from *blank* to 3 '- In discontinuity spreadsheet at 104.42 changed dip from 75 to 73 and changed surface shape from IR to PL '- In discontinuity spreadsheet at 104.70 changed dip from 40 to 4 '- In discontinuity spreadsheet at 139.78 changed infilling from *blank* to CH SU and changed Jr and Ja from *blank* to 3 and 1 '- In discontinuity spreadsheet at 140.04 changed infilling from *blank* to CH (both entries) and changed Jr and Ja from *blank* to 3 and 1 (first entry only) '- In discontinuity data at 156.40 changed discontinuity number from *blank* to 2	JFG (Data Entry Check)

MW-03-1	GINTemplate_Sept-12-03_complete.xls	10-13, 34-37, 70-73, 115-118, 154-157, 187-190	x	N/A	- No errors	JFG (Data Entry Check)
MW-03-2	GINTemplate_Sept-12-03_complete.xls	22.5-25.5, 79.5-82.5, 46.5-49.5, 127.5-130.5, 154.5-157.5	x	N/A	- No errors	JFG (Data Entry Check)
MW-03-3	GINTemplate_Sept-12-03_complete.xls	7.5-10.5, 37.5-40.5, 49.5-52.5, 70.5-73.5, 109.5-112.5, 142.5-145.5	x	x (applicable for 109.5-112.5 and 142.5-145.5)	- In discontinuity spreadsheet, changed discontinuity from 11.00 to 111.00 '- In recovery spreadsheet, from 109.5 through 150.0 added Jn (was not previously entered)	JFG (Data Entry Check)
MW-03-4	GINTemplate_Sept-12-03_complete.xls	16.5-19.5, 40.5-43.5, 64.5-67.5, 91.5-94.5, 130.5-133.5, 157.5-160.5, 184.5-187.5	x	x (applicable for 157.5-160.5 and 184.5-187.5)	- In recovery spreadsheet, from 157.5 through 193.5 added Jn (was not previously entered) '- In recovery spreadsheet, from entered missing runs from 193.5-199.5 '- In discontinuity spreadsheet, corrected all discontinuities by -0.5m to match recovery spreadsheet '- In recovery spreadsheet, split one run from 184.5-187.5 into 2 seperate runs as was logged	JFG (Data Entry Check)
TP98-312	TP1998ProcessedOrientedDataWithRMRJan2007	12-15, 51-54, 81-84	x	x	-In Combined1998 spreadsheet and Processingtemplate1998 spreadsheet at 14.38 changed discontinuity type from FR to FX '-In Combined1998 spreadsheet and Processingtemplate1998 spreadsheet at 14.46 changed discontinuity type from FR to FX '-In Combined1998 spreadsheet and Processingtemplate1998 spreadsheet at 83.48 changed dip from 68 to 74 '-In Combined1998 spreadsheet and Processingtemplate1998 spreadsheet at 83.66 changed dip from 72 to 15 '-In Combined1998 spreadsheet and Processingtemplate1998 spreadsheet at 83.80 changed dip from 74 to 25 '-In Combined1998 spreadsheet and Processingtemplate1998 spreadsheet at 83.87 changed dip from 15 to 45	ELK (Data Entry Check)
TP98-258	TP1998ProcessedOrientedDataWithRMRJan2007	23-25.95, 50-52.95, 89-92, 121.9-125, 145.9-149	x	x	-In Combined1998 spreadsheet changed the run number from 28 onwards, added 1 '-In Combined1998 spreadsheet in run 38, changed the rqdm from 3.05 to 3.06	ELK (Data Entry Check)

TP98-265	TP1998ProcessedOrientedDataWithRMRJan2007	35.04-37.91, 56-59, 80-83	x	x	-In Combined1998 spreadsheet and Processingtemplate1998 spreadsheet at 37.23 changed the Ja from 4 to 1 '-In Combined1998 spreadsheet and Processingtemplate1998 spreadsheet at 82.78 changed the Ja from 1 to 4 '-In Combined1998 spreadsheet and Processingtemplate1998 spreadsheet at 82.86 changed the Ja from 4 to 3	ELK (Data Entry Check)
TP98-261	TP1998ProcessedOrientedDataWithRMRJan2007	8-11, 44-47, 80.04-83, 107-110, 143-146	x	x	-In Combined1998 spreadsheet in run 3, changed joint num from 9 to 4	ELK (Data Entry Check)
TP98-313	TP1998ProcessedOrientedDataWithRMRJan2007	12-15, 48-52, 75-78	x	x	-No errors	ELK (Data Entry Check)
NP02-412	NPOrientedDataForProcessing.xls	30-33, 42-45, 60-63	x	x	- at 44.6 deleted 8 duplicated discontinuity entries	JFG (Data Entry Check)
NP02-401	NPOrientedDataForProcessing.xls	35-41, 50.24-53, 86-89, 120.8-122.9, 136.66-140	x	x	- Split run 35-41 into 2 separate runs according to drill logs '- Changed discontinuity from 41.15 to 40.15 '- Run 26 (86-89) changed rqdm from 2.8 to 2.3 '- At 86.90 changed discontinuity type from FO to JN '- At 87.10 changed discontinuity type from JN to CJ '- At 87.20 changed discontinuity type from CJ to FO '- At 84.80 changed discontinuity direction from 240 to 250 '- At 85.90 changed discontinuity direction from 140 to 250 '- At 86.10 changed discontinuity direction from 110 to 220	JFG (Data Entry Check)
GT02-VLT-1	VaultReducedOrientedData.xls	15-16.5, 31.4-34.5, 69-69.82, 93-96, 108-109.5	x	x	- No errors	JFG (Data Entry Check)
GT02-VLT-2	VaultReducedOrientedData.xls	15-16.5, 51.1-53, 61.58-63, 83.6-85.5	x	x	- No errors	JFG (Data Entry Check)
GT02-VLT-3	VaultReducedOrientedData.xls	12-12.9, 28.5-30.5, 63-64.5, 82.5-84	x	x	- Run 21 (28.5-30.5) changed TCR and RQD from 2.0 to 1.96	JFG (Data Entry Check)
GT02-NP-1	NPOrientedDataForProcessing.xls	15-16.5, 34.5-36, 72-73.5, 102-103.5	x	x	- At 16.3 changed Ja from 0.85 to 0.75 '- In run 10 (15-16.5) added another discontinuity at 16.3 to represent 2 discontinuities at 16.3 '- in discontinuity data, from 71.23 to 72.66, dip direction data was shifted up by one row. Fixed	JFG (Data Entry Check)
GT02-NP-2	NPOrientedDataForProcessing.xls	31.7-34.5, 51-52.5, 69-72, 70-91.5, 98.3-99	x	x	- Added run numbers to all core runs in hole. '- Runs 17, 18, 19 (31.7-36.7) changed weathering index from W1 to W2 '- Run 59 (90-91.5) changed Jn from 4 to 6	JFG (Data Entry Check)
GT02-NP-3	NPOrientedDataForProcessing.xls	14-16.2, 53-56.9, 92-95	x	x	- Added discontinuity at 94.88	JFG (Data Entry Check)

GT02-TP-1	TPOrientedDataForProcessing.xls	7-10, 34.8-37, 52-54.7, 63.14-64, 85-88	x	x	- At 35.42 and 35.50 changed Jr from 4 to 1.5 '- at 35.50 changed dip direction from *blank* to 10 '- Run 43 (85-88), changed Rock strength from R2/R3 to R3, changed "bcfrom" from 87.4 to 87.6 '- At 85.00 changed discontinuity direction from *blank* to 30, also added 2nd line to show 2 parallel joints '- Run 52 (109-EOH) changed EOH from 112.00 to 110.20	JFG (Data Entry Check)
GT02-TP-2	TPOrientedDataForProcessing.xls	15.8-17, 45.83-47, 62-65, 101-104, 122.10-125, 137-138.6	x	x	- At 63.23 changed discontinuity type from JN to FO '- Corrected RQD and TCR from 58.6 - EOH	JFG (Data Entry Check)
02GT-01	Copy of 022-14~1updated	5.6-9.57	x	x	- In discontinuity table, record 1 changed roughness from P to R '- In discontinuity table, records 6 and 7 changed roughness from R to SM (on drill logs listed as R-SM)	JFG (Data Entry Check)
02GT-02A	Copy of 022-14~1updated	6.6-9.5	x	x	- In discontinuity table, record 496 changed shape from ST to IR '- in discontinuity table, records 21, 497, 498 changed roughness from R to VR	JFG (Data Entry Check)
02GT-02B	Copy of 022-14~1updated	7-12.5	x	x	- No errors	JFG (Data Entry Check)
02GT-03	Copy of 022-14~1updated	8.5-11.5, 23.5-26.5	x	x	- No errors	JFG (Data Entry Check)
02GT-04	Copy of 022-14~1updated	11.5-14.5, 23.5-26.5	x	x	- No errors	JFG (Data Entry Check)
02GT-05	Copy of 022-14~1updated	12.5-17	x	x	- In Discontinuity table, at 13.4 changed depth from 13.5 to 13.4	JFG (Data Entry Check)
02GT-06	Copy of 022-14~1updated				- All data for this hole was an identical copy from 02GT-05 and should not have been there. 02GT-06 was abandoned with no core recovery. '- Data was deleted from core recovery, discontinuity and strength/weathering tables.	JFG (Data Entry Check)
02GT-07	Copy of 022-14~1updated	11.75-15.5	x	x	- In core table, entry 70 changed run number from 2 to 3 and changed core recovery from *blank* to 100 '- In discontinuity table, at 13 changed roughness from R to SM '- In discontinuity table, 13.65 changed type from *blank* to CO	JFG (Data Entry Check)
02GT-08	Copy of 022-14~1updated	9.5-12.5, 15.5-17	x	x	- In strength_weathering table, at entry 36 changed the strength index from 3.5 to 4 '- In discontinuity table entry 268 changed dip from 90 to 70	JFG (Data Entry Check)

02GT-09	Copy of 022-14~1updated	11.5-14.5, 26.5-29.5	x	x	- In strength_weathering table, at entry 46 changed strength from 4 to 3 '- In strength_weathering table, at entry 47 changed strength from 3 to 4	JFG (Data Entry Check)
02GT-10	Copy of 022-14~1updated	5.5-8.5, 23.5-26.5	x	x	- In discontinuity table, at entry 443 depth 25, changed roughness from R to SM	JFG (Data Entry Check)
02GT-11	Copy of 022-14~1updated	21-24, 25-27	x	x	- In Core table, entry 69 changed RQD from 100 to *blank* '- In discontinuity table, entry 86 changed RQD from *blank* to 100 and run number from *blank* to 3 '- In discontinuity table, entry 492, changed type from *blank* to BC '- In discontinuity table, entry 465, changed Infilling from FE to CL and other from *blank* to G	JFG (Data Entry Check)

APPENDIX V

SUMMARY OF OVERBURDEN OBSERVATIONS AND HYDRAULIC CONDUCTIVITY TESTING FROM BOREHOLES

TABLE V-1: Summary of On-land Borehole Observations of Soil Overlying Bedrock

Borehole	Ground Surface El. (masl)	Bedrock Surface El. (masl)	Thickness (m)	Description of Soils
02GT-01	131.50	126.40	5.10	Cobbles and gravel
03GT-GI-7	139.35	134.97	4.38	Gravel and cobbles
03GT-PS-1	149.16	147.76	1.40	Boulders and cobbles with silty sand and trace gravel over cobbles with gravel and trace silt
03GT-PS-4	149.33	148.68	0.65	Cobbles and boulders with some gravel
03GT-PS-5	144.68	140.08	4.60	Cobbles and boulders with some angular gravel
03GT-PS-7	149.82	149.37	0.45	Cobbles and boulders with trace gravel and 0.05 m of organics
03GT-PS-9	147.47	146.72	0.75	Cobbles and boulders with trace gravel
03GT-PS-10	148.14	147.49	0.65	Cobbles and boulders with some gravel
03GT-PS-11	149.58	148.88	0.70	Cobbles and boulders with trace gravel
03GT-TD-1	136.41	134.34	2.07	Loose cobbles and round gravel with occasional boulders
03GT-Spec-F1	139.85	138.89	0.97	Cobbles and some angular gravel

TABLE V-2: Summary of Soil Depth and Description for Boreholes Drilled in Lakes

Borehole	Thickness of Soils Encountered (m)	Description
02GT-02A	2.7	Loose, homogenous, wet, dark grey, well graded, clean sand
02GT-02B	3.1	Loose, homogenous, wet, dark grey, well graded, clean sand
02GT-05	1.5	Lake bottom sediments and coarse sand, cobble and gravel
02GT-07	0.45	Loose, yellow silty clay
02GT-08	4.2	Dense yellow clay, silt, sand and gravel over loose gravel and cobbles over loose grey green, white rounded to sub-rounded cobbles, coarse gravel and sand
02GT-11	1.6	Lake bottom sediments and till
03GT-BZ-2	2.16	Loose cobbles and gravel with trace sand
03GT-BZ-3	1.20	Gravel and cobbles
03GT-BZ-5	2.74	Cobbles and boulders with some gravel, trace sandy silt
03GT-BZ-6	4.43	Boulders and cobbles with some gravel, trace sand and silt
03GT-GI-1	3.31	Boulder over cobbles and gravel with trace of clay and sand
03GT-GI-2	3.60	Cobbles and gravel over silty clay with some sand and trace gravel over sandy clay with gravel over sandy clay and gravel with cobbles
03GT-GI-3	1.25	Cobbles and gravel
03GT-GI-4	1.81	Cobble and gravel with trace sand and clay
03GT-GI-5	1.84	Gravel
03GT-GI-6	5.90	Loose cobbles and gravel with trace sand
03GT-GI-8	3.52	Cobbles and boulder with some gravel

Borehole	Thickness of Soils Encountered (m)	Description
03GT-GPIT-1	10.45	Cobbles and gravel
03GT-GPIT-3	14.30	Gravel and cobbles with trace and clay and sand
03GT-GPIT-4	14.94	Cobbles and gravel with trace coarse sand, silty fine grained sand over medium to fine grained sand
03GT-SE-1	4.58	Stiff layered moist light brown and grey greasy silty clay with little gravel over gravel and cobbles
03GT-SE-2	1.54	Cobbles and gravel
03GT-TD-2	5.33	Cobbles and gravel
03GT-TD-3	14.40	Green mud over cobbles and gravel with trace sand and clay
03GT-TD-4	5.84	Cobbles and gravel with trace of sand
03GT-TD-6	18.13	Cobbles and gravel
03GT-Spec-F2	1.61	Gravel
06GT-TD1	10.5	Cored boulders
06GT-TD2	14.4	Fine gravel over boulder and cobbles
06GT-TD3	16.21	Boulder and cobbles with trace of silt, coarse sand to fine gravel over clay silt and sand layer over cobbles

TABLE V-3: Borehole Observations of Bedrock Surface Elevation, Till Surface Elevation, and Boulder Presence

Borehole Number	Bedrock Elevation (masl)	Till Elevation (masl)	Thickness of soils (m)	Boulders Present (Y/N)	Location	Reference
G02-NP-1	136.22	N/A	N/A	N/A	North Portage	Golder (2002b)
GT02-NP-2	127.57	136.87	9.3	Y	North Portage	
GT02-NP-3	142.34	146.84	4.5	Y	North Portage	
G02-TP-01	134.09	N/A	N/A	N/A	3rd Portage	
GT02-TP-2	135.31	N/A	N/A	N/A	3rd Portage	
02GT-07	N/A	4.5 below reference elevation	0.45	N	N/A	
MRC02-01	N/A	at reference elevation	1.8	N	N/A	
MRC02-02	N/A	0.7m below reference elevation	1.52	N	N/A	
MRC02-03	N/A	2.64 m below reference elevation	0.36	N	N/A	
MRC02-04	N/A	at reference elevation	1.2	N	N/A	
MRC02-360	N/A	0.95m below reference elevation	1.05	N	N/A	
MRC02-284	N/A	at reference elevation	0.45	N	N/A	
MRC02-365	N/A	at reference elevation	1.6	N	N/A	
MRC02-362	N/A	at reference elevation	2.1	Y	N/A	
MRC02-04	N/A	1.2m below reference elevation	1.5	Y	N/A	

Borehole Number	Bedrock Elevation (masl)	Till Elevation (masl)	Thickness of soils (m)	Boulders Present (Y/N)	Location	Reference
MRC02-01	N/A	1.8m below reference elevation	1.5	Y	N/A	
MRC02-01	N/A	at reference elevation	1.5	Y	N/A	
MRC02-364	N/A	1.0m below reference elevation	0.1	Y	N/A	
MRC02-366	N/A	at reference elevation	1.4	Y	N/A	
MRC02-363	N/A	1.1m below reference elevation	0.5	Y	N/A	
MRC02-367	N/A	at reference elevation	1.1	Y	N/A	
MRC02-02	N/A	0.7 below reference elevation	1.5	Y	N/A	
MRC02-282	N/A	at reference elevation	0.7	Y	N/A	
MRC02-283	N/A	at reference elevation	0.6	Y	N/A	
MRC02-359	N/A	at reference elevation	1	Y	N/A	
MRC02-361	N/A	at reference elevation	0.8	N	N/A	
02GT-01	126.4	none		N	East Dyke	Golder (2002a)
02GT-02A	125.88	none		N	East Dyke	
02GT-02B	125.48	none		N	East Dyke	
02GT-03	132.74	135.07	2.33	Y	East Dyke	

Borehole Number	Bedrock Elevation (masl)	Till Elevation (masl)	Thickness of soils (m)	Boulders Present (Y/N)	Location	Reference
02GT-04	133.07	136.04	2.97	Y Below 2.75m	East Dyke	
02-GT-05	120.28	none		N	Causeway Alignment, North Hole	
02-GT-07	120.87	126.12	3	Y	West Dyke	
02GT-08	124.3	none		N	West Dyke	
02GT-09	135.58	136.77	1.19	Y	West Dyke	
02GT-10	135.16	136.16	1	Y	West Dyke	
02GT-11	112.88	114.48	1.6	N	Causeway	
03GT-BZ-2	126.34	none		N	Bay Zone	Golder (2003d)
03GT-BZ-3	131.35	none		N	Bay Zone	
03GT-BZ-5	125.59	none		Y	Bay Zone	
03GT-BZ-6	125.4	none		Y	Bay Zone	
03GT-GI-1	129.08	none		Y	Goose Island Dike	
03GT-GI-2	129.49	none		N	Goose Island Dike	
03GT-GI-3	122.2	none		N	Goose Island Dike	
03GT-GI-4	131.58	none		N	Goose Island Dike	
03GT-GI-5	129.74	none		N	Goose Island Dike	
03GT-GI-6	121	none		N	Goose Island Dike	
03GT-GI-7	130.59	none		N	Goose Island Dike	
03GT-GI-8	125.4	none		N	Goose Island Dike	

Borehole Number	Bedrock Elevation (masl)	Till Elevation (masl)	Thickness of soils (m)	Boulders Present (Y/N)	Location	Reference
03GT-GPIT-1	119.481	none		N	Goose Island Pit	
03GT-GPIT-2	132.22	none			Goose Island Pit	
03GT-GPIT-3	115.83	none		N	Goose Island Pit	
03GT-GPIT-4	113.47	none		N	Goose Island Pit	
03GT-PS-1	146.36	none		Y	Plant site	
03GT-PS-2	147.14	none		N	Plant site	
03GT-PS-3	148.05	none		N	Plant site	
03GT-PS-4	148.03	none		N	Plant site	
03GT-PS-5	135.48	none		N	Plant site	
03GT-PS-6	146.63	none		N	Plant site	
03GT-PS-7	148.92	none		Y	Plant site	
03GT-PS-8	143.72	none		N	Plant site	
03GT-PS-9	145.97	none		Y	Plant site	
03GT-PS-10	146.84	none		Y	Plant site	
03GT-PS-11	148.18	none		Y	Plant site	
03GT-SE-1	124.67	none		N	2nd Portage Lake	
03GT-SE-2	131.16	none		N	3rd Portage Lake	
03GT-TD-1	132.27	none		Y	Tailings Dike 2nd Portage abutment	
03GT-TD-2	110.89	none		N	Tailings Dike 2nd Portage	

Borehole Number	Bedrock Elevation (masl)	Till Elevation (masl)	Thickness of soils (m)	Boulders Present (Y/N)	Location	Reference
03GT-TD-3	Below 94.60	none		N	Tailings Dike 2nd Portage	
03GT-TD-4	112.32	none		N	Tailings Dike 2nd Portage	
03GT-TD-6	91.34	none		N	Tailings Dike 2nd Portage	
03GT-Spec-F1	137.93	none		N	Between 2nd and 3rd Port Lakes	
03GT-Spec-F2	125.93	none		N	Between 2nd and 3rd Port Lakes	
06GT-TD1	96.64	N/A		Y	2nd Portage Lake	Golder (2006d)
06GT-TD2	91.21	N/A		Y	2nd Portage Lake	
06GT-TD2A	93.56	N/A		Y	2nd Portage Lake	
06GT-TD3	112.98	N/A		N	2nd Portage Lake	

TABLE V-4: Summary of Till Gradations

Borehole	Depth (m)	% Gravel (>#4)	% Sand (>#200 & <#4)	% Silt (>0.002 mm & <#200)	% Clay (<0.002 mm)	Moisture Content (%)	Reference
Third Portage Trench spoil (59644)	N/A	26	43	24	7	4.4	Golder (2002b)
Third Portage Trench spoil (59645)	N/A	20	41	32	7	4	
Third Portage Trench spoil (59646)	N/A	17	40	37	6	2.7	
MRC02-01-2001	0-1.8	11	60	24	6	3.1	
MRC02-03	2.64-3.0	9	68	22		1.5	
MRC02-04	0-1.2	11	62	23	4	1.4	
MRC02-360	0.95-2.0	7	61	27	5	2.6	
MRC02-284	0-0.45	11	64	21	4	3	
MRC02-365	0-1.6	5	63	24	8	3.6	
MRC02-362	0-2.0	4	70	18	8	4.8	
MRC02-04	1.2-2.7	11	62	23	4	0.8	
MRC02-01-2002	1.8-3.3	12	58	25	5	2.9	
MRC02-01-2003	3.3-4.9	7	59	30	3	0.5	
MRC02-364	1-1.1	6	60	30	5	1.3	
MRC02-366	0-1.4	6	63	24	8	3.7	
MRC02-363	N/A	7	69	18	7	2.8	
MRC02-367	0-1.0	8	65	21	5	3.6	

Borehole	Depth (m)	% Gravel (>#4)	% Sand (>#200 & <#4)	% Silt (>0.002 mm & <#200)	% Clay (<0.002 mm)	Moisture Content (%)	Reference
02GT-02	128.58	3	93	4		16.3	
02GT-07-3	128.12	16	46	27	11	10.5	
02GT-07-4	127.67	12	49	30	9	11.4	
02GT-07-5	127.22	9	46	33	12	13.1	
02GT-07-6	126.79	9	52	29	10	11.1	
02GT-07-7	125.89	0	71	26	3	19.6	
GT02-TP-1	40.291	4	56	34	6	N/A	
Till Spoil 1	N/A	45	37	13	6	4.4	Golder Laboratory Testing 2006
Till Spoil 2	N/A	35	38	20	7	5.7	
Till Spoil 3	N/A	44	31	18	7	5.9	
Till. Grassland 4	N/A	39	33	22	6	14.8	
Till Spoil 5	N/A	23	41	26	10	5.3	
Till Spoil 6 & 7	N/A	34	44	16	6	5	
Till Spoil 8	N/A	43	40	15	2	4.2	
Till Spoil 9-10	N/A	18	46	34	2	7	
Till Spoil 11	N/A	19	42	33	6	10.9	
Till Spoil 12	N/A	39	33	20	8	8.2	
06-1413-034/3000-SA 9	N/A	25	48	18	10	N/A	Sampled Aug-29-06 by Golder, previously unreported
06-1413-034/3000-SA 2	N/A	25	42	27	6	17.2	

Borehole	Depth (m)	% Gravel (>#4)	% Sand (>#200 & <#4)	% Silt (>0.002 mm & <#200)	% Clay (<0.002 mm)	Moisture Content (%)	Reference
051413036-SA1	N/A	18	48	28	6	24.1	Reported in 05-1413-036/4000 – Aug 29 2005 Letter to CRL
051413036-SA2	N/A	13	48	30	9	11.2	
051413036-SA3	N/A	14	48	28	9	23.6	
051413036-SA4	N/A	15	49	28	8	23	
051413036-SA5	N/A	26	45	24	5	11.8	
051413036-SA6	N/A	4	54	33	8	20.5	
CJC04-034-002		36	27	38		N/A	Sept 13 2004 Site Visit Report
CJC04-034-003		15	52	31	2	N/A	
MRC02-151-2472	N/A	6	70	22	2	N/A	

TABLE V-5: Summary of Bedrock Hydraulic Conductivity Test Data

Borehole	Reference Elevation (masl)	Down Hole Depth from ground surface or ice surface		Inclination (degrees)	Azimuth (degrees)	End of Borehole (down the hole depth m)	Vertical Depth		Elevation		Rock Unit	Hydraulic Conductivity (m/s)
		from (m)	to (m)				from (m)	to (m)	from (masl)	to (masl)		
06GT-TD1**	135.1	44.5	67.0	-89.4	-	204.0	44.5	67.0	91	68	Quartzite	$>3 \times 10^{-05}$
	135.1	60.5	83.5	-89.4	-	204.0	60.5	83.5	75	52	Intermediate Volcanic And Quartzite	$>3 \times 10^{-05}$
	135.1	80.5	113.0	-89.4	-	204.0	80.5	113.0	55	22	Quartzite	5×10^{-06}
	135.1	98.5	113.0	-89.4	-	204.0	98.5	113.0	37	22	Quartzite	1×10^{-05}
	135.1	109.5	144.0	-89.4	-		109.5	144.0	26	-9	Quartzite and Intermediate Volcanic	2×10^{-06}
	135.1	139.5	174.0	-89.4	-		139.5	174.0	-4	-39	Quartzite and Wack, Ultra Mafics	5×10^{-08}
	135.1	172.5	204.0	-89.4	-		172.5	204.0	-37	-69	Intermediate Volcanic	3×10^{-09}
06GT-TD2A	135.1	43.5	60.0	-89.3	-	201.0	43.5	60.0	92	75	Intermediate Volcanic	3×10^{-06}
	135.1	58.5	81.0	-89.3	-		58.5	81.0	77	54	Intermediate Volcanic/ Quartzite	2×10^{-07}
	135.1	79.5	105.0	-89.3	-		79.5	105.0	56	30	Quartzite, Intermediate Volcanic, Ultra Mafics	3×10^{-07}
	135.1	103.5	135.0	-89.3	-		103.5	135.0	32	0	Quartzite	2×10^{-07}
	135.1	133.5	164.0	-89.3	-		133.5	164.0	2	-29	Quartzite, 0.3m Sand Seam	7×10^{-07}
	135.1	163.5	201.0	-89.3	-		163.5	201.0	-28	-66	Intermediate Volcanic	6×10^{-08}
06GT-TD3	135.1	25.5	45.0	-89.6	-	126.0	25.5	45.0	110	90	Intermediate Volcanic	2×10^{-05}
	135.1	43.5	66.0	-89.6	-		43.5	66.0	92	69	Intermediate Volcanic	1×10^{-05}
	135.1	64.5	81.0	-89.6	-		64.5	81.0	71	54	Intermediate Volcanic, Iron Formation	6×10^{-07}
	135.1	79.5	96.0	-89.6	-		79.5	96.0	56	39	Intermediate Volcanic	1×10^{-06}
	135.1	94.5	117.0	-89.6	-		94.5	117.0	41	18	Quartzite, Intermediate Volcanic	3×10^{-06}
03GT-BZ-2	134	10.9	15.4	-90.0	-	15.4	10.9	15.4	123	119	Intermediate Volcanics	1.3×10^{-06}
03GT-BZ-3	134	6.4	9.4	-90.0	-	9.4	6.4	9.4	128	125	Intermediate Volcanics	3.1×10^{-06}
03GT-BZ-5	134	8.6	16.1	-90.0	-	16.1	8.6	16.1	125	118	Ultra Mafics	5×10^{-08}
03GT-BZ-6	134	11.6	16.1	-90.0	-	16.1	11.6	16.1	122	118	Ultra Mafics	1.3×10^{-07}
03GT-GI-1	134	7.6	12.1	-90.0	-	12.1	7.6	12.1	126	122	Intermediate Volcanics	2.5×10^{-08}
03GT-GI-2	134	7.5	12.0	-90.0	-	12.0	7.5	12.0	126	122	Intermediate Volcanics	3.7×10^{-09}
03GT-GI-3	134	15.4	18.4	-90.0	-	18.4	15.4	18.4	119	116	Intermediate Volcanics	1.3×10^{-06}
03GT-GI-5	134	7.6	12.1	-90.0	-	12.1	7.6	12.1	126	122	Ultra Mafics	3.3×10^{-05}

Borehole	Reference Elevation (masl)	Down Hole Depth from ground surface or ice surface		Inclination (degrees)	Azimuth (degrees)	End of Borehole (down the hole depth m)	Vertical Depth		Elevation		Rock Unit	Hydraulic Conductivity (m/s)
		from (m)	to (m)				from (m)	to (m)	from (masl)	to (masl)		
03GT-GI-6	134	15.0	18.8	-90.0	-	18.8	15.0	18.8	119	115	Quartzite	4.7x10 ⁻⁰⁷
03GT-GPIT-1	132.92	106.8	150.3	-62.0	51.0	150.3	94.3	132.7	39	0	Ultra Mafics	7.8x10 ⁻⁰⁸
	132.92	61.8	150.3	-62.0	51.0		54.5	132.7	78	0	Ultra Mafics	4.1x10 ⁻⁰⁸
	132.92	22.8	150.3	-62.0	51.0		20.1	132.7	113	0	Ultra Mafics	1.1x10 ⁻⁰⁷
03GT-GPIT-3	133.01	22.7	33.2	-61.0	133.0	150.2	19.9	29.1	113	104	Ultra Mafics	1.3x10 ⁻⁰⁸
	133.01	97.7	150.2	-61.0	133.0		85.5	131.4	48	2	Iron Formation-Intermediate Volcanics	6.4x10 ⁻⁰⁷
	133.01	97.7	150.2	-61.0	133.0		85.5	131.4	48	2	Iron Formation-Intermediate Volcanics	6.1x10 ⁻⁰⁷
	133.01	49.7	150.2	-61.0	133.0		43.5	131.4	90	2	Iron Formation-Mafics-Volcanics	2.6x10 ⁻⁰⁷
	133.01	28.7	150.2	-61.0	133.0		25.1	131.4	108	2	Iron Formation-Mafics-Volcanics	2x10 ⁻⁰⁷
03GT-GPIT-4	129.77	108.7	149.2	-58.0	291.0	149.1	92.2	126.6	38	3	Iron Formation-Mafics	7.6x10 ⁻⁰⁹
	129.77	87.7	149.2	-58.0	291.0		74.4	126.6	55	3	Iron Formation-Mafics	6.5x10 ⁻⁰⁹
	129.77	66.7	149.2	-58.0	291.0		56.6	126.6	73	3	Iron Formation-Mafics	8.6x10 ⁻⁰⁹
	129.77	24.7	149.2	-58.0	291.0		21.0	126.6	109	3	Iron Formation-Mafics	2x10 ⁻⁰⁸
03GT-TD-2	133	24.9	29.4	-90.0	-	29.4	24.9	29.4	108	104	Ultra Mafics	2.8x10 ⁻⁰⁵
03GT-TD-4	133	24.8	29.3	-90.0	-	29.3	24.8	29.3	108	104	Intermediate Volcanics	4x10 ⁻⁰⁵
03GT-TD-6	132.58	47.8	52.3	-90.0	-	52.3	47.8	52.3	85	80	Intermediate Volcanics	5.1x10 ⁻⁰⁶
03GT-SE-1	133	11.3	15.8	-90.0	-	15.8	11.3	15.8	122	117	Quartzite	7.2x10 ⁻⁰⁶
03GT-SE-2	133	5.8	10.3	-90.0	-	10.3	5.8	10.3	127	123	Intermediate Volcanics	7.9x10 ⁻⁰⁸
03GT-SPEC-F2	132.20	15.9	35.4	-58.0	232.0	174.4	13.5	30.0	119	102	Mainly Ultra Mafics	1.6x10 ⁻⁰⁶
	132.20	51.9	74.4	-58.0	232.0		44.0	63.1	88	69	Mainly Ultra Mafics	1.3x10 ⁻⁰⁶
	132.20	75.9	104.4	-58.0	232.0		64.3	88.5	68	44	Mainly Ultra Mafics	2.8x10 ⁻⁰⁸
	132.20	111.9	135.9	-58.0	232.0		94.9	115.2	37	17	Mainly Ultra Mafics	6.3x10 ⁻⁰⁹
	132.20	138.9	147.9	-58.0	232.0		117.8	125.4	14	7	Mainly Ultra Mafics	2.1x10 ⁻⁰⁸
	132.20	154.9	174.4	-58.0	232.0		131.3	147.9	1	-16	Ultra Mafics-Iron Formation	1.5x10 ⁻⁰⁸
	132.20	136.9	174.4	-58.0	232.0		116.1	147.9	16	-16	Ultra Mafics-Iron Formation	4.3x10 ⁻⁰⁹
02GT-01	132.5	7.5	9.5	-90.0	-	9.5	7.5	9.5	125	123	Intermediate Volcanic	2x10 ⁻⁰⁶
	132.5	7.5	9.5	-90.0	-		7.5	9.5	125	123	Intermediate Volcanic	4x10 ⁻⁰⁷
02GT-02	132.48	10.5	12.5	-90.0	-	12.5	10.5	12.5	122	120	Intermediate Volcanic	3.5x10 ⁻⁰⁷

Borehole	Reference Elevation (masl)	Down Hole Depth from ground surface or ice surface		Inclination (degrees)	Azimuth (degrees)	End of Borehole (down the hole depth m)	Vertical Depth		Elevation		Rock Unit	Hydraulic Conductivity (m/s)
		from (m)	to (m)				from (m)	to (m)	from (masl)	to (masl)		
02GT-04	136.04	6.5	8.5	-50.3	22.0	30.1	5.1	6.6	131	129	Intermediate Volcanic	2x10 ⁻⁰⁸
	136.04	9.5	17.5	-50.3	22.0		7.4	13.6	129	122	Intermediate Volcanic	3x10 ⁻⁰⁷
	136.04	18.5	29.5	-50.3	22.0		14.4	22.9	122	113	Intermediate Volcanic	2x10 ⁻⁰⁸
02GT-05	132.5	15.0	17.0	-90.0	-	17.0	15.0	17.0	118	116	Intermediate Volcanic	3x10 ⁻⁰⁵
02GT-07	132.621	13.5	15.5	-90.0	-	15.5	13.5	15.5	119	117	Quartzite	1x10 ⁻⁰⁶
02GT-08	132.6	10.5	12.5	-90.0	-	17.0	10.5	12.5	122	120	Intermediate To Felsic Volcaniclasitics	1x10 ⁻⁰⁴
	132.6	11.5	17.0	-90.0	-		11.5	17.0	121	116	Intermediate To Felsic Volcaniclasitics	7x10 ⁻⁰⁵
	132.6	13.5	17.0	-90.0	-		13.5	17.0	119	116	Granite	3x10 ⁻⁰⁶
02GT-09	136.77	24.5	30.5	-48.4	79.0	30.8	18.3	22.8	118	114	Ultra Mafics Volcanic	2x10 ⁻⁰⁸
02GT-10	136.29	15.5	28.0	-48.7	238.0	30.0	11.6	21.0	125	115	Intermediate Volcanic	3x10 ⁻⁰⁷
	136.29	21.5	30.0	-48.7	238.0		16.1	22.5	120	114	Intermediate Volcanic	1x10 ⁻⁰⁹
02GT-11	132.78	25.0	27.0	-90.0	-	27.0	25.0	27.0	108	106	Ultra Mafics Volcanic	3x10 ⁻⁰⁵
	132.78	22.0	27.0	-90.0	-		22.0	27.0	111	106	Ultra Mafics Volcanic	2x10 ⁻⁰⁵
NP02-401	132.91	135.0	158.0	-66.4	113.9	158.0	125.5	144.7	7	-12	Intermediate Volcanic	2x10 ⁻⁰⁶
	132.91	129.0	158.0	-66.4	113.9		118.2	144.7	15	-12	Intermediate Volcanic	3x10 ⁻⁰⁹
	132.91	66.0	158.0	-66.4	113.9		60.5	144.7	72	-12	Intermediate Volcanic	5x10 ⁻⁰⁷
NP02-412	133.24	31.0	39.0	-68.3	109.1	69.0	28.8	36.2	104	97	Ultra Mafics	9x10 ⁻⁰⁶
	133.24	40.0	69.0	-68.3	109.1		37.1	64.1	96	69	Intermediate Volcanic	3x10 ⁻⁰⁶
GT02-NP-1	136.87	25.5	111.0	-59.9	251.0	111.0	21.6	96.0	115	41	Iron Formation/Ultra Mafics/ Intermediate Volcanic	3x10 ⁻⁰⁹
	136.87	55.5	111.0	-59.9	251.0		48.0	96.0	89	41		5x10 ⁻⁰⁹
	136.87	73.5	111.0	-59.9	251.0		63.6	96.0	73	41	Intermediate Volcanic	4x10 ⁻⁰⁹
	136.87	88.5	111.0	-59.9	251.0		76.6	96.0	60	41	Chloritic Intermediate Volcanic	2x10 ⁻⁰⁸

Borehole	Reference Elevation (masl)	Down Hole Depth from ground surface or ice surface		Inclination (degrees)	Azimuth (degrees)	End of Borehole (down the hole depth m)	Vertical Depth		Elevation		Rock Unit	Hydraulic Conductivity (m/s)
		from (m)	to (m)				from (m)	to (m)	from (masl)	to (masl)		
GT02-NP-2	136.87	12.0	16.5	-50.2	292.0	109.5	9.2	12.7	128	124	Mafic	3x10 ⁻⁰⁸
	136.87	25.5	30.0	-50.2	292.0		19.6	23.0	117	114	Quartzite/Mafic Volcanic	2x10 ⁻⁰⁸
	136.87	31.5	42.0	-50.2	292.0		24.2	32.3	113	105	Ultra Mafics	2x10 ⁻⁰⁸
	136.87	64.5	81.0	-50.2	292.0		49.1	62.2	88	75	Ultra Mafics/Fault	2x10 ⁻⁰⁸
	136.87	87.0	109.5	-50.2	292.0		66.8	84.1	70	53	Iron Formation/Intermediate Volcanic/ Ultra Mafics	3x10 ⁻⁰⁹
	136.87	99.0	109.5	-50.2	292.0		76.0	84.1	61	53	Ultra Mafics	8x10 ⁻⁰⁹
TP98-258	133.5	18.5	173.0	-58.0	112.0	173.0	15.7	146.7	118	-13	Intermediate Volcanic-Highly Fractured	1x10 ⁻⁰⁷
	133.5	18.5	38.0	-58.0	112.0		15.7	32.2	118	101	Intermediate Volcanic	6x10 ⁻⁰⁷
	133.5	39.5	173.0	-58.0	112.0		33.5	146.7	100	-13	Iron Formation	3x10 ⁻⁰⁹
	133.5	75.5	173.0	-58.0	112.0		64.0	146.7	70	-13	Ultra Mafics-Bz Fault 82.33 To 88.10	3x10 ⁻⁰⁹
	133.5	96.5	173.0	-58.0	112.0		81.8	146.7	52	-13	Ultra Mafics	5x10 ⁻⁰⁹
	133.5	150.5	173.0	-58.0	112.0		127.6	146.7	6	-13	Intermediate Volcanic/Iron Formation	2x10 ⁻⁰⁸
TP98-261	134.79	9.5	152.0	-56.0	112.0	101.0	7.9	126.0	127	9	Quartzite-Highly Fractured	1x10 ⁻⁰⁹
	134.79	22.5	152.0	-56.0	112.0		18.7	126.0	116	9	Intermediate Volcanic/Ultra Mafics	2x10 ⁻⁰⁹
	134.79	42.5	152.0	-56.0	112.0		35.2	126.0	100	9	Intermediate Volcanic/Iron Formation	3x10 ⁻⁰⁹
	134.79	63.5	152.0	-56.0	112.0		52.6	126.0	82	9	Ultramafics-Bz Fault 73.5 To 76.8	2x10 ⁻⁰⁹
	134.79	81.5	152.0	-56.0	112.0		67.6	126.0	67	9	Intermediate Vol./Iron Formation/ Ultra Mafics	4x10 ⁻⁰⁹
TP98-265	133.41	18.5	50.0	-52.0	112.0	152.0	14.6	39.4	119	94	Int. Volcanic/Iron Formation-Highly Fractured	3x10 ⁻⁰⁷
	133.41	18.5	101.0	-52.0	112.0		14.6	79.6	119	54	Int. Volcanic/Iron Formation-Highly Fractured	6x10 ⁻⁰⁷
	133.41	51.5	101.0	-52.0	112.0		40.6	79.6	93	54	Intermediate. Volcanic/Iron Formation	5x10 ⁻⁰⁹
	133.41	90.5	101.0	-52.0	112.0		71.3	79.6	62	54	Intermediate. Volcanic/ Ultra Mafics-Bz Fault 92.87 to 93.22	3x10 ⁻⁰⁸

** Drilling targeted fault zone

APPENDIX VI
PSEUDO PROBABILISTIC ANALYSES

1.0 INTRODUCTION

A deterministic wedge stability analysis was undertaken based on the main structural orientations in each of the Structural Domains for the Portage and Goose Island Deposit areas. For the purposes of the analysis, a friction angle of $\phi=42^\circ$ has been assumed for discontinuous joint surfaces, and $\phi=37^\circ$ has been assumed for foliation and stratigraphic contacts. As discussed previously, this provides a conservative estimate of wedge stability because joint surface asperities are not considered in the analyses. The stability analyses assume dry conditions to exist.

1.1 Goose Island Deposit Deterministic Wedge Stability Analysis

The results of the analyses are tabulated in the following tables.

TABLE VI.1: Domain 1 - Wedge Stability Factor of Safety Matrix

	Type	Fol1	Fol2	CJ1	CJ3	CJ4	CX1	Flat1
Domain 1 Factor of Safety	CJ1	0.94	1.03					
	CJ3	1.11	3.58	0.54				
	CJ4	0.80	1.77	1.54	7.90			
	CX1	1.59	1.10	3.64	4.11	6.97		
	Flat1	7.54	12.05	2.86	4.33	3.24	2.57	
	Or	7.87	72.13	5.20	13.70	9.37	7.20	20.51
Domain 1 Wedge Orientations	CJ1	50/263	41/275					
	CJ3	44/217	20/230	61/198				
	CJ4	49/270	38/264	46/269	19/064			
	CX1	33/310	39/327	20/291	20/064	20/063		
	Flat1	12/333	09/216	20/291	14/232	19/256	20/290	
	Or	07/169	01/207	10/127	05/059	06/068	07/079	03/196

TABLE VI.1: Domain 2 - Wedge Stability Factor of Safety Matrix

	Type	Fol1	CJ1	CJ2	CJ3	CJ4	CX1	Or
Domain 2 Factor of Safety	CJ1	0.43						
	CJ2	1.62	7.42					
	CJ3	1.93	0.64	0.79				
	CJ4	0.57	1.30	0.76	8.07			
	CX1	0.61	3.26	0.54	1.95	0.52		
	Or	60.99	1.96	1.62	1.95	2.20	1.29	
	Flat	5.09	1.49	1.96	9.88	4.28	1.56	6.23
Domain 2 Wedge Orientations	CJ1	66/231						
	CJ2	44/356	15/137					
	CJ3	42/207	60/179	55/095				
	CJ4	Sliding	47/281	55/014	13/058			
	CX1	60/342	29/296	61/035	39/074	Sliding		
	Or	01/012	32/146	41/118	39/074	29/048	39/075	
	Flat	19/063	33/293	29/342	08/228	25/261	34/299	10/022

TABLE VI.2: Domain 3 - Wedge Stability Factor of Safety Matrix

	Type	Fol1	Bed	Fol3	CJ1	CJ2	CJ4	CX1	Or
Domain 3 Factors of Safety	Bed	4.65							
	CJ1	0.64	0.94	1.88					
	CJ2	1.25	1.37	0.49	8.86				
	CJ4	1.59	0.33	1.43	0.76	0.61			
	CX1	0.73	0.66	0.77	1.84	0.54	0.91		
	Or	28.07	18.84	31.61	3.68	3.31	4.63	2.35	
	Flat	2.05	2.16	2.11	4.04	5.18	3.91	30.86	3.05
Domain 3 Wedge Orientations	Bed	32/354							
	CJ1	53/276	59/213	40/171					
	CJ2	42/340	47/346	62/048	12/317				
	CJ4	49/259	70/310	49/032	57/267	60/018			
	CX1	51/316	58/336	56/038	38/298	60/018	60/018		
	Or	04/204	04/003	02/009	19/313	17/320	16/241	21/284	
	Flat	24/002	24/357	24/018	15/315	17/320	19/048	4/090	17/321

TABLE VI.3: Domain 4 - Wedge Stability Factor of Safety Matrix

	Type	Fol1	CJ1	CJ2	CJ3	CX1	OR
Domain 4 Factors of Safety	CJ1	2.74					
	CJ2	6.72	7.39				
	CJ3	2.54	1.53	1.67			
	CX1	4.25	13.46	11.61	1.22		
	Or	7.31	1.40	1.66	0.40	0.65	
	Flat	4.07	2.79	3.09	49.45	3.15	4.27
Domain 4 Wedge Orientations	CJ1	19/269					
	CJ2	08/324	09/121				
	CJ3	19/232	41/223	33/069			
	CX1	12/308	06/118	14/113	49/079		
	Or	08/187	38/169	35/028	66/101	58/055	
	Flat	12/201	21/135	17/108	02/059	18/110	17/182

1.2 North Connector and Third Portage Deposit Deterministic Wedge Stability Analysis

The results of the analyses are tabulated in the following tables. In the tables below, BZ indicates the Bay Fault, and 2PL indicates the Second Portage Lake Fault.

1.2.1 Domain TP-1

The following table summarizes the orientations of wedges formed by the intersection of the various structural discontinuities within Domain 1.

TABLE VI.4: Domain TP-1 - Wedge Orientations

	Type	BZ	2PL	Fol	Or1	Or2	CJ1	CJ2	CJ3	CJ4
Domain TP-1 Factors of Safety	Fol	6.59	3.84							
	Or1	27.19	1.52	7.84						
	Or2	1.18	0.31	9.43	17.89					
	CJ1	0.44	24.52	4.10	2.02	0.49				
	CJ2	1.33	9.01	3.80	0.33	1.36	8.48			
	CJ3	0.55	0.21	12.43	0.41	1.07	0.29	0.46		
	CJ4	N/W	N/W	N/W	N/W	N/W	N/W	N/W	N/W	
	CX1	1.86	3.14	5.36	2.09	1.95	3.33	4.86	3.75	N/W
Domain TP-1 Wedge Orientations	Fol	08/357	21/321							
	Or1	05/182	46/167	06/005						
	Or2	68/293	68/261	06/007	09/005					
	CJ1	69/287	24/154	11/325	49/165	69/288				
	CJ2	47/337	12/320	12/320	71/053	51/341	19/323			
	CJ3	64/230	70/227	04/238	74/072	60/231	75/222	70/069		
	CJ4	N/W	N/W	N/W	N/W	N/W	N/W	N/W	N/W	
	CX1	26/190	21/153	02/009	25/176	26/200	21/154	14/131	19/237	N/W

Notes: N/W = No Wedge Formed

1.2.2 Domain TP-2

The following table summarizes the orientations of wedges formed by the intersection of the various structural discontinuities within the Domain 2 east region.

TABLE VI.5: Domain TP-2 East Region - Wedge Orientations

	Type	BZ	2PL	Fol	Or	CJ1	CJ2	CJ3	CJ4
Domain TP-2 Factors of Safety	Fol	7.50	0.70						
	Or	10.66	20.22	16.41					
	CJ1	0.74	4.95	0.65	10.72				
	CJ2	0.91	3.67	1.52	8.40	19.26			
	CJ3	N/W	N/W	N/W	N/W	N/W	N/W		
	CJ4	0.45	0.63	0.57	3.86	1.29	0.51	N/W	
	CX1	0.70	0.48	0.81	4.04	0.65	1.89	N/W	5.55
Domain TP-2 Wedge Orientations	Fol	42/199	63/279						
	Or	05/358	03/146	04/351					
	CJ1	56/212	36/160	56/219	05/135				
	CJ2	54/330	27/314	46/323	08/123	06/307			
	CJ3	N/W	N/W	N/W	N/W	N/W	N/W		
	CJ4	62/316	57/291	59/298	14/053	44/270	63/341	N/W	
	CX1	55/211	61/186	53/214	13/087	55/209	42/109	N/W	18/250

Notes: N/W = No Wedge Formed

The following table summarizes the orientations of wedges formed by the intersection of the various structural discontinuities within the Domain 2 west region.

TABLE VI.6: Domain TP-2 West Region - Wedge Orientations

	Type	BZ	2PL	Fo1	Fo2	Fo3	Or	
Domain TP-2 Factors of Safety	Fo1	3.65	2.15					Remaining factors of safety are the same as for TABLE VI.5
	Fo2	9.12	17.30	4.83				
	Fo3	1.09	2.39	3.10	5.44			
	Or	3.30	6.82	2.86	N/W	2.51		
	CJ1	0.74	4.95	2.28	9.34	4.92	4.24	
	CJ2	0.91	3.67	2.08	7.27	7.87	0.69	
	CJ3	N/W	N/W	N/W	N/W	N/W	N/W	
	CJ4	0.45	0.63	10.05	3.27	2.51	0.86	
	CX1	0.70	0.48	4.87	3.44	3.59	0.98	
Domain TP-2 Wedge Orientations	Fo1	15/354	20/317					Remaining wedge orientations are the same as for TABLE VI.5
	Fo2	05/358	03/146	09/017				
	Fo3	36/195	28/156	15/268	08/121			
	Or	27/349	15/151	17/344	N/W	24/146		
	CJ1	56/212	36/160	19/297	05/135	25/122	22/147	
	CJ2	54/330	27/314	20/311	08/123	09/122	66/081	
	CJ3	N/W	N/W	N/W	N/W	N/W	N/W	
	CJ4	62/316	57/291	8/244	14/053	23/253	55/014	
	CX1	55/211	61/186	11/254	13/087	27/244	52/124	

Notes: N/W = No Wedge Formed

1.2.3 Domain TP-3

The following table summarizes the orientations of wedges formed by the intersection of the various structural discontinuities within the Domain 3 east region.

TABLE VI.7: Domain TP-3 East Region - Wedge Orientations

	Type	BZ	2PL	Fol	Or	CJ1	CJ2	CJ3	CJ4	CX1	CX2
Domain TP-3 Factors of Safety	Fol	11.38	0.20								
	Or	46.10	3.64	22.13							
	CJ1	0.63	39.59	0.70	4.39						
	CJ2	2.96	5.69	4.50	6.27	8.38					
	CJ3	1.14	0.50	1.16	3.22	0.53	0.32				
	CJ4	0.31	0.43	0.36	3.75	0.43	0.73	54.69			
	CX1	0.96	1.01	0.97	1.96	1.24	1.28	1.96	2.68		
	CX2	1.29	2.95	1.53	1.77	3.29	1.96	1.57	0.87	5.59	
	CX3	0.20	0.39	0.23	1.97	0.33	0.15	1.92	1.70	13.39	3.05
Domain TP-3 Wedge Orientations	Fol	48/336	70/233								
	Or	01/180	16/151	3/177							
	CJ1	67/299	12/149	71/292	16/150						
	CJ2	36/345	23/154	34/344	14/156	29/153					
	CJ3	50/205	63/189	54/201	23/056	68/165	72/129				
	CJ4	68/297	64/277	69/305	17/039	68/298	63/356	03/227			
	CX1	45/201	47/168	46/194	26/115	45/158	43/149	42/211	28/238		
	CX2	38/343	22/316	38/342	28/083	26/321	39/345	38/063	46/023	13/100	
	CX3	70/264	67/264	73/266	27/078	77/268	81/066	55/076	57/262	09/259	31/078

Notes: N/W = No Wedge Formed

The following table summarizes the orientations of wedges formed by the intersection of the various structural discontinuities within the Domain 3 west region.

TABLE VI.8: Domain TP-3 West Region - Wedge Orientations

	Type	BZ	2PL	Fo1	Fo2	Or1	Or2	CJ1	CJ2	CJ3	CJ4	CX1
Domain TP-3 Factors of Safety	Fo1	1.71	1.80									
	Fo2	40.32	10.45	8.85								
	Or1	1.70	0.34	1.57	24.91							
	Or2	7.17	1.28	2.55	233.14	4.50						
	CJ1	0.33	1.05	2.41	8.80	0.36	0.89					
	CJ2	N/W	N/W	N/W	N/W	N/W	N/W	N/W				
	CJ3	0.75	0.34	11.50	10.87	0.70	0.51	0.30	N/W			
	CJ4	0.64	0.73	7.51	12.68	0.59	2.53	0.91	N/W	15.85		
	CX1	1.14	0.89	15.36	8.16	1.08	0.95	1.39	N/W	4.53	4.06	
	CX2	0.84	1.84	4.74	7.20	1.06	0.72	3.16	N/W	1.72	0.63	6.68
Domain TP-3 Wedge Orientations	Fo1	26/340	24/316									
	Fo2	01/360	04/323	06/262								
	Or1	68/245	69/255	26/341	02/351							
	Or2	20/188	53/174	21/018	00/193	30/185						
	CJ1	69/253	69/253	21/304	05/309	69/254	61/167					
	CJ2	N/W	N/W	N/W	N/W	N/W	N/W	N/W				
	CJ3	64/227	70/225	06/058	04/237	65/226	74/075	72/221	N/W			
	CJ4	58/325	55/294	13/042	04/232	58/314	36/023	53/286	N/W	10/236		
	CX1	43/200	47/168	04/256	05/256	45/194	47/178	45/150	N/W	25/235	19/242	
	CX2	51/330	40/307	17/290	06/283	51/324	58/037	31/300	N/W	48/063	57/338	13/093

Notes: N/W = No Wedge Formed

1.2.4 Domain TP-4

The following table summarizes the orientations of wedges formed by the intersection of the various structural discontinuities within Domain 4.

TABLE VI.9: Domain TP-4 - Wedge Orientations

	Type	BZ	2PL	Fo1	Flat	Or	CJ1	CJ2	CJ3	CJ4	CX1
Domain TP-4 Factors of Safety	Fol	17.77	0.19								
	Flat	2.68	2.01	3.03							
	Or	53.49	5.07	29.53	4.46						
	CJ1	0.93	88.33	1.08	2.16	5.83					
	CJ2	1.40	3.27	1.46	2.25	2.20	4.48				
	CJ3	0.89	0.39	1.11	86.82	3.10	0.73	1.68			
	CJ4	0.38	0.47	0.48	17.60	3.93	0.76	0.97	13.45		
	CX1	1.08	1.07	1.20	6.73	2.39	0.96	4.70	3.29	3.11	
	CX2	0.25	0.53	0.30	7.41	2.35	1.04	2.69	2.98	1.38	21.03
Domain TP-4 Wedge Orientations	Fol	41/198	70/240								
	Flat	19/353	21/317	18/357							
	Or	01/360	11/149	02/002	11/024						
	CJ1	58/215	04/147	57/211	20/311	11/151					
	CJ2	36/344	20/317	38/349	21/318	23/089	17/313				
	CJ3	55/212	66/199	57/211	01/053	20/058	57/211	37/064			
	CJ4	66/306	62/282	66/320	05/043	16/038	55/265	44/020	11/230		
	CX1	41/199	44/165	41/199	08/256	22/108	44/179	14/100	32/244	24/236	
	CX2	69/286	63/279	72/291	09/260	22/074	53/271	34/071	45/068	60/276	05/259

Notes: N/W = No Wedge Formed

1.2.5 Domain NP-1

The following table summarizes the orientations of wedges formed by the intersection of the various structural discontinuities within North Portage Domain 1.

TABLE VI.10: Domain NP-1 - Wedge Orientations

	Type	BZ	2PL	Fol1	Fol2	Or	CJ1	CJ2	CJ3	CJ4
Domain NP-1 Factors of Safety	2PL	0.19								
	Fol1	13.23	3.89							
	Fol2	10.41	3.60							
	Or	6.97	0.48	9.96	8.40					
	CJ1	0.34	1.14	3.37	3.27	0.50				
	CJ2	1.04	4.52	3.38	2.89	1.54	27.44			
	CJ3	0.89	0.39	5.45	5.51	0.85	0.48	0.68		
	CJ4	0.33	0.43	7.23	7.85	0.37	0.69	0.59	10.52	
	CX1	0.30	0.62	3.23	3.30	0.42	1.27	0.31	2.84	0.76
Domain NP-1 Wedge Orientations	2PL	69/253								
	Fol1	04/358	13/320							
	Fol2	05/182	13/150							
	Or	50/335	69/218	06/351	07/175					
	CJ1	67/239	67/204	15/306	15/138	68/214				
	CJ2	51/333	23/316	14/313	16/122	51/333	05/310			
	CJ3	55/212	66/199	10/231	11/056	63/204	66/199	64/083		
	CJ4	67/299	67/278	09/227	07/040	68/311	60/268	63/351	15/229	
	CX1	68/295	61/284	15/264	15/077	71/302	54/278	71/038	44/067	67/292

1.2.6 Domain NP-2

The following table summarizes the orientations of wedges formed by the intersection of the various structural discontinuities within North Portage Domain 2.

TABLE VI.11: Domain NP-2 - Wedge Orientations

	Type	BZ	2PL	Fol	Or	CJ1	CJ2	CJ3	CJ4
Domain NP-2 Factors of Safety	2PL	0.19							
	Fol	13.03	4.51						
	Or	41.14	1.64	16.44					
	CJ1	0.27	0.35	3.49	0.93				
	CJ2	1.02	4.05	3.86	0.39	18.00			
	CJ3	1.80	0.64	16.74	0.31	0.50	0.60		
	CJ4	0.35	0.37	20.63	3.42	0.60	0.75	18.14	
	CX1	0.50	0.79	4.65	1.03	1.68	0.52	2.58	0.48
Domain NP-2 Wedge Orientations	2PL	69/253							
	Fol	04/358	11/321						
	Or	03/181	43/165	03/003					
	CJ1	69/249	70/244	13/296	59/151				
	CJ2	51/334	24/316	12/311	68/052	09/123			
	CJ3	41/199	59/182	04/214	72/114	67/166	63/076		
	CJ4	68/296	66/272	03/210	33/014	63/263	59/346	08/212	
	CX1	60/320	53/296	11/257	53/026	45/283	62/351	36/049	62/340

1.2.7 Domain NP-3

The following table summarizes the orientations of wedges formed by the intersection of the various structural discontinuities within North Portage Domain 3.

TABLE VI.12: Domain NP-3 – Inferred Wedge Orientations

	Type	BZ	2PL	Fol	Or	CJ1	CJ2	CJ3	CJ4
Domain NP-3 Factors of Safety	Fol	3.17	0.45						
	Or	8.76	2.62	Very Large					
	CJ1	0.34	1.14	0.52	2.41				
	CJ2	1.04	4.52	1.05	1.85	27.44			
	CJ3	0.89	0.39	2.15	3.72	0.48	0.68		
	CJ4	0.33	0.43	1.14	5.59	0.69	0.59	10.52	
	CX1	0.30	0.62	0.45	2.25	1.27	0.31	2.84	0.76
Domain NP-3 Wedge Orientations	Fol	47/337	60/286						
	Or	07/183	21/153	00/195					
	CJ1	67/239	67/204	59/270	25/143				
	CJ2	51/333	23/316	50/332	29/117	05/310			
	CJ3	55/212	66/199	38/222	22/059	66/199	64/083		
	CJ4	67/299	64/278	58/264	13/038	60/268	63/351	15/229	
	CX1	68/295	61/284	60/284	26/073	54/278	71/038	44/067	67/292

1.3 Plane and Wedge Stability Analysis Based on Wall Sector Azimuth

Not all of the wedge structures discussed in the previous section will actually be exposed in the pit walls. Therefore a pseudo-probabilistic analysis was carried out for planar and wedge stability within each Structural Domain for the main wall orientations. This involved analyzing the oriented geotechnical data from each of the interpreted Structural Domains to develop cumulative frequency distributions for the potential failure modes (plane and wedge failure) based on wall orientation and using estimates of the frictional strength characteristics of the surfaces. A friction angle, ϕ , of 37 degrees was assumed for planar surfaces dipping to the west as these represent foliation and stratigraphic contacts, while an angle of 42 degrees was assumed for all other planar orientations. The analyses are considered to be pseudo-probabilistic as they do not account for variations in the statistical distribution of frictional strength, effective cohesion due to rock bridging, pore pressure distributions, and other factors that could potentially affect slope stability.

In general, the range in wall azimuth over which the analyses are applicable will be +/- 25 degrees for dip direction for planar failure and +/- 45 degrees for plunge direction for wedge failure. For example, for the west pit wall having a wall sector azimuth of 270 degrees, the range in wall azimuth for planar failure considered in the analyses would be from about 245 degrees through to 295 degrees, while for wedge failure would be from about 225 degrees through to 315 degrees.

A kinematic window of 50 degrees was used for assessing planar failure, and 90 degrees for wedge failure. This means that for planar failure, planes with a dip direction within 50 degrees of the facing direction for a pit wall were considered in the planar analyses, and wedges having a plunge direction within 90 degrees of the facing direction were considered in the wedge analyses.

The cumulative frequency distributions for failure have been used to estimate the potential likelihood of failure for a given bench face angle and wall orientation. In general, for bench face angle design purposes, a 30% likelihood of failure is considered to be reasonable.

1.3.1 Third Portage Deposit Area

The following table summarizes the results of the analyses for pit slopes within Domain 1:

TABLE VI.13: Domain TP-1 Analysis of Bench Scale Planar and Wedge Instability

Wall	Mode	No. in analysis	Max. No. Failed	Max. % Failure	% Failure at Slope Angle		
					60 degrees	65 degrees	70 degrees
West	Planar	36	18	50%	3%	9%	11%
	Wedge	409	0	<1%	<1%	<1%	<1%
East	Planar	96	40	42%	15%	18%	22%
	Wedge	800	4	1%	<1%	<1%	<1%

The results of the analyses indicate that for the west pit walls within this Domain there is a low likelihood of planar and wedge failures. For the east pit walls, there is a high likelihood (>30%) of planar failure if the west dipping foliation and stratigraphy are undercut.

The following table summarizes the results of the analyses for pit slopes within Domain 2:

TABLE VI.14: Domain TP-2 Analysis of Bench Scale Planar and Wedge Instability

Wall	Mode	No. in analysis	Max. No. Failed	Max. % Failure	% Failure at Slope Angle		
					60 degrees	65 degrees	70 degrees
West	Planar	47	20	43%	6%	12%	14%
	Wedge	1340	12	1%	<1%	<1%	<1%
East	Planar	175	111	63%	31%	39%	44%
	Wedge	3801	27	1%	<1%	<1%	<1%

The table indicates that based on the analyses there is a low likelihood of planar and wedge failures for the west wall within this Domain, while for the east wall there is the potential of planar failure along the west dipping foliation and stratigraphy if these are undercut.

The following table summarizes the results of the analyses for pit slopes within Domain 3:

TABLE VI.15: Domain TP-3 Analysis of Bench Scale Planar and Wedge Instability

Wall	Mode	No. in analysis	Max. No. Failed	Max. % Failure	% Failure at Slope Angle		
					60 degrees	65 degrees	70 degrees
West (near Bay Fault)	Planar	40	19	48%	8%	11%	12%
	Wedge	6408	393	6%	1%	1%	2%
West (Central Region)	Planar	21	10	48%	13%	14%	24%
	Wedge	2086	8	<1%	<1%	<1%	<1%
East	Planar	105	91	87%	16%	23%	37%
	Wedge	365	0	<1%	<1%	<1%	<1%
Southeast	Planar	50	38	76%	20%	26%	39%
	Wedge	947	22	2%	1%	1%	2%
South	Planar	52	36	69%	17%	22%	25%
	Wedge	2028	91	4%	<1%	2%	2%

As with the previous Domains, there is a low likelihood of wedge failure for the wall orientations presented in the table. There is a relatively low likelihood of planar failure for the east and southeast and south pit walls within this Domain where bench face angles are less than 65 degrees.

The following table summarizes the results of the analyses for pit slopes within Domain 4:

TABLE VI.16: Domain TP-4 Analysis of Bench Scale Planar and Wedge Instability

Wall	Mode	No. in analysis	Max. No. Failed	Max. % Failure	% Failure at Slope Angle		
					60 degrees	65 degrees	70 degrees
West	Planar	47	17	36%	8%	9%	10%
	Wedge	6456	388	6%	1%	1%	2%
Southwest	Planar	47	11	23%	17%	17%	18%
	Wedge	2571	117	5%	<1%	2%	3%
South	Planar	63	37	59%	16%	20%	22%
	Wedge	2632	66	3%	<1%	1%	1%

There is a low likelihood of wedge failure for the wall orientations presented in the table. There is a low likelihood of planar failure for the southwest pit walls within this Domain where bench face angles are less than 70 degrees.

1.3.2 Portage (North) Deposit Area

The following table summarizes the relevant analyses carried out for bench scale planar and wedge instability for the west wall at the Portage (North) area.

TABLE VI.17: West Wall Analysis of Bench Scale Planar and Wedge Instability

Domain	Mode	No. in analysis	Max. No. Failed	Max. % Failure	% Failure at Slope Angle		
					60 degrees	65 degrees	70 degrees
NP-1	Planar	65	23	35%	17%	18%	19%
	Wedge	3518	91	3%	<1%	1%	2%
NP-2	Planar	70	54	77%	17%	24%	33%
	Wedge	2893	45	2%	<1%	1%	1%

Generally, a likelihood of failure of around 30% is considered to be acceptable for bench scale instability. In the above table, the likelihood of planar failure for the lower west pit walls within Domain 2 is indicated to be about 33% for a bench face angle of 70 degrees. However, the majority of these planes are expected to be the orthogonal joints set which will be widely spaced and discontinuous, based on the oriented drilling and geotechnical mapping carried out to date. The orthogonal set is inclined at about 73 degrees towards 092 degrees azimuth. It is likely that during blasting, bench faces will break back to the orientation of the orthogonal set. Therefore plane failures are expected to be limited to local occurrences where these do occur and where bench faces undercut these features.

The following table summarizes the relevant analyses carried out for bench scale planar and wedge instability for the middle to upper portions of the proposed north pit wall.

TABLE VI.18: Middle to Upper North Wall Analysis of Bench Scale Planar and Wedge Instability

Domain	Mode	No. in analysis	Max. No. Failed	Max. % Failure	% Failure at Slope Angle		
					60 degrees	65 degrees	70 degrees
Domain NP-1 Northwest	Planar	62	18	29%	6%	10%	15%
	Wedge	2979	41	1%	<1%	<1%	1%
Domain NP-1 North	Planar	41	18	44%	14%	14%	15%
	Wedge	4113	12	<1%	<1%	<1%	<1%

Based on the analyses there is a low likelihood of failure associated with the main discontinuities that will be exposed in the northwest through northeast pit walls.

The following table summarizes the relevant analyses carried out for bench scale planar and wedge instability for the lower benches of the north pit wall.

TABLE VI.19: Lower North Wall Analysis of Bench Scale Planar and Wedge Instability

Domain	Mode	No. in analysis	Max. No. Failed	Max. % Failure	% Failure at Slope Angle		
					60 degrees	65 degrees	70 degrees
Domain NP-2 Northwest	Planar	48	20	42%	10%	11%	12%
	Wedge	7866	154	2%	<1%	<1%	1%
Domain NP-2 North	Planar	67	10	15%	8%	9%	9%
	Wedge	10202	69	1%	<1%	<1%	<1%
Domain NP-2 Northeast	Planar	139	23	17%	5%	7%	8%
	Wedge	9882	19	<1%	<1%	<1%	<1%

Based on the analyses there is a low likelihood of failure associated with the planar and wedge failure mechanisms that will be exposed in the lower portions of the northwest through northeast pit wall.

The following table summarizes the results of a pseudo-probabilistic analysis of the potential planar and wedge failure mechanisms that will be exposed in the east wall.

TABLE VI.20: East Wall Analysis of Bench Scale Planar and Wedge Instability

Domain	Mode	No. in analysis	Max. No. Failed	Max. % Failure	% Failure at Slope Angle		
					60 degrees	65 degrees	70 degrees
Domain NP-2	Planar	186	36	19%	8%	10%	11%
	Wedge	12078	36	<1%	<1%	<1%	<1%

There is a low likelihood of failure associated with the structures that will be exposed in the east pit wall.

1.3.3 Goose Island Deposit Area

The following table summarizes the results of a pseudo-probabilistic analysis of the potential planar and wedge failure mechanisms that will be exposed in the north wall.

TABLE VI.21: North Wall Analysis of Bench Scale Planar and Wedge Instability

Domain	Mode	No. in analysis	Max. No. Failed	Max. % Failure	% Failure at Slope Angle				
					50 degrees	55 degrees	60 degrees	65 degrees	70 degrees
Domain 1	Planar	11	8	73%	23%	26%	46%	50%	55%
	Wedge	612	86	14%	1%	4%	10%	12%	13%
Domain 2	Planar	4	3	75%	<1%	10%	30%	50%	71%
	Wedge	449	68	15%	<1%	2%	5%	9%	13%

The analyses indicate there is a low likelihood of failure for wedge failure for the north wall for bench faces up to 70 degrees, and a low likelihood of planar failure for bench face angles less than about 55 degrees in Domain 1 and 60 degrees in Domain 2. Planar failure would be associated with south to southwest dipping non-persistent joint features.

The following table summarizes the results of a pseudo-probabilistic analysis of the potential planar and wedge failure mechanisms that will be exposed in the east wall.

TABLE VI.22: East Wall Analysis of Bench Scale Planar and Wedge Instability

Domain	Mode	No. in analysis	Max. No. Failed	Max. % Failure	% Failure at Slope Angle				
					50 degrees	55 degrees	60 degrees	65 degrees	70 degrees
Domain 1	Planar	27	20	74%	24%	37%	41%	58%	62%
	Wedge	1233	283	23%	5%	10%	13%	19%	20%
Domain 2	Planar	16	13	81%	<1%	<1%	<1%	16%	39%
	Wedge	575	110	19%	1%	2%	6%	10%	17%
Domain 3	Planar	53	44	83%	16%	32%	43%	49%	57%
	Wedge	2764	847	31%	4%	13%	19%	22%	25%

The analyses indicate that within Domain 1 and Domain 3, there is a significant likelihood of planar failure associated with undercutting of the main foliation and stratigraphic orientations, where bench face angles are greater than about 50 to 55 degrees. Within Domain 2, the foliation and stratigraphy dip at steeper angles, and hence the likelihood of undercutting these features is reduced. The slope design criteria for the

east wall is predicated on minimizing undercutting of the west dipping foliation and stratigraphy. There is an acceptable likelihood of wedge failures for all bench face angles considered.

The following table summarizes the results of a pseudo-probabilistic analysis of the potential planar and wedge failure mechanisms that will be exposed in the south wall.

TABLE VI.23: South Wall Analysis of Bench Scale Planar and Wedge Instability

Domain	Mode	No. in analysis	Max. No. Failed	Max. % Failure	% Failure at Slope Angle				
					50 degrees	55 degrees	60 degrees	65 degrees	70 degrees
Domain 2	Planar	19	12	63%	6%	21%	27%	39%	57%
	Wedge	786	224	28%	2%	8%	12%	21%	25%
Domain 3	Planar	25	13	52%	7%	18%	24%	36%	40%
	Wedge	4861	667	14%	1%	4%	8%	11%	12%

The analyses indicate that within Domain 2 and Domain 3, there is a relatively low likelihood of both planar and wedge failure where bench face angles dip less than 60 degrees. However, planar failure is anticipated to be associated with non-persistent joint sets dipping out of the wall. Consequently, planar failures are expected to be limited to bench scale ravelling, and will be retained by the catch benches. There is a low likelihood of wedge failures for the range of bench face angles considered.

The following table summarizes the results of a pseudo-probabilistic analysis of the potential planar and wedge failure mechanisms that will be exposed in the southwest wall.

TABLE VI.24: Southwest Wall Analysis of Bench Scale Planar and Wedge Instability

Domain	Mode	No. in analysis	Max. No. Failed	Max. % Failure	% Failure at Slope Angle				
					50 degrees	55 degrees	60 degrees	65 degrees	70 degrees
Domain 4	Planar	15	8	53%	11%	15%	21%	34%	39%
	Wedge	607	80	13%	1%	3%	6%	9%	11%

The analyses indicate there is a relatively low probability of wedge and planar failure where bench face angles are inclined at less than about 60 degrees to 65 degrees towards the northeast. Where bench face angles are inclined greater than this, there is an increasing risk of planar failure.

The following table summarizes the results of a pseudo-probabilistic analysis of the potential planar and wedge failure mechanisms that will be exposed in the west wall.

TABLE VI.26: West Wall Analysis of Bench Scale Planar and Wedge Instability

Domain	Mode	No. in analysis	Max. No. Failed	Max. % Failure	% Failure at Slope Angle				
					50 degrees	55 degrees	60 degrees	65 degrees	70 degrees
Domain 2	Planar	11	8	73%	18%	28%	37%	39%	42%
	Wedge	290	39	13%	3%	6%	8%	10%	11%
Domain 3	Planar	20	17	85%	<1%	5%	10%	12%	45%
	Wedge	398	87	22%	<1%	1%	4%	11%	17%
Domain 4	Planar	19	12	63%	8%	14%	30%	38%	42%
	Wedge	794	82	10%	1%	2%	5%	7%	8%

The analyses indicate that for portions of the pit wall excavated within Domain 2 (east of the Bay Fault), there is a relatively low probability of wedge and planar failure where bench face angles are inclined at less than about 55 degrees to 60 degrees towards the east. Planar failure would be associated with undercutting of the non-persistent orthogonal joint set dipping at moderate angles to the east. Where Domain 3 is exposed in the lower portions of the west wall, the orthogonal joint set will be inclined at relatively shallow angles. Hence the likelihood of planar failure for this portion of the wall is significantly lower for bench face angles up to 65 degrees. Domain 4, to the west of the Bay Fault, will form the upper portion of the pit wall. Planar failure again will be associated with the orthogonal set dipping at moderate angles to the east. It is expected that planar failure will be limited to local occurrences due to the non-persistent nature of this set. The analyses indicate there is a low likelihood of wedge failure for all bench orientations considered.

The following table summarizes the results of a pseudo-probabilistic analysis of the potential planar and wedge failure mechanisms that will be exposed in the northwest wall within Domain 4.

TABLE VI.27: Northwest Wall Analysis of Bench Scale Planar and Wedge Instability

Domain	Mode	No. in analysis	Max. No. Failed	Max. % Failure	% Failure at Slope Angle				
					50 degrees	55 degrees	60 degrees	65 degrees	70 degrees
Domain 4	Planar	25	8	32%	4%	6%	8%	14%	17%
	Wedge	903	39	4%	1%	2%	2%	3%	3%

The analyses indicate that for portions of the pit wall excavated within Domain 4 (west of the Bay Fault), there is a low probability of wedge and planar failure for all bench face angles considered.

PORTAGE MAIN CFA ANALYSIS

PIT WALL PARAMETERS:

Slope Direction: 90 °

Kinematic Window: 50 °

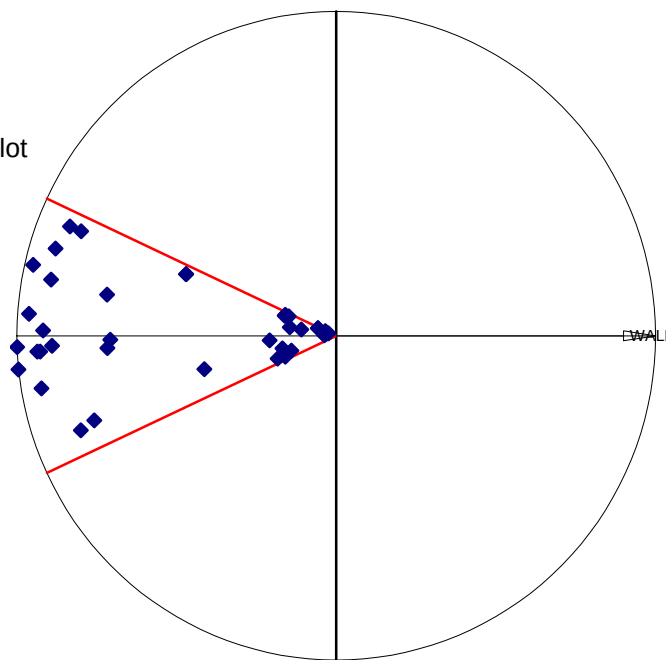
Friction Angle (ϕ): 42 °

36 Planes included in the window analysis

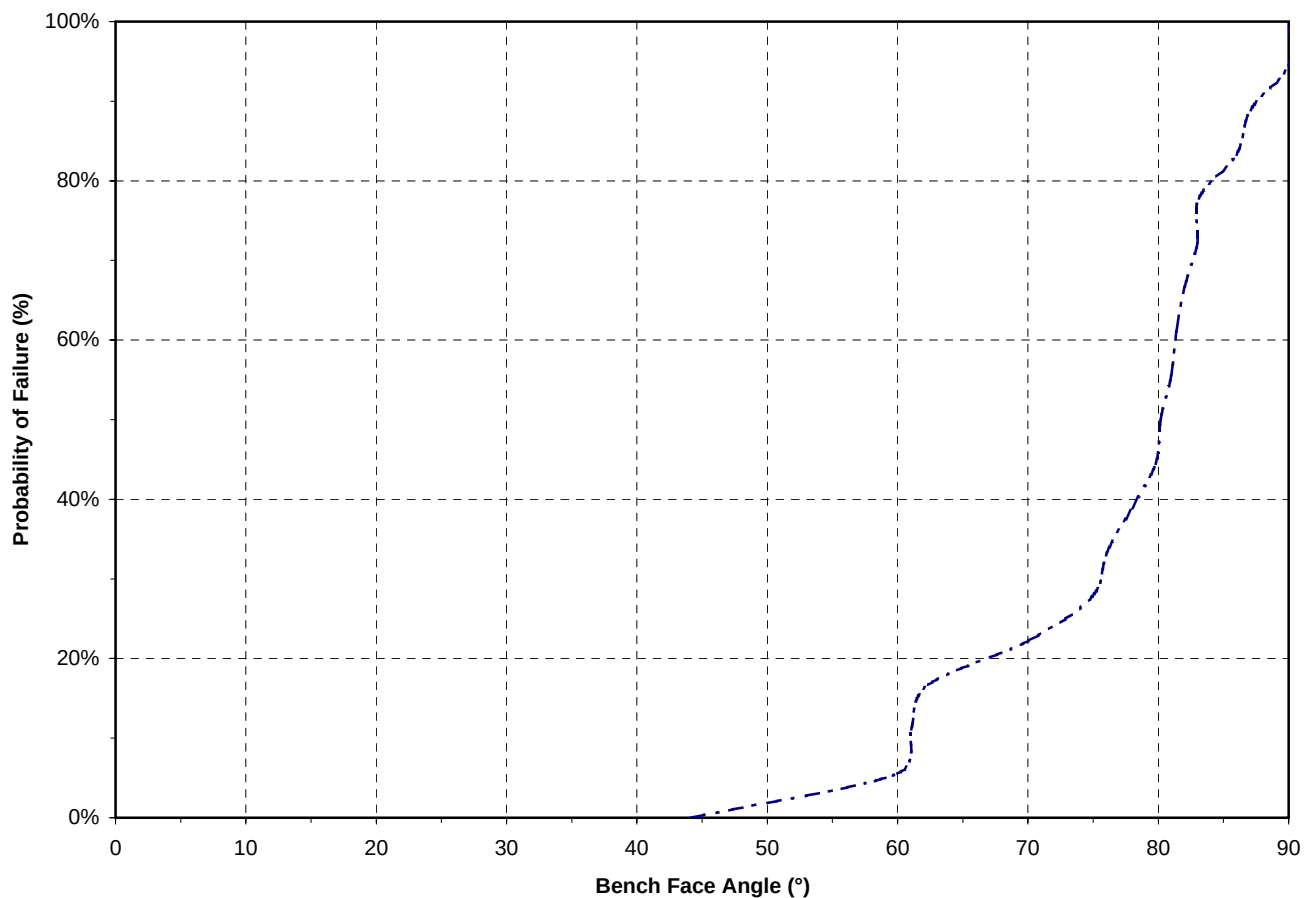
18 Failed Planes in the Cumulative Frequency Plot

50% Failure

Quantity: FALSE



EQUAL AREA STEREONET



PIT WALL PARAMETERS:

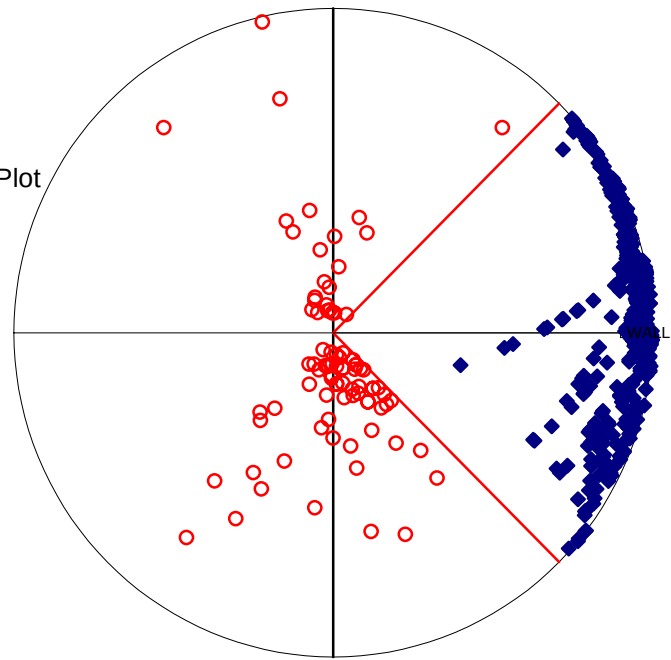
Slope Direction: 90 °
 Kinematic Window: 90 °
 Friction Angle (ϕ): 42 °

409 Wedges included in the window analysis

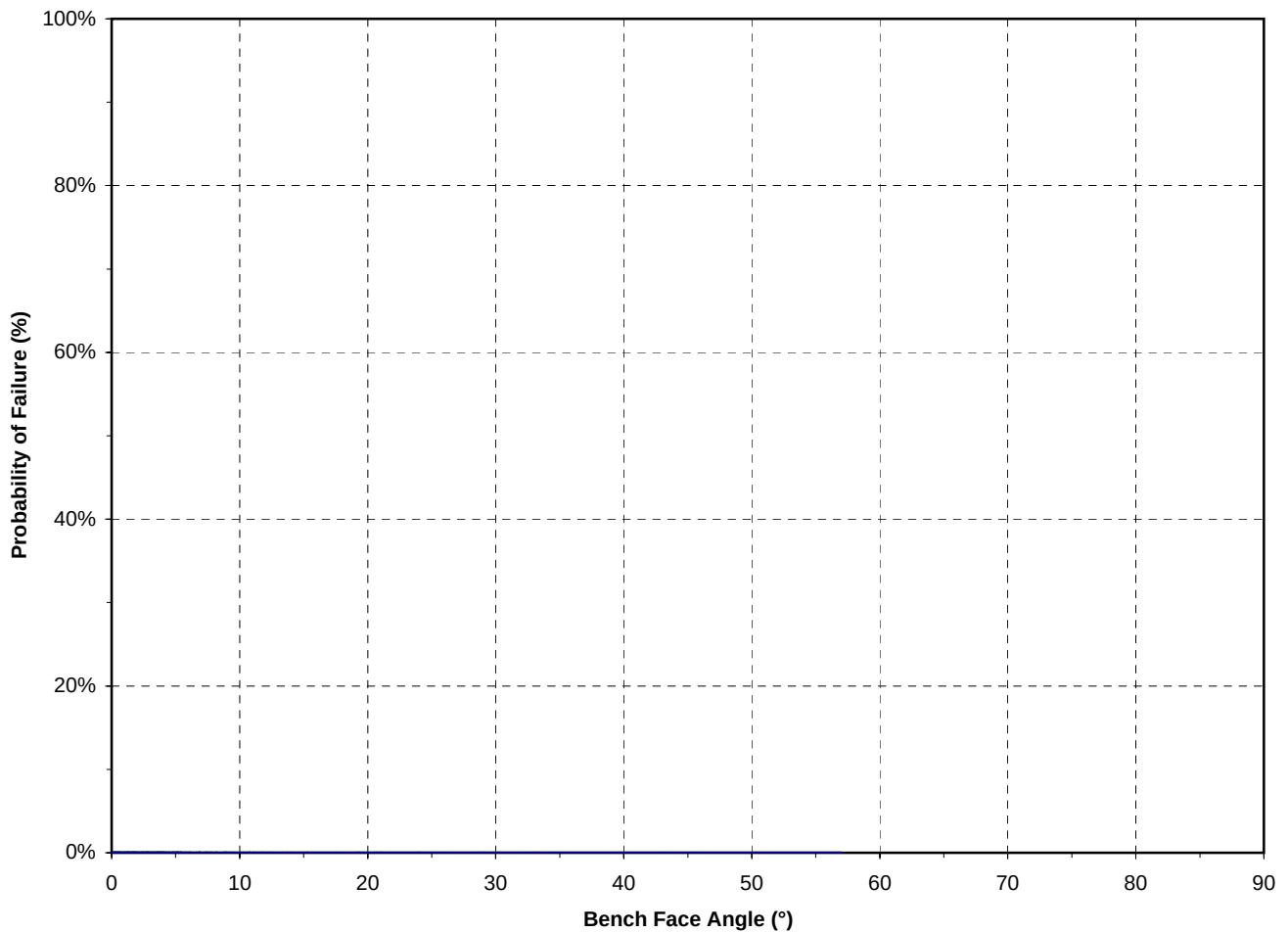
0 Failed Wedges in the Cumulative Frequency Plot

0% Failure

Quantity: FALSE



EQUAL AREA STEREONET



PIT WALL PARAMETERS:

Slope Direction: 270 °

Kinematic Window: 50 °

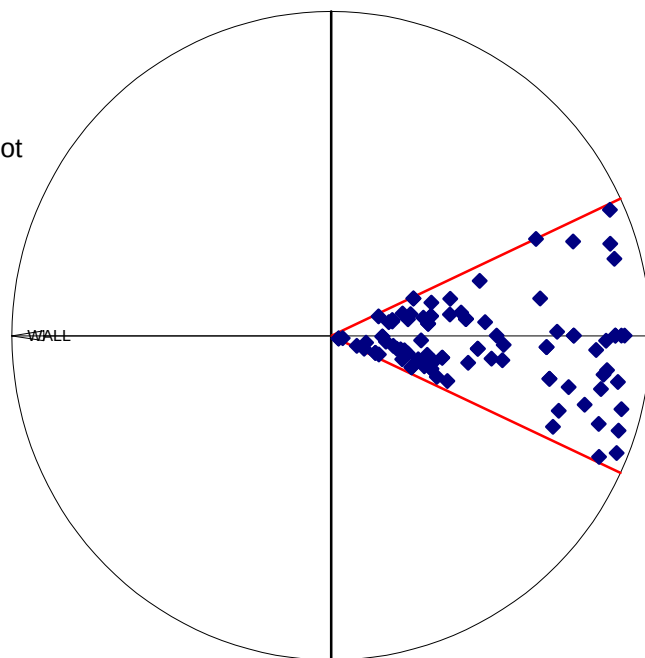
Friction Angle (ϕ): 37 °

96 Planes included in the window analysis

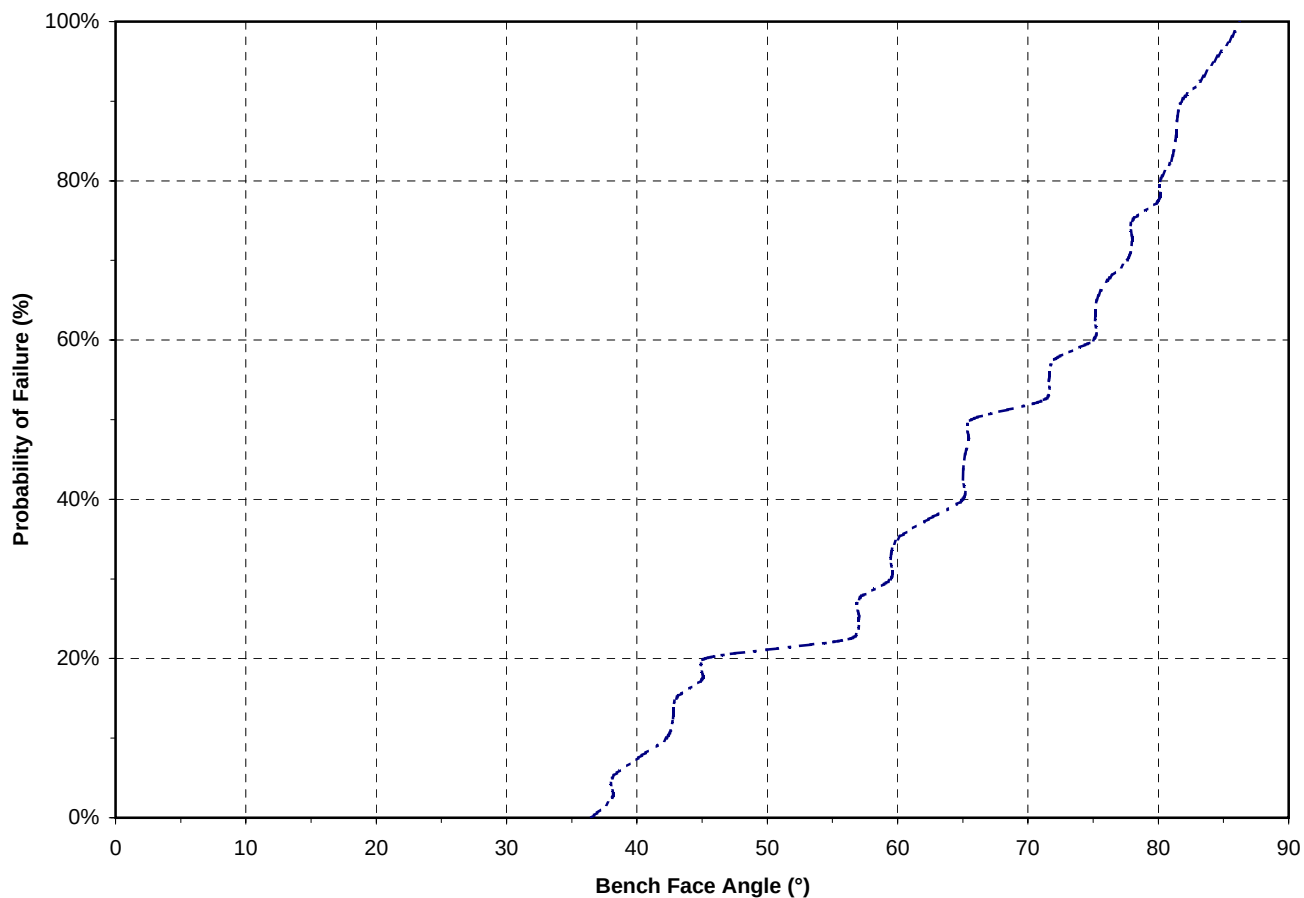
40 Failed Planes in the Cumulative Frequency Plot

42% Failure

Quantity: FALSE



EQUAL AREA STEREONET



PIT WALL PARAMETERS:

Slope Direction: 270 °

Kinematic Window: 90 °

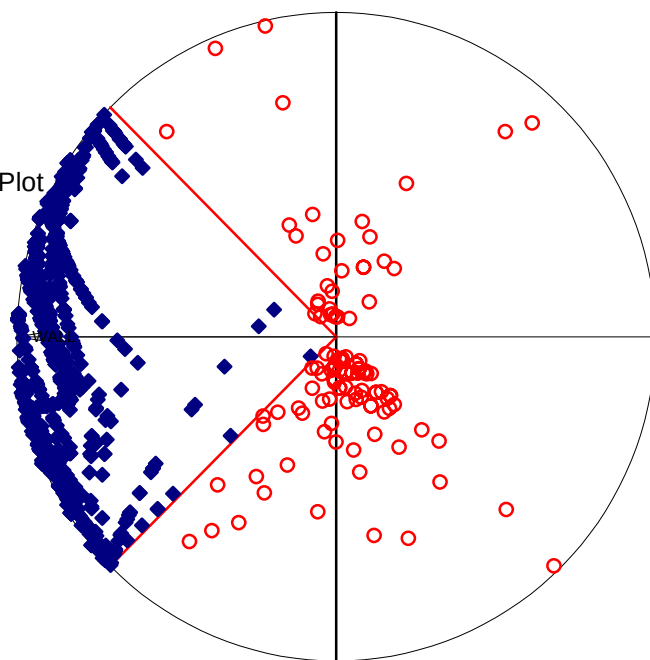
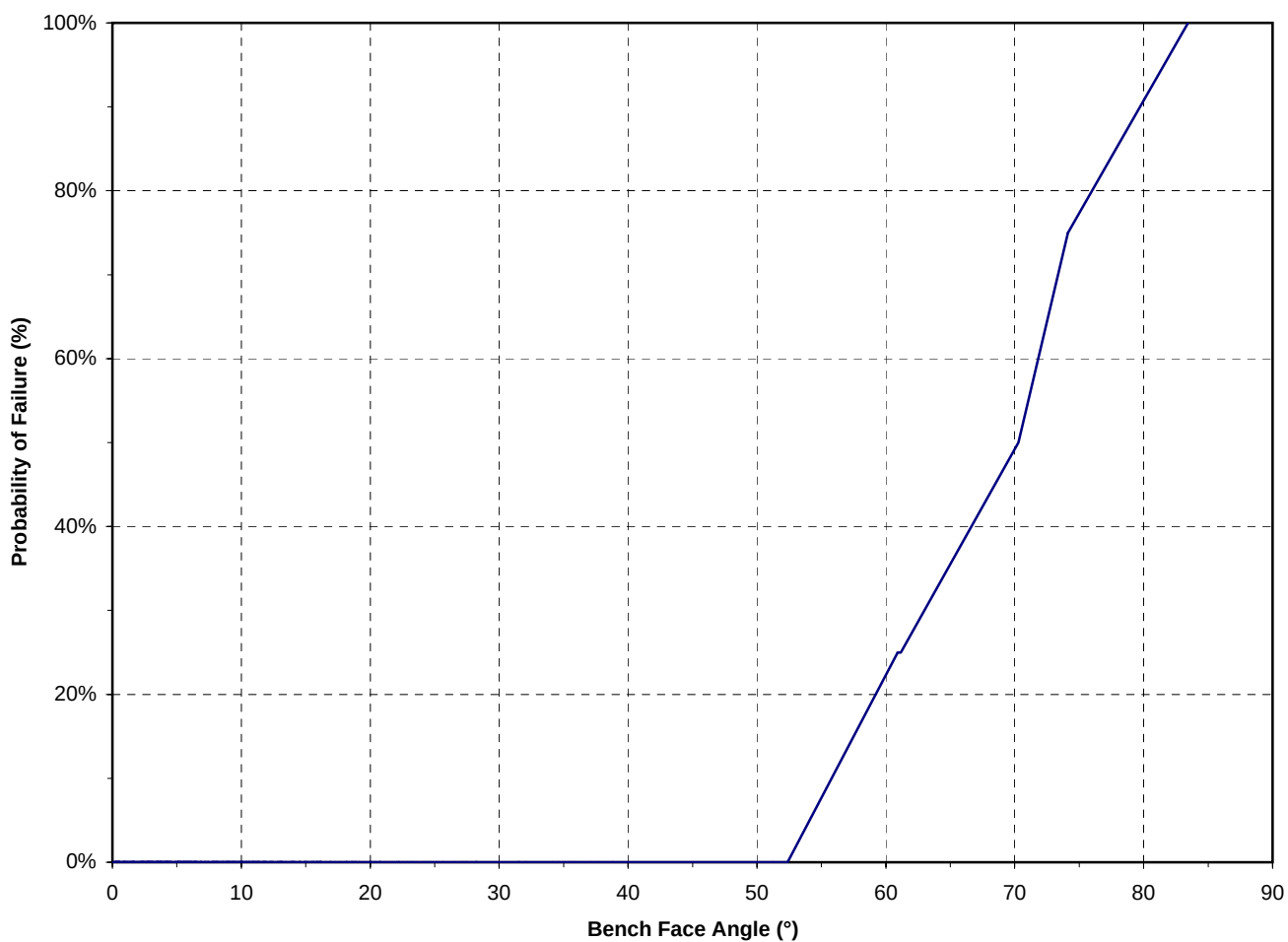
Friction Angle (ϕ): 42 °

800 Wedges included in the window analysis

4 Failed Wedges in the Cumulative Frequency Plot

1% Failure

Quantity: FALSE


EQUAL AREA STEREONET


PIT WALL PARAMETERS:

Slope Direction: 70 °

Kinematic Window: 50 °

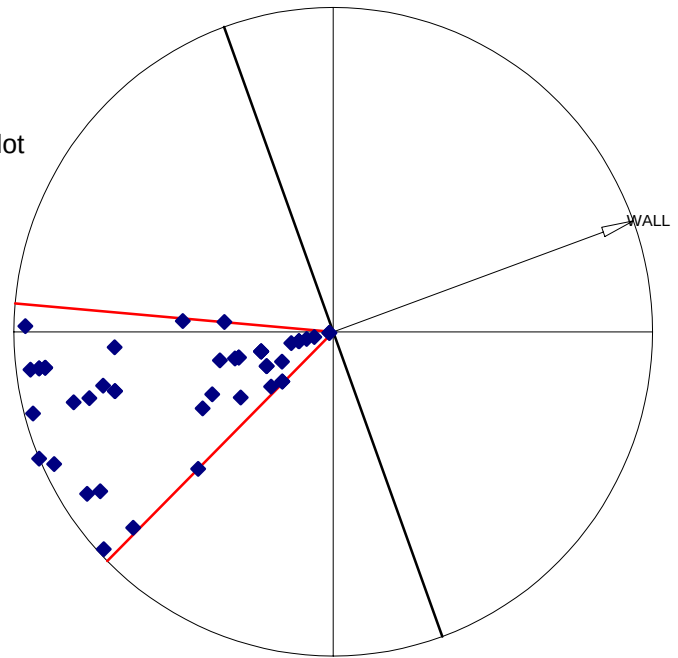
Friction Angle (ϕ): 42 °

47 Planes included in the window analysis

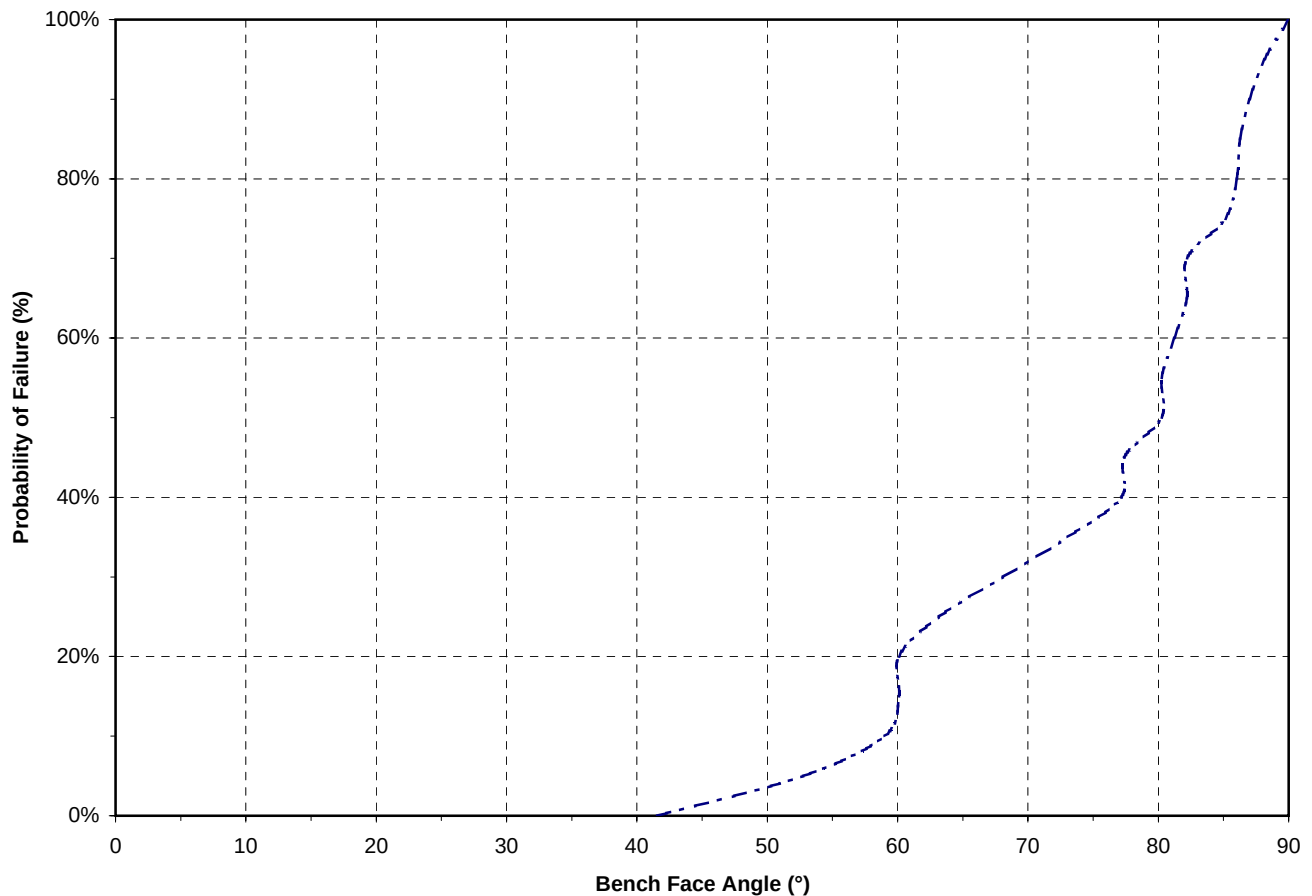
20 Failed Planes in the Cumulative Frequency Plot

43% Failure

Quantity: FALSE



EQUAL AREA STEREONET



PIT WALL PARAMETERS:

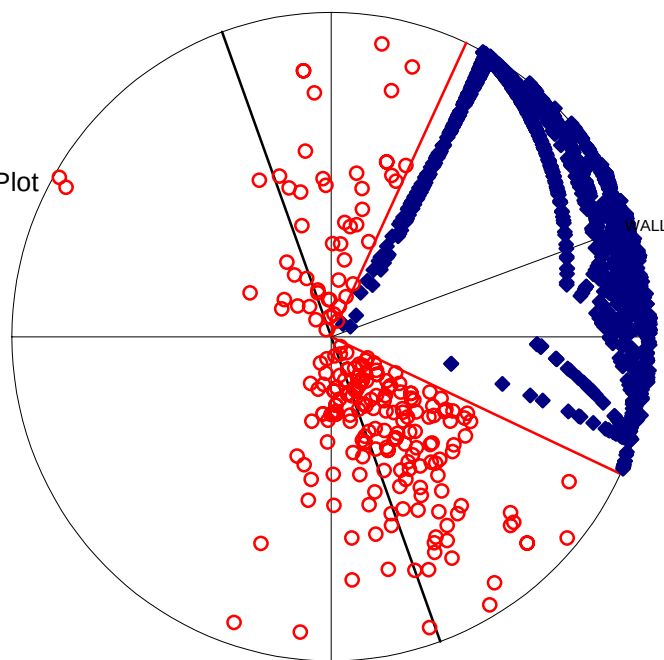
Slope Direction: 70 °
 Kinematic Window: 90 °
 Friction Angle (ϕ): 42 °

1340 Wedges included in the window analysis

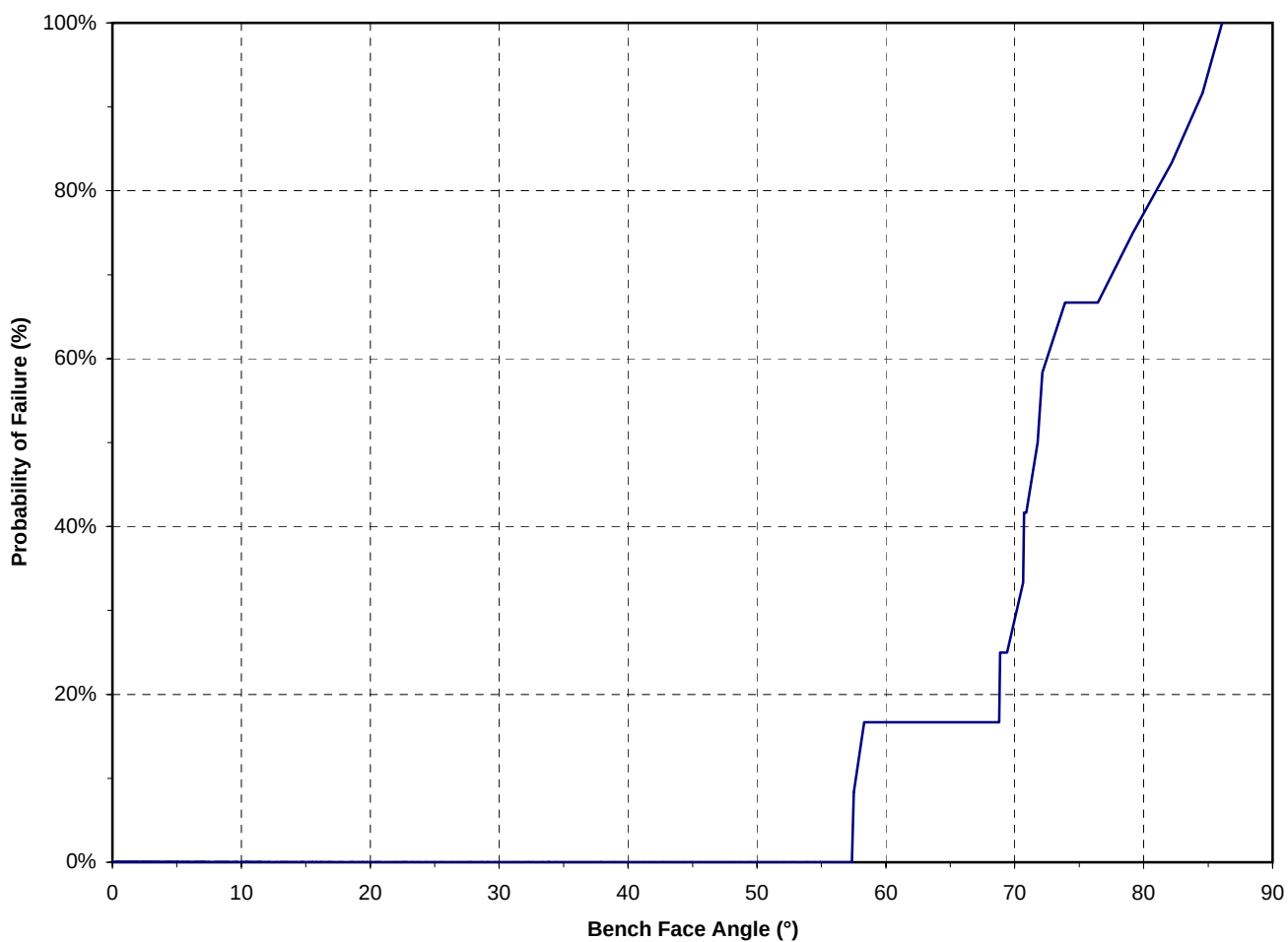
12 Failed Wedges in the Cumulative Frequency Plot

1% Failure

Quantity: FALSE



EQUAL AREA STEREONET



PIT WALL PARAMETERS:

Slope Direction: 255 °

Kinematic Window: 50 °

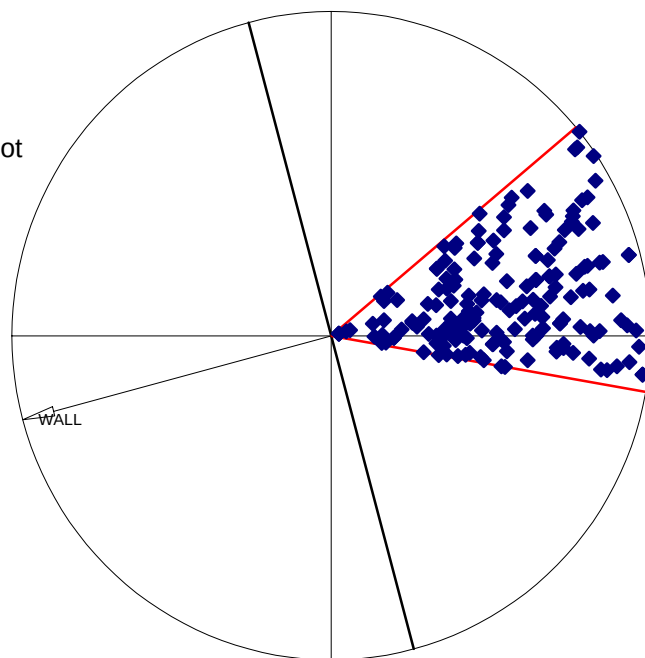
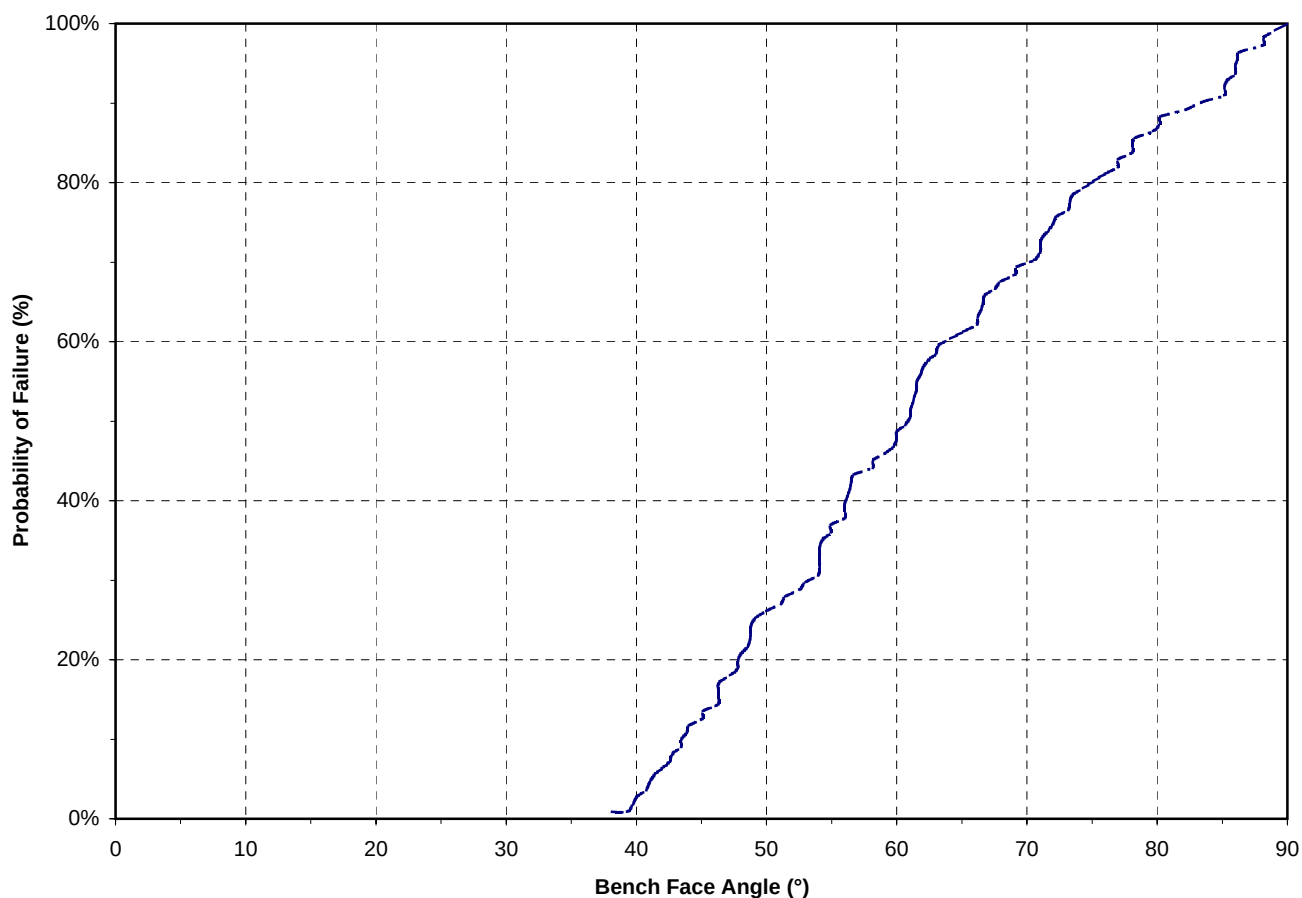
Friction Angle (ϕ): 37 °

175 Planes included in the window analysis

111 Failed Planes in the Cumulative Frequency Plot

63% Failure

Quantity: FALSE

**EQUAL AREA STEREONET**

PIT WALL PARAMETERS:

Slope Direction: 255 °

Kinematic Window: 90 °

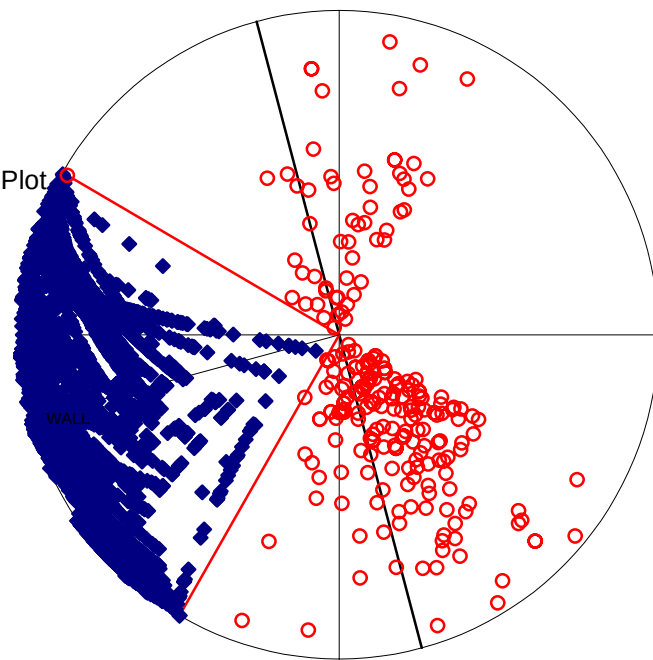
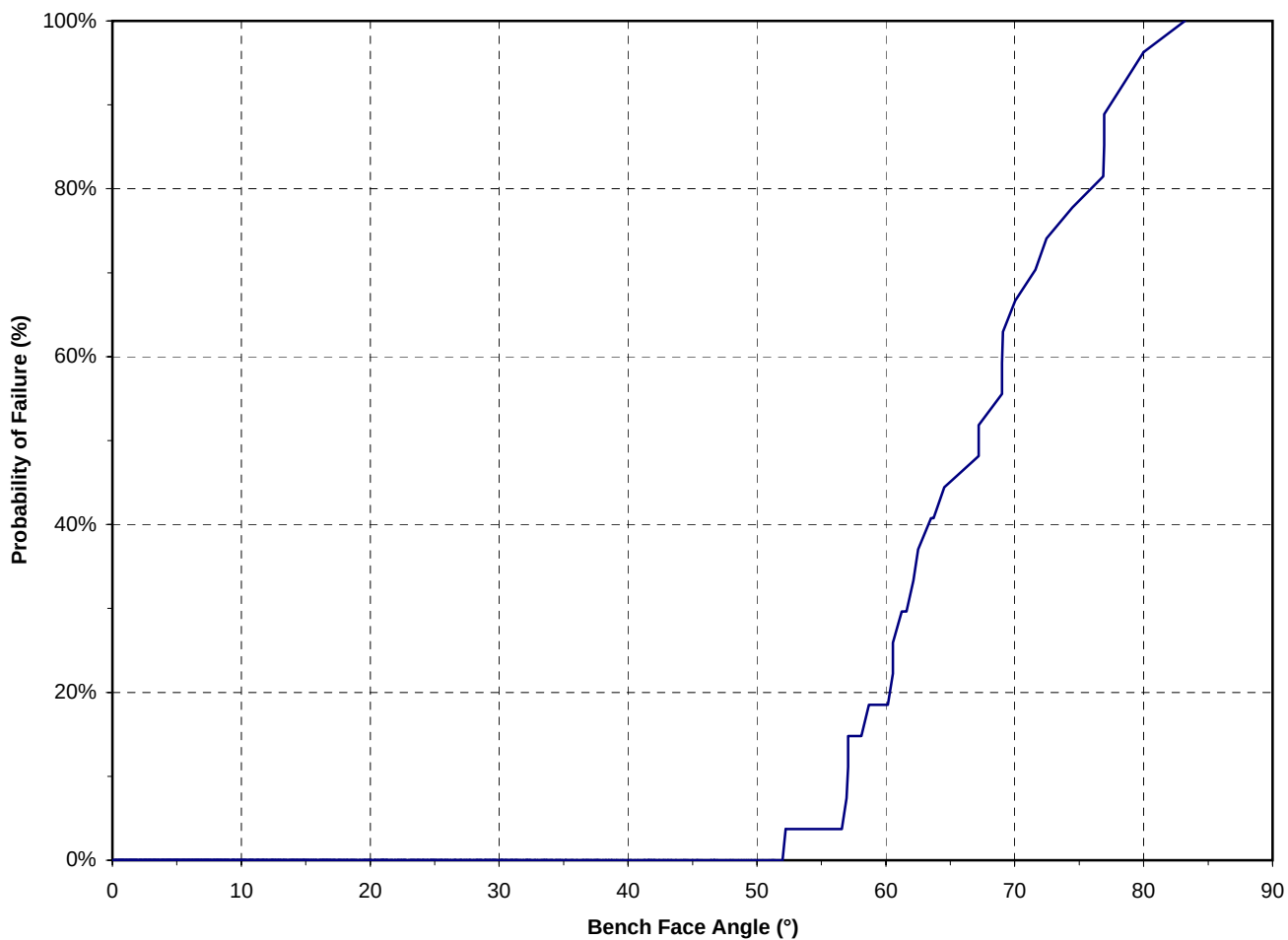
Friction Angle (ϕ): 42 °

3801 Wedges included in the window analysis

27 Failed Wedges in the Cumulative Frequency Plot

1% Failure

Quantity: FALSE


EQUAL AREA STEREONET


PIT WALL PARAMETERS:

Slope Direction: 90 °

Kinematic Window: 50 °

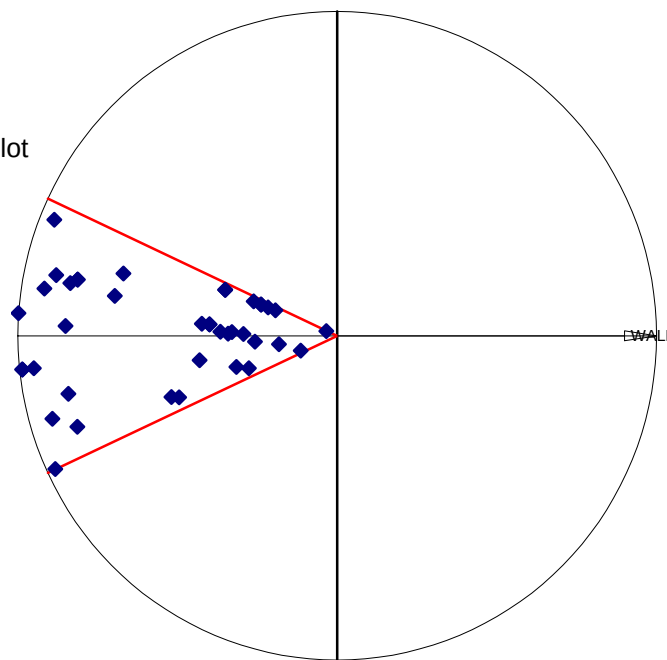
Friction Angle (ϕ): 37 °

40 Planes included in the window analysis

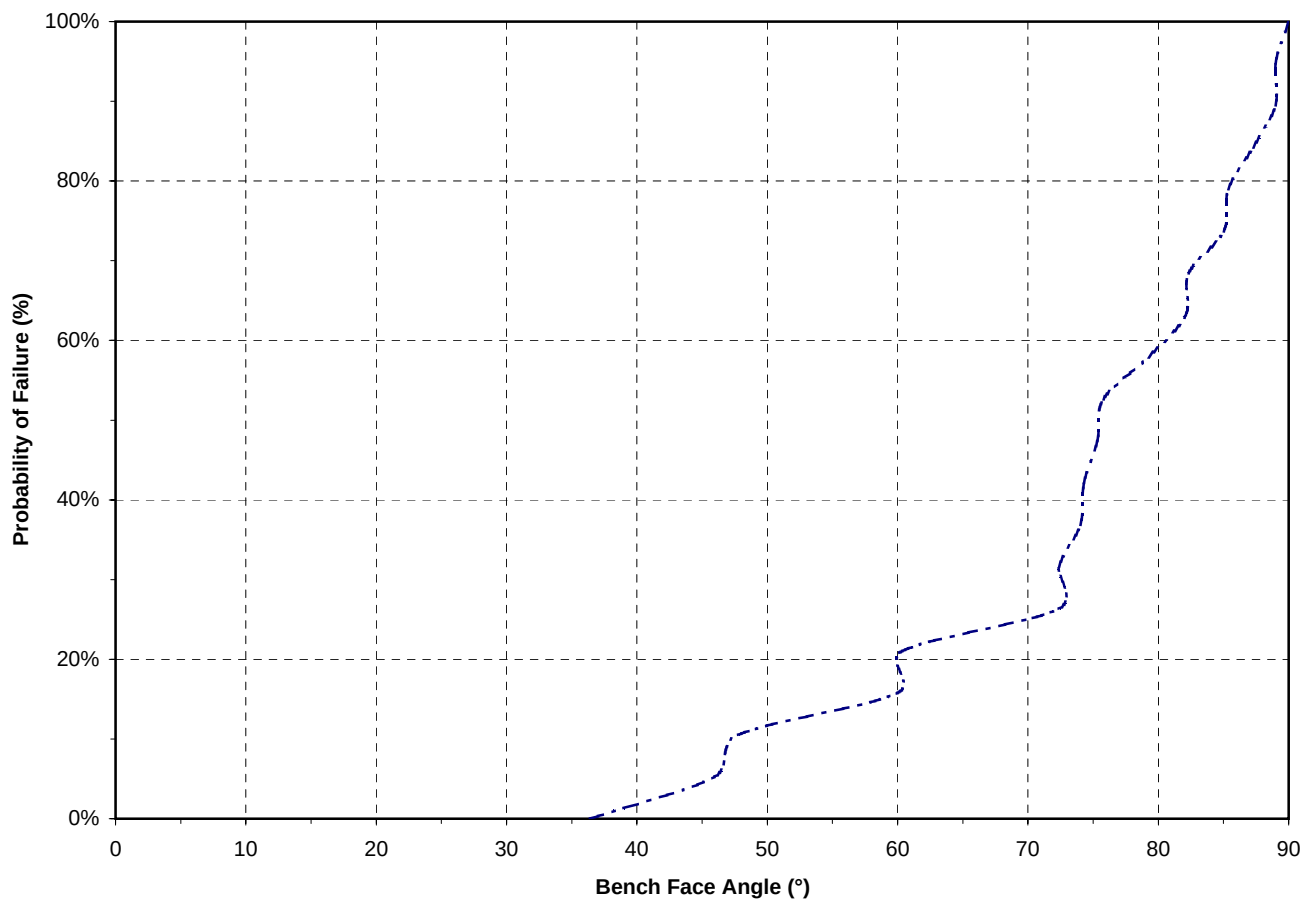
19 Failed Planes in the Cumulative Frequency Plot

48% Failure

Quantity: FALSE



EQUAL AREA STEREONET



PIT WALL PARAMETERS:

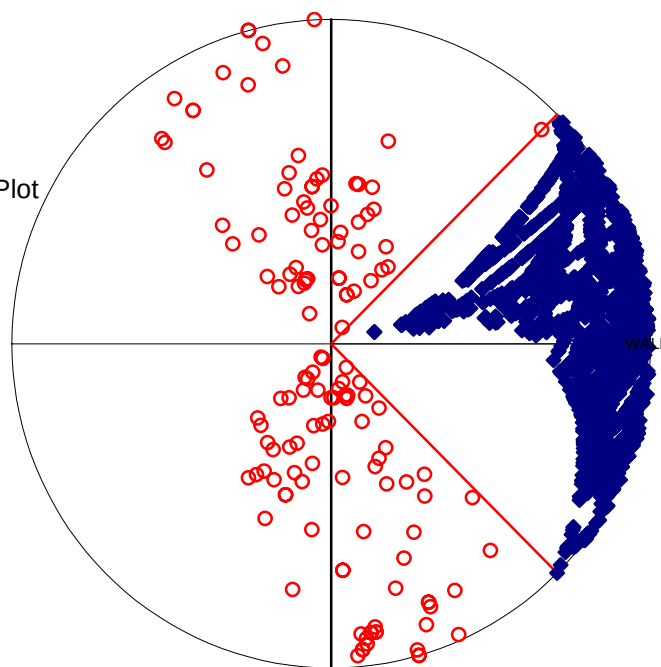
Slope Direction: 90 °
Kinematic Window: 90 °
Friction Angle (ϕ): 37 °

2334 Wedges included in the window analysis

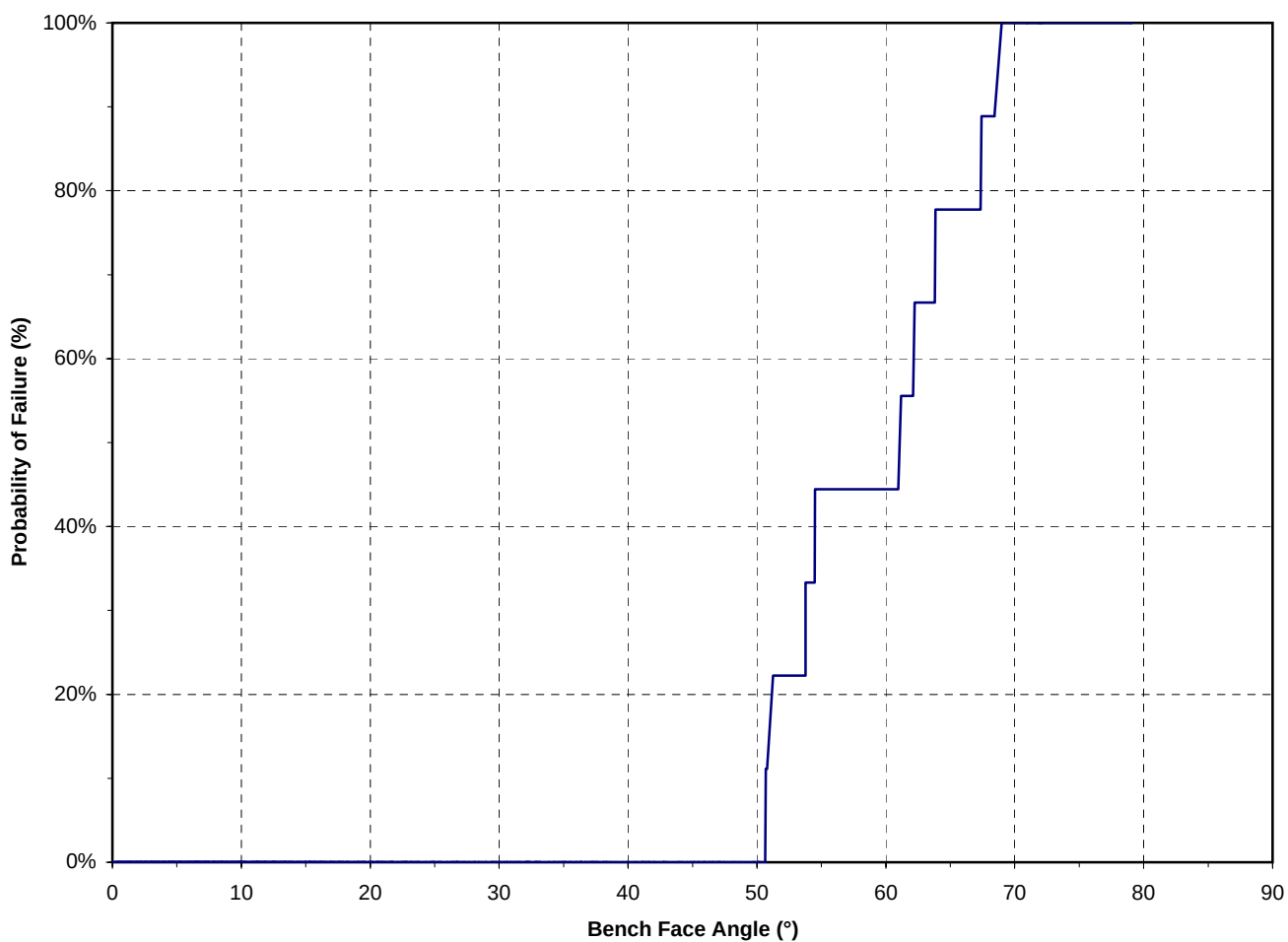
9 Failed Wedges in the Cumulative Frequency Plot

0% Failure

Quantity: FALSE



EQUAL AREA STEREONET



PIT WALL PARAMETERS:

Slope Direction: 90 °

Kinematic Window: 50 °

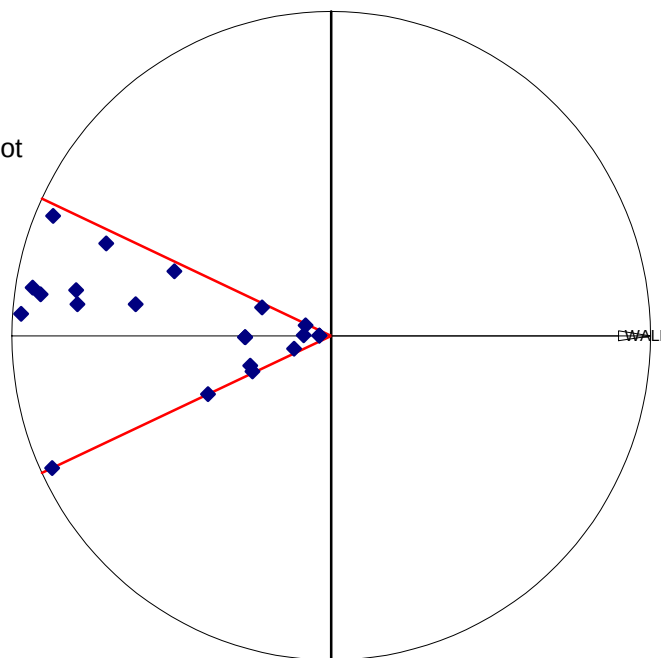
Friction Angle (ϕ): 42 °

21 Planes included in the window analysis

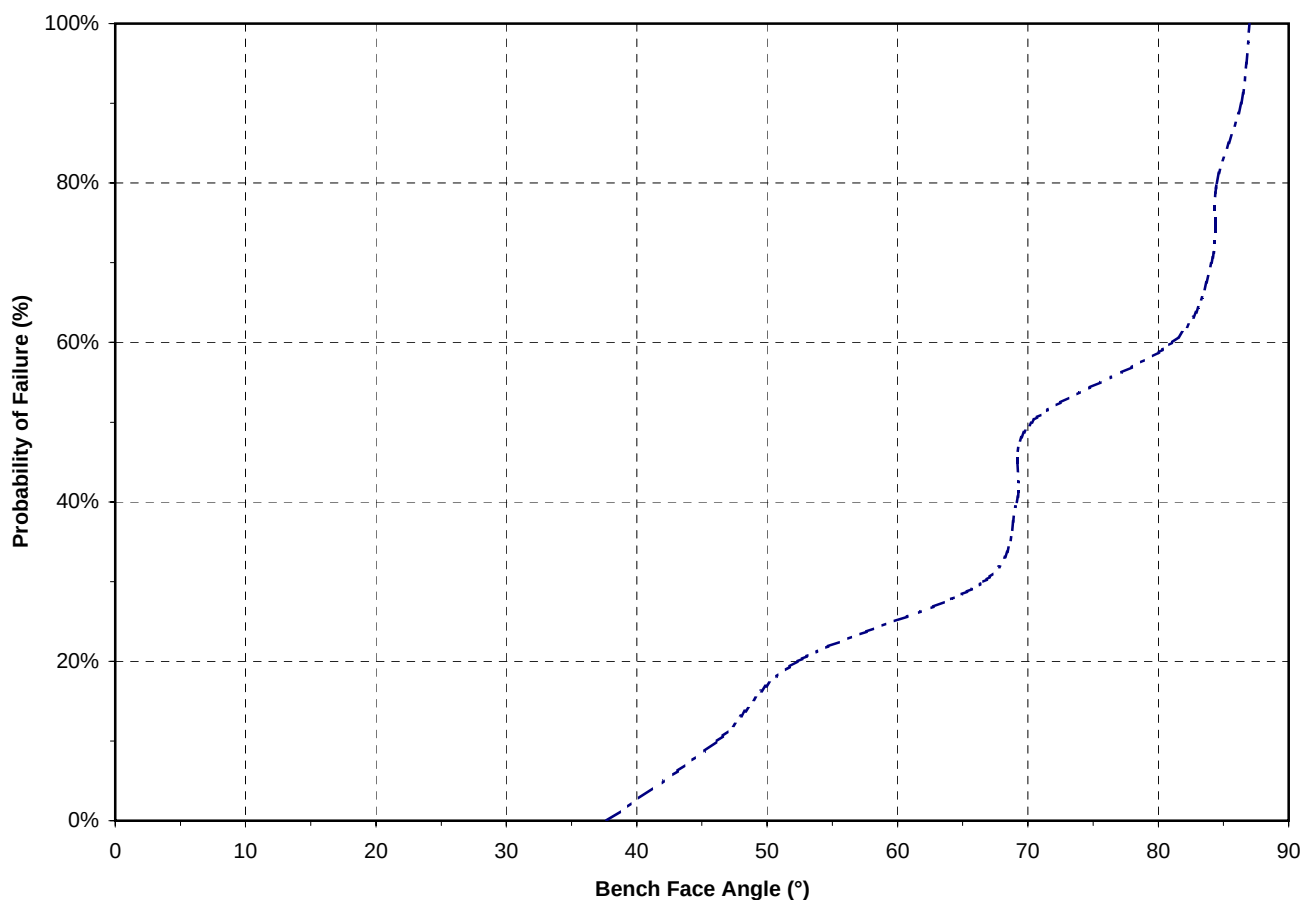
10 Failed Planes in the Cumulative Frequency Plot

48% Failure

Quantity: FALSE



EQUAL AREA STEREONET



PIT WALL PARAMETERS:

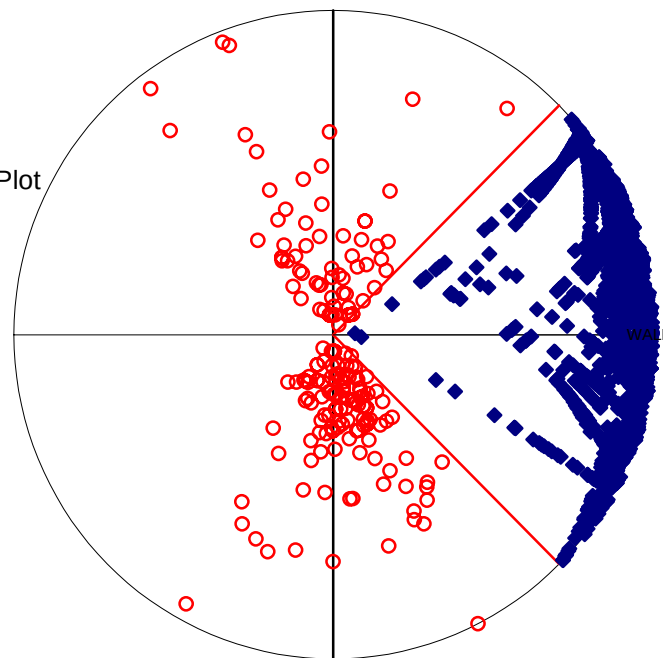
Slope Direction: 90 °
Kinematic Window: 90 °
Friction Angle (ϕ): 42 °

2086 Wedges included in the window analysis

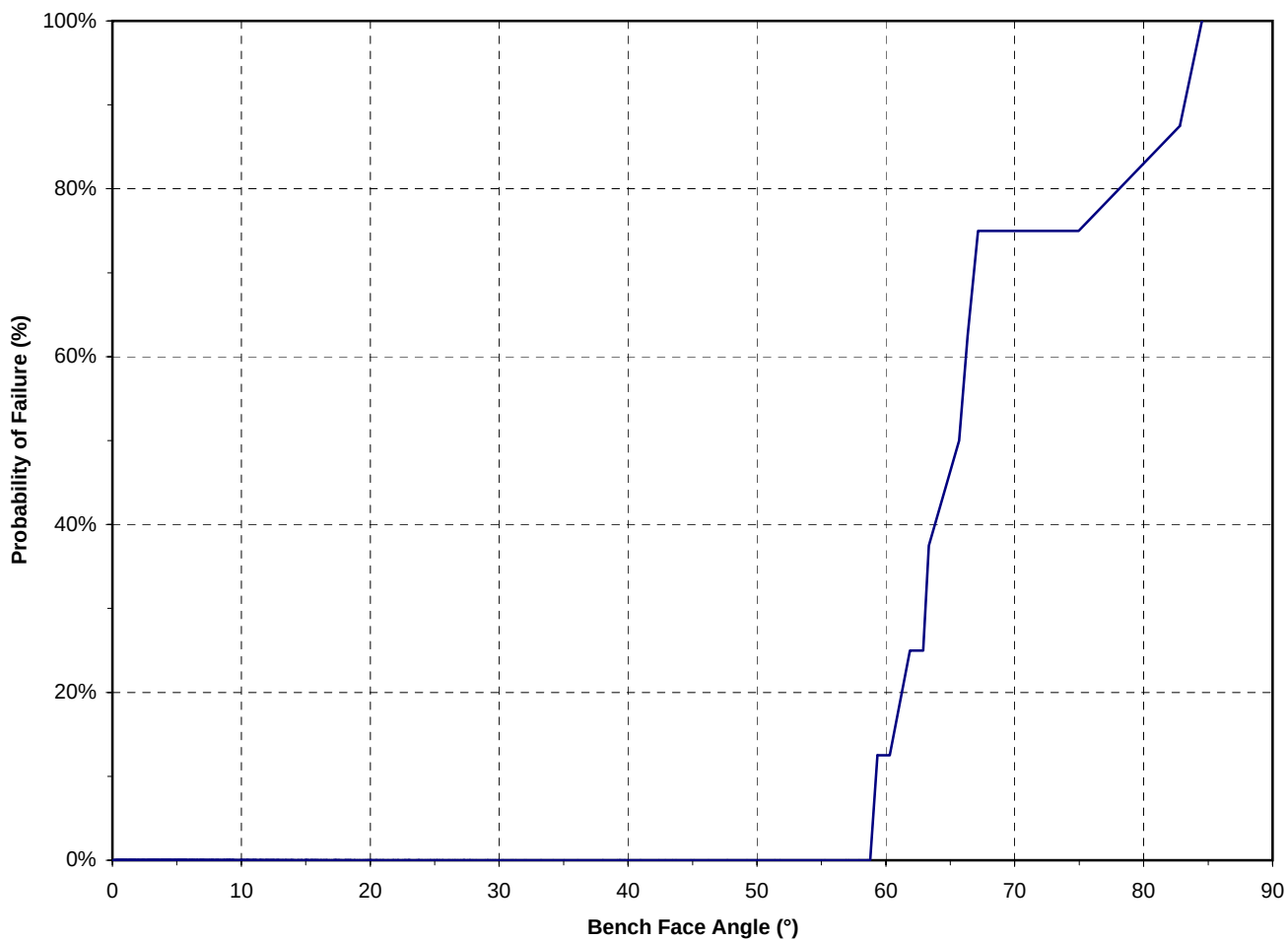
8 Failed Wedges in the Cumulative Frequency Plot

0% Failure

Quantity: FALSE



EQUAL AREA STEREONET



PIT WALL PARAMETERS:

Slope Direction: 270 °

Kinematic Window: 50 °

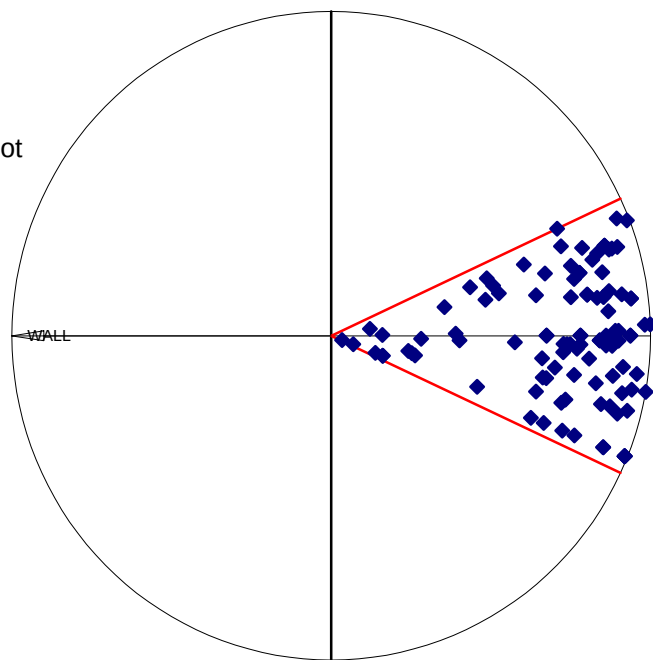
Friction Angle (ϕ): 37 °

105 Planes included in the window analysis

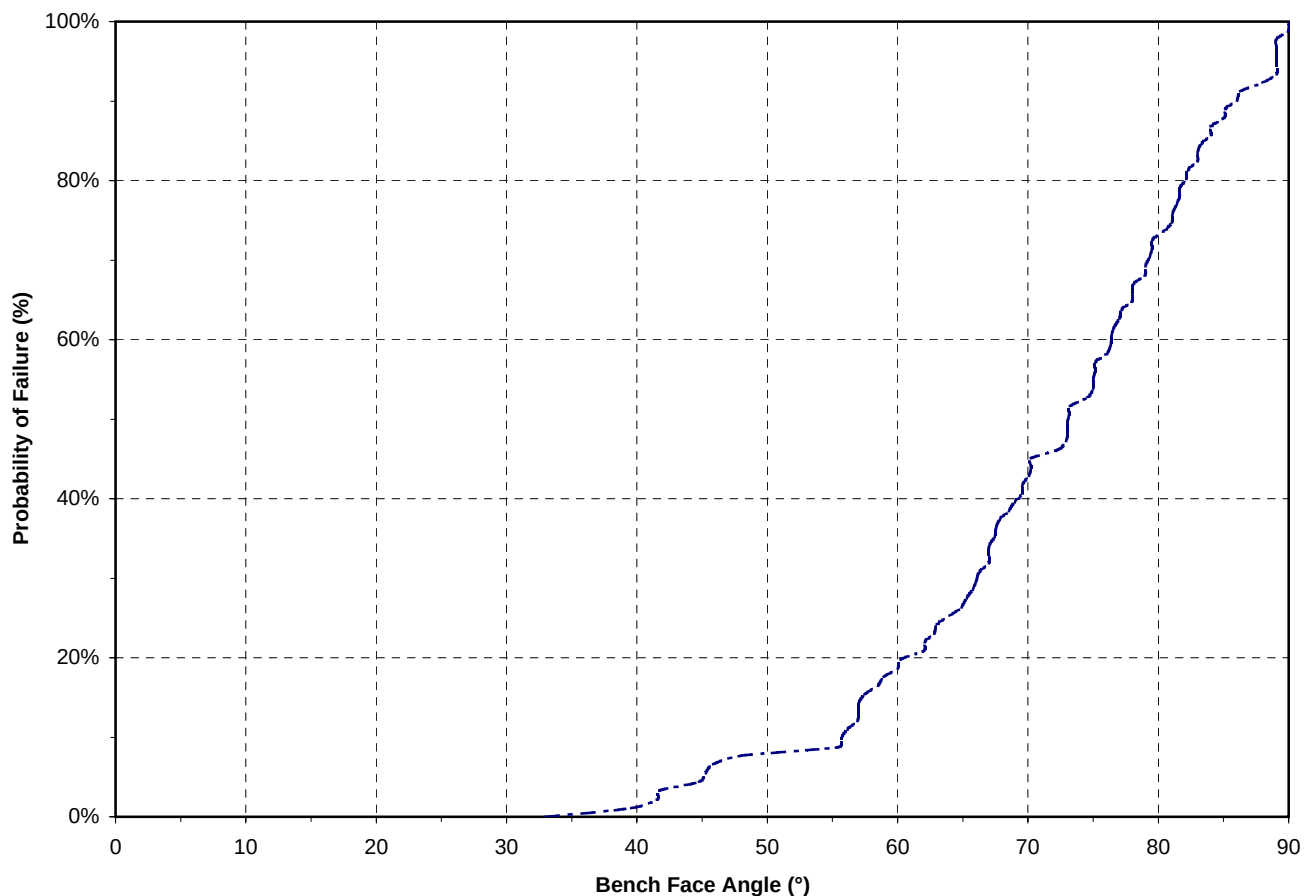
91 Failed Planes in the Cumulative Frequency Plot

87% Failure

Quantity: FALSE



EQUAL AREA STEREONET



PIT WALL PARAMETERS:

Slope Direction: 270 °

Kinematic Window: 90 °

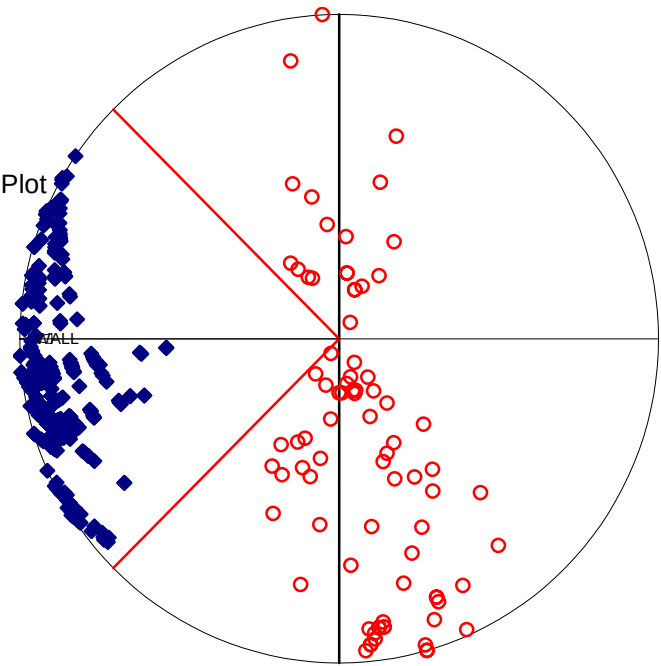
 Friction Angle (ϕ): 42 °

365 Wedges included in the window analysis

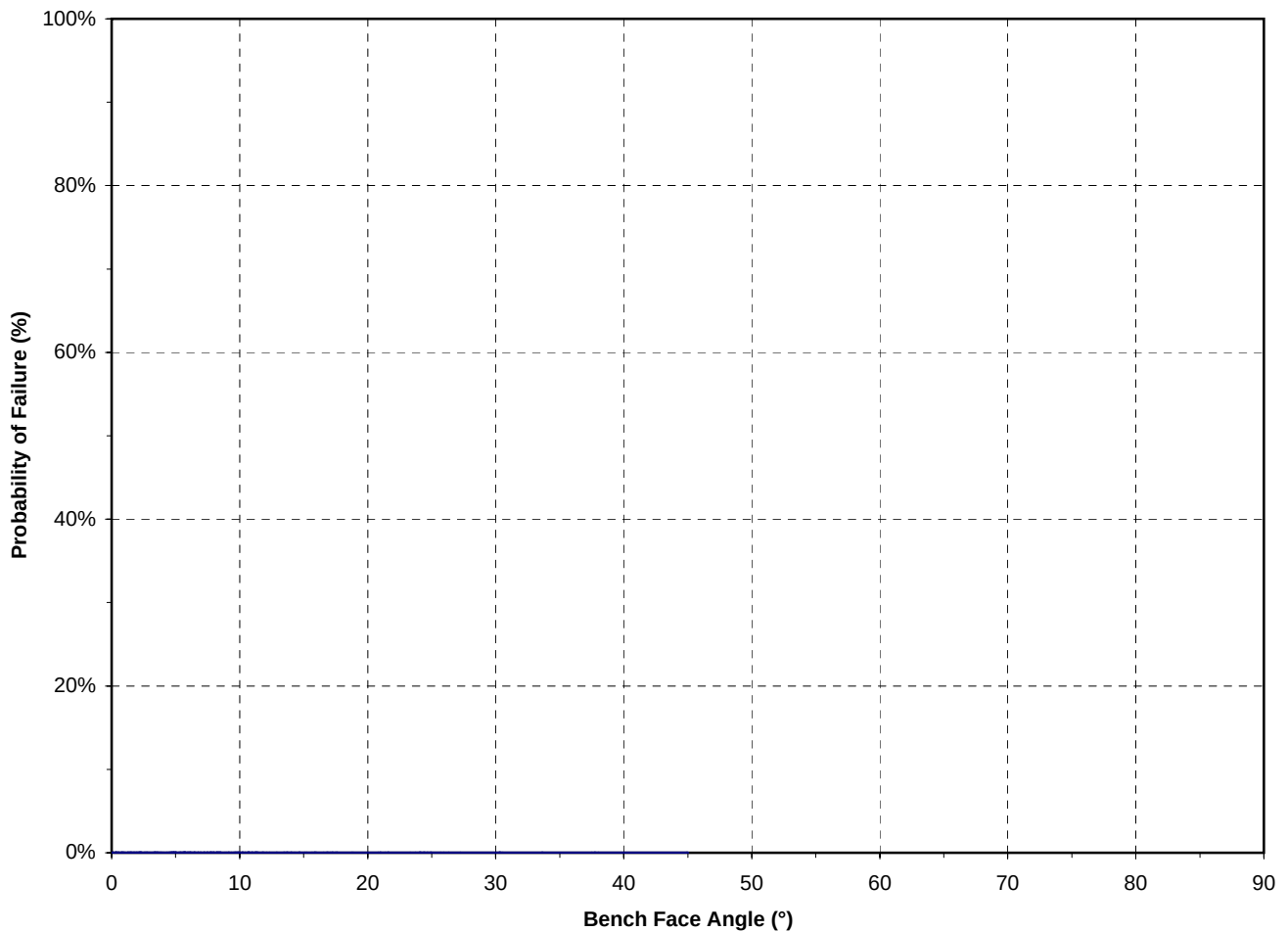
0 Failed Wedges in the Cumulative Frequency Plot

0% Failure

Quantity: FALSE

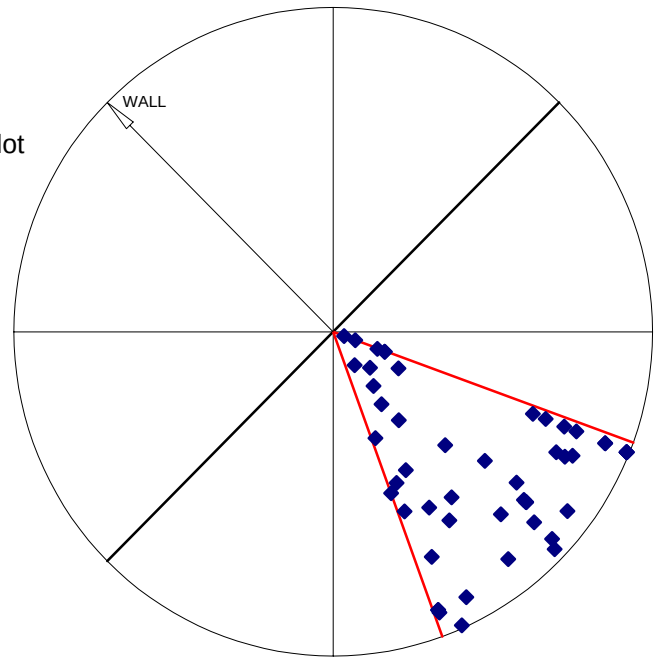


EQUAL AREA STEREONET

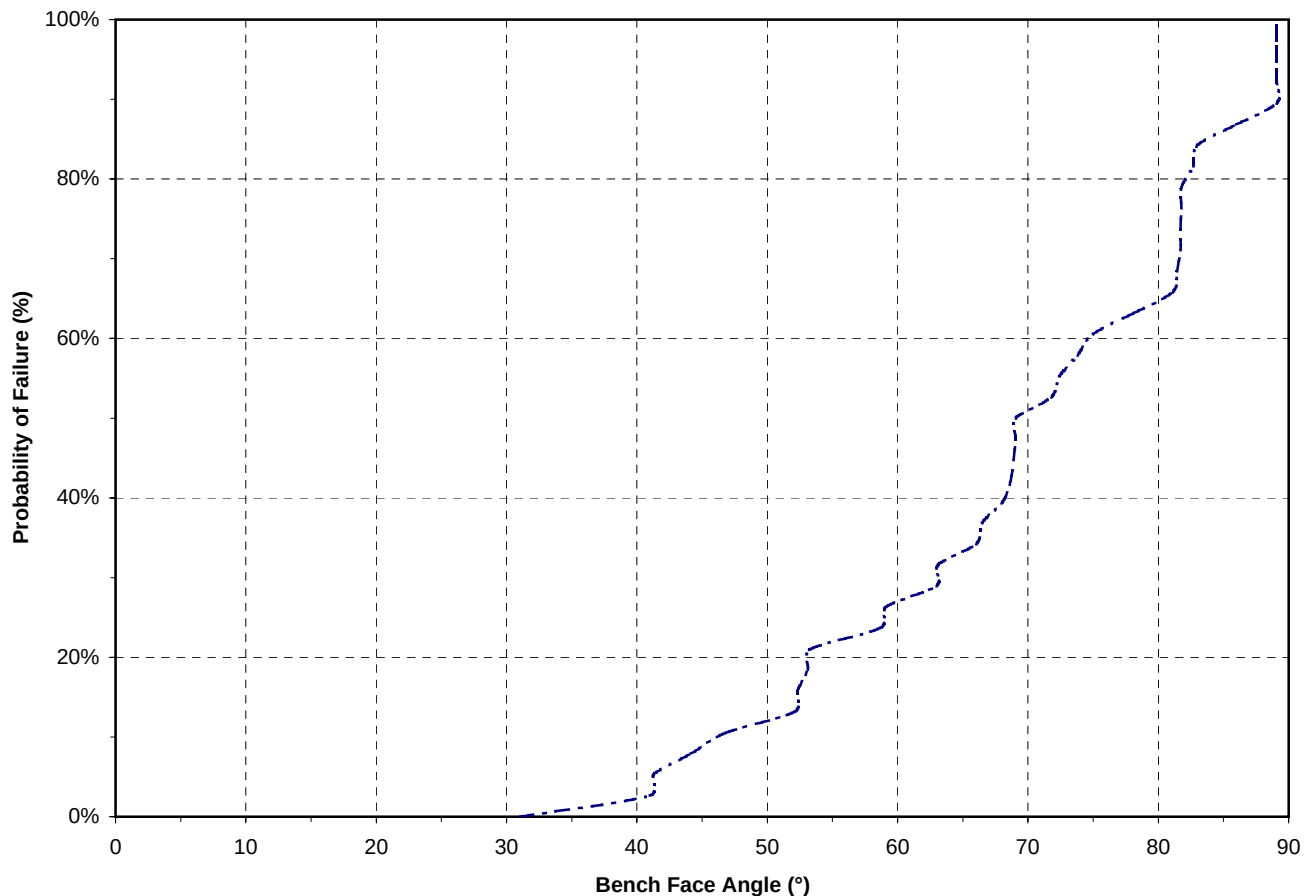


PIT WALL PARAMETERS:

Slope Direction: 315 °
 Kinematic Window: 50 °
 Friction Angle (ϕ): 37 °
 50 Planes included in the window analysis
 38 Failed Planes in the Cumulative Frequency Plot
 76% Failure
 Quantity: FALSE



EQUAL AREA STEREONET



PIT WALL PARAMETERS:

Slope Direction: 315 °

Kinematic Window: 90 °

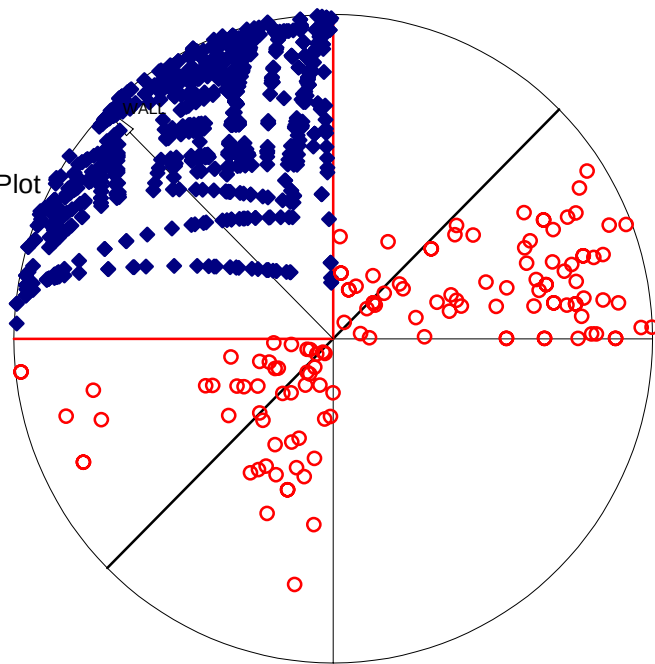
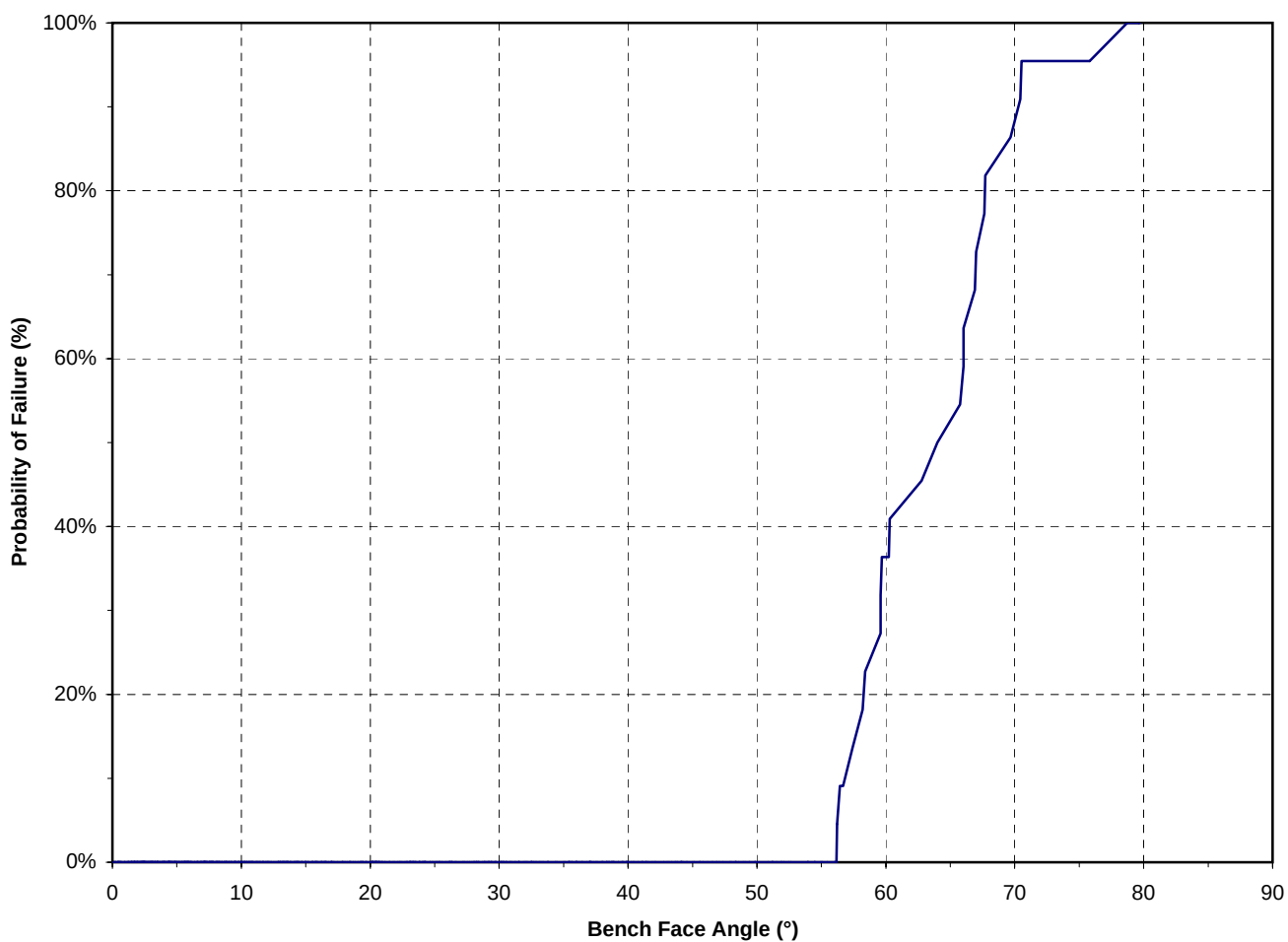
Friction Angle (ϕ): 42 °

947 Wedges included in the window analysis

22 Failed Wedges in the Cumulative Frequency Plot

2% Failure

Quantity: FALSE


EQUAL AREA STEREONET


PIT WALL PARAMETERS:

Slope Direction: 360 °

Kinematic Window: 50 °

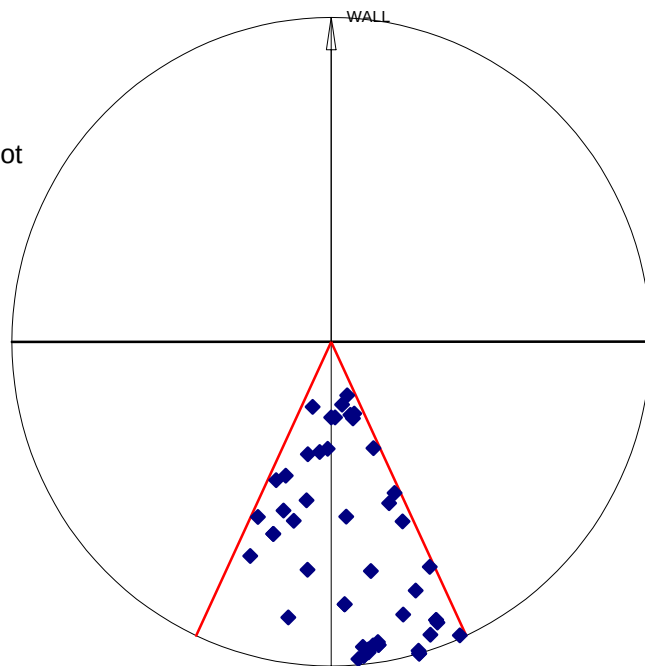
Friction Angle (ϕ): 42 °

52 Planes included in the window analysis

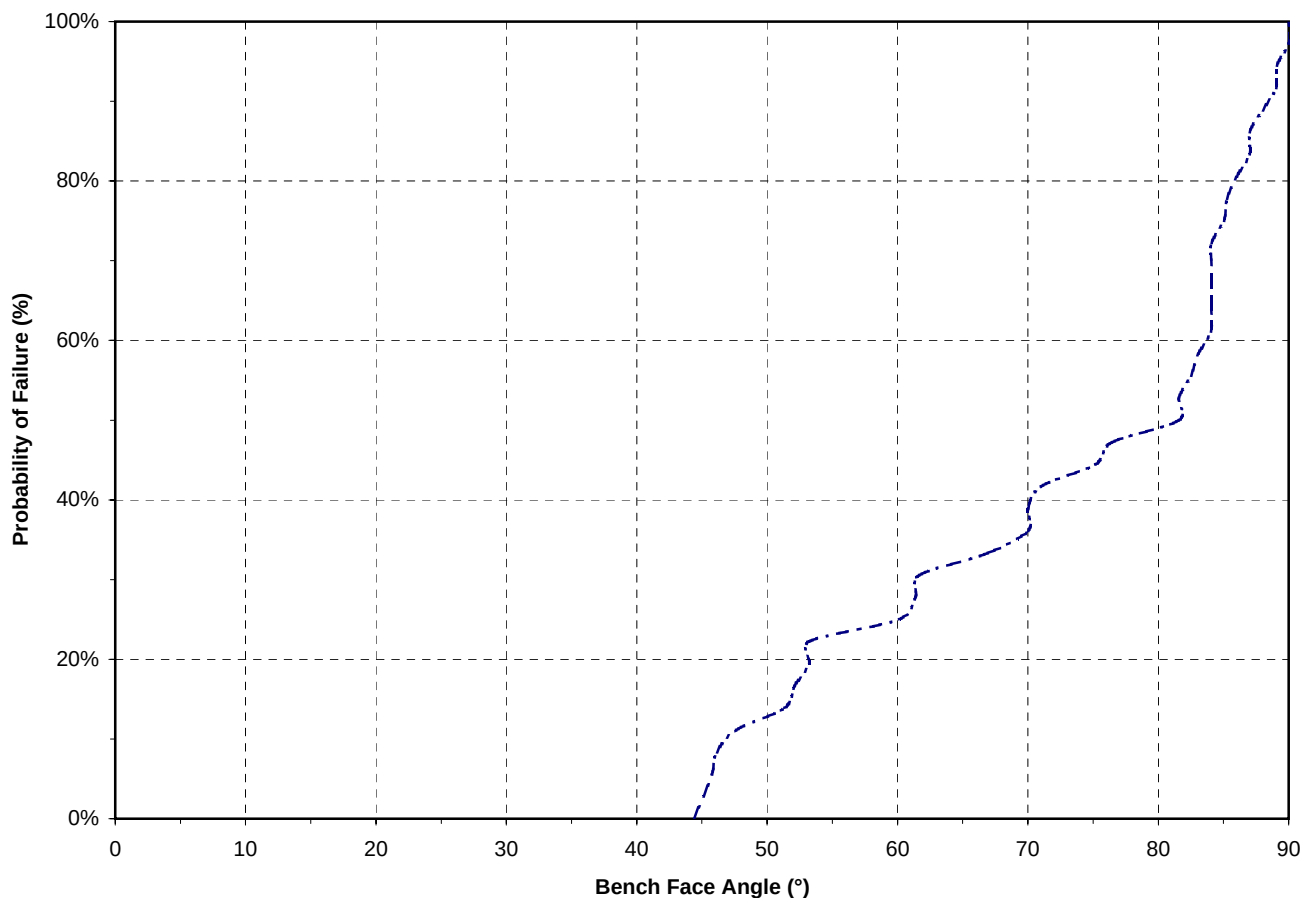
36 Failed Planes in the Cumulative Frequency Plot

69% Failure

Quantity: FALSE



EQUAL AREA STEREONET



PIT WALL PARAMETERS:

Slope Direction: 360 °

Kinematic Window: 90 °

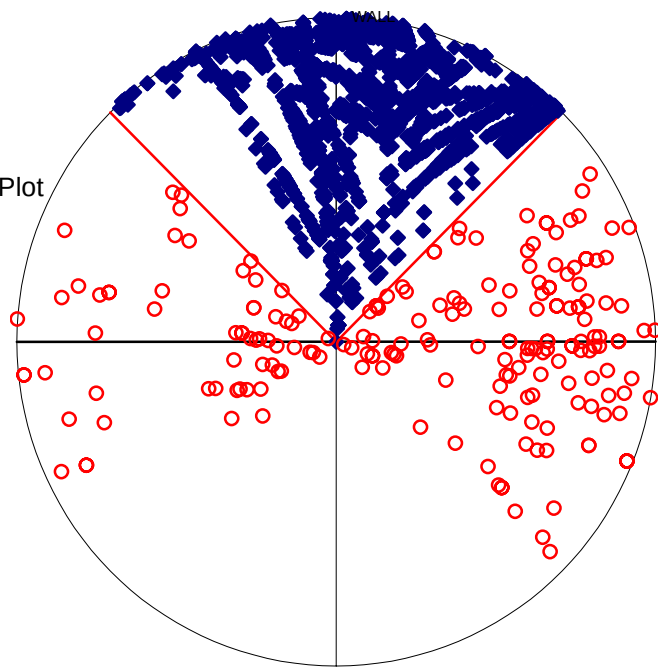
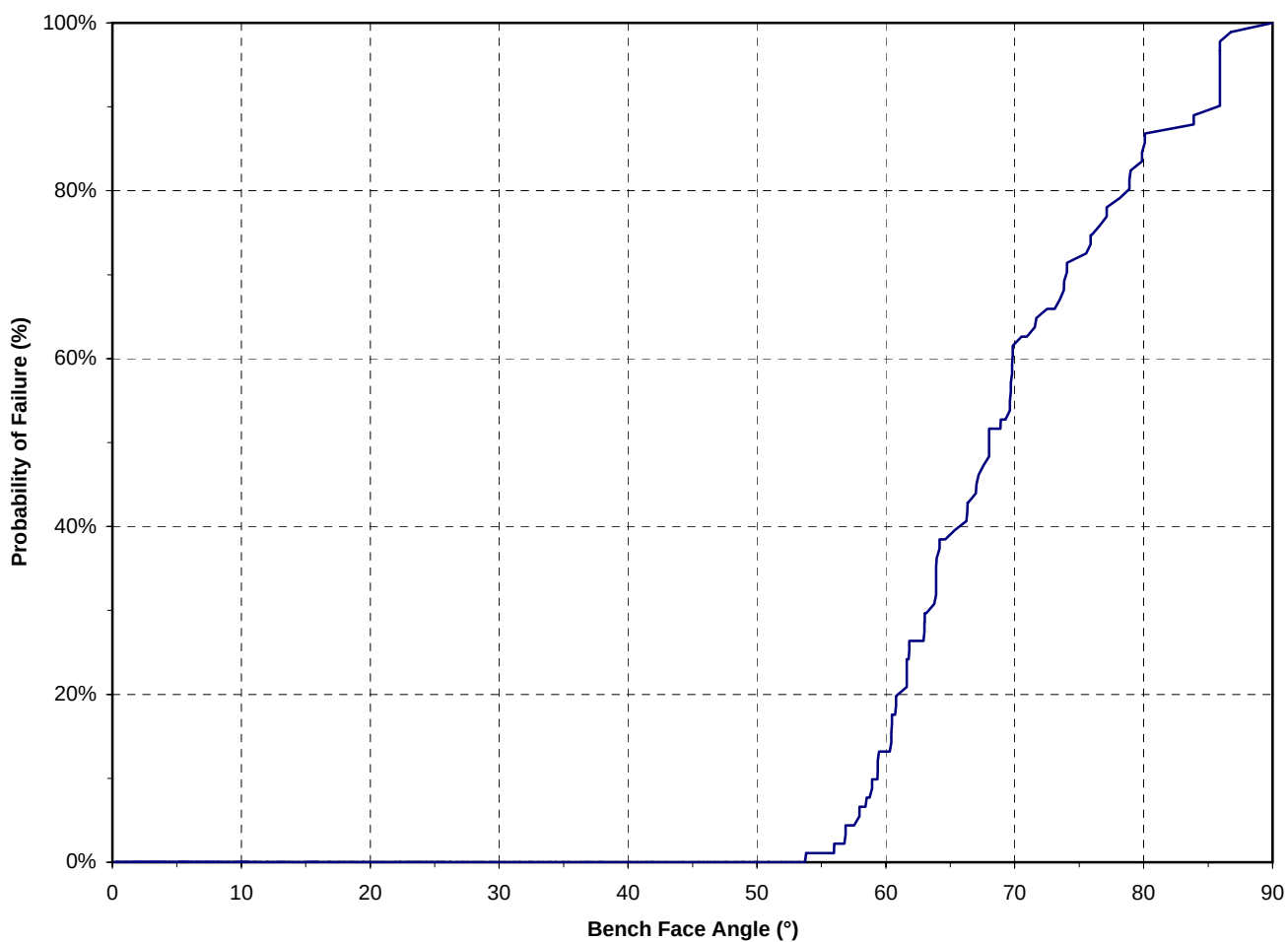
Friction Angle (ϕ): 37 °

2028 Wedges included in the window analysis

91 Failed Wedges in the Cumulative Frequency Plot

4% Failure

Quantity: FALSE


EQUAL AREA STEREONET


PIT WALL PARAMETERS:

Slope Direction: 90 °

Kinematic Window: 50 °

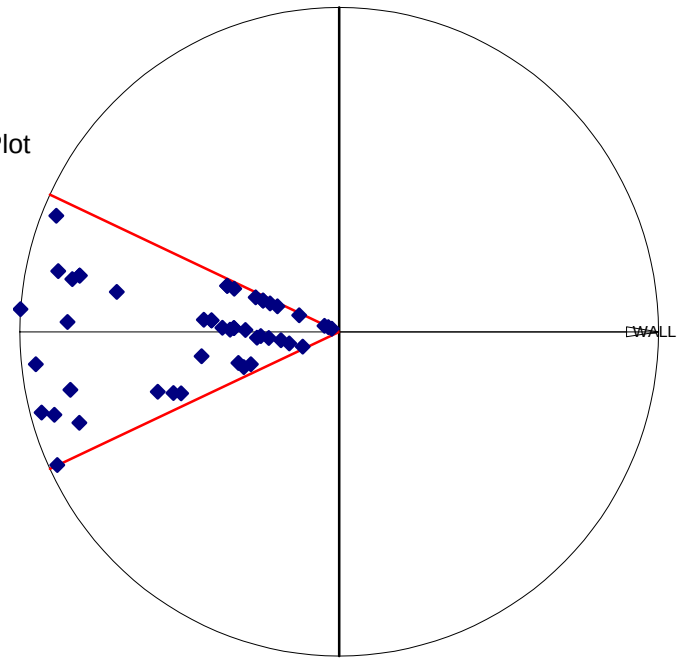
Friction Angle (ϕ): 42 °

47 Planes included in the window analysis

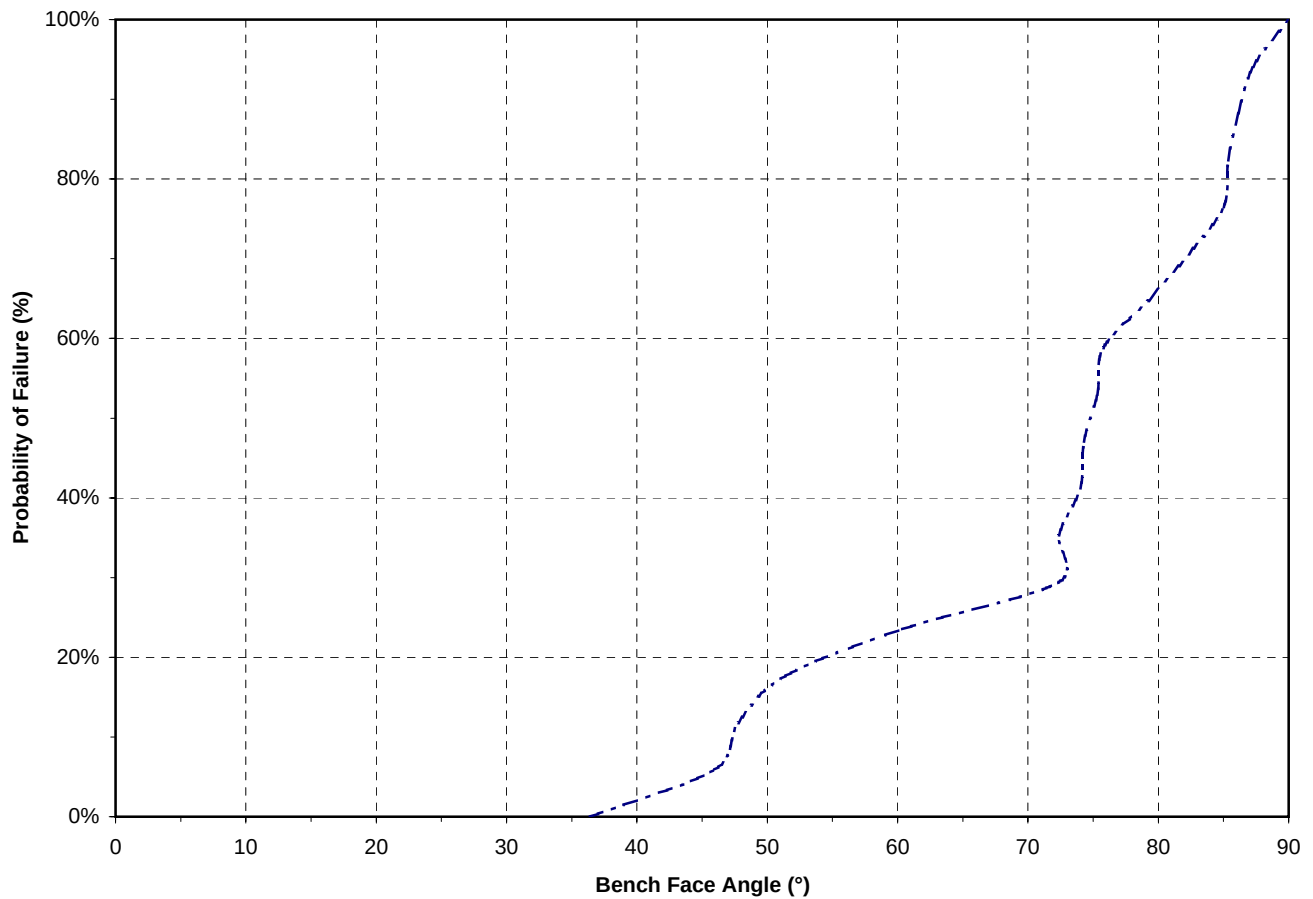
17 Failed Planes in the Cumulative Frequency Plot

36% Failure

Quantity: FALSE



EQUAL AREA STEREONET



PIT WALL PARAMETERS:

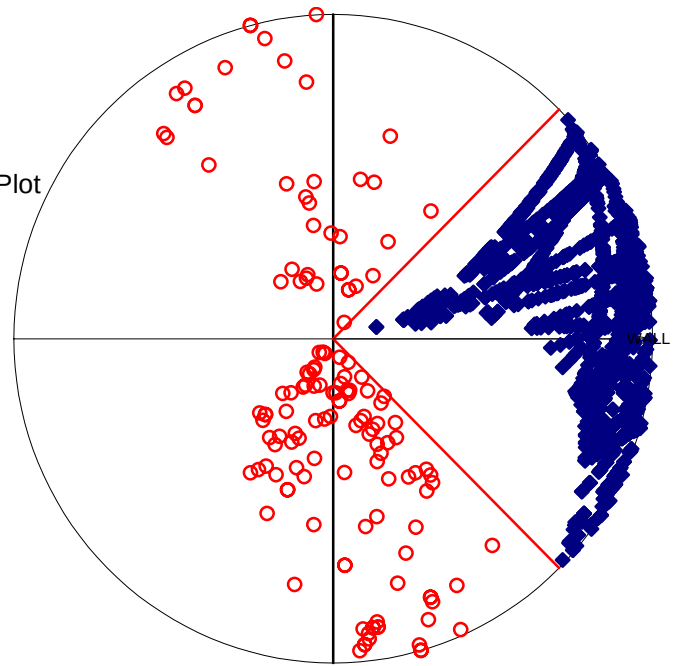
Slope Direction: 90 °
 Kinematic Window: 90 °
 Friction Angle (ϕ): 42 °

1718 Wedges included in the window analysis

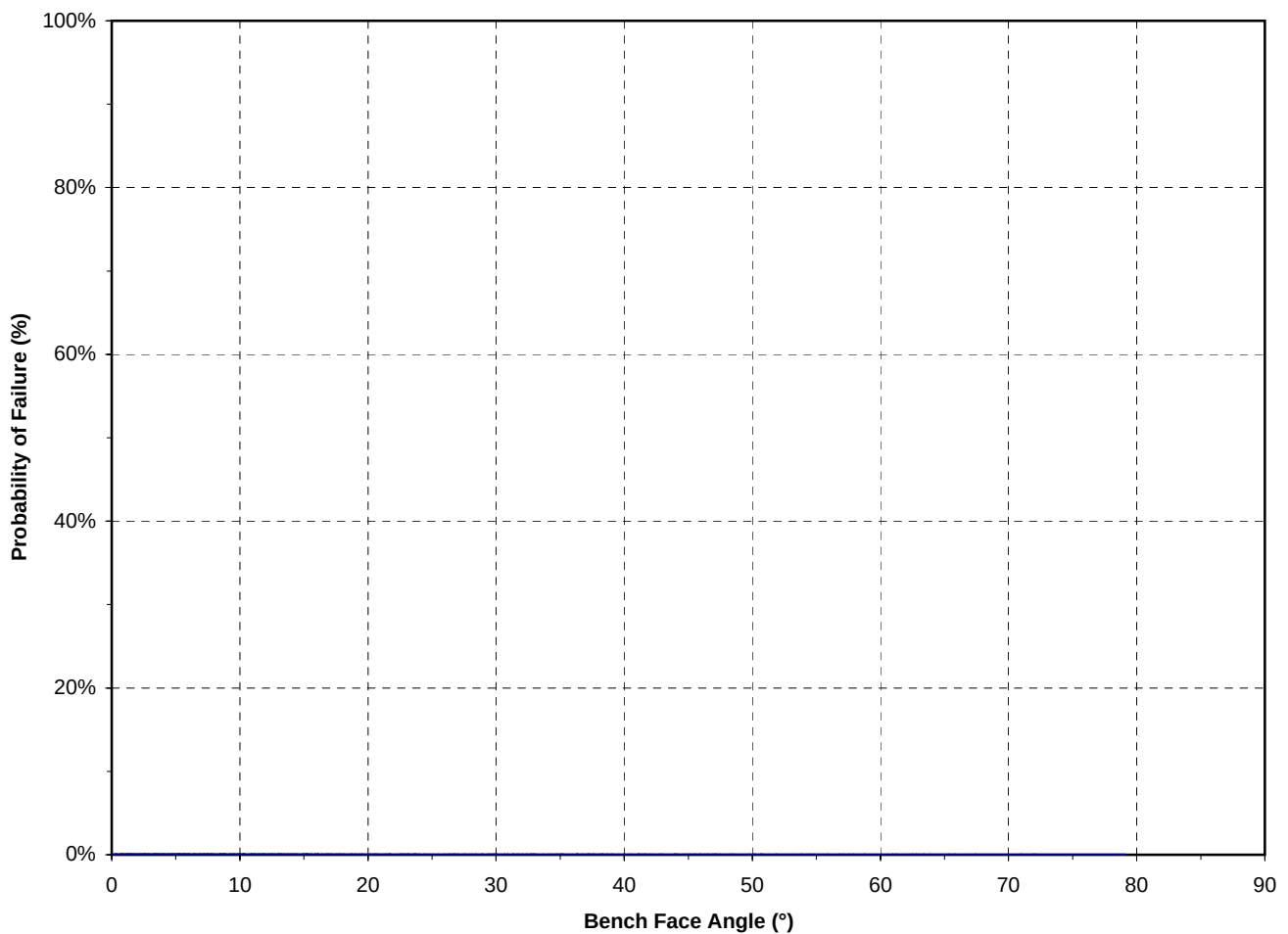
16 Failed Wedges in the Cumulative Frequency Plot

1% Failure

Quantity: FALSE



EQUAL AREA STEREONET



PIT WALL PARAMETERS:

Slope Direction: 45 °

Kinematic Window: 50 °

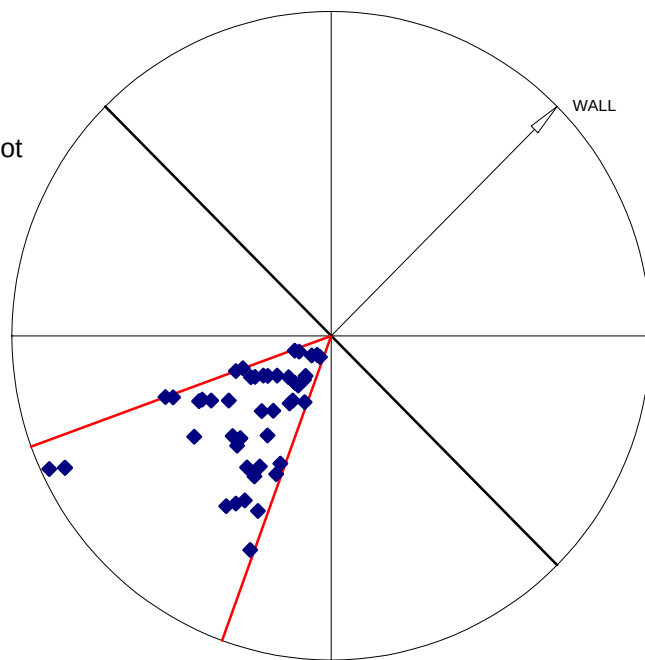
Friction Angle (ϕ): 42 °

47 Planes included in the window analysis

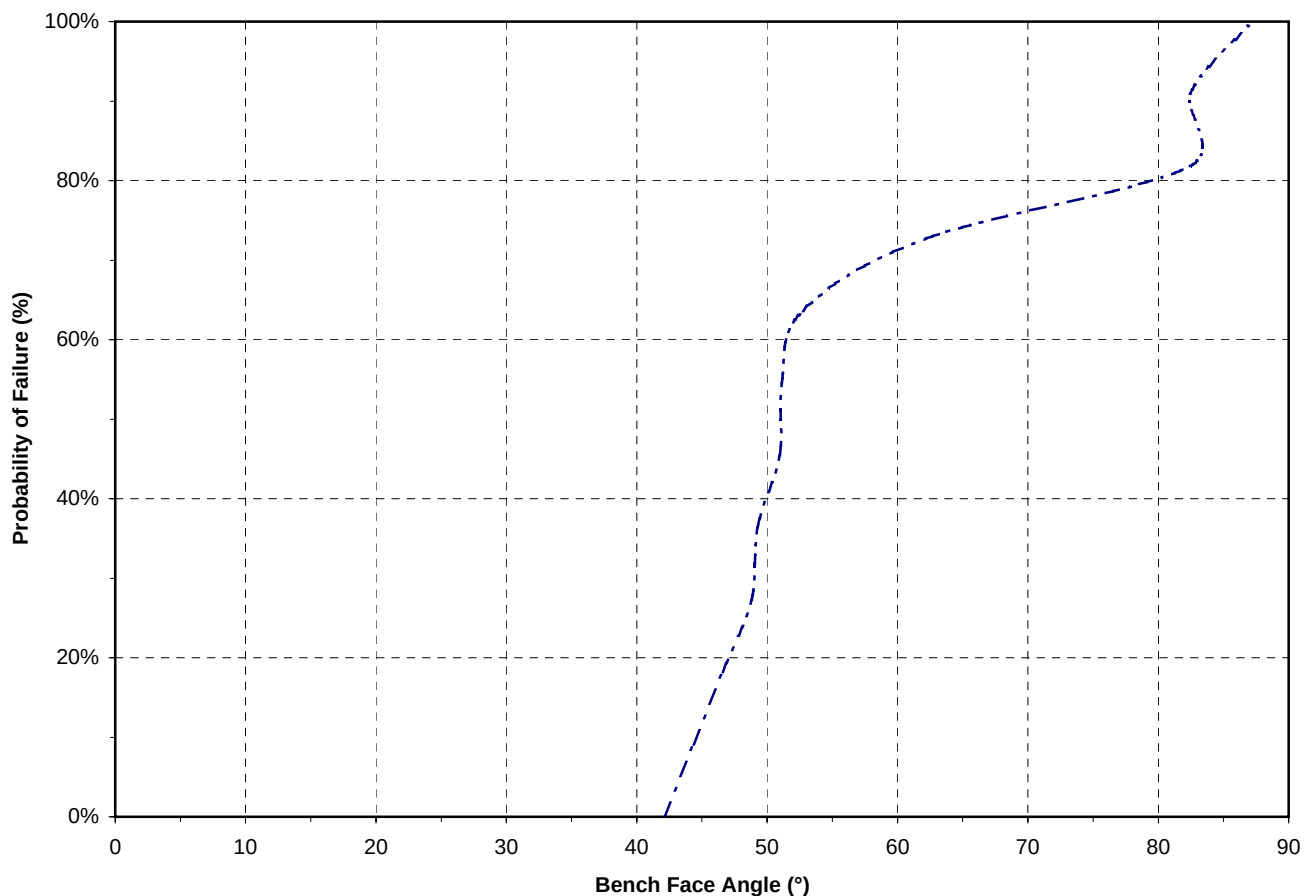
11 Failed Planes in the Cumulative Frequency Plot

23% Failure

Quantity: FALSE



EQUAL AREA STEREONET



PIT WALL PARAMETERS:

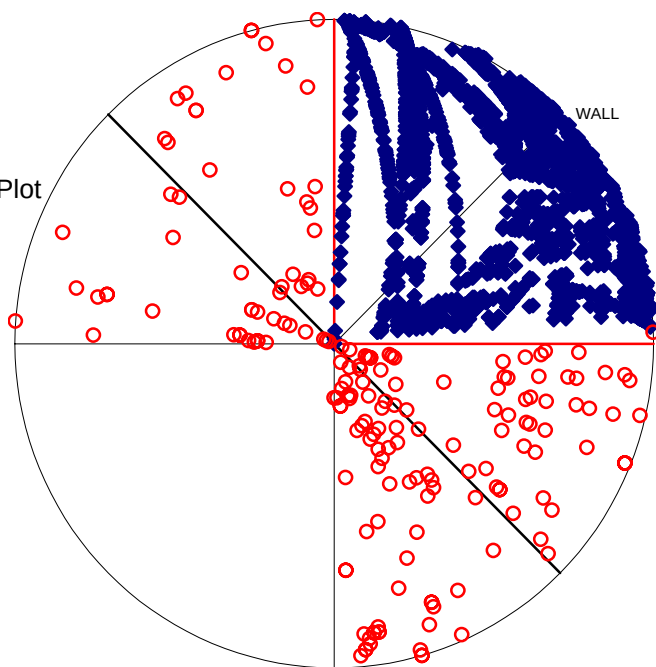
Slope Direction: 45 °
 Kinematic Window: 90 °
 Friction Angle (ϕ): 42 °

2571 Wedges included in the window analysis

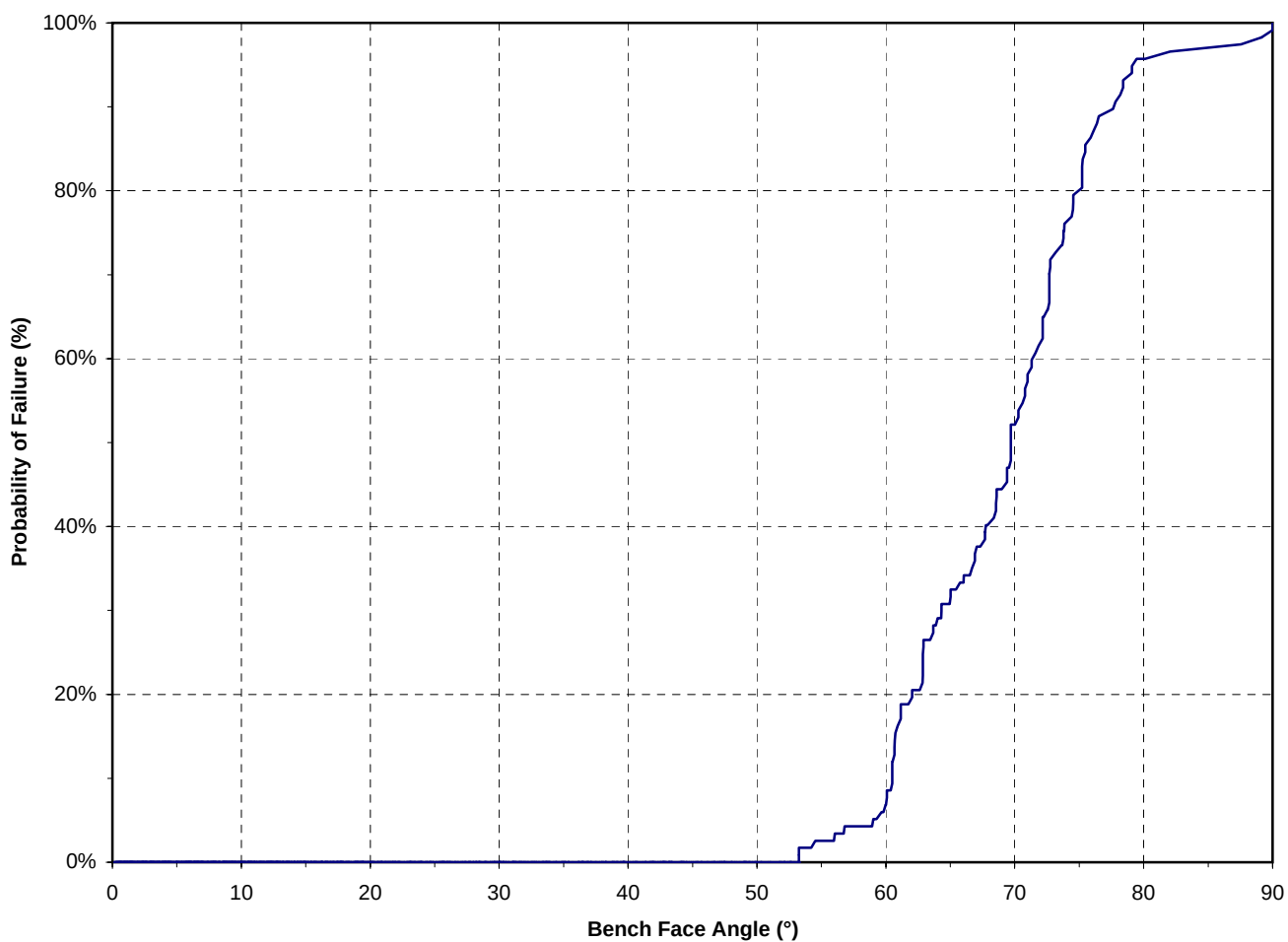
117 Failed Wedges in the Cumulative Frequency Plot

5% Failure

Quantity: FALSE



EQUAL AREA STEREONET



PIT WALL PARAMETERS:

Slope Direction: 360 °

Kinematic Window: 50 °

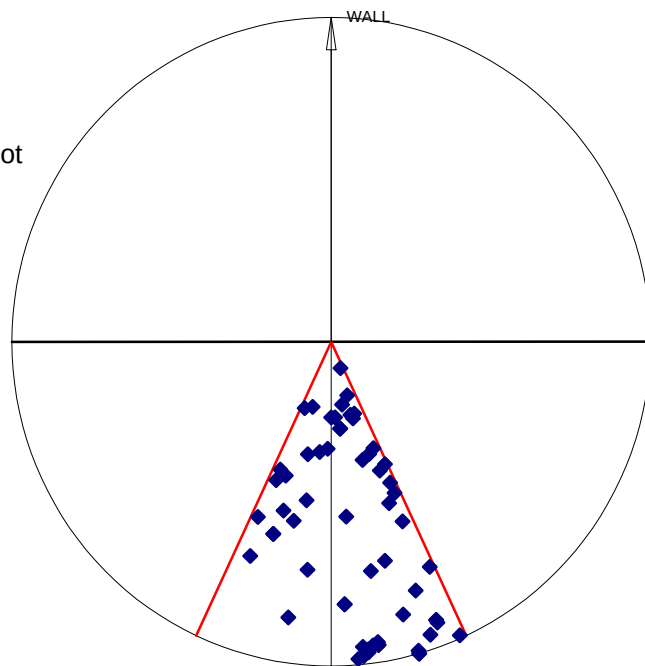
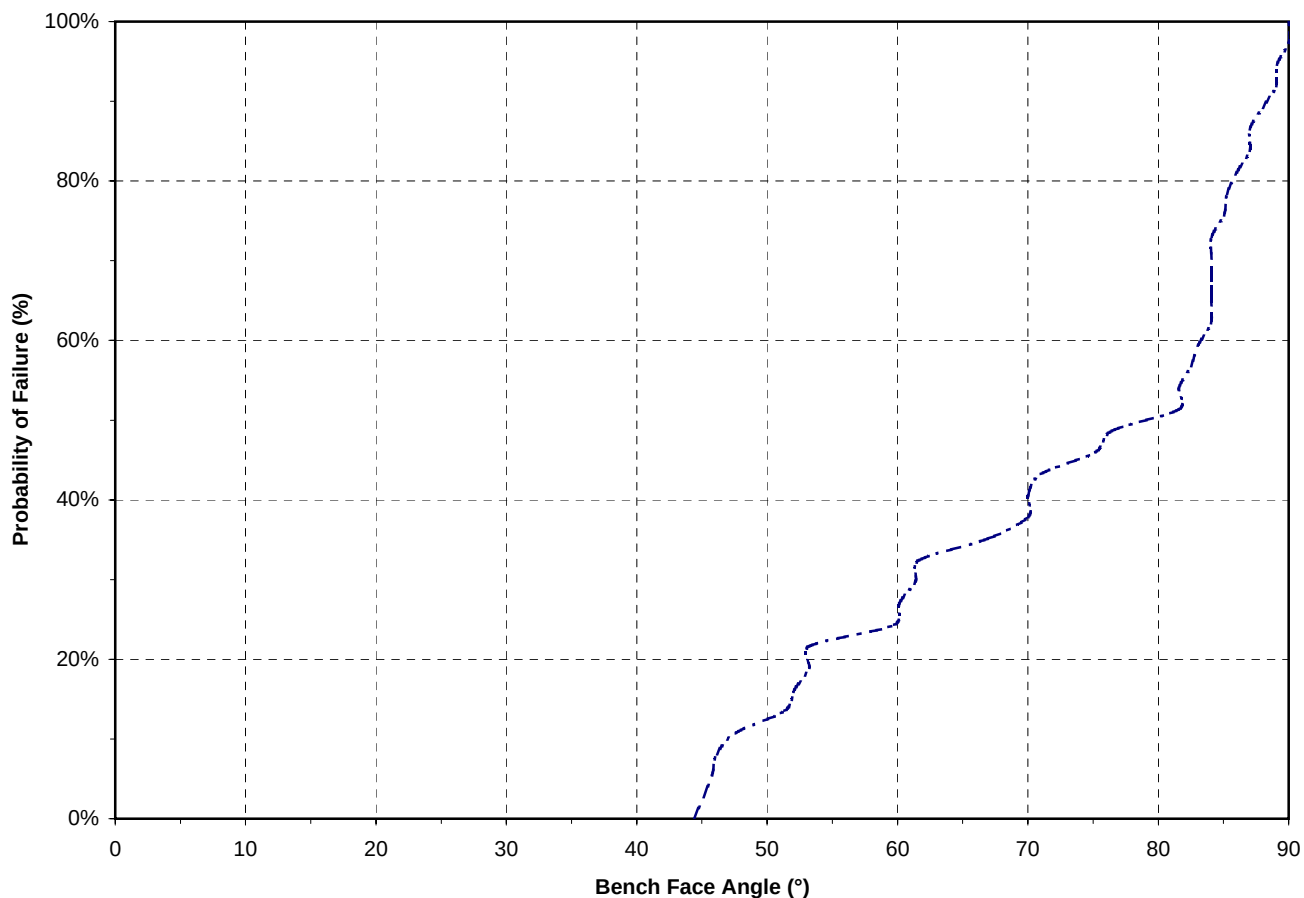
Friction Angle (ϕ): 42 °

63 Planes included in the window analysis

37 Failed Planes in the Cumulative Frequency Plot

59% Failure

Quantity: FALSE

**EQUAL AREA STEREONET**

PIT WALL PARAMETERS:

Slope Direction: 360 °

Kinematic Window: 90 °

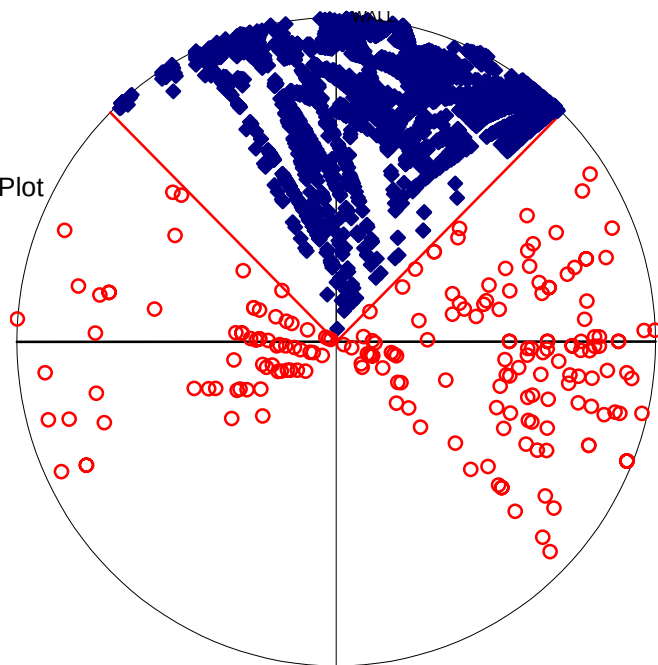
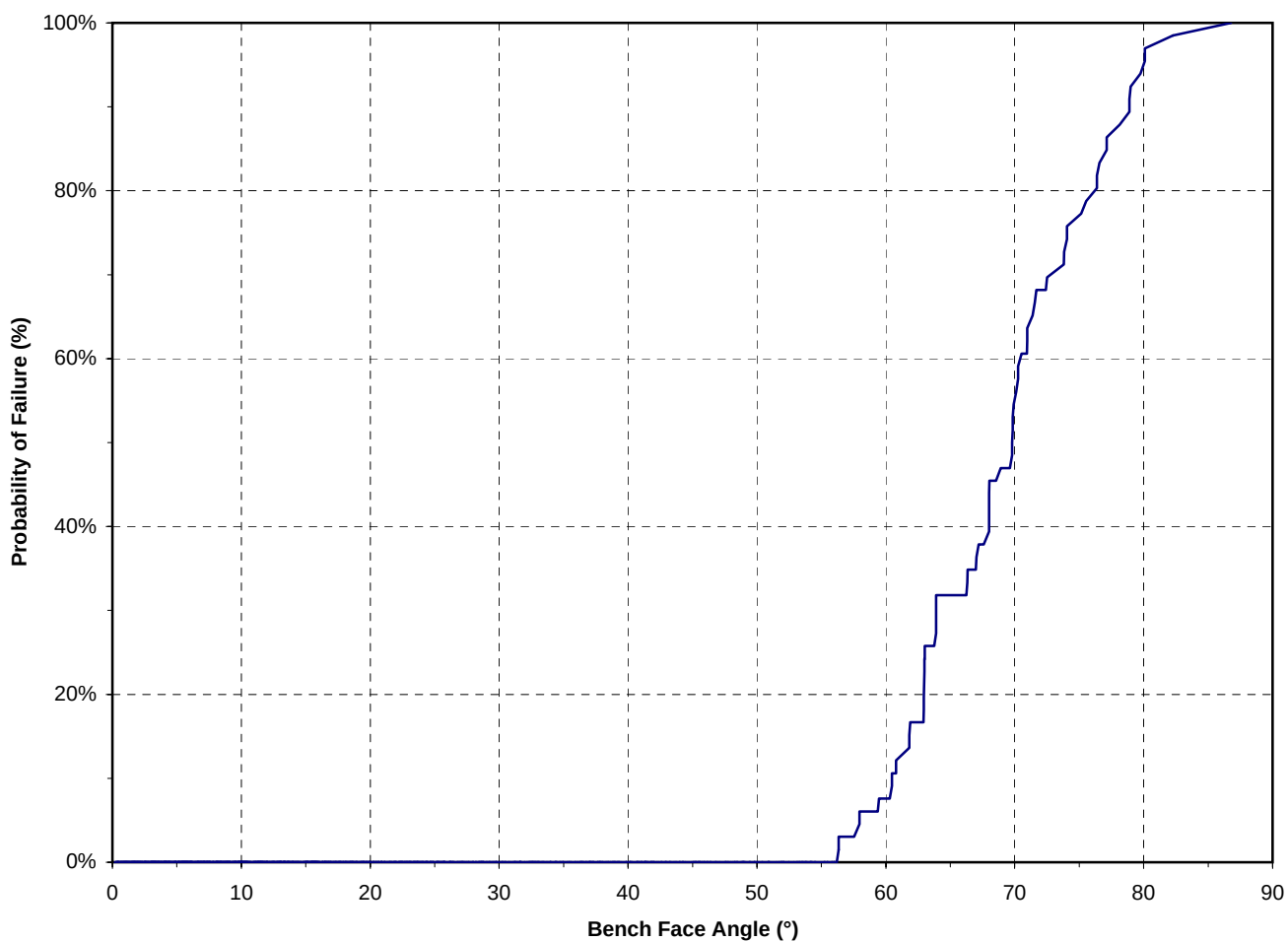
Friction Angle (ϕ): 42 °

2632 Wedges included in the window analysis

66 Failed Wedges in the Cumulative Frequency Plot

3% Failure

Quantity: FALSE


EQUAL AREA STEREONET


PORTAGE NORTH CFA ANALYSIS

PIT WALL PARAMETERS:

Slope Direction: 135 °

Kinematic Window: 50 °

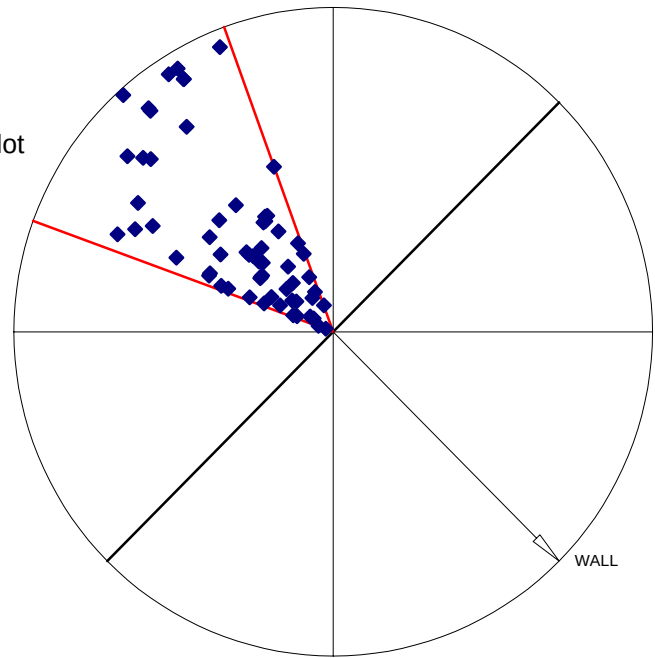
Friction Angle (ϕ): 42 °

62 Planes included in the window analysis

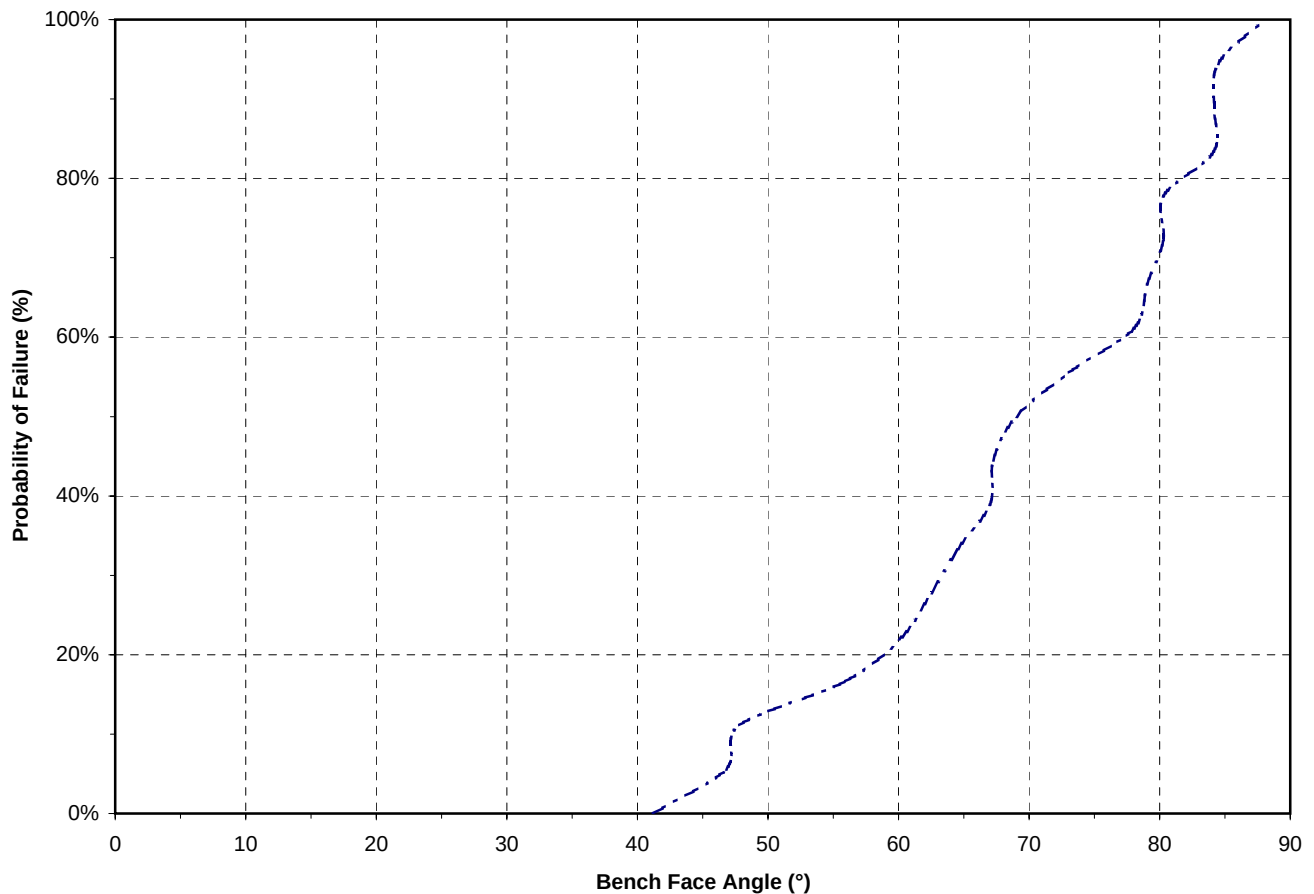
18 Failed Planes in the Cumulative Frequency Plot

29% Failure

Quantity: FALSE



EQUAL AREA STEREONET



PIT WALL PARAMETERS:

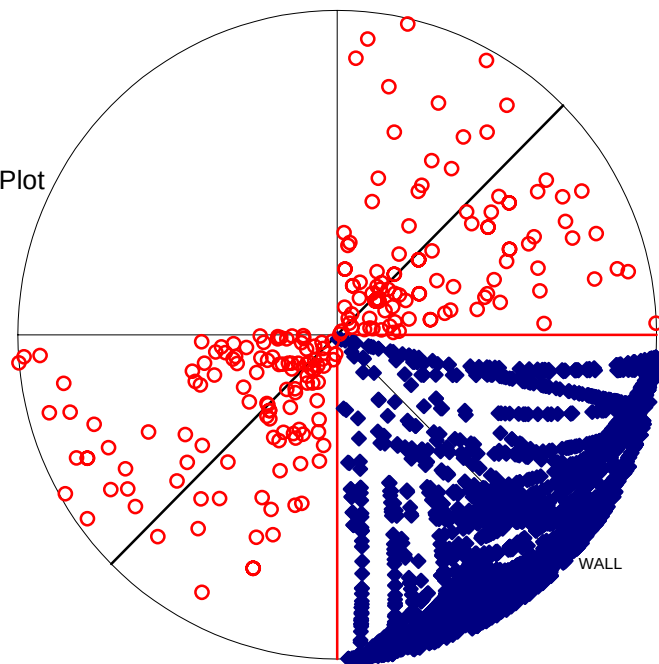
Slope Direction: 135 °
 Kinematic Window: 90 °
 Friction Angle (ϕ): 42 °

2979 Wedges included in the window analysis

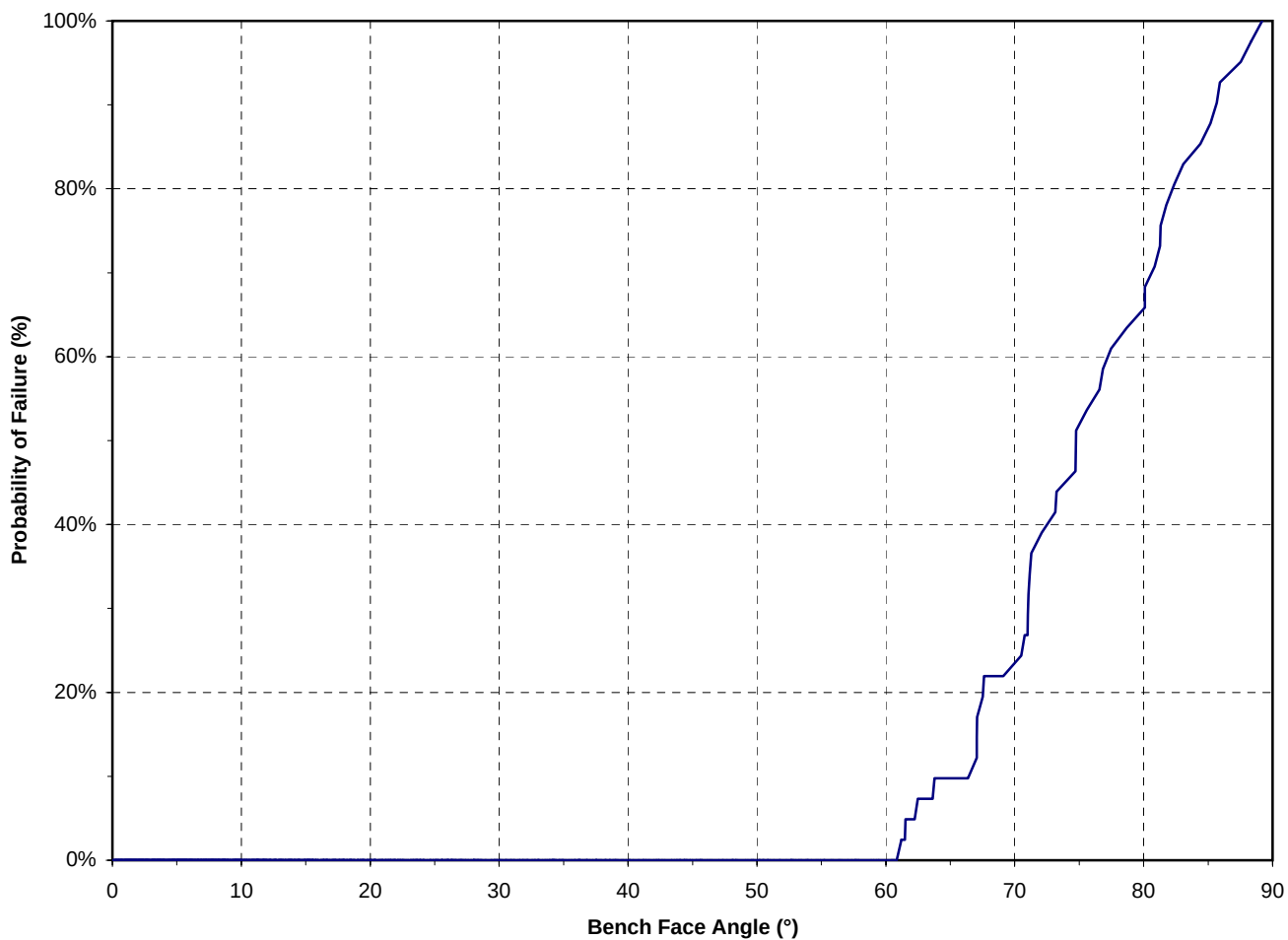
41 Failed Wedges in the Cumulative Frequency Plot

1% Failure

Quantity: FALSE

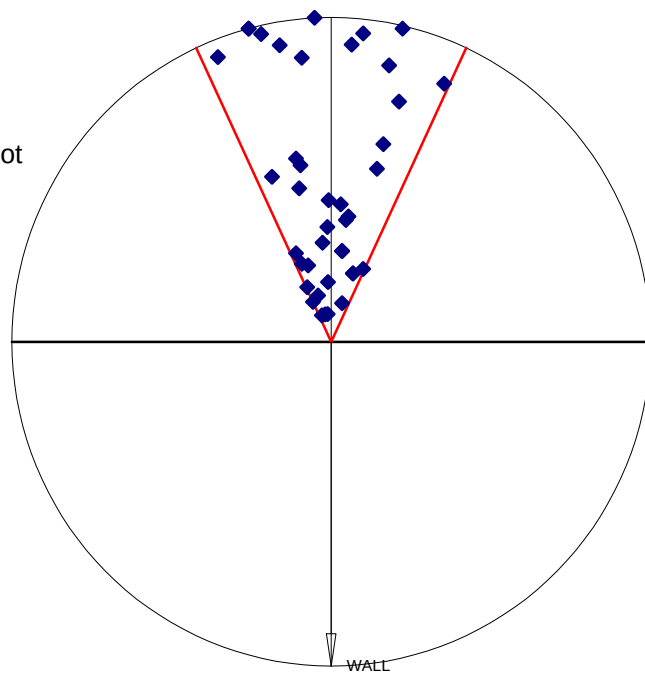


EQUAL AREA STEREONET

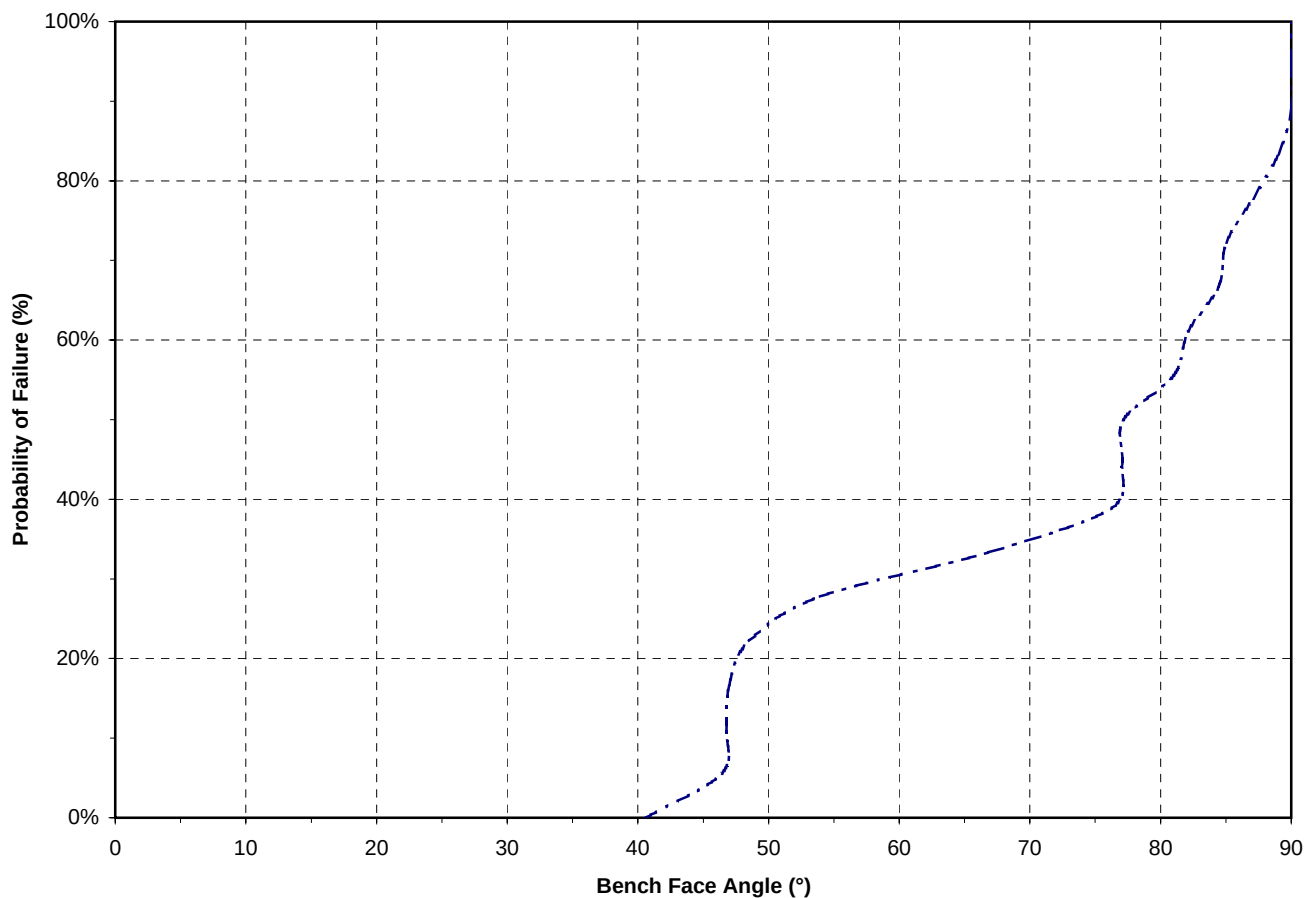


PIT WALL PARAMETERS:

Slope Direction: 180 °
 Kinematic Window: 50 °
 Friction Angle (ϕ): 42 °
 41 Planes included in the window analysis
 18 Failed Planes in the Cumulative Frequency Plot
 44% Failure
 Quantity: FALSE



EQUAL AREA STEREONET



PIT WALL PARAMETERS:

Slope Direction: 180 °

Kinematic Window: 90 °

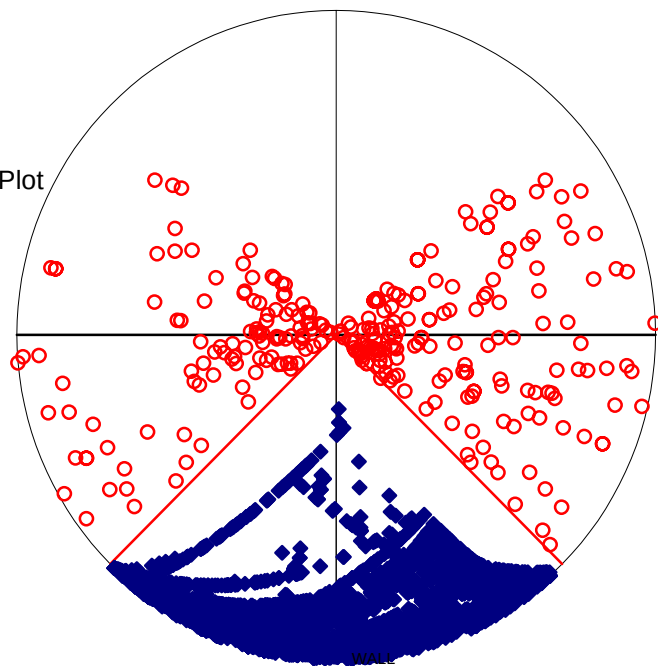
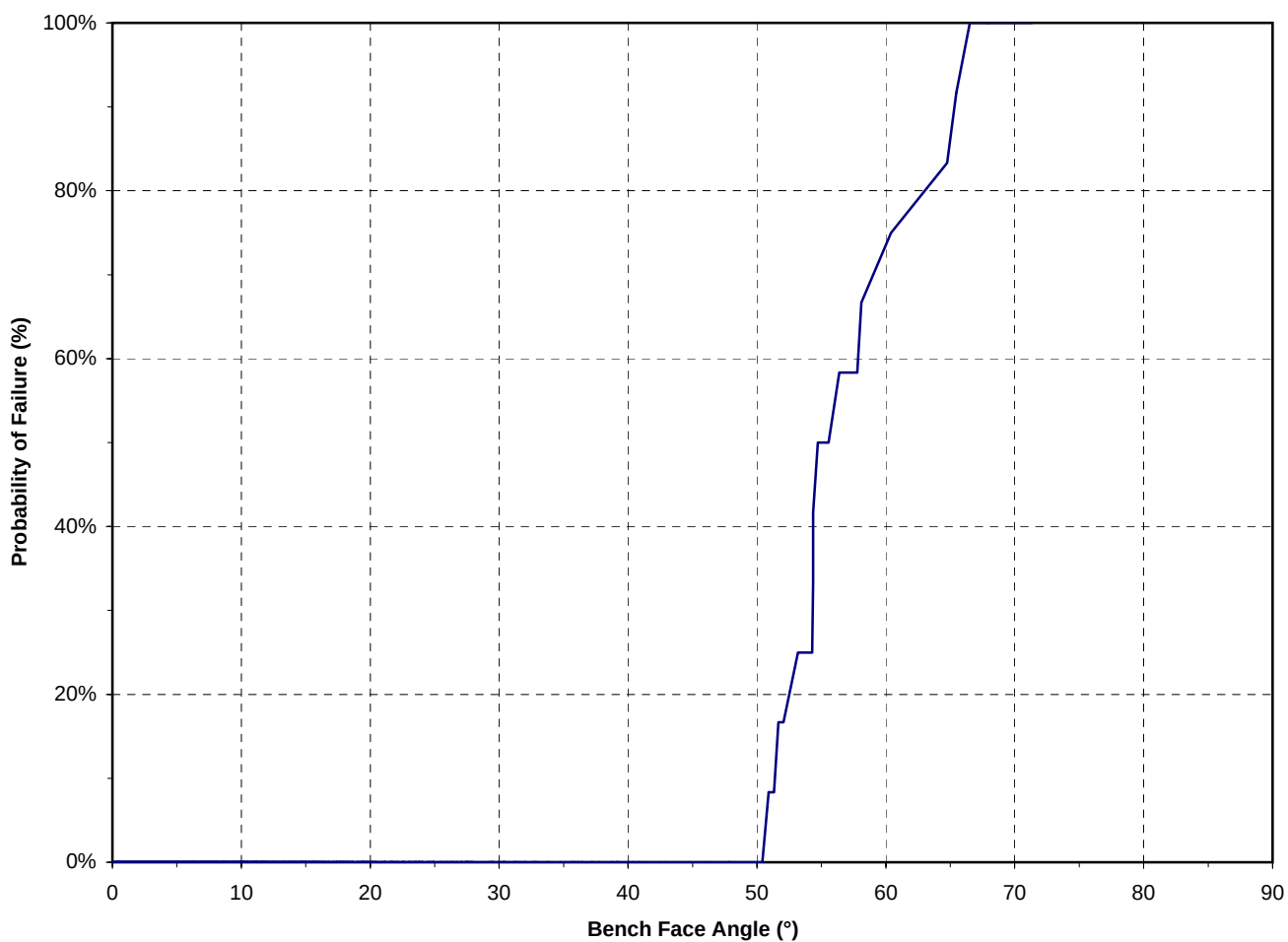
Friction Angle (ϕ): 37 °

4113 Wedges included in the window analysis

12 Failed Wedges in the Cumulative Frequency Plot

0% Failure

Quantity: FALSE


EQUAL AREA STEREONET


PIT WALL PARAMETERS:

Slope Direction: 140 °

Kinematic Window: 50 °

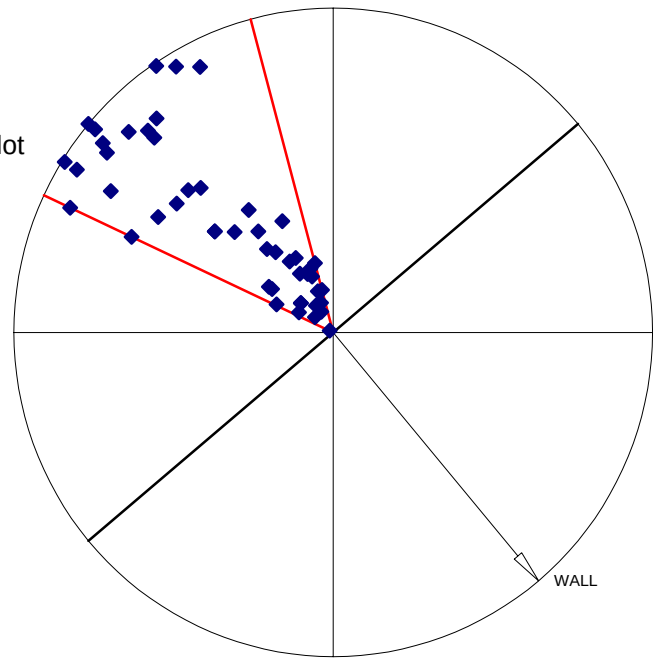
Friction Angle (ϕ): 42 °

48 Planes included in the window analysis

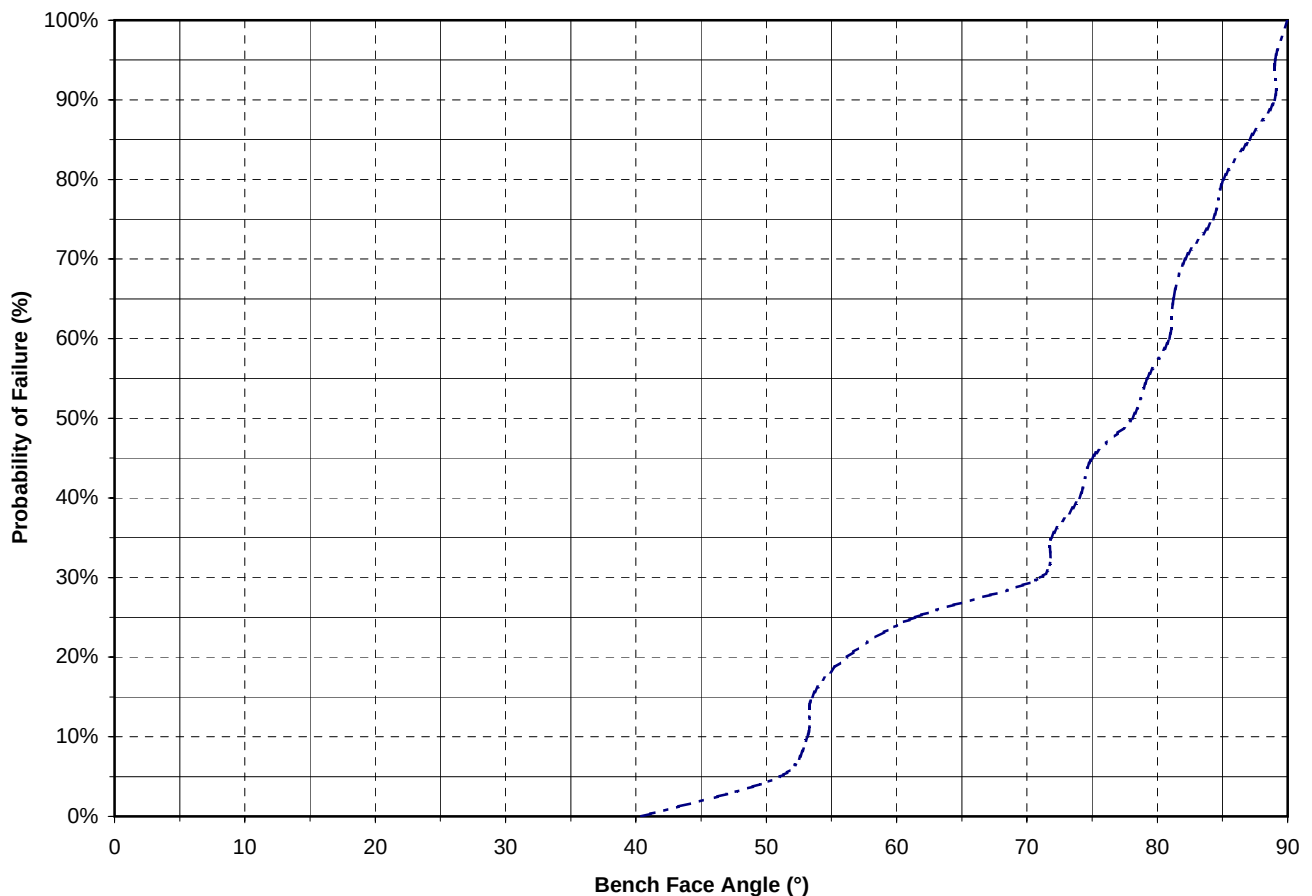
20 Failed Planes in the Cumulative Frequency Plot

42% Failure

Quantity: FALSE



EQUAL AREA STEREONET



PIT WALL PARAMETERS:

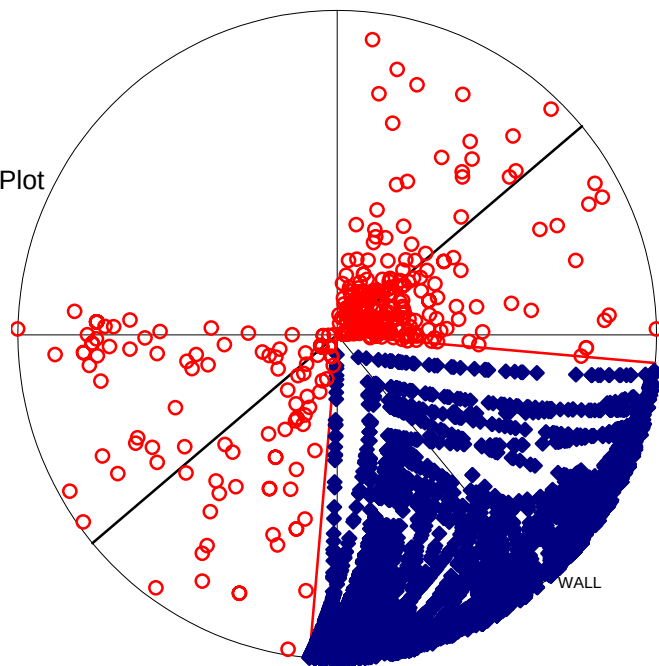
Slope Direction: 140 °
 Kinematic Window: 90 °
 Friction Angle (ϕ): 42 °

7866 Wedges included in the window analysis

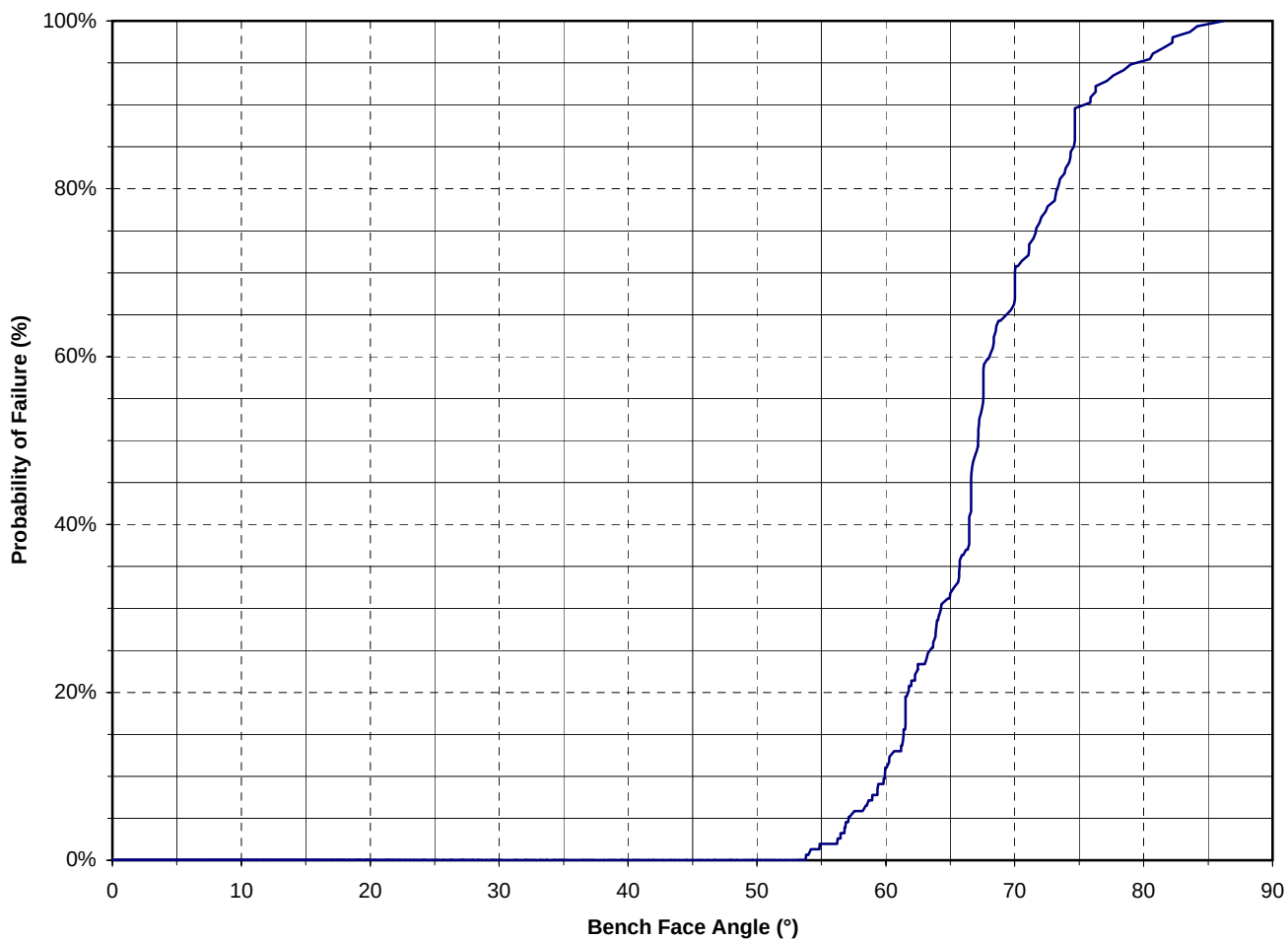
154 Failed Wedges in the Cumulative Frequency Plot

2% Failure

Quantity: FALSE

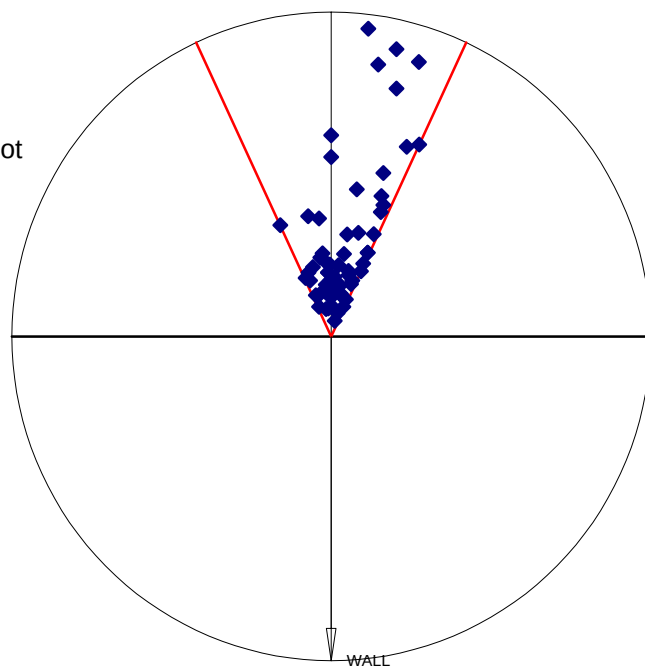


EQUAL AREA STEREONET

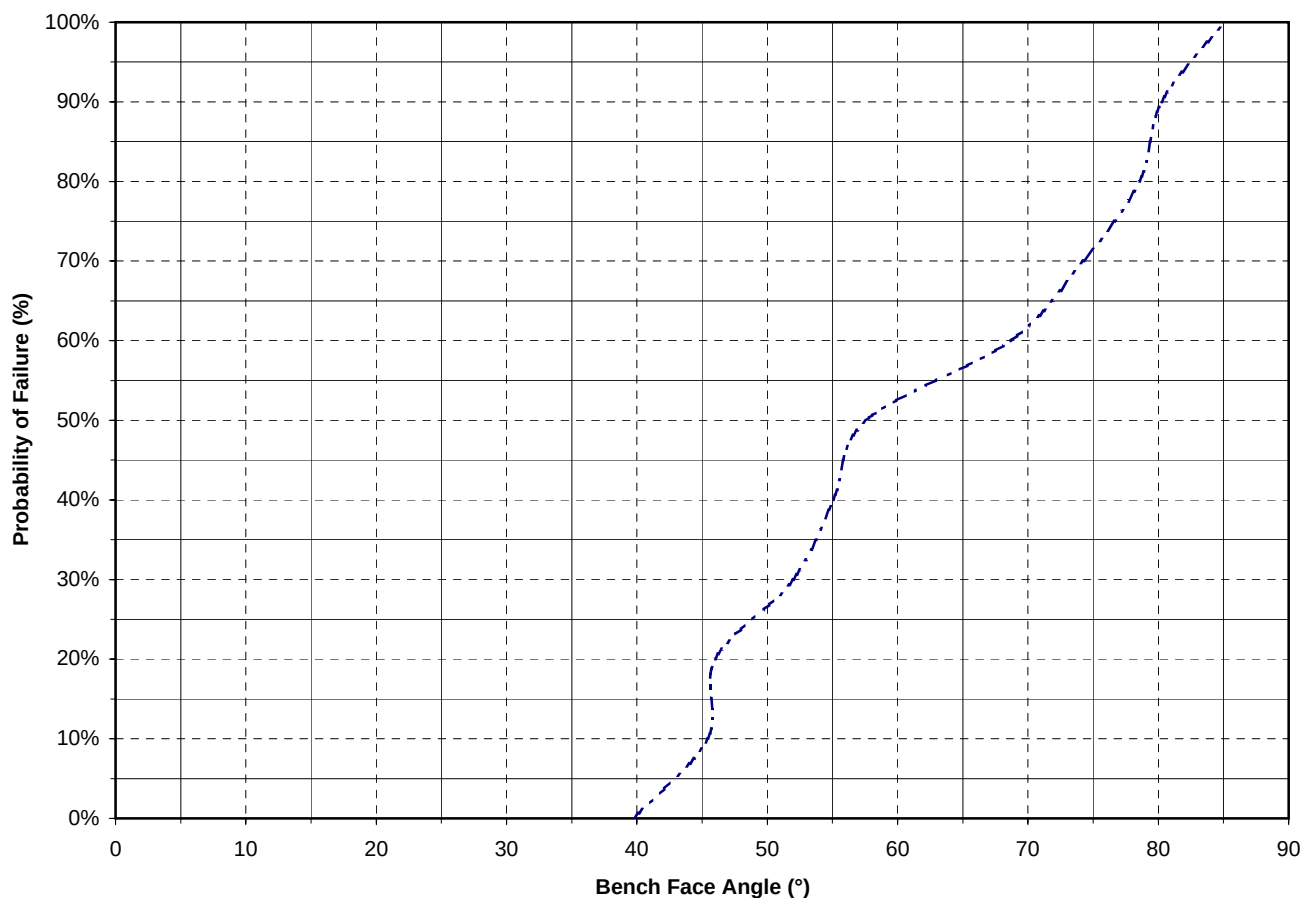


PIT WALL PARAMETERS:

Slope Direction: 180 °
 Kinematic Window: 50 °
 Friction Angle (ϕ): 42 °
 67 Planes included in the window analysis
 10 Failed Planes in the Cumulative Frequency Plot
 15% Failure
 Quantity: FALSE



EQUAL AREA STEREONET



PIT WALL PARAMETERS:

Slope Direction: 180 °

Kinematic Window: 90 °

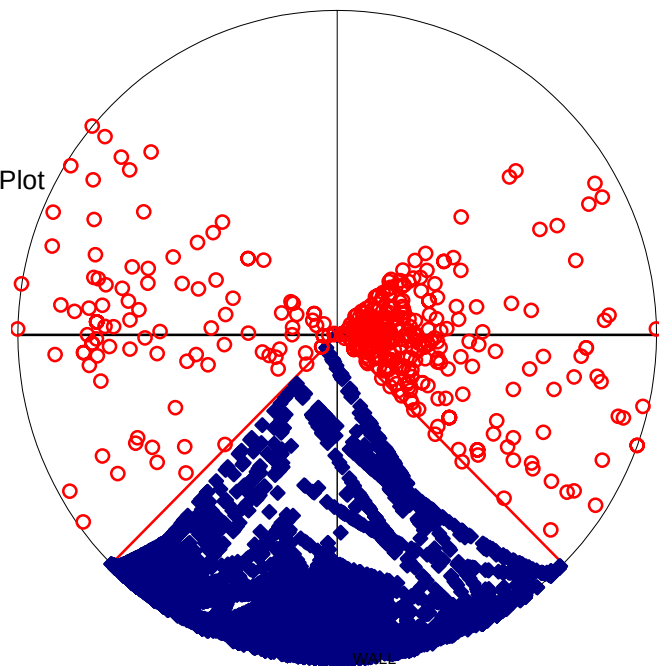
Friction Angle (ϕ): 42 °

10202 Wedges included in the window analysis

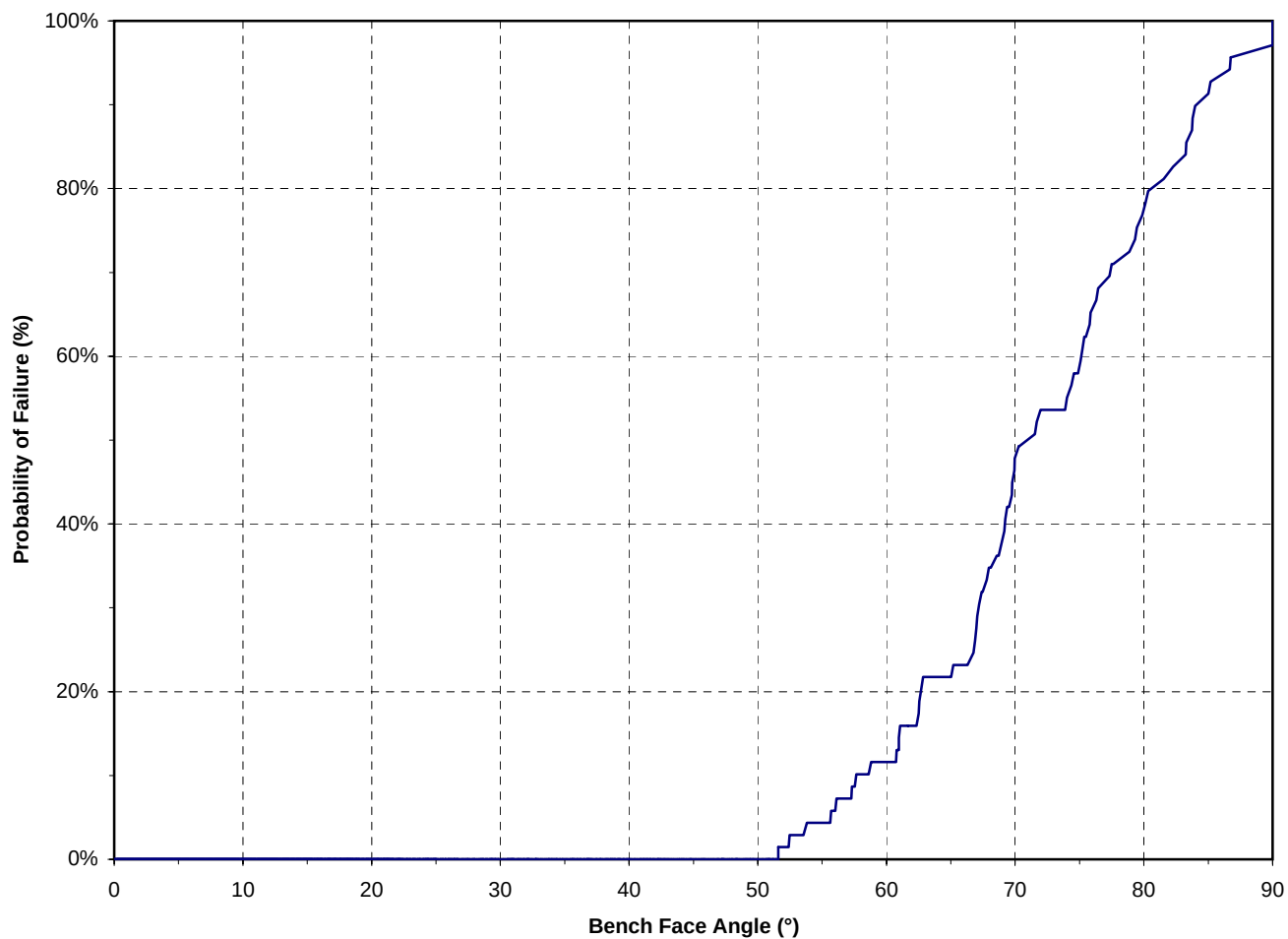
69 Failed Wedges in the Cumulative Frequency Plot

1% Failure

Quantity: FALSE



EQUAL AREA STEREONET



PIT WALL PARAMETERS:

Slope Direction: 230 °

Kinematic Window: 50 °

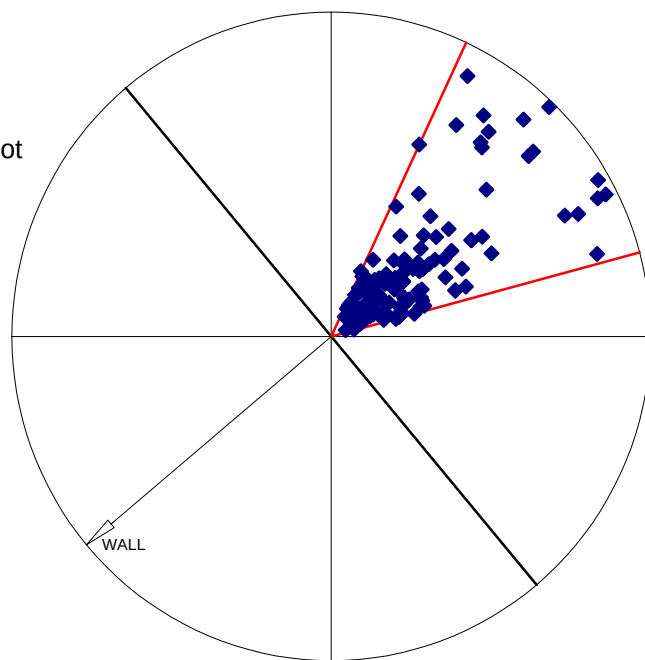
Friction Angle (ϕ): 42 °

139 Planes included in the window analysis

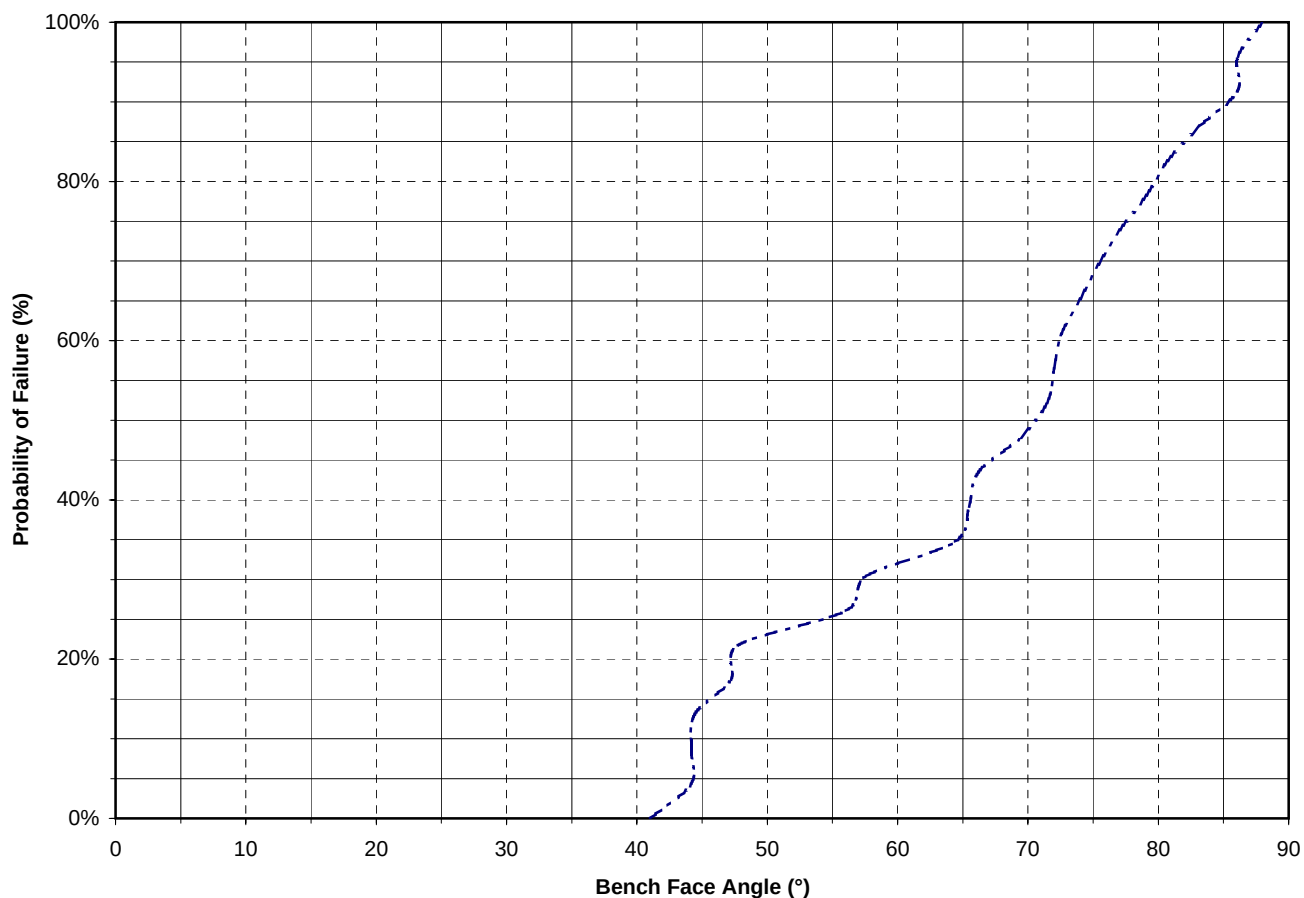
23 Failed Planes in the Cumulative Frequency Plot

17% Failure

Quantity: FALSE



EQUAL AREA STEREONET



PIT WALL PARAMETERS:

Slope Direction: 230 °

Kinematic Window: 90 °

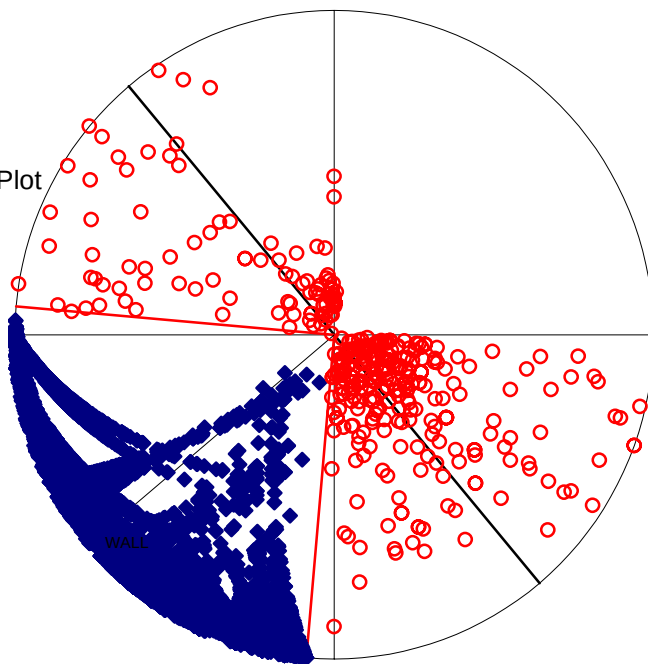
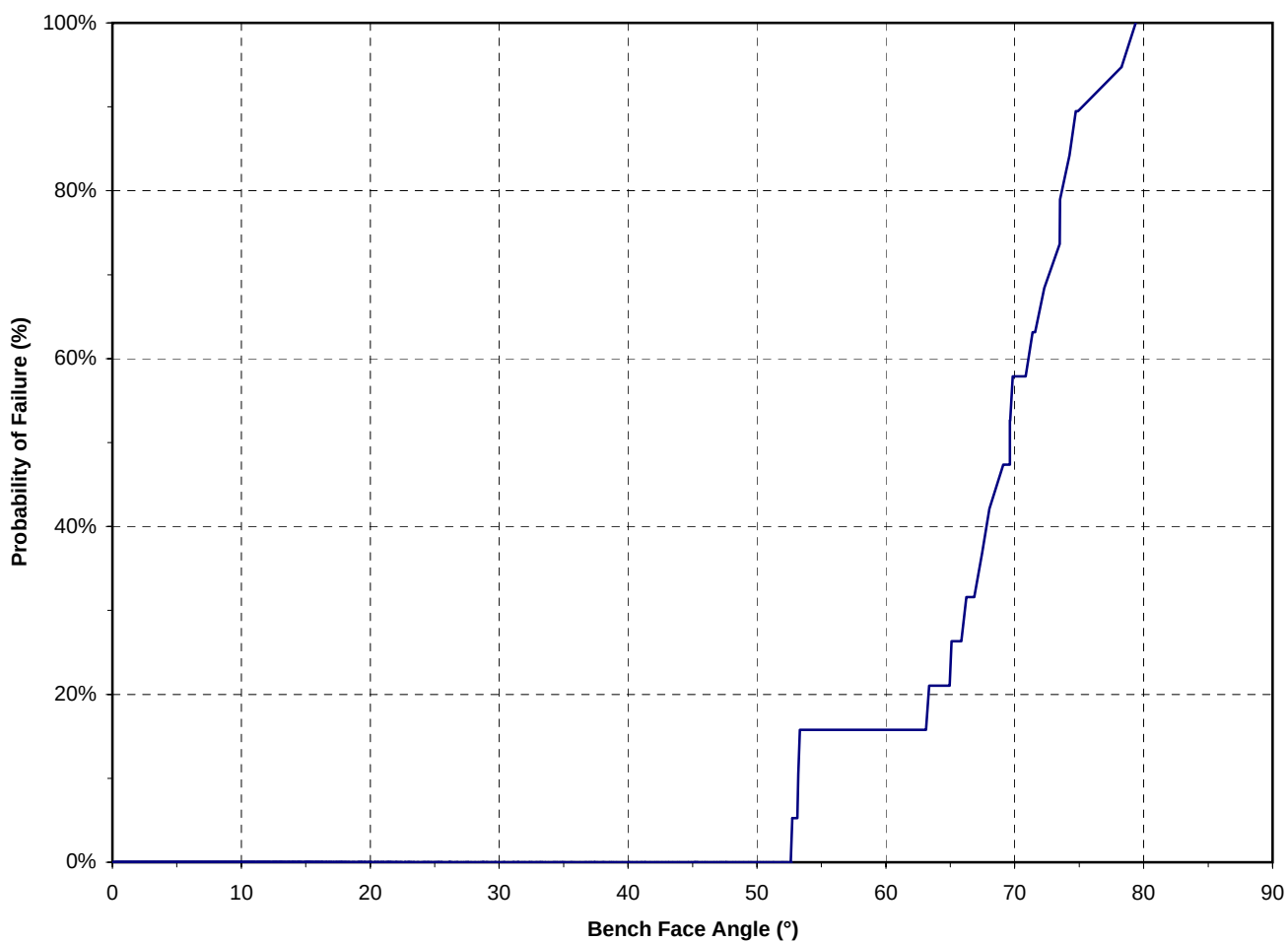
Friction Angle (ϕ): 42 °

9882 Wedges included in the window analysis

19 Failed Wedges in the Cumulative Frequency Plot

0% Failure

Quantity: FALSE


EQUAL AREA STEREONET


PIT WALL PARAMETERS:

Slope Direction: 270 °

Kinematic Window: 50 °

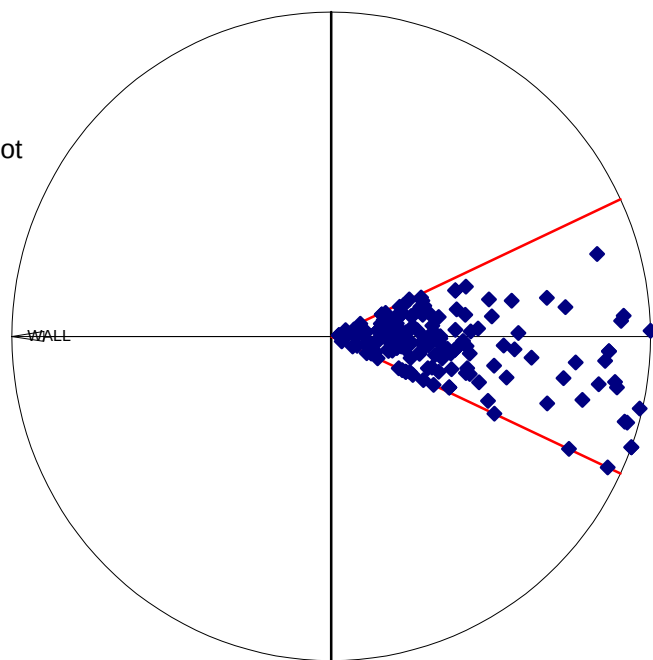
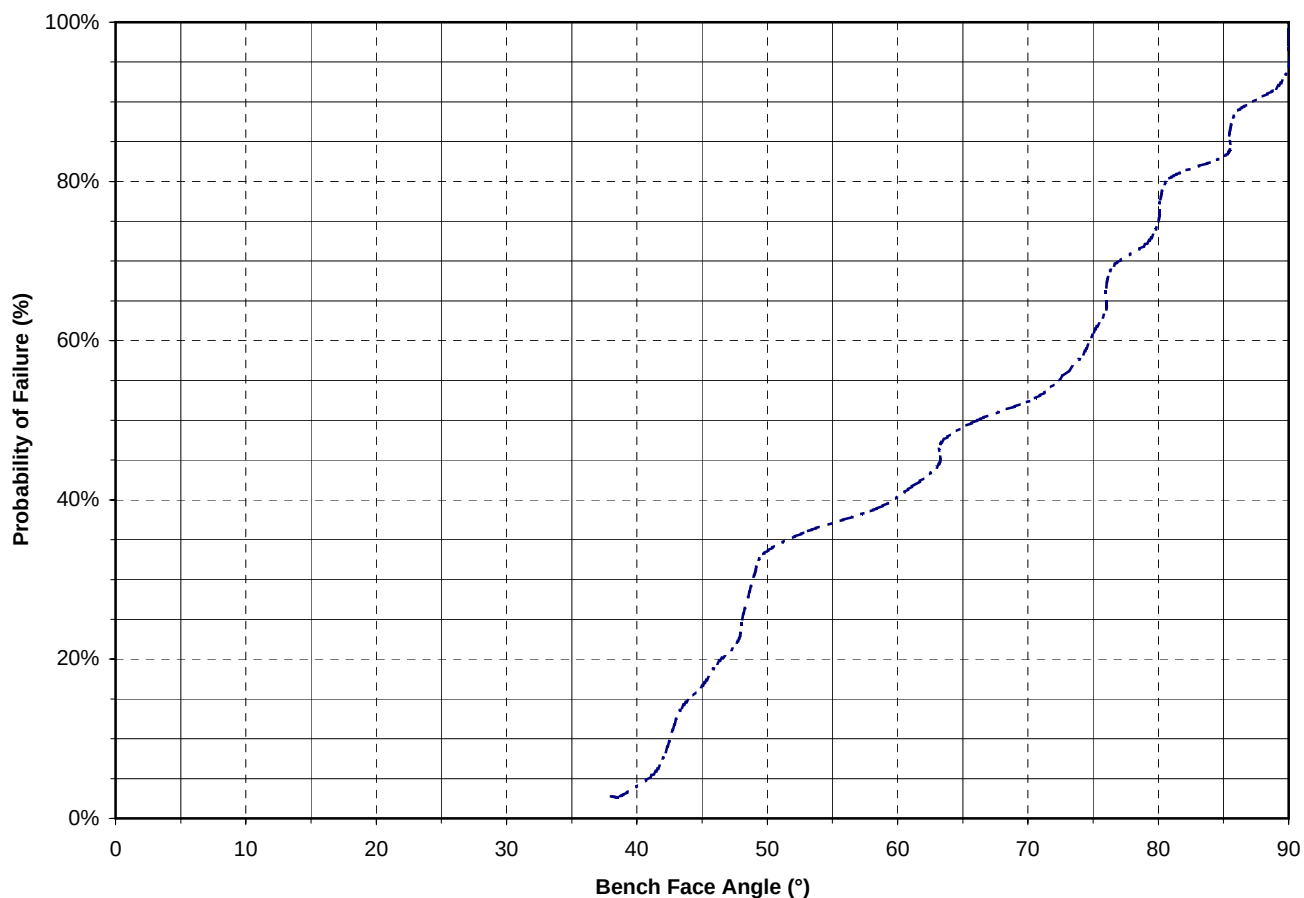
Friction Angle (ϕ): 37 °

186 Planes included in the window analysis

36 Failed Planes in the Cumulative Frequency Plot

19% Failure

Quantity: FALSE


EQUAL AREA STEREONET


PIT WALL PARAMETERS:

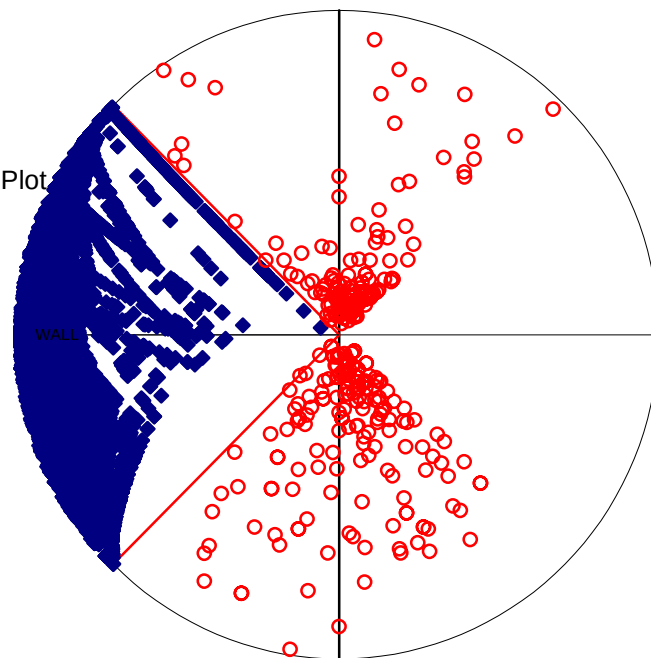
Slope Direction: 270 °
 Kinematic Window: 90 °
 Friction Angle (ϕ): 42 °

12078 Wedges included in the window analysis

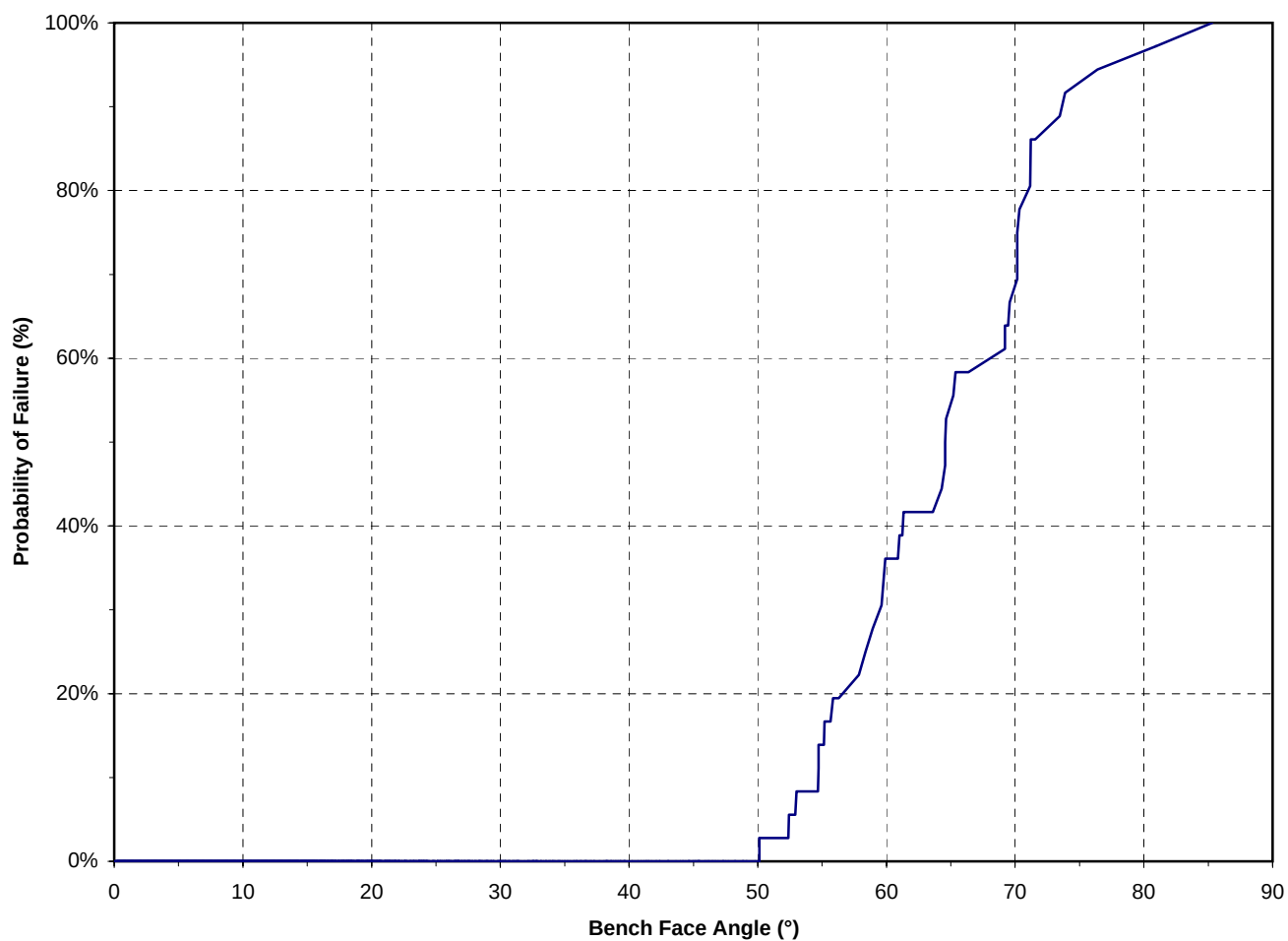
36 Failed Wedges in the Cumulative Frequency Plot

0% Failure

Quantity: FALSE



EQUAL AREA STEREONET



GOOSE CFA ANALYSIS

PLANAR BENCH ANALYSIS

FIGURE I-37

PIT WALL PARAMETERS:

Slope Direction: 200 °

Kinematic Window: 50 °

Friction Angle (ϕ): 37 °

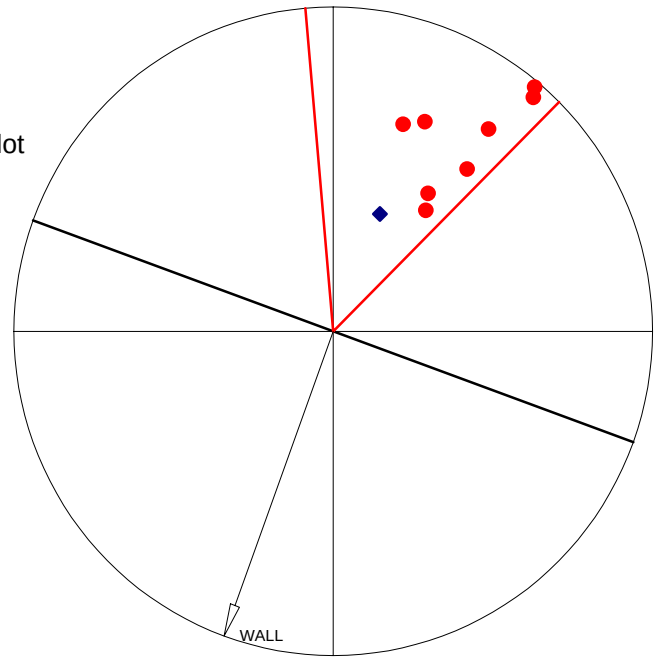
11 Planes included in the window analysis

8 Failed Planes in the Cumulative Frequency Plot

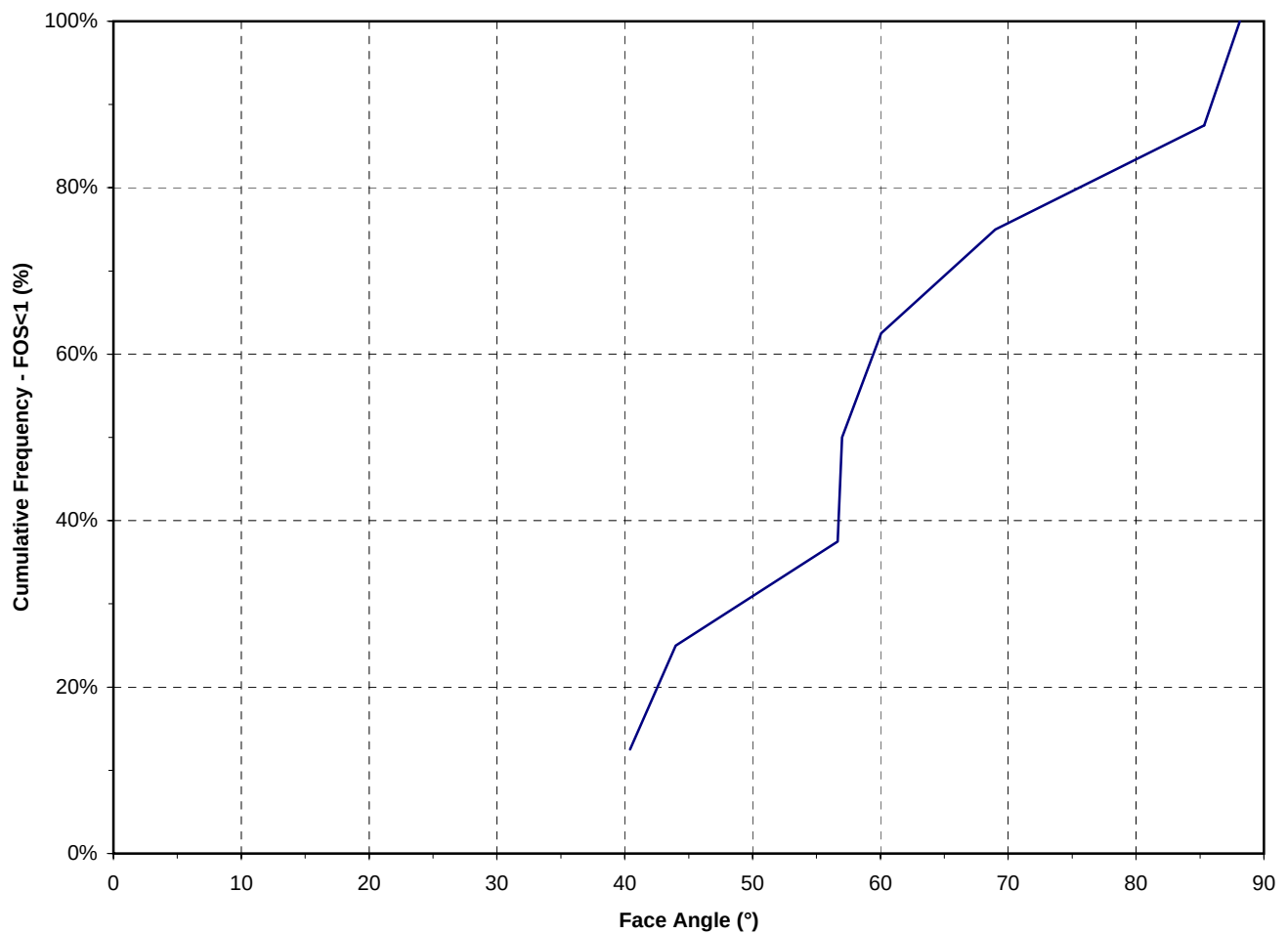
73% Failure

Quantity: FALSE

Terzaghi Weight: FALSE



EQUAL AREA STEREONET



WEDGE BENCH ANALYSIS

FIGURE I-38

PIT WALL PARAMETERS:

Slope Direction: 200 °
Kinematic Window: 90 °
Friction Angle (ϕ): 42 °

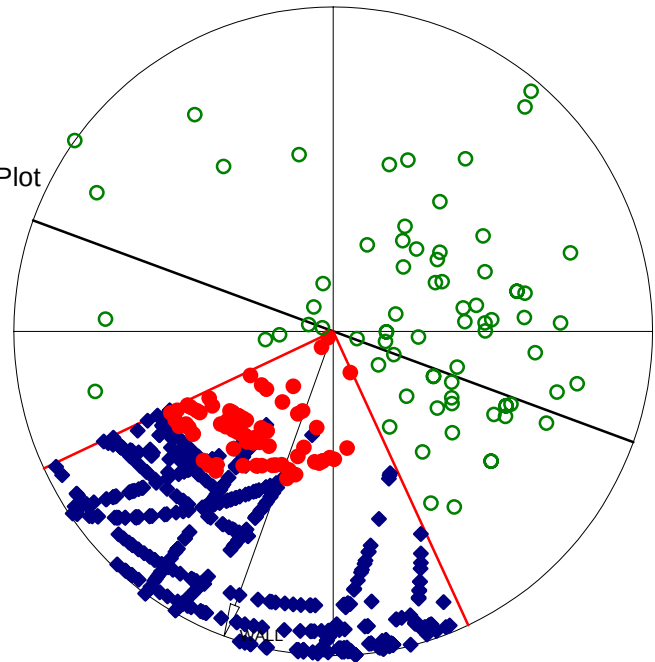
612 Wedges included in the window analysis

86 Failed Wedges in the Cumulative Frequency Plot

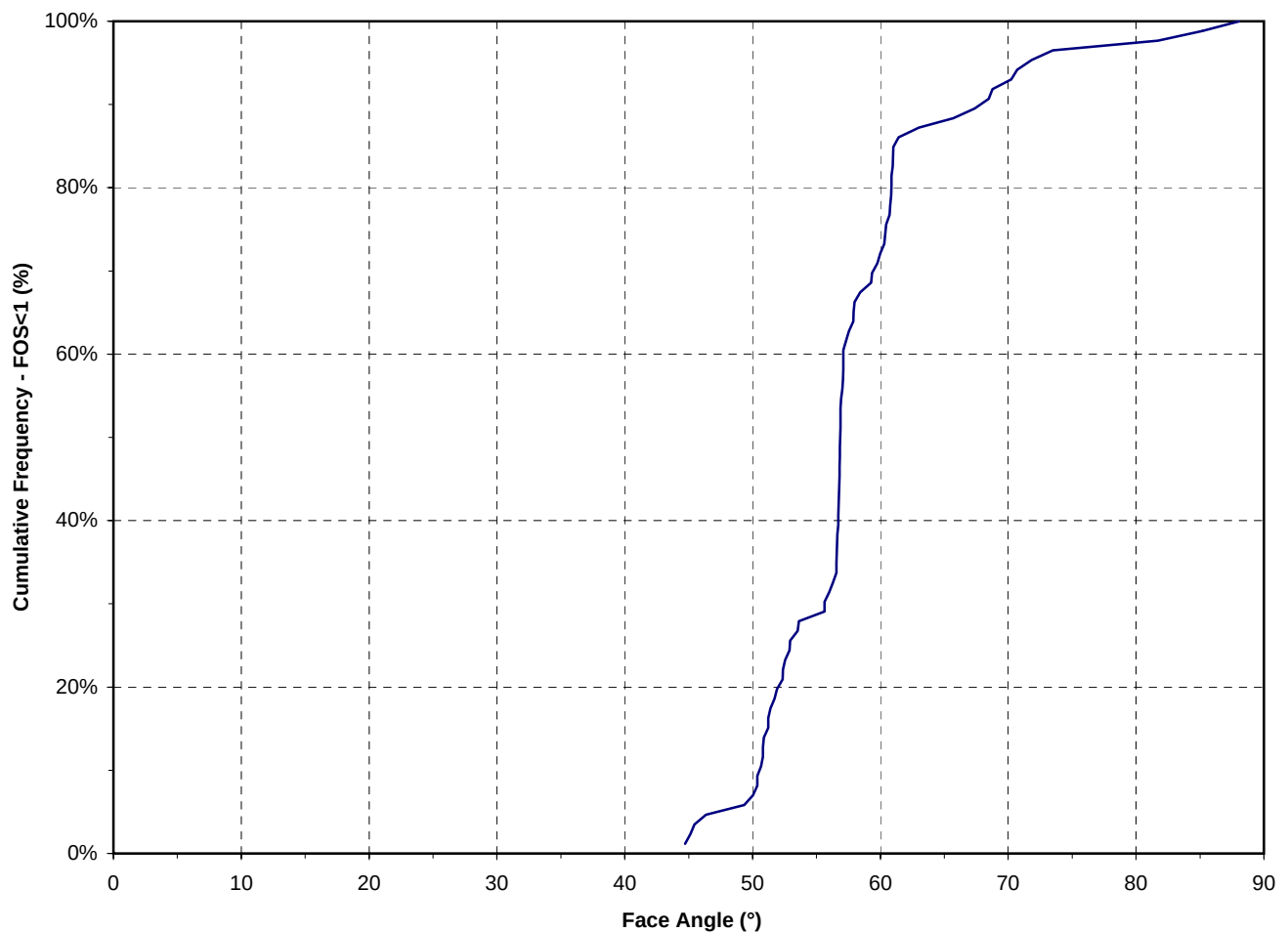
14% Failure

Quantity: FALSE

Terzaghi Weight: FALSE



EQUAL AREA STEREONET



PLANAR BENCH ANALYSIS

FIGURE I-39

PIT WALL PARAMETERS:

Slope Direction: 260 °

Kinematic Window: 50 °

Friction Angle (ϕ): 37 °

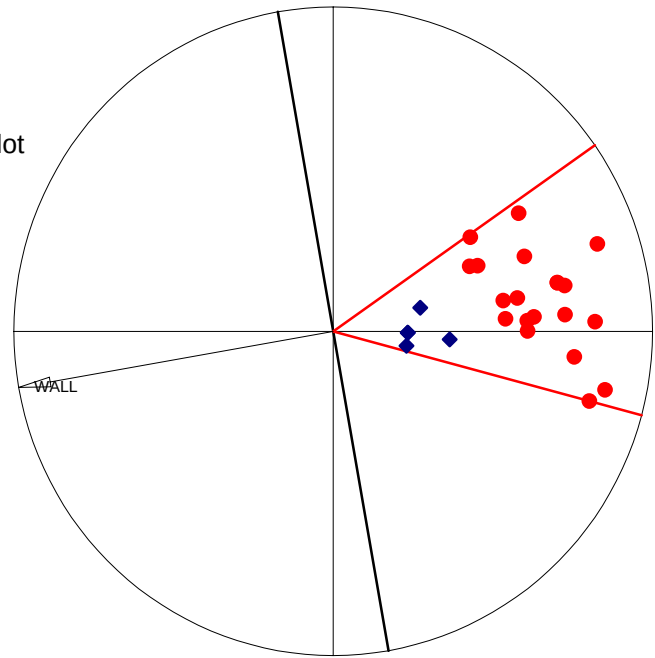
27 Planes included in the window analysis

20 Failed Planes in the Cumulative Frequency Plot

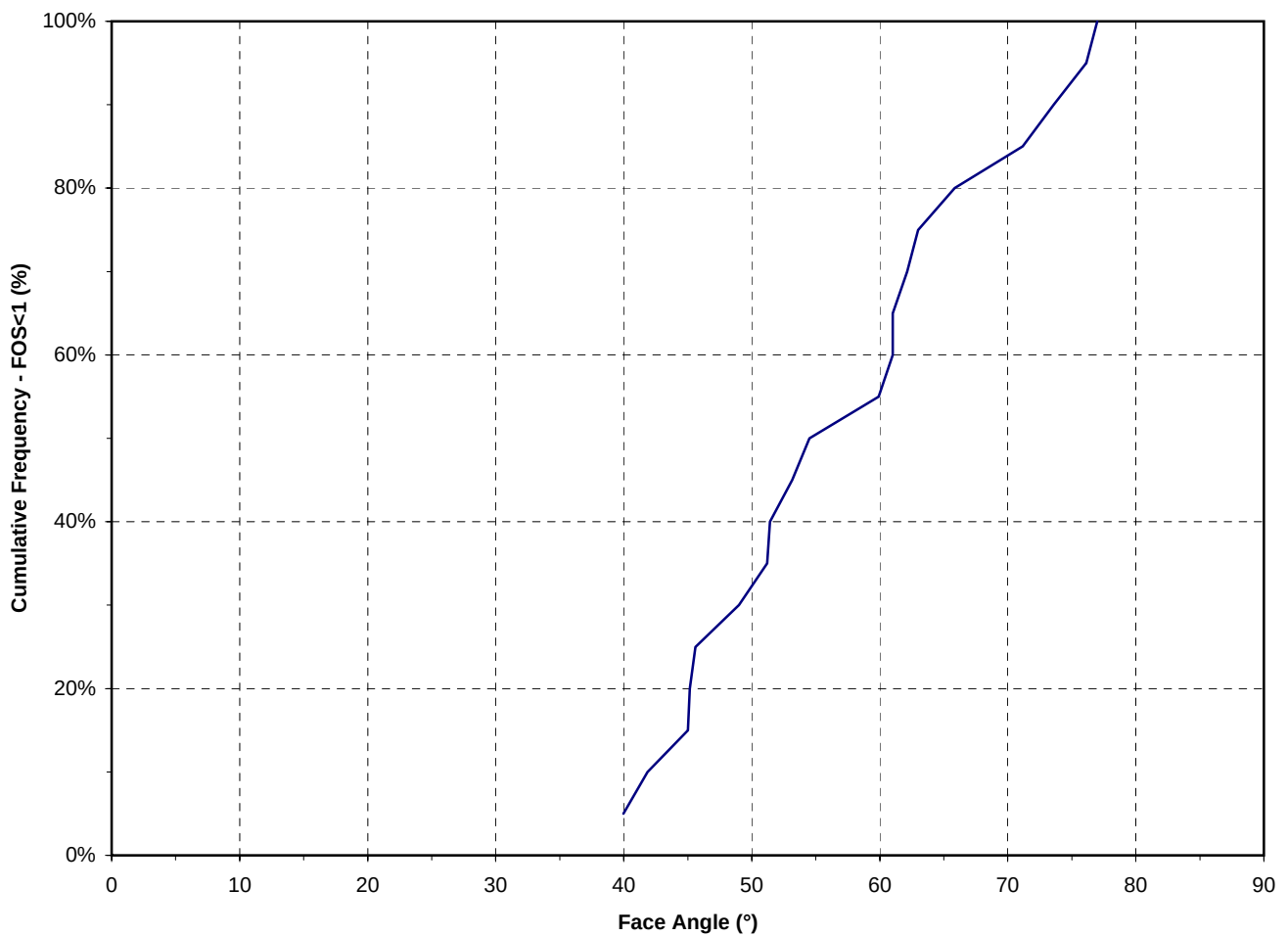
74% Failure

Quantity: FALSE

Terzaghi Weight: FALSE



EQUAL AREA STEREONET



WEDGE BENCH ANALYSIS

FIGURE I-40

PIT WALL PARAMETERS:

Slope Direction: 260 °
Kinematic Window: 90 °
Friction Angle (ϕ): 42 °

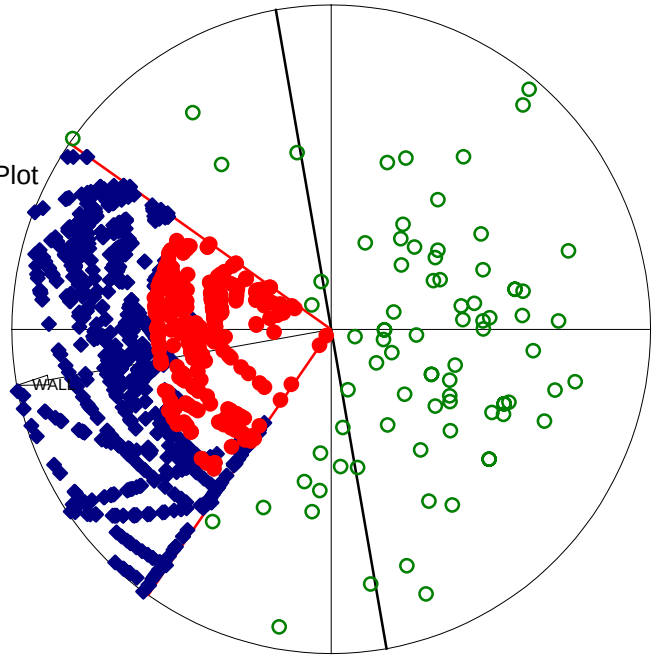
1233 Wedges included in the window analysis

283 Failed Wedges in the Cumulative Frequency Plot

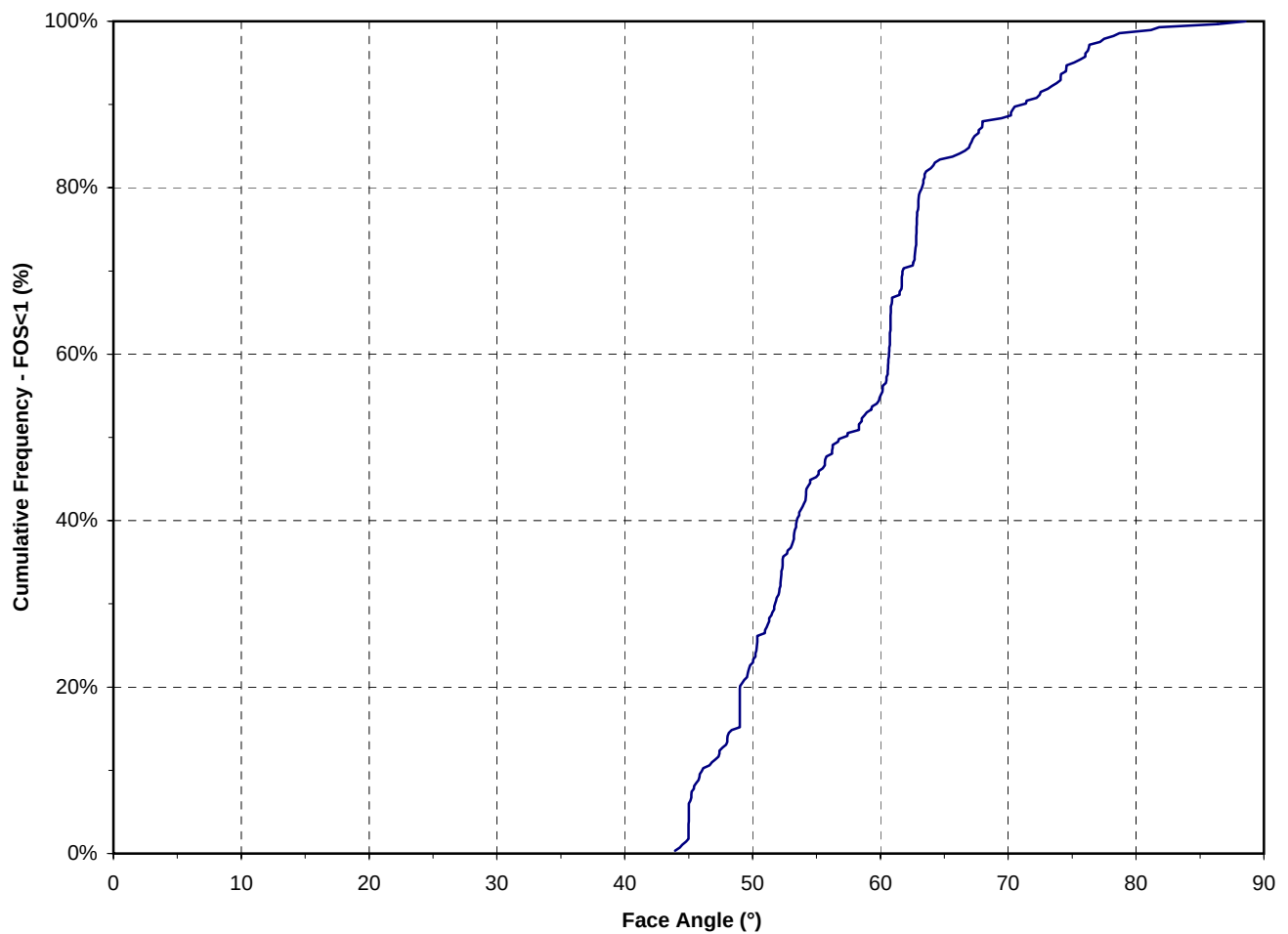
23% Failure

Quantity: FALSE

Terzaghi Weight: FALSE



EQUAL AREA STEREONET



PLANAR BENCH ANALYSIS

FIGURE I-41

PIT WALL PARAMETERS:

Slope Direction: 190 °

Kinematic Window: 50 °

Friction Angle (ϕ): 37 °

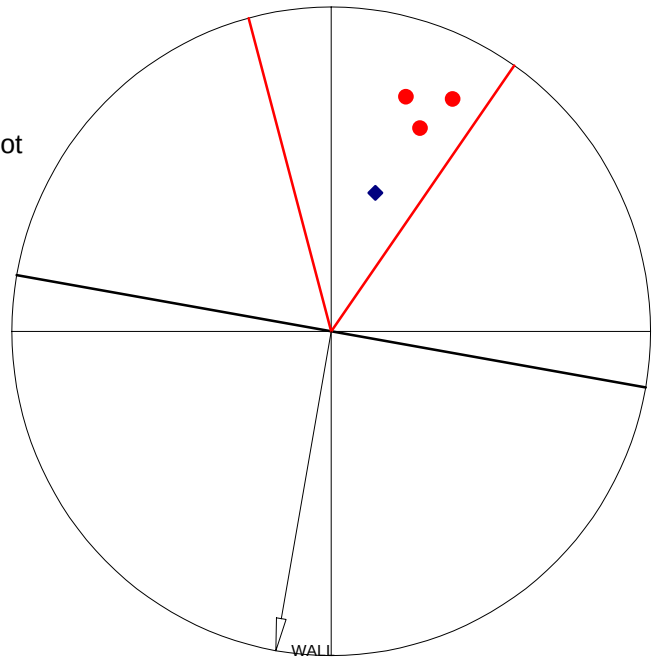
4 Planes included in the window analysis

3 Failed Planes in the Cumulative Frequency Plot

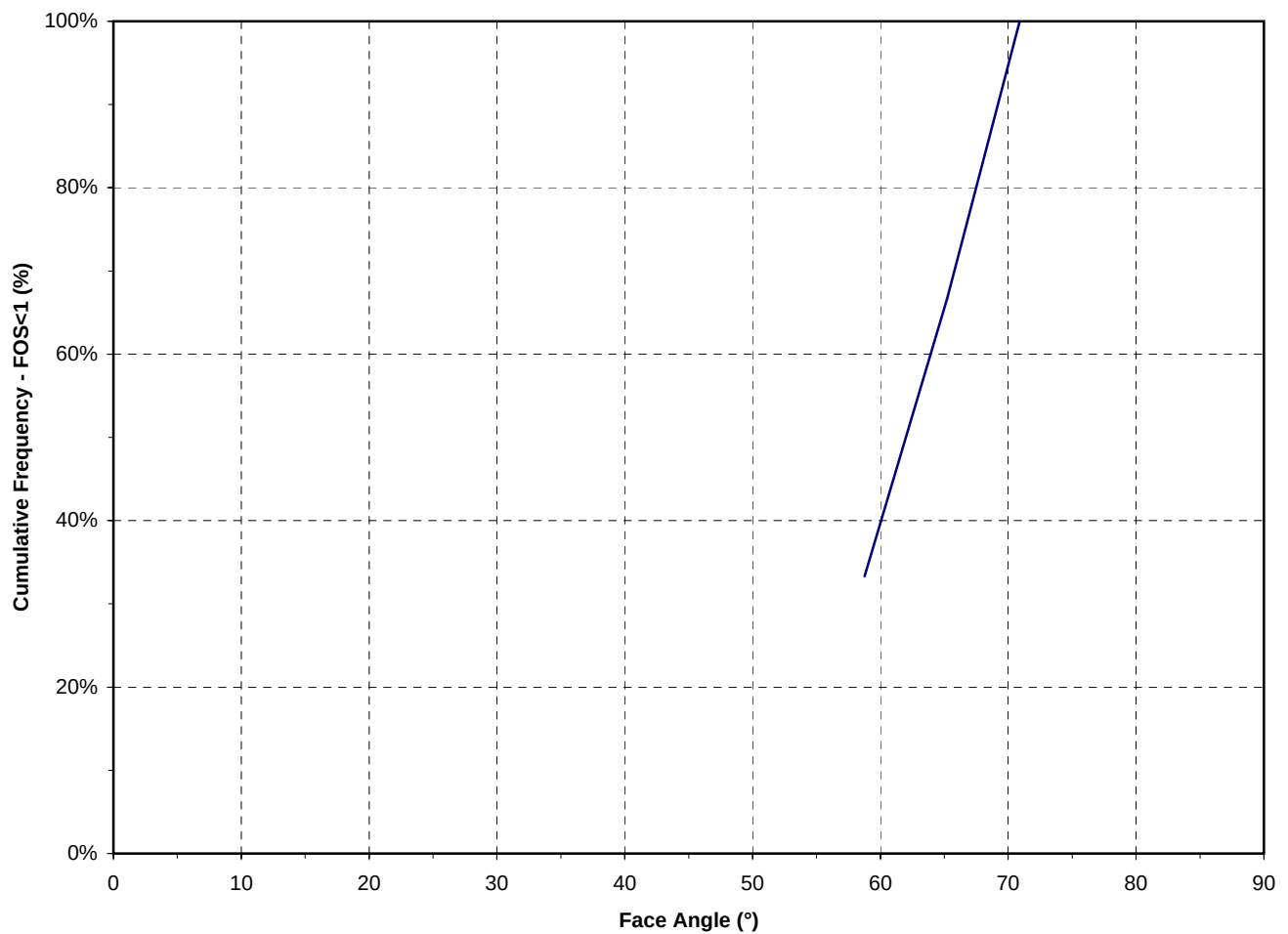
75% Failure

Quantity: FALSE

Terzaghi Weight: FALSE



EQUAL AREA STEREONET



WEDGE BENCH ANALYSIS

FIGURE I-42

PIT WALL PARAMETERS:

Slope Direction: 190 °
Kinematic Window: 90 °
Friction Angle (ϕ): 42 °

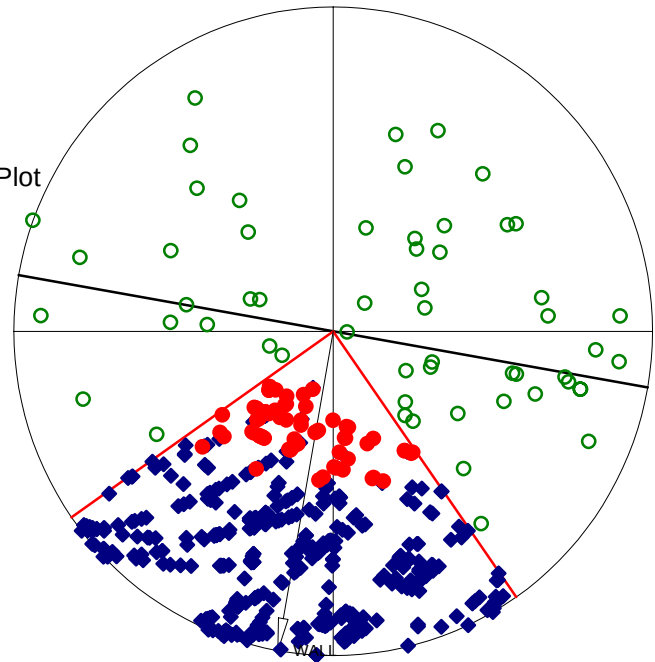
449 Wedges included in the window analysis

68 Failed Wedges in the Cumulative Frequency Plot

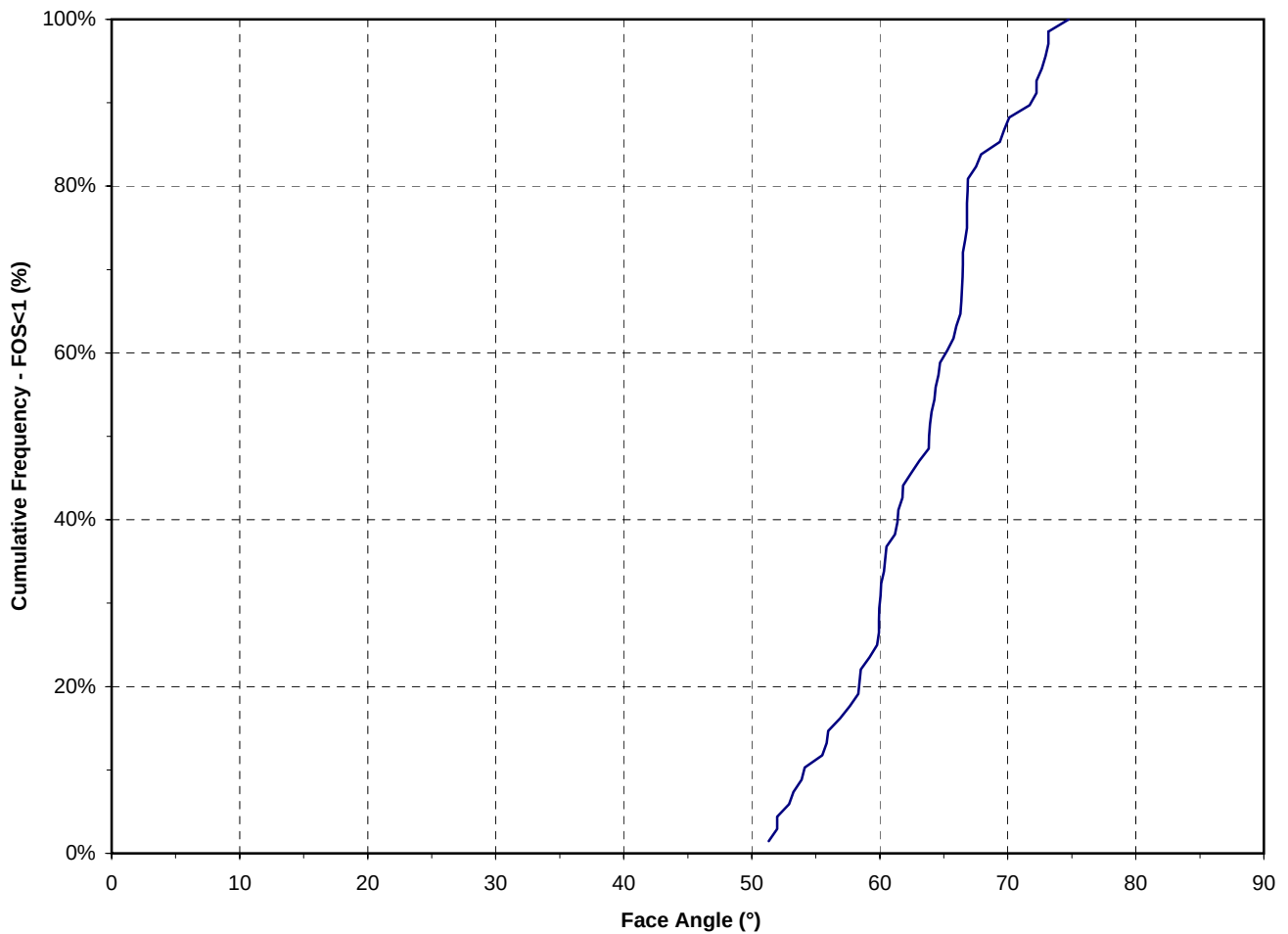
15% Failure

Quantity: FALSE

Terzaghi Weight: FALSE



EQUAL AREA STEREONET



PLANAR BENCH ANALYSIS

FIGURE I-43

PIT WALL PARAMETERS:

Slope Direction: 260 °

Kinematic Window: 50 °

Friction Angle (ϕ): 37 °

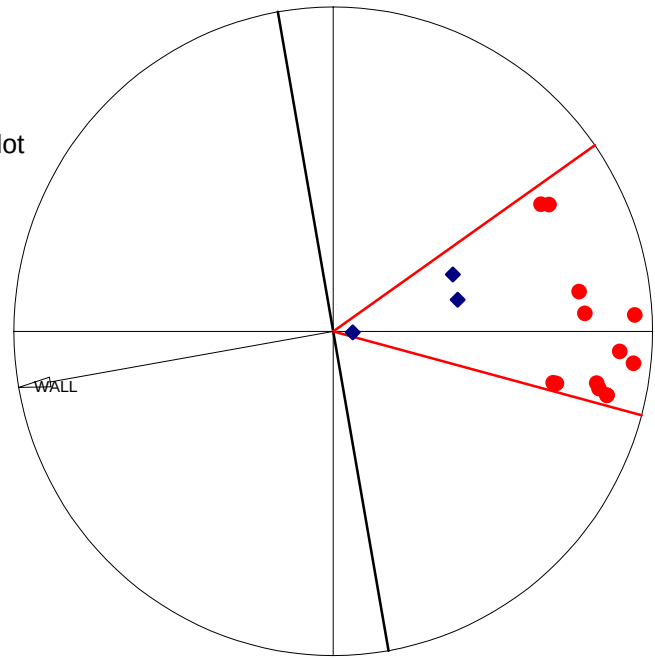
16 Planes included in the window analysis

13 Failed Planes in the Cumulative Frequency Plot

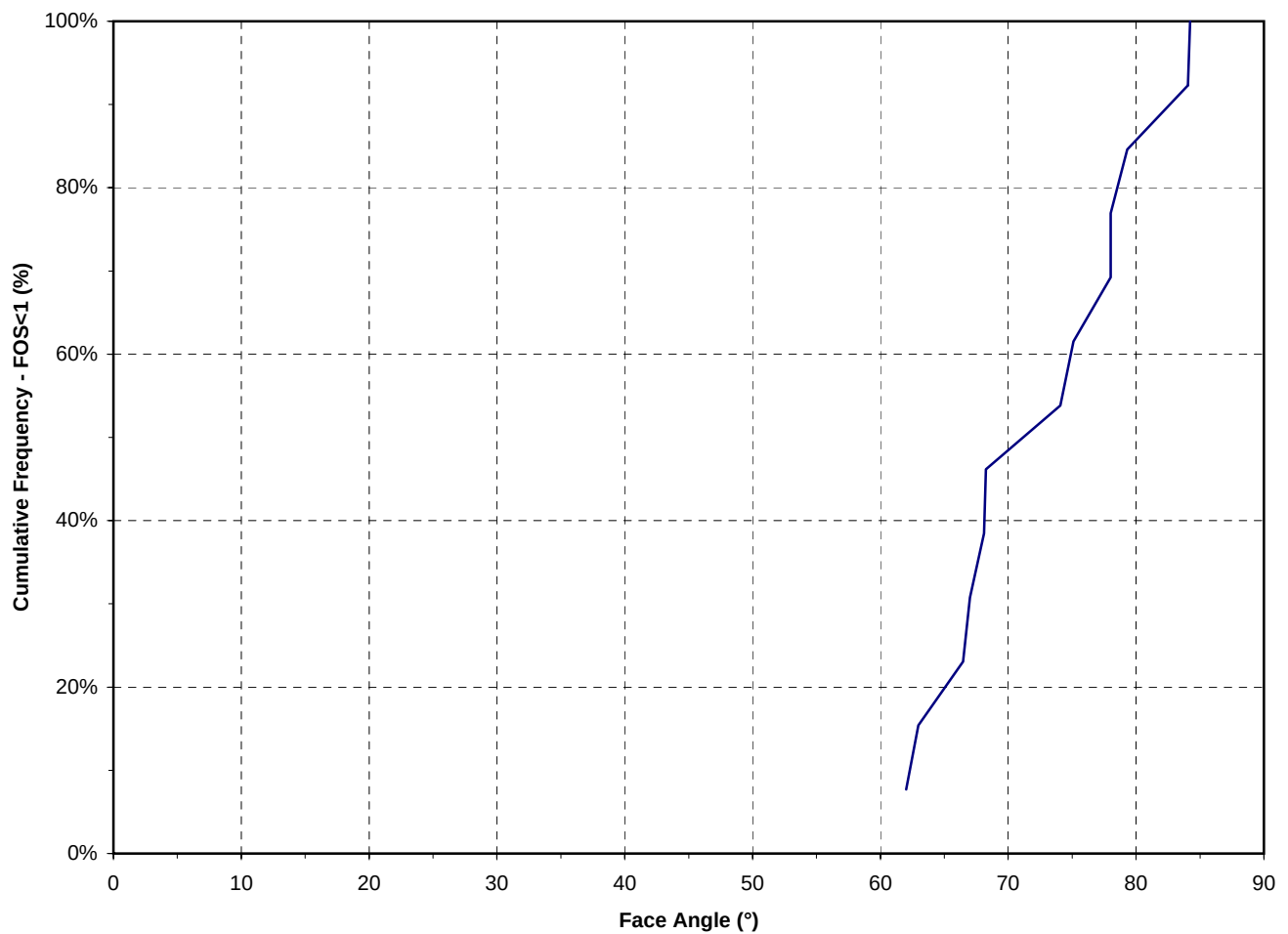
81% Failure

Quantity: FALSE

Terzaghi Weight: FALSE



EQUAL AREA STEREONET



WEDGE BENCH ANALYSIS

FIGURE I-44

PIT WALL PARAMETERS:

Slope Direction: 260 °
Kinematic Window: 90 °
Friction Angle (ϕ): 42 °

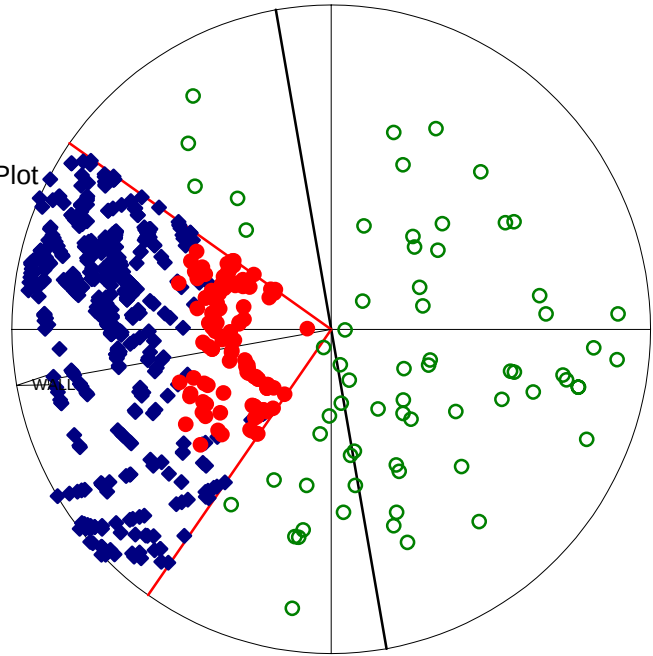
575 Wedges included in the window analysis

110 Failed Wedges in the Cumulative Frequency Plot

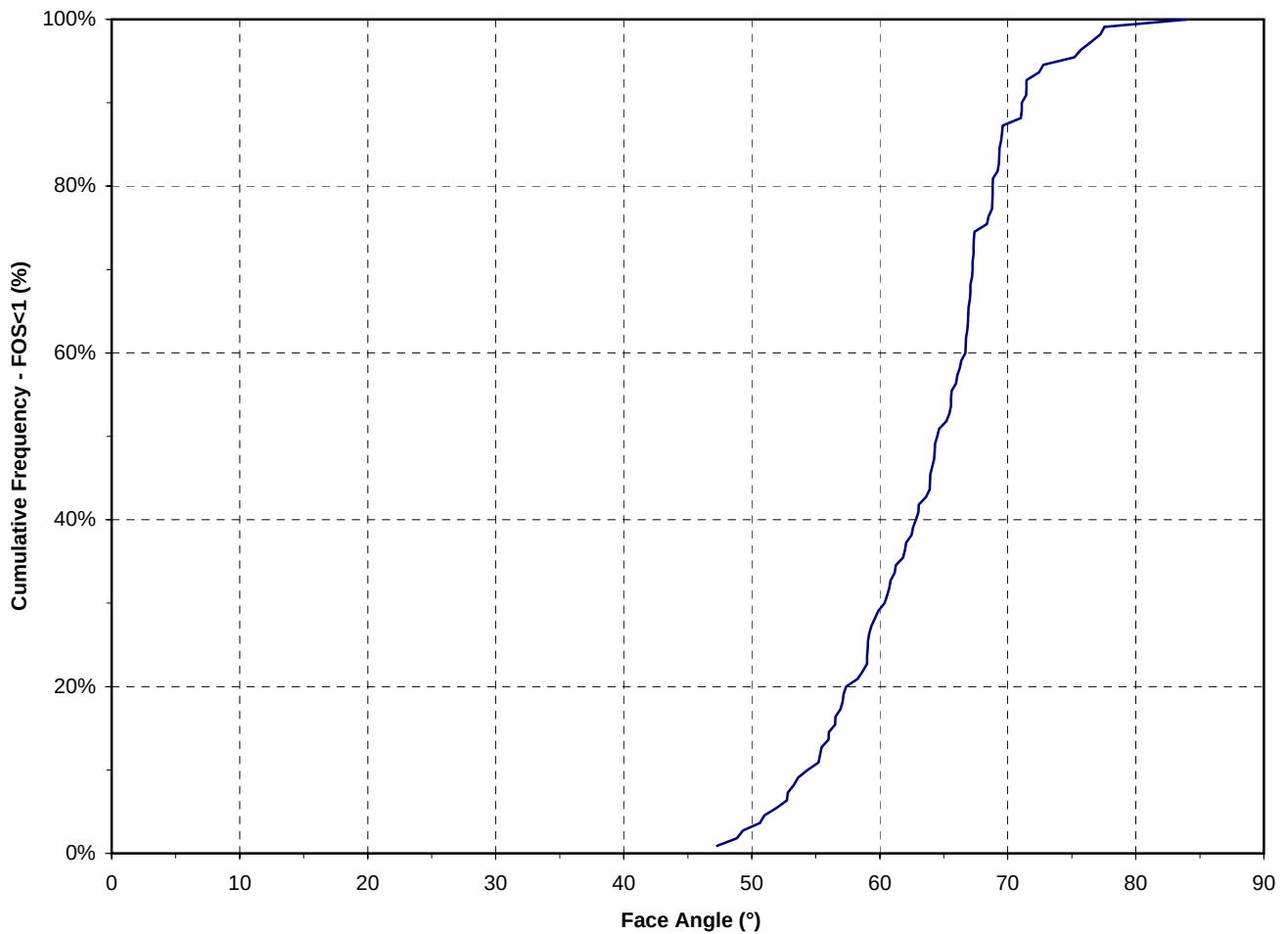
19% Failure

Quantity: FALSE

Terzaghi Weight: FALSE



EQUAL AREA STEREONET



PLANAR BENCH ANALYSIS

FIGURE I-45

PIT WALL PARAMETERS:

Slope Direction: 0 °

Kinematic Window: 50 °

Friction Angle (ϕ): 42 °

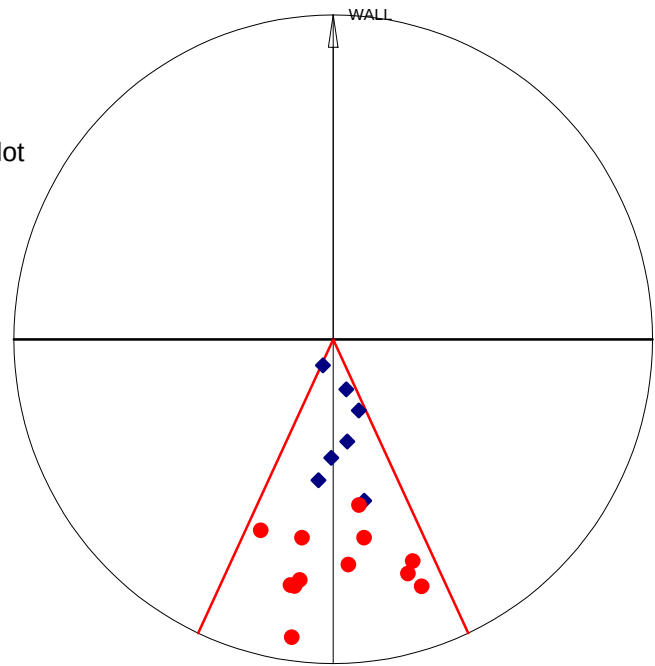
19 Planes included in the window analysis

12 Failed Planes in the Cumulative Frequency Plot

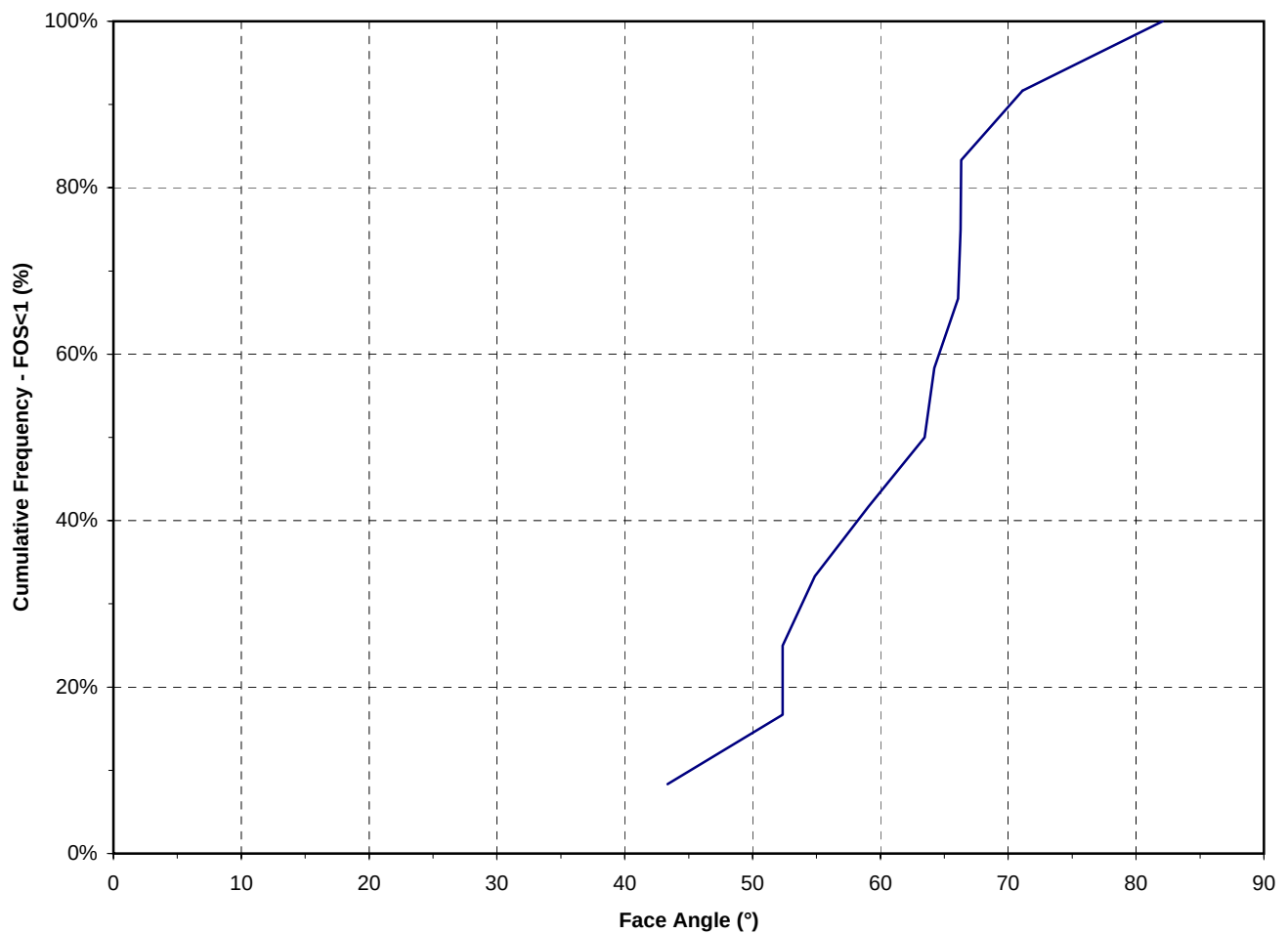
63% Failure

Quantity: FALSE

Terzaghi Weight: FALSE



EQUAL AREA STEREONET



WEDGE BENCH ANALYSIS

FIGURE I-46

PIT WALL PARAMETERS:

Slope Direction: 0 °
Kinematic Window: 90 °
Friction Angle (ϕ): 42 °

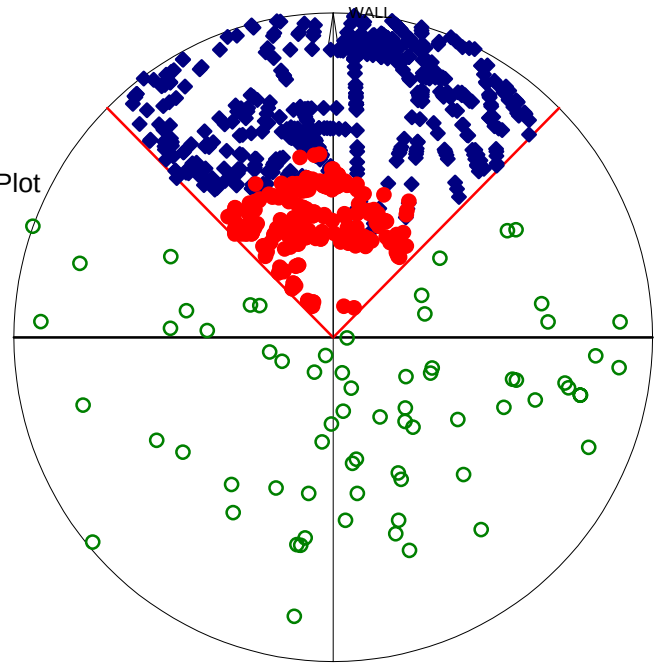
786 Wedges included in the window analysis

224 Failed Wedges in the Cumulative Frequency Plot

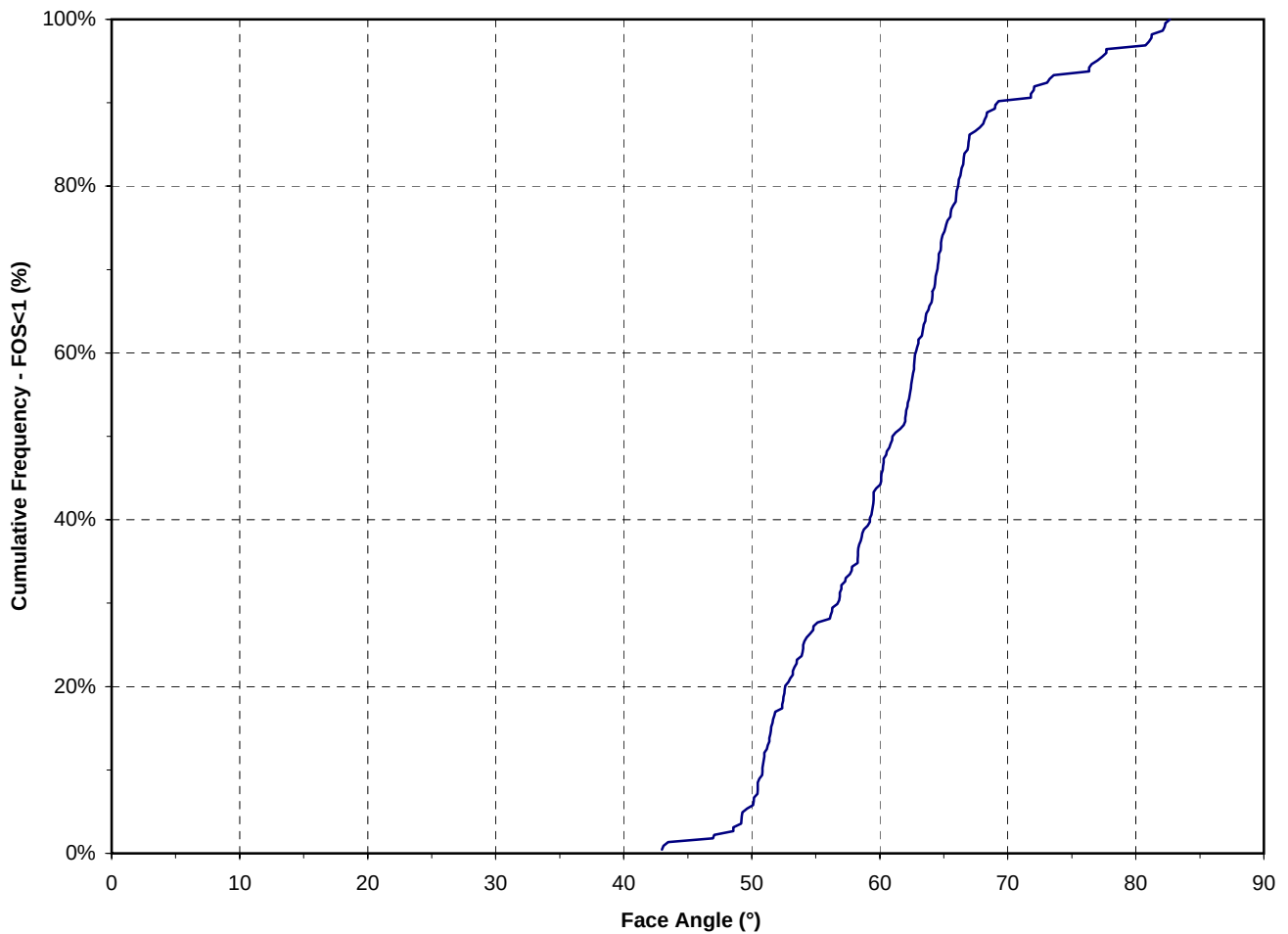
28% Failure

Quantity: FALSE

Terzaghi Weight: FALSE



EQUAL AREA STEREONET



PLANAR BENCH ANALYSIS

FIGURE I-47

PIT WALL PARAMETERS:

Slope Direction: 100 °

Kinematic Window: 50 °

Friction Angle (ϕ): 42 °

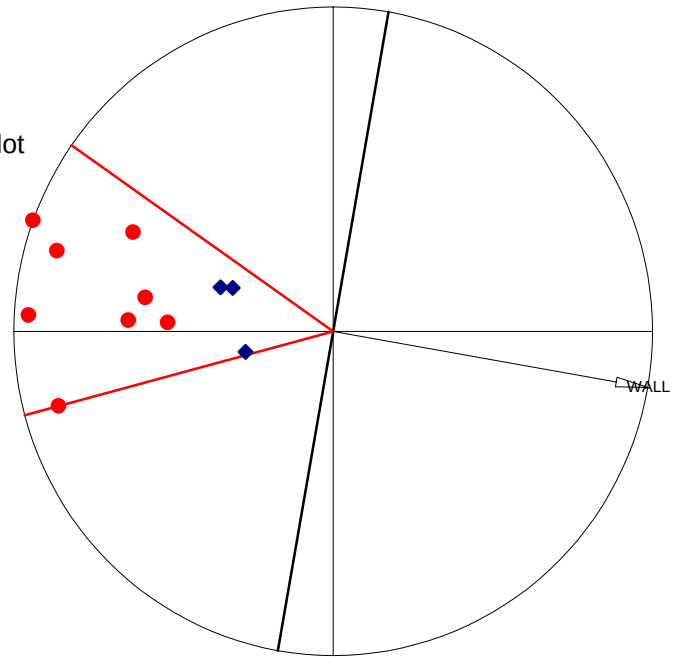
11 Planes included in the window analysis

8 Failed Planes in the Cumulative Frequency Plot

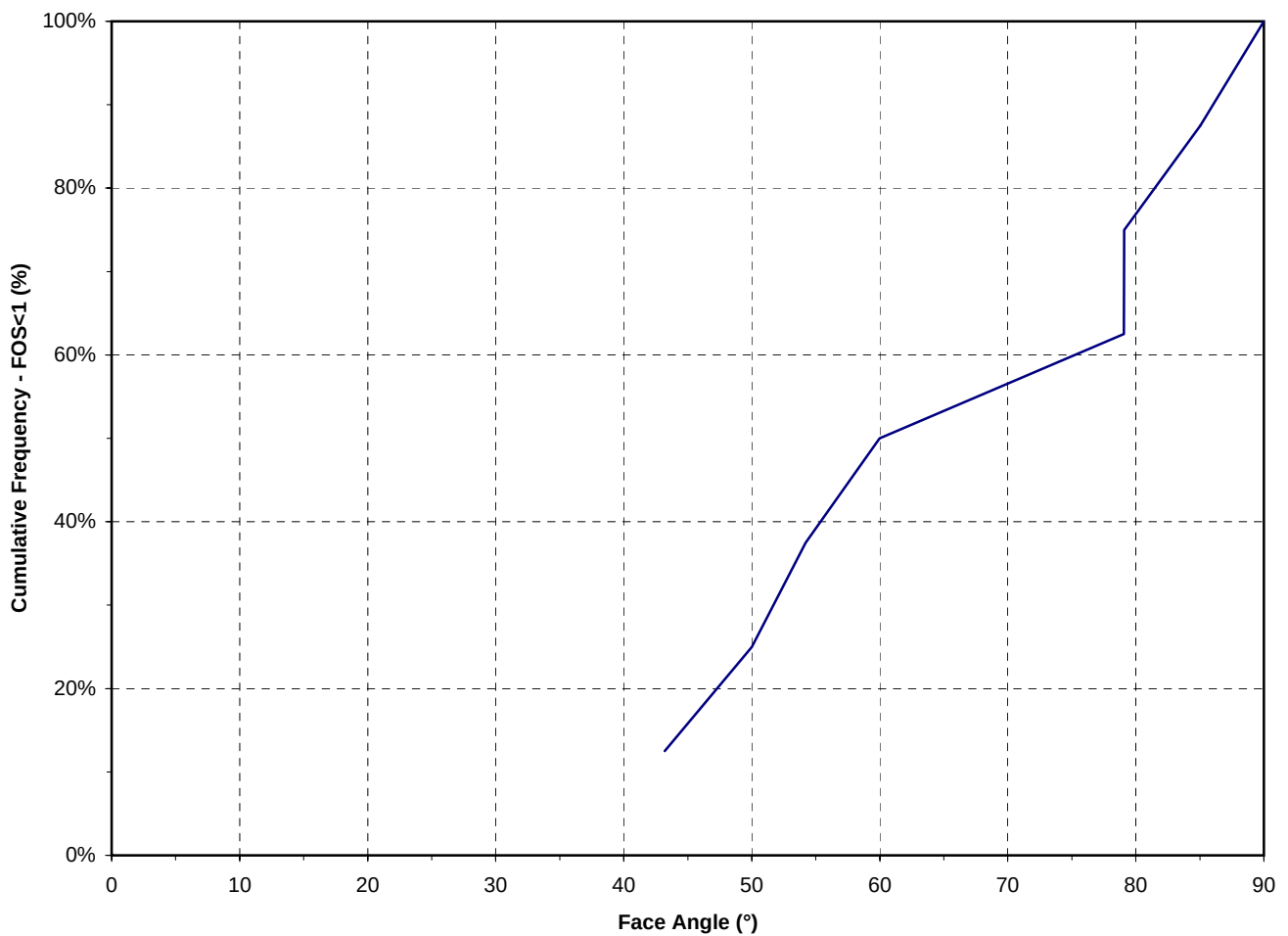
73% Failure

Quantity: FALSE

Terzaghi Weight: FALSE



EQUAL AREA STEREONET



WEDGE BENCH ANALYSIS

FIGURE I-48

PIT WALL PARAMETERS:

Slope Direction: 100 °
Kinematic Window: 90 °
Friction Angle (ϕ): 42 °

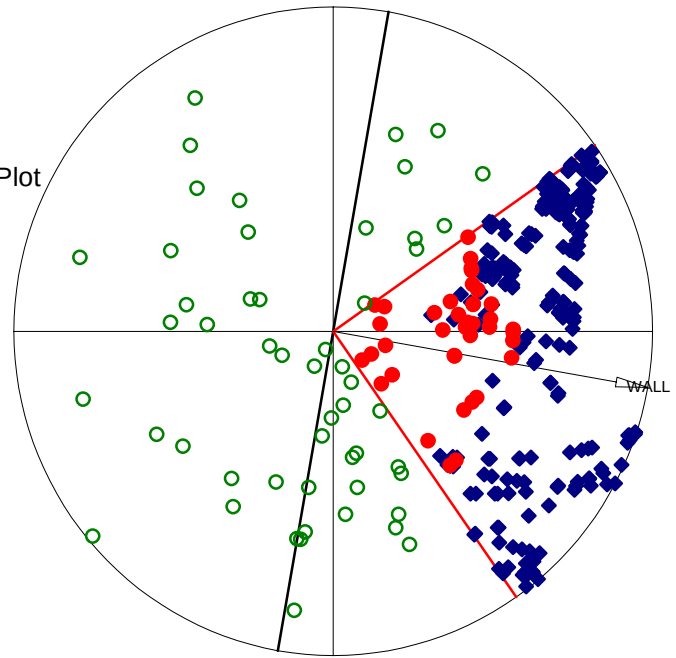
290 Wedges included in the window analysis

39 Failed Wedges in the Cumulative Frequency Plot

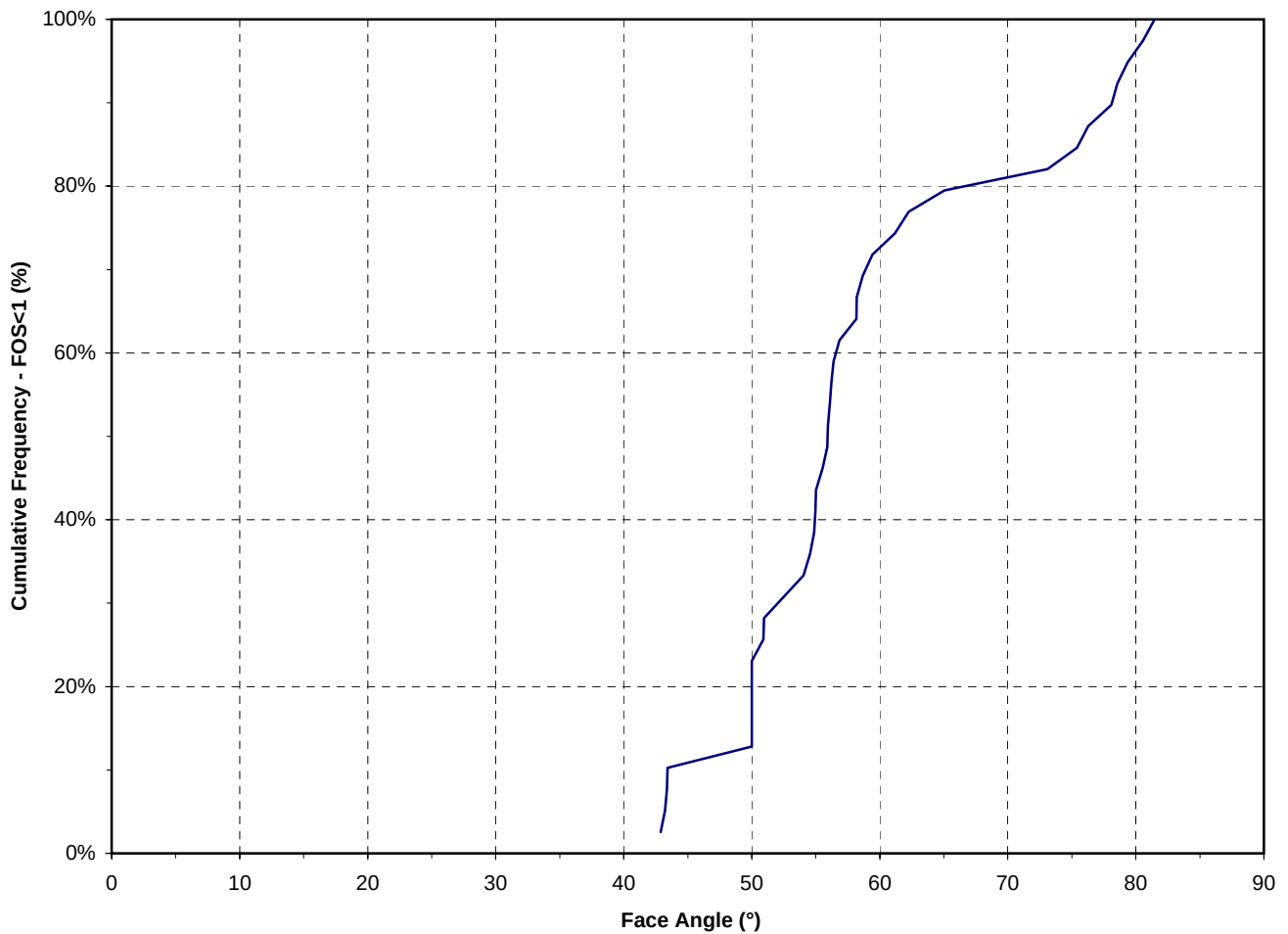
13% Failure

Quantity: FALSE

Terzaghi Weight: FALSE



EQUAL AREA STEREONET



PLANAR BENCH ANALYSIS

FIGURE I-49

PIT WALL PARAMETERS:

Slope Direction: 260 °

Kinematic Window: 50 °

Friction Angle (ϕ): 37 °

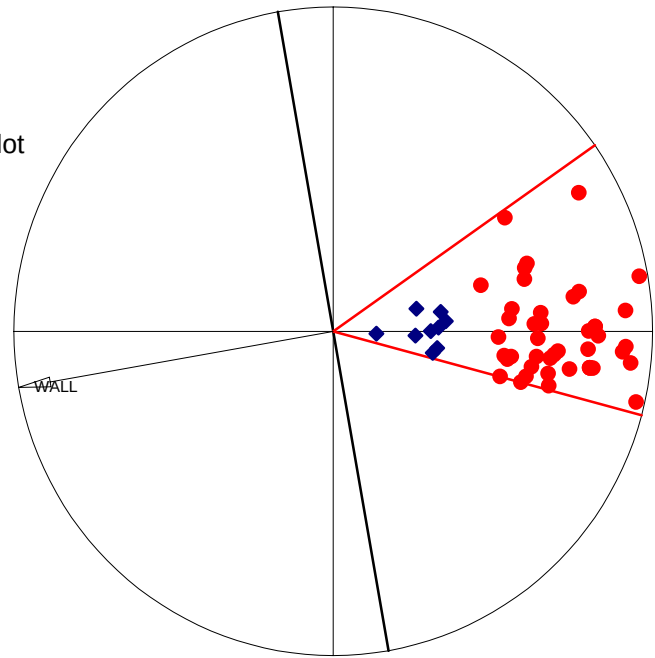
53 Planes included in the window analysis

44 Failed Planes in the Cumulative Frequency Plot

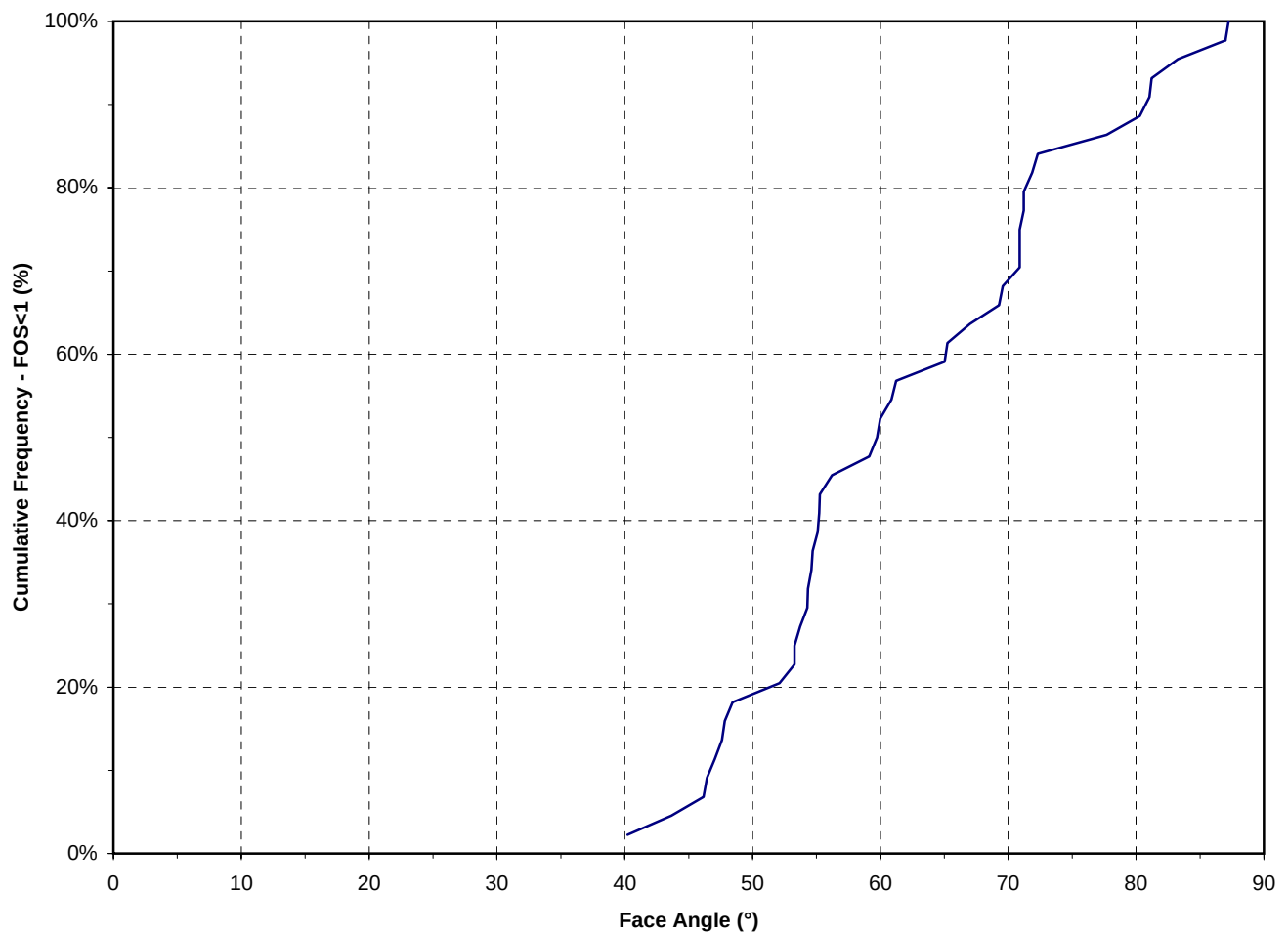
83% Failure

Quantity: FALSE

Terzaghi Weight: FALSE



EQUAL AREA STEREONET



WEDGE BENCH ANALYSIS

FIGURE I-50

PIT WALL PARAMETERS:

Slope Direction: 260 °
Kinematic Window: 90 °
Friction Angle (ϕ): 42 °

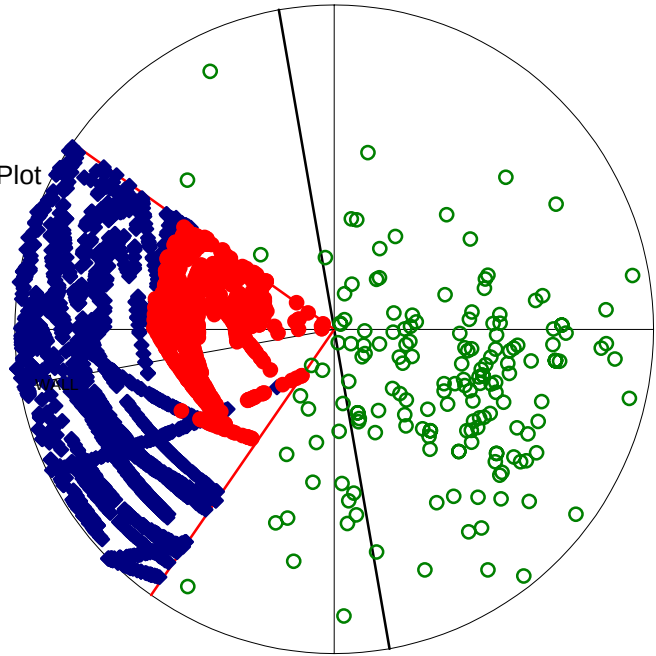
2764 Wedges included in the window analysis

847 Failed Wedges in the Cumulative Frequency Plot

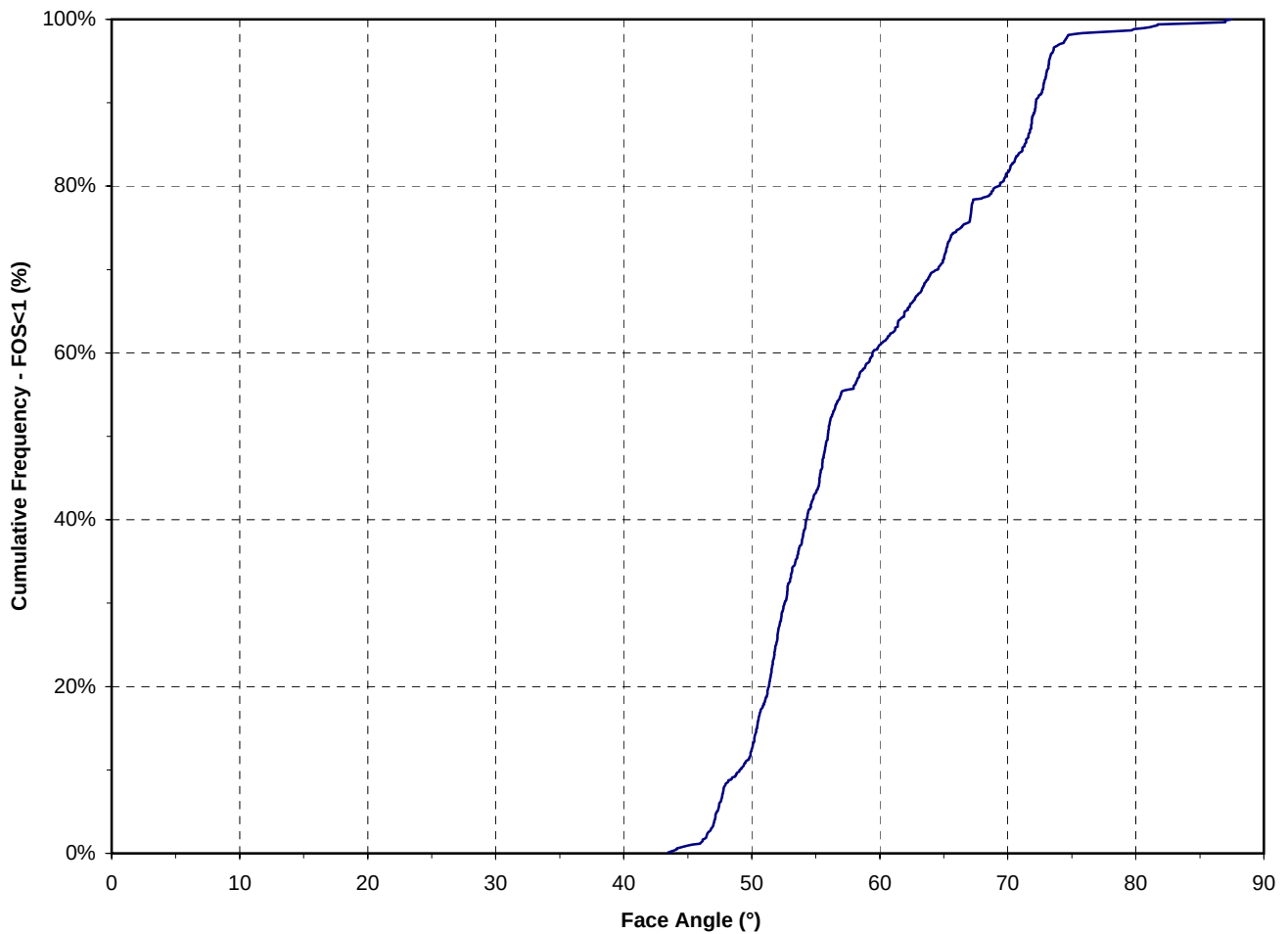
31% Failure

Quantity: FALSE

Terzaghi Weight: FALSE



EQUAL AREA STEREONET



PLANAR BENCH ANALYSIS

FIGURE I-51

PIT WALL PARAMETERS:

Slope Direction: 0 °

Kinematic Window: 50 °

Friction Angle (ϕ): 42 °

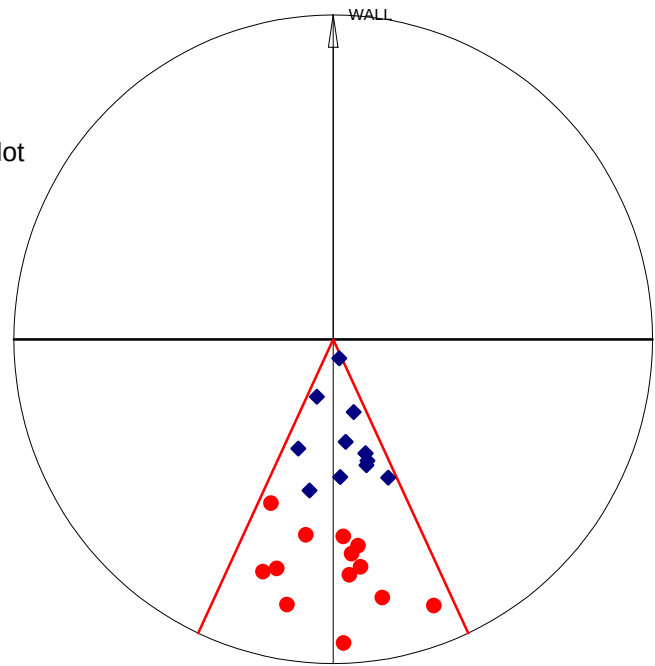
25 Planes included in the window analysis

13 Failed Planes in the Cumulative Frequency Plot

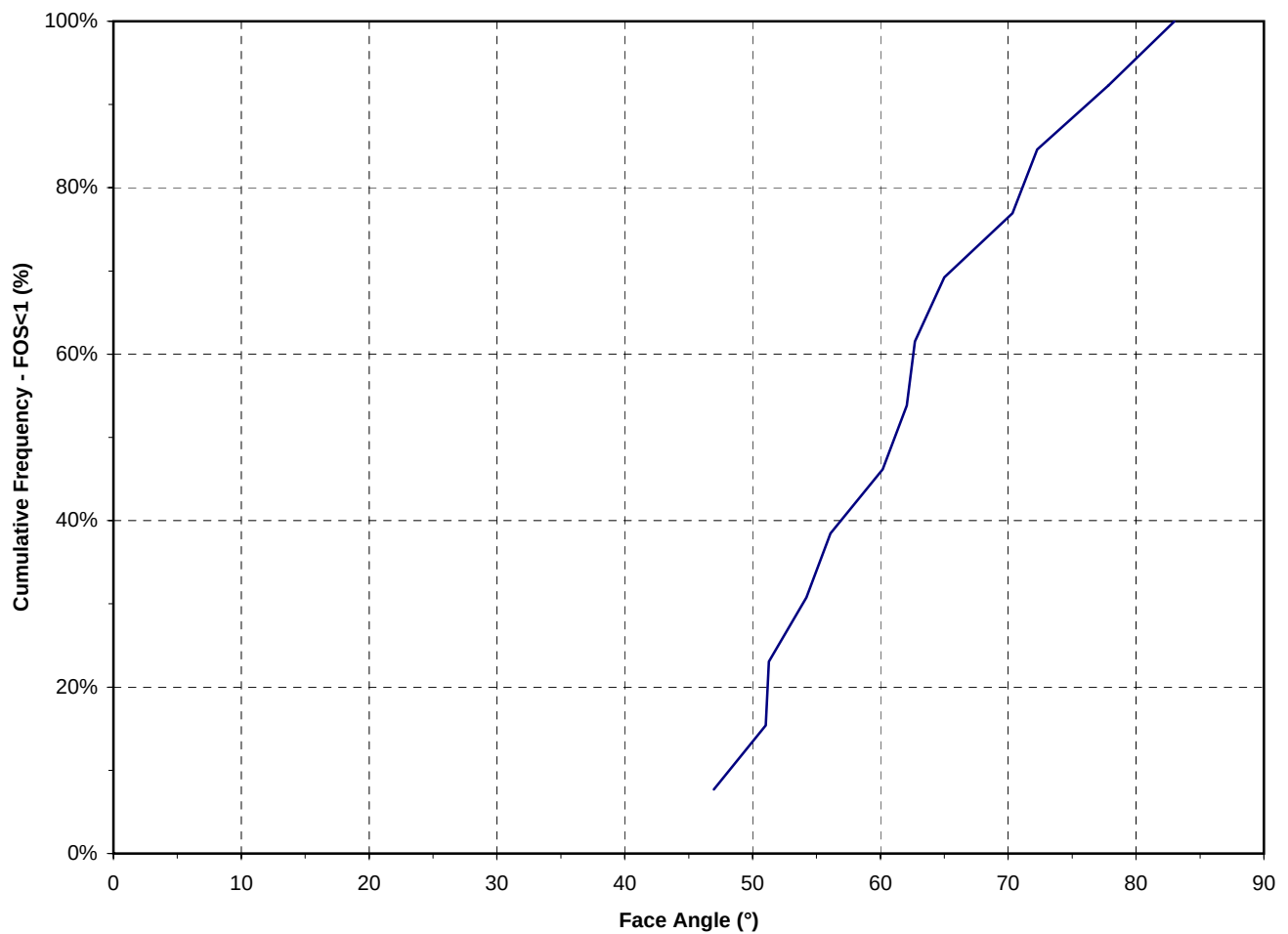
52% Failure

Quantity: FALSE

Terzaghi Weight: FALSE



EQUAL AREA STEREONET



WEDGE BENCH ANALYSIS

FIGURE I-52

PIT WALL PARAMETERS:

Slope Direction: 0 °
Kinematic Window: 90 °
Friction Angle (ϕ): 42 °

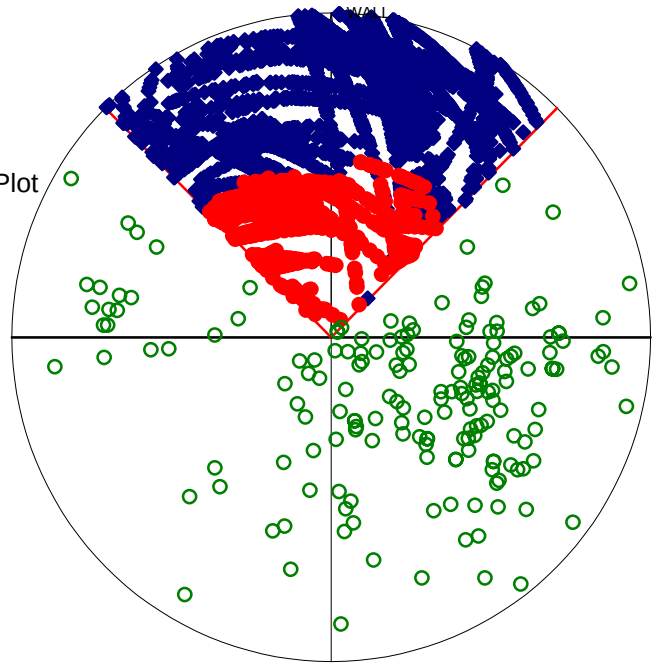
4861 Wedges included in the window analysis

667 Failed Wedges in the Cumulative Frequency Plot

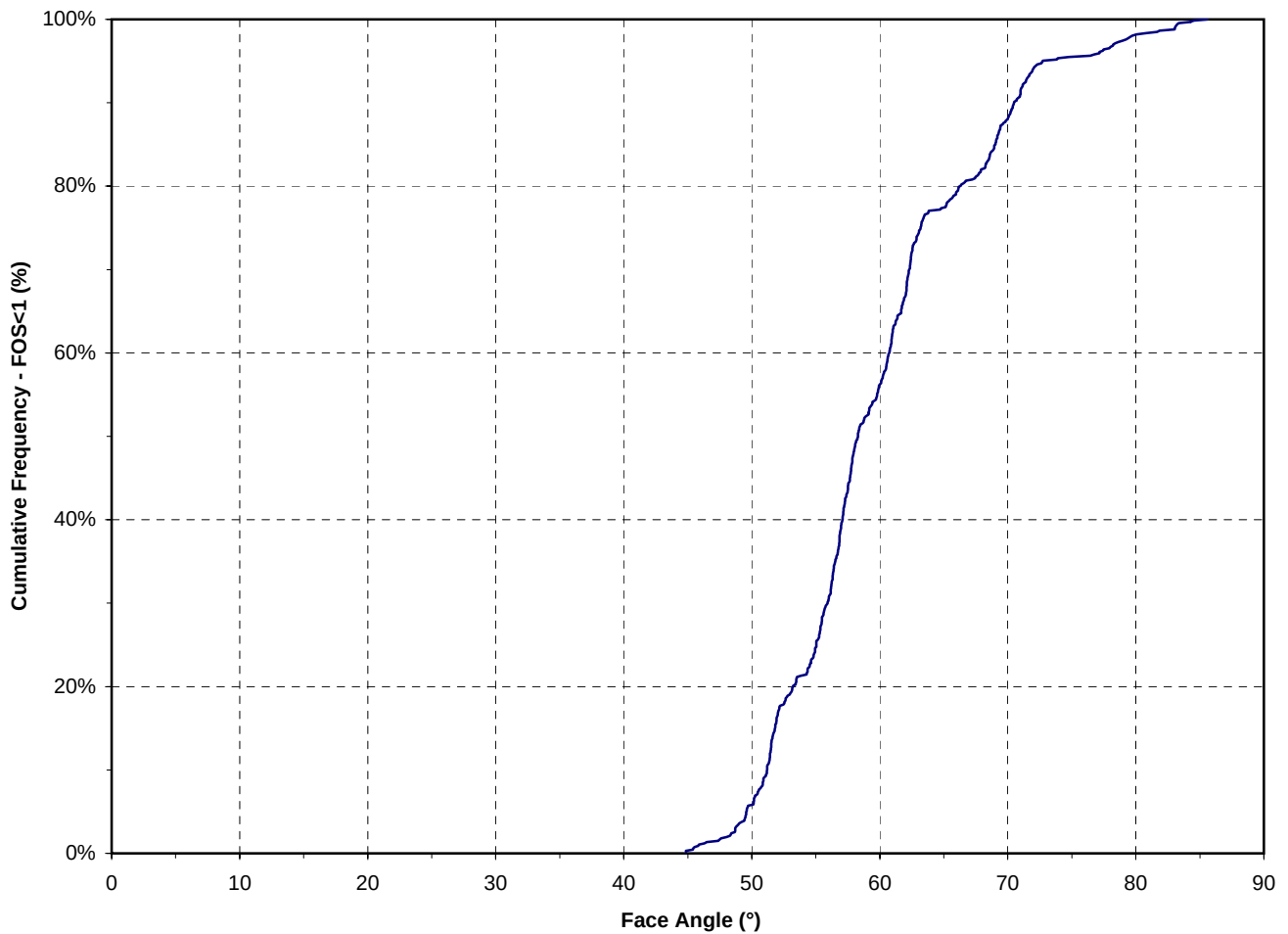
14% Failure

Quantity: FALSE

Terzaghi Weight: FALSE



EQUAL AREA STEREONET



PLANAR BENCH ANALYSIS

FIGURE I-53

PIT WALL PARAMETERS:

Slope Direction: 100 °

Kinematic Window: 50 °

Friction Angle (ϕ): 42 °

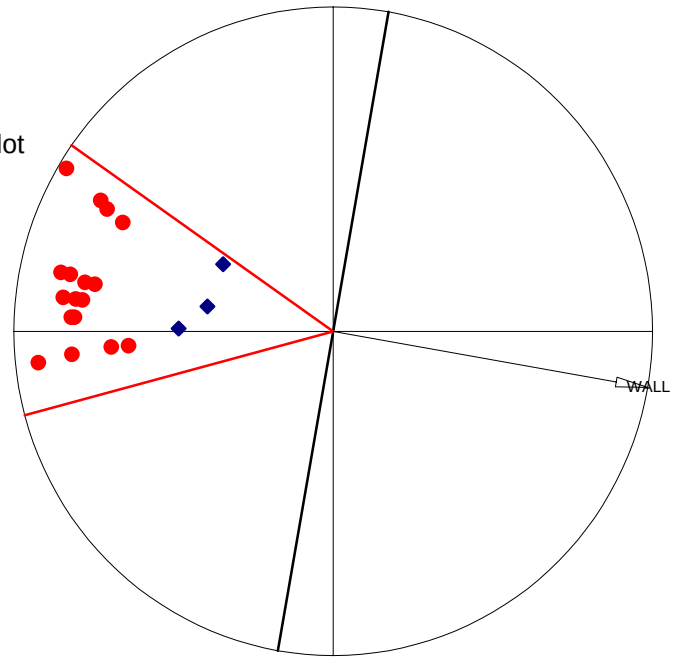
20 Planes included in the window analysis

17 Failed Planes in the Cumulative Frequency Plot

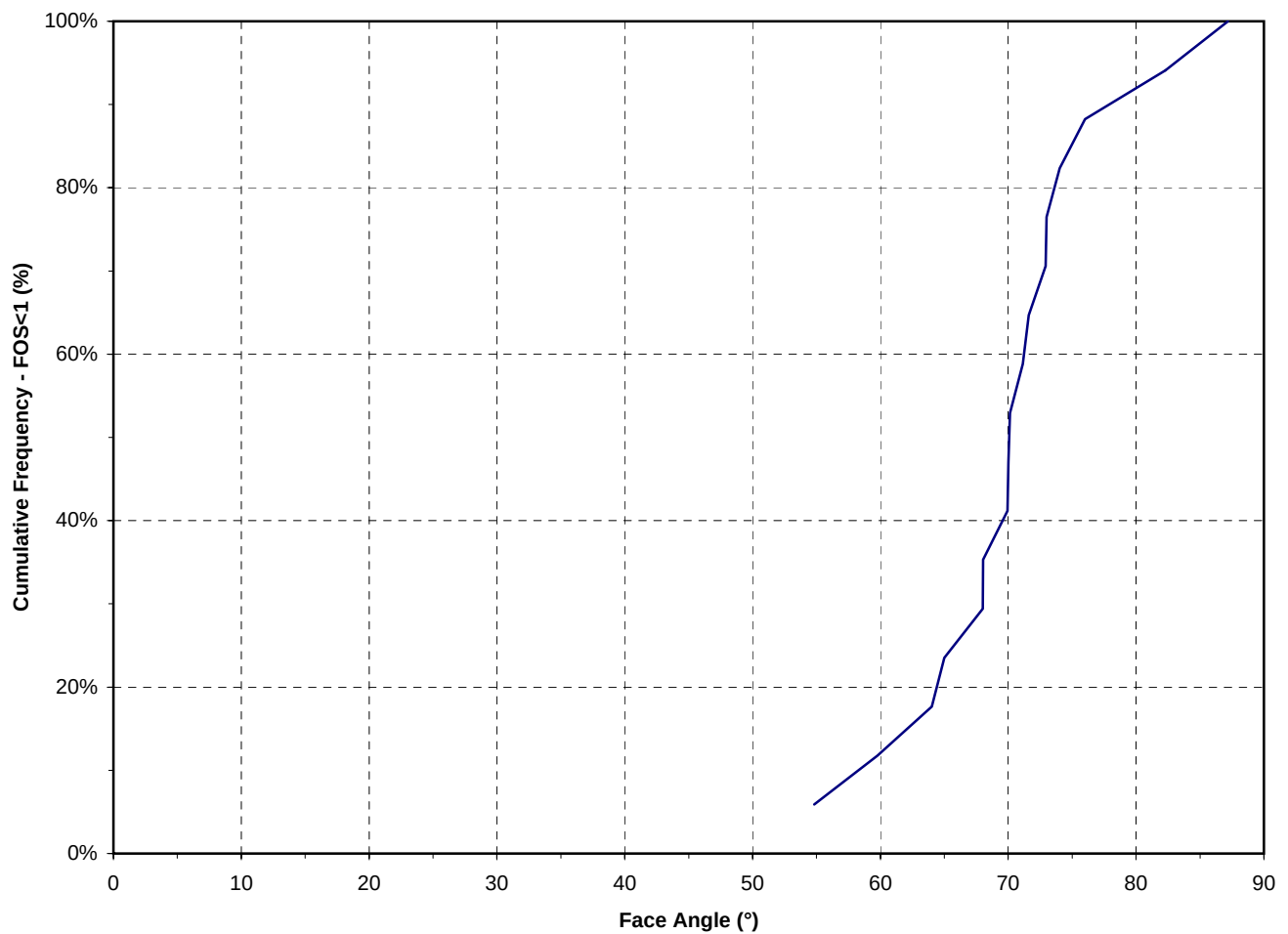
85% Failure

Quantity: FALSE

Terzaghi Weight: FALSE



EQUAL AREA STEREONET



WEDGE BENCH ANALYSIS

FIGURE I-54

PIT WALL PARAMETERS:

Slope Direction: 100 °
Kinematic Window: 90 °
Friction Angle (ϕ): 42 °

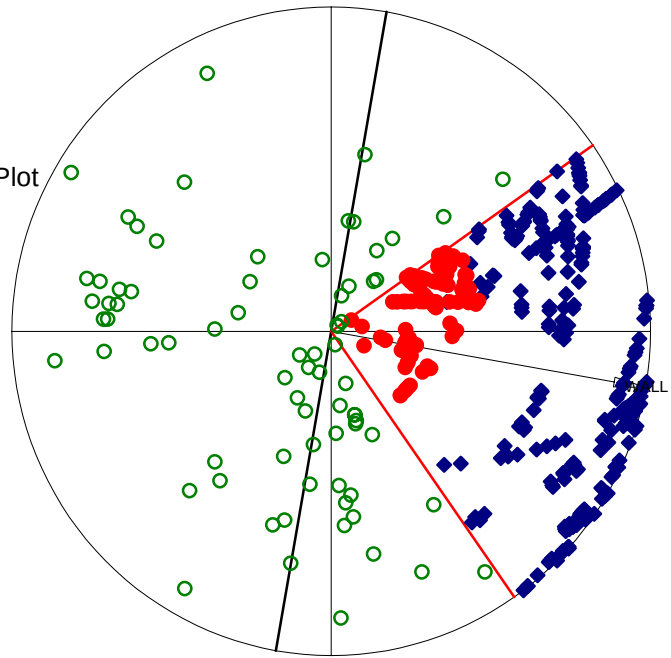
398 Wedges included in the window analysis

87 Failed Wedges in the Cumulative Frequency Plot

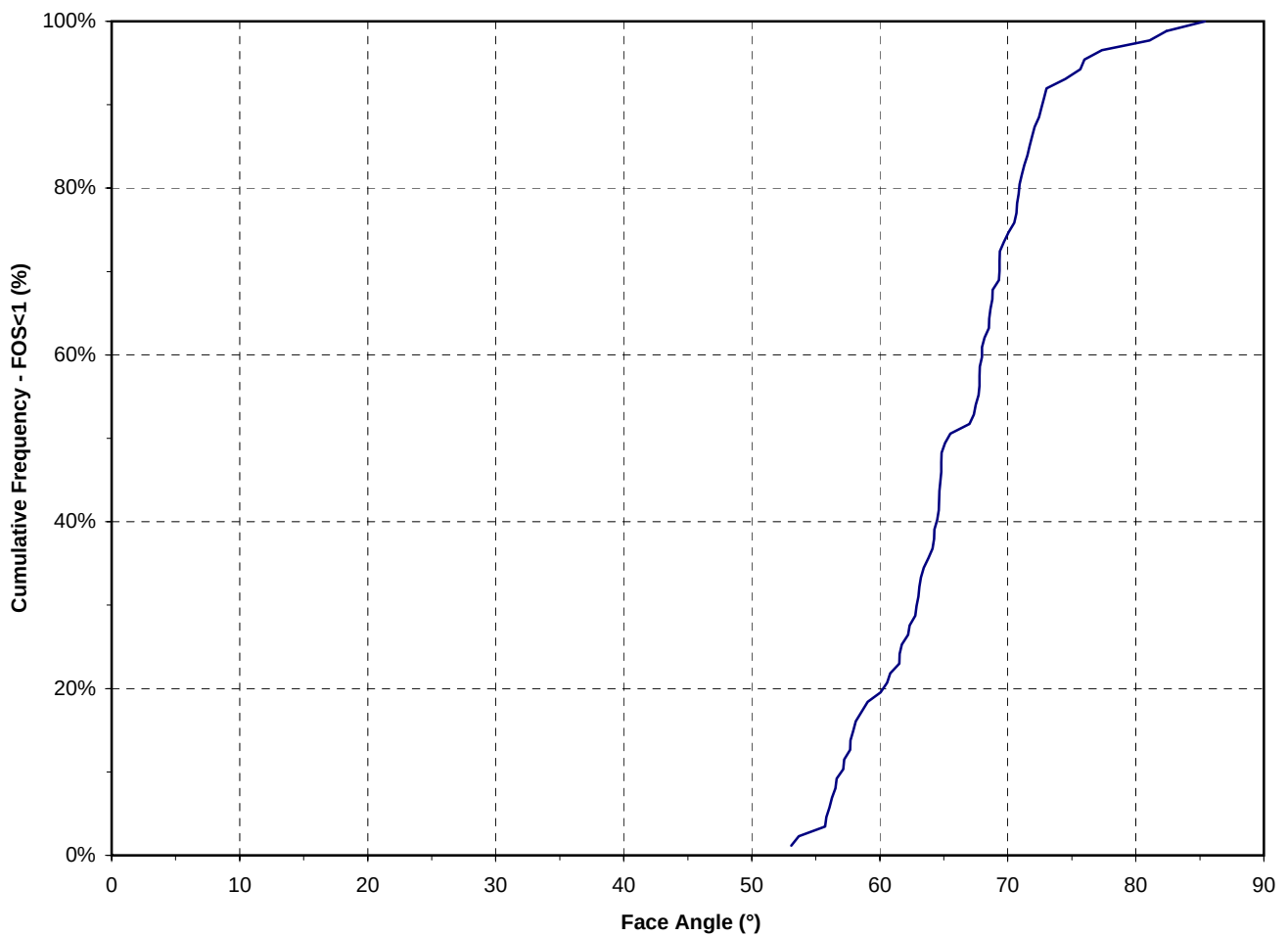
22% Failure

Quantity: FALSE

Terzaghi Weight: FALSE



EQUAL AREA STEREONET



PLANAR BENCH ANALYSIS

FIGURE I-55

PIT WALL PARAMETERS:

Slope Direction: 70 °

Kinematic Window: 50 °

Friction Angle (ϕ): 42 °

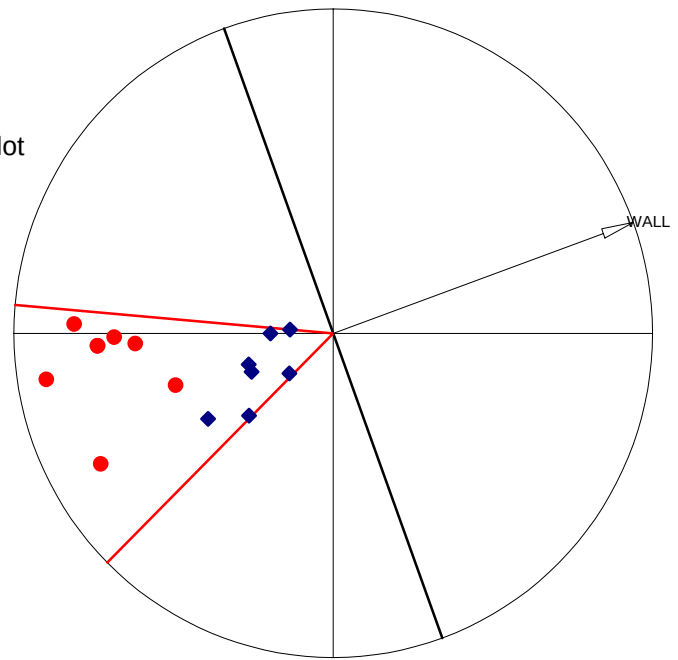
15 Planes included in the window analysis

8 Failed Planes in the Cumulative Frequency Plot

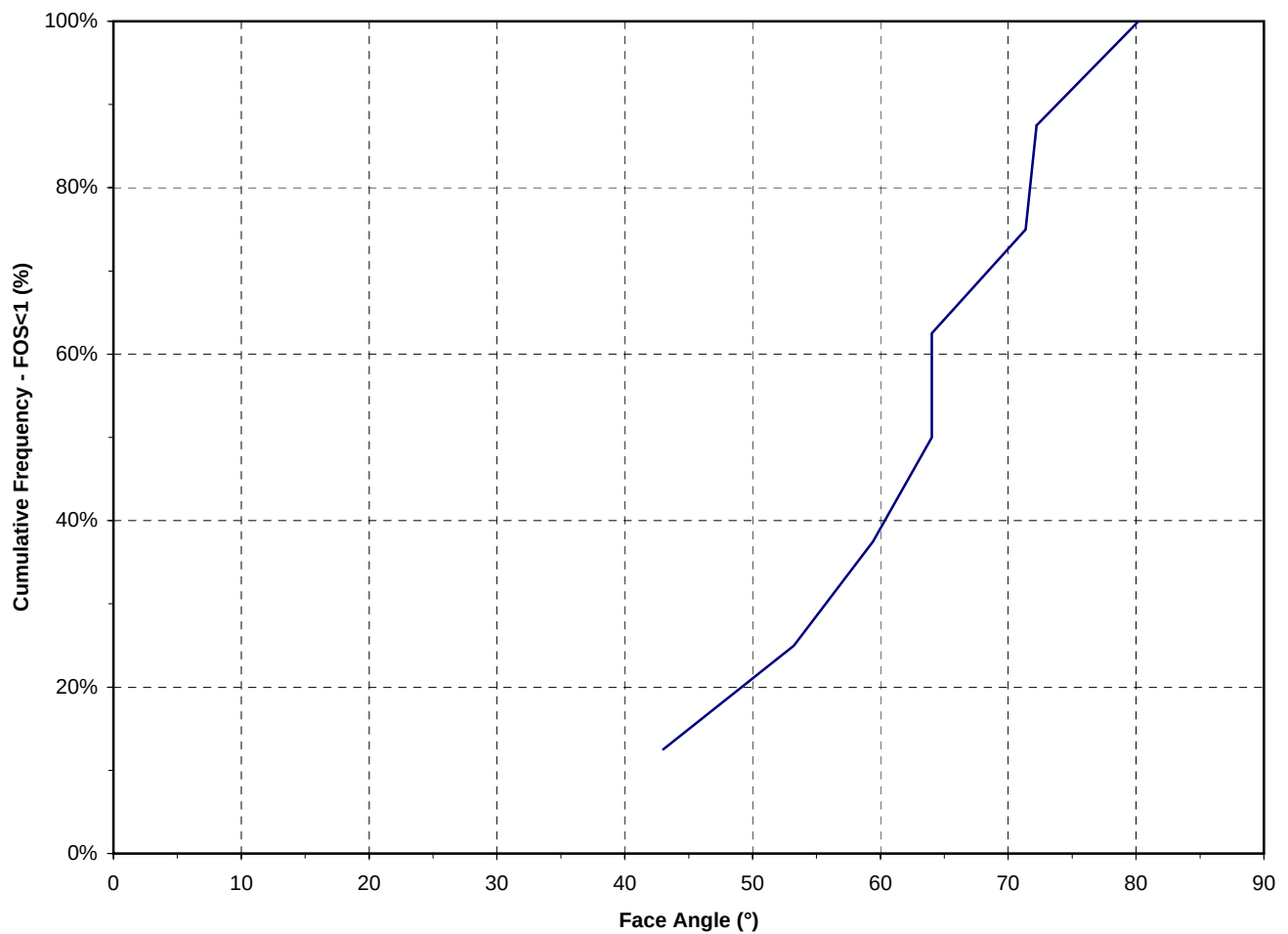
53% Failure

Quantity: FALSE

Terzaghi Weight: FALSE



EQUAL AREA STEREONET



WEDGE BENCH ANALYSIS

FIGURE I-56

PIT WALL PARAMETERS:

Slope Direction: 70 °
Kinematic Window: 90 °
Friction Angle (ϕ): 42 °

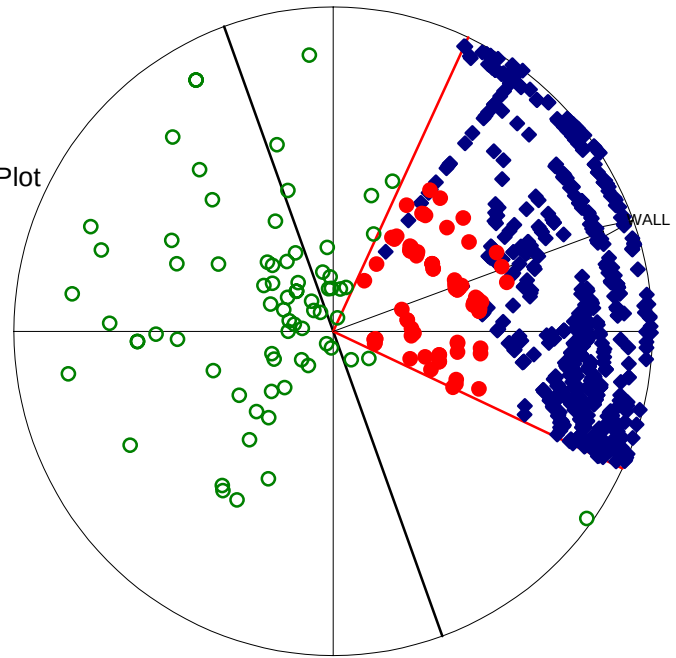
607 Wedges included in the window analysis

80 Failed Wedges in the Cumulative Frequency Plot

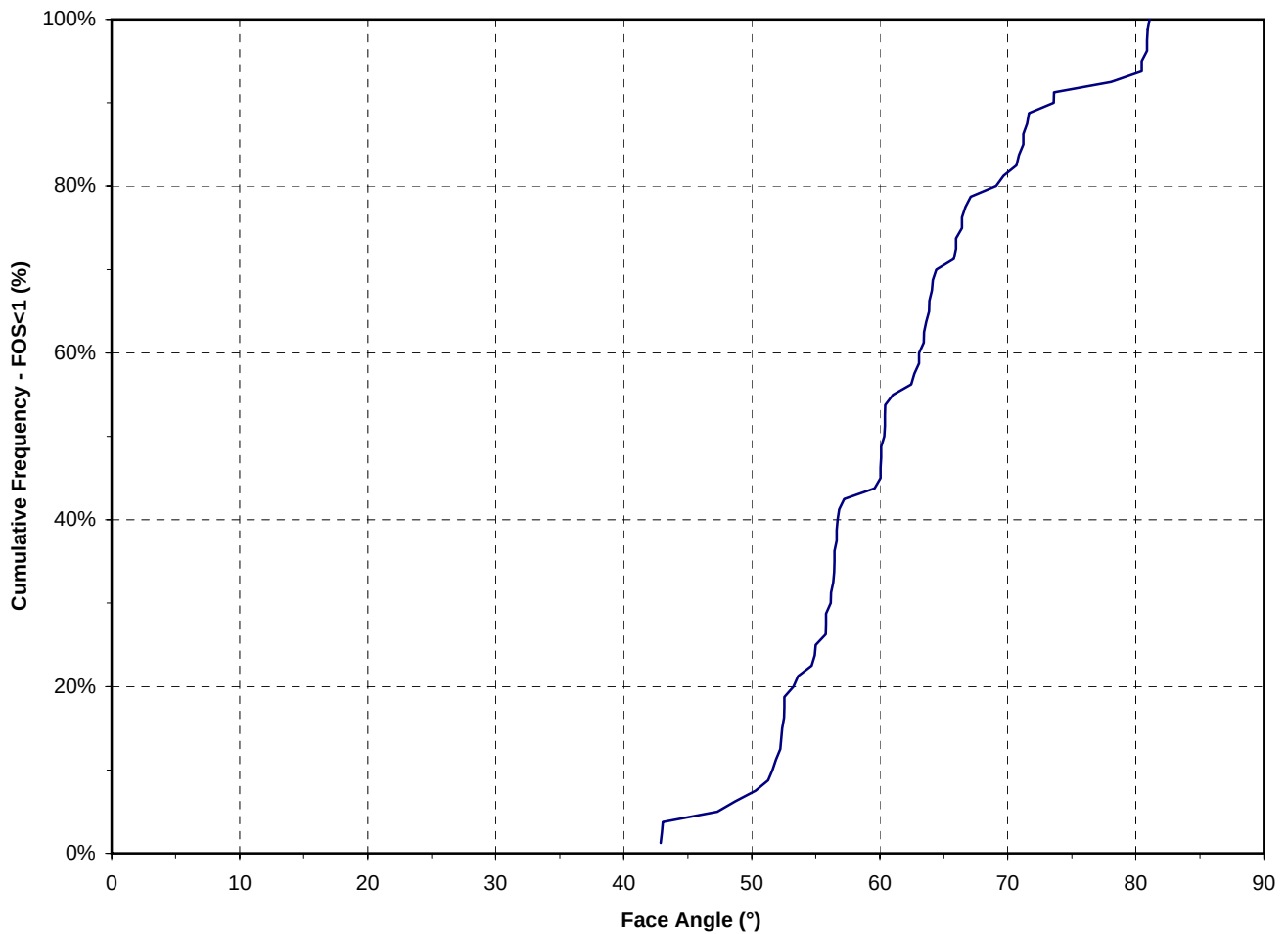
13% Failure

Quantity: FALSE

Terzaghi Weight: FALSE



EQUAL AREA STEREONET



PLANAR BENCH ANALYSIS

FIGURE I-57

PIT WALL PARAMETERS:

Slope Direction: 100 °

Kinematic Window: 50 °

Friction Angle (ϕ): 42 °

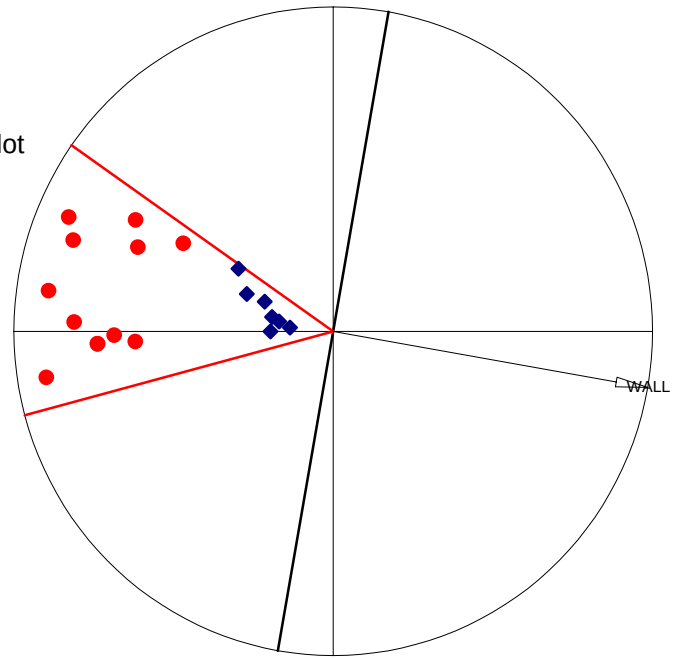
19 Planes included in the window analysis

12 Failed Planes in the Cumulative Frequency Plot

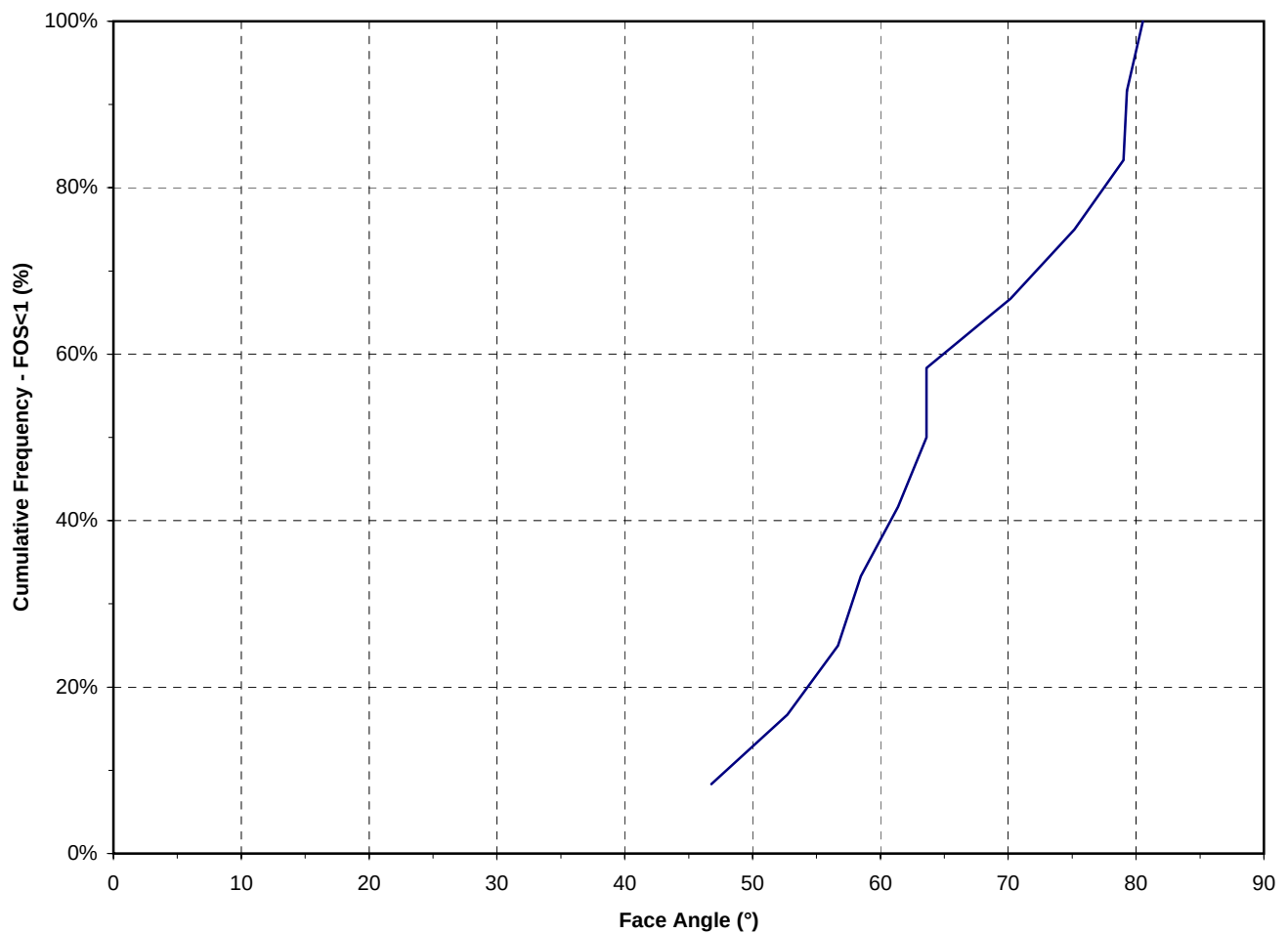
63% Failure

Quantity: FALSE

Terzaghi Weight: FALSE



EQUAL AREA STEREONET



WEDGE BENCH ANALYSIS

FIGURE I-58

PIT WALL PARAMETERS:

Slope Direction: 100 °
Kinematic Window: 90 °
Friction Angle (ϕ): 42 °

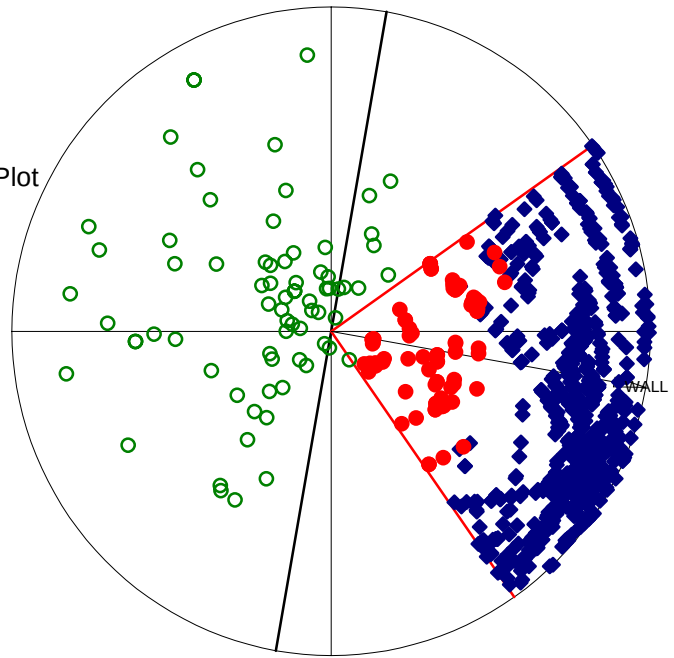
794 Wedges included in the window analysis

82 Failed Wedges in the Cumulative Frequency Plot

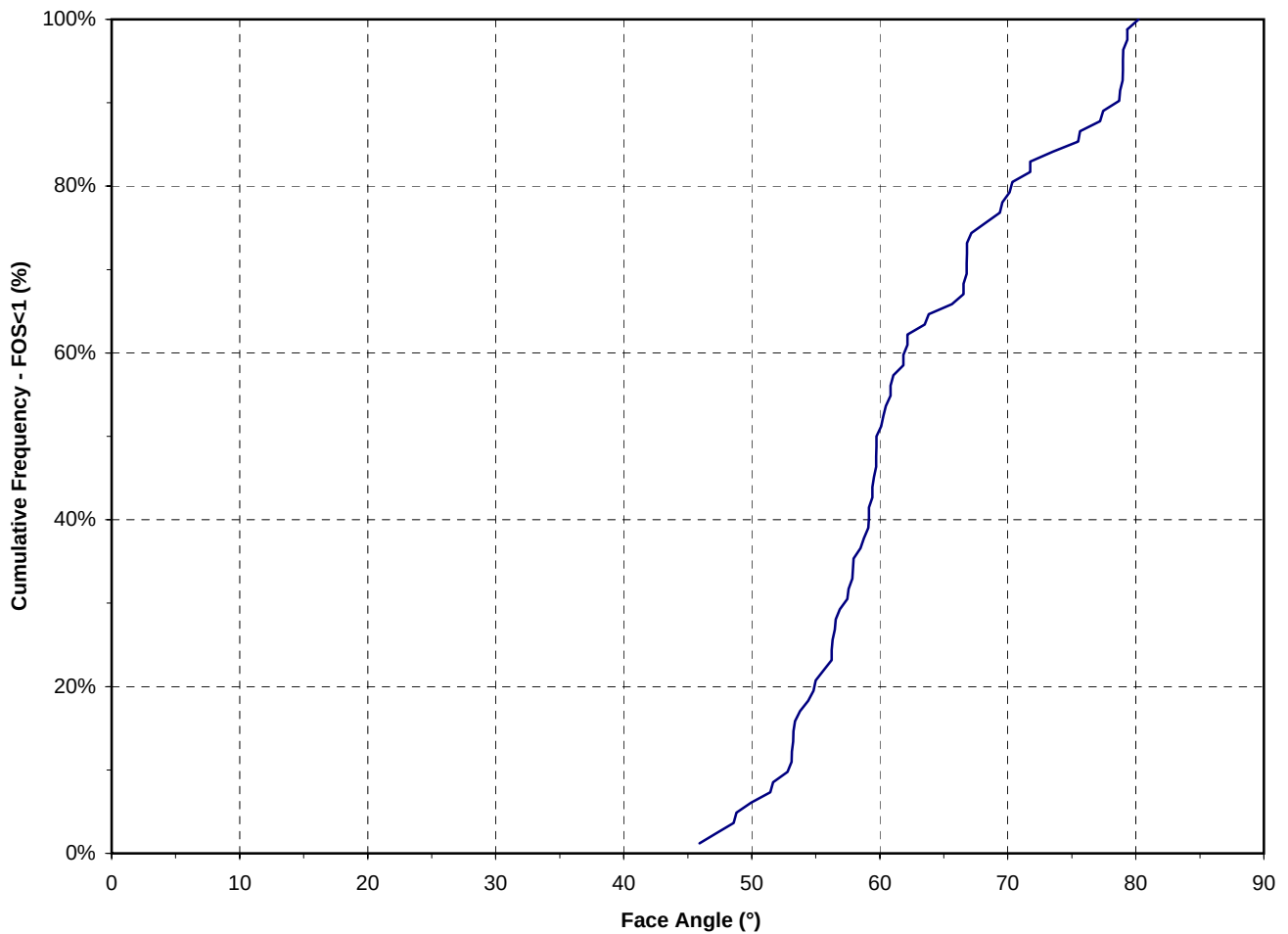
10% Failure

Quantity: FALSE

Terzaghi Weight: FALSE



EQUAL AREA STEREONET



PLANAR BENCH ANALYSIS

FIGURE I-59

PIT WALL PARAMETERS:

Slope Direction: 160 °

Kinematic Window: 50 °

Friction Angle (ϕ): 42 °

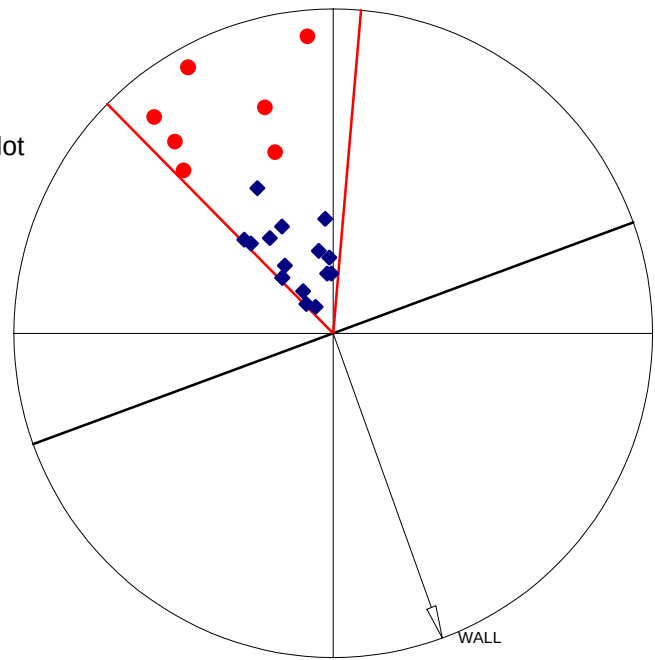
25 Planes included in the window analysis

8 Failed Planes in the Cumulative Frequency Plot

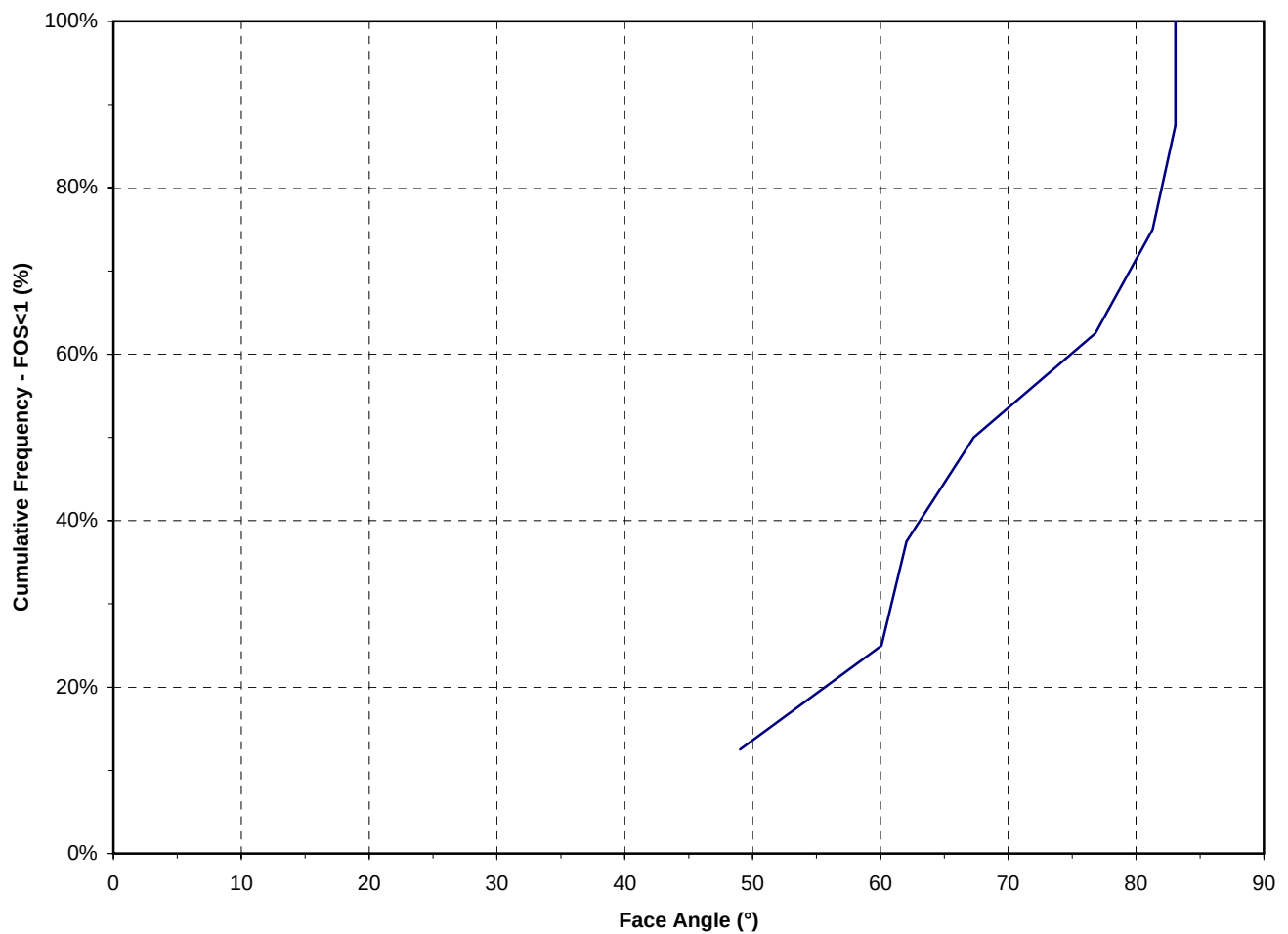
32% Failure

Quantity: FALSE

Terzaghi Weight: FALSE



EQUAL AREA STEREONET



WEDGE BENCH ANALYSIS

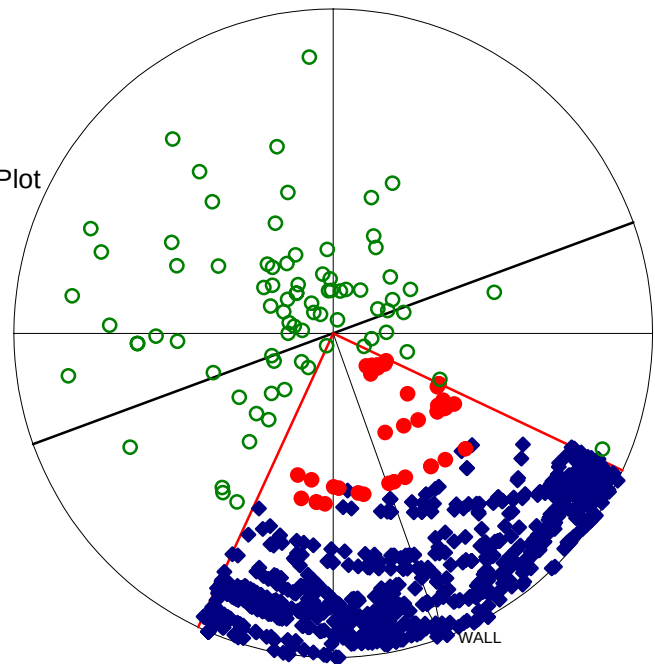
FIGURE I-60

PIT WALL PARAMETERS:

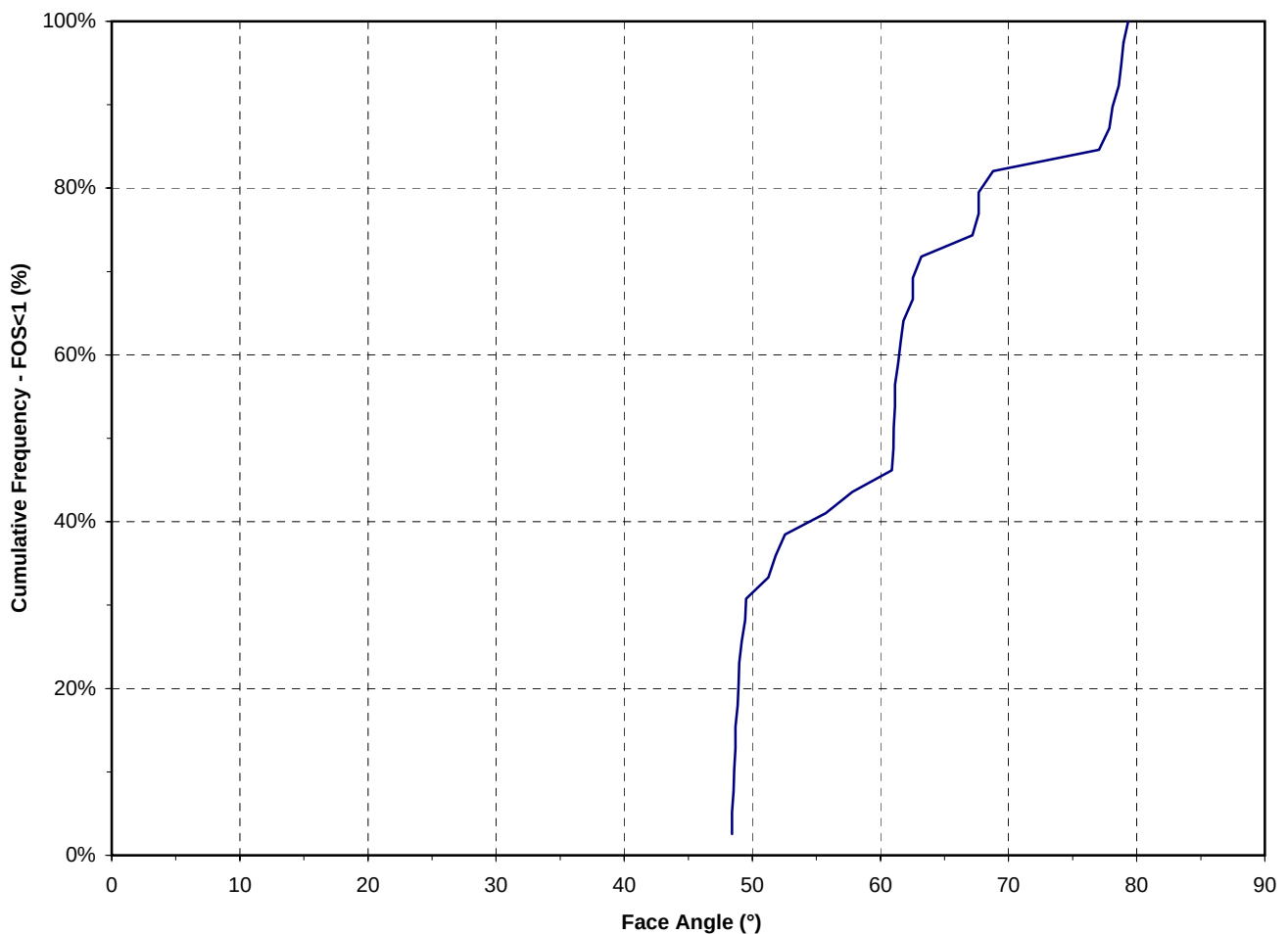
Slope Direction: 160 °
Kinematic Window: 90 °
Friction Angle (ϕ): 42 °

903 Wedges included in the window analysis
39 Failed Wedges in the Cumulative Frequency Plot
4% Failure

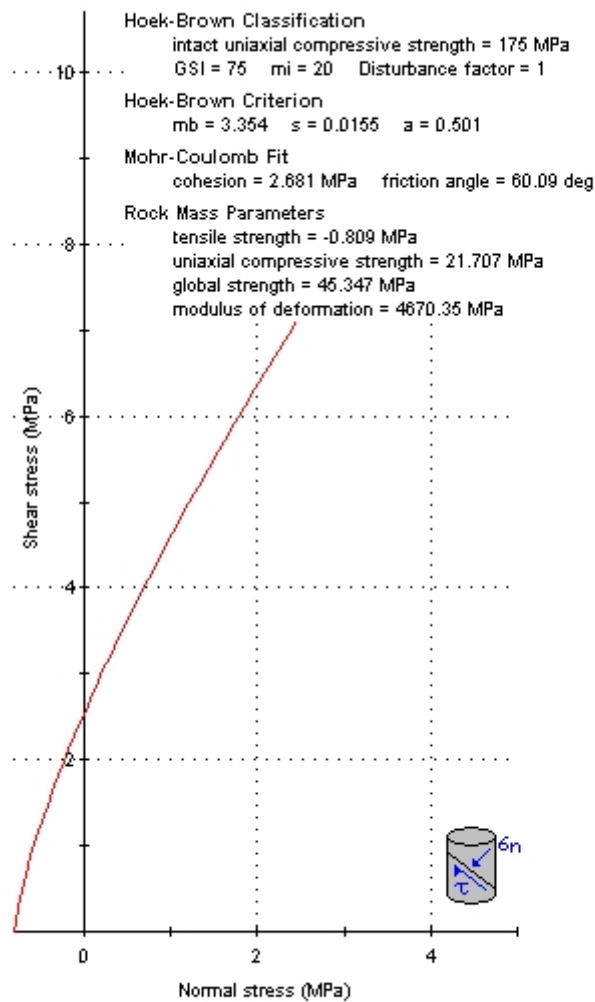
Quantity: FALSE
Terzaghi Weight: FALSE



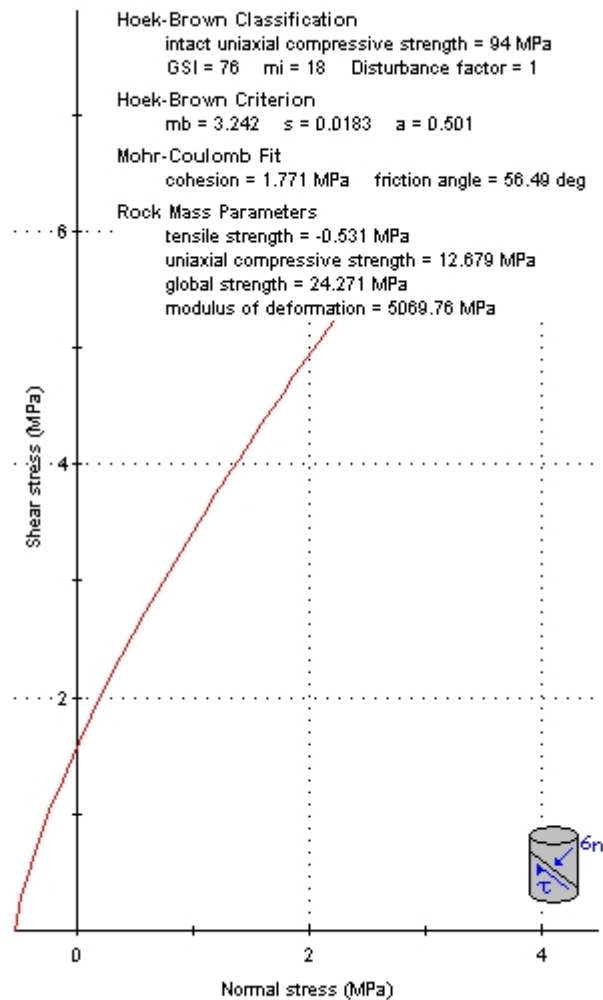
EQUAL AREA STEREONET



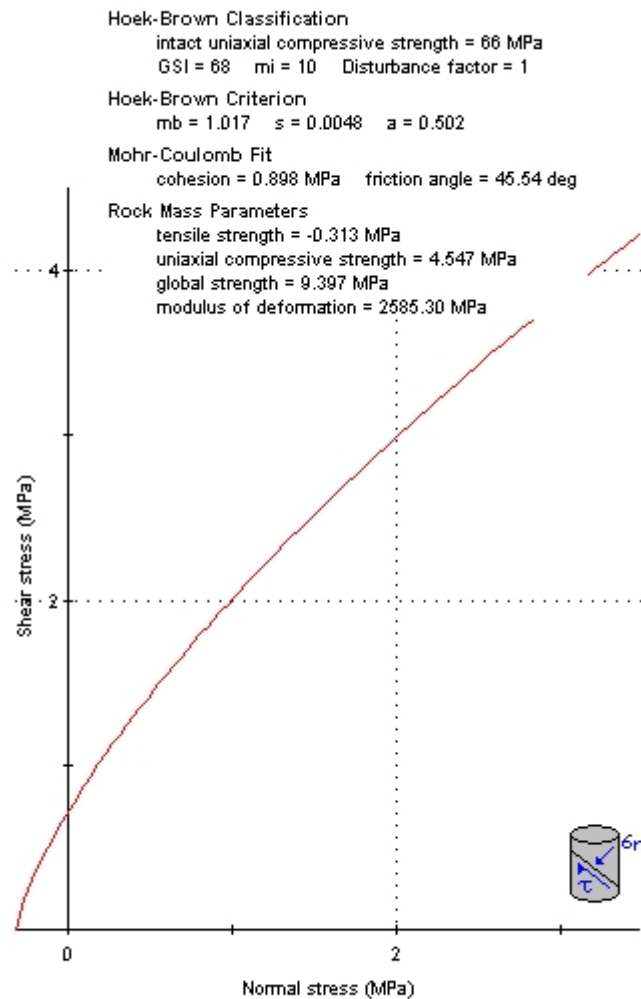
APPENDIX VII
ROCLAB ASSESSMENT



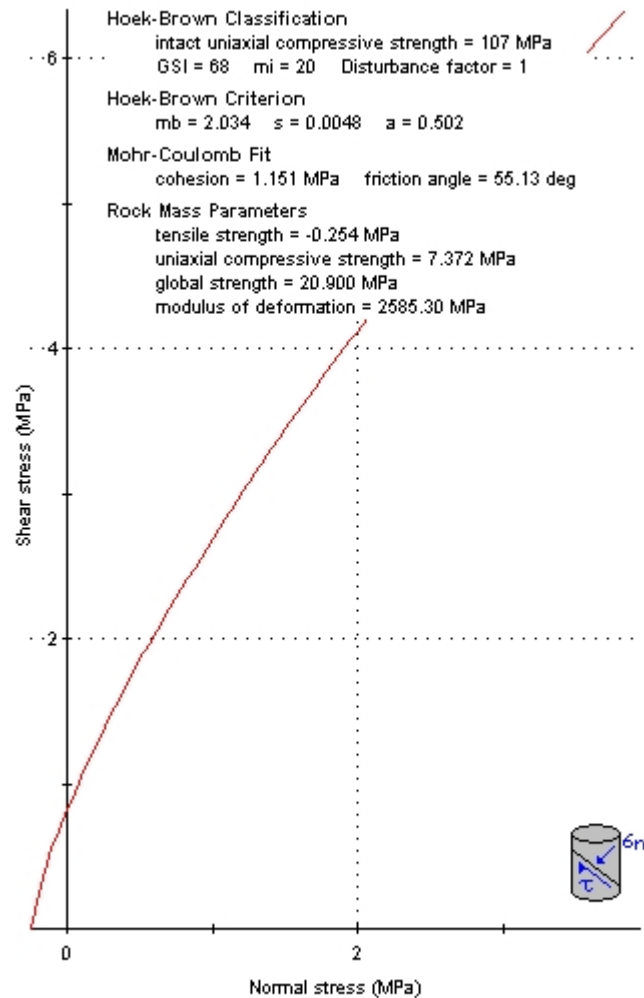
PROJECT		MEADOWBANK MINING CORPORATION			
TITLE		IRON FORMATION ROCLAB RESULTS			
		PROJECT No. 06-1413-089		FILE No.	
		DESIGN	JFG	23FEB07	SCALE NTS
		CADD	JFG	02APR07	REV.
		CHECK			FIGURE VII-1
		REVIEW			



PROJECT		MEADOWBANK MINING CORPORATION			
TITLE		INTERMEDIATE VOLCANICS ROCLAB RESULTS			
		PROJECT No. 06-1413-089		FILE No.	
		DESIGN	JFG	23FEB07	SCALE NTS
		CADD	JFG	02APR07	REV.
		CHECK			FIGURE VII-2
		REVIEW			

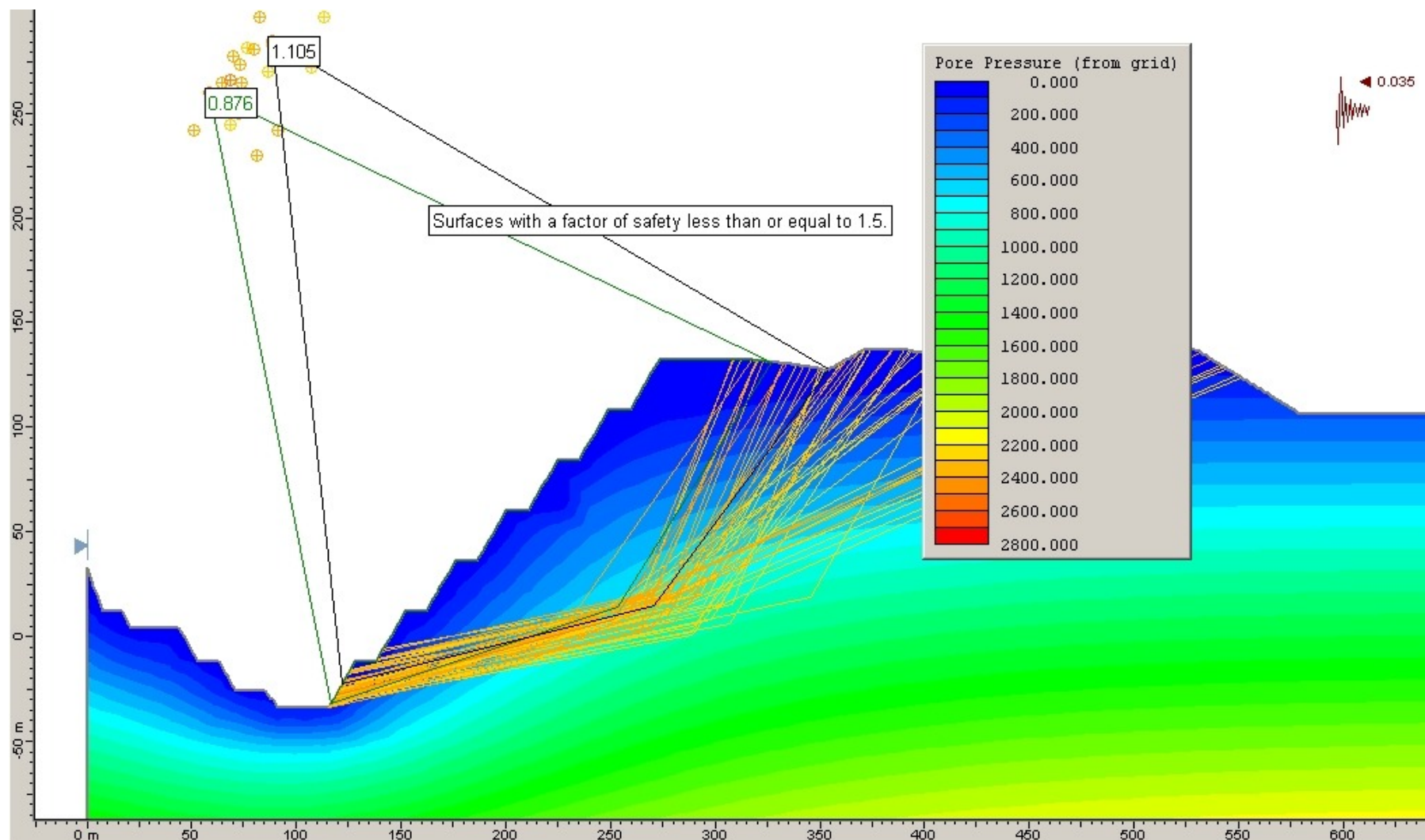


PROJECT		MEADOWBANK MINING CORPORATION			
TITLE		ULTRAMAFIC VOLCANICS ROCLAB RESULTS			
		PROJECT No. 06-1413-089		FILE No.	
		DESIGN	JFG	23FEB07	SCALE NTS
		CADD	JFG	02APR07	REV.
		CHECK			FIGURE VII-3
		REVIEW			

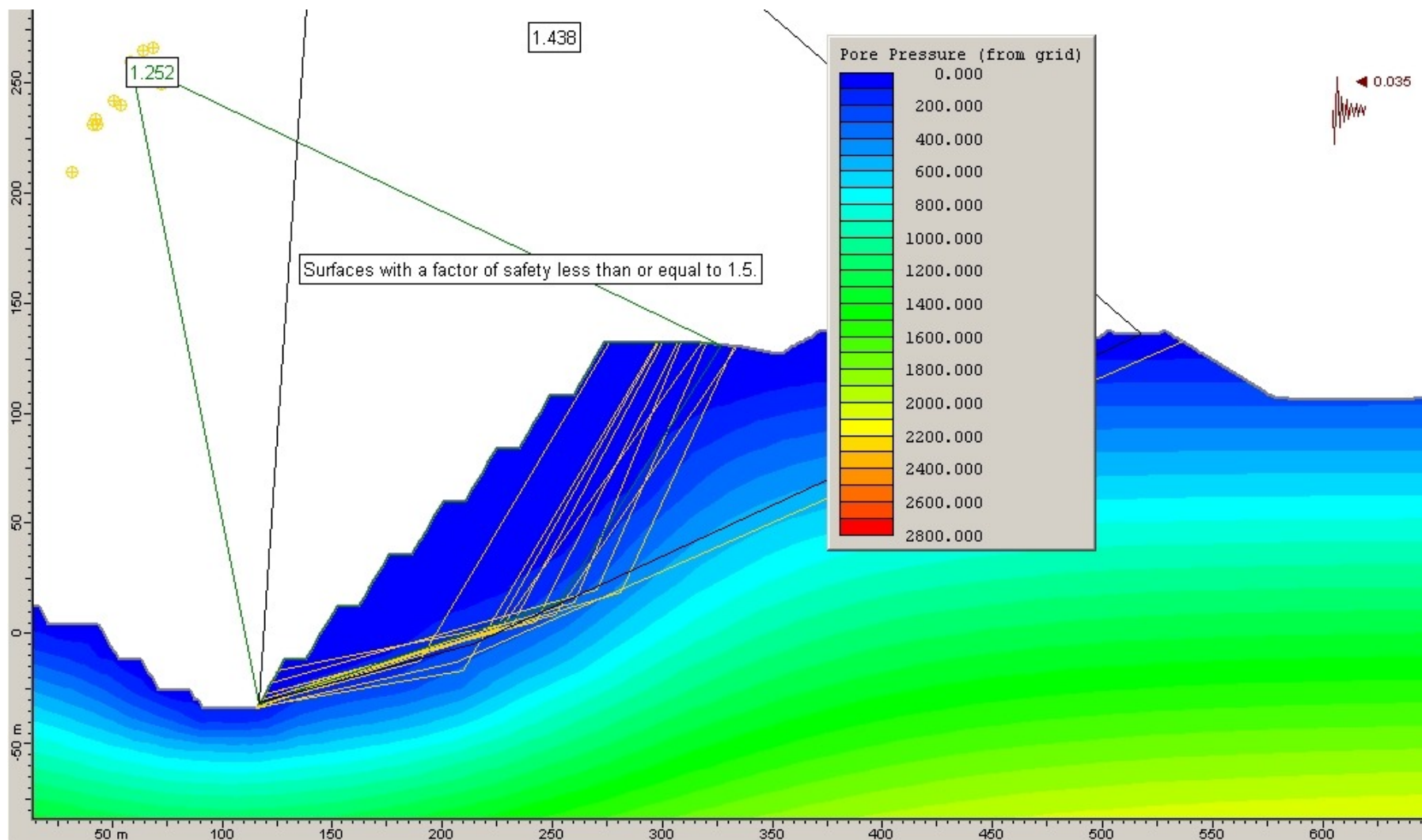


PROJECT		MEADOWBANK MINING CORPORATION			
TITLE		QUARTZITE ROCLAB RESULTS			
		PROJECT No. 06-1413-089		FILE No.	
		DESIGN	JFG	23FEB07	SCALE NTS
		CADD	JFG	02APR07	REV.
		CHECK			FIGURE VII-4
		REVIEW			

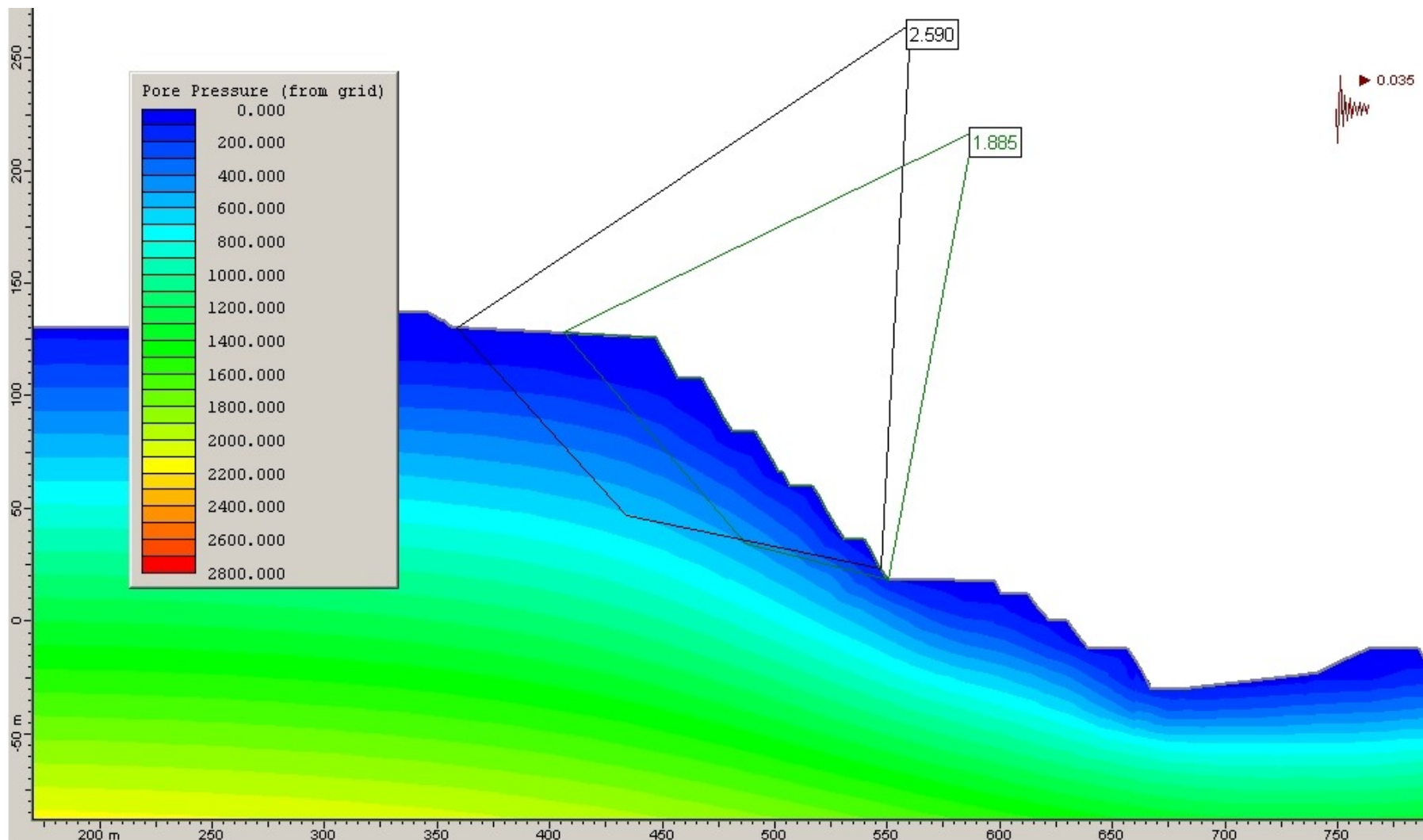
APPENDIX VIII
PSEUDO STATIC ANALYSES



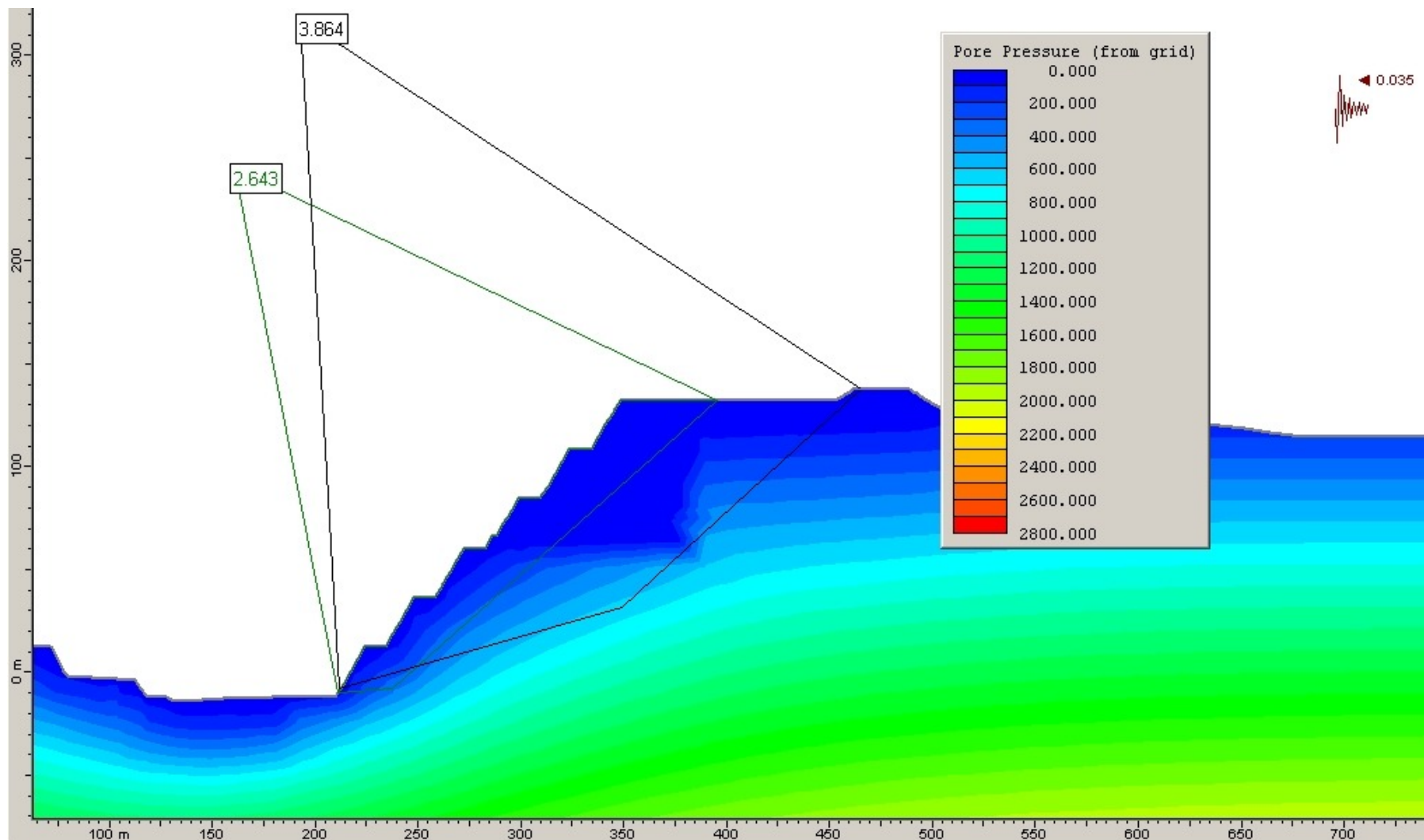
PROJECT		MEADOWBANK MINING CORPORATION			
TITLE		SLIDE SEISMIC ANALYSIS GOOSE SOUTHEAST - 12+00S NO DEPRESSURIZATION			
		PROJECT No. 06-1413-089		FILE No.	
		DESIGN	JFG	21MAR07	SCALE NTS
		CADD	AS	21MAR07	REV.
		CHECK			
		REVIEW			
					FIGURE VIII.1



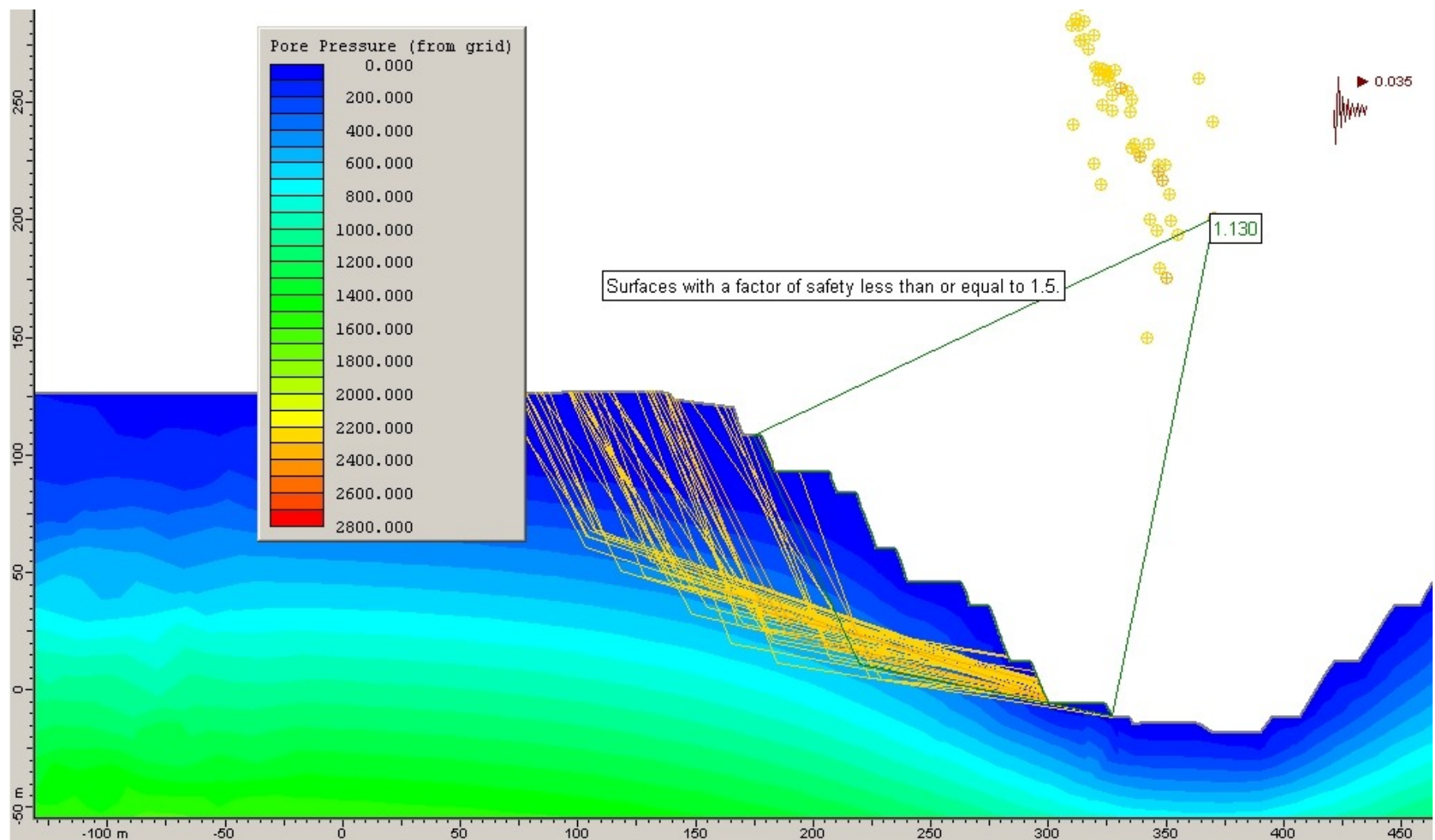
PROJECT		MEADOWBANK MINING CORPORATION			
TITLE		SLIDE SEISMIC ANALYSIS GOOSE SOUTHEAST - 12+00S DEPRESSURIZED			
		PROJECT No. 06-1413-089		FILE No.	
		DESIGN	JFG	21MAR07	SCALE NTS
		CADD	AS	21MAR07	REV.
		CHECK			
		REVIEW			
					FIGURE VIII.2



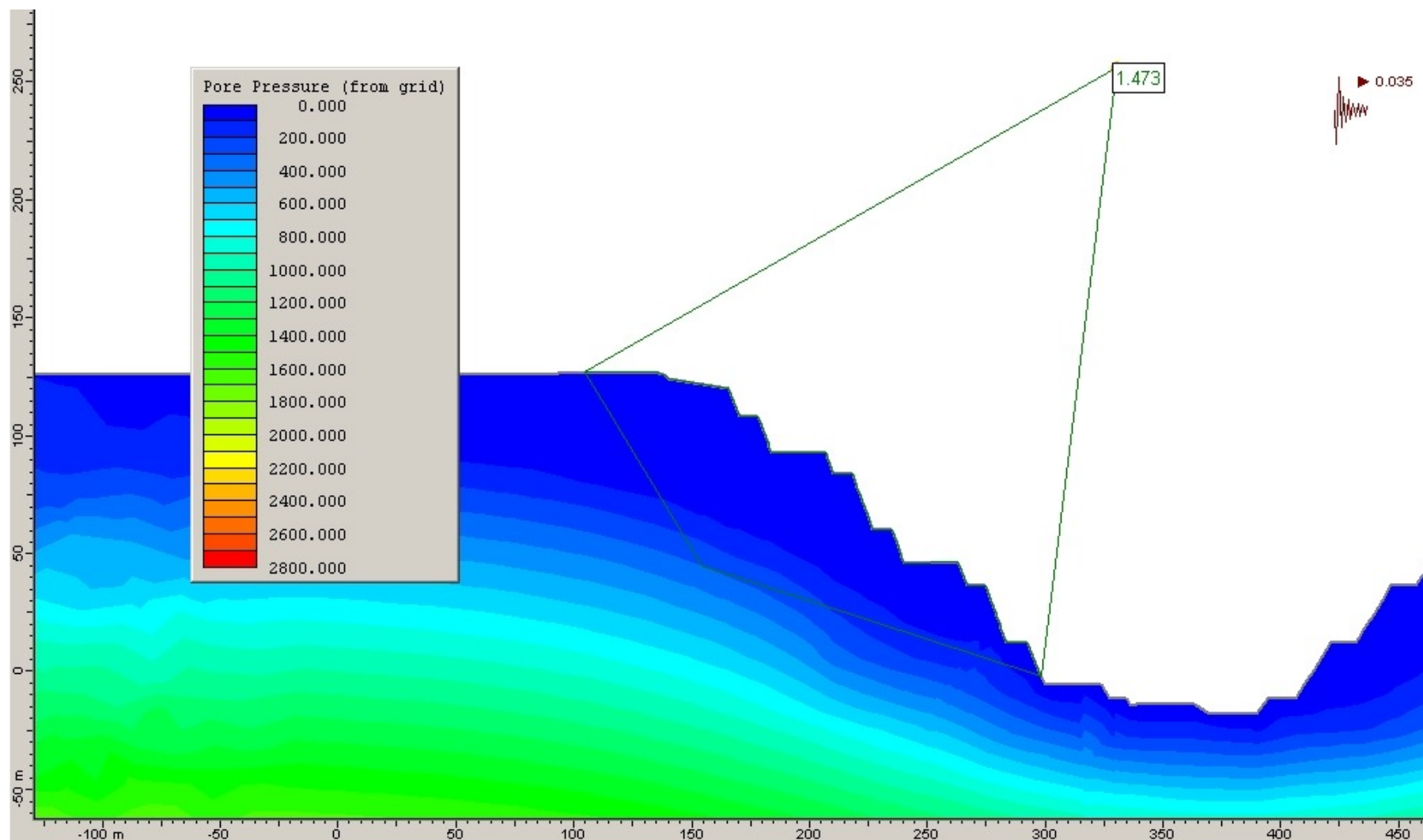
PROJECT		MEADOWBANK			
		MINING CORPORATION			
TITLE		SLIDE SEISMIC ANALYSIS			
		GOOSE - SOUTH			
		NO DEPRESSURIZATION			
		PROJECT No.		FILE No.	
		DESIGN	JFG	21MAR07	SCALE NTS
		CADD	AS	21MAR07	REV.
		CHECK			FIGURE VIII.3
		REVIEW			



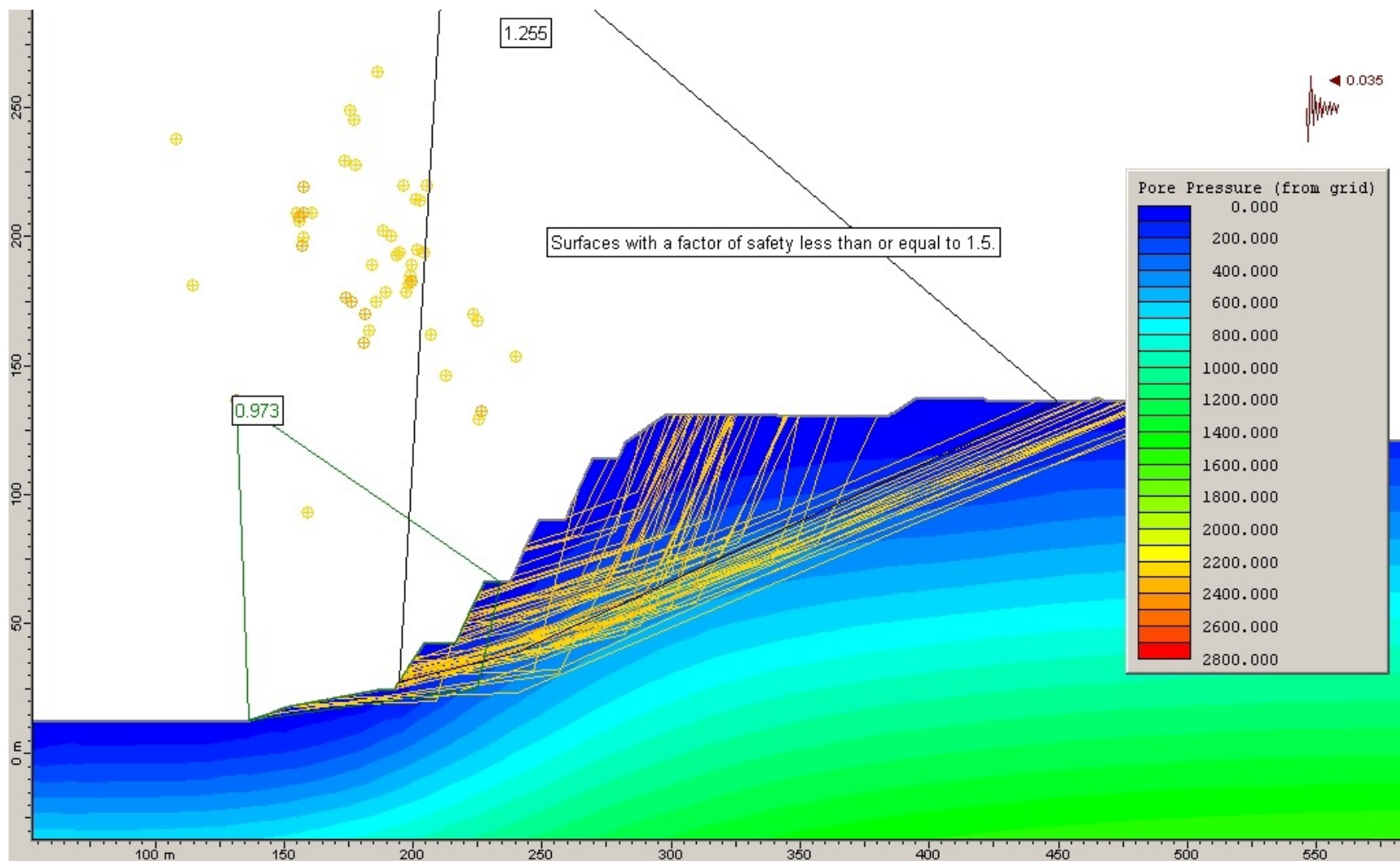
PROJECT		MEADOWBANK MINING CORPORATION			
TITLE		SLIDE SEISMIC ANALYSIS GOOSE - NORTHEAST NO DEPRESSURIZATION			
		PROJECT No. 06-1413-089		FILE No.	
		DESIGN	JFG	21MAR07	SCALE NTS
		CADD	AS	21MAR07	REV.
		CHECK			
		REVIEW			
					FIGURE VIII.4



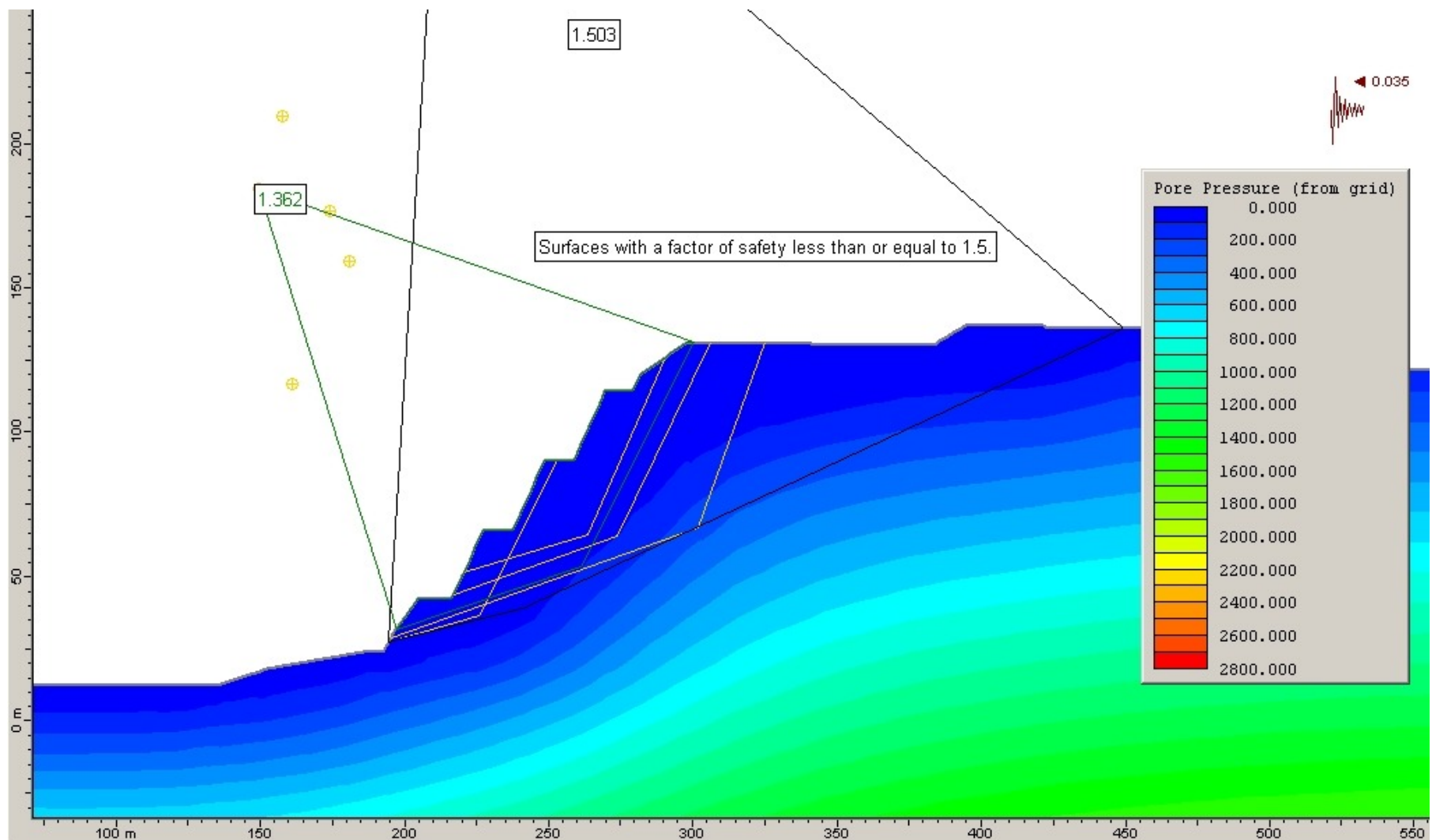
PROJECT		MEADOWBANK MINING CORPORATION			
TITLE		SLIDE SEISMIC ANALYSIS GOOSE WEST - 11+00S NO DEPRESSURIZATION			
		PROJECT No. 06-1413-089		FILE No.	
		DESIGN	JFG	21MAR07	SCALE NTS
		CADD	AS	21MAR07	REV.
		CHECK			
		REVIEW			
					FIGURE VIII.5



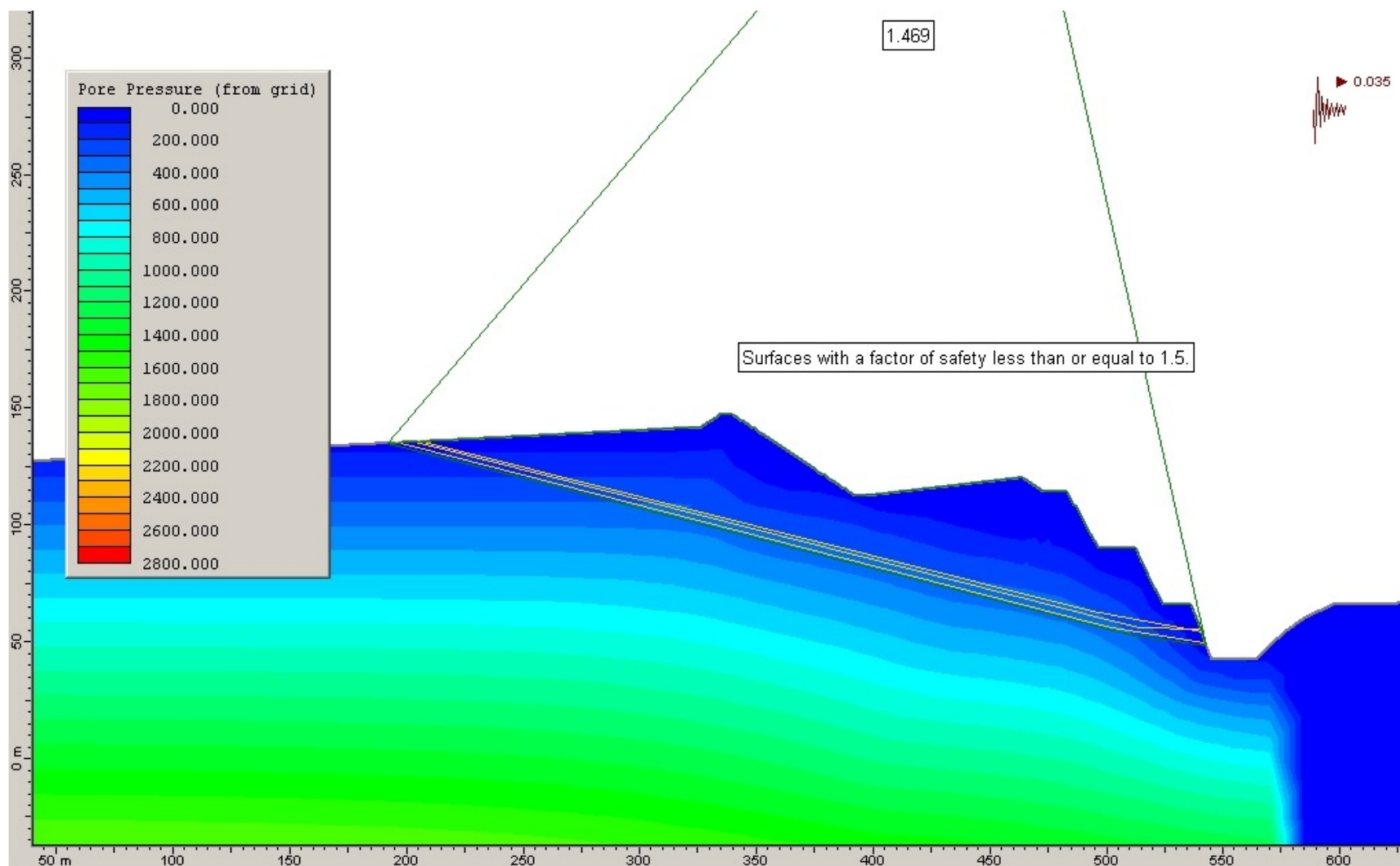
PROJECT		MEADOWBANK MINING CORPORATION			
TITLE		SLIDE SEISMIC ANALYSIS GOOSE WEST - 11+00S DEPRESSURIZED			
		PROJECT No. 06-1413-089		FILE No.	
		DESIGN	JFG	21MAR07	SCALE NTS
		CADD	AS	21MAR07	REV.
		CHECK			
		REVIEW			
					FIGURE VIII.6



PROJECT		MEADOWBANK MINING CORPORATION			
TITLE		SLIDE SEISMIC ANALYSIS PORTAGE - SOUTHEAST NO DEPRESSURIZATION			
		PROJECT No. 06-1413-089		FILE No.	
		DESIGN	JFG	21MAR07	SCALE NTS
		CADD	AS	21MAR07	REV.
		CHECK			
		REVIEW			
					FIGURE VIII.7



PROJECT	MEADOWBANK MINING CORPORATION			
TITLE	SLIDE SEISMIC ANALYSIS PORTAGE - SOUTHEAST DEPRESSURIZED			
	PROJECT No.	06-1413-089	FILE No.	
	DESIGN	JFG	21MAR07	SCALE NTS
	CADD	AS	21MAR07	REV.
	CHECK			
	REVIEW			
				FIGURE VIII.8



PROJECT		MEADOWBANK MINING CORPORATION			
TITLE		SLIDE SEISMIC ANALYSIS PORTAGE/TAILINGS - NORTHWEST NO DEPRESSURIZATION			
		PROJECT No. 06-1413-089		FILE No.	
		DESIGN	JFG	21MAR07	SCALE NTS
		CADD	AS	21MAR07	REV.
		CHECK			
		REVIEW			
		FIGURE VIII.9			