Appendix A

Borehole Logs

Notes and Abbreviations

LY4245

LY4246

LY4379

Installation Details

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SOIL AND ROCK DESCRIPTION SHEET 1 - GENERAL

Soil and rock descriptions are generally in accordance with the recommendations of Australian Standard 1726-1993 and cover the following properties:

SOIL:	Soil Name (Classification Group Symbol), Plasticity or Particle Characteristics, Colour, Secondary Components, Other Minor Components, Moisture Condition, Consistency, Structure.
ROCK:	Rock Type, Grain Size, Texture and Fabric, Colour, Strength, Material, Weathering, Structure, Defects.

Notes: Field tests have been used to assess soil consistency, rock strength and grain size. Unless specifically stated otherwise, these assessments have been transferred directly to the bore logs and not modified to coincide with laboratory test results. Descriptive terms used on the bore logs are explained on the following pages.

1. Individual assessment of colour has been used and no reference made to standard colour charts unless specifically stated.
2. AS 1726-1993 generally follows ASTM D2487 (Unified Soil Classification System) except that it adopts different particle size limits.
3. For Classification Group Symbol, refer Table A1 of AS 1726-1993.
4. For drilling method, use correct drilling terms if known (eg. NMLC, HQ3 etc). Alternatively use generic descriptors for basic method and flushing medium, as appropriate from list below.

DRILLING/EXCAVATION METHOD

RW	Rotary wash boring
RT	Rotary triple tube coring
PC	Percussion Cable Tool Boring
PT	Percussion Top Hammer Boring
PD	Percussion Down Hole Hammer Boring
PSC	Percussion Hammer with Casing Advance
AS	Augering Solid Flight
AH	Augering Hollow Flight
CC	Continuous Coring
HA	Hand Augering
CT	Continuous Tube Sampler
HE	Hand Excavation (shovel/pick etc)
BE	Bucket Excavation
BL	Blade Excavation
HH	Hydraulic Hammer
T	Tyne/Rock Pick
Rp	Bulldozer Ripper/Tyne

SUPPORT

M	Mud
C	Casing
N	Nil

RUN

——	Indicated depth at end of Drill Run (x metres)
C	Depth at end of Casing (x metres)

WATER

▼	Water level
▸	Water inflow
◂	Water outflow
GNE	Groundwater not Encountered
GNM	Groundwater not Measured

FIELD RANK (Environmental Logs)

0	No visual contamination or odour
1	Some visual contamination or odour
2	Significant visual contamination or odour
3	Significant visual contamination and odour

SAMPLING AND TESTING

Piston	Piston tube sampler
D	Disturbed sample/Grab sample (Symbol shown at sample depth)
U (x)	Undisturbed sample (x mm diameter)
CS	Core sample
SPT	Standard penetration test
SS	Split Spoon Samples
GP	Direct Push Geoprobe Sample
SPT+	Standard penetration test, Refusal
N	SPT Indicate blows / 150 mm and N value for final 300 mm
IV	Insitu vane shear test (kPa)
HV	Hand vane test on sample (kPa)
PP	Pocket penetrometer test on sample.
PM	Pressure meter test
IS	Point Load Test (Mpa)
UCS	Unconfined compressive strength (MPa)
PK	Packer test (kPa)
CH	Constant head test
FH	Falling head test
PT	Pump test
AL	Air lift (water inflow test)
W	Water sample
UU	Unconsolidated Undrained Compressive Strength (kPa)
uL	Lugeon Value

MONITORING BORE DETAILS

CG	Cement grout
BP	Bentonite pellets
RB	Random backfill
BCG	Bentonite cement grout
GR	Gravel pack
PN	Pneumatic Piezometer
PC	Casagrande Piezometer
PV	Vibrating Wire Piezometer

OTHER ABBREVIATIONS

(Add other abbreviations specific to this project here)

NOTE: Based on Classification System AS1726 – 1993
Field classification is an estimate and is therefore not precise

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SOIL AND ROCK DESCRIPTION SHEET 2 - SOILS

DESCRIPTION

The basic soil types (material finer than 63 mm) are coarse-grained soils consisting of sands and gravels and fine-grained soils consisting of silts and clays

GROUP		SYMBOL	DESCRIPTION
COARSE GRAINED SOILS (<50% passing 0.075mm sieve)	Gravels	GW	Well-graded gravels and gravel-sand mixtures - little or no fines.
		GP	Poorly graded gravels and gravel-sand mixtures - little or no fines.
	Gravelly	GM	Silty gravels, gravel-sand-silt mixtures.
		GC	Clayey gravels, gravel-sand-clay mixtures.
	Sands	SW	Well graded sands and gravelly sands - little or no fines.
		SP	Poorly graded sands and gravelly sands - little or no fines.
	Sandy Soils	SM	Silty sand, sand-silt mixtures.
		SC	Clayey sands, sand-clay mixtures.
		-	Fill

GROUP	SYMBOL	DESCRIPTION
FINE GRAINED SOILS (>50% passing 0.075mm sieve)	ML	Inorganic silts, very find sands, rock flour, silty or clayey fine sands.
	CL	Inorganic low plasticity, gravelly clays, sandy clays, clays.
	CI	Inorganic medium plasticity clays, gravelly clays, clays.
	OL	Organic silts and organic clays of low plasticity.
	MH	Inorganic silts, micaceous or diatomaceous fine sands or silts.
	CH	Inorganic high plasticity gravely clays, sandy clays and clays.
	OH	Organic clays of medium to high plasticity.
	PT	Peat, muck and other highly organic soils.
		Coal

DESCRIPTIVE TERMS FOR SECONDARY / MINOR COMPONENT

COARSE GRAINED SOILS		FINE GRAINED SOILS	
% FINES	MODIFIER	% COARSE	MODIFIER
≤ 5	Omit, or use 'trace'	≤ 15	Omit, or use 'trace'
> 5 ≤ 12	Describe as 'with clay/silt' as applicable	>15 ≤ 30	Describe as 'with sand/gravel' as applicable
>12	Prefix soil as 'silty/clayey' as applicable	> 30	Prefix soil as 'sandy/gravely' as applicable

MOISTURE CONDITION

TERM	CODE	DESCRIPTION
Dry	D	Looks and feels dry; cohesive soils usually hard, powdery or friable, granular soils run freely through hands.
Moist	M	Soil feels cool, darkened in colour; cohesive soils usually weakened by moisture; granular soils tend to cohere, but no free water collects on hands on remoulding.
Wet	W	As above free water collects on hands when remoulding.

GRAIN SIZE

DESIGNATION	CLAY	SILT	SAND			GRAVEL			COBBLES	BOULDERS
			Fine (f)	Medium (m)	Coarse (c)	Fine (f)	Medium (m)	Coarse (c)		
GRAIN SIZE	2	75	200	600	2	6	20	60	200	
	Microns				Millimetres					

GRAIN SHAPE

Described as flaky, elongate or one of the following: angular, sub-angular, sub-rounded or rounded.

NOTE: Based on Classification System AS1726 – 1993
Field classification is an estimate and is therefore not precise

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SOIL STRUCTURE

ZONING	*Separate zones of soil which differ in colour, grain size or other property.*
Layer	continuous across exposure.
Lens	discontinuous layer with lenticular shape across exposure.
Pocket	irregular inclusion within exposure.

CEMENTING	
Weakly Cemented	sample shows a degree of cementing, but can be remoulded when saturated
Strongly Cemented	a cemented soil that can not be remoulded by hand when saturated

DEFECTS	*These may include fissures, cracks, root-holes.*
Bedding	layering of grains formed by deposition.
Foliation	layering of grains caused by pressure.
Joint	crack or discontinuity. Fissures are irregular joints of < 200 mm extent
Sheared zone	zone of sub-parallel smooth or slickensided joints, caused by shearing.
Wetted zone	zone wetter than adjacent soil.
Tube	tubular cavity (eg: from decomposed root)
Tube-cast	tubes infilled by material with rock strength.
Infilled seam	substance infilling defects.

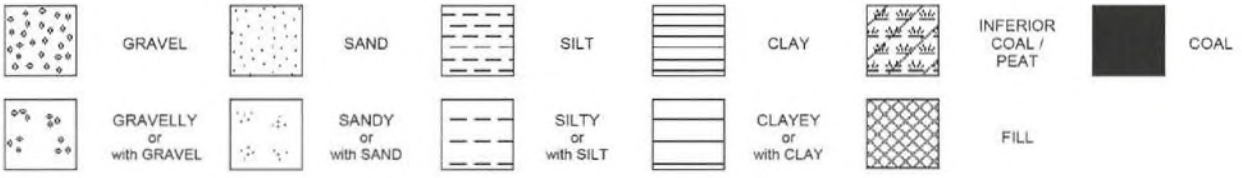
CONSISTENCY - COHESIVE SOILS

TERM	Undrained shear strength Su (kPa)	SPT blows per 300mm	FIELD GUIDE
Very Soft	≤ 12	<2	Exudes between the fingers when squeezed in hand
Soft	> 12 ≤ 25	2 - 4	Can be moulded by light finger pressure
Firm	> 25 ≤ 50	4 - 8	Can be moulded by strong finger pressure
Stiff	> 50 ≤ 100	8 - 15	Cannot be moulded by fingers. Can be indented by thumb
Very Stiff	> 100 ≤ 200	15 - 30	Can be indented by thumb nail
Hard	> 200	> 30	Can be indented with difficulty by thumb nail

CONSISTENCY - NON-COHESIVE SOILS

TERM	RELATIVE DENSITY %	SPT blows per 300mm
Very Loose	≤ 15	0 - 4
Loose	> 15 ≤ 35	4 - 10
Medium dense	> 35 ≤ 65	10 - 30
Dense	> 65 ≤ 85	30 - 50
Very Dense	> 85	> 50

GRAPHIC SYMBOLS FOR SOILS



NOTE: Based on Classification System AS1726 – 1993
Field classification is an estimate and is therefore not precise

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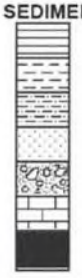
SOIL AND ROCK DESCRIPTION SHEET 3 – ROCKS

DESCRIPTION

SEDIMENTARY



Mudstone
Shale
Siltstone
Sandstone
Conglomerate
Limestone
Coal

METAMORPHIC

Low grade: slate, phyllite, schist etc
High grade: quartzite, gneiss, marble etc

IGNEOUS

Plutonic (generally coarse grained): granite gabbro etc
Hypabyssal (generally medium grained): micro-granite, dolerite
Volcanic (generally fine grained): rhyolite andesite, basalt etc
Pyroclastic: pumice, tuff etc

STRENGTH

TERM	SYMBOL	POINT LOAD INDEX (MPa) I_s50	FIELD GUIDE TO STRENGTH
Extremely low	EL	≤ 0.03	Easily remoulded by hand to a material with soil properties
Very low	VL	> 0.03 ≤ 0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with knife; too hard to cut a triaxial sample by hand. Pieces up to 3cm thick can be broken by finger pressure
Low	L	> 0.1 ≤ 0.3	Easily scored with a knife; indentations 1mm to 3mm show in the specimen with firm blows of the pick point; has dull sound under hammer. A piece of core 150mm long 50mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling
Medium	M	> 0.3 ≤ 1	Readily scored with a knife; a piece of core 150mm long by 50mm diameter can be broken by hand with difficulty
High	H	> 1 ≤ 3	A piece of core 150mm long by 50mm diameter cannot be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer
Very high	VH	> 3 ≤ 10	Hand specimen breaks with pick after more than one blow; rock rings under hammer
Extremely high	EH	> 10	Specimen requires many blows with geological pick to break through intact material; rock rings under hammer

GRAIN SIZE

DESIGNATION	Very Fine Grained	Fine Grained	Medium Grained	Coarse Grained	Very Coarse Grained
GRAIN SIZE	2	75	2	60	
	Microns		Millimetres		

BLOCK SIZE AND SHAPE

Block size may be described in millimetres.

Block shape may be described as:

Massive	- few defects or very widely spaced defects.
Blocky	- approximately equi-dimensional
Tabular	- one dimension considerably smaller than the other two.
Columnar	- two dimension considerably smaller than the other one.
Irregular	- wide variation in block size and shape.

FABRIC DEVELOPMENT

Development of layering (eg: bedding, foliation or lineation).

Isotropic	- no obvious development
Indistinct	- no obvious development
Well developed	- clearly visible

STRUCTURE

The structure of the rock 'mass', as distinct from the rock 'material' should be described in the following terms:

Sedimentary rocks	- Bedded, laminated (laminae are less than 20mm thick).
Metamorphic rocks	- Foliated, banded cleaved.
Igneous rocks	- Massive, flow banded.

NOTE: Based on Classification System AS1726 – 1993
Field classification is an estimate and is therefore not precise

GHD CLIENTS | PEOPLE | PERFORMANCE

BEDDING	SPACING (MM)	JOINTING
Very thickly bedded	> 2000	Very widely jointed
Thickly bedded	600 - 2000	Widely jointed
Medium bedded	200 - 600	Medium jointed
Thinly bedded	60 - 200	Closely jointed
Very thinly bedded	20 - 60	Very closely jointed
Extremely thinly bedded	6 - 20	Extremely closely jointed
Intensely bedded	< 6	Intensely jointed

COLOUR
Individual assessment of colour. Standard colour charts used only where specifically stated.

RQD - ROCK QUALITY DESIGNATION

RQD is calculated for like intervals of rock and not by core run or core tray. Note that when estimating RQD from drill core it is necessary to discount artificial breaks clearly caused by the drilling process or when fitting core into the tray. It should also be noted that the degree of fracturing of the core during the drilling process might be partly a function of core diameter in weaker rocks. RQD should not be determined on highly to extremely weathered rocks.

$$\frac{\textit{Sum of length of sound core pieces > 100mm}}{\textit{Total length of core interval (m)}} = \textit{RQD (\%)}$$

CORE RECOVERY

The end of a core run is shown by a horizontal line at the appropriate depth. Core recovery represents the ratio of core recovered to the length drilled expressed as a percentage of each run.

WATER PRESSURE TEST RESULTS

The results of the water pressure tests are from 5 stage, single or double packer tests and analysed using the methods outline by Houlsby 1990.

FRACTURE FREQUENCY

Fracture Frequency is calculated for like intervals of rock and not by core run or core tray.

$$\frac{\textit{Number of Fractures}}{\textit{Length of core interval (m)}} = \textit{Fracture Frequency}$$

WEATHERING

Weathering is the chemical alteration of the individual grains, the grain bonds or the groundmass materials and generally results in one or more of: loss of lustre, staining, cementing, leaching, disintegration, weakening or strength. Classification of rock substance weathering is based on visual classification.

DEGREE OF WEATHERING		SYMBOL		WEATHERING DESCRIPTION
Residual Soil		RS		Soil developed on extremely weathered rock; the mass structure and substance fabric are no longer evident; there is a large change in volume but the soil has not been significantly transported
Extremely Weathered Rock		XW		Rock is weathered to such an extent that it has 'soil' properties, i.e. it either disintegrates or can be remoulded in water
Distinctly Weathered Rock[1]	Highly Weathered Rock	DW	HW	Secondary minerals often weathered to clay. Staining of most grain boundaries and some disintegration due to weakening of grain bonds. Often significant loss of strength. However cementing of joints can occasionally lead to strengthening
	Moderately Weathered Rock		MW	Staining and pitting of most secondary minerals and other grain boundaries. The loss of strength depends upon the weathering and extent of secondary minerals in the rock matrix. The rock substance may be highly discoloured, usually by iron staining.
Slightly Weathered Rock		SW		Rock is slightly discoloured but shows little or no change of strength from fresh rock
Fresh Rock		FR		Rock shows no sign of decomposition or staining

[1] AS1726 suggests the term "Distinctly Weathered" (DW) to cover the range of substance weathering conditions between XW and SW. For projects where it is not practical to delineate between HW and MW or it is judged that there is no advantage in making such a decision, DW may be used with the definition given in AS1726.

DISCONTINUITY DESCRIPTION

TYPE

P	Parting
B	Broken Zone
C	Contact
Bd	Bed
J	Joint
F	Foliation
Db	Drill Break
Cv	Cleavage

SHAPE & ROUGHNESS

pl	Planar
u	Undulose
sl	Slickensided
r	Rough
c	Curved
st	Stepped
sm	Smooth

NATURE OF INFILLING

Ca	Carbonate
Cl	Clay
Fe	Iron Stained
PFe	Partly Iron Stained
Mn	Manganese
Q	Quartz
Ch	Chlorite
Py	Pyrite
W	Weathering Product

NOTE: Based on Classification System AS1726 – 1993
Field classification is an estimate and is therefore not precise

BOREHOLE LOG

SOIL

Bore No.: LY4245
Page: 1 of 12

Client: Loy Yang Power
Project: OB Dump Satability Installation
Job No.: 311145207
Location: LY OB Dump
Date Drilled: 05/09/2007 **to:**

Drilling Co.: Drilltec
Driller: B Vanderbrand
Rig Type: Cable Tool
Inclination: Vertical
Bearing:

Easting: 414676
Northing: 258381
Grid Ref:
Collar RL:
Logged by: RL **Checked by:** LT

DRILLING							SOIL DESCRIPTION			STRUCTURE, ADDITIONAL OBSERVATIONS AND COMMENTS	
Depth (m)	Run	Method	Support	Samples, Tests.	Water	Graphic Log	Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency		Elevation (m)
							Ground Surface				0.0
0.0		PC	C				CLAY with SAND (CH) Mottled yellowish brown/ pale white & pale red, some baked clay inclusions	M	F	Fill	
1.0				D							
				SPT: 1.5-1.8m, 3/3/2 (N=5)							
2.0											
				U(63) tube: 2.5-2.8m							
				D							
3.0				SPT: 3.0-3.3m, 2/3/3 (N=6)							
											-3.4
							COAL (OH) Band of coal.				-3.5
							CLAY (CH) Dark brown, with coal inclusions.				-3.9
4.0				D			COAL (OH) Band of coal.				-4.0
							CLAY (CH) Dark brown, with coal inclusions.				
				SPT: 4.5-4.8m, 0/2/5 (N=7)							-4.7
							CLAY with SAND (CH) Yellowish brown/ pale white staining, with sand.				
5.0				D							-5.0

NOTES:

GHD Soil Classifications: The GHD Soil Classification is based on Australian Standards AS 1726-1993: Geotechnical Site Investigation.

BOREHOLE LOG

SOIL

Bore No.: LY4245
Page: 2 of 12

Client: Loy Yang Power
Project: OB Dump Satability Installation
Job No.: 311145207
Location: LY OB Dump
Date Drilled: 05/09/2007 **to:**

Drilling Co.: Drilltec
Driller: B Vanderbrand
Rig Type: Cable Tool
Inclination: Vertical
Bearing:

Easting: 414676
Northing: 258381
Grid Ref:
Collar RL:
Logged by: RL **Checked by:** LT

DRILLING							SOIL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	STRUCTURE, ADDITIONAL OBSERVATIONS AND COMMENTS	Elevation (m)
Depth (m)	Run	Method	Support	Samples, Tests.	Water	Graphic Log					
							Pale yellowish brown/ dark brown.				-5.5
				U(63) tube: 5.5-5.9m			Mottled yellowish brown/ pale grey/ pale red.				-6.0
				D							
6.0				SPT: 6.0-6.3m, 1/3/4 (N=7)			CLAY (CH) Mottled yellowish brown/ pale greyish white/ pale reddish brown, trace of fine sand.				
				D							-7.0
7.0							Mottled yellowish brown/ light grey/pale white.				-7.3
							COAL (OH)				-7.5
				SPT: 7.5-7.8m, 0/3/5 (N=8)			INFERIOR COAL (PT) Clay and inferior coal mix, pale yellowish brown with pale white staining & black.		ST		-7.9
				D			COAL (OH) Black.				-8.0
8.0							Clay & coal mix, pale yellowish brown with pale white stainnig & black coal.				-8.5
				U(63) tube: 8.5-8.9m			CLAY (CL) Mixture of sandy clay & ligneous clay, pale brown & black.				-9.0
9.0				SPT: 9.0-9.3m, 2/4/5 (N=9)			INFERIOR COAL (OL) Black.				
				D			Some clay inclusions.				-9.5
10.0											

NOTES:

GHD Soil Classifications: The GHD Soil Classification is based on Australian Standards AS 1726-1993: Geotechnical Site Investigation.

BOREHOLE LOG

SOIL

Bore No.: LY4245
Page: 3 of 12

Client: Loy Yang Power
Project: OB Dump Satability Installation
Job No.: 311145207
Location: LY OB Dump
Date Drilled: 05/09/2007 **to:**

Drilling Co.: Drilltec
Driller: B Vanderbrand
Rig Type: Cable Tool
Inclination: Vertical
Bearing:

Easting: 414676
Northing: 258381
Grid Ref:
Collar RL:
Logged by: RL **Checked by:** LT

DRILLING											
Depth (m)	Run	Method	Support	Samples, Tests.	Water	Graphic Log	SOIL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	STRUCTURE, ADDITIONAL OBSERVATIONS AND COMMENTS	Elevation (m)
				D							
				SPT: 10.5-10.8m, 0/3/5 (N=8)			Brownish black.				-10.5
11.0				D							
				D							
12.0				SPT: 12.0-12.3m, 2/4/5 (N=9)							
				D							
13.0				D							
				SPT: 13.5-13.8m, 2/4/7 (N=11)							
14.0				D			COAL (OH) Coal & clay mix. Clay: mottled yellowish brown/ pale red & white.				-14.0
				D							
				D							-14.6
				U(63) tube: 14.6-15m.			INFERIOR COAL (OL) Dark brownish black.				
15.0											

NOTES:

GHD Soil Classifications: The GHD Soil Classification is based on Australian Standards AS 1726-1993: Geotechnical Site Investigation.

BOREHOLE LOG

SOIL

Bore No.: LY4245

Page: 4 of 12

Client: Loy Yang Power
Project: OB Dump Satability Installation
Job No.: 311145207
Location: LY OB Dump
Date Drilled: 05/09/2007 **to:**

Drilling Co.: Drilltec
Driller: B Vanderbrand
Rig Type: Cable Tool
Inclination: Vertical
Bearing:

Easting: 414676
Northing: 258381
Grid Ref:
Collar RL:
Logged by: RL **Checked by:** LT

DRILLING											
Depth (m)	Run	Method	Support	Samples, Tests.	Water	Graphic Log	SOIL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	STRUCTURE, ADDITIONAL OBSERVATIONS AND COMMENTS	Elevation (m)
				D							
				SPT: 15.1-15.4m, 3/5/8 (N=13)							
				D							
16.0				D							
				D							
				SPT: 16.5-16.8m, 3/7/7 (N=14)							
17.0				D							-17.5
				U(63) tube: 17.5-17.9m.			With pale brown clay bands.				
18.0				D							
				SPT: 18.1-18.4m, 0/4/7 (N=11)							
				D							-18.9
19.0				D			With small bands of pale brownish grey silt.				
				SPT: 19.5-19.9m, 4/8/10 (N=18)					VST		
20.0											

NOTES:

GHD Soil Classifications: The GHD Soil Classification is based on Australian Standards AS 1726-1993: Geotechnical Site Investigation.

BOREHOLE LOG

SOIL

Bore No.: LY4245
Page: 5 of 12

Client: Loy Yang Power
Project: OB Dump Satability Installation
Job No.: 311145207
Location: LY OB Dump
Date Drilled: 05/09/2007 **to:**

Drilling Co.: Drilltec
Driller: B Vanderbrand
Rig Type: Cable Tool
Inclination: Vertical
Bearing:

Easting: 414676
Northing: 258381
Grid Ref:
Collar RL:
Logged by: RL **Checked by:** LT

DRILLING											
Depth (m)	Run	Method	Support	Samples, Tests	Water	Graphic Log	SOIL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	STRUCTURE, ADDITIONAL OBSERVATIONS AND COMMENTS	Elevation (m)
				U(63) tube: 20.0-20.4m.							-20.4
				D			Mixture of dark white ligneous clay and brownish black inferior coal				-20.7
				D			LIGNEOUS CLAY (OH) mottled brownish black & brownish grey.				-21.0
21.0				SPT: 21.0-21.3m, 5/9/10 (N=19)			INFERIOR COAL (OH) Mixture of brownish blackinferior coal & dark brown lignious clay.				
				D							
22.0				D							
				D							-22.4
				SPT: 22.5-22.8m, 6/7/13 (N=20)			LIGNIOS CLAY (OH) Dark brown with brownish black inclusions.				-22.8
							Dark brown with bands of pale white & pale red clay.				
23.0				U(63) tube: 23.0-23.4m.							-23.1
							Dark brown.				-23.4
				D			CLAY (CH) Mottled pale grey & pale pink.				-23.9
24.0				SPT: 24.0-24.3m, 4/7/10 (N=17)			Mottled pale grey, pale brown & pale pink.				
				D				M-W			
25.0								M			

NOTES:

GHD Soil Classifications: The GHD Soil Classification is based on Australian Standards AS 1726-1993: Geotechnical Site Investigation.

BOREHOLE LOG

SOIL

Bore No.: LY4245
Page: 6 of 12

Client: Loy Yang Power
Project: OB Dump Satability Installation
Job No.: 311145207
Location: LY OB Dump
Date Drilled: 05/09/2007 **to:**

Drilling Co.: Drilltec
Driller: B Vanderbrand
Rig Type: Cable Tool
Inclination: Vertical
Bearing:

Easting: 414676
Northing: 258381
Grid Ref:
Collar RL:
Logged by: RL **Checked by:** LT

DRILLING							SOIL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	STRUCTURE, ADDITIONAL OBSERVATIONS AND COMMENTS	Elevation (m)
Depth (m)	Run	Method	Support	Samples, Tests.	Water	Graphic Log					
											-25.4
				SPT: 25.5-25.8m, 4/7/10 (N=17)			Mottled pale brownish grey/ pale yellowish brown.				
26.0				U(63) tube: 26.0-26.4m.							
											-27.0
27.0				SPT: 27.0-27.3m, 3/7/10 (N=17)			INFERIOR COAL (OH) With pale yellowish brown clay inclusions.				
				D							-27.5
							CLAY (CH) Mottled pale yellowish brown/ pale greyish brown/ pale white.				
28.0				D							
											-28.5
				SPT: 28.5-28.8m, 3/6/6 (N=12)			INFERIOR COAL (OH) With mottled pale grey & pale pink clay inclusions.	M-W	ST		
29.0				U(63) tube: 29.0-29.4m.				W			
				D							
30.0											-30.0

NOTES:

GHD Soil Classifications: The GHD Soil Classification is based on Australian Standards AS 1726-1993: Geotechnical Site Investigation.

BOREHOLE LOG

SOIL

Bore No.: LY4245
Page: 7 of 12

Client: Loy Yang Power
Project: OB Dump Satability Installation
Job No.: 311145207
Location: LY OB Dump
Date Drilled: 05/09/2007 **to:**

Drilling Co.: Drilltec
Driller: B Vanderbrand
Rig Type: Cable Tool
Inclination: Vertical
Bearing:

Easting: 414676
Northing: 258381
Grid Ref:
Collar RL:
Logged by: RL **Checked by:** LT

DRILLING											
Depth (m)	Run	Method	Support	Samples, Tests.	Water	Graphic Log	SOIL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	STRUCTURE, ADDITIONAL OBSERVATIONS AND COMMENTS	Elevation (m)
				SPT: 30.0-30.3m, 0/4/6 (N=10)			With dark blackish brown ligneous clay & pale yellowish brown clay.				
				D							-30.9
31.0				D			LIGNEOUS CLAY (OH) With inferior coal inclusions, dark blackish brown.				
				D							-31.5
				SPT: 31.5-31.8m, 3/8/11 (N=19)			INFERIOR COAL (OH) Dark brownish black.		VST		
32.0				U(63) tube: 32.0-32.4m.				M			
				D			Some clay inclusions.				-32.6
33.0				SPT: 33.0-33.3m, 2/4/8 (N=12)					ST		
				D							
34.0				D							
35.0											-35.0

NOTES:

GHD Soil Classifications: The GHD Soil Classification is based on Australian Standards AS 1726-1993: Geotechnical Site Investigation.

BOREHOLE LOG

SOIL

Bore No.: LY4245

Page: 8 of 12

Client: Loy Yang Power
Project: OB Dump Satability Installation
Job No.: 311145207
Location: LY OB Dump
Date Drilled: 05/09/2007 **to:**

Drilling Co.: Drilltec
Driller: B Vanderbrand
Rig Type: Cable Tool
Inclination: Vertical
Bearing:

Easting: 414676
Northing: 258381
Grid Ref:
Collar RL:
Logged by: RL **Checked by:** LT

DRILLING											
Depth (m)	Run	Method	Support	Samples, Tests.	Water	Graphic Log	SOIL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	STRUCTURE, ADDITIONAL OBSERVATIONS AND COMMENTS	Elevation (m)
				U(63) tube: 35.0-35.4m.			CLAY (CH) With coal inclusions, mottled pale yellowish brown/ pale orange/ light grey & brownish black.				
				D							-36.0
36.0				SPT: 36.0-36.3m, 1/6/8 (N=14)			Mottled pale yellowish brown & pale brownish grey.				
											-36.6
							With coal inclusions, mottled pale grey/ pale yellowish brown/ pale red/ brownish black.				
37.0				D							
				D							
				SPT: 37.5-37.8m, 3/7/10 (N=17)					VST		
38.0				U(63) tube: 38.0-38.4m							
				D							
39.0				SPT: 39.0-39.3m, 3/7/10 (N=17)							
											-39.6
							LIGNEOUS CLAY (OH) With clay inclusions, blackish brown with pale white/ pale yellow brown inclusions.				
40.0				D							

NOTES:

GHD Soil Classifications: The GHD Soil Classification is based on Australian Standards AS 1726-1993: Geotechnical Site Investigation.

BOREHOLE LOG

SOIL

Bore No.: LY4245

Page: 9 of 12

Client: Loy Yang Power
Project: OB Dump Satability Installation
Job No.: 311145207
Location: LY OB Dump
Date Drilled: 05/09/2007 **to:**

Drilling Co.: Drilltec
Driller: B Vanderbrand
Rig Type: Cable Tool
Inclination: Vertical
Bearing:

Easting: 414676
Northing: 258381
Grid Ref:
Collar RL:
Logged by: RL **Checked by:** LT

DRILLING											
Depth (m)	Run	Method	Support	Samples, Tests.	Water	Graphic Log	SOIL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	STRUCTURE, ADDITIONAL OBSERVATIONS AND COMMENTS	Elevation (m)
				D							
				SPT: 40.5-40.8m, 3/8/10 (N=18)							
41.0				U(63) tube: 41.0-41.4m.							
				D							
42.0				SPT: 42.0-42.3m, 3/6/8 (N=14)			Dark brownish black with pale white clay.	W	ST		-42.0
				D							
43.0				SPT: 43.5-43.8m, 0/3/7 (N=10)							
44.0				U(63) tube: 44.0-44.4m.							
45.0											

NOTES:

GHD Soil Classifications: The GHD Soil Classification is based on Australian Standards AS 1726-1993: Geotechnical Site Investigation.

BOREHOLE LOG

SOIL

Bore No.: LY4245

Page: 1 of 12

Client: Loy Yang Power
Project: OB Dump Satability Installation
Job No.: 311145207
Location: LY OB Dump
Date Drilled: 05/09/2007 **to:**

Drilling Co.: Drilltec
Driller: B Vanderbrand
Rig Type: Cable Tool
Inclination: Vertical
Bearing:

Easting: 414676
Northing: 258381
Grid Ref:
Collar RL:
Logged by: RL **Checked by:** LT

DRILLING											
Depth (m)	Run	Method	Support	Samples, Tests.	Water	Graphic Log	SOIL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	STRUCTURE, ADDITIONAL OBSERVATIONS AND COMMENTS	Elevation (m)
				D							-45.5
							CLAY (CH) With coal inclusions, mottled yellowish brown/ pale grey/ pale red/ brownish black.	M			-46.0
46.0				SPT: 46.0-46.3m, 1/24/Refusal (N=R)			Mottled pale white/ yellowish brown/ pale red/ brownish black.				
				D							-47.0
47.0				U(63) tube: 47.0-47.4m.			SAND with SILT (SM) Coarse grained with gravel inclusions, pale brown,	W	D	Natural	-47.4
				D			CLAY (CH) With coarse grained sand, mottled pale red/ pale grey/ yellowish brown.	M	VST		-47.9
48.0							SAND (SC) With Clay, medium grained, mottled pale yellowish brown/ pale red/ pale yellow.		VD		
49.0				SPT: 49.0-49.3m, 4/20/Refusal (N=R)							
50.0											-50.0

NOTES:

GHD Soil Classifications: The GHD Soil Classification is based on Australian Standards AS 1726-1993: Geotechnical Site Investigation.

BOREHOLE LOG

SOIL

Bore No.: LY4245
Page: 1 of 12

Client: Loy Yang Power
Project: OB Dump Satability Installation
Job No.: 311145207
Location: LY OB Dump
Date Drilled: 05/09/2007 **to:**

Drilling Co.: Drilltec
Driller: B Vanderbrand
Rig Type: Cable Tool
Inclination: Vertical
Bearing:

Easting: 414676
Northing: 258381
Grid Ref:
Collar RL:
Logged by: RL **Checked by:** LT

DRILLING											
Depth (m)	Run	Method	Support	Samples, Tests.	Water	Graphic Log	SOIL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	STRUCTURE, ADDITIONAL OBSERVATIONS AND COMMENTS	Elevation (m)
				U(63) tube: 50.0-50.4m.			CLAY (CH) Mottled yellowish brown/ pale grey/ pale red.		H		
				SPT: 50.5-50.8m, 4/15/Refusal (N=R)							-50.6
							With fine grained sand, pale grey with yellowish brown staining.				
51.0				D							
				D							
52.0				SPT: 52.0-52.3m, 6/17/Refusal (N=R)				M-W			
53.0				D			SAND (SP) Very coarse sand with gravel, pale brown.	W	D		-53.0
54.0											
				D							
55.0				D							

NOTES:

GHD Soil Classifications: The GHD Soil Classification is based on Australian Standards AS 1726-1993: Geotechnical Site Investigation.

BOREHOLE LOG

SOIL

Bore No.: LY4245

Page: 12 of 12

Client: Loy Yang Power
Project: OB Dump Satability Installation
Job No.: 311145207
Location: LY OB Dump
Date Drilled: 05/09/2007 **to:**

Drilling Co.: Drilltec
Driller: B Vanderbrand
Rig Type: Cable Tool
Inclination: Vertical
Bearing:

Easting: 414676
Northing: 258381
Grid Ref:
Collar RL:
Logged by: RL **Checked by:** LT

DRILLING											
Depth (m)	Run	Method	Support	Samples, Tests.	Water	Graphic Log	SOIL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	STRUCTURE, ADDITIONAL OBSERVATIONS AND COMMENTS	Elevation (m)
				D							-56.0
56.0				D			CLAY (CL) With coarse grained sand, yellowish brown.	M	VS		-56.5
				D			SAND (SP) Very coarse sand with gravel, pale brown.		VD		
57.0											-57.7
				SPT : 57.4-57.7m, 1/5/5 (N=10)			**End of Borehole @ 57.5m.**				
58.0											
59.0											
60.0											

NOTES:

GHD Soil Classifications: The GHD Soil Classification is based on Australian Standards AS 1726-1993: Geotechnical Site Investigation.

BOREHOLE LOG

SOIL

Bore No.: LY4246
Page: 1 of 9

Client: Loy Yang Power
Project: OB Dump Stability Inatallations
Job No.: 311145207
Location: LY OB Dump
Date Drilled: 01/02/2008 **to:** 14/02/2008

Drilling Co.: Drilltec
Driller: B Vanderbrand
Rig Type: Cable Tool
Inclination: Vertical
Bearing:

Easting: 415273
Northing: 258336
Grid Ref:
Collar RL: 134.63
Logged by: RL **Checked by:** LT

DRILLING											
Depth (m)	Run	Method	Support	Samples, Tests.	Water	Graphic Log	SOIL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	STRUCTURE, ADDITIONAL OBSERVATIONS AND COMMENTS	Elevation (m)
							Ground Surface				0.0
0.0		PC	C	D			CLAY (CH) Brown/ yellow/ grey, trace of coarse sand.	M	ST		
1.0				D			Brown/ grey to pale grey.				-1.0
				SPT: 1.5-1.8m, 5/5/5 (N=10)							
2.0				D			Reddish brown/ light brown/ yellow/ grey.				-2.0
				U(63) Tube: 2.5-2.9m							
				D							
3.0				SPT: 3.0-3.3m, 1/2/2 (N=4)			CLAY with SAND (CI) Brown/ grey/ yellow.	M	ST		-3.0
4.0				D			CLAY (CH) Light brown/ yellow/ light grey, trace of coarse sand.	M	ST		-4.0
				SPT: 4.5-4.8m, 3/3/4 (N=7)							
5.0											

NOTES:

GHD Soil Classifications: The GHD Soil Classification is based on Australian Standards AS 1726-1993: Geotechnical Site Investigation.

BOREHOLE LOG

SOIL

Bore No.: LY4246

Page: 2 of 9

Client: Loy Yang Power
Project: OB Dump Stability Inatallations
Job No.: 311145207
Location: LY OB Dump
Date Drilled: 01/02/2008 **to:** 14/02/2008

Drilling Co.: Drilltec
Driller: B Vanderbrand
Rig Type: Cable Tool
Inclination: Vertical
Bearing:

Easting: 415273
Northing: 258336
Grid Ref:
Collar RL: 134.63
Logged by: RL **Checked by:** LT

DRILLING											
Depth (m)	Run	Method	Support	Samples, Tests.	Water	Graphic Log	SOIL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	STRUCTURE, ADDITIONAL OBSERVATIONS AND COMMENTS	Elevation (m)
								M	ST		
				U(63) Tube: 5.5-5.9m							
				D							-6.0
6.0				SPT: 6.0-6.3m, 3/3/6 (N=9)			Brown/ yellow/ grey with trace of coarse sand and trace of dark brown inferior coal.				
				D							-7.0
7.0							Dark brown/ Black ligneous clay inclusions.				
				SPT: 7 .5-7.8m, 2/3/5 (N=8)							
				D							
8.0											
				U(63) Tube: 8.5-8.9m							
				D							
9.0				SPT: 9.0-9.3m, 3/5/5 (N=10)							
10.0											

NOTES:

GHD Soil Classifications: The GHD Soil Classification is based on Australian Standards AS 1726-1993: Geotechnical Site Investigation.

BOREHOLE LOG

SOIL

Bore No.: LY4246
Page: 3 of 9

Client: Loy Yang Power
Project: OB Dump Stability Inatallations
Job No.: 311145207
Location: LY OB Dump
Date Drilled: 01/02/2008 **to:** 14/02/2008

Drilling Co.: Drilltec
Driller: B Vanderbrand
Rig Type: Cable Tool
Inclination: Vertical
Bearing:

Easting: 415273
Northing: 258336
Grid Ref:
Collar RL: 134.63
Logged by: RL **Checked by:** LT

DRILLING											
Depth (m)	Run	Method	Support	Samples, Tests.	Water	Graphic Log	SOIL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	STRUCTURE, ADDITIONAL OBSERVATIONS AND COMMENTS	Elevation (m)
				D				M	ST		
				SPT: 10.5-10.8m, 3/5/6 (N=11)							
				D							
11.0											-11.0
				U(63) Tube: 11.5-11.9m			LIGNEOUS CLAY (OH) Dark brown/ black	D	ST		
				D							
12.0				SPT: 12.0-12.3m, 5/6/7 (N=13)							
				D							
13.0											-13.0
							With light brown/ pink/ light grey clay inclusions.	M			
				SPT: 13.5-13.8m, 4/5/8 (N=13)							
				D							
14.0											
				U(63) Tube: 14.5-14.9m							
15.0											

NOTES:

GHD Soil Classifications: The GHD Soil Classification is based on Australian Standards AS 1726-1993: Geotechnical Site Investigation.

BOREHOLE LOG

SOIL

Bore No.: LY4246

Page: 4 of 9

Client: Loy Yang Power
Project: OB Dump Stability Inatallations
Job No.: 311145207
Location: LY OB Dump
Date Drilled: 01/02/2008 **to:** 14/02/2008

Drilling Co.: Drilltec
Driller: B Vanderbrand
Rig Type: Cable Tool
Inclination: Vertical
Bearing:

Easting: 415273
Northing: 258336
Grid Ref:
Collar RL: 134.63
Logged by: RL **Checked by:** LT

DRILLING							SOIL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	STRUCTURE, ADDITIONAL OBSERVATIONS AND COMMENTS	Elevation (m)
Depth (m)	Run	Method	Support	Samples, Tests.	Water	Graphic Log					
				SPT: 15.0-15.3m, 4/5/8 (N=13)				M	ST		
16.0				D							
				SPT: 16.5-16.8m, 5/5/6 (N=11)							
17.0				D							-17.0
				U(63) Tube: 17.5-17.9m			With brown/ yellow/ pink clay inclusions, trace of sand.				
				D							
18.0				SPT: 18.0-18.3m, 4/4/5 (N=9)							
				D							
19.0							Clay (CH) Brown/ yelow/ pink, trace of ligneous clay inclusions.	M	ST		-19.0
				SPT: 19.5-19.8m, 4/6/9 (N=15)							
20.0											-20.0

NOTES:

GHD Soil Classifications: The GHD Soil Classification is based on Australian Standards AS 1726-1993: Geotechnical Site Investigation.

BOREHOLE LOG

SOIL

Bore No.: LY4246
Page: 5 of 9

Client: Loy Yang Power
Project: OB Dump Stability Inatallations
Job No.: 311145207
Location: LY OB Dump
Date Drilled: 01/02/2008 **to:** 14/02/2008

Drilling Co.: Drilltec
Driller: B Vanderbrand
Rig Type: Cable Tool
Inclination: Vertical
Bearing:

Easting: 415273
Northing: 258336
Grid Ref:
Collar RL: 134.63
Logged by: RL **Checked by:** LT

DRILLING											
Depth (m)	Run	Method	Support	Samples, Tests.	Water	Graphic Log	SOIL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	STRUCTURE, ADDITIONAL OBSERVATIONS AND COMMENTS	Elevation (m)
				U(63) Tube: 20.0-20.4m			Light brown/ yellow/ red.	M	ST		
				D							-21.0
21.0				SPT: 21.0-21.3m, 5/8/9 (N=17)			Brown/ yellow with ligneous clay inclusions.				
				D							-22.0
22.0							LIGNEOUS CLAY (OH) Dark brown/ black with brown/ yellow/ grey clay inclusions.	M	ST		
				SPT: 22.5-22.8m, 4/7/8 (N=15)							
				D							-23.0
23.0				U(63) Tube: 23.0-23.4m			Trace of brown/ yellow/grey clay inclusions.				
				D							-24.0
24.0				SPT: 24.0-24.3m, 3/5/4 (N=9)			With sand, trace of brown/ yellow clay.				
25.0											-25.0

NOTES:

GHD Soil Classifications: The GHD Soil Classification is based on Australian Standards AS 1726-1993: Geotechnical Site Investigation.

BOREHOLE LOG

SOIL

Bore No.: LY4246

Page: 6 of 9

Client: Loy Yang Power
Project: OB Dump Stability Inatallations
Job No.: 311145207
Location: LY OB Dump
Date Drilled: 01/02/2008 **to:** 14/02/2008

Drilling Co.: Drilltec
Driller: B Vanderbrand
Rig Type: Cable Tool
Inclination: Vertical
Bearing:

Easting: 415273
Northing: 258336
Grid Ref:
Collar RL: 134.63
Logged by: RL **Checked by:** LT

DRILLING											
Depth (m)	Run	Method	Support	Samples, Tests.	Water	Graphic Log	SOIL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	STRUCTURE, ADDITIONAL OBSERVATIONS AND COMMENTS	Elevation (m)
				D			With coarse sand	W	ST		
				SPT: 25.5-25.8m, 3/3/5 (N=8)							
				D							-26.0
26.0				U(63) Tube: 26.0-26.4m			With coarse sand & trace of gravel.				
				D							-27.0
27.0				SPT: 27.0-27.3m, 4/7/10 (N=17)			Trace brown/ yellow/ grey clay inclusions.				
				D							
28.0				SPT: 28.5-28.8m, 6/7/12 (N=19)							
				D							-29.0
29.0				U(63) Tube: 29.0-29.4m			CLAY (CH) Brown/ Light grey, with ligneous clay inclusions.	W	ST		
											-30.0
30.0											

NOTES:

GHD Soil Classifications: The GHD Soil Classification is based on Australian Standards AS 1726-1993: Geotechnical Site Investigation.

BOREHOLE LOG

SOIL

Bore No.: LY4246

Page: 7 of 9

Client: Loy Yang Power
Project: OB Dump Stability Inatallations
Job No.: 311145207
Location: LY OB Dump
Date Drilled: 01/02/2008 **to:** 14/02/2008

Drilling Co.: Drilltec
Driller: B Vanderbrand
Rig Type: Cable Tool
Inclination: Vertical
Bearing:

Easting: 415273
Northing: 258336
Grid Ref:
Collar RL: 134.63
Logged by: RL **Checked by:** LT

DRILLING											
Depth (m)	Run	Method	Support	Samples, Tests.	Water	Graphic Log	SOIL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	STRUCTURE, ADDITIONAL OBSERVATIONS AND COMMENTS	Elevation (m)
				SPT: 30.0-30.3m, 5/6/8 (N=14)			Pale brown/ grey, absence of clay inclusions.	W	ST		
31.0				D				M			
				SPT: 31.5-31.8m, 6/7/9 (N=16)							
				D							
32.0				U(63) Tube: 32.0-32.4m			Brown/ grey/ pale pink.				-32.0
				D							
33.0				SPT: 33.0-33.3m, 8/9/12 (N=21)							
				D							
34.0				SPT: 34.5-34.8m, 7/9/11 (N=20)							
35.0											-35.0

NOTES:

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BOREHOLE LOG

SOIL

Bore No.: LY4246

Page: 8 **of** 9

Client: Loy Yang Power
Project: OB Dump Stability Inatallations
Job No.: 311145207
Location: LY OB Dump
Date Drilled: 01/02/2008 **to:** 14/02/2008

Drilling Co.: Drilltec
Driller: B Vanderbrand
Rig Type: Cable Tool
Inclination: Vertical
Bearing:

Easting: 415273
Northing: 258336
Grid Ref:
Collar RL: 134.63
Logged by: RL **Checked by:** LT

DRILLING											
Depth (m)	Run	Method	Support	Samples, Tests.	Water	Graphic Log	SOIL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	STRUCTURE, ADDITIONAL OBSERVATIONS AND COMMENTS	Elevation (m)
				U(63) Tube: 35.0-35.4m			LIGNEOUS CLAY (OH) Dark brown/ black with brown/ grey/ pink clay inclusions.	M	ST		
36.0				D			CLAY (CH) Brown/ light grey/ pink with dark brown/ black ligneous clay inclusions.	M	ST		-36.0
37.0				D			Reddish brown/ yellow/ grey/ pink/ pale brown				-37.0
				D							
38.0				U(63) Tube: 38.0-38.4m							
39.0				D			CLAY with SAND (Cl) Pale brown/ yellow/ grey.	W	ST	Natural	-39.0
40.0											-40.0

NOTES:

GHD Soil Classifications: The GHD Soil Classification is based on Australian Standards AS 1726-1993: Geotechnical Site Investigation.

BOREHOLE LOG

SOIL

Bore No.: LY4246
Page: 9 of 9

Client: Loy Yang Power
Project: OB Dump Stability Inatallations
Job No.: 311145207
Location: LY OB Dump
Date Drilled: 01/02/2008 **to:** 14/02/2008

Drilling Co.: Drilltec
Driller: B Vanderbrand
Rig Type: Cable Tool
Inclination: Vertical
Bearing:

Easting: 415273
Northing: 258336
Grid Ref:
Collar RL: 134.63
Logged by: RL **Checked by:** LT

DRILLING											
Depth (m)	Run	Method	Support	Samples, Tests.	Water	Graphic Log	SOIL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	STRUCTURE, ADDITIONAL OBSERVATIONS AND COMMENTS	Elevation (m)
41.0				D U(63) Tube: 41.0-41.4m			With coasrse grained sand, pale brown/ yellow/ pale grey.	W	ST		
42.0											
43.0											
44.0											-44.0
							End of Borehole @ 44m.				
45.0											

NOTES:

GHD Soil Classifications: The GHD Soil Classification is based on Australian Standards AS 1726-1993: Geotechnical Site Investigation.

BOREHOLE LOG SHEET

Client :	Loy Yang Power			**HOLE No. LY4379**	
Project :	Geotechnical Investigations				**SHEET 1 OF 6**
Location :	Overburden Dump				
Position :	416668.0 E,258119.0 N SECV	**Surface RL:** 160.0m	**Inclination\Bearing:** 90		**Processed :** AF
Rig Type :	Cable Tool	**Contractor :**	**Driller :**		**Checked :**
Date Started :	22/10/09	**Date Completed :** 23/10/09	**Logged by :** AF		**Date :**

DRILLING					MATERIAL						
SCALE (m)	Drilling Method	Hole Support / Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	Group Symbol	Description SOIL TYPE, colour, structure,minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Relative Density	Comments/ Observations
1				U63 P.P.>450kPa			CH	CLAY brown, orange, high plasticity	M	St	The samples were collected by the driller and logging was based on the samples observed in the lab.
2					2.00 158.00		ML	SILT grey, light brown, low plasticity, with some sand	M	St	
3				SPT 2/3/4 N=7							
4											
5				U63 P.P.=350kPa	5.00 155.00		CL	Ligneous CLAY/SILT black, grey, low to medium plasticity	M		
6				SPT 3/5/6 N=11							
7					7.00 153.00		ML	SILT dark grey, with inferior coal	M		
8				U63 P.P.=375kPa				more clay content			
9				SPT 5/7/7 N=14				dark brown		VSt	
10											

See standard sheets for details of abbreviations & basis of descriptions

GHD GEOTECHNICS
Lvl 8, 180 Lonsdale Street, Melbourne VIC 3000
T: 61 3 8687 8000 F: 61 3 8687 8111 E: melmail@ghd.com.au
CONSULTING GEOTECHNICAL ENGINEERS AND GEOLOGISTS

Job No. 311145209

GEO_BOREHOLE LY4379.GPJ GHD_GEO_TEMPLATE_VICTORIA.GDT 6/1/10

BOREHOLE LOG SHEET

Client :	Loy Yang Power			**HOLE No. LY4379**	
Project :	Geotechnical Investigations				**SHEET 2 OF 6**
Location :	Overburden Dump				
Position :	416668.0 E,258119.0 N	SECV	**Surface RL:** 160.0m	**Inclination\Bearing:** 90	**Processed :** AF
Rig Type :	Cable Tool		**Contractor :**	**Driller :**	**Checked :**
Date Started :	22/10/09		**Date Completed :** 23/10/09	**Logged by :** AF	**Date :**

DRILLING					MATERIAL						
SCALE (m)	Drilling Method	Hole Support / Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	Group Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Relative Density	Comments/ Observations
11				U63 P.P.=300kPa				some sand, coarse	M		
12				SPT 2/3/3 N=6	12.00 148.00		CH	CLAY/SILT with inferior coal black, grey and red brown	M	F-St	
13								more inferior coal			
14				U63 P.P.=250kPa							
15				SPT 3/6/9 N=15							
16								more silt content, dark brown			
17				U63 P.P.=150kPa	17.00 143.00		ML	SILT with coal inclusion dark brown, low plasticity	M	St	
18				SPT 2/3/4 N=5							
19											
20				U63 P.P.=400kPa							

GEO BOREHOLE LY4379.GPJ GHD_GEO_TEMPLATE_VICTORIA.GDT 6/1/10

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BOREHOLE LOG SHEET

Client :	Loy Yang Power			**HOLE No. LY4379**	
Project :	Geotechnical Investigations				**SHEET 3 OF 6**
Location :	Overburden Dump				
Position :	416668.0 E,258119.0 N	SECV	**Surface RL:** 160.0m	**Inclination\Bearing:** 90	**Processed :** AF
Rig Type :	Cable Tool		**Contractor :**	**Driller :**	**Checked :**
Date Started :	22/10/09		**Date Completed :** 23/10/09	**Logged by :** AF	**Date :**

DRILLING					MATERIAL						
SCALE (m)	Drilling Method	Hole Support / Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	Group Symbol	Description SOIL TYPE, colour, structure,minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Relative Density	Comments/ Observations
								with some clay	M	St	
21				SPT 4/5/7 N=12	21.00 139.00		CL	SANDY CLAY, brown, grey, coarse sand	M	VSt	
22								inferior coal/silt dark brown			
				U63 P.P.=450kPa							
23								less sand			
24				SPT 4/6/8 N=14							
25								with some sand, orange mottling			
				U63 P.P.=100kPa							
26								grey, orange			
27				SPT 5/8/12 N=20	27.00 133.00		CH	CLAY. grey, red brown, with coal inclusion	M	VSt	
28											
				U63 P.P.=200kPa							
29											
30											

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GEO_BOREHOLE LY4379.GPJ GHD_GEO_TEMPLATE_VICTORIA.GDT 6/1/10

BOREHOLE LOG SHEET

Client :	Loy Yang Power	**HOLE No. LY4379**	
Project :	Geotechnical Investigations		**SHEET 4 OF 6**
Location :	Overburden Dump		
Position :	416668.0 E,258119.0 N SECV	**Surface RL:** 160.0m	**Inclination\Bearing:** 90
Rig Type :	Cable Tool	**Contractor :**	**Driller :**
Date Started :	22/10/09	**Date Completed :** 23/10/09	**Logged by :** AF

Processed : AF
Checked :
Date :

DRILLING					MATERIAL						
SCALE (m)	Drilling Method	Hole Support / Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	Group Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Relative Density	Comments/ Observations
31				SPT 7/8/9 N=17				dark brown	M	VSt	
32				U63 P.P.>450kPa	32.00 128.00		ML	SILT with inferior coal dark brown, low plasticity		VSt	
33				SPT 4/6/7 N=13							
34											
35				U63 P.P.=225kPa	35.00 125.00		CH	CLAY dark brown, grey veins, coal inclusion		VSt	
36				SPT 3/4/7 N=11				with some sand			
37					37.00 123.00		CH	CLAY orange, yellow brown, brown, minor sand	M	VSt	
38				U63 P.P.=325kPa							
39				SPT 4/9/12 N=21				brown, black mottling			
40											

GEO BOREHOLE LY4379.GPJ GHD GEO TEMPLATE VICTORIA.GDT 6/1/10

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Job No.
311145209

BOREHOLE LOG SHEET

Client :	Loy Yang Power	**HOLE No. LY4379**	
Project :	Geotechnical Investigations		**SHEET 5 OF 6**
Location :	Overburden Dump		
Position :	416668.0 E,258119.0 N SECV	**Surface RL:** 160.0m	**Inclination\Bearing:** 90
Rig Type :	Cable Tool	**Contractor :**	**Driller :**
Date Started :	22/10/09	**Date Completed :** 23/10/09	**Logged by :** AF

Processed : AF
Checked :
Date :

DRILLING					MATERIAL						
SCALE (m)	Drilling Method	Hole Support / Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	Group Symbol	Description SOIL TYPE, colour, structure,minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Relative Density	Comments/ Observations
								with some sand	M	VSt	
				U63 P.P.=275kPa	41.00 119.00		CL	SANDY CLAY dark brown, orange, black mottling			
41											
42				SPT 5/6/10 N=15							
43					43.00 117.00		SC	CLAYEY SAND (SC) brown, dark brown, medium to coarse grained	M	MD	
				U63 P.P.>450kPa							
44											
45				SPT 5/5/6 N=11							
46											
				U63 P.P.=175kPa							
47					47.00 113.00		ML	SILT with inferior coal dark brown			
48				SPT 5/6/10 N=16	48.00 112.00		SC	CLAYEY SAND brown, grey, medium to coarse grained	M		
49								less clay			
				U63							
50											

See standard sheets for details of abbreviations & basis of descriptions

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Job No. 311145209

GEO BOREHOLE LY4379.GPJ GHD_GEO_TEMPLATE_VICTORIA.GDT 6/1/10

BOREHOLE LOG SHEET

Client :	Loy Yang Power			**HOLE No. LY4379**	
Project :	Geotechnical Investigations				SHEET 6 OF 6
Location :	Overburden Dump				
Position :	416668.0 E,258119.0 N SECV	**Surface RL:** 160.0m	**Inclination\Bearing:** 90		**Processed :** AF
Rig Type :	Cable Tool	**Contractor :**	**Driller :**		**Checked :**
Date Started :	22/10/09	**Date Completed :** 23/10/09	**Logged by :** AF		**Date :**

DRILLING					MATERIAL						
SCALE (m)	Drilling Method	Hole Support / Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	Group Symbol	Description SOIL TYPE, colour, structure,minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Relative Density	Comments/ Observations
									M		
51				SPT 6/9/10 N=19				dark grey, black, wood inclusions			
52											
				U63 P.P.>450kPa							
53								brown			
54				SPT 9/14/26 N=40				grey brown		D	
55											
				U63 P.P.>450kPa							
56											
57				SPT 16/21/26 N=47				more clay content			
58											
				U63 P.P.>450kPa							
59											
				SPT 11/5/16 N=21				light brown Borehole Terminated at 60m.			
60					59.90 100.10						

GEO_BOREHOLE LY4379.GPJ GHD_GEO_TEMPLATE VICTORIA.GDT 6/1/10

See standard sheets for details of abbreviations & basis of descriptions

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T: 61 3 8687 8000 F: 61 3 8687 8111 E: melmail@ghd.com.au
CONSULTING GEOTECHNICAL ENGINEERS AND GEOLOGISTS

Job No. 311145209

GHD

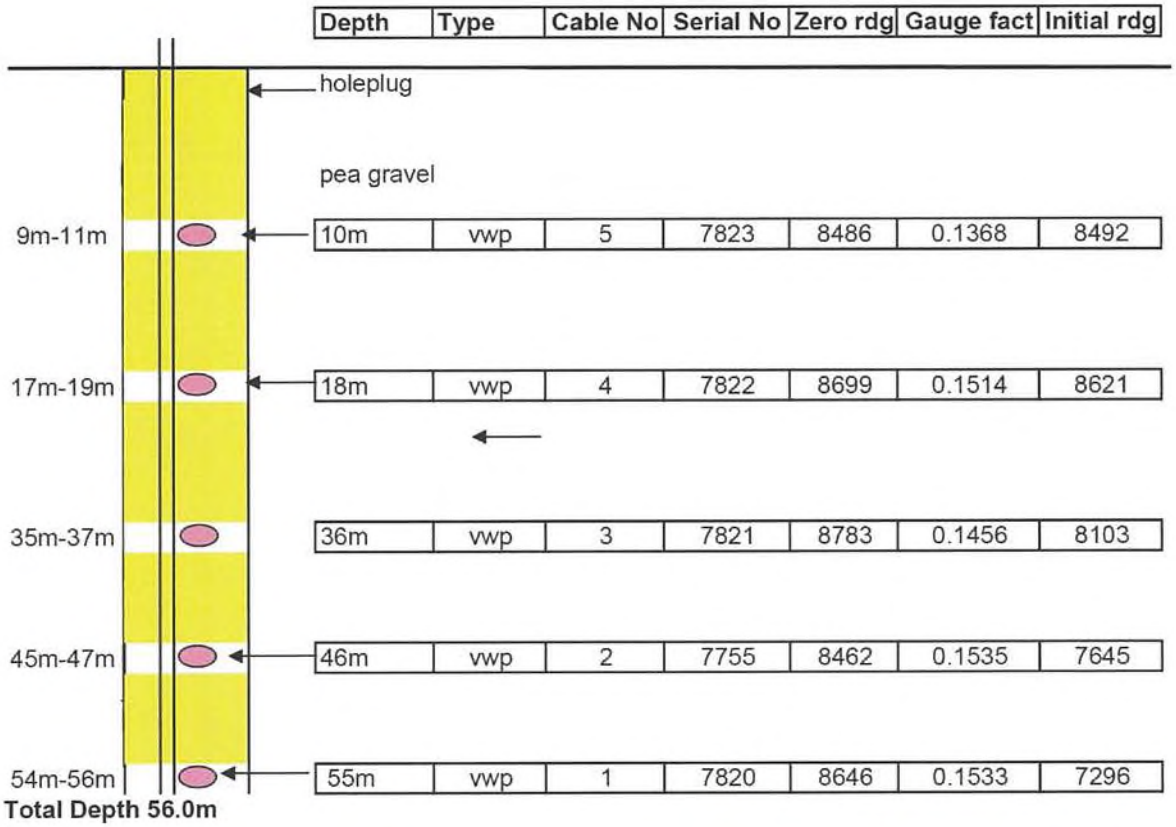
www.ghd.com.au
Tel. (03) 5133 9511 Fax. (03) 5133 9579
Cnr Hazelwood Dr Lignite Crt MORWELL Vic 3840

GHD Installation Diagram

Bore No ly4245

Date installed 13/11/2007.... M Giddens Job No 311145207
Site conditions ...clay.....

E:414676.....
N:258381.....
Collar RL 134.2
Pipe RL



Backfill codes pea gravel bentonite sausages Hole plug Grout

Pipe details 25mm pvc conduit Screen NA

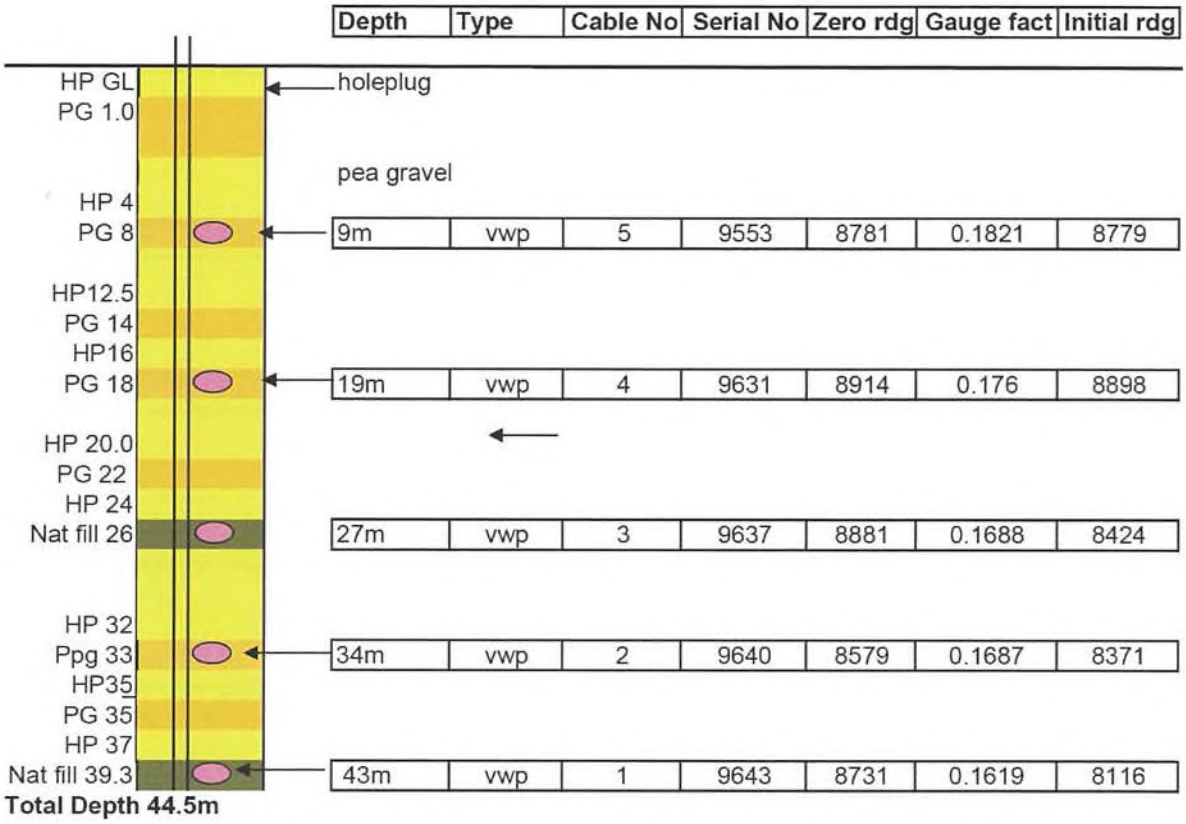
Signed Mick Forys Date 16/11/2007

GHD

www.ghd.com.au
Tel. (03) 5133 9511 Fax. (03) 5133 9579
Cnr Hazelwood Dr Lignite Crt MORWELL Vic 3840

GHD Installation Diagram
Bore No ly4246

Date installed 14/2/2008..... M Forys Job No 311145208 E:415273.....
Site conditions ...clay..... N:258336.....
Collar RL 134.2
Pipe RL



Depth	Type	Cable No	Serial No	Zero rdg	Gauge fact	Initial rdg
9m	vwp	5	9553	8781	0.1821	8779
19m	vwp	4	9631	8914	0.176	8898
27m	vwp	3	9637	8881	0.1688	8424
34m	vwp	2	9640	8579	0.1687	8371
43m	vwp	1	9643	8731	0.1619	8116

Total Depth 44.5m

Backfill codes pea gravel bentonite sausages Hole plug Grout

Pipe details 20mm pvc conduit Screen NA

Signed Mick Forys Date 15/2/2008

GHD Installation Diagram

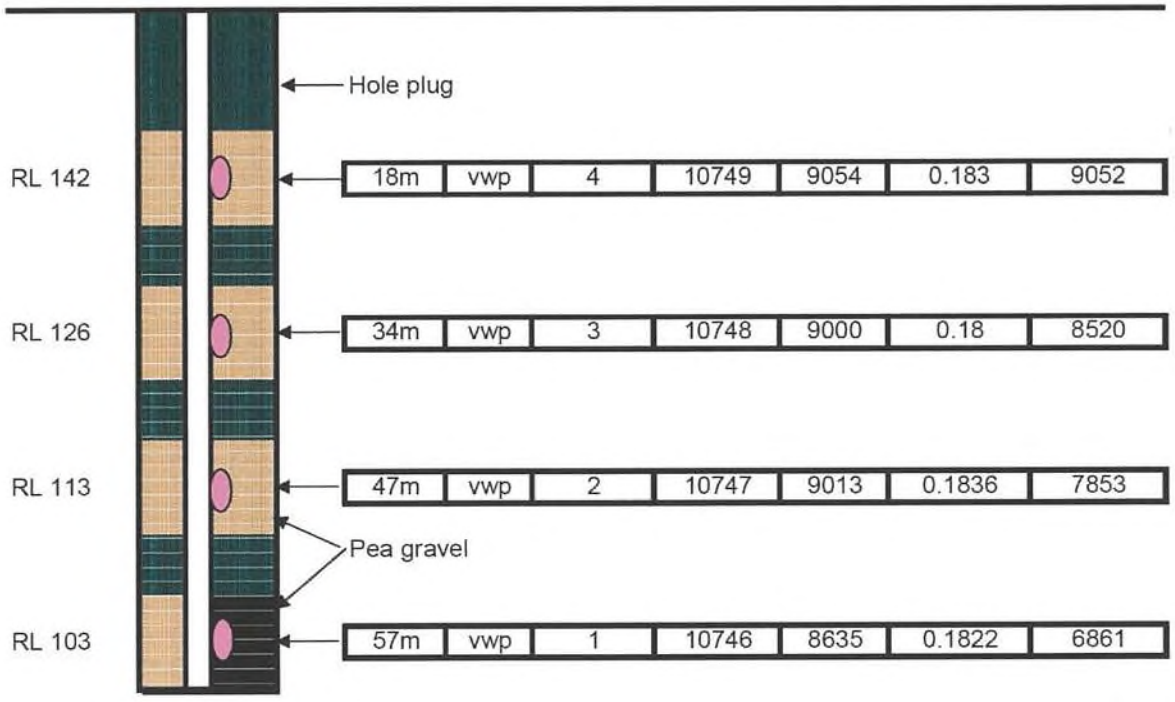
LY 4379

Job no 311145209

E:416670.9.....
N:258130.5.....
Collar RL 160.3
Pipe RL

Date installed 23/10/2009
Site conditions Clay

Depth	Type	Cable No	Serial No	Zero rdg	Gauge fact	Initial rdg
18m	vwp	4	10749	9054	0.183	9052
34m	vwp	3	10748	9000	0.18	8520
47m	vwp	2	10747	9013	0.1836	7853
57m	vwp	1	10746	8635	0.1822	6861



Total Depth 60m

Backfill codes pea gravel bentonite sausages Hole plug Grout

Pipe details 25mm pvc conduit

Screen details

Signed M.Forys & T.Murphy Date 26/10/2009

Appendix B

Electric Cone Penetration Test Results

CPTU - Site A

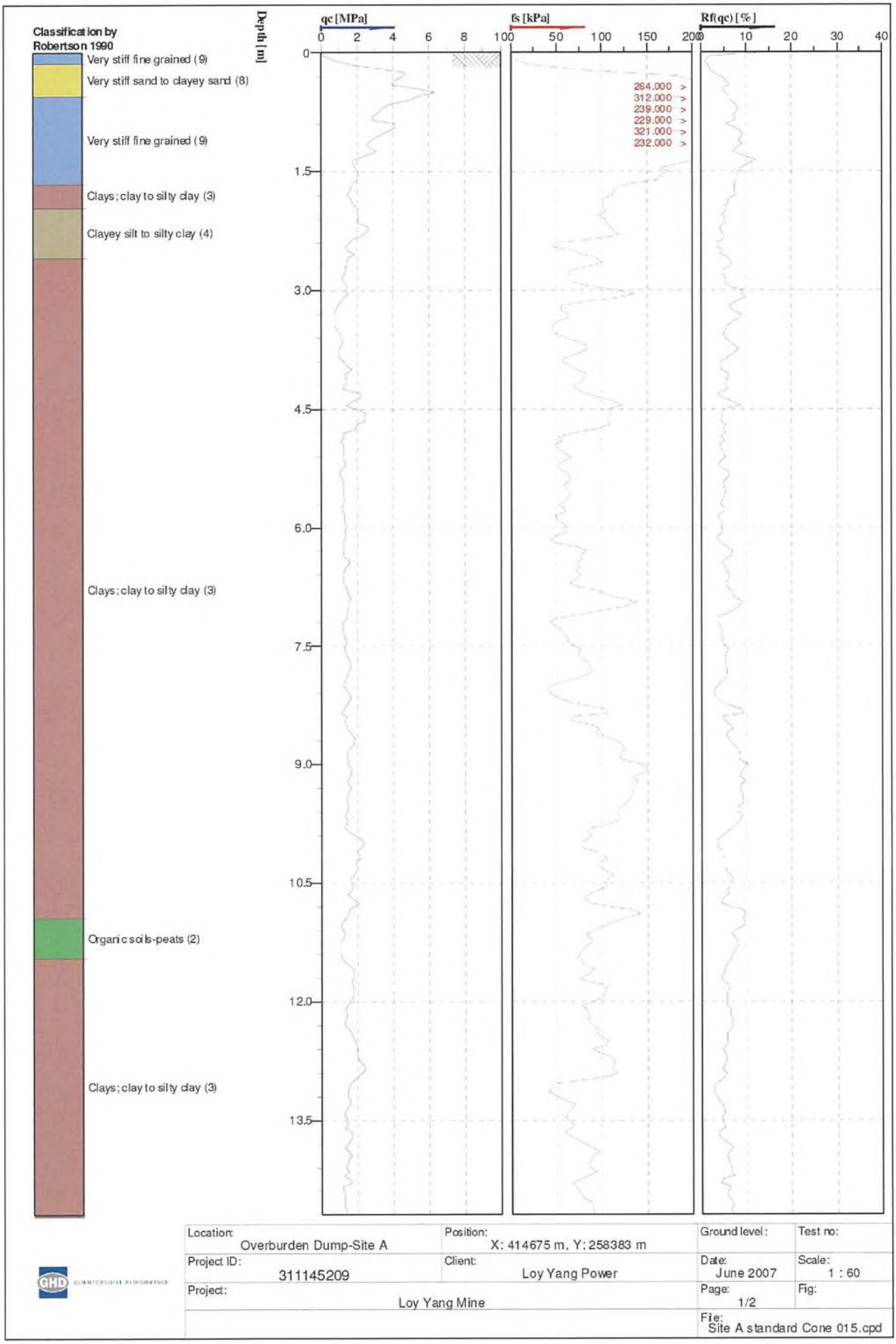
CPTU - Site B

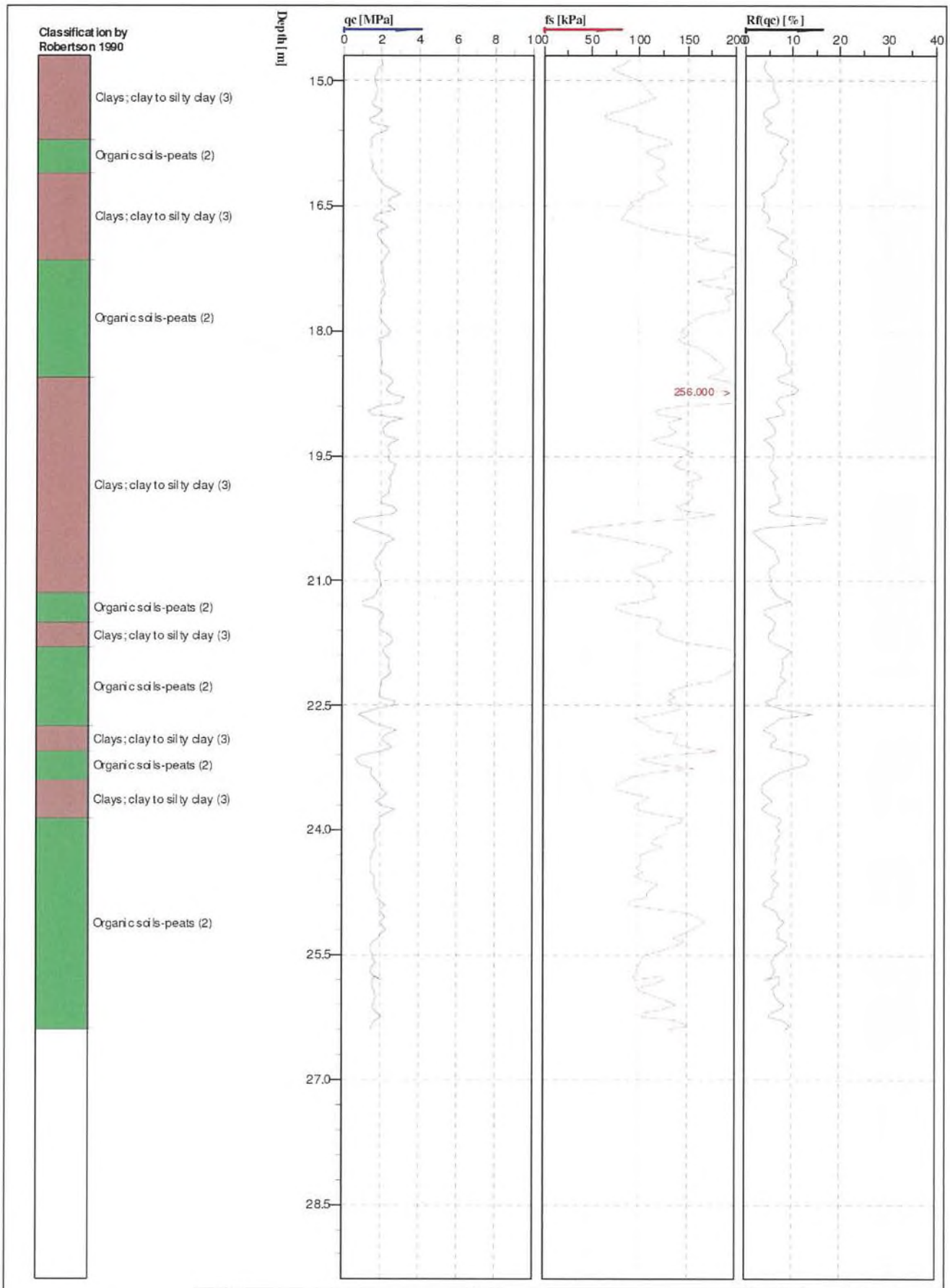
Dissipation Test – Site A @ 23.0m

Dissipation Test – Site A @ 25.8m

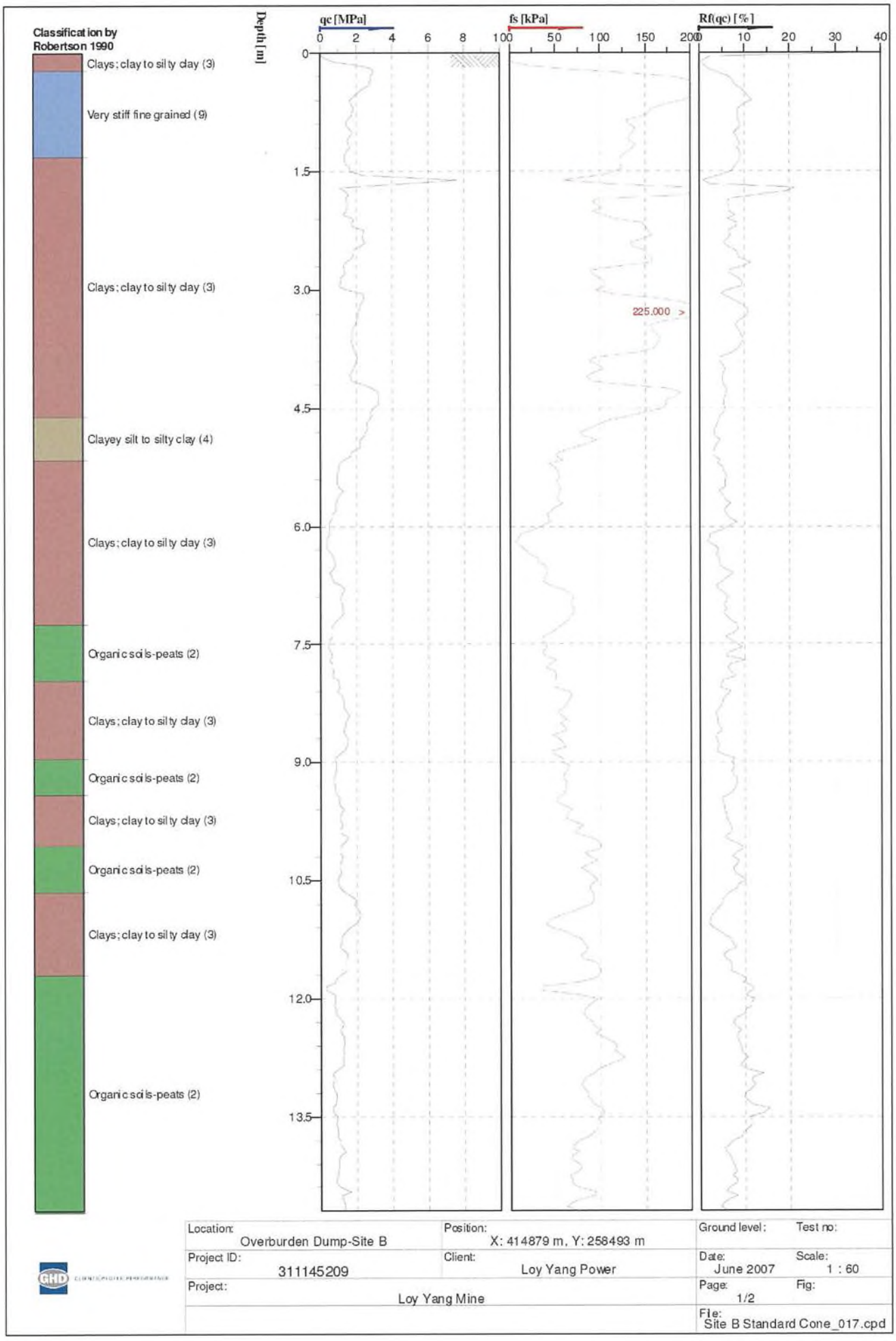
Dissipation Test – Site B @ 24.1m

Dissipation Test – Site B @ 26.85m

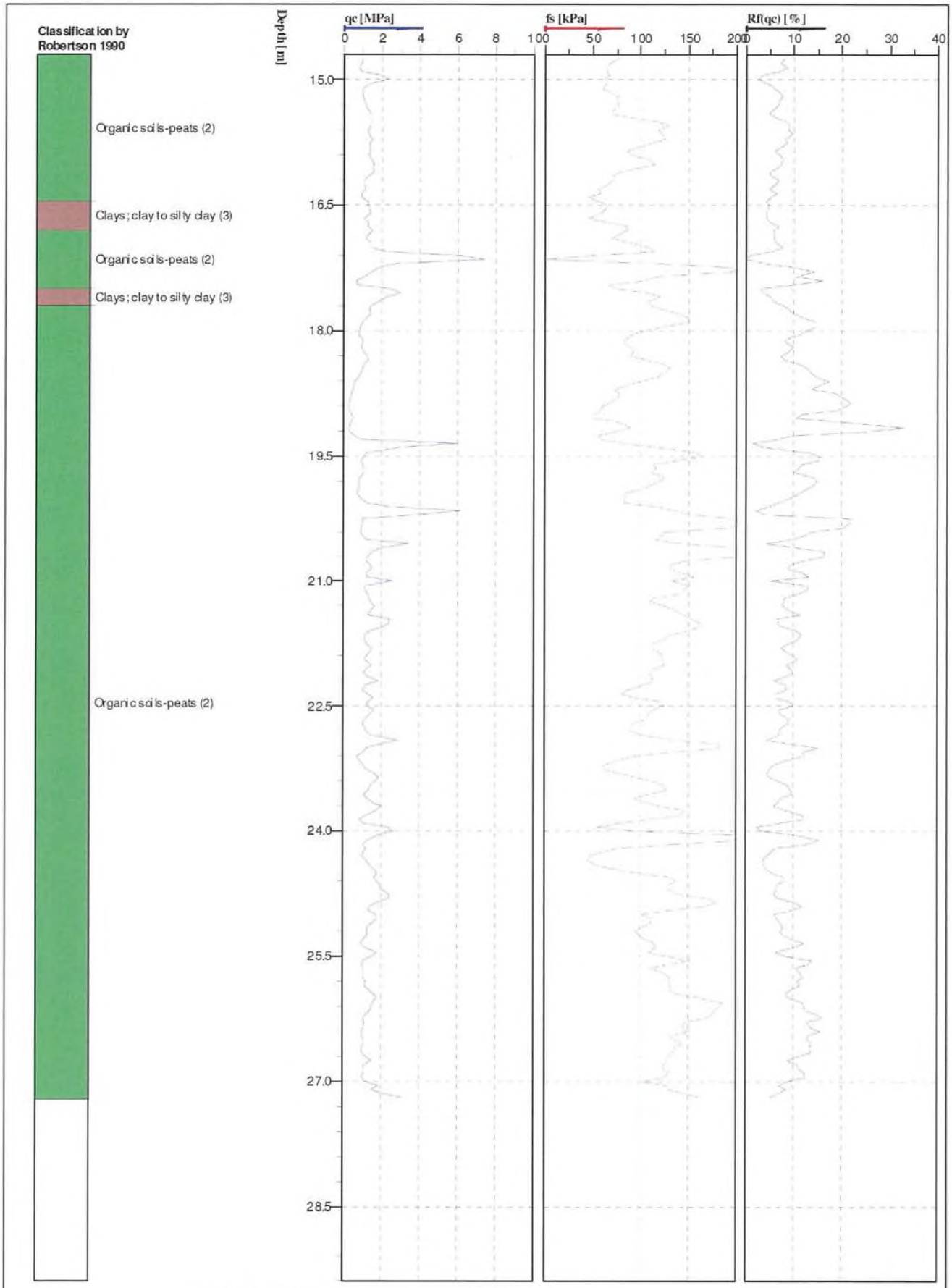

Classification by Robertson 1990
Very stiff fine grained (9)
Very stiff sand to clayey sand (8)
Very stiff fine grained (9)
Clays; clay to silty clay (3)
Clayey silt to silty clay (4)
Clays; clay to silty clay (3)
Organic soils-peats (2)
Clays; clay to silty clay (3)
Depth [m]
qc [MPa]
fs [kPa]
Rf(qc) [%]
0
1.5
3.0
4.5
6.0
7.5
9.0
10.5
12.0
13.5
264.000 >
312.000 >
239.000 >
229.000 >
321.000 >
232.000 >
Location: Overburden Dump-Site A
Position: X: 414675 m, Y: 258383 m
Ground level:
Test no:
Project ID: 311145209
Client: Loy Yang Power
Date: June 2007
Scale: 1 : 60
Project: Loy Yang Mine
Page: 1/2
Fig:
File: Site A standard Cone 015.cpd



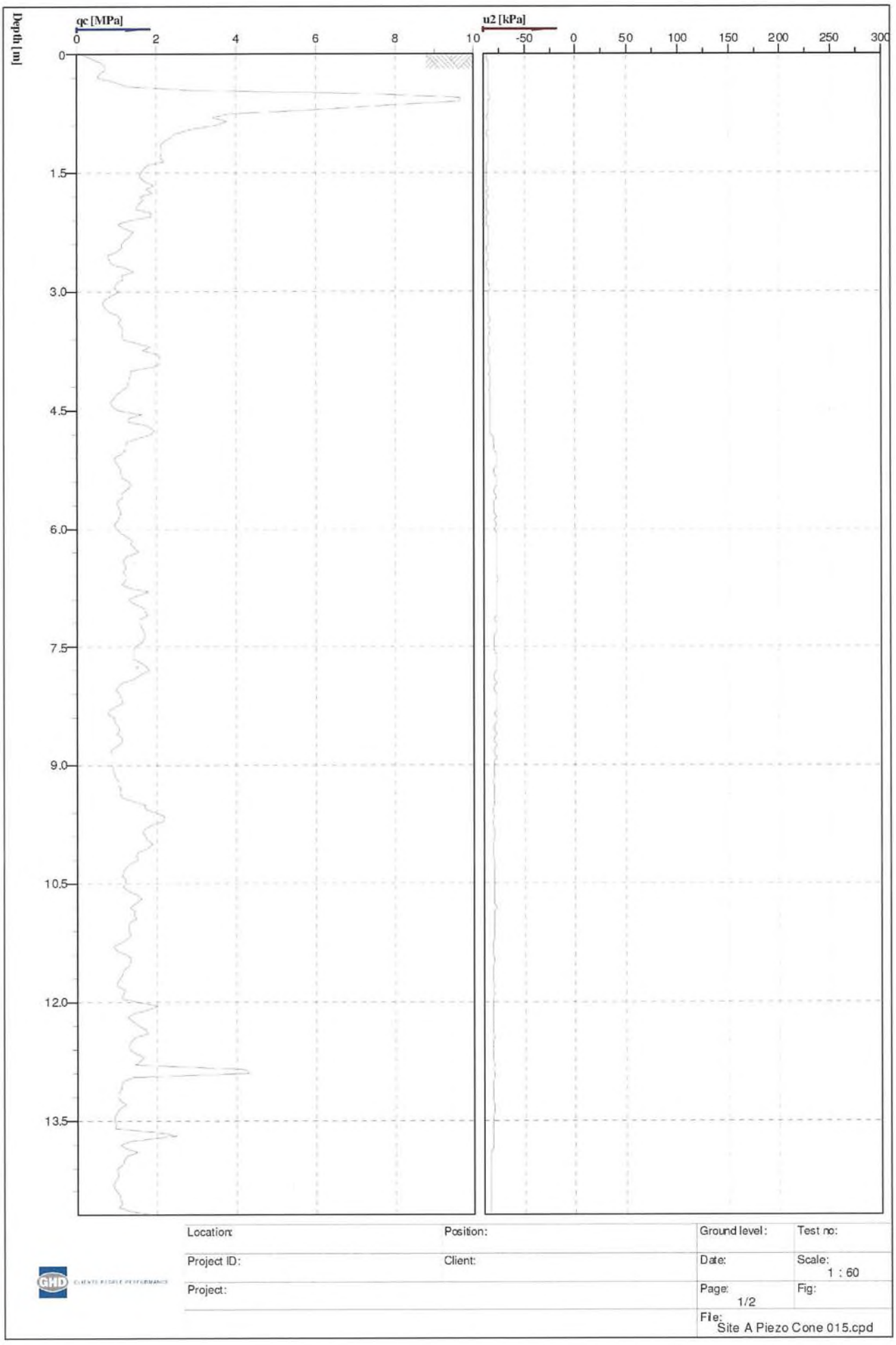
Location: Overburden Dump-Site A	Position: X: 414675 m, Y: 258383 m	Ground level:	Test no:
Project ID: 311145209	Client: Loy Yang Power	Date: June 2007	Scale: 1 : 60
Project: Loy Yang Mine		Page: 2/2	Fig:
		File: Site A standard Cone 015.cpd	



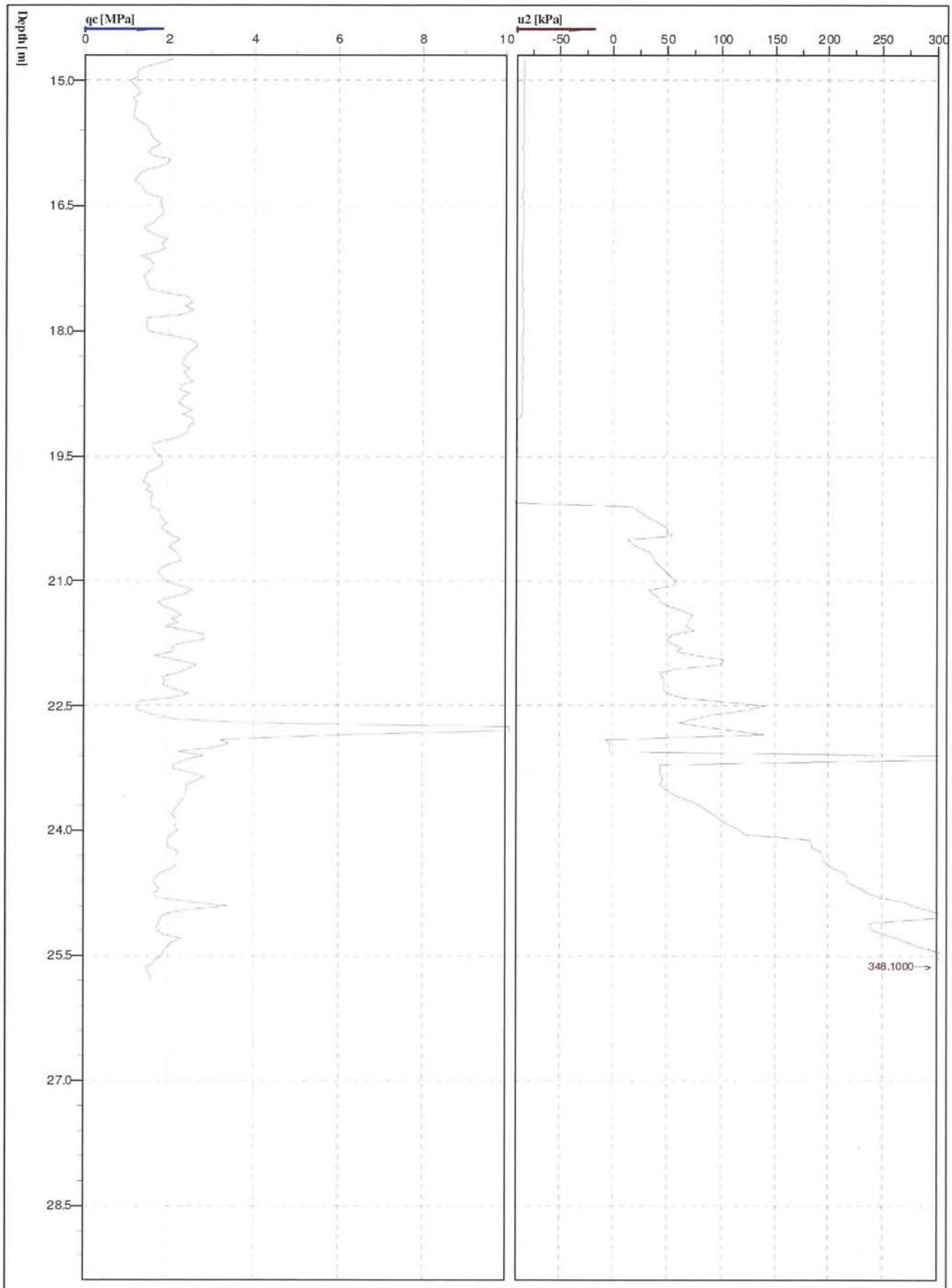
Location: Overburden Dump-Site B	Position: X: 414879 m, Y: 258493 m	Ground level:	Test no:
Project ID: 311145209	Client: Loy Yang Power	Date: June 2007	Scale: 1 : 60
Project: Loy Yang Mine		Page: 1/2	Fig:
		File: Site B Standard Cone_017.cpd	



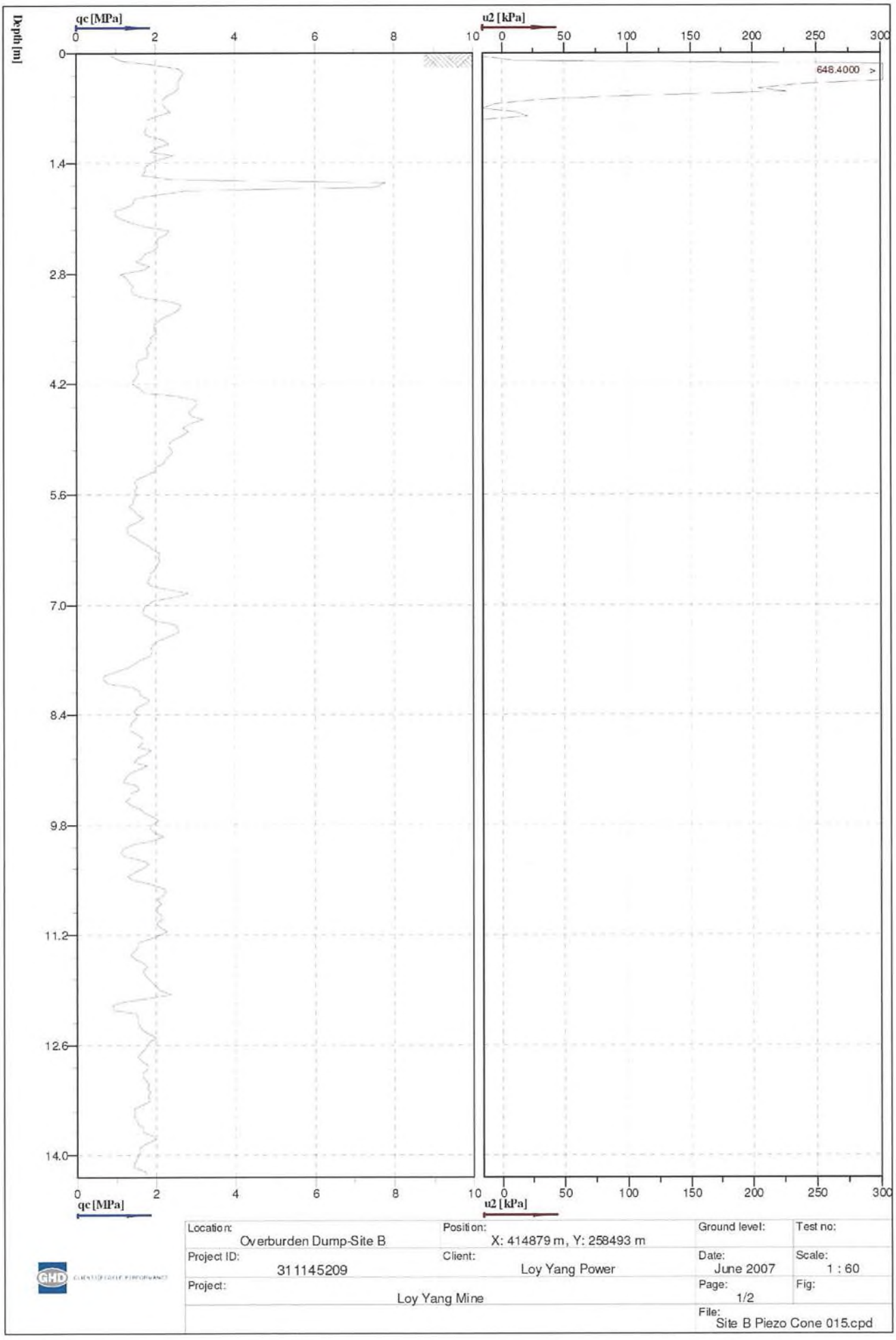
Location: Overburden Dump-Site B	Position: X: 414879 m, Y: 258493 m	Ground level:	Test no:
Project ID: 311145209	Client: Loy Yang Power	Date: June 2007	Scale: 1 : 60
Project: Loy Yang Mine		Page: 2/2	Fig:
		File: Site B Standard Cone_017.cpd	

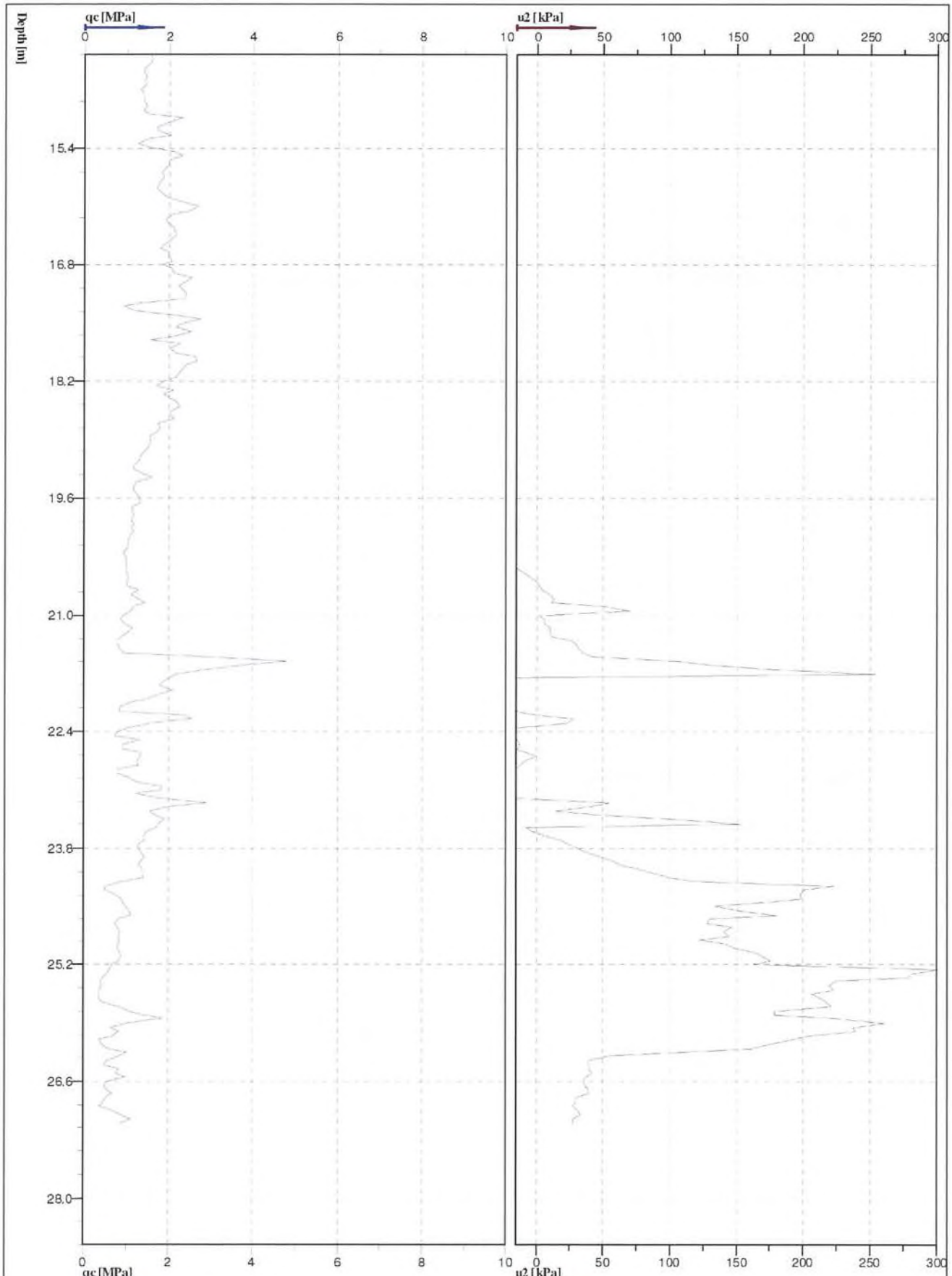


Location:	Position:	Ground level:	Test no:
Project ID:	Client:	Date:	Scale: 1 : 60
Project:		Page: 1/2	Fig:
		File: Site A Piezo Cone 015.cpd	



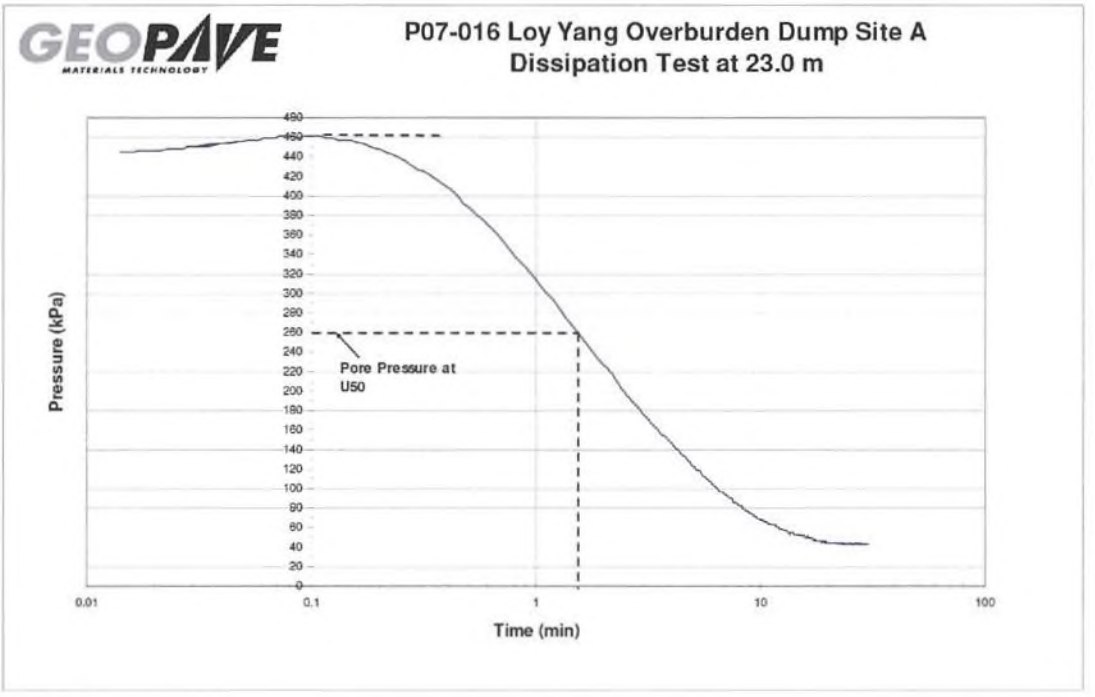
Location:	Position:	Ground level:	Test no:
Project ID:	Client:	Date:	Scale: 1 : 60
Project:		Page: 2/2	Fig:
		File: Site A Piezo Cone 015.cpd	


qc [MPa]
u2 [kPa]
Depth [m]
0
2
4
6
8
10
50
100
150
200
250
300
1.4
2.8
4.2
5.6
7.0
8.4
9.8
11.2
12.6
14.0
648.4000 >
Location: Overburden Dump-Site B
Position: X: 414879 m, Y: 258493 m
Ground level:
Test no:
Project ID: 311145209
Client: Loy Yang Power
Date: June 2007
Scale: 1 : 60
Project: Loy Yang Mine
Page: 1/2
Fig:
File: Site B Piezo Cone 015.cpd

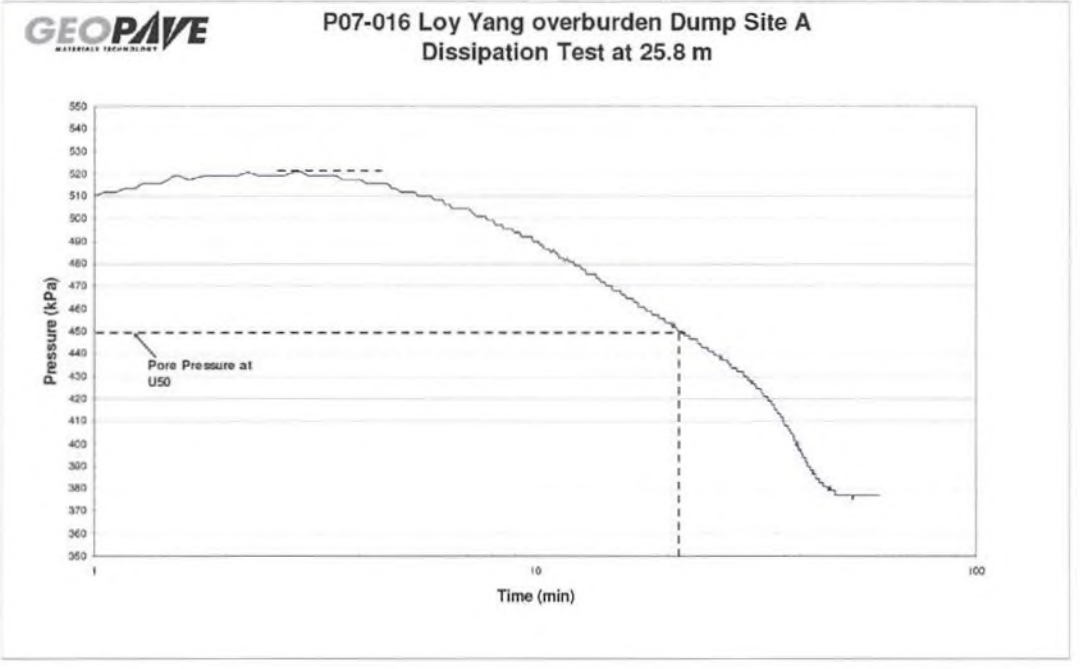


Location: Overburden Dump-Site B	Position: X: 414879 m, Y: 258493 m	Ground level:	Test no:
Project ID: 311145209	Client: Loy Yang Power	Date: June 2007	Scale: 1 : 60
Project: Loy Yang Mine		Page: 2/2	Fig:
		File: Site B Piezo Cone 015.cpd	

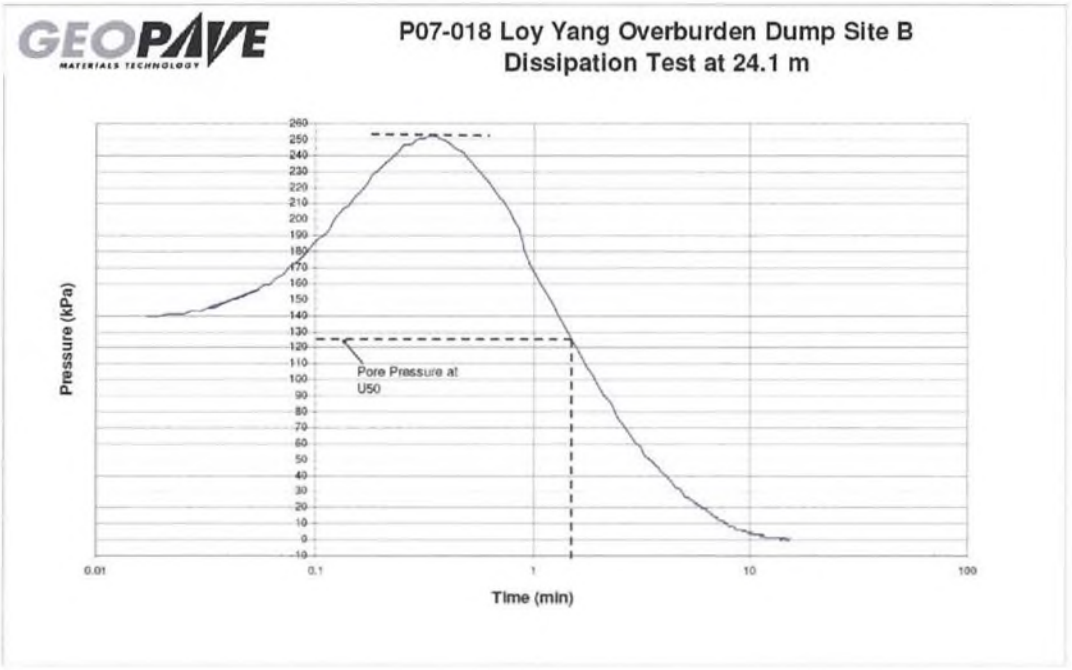
Dissipation Test at 23m (Site A)



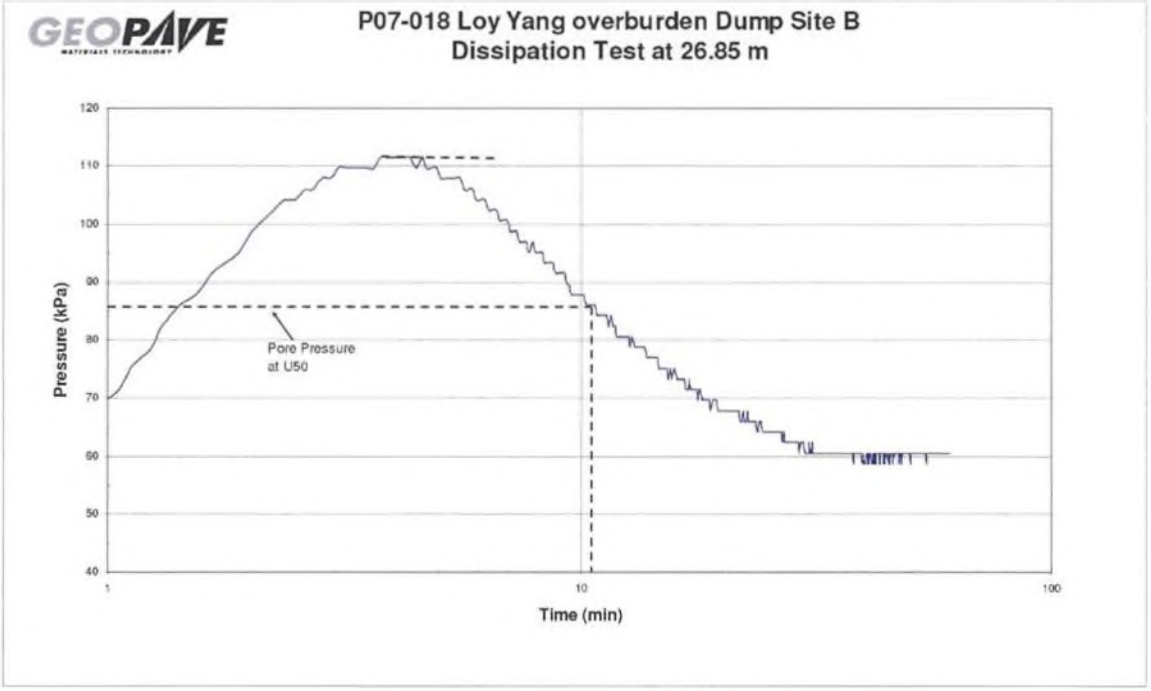
Dissipation Test at 25.8m (Site A)



Dissipation Test at 24.1m (Site B)



Dissipation Test at 26.8m (Site B)



Appendix C

Geotechnical Laboratory Test Certificates

MANAGEMENT
ENGINEERING
ENVIRONMENT

NATA REPORT # 22370

Lab. No: 76548
Operator: RL
Started: 15/10/2007

Client: Loy Yang Power
Project: OB Dump Stability Installations
Location: LY4245 @ 2.0m

Sampled: GHD
Material: CLAY with sand(CH)

Approved Nata Signatory: R Law

Date: 15.11.2007

Liquid Limit %	Plasticity Limit %	Plasticity Index %	Linear Shrinkage %	Fines %	Moisture %
53	14	39	16.0	71	14.0

Grading Requirements (% passing)

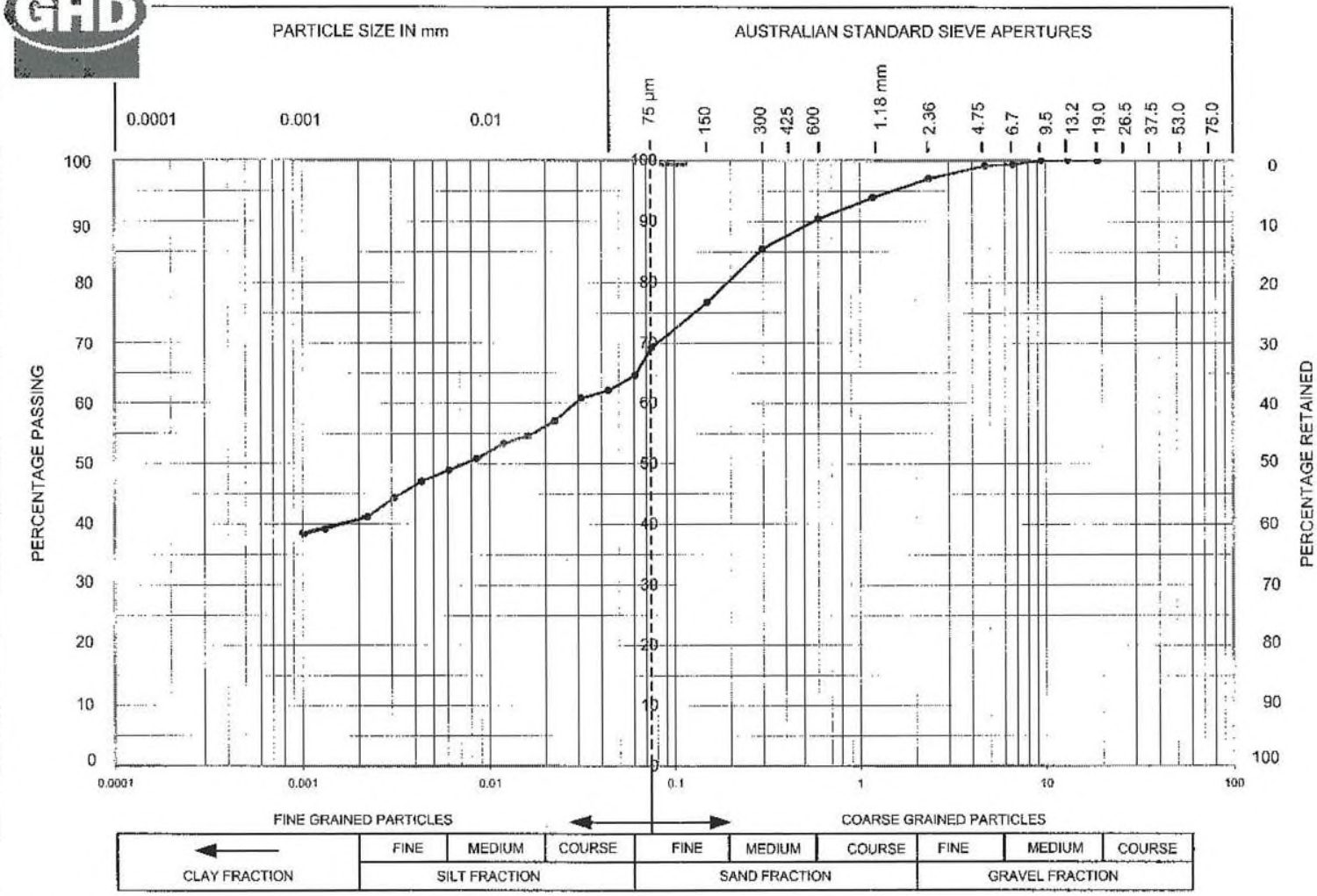
Sieve Size AS (mm)										
19.0	13.2	9.5	6.7	4.75	2.36	1.18	0.600	0.300	0.150	0.075
100	100	100	99	99	97	94	90	85	77	69

0.061	0.044	0.031	0.023	0.016	0.012	0.009	0.006	0.004	0.003	0.002	0.001
65	62	61	57	55	53	51	49	47	44	41	38

Linear Shrinkage AS 1289 3.4.1
Classification AS 1726 -1993
Drying Method AS1289 2.1.1
Emerson Class No AS 1289.3.8.1
Sieve AS 1289 3.6.1
Hydrometer AS 1289 3.6.3

GHD Geo-Eng
A division of GHD Pty Ltd
ABN 39 008 488 373
Cnr Hazelwood Drive & Ignite Court
Mulgrave Vic 3840
Australia
Locked Bag 5
Mulgrave Vic 3840
Australia
T 61 3 8560 1000
F 61 3 8560 1099
E mwlmail@ghd.com.au
W www.ghd.com.au

PARTICLE SIZE DISTRIBUTION



LAB No: 76548 CLIENT: Loy Yang Power REPORT: 2 of 2

NATA No: 22370 PROJECT: OB Dump Stability Installations DATE: 15/10/2007

GHD | MANAGEMENT ENGINEERING ENVIRONMENT

NATA REPORT # 22372

Lab #:	76550	Client:	Loy Yang Power
Operator:	RL	Project:	OB Dump Stability Installations
Started:	15/10/2007	Location:	LY4245 @ 8.5m

Sampled: GHD
Layer: -
Material: CLAY trace of sand(CH)

Date: 15.11.2007

Approved Nata Signatory: R Law

All Passing Sieve Size AS (mm)	Liquid Limit %	Plasticity Limit %	Plasticity Index %	Linear Shrinkage %	Fines %	Moisture %
6.7	63	23	40	14.0	85	31.7

Grading Requirements (% passing)

Sieve Size AS (mm)											
19.0	13.2	9.5	6.7	4.75	2.36	1.18	0.600	0.425	0.300	0.150	0.075
100	100	100	100	99	98	97	95	94	93	89	85
Limits											

TEST METHODS

Liquid Limit AS1289 3.1.2 [ ] Natural State [ ] Air-dried [X] Oven-dried [ ] Unknown
Plastic Limit AS 1289 3.2.1 [ ] Wet-sieved [X] Dry-sieved
Plastic Index AS 1289 3.3.1
Linear Shrinkage AS 1289 3.4.1
Drying Method AS 1289 2.1.1
Sieve AS 1289 3.6.1
Classification AS 1726-1993
Emerson Class AS 1289.3.8.1

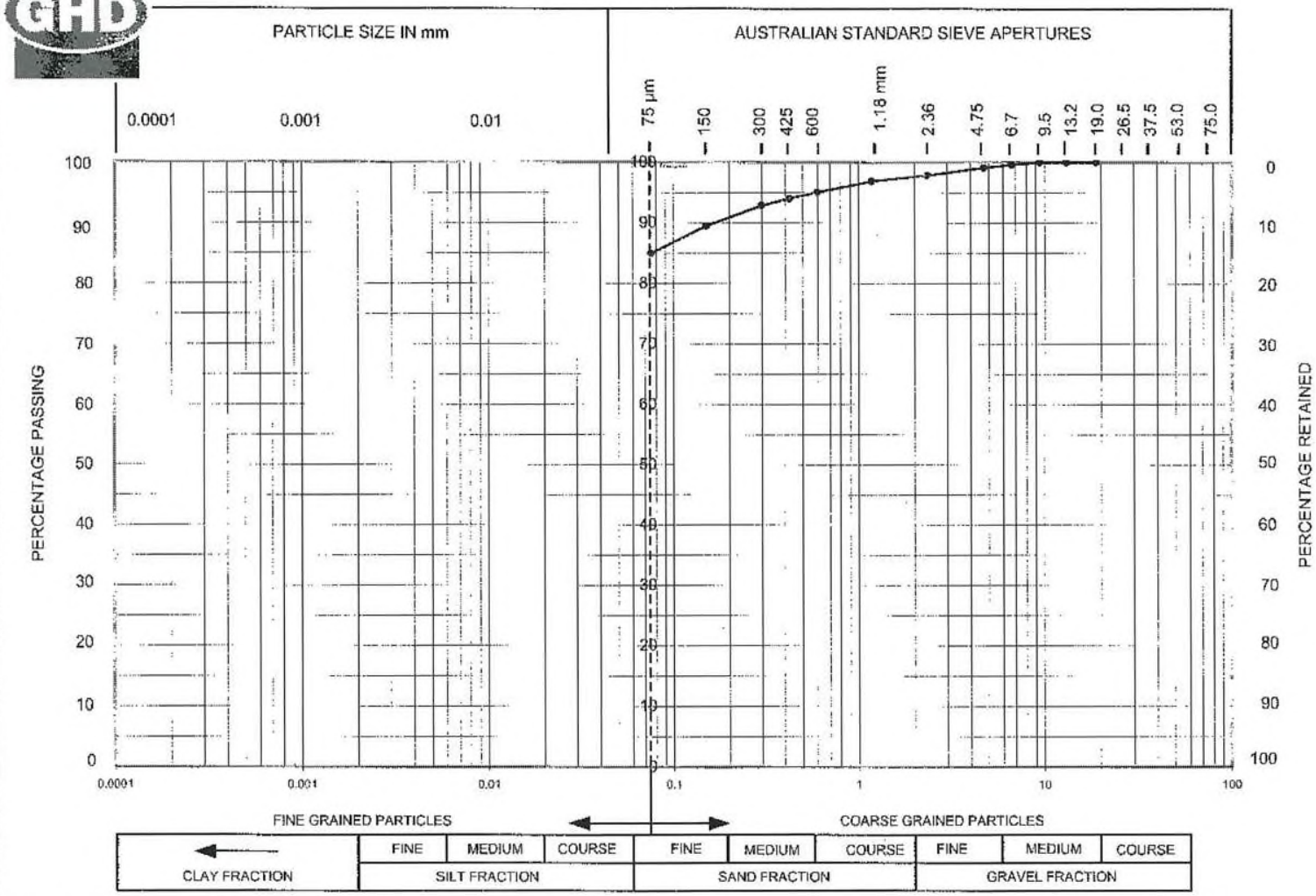
GHD Geo-Eng
A division of GHD Pty Ltd
ABN 39 008 488 373

Cnr Hazelwood Drive & Ligonite Court
Morwell Vic 3840
Australia

Locked Bag 5
Morwell Vic 3840
Australia

T 61 3 5133 95 1
F 61 3 5133 9579
E mwlmail@ghd.com.au
W www.ghd.com.au

PARTICLE SIZE DISTRIBUTION



LAB No: 76550 CLIENT: Loy Yang Power REPORT: 2 of 2

NATA No: 22372 PROJECT: OB Dump Stability Installations DATE: 15/10/2007

GHD | MANAGEMENT ENGINEERING ENVIRONMENT

NATA REPORT # 22376

Lab #:	76555	Client:	Loy Yang Power	Sampled:	GHD
Operator:	RL	Project:	OB Dump Stability Installations	Layer:	-
Started:	15/10/2007	Location:	LY4245 @ 23.0m	Material:	CLAY(CH)

Date: 15-11-2007

Approved Nata Signatory: R Law

All Passing Sieve Size AS (mm)	Liquid Limit %	Plasticity Limit %	Plasticity Index %	Linear Shrinkage %	Fines %	Moisture %
2.36	64	17	47	17.5	91	23.9

Grading Requirements (% passing)

Sieve Size AS (mm)											
19.0	13.2	9.5	6.7	4.75	2.36	1.18	0.600	0.425	0.300	0.150	0.075
100	100	100	100	100	100	99	98	97	97	95	91
Limits											

TEST METHODS

Liquid Limit AS1289 3.1.2 [ ] Natural State [ ] Air-dried [X] Oven-dried [ ] Unknown
Plastic Limit AS 1289 3.2.1 [ ] Wet-sieved [X] Dry-sieved
Plastic Index AS 1289 3.3.1
Linear Shrinkage AS 1289 3.4.1
Drying Method AS 1289 2.1.1
Sieve AS 1289 3.6.1
Classification AS 1726-1993
Emerson Class AS 1289.3.8.1

GHD Geo-Eng
A division of GHD Pty Ltd
ABN 39 008 488 373

Cnr Hazelwood Drive & Lignite Court
Morwell Vic 3840
Australia

Locked Bag 5
Morwell Vic 3840
Australia

T 61 3 5133 9511
F 61 3 5133 9579
E gewlmail@ghd.com.au
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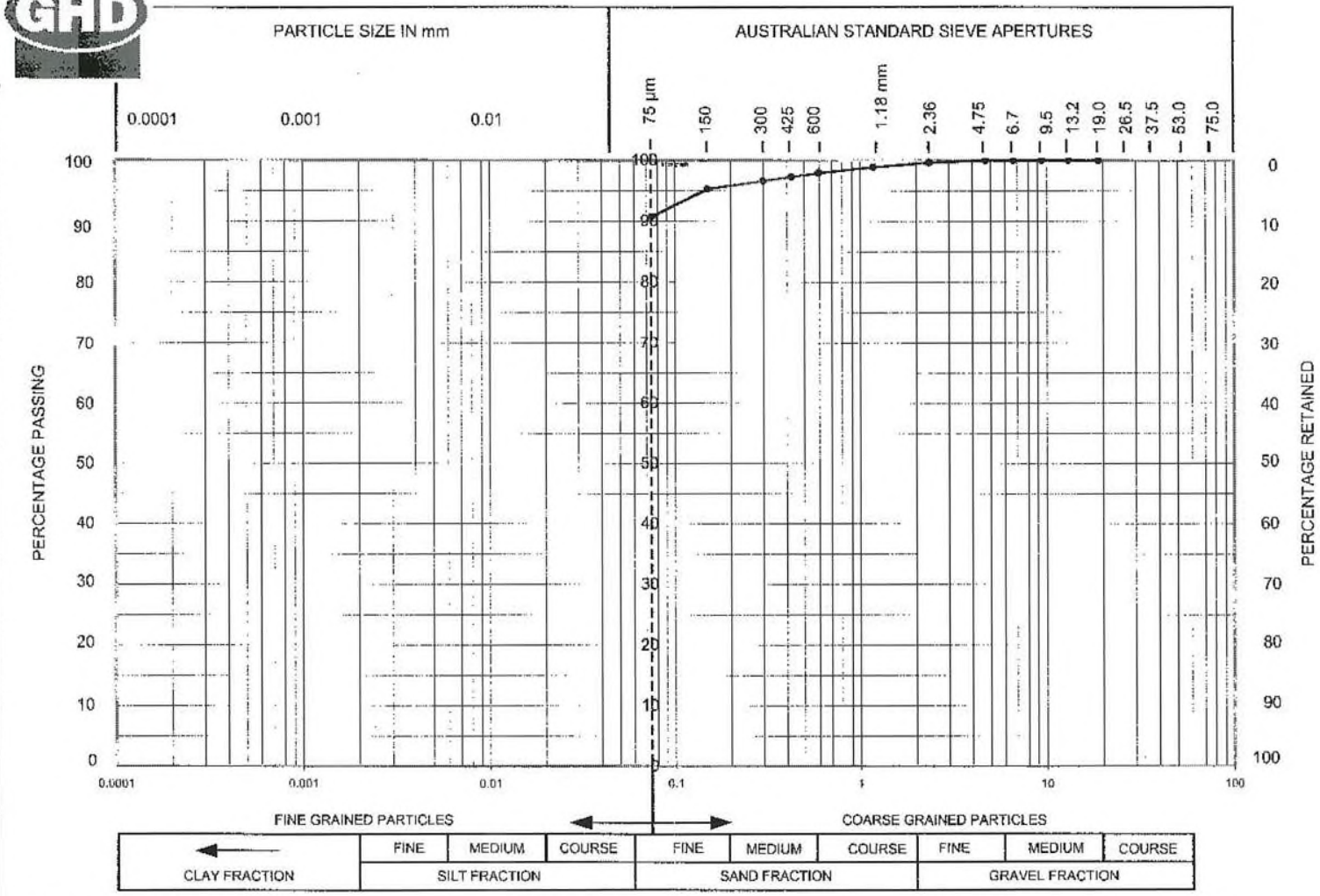

LAB No: 76555 CLIENT: Loy Yang Power REPORT: 2 of 2

NATA No: 22376 PROJECT: OB Dump Stability Installations DATE: 15/10/2007

GHD | MANAGEMENT ENGINEERING ENVIRONMENT

NATA REPORT # 22371

Lab #:	76548	Client:	Loy Yang Power	Sampled:	GHD
Operator:	RL	Project:	OB Dump Stability Installations	Layer:	-
Started:	15/10/2007	Location:	LY4245 @ 5.5m	Material:	sandy CLAY(CI)

Date: 15.11.2007

Approved Nata Signatory: R Law

All Passing Sieve Size AS (mm)	Liquid Limit %	Plasticity Limit %	Plasticity Index %	Linear Shrinkage %	Fines %	Moisture %
4.75	42	12	30	15.0	59	14.6

Grading Requirements (% passing)

Sieve Size AS (mm)											
19.0	13.2	9.5	6.7	4.75	2.36	1.18	0.600	0.425	0.300	0.150	0.075
100	100	100	100	100	99	95	88	84	80	69	59
Limits											

TEST METHODS

Liquid Limit AS1289 3.1.2 [ ] Natural State [ ] Air-dried [X] Oven-dried [ ] Unknown
Plastic Limit AS 1289 3.2.1 [ ] Wet-sieved [X] Dry-sieved
Plastic Index AS 1289 3.3.1
Linear Shrinkage AS 1289 3.4.1
Drying Method AS 1289 2.1.1
Sieve AS 1289 3.6.1
Classification AS 1726-1993
Emerson Class AS 1289.3.8.1

GHD Geo-Eng
A division of GHD Pty Ltd
ABN: 39 008 488 373

Cnr Lucelwood Drive & Lignite Court
Morwell Vic 3840
Australia

Locked Bag 5
Morwell Vic 3840
Australia

T 61 3 5133 9511
F 61 3 5133 9579
E mwlmail@ghd.com.au
W www.ghd.com.au

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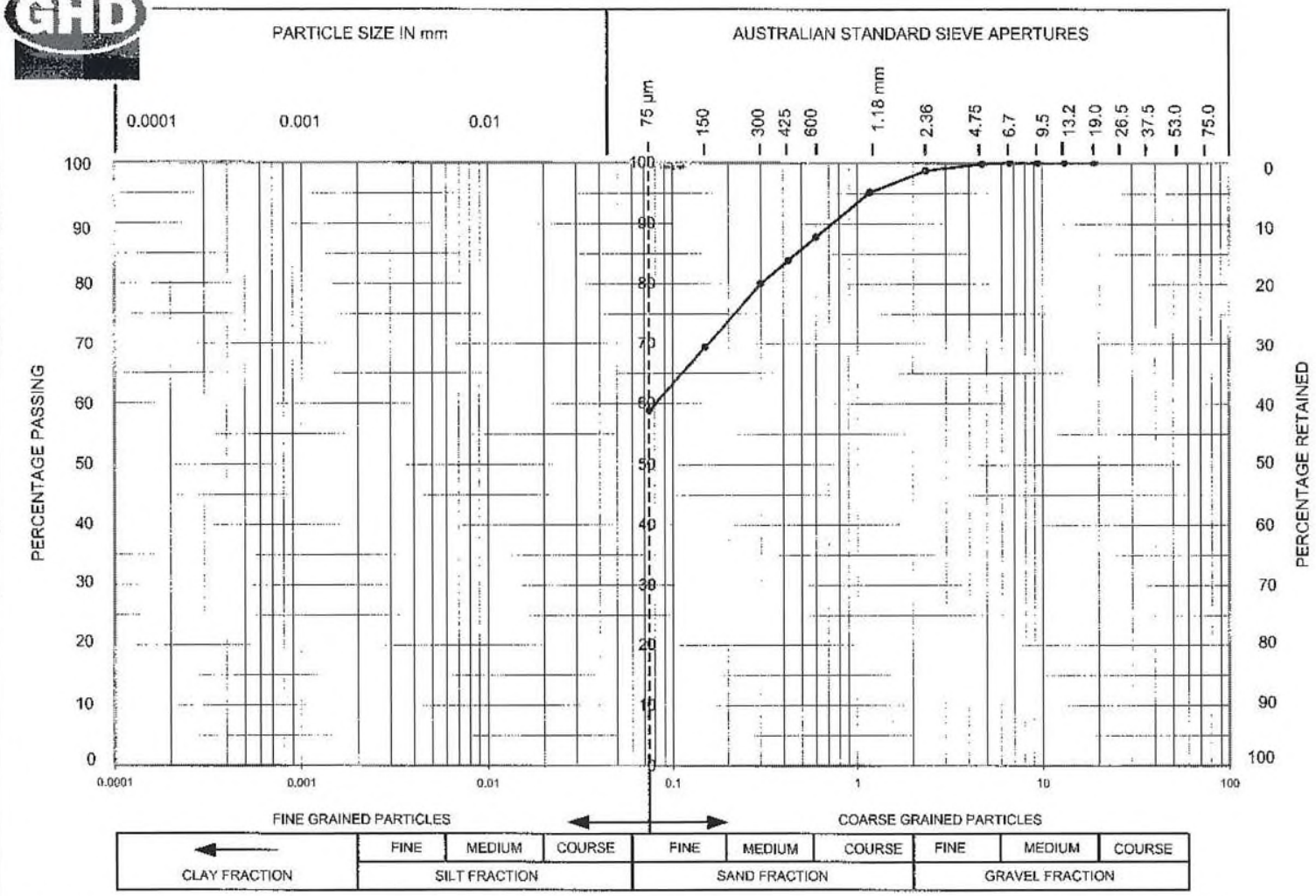

LAB No: 76548 CLIENT: Loy Yang Power REPORT: 2 of 2

NATA No: 22371 PROJECT: OB Dump Stability Installations DATE: 15/10/2007

GHD | MANAGEMENT | ENGINEERING | ENVIRONMENT

NATA REPORT # 22373

Lab. No:	76651	Client:	Loy Yang Power	Sampled:	GHD
Operator:	RL	Project:	OB Dump Stability Installations	Material:	inferior COAL(PT)
Started:	15/10/2007	Location:	LY4245 @ 12.0m		

Approved Nata Signatory: R Law

Date: 3.12.2007

Liquid Limit %	Plastic Limit %	Plasticity Index %	Linear Shrinkage %	Fines %	Moisture %
90	69	21	6.5	99	112.3

TEST METHODS

Liquid Limit AS1289 3.1.2
Plastic Limit AS 1289 3.2.1
Plastic Index AS 1289 3.3.1
Linear Shrinkage AS 1289 3.4.1
Classification AS 1726 -1993
Drying Method AS1289 2.1.1
Emerson Class AS 1289.3.8.1
Fines AS 1141.12

[ ] Natural State [ ] Air-dried [X] Oven-dried [ ] Unknown
[ ] Wet-sieved [X] Dry-sieved

GHD Geo-Eng
A division of GHD Pty Ltd
ABN 39 008 488 373
Cnr Hazelwood Drive & Ignite Court
Morwell Vic 3840
Australia
Locked Bag 5
Morwell Vic 3840
Australia
T 61 3 5133 9511
F 61 3 5133 9579
E mwlmail@ghd.com.au
W www.ghd.com.au

GHD | MANAGEMENT ENGINEERING ENVIRONMENT

NATA REPORT # 22374

Lab #:	76553	Client:	Loy Yang Power
Operator:	RL	Project:	OB Dump Stability Installations
Started:	15/10/2007	Location:	LY4245 @ 17.5m

Sampled: GHD
Layer: -
Material: Inferior COAL(PT)

Date: 3.12.2007

Approved Nata Signatory: R Law

All Passing Sieve Size AS (mm)	Liquid Limit %	Plasticity Limit %	Plasticity Index %	Linear Shrinkage %	Fines %	Moisture %
0.600	104	92	12	6.0	97	125.6

Grading Requirements (% passing)

Sieve Size AS (mm)											
19.0	13.2	9.5	6.7	4.75	2.36	1.18	0.600	0.425	0.300	0.150	0.075
100	100	100	100	100	100	100	100	99	99	98	97
Limits											

TEST METHODS

Liquid Limit AS1289 3.1.2 [ ] Natural State [ ] Air-dried [X] Oven-dried [ ] Unknown
Plastic Limit AS 1289 3.2.1 [ ] Wet-sieved [X] Dry-sieved
Plastic Index AS 1289 3.3.1
Linear Shrinkage AS 1289 3.4.1
Drying Method AS 1289 2.1.1
Sieve AS 1289 3.6.1
Classification AS 1726-1993
Emerson Class AS 1289.3.8.1

Date: 24.01.2000

GHD Geo-Eng
A division of GHD Pty Ltd
ABN 39 008 488 373

Cnr Hazelwood Drive & Lignite Court
Morwell Vic 3840
Australia

Locked Bag 5
Morwell Vic 3840
Australia

T 61 3 5133 9511
F 61 3 5133 9579
E mwlmail@ghd.com.au
W www.ghd.com.au

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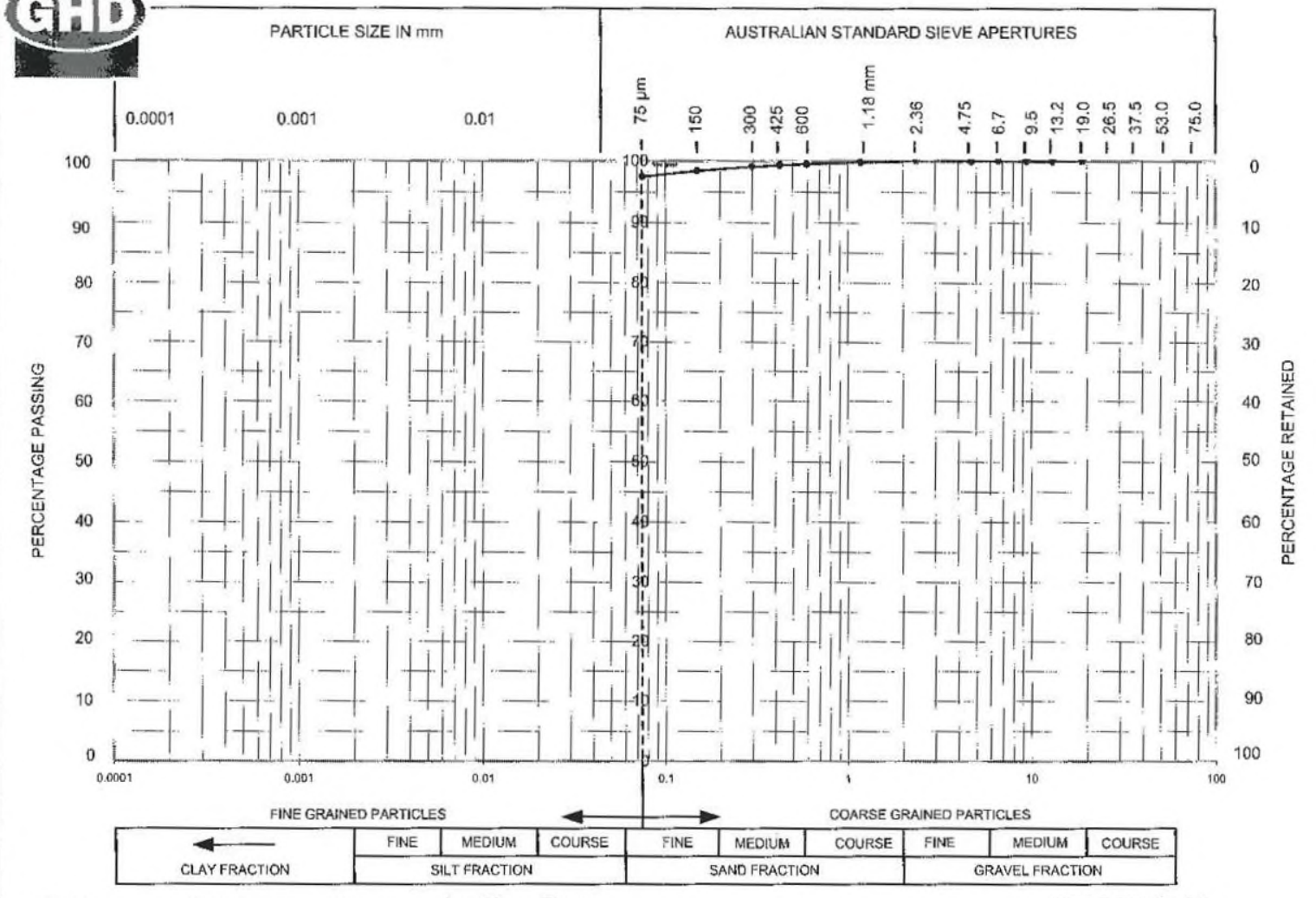


LAB No: 76553 CLIENT: Loy Yang Power REPORT: 2 of 2

NATA No: 22374 PROJECT: OB Dump Stability Installations DATE: 15/10/2007

MANAGEMENT
ENGINEERING
ENVIRONMENT

NATA REPORT # 22375

Lab. No: 76654
Operator: RL
Started: 15/10/2007

Client: Loy Yang Power
Project: OB Dump Stability Installations
Location: LY4245 @ 19.0m

Sampled: GHD
Material: inferior COAL(PT)

Date: 3.12.2007

Approved Nata Signatory: R Law

Liquid Limit %	Plasticity Limit %	Plasticity Index %	Linear Shrinkage %	Fines %	Moisture %
85	73	12	5.5	93	89.9

Grading Requirements (% passing)

Sieve Size AS (mm)																	
4.75	2.36	1.18	0.600	0.300	0.150	0.075	0.072	0.052	0.037	0.026	0.019	0.014	0.010	0.007	0.005	0.004	0.003	0.001
100	99	99	98	97	96	93	72	66	62	59	54	46	41	35	30	25	20	15

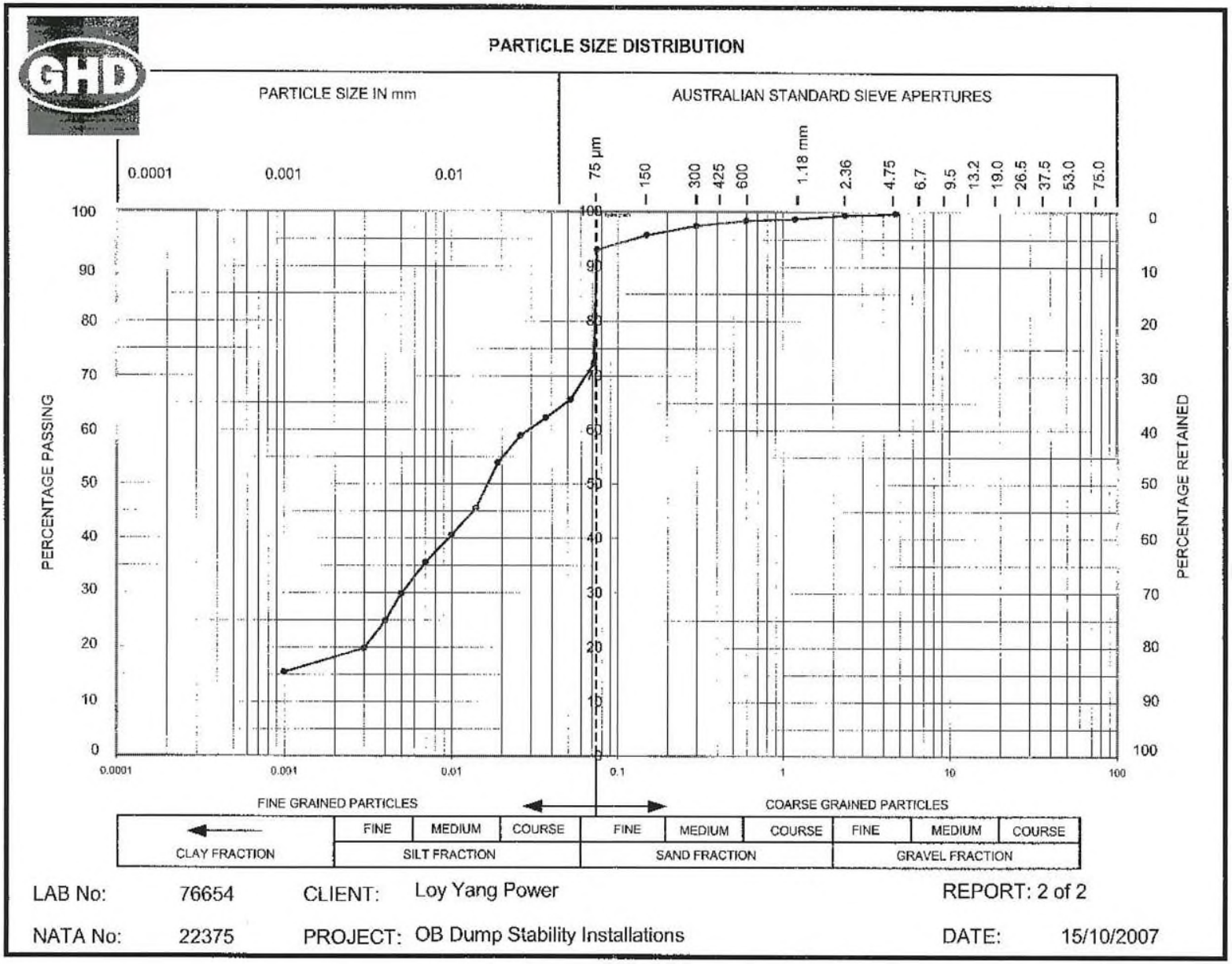
TEST METHODS
Liquid Limit AS1289 3.1.2 [ ] Natural State [ ] Air-dried [X] Oven-dried [ ] Unknown
Plastic Limit AS 1289 3.2.1 [ ] Wet-sieved [X] Dry-sieved
Plastic Index AS 1289 3.3.1
Linear Shrinkage AS 1289 3.4.1
Classification AS 1726 -1993
Drying Method AS1289 2.1.1
Emerson Class No AS 1289.3.8.1
Sieve AS 1289 3.6.1
Hydrometer AS 1289 3.6.3

GHD Geo-Eng
A division of GHD Pty Ltd
ABN 39 008 488 373

Cnr Hazelwood Drive
& Lignite Court
Morwell Vic 3840
Australia

Locked Bag 5
Morwell Vic 3840
Australia

T 61 3 5133 9511
F 61 3 5133 9579
E mwmail@ghd.com.au
W www.ghd.com.au



GHD | MANAGEMENT ENGINEERING ENVIRONMENT

NATA REPORT # 22550

Lab #:	76765	Client:	Loy Yang Power
Operator:	AF	Project:	OB Dump Stability Installations
Started:	08/11/2007	Location:	LY4245 @ 38.0m

Sampled: GHD
Layer: -
Material: CLAY(CI)

Date: 3.12.2007

Approved Nata Signatory: R Law

All Passing Sieve Size AS (mm)	Liquid Limit %	Plasticity Limit %	Plasticity Index %	Linear Shrinkage %	Fines %	Moisture %
2.36	46	27	20	9.0	93	63.8

Grading Requirements (% passing)

Sieve Size AS (mm)											
19.0	13.2	9.5	6.7	4.75	2.36	1.18	0.600	0.425	0.300	0.150	0.075
100	100	100	100	100	100	99	97	96	95	94	93
Limits											

TEST METHODS

Liquid Limit AS1289 3.1.2 [ ] Natural State [ ] Air-dried [X] Oven-dried [ ] Unknown
Plastic Limit AS 1289 3.2.1 [ ] Wet-sieved [X] Dry-sieved
Plastic Index AS 1289 3.3.1
Linear Shrinkage AS 1289 3.4.1
Drying Method AS 1289 2.1.1
Sieve AS 1289 3.6.1
Classification AS 1726-1993
Emerson Class AS 1289.3.8.1

Date: 24.01.2000

pf: 4021-1

Rev: 1

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A division of GHD Pty Ltd
ABN 39 008 488 373

Cnr Hazelwood Drive & Lignite Court
Morwell Vic 3840
Australia

Locked Bag 3
Morwell Vic 3840
Australia

T 61 3 5133 9511
F 61 3 5133 9579
E mwmail@ghd.com.au
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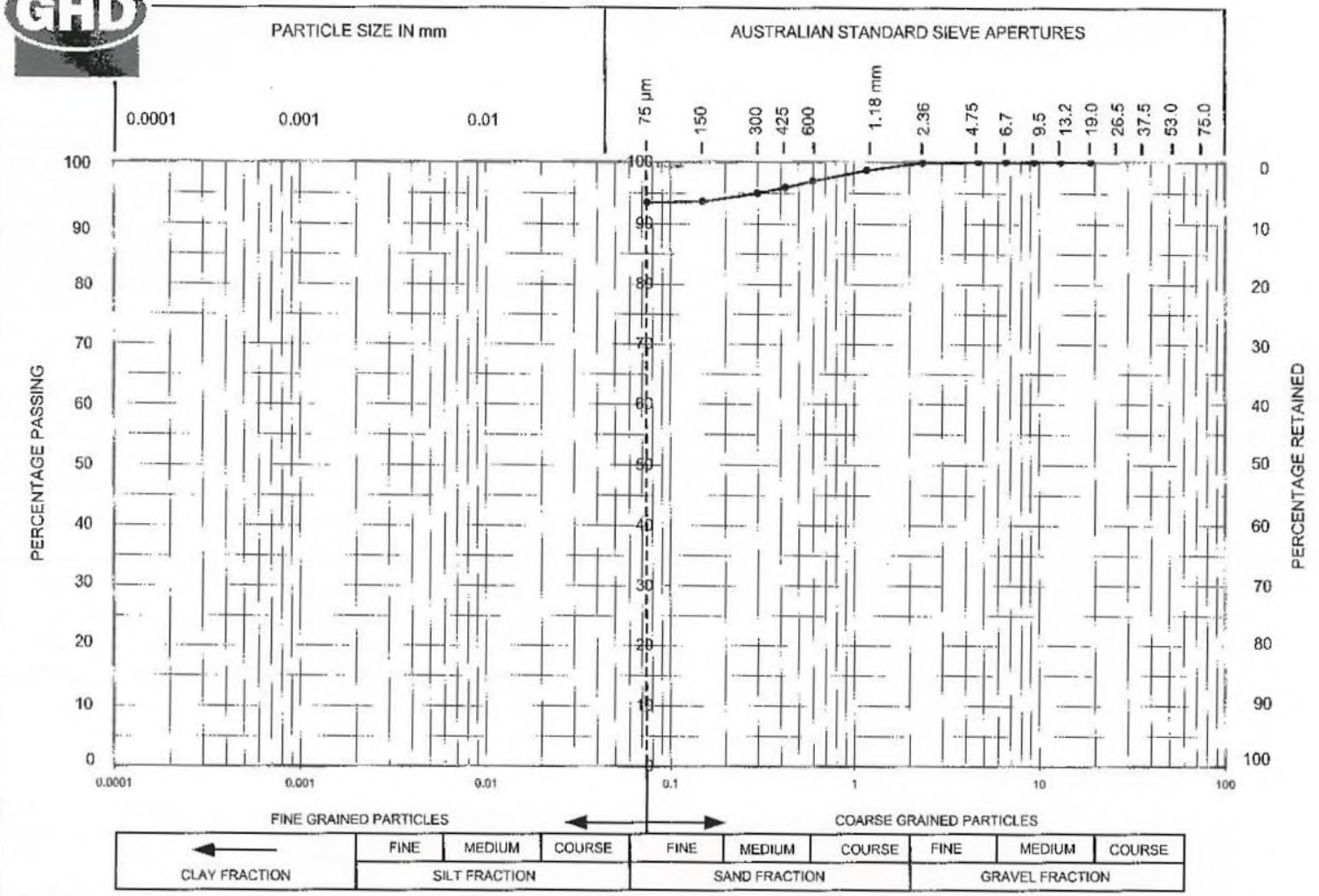

LAB No: 76765 CLIENT: Loy Yang Power REPORT: 2 of 2

NATA No: 22550 PROJECT: OB Dump Stability Installations DATE: 08/11/2007

GHD | MANAGEMENT ENGINEERING ENVIRONMENT

NATA REPORT # 22685

Lab. No: 76923
Operator: MG
Started: 21/11/2007

Client: Loy Yang Power
Project: Loy Yang OB Dump Western End E416676 N258381
Location: LY4245 @ 24.5m

Sampled: GHD
Material: CLAY (CH)

Date: 10-12-2007

Approved Nata Signatory: R Law

Liquid Limit %	Plasticity Limit %	Plasticity Index %	Linear Shrinkage %	Fines %	Moisture %
60	19	42	12.0	93	22.1

Grading Requirements (% passing)

Sieve Size AS (mm)																		
4.75	2.36	1.18	0.600	0.300	0.150	0.075	0.054	0.040	0.029	0.021	0.015	0.012	0.008	0.006	0.004	0.003	0.002	0.001
100	100	100	99	99	99	93	88	81	76	71	67	64	60	56	53	48	43	38

TEST METHODS
Liquid Limit AS1289 3.1.2 [ ] Natural State [ ] Air-dried [X] Oven-dried [ ] Unknown
Plastic Limit AS 1289 3.2.1 [ ] Wet-sieved [X] Dry-sieved
Plastic Index AS 1289 3.3.1
Linear Shrinkage AS 1289 3.4.1
Classification AS 1726-1993
Drying Method AS1289 2.1.1
Emerson Class No AS 1289.3.8.1
Sieve AS 1289 3.6.1
Hydrometer AS 1289 3.6.3

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A division of GHD Pty Ltd
ABN 39 008 488 373

Cnr Hazelwood Drive & Lignite Court
Morwell Vic 3840
Australia

Locked Bag 5
Morwell Vic 3840
Australia

T 61 3 5133 9511
F 61 3 5133 9579
E mwlmail@ghd.com.au
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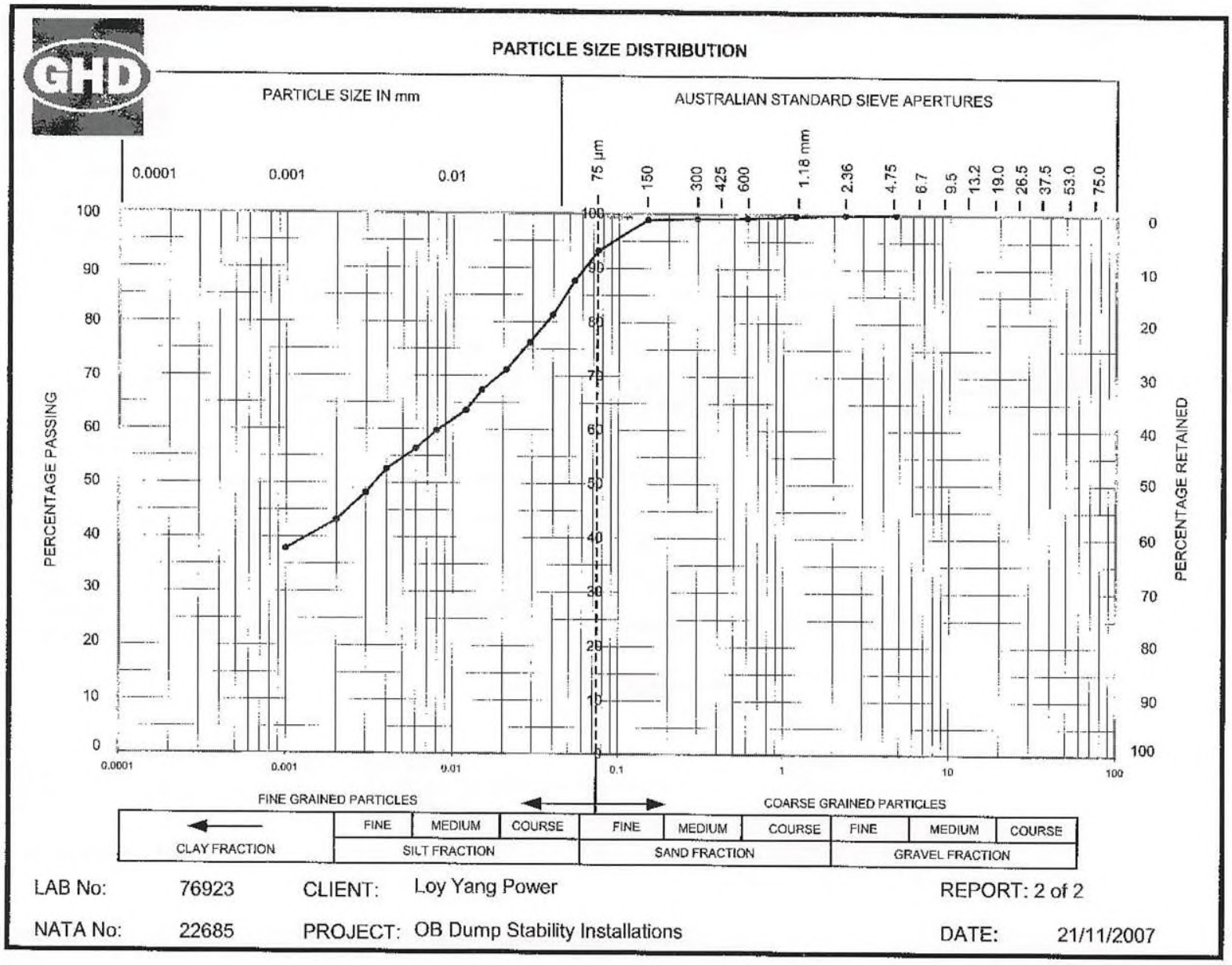

GHD | MANAGEMENT ENGINEERING ENVIRONMENT

NATA REPORT # 22686

Lab #:	76924	Client:	Loy Yang Power	Sampled:	GHD
Operator:	RL	Project:	Loy Yang OB Dump Western End E416676 N258381	Layer:	-
Started:	21/11/2007	Location:	LY4245 @ 32.0m	Material:	SILT(OH)

Date: 13.12.2007

Approved Nata Signatory: R Law

All Passing Sieve Size AS (mm)	Liquid Limit %	Plasticity Limit %	Plasticity Index %	Linear Shrinkage %	Fines %	Moisture %
0.425	73	46	27	11.5	94	36.7

Grading Requirements (% passing)

Sieve Size AS (mm)											
19.0	13.2	9.5	6.7	4.75	2.36	1.18	0.600	0.425	0.300	0.150	0.075
100	100	100	100	100	100	100	100	100	99	97	94
Limits											

TEST METHODS

Liquid Limit AS1289 3.1.2 [ ] Natural State [ ] Air-dried [X] Oven-dried [ ] Unknown
Plastic Limit AS 1289 3.2.1 [ ] Wet-sieved [X] Dry-sieved
Plastic Index AS 1289 3.3.1
Linear Shrinkage AS 1289 3.4.1
Drying Method AS 1289 2.1.1
Sieve AS 1289 3.6.1
Classification AS 1726-1993
Emerson Class AS 1289.3.8.1

GHD Geo-Eng
A division of GHD Pty Ltd
ABN 39 008 488 373

Cnr Hazelwood Drive & Lignite Court
Morwell Vic 3840
Australia

Locked Bag 5
Morwell Vic 3840
Australia

T 61 3 5133 9511
F 61 3 5133 9579
E mwlmail@ghd.com.au
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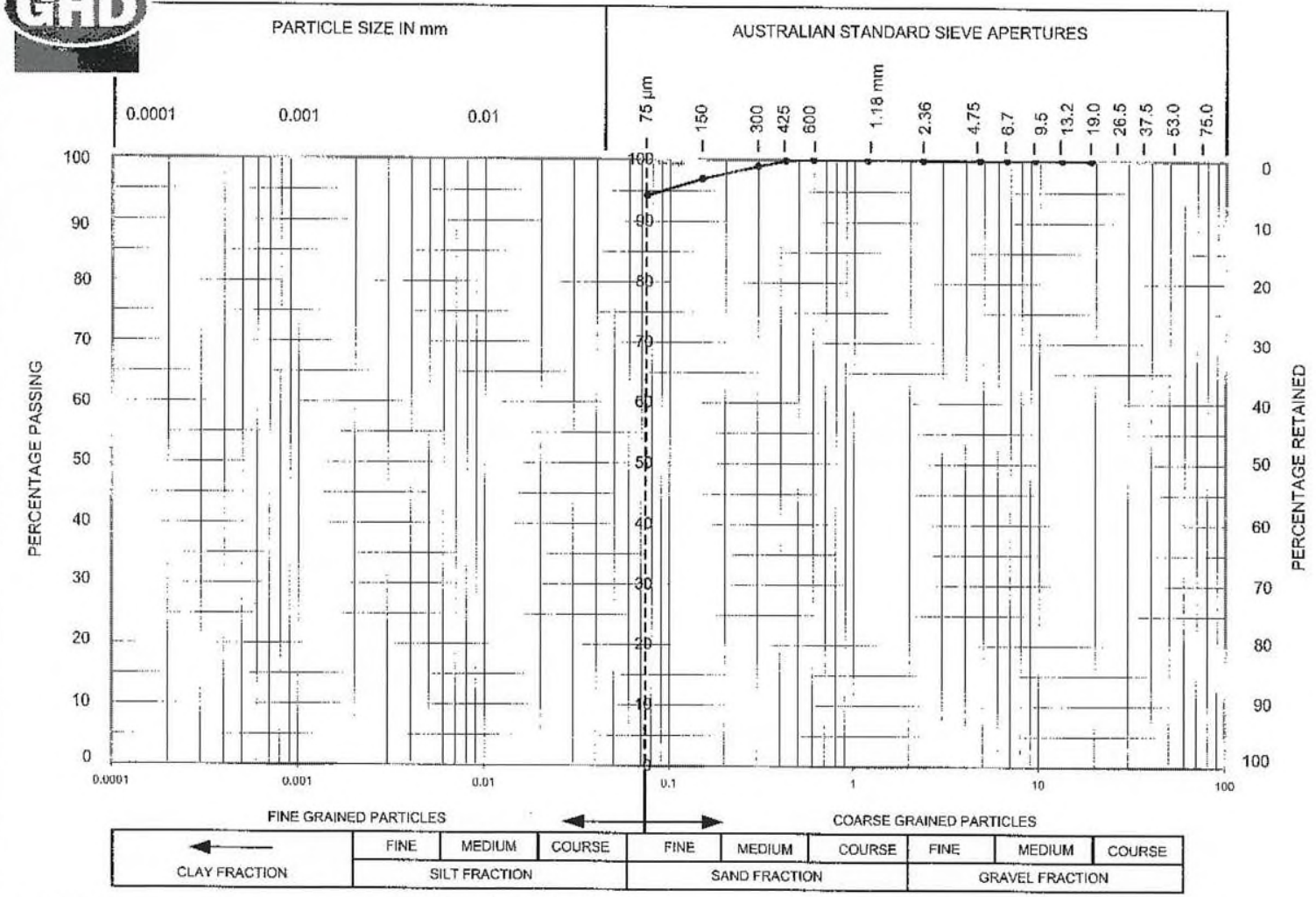

LAB No: 76924 CLIENT: Loy Yang Power REPORT: 2 of 2

NATA No: 22686 PROJECT: Loy Yang OB Dump Western End E416676 N258381 DATE: 21/11/2007

GHD | MANAGEMENT ENGINEERING ENVIRONMENT

NATA REPORT # 22687

Lab. No: 76925
Operator: MG
Started: 21/11/2007

Client: Loy Yang Power
Project: Loy Yang OB Dump Western End E416676 N258381
Location: LY4245 @ 35.9m

Sampled: GHD
Material: CLAY trace of sand(CH)

Date: 10.12.2007

Approved Nata Signatory: R Law

Liquid Limit %	Plasticity Limit %	Plasticity Index %	Linear Shrinkage %	Fines %	Moisture %
52	16	36	12.0	86	22.1

Grading Requirements (% passing)

Sieve Size AS (mm)																	
4.75	2.36	1.18	0.600	0.300	0.150	0.075	0.064	0.045	0.032	0.023	0.017	0.012	0.009	0.006	0.004	0.003	0.002	0.001
100	100	98	96	93	90	86	82	80	77	74	71	69	66	63	61	57	54	51

TEST METHODS
Liquid Limit AS1289 3.1.2 [ ] Natural State [ ] Air-dried [X] Oven-dried [ ] Unknown
Plastic Limit AS 1289 3.2.1 [ ] Wet-sieved [X] Dry-sieved
Plastic Index AS 1289 3.3.1
Linear Shrinkage AS 1289 3.4.1
Classification AS 1726 -1993
Drying Method AS1289 2.1.1
Emerson Class No AS 1289.3.8.1
Sieve AS 1289 3.6.1
Hydrometer AS 1289 3.6.3

GHD Geo-Eng
A division of GHD Pty Ltd
ABN 39 008 488 373
Cnr Horelwood Drive & Ligurite Court
Morwell Vic 3840
Australia
Locked Bag 5
Morwell Vic 3840
Australia
T 61 3 5133 9511
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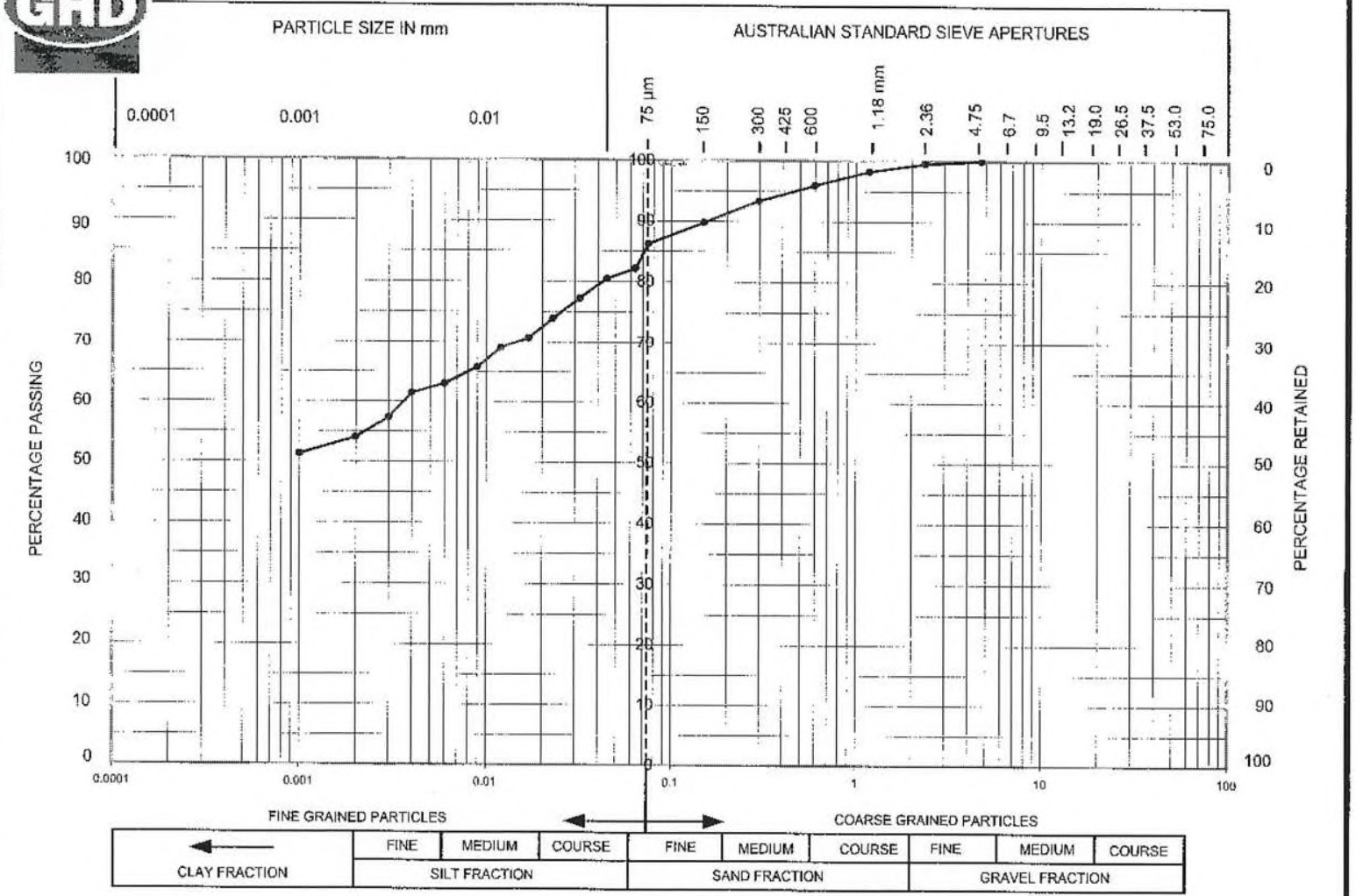

LAB No: 76925 CLIENT: Loy Yang Power REPORT: 2 of 2

NATA No: 22687 PROJECT: OB Dump Stability Installations DATE: 21/11/2007

GHD | MANAGEMENT ENGINEERING ENVIRONMENT

NATA REPORT # 22688

Lab #:	76926	Client:	Loy Yang Power	Sampled:	GHD
Operator:	RL	Project:	Loy Yang OB Dump Western End E416676 N258381	Layer:	-
Started:	21/11/2007	Location:	LY4245 @ 44.0m	Material:	inferior COAL(Pt)

Date: 13.12.2007

Approved Nata Signatory: R Law

All Passing Sieve Size AS (mm)	Liquid Limit %	Plasticity Limit %	Plasticity Index %	Linear Shrinkage %	Fines %	Moisture %
0.425	106	91	16	10.5	95	113.7

Grading Requirements (% passing)

Sieve Size AS (mm)											
19.0	13.2	9.5	6.7	4.75	2.36	1.18	0.600	0.425	0.300	0.150	0.075
100	100	100	100	100	100	100	100	100	99	96	95
Limits											

TEST METHODS

Liquid Limit AS1289 3.1.2 [ ] Natural State [ ] Air-dried [X] Oven-dried [ ] Unknown
Plastic Limit AS 1289 3.2.1 [ ] Wet-sieved [X] Dry-sieved
Plastic Index AS 1289 3.3.1
Linear Shrinkage AS 1289 3.4.1
Drying Method AS 1289 2.1.1
Sieve AS 1289 3.6.1
Classification AS 1726-1993
Emerson Class AS 1289.3.8.1

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A division of GHD Pty Ltd
ABN 39 008 488 373

Cnr Hazelwood Drive & Lignite Court
Morwell Vic 3840
Australia

Locked Bag 5
Morwell Vic 3840
Australia

T 61 3 5133 9511
F 61 3 5133 9579
E mwlmail@ghd.com.au
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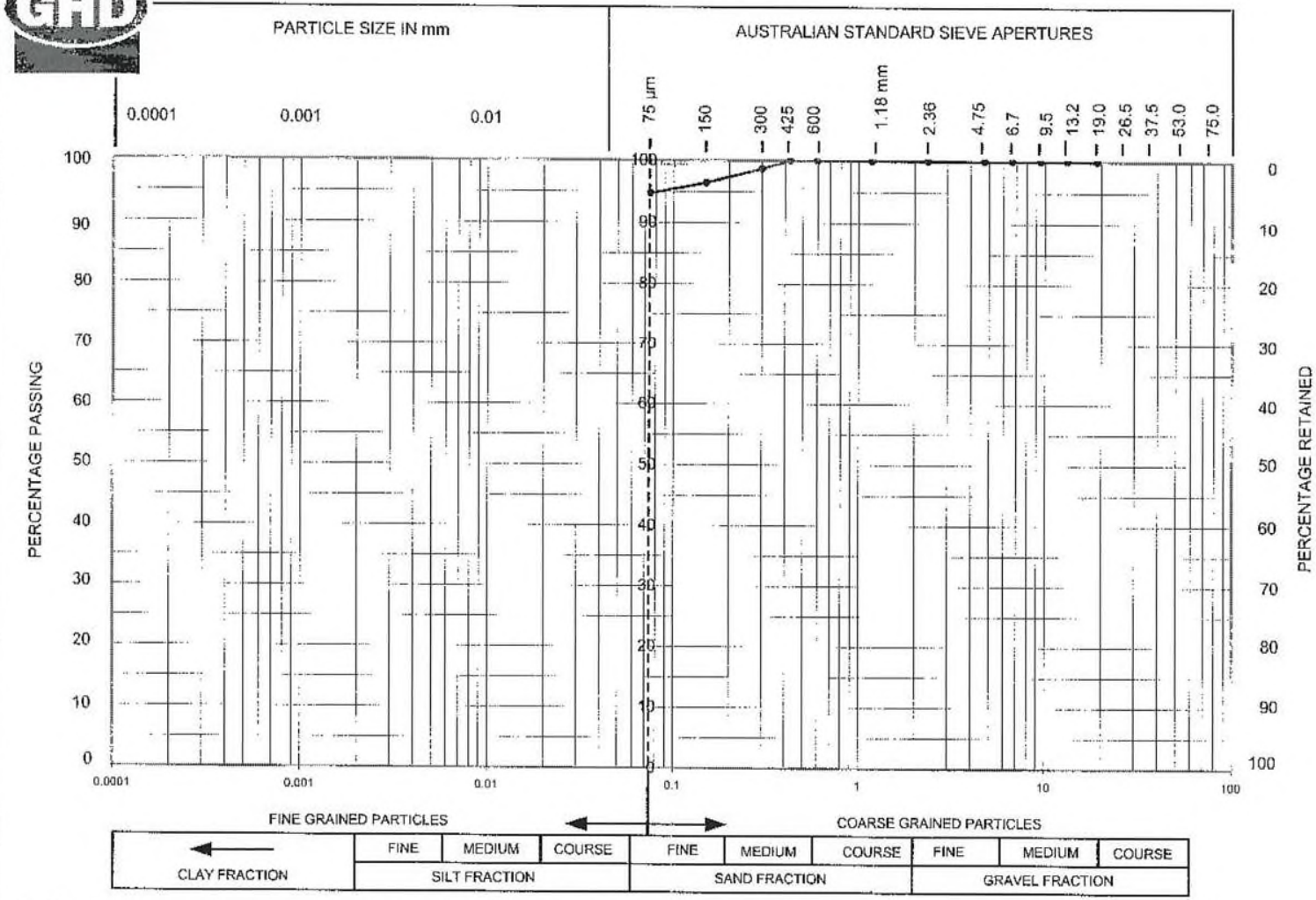


LAB No: 76926 CLIENT: Loy Yang Power REPORT: 2 of 2

NATA No: 22688 PROJECT: Loy Yang OB Dump Western End E416676 N258381 DATE: 21/11/2007

CLIENTS|PEOPLE|PERFORMANCE

TRIAXIAL COMPRESSION TEST

(Unconsolidated Undrained without Pore Pressure Measurement)

Nata No 22688

Job No 311145207
Sample No 76926
Sheet No 1 of 2

Client	Loy Yang Power	Tested by	RL
Project	OB Dump Stability Installations	Date	03/12/2007
Location	Loy Yang OB Dump Western End E416676 N258381	Checked by	TO

Sample location	LY4245 @ 44.0m	Sampled by	GHD
Type of sample	63mm TWT	Sampling date	2007
Sample description	inferior COAL, brownish black. Sample in good condition.		
Test method	AS 1289.6.4.1, AS1289.2.1.1		
Failure criteria	Maximum deviator stress		

Stage Details

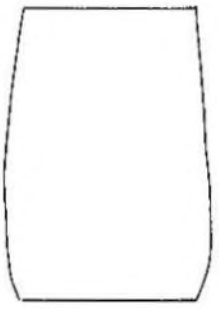
Stage No		1	2	3
Confining pressure	kPa	250	500	1000
Deviator stress at failure	kPa	212	230	327
Mean normal stress at failure	kPa	356	615	1164
Maximum shear stress at failure	kPa	106	115	164
Strain at failure (cumulative)	%	4.16	4.96	14.08
Rate of strain	mm/min	1.524	1.524	1.524

Remarks

Specimen Details

Initial diameter	mm	63.0
Initial height	mm	125.0
Initial bulk density	t/m^3	1.17
Initial dry density	t/m^3	0.55
Moisture content	%	113.1

Mode of Failure



Shear Strength Envelope

Cohesion	kPa	**164**
Angle of internal friction	deg	**0**

Certified by R Smith

Date 13 Dec 07

GHD Pty Ltd ABN 39 008 488 373 Cnr Hazelwood Drive & Lignite Court Morwell VIC 3840 Locked Bag 5 Morwell 3840 VIC Australia
T 61 3 5136 5937 F 61 3 5136 5999 E mwlmail@ghd.com.au W www.ghd.com.au

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TRIAXIAL COMPRESSION TEST

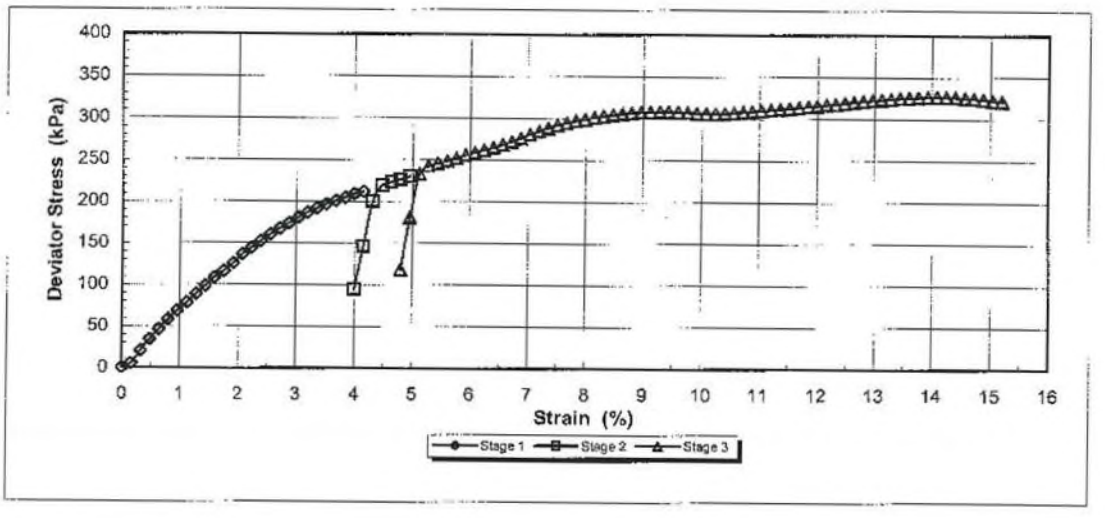
(Unconsolidated Undrained without Pore Pressure Measurement)

Nata No 22688

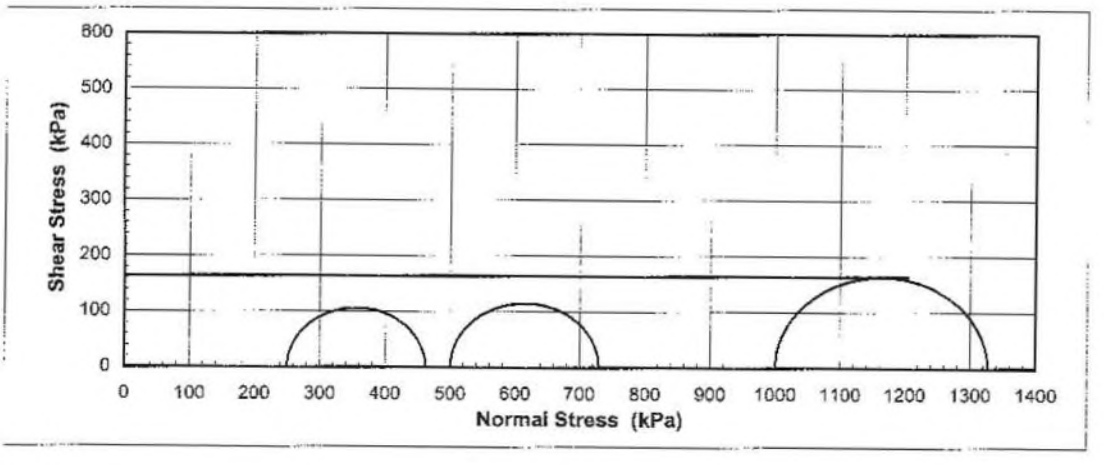
Job No	311145207
Sample No	76926
Sheet No	2 of 2

Client	Loy Yang Power	Tested by	RL
Project	OB Dump Stability Installations	Date	03/12/2007
Location	Loy Yang OB Dump Western End E416676 N	Checked by	TO

Stress / Strain Plot



Strength Envelope



C_u = 164 kPa ϕ_u = 0 deg

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TRIAXIAL COMPRESSION TEST

(Unconsolidated Undrained without Pore Pressure Measurement)

Nata No 22686

Job No 311145207
Sample No 76924
Sheet No 1 of 2

Client	Loy Yang Power	Tested by	RL
Project	OB Dump Stability Installations	Date	03/12/2007
Location	Loy Yang OB Dump Western End E416676 N258381	Checked by	TO

Sample location	LY4245 @ 32.0m	Sampled by	GHD
Type of sample	63mm TWT	Sampling date	2007
Sample description	Inferior COAL / Ligneous CLAY and CLAY mixture. Brownish black, mottled pale yellow and pale brown. Sample in good condition.		
Test method	AS 1289.6.4.1, AS1289.2.1.1		
Failure criteria	Maximum deviator stress		

Stage Details

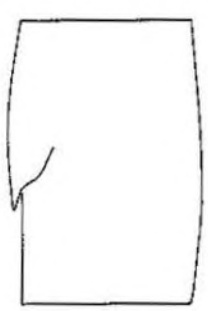
Stage No		1	2	3
Confining pressure	kPa	230	460	920
Deviator stress at failure	kPa	29	42	74
Mean normal stress at failure	kPa	244	481	957
Maximum shear stress at failure	kPa	14	21	37
Strain at failure (cumulative)	%	1.27	2.07	8.27
Rate of strain	mm/min	1.524	1.524	1.524

Remarks

Specimen Details

Initial diameter	mm	63.0
Initial height	mm	125.8
Initial bulk density	t/m^3	1.69
Initial dry density	t/m^3	1.23
Moisture content	%	37.5

Mode of Failure



Shear Strength Envelope

Cohesion	kPa	37
Angle of internal friction	deg	0

Certified by R Smith

Date 13 Dec 07.

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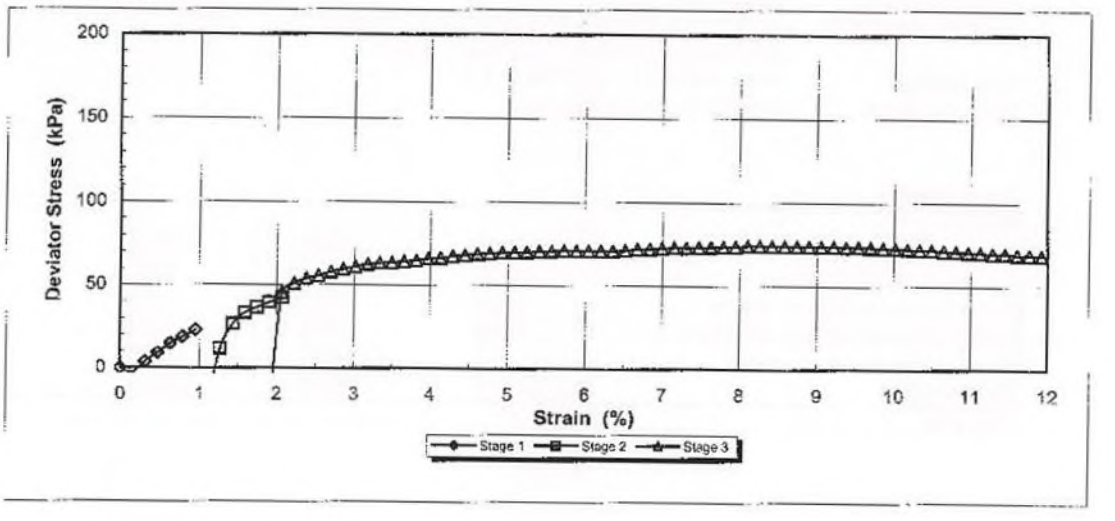
TRIAXIAL COMPRESSION TEST

(Unconsolidated Undrained without Pore Pressure Measurement)

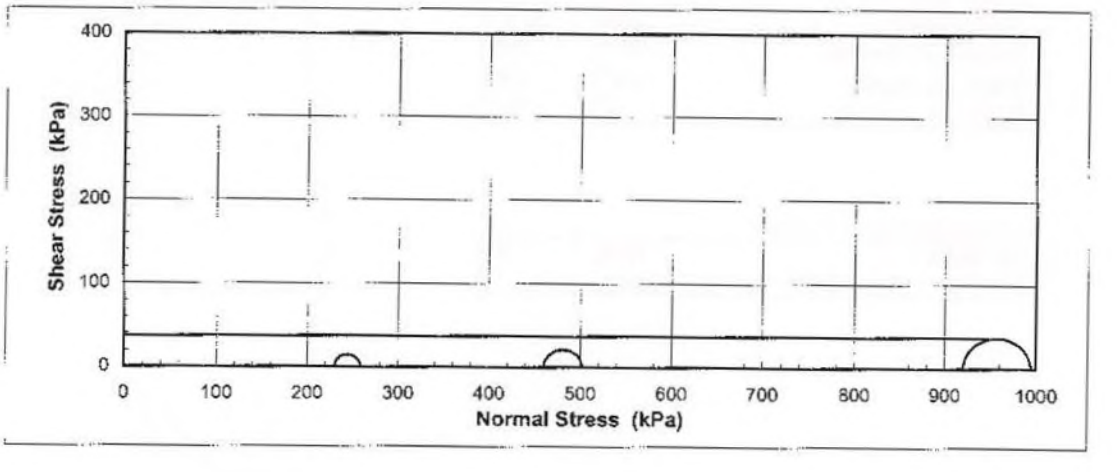
Nata No	22686	Job No	311145207
		Sample No	76924
		Sheet No	2 of 2

Client	Loy Yang Power	Tested by	RL
Project	OB Dump Stability Installations	Date	03/12/2007
Location	Loy Yang OB Dump Western End E416676 N	Checked by	TO

Stress / Strain Plot



Strength Envelope



C_u = 37 kPa ϕ_u = 0 deg

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TRIAXIAL COMPRESSION TEST

(Unconsolidated Undrained without Pore Pressure Measurement)

Nata No	22376	Job No	311145207
		Sample No	76550
		Sheet No	1 of 2

Client	Loy Yang Power	Tested by	R Law
Project	OB Dump Stability Installations	Date	18/10/2007
Location	Loy Yang OB Dump Western End E416676 N258381	Checked by	TO

Sample location	LY4245 @ 23.0m	Sampled by	Drilltec
Type of sample	63mm TWT	Sampling date	10/2007
Sample description	CLAY(CH). Mottled pale grey, pale purple & pale yellowish brown. Sample in good		
Test method	AS 1289.6.4.1, AS1289.2.1.1		
Failure criteria	Maximum deviator stress		

Stage Details

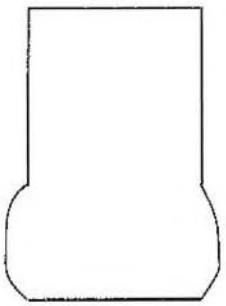
Stage No		1	2	3
Confining pressure	kPa	200	400	800
Deviator stress at failure	kPa	220	234	291
Mean normal stress at failure	kPa	310	517	945
Maximum shear stress at failure	kPa	110	117	145
Strain at failure (cumulative)	%	3.51	4.31	14.35
Rate of strain	mm/min	1.524	1.524	1.524

Remarks

Specimen Details

Initial diameter	mm	62.7
Initial height	mm	125.4
Initial bulk density	t/m^3	2.01
Initial dry density	t/m^3	1.63
Moisture content	%	23.7

Mode of Failure



Shear Strength Envelope

Cohesion	kPa	90
Angle of internal friction	deg	3

Certified by R Smith

Date 3 Dec 07

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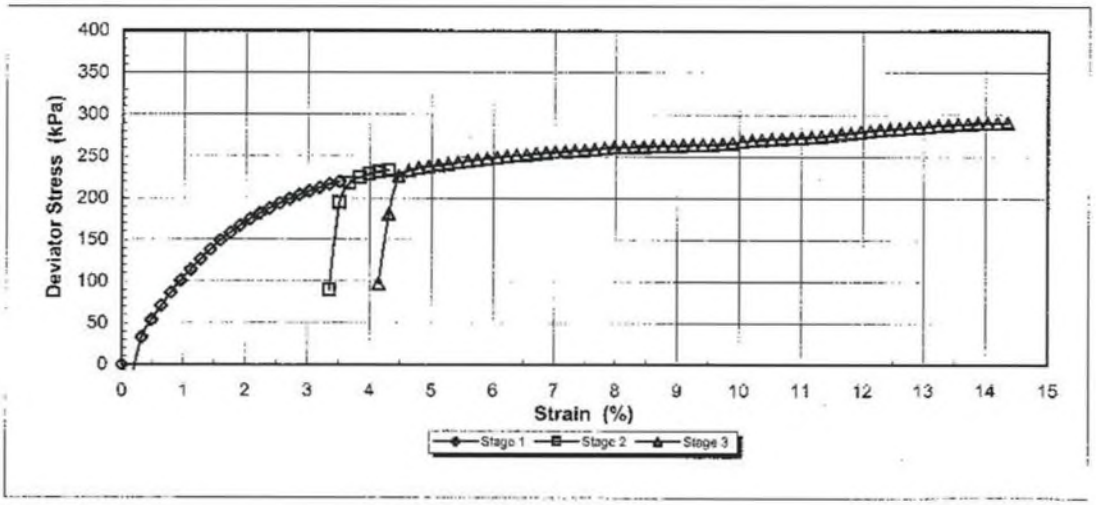
TRIAXIAL COMPRESSION TEST

(Unconsolidated Undrained without Pore Pressure Measurement)

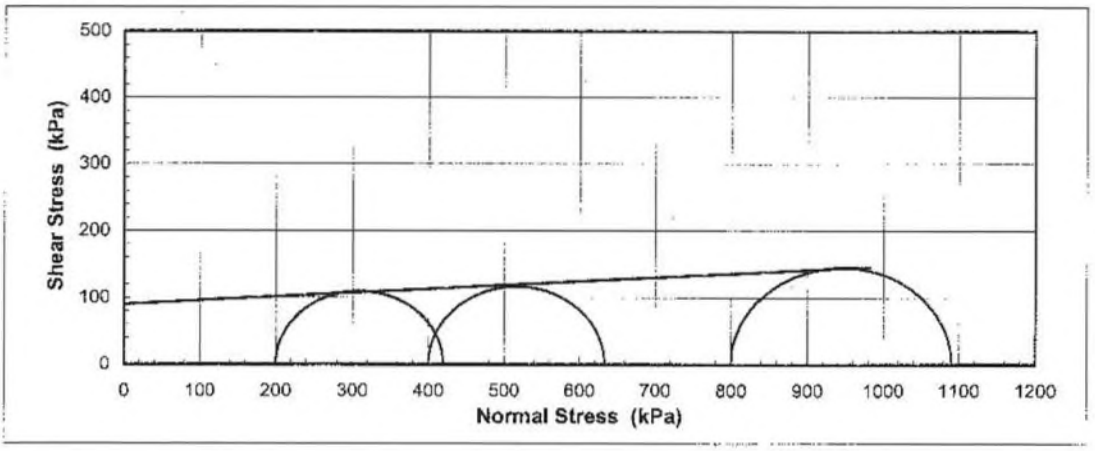
Nata No	22376	Job No	311145207
		Sample No	76550
		Sheet No	2 of 2

Client	Loy Yang Power	Tested by	R Law
Project	OB Dump Stability Installations	Date	18/10/2007
Location	Loy Yang OB Dump Western End E416676 N	Checked by	TO

Stress / Strain Plot



Strength Envelope



C_u = 90 kPa ϕ_u = 3 deg

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TRIAXIAL COMPRESSION TEST

(Unconsolidated Undrained without Pore Pressure Measurement)

Nata No	22374	Job No	311145207
		Sample No	76553
		Sheet No	1 of 2

Client	Loy Yang Power	Tested by	R Law
Project	OB Dump Stability Installations	Date	18/10/2007
Location	Loy Yang OB Dump Western End E416676 N258381	Checked by	TO

Sample location	LY4245 @ 17.5m	Sampled by	Drilltec
Type of sample	63mm TWT	Sampling date	10/2007
Sample description	Inferior COAL (PT). Dark brown to black, sample in good condition.		
Test method	AS 1289.6.4.1, AS1289.2.1.1		
Failure criteria	Maximum deviator stress		

Stage Details

Stage No		1	2	3
Confining pressure	kPa	150	300	600
Deviator stress at failure	kPa	447	531	595
Mean normal stress at failure	kPa	373	565	897
Maximum shear stress at failure	kPa	223	265	297
Strain at failure (cumulative)	%	5.24	7.04	10.31
Rate of strain	mm/min	1.524	1.524	1.524

Remarks

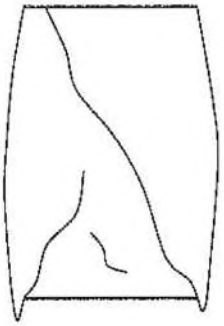
Specimen Details

Initial diameter	mm	62.5
Initial height	mm	122.2
Initial bulk density	t/m^3	1.12
Initial dry density	t/m^3	0.49
Moisture content	%	126.5

Shear Strength Envelope

Cohesion	kPa	176
Angle of internal friction	deg	8

Mode of Failure



Certified by R Smith

Date 3 Dec 07

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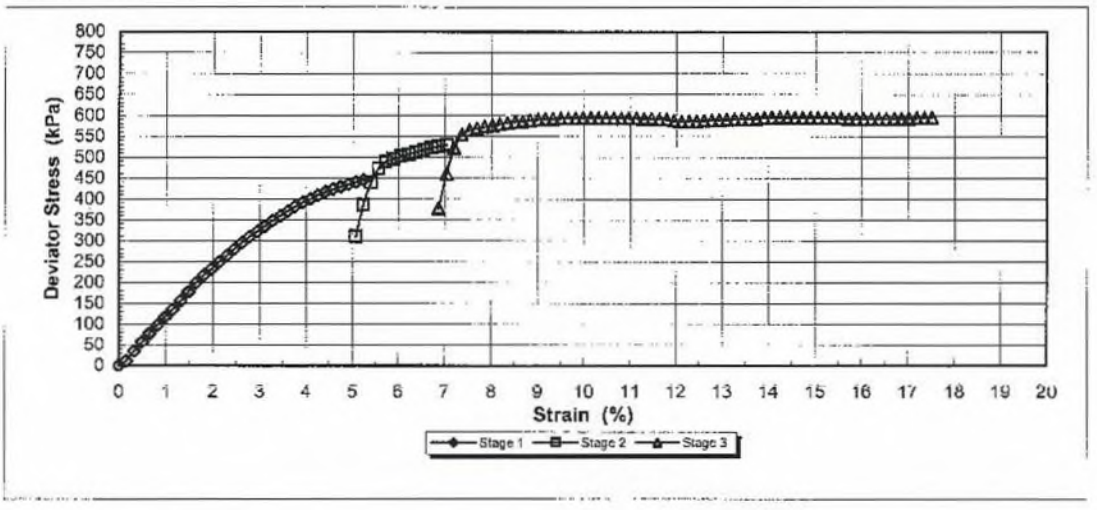
TRIAXIAL COMPRESSION TEST

(Unconsolidated Undrained without Pore Pressure Measurement)

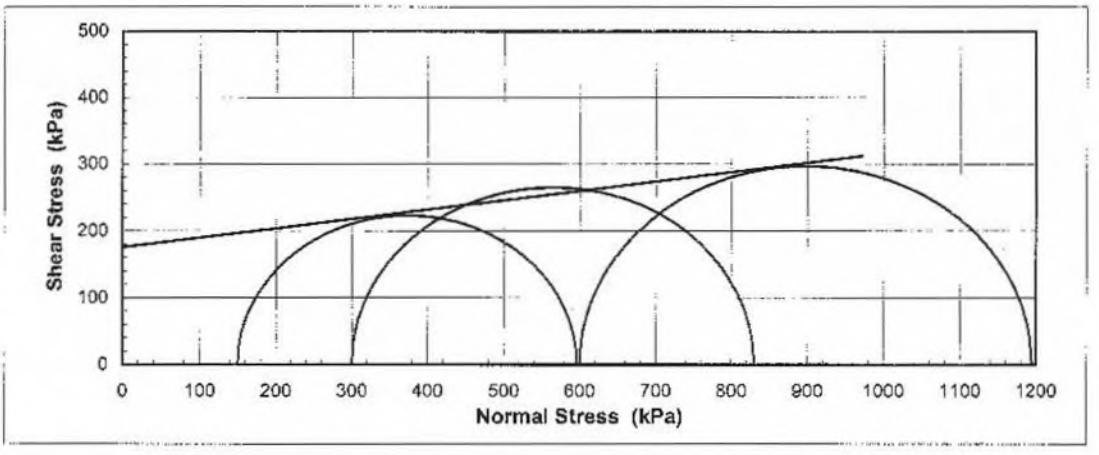
Nata No	22374	Job No	311145207
		Sample No	76553
		Sheet No	2 of 2

Client	Loy Yang Power	Tested by	R Law
Project	OB Dump Stability Installations	Date	18/10/2007
Location	Loy Yang OB Dump Western End E416676 N	Checked by	TO

Stress / Strain Plot



Strength Envelope



C_u = 176 kPa ϕ_u = 8 deg

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TRIAXIAL COMPRESSION TEST

(Unconsolidated Undrained without Pore Pressure Measurement)

Nata No 22372

Job No	311145207
Sample No	76550
Sheet No	1 of 2

Client	Loy Yang Power	Tested by	R Law
Project	OB Dump Stability Installations	Date	18/10/2007
Location	OB Dump West End E416676 N258381	Checked by	TO

Sample location	LY4245 @ 8.5m	Sampled by	Drilltec
Type of sample	63mm TWT	Sampling date	10/2007
Sample description	Multi-layered (Coal/Clay). See Sheet 2		

Test method	AS 1289.6.4.1, AS1289.2.1.1
Failure criteria	Maximum deviator stress

Stage Details

Stage No		1	2	3
Confining pressure	kPa	80	160	320
Deviator stress at failure	kPa	331	351	402
Mean normal stress at failure	kPa	246	336	521
Maximum shear stress at failure	kPa	166	176	201
Strain at failure (cumulative)	%	3.98	4.94	9.55
Rate of strain	mm/min	1.524	1.524	1.524

Remarks

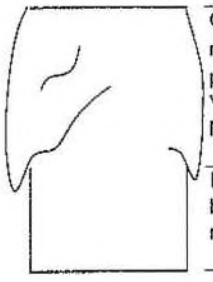
Specimen Details

Initial diameter	mm	62.1
Initial height	mm	125.6
Initial bulk density	t/m^3	1.83
Initial dry density	t/m^3	1.39
Moisture content	%	31.9

Shear Strength Envelope

Cohesion	kPa	134
Angle of internal friction	deg	7

Mode of Failure



CLAY(CH)
mottled yellowish brown, pale white & pale purple.
Very Stiff
Moist

Inferior COAL with clay inclusions
brownish black and light grey, moist.

Certified by R Smith

Date 3 Dec 07

NATA TECHNICAL COMPETENCE

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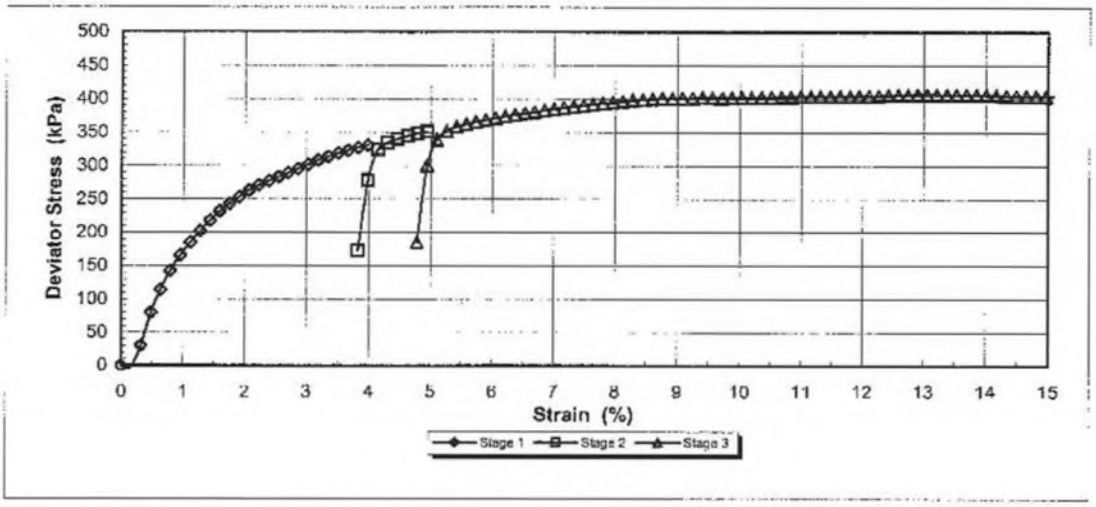
TRIAXIAL COMPRESSION TEST

(Unconsolidated Undrained without Pore Pressure Measurement)

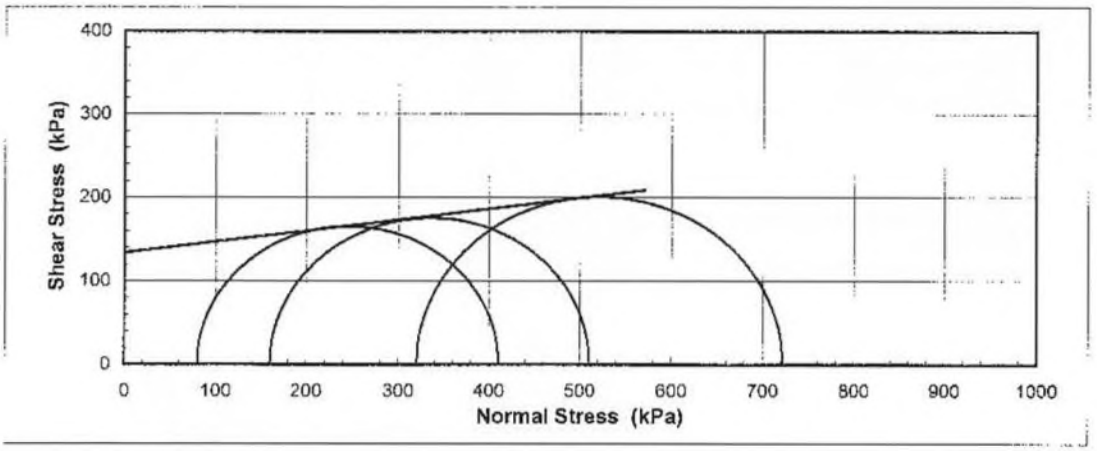
Nata No	22372	Job No	311145207
		Sample No	76550
		Sheet No	2 of 2

Client	Loy Yang Power	Tested by	R Law
Project	OB Dump Stability Installations	Date	18/10/2007
Location	OB Dump West End E416676 N258381	Checked by	TO

Stress / Strain Plot



Strength Envelope



C_u = 134 kPa ϕ_u = 7 deg

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TRIAXIAL COMPRESSION TEST

(Unconsolidated Undrained without Pore Pressure Measurement)

Nata No 22371

Job No 311145207
Sample No 76549
Sheet No 1 of 2

Client	Loy Yang Power	Tested by	R Law
Project	OB Dump Stability Installations	Date	18/10/2007
Location	OB Dump West End E416676 N258381	Checked by	TO

Sample location	LY4245 @ 5.5m	Sampled by	Drilltec
Type of sample	63mm TWT	Sampling date	10/2007
Sample description	CLAY (CH) with sand. Mottled yellowish brown, pale orange, pale grey & pale purple.		
Test method	AS 1289.6.4.1, AS1289.2.1.1		
Failure criteria	Maximum deviator stress		

Stage Details

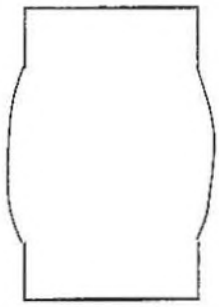
Stage No		1	2	3
Confining pressure	kPa	60	120	240
Deviator stress at failure	kPa	373	401	476
Mean normal stress at failure	kPa	246	321	478
Maximum shear stress at failure	kPa	186	201	238
Strain at failure (cumulative)	%	4.27	5.54	13.13
Rate of strain	mm/min	1.524	1.524	1.524

Remarks

Specimen Details

Initial diameter	mm	62.0
Initial height	mm	126.4
Initial bulk density	t/m^3	2.06
Initial dry density	t/m^3	1.79
Moisture content	%	15.1

Mode of Failure



Shear Strength Envelope

Cohesion	kPa	**133**
Angle of internal friction	deg	**13**

Certified by R Smith

Date 3 Dec 07

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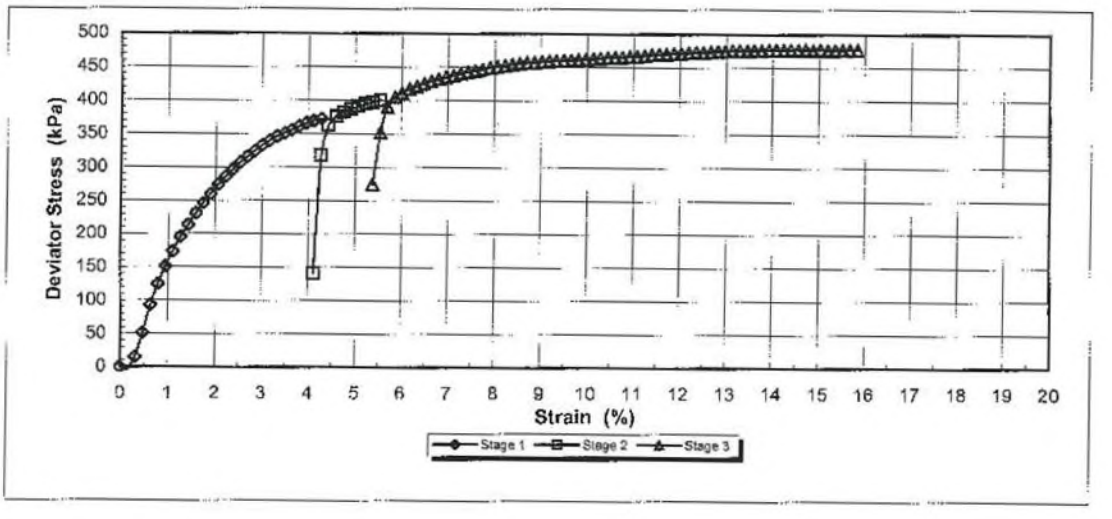
TRIAXIAL COMPRESSION TEST

(Unconsolidated Undrained without Pore Pressure Measurement)

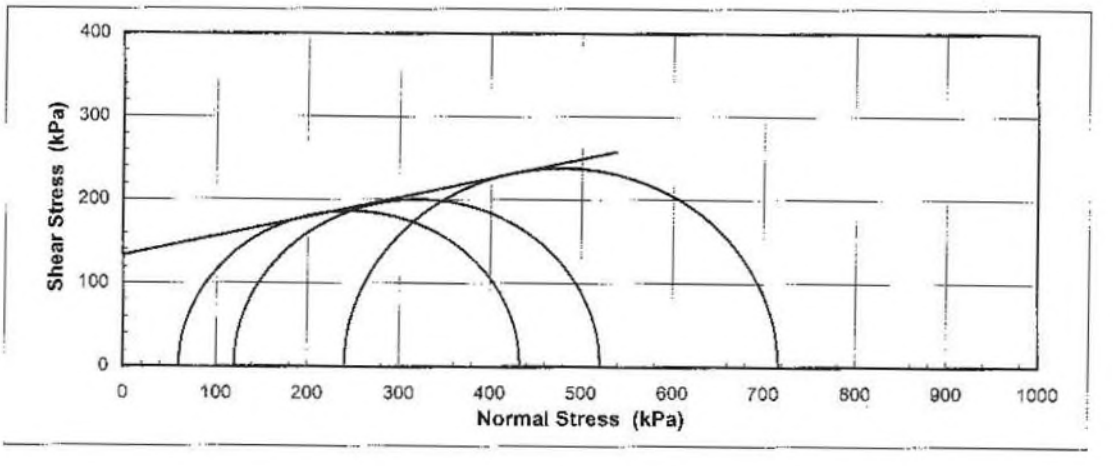
Nata No	22371	Job No	311145207
		Sample No	76549
		Sheet No	2 of 2

Client	Loy Yang Power	Tested by	R Law
Project	OB Dump Stability Installations	Date	18/10/2007
Location	OB Dump West End E416676 N258381	Checked by	TO

Stress / Strain Plot



Strength Envelope



C_u = 133 kPa ϕ_u = 13 deg

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TRIAXIAL COMPRESSION TEST

(Unconsolidated Undrained without Pore Pressure Measurement)

Nata No	22688	Job No	311145207
		Sample No	76926
		Sheet No	1 of 2

Client	Loy Yang Power	Tested by	RL
Project	OB Dump Stability Installations	Date	03/12/2007
Location	Loy Yang OB Dump Western End E416676 N258381	Checked by	TO

Sample location	LY4245 @ 44.0m	Sampled by	GHD
Type of sample	63mm TWT	Sampling date	2007
Sample description	inferior COAL, brownish black. Sample in good condition.		
Test method	AS 1289.6.4.1, AS1289.2.1.1		
Failure criteria	Maximum deviator stress		

Stage Details

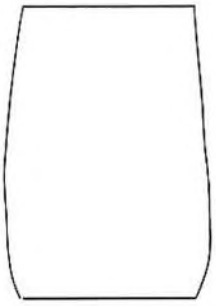
Stage No		1	2	3
Confining pressure	kPa	250	500	1000
Deviator stress at failure	kPa	212	230	327
Mean normal stress at failure	kPa	356	615	1164
Maximum shear stress at failure	kPa	106	115	164
Strain at failure (cumulative)	%	4.16	4.96	14.08
Rate of strain	mm/min	1.524	1.524	1.524

Remarks

Specimen Details

Initial diameter	mm	63.0
Initial height	mm	125.0
Initial bulk density	t/m^3	1.17
Initial dry density	t/m^3	0.55
Moisture content	%	113.1

Mode of Failure



Shear Strength Envelope

Cohesion	kPa	80
Angle of internal friction	deg	4

Certified by R Smith

Date 7 Jan 08

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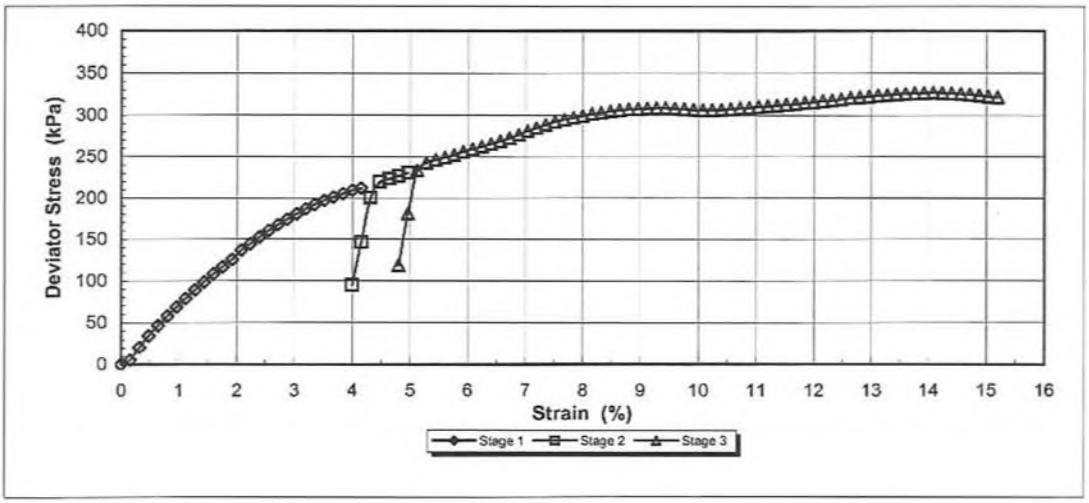
TRIAXIAL COMPRESSION TEST

(Unconsolidated Undrained without Pore Pressure Measurement)

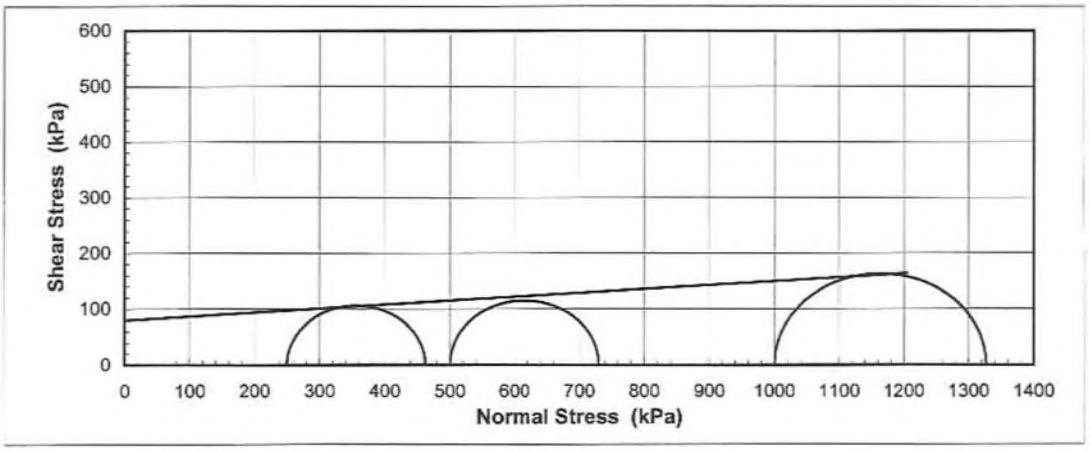
Nata No	22688	Job No	311145207
		Sample No	76926
		Sheet No	2 of 2

Client	Loy Yang Power	Tested by	RL
Project	OB Dump Stability Installations	Date	03/12/2007
Location	Loy Yang OB Dump Western End E416676 N	Checked by	TO

Stress / Strain Plot



Strength Envelope



C_u = 80 kPa ϕ_u = 4 deg

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GHD CLIENTS|PEOPLE|PERFORMANCE

TRIAXIAL COMPRESSION TEST

(Unconsolidated Undrained without Pore Pressure Measurement)

Nata No 22686

Job No 311145207
Sample No 76924
Sheet No 1 of 2

Client	Loy Yang Power	Tested by	RL
Project	OB Dump Stability Installations	Date	03/12/2007
Location	Loy Yang OB Dump Western End E416676 N258381	Checked by	TO

Sample location	LY4245 @ 32.0m	Sampled by	GHD
Type of sample	63mm TWT	Sampling date	2007
Sample description	Inferior COAL / Ligneous CLAY and CLAY mixture. Brownish black, mottled pale yellow and pale brown. Sample in good condition.		

Test method	AS 1289.6.4.1, AS1289.2.1.1
Failure criteria	Maximum deviator stress

Stage Details

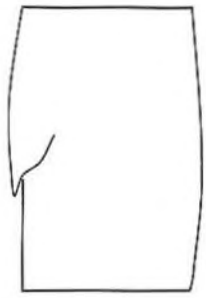
Stage No		1	2	3
Confining pressure	kPa	230	460	920
Deviator stress at failure	kPa	29	42	74
Mean normal stress at failure	kPa	244	481	957
Maximum shear stress at failure	kPa	14	21	37
Strain at failure (cumulative)	%	1.27	2.07	8.27
Rate of strain	mm/min	1.524	1.524	1.524

Remarks

Specimen Details

Initial diameter	mm	63.0
Initial height	mm	125.8
Initial bulk density	t/m^3	1.69
Initial dry density	t/m^3	1.23
Moisture content	%	37.5

Mode of Failure



Shear Strength Envelope

Cohesion	kPa	6
Angle of internal friction	deg	2

Certified by R Smith

Date 7 Jan 08

GHD Pty Ltd ABN 39 008 488 373 Cnr Hazelwood Drive & Lignite Court Morwell VIC 3840 Locked Bag 5 Morwell 3840 VIC Australia
T 61 3 5136 5937 F 61 3 5136 5999 E mwlmail@ghd.com.au W www.ghd.com.au

GHD CLIENTS PEOPLE PERFORMANCE

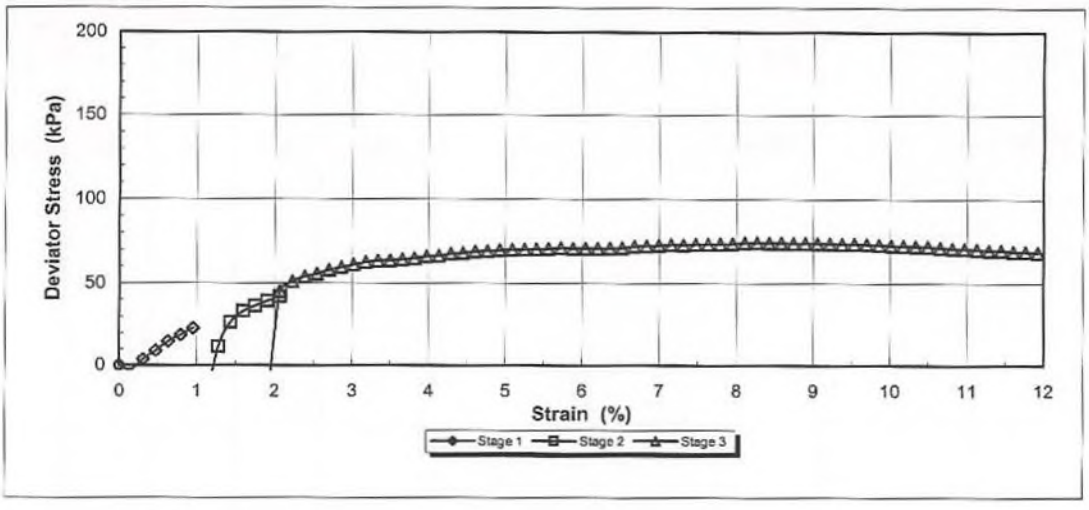
TRIAXIAL COMPRESSION TEST

(Unconsolidated Undrained without Pore Pressure Measurement)

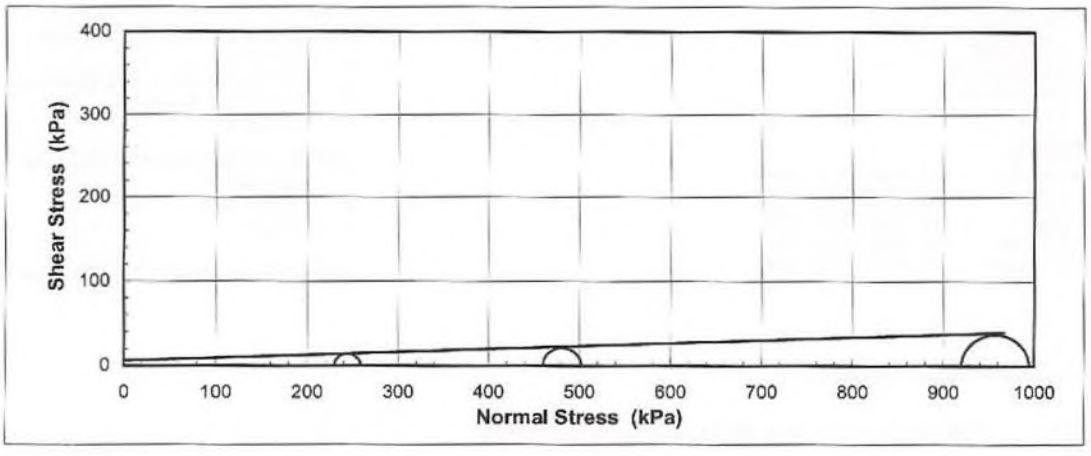
Nata No	22686	Job No	311145207
		Sample No	76924
		Sheet No	2 of 2

Client	Loy Yang Power	Tested by	RL
Project	OB Dump Stability Installations	Date	03/12/2007
Location	Loy Yang OB Dump Western End E416676 N	Checked by	TO

Stress / Strain Plot



Strength Envelope



C_u = 6 kPa ϕ_u = 2 deg

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Douglas Partners
Geotechnics · Environment · Groundwater

Douglas Partners Pty Ltd
ABN 75 053 980 117
68 Brighton Street
Richmond VIC 3121
Australia

PO Box 4155
Richmond VIC 3121
Phone (03) 9428 1831
Fax: (03) 9428 7841
dpmelb@douglaspartners.com.au

RESULTS OF MOISTURE CONTENT, PLASTICITY AND LINEAR SHRINKAGE TESTS

Client: GHD
Project: OB Dump Stability Installations
Location: Loy Yang

Project No: 68626
Report No: M07114001
Report Date: 13-Dec-2007
Date Sampled: -
Date of Test: 28-Nov-2007
Page: 1 of 1

TEST LOCATION	DEPTH (m)	DESCRIPTION	CODE	W_F %	W_L %	W_P %	PI %	*LS %
LY4245	29	Silty CLAY	2,5	58.7	62	38	24	9.0
LY4245	41	Silty CLAY	2,5	34.2	58	27	31	11.0

Legend:
W_F Field Moisture Content
W_L Liquid limit
W_P Plastic limit
PI Plasticity Index
LS Linear shrinkage from liquid limit condition (Mould length 125mm)

Test Methods:
Moisture Content: AS 1289 2.1.1 - 2005
Liquid Limit: AS 1289 3.1.2 - 1995
Plastic Limit: AS 1289 3.2.1 - 1995
Plasticity Index: AS 1289 3.3.1 - 1995
Linear Shrinkage: AS 1289 3.4.1 - 1995

Code
Sample history for plasticity tests
1. Air dried
2. Low temperature (<50°C) oven dried
3. Oven (105°C) dried
4. Unknown

Method of preparation for plasticity tests
5. Dry sieved
6. Wet sieved
7. Natural

*Specify if sample crumbled CR or curled CU

Sampling Method(s): Sampled by Client

Remarks: Field Moisture taken from associated Triaxial Stress tests.

Approved Signatory:

Tested: DC
Checked: PC

Peter Chan
Laboratory Manager

NATA Accredited Laboratory Number: 828
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Douglas Partners Pty Ltd
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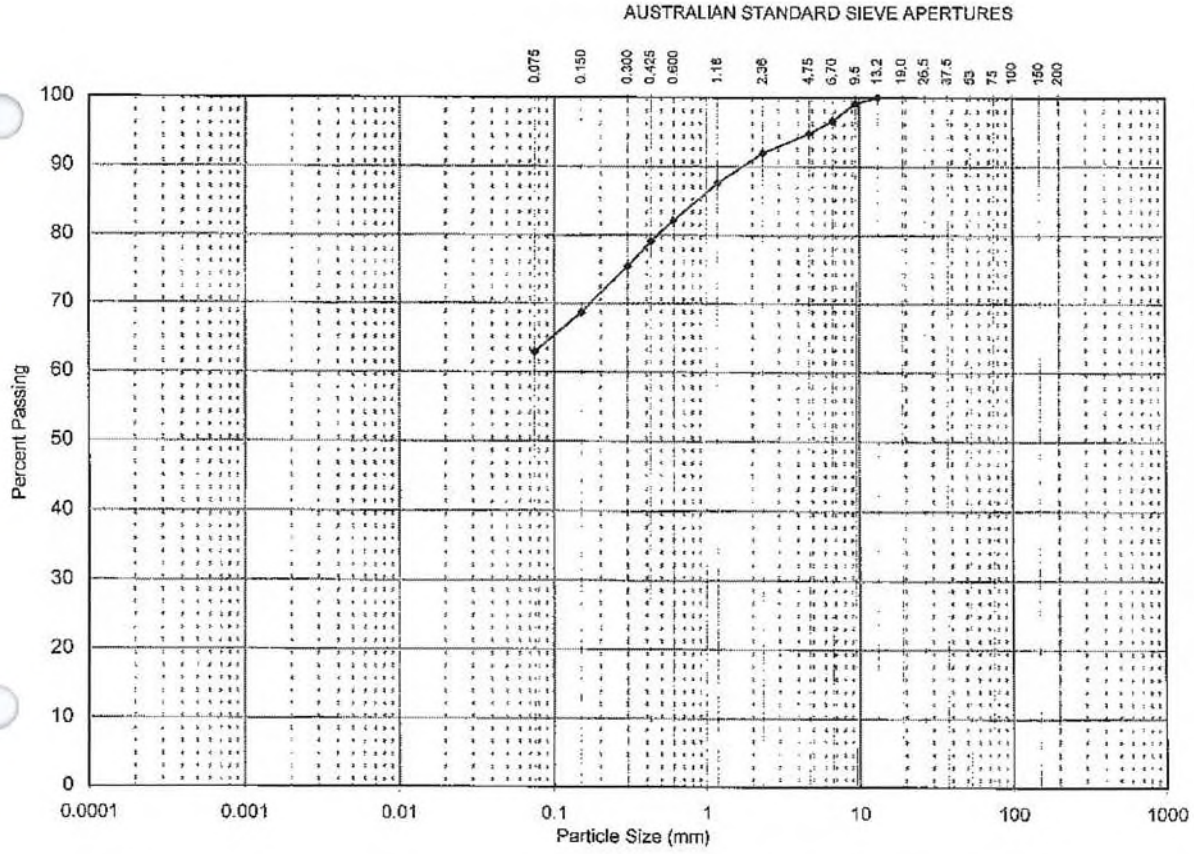
68 Brighton Street
Richmond VIC 3121
AUSTRALIA

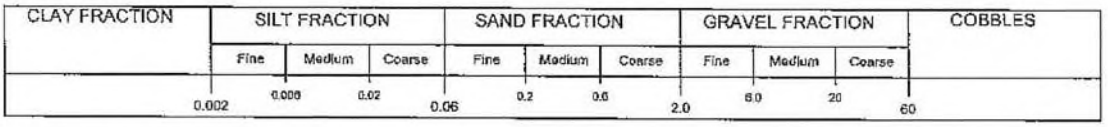
PO Box 4155
Richmond VIC 3121
Phone 03 9428 1831
Fax: 03 9428 7841
dpmelb@douglaspartners.com.au

RESULTS OF PARTICLE SIZE DISTRIBUTION

Client :	GHD			**Project No. :**	68626
				Report No. :	M07114002
Project :	OB Dump Stability Installations			**Report Date :**	07-Dec-07
				Date Sampled:	-
Location :	Loy Yang			**Date of Test:**	04-Dec-07
Road No:	-	**Sample / Pit No:**	LY4245	**Depth / Layer:**	29m
Chainage:	-	**Section / Lot No:**	-	**Test Request No:**	-
				Page:	1 of 1



Sieve Size (mm)	% Passing
75.0	~
53.0	~
37.5	~
26.5	~
19.0	~
13.2	100%
9.5	99%
6.7	97%
4.75	95%
2.36	92%
1.18	88%
0.600	82%
0.425	79%
0.300	75%
0.150	69%
0.075	63%



Description: Silty CLAY

Test Method(s): AS 1289.3.6.1 - 1995, AS 1289.3.6.3 - 1995

Sampling Method(s): Sampled by Client

Remarks: No Pretreatment

Form R004A Rev01 Jul 2005

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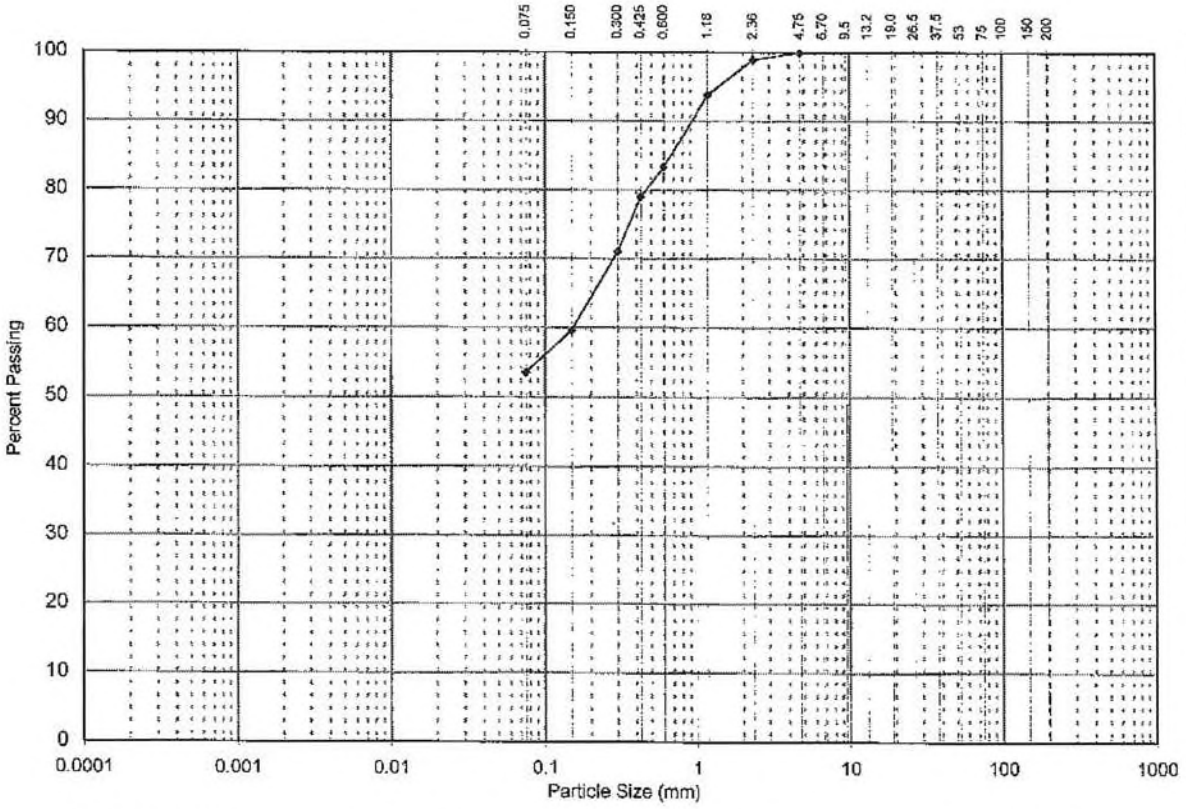
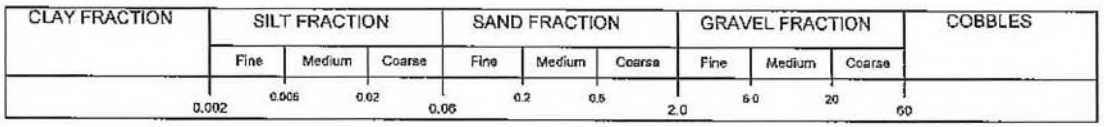
RESULTS OF PARTICLE SIZE DISTRIBUTION

Client :	GHD			**Project No. :**	68626
				Report No. :	M07114003
Project :	OB Dump Stability Installations			**Report Date :**	07-Dec-07
				Date Sampled:	-
Location :	Loy Yang			**Date of Test:**	04-Dec-07
Road No:	-	**Sample / Pit No:**	LY4245	**Depth / Layer:**	41m
Chainage:	-	**Section / Lot No:**	-	**Test Request No:**	-
				Page:	1 of 1

AUSTRALIAN STANDARD SIEVE APERTURES



Sieve Size (mm)	% Passing
75.0	~
53.0	~
37.5	~
26.5	~
19.0	~
13.2	~
9.5	~
6.7	~
4.75	100%
2.36	99%
1.18	94%
0.600	83%
0.425	79%
0.300	71%
0.150	60%
0.075	54%



Description: Silty CLAY

Test Method(s): AS 1289.3.6.1 - 1995, AS 1289.3.6.3 - 1995

Sampling Method(s): Sampled by Client

Remarks: No Pretreatment

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Australia

68 Brighton Street
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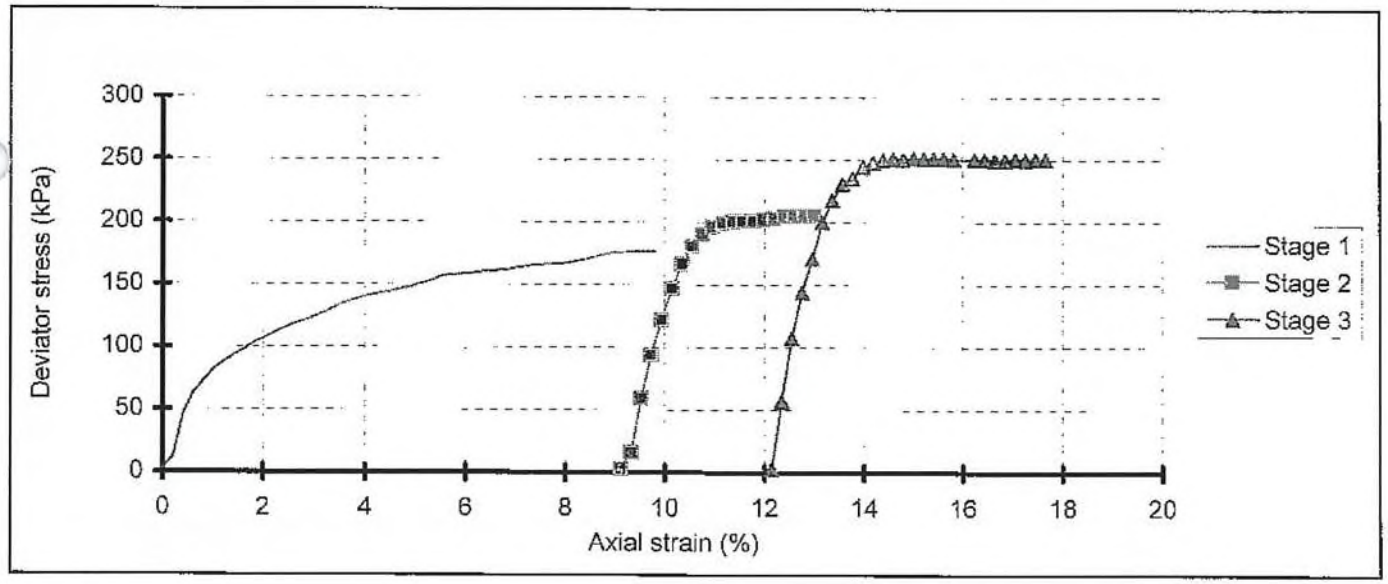
dpmelb@douglaspartners.com.au

TRIAXIAL COMPRESSION TEST RESULTS

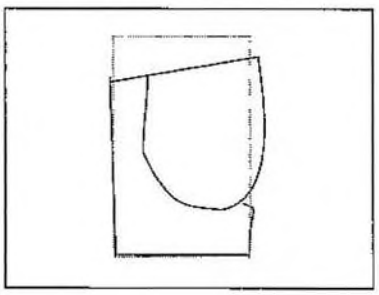
(UNDRAINED WITHOUT PORE PRESSURE MEASUREMENT)

Client :	GHD	**Project No. :**	68626
		Report No. :	M07114004
Project :	OB Dump Stability Installations	**Report Date :**	13 Dec 2007
		Date Sampled :	-
Location :	Loy Yang	**Date of Test:**	19 Nov 2007
Test Location :	LY4245	**Sample Type:**	Undisturbed
Depth / Layer :	29.0m	**Page:**	1 of 1
Sample Description:	Silty CLAY		



UNDRAINED SHEAR STRENGTH	Stage 1	Stage 2	Stage 3
C_u (kPa)	89	103	126
STAGE DETAILS			
Cell pressure (kPa):	220	420	840
Strain rate (mm/min):	1.20	1.20	1.20
Strain at failure (%):	9.61	4.05	3.26
Maximum deviator stress (kPa):	177	205	251
SPECIMEN DETAILS			
Initial Moisture content (%):	58.7		
Dry density (t/m³):	0.99		
Sample Length(mm):	122		
Sample Diameter(mm):	58		

MODE OF FAILURE DIAGRAM



1. Failure criteria : maximum deviator stress for each stage
2. Membrane corrections were applied to the deviator stress.

Test Method(s): AS 1289.6.4.1-1998

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Laboratory Manager

Douglas Partners
Geotechnics · Environment · Groundwater

Douglas Partners Pty Ltd
ABN 75 053 980 117
PO Box 4155
Richmond VIC 3121
Australia

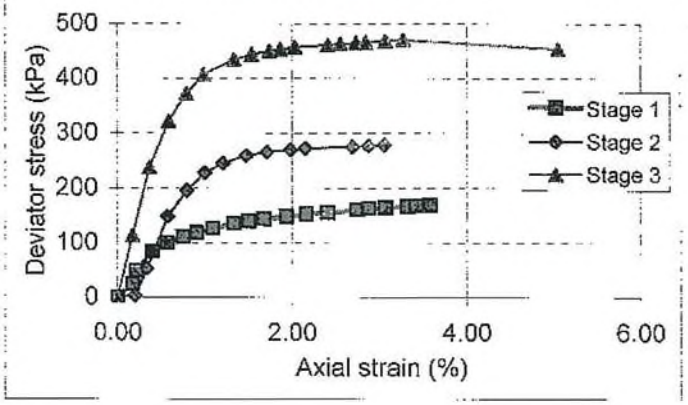
68 Brighton Street
Richmond VIC 3121
Phone (03) 9428 1831
Fax: (03) 9428 7841
melbourne@douglaspartners.com.au

TRIAXIAL COMPRESSION TEST RESULTS

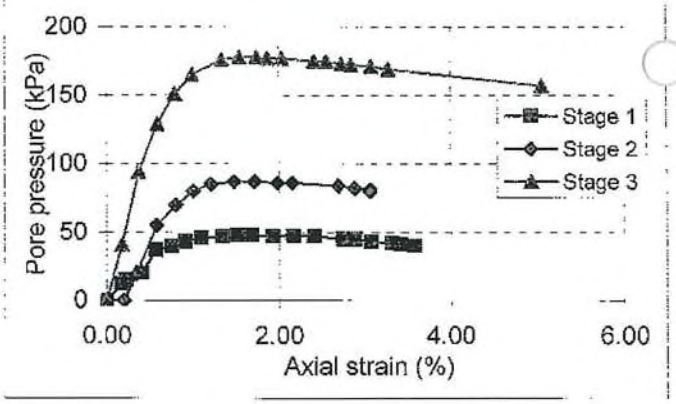
(CONSOLIDATED UNDRAINED WITH PORE PRESSURE MEASUREMENT)

Client :	GHD	**Project No. :**	68626
		Report No. :	M07114005
Project :	OB Dump Stability Installations	**Report Date :**	13 Dec 2007
		Date Sampled :	-
Location :	Loy Yang	**Date of Test:**	19 Nov 2007
Test Location :	LY4245	**Sample Type:**	Undisturbed
Depth / Layer :	41m	**Page:**	1
Sample Description:	Silty CLAY		

DEVIATOR STRESS



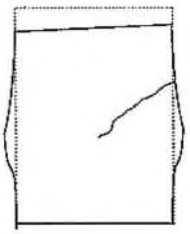
PORE WATER PRESSURE



STAGE DETAILS	STAGE 1	STAGE 2	STAGE 3
Cell pressure (kPa)	425	550	800
Back pressure (kPa)	300	300	300
Volume change (%)	2.6	3.8	5.3
Strain rate (mm/min)	0.036	0.036	0.036
AT FAILURE			
Strain (%)	2.9	2.2	3.1
Deviator Stress (kPa)	163	272	469
Pore pressure (kPa)	345	386	470
Stress ratio	3.0	2.7	2.4

SPECIMEN DETAILS	Initial	Final
Moisture content (%)	34.2	32.6
Dry density (t/m3)	1.33	
B' value after saturation	0.98	

MODE OF FAILURE DIAGRAM



NOTES

1. Test technique : multi-staged.
2. Failure criteria : maximum stress ratio.
3. Specimen was fitted with side drains.
4. Specimen was saturated with an applied cell pressure of 315 kPa and an applied back pressure of 300 kPa
5. Membrane corrections were applied to the deviator stress according to figure 4 of BS 1377 : Part 8 : 1990.
6. Consolidation pore pressure was completely dissipated prior to testing.
7. Water used for testing was not deaired prior to use.

Test Method(s): AS 1289.6.4.2-1998

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Checked: PC

Peter Chan
Laboratory Manager

Douglas Partners
Geotechnics · Environment · Groundwater

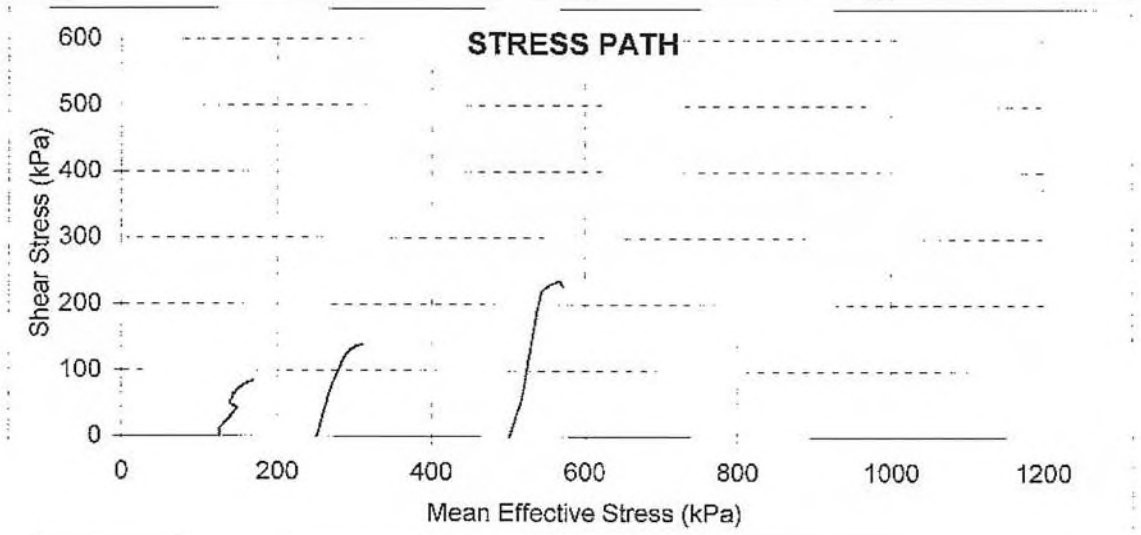
Douglas Partners Pty Ltd
ABN 75 053 980 117
PO Box 4155
Richmond VIC 3121
Australia

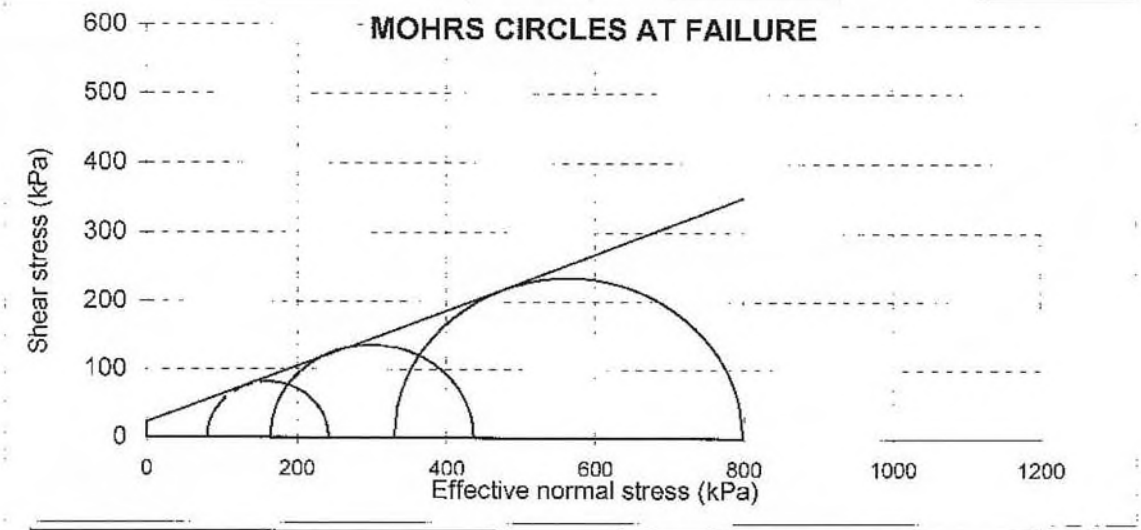
68 Brighton Street
Richmond VIC 3121
Phone (03) 9428 1831
Fax: (03) 9428 7841
melbourne@douglaspartners.com.au

TRIAXIAL COMPRESSION TEST RESULTS

(CONSOLIDATED UNDRAINED WITH PORE PRESSURE MEASUREMENT)

Client :	GHD	**Project No. :**	68626
Project :	OB Dump Stability Installations	**Report No. :**	M07114005
Location :	Loy Yang	**Report Date :**	13 Dec 2007
Test Location :	LY4245		
Depth / Layer :	41m	**Page:**	2 (Optional)





Cohesion, c'	**23 kPa**
Friction Angle, Ø'	**22 degrees**

Test Method(s): AS 1289.6.4.2-1998

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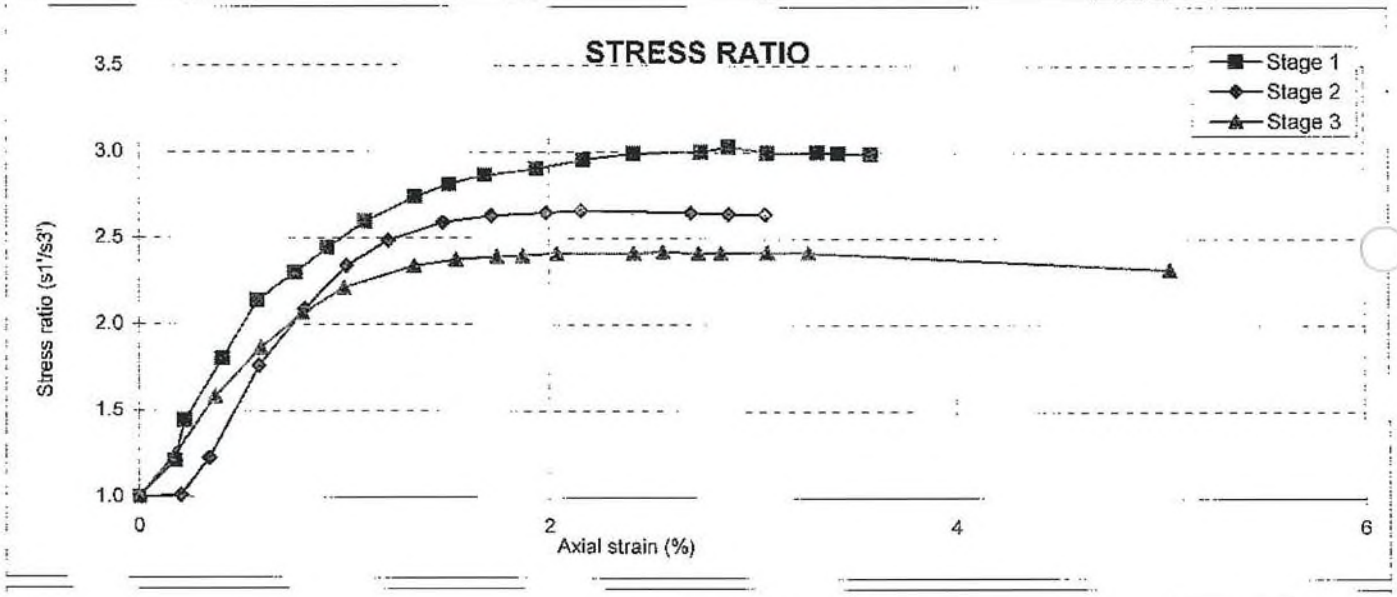
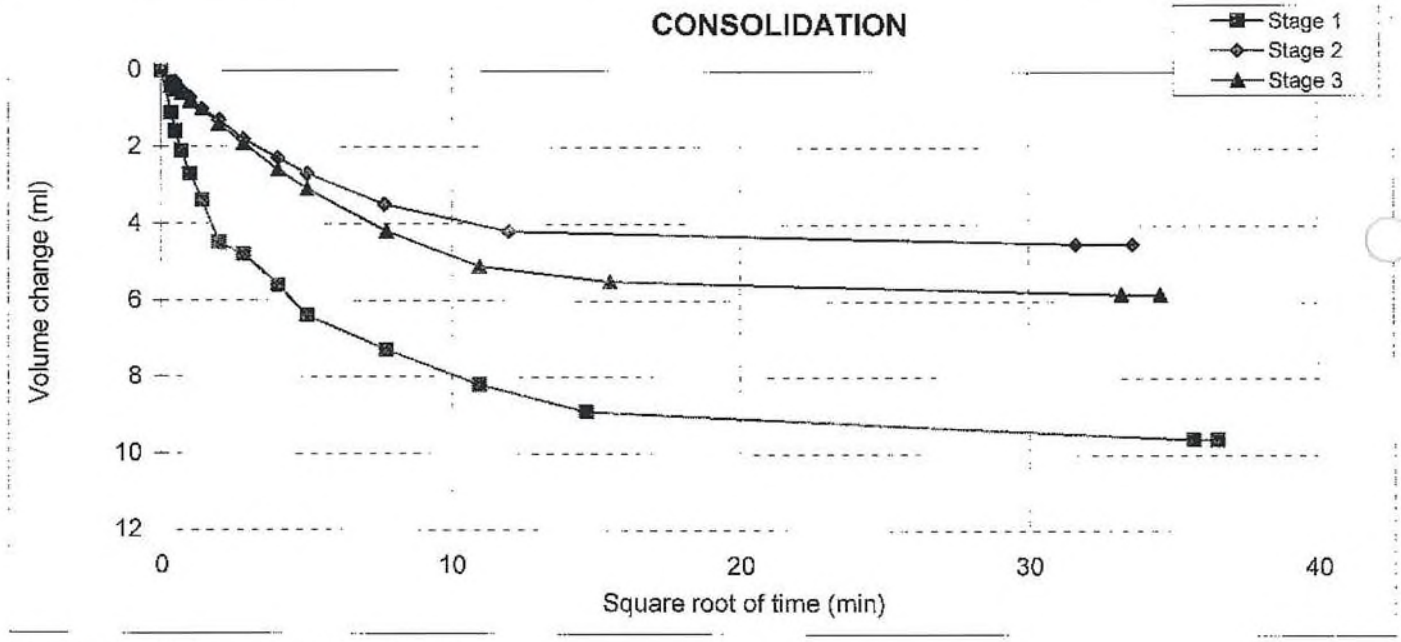
TRIAXIAL COMPRESSION TEST RESULTS

(CONSOLIDATED UNDRAINED WITH PORE PRESSURE MEASUREMENT)

Client :	GHD	**Project No. :**	68626
Project :	OB Dump Stability Installations	**Report No. :**	M07114005
Location :	Loy Yang	**Report Date :**	13 Dec 2007
Test Location :	LY4245		
Depth / Layer :	41m	**Page:**	3 (Optional)





Test Method(s): AS 1289.6.4.2-1998

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68 Brighton Street
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Australia

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dpmelb@douglaspartners.com.au

RESULTS OF FALLING HEAD PERMEABILITY

Client: GHD
Project: OB Dump Stability Installations
Location: Loy Yang

Project No: 68626
Report No: M07114006
Report Date: 13-Dec-2007
Date Sampled: Client
Date of Test: 22-Nov-2007
Page: 1 of 1

Sample Location	Depth (m)	Sample Description	Bulk Density Before Test	Density Ratio (Standard) (%)	Moisture Content Before Test (%)	Moisture Content After test (%)	Hydraulic Gradient	Surcharge Applied (kg)	Percentage Oversize (%)	Coefficient of Permeability (m/sec)
LY 4245	29	Silty CLAY	1.60	N/A	26.3	54.0	Variable	NIL	NIL	$4x10^{-10}$
LY 4245	41	Silty CLAY	1.50	N/A	44.4	56.6	Variable	NIL	NIL	$2x10^{-10}$

Test Method(s): DP In-House Method

Sampling Method(s): Sampled by Client

Remarks: Coefficient of permeability corrected to equivalent water temperature 20°c
Saturation achieved in closed system within the test mould

Form No R21 Rev 1 Date of Issue January 2003

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Tested: DC
Checked: PC

Peter Chan
Laboratory Manager

TEST RESULTS

AS 1289 Methods 1, 2.1.1, 3.1.2, 3.2.1, 3.3.1, 3.4.1 & 3.6.1

CIVIL GEOTECHNICAL SERVICES
27 / 107 - 113 Heatherdale Road, Ringwood 3134

		Job No	07008
		Report No	07008CC
		Date of Issue	13/12/07
Client	GHD SERVICES PTY LTD (MORWELL)	*Tested by*	ANR/SK
Project	311145207	*Date tested*	28/11-10/12/7
Location	LOY YANG POWER	*Checked by*	PJF

Sample Identification	*Soil Description*	*Field Moisture Content* %	*Liquid Limit* %	*Plastic Limit* %	*Plasticity Index* %	*Linear Shrinkage* %	*% Passing 75µm sieve*
07008 056 LY4245 14.5m	CLAY, high plasticity, white with pale brown and black, with fine to medium sand.	32.3	91	32	59	16	82

Notes

AS1289.3.1.2,3.2.1,3.4.1 *Method of drying:* Oven dried
Dry/Wet sieve: Dry
Curing time: >24hrs

SUMMARY V1.1 JUN 06

Approved Signatory: Peter Fry

EFFECTIVE STRESS TRIAXIAL TEST

AS 1289.2.1.1 & 6.4.2

CIVIL GEOTECHNICAL SERVICES
27 / 107 - 113 Heatherdale Road, Ringwood 3134

		Job No	07008
		Report No	07008CB
		Issue date	13/12/07
Client	GHD SERVICES PTY LTD (MORWELL)	Tested by	ANR
Project	311145207	Date tested	19/11-10/12/07
Location	LOY YANG POWER	Checked by	PJF

Sample No	07008 056	Sampled by	Client
Sample location	LY4245 14.5m	Sampling date	2007

Type of sample: U63

Type of test: Compressive strength of a saturated specimen tested in undrained triaxial compression with measurement of pore water pressure (multi stage)

Drainage conditions: Top, bottom and side

Failure criteria: Principle Stress Ratio

Test Details

	Stage No	1	2	3
Initial cell pressure	kPa	625	750	1000
Back pressure	kPa	500	500	500
Effective axial stress at failure	kPa	207	375	729
Effective lateral stress at failure	kPa	78	152	319
Effective pore pressure at failure	kPa	47	98	181
Deviator stress at failure	kPa	129	223	411
Strain at failure	%	2.80	4.46	6.45
Degree of saturation before test (B)			1.0	
Rate of strain	mm/min		0.006	

Sample Details

Initial sample length	mm	127.1
Initial sample diameter	mm	63.0
Initial dry density	t/m³	1.38
Initial moisture content	%	32.3

Moisture content after test

Moisture Content	%	35.8

Test Results

EFFECTIVE COHESION	kPa	**12**
EFFECTIVE ANGLE OF FRICTION	o	**22**

Sample Description: CLAY, high plasticity, white with pale brown and black, with fine to medium sand.

Mode of Failure: Shear failure at 30 degrees to horizontal axis.

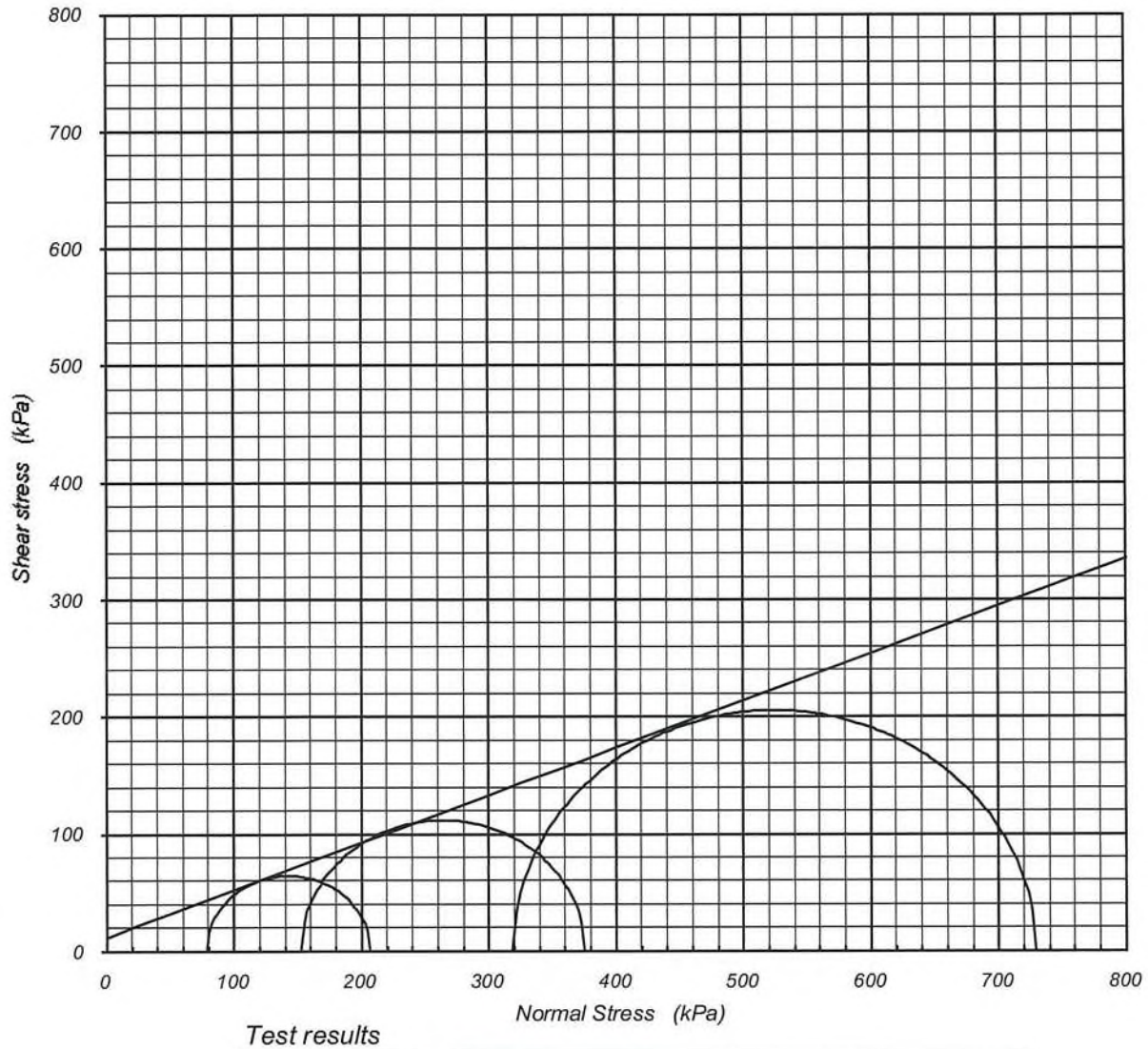
EFFECTIVE STRESS TRIAXIAL TEST

AS 1289.2.1.1 & 6.4.2

CIVIL GEOTECHNICAL SERVICES
27 / 107 - 113 Heatherdale Road, Ringwood 3134

		Job No	07008
		Report No	07008CB
		Issue date	13/12/07
Client	GHD SERVICES PTY LTD (MORWELL)	Tested by	ANR
Project	311145207	Date tested	19/11-10/12/07
Location	LOY YANG POWER	Checked by	PJF
Sample location	LY4245 14.5m	Sample No	07008 056

SHEAR STRESS - NORMAL STRESS PLOT



Test results

EFFECTIVE COHESION	12	kPa
EFFECTIVE ANGLE OF FRICTION	22	°

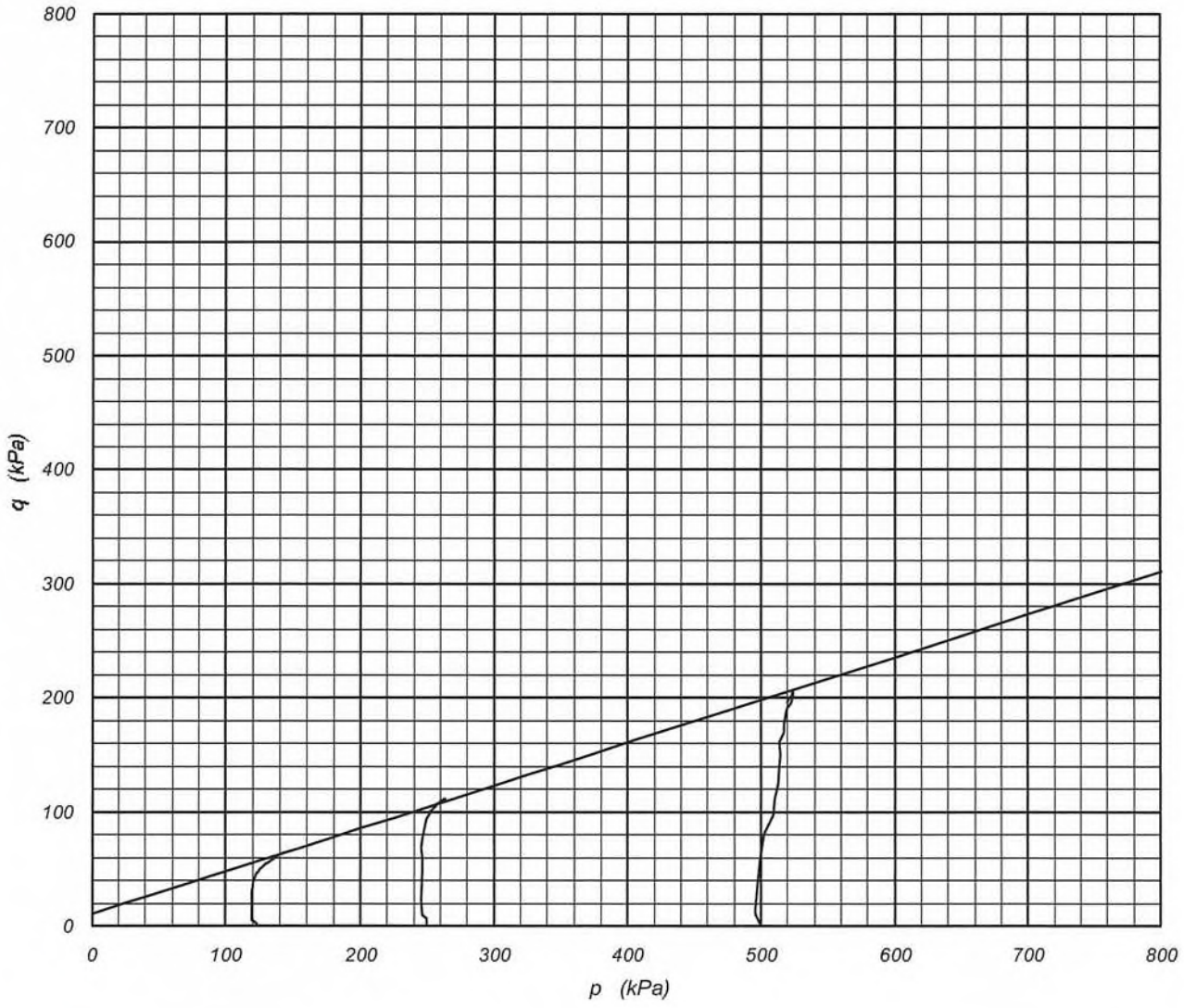
EFFECTIVE STRESS TRIAXIAL TEST

AS 1289.2.1.1 & 6.4.2

CIVIL GEOTECHNICAL SERVICES
27 / 107 - 113 Heatherdale Road, Ringwood 3134

		Job No	07008
		Report No	07008CB
		Issue date	13/12/07
Client	GHD SERVICES PTY LTD (MORWELL)	Tested by	ANR
Project	311145207	Date tested	19/11-10/12/07
Location	LOY YANG POWER	Checked by	PJF
Sample location	LY4245 14.5m	Sample No	07008 056

p' - q' PLOT



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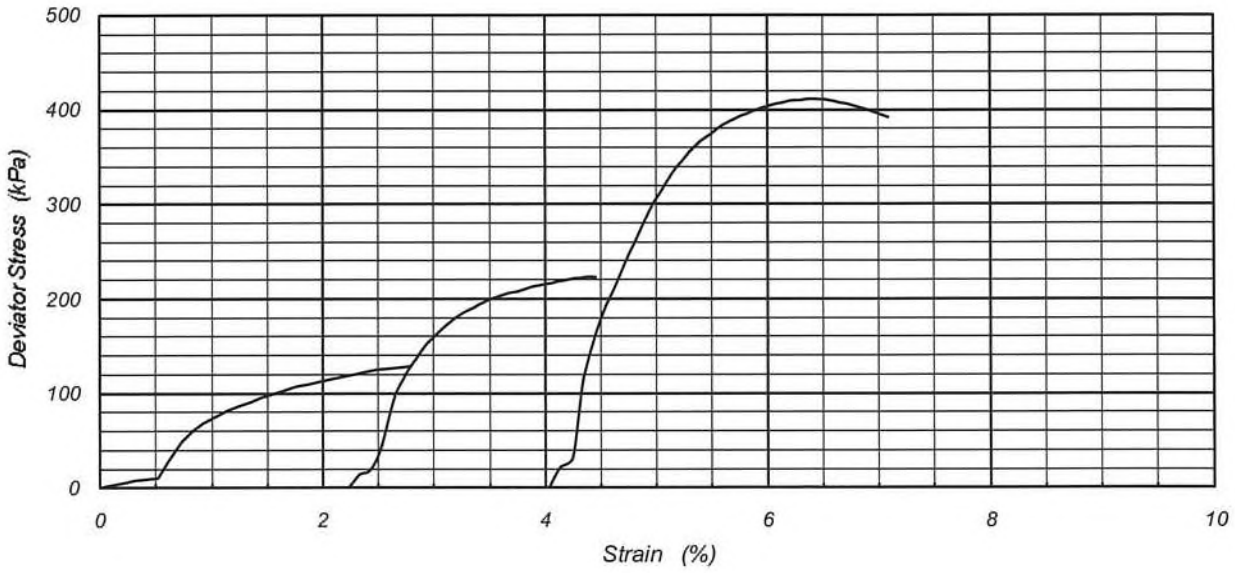
EFFECTIVE STRESS TRIAXIAL TEST

AS 1289.2.1.1 & 6.4.2

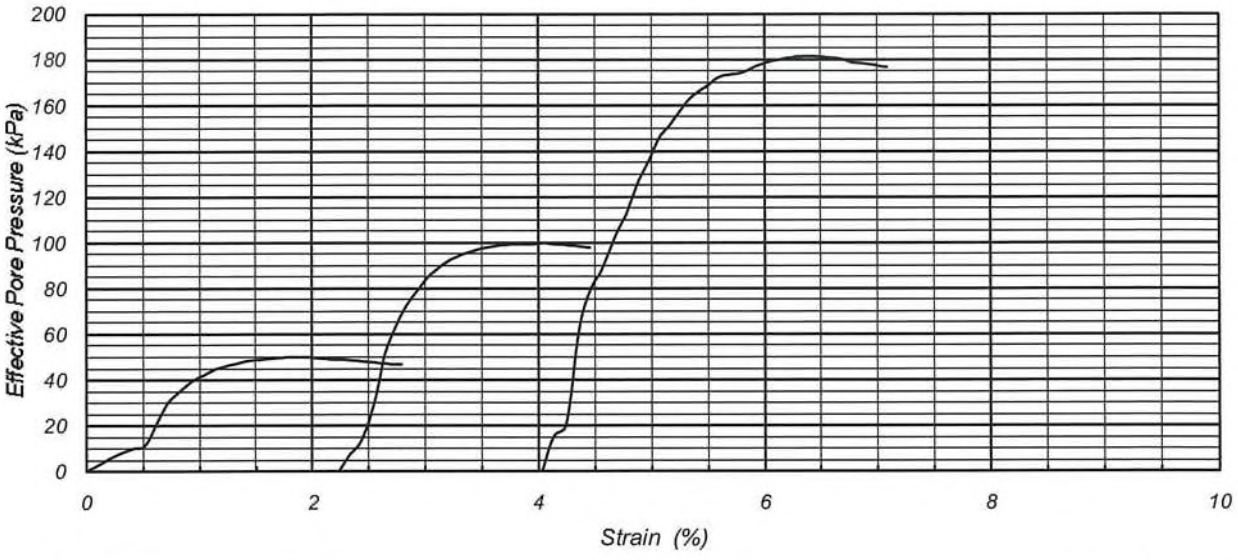
CIVIL GEOTECHNICAL SERVICES
27 / 107 - 113 Heatherdale Road, Ringwood 3134

		Job No	07008
		Report No	07008CB
		Issue date	13/12/07
Client	GHD SERVICES PTY LTD (MORWELL)	Tested by	ANR
Project	311145207	Date tested	19/11-10/12/07
Location	LOY YANG POWER	Checked by	PJF
Sample location	LY4245 14.5m	Sample No	07008 056

STRESS - STRAIN PLOT



EFFECTIVE PORE PRESSURE - STRAIN PLOT



Approved Signatory: Peter Fry

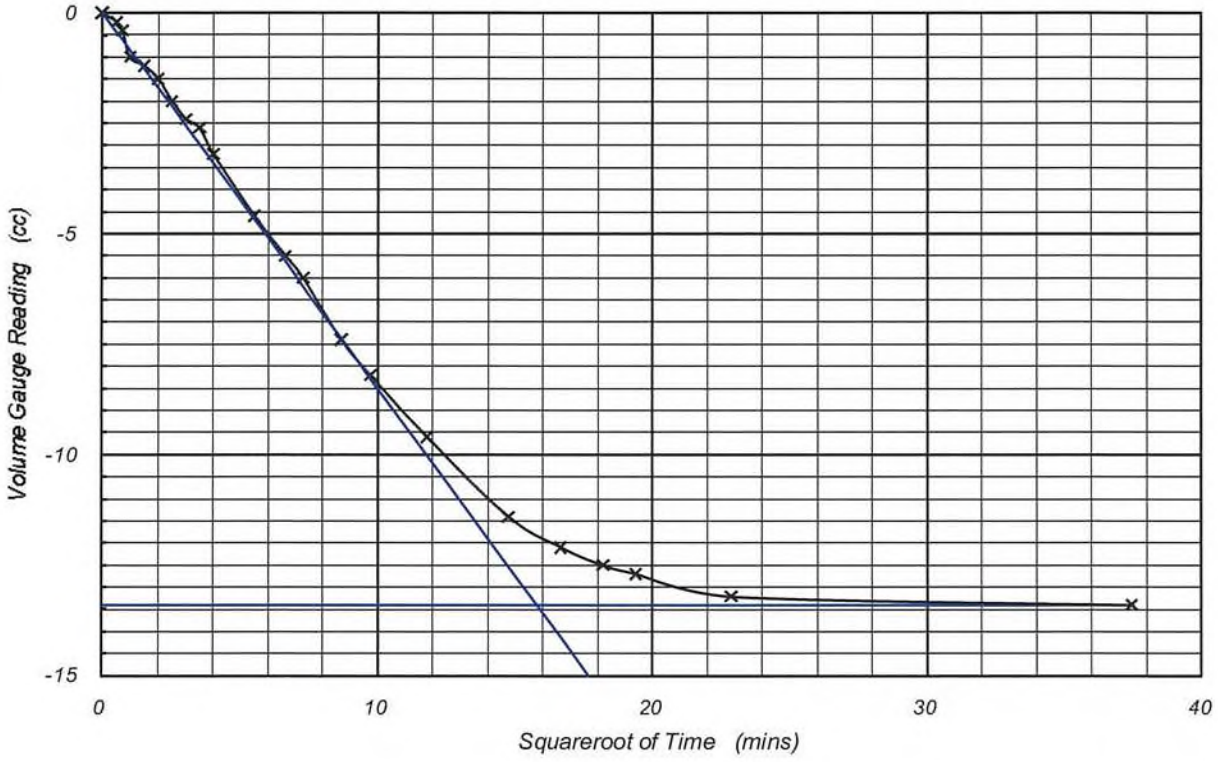
EFFECTIVE STRESS TRIAXIAL TEST

AS 1289.2.1.1 & 6.4.2

CIVIL GEOTECHNICAL SERVICES
27 / 107 - 113 Heatherdale Road, Ringwood 3134

		Job No	07008
		Report No	07008CB
		Issue date	13/12/07
Client	GHD SERVICES PTY LTD (MORWELL)	Tested by	ANR
Project	311145207	Date tested	19/11-10/12/07
Location	LOY YANG POWER	Checked by	PJF
Sample location	LY4245 14.5m	Sample No	07008 056

CONSOLIDATION TEST



Stage No	1	
Effective cell pressure	125	kPa
Consolidation 100% (t_{100})	248.5	mins
Coefficient of consolidation (c_v)	0.3	M^2 / year

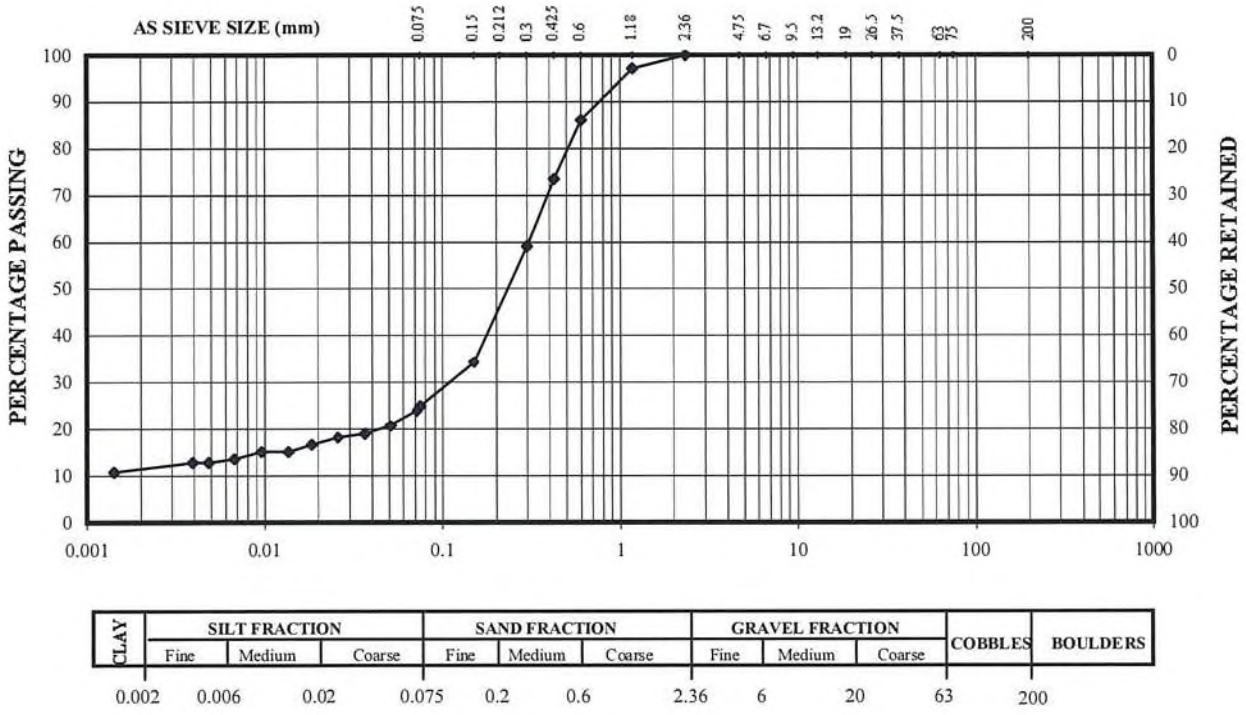
Approved Signatory: Peter Fry

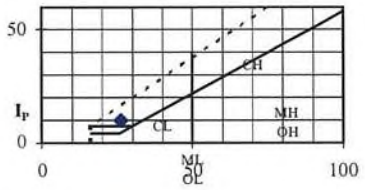
SOIL CLASSIFICATION REPORT

Trial Hole:	LY4246
Depth:	39.00
Sample No:	08-0778

Client: LOY YANG POWER MANAGEMENT
Project: OB DUMP FACILITY
Location:

Client Sample No.:
Sample History: SAMPLED BY GHD GEOTECHNICS





TEST METHODS
Classification AS1726 A2 Particle size AS1289.3.6.2

OTHER TESTS

GRADING
$C_u = D_{60} / D_{10}$ = not determinable
$C_c = D_{30}^2 / (D_{10} \times D_{60})$ = not determinable

PARTICLE DENSITY 2.65 (assumed)

PRE-TREATMENT HYDROMETER N/A

TEST CONDITION Washed sieve with dispersing agent

GROUP SYMBOL: SC

SOIL NAME: Light brown clayey SAND

REMARKS:

INDEX PROPERTIES (%)
Liquid Limit = 26 Plastic Limit = 16
Plasticity Index = 10 Linear Shrinkage % = Not determined

Atterberg Limits (History/preparation) Dry/oven dry

Liquid Limit (type of test) 4 point

Linear Shrinkage (mould size)

Tested by:	KR
Date tested:	11.04.08
Checked by:	
Date checked:	
Approved Signatory:	

GHD GEOTECHNICS
57 Herbert St, Artarmon NSW, 2064
Tel: 9462 4700 Fax: 9462 4710
GEOTECHNICAL TESTING SERVICES

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Laboratory Accreditation Number: 679

JOB No.	**2117327**
REPORT No.	

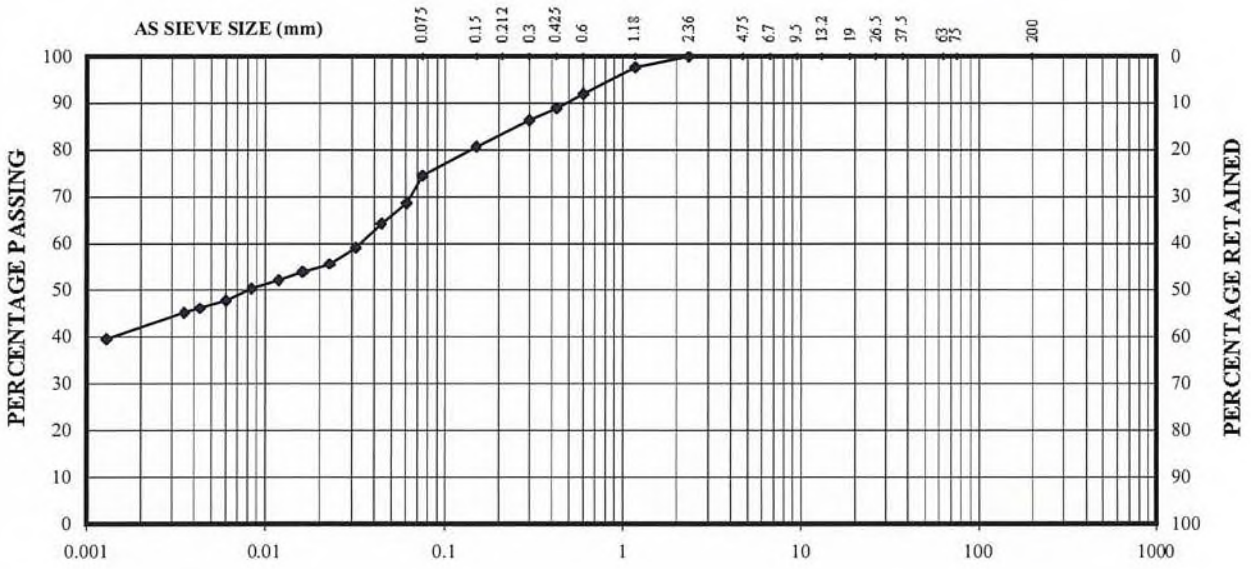
Ref: G:\Geo_Lab\sieve.xls

SOIL CLASSIFICATION REPORT

Trial Hole:	LY4246
Depth:	19.00
Sample No:	08-0773

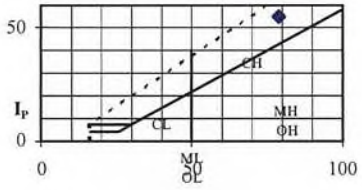
Client: LOY YANG POWER MANAGEMENT
Project: OB DUMP FACILITY
Location:

Client Sample No.:
Sample History: SAMPLED BY GHD GEOTECHNICS



TEST METHODS
Classification AS1726 A2 Particle size AS1289.3.6.2

OTHER TESTS



GRADING
$C_u = D_{60} / D_{10}$ = not determinable
$C_c = D_{30}^2 / (D_{10} \times D_{60})$ = not determinable

PARTICLE DENSITY 2.65 (assumed)

PRE-TREATMENT HYDROMETER N/A

TEST CONDITION Washed sieve with dispersing agent

GROUP SYMBOL: CH

SOIL NAME: Black mottled white, orange & brown high plasticity CLAY with sand

INDEX PROPERTIES (%)
Liquid Limit = 79 Plastic Limit = 24
Plasticity Index = 55 Linear Shrinkage % = Not determined

Atterberg Limits (History/preparation) Dry/oven dry

Liquid Limit (type of test) 4 point

Linear Shrinkage (mould size)

REMARKS:

Tested by: KR
Date tested: 11.04.08
Checked by:
Date checked:
Approved Signatory:

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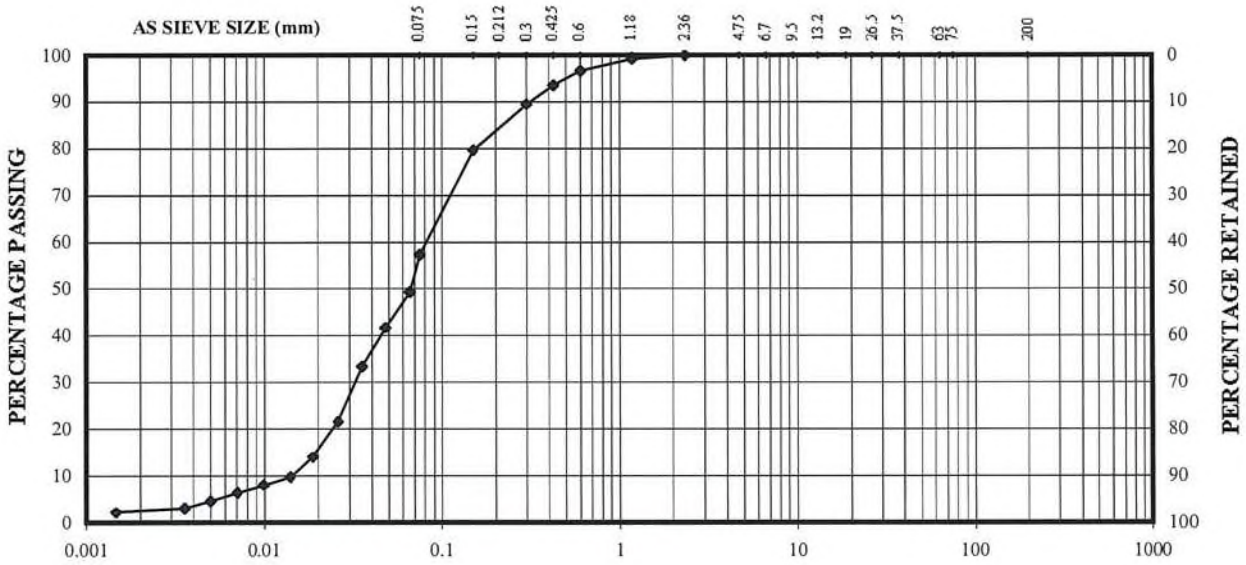
JOB No. 2117327
REPORT No.
Ref: G:\Geo_Lab\sieve.xls

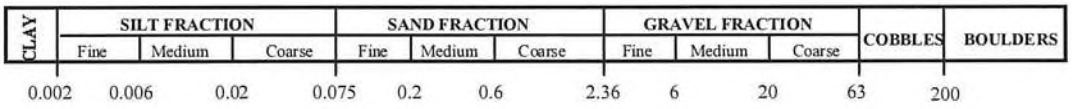
SOIL CLASSIFICATION REPORT

Trial Hole:	LY4246
Depth:	7.00
Sample No:	08-0769

Client: LOY YANG POWER MANAGEMENT
Project: OB DUMP STABILITY
Location:

Client Sample No.:
Sample History: SAMPLED BY GHD

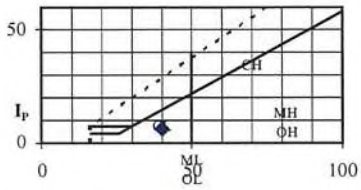




PARTICLE SIZE (mm)

TEST METHODS
Classification AS1726 A2 Particle size AS1289.3.6.2

OTHER TESTS



Liquid limit (W_L)

GRADING
$C_u = D_{60} / D_{10} =$ 5.9
$C_c = D_{30}^2 / (D_{10} \times D_{60}) =$ 0.9

PARTICLE DENSITY 2.65 (assumed)

PRE-TREATMENT HYDROMETER N/A

TEST CONDITION Dry

GROUP SYMBOL: SM

SOIL NAME: Black silty SAND

REMARKS:

INDEX PROPERTIES (%)
Liquid Limit = 40 Plastic Limit = 34
Plasticity Index = 6 Linear Shrinkage % = Not determined

Atterberg Limits (History/preparation) Dry/oven dry

Liquid Limit (type of test) 4 point

Linear Shrinkage (mould size)

Tested by:	KR
Date tested:	11.04.08
Checked by:	
Date checked:	
Approved Signatory:	

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57 Herbert St, Artarmon NSW, 2064
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JOB No.	**2117327**
REPORT No.	

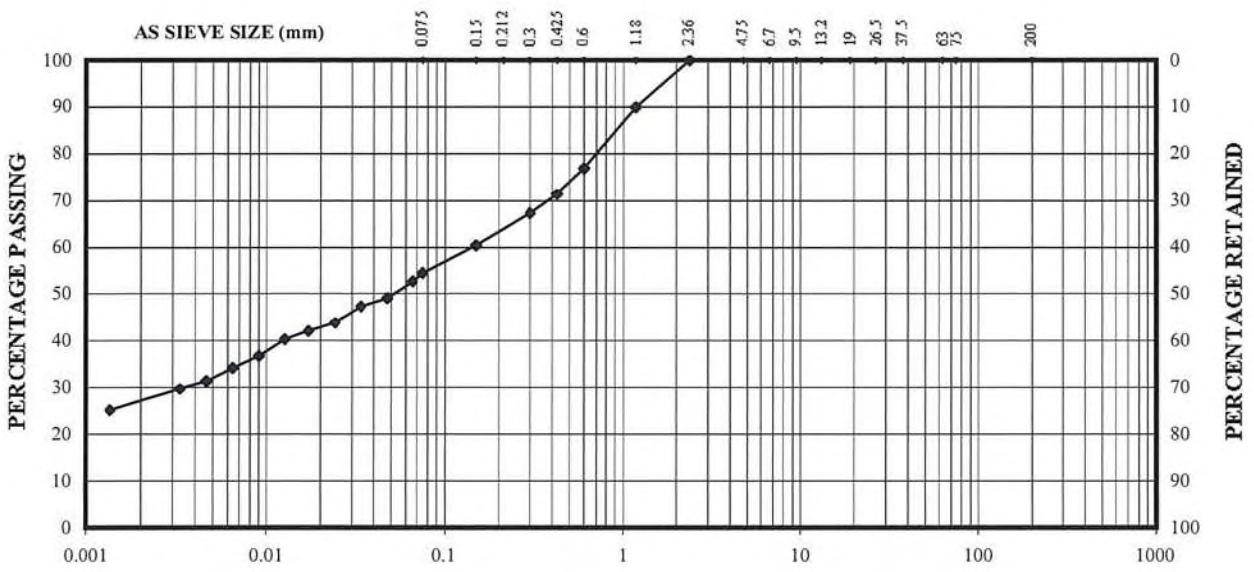
Ref: G:\Geo_Lab\sieve.xls

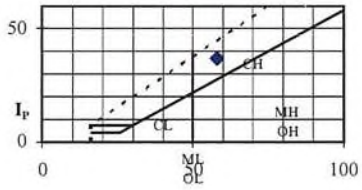
SOIL CLASSIFICATION REPORT

Trial Hole:	LY4246
Depth:	2.00
Sample No:	08-0767

Client: LOY YANG POWER MANAGEMENT
Project: OB DUMP FACILITY
Location:

Client Sample No.:
Sample History: Sampled by GHD Geotechnics (Melbourne)





TEST METHODS
Classification AS1726 A2 Particle size AS1289.3.6.2

OTHER TESTS

GRADING
$C_u = D_{60} / D_{10}$ = not determinable
$C_c = D_{30}^2 / (D_{10} \times D_{60})$ = not determinable

PARTICLE DENSITY 2.65 (assumed)

PRE-TREATMENT HYDROMETER N/A

TEST CONDITION Dry

GROUP SYMBOL: CH

SOIL NAME: Light brown mottledorange & white high plasticity sandy CLAY

INDEX PROPERTIES (%)
Liquid Limit = 58 Plastic Limit = 21
Plasticity Index = 37 Linear Shrinkage % = Not determined

Atterberg Limits (History/preparation) Dry/oven dry

Liquid Limit (type of test) 4 point

Linear Shrinkage (mould size)

REMARKS:

Tested by:	KR
Date tested:	11.04.08
Checked by:	
Date checked:	

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Tel: 9462 4700 Fax: 9462 4710
GEOTECHNICAL TESTING SERVICES

Approved Signatory:

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JOB No.	2117327
REPORT No.	

Ref: G:\Geo_Lab\aiove.xls

GHD GEOTECHNICS
Sydney Laboratory
57 Herbert St
Artarmon NSW 2064
Locked Bag 2727 St Leonards 1590
email: artarmon@ghd.com.au
web: www.ghd.com.au/ghdgeotechnics
Tel: (02) 9462 4860
Fax:(02) 9462 4710

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GHD GEOTECHNICS

Material Test Report

Report No: SYD080491
Issue No:
This issue replaces all previous issues of Report No:

Client: Loy Yang Power Management Pty Ltd
OB Dump Stability

Project: 2117327

NATA Accredited Laboratory Number: 679

This laboratory is accredited by the National Association of Testing Authorities, Australia. The Test(s) reported have been performed in accordance with its terms of accreditation.

Approved Signatory: D.P Brooke (Sydney Laboratory Manager)

Date of Issue: 6/05/2008

Material Details

Source:	N/A	Sampled From:	N/A
Description:	N/A	Location:	N/A
Specification:	N/A	Sample Method:	

Sample Details

							Limits
Sample ID:		SYD08-0773	SYD08-0774	SYD08-0775	SYD08-0776	SYD08-0777	SYD08-0778	
Field Sample ID:		LY4246, 19.0m	LY4246, 23.0m	LY4246, 29.0m	LY4246, 35.0m	LY4246, 38.0m	LY4246, 39.0m	
Date Sampled:		13/03/2008	13/03/2008	13/03/2008	13/03/2008	13/03/2008	13/03/2008	
Progressive Quantity (t):								

Particle Size Distribution

Method:	Sieve Size	% Passing					Limits
	53.0mm						
	37.5mm						
Description:	26.5mm						
	19.0mm						
	13.2mm		100	100			
	9.5mm		98	100		100	
Drying by:	6.7mm		98	100		100	
N/A	4.75mm		98	100		99	
	2.36mm	100	97	99		98	100
Washed:	1.18mm	98	94	98		96	97
Sample Washed	600µm	92	88	96		93	86
	425µm	89	85	96		91	73
	300µm	86	82	95		90	59
	150µm	81	78	91		85	34
	75µm	76	73	78		80	25

Other Test Results

Description	Method	Results						Limits
Sample History	AS 1289.3.1.1, AS 1289.3.2.1, AS 1289.3.3.1	Oven-dried	Oven-dried	Oven-dried	Oven-dried	Oven-dried	Oven-dried	
Preparation		Dry Sieved	Dry Sieved	Dry Sieved	Dry Sieved	Dry Sieved	Dry Sieved	
Linear Shrinkage (%)		n/a	10.0	7.5	13.0	13.0	n/a	
Mould Length (mm)		0	125	125	125	127	0	
Crumbling		No	No	No	Yes	No	No	
Curling		No	No	No	Yes	Yes	No	
Liquid Limit (%)		79	58	38	108	46	26	
Method		Four Point	Four Point	Four Point	Four Point	Four Point	Four Point	
Plastic Limit (%)		24	38	25	100	20	16	
Plasticity Index (%)		55	20	13	8	26	10	
Moisture Content (%)	AS 1289.2.1.1	24.9	65.8	51.2	72.0	21.9	17.8	
Coef of Permeability (m/sec)	AS 1289.6.7.3				9.7 E-09			

Comments

GHD GEOTECHNICS
Sydney Laboratory
57 Herbert St
Artarmon NSW 2064
Locked Bag 2727 St Leonards 1590
email: artarmon@ghd.com.au
web: www.ghd.com.au/ghdgeotechnics
Tel: (02) 9462 4860
Fax:(02) 9462 4710

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GHD GEOTECHNICS

Material Test Report

Report No: SYD080490
Issue No:
This issue replaces all previous issues of Report No:

Client: Loy Yang Power Management Pty Ltd
OB Dump Stability

Project: 2117327

NATA Accredited Laboratory Number: 679

This laboratory is accredited by the National Association of Testing Authorities, Australia. The Test(s) reported have been performed in accordance with its terms of accreditation.

Approved Signatory: D.P Brooke (Sydney Laboratory Manager)

Date of Issue: 6/05/2008

Material Details

Source:	N/A	Sampled From:	N/A
Description:	N/A	Location:	N/A
Specification:	N/A	Sample Method:	

Sample Details

Sample ID:	SYD08-0767	SYD08-0768	SYD08-0769	SYD08-0770	SYD08-0771	SYD08-0772	Limits
Field Sample ID:	LY4246, 2.0m	LY4246, 5.5m	LY4246, 7.0m	LY4246, 11.5m	LY4246, 14.5m	LY4246, 17.5m	
Date Sampled:	13/03/2008	13/03/2008	13/03/2008	13/03/2008	13/03/2008	13/03/2008	
Progressive Quantity (t):							

Particle Size Distribution

Method:	Sieve Size	% Passing						Limits
	53.0mm							
	37.5mm							
Description:	26.5mm							
	19.0mm							
	13.2mm		100					
	9.5mm		97				100	
Drying by:	6.7mm		97				100	
N/A	4.75mm		97		100	98	99	
	2.36mm	100	95	100	99	93	98	
Washed:	1.18mm	90	92	99	82	85	94	
Sample Washed	600µm	77	87	97	71	74	85	
	425µm	71	83	94	67	68	81	
	300µm	67	80	90	64	65	76	
	150µm	60	68	80	59	57	67	
	75µm	55	62	57	54	50	62	

Other Test Results

Description	Method	Results						Limits
Sample History	AS 1289.3.1.1, AS 1289.3.2.1, AS 1289.3.3.1	Oven-dried	Oven-dried	Oven-dried	Oven-dried	Oven-dried	Oven-dried	
Preparation		Dry Sieved	Dry Sieved	Dry Sieved	Dry Sieved	Dry Sieved	Dry Sieved	
Linear Shrinkage (%)		n/a	n/a	n/a	7.0	n/a	8.0	
Mould Length (mm)					125		125	
Crumbling		No	No	No	No	No	No	
Curling		No	No	No	No	No	No	
Liquid Limit (%)		58	46	40	91	45	44	
Method		Four Point	Four Point	Four Point	Four Point	Four Point	Four Point	
Plastic Limit (%)		21	16	34	83	30	33	
Plasticity Index (%)		37	30	6	8	15	11	
Moisture Content (%)	AS 1289.2.1.1	12.4	14.1	39.5	111.9	21.9	51.5	
Coef of Permeability (m/sec)	AS 1289.6.7.3		5.4 E -11			1.2 E -08		

Comments

Sample 08-0770 NMC dried at 105 °C
Sample08-0767, 08-0769 - See additional Hydrometer Report

Triaxial - Report

Report No. : SYD080624

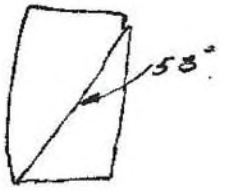
Client:	Loy Yang Power Management Pty Ltd
Project:	OB Dump Stability
Location:	Taralgon, VIC

Job No.:	2117327
Sample No.:	SYD08-0771
Test Hole No.:	LY4246
Depth (m) :	14.5
Client Sample ID :	n/av

TEST METHOD : ☐ AS1289.6.4.1 ☑ AS1289.6.4.2

Sample History : Sampled by GHD Geotechnics

Failure Mode



SAMPLE INFORMATION					
Specimen No :		1	2	3	4
Moisture Content Before	(%)	21.9			
Dry Density Before	(t/m³)	1.30			
Moisture Content After	Top (%)	41.9			
	Centre (%)	44.0			
	Bottom (%)	50.1			
Sample Size (mm)		63 x 132			

TEST TYPE

☑ Consolidated ☐ Drained ☑ With pore pressure measurement
☐ Unconsolidated ☑ Undrained ☐ Without pore pressure measurement
☑ Sample stage tested ☐ Separate sample for each stage

SATURATION

☑ Yes Checked by ☑ Pore water pressure respose (B) 99.4
☐ No ☐

FILTERS

Side Drains ☑ Filter paper ☐ Not used

SAMPLE DESCRIPTION / TEST COMMENTS

black SILT (463)

TEST DATA

	Stage No.	1	2	3	4
Back Pressure	(kPa)	300	300	300	
Effective Stress	(kPa)	105	210	420	
Rate of Strain	(mm/min)	0.0152	0.0152	0.0152	
Deviator stress at failure	(kPa)	197.6	332.3	558.1	
Pore water pressure at failure	(kPa)	56.0	102.2	201.4	
Volume Change	(ml)	6.4	5.9	6.7	
☐ ☐		-	-	-	
		-	-	-	
		-	-	-	
		-	-	-	

Tested by:	SI
Date tested:	18.04.08
Checked by:	
Approved Signatory	
Date:	8 May 08

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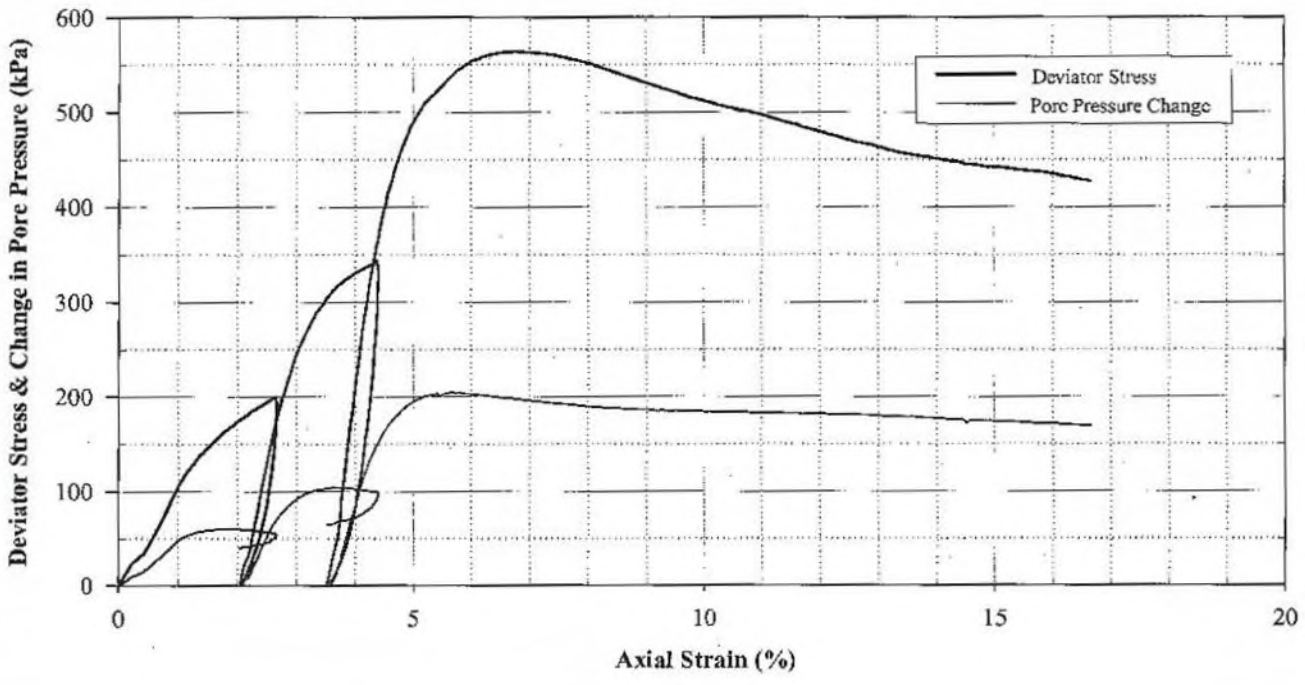
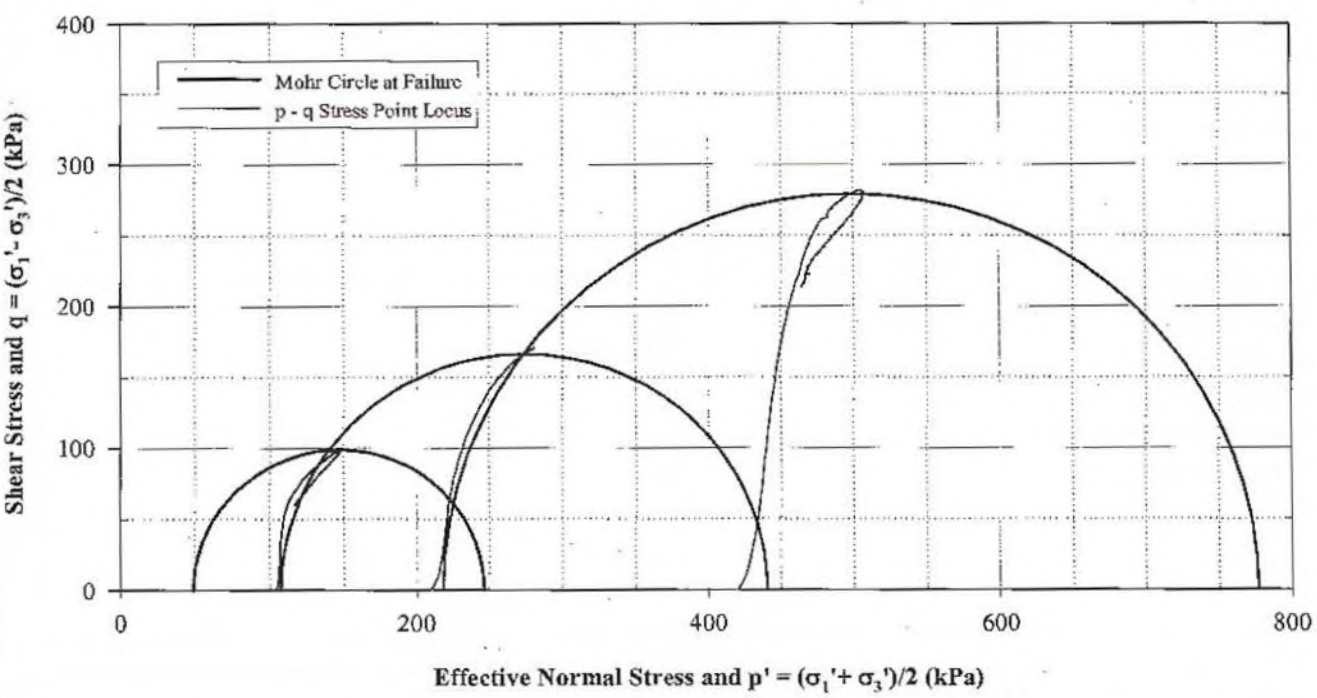
Triaxial (CU) (Effective Stress) - Report

Report No: **SYD080624**

Client:	Loy Yang Power Management Pty Ltd
Project:	OB Dump Stability
Location:	Taralgon, VIC
Test Method:	AS 1289.6.4.2

Job Number:	2117327
Borehole No:	LY4246
Depth (m):	14.5
LM Sample No:	SYD08-0771
Client Sample ID:	n/av





Tested by:	SI
Date Tested:	18.04.2008
Checked by:	
Approved Signatory:	
Date:	8 May 08

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Tel: (02) 9462 4700 Fax: (02) 9462 4710
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Triaxial - Report

Report No. : SYD08030

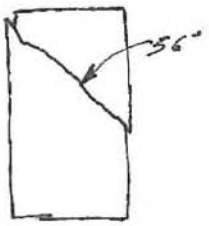
Client:	Loy Yang Power Management Pty Ltd
Project:	OB Dump Stability
Location:	Taralgon, VIC

Job No.:	2117327
Sample No.:	SYD08-0768
Test Hole No.:	LY4246
Depth (m) :	5.5
Client Sample ID :	n/av

TEST METHOD : ☑ AS1289.6.4.1 ☐ AS1289.6.4.2

Sample History : Sampled by GHD (Geotechnical)

Failure Mode



SAMPLE INFORMATION					
Specimen No :		1	2	3	4
Moisture Content Before	(%)	14.1			
Dry Density Before	(t/m³)	1.94			
Moisture Content After	Top (%)	nt			
	Centre (%)	nt			
	Bottom (%)	nt			
Sample Size (mm)		62 x 138			

TEST TYPE

- ☐ Consolidated
- ☑ Unconsolidated
- ☐ Sample stage tested
- ☐ Drained
- ☑ Undrained
- ☐ With pore pressure measurement
- ☑ Without pore pressure measurement
- ☐ Separate sample for each stage

SATURATION

- ☐ Yes
- ☑ No

Checked by

- ☐ Pore water pressure respose (B)
- ☐

FILTERS

Side Drains ☐ Filter paper ☑ Not used

SAMPLE DESCRIPTION / TEST COMMENTS

yellow brown / grey CLAY

TEST DATA

	Stage No.	1	2	3	4
Back Pressure	(kPa)	n/a			
Effective Stress	(kPa)	80			
Rate of Strain	(mm/min)	0.1016			
Deviator stress at failure	(kPa)	725.9			
Pore water pressure at failure	(kPa)	n/a			
Volume Change	(ml)	n/a			
☐ ☐		-			
		-			
		-			
		-			

Tested by:	SI
Date tested:	17.04.08
Checked by:	
Approved Signatory :	
Date:	6 May 08

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Tel: (02) 9462 4860 Fax: (02) 94624710
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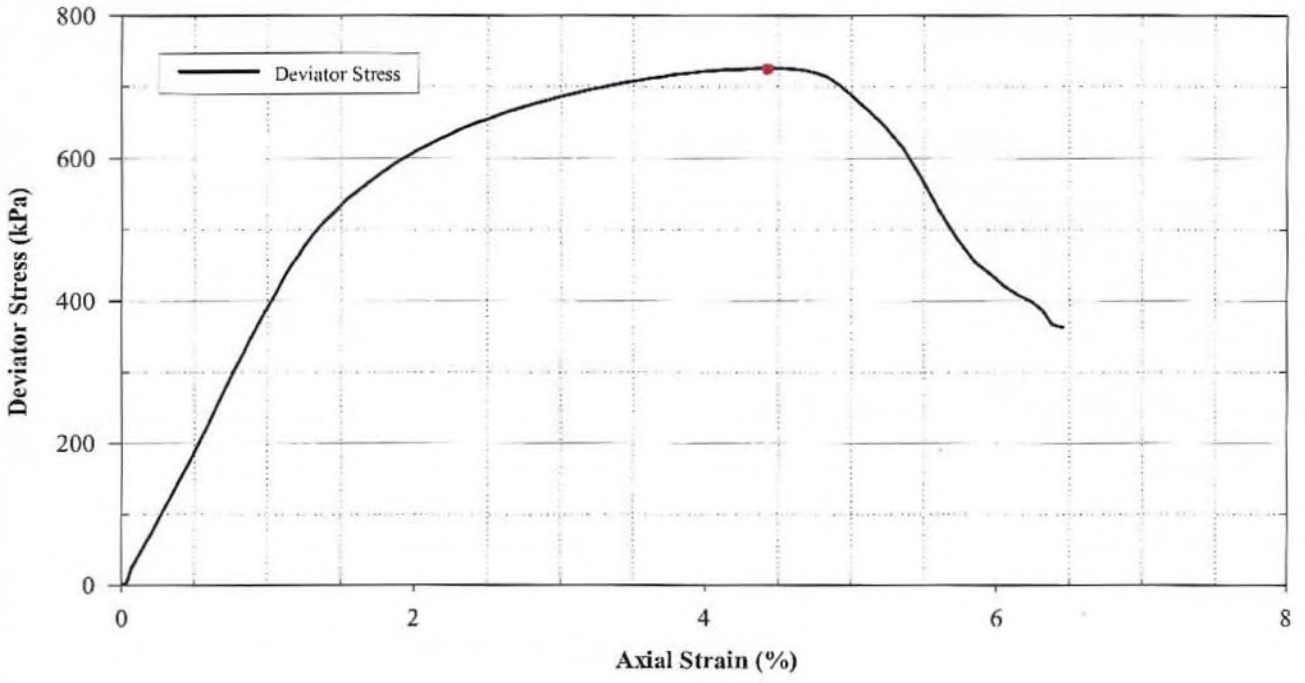
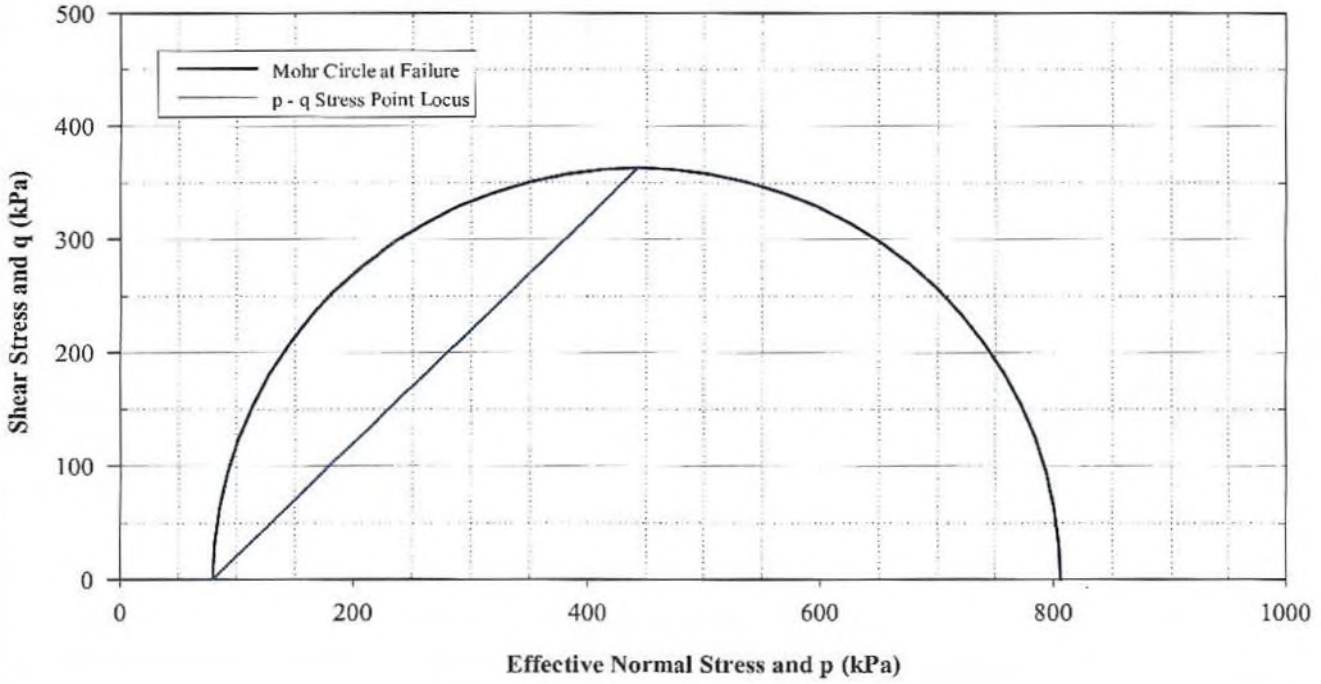
Undrained Triaxial (UU) without measurement of pore water pressure - Report *Report No:* SYD080630

Client:	Loy Yang Power Management Pty Ltd
Project:	OB Dump Stability
Location:	Taralgon, VIC
Test Method:	AS 1289.6.4.1

Job Number:	2117327
Borehole No:	LY4246
Depth (m):	5.5
LM Sample No:	SYD08-0768
Client Sample ID:	n/av





Tested by:	SI
Date Tested:	17.04.2008
Checked by:	
Approved Signatory:	
Date:	6 May 08

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Triaxial - Report

Report No. : SYD080624

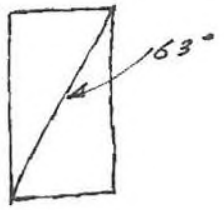
Client:	Loy Yang Power Management Pty Ltd
Project:	OB Dump Stability
Location:	Taralgon, VIC

Job No.:	2117327
Sample No.:	SYD08-0770
Test Hole No.:	LY4246
Depth (m) :	11.5
Client Sample ID :	n/av

TEST METHOD : ☑ AS1289.6.4.1 ☐ AS1289.6.4.2

Sample History : Sampled by GHD (Geotechnical)

Failure Mode



SAMPLE INFORMATION					
Specimen No :		1	2	3	4
Moisture Content Before	(%)	109.5			
Dry Density Before	(t/m³)	0.65			
Moisture Content After	Top (%)	nt			
	Centre (%)	nt			
	Bottom (%)	nt			
Sample Size (mm)		63 x 120			

TEST TYPE

- ☐ Consolidated
- ☑ Unconsolidated
- ☐ Sample stage tested
- ☐ Drained
- ☑ Undrained
- ☐ With pore pressure measurement
- ☑ Without pore pressure measurement
- ☐ Separate sample for each stage

SATURATION

- ☐ Yes
- ☑ No

Checked by

- ☐ Pore water pressure respose (B)
- ☐

FILTERS

Side Drains ☐ Filter paper ☑ Not used

SAMPLE DESCRIPTION / TEST COMMENTS

black SILT

TEST DATA

	Stage No.	1	2	3	4
Back Pressure	(kPa)	n/a			
Effective Stress	(kPa)	165			
Rate of Strain	(mm/min)	0.1016			
Deviator stress at failure	(kPa)	454.3			
Pore water pressure at failure	(kPa)	n/a			
Volume Change	(ml)	n/a			
☐ ☐		-			
		-			
		-			
		-			

Tested by:	SI
Date tested:	14.04.08
Checked by:	
Approved Signatory:	
Date:	6 May 08

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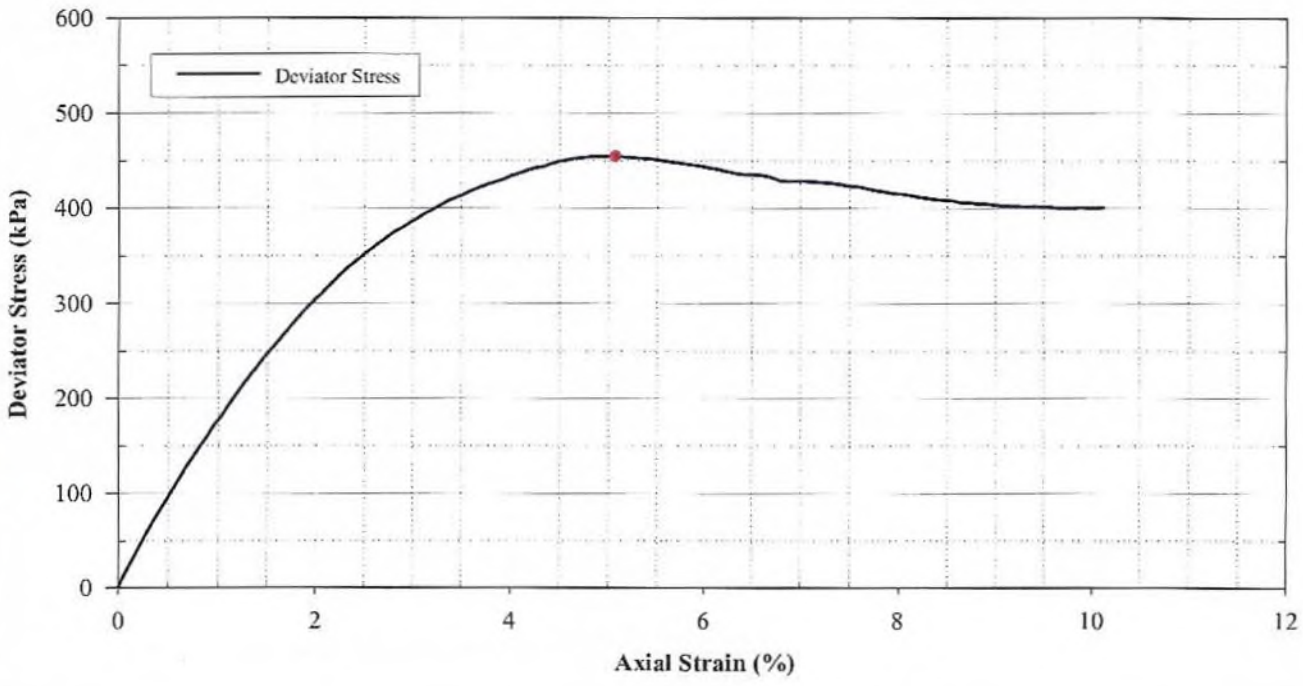
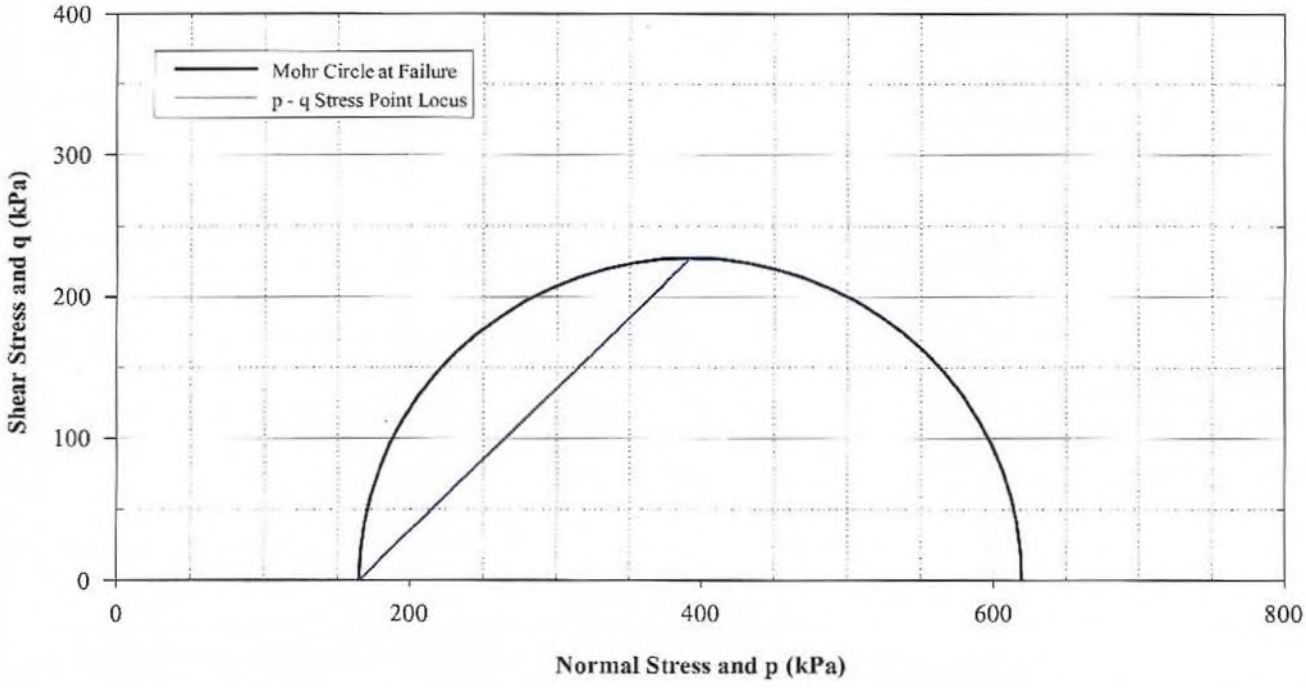
Undrained Triaxial (UU) without measurement of pore water pressure - Report **Report No: SYD080624**

Client:	Loy Yang Power Management Pty Ltd
Project:	OB Dump Stability
Location:	Taralgon, VIC
Test Method:	AS 1289.6.4.1

Job Number:	2117327
Borehole No:	LY4246
Depth (m):	11.5
LM Sample No:	SYD08-0770
Client Sample ID:	n/av





Tested by:	SI
Date Tested:	14.04.2008
Checked by:	
Approved Signatory:	
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Triaxial - Report

Report No. : SYD080627

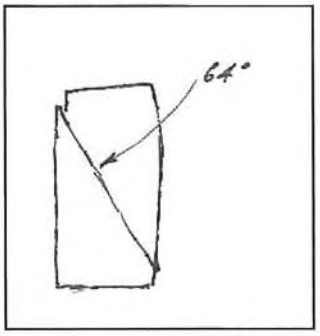
Client:	Loy Yang Power Management Pty Ltd
Project:	OB Dump Stability
Location:	Taralgon, VIC

Job No.:	2117327
Sample No.:	SYD08-0772
Test Hole No.:	LY4246
Depth (m) :	17.5
Client Sample ID :	n/av

TEST METHOD : ☑ AS1289.6.4.1 ☐ AS1289.6.4.2

Sample History : Sampled by GHD (Geotechnical)

Failure Mode



SAMPLE INFORMATION

		Specimen No :	1	2	3	4
Moisture Content Before		(%)	26.7			
Dry Density Before		(t/m³)	1.35			
Moisture Content After	Top	(%)	nt			
	Centre	(%)	nt			
	Bottom	(%)	nt			
Sample Size		(mm)	61 x 121			

TEST TYPE

- ☐ Consolidated
- ☑ Unconsolidated
- ☐ Sample stage tested
- ☐ Drained
- ☑ Undrained
- ☐ With pore pressure measurement
- ☑ Without pore pressure measurement
- ☐ Separate sample for each stage

SATURATION

- ☐ Yes
- ☑ No

Checked by

- ☐ Pore water pressure respose (B)
- ☐

FILTERS

Side Drains ☐ Filter paper ☑ Not used

SAMPLE DESCRIPTION / TEST COMMENTS

grey CLAY wirh pockets of black silt

TEST DATA

	Stage No.	1	2	3	4
Back Pressure	(kPa)	n/a			
Effective Stress	(kPa)	250			
Rate of Strain	(mm/min)	0.1016			
Deviator stress at failure	(kPa)	202.7			
Pore water pressure at failure	(kPa)	n/a			
Volume Change	(ml)	n/a			
☐ ☐		-			
		-			
		-			
		-			

Tested by:	SI
Date tested:	14.04.08
Checked by:	
Approved Signatory:	
Date:	6 May 08

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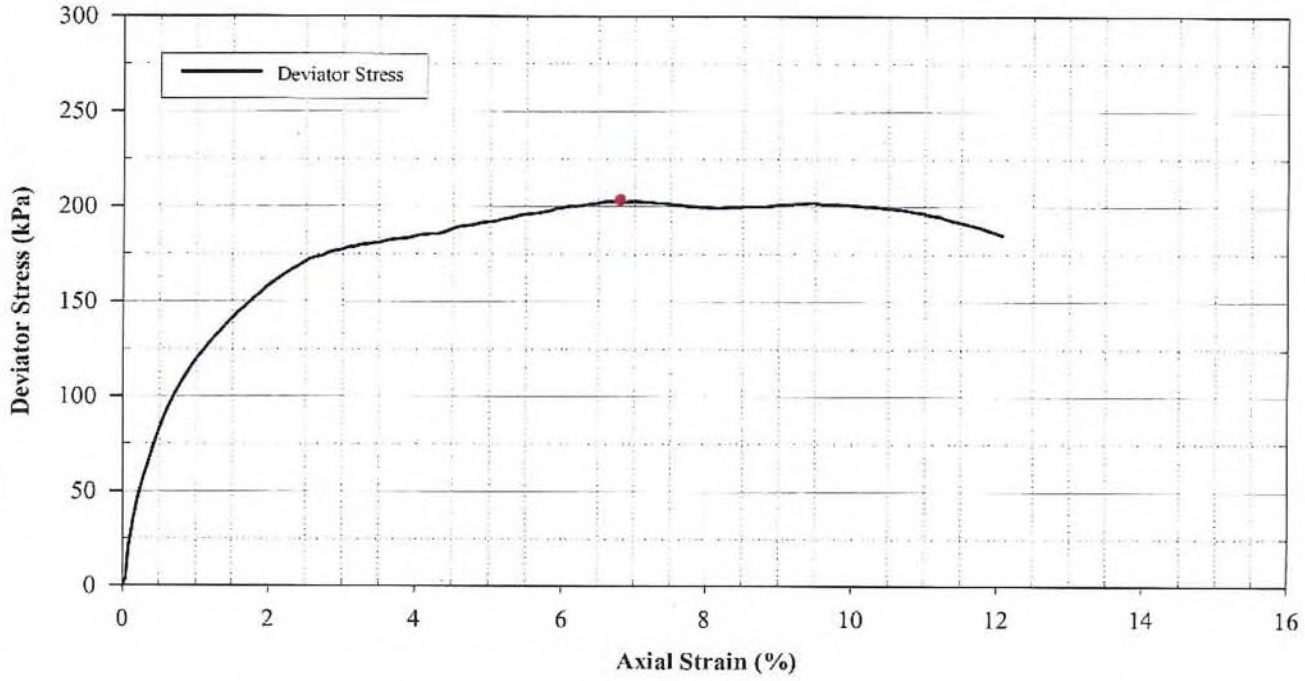
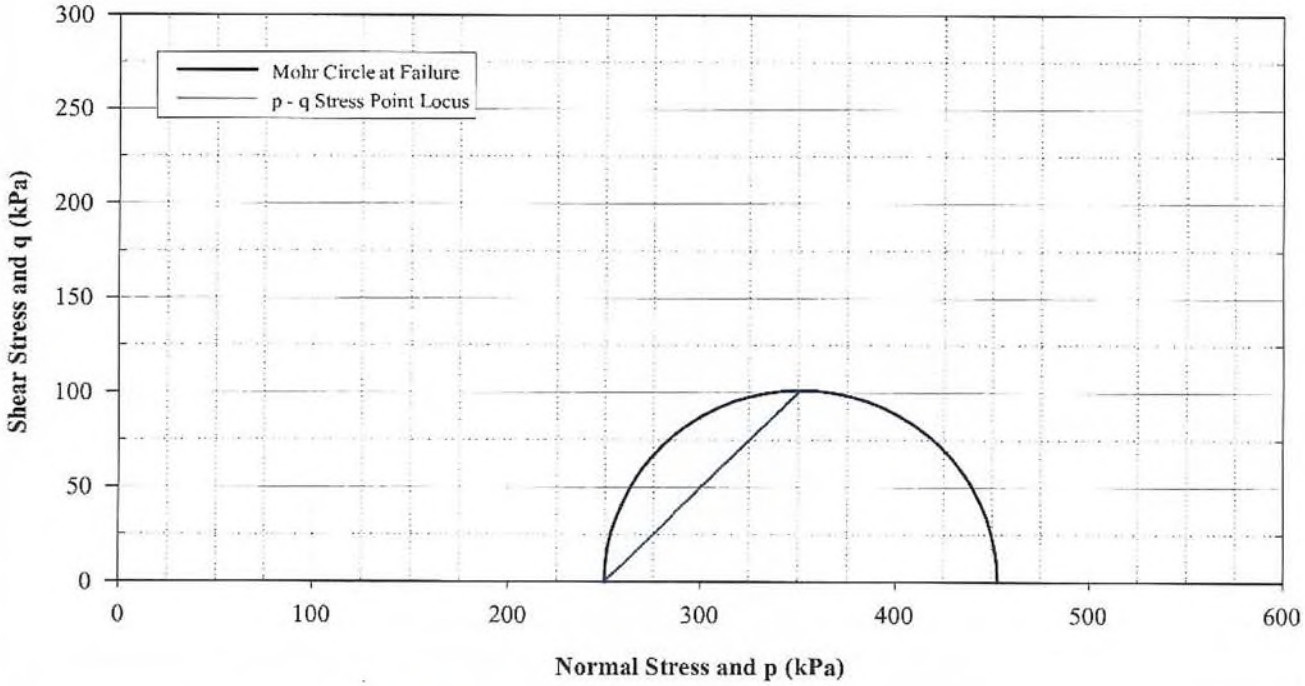
Undrained Triaxial (UU) without measurement of pore water pressure - Report

Report No: SYD080627

Client:	Loy Yang Power Management Pty Ltd
Project:	OB Dump Stability
Location:	Taralgon, VIC
Test Method:	AS 1289.6.4.1

Job Number:	2117327
Borehole No:	LY4246
Depth (m):	17.5
LM Sample No:	SYD08-0772
Client Sample ID:	n/av





Tested by:	SI
Date Tested:	14.04.2008
Checked by:	
Approved Signatory:	
Date:	

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Triaxial - Report

Report No. : SYD080628

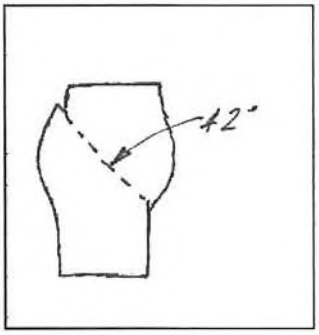
Client:	Loy Yang Power Management Pty Ltd
Project:	OB Dump Stability
Location:	Taralgon, VIC

Job No.:	2117327
Sample No.:	SYD08-0774
Test Hole No.:	LY4246
Depth (m) :	23.0
Client Sample ID :	n/av

TEST METHOD : ☑ AS1289.6.4.1 ☐ AS1289.6.4.2

Sample History : Sampled by GHD (Geotechnical)

Failure Mode



SAMPLE INFORMATION					
Specimen No :		1	2	3	4
Moisture Content Before	(%)	39.1			
Dry Density Before	(t/m³)	1.15			
Moisture Content After	Top (%)	nt			
	Centre (%)	nt			
	Bottom (%)	nt			
Sample Size (mm)		61 x 121			

TEST TYPE

- ☐ Consolidated
- ☑ Unconsolidated
- ☐ Sample stage tested
- ☐ Drained
- ☑ Undrained
- ☐ With pore pressure measurement
- ☑ Without pore pressure measurement
- ☐ Separate sample for each stage

SATURATION

- ☐ Yes
- ☑ No

Checked by

- ☐ Pore water pressure respose (B)
- ☐

FILTERS

Side Drains ☐ Filter paper ☑ Not used

SAMPLE DESCRIPTION / TEST COMMENTS

grey CLAY wirh pockets of black silt

TEST DATA

	Stage No.	1	2	3	4
Back Pressure	(kPa)	n/a			
Effective Stress	(kPa)	330			
Rate of Strain	(mm/min)	0.1016			
Deviator stress at failure	(kPa)	196.9			
Pore water pressure at failure	(kPa)	n/a			
Volume Change	(ml)	n/a			
☐ ☐		-			
		-			
		-			
		-			

Tested by:	SI
Date tested:	14.04.08
Checked by:	
Approved Signatory:	
Date:	6/May/08

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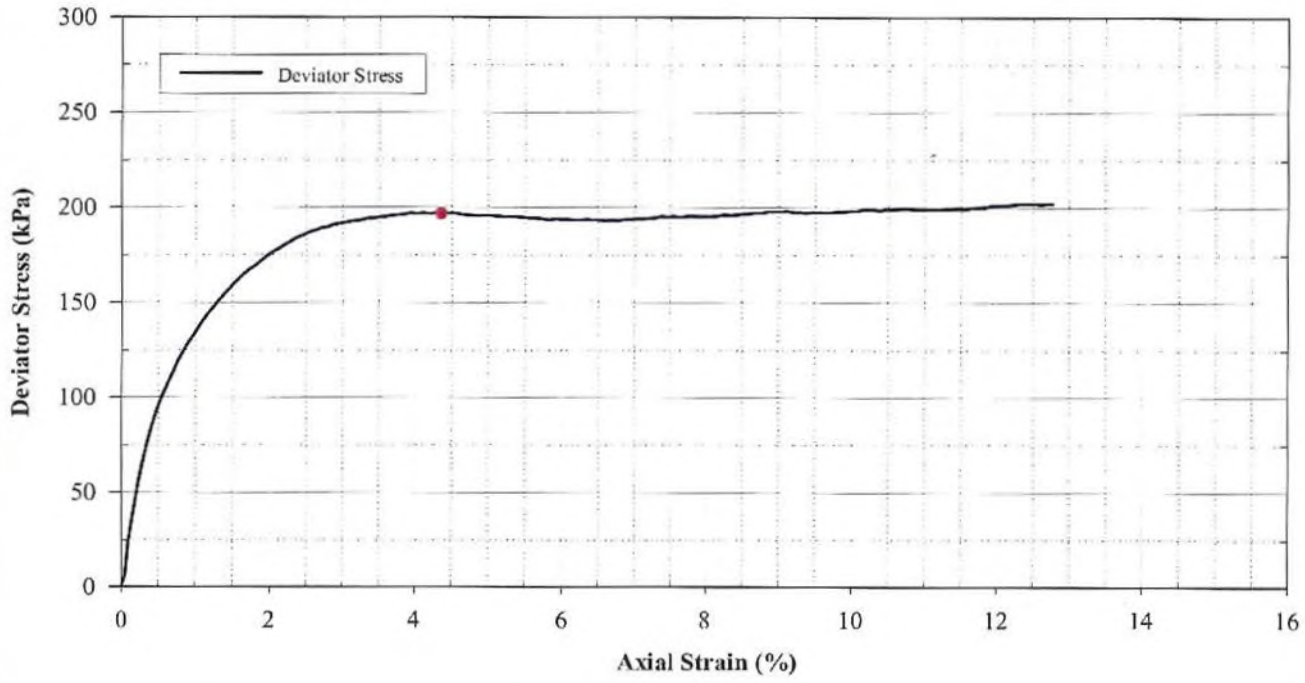
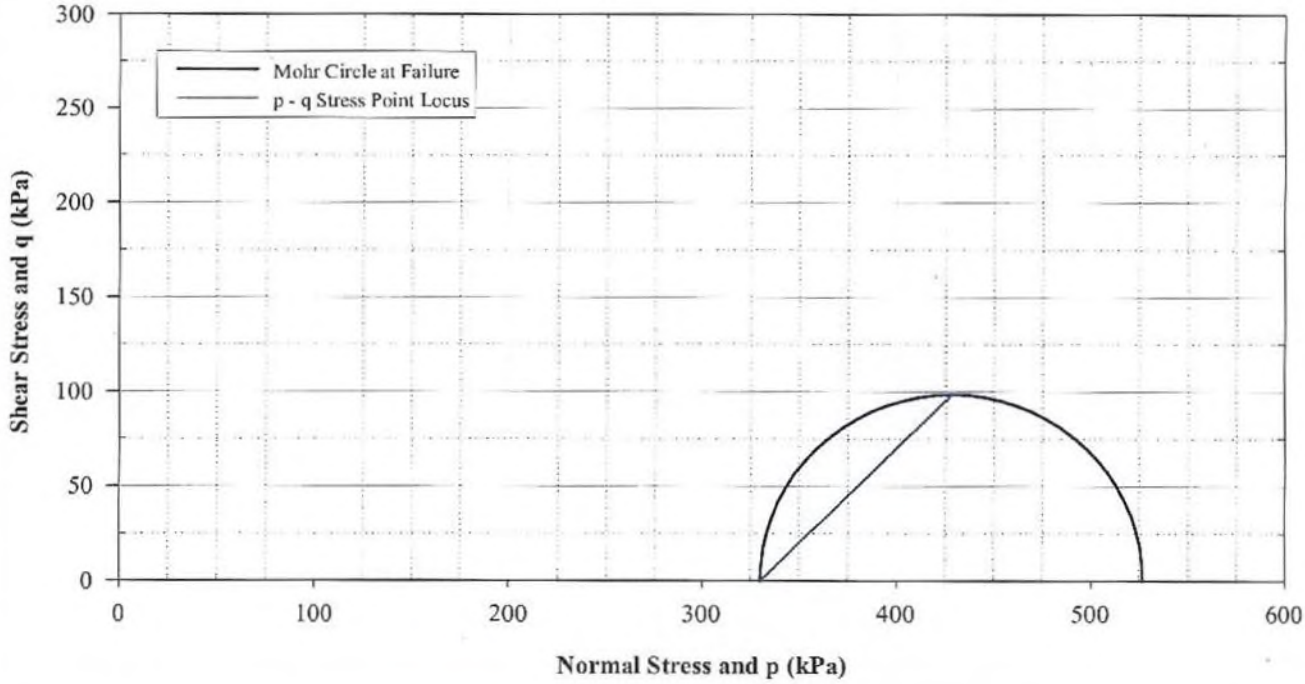
Undrained Triaxial (UU) without measurement of pore water pressure - Report

Report No: SYD080628

Client:	Loy Yang Power Management Pty Ltd
Project:	OB Dump Stability
Location:	Taralgon, NSW
Test Method:	AS 1289.6.4.1

Job Number:	2117327
Borehole No:	LY4246
Depth (m):	23.0
LM Sample No:	SYD08-0774
Client Sample ID:	n/av





Tested by:	SI
Date Tested:	14.04.2008
Checked by:	
Approved Signatory:	
Date:	6 May 08

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Triaxial - Report

Report No. : SYD080629

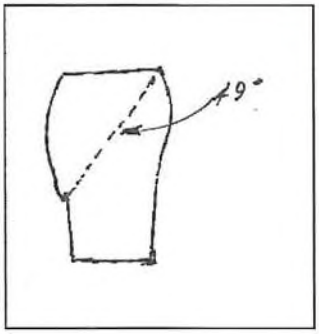
Client:	Loy Yang Power Management Pty Ltd
Project:	OB Dump Stability
Location:	Taralgon, VIC

Job No.:	2117327
Sample No.:	SYD08-0775
Test Hole No.:	LY4246
Depth (m) :	29.0
Client Sample ID :	n/av

TEST METHOD : ☑ AS1289.6.4.1 ☐ AS1289.6.4.2

Sample History : Sampled by GHD (Geotechnical)

Failure Mode



SAMPLE INFORMATION

Specimen No :	1	2	3	4
Moisture Content Before (%)	29.6			
Dry Density Before (t/m³)	1.47			
Moisture Content After Top (%)	nt			
Moisture Content After Centre (%)	nt			
Moisture Content After Bottom (%)	nt			
Sample Size (mm)	61 x 121			

TEST TYPE

- ☐ Consolidated
- ☑ Unconsolidated
- ☐ Sample stage tested
- ☐ Drained
- ☑ Undrained
- ☐ With pore pressure measurement
- ☑ Without pore pressure measurement
- ☐ Separate sample for each stage

SATURATION

- ☐ Yes
- ☑ No

Checked by

- ☐ Pore water pressure respose (B)
- ☐

FILTERS

Side Drains ☐ Filter paper ☑ Not used

SAMPLE DESCRIPTION / TEST COMMENTS

grey CLAY with pockets of black silt

TEST DATA

Stage No.	1	2	3	4
Back Pressure (kPa)	n/a			
Effective Stress (kPa)	380			
Rate of Strain (mm/min)	0.1016			
Deviator stress at failure (kPa)	236.7			
Pore water pressure at failure (kPa)	n/a			
Volume Change (ml)	n/a			
☐ ☐	-			
	-			
	-			
	-			

Tested by:	SI
Date tested:	14.04.08
Checked by:	BB
Approved Signatory	
Date:	6 May 08

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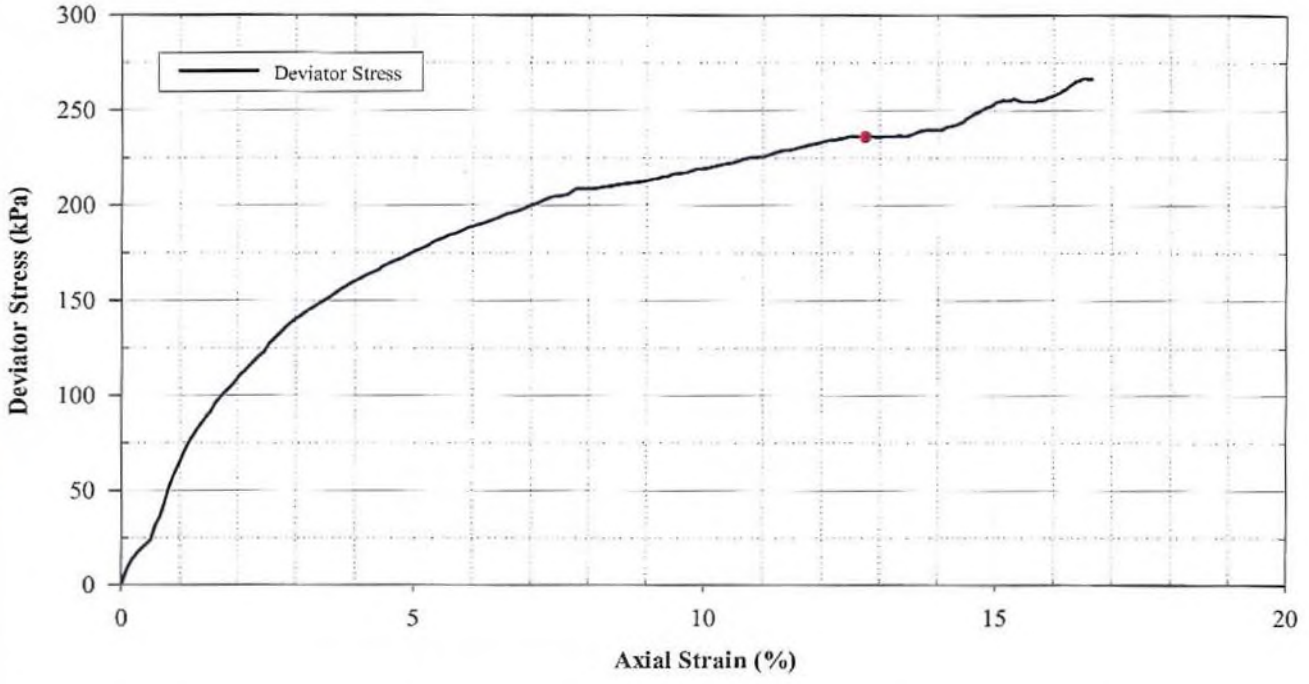
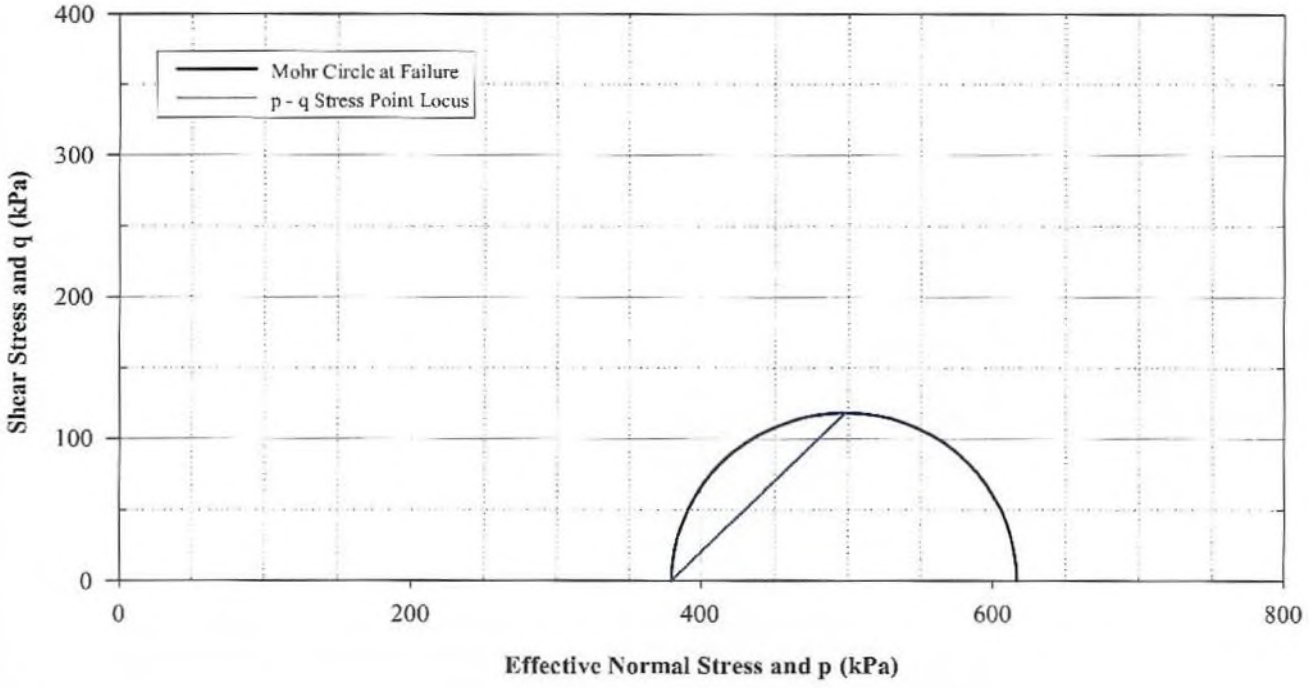
Undrained Triaxial (UU) without measurement of pore water pressure - Report *Report No:* SYD080629

Client:	Loy Yang Power Management Pty Ltd
Project:	OB Dump Stability
Location:	Taralgon, VIC
Test Method:	AS 1289.6.4.1

Job Number:	2117327
Borehole No:	LY4246
Depth (m):	29.0
LM Sample No:	SYD08-0775
Client Sample ID:	n/av





Tested by:	SI
Date Tested:	14.04.2008
Checked by:	
Approved Signatory:	
Date:	8 May 08

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Triaxial - Report

Report No. : SYD08031

Client:	Loy Yang Power Management Pty Ltd
Project:	OB Dump Stability
Location:	Taralgon, VIC

Job No.:	2117327
Sample No.:	SYD08-0777
Test Hole No.:	LY4246
Depth (m) :	38.0
Client Sample ID :	n/av

TEST METHOD : ☑ AS1289.6.4.1 ☐ AS1289.6.4.2

Sample History : Sampled by GHD (Geotechnical)

Failure Mode

SAMPLE INFORMATION					
Specimen No :		1	2	3	4
Moisture Content Before (%)		24.8			
Dry Density Before (t/m³)		1.61			
Moisture Content After	Top (%)	nt			
	Centre (%)	nt			
	Bottom (%)	nt			
Sample Size (mm)		59 x 115			

TEST TYPE

- ☐ Consolidated
- ☑ Unconsolidated
- ☐ Sample stage tested
- ☐ Drained
- ☑ Undrained
- ☐ With pore pressure measurement
- ☑ Without pore pressure measurement
- ☐ Separate sample for each stage

SATURATION

- ☐ Yes
- ☑ No

Checked by

- ☐ Pore water pressure respose (B)
- ☐

FILTERS

Side Drains ☐ Filter paper ☑ Not used

SAMPLE DESCRIPTION / TEST COMMENTS

red brown / grey CLAY

TEST DATA

Stage No.		1	2	3	4
Back Pressure	(kPa)	n/a			
Effective Stress	(kPa)	425			
Rate of Strain	(mm/min)	0.1016			
Deviator stress at failure	(kPa)	633.4			
Pore water pressure at failure	(kPa)	n/a			
Volume Change	(ml)	n/a			
☐ ☐		-			
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		-			
		-			

Tested by:	SI
Date tested:	14.04.08
Checked by:	
Approved Signatory:	
Date:	6 May 08

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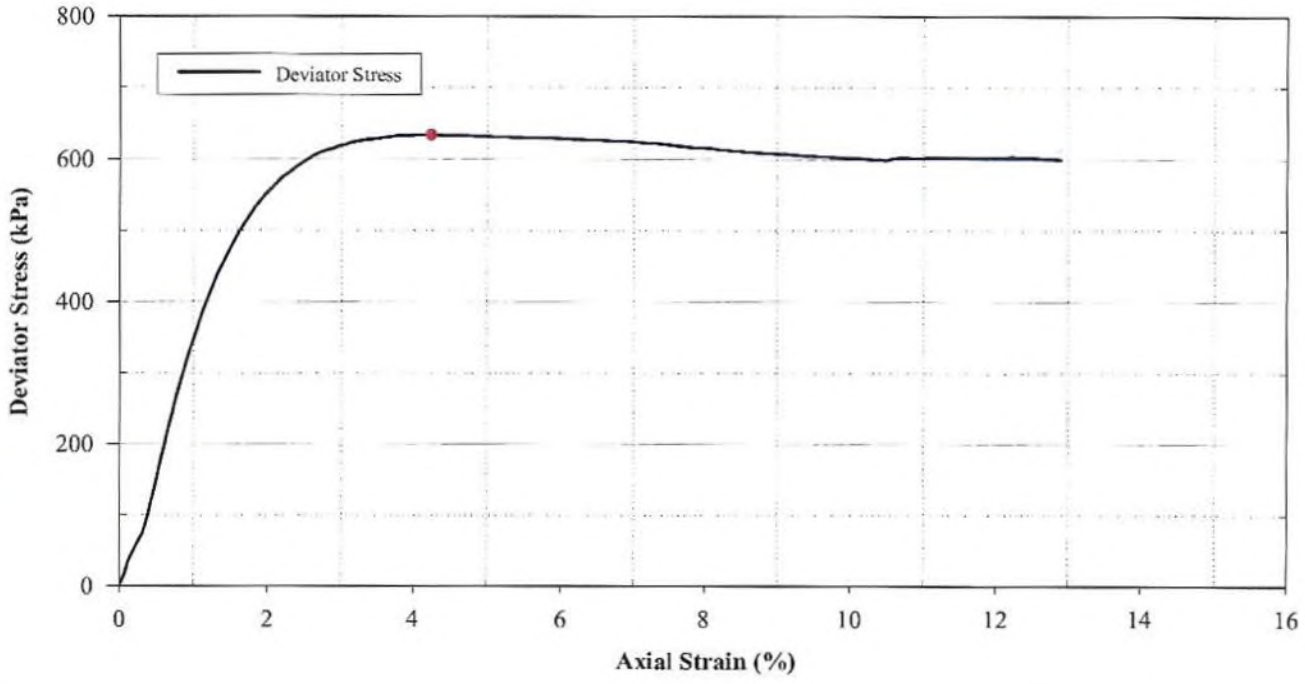
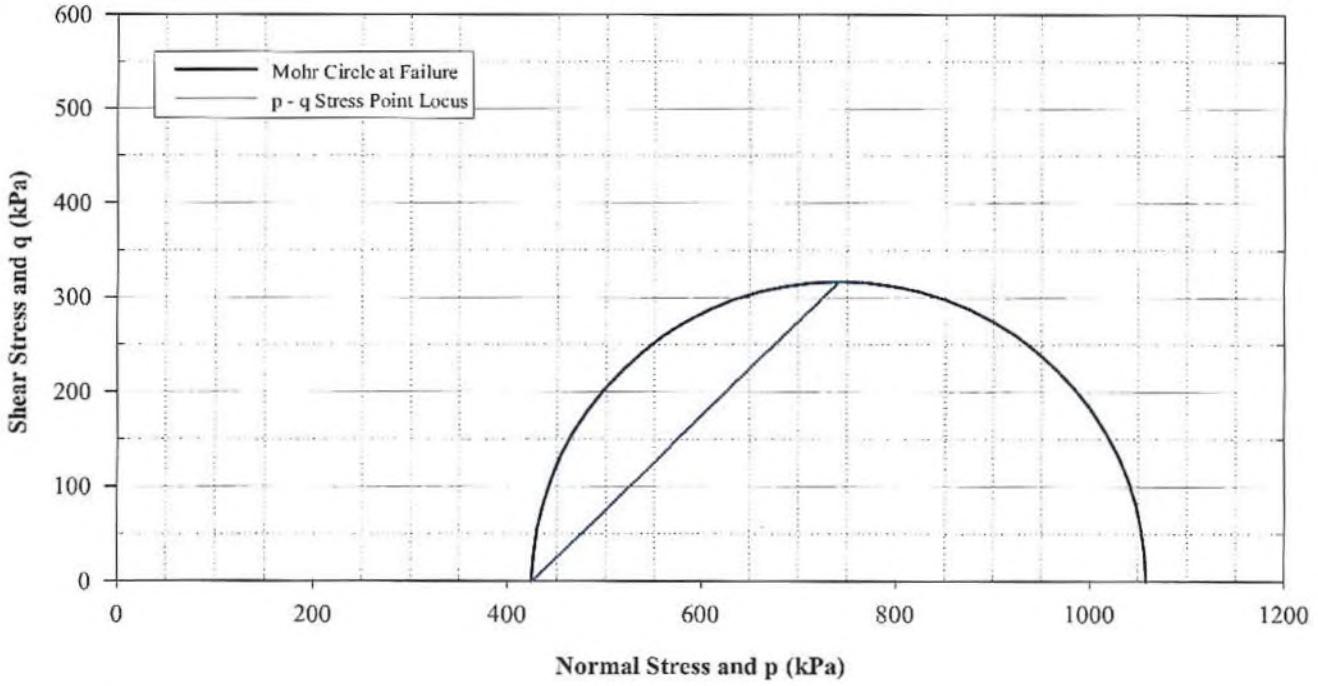
Undrained Triaxial (UU) without measurement of pore water pressure - Report **Report No: SYD080631**

Client:	Loy Yang Power Management Pty Ltd
Project:	OB Dump Stability
Location:	Taralgon, VIC
Test Method:	AS 1289.6.4.1

Job Number:	2117327
Borehole No:	LY4246
Depth (m):	38.0
LM Sample No:	SYD08-0777
Client Sample ID:	n/av





Tested by:	SI
Date Tested:	14.04.2008
Checked by:	
Approved Signatory:	
Date:	

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CLIENTS | PEOPLE | PERFORMANCE

NATA REPORT # 29065

Lab. No:	92647	Client:	Loy Yang Power
Operator:	TF	Project:	OB Dump Geotechnical Investigation
Started:	12/11/2009	Location:	LY4379 @ 6.0m

Sampled: GHD
Material: SILT trace of sand (OH)

Approved Nata Signatory: R Law

Date: 07/12/2009

Liquid Limit %	Plastic Limit %	Plasticity Index %	Linear Shrinkage %	Fines %	Moisture %
61	42	19	7.5	87	44.7

TEST METHODS

Liquid Limit AS1289 3.1.2
Plastic Limit AS 1289 3.2.1
Plastic Index AS 1289 3.3.1
Linear Shrinkage AS 1289 3.4.1
Classification AS 1726
Drying Method AS1289 2.1.1
Fines AS 1141.12

[ ] Natural State [ ] Air-dried [X] Oven-dried [ ] Unknown
[ ] Wet-sieved [X] Dry-sieved

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T 61 3 5136 5937 F 61 3 5136 5999 E mwlmail@ghd.com.au W [illegible]v.ghd.com.au

CLIENTS|PEOPLE|PERFORMANCE

NATA REPORT # 29066

Lab. No:	92648	Client:	Loy Yang Power	Sampled:	GHD
Operator:	AS	Project:	OB Dump Geotechnical Investigation	Material:	CLAY with sand (CH)
Started:	12/11/2009	Location:	LY4379 @ 12.0m		

Approved Nata Signatory: R Law

Date: 07/12/2009

Liquid Limit %	Plastic Limit %	Plasticity Index %	Linear Shrinkage %	Fines %	Moisture %
61	17	44	16.0	72	26.4

TEST METHODS

Liquid Limit AS1289 3.1.2
Plastic Limit AS 1289 3.2.1
Plastic Index AS 1289 3.3.1
Linear Shrinkage AS 1289 3.4.1
Classification AS 1726
Drying Method AS1289 2.1.1
Fines AS 1141.12

[ ] Natural State [ ] Air-dried [X] Oven-dried [ ] Unknown
[ ] Wet-sieved [X] Dry-sieved

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GHD CLIENTS|PEOPLE|PERFORMANCE

NATA REPORT # 29067

Lab. No:	92650	Client:	Loy Yang Power	Sampled:	GHD
Operator:	AS	Project:	OB Dump Geotechnical Investigation	Material:	SILT (OH)
Started:	12/11/2009	Location:	LY4379 @ 18.0m		

Approved Nata Signatory: R Law

Date: 07/12/2009

Liquid Limit %	Plastic Limit %	Plasticity Index %	Linear Shrinkage %	Fines %	Moisture %
55	51	4	3.5	92	73.1

TEST METHODS

Liquid Limit AS1289 3.1.2 [ ] Natural State [ ] Air-dried [X] Oven-dried [ ] Unknown
Plastic Limit AS 1289 3.2.1 [ ] Wet-sieved [X] Dry-sieved
Plastic Index AS 1289 3.3.1
Linear Shrinkage AS 1289 3.4.1
Classification AS 1726
Drying Method AS1289 2.1.1
Fines AS 1141.12

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GHD CLIENTS|PEOPLE|PERFORMANCE

NATA REPORT # 29068

Lab. No:	92651	Client:	Loy Yang Power	Sampled:	GHD
Operator:	SH	Project:	OB Dump Geotechnical Investigation	Material:	clayey SAND (SC)
Started:	12/11/2009	Location:	LY4379 @ 22.5m		

Approved Nata Signatory: R Law

Date: 07/12/2009

Fines	Moisture
%	%
40	17.1

TEST METHODS

Classification - Visual
Drying Method AS1289 2.1.1
Fines AS 1141.12

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CLIENTS|PEOPLE|PERFORMANCE

NATA REPORT # 29069

Lab. No:	92653	Client:	Loy Yang Power	Sampled:	GHD
Operator:	AS	Project:	OB Dump Geotechnical Investigation	Material:	SILT (OH)
Started:	12/11/2009	Location:	LY4379 @ 28.5m		

Approved Nata Signatory: R Law

Date: 07/12/2009

Liquid Limit %	Plastic Limit %	Plasticity Index %	Linear Shrinkage %	Fines %	Moisture %
65	44	21	8.5	98	63.1

TEST METHODS

Liquid Limit AS1289 3.1.2
Plastic Limit AS 1289 3.2.1
Plastic Index AS 1289 3.3.1
Linear Shrinkage AS 1289 3.4.1
Classification AS 1726
Drying Method AS1289 2.1.1
Fines AS 1141.12

[ ] Natural State [ ] Air-dried [X] Oven-dried [ ] Unknown
[ ] Wet-sieved [X] Dry-sieved

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GHD CLIENTS|PEOPLE|PERFORMANCE

NATA REPORT # 29070

Lab. No:	**92654**	Client:	**Loy Yang Power**	Sampled:	**GHD**
Operator:	**AF**	Project:	**OB Dump Geotechnical Investigation**	Material:	**CLAY with sand (CI)**
Started:	**12/11/2009**	Location:	**LY4379 @ 34.5m**		

Approved Nata Signatory: R Law

Date: 07/12/2009

Liquid Limit %	Plastic Limit %	Plasticity Index %	Linear Shrinkage %	Fines %	Moisture %
50	27	23	10.0	83	56.8

TEST METHODS

Liquid Limit AS1289 3.1.2
Plastic Limit AS 1289 3.2.1
Plastic Index AS 1289 3.3.1
Linear Shrinkage AS 1289 3.4.1
Classification AS 1726
Drying Method AS1289 2.1.1
Fines AS 1141.12

[ ] Natural State [ ] Air-dried [X] Oven-dried [ ] Unknown
[ ] Wet-sieved [X] Dry-sieved

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CLIENTS|PEOPLE|PERFORMANCE

NATA REPORT # 29071

Lab. No:	92656	Client:	Loy Yang Power
Operator:	AF	Project:	OB Dump Geotechnical Investigation
Started:	12/11/2009	Location:	LY4379 @ 39.0m

Sampled: GHD
Material: CLAY with sand (CI)

Approved Nata Signatory: R Law

Date: 07/12/2009

Liquid Limit %	Plastic Limit %	Plasticity Index %	Linear Shrinkage %	Fines %	Moisture %
37	12	25	10.5	84	22.6

TEST METHODS

Liquid Limit AS1289 3.1.2
Plastic Limit AS 1289 3.2.1
Plastic Index AS 1289 3.3.1
Linear Shrinkage AS 1289 3.4.1
Classification AS 1726
Drying Method AS1289 2.1.1
Fines AS 1141.12

[ ] Natural State [ ] Air-dried [X] Oven-dried [ ] Unknown
[ ] Wet-sieved [X] Dry-sieved

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CLIENTS|PEOPLE|PERFORMANCE

NATA REPORT # 29072

Lab. No:	92657	Client:	Loy Yang Power	Sampled:	GHD
Operator:	SH	Project:	OB Dump Geotechnical Investigation	Material:	clayey SAND (SC)
Started:	12/11/2009	Location:	LY4379 @ 43.5m		

Date: 07/12/2009

Approved Nata Signatory: R Law

Fines	Moisture
%	%
38	9.7

TEST METHODS

Classification - Visual
Drying Method AS1289 2.1.1
Fines AS 1141.12

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T 61 3 5136 5937 F 61 3 5136 5999 E mwlmail@ghd.com.au W www.ghd.com.au

A.G. LABS

Australian Geomechanical Laboratories P/L
ABN: 25 065 630 506

Soil & Rock Testing

Postal: PO Box 3317 Newmarket Qld 4051
Address: 10/104 Newmarket Rd Windsor Qld 4030

(Phone) 07 3357 5535
(Fax) 07 3357 5531
windsor@aglabs.com.au

PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Method: AS1289 3.6.1, 2.1.1

Client:	GHD Pty Ltd	Report No.	9120014-%F
Project:	31/1145209	Test Date:	11/12/09
		Report Date:	21/12/09

Sample No.	9120014
Client ID:	09-5266 LY3479
Depth (m):	52.5
Moisture (%)	16.1

AS SIEVE SIZE (mm)	PERCENT PASSING
0.075	48

Sample/s supplied by the client

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N ATA Accredited Laboratory Number 9926

Form Number: GT005-5/1

Authorised Signatory

James Russell

J. Russell

Manager

A.G. LABS
Australian Geomechanical Laboratories P/L
ABN: 25 065 630 506
Soil & Rock Testing
Postal: PO Box 3317 Newmarket Qld 4051
Address: 10/104 Newmarket Rd Windsor Qld 4030
(Phone) 07 3357 5535
(Fax) 07 3357 5531
windsor@aglabs.com.au

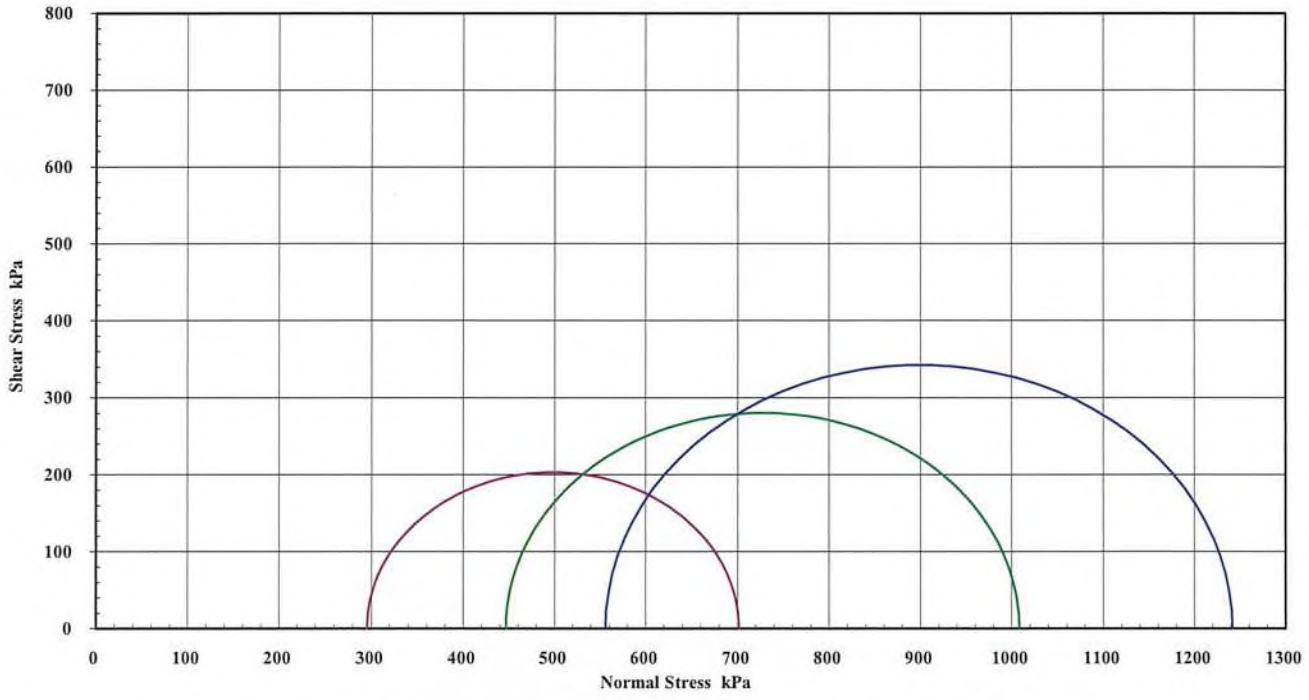
TRIAXIAL TEST REPORT

Test Method: AS1289.6.4.2

Client:	GHD Pty Ltd	**Report No.:**	9120013-cu
Project:	31-1145209	**Test Date:**	14/12/2009
		Report Date:	21/12/2009
Client Id.:	LY3479	**Depth (m):**	37.5

Description: CLAY- grey orange brown mottled

Mohr Circle Diagram



	1 to 2	2 to 3	1 to 3
Interpretation between stages :			
Cohesion C' (kPa) :	37.5	17.2	31.2
Angle of Shear Resistance Φ' (Degrees) :	19.7	21.3	20.4

Cell Pressures (kPa):		500-650-800	**Failure Criteria:** Peak Principal Stress Ratio

SAMPLE & TEST DETAILS

Sample Details			Moisture Contents
Initial Height :	130.7	mm	Initial Moisture
Initial Diameter :	62.6	mm	19.7 %
Wet Density :	2.04	t/m^3	Final Moisture
Dry Density :	1.71	t/m^3	
Rate of Strain:	0.007	%/min	20.7 %
B Response:	99	%	

Sample Type:	Single Individual Undisturbed Specimen

FAILURE DETAILS

Principal Effective Stresses σ'_1	Principal Effective Stresses σ'_3	Deviator Stress	Strain
702 kPa	295 kPa	407 kPa	2.84 %
1008 kPa	447 kPa	561 kPa	3.86 %
1242 kPa	556 kPa	686 kPa	4.59 %

Remarks:	Tested as Received

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ABN: 25 065 630 506

Soil & Rock Testing

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Address: 10/104 Newmarket Rd Windsor Qld 4030
(Phone) 07 3357 5535
(Fax) 07 3357 5531
windsor@aglabs.com.au

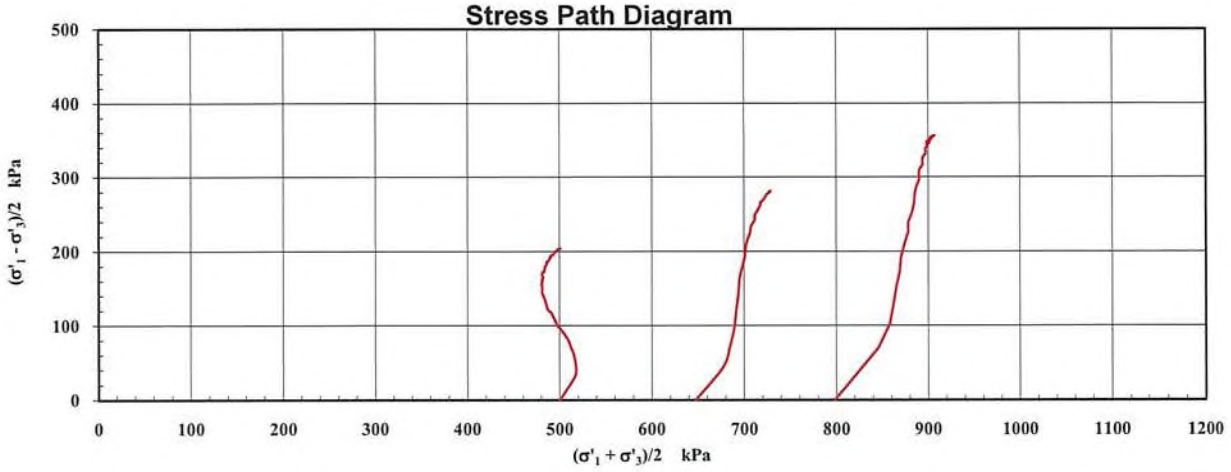
TRIAXIAL TEST REPORT

Test Method: AS1289.6.4.2

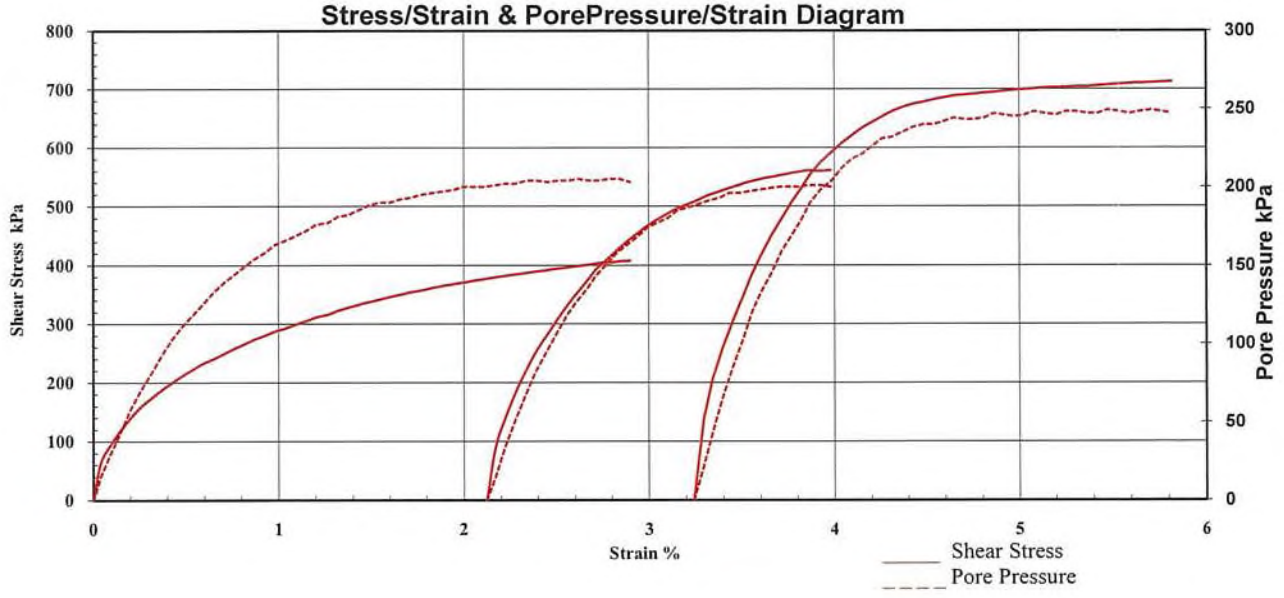
Client:	GHD Pty Ltd	**Report No.:**	9120013-cu
Project:	31-1145209	**Test Date:**	14/12/2009
		Report Date:	21/12/2009
Client Id.:	LY3479	**Depth (m):**	37.5

Description: CLAY- grey orange brown mottled

Stress Path Diagram



Stress/Strain & PorePressure/Strain Diagram



Sample Type:	Single Individual Undisturbed Specimen	Remarks:	Tested as Received

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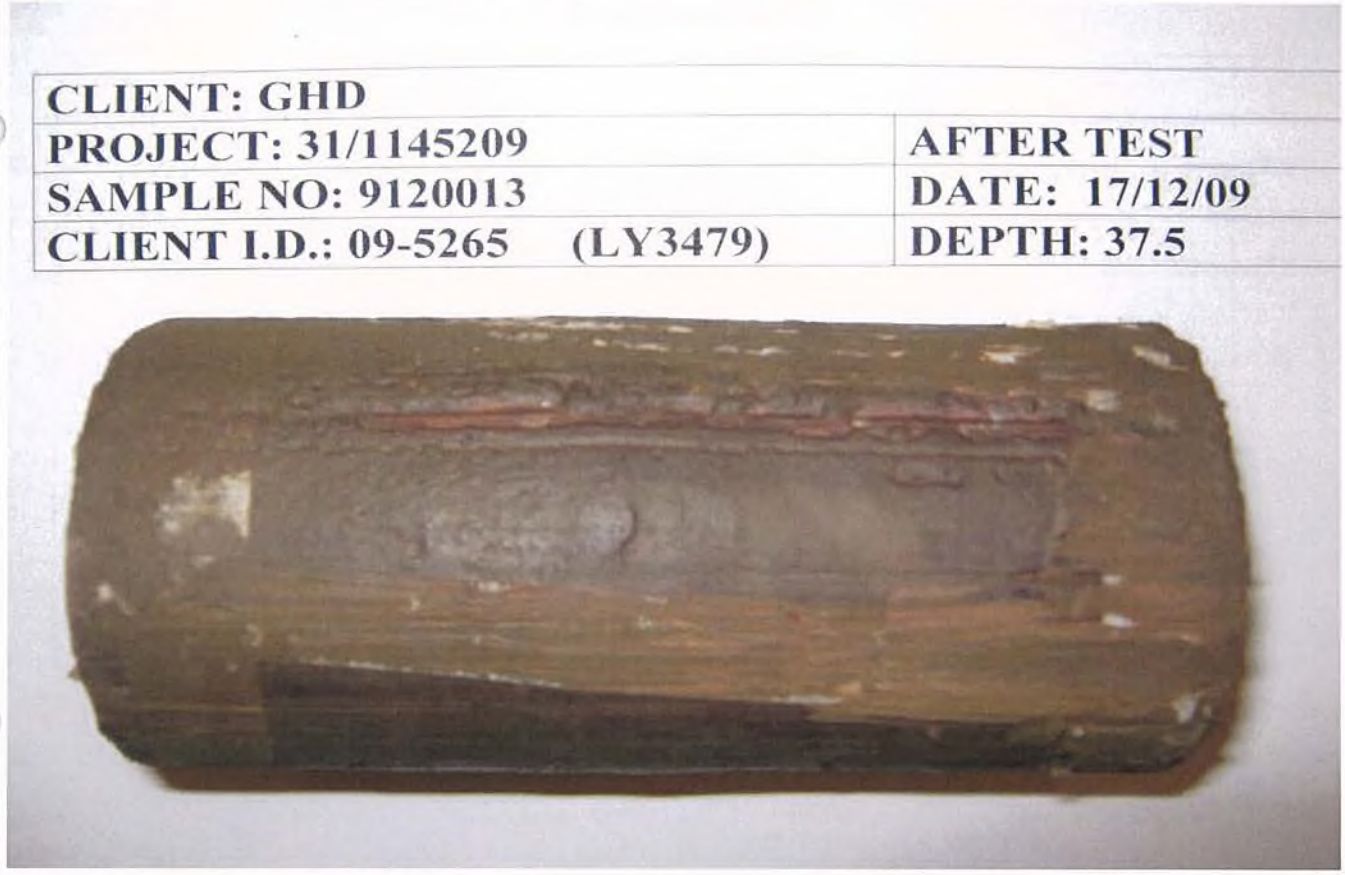
TRIAXIAL TEST REPORT

Test Method: AS1289.6.4.2

Client:	GHD Pty Ltd	**Report No.:**	9120013-cu
Project:	31-1145209	**Test Date:**	14/12/2009
		Report Date:	21/12/2009
Client Id.:	LY3479	**Depth (m):**	37.5

Description: CLAY- grey orange brown mottled



Sample Type:	Single Individual Undisturbed Specimen	Remarks:	Tested as Received

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Address: 10/104 Newmarket Rd Windsor Qld 4030

(Phone) 07 3357 5535
(Fax) 07 3357 5531
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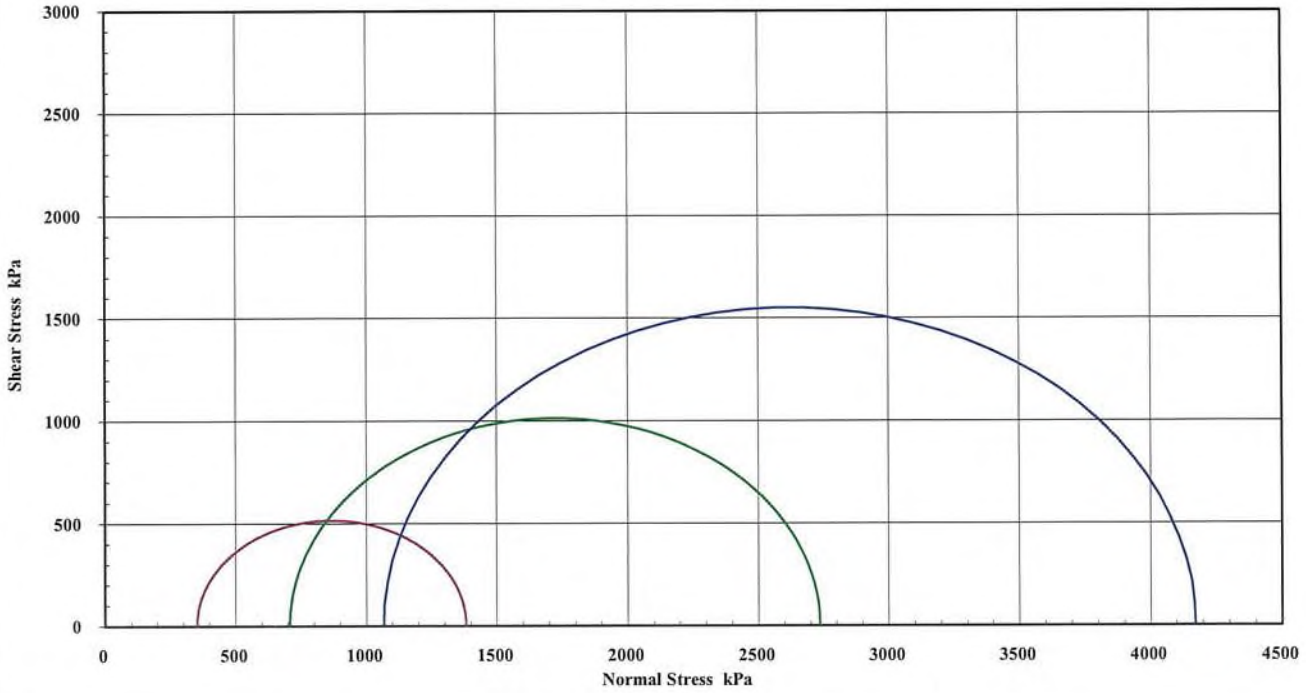
TRIAXIAL TEST REPORT

Test Method: AS1289.6.4.2

Client:	GHD Pty Ltd	**Report No.:**	9120014-cu
Project:	31/1145209	**Test Date:**	14/12/2009
		Report Date:	22/12/2009
Client Id.:	LY3479	**Depth (m):**	52.5

Description: SANDY CLAY- grey brown

Mohr Circle Diagram



Interpretation between stages :	**1 to 2**	**1 to 3**
Cohesion C' (kPa) :	**11.7**	**0.0**
Angle of Shear Resistance Φ' (Degrees) :	**35.7**	**36.3**

Cell Pressures (kPa):		800-1000-1200	**Failure Criteria:** Peak Principal Stress Ratio

SAMPLE & TEST DETAILS

Sample Details			*Moisture Contents*
Initial Height :	130.5	mm	**Initial Moisture**
Initial Diameter :	62.8	mm	11.6 %
Wet Density :	2.14	t/m^3	**Final Moisture**
Dry Density :	1.92	t/m^3	9.8 %
Rate of Strain:	0.008	%/min	
B Response:	99	%	

FAILURE DETAILS

Principal Effective Stresses		*Deviator Stress*	*Strain*
σ'_1	σ'_3		
1381 kPa	351 kPa	1030 kPa	3.78 %
2736 kPa	707 kPa	2029 kPa	6.04 %
4171 kPa	1066 kPa	3105 kPa	7.57 %

Sample Type:	Single Individual Undisturbed Specimen	Remarks:	Tested as Received

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James Russell
J. Russell

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TRIAXIAL TEST REPORT

Test Method: AS1289.6.4.2

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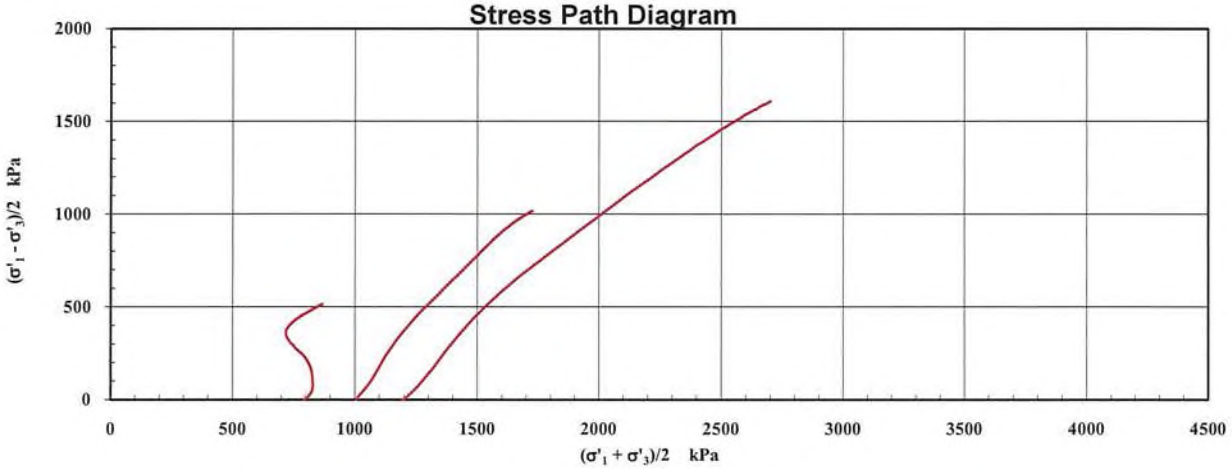
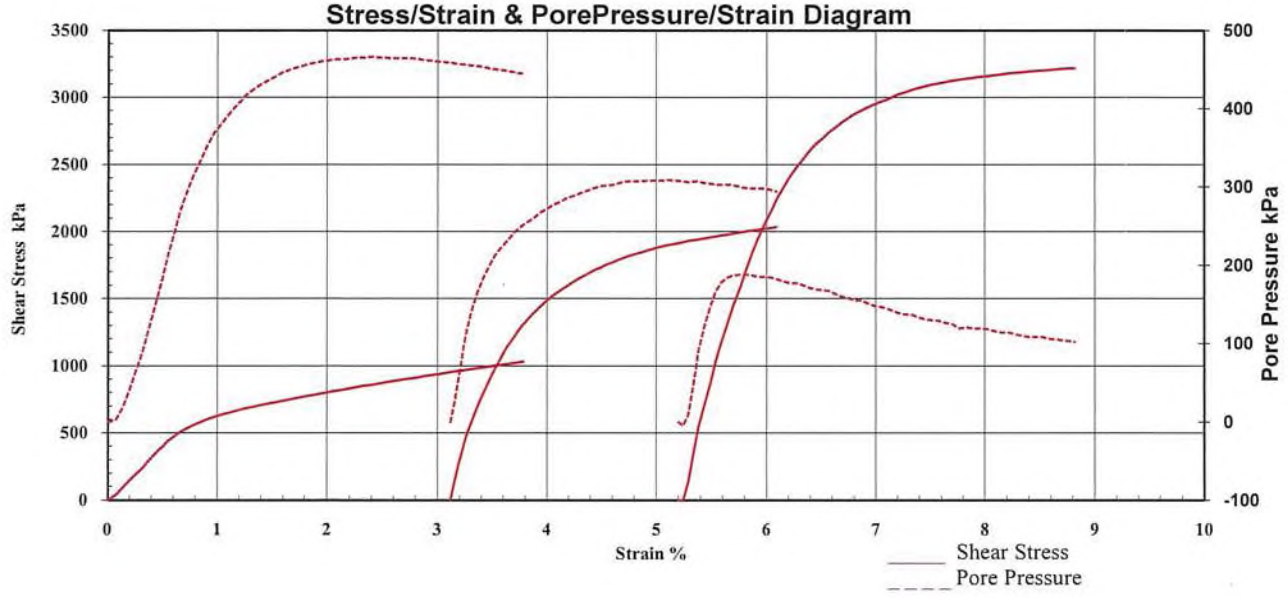
Project:	31/1145209	**Test Date:**	14/12/2009
		Report Date:	22/12/2009
Client Id.:	LY3479	**Depth (m):**	52.5
Description:	SANDY CLAY- grey brown		

Stress Path Diagram



Stress/Strain & PorePressure/Strain Diagram



Sample Type:	Single Individual Undisturbed Specimen	Remarks:	Tested as Received

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(Phone) 07 3357 5535
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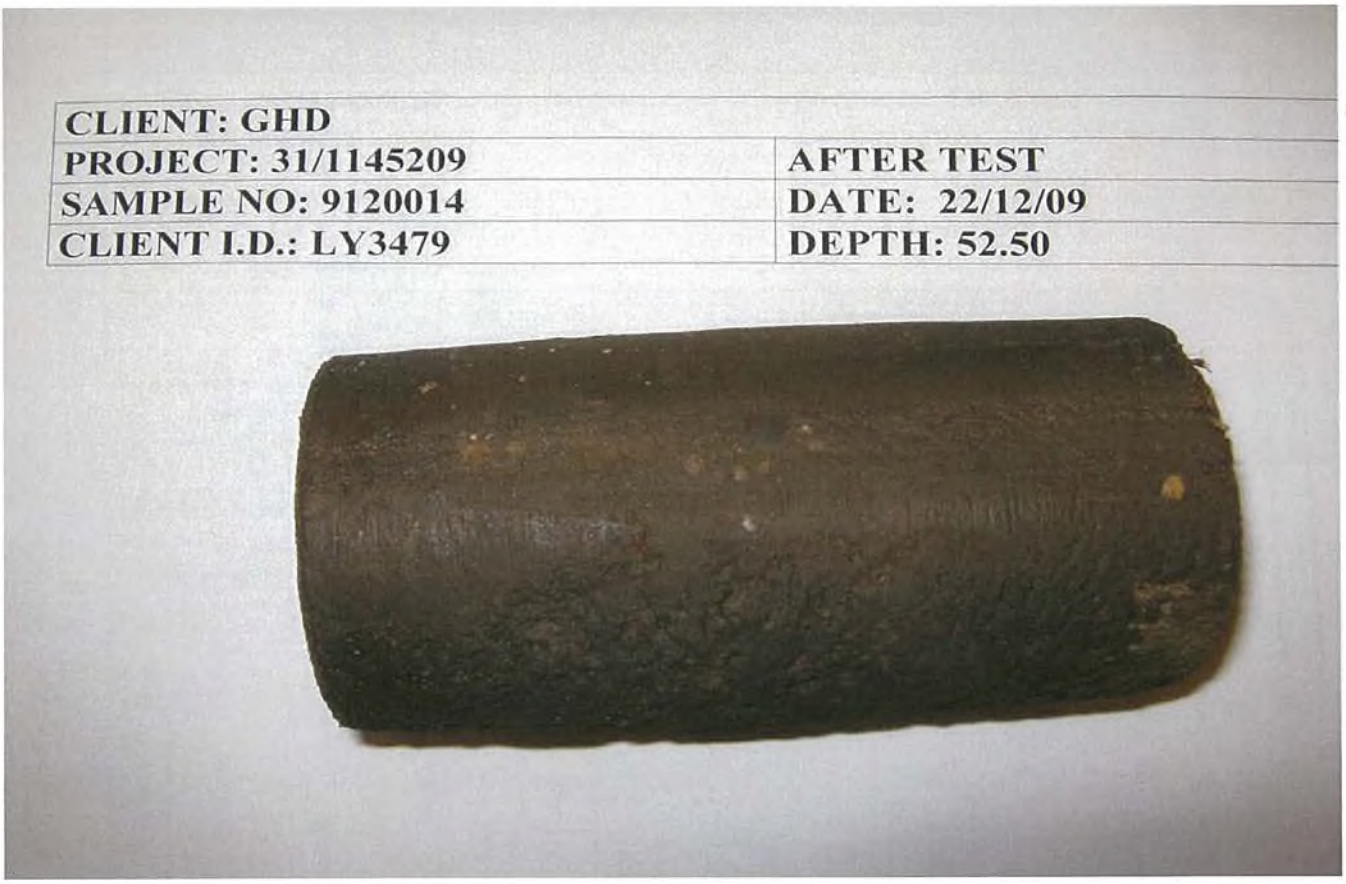
TRIAXIAL TEST REPORT

Test Method: AS1289.6.4.2

Client:	GHD Pty Ltd	**Report No.:**	9120014-cu
Project:	31/1145209	**Test Date:**	14/12/2009
		Report Date:	22/12/2009
Client Id.:	LY3479	**Depth (m):**	52.5

Description: SANDY CLAY- grey brown



Sample Type:	Single Individual Undisturbed Specimer	Remarks:	Tested as Received

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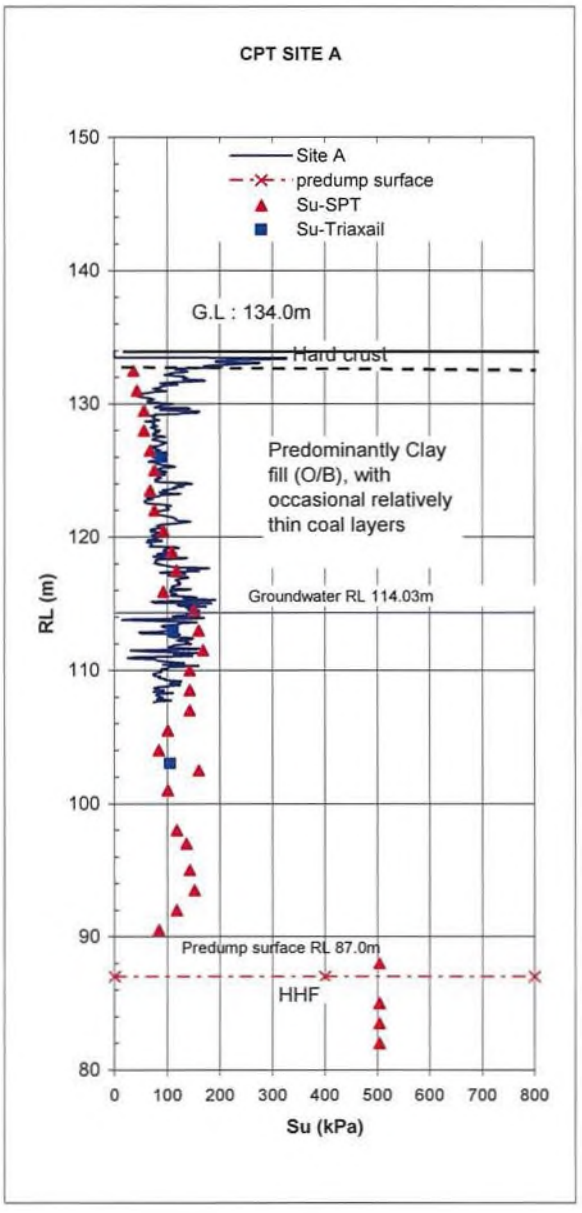
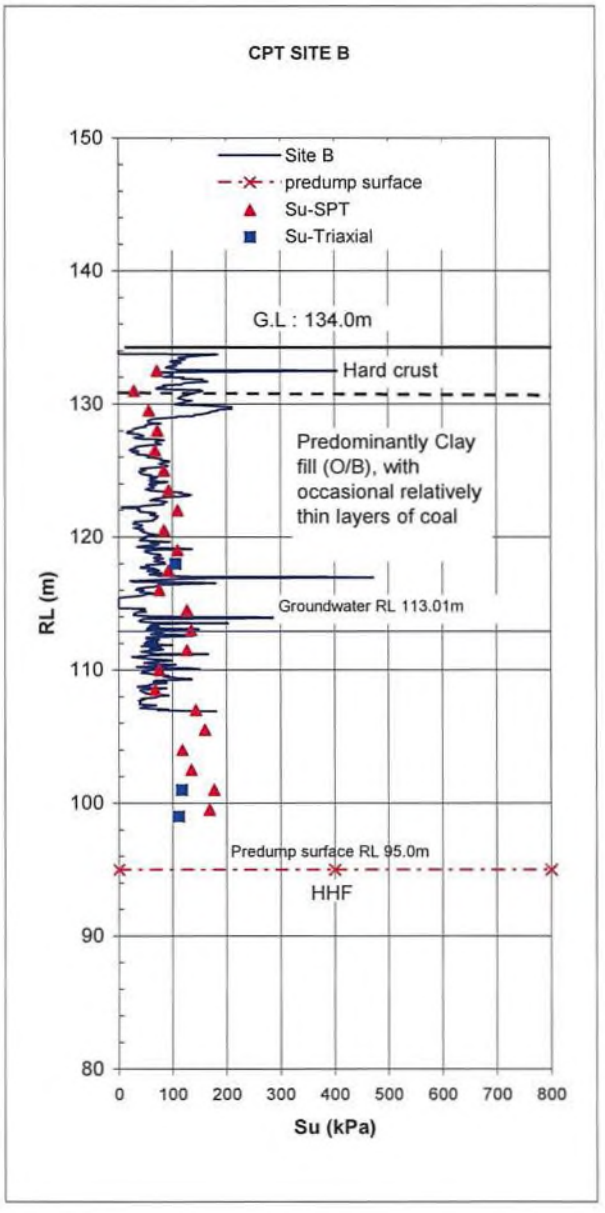
J. Russell

Appendix D

Undrained Strength & Fully-softened Strength Plots





Summary of CPT Results

Notes:
1. Surface ground levels (GL) of test locations supplied by survey data
2. Predump stripped surface levels shown have been determined from calibrated borehole information.
3. Strength trace shown for interpreted cohesive layers shown only.
4. Undrained shear strength interpretation based on assumed (uncalibrated) Nk factor of 15

GHD GEOTECHNICS

Loy Yang Mine
Loy Yang External O/B Dump
Summary of CPT Results - Interpreted Undrained Strength (cohesive layers)

job no 31 / 11452/10
file ref

scale as shown date 8/12/2010

Figure D1

Level 8, 180 Lonsdale Street Melbourne VIC 3000 T 61 3 8687 8000 F 61 3 8687 8111 E melmail@ghd.com.au/ghdgeotechnics

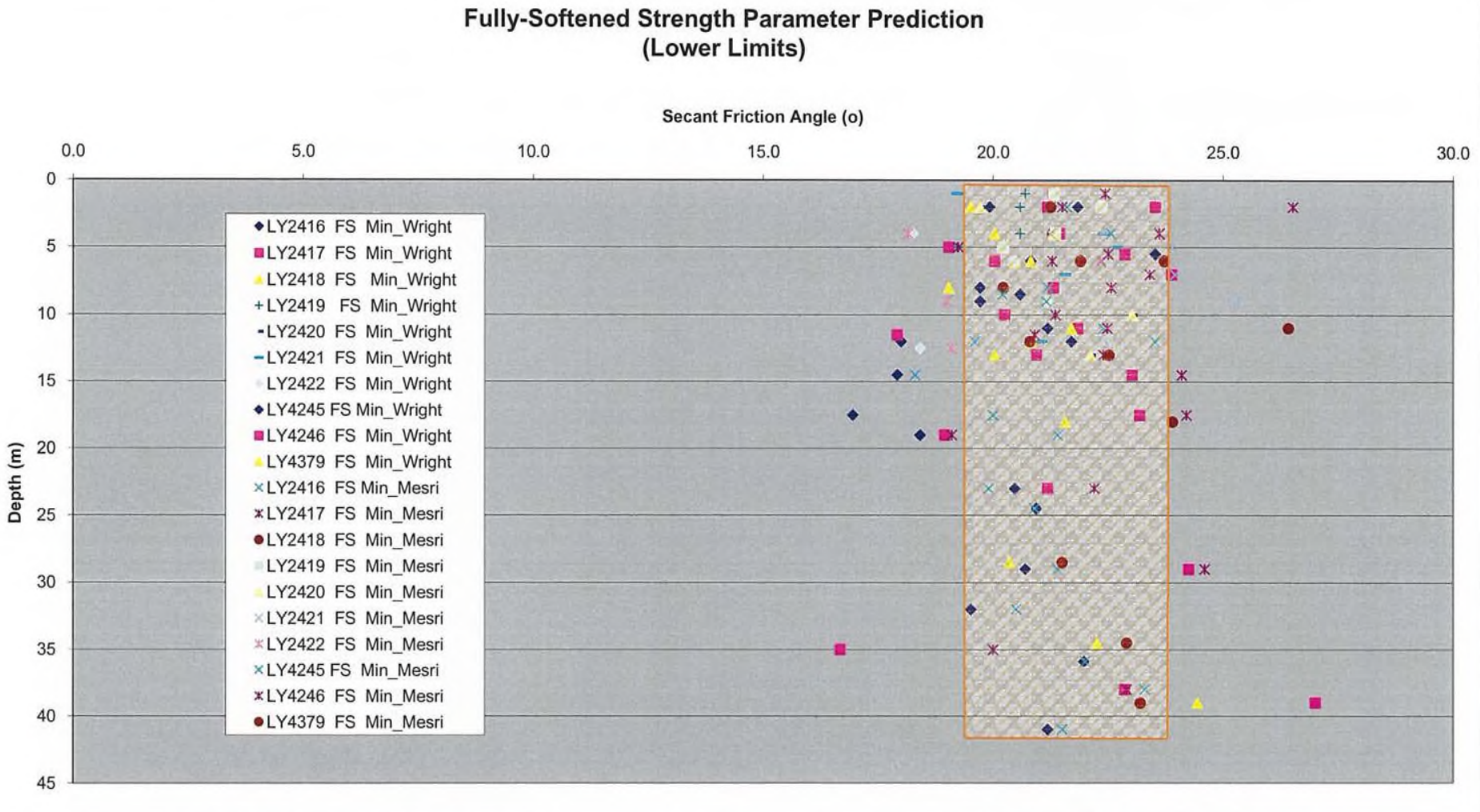


Figure D2 **-- Fully-Softened Strength_Lower Limits**

Project Name: Northern Batter Overburden Dump Stability Analysis

Client Name: Loy Yang Power

Job Number : 311145210

LOY YANG power

GHD GEOTECHNICS

AGL.0001.004.0794

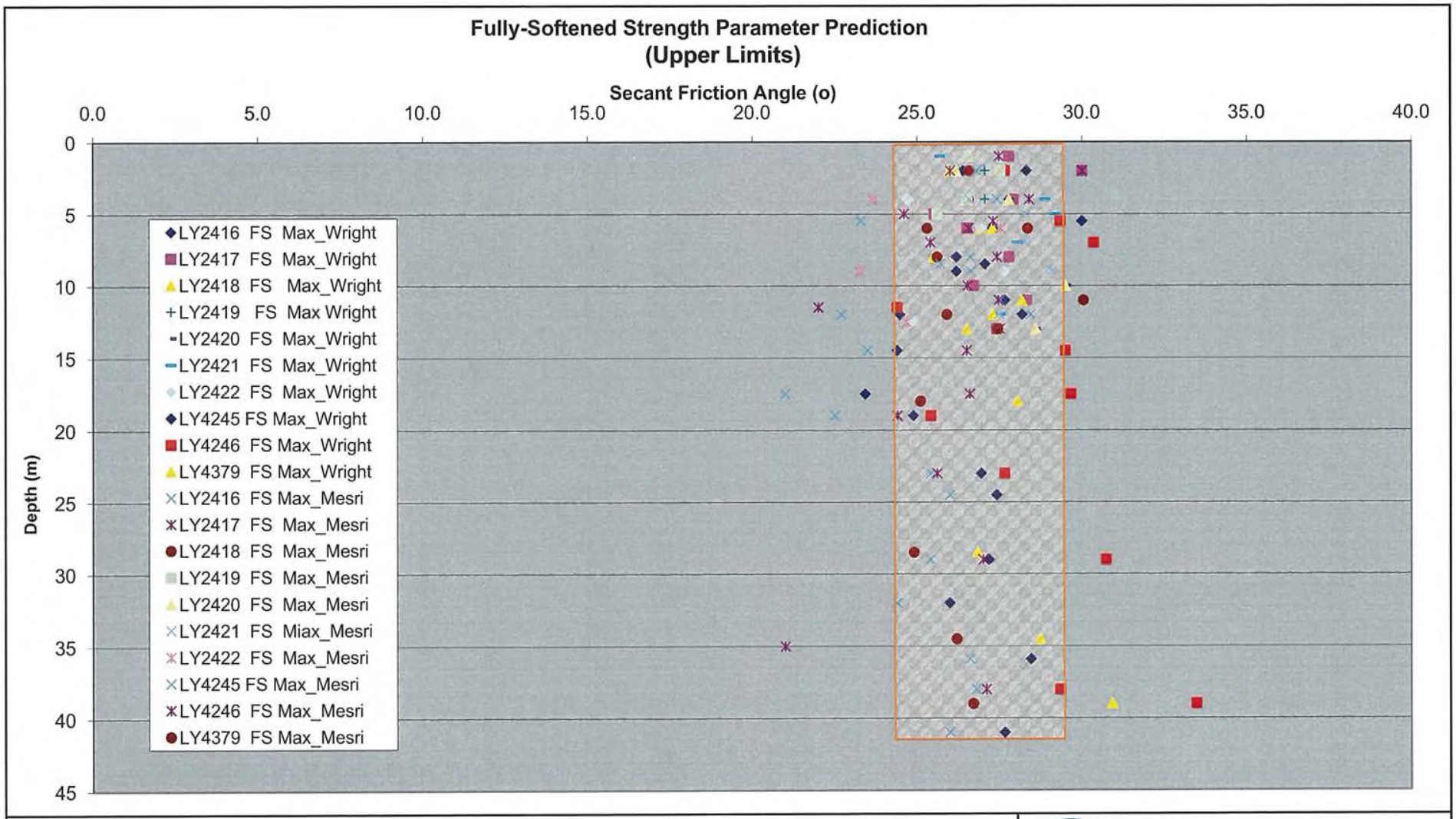


Figure D3 **-- Fully-Softened Strength_Upper Limits**

Project Name: Northern Batter Overburden Dump Stability Analysis

Client Name: Loy Yang Power

Job Number : 311145210

LOY YANG power

GHD GEOTECHNICS

AGL.0001.004.0795

This External Overburden Dump - Material Parameter Review (Report) has been prepared by GHD Pty Ltd (GHD) for Loy Yang Power Management Pty Ltd (Loy Yang Power) under Loy Yang Power Order No 20010030 "Provision of Mine Planning, Earth Sciences and Associated Services", and associated Modifications as at the date of this Report (the Contract). The Contract, and relevant sections in this report, provide a list of the information relied upon in preparing this report, and any limitations/assumptions made. This report may only be used/relied upon by Loy Yang Power.

GHD

180 Lonsdale Street
Melbourne, Victoria 3000
T: (03) 8687 8000 F: (03) 8687 8111 E: melmail@ghd.com.au

Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	D. Hu S. Kacavenda	S. Kacavenda A. Litwinowicz		S. Kacavenda		22/07/11