Central Queensland Coal Project

Appendix 6g – Core Permeability Tests

Central Queensland Coal

CQC SEIS, Version 3

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John Bernal
Waratah Coal Pty Ltd
Level 17, 240 Queen Street
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Attention: John

Re: Styx Core Test Data Results

Two recently drill holes were sampled to gain representative lithologies from major interburden units. Boreholes from which core samples were taken include STX1812 and STX1903. The core samples were laboratory tested to determine vertical and horizontal hydraulic conductivity. Testing for vertical permeability was taken perpendicular to the bedding planes, while horizontal permeability was taken parallel to the bedding planes. There was a high degree of test failures during the testing process under the pressurised test regimen which was predominantly occurred in laminated mudstone lithology while sand dominant intervals were better capable of standing up to pressures exerted. Of a total of 76 horizontal and vertical tests undertaken, 26 tests failed. This effectively skews the test data towards a higher value of permeability and porosity.

A summary of the core permeability test results is provided in Table 1. These results can be regarded as lower limits for use in model calibration, as cores do not capture the bulk fractured characteristics of a formation.

Porosity testing was also undertaken on a sub sample of the stratigraphic column presented by the two boreholes. Tis included 8 tests for total porosity and effective porosity or specific yield. Average total porosity was 9.7% and effective porosity was 1.1%.

Table 1: Core Permeability Test Results

Horizontal Hydraulic Conductivity (m/d)					
Arithmetic Mean	Harmonic Mean	Number of Samples	Max	Min	Formation
4.3×10^{-3}	9.1×10^{-5}	6	2.3×10^{-2}	1.4×10^{-6}	Regolith to Red Lower
1.9×10^{-5}	5.0×10^{-7}	15	1.2×10^{-4}	8.3×10^{-8}	Red Lower to Blue Lower
2.2×10^{-5}	4.4×10^{-6}	2	4.2×10^{-5}	2.3×10^{-6}	Blue Lower to Violet Lower

Vertical Hydraulic Conductivity (m/d)					
Arithmetic Mean	Harmonic Mean	Number of Samples	Max	Min	
9.2×10^{-4}	5.7×10^{-5}	7	3.2×10^{-3}	2.0×10^{-5}	Regolith to Red Lower
3.6×10^{-5}	4.8×10^{-7}	17	6.0×10^{-4}	8.3×10^{-8}	Red Lower to Blue Lower
1.4×10^{-6}	6.7×10^{-7}	3	3.1×10^{-6}	6.7×10^{-7}	Blue Lower to Violet Lower

Yours Sincerely

Andrew Fulton

COMPANY: Andrew Fulton
Project: STX Bore Holes

TOTAL POROSITY, EFFECTIVE POROSITY
PERMEABILITY and HYDRAULIC CONDUCTIVITY

SAMPLE NUMBER	Bore	CORE DEPTH TOP (m)	CORE DEPTH BOTTOM (m)	ORIENTATION	1000psig NOB PRESSURE PERMEABILITY Kinf (md)	1000psig NOB PRESSURE PERMEABILITY Kair (md)	EFFECTIVE POROSITY (%)	Total POROSITY (%)	HYDRAULIC CONDUCTIVITY For 20deg C (m/Day)	HYDRAULIC CONDUCTIVITY For 60deg F (m/Day)	COMMENTS
1	STX1812	20.03	20.20	Horizontal	0.706	0.955			5.86E-04	5.23E-04	
1V				Vertical	0.030	0.100			2.50E-05	2.23E-05	
2		22.52	22.63	Horizontal	0.286	0.400	5.7	13.7	2.37E-04	2.12E-04	
2V				Vertical	0.087	0.139			7.22E-05	6.44E-05	
3		26.33	26.49	Horizontal	0.0016	0.007			1.35E-06	1.20E-06	
3V				Vertical	0.081	0.114			6.68E-05	5.97E-05	
4		34.18	34.30	Horizontal							Failed
4V				Vertical	0.005	0.018			4.18E-06	3.74E-06	
5		37.53	37.63	Horizontal	0.003	0.012	0.5	12.1	2.70E-06	2.41E-06	
5V				Vertical	0.0010	0.005			8.22E-07	7.34E-07	
6		42.44	42.56	Horizontal	0.092	0.147			7.62E-05	6.81E-05	
6V				Vertical	0.003	0.012			2.60E-06	2.32E-06	
7		45.60	45.75	Horizontal							Failed
7V				Vertical	0.0013	0.006			1.10E-06	9.86E-07	
8		49.74	49.84	Horizontal	0.044	0.096	1.3	13.5	3.65E-05	3.25E-05	
8V				Vertical	0.0012	0.006			9.88E-07	8.82E-07	
9		49.94	50.05	Horizontal	0.038	0.086			3.15E-05	2.81E-05	
9V				Vertical	0.722	0.847			5.99E-04	5.35E-04	
10		57.97	58.12	Horizontal	0.0014	0.006			1.19E-06	1.06E-06	
10V				Vertical	0.0014	0.006			1.17E-06	1.05E-06	
11		60.80	60.95	Horizontal	240	261			1.99E-01	1.78E-01	Fractured
11V				Vertical							Failed
12		67.39	67.52	Horizontal							Failed
12V				Vertical	0.0005	0.003			3.84E-07	3.43E-07	
13		76.37	76.47	Horizontal	0.050	0.083			4.17E-05	3.72E-05	
13V				Vertical	0.004	0.014			3.11E-06	2.77E-06	
14		86.70	86.81	Horizontal	0.003	0.011			2.32E-06	2.08E-06	
14V				Vertical	0.0009	0.005			7.83E-07	6.99E-07	
15		92.33	92.44	Horizontal							Failed
15V				Vertical							Failed
16		99.44	99.55	Horizontal							Failed
16V				Vertical	0.0004	0.002			3.49E-07	3.11E-07	
17	STX1903	20.02	20.12	Horizontal	28.1	33.4			2.33E-02	2.08E-02	Mounted
17V				Vertical	3.81	4.70			3.16E-03	2.82E-03	Mounted
18		23.98	24.10	Horizontal	8.89	10.4			7.38E-03	6.59E-03	Mounted
18V				Vertical	3.46	4.17			2.87E-03	2.56E-03	Mounted

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Project: STX Bore Holes

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19		28.11	28.32	Horizontal	0.929	1.18			7.71E-04	6.89E-04	
19V				Vertical	0.294	0.377			2.44E-04	2.18E-04	
20		36.17	36.28	Horizontal							Failed
20V				Vertical							Failed
21		45.08	45.22	Horizontal	0.081	0.125			6.73E-05	6.00E-05	Mounted
21V				Vertical	0.024	0.060			2.02E-05	1.80E-05	Mounted
22		55.18	55.30	Horizontal	0.0014	0.006	0.3	10.2	1.12E-06	1.00E-06	
22V				Vertical	0.0012	0.006			1.01E-06	9.04E-07	
23		62.17	62.32	Horizontal	<0.0001	<0.0001			8.30E-08	7.41E-08	
23V				Vertical	0.0002	0.001			1.73E-07	1.54E-07	
24		64.71	64.81	Horizontal	0.145	0.256			1.20E-04	1.07E-04	
24V				Vertical	0.0005	0.003			4.25E-07	3.80E-07	
25		77.43	77.55	Horizontal	0.005	0.018	0.4	10.6	4.29E-06	3.83E-06	
25V				Vertical	0.0008	0.004			6.76E-07	6.03E-07	
26		86.85	86.97	Horizontal							Failed
26V				Vertical							Failed
27		87.40	87.52	Horizontal							Failed
27V				Vertical							Failed
28		93.17	93.30	Horizontal	0.003	0.012			2.49E-06	2.22E-06	
28V				Vertical	0.002	0.008			1.48E-06	1.32E-06	
29		98.47	98.63	Horizontal	0.002	0.007	0.3	7.5	1.30E-06	1.16E-06	
29V				Vertical	0.0011	0.005			8.80E-07	7.86E-07	
30		103.94	104.06	Horizontal	0.013	0.037			1.11E-05	9.93E-06	
30V				Vertical	0.0006	0.003			5.35E-07	4.77E-07	
31		107.23	107.35	Horizontal							Failed
31V				Vertical							Failed
32		108.39	108.51	Horizontal	<0.0001	<0.0001	0.1	2.4	8.30E-08	7.41E-08	
32V				Vertical	<0.0001	<0.0001			8.30E-08	7.41E-08	
33		111.81	111.91	Horizontal	0.0013	0.006			1.07E-06	9.56E-07	
33V				Vertical	0.0010	0.005			8.39E-07	7.49E-07	
34		115.52	115.65	Horizontal							Failed
34V				Vertical							Failed
35		125.51	125.61	Horizontal							Failed
35V				Vertical							Failed
36		134.32	134.47	Horizontal	0.0010	0.005	0.4	7.9	8.23E-07	7.35E-07	
36V				Vertical	0.0005	0.003			3.79E-07	3.38E-07	
37		145.30	145.46	Horizontal							Failed

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37V				Vertical							Failed
38		149.30	149.41	Horizontal							Failed
38V				Vertical							Failed