Appendix 15 – Sampling and Analysis implementation report.

Pluto LNG Development

SURFACE SEDIMENT SAMPLING AND ANALYSIS PLAN IMPLEMENTATION REPORT

- Rev 1
- 8 January 2008

Pluto LNG Development

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Contents

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1. Introduction

1.1 Overview

The Pluto gas field was discovered in April 2005 on the North West Shelf, approximately 190 km north-west of Dampier, Western Australia. Woodside plans to develop the field through an offshore subsea gathering system which would be tied back to an offshore riser platform. Gas will then be transported to shore via a gas trunkline for processing. Development of two separate sites within the Burrup Industrial Estate will be required. Development at these sites will include hydrocarbon storage and export facilities at Site A and a gas processing plant at Site B. Production is planned to commence by the end of 2010. The gas field and associated facilities are anticipated to have a design life of up to 30 years.

As part of the Pluto LNG Development, dredging activities will be undertaken to create a new navigation channel and turning basin as part of a new export facility. The new Pluto LNG channel will facilitate the movement of LNG tankers from deeper waters in Mermaid Sound, to berth at an export jetty immediately adjacent to Site A.

In order to monitor potential changes in marine sediments in the area surrounding the dredging works, a Surface Sediment Sampling and Analysis Plan (SAP) is being undertaken. The aim of this SAP is to investigate potential changes to Particle Size Distribution (PSD) resulting from the Pluto navigation channel dredging works. This implementation report is the first in what will be a series of documents outlining results of the SAP and providing breakdowns in the change in characteristics of marine sediment over time.

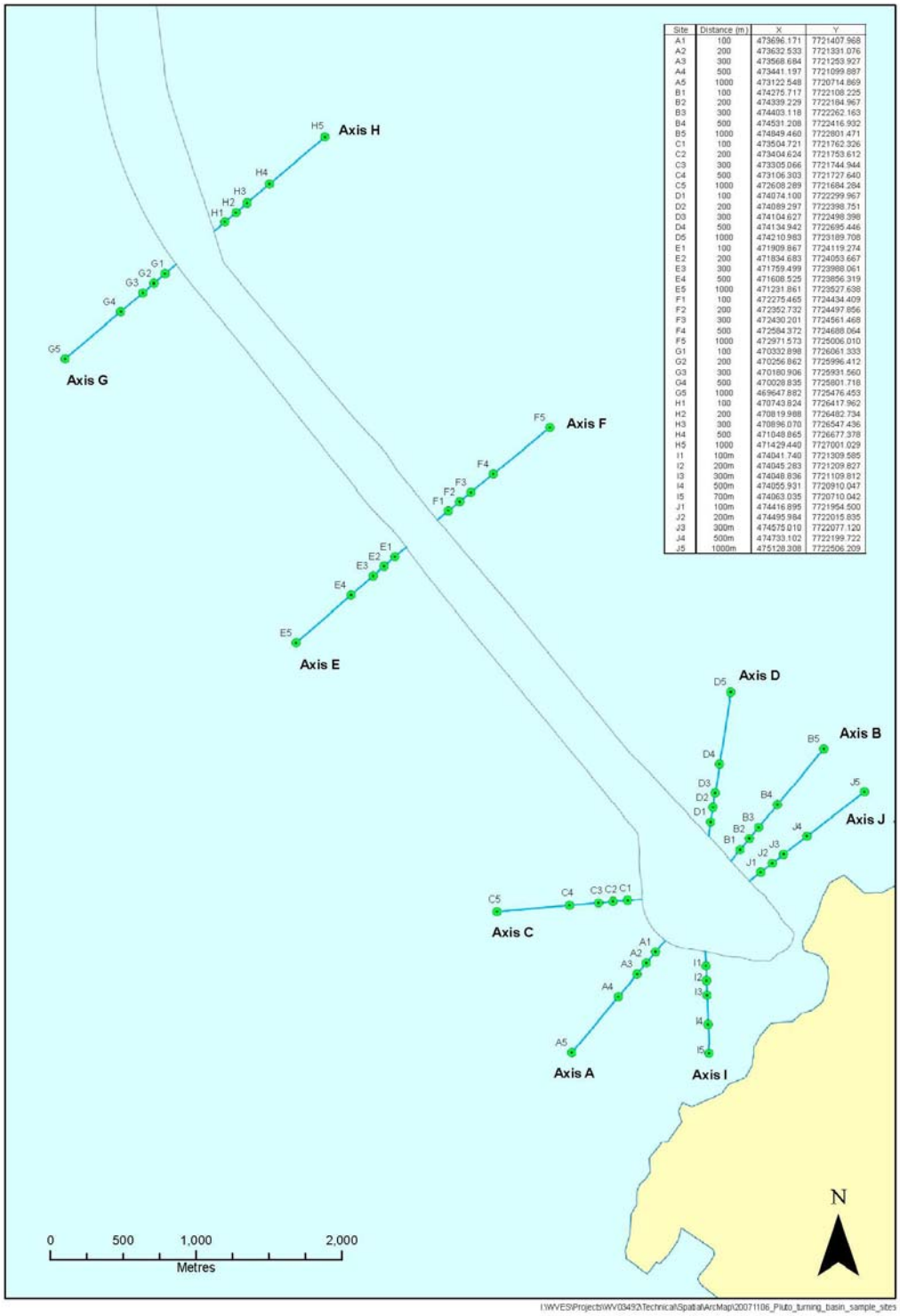
This report provides results on PSD prior to the commencement of dredging operations for the Pluto navigation channel.

1.2 Timeframe

Initial sampling was undertaken during early November 2007. Subsequent follow up sampling will be undertaken on the completion of dredging activities. In the event that significant changes to the sediment characteristics are observed, a follow up survey will be undertaken approximately six months after the completion of dredging works. Currently dredging operations commenced in late November 2007.

1.3 Sampling Location

Samples will be taken from the area surrounding the proposed Pluto turning basin and navigation channel. **Figure 1-1** illustrates the location of each sampling site within Mermaid Sound. **Table 1-1** shows the coordinates of the sample sites.



Site	Distance (m)	X	Y
A1	100	473696.171	7721407.968
A2	200	473632.533	7721331.076
A3	300	473568.684	7721253.927
A4	500	473441.197	7721099.887
A5	1000	473122.548	7720714.869
B1	100	474275.717	7722108.225
B2	200	474339.229	7722184.967
B3	300	474403.118	7722262.163
B4	500	474531.208	7722416.932
B5	1000	474849.460	7722801.471
C1	100	473504.721	7721762.326
C2	200	473404.624	7721753.612
C3	300	473305.066	7721744.944
C4	500	473106.303	7721727.640
C5	1000	472608.289	7721684.284
D1	100	474074.100	7722299.967
D2	200	474089.297	7722398.751
D3	300	474104.627	7722498.398
D4	500	474134.942	7722695.446
D5	1000	474210.983	7723189.708
E1	100	471909.867	7724119.274
E2	200	471834.683	7724053.667
E3	300	471759.499	7723988.061
E4	500	471608.525	7723856.319
E5	1000	471231.861	7723527.638
F1	100	472275.465	7724434.409
F2	200	472352.732	7724497.856
F3	300	472430.201	7724561.468
F4	500	472584.372	7724688.064
F5	1000	472971.573	7725006.010
G1	100	470332.898	7726061.333
G2	200	470256.862	7725996.412
G3	300	470180.906	7725931.560
G4	500	470028.835	7725801.718
G5	1000	469647.882	7725476.453
H1	100	470743.824	7726417.962
H2	200	470819.988	7726482.734
H3	300	470896.070	7726547.436
H4	500	471048.865	7726677.378
H5	1000	471429.440	7727001.029
I1	100m	474041.740	7721309.585
I2	200m	474045.283	7721209.827
I3	300m	474048.836	7721109.812
I4	500m	474055.931	7720910.047
I5	700m	474063.035	7720710.042
J1	100m	474416.895	7721954.500
J2	200m	474495.984	7722015.835
J3	300m	474575.010	7722077.120
J4	500m	474733.102	7722199.722
J5	1000m	475128.308	7722506.209

I:\WVES\Projects\WV03492\Technical\Spatial\ArcMap\20071106_Pluto_turning_basin_sample_sites

- **Figure 1-1 Location of Particle Size Distribution Sampling Sites**

SKM

- **Table 1-1 Sample Site Coordinates**

Label	Easting	Northing
A1	473696.171	7721407.968
A2	473632.533	7721331.076
A3	473568.684	7721253.927
A4	473441.197	7721099.887
A5	473122.548	7720714.869
B1	474275.717	7722108.225
B2	474339.229	7722184.967
B3	474403.118	7722262.163
B4	474531.208	7722416.932
B5	474849.460	7722801.471
C1	473504.721	7721762.326
C2	473404.624	7721753.612
C3	473305.066	7721744.944
C4	473106.303	7721727.640
C5	472608.289	7721684.284
D1	474074.100	7722299.967
D2	474089.297	7722398.751
D3	474104.627	7722498.398
D4	474134.942	7722695.446
D5	474210.983	7723189.708
E1	471909.867	7724119.274
E2	471834.683	7724053.667

Label	Easting	Northing
E3	471759.499	7723988.061
E4	471608.525	7723856.319
E4	471231.861	7723527.638
F1	472275.465	7724434.409
F2	472352.732	7724497.856
F3	472430.201	7724561.468
F4	472584.372	7724688.064
F5	472971.573	7725006.010
G1	470332.898	7726061.333
G2	470256.862	7725996.412
G3	470180.906	7725931.560
G4	470028.835	7725801.718
G5	469647.882	7725476.453
H1	470743.824	7726417.962
H2	470819.988	7726482.734
H3	470896.070	7726547.436
H4	471048.865	7726677.378
H5	471429.440	7727001.029
I1	474041.740	7721309.585
I2	474045.283	7721209.827
I3	474048.836	7721109.812
I4	474055.931	7720910.047
I5	474063.035	7720710.042

Label	Easting	Northing
J1	474416.985	7721954.500
J2	474495.984	7722015.835
J3	474575.010	7722077.120
J4	474733.102	7722199.722
J5	475128.308	7722506.209

2. Sampling Protocols

2.1 Sampling Design

Surface sediment sampling sites were located in areas of soft sediment within the zone of dredging influence and positioned at increasing distance away from the proposed Pluto navigation channel area. This design thereby enables the determination of the spatial effects of dredge sediment deposition on surface sediments. Each sample site was undertaken along designated transect lines. Transects then had samples taken at distances of 100, 200, 300, 500 and 1000 m from the zone of influence (edge of the proposed channel). In total, 50 sites were sampled over 10 transects.

2.2 Sampling Methodology

Samples were collected via hand corers operated by divers. Upon the dive boat being secure in position (position confirmed via vessel GPS), the diver descended to the seabed surface. The corer is pushed into the seabed to a distance of 10cm. The end of the corer is then plugged and the corer is pulled out of seabed with the sediment sample. The bottom end of the corer and the top are then plugged with rubber stoppers and the sample is returned to the surface, being kept as upright as possible to minimise the mixing of the collected sediment. Upon receival at the surface, collected sediment is then placed in 250 mL zip lock bags with each bag marked with sample time, date, depth, sampling site ID and required analysis information. A separate field log was also kept, noting water depth and nature of the sediment, in addition to any other sampling comments which may be appropriate (e.g. presence of biological material in sample).

Zip lock bags containing the collected sediment were then be placed into eskies and kept chilled on ice. At the conclusion of sampling, chilled samples were maintained on ice prior to being couriered by refrigerated truck and consigned to the laboratory the following day.

2.3 Sample Analysis

Samples were sent to a NATA certified laboratory (ALS Laboratory) for PSD analysis. As the ALS Laboratory in Perth does not undertake PSD analysis, received samples were forwarded to the laboratory's approved sub-consultant, Golder Associates in Queensland. A general description of the sample material was then made, followed by a particle size fraction graph. Sampling test procedures were undertaken in accordance with AS 1289 3.6.1 – Determination of the particle size distribution of a soil. **Table 2-1** shows the size fractions used for the PSD analysis.

Table 2-1 Size Fractions for PSD Analysis

>2000 µm	250–500 µm	63–90 µm
1000–2000 µm	180–250 µm	38–63 µm
500–1000 µm	90–180 µm	<38 µm

3. Sampling Results

3.1 Results

The results of PSD analysis are presented in **Table 3-1**. Examination of the particle size summary indicated those areas sampled immediately surrounding the proposed turning basin were composed primarily of brown silty clay (largely A, B, C, D, I, and J transects) (e.g. **Figure 3-1**). A small number of samples within these areas recorded low levels of sand and shell grit. As transect distance from the turning basin increased (500 m and 1000 m from turning basin), a PSD towards a more sandy clay was observed. The exception to this was the J transect, whose 500 m and 1000 m sample locations recorded higher sand fractions (clayey sand). The transects further offshore, radiating outwards from the proposed channel (E, F, G and H), also largely comprised clayey sand and shell with many samples having gravel components (e.g. **Figure 3-2**).

- **Table 3-1 Results of Particle Size Distribution for the 50 Sample Locations**

Sample Location	Particle Size Summary				Sample Description
	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	
A1	0	12	42	46	Silty CLAY, brown.
A2	0	16	43	41	Silty CLAY, brown, with some sand.
A3	0	8	42	50	Silty CLAY, brown.
A4	0	40	32	28	Sandy CLAY, brown.
A5	0	46	27	27	Sandy CLAY, brown.
B1	0	28	36	36	Silty CLAY, brown, with some sand.
B2	0	11	47	42	Silty CLAY, brown.
B3	0	12	47	41	Silty CLAY, brown.
B4	0	10	51	39	Silty CLAY, brown.
B5	0	24	42	34	Silty CLAY, brown, with some sand.
C1	0	8	38	54	Silty CLAY, brown.
C2	1	15	43	41	Silty CLAY, brown, with some sand.
C3	1	47	22	30	Sandy CLAY, brown.
C4	1	40	29	30	Sandy CLAY, brown.
C5	0	48	28	24	Sandy CLAY, pale grey brown.
D1	0	26	36	38	Silty CLAY, brown, with some sand.
D2	0	18	38	44	Silty CLAY, brown, with some sand and shell.
D3	0	20	40	40	Silty CLAY, brown, with some sand and shell.
D4	0	34	32	34	Sandy CLAY, brown, with shell.
D5	0	39	32	29	Sandy CLAY, brown, with shell.
E1	0	70	13	17	Clayey SAND, brown, with shell.
E2	3	77	7	13	Clayey SAND, brown, with shell.

E3	0	73	13	14	Clayey SAND, brown.
E4	3	88	5	4	Clayey SAND/SAND, brown, with shell.
E5	0	60	21	19	Clayey SAND, brown.
F1	0	75	10	15	Clayey SAND, brown.
F2	3	94	3		SAND, brown, with shell.
F3	6	89	5		SAND, brown, with shell.
F4	1	75	9	15	Clayey SAND, brown.
F5	4	89	5	2	Clayey SAND/SAND, brown.
G1	17	67	8	8	Clayey SAND, brown, with some gravel and shell.
G2	16	68	7	9	Clayey SAND, brown, with some gravel and shell.
G3	13	73	6	8	Clayey SAND, brown, with shell.
G4	14	78	3	5	Clayey SAND/SAND, brown, with shell.
G5	11	69	9	11	Clayey SAND, brown, with shell.
H1	19	67	6	8	Clayey SAND, brown, with some gravel and shell.
H2	29	58	6	7	Clayey SAND, brown, with some gravel and shell.
H3	21	68	5	6	Clayey SAND, brown, with some gravel and shell.
H4	11	68	10	11	Clayey SAND, brown, with shell.
H5	11	75	7	7	Clayey SAND, brown, with shell.
I1	0	11	47	42	Silty CLAY, brown.
I2	0	40	31	29	Sandy CLAY, brown.
I3	0	29	37	34	Silty CLAY, brown, with some sand.
I4	0	38	36	26	Sandy CLAY, brown.
I5	3	83	7	7	Clayey SAND, grey brown, with shell.
J1	0	8	47	45	Silty CLAY, grey brown.
J2	5	29	36	30	Silty CLAY, brown, with some sand.
J3	2	16	42	40	Silty CLAY, grey brown, with some sand.
J4	21	51	13	15	Clayey SAND, grey brown, with some shell and gravel.
J5	5	61	18	16	Clayey SAND, grey brown, with shell.

Note: Percentage breakdown for particle size is based on the following size distributions:

- Gravel (> 2 mm)
- Sand (2 mm – 0.060 mm)
- Silt (0.060 mm – 0.002 mm)
- Clay (<0.002 mm)

- **Figure 3-1 A Silty Clay Sample; B2**

- **Figure 3-2 A Clayey Sand Sample; E4**

4. Conclusion

The results of PSD analysis revealed the large majority of inshore samples to comprise brown clay sediments with varying amounts of sand. In comparison, offshore samples adjacent to the proposed channel were predominantly brown clayey sand with a small marine shell fraction.

The baseline data collected within this report will be used for comparison against future sampling regimes once dredging for the Pluto navigation channel is complete. Should significant changes to the sediment characteristics be observed upon the completion of dredging activities, further follow up sampling will be undertaken approximately six months after dredging operations have ceased.

5. References

SKM 2007, Pluto LNG Development Surface Sediment Sampling and Analysis Plan, prepared for Woodside Energy Ltd.

Appendix A Particle Size Distribution Laboratory Results

Golder Associates

MANSFIELD
LABORATORY

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Phone:(07) 3343 3166 Fax:(07) 3849 4705
www.golder.com.au

TEST RESULTS

Client :	ALS Environmental Perth	Job No. :	077634002/2
Project :	Delivered Samples	Date Received :	19-Nov-07
Batch No. :	EP0705490	Sampled by :	Client

PARTICLE SIZE SUMMARY

Reg'n No.	Sample No.	Sample ID	Percent Gravel (+ 2 mm)	Percent Sand (2 mm - 0.060 mm)	Percent Silt (0.060 mm - 0.002 mm)	Percent Clay (-0.002 mm)
L19152	1	A1_PSD	0	12	42	46
L19153	2	A2_PSD	0	16	43	41
L19154	3	A3_PSD	0	8	42	50
L19155	4	A4_PSD	0	40	32	28
L19156	5	A5_PSD	0	46	27	27
L19157	6	B1_PSD	0	28	36	36
L19158	7	B2_PSD	0	11	47	42
L19159	8	B3_PSD	0	12	47	41
L19160	9	B4_PSD	0	10	51	39
L19161	10	B5_PSD	0	24	42	34
L19162	11	C1_PSD	0	8	38	54
L19163	12	C2_PSD	1	15	43	41
L19164	13	C3_PSD	1	47	22	30
L19165	14	C4_PSD	1	40	29	30
L19166	15	C5_PSD	0	48	28	24
L19167	16	D1_PSD	0	26	36	38
L19168	17	D2_PSD	0	18	38	44
L19169	18	D3_PSD	0	20	40	40
L19170	19	D4_PSD	0	34	32	34
L19171	20	D5_PSD	0	39	32	29
L19172	21	E1_PSD	0	70	13	17
L19173	22	E2_PSD	3	77	7	13
L19174	23	E3_PSD	0	73	13	14
L19175	24	E4_PSD	3	88	5	4
L19176	25	E5_PSD	0	60	21	19
L19177	26	F1_PSD	0	75	10	15
L19178	27	F2_PSD	3	94	3	
L19179	28	F3_PSD	6	89	5	
L19180	29	F4_PSD	1	75	9	15
L19181	30	F5_PSD	4	89	5	2
L19182	31	G1_PSD	17	67	8	8
L19183	32	G2_PSD	16	68	7	9
L19184	33	G3_PSD	13	73	6	8
L19185	34	G4_PSD	14	78	3	5
L19186	35	G5_PSD	11	69	9	11
L19187	36	H1_PSD	19	67	6	8
L19188	37	H2_PSD	29	58	6	7
L19189	38	H3_PSD	21	68	5	6
L19190	39	H4_PSD	11	68	10	11
L19191	40	H5_PSD	11	75	7	7

Remarks :

Test Procedures : AS 1289 3.6.1 & 3.6.3

Prepared by : NF Checked by JA

Golder Associates

MANSFIELD LABORATORY

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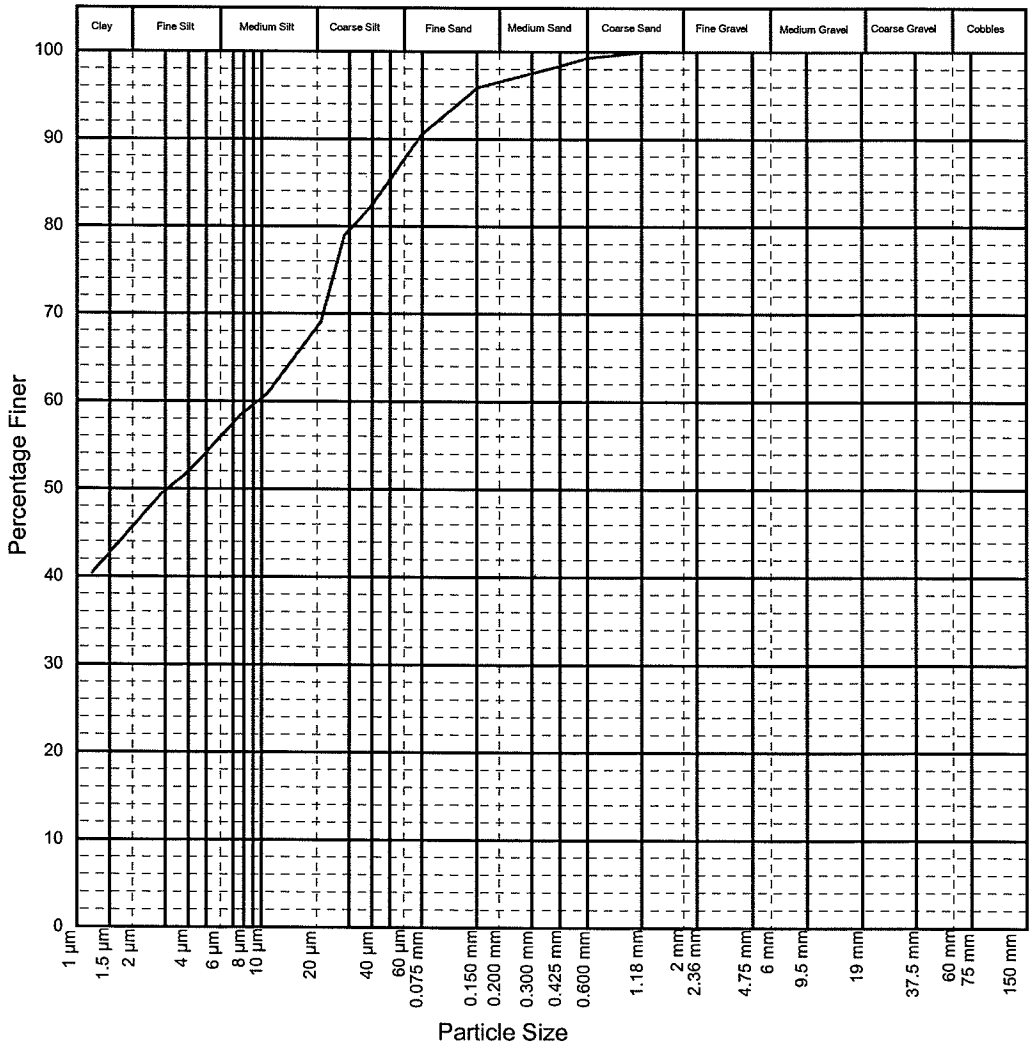
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19152
Sample ID :	A1_PSD	Batch No. :	EP0705490 - 1
		Date Received :	19/11/2007
		Sampled By :	Client

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	
4.75	
2.36	100.0
1.18	99.9
0.600	99.3
0.425	98.4
0.300	97.5
0.150	95.9
0.075	90.5
Particle Size (Microns)	**Percent Passing**
39.2	82.2
28.2	78.9
21.0	69.1
10.8	60.9
7.7	58.4
5.5	55.1
4.0	51.9
2.8	49.4
1.2	40.4

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(CH) Silty CLAY, brown		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : NT		Checked by : JA	

NATA 1446

7/12/07
Authorised Signatory

Golder Associates

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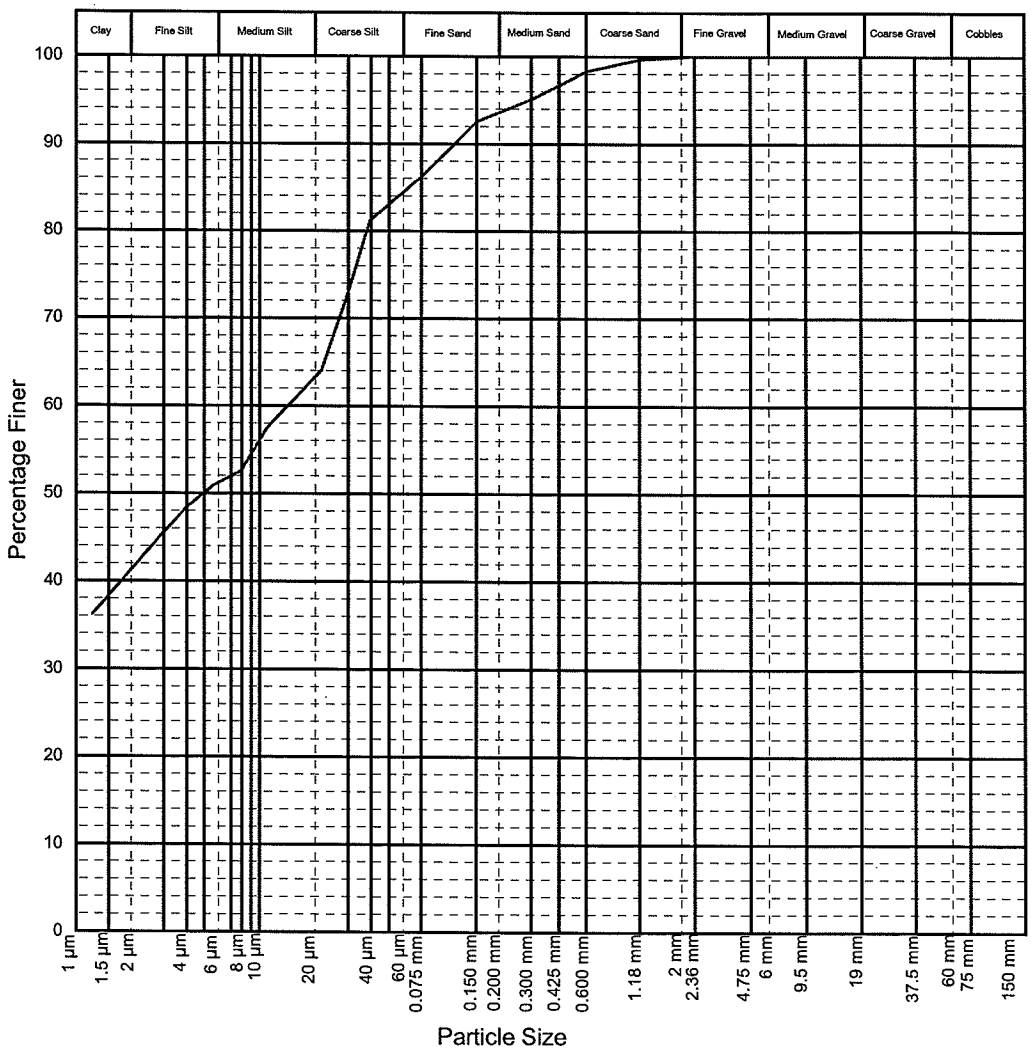
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19153
Sample ID :	A2_PSD	Batch No. :	EP0705490 - 2
		Date Received :	19/11/2007
		Sampled By :	Client

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	
4.75	
2.36	100.0
1.18	99.7
0.600	98.3
0.425	96.6
0.300	95.1
0.150	92.5
0.075	86.2
Particle Size (Microns)	Percent Passing
39.3	81.2
29.2	72.2
21.5	64.0
10.9	57.5
7.9	52.5
5.6	50.9
4.0	48.5
2.9	45.2
1.2	36.2

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(CH) Silty CLAY, brown, with some sand		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : NT		Checked by : JA	

NATA 1446

R Dunn 7/12/7
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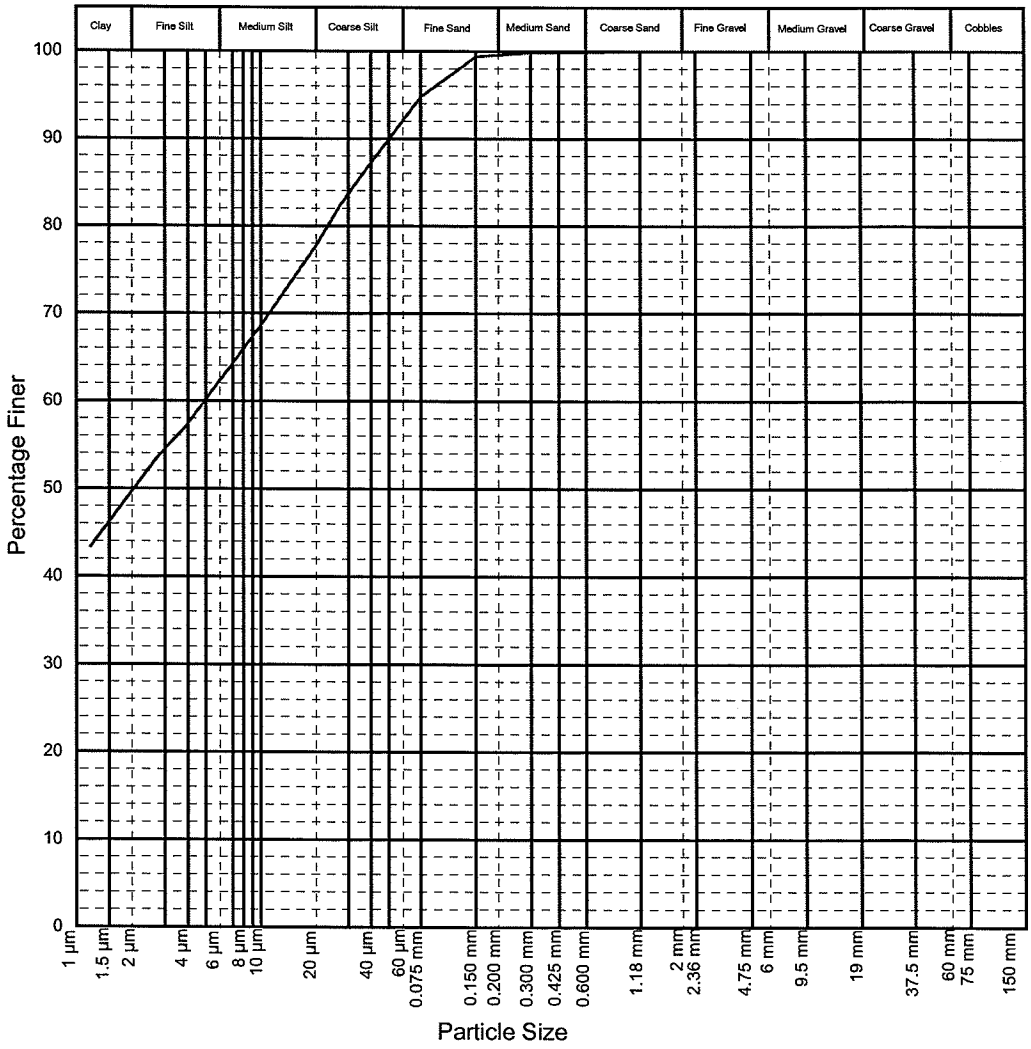
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19154
Sample ID :	A3_PSD	Batch No. :	EP0705490 - 3
		Date Received :	19/11/2007
		Sampled By :	Client

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	
4.75	
2.36	
1.18	100.0
0.600	99.9
0.425	99.9
0.300	99.8
0.150	99.4
0.075	94.8
Particle Size (Microns)	Percent Passing
37.6	86.4
27.3	82.4
19.9	77.7
10.2	68.9
7.4	64.9
5.3	60.9
3.9	56.9
2.8	53.7
1.2	43.3

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(CH) Silty CLAY, brown		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : NF		Checked by : JA	

NATA 1446

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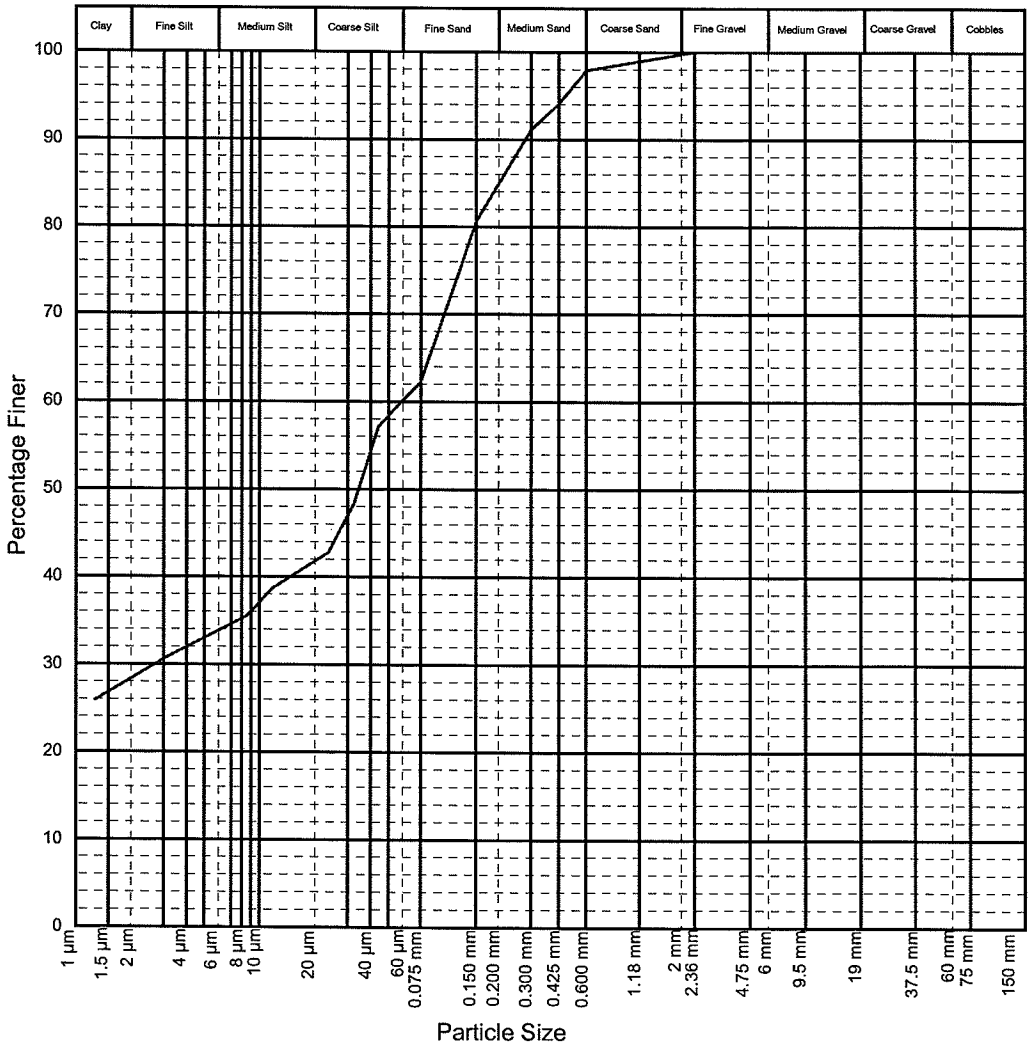
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19155
Sample ID :	A4_PSD	Batch No. :	EP0705490 - 4
		Date Received :	19/11/2007
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	
4.75	
2.36	100.0
1.18	98.9
0.600	97.9
0.425	94.0
0.300	91.1
0.150	80.6
0.075	62.2
Particle Size (Microns)	Percent Passing
44.2	57.2
32.5	48.4
23.6	42.7
11.9	38.7
8.5	35.5
6.1	33.9
4.3	32.3
3.1	30.7
1.3	25.9



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(CH) Sandy CLAY, brown		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : MF		Checked by : JA	

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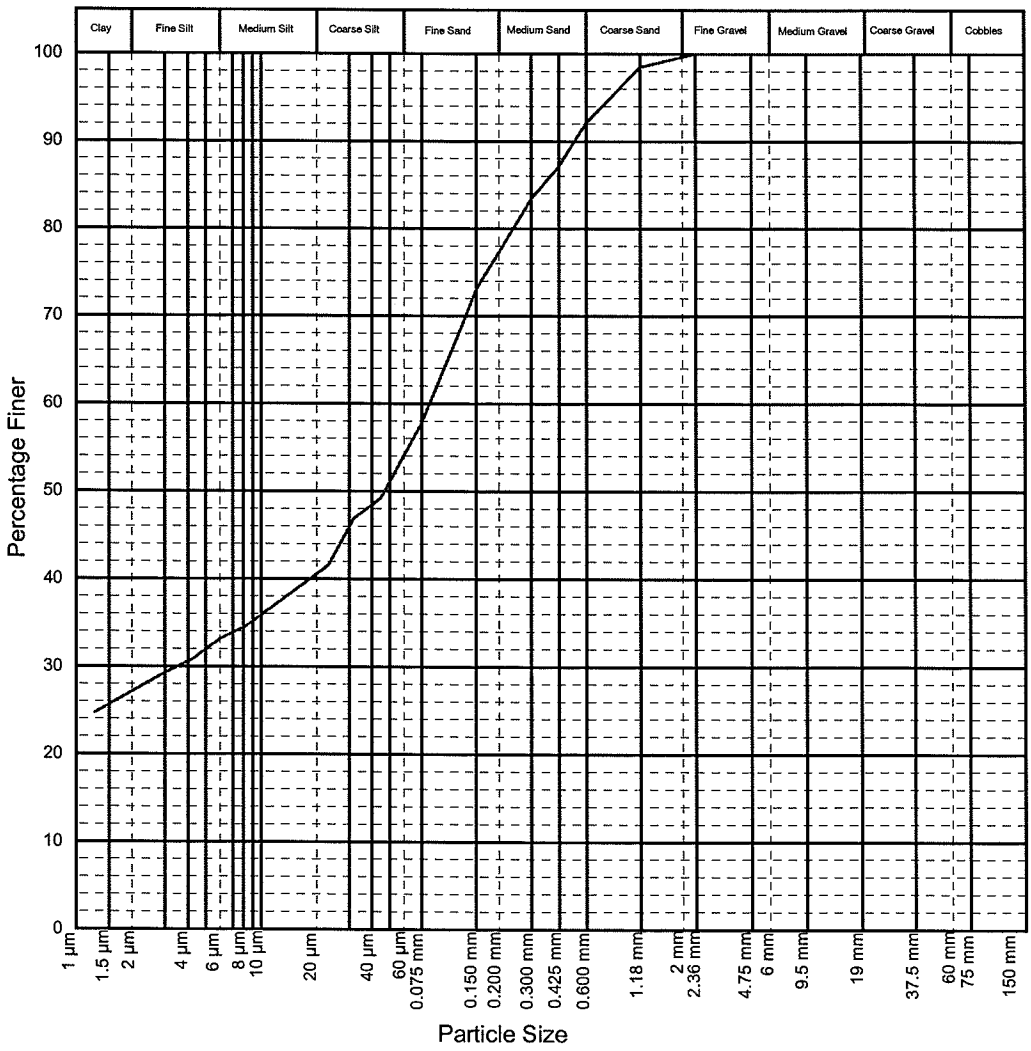
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19156
Sample ID :	A5_PSD	Batch No. :	EP0705490 - 5
		Date Received :	19/11/2007
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	
4.75	
2.36	100.0
1.18	98.5
0.600	92.1
0.425	87.2
0.300	83.4
0.150	73.0
0.075	57.8
Particle Size (Microns)	Percent Passing
44.7	49.2
32.0	46.9
23.2	41.6
11.7	37.0
8.4	34.7
6.0	33.1
4.3	30.8
3.0	29.3
1.3	24.7



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(CH) Sandy CLAY, brown		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : NM		Checked by : JA	

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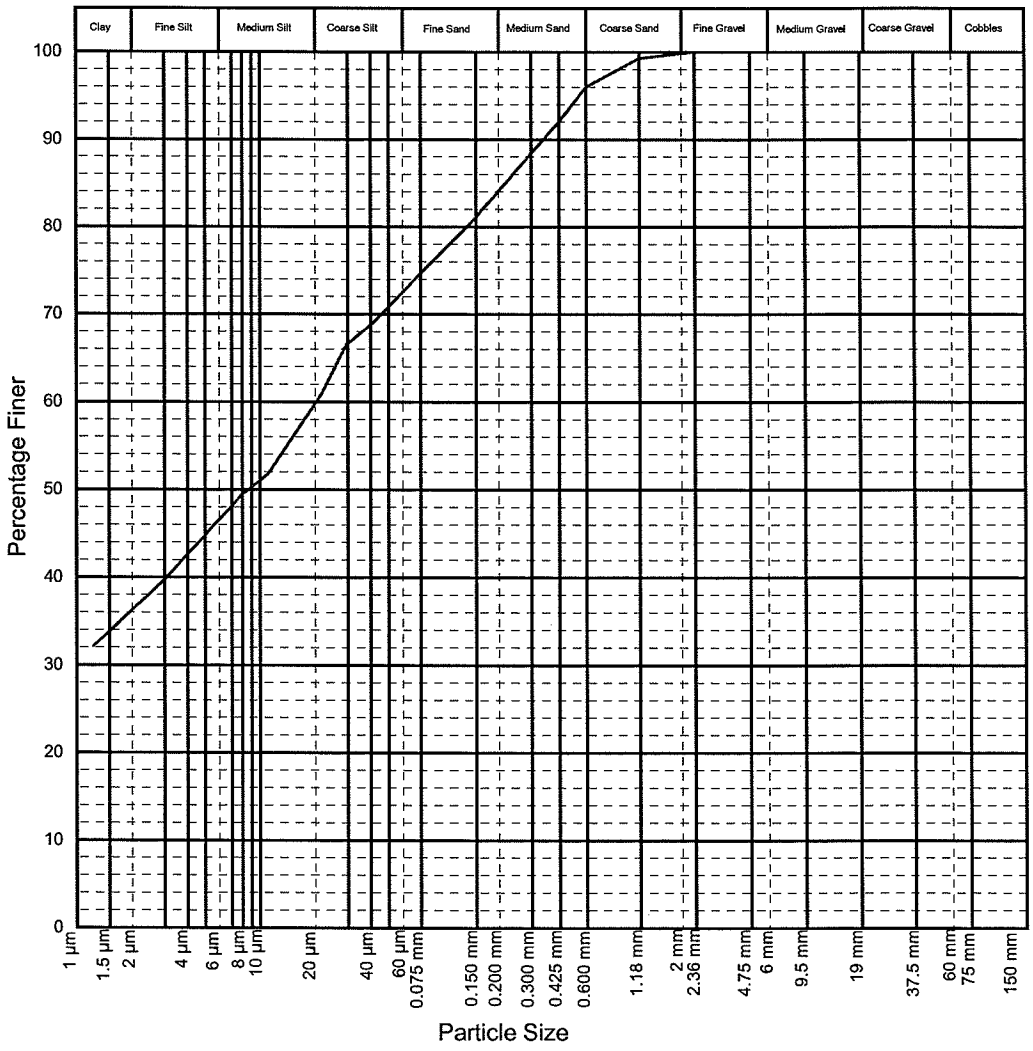
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19157
Sample ID :	B1_PSD	Batch No. :	EP0705490 - 6
		Date Received :	19/11/2007
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	
4.75	
2.36	100.0
1.18	99.3
0.600	96.0
0.425	92.0
0.300	88.4
0.150	81.1
0.075	74.7
Particle Size (Microns)	Percent Passing
41.3	69.0
29.6	66.5
21.5	60.8
11.1	51.8
7.9	49.3
5.7	46.1
4.1	42.8
2.9	39.5
1.2	32.1



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(CH) Silty CLAY, brown, with some sand		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : AH		Checked by : JA	

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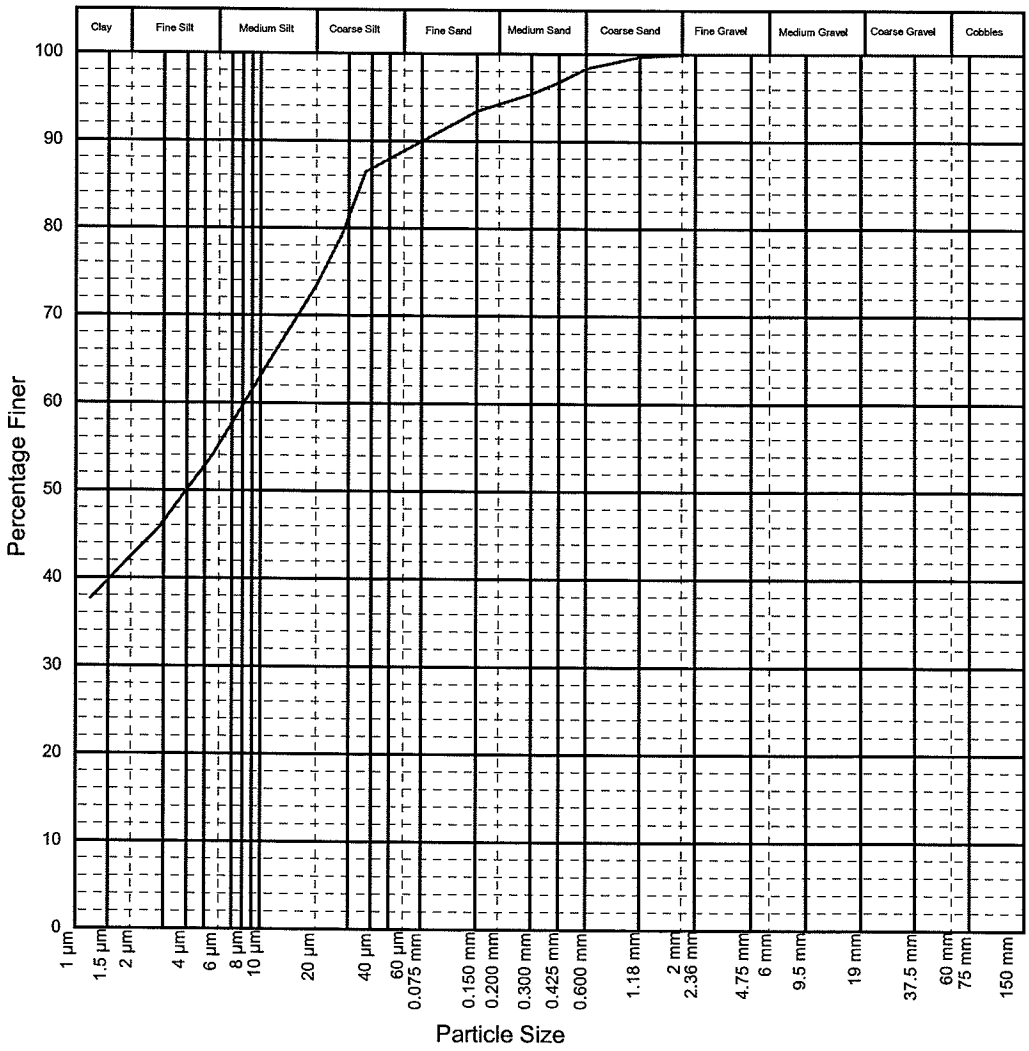
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19158
Sample ID :	B2_PSD	Batch No. :	EP0705490 - 7
		Date Received :	19/11/2007
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	
4.75	
2.36	100.0
1.18	99.7
0.600	98.3
0.425	96.8
0.300	95.4
0.150	93.4
0.075	89.9
Particle Size (Microns)	Percent Passing
37.2	86.5
27.6	79.1
20.1	73.4
10.4	63.7
7.5	58.8
5.5	53.9
3.9	49.8
2.8	45.8
1.2	37.6



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(CH) Silty CLAY, brown		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : MF		Checked by : JA	

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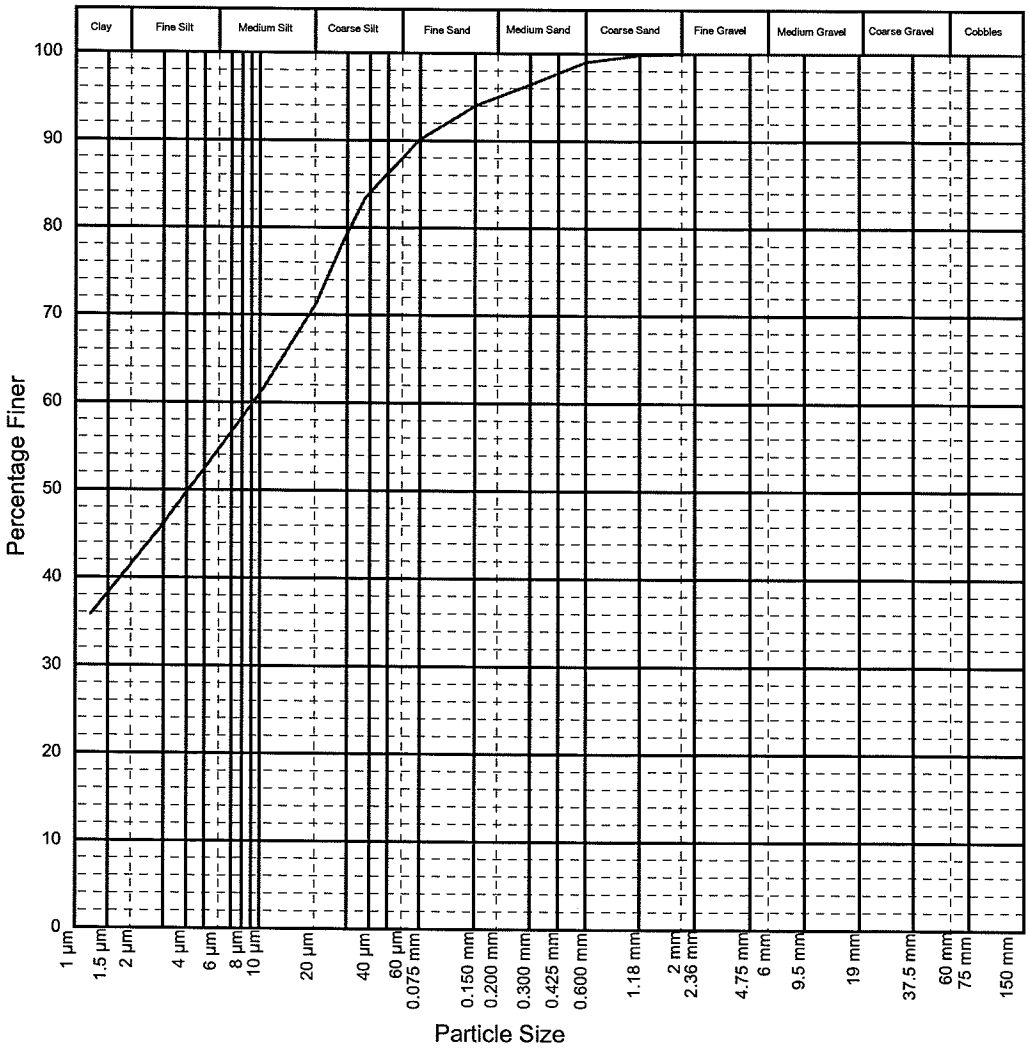
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19159
Sample ID :	B3_PSD	Batch No. :	EP0705490 - 8
		Date Received :	19/11/2007
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	
4.75	
2.36	100.0
1.18	99.8
0.600	99.0
0.425	97.7
0.300	96.4
0.150	94.0
0.075	90.1
Particle Size (Microns)	**Percent Passing**
37.8	83.5
27.7	77.8
20.3	71.3
10.5	61.6
7.6	57.6
5.5	53.6
3.9	49.5
2.8	45.5
1.2	35.8



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(CH) Silty CLAY, brown		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : NF		Checked by : JA	

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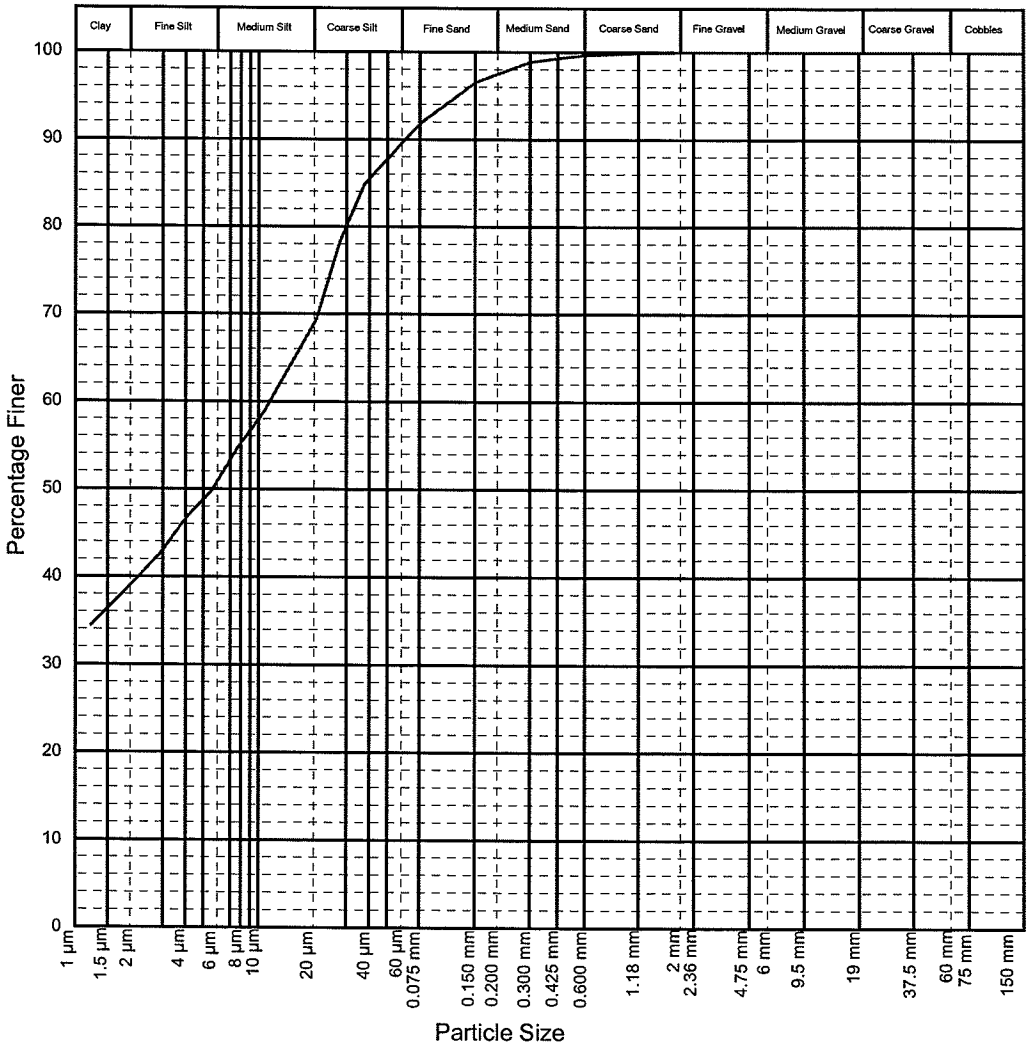
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19160
Sample ID :	B4_PSD	Batch No. :	EP0705490 - 9
		Date Received :	19/11/2007
		Sampled By :	Client

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	
4.75	
2.36	100.0
1.18	99.9
0.600	99.7
0.425	99.3
0.300	98.8
0.150	96.5
0.075	91.8
Particle Size (Microns)	**Percent Passing**
37.6	84.8
27.7	78.3
20.6	69.4
10.7	58.8
7.7	54.7
5.6	49.8
4.0	46.6
2.9	42.5
1.2	34.4

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(CH) Silty CLAY, brown		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : MF		Checked by : JA	

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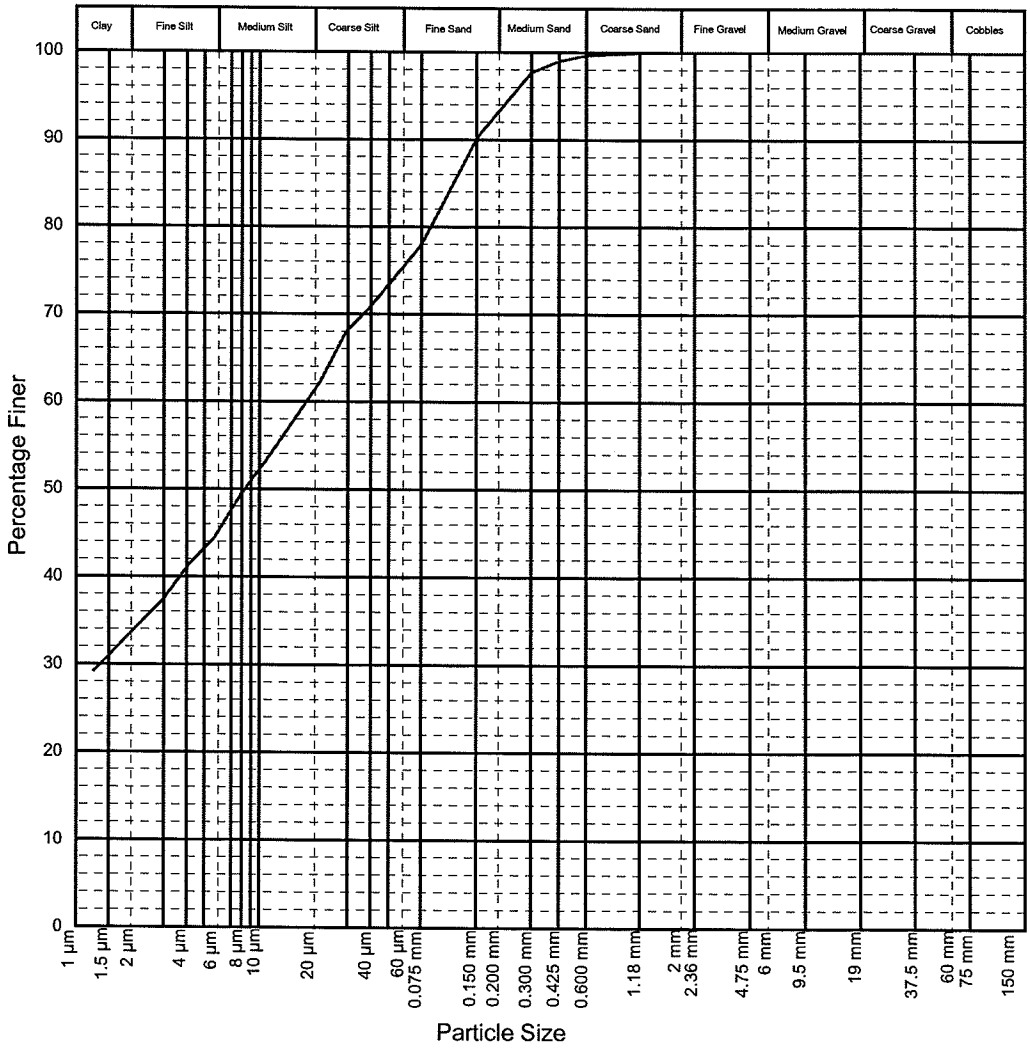
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19161
Sample ID :	B5_PSD	Batch No. :	EP0705490 - 10
		Date Received :	19/11/2007
		Sampled By :	Client

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	
4.75	
2.36	
1.18	100.0
0.600	99.6
0.425	99.0
0.300	97.7
0.150	90.1
0.075	77.9
Particle Size (Microns)	**Percent Passing**
40.6	71.1
29.2	67.9
21.3	62.2
10.9	53.4
7.9	49.3
5.7	44.5
4.1	41.3
2.9	37.3
1.2	29.2

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(CH) Silty CLAY, brown, with some sand		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : NF		Checked by : JA	

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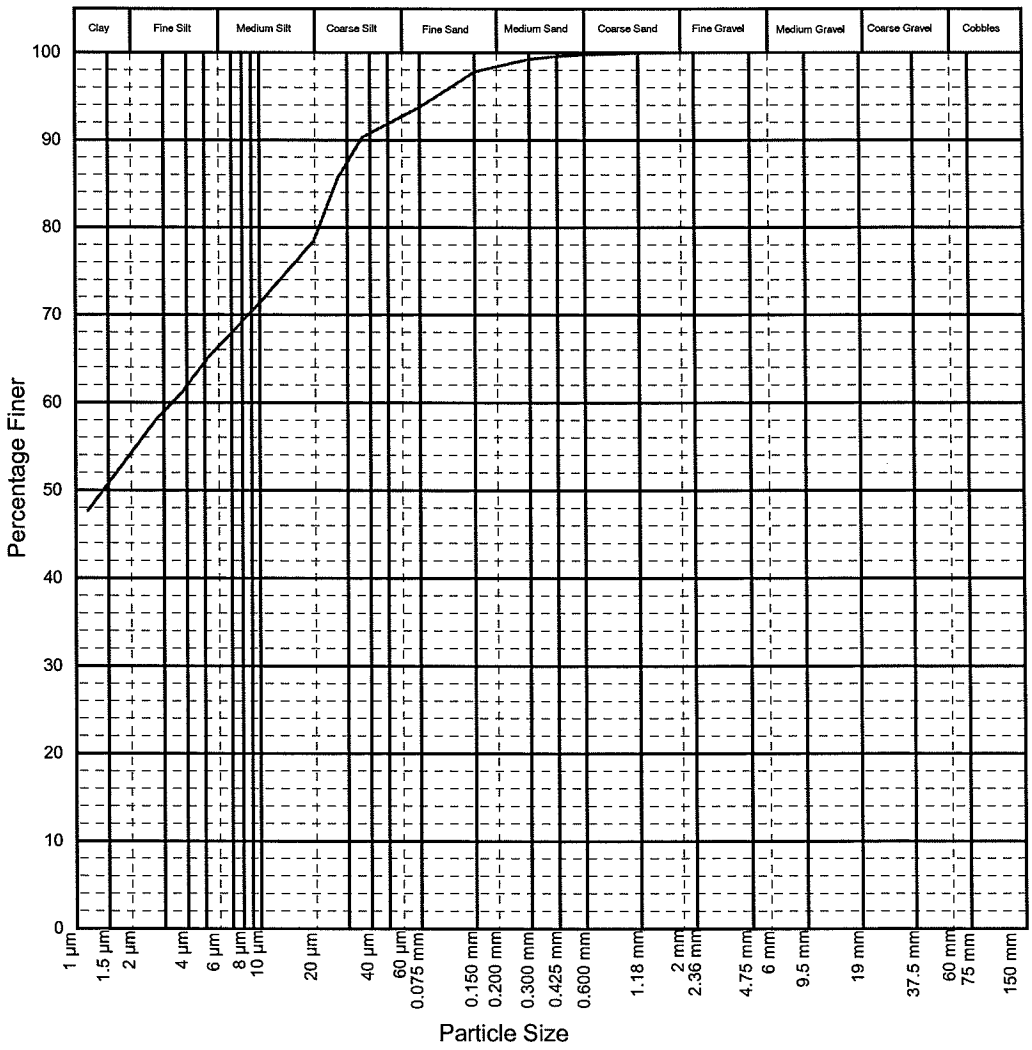
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19162
Sample ID :	C1_PSD	Batch No. :	EP0705490 - 11
		Date Received :	19/11/2007
		Sampled By :	Client

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	
4.75	
2.36	
1.18	100.0
0.600	99.8
0.425	99.6
0.300	99.2
0.150	97.8
0.075	93.7
Particle Size (Microns)	Percent Passing
36.4	90.3
26.6	85.6
19.7	78.5
10.0	71.4
7.2	68.2
5.2	65.0
3.8	61.1
2.7	57.9
1.2	47.6

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(CH) Silty CLAY, brown		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : NF		Checked by : JA	

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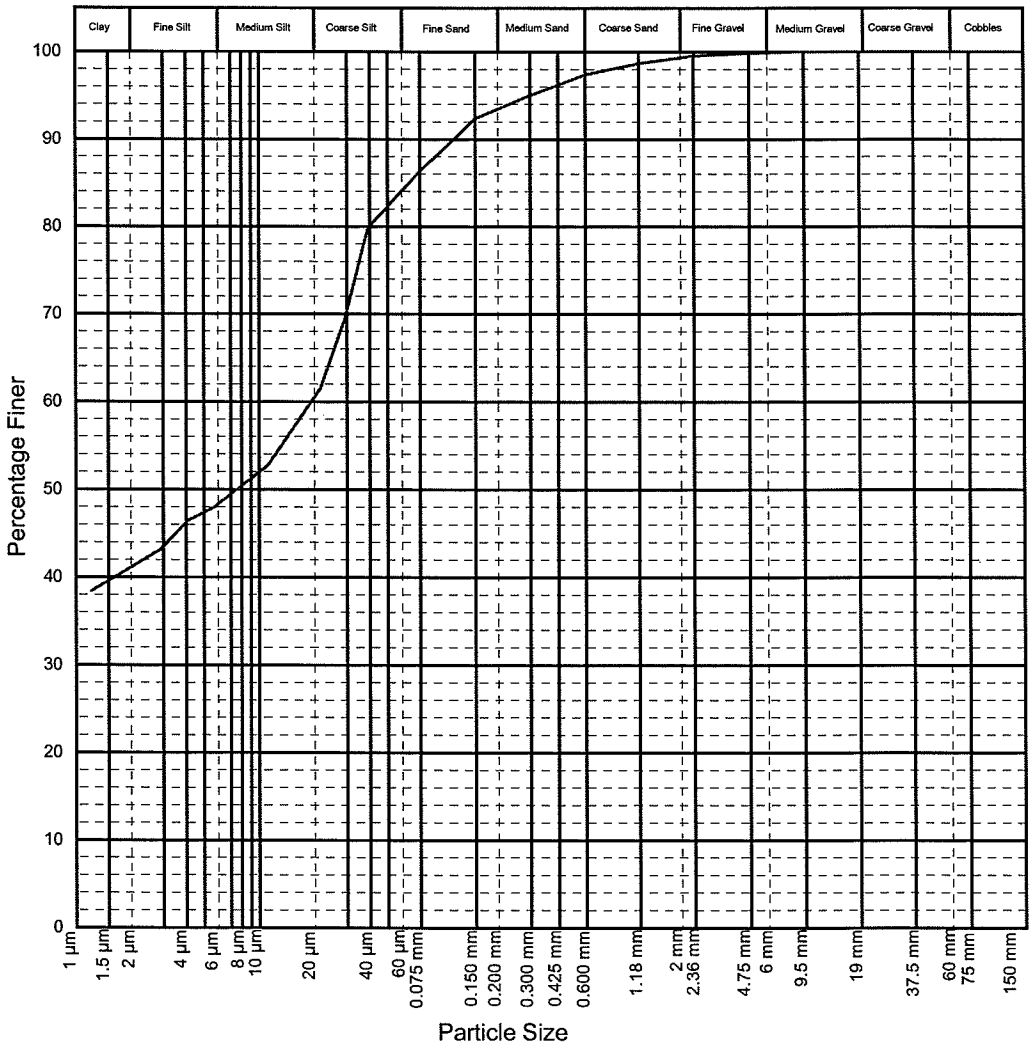
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19163
Sample ID :	C2_PSD	Batch No. :	EP0705490 - 12
		Date Received :	19/11/2007
		Sampled By :	Client

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	100.0
4.75	99.8
2.36	99.5
1.18	98.6
0.600	97.4
0.425	96.2
0.300	95.0
0.150	92.4
0.075	86.3
Particle Size (Microns)	Percent Passing
39.2	79.8
29.4	69.5
21.6	61.5
11.1	52.7
8.0	50.4
5.7	48.0
4.1	46.4
2.9	43.2
1.2	38.4

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(CH) Silty CLAY, brown, with some sand		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : MF		Checked by : JA	

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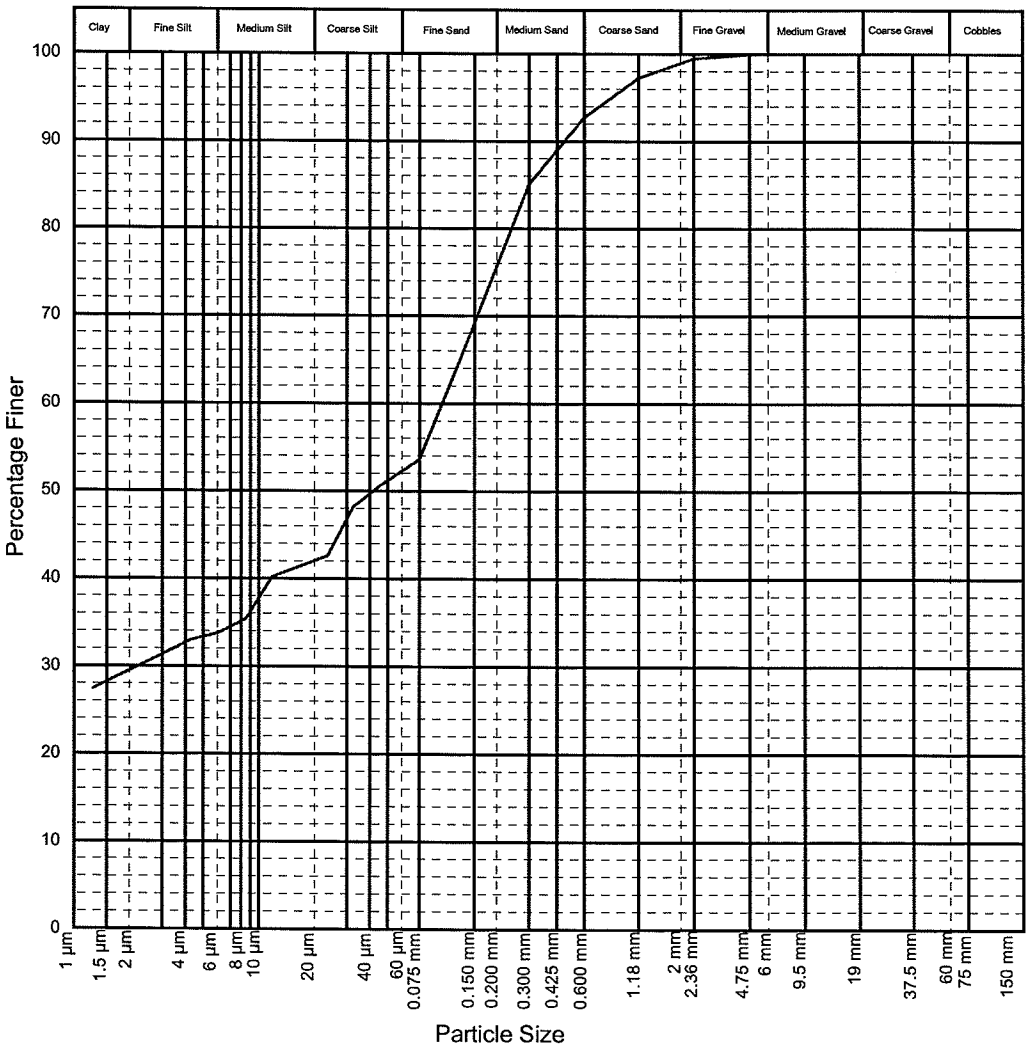
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19164
Sample ID :	C3_PSD	Batch No. :	EP0705490 - 13
		Date Received :	19/11/2007
		Sampled By :	Client

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	100.0
4.75	99.9
2.36	99.5
1.18	97.2
0.600	92.7
0.425	89.0
0.300	85.1
0.150	69.1
0.075	53.6
Particle Size (Microns)	Percent Passing
45.5	50.6
32.5	48.2
23.6	42.6
11.8	40.2
8.5	35.4
6.1	33.8
4.3	33.0
3.1	31.4
1.3	27.4

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(CH) Sandy CLAY, brown		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : NK		Checked by : JA	

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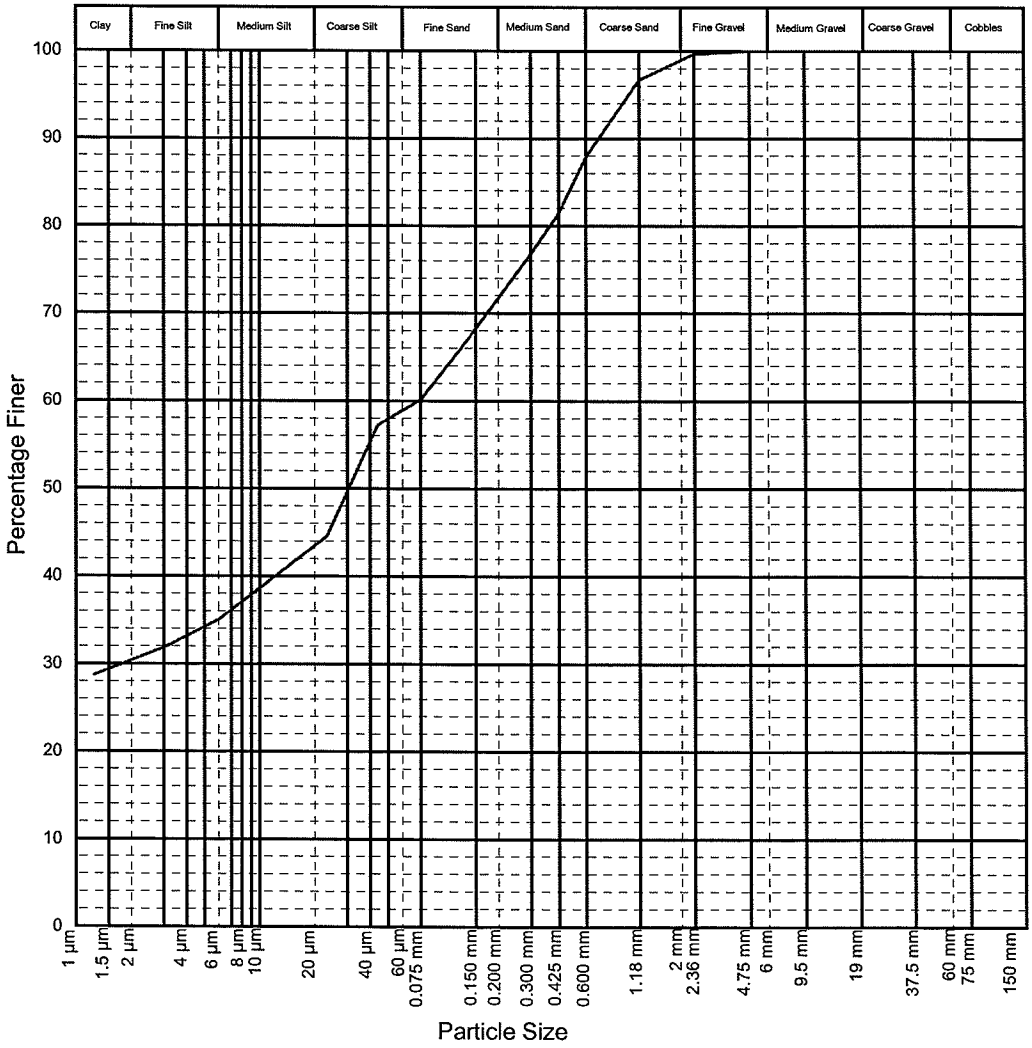
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19165
Sample ID :	C4_PSD	Batch No. :	EP0705490 - 14
		Date Received :	19/11/2007
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	
4.75	100.0
2.36	99.6
1.18	96.7
0.600	87.8
0.425	81.4
0.300	76.7
0.150	68.2
0.075	60.1
Particle Size (Microns)	Percent Passing
44.1	57.2
32.1	50.9
23.3	44.6
11.8	39.8
8.4	37.4
6.0	35.0
4.3	33.5
3.0	31.9
1.3	28.7



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(CH) Sandy CLAY, brown		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : NV		Checked by : DA	

NATA 1446

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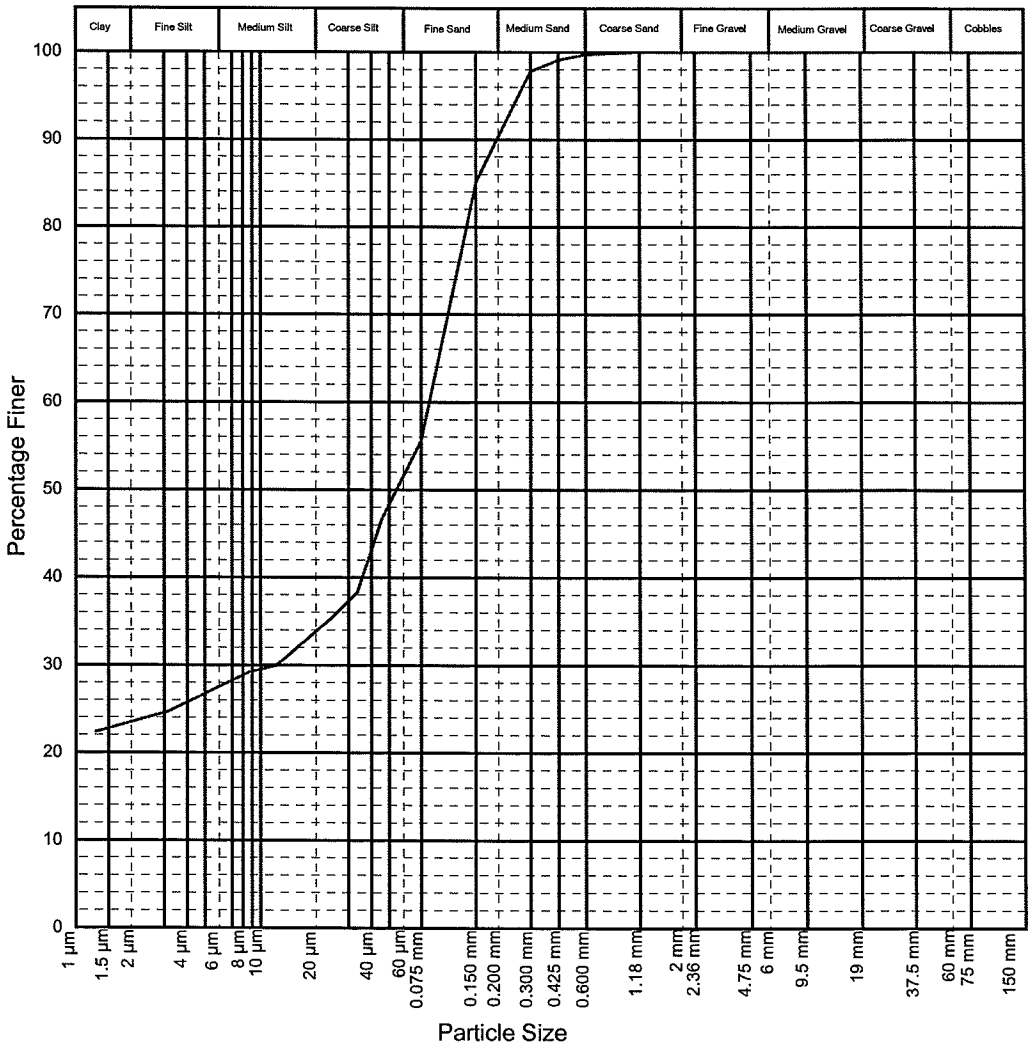
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19166
Sample ID :	C5_PSD	Batch No. :	EP0705490 - 15
		Date Received :	19/11/2007
		Sampled By :	Client

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	
4.75	
2.36	
1.18	100.0
0.600	99.7
0.425	99.1
0.300	97.8
0.150	85.0
0.075	55.6
Particle Size (Microns)	Percent Passing
45.9	46.8
33.6	38.4
24.1	35.3
12.2	30.0
8.7	29.2
6.2	27.7
4.4	26.1
3.1	24.6
1.3	22.3

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(CI) Sandy CLAY, pale grey brown		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : NL		Checked by : JA	

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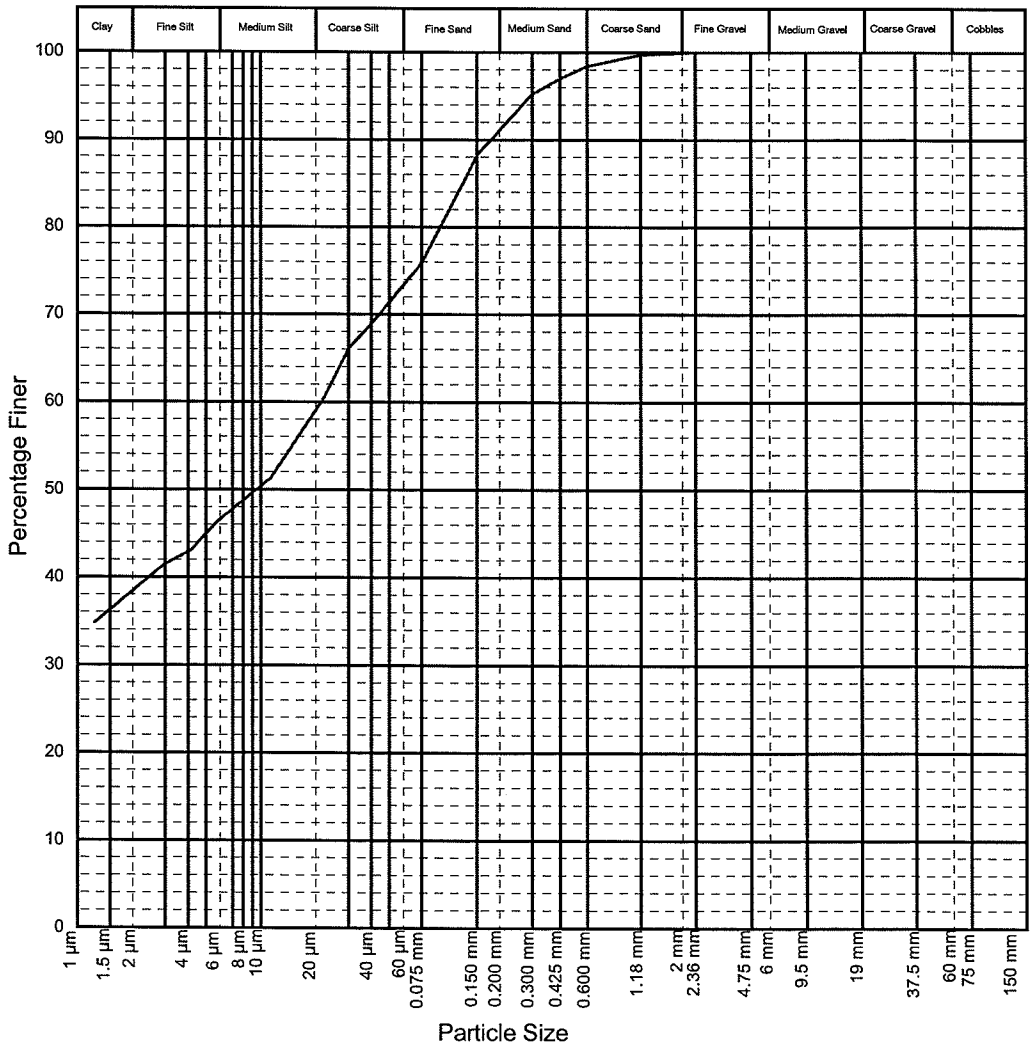
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19167
Sample ID :	D1_PSD	Batch No. :	EP0705490 - 16
		Date Received :	19/11/2007
		Sampled By :	Client

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	
4.75	
2.36	100.0
1.18	99.7
0.600	98.4
0.425	97.0
0.300	95.2
0.150	88.2
0.075	75.8
Particle Size (Microns)	**Percent Passing**
42.0	69.4
30.2	66.1
22.0	60.3
11.3	51.3
8.1	48.8
5.8	46.3
4.1	43.0
2.9	41.4
1.2	34.8

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(CH) Silty CLAY, brown, with some sand		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : NK		Checked by : JR	

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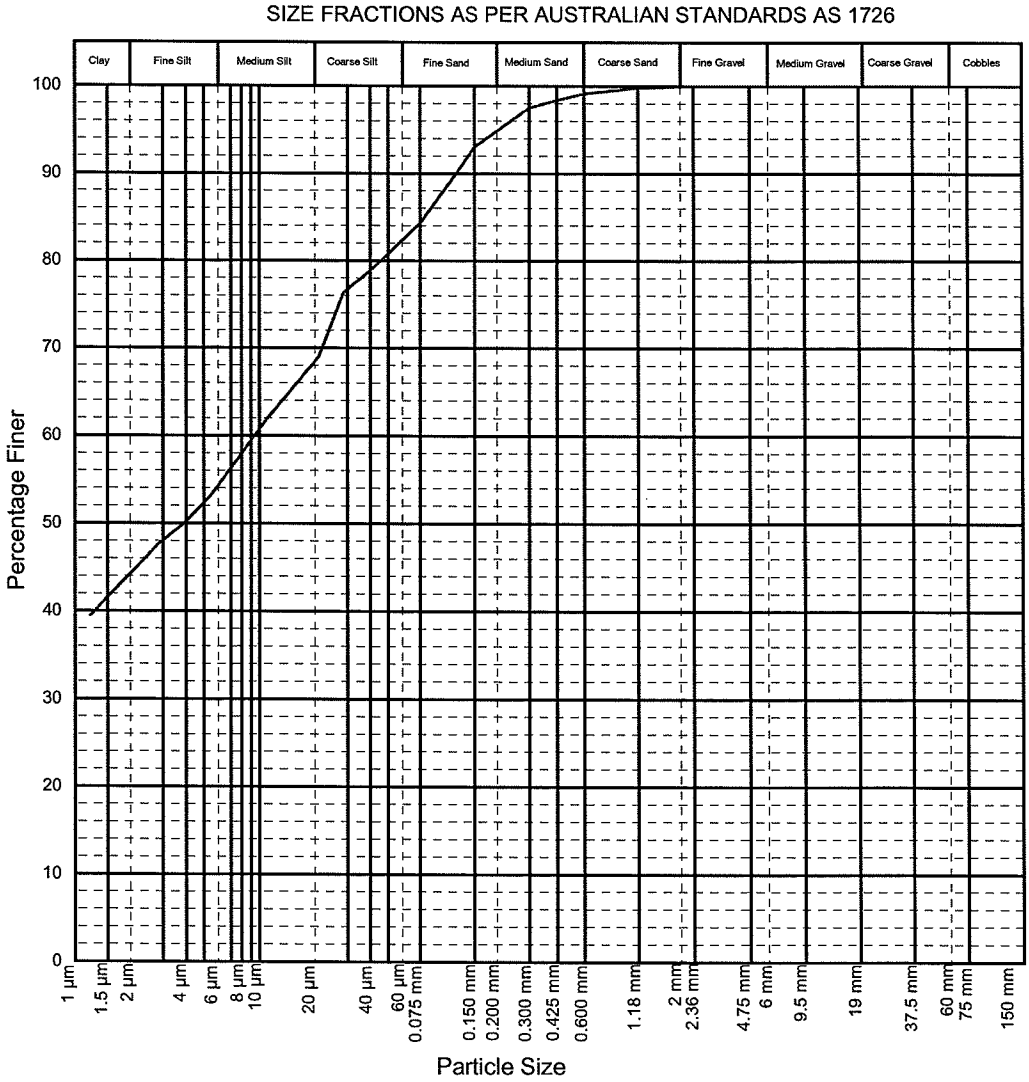
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19168
Sample ID :	D2_PSD	Batch No. :	EP0705490 - 17
		Date Received :	19/11/2007
		Sampled By :	Client

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	
4.75	
2.36	100.0
1.18	99.8
0.600	99.1
0.425	98.4
0.300	97.5
0.150	93.0
0.075	84.3
Particle Size (Microns)	Percent Passing
39.9	78.8
28.6	76.3
21.0	69.0
10.7	61.6
7.7	57.5
5.6	53.4
4.0	50.2
2.9	47.7
1.2	39.5



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(CH) Silty CLAY, brown, with some sand & shell		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : AM		Checked by : JA	

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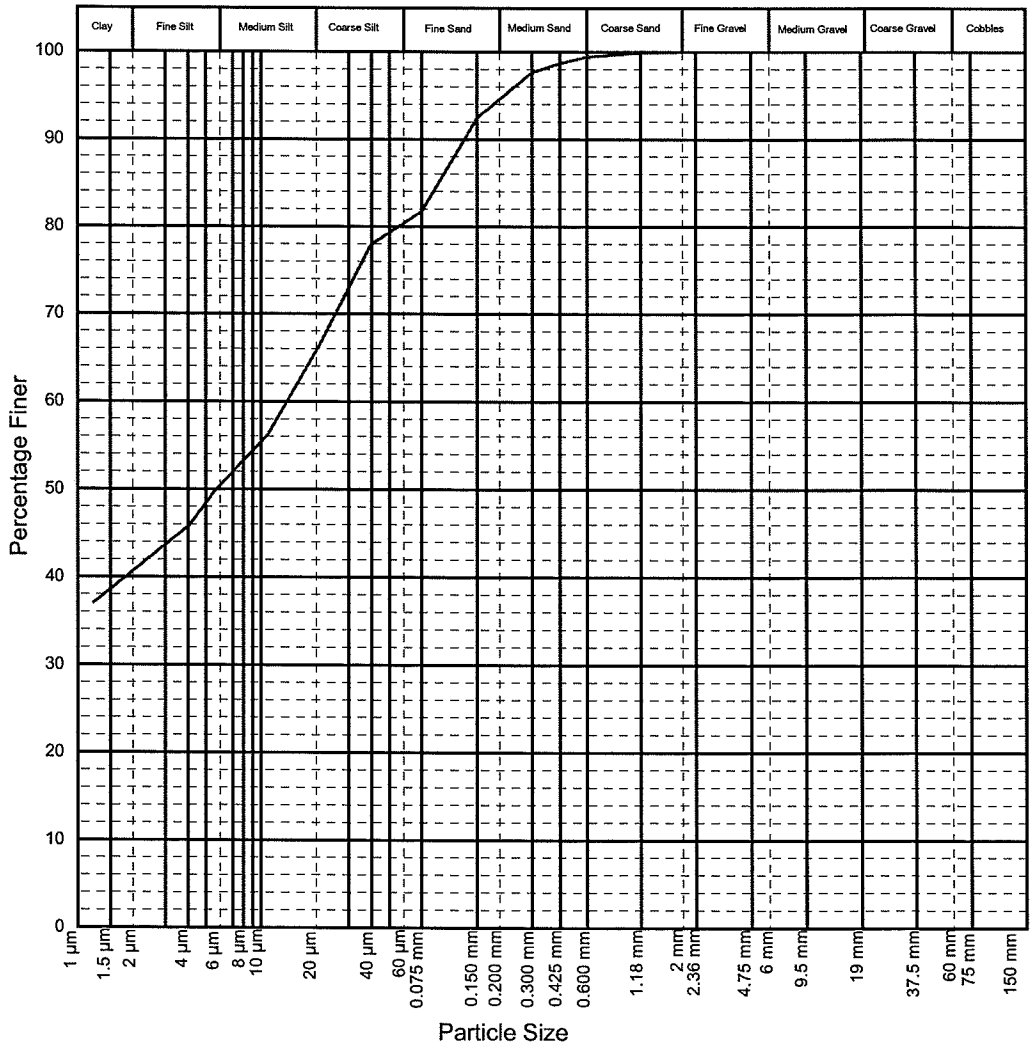
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19169
Sample ID :	D3_PSD	Batch No. :	EP0705490 - 18
		Date Received :	19/11/2007
		Sampled By :	Client

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	
4.75	
2.36	100.0
1.18	99.9
0.600	99.4
0.425	98.7
0.300	97.6
0.150	92.4
0.075	81.7
Particle Size (Microns)	Percent Passing
39.7	77.9
29.0	72.3
21.1	66.7
10.9	56.3
7.9	53.1
5.6	49.9
4.1	45.9
2.9	43.5
1.2	37.0

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(CH) Silty CLAY, brown, with some sand & shell		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : MF		Checked by : JA	

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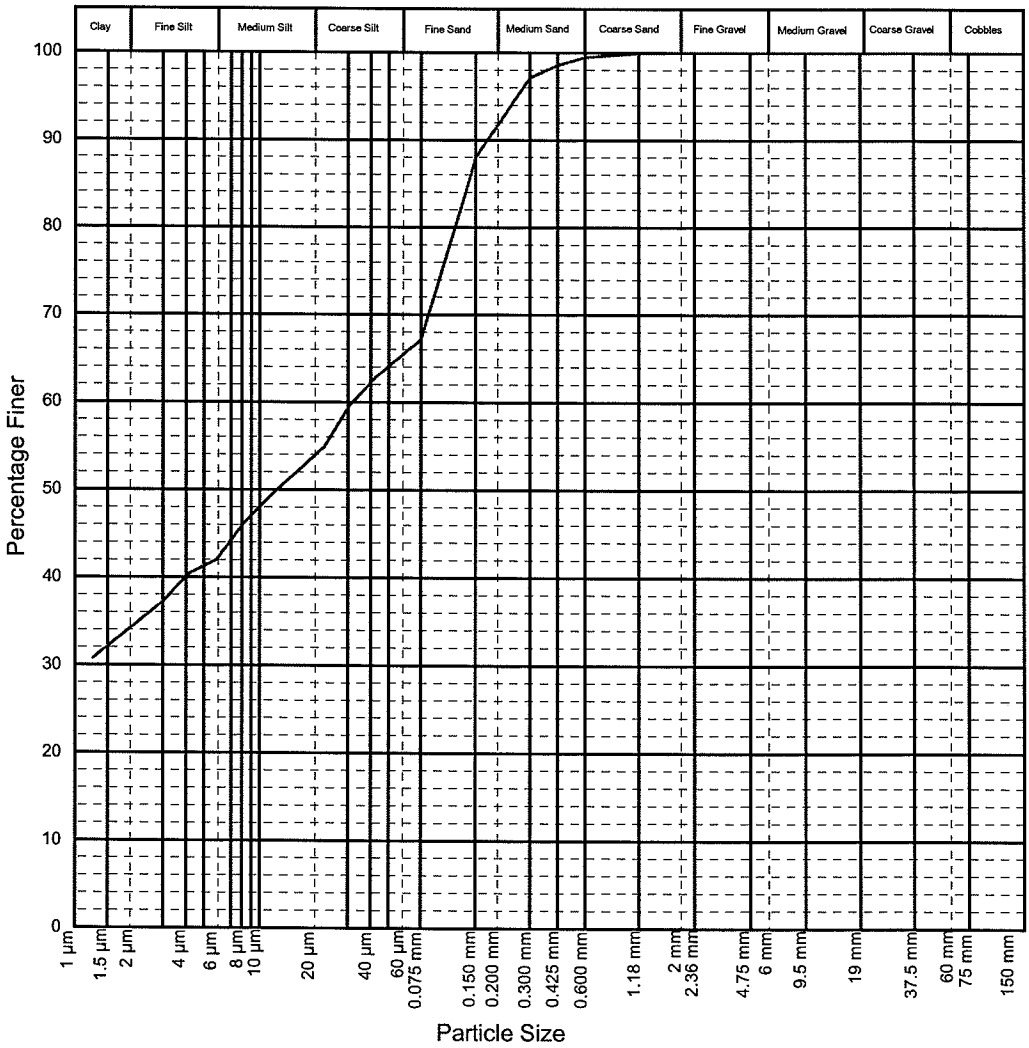
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19170
Sample ID :	D4_PSD	Batch No. :	EP0705490 - 19
		Date Received :	19/11/2007
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	
4.75	
2.36	
1.18	100.0
0.600	99.5
0.425	98.6
0.300	97.1
0.150	88.0
0.075	67.1
Particle Size (Microns)	Percent Passing
43.1	62.9
30.9	59.7
22.4	54.9
11.3	49.2
8.1	46.0
5.9	42.0
4.2	40.4
3.0	37.2
1.3	30.8



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(CH) Sandy CLAY, brown, with shell		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : MF		Checked by : JA	

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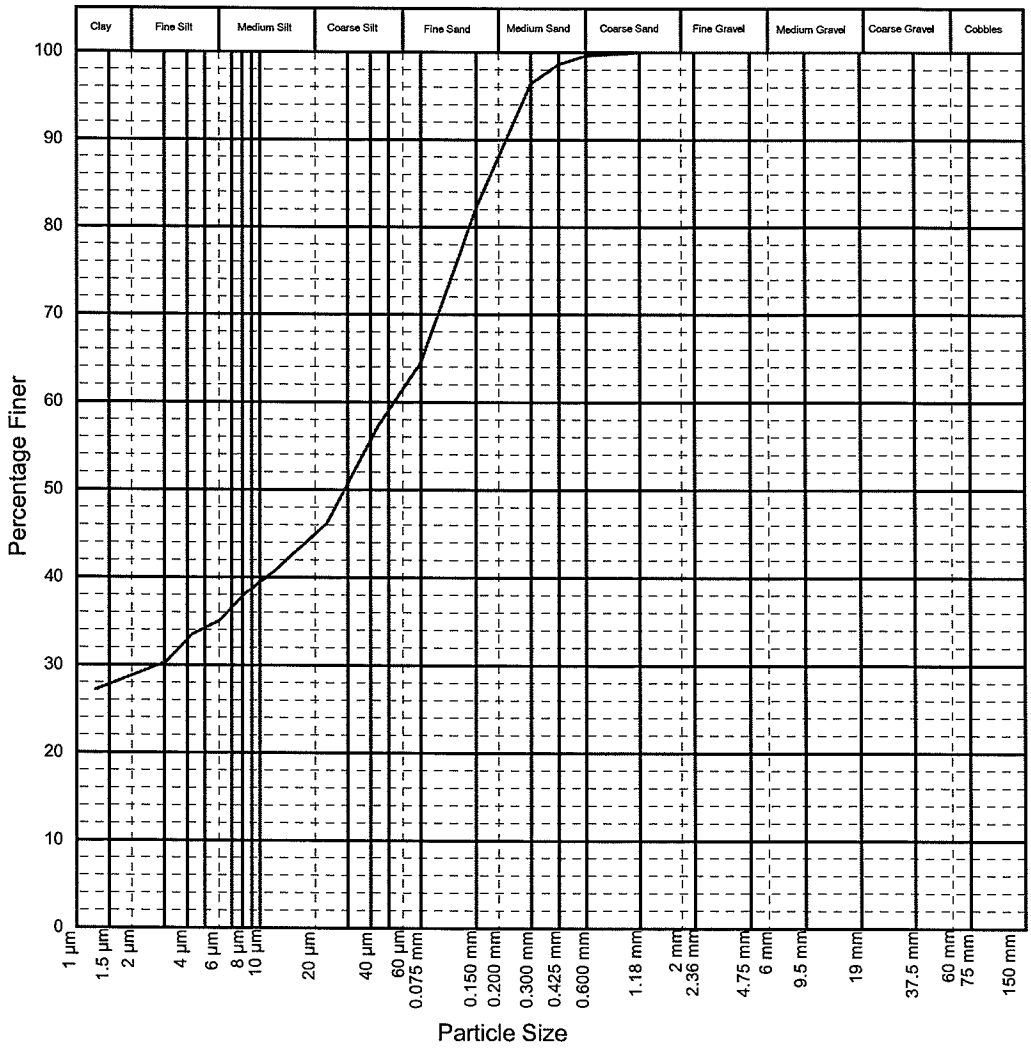
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19171
Sample ID :	D5_PSD	Batch No. :	EP0705490 - 20
		Date Received :	19/11/2007
		Sampled By :	Client

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	
4.75	
2.36	
1.18	100.0
0.600	99.6
0.425	98.6
0.300	96.4
0.150	82.1
0.075	64.5
Particle Size (Microns)	Percent Passing
44.1	57.2
32.0	51.7
23.2	46.2
11.8	40.6
8.4	38.2
6.0	35.1
4.3	33.5
3.1	30.3
1.3	27.1

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(CH) Sandy CLAY, brown, with shell		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : AV		Checked by :	

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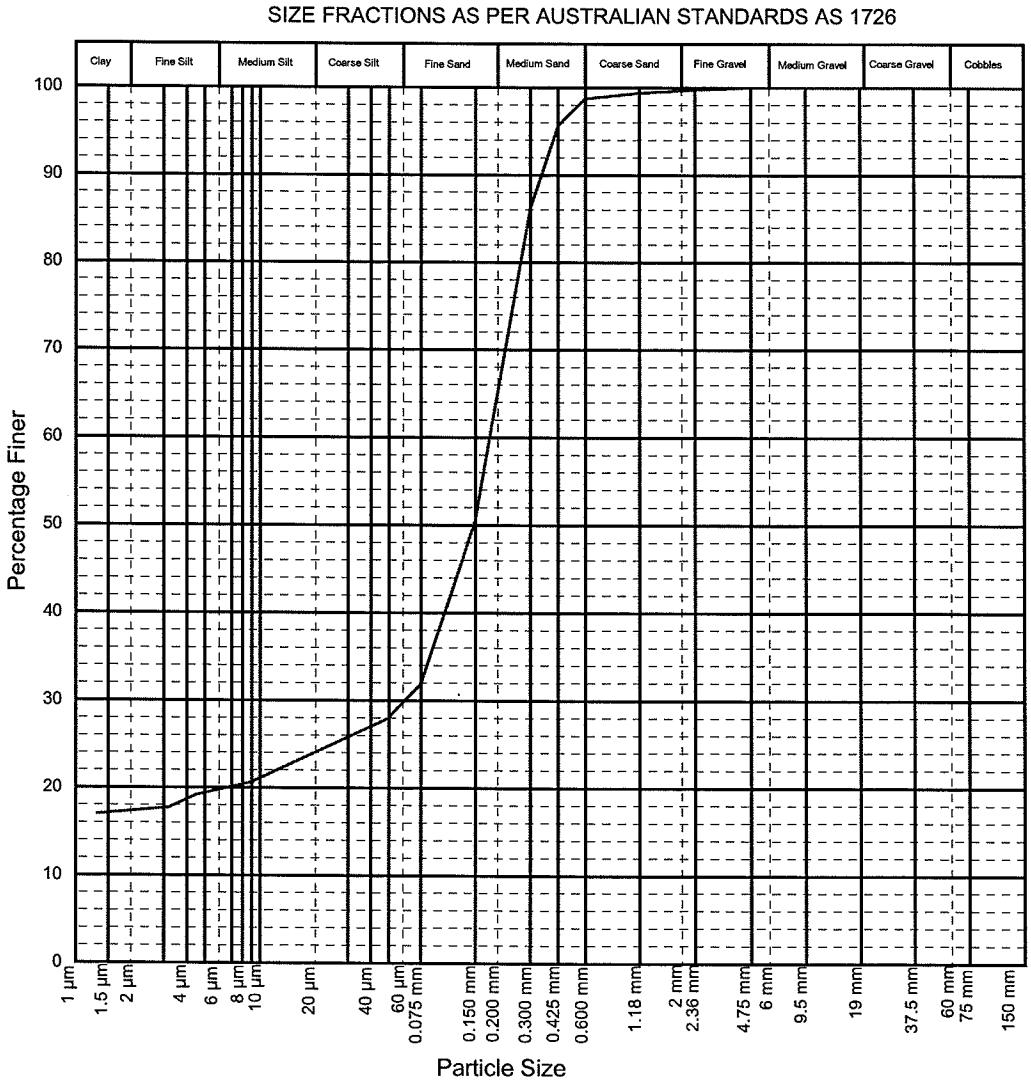
Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19172
Sample ID :	E1_PSD	Batch No. :	EP0705490 - 21
		Date Received :	19/11/2007
		Sampled By :	Client

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	
4.75	100.0
2.36	99.7
1.18	99.4
0.600	98.7
0.425	95.6
0.300	86.2
0.150	50.6
0.075	31.9

Particle Size (Microns)	Percent Passing
49.3	27.9
35.0	26.5
24.9	25.0
12.6	22.1
8.9	20.6
6.3	19.9
4.5	19.2
3.2	17.7
1.3	17.0



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(SC) Clayey SAND, brown, with shell		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : MK		Checked by : JA	

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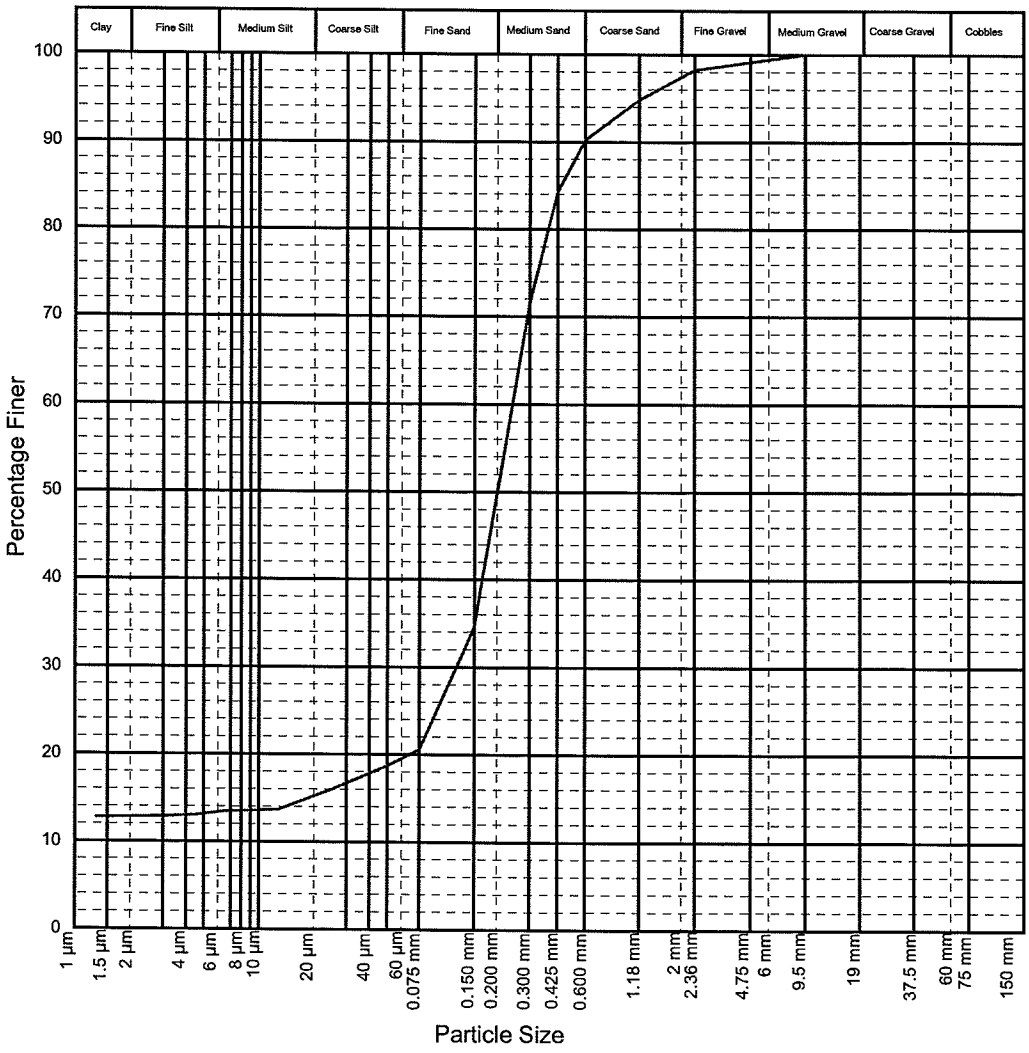
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19173
Sample ID :	E2_PSD	Batch No. :	EP0705490 - 22
		Date Received :	19/11/2007
		Sampled By :	Client

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	100.0
4.75	99.1
2.36	98.2
1.18	94.8
0.600	90.2
0.425	84.2
0.300	71.5
0.150	34.6
0.075	20.6
Particle Size (Microns)	**Percent Passing**
50.1	18.7
35.6	17.4
25.3	16.0
12.8	13.7
9.0	13.5
6.4	13.4
4.5	13.0
3.2	12.9
1.3	12.7

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(SC) Clayey SAND, brown, with shell		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : MF		Checked by : JA	

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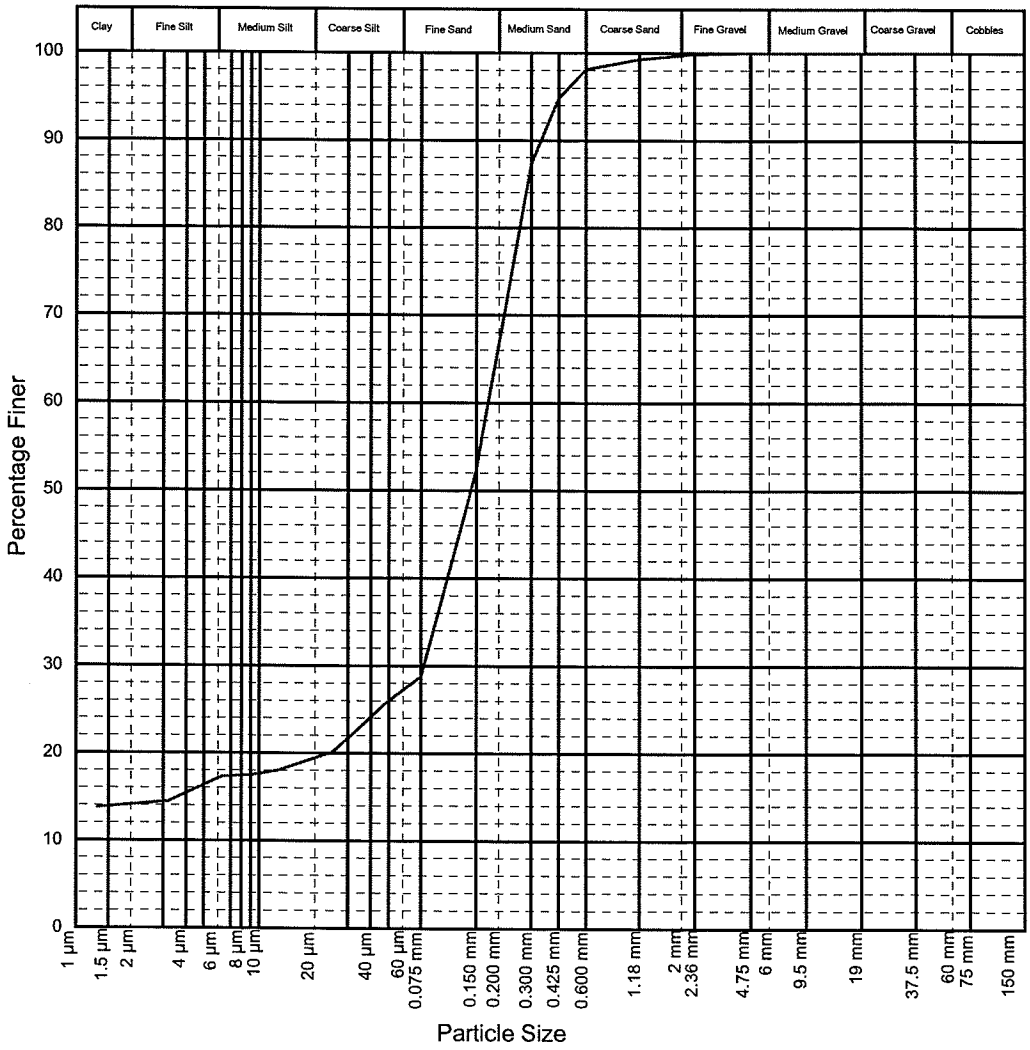
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19174
Sample ID :	E3_PSD	Batch No. :	EP0705490 - 23
		Date Received :	19/11/2007
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	
4.75	100.0
2.36	99.8
1.18	99.3
0.600	98.1
0.425	94.8
0.300	87.3
0.150	52.4
0.075	28.8
Particle Size (Microns)	Percent Passing
49.0	25.9
35.0	23.0
25.1	20.2
12.6	18.0
8.9	17.4
6.3	17.3
4.5	15.9
3.2	14.4
1.3	13.7



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(SC) Clayey SAND, brown		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : MF		Checked by : JA	

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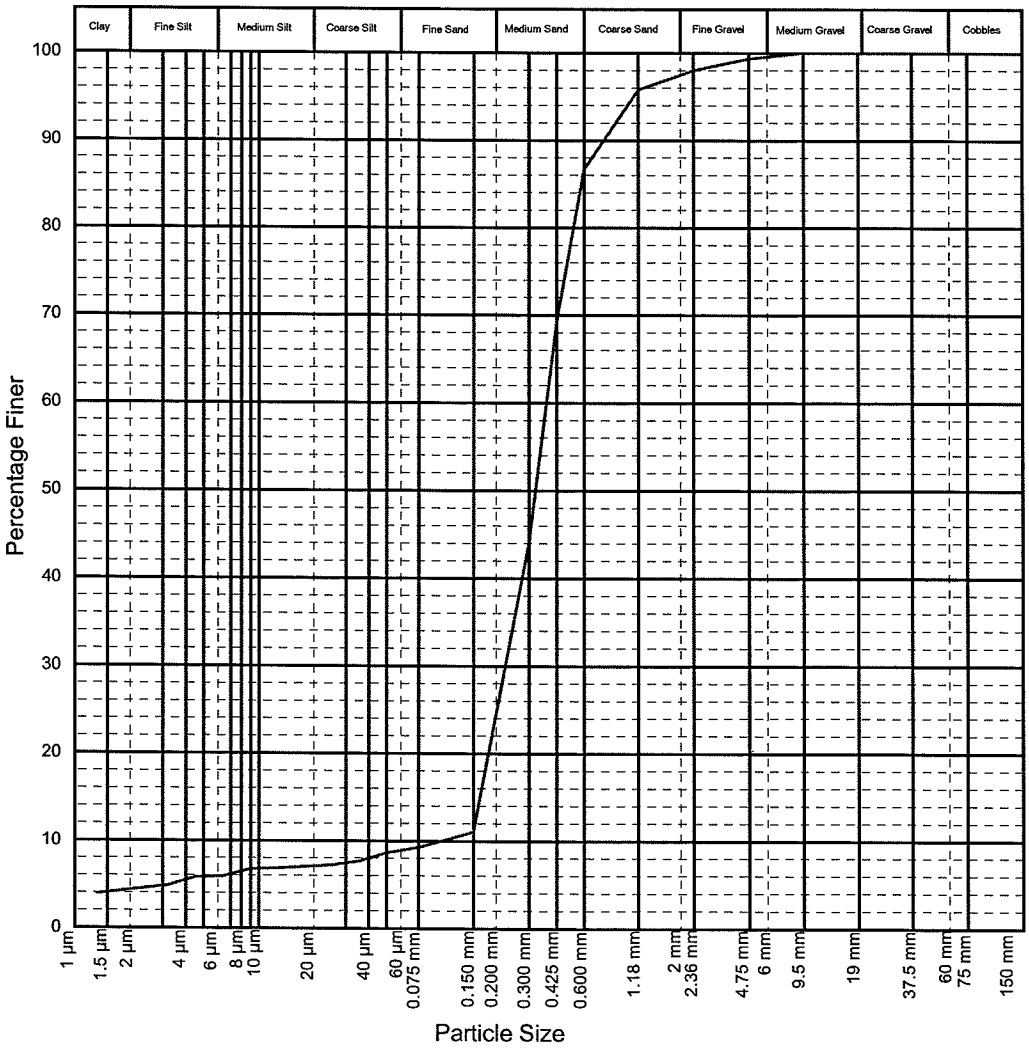
Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19175
Sample ID :	E4_PSD	Batch No. :	EP0705490 - 24
		Date Received :	19/11/2007
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	100.0
4.75	99.3
2.36	98.0
1.18	95.8
0.600	86.7
0.425	69.2
0.300	44.0
0.150	11.0
0.075	9.3
Particle Size (Microns)	Percent Passing
50.4	8.7
35.8	7.7
25.4	7.2
12.7	6.9
9.0	6.8
6.4	5.9
4.5	5.8
3.2	4.9
1.3	3.9



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(SC/SP) Clayey SAND/SAND, brown, with shell		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : NH		Checked by : JA	

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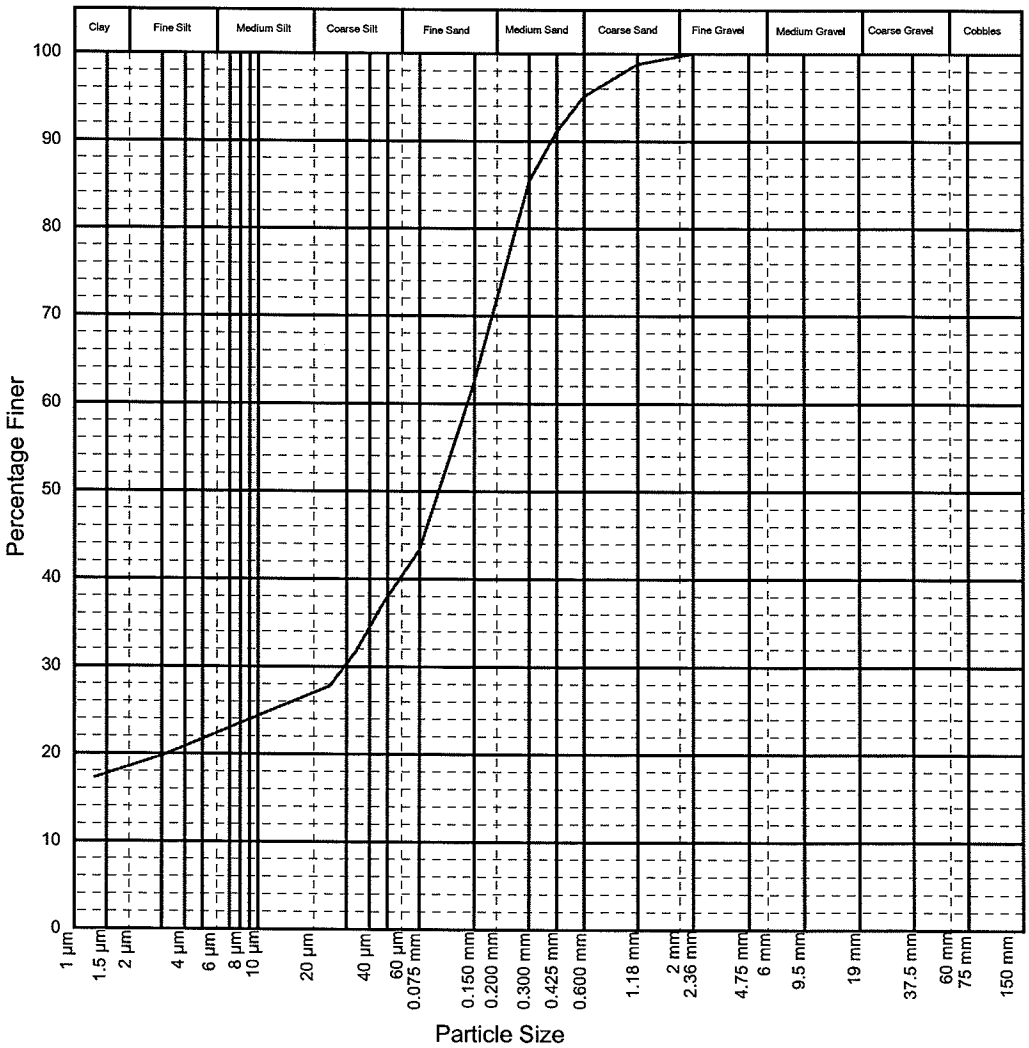
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19176
Sample ID :	E5_PSD	Batch No. :	EP0705490 - 25
		Date Received :	19/11/2007
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	
4.75	
2.36	100.0
1.18	98.8
0.600	95.1
0.425	91.1
0.300	85.4
0.150	62.5
0.075	43.3
Particle Size (Microns)	Percent Passing
46.7	37.0
33.8	31.7
24.4	27.8
12.3	25.1
8.7	23.8
6.2	22.5
4.4	21.2
3.1	19.9
1.3	17.3



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(SC) Clayey SAND, brown		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : NF		Checked by : JA	

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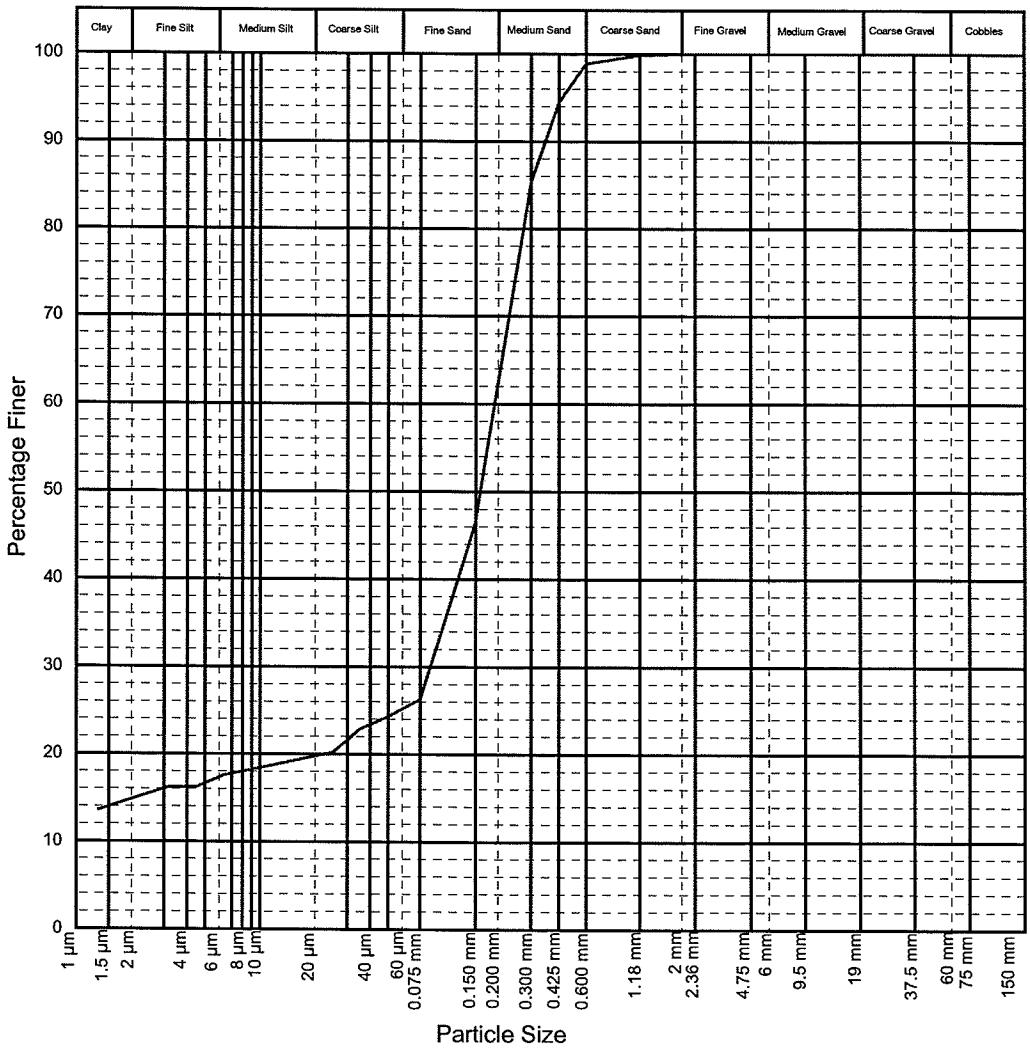
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19177
Sample ID :	F1_PSD	Batch No. :	EP0705490 - 26
		Date Received :	19/11/2007
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	
4.75	
2.36	100.0
1.18	99.9
0.600	98.9
0.425	94.5
0.300	85.3
0.150	46.6
0.075	26.3
Particle Size (Microns)	Percent Passing
49.5	24.2
35.2	22.9
25.2	20.2
12.6	18.9
9.0	18.2
6.4	17.6
4.5	16.2
3.2	16.2
1.3	13.5



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(SC) Clayey SAND, brown		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : NF		Checked by : JA	

NATA 1446

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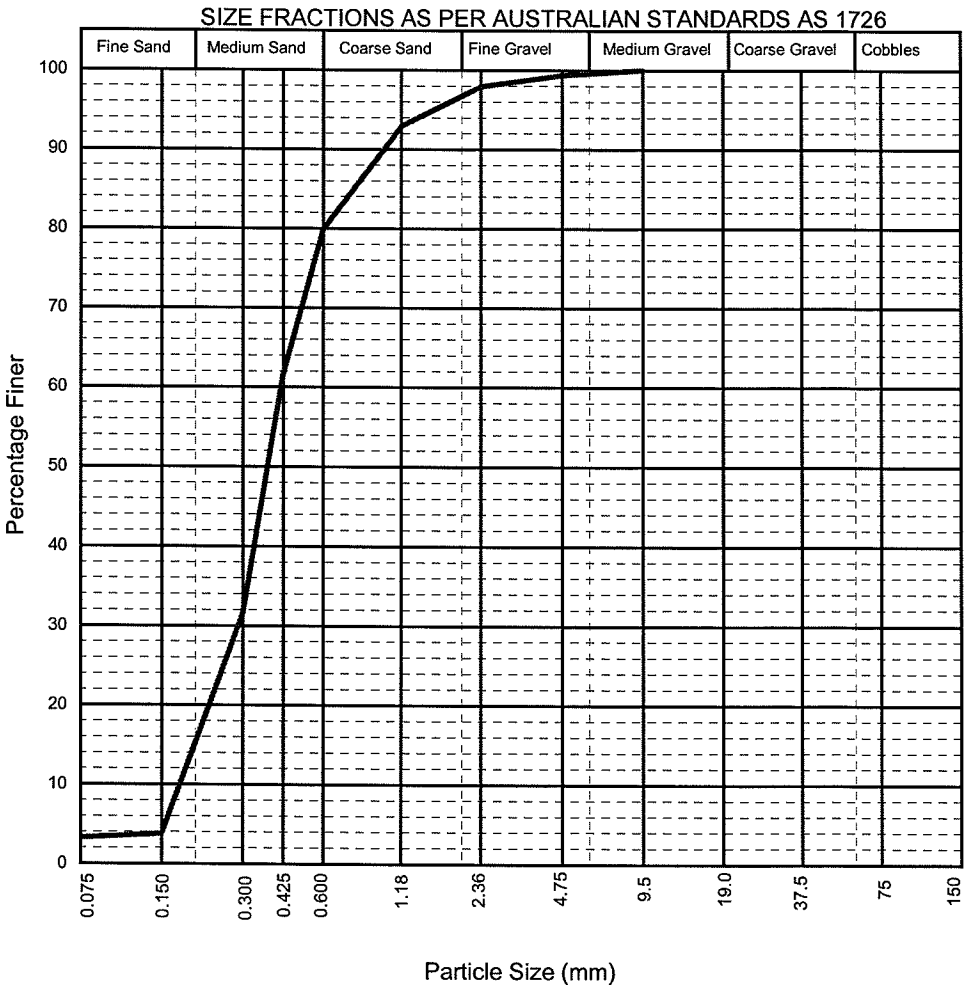
PARTICLE SIZE DISTRIBUTION

Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19178
Sample ID :	F2_PSD	Batch No. :	EP0705490 - 27
		Date Received :	19/11/07
		Sampled By :	Client

Sieve Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	100.0
4.75	99.4
2.36	97.9
1.18	92.9
0.600	79.9
0.425	61.7
0.300	31.6
0.150	3.8
0.075	3.3



Remarks :

Material Description : (SP) SAND, brown, with shell

Test Procedure : AS 1289 3.6.1

Prepared by : NF

Checked by : JA

NATA 1446

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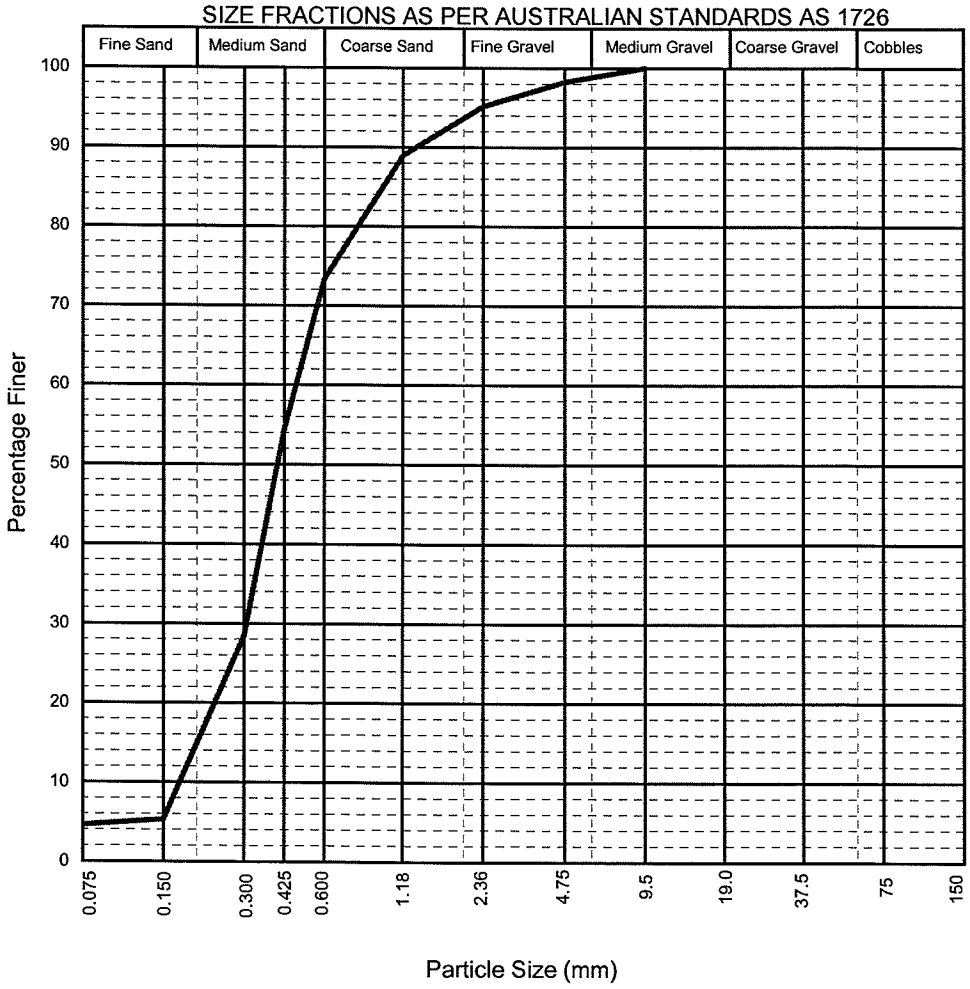
PARTICLE SIZE DISTRIBUTION

Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19179
Sample ID :	F3_PSD	Batch No. :	EP0705490 - 28
		Date Received :	19/11/07
		Sampled By :	Client

Sieve Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	100.0
4.75	98.2
2.36	95.2
1.18	88.9
0.600	73.3
0.425	54.4
0.300	28.4
0.150	5.3
0.075	4.6



Remarks :

Material Description : (SP) SAND, brown, with shell

Test Procedure : AS 1289 3.6.1

Prepared by : MF | Checked by : JA

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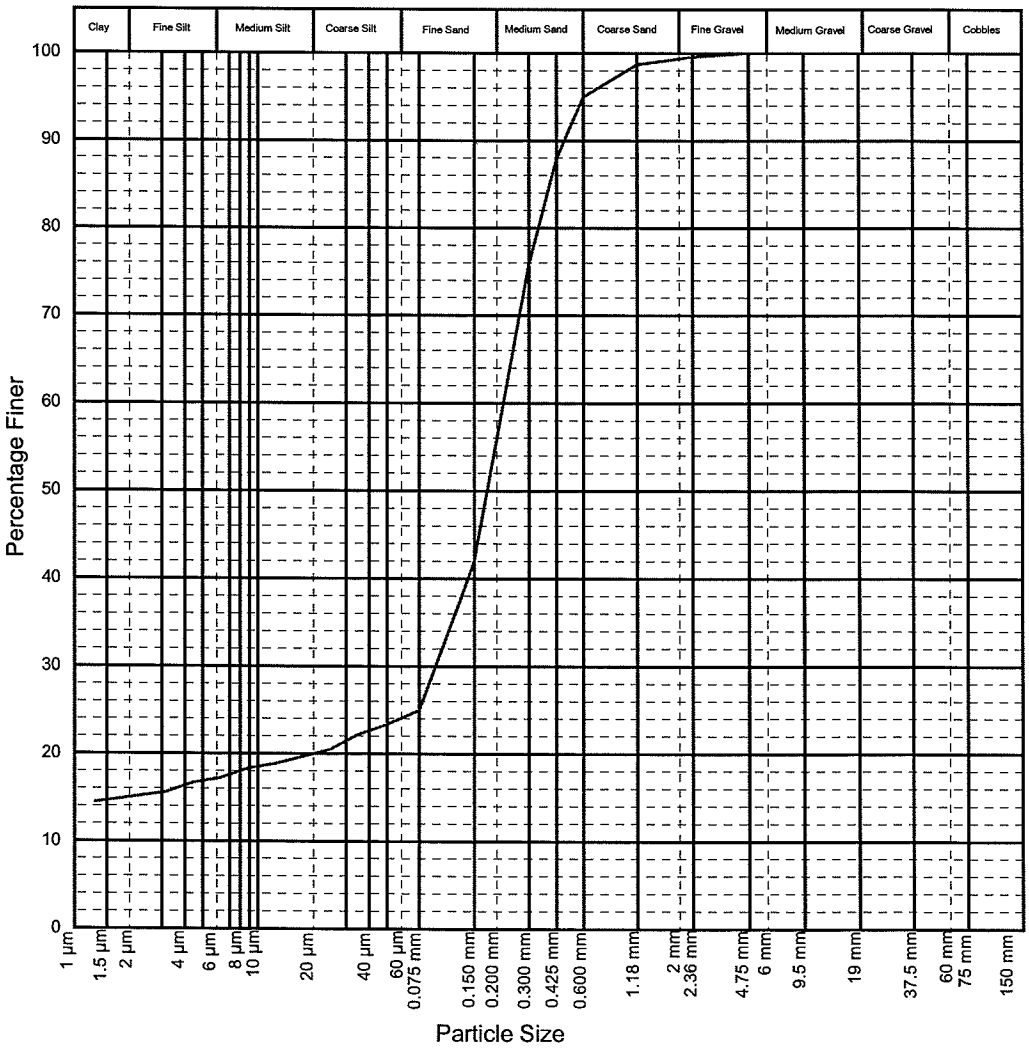
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19180
Sample ID :	F4_PSD	Batch No. :	EP0705490 - 29
		Date Received :	19/11/2007
		Sampled By :	Client

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	
4.75	100.0
2.36	99.6
1.18	98.7
0.600	95.0
0.425	87.9
0.300	75.8
0.150	42.0
0.075	25.0
Particle Size (Microns)	Percent Passing
48.7	23.2
34.6	22.1
24.7	20.5
12.4	18.8
8.8	18.3
6.3	17.2
4.4	16.6
3.2	15.5
1.3	14.4

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(SC) Clayey SAND, brown		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : NK		Checked by : JA	

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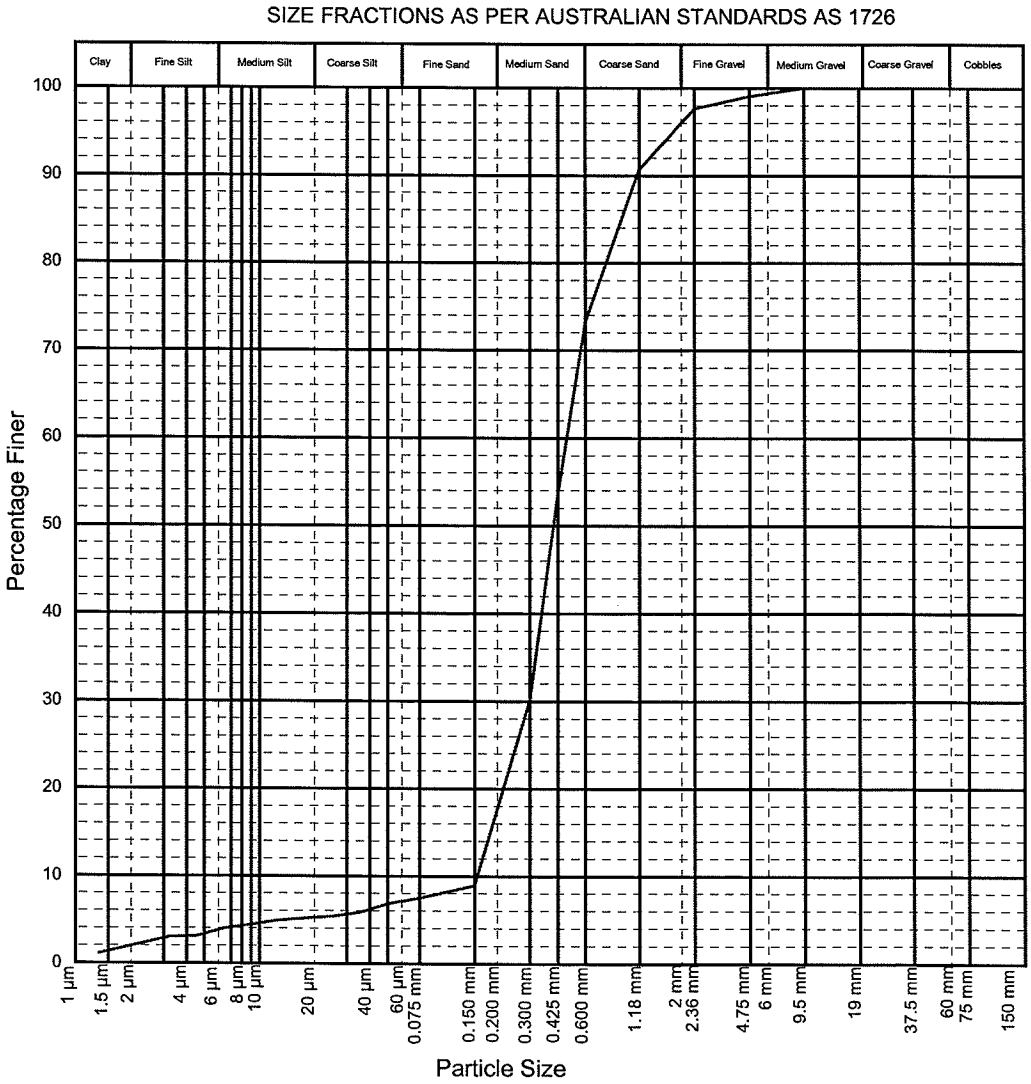
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19181
Sample ID :	F5_PSD	Batch No. :	EP0705490 - 30
		Date Received :	19/11/2007
		Sampled By :	Client

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	100.0
4.75	99.1
2.36	97.6
1.18	90.7
0.600	73.2
0.425	53.6
0.300	30.1
0.150	8.9
0.075	7.5
Particle Size (Microns)	Percent Passing
50.7	6.8
36.0	5.9
25.6	5.4
12.8	4.9
9.1	4.4
6.4	4.0
4.6	3.1
3.2	3.0
1.3	1.1



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		

Remarks :

Material Description : (SC/SP) Clayey SAND/SAND, brown

Test Procedure : AS 1289 3.6.2, 3.6.3 (up to 24 hours)

Prepared by : MP Checked by : JA

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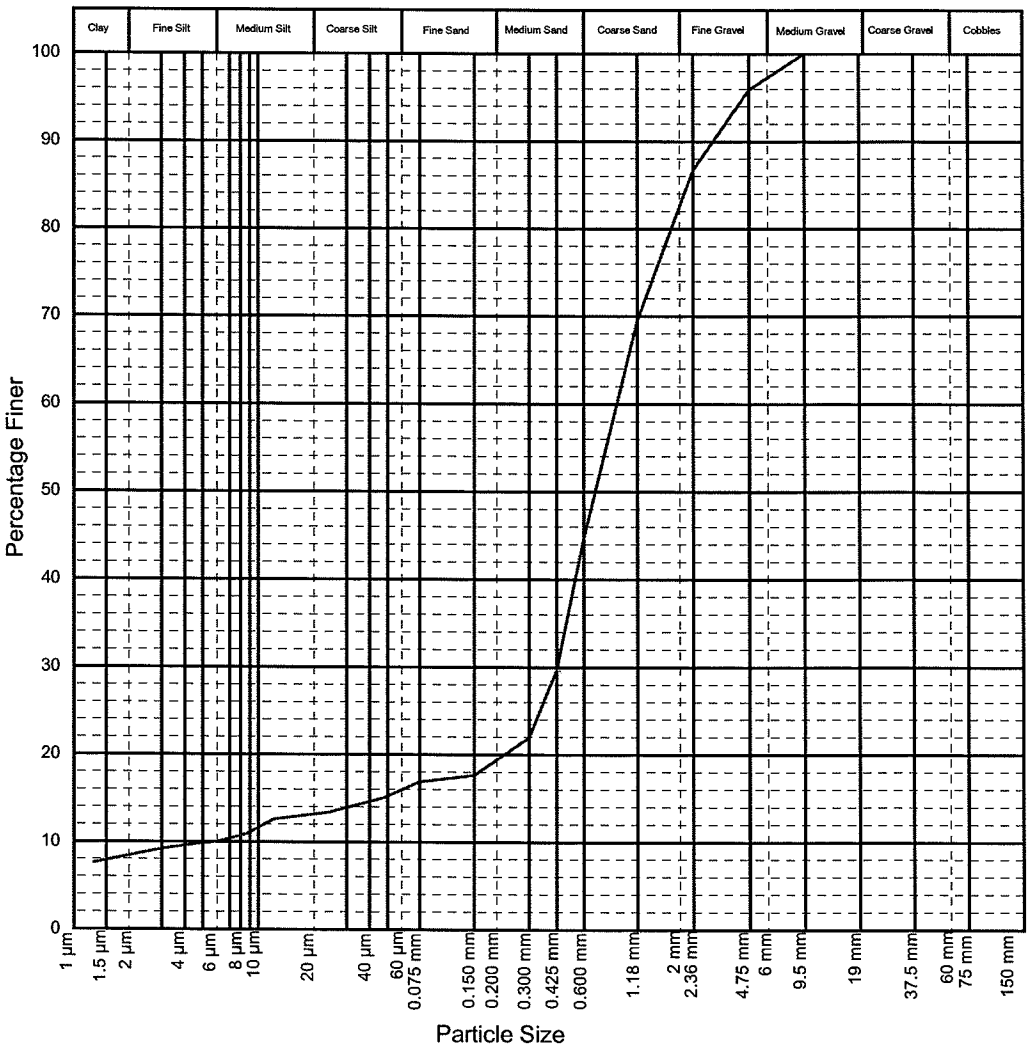
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19182
Sample ID :	G1_PSD	Batch No. :	EP0705490 - 31
		Date Received :	19/11/2007
		Sampled By :	Client

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	100.0
4.75	95.9
2.36	86.7
1.18	69.4
0.600	44.7
0.425	29.7
0.300	21.9
0.150	17.6
0.075	16.9
Particle Size (Microns)	**Percent Passing**
47.8	15.0
34.0	14.2
24.2	13.4
12.1	12.6
8.7	10.9
6.2	10.1
4.4	9.7
3.1	9.2
1.3	7.6

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(SC) Clayey SAND, brown, with some gravel & shell		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : NF		Checked by : JA	

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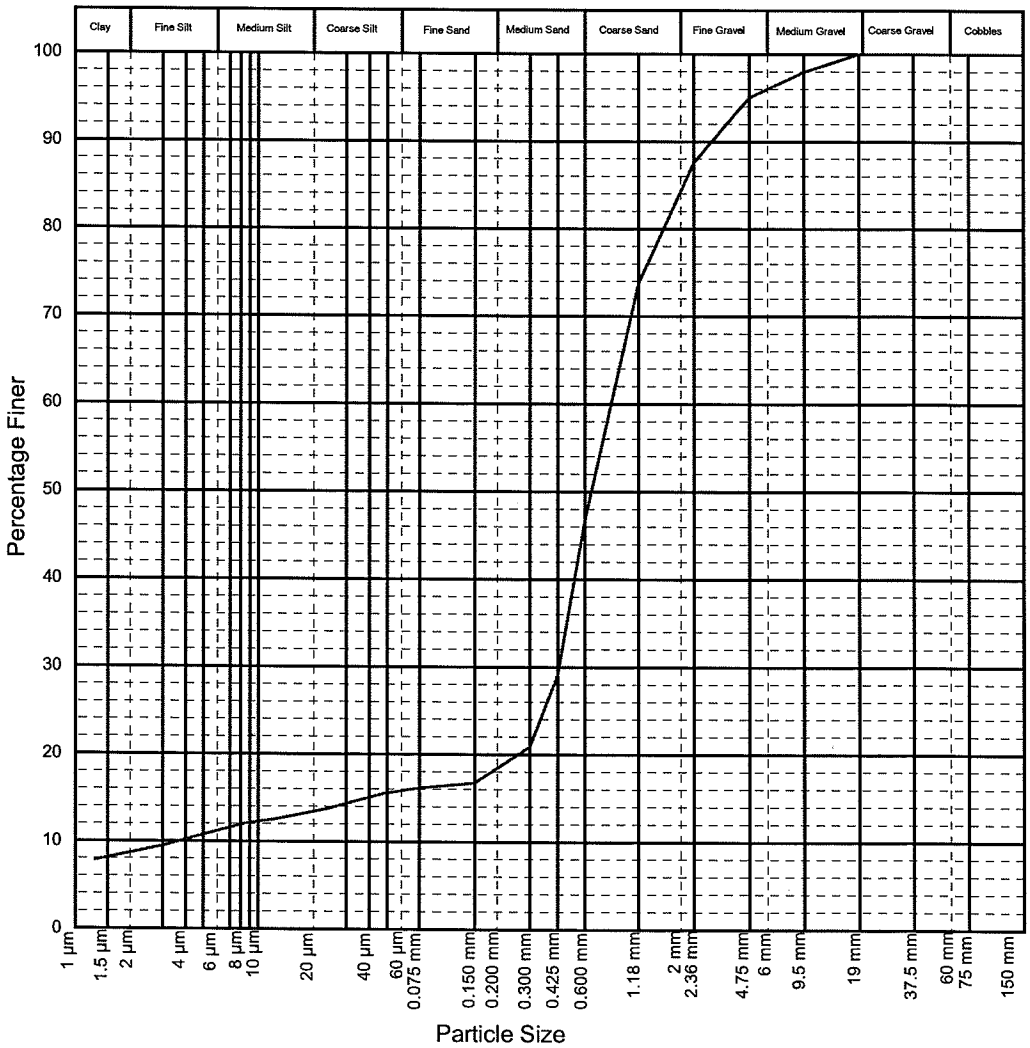
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19183
Sample ID :	G2_PSD	Batch No. :	EP0705490 - 32
		Date Received :	19/11/2007
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	100.0
9.5	97.9
4.75	95.0
2.36	87.6
1.18	73.7
0.600	46.7
0.425	29.1
0.300	20.9
0.150	16.7
0.075	16.2
Particle Size (Microns)	Percent Passing
47.8	15.5
34.0	14.6
24.2	13.8
12.1	12.5
8.6	12.1
6.1	11.2
4.4	10.4
3.1	9.5
1.3	7.8



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(SC) Clayey SAND, brown, with some gravel & shell		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : NF		Checked by : SA	

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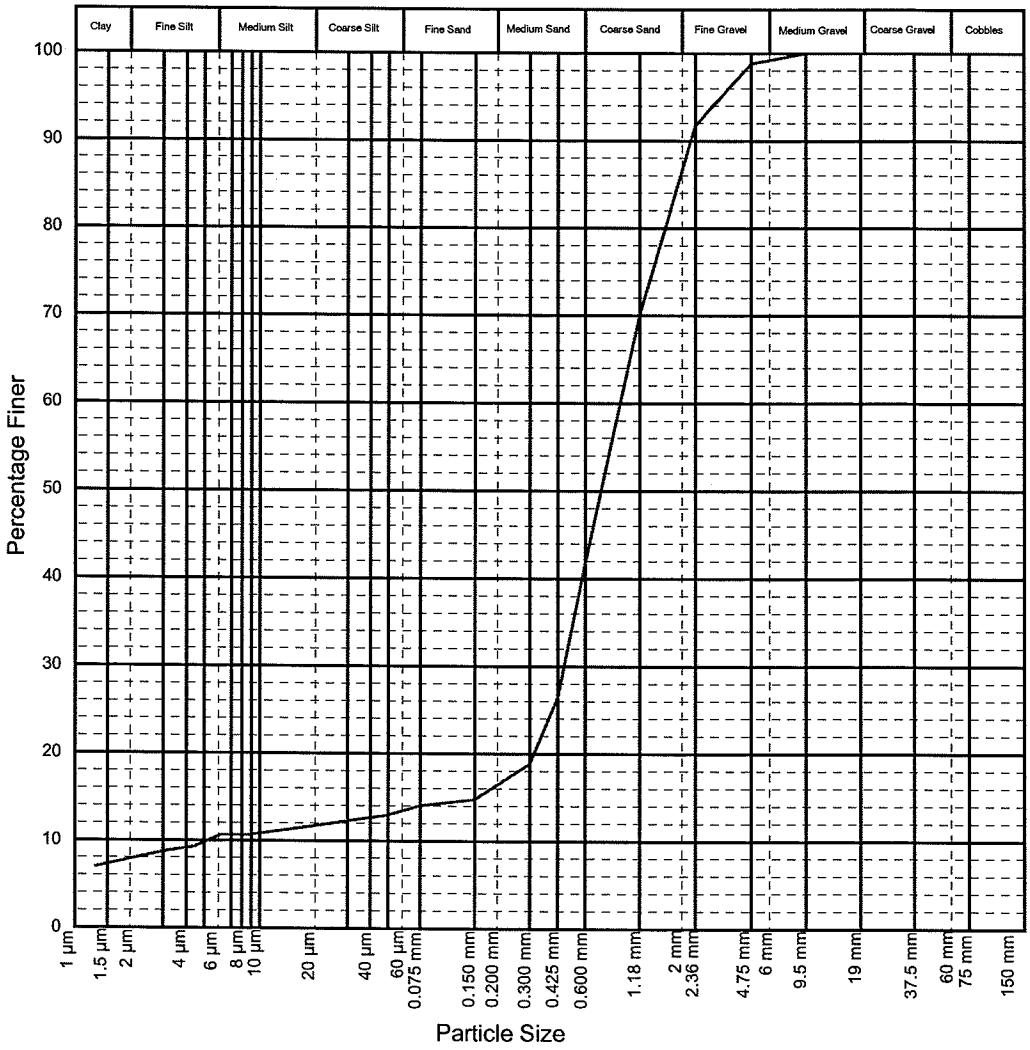
Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19184
Sample ID :	G3_PSD	Batch No. :	EP0705490 - 33
		Date Received :	19/11/2007
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	100.0
4.75	98.8
2.36	91.7
1.18	70.1
0.600	41.7
0.425	26.4
0.300	18.8
0.150	14.7
0.075	14.0
Particle Size (Microns)	Percent Passing
49.0	12.9
34.7	12.5
24.6	12.0
12.3	11.1
8.7	10.6
6.2	10.6
4.4	9.3
3.1	8.8
1.3	7.0



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(SC) Clayey SAND, brown, with shell		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : NK		Checked by : JA	

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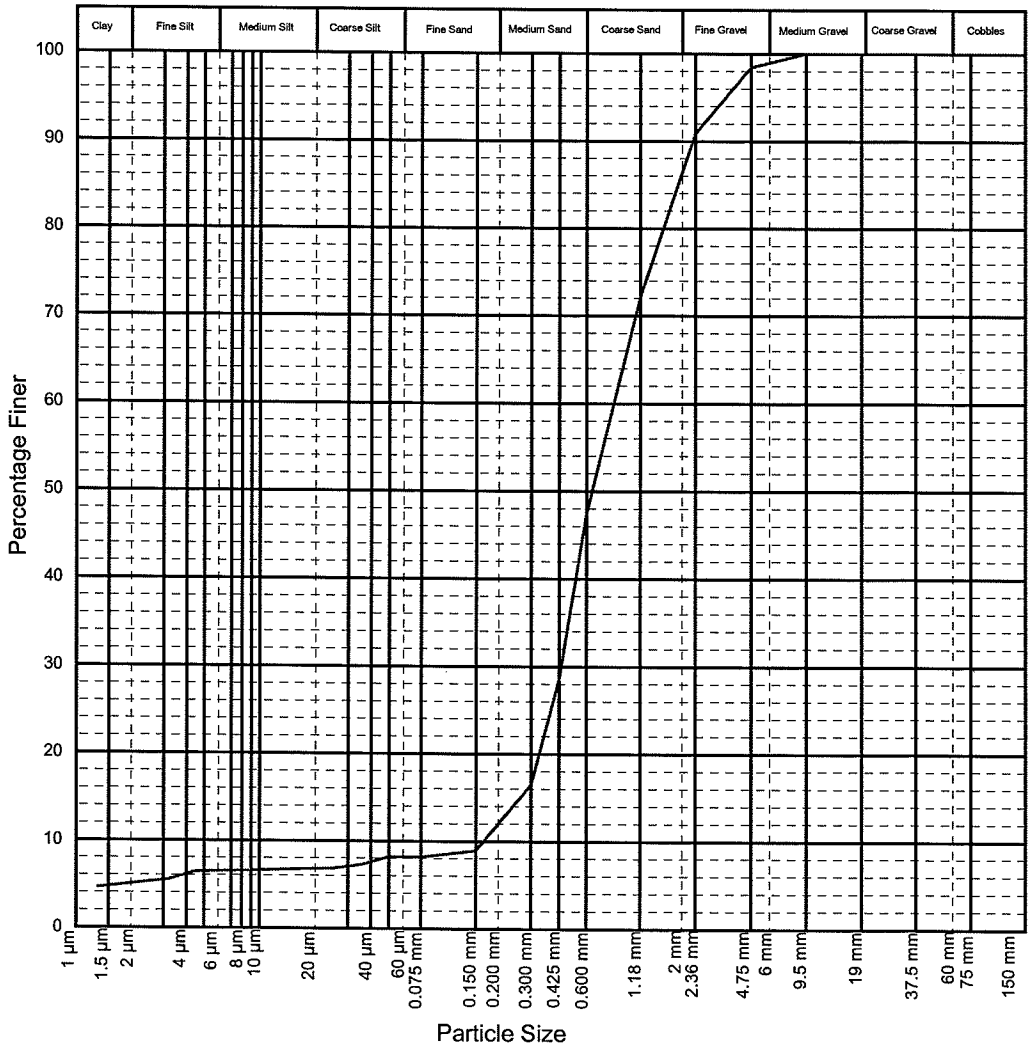
Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19185
Sample ID :	G4_PSD	Batch No. :	EP0705490 - 34
		Date Received :	19/11/2007
		Sampled By :	Client

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	100.0
4.75	98.4
2.36	90.9
1.18	72.1
0.600	47.4
0.425	28.5
0.300	16.4
0.150	8.9
0.075	8.2
Particle Size (Microns)	Percent Passing
50.4	8.2
35.8	7.3
25.4	6.8
12.7	6.7
9.0	6.6
6.4	6.5
4.5	6.4
3.2	5.5
1.3	4.6

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(SC/SP) Clayey SAND/SAND, brown, with shell		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : NF		Checked by :	

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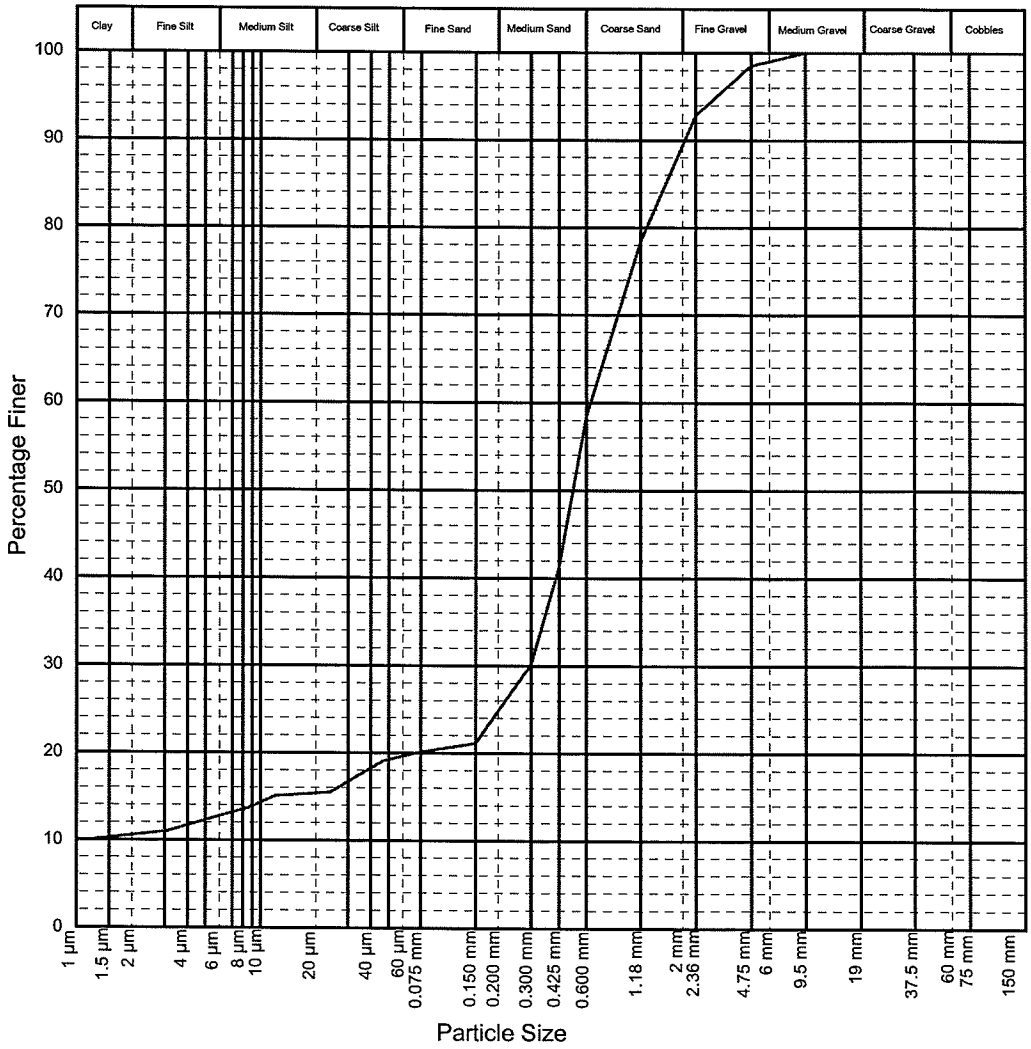
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19186
Sample ID :	G5_PSD	Batch No. :	EP0705490 - 35
		Date Received :	19/11/2007
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	100.0
4.75	98.5
2.36	92.8
1.18	78.4
0.600	58.4
0.425	41.2
0.300	30.2
0.150	21.1
0.075	20.1
Particle Size (Microns)	Percent Passing
47.0	19.1
33.6	17.3
24.1	15.5
12.0	15.0
8.6	13.7
6.1	12.8
4.3	11.9
3.1	11.0
1.3	10.1



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(SC) Clayey SAND, brown, with shell		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : NK		Checked by : JA	

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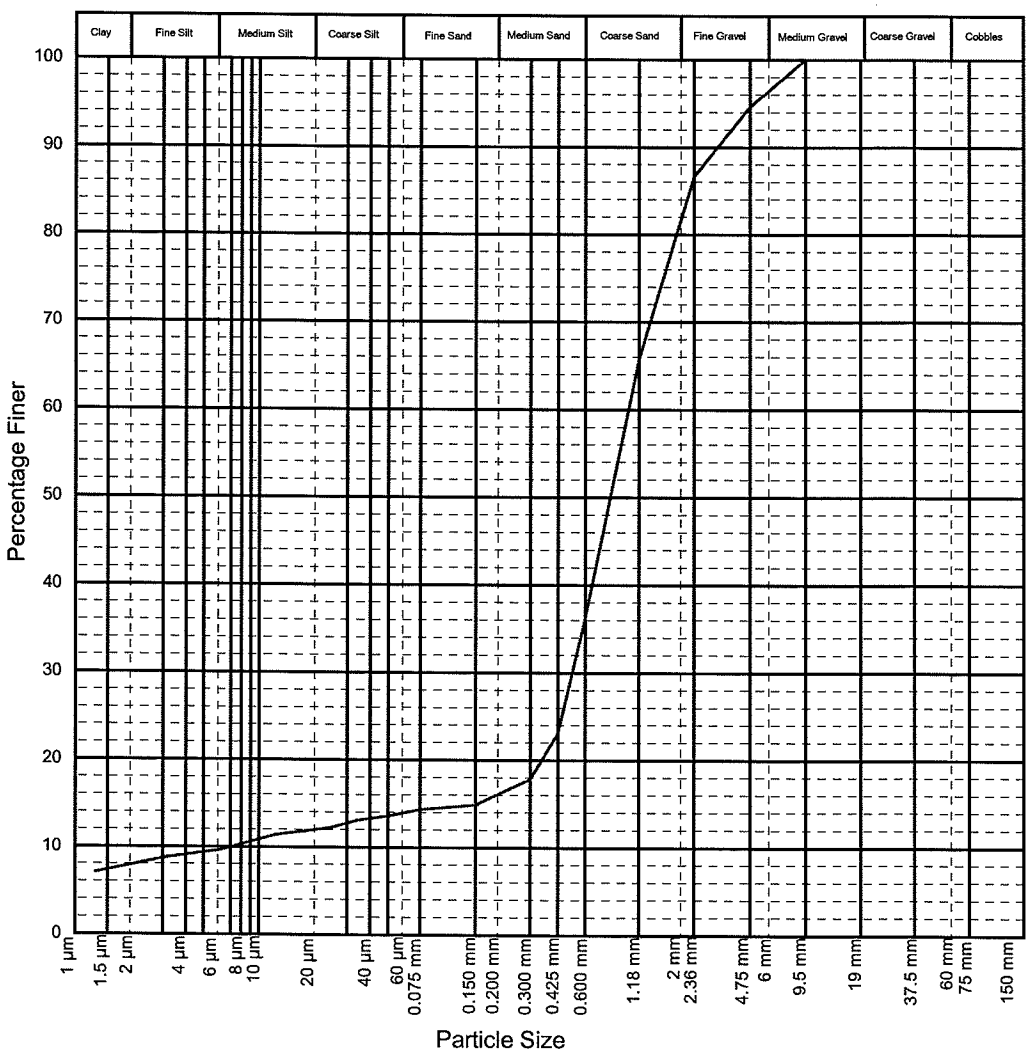
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19187
Sample ID :	H1_PSD	Batch No. :	EP0705490 - 36
		Date Received :	19/11/2007
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	100.0
4.75	94.6
2.36	86.6
1.18	65.6
0.600	36.2
0.425	23.1
0.300	17.8
0.150	14.9
0.075	14.3
Particle Size (Microns)	Percent Passing
48.6	13.5
34.4	13.1
24.5	12.2
12.3	11.4
8.7	10.5
6.2	9.6
4.4	9.2
3.1	8.8
1.3	7.0



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(SC) Clayey SAND, brown, with some gravel & shell		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : MK		Checked by : JA	

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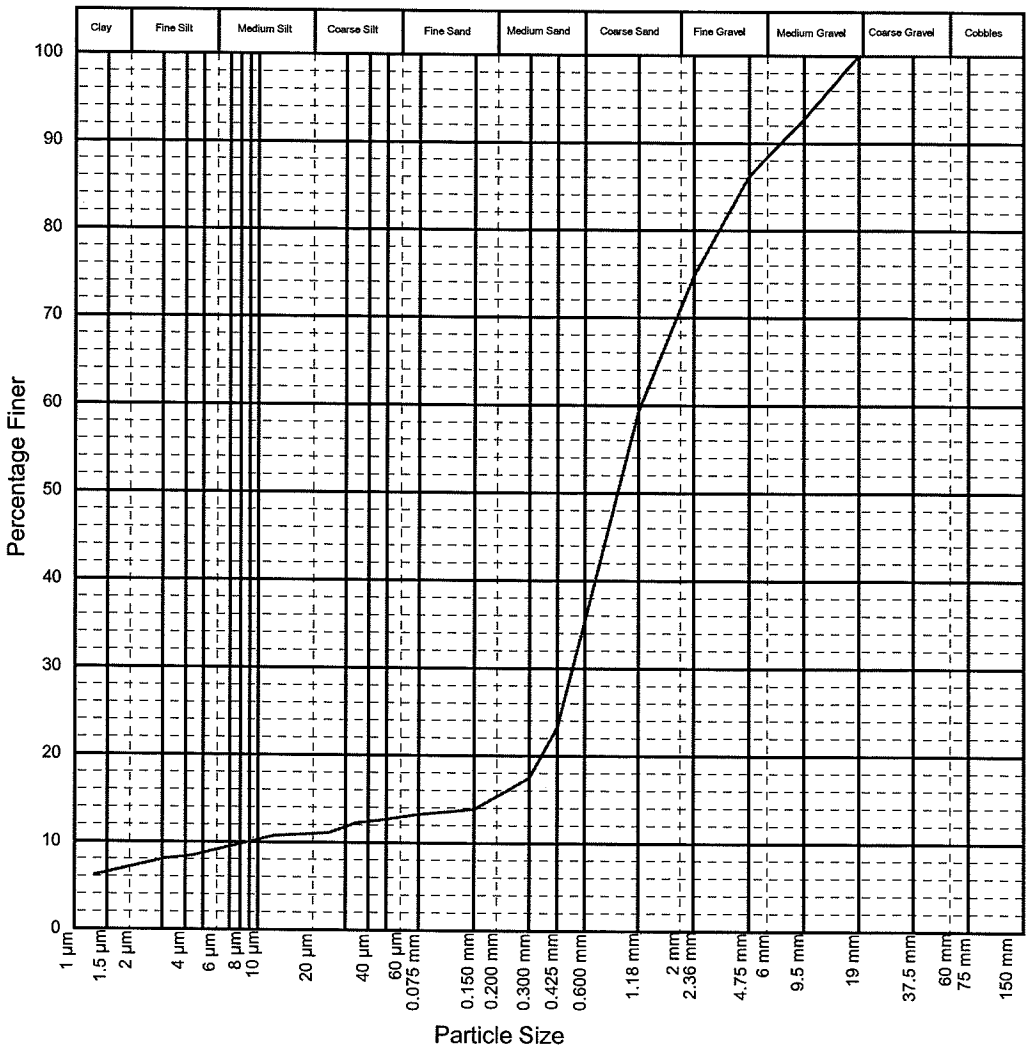
Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19188
Sample ID :	H2_PSD	Batch No. :	EP0705490 - 37
		Date Received :	19/11/2007
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	100.0
9.5	92.7
4.75	86.2
2.36	74.7
1.18	59.3
0.600	35.3
0.425	23.2
0.300	17.5
0.150	13.9
0.075	13.2
Particle Size (Microns)	**Percent Passing**
48.3	12.6
34.2	12.2
24.4	11.1
12.2	10.7
8.7	9.9
6.2	9.2
4.4	8.4
3.1	8.1
1.3	6.2



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(SC) Clayey SAND, brown, with some gravel & shell		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by :		Checked by :	

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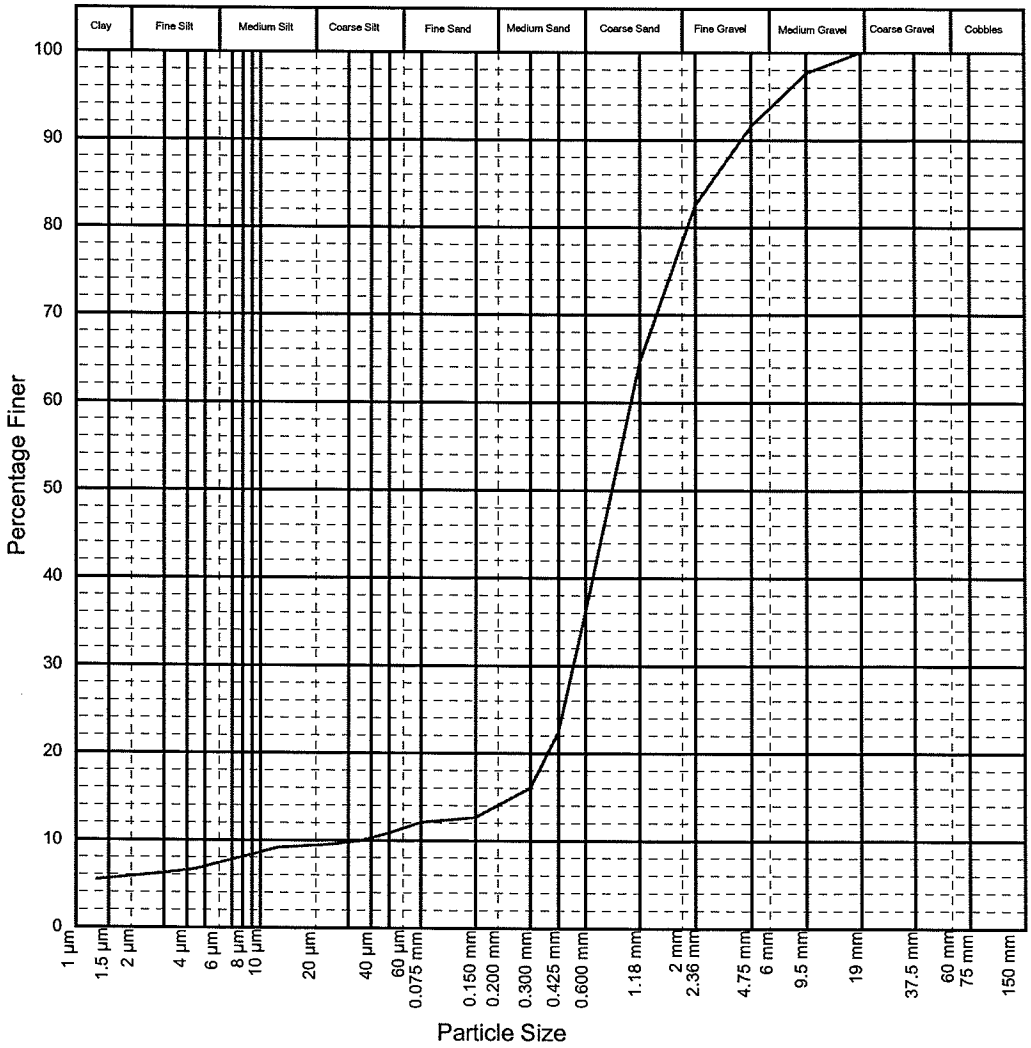
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19189
Sample ID :	H3_PSD	Batch No. :	EP0705490 - 38
		Date Received :	19/11/2007
		Sampled By :	Client

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	100.0
9.5	97.6
4.75	91.5
2.36	82.6
1.18	64.6
0.600	36.2
0.425	22.4
0.300	16.0
0.150	12.7
0.075	12.1
Particle Size (Microns)	Percent Passing
49.3	10.8
35.0	10.0
24.8	9.5
12.4	9.1
8.8	8.3
6.3	7.5
4.5	6.7
3.2	6.3
1.3	5.4

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(SC) Clayey SAND, brown, with some gravel & shell		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : MW		Checked by : JA	

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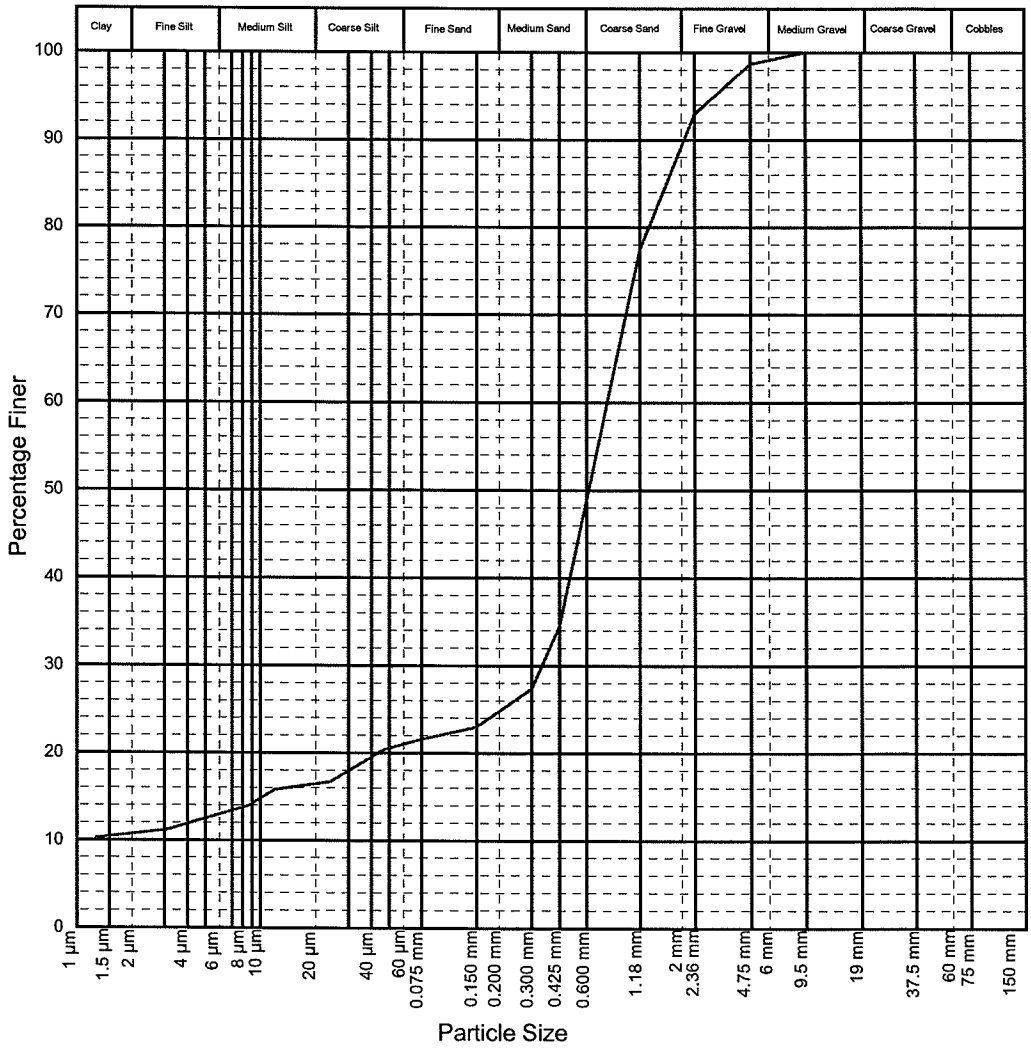
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19190
Sample ID :	H4_PSD	Batch No. :	EP0705490 - 39
		Date Received :	19/11/2007
		Sampled By :	Client

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	100.0
4.75	98.7
2.36	92.9
1.18	77.3
0.600	48.8
0.425	34.5
0.300	27.4
0.150	23.0
0.075	21.6
Particle Size (Microns)	Percent Passing
46.7	20.4
33.4	18.5
23.9	16.7
12.0	15.8
8.6	13.9
6.1	13.0
4.3	12.1
3.1	11.2
1.3	10.2

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(SC) Clayey SAND, brown, with shell		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : MW		Checked by : JA	

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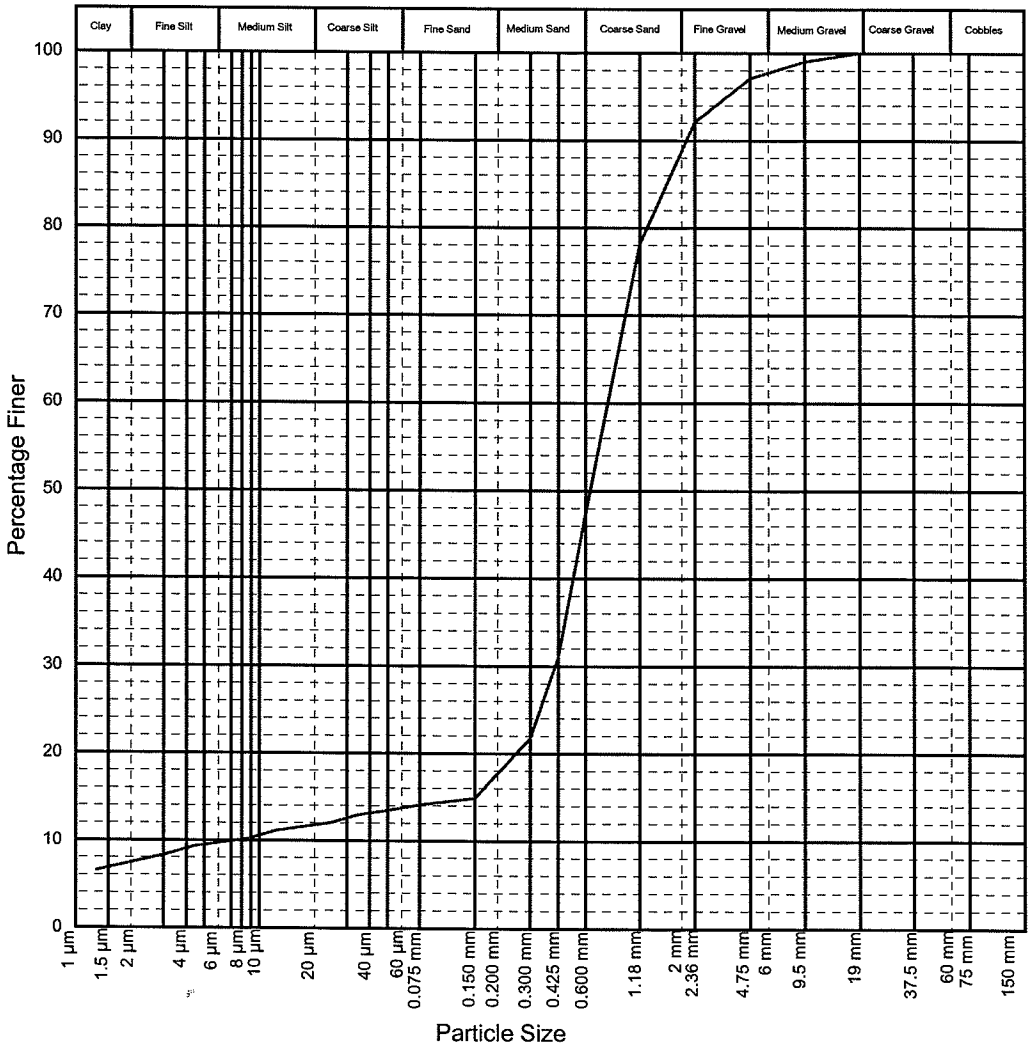
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6779
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19191
Sample ID :	H5_PSD	Batch No. :	EP0705490 - 40
		Date Received :	19/11/2007
		Sampled By :	Client

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	100.0
9.5	99.0
4.75	97.1
2.36	92.1
1.18	78.1
0.600	47.4
0.425	31.0
0.300	21.7
0.150	14.9
0.075	14.1
Particle Size (Microns)	Percent Passing
48.8	13.4
34.6	13.0
24.6	12.0
12.3	11.1
8.8	10.2
6.2	9.7
4.4	9.3
3.1	8.4
1.3	6.5

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(SC) Clayey SAND, brown, with shell		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : MW		Checked by : JA	

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TEST RESULTS

Client :	ALS Environmental Perth	Job No. :	077634002/2
Project :	Delivered Samples	Date Received :	30-Nov-07
Batch No. :	EP0705727	Sampled by :	Client

PARTICLE SIZE SUMMARY

Reg'n No.	Sample No.	Sample ID	Percent Gravel (+ 2 mm)	Percent Sand (2 mm - 0.060 mm)	Percent Silt (0.060 mm - 0.002 mm)	Percent Clay (-0.002 mm)
L19592	1	I1_PSD	0	11	47	42
L19593	2	I2_PSD	0	40	31	29
L19594	3	I3_PSD	0	29	37	34
L19595	4	I4_PSD	0	38	36	26
L19596	5	I5_PSD	3	83	7	7
L19597	6	J1_PSD	0	8	47	45
L19598	7	J2_PSD	5	29	36	30
L19599	8	J3_PSD	2	16	42	40
L19600	9	J4_PSD	21	51	13	15
L19601	10	J5_PSD	5	61	18	16

Remarks :

Test Procedure : AS 1289 3.6.3

Prepared by : NF Checked by BS

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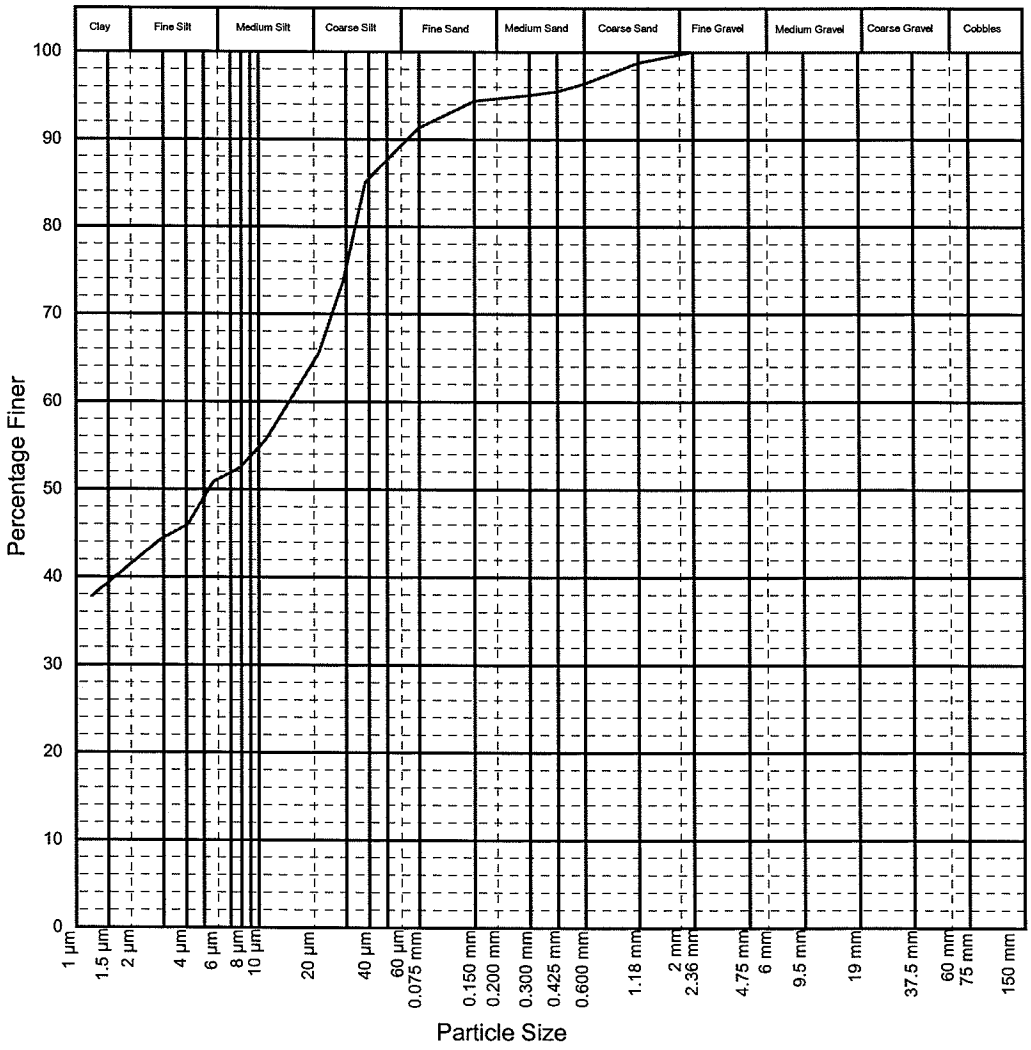
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6794
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19592
Sample ID :	I1_PSD	Batch No. :	EP0705727 - 1
		Date Received :	30/11/2007
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	
4.75	
2.36	100.0
1.18	98.8
0.600	96.4
0.425	95.5
0.300	95.0
0.150	94.4
0.075	91.3
Particle Size (Microns)	Percent Passing
38.4	85.2
29.0	73.7
21.4	65.6
11.0	55.8
7.9	52.5
5.6	50.9
4.1	46.0
2.9	44.3
1.2	37.8



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		

Remarks :

Material Description : (CH) Silty CLAY, brown

Test Procedure : AS 1289 3.6.2, 3.6.3 (up to 24 hours)

Prepared by : NL Checked by : BS

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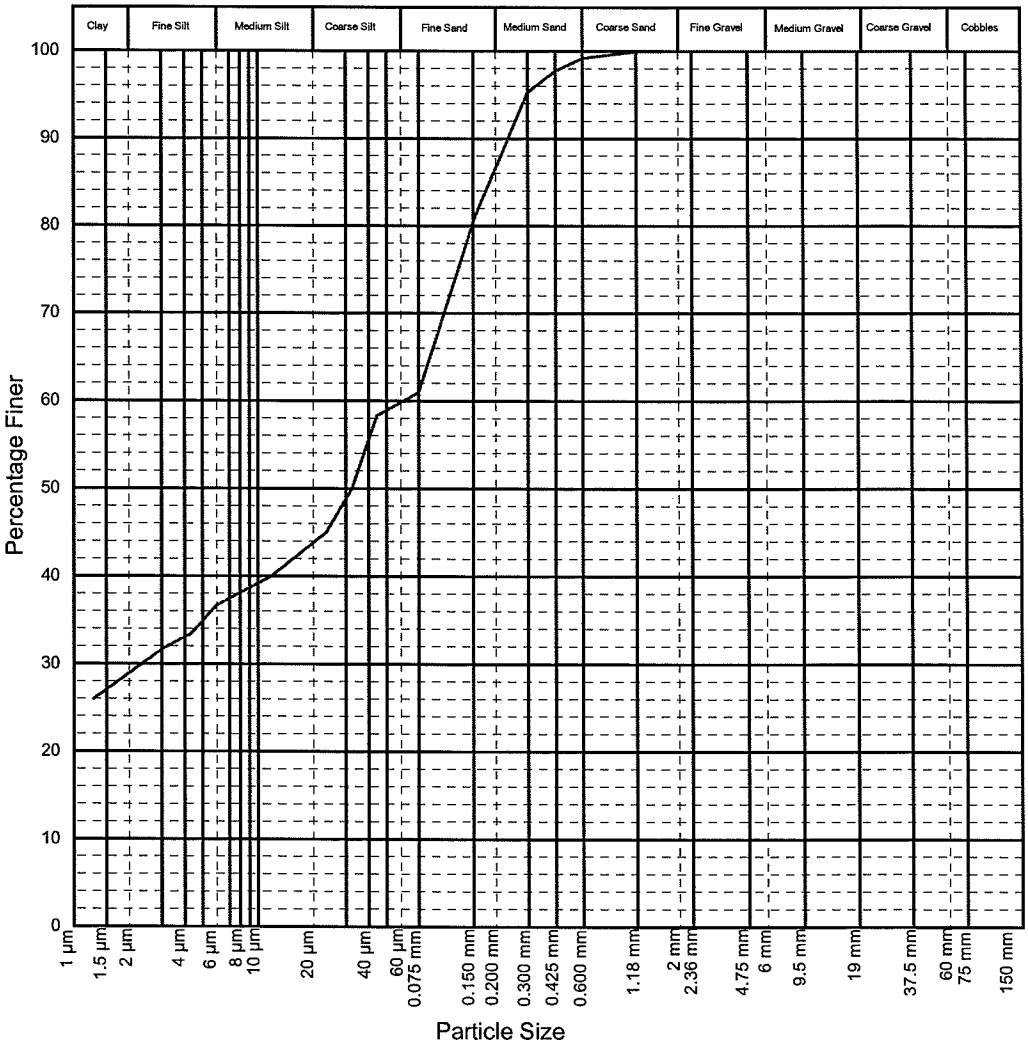
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6794
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19593
Sample ID :	I2_PSD	Batch No. :	EP0705727 - 2
		Date Received :	30/11/2007
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	
4.75	
2.36	100.0
1.18	99.9
0.600	99.2
0.425	97.7
0.300	95.3
0.150	80.5
0.075	60.9
Particle Size (Microns)	Percent Passing
44.4	58.3
32.5	50.0
23.5	45.0
11.9	40.0
8.5	38.4
6.0	36.7
4.3	33.4
3.1	31.7
1.3	25.9



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(Cl) Sandy CLAY, brown		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : NF		Checked by : BS	

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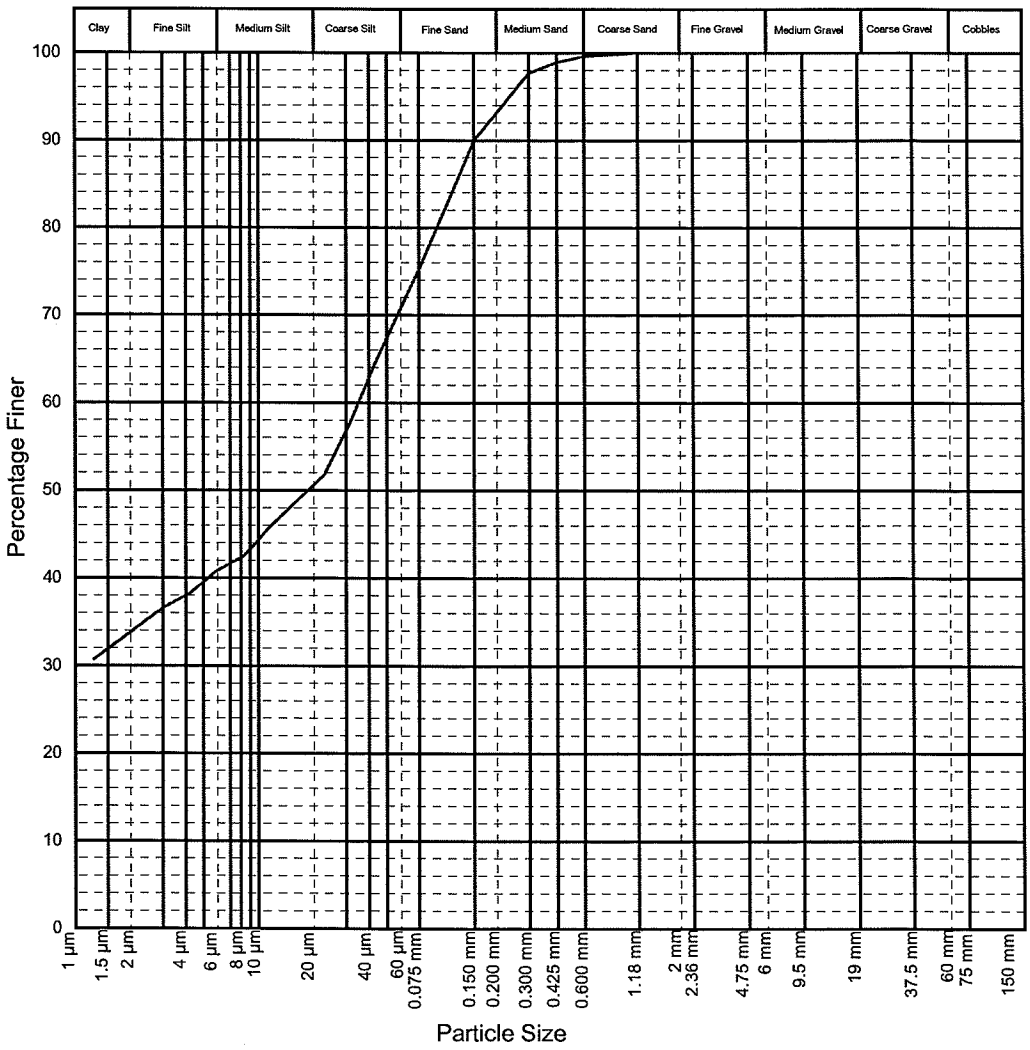
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6794
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19594
Sample ID :	I3_PSD	Batch No. :	EP0705727 - 3
		Date Received :	30/11/2007
		Sampled By :	Client

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	
4.75	
2.36	
1.18	100.0
0.600	99.6
0.425	98.9
0.300	97.7
0.150	89.9
0.075	75.1
Particle Size (Microns)	Percent Passing
43.4	64.5
31.6	57.7
22.9	51.8
11.6	45.9
8.3	42.5
5.9	40.8
4.2	38.3
3.0	36.6
1.3	30.7

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(CI) Silty CLAY, brown, with some sand		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : NF		Checked by : BS	

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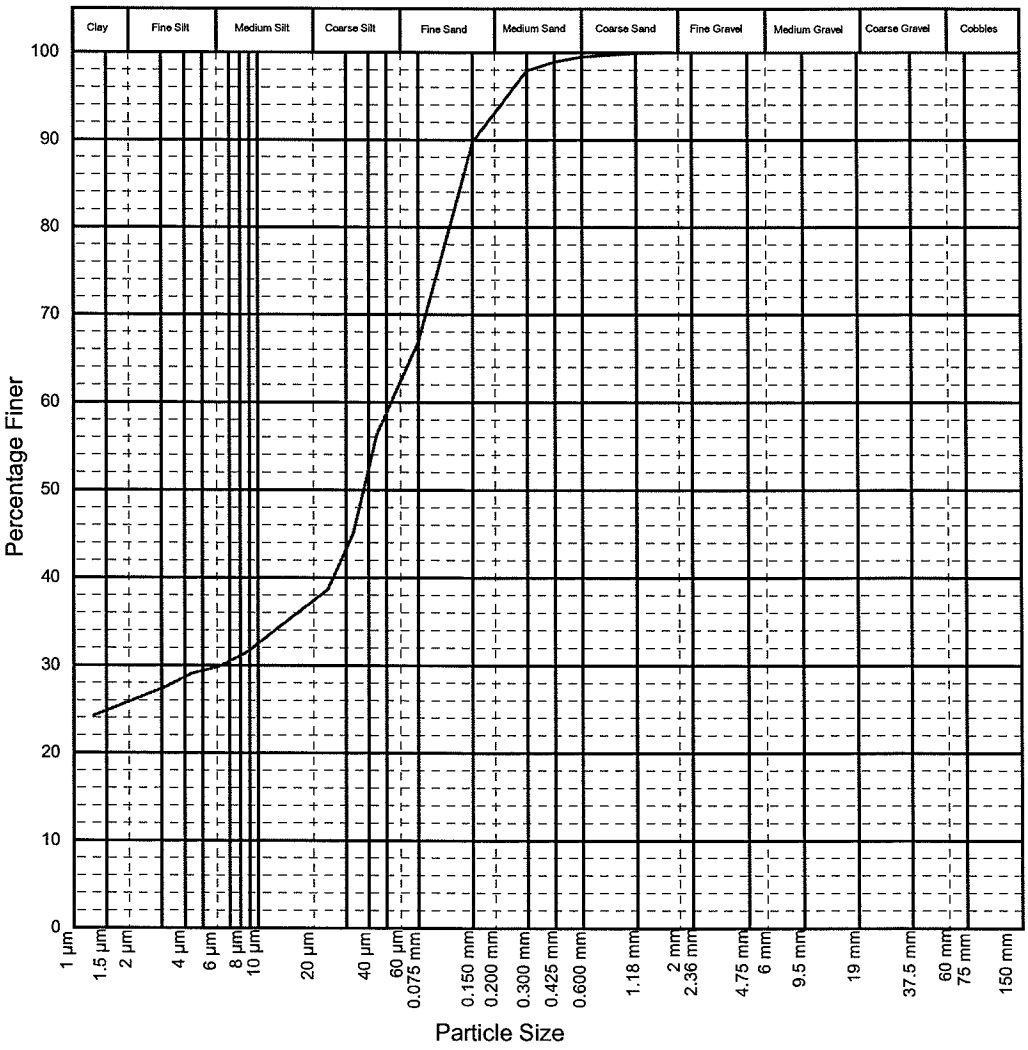
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6794
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19595
Sample ID :	I4_PSD	Batch No. :	EP0705727 - 4
		Date Received :	30/11/2007
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	
4.75	
2.36	100.0
1.18	99.9
0.600	99.5
0.425	98.9
0.300	97.9
0.150	89.7
0.075	66.8
Particle Size (Microns)	Percent Passing
44.4	56.3
33.0	45.1
23.9	38.6
12.1	33.8
8.6	31.4
6.1	29.8
4.4	29.0
3.1	27.4
1.3	24.2



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(CI) Sandy CLAY, brown		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : MF		Checked by : BS	

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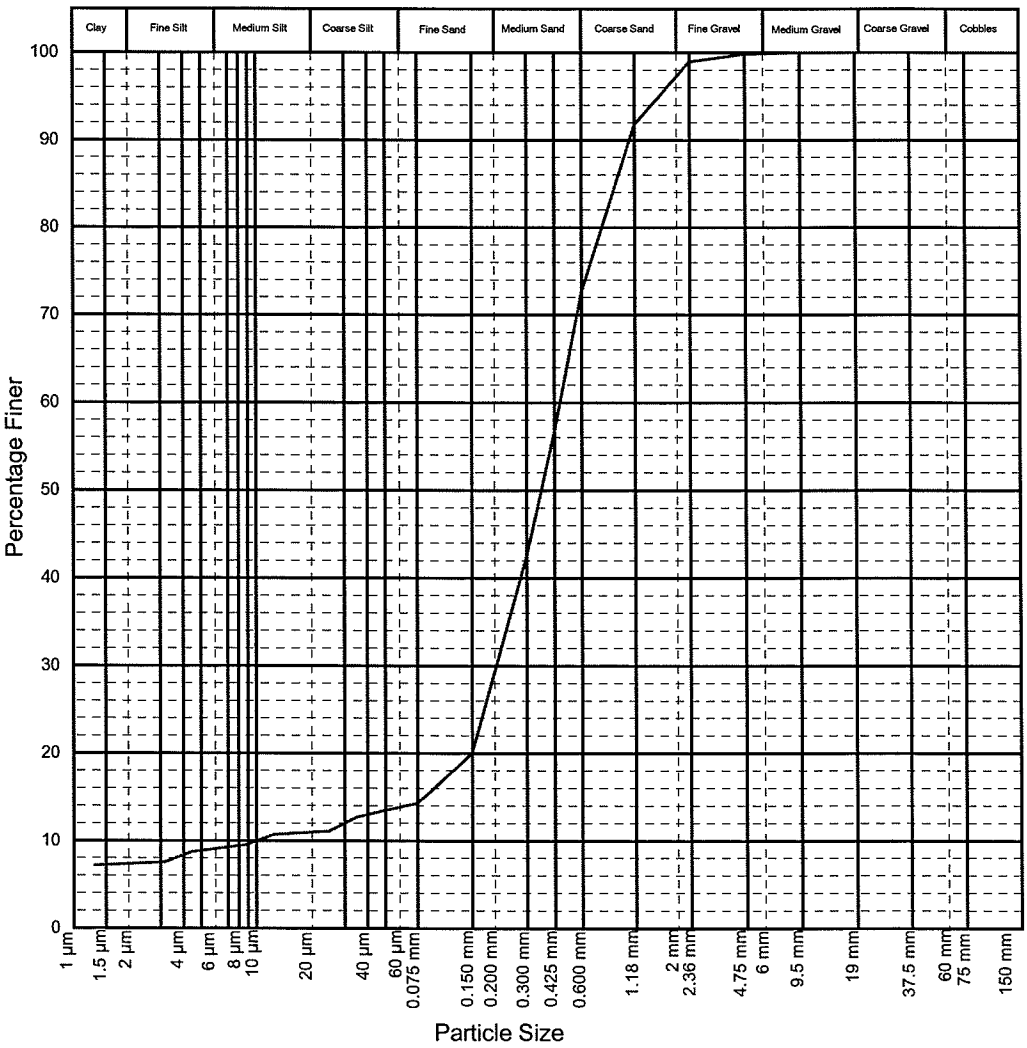
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6794
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19596
Sample ID :	I5_PSD	Batch No. :	EP0705727 - 5
		Date Received :	30/11/2007
		Sampled By :	Client

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	100.0
4.75	99.8
2.36	99.0
1.18	91.8
0.600	72.6
0.425	56.6
0.300	42.6
0.150	20.0
0.075	14.3
Particle Size (Microns)	Percent Passing
48.7	13.4
34.6	12.6
24.8	11.1
12.4	10.7
8.8	9.5
6.3	9.1
4.4	8.7
3.2	7.5
1.3	7.2

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(SC) Clayey SAND, grey brown, with shell		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : NF		Checked by : BS.	

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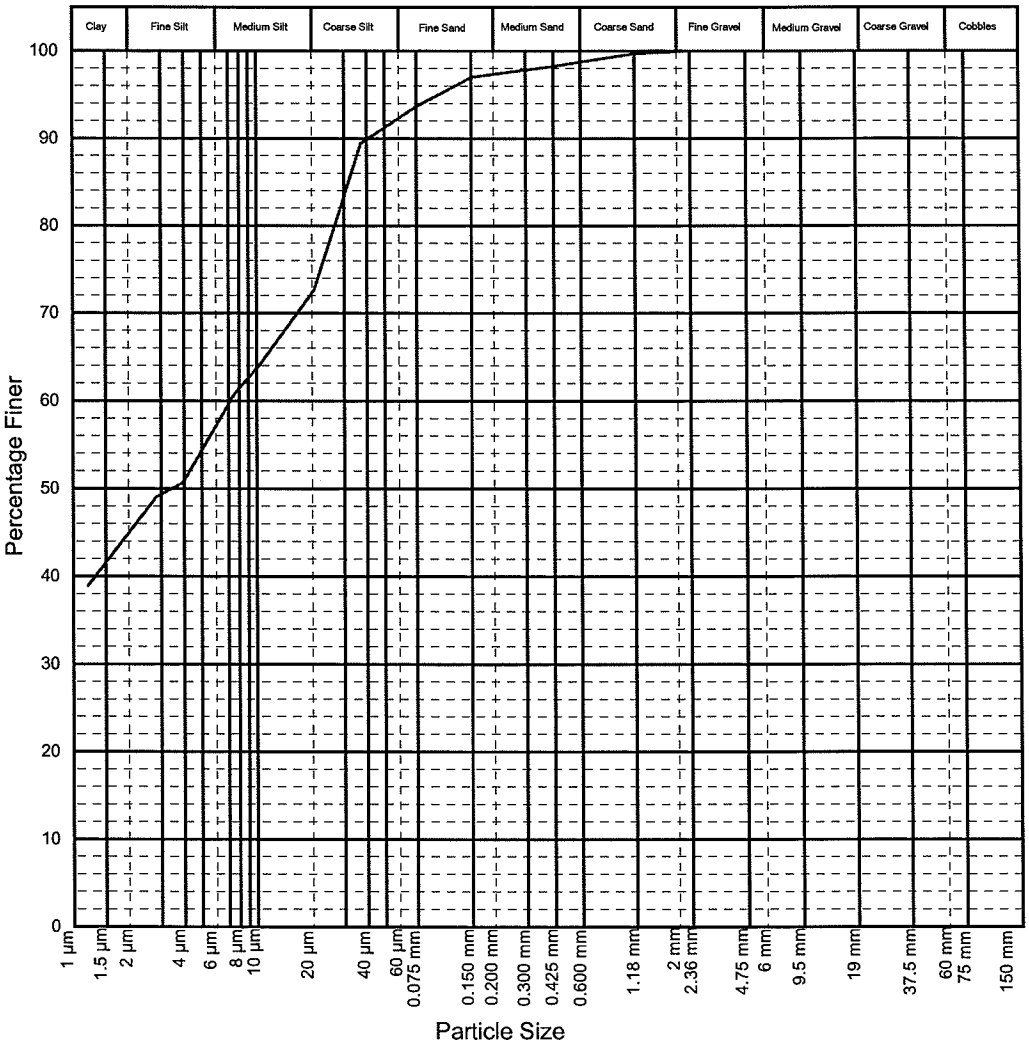
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6794
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19597
Sample ID :	J1_PSD	Batch No. :	EP0705727 - 6
		Date Received :	30/11/2007
		Sampled By :	Client

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	
4.75	
2.36	100.0
1.18	99.7
0.600	98.7
0.425	98.2
0.300	97.8
0.150	97.0
0.075	93.6
Particle Size (Microns)	Percent Passing
37.2	89.4
27.7	81.0
20.5	72.6
10.5	64.2
7.5	60.8
5.5	55.8
4.0	50.7
2.8	49.0
1.2	38.9

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(CH) Silty CLAY, grey brown		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : NF		Checked by : BS.	

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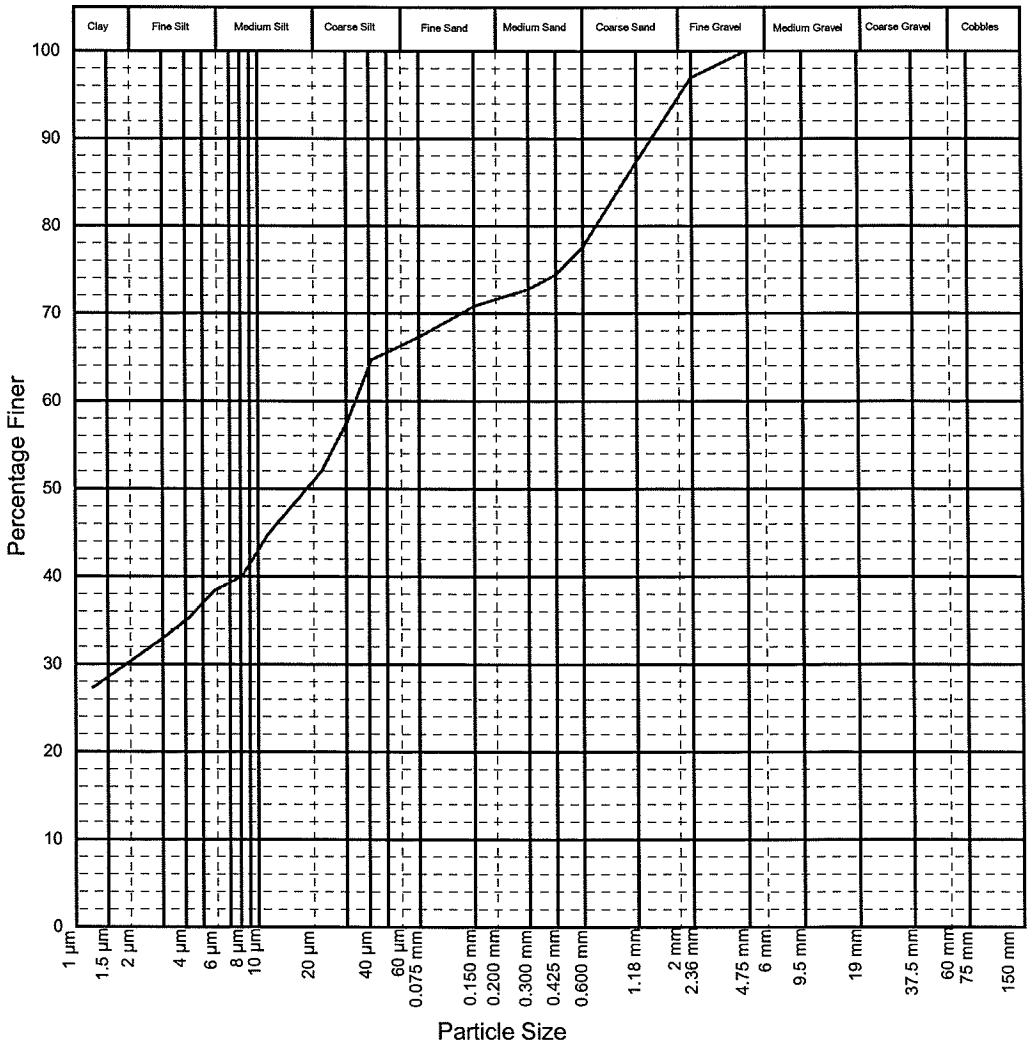
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6794
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19598
Sample ID :	J2_PSD	Batch No. :	EP0705727 - 7
		Date Received :	30/11/2007
		Sampled By :	Client

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	
4.75	100.0
2.36	96.9
1.18	87.3
0.600	77.5
0.425	74.4
0.300	72.7
0.150	70.8
0.075	67.3
Particle Size (Microns)	Percent Passing
41.5	64.7
30.5	57.5
22.1	52.0
11.3	44.8
8.2	40.0
5.8	38.4
4.2	35.2
3.0	32.9
1.2	27.3

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(Cl) Silty CLAY, brown, with some sand		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : NW		Checked by : BS.	

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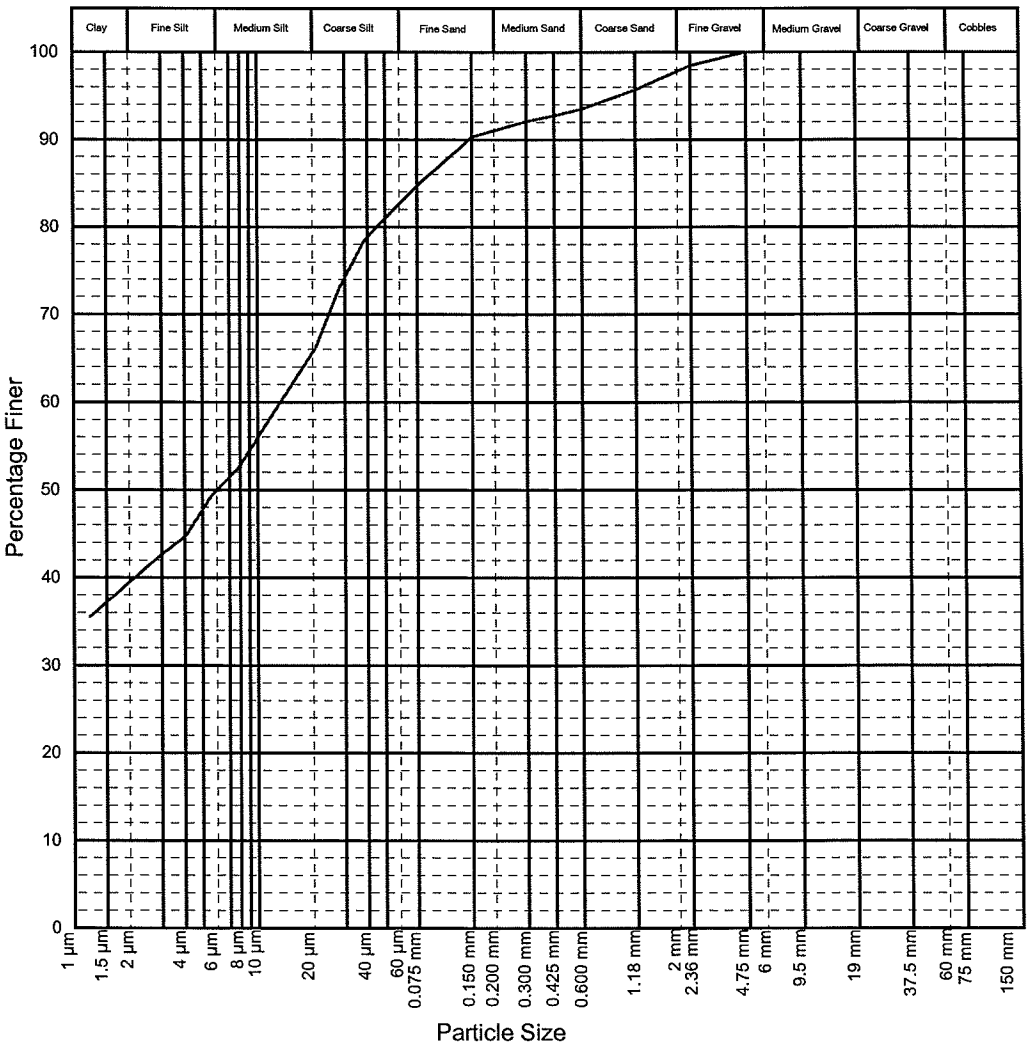
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6794
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19599
Sample ID :	J3_PSD	Batch No. :	EP0705727 - 8
		Date Received :	30/11/2007
		Sampled By :	Client

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	
4.75	100.0
2.36	98.4
1.18	95.7
0.600	93.5
0.425	92.7
0.300	92.1
0.150	90.3
0.075	84.7
Particle Size (Microns)	Percent Passing
38.8	78.5
28.3	73.1
20.8	66.2
10.8	57.0
7.8	52.4
5.6	49.3
4.1	44.7
2.9	42.4
1.2	35.5

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		

Remarks :

Material Description : (CH) Silty CLAY, grey brown, with some sand

Test Procedure : AS 1289 3.6.2, 3.6.3 (up to 24 hours)

Prepared by : MF Checked by : BS.

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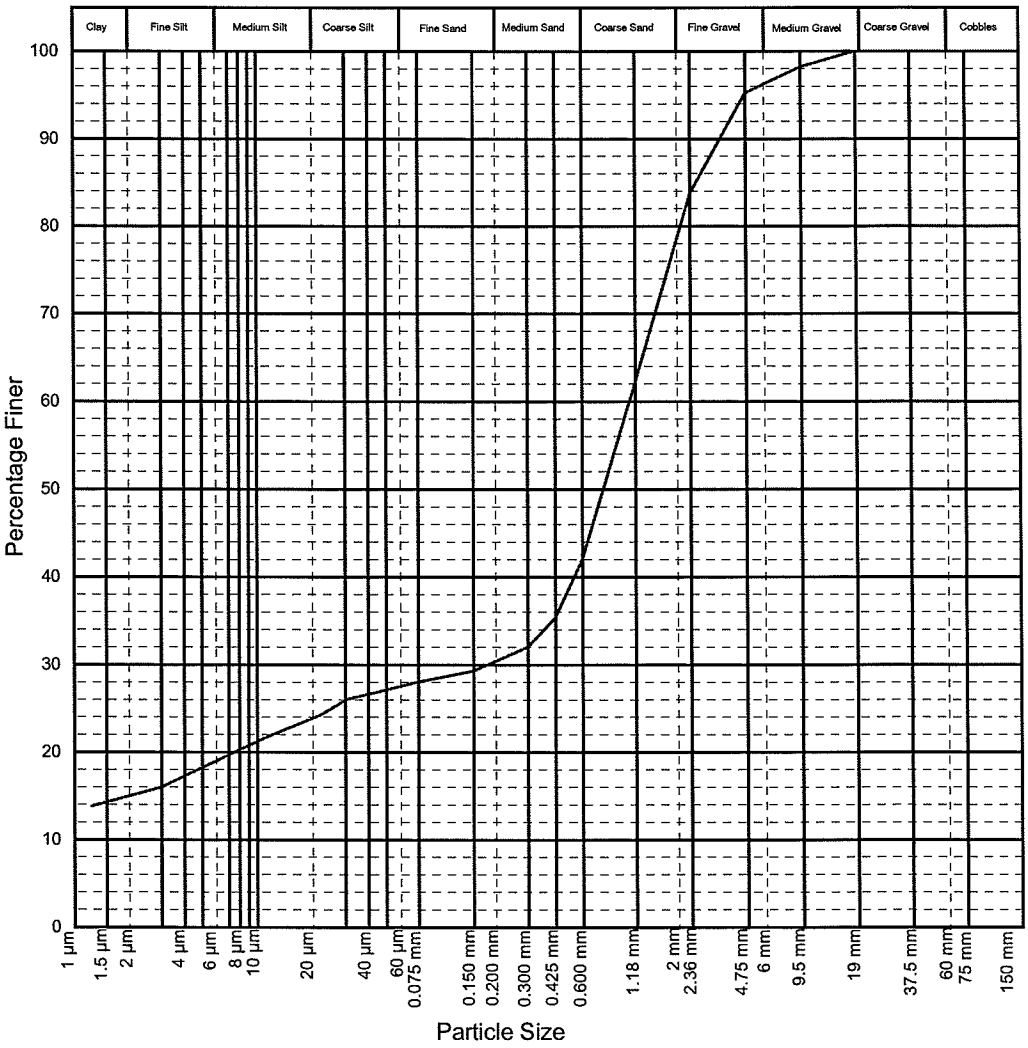
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6794
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19600
Sample ID :	J4_PSD	Batch No. :	EP0705727 - 9
		Date Received :	30/11/2007
		Sampled By :	Client

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	100.0
9.5	98.2
4.75	95.2
2.36	83.7
1.18	62.2
0.600	42.1
0.425	35.4
0.300	32.0
0.150	29.3
0.075	28.1
Particle Size (Microns)	Percent Passing
43.1	26.8
30.7	26.1
22.1	24.3
11.2	21.7
8.0	20.3
5.8	18.9
4.1	17.4
3.0	16.0
1.2	13.8

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(SC) Clayey SAND, grey brown, with some shell & gravel		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : MW		Checked by : BS.	

NATA 1446

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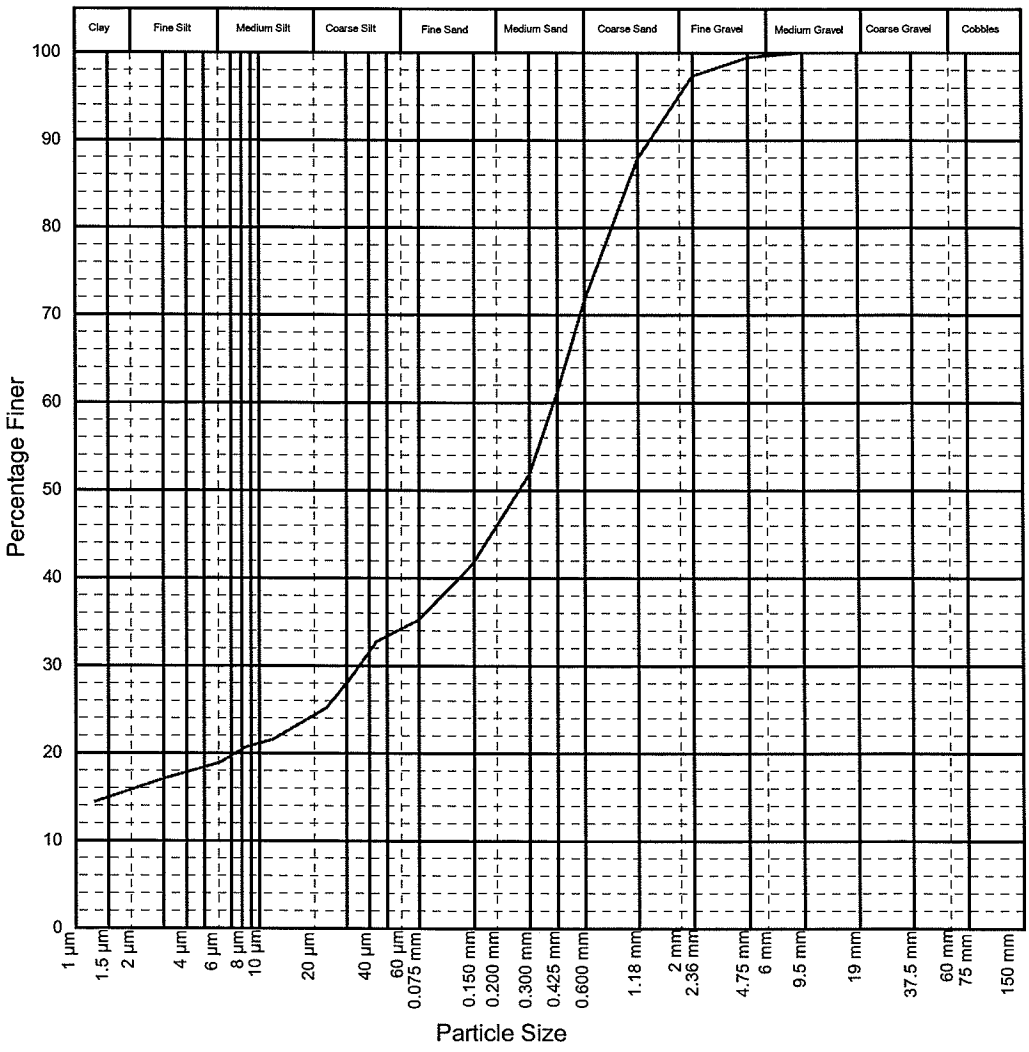
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	ALS Environmental Perth	Report No. :	R6794
Address :	10 Hod Way, Malaga	Job No. :	077634002/2
Project :	Delivered Samples	Reg'n No. :	L19601
Sample ID :	J5_PSD	Batch No. :	EP0705727 - 10
		Date Received :	30/11/2007
		Sampled By :	Client

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	100.0
4.75	99.5
2.36	97.3
1.18	87.9
0.600	71.7
0.425	61.2
0.300	51.8
0.150	41.8
0.075	35.2
Particle Size (Microns)	Percent Passing
43.9	32.8
32.1	28.8
23.3	25.2
11.9	21.6
8.5	20.7
6.1	18.9
4.3	18.0
3.1	17.1
1.3	14.4

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Remarks :			
Material Description :	(SC) Clayey SAND, grey brown, with shell		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : MF		Checked by : BJ.	

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Appendix B Fieldwork Logs

Pluto LNG Development Surface Sediment Sampling (Diver Sampling)
Proposed PLUTO Turning Basin and Channel

Location Axis	Date	Particle Size Distribution	Notes / Comments
A1	10/11/07	X	POS: 20°36.378 S, 116°44.850 E. (Depth: 12 m. 12.51pm) Fine silts, mousse-like. Photo taken.
A2	10/11/07	X	POS: 20°36.420 S, 116°44.814 E. (Depth: 11.5 m. 12.58pm) Very fine consolidated silt, mousse-like. Photo taken.
A3	10/11/07	X	POS: 20°36.479 S, 116°44.783 E. (Depth: 11.5 m. 1.02pm) Heavy silt, hard to release from sampler, mousse-like. Photo taken.
A4	10/11/07	X	POS: 20°36.541 S, 116°44.712 E. (Depth: 12.4 m. 1.04pm) Silty, mousse-like. Photo taken.
A5	10/11/07	X	POS: 20°36.788 S, 116°44.461 E. (Depth: 12 m. 1.12pm) Fine silts, mousse-like. A5 location shifted slightly south-west out of existing channel. Photo taken.
B1	11/11/07	X	POS: 20°35.999 S, 116°45.178 E. (Depth: 12.2 m. 10.55am) Uniform grey silt, slightly orange on surface. Photo taken.

Pluto LNG Development Surface Sediment Sampling (Diver Sampling)
Proposed PLUTO Turning Basin and Channel

Location Axis	Date	Particle Size Distribution	Notes / Comments
B2	11/11/07	X	POS: 20°35.959 S, 116°45.212 E. (Depth: 12 m. 10.50am) Uniform grey silt, slightly orange on surface, mousse-like. Photo taken.
B3	11/11/07	X	POS: 20°35.919 S, 116°45.241 E. (Depth: 12 m. 10.42am) Uniform grey silt, mousse-like. Photo taken.
B4	11/11/07	X	POS: 20°35.835 S, 116°45.312 E. (Depth: 12 m. 10.36am) Fine uniform silts, grey, mousse-like. Photo taken.
B5	11/11/07	X	POS: 20°35.624 S, 116°45.499 E. (Depth: 11 m. 10.30am) Fine uniform silts, grey, mousse-like. Easy release from sampler. Photo taken.
C1	11/11/07	X	POS: 20°36.188 S, 116°44.732 E. (Depth: 12.3 m. 11.44am) Fine sand, silt component, grey, orange fine sands on surface. Photo taken.
C2	11/11/07	X	POS: 20°36.192 S, 116°44.676 E. (Depth: 12 m. 11.38 am) Fine sand and silt, easy to remove from sampler. Photo taken,
C3	11/11/07	X	POS: 20°36.194 S, 116°44.611 E. (Depth: 11.8 m. 11.32am) Fine sand and silt, gritty. Photo taken.

Pluto LNG Development Surface Sediment Sampling (Diver Sampling)
Proposed PLUTO Turning Basin and Channel

Location Axis	Date	Particle Size Distribution	Notes / Comments
C4	11/11/07	X	POS: 20°36.203 S, 116°44.501 E. (Depth: 11.6 m. 11.25am) Fine sand with some grit, silt component. Photo taken.
C5	11/11/07	X	POS: 20°36.221 S, 116°44.206 E. (Depth: 12.5 m. 11.18am) Finer sand with silt fraction, uniform. Photo taken.
D1	11/11/07	X	POS: 20°35.897 S, 116°45.060 E. (Depth: 12 m. 10.13am) Uniform grey silt, difficult to remove from sampler. Photo taken.
D2	11/11/07	X	POS: 20°35.847 S, 116°45.065 E. (Depth: 12 m. 10.07am) Uniform grey silt, easy to push into seabed. Photo taken.
D3	11/11/07	X	POS: 20°35.787 S, 116°45.079 E. (Depth: 11.8 m. 10.02am) Greyish silt, uniform. Photo taken.
D4	11/11/07	X	POS: 20°35.693 S, 116°45.108 E. (Depth: 11.7 m. 9.55am) Grey uniform fine sands with silt, greyish. Photo taken.
D5	11/11/07	X	POS: 20°35.420 S, 116°45.156 E. (Depth: 11 m. 9.47am) Fine sand, silt component, greyish. Photo taken.

Pluto LNG Development Surface Sediment Sampling (Diver Sampling)
Proposed PLUTO Turning Basin and Channel

Location Axis	Date	Particle Size Distribution	Notes / Comments
E1	10/11/07	X	POS: 20°34.909 S, 116°43.827 E. (Depth: 12.3 m. 11.18am) Fine grey sandy, larger silt component than G locations. Photo taken.
E2	10/11/07	X	POS: 20°34.934 S, 116°43.787 E. (Depth: 15 m. 11.23am) Finer sands with silt, grey. Photo taken.
E3	10/11/07	X	POS: 20°34.966 S, 116°43.732 E. (Depth: 11.5 m. 11.30am) Fine grey sands, core fell apart once released from sampler. Photo taken.
E4	10/11/07	X	POS: 20°35.033 S, 116°43.651 E. (Depth: 11 m. 11.34am) Hard bottom, penetration of sample gear difficult for diver. Coarse orange sand. Photo taken.
E5	10/11/07	X	POS: 20°35.228 S, 116°43.427 E. (Depth: 11.5 m. 11.39am) Fine sand, easy to push in for diver, silt component, greyish orange. Photo taken.
F1	10/11/07	X	POS: 20°34.719 S, 116°44.038 E. (Depth: 11.3 m. 12.23am) Greyish fine sand, small silt fraction. Photo taken.

Pluto LNG Development Surface Sediment Sampling (Diver Sampling)
Proposed PLUTO Turning Basin and Channel

Location Axis	Date	Particle Size Distribution	Notes / Comments
F2	10/11/07	X	POS: 20°34.699 S, 116°44.082 E. (Depth: 10.5 m. 12.19pm) Coarse orange sand, small shell fragments. Photo taken.
F3	10/11/07	X	POS: 20°34.653 S, 116°44.126 E. (Depth: 10.7 m. 12.14pm) Orange sandy. Photo taken.
F4	10/11/07	X	POS: 20°34.592 S, 116°44.214 E. (Depth: 11.2 m. 12.08pm) Finer sand, greyish orange.
F5	10/11/07	X	POS: 20°34.426 S, 116°44.433 E. (Depth: 10.5 m. 12.00pm) Coarse orange sand, difficult to push in for diver. Photo taken.
G1	10/11/07	X	POS: 20°33.855 S, 116°42.919 E. Gritty sand and silt, orange, small silt component.
G2	10/11/07	X	POS: 20°33.885 S, 116°42.885 E. Gritty sand and silt, orange, shell fragments, small silt component. Photo taken.
G3	10/11/07	X	POS: 20°33.937 S, 116°42.855 E. Gritty sand and silt, orange, shell fragments, small silt component. Photo taken.

Pluto LNG Development Surface Sediment Sampling (Diver Sampling)
Proposed PLUTO Turning Basin and Channel

Location Axis	Date	Particle Size Distribution	Notes / Comments
G4	10/11/07	X	POS: 20°33.978 S, 116°42.748 E. (Depth: 14.6 m. 10.40am) Gritty sand and silt, orange, shell fragments, small silt component. Photo taken.
G5	10/11/07	X	POS: 20°34.155 S, 116°42.519 E. (Depth: 13.7 m. 10.50am) Gritty sand, orange, small silt component. Photo taken.
H1	11/11/07	X	POS: 20°33.671 S, 116°43.147 E. (Depth: 12.8 m. 9.10am) Coarse orange sand with shell fragments. Photo taken.
H2	11/11/07	X	POS: 20°33.633 S, 116°43.190 E. (Depth: 13 m. 9.05am) Coarse orange greyish sand, shell fragments. Photo taken.
H3	11/11/07	X	POS: 20°33.600 S, 116°43.248 E. (Depth: 13 m. 9.0am) Coarse orange greyish sand, shell fragments. Photo taken.
H4	11/11/07	X	POS: 20°33.536 S, 116°43.346 E. (Depth: 13.5 m. 8.56am) Coarse orange greyish sand with shell fragments. Photo taken.
H5	11/11/07	X	POS: 20°33.355 S, 116°43.546 E. (Depth: 13.7 m. 8.50am) Coarse sandy material, orange grey. Photo taken.

Pluto LNG Development Surface Sediment Sampling (Diver Sampling)
Proposed PLUTO Turning Basin and Channel

Location Axis	Date	Particle Size Distribution	Notes / Comments
I1	16/11/07	X	POS: 20°36.422 S, 116°45.045 E. (Depth: 7.8 m. 9.58am) Heavy grey silt, difficult to remove from sampler, uniform. Photo taken.
I2	16/11/07	X	POS: 20°36.477 S, 116°45.048 E. (Depth: 7.7 m. 10.05am) Fine grey silt, easy to remove from sampler, uniform. Photo taken.
I3	16/11/07	X	POS: 20°36.521 S, 116°45.047 E. (Depth: 7.5 m. 10.10am) Fine grey silt, uniform. Photo taken.
I4	16/11/07	X	POS: 20°36.639 S, 116°45.055 E. (Depth: 6.8 m. 10.16am) Silty grey very fine sand, orangy-greyish. Photo taken.
I5	16/11/07	X	POS: 20°36.752 S, 116°45.052 E. (Depth: 6.4 m. 10.21am) Coarse orange/grey sand, difficult to collect for diver – scraping taken off very top. Photo taken.
J1	16/11/07	X	POS: 20°36.088 S, 116°45.263 E. (Depth: 10.2 m. 11.04am) Fine grey silt, consolidated, difficult to remove from sampler. Photo taken.

Pluto LNG Development Surface Sediment Sampling (Diver Sampling) Proposed PLUTO Turning Basin and Channel				
Location Axis	**Date**	**Particle Size Distribution**	**Notes / Comments**	
J2	16/11/07	X	POS: 20°36.047 S, 116°45.306 E. (Depth: 10 m. 10.57am) Very fine silt, grey, uniform, difficult to remove from sampler. Photo taken.	
J3	16/11/07	X	POS: 20°36.018 S, 116°45.354 E. (Depth: 9 m. 10.51am) Very fine silt, difficult to remove from sampler, uniform grey, consolidated. Photo taken.	
J4	16/11/07	X	POS: 20°35.949 S, 116°45.449 E. (Depth: 6.6 m. 10.45am) Coarse gritty sand and shell fragments on top 10cm. Silty material deeper in profile. Photo taken.	
J5	16/11/07	X	POS: 20°35.785, 116°45.667 E. (Depth: 4.6 m. 10.40am) Grey gritty sand with silt fraction, easy removal from sampler. Photo taken. Sandy bottom.	

Appendix 16 – Implementation of Blasting Procedures

Due to the success of mechanical dredging methods in the berth pocket and inner trunkline, only a single blast pattern has been required to date. This occurred during daylight hours on 17 October 2008 without incident. The DEMG were consulted and provided the following advice. Following submission of DEMG advice, correspondence was provided to DEC outlining the completion of marine blasting operations.

Our Reference: DRIMS # 4500501
Your Reference :

15 October 2008

Neville Bryant
Infrastructure Manager
Pluto LNG Project
Woodside Energy Ltd.
240 St Georges Terrace
Perth WA 6000
Australia

DEMG
Pluto LNG Project
Dredge Environmental Management Group

Please direct all responses/queries to:
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Dear Neville

DEMG ADVICE REGARDING NEAR SHORE BLASTING ACTIVITES ASSOCIATED WITH THE PLUTO LNG PROJECT

Woodside Energy Ltd (Woodside) as part of its dredging programme for the Pluto LNG Project, needs to undertake a single blast pattern with a remote possibility of some isolated clean up blasts near Holden Point as part of the near-shore trunkline works. Approximately 2 days of dredging will accompany the blasting activities, to remove fractured rock for disposal at Spoil Ground A/B. As committed in the approved Sea Turtle Management Plan, the Dredge Environmental Management Group (DEMG) established by the Minister for Environment has been requested to comment and provide recommendations on the proposed blasting operation in particular the proposed exclusion zone for the blasting operation, as well as on the water quality and coral health monitoring survey frequency that may be required for these works.

The DEMG discussed these matters at a meeting on Friday 10 October 2008. To assist its discussions, the DEMG was provided with considerable additional technical information and advice regarding calculating and managing the impacts of blasting and the setting of appropriate exclusion zones.

The DEMG would like to provide the DEC and Woodside with the following Comments and Recommendations:

1. The DEMG supports the proposed blasting radius exclusion zone of 1000m for sea turtles and marine mammals and considers that this will provide acceptable levels of environmental protection

   The DEMG notes that this exclusion zone should be considered as very conservative based on experience from previous Mermaid Sound blasting and other relevant international practice. However, given that only a single blast pattern and not an extended blasting campaign is proposed, it appears manageable in this instance. The DEMG notes that due to the location of the blast being close to shore only approximately half of a circular exclusion radius is therefore required. The selection of a 1000m exclusion zone for this

operation should not create a precedent for future blasting operations. Each blasting project should be considered individually and assessed accordingly.

2. The DEMG recommends that the highest monitoring effort for sea turtles, dugongs and cetaceans should be concentrated closer to the proposed blast pattern (the 0-500m zone), rather than at the outer extent of the 1000m where the risk of impact to marine fauna is far lower.. Focus should be directed towards ensuring the areas closest to the blast are clear of these animals. While effort should be made to cover the outer area using support vessels, the DEMG recognises that effective observation and management (especially of sea turtles) at this distance from the blast can be extremely difficult especially under adverse sea conditions. The DEMG notes that this is an operational reality and is of the view that it is acceptable in this case because the very conservative parameters applied has ensured that in the outer rim of the 1000m exclusion zone the risk of impact on marine fauna is extremely low.

3. The DEMG also notes that the Pluto LNG Project dredging monitoring programme is currently operating on a monthly survey frequency due to the suspension of dredging activities. The DEMG considers that recommencement of the full water quality and coral health survey frequency solely for this blasting event and associated dredging and disposal of fractured rock is not warranted considering the small size, short duration (approximately two days) and nature of the operation (removal of fractured rock) which will cause only very minor turbidity in a the area. Re-instatement of the reactive components of the water quality and coral health monitoring programme is highly unlikely to provide additional environmental benefits or management options.

   The DEMG recommends that the proponent undertake suitable observations during the dredging and blasting activities to confirm these views.

We trust these Comments and Recommendations will be of value in further developing the monitoring and audit programmes for the Pluto LNG dredging operation.

Yours faithfully

Des Lord

CHAIR: PLUTO LNG PROJECT DEMG

CC- Department of Environment and Conservation – Ian Munro

Please direct all responses/queries to:
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Our reference: PLU/GOV/00299
DRIMS #4496212
Your reference:

14 October 2008

BY COURIER

Mr Ian Munro
Manager, Inspection and Compliance
Environmental Regulation Division
The Atrium
Level 4, 168 St Georges Terrace
Perth Western Australia 6000

Dear Ian,

BLASTING EXCLUSION ZONE AND SURVEY FREQUENCY – PLUTO PROJECT

Exclusion Zone
During the approvals process for the Sea Turtle Management Plan required by Condition 9-1 of the Pluto Ministerial Statement, the EPASU requested verification of the 500m exclusion zone for sea turtles and marine mammals. Section 4.1 of the approved plan includes a commitment that physical characteristics of the proposed blasting will be calculated, which will then be evaluated by environmental professionals in relation to physiological tolerances of key species.

This process has been completed and the outcomes were discussed in DEMG meeting 12, on 10 October 2008. A review conducted by Dr Norm Broner (SKM Practice Leader – Acoustics) based on the proposed blasting specifications is attached. We understand that DEMG advice on the matter is currently being prepared.

The cutter suction dredge 'Phoenix' and backhoe dredge 'Hippopotes' made excellent progress in the Pluto turning basin and trunkline shore crossing during Phase 1 of the programme, therefore the volume of blasting required has been reduced significantly to only a single blast. This blast will now proceed on the 16/17 October 2008. As this is a single blast and there is not a lead in period to develop a site specific response, a precautionary exclusion radius of 1000m has been adopted along with the other controls specified for this activity in the Sea Turtle Management Plan. This size exclusion zone has been successfully implemented on another Woodside project recently, with no cases of sea turtle or marine mammal injury or mortality.

This information is submitted for your records.

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Survey Frequency
Further to our correspondence dated 20 August 2008, the monitoring programme remains on a monthly survey frequency as dredging activities are currently suspended. The above blasting activities will require approximately 2 days of backhoe dredging with disposal of fractured rock to Spoil Ground A/B. This technically represents a recommencement of dredging activities for the Pluto Project, however given the short duration, and nature of the works (a low volume of coarse material removed by backhoe dredge); re-instatement of the full survey frequency and reactive components of the monitoring programme (telemetry and daily water quality reports) does not appear warranted. This proposal was tabled with the DEMG on 6 October 2008, and we understand DEMG advice on the matter is currently being prepared. Woodside consider that given the low risk potential of the activity, effort would be better placed on continued maintenance of equipment, and re-instatement of coral monitoring sites affected by the 2007/2008 thermal bleaching event. Qualitative/visual observations of the blasting and dredging activities will be made to supplement the monthly survey data.

If you have any queries, please do not hesitate to contact Nick Jones on 9348 3817.

Yours sincerely

Neville Bryant
Infrastructure Manager

cc: Richard Sutherland (DEC)
cc: Des Lord (Pluto DEMG Chair)

Attachment 1: Dr Norm Broner Memo