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ENGINEERING BOREHOLE LOG

FOR GEOTECHNICAL TERMS AND
SYMBOLS REFER FORM F:GEOT 017/5-2009

BOREHOLE No BH034
SHEET 1 of 4
REFERENCE No H10582

PROJECT BRUCE HIGHWAY (COOROY - CURRA) SECTION A GEOTECHNICAL INVESTIGATION
LOCATION Cut 12 COORDINATES 485052.1 E; 7081141.9 N
PROJECT No FG5825 SURFACE R.L. 179.85m PLUNGE _____ DATE STARTED 21/7/09 GRID DATUM MGA94
JOB No 128/10A/901 HEIGHT DATUM AHD BEARING _____ DATE COMPLETED 22/7/09 DRILLER R & D Drilling

DEPTH (m)	R.L. (m)	AUGER CASING WASH BORING CORE DRILLING	RQD (%)	SAMPLE	MATERIAL DESCRIPTION	LITHOLOGY	USC WEATHERING	INTACT STRENGTH	DEFECT SPACING (mm)	GRAPHIC LOG	ADDITIONAL DATA AND TEST RESULTS	SAMPLES TESTS
0	179.85		CORE REC %									
1				A	Clayey SILT (Residual) Light grey to mottled red-brown, moist, stiff to very stiff.							
					Traces of organics; occasional relic rock structure.	(ML)					3,4,8 N=12	SPT
2	178.20			B	PHYLLITE (XW): Generally exhibits the engineering properties of pale brown to grey, moist, very stiff to hard clayey Silt.						5,8,11 N=19	SPT
					Rock fabric visible in parts.	XW						
3	176.85			C	PHYLLITE (HW) Mottled red to brown, fine grained, foliated.							
			(0)		In parts exhibits the engineering properties of moist, hard, gravelly clay.						14,21,23 N=44	SPT
4			100 (19)		Occasional quartz bands.	HW						
5			100 (25)		Detailed defect descriptions are shown on Form GEOT533/8 attached.							
6	174.35				PHYLLITE (MW): Light brown, fine grained, foliated.							
			100 (44)		Foliations are indistinct and dip at ~30°.	MW					MC = 10.8%; UCS=3.98MPa	UCS
7					Defects are generally close to medium spaced.							
			100 (11)		Prominent defect set parallel to foliation with another set at 70°.							
8					Defect surfaces are typically iron stained or thinly clay infilled.							
					Occasional clay seams up to 50mm.							
9	171.35				PHYLLITE (HW): Mottled red to brown, fine grained, foliated.							
					Heavily brecciated; quartz veins throughout.	HW						
10												

REMARKS Detailed defect descriptions are shown on Form GEOT533/8 attached.

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ENGINEERING BOREHOLE LOG

FOR GEOTECHNICAL TERMS AND
SYMBOLS REFER FORM F:GEOT 017/5-2009

BOREHOLE No BH034
SHEET 2 of 4
REFERENCE No H10582

PROJECT BRUCE HIGHWAY (COOROY - CURRA) SECTION A GEOTECHNICAL INVESTIGATION
LOCATION Cut 12 COORDINATES 485052.1 E; 7081141.9 N
PROJECT No FG5825 SURFACE R.L. 179.85m PLUNGE _____ DATE STARTED 21/7/09 GRID DATUM MGA84
JOB No 128/10A/901 HEIGHT DATUM AHD BEARING _____ DATE COMPLETED 22/7/09 DRILLER R & D Drilling

DEPTH (m)	R.L. (m)	AUGER CASING WASH BORING CORE DRILLING	RQD (%)	CORE REC %	SAMPLE	MATERIAL DESCRIPTION	LITHOLOGY	USC	WEATHERING	INTACT STRENGTH	DEFECT SPACING (mm)	GRAPHIC LOG	ADDITIONAL DATA AND TEST RESULTS	SAMPLES	TESTS
10	169.85		100			PHYLLITE (HW): (Cont'd)									
			(29)			10.5 - 10.8m: MW band.							Clay seam Crushed quartz vein with clay infilling Is(50) = 0.09MPa Is(50) = 0.04MPa		
11			100										Heavily fractured quartz vein and clay seams.		
			(0)										Heavily fractured quartz vein and clayey zone.		
12						Detailed defect descriptions are shown on Form GEOT533/8 attached.									
			100										Is(50) = 0.20MPa		
			(7)												
13						13.0 - 13.5m: MW band.									
			100												
			(0)												
14						14.8 - 15.7m: MW band.							Clayey crushed quartz veins Clay seam		
			100										Is(50) = 0.50MPa Is(50) = 0.30MPa		
			(0)												
15															
			100												
			(0)												
16													Crushed quartz vein		
			100												
			(0)												
17	163.40					PHYLLITE (MW): Light brown, fine grained, foliated.							Is(50) = 0.07MPa Is(50) = 0.12MPa MC = 6.4%; UCS=3.64MPa		
						Foliations are indistinct and dip at ~30°.									
						Defects are generally close to medium spaced.									
			100			Prominent defect set parallel to foliation with another set at 70°.							MC = 7%; UCS=4.04MPa		
			(0)			Defect surfaces are typically iron stained or thinly clay infilled.									
18						Occasional clay seams up to 50mm thick.									
			100										Is(50) = 0.24MPa MC = 6.4%; UCS=2.05MPa		
			(0)										Is(50) = 0.21MPa		
19															
20															

REMARKS Detailed defect descriptions are shown on Form GEOT533/8 attached.

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ENGINEERING BOREHOLE LOG

FOR GEOTECHNICAL TERMS AND
SYMBOLS REFER FORM F:GEOT 017/5-2009

BOREHOLE No BH034
SHEET 3 of 4
REFERENCE No H10582

PROJECT BRUCE HIGHWAY (COOROY - CURRA) SECTION A GEOTECHNICAL INVESTIGATION
LOCATION Cut 12 COORDINATES 485052.1 E; 7081141.9 N
PROJECT No FG5825 SURFACE R.L. 179.85m PLUNGE _____ DATE STARTED 21/7/09 GRID DATUM MGA94
JOB No 128/10A/901 HEIGHT DATUM AHD BEARING _____ DATE COMPLETED 22/7/09 DRILLER R & D Drilling

DEPTH (m)	R.L. (m)	AUGER CASING WASH BORING CORE DRILLING	RQD (%)	SAMPLE	MATERIAL DESCRIPTION	LITHOLOGY	USC WEATHERING	INTACT STRENGTH	DEFECT SPACING (mm)	GRAPHIC LOG	ADDITIONAL DATA AND TEST RESULTS	SAMPLES TESTS
20	159.85											
21			100		PHYLLITE (MW): (Cont'd)							
22	158.25		100		PHYLLITE (MW - SW): Pale grey, fine grained, foliated. Foliations are distinct and vary in dip from 40 to 70°. Defects are generally medium to widely spaced.						Is(50) = 0.19MPa Is(50) = 0.15MPa	o x
23			100		Prominent defect set parallel to foliation with another set at 20°. Defect surfaces are typically thinly clay infilled or clean. 23.13 - 23.45m: High strength quartz vein.							
24			100								Is(50) = 0.13MPa Is(50) = 0.29MPa	x o
25			100		21.6 - 25.4m: Brecciated zone with prominent quartz veining.						Is(50) = 0.30MPa Is(50) = 0.53MPa	x o
26			100									
27			100		Detailed defect descriptions are shown on Form GEOT533/8 attached.						Is(50) = 0.32MPa Is(50) = 0.37MPa	x o
28			100									
29			100		29.0 - 30.75m: Clayey sheared / broken zone with prominent quartz veining.						Is(50) = 0.24MPa Is(50) = 0.11MPa	x o
30			100									

REMARKS Detailed defect descriptions are shown on Form GEOT533/8 attached.

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Main Roads

ENGINEERING BOREHOLE LOG

FOR GEOTECHNICAL TERMS AND
SYMBOLS REFER FORM F:GEOT 017/5-2009

BOREHOLE No BH034

SHEET 4 of 4

REFERENCE No H10582

PROJECT BRUCE HIGHWAY (COOROY - CURRA) SECTION A GEOTECHNICAL INVESTIGATION

LOCATION Cut 12 COORDINATES 485052.1 E; 7081141.9 N

PROJECT No FG5825 SURFACE R.L. 179.85m PLUNGE DATE STARTED 21/7/09 GRID DATUM MGA94

JOB No 128/10A/901 HEIGHT DATUM AHD BEARING DATE COMPLETED 22/7/09 DRILLER R & D Drilling

DEPTH (m)	R.L. (m)	AUGER CASING WASH BORING CORE DRILLING	RQD (%)	CORE REC %	SAMPLE	MATERIAL DESCRIPTION	LITHOLOGY	USC WEATHERING	INTACT STRENGTH	DEFECT SPACING (mm)	GRAPHIC LOG	ADDITIONAL DATA AND TEST RESULTS	SAMPLES TESTS
30	149.85					PHYLLITE (MW - SW): (Cont'd)							
			100									Sheared/broken zone	
						Detailed defect descriptions are shown on Form GEOT533/8 attached.						MC = 2.4%; UCS=8.94MPa	UCS
												Is(50) = 0.10MPa	x
												Is(50) = 0.17MPa	o
31													
	148.13		100			Borehole terminated at 31.72m							
32													
33													
34													
35													
36													
37													
38													
39													
40													

REMARKS Detailed defect descriptions are shown on Form GEOT533/8 attached.

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Project: **Bruce Highway Upgrade (Cooroy – Curra) Section A**
 Borehole No: **BH34 Cut 12**
 Start Depth: 3.00m
 Finish Depth: 31.72m
 Project No: FG5825
 H No: 10582



SCALE 1:5

F:GEOT043/1

Project: **Bruce Highway Upgrade (Cooroy – Curra) Section A**
Borehole No: **BH34 Cut 12**
Start Depth: 3.00m
Finish Depth: 31.72m
Project No: FG5825
H No: 10582



0 100 200 300 400 500 600mm

SCALE 1:5

F:GEOT043/1

Project: **Bruce Highway Upgrade (Cooroy – Curra) Section A**
Borehole No: **BH34 Cut 12**
Start Depth: 3.00m
Finish Depth: 31.72m
Project No: FG5825
H No: 10582

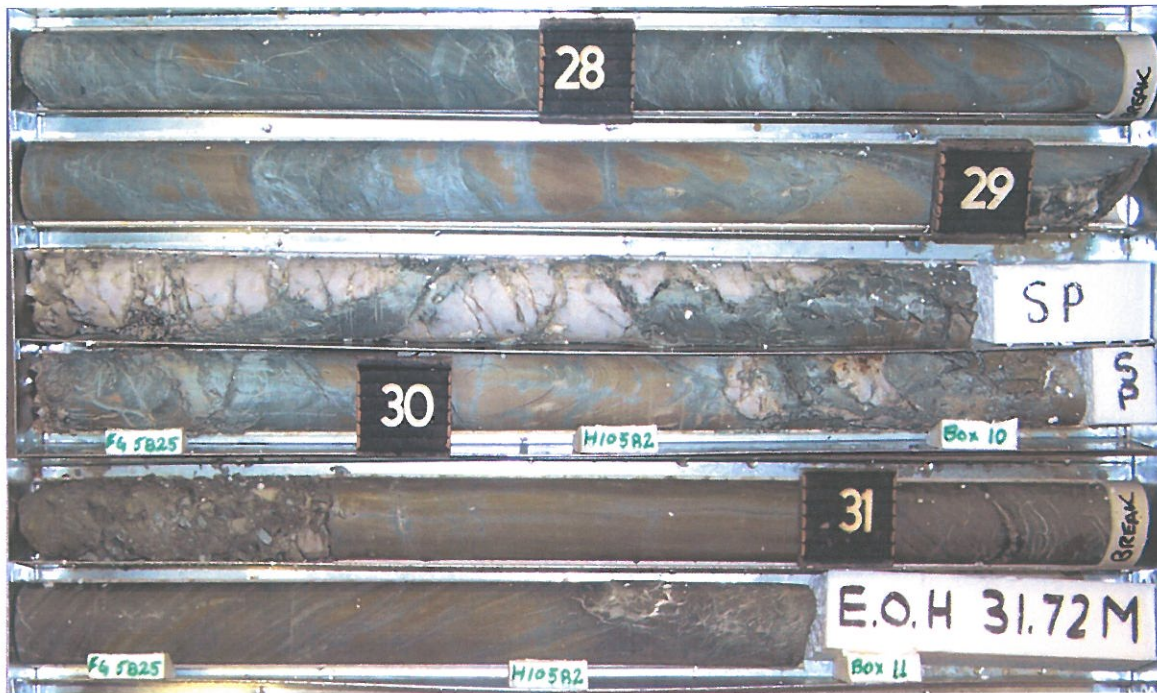


0 100 200 300 400 500 600mm

SCALE 1:5

F:GEOT043/1

Project: **Bruce Highway Upgrade (Cooroy – Curra) Section A**
Borehole No: **BH34 Cut 12**
Start Depth: 3.00m
Finish Depth: 31.72m
Project No: FG5825
H No: 10582



SCALE 1:5

F:GEOT043/1

DEFECT DESCRIPTIONS OF ENGINEERING BORELOGS

[CHARACTERISATION OF DEFECTS ARE IN ACCORDANCE WITH
ISRM SUGGESTED METHODS (1981)]

BOREHOLE NO.:	BH34
SHEET:	1 of 5
REFERENCE NO.:	H10582

PROJECT: Bruce Highway (Cooroy – Curra) Section A Geotechnical Investigation

LOCATION: Cut 12

PROJECT NO.: FG5825

SURFACE R.L.: 179.9

DRILLER: R & D Drilling

JOB NO.: 128/10A/901

DATUM: MGA94

DATE DRILLED: 21/7/09

DEPTH	DEFECT TYPE	DIP°	PLANARITY	ROUGHNESS	APERTURE	WALL ALTERATION	OTHER
3.22	J	70°	PI	S	O		Cn
3.22	J	Subvertical	PI		C	FeSt	
3.33	J	10°	Ir		C	FeSt	
4.20	J	70°	PI		C		Cl
4.42	J	30°	PI	S	O		Cn
4.43	J	30°	PI	S	O		Cn
4.50	J	30°	PI	S	O		Cn
4.60	J	10°	Ir	R	T		Cn
4.74	J	60°	PI	S	O		Cl
5.55	J	30°	PI		C		Cl
5.58	J	70°	PI		C		Cl
5.63	J	30°	PI		C		Cl
5.92	J	70°	PI	S	T	FeSt	
6.22	J	50°	PI	SR	O		Cn
6.42	J	30°	PI	S	O	FeSt	
6.44	J	60°	PI		C		Cl
6.47	J	30°	PI	R	O		Cn
6.55	J	30°	PI	S	O	FeSt	

Abbreviations (as per F: GEOT 017/5 – 2009)

ROUGHNESS		WALL ALTERATIONS		TYPE		OTHER	
R	Rough	FeSt	Iron Stained	J, Js	Joint, Joints	Cl	Clay Infill
Sr	Slightly Rough	W	Weathered	B	Bedding	CLy	Clayey
S	Smooth	Smn	Secondary Mineralisation	BP	Bedding Parting	Co	Coal Seam
SL	Slickensided	Cn	Clean	FP	Foliation Parting	Carb	Carbonaceous
PO	Polished	MnSt	Manganese Stained	LP	Lamination Parting	SI	Sand Infill
PLANARITY		APERTURE		CLV	Cleavage	QZ	Quartz
PI	Planar	C	Closed	Fr	Fracture	CA	Calcite
St	Stepped	O	Open	SZ	Sheared Zone	Chl	Chlorite
Un	Undulating	F	Filled	CZ	Crushed Zone	In	Incipient
Cu	Curved	T	Tight	BZ	Broken Zone	Int	Intersecting
Ir	Irregular			HFZ	Highly Fractured Zone	Lam (s)	Lamination (s)
				WS	Weathered Seam	Di	Drilling Induced
				Vn	Vein	H	Horizontal
						V	Vertical

NOTE: This sheet should be read in conjunction with appropriate Engineering Borelog. Defect angles were measured with respect to horizontal plane.

BOREHOLE NO.:	BH34
SHEET:	2 of 5
REFERENCE NO.:	H10582

DEPTH	DEFECT TYPE	DIP°	PLANARITY	ROUGHNESS	APERTURE	WALL ALTERATION	OTHER
6.64	J	80°	Pl		C	FeSt	
6.76	J	30°	Pl	S	T	FeSt	
7.06	J	20°	lr	R	O	FeSt	
7.11	J	10°	Pl	S	T	FeSt	
7.16	J	10°	Pl	S	T	FeSt	
7.20	J	10°	Pl	S	T		
7.40	J	80°	Pl	S	T	FeSt	
7.47	J	20°	lr	S	O	FeSt	
7.54	J	20°	lr	R	O	FeSt	
7.63	J	10°	lr	R	O	FeSt	
7.87	J	10°	lr	R	T	FeSt	
7.92	J	10°	Pl	S	O	FeSt	
7.97	J	30°	Pl	S	O	FeSt	
8.03	J	30°	Pl		C		Cl
8.05	J	30°	Pl		C	FeSt	
8.07	J	30°	lr		C		Cl
8.25	J	Subvertical	Pl	S	O	FeSt	
8.28	J	30°	Pl	S	O	FeSt	
8.33	J	30°	Pl		C		Cl
8.33	J	80°	Pl		C		Cl
8.42	J	30°	Pl	S	O		Cl
8.45	J	30°	Pl		T		Cl
8.75	J	10°	lr	R	T		
9.36	J	Subvertical	lr		C		Cl
9.50	J	10°	Pl	SR	T		
9.62	J	10°	lr	R	T		
9.71	J	30°	Pl	S	O		Cn
9.8	J	50°	Pl	S	T		Cl
10.61	J	20°	Pl	SR	O	FeSt	
10.71	J	10°	lr	SR	T	FeSt	
11.26	J	45°	Pl	S	O	FeSt	
11.30	J	Subvertical	Cu		C		Cl
11.65	J	Subvertical	lr	S	T	FeSt	
11.95	J	10°	Pl	R	O	FeSt	
11.97	J	60°	Pl	S	T		Cl
12.12	J	60°	Pl		C		Cl
12.17	J	60°	Pl		C		
12.25	J	45°	Pl	S	O	FeSt	
12.27	J	Subvertical	lr	S	T		Cn
12.45	J	Subvertical	lr	S	T	FeSt	
12.80	J	Subvertical	lr	S	T	FeSt	
13.00	J	45°	Pl	S	T	FeSt	
13.29	J	60°	Pl	SR	O	FeSt	
13.35	J	Subvertical	Cu	S	T	FeSt	
13.61	J	10°	lr	R	T		
14.39	J	50°	Pl		C	FeSt	
14.52	J	60°	Pl	S	O		Cl
14.61	J	45°	Pl	S	O	FeSt	
14.64	J	45°	Pl	S	O		Cl
14.67	J	45°	Pl	S	O		Cl
14.69	J	80-90°	Pl	S	C		Cl
14.82	J	45°	Pl	R	O		Cn
15.12	J	20°	Pl	R	O	FeSt	
15.24	J	45°	Pl		T		
15.38	J	20°	Pl	R	C		
15.45	J	50°	Pl		C		Cl
15.58	J	70°	Pl	S	O	FeSt	

BOREHOLE NO.:	BH34
SHEET:	3 of 5
REFERENCE NO.:	H10582

DEPTH	DEFECT TYPE	DIP°	PLANARITY	ROUGHNESS	APERTURE	WALL ALTERATION	OTHER
16.25	J	70°	Pl	S	O	FeSt	
16.29	J	70°	Pl	S	C		
16.46	J	60°	Pl	S	O		Cn
16.50	J	20°	Pl	S	C		Cl
16.58	J	10°	Pl	S	C	FeSt	
16.61	J	10°	Pl	S	C	FeSt	
16.66	J	20°	Pl	SR	O	FeSt	
16.76	J	60°	Pl		C		Cl
16.87	J	20°	Pl		C		
16.94	J	20°	lr	R	O	FeSt	
17.22	J	40°	Pl	S	O	FeSt	
17.29	J	10°	Pl		C		
17.40	J	10°	Pl		C		
17.49	J	10°	Pl	S	O	FeSt	
17.52	J	10°	Pl	S	O	FeSt	
17.76	J	60°	Pl	S	O	FeSt	
17.80	J	30°	Pl	S	O	FeSt	
17.88	J	30°	Pl	S	O	FeSt	
18.00	J	60°	Pl	S	C	FeSt	
18.02	J	30°	Pl	S	C	FeSt	
18.10	J	30°	Pl	S	O	FeSt	
18.30	J	20°	Pl		C		
18.30	J	60°	Pl	S	O	FeSt	
18.35	J	80-90°	Pl	S	O	FeSt	
18.40	J	80-90°	lr	S	O	FeSt	
18.50	J	80-90°	lr		O		Cl
18.59	J	80°	Pl		C		Cl
18.67	J	45°	Pl	S	C	FeSt	
19.20	J	45°	Pl	S	O	FeSt	
19.37	J	45°	Pl	S	O	FeSt	
19.39	J	45°	Pl	S	C	FeSt	
19.56	J	80-90°	Pl	S	O	FeSt	
19.63	J	10°	Pl	S	O	FeSt	
19.65	J	60°	Pl	S	O	FeSt	
19.84	J	60°	Pl	S	O	FeSt	
19.94	J	60°	Pl	S	O	FeSt	
20.10	J	10°	Pl	SR	O	FeSt	
20.20	J	60°	Pl	S	O	FeSt	
20.37	J	20°	Pl	S	O	FeSt	
20.66	J	10°	lr	SR	O		Cl
20.70	J	10°	lr	R	C	FeSt	
20.83	J	20°	Pl		C		
20.87	J	20°	Pl	S	O	FeSt	
20.91	J	20°	Pl	S	O	FeSt	
20.92	J	20°	Pl	S	O	FeSt	
21.01	J	20°	Pl	S	O	FeSt	
21.04	J	20°	Pl	S	O	FeSt	
21.06	J	20°	Pl	S	O	FeSt	
21.07	J	20°	Pl	S	O	FeSt	
21.09	J	20°	Pl	S	O	FeSt	
21.13	J	20°	Pl	S	O	FeSt	
21.15	J	20°	Pl	S	O	FeSt	
21.21	J	10°	Pl	S	O	FeSt	
21.34	J	10°	Pl	S	O	FeSt	
21.80	J	60°	lr	SR	O		Cn
22.17	J	45°	Pl		C		
22.23	J	65°	Pl		C		Cl

BOREHOLE NO.:	BH34
SHEET:	4 of 5
REFERENCE NO.:	H10582

DEPTH	DEFECT TYPE	DIP°	PLANARITY	ROUGHNESS	APERTURE	WALL ALTERATION	OTHER
22.27	J	50°	Pl		C		
22.56	J	45°	Pl		C		Cl
22.66	J	45°	Ir	R	C		
22.71	J	30°	St		C		
22.76	J	30°	Ir	SR	O		Cn
23.17	J	20°	Pl		C		Cl
23.22	J	10°	Pl		C		Cl
23.25	J	20°	Pl		C		Cl
23.31	J	30°	Pl		C		Cl
23.32	J	30°	Pl		C		Cl
23.34	J	30°	Pl		C		Cl
23.39	J	20°	Pl		C		Cl
23.46	J	10°	Ir		C		Cl
23.57	J	30°	Pl	S	O		Cl
23.70	J	30°	Pl		C		
23.73	J	30°	Pl		C		
23.75	J	70°	Pl	R	O		Cn
23.8	J	45°	Ir	SR	O		Cl
23.93	J	30°	Pl	S	O		Cn
24.03	J	30°	Pl	S	O		Cl
24.06	J	30°	Pl	SR	O		Cn
24.12	J	30°	Ir	S	O		Cn
24.19	J	30°	Ir	S	O		Cn
24.32	J	30°	Pl	SR	O		Cn
24.40	J	10°	Un	R	O		Cn
24.99	J	30°	Ir	SR	O		Cn
25.05	J	10°	Ir	R	C		
25.71	J	60°	Pl	S	C	FeSt	
25.73	J	30°	Pl		C		Cl
25.80	J	70°	Pl	S	O	FeSt	
25.85	J	70°	Pl	S	O	FeSt	
25.88	J	10°	Ir	SR	O		Cn
26.00	J	20°	Pl		C		Cl
26.00	J	70°	Pl		C		Cl
26.07	J	45°	Pl	S	O		Cl
26.50	J	30°	Pl		C		Cl
26.55	J	60°	Pl		C		Cl
26.67	J	20°	Ir	R	O		Cn
26.80	J	60°	Pl		C		Qz
26.89	J	50°	Pl		C		Cl
26.93	J	30°	Pl		C		Cn
26.97	J	10°	Un		C		Cn
26.98	J	30°	Pl		C		Cl
27.14	J	30°	Pl		C		
27.31	J	30°	Ir	R	O		Cn
27.44	J	60°	Pl	S	O		Cn
27.48	J	45°	Pl	S	O		Cn
27.56	J	30°	Pl		C		
27.95	J	30°	Pl	S	O		Cn
28.34	J	60°	Pl		C		
28.53	J	60°	Pl		C		Cl
28.65	J	10°	St		C		Cn
29.00	J	70°	Pl		C		Cl
29.03	J	70°	Pl	SR	O		Cl
29.11	J	10°	Pl	SR	O		Cl
29.20	J	10°	Pl	SR	O		Cl
29.24	J	10°	Pl	SR	O		Cl

BOREHOLE NO.:	BH34
SHEET:	5 of 5
REFERENCE NO.:	H10582

DEPTH	DEFECT TYPE	DIP°	PLANARITY	ROUGHNESS	APERTURE	WALL ALTERATION	OTHER
29.27	J	10°	Pl	SR	O		Cl
29.29	J	10°	Pl		C		Cl
29.32	J	30°	Pl		C		Cl
29.41	J	30°	Pl		C		Cl
29.45	J	30°	Pl		C		Cl
29.49	J	30°	Pl		C		Cl
29.52	J	45°	Pl		C		Cl
29.53	J	80-90°	lr	R	C		Cl
29.57	J	30°	Pl		C		Cl
29.81	J	30°	Pl	S	O		Cl
29.94	J	45°	Pl		C		Cl
30.03	J	30°	Pl	S	O		Cn
30.03	J	70°	Pl	S	O		Cn
31.00	J	20°	Pl	SR	O		Cn
31.08	J	30°	Pl	R	O		Cn
31.16	J	40°	Pl	S	O		Cn
31.24	J	30°	Pl	S	O		Cn
31.32	J	50°	Pl	S	O		Cn
31.41	J	50°	Pl		C		
31.59	J	10°	Pl	SR	O		Cn