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TABLE DR1. SUMMARY OF ORIENTATION AND FRACTURE TRACE LENGTH DISTRIBUTIONS AND PARAMETERS OF STATISTICALLY SIMILAR FRACTURE DATA OF MAYNE ISLAND.

Scanline ID	Set	Fracture Orientation PDF	Mean Trend/Plunge (°)		Major Axis Trend/Plunge (°)		Fisher Constant, k	Bingham Constants, k1, k2		Fracture % of observed total (%)	Fracture Length PDF	Mean (m)	Deviation (m)
M1-5	1	Fisher	358.0	16.6	178.0	73.4	83.14	-	-	78.7	LogNormal	9.2	12.7
94*	2	Bingham	89.7	9.7	191.5	50.1	-	-50.00	-16.67	16.4	Power Law	7.5	4.4
96*	3	Fisher	202.6	71.4	22.6	18.6	100.00	-	-	4.9	LogNormal	25.5	55.7
100*	1	Fisher	358.0	16.6	178.0	73.4	83.14	-	-	78.7	LogNormal	9.2	12.7
	2	Bingham	89.7	9.7	191.5	50.1	-	-50.00	-16.67	16.4	Power Law	7.5	4.4
M2	1	Fisher	4.0	20.7	184.0	69.3	90.05	-	-	89.6	LogNormal	7.6	6.1
92*	2	Fisher	209.0	80.3	29.0	9.7	100.00	-	-	6.3	LogNormal	16.6	1.1
	3	Fisher	102.9	29.2	282.9	29.2	83.63	-	-	4.2	LogNormal	0.5	0.5
M7	1	Bingham	322.0	12.9	187.4	71.9	-	-36.56	-14.33	92.8	LogNormal	4.3	17.7
M8	2	Fisher	248.2	3.4	68.2	86.6	7.78	-	-	7.2	LogNormal	5.5	83.3
97*													
108*													
M6	1	Fisher	20.3	7.9	200.3	82.1	20.92	-	-	19.4	Constant	0.8	-
103*	2	Bingham	16.1	15.0	168.0	73.1	-	-5.47	-2.01	71.6	Exponential	0.7	-
104*	3	Fisher	196.1	73.7	196.1	73.7	45.32	-	-	9.0	LogNormal	8.0	10.6
M3	1	Fisher	210.4	71.8	30.4	18.2	100.00	-	-	78.7	LogNormal	46.8	28.4
M4	2	Bingham	23.3	18.0	244.0	66.8	-	-15.79	-5.26	21.3	Exponential	0.8	-
M9													

Note: The groupings represent statistically similar fracture data collection sites within close spatial proximity to one another. Refer to Figure 3 for station locations. (*) designates station data collected previously by Mackie (2002). PDF is probability density function. The orientation and trace length distribution data for 97* and 108* are the same as M7 and M8. Distribution data for station M9 is the same as M3 and M4 as denoted by the station groupings.

TABLE DR2. TRANSMISSIVITY AND PERMEABILITY VALUES DERIVED FROM PUMP TEST ANALYSIS CONDUCTED ON MAYNE ISLAND.

Domain	Well Depth (m)	Depth of Open Hole (m)	Transmissivity[1] (m^2/s)	Permeability[2] (m^2)	Geometric Mean Permeability (m^2)	Model Geometric Mean Permeability (m^2)
LFSS	134.1	131.1	1.17×10^{-5}	1.19×10^{-14}	3.73×10^{-14}	4.26×10^{-14}
	30.5	25.0	2.49×10^{-5}	1.33×10^{-13}		
	103.6	101.2	2.49×10^{-5}	3.28×10^{-14}		

[1] Previously published pump test data (Allen et al., 2003)
[2] Calculated from transmissivity using open hole depth as aquifer thickness

TABLE DR3. RELATIVE POTENTIAL PERMEABILITY ESTIMATES FOR THE MLM AND THE FOUR MODELS OF THE FACTORIAL DESIGN FOR THE REPRESENTATIVE STATION OF EACH HYDROSTRUCTURAL DOMAIN.

Model		Direction	Rel. Potential Permeability k_p (m^2)	Geometric Mean k_p (m^2)	Max k_p (m^2)	Direction	Min k_p (m^2)	Direction
LFSS	MLM	NS	3.5×10^{-14}	4.9×10^{-14}	6.0×10^{-14}	EW	3.5 x 10-^{14}	NS
		EW	6.0×10^{-14}					
		TB	5.7×10^{-14}					
	Run 1	NS	3.8×10^{-17}	7.2×10^{-17}	1.3×10^{-16}	EW	3.8×10^{-17}	NS
		EW	1.3×10^{-16}					
		TB	7.2×10^{-17}					
	Run 2	NS	5.9×10^{-17}	8.5×10^{-17}	1.4×10^{-16}	EW	5.9×10^{-17}	NS
		EW	1.4×10^{-16}					
		TB	7.7×10^{-17}					
	Run 3	NS	3.4×10^{-11}	6.4×10^{-11}	1.3×10^{-10}	EW	3.4×10^{-11}	NS
		EW	1.3×10^{-10}					
		TB	6.2×10^{-11}					
	Run 4	NS	5.1×10^{-11}	7.8×10^{-11}	1.3×10^{-10}	EW	5.1×10^{-11}	NS
		EW	1.3×10^{-10}					
		TB	7.1×10^{-11}					
IBMS-SS	MLM	NS	3.8×10^{-13}	2.9×10^{-13}	3.8×10^{-13}	NS	1.8×10^{-13}	TB
		EW	3.7×10^{-13}					
		TB	1.8×10^{-13}					
	Run 1	NS	3.5×10^{-16}	2.9×10^{-16}	3.7×10^{-16}	EW	1.9×10^{-16}	TB
		EW	3.7×10^{-16}					
		TB	1.9×10^{-16}					
	Run 2	NS	4.8×10^{-16}	3.4×10^{-16}	4.8×10^{-16}	NS	2.1×10^{-16}	TB
		EW	4.0×10^{-16}					
		TB	2.1×10^{-16}					
	Run 3	NS	3.4×10^{-10}	2.8×10^{-10}	3.6×10^{-10}	EW	1.9×10^{-10}	NS
		EW	3.6×10^{-10}					
		TB	1.9×10^{-10}					
	Run 4	NS	4.8×10^{-10}	3.4×10^{-10}	4.8×10^{-10}	NS	2.1×10^{-10}	TB
		EW	3.9×10^{-10}					
		TB	2.1×10^{-10}					
FZ	MLM	NS	8.0×10^{-14}	1.1×10^{-13}	1.9×10^{-13}	EW	8.0×10^{-14}	NS
		EW	1.9×10^{-13}					
		TB	8.4×10^{-14}					
	Run 1	NS	7.6×10^{-17}	1.1×10^{-16}	2.0×10^{-16}	EW	7.6×10^{-17}	NS
		EW	2.0×10^{-16}					
		TB	9.3×10^{-17}					
	Run 2	NS	1.3×10^{-16}	1.4×10^{-16}	2.0×10^{-16}	EW	1.0×10^{-16}	TB
		EW	2.0×10^{-16}					
		TB	1.0×10^{-16}					
	Run 3	NS	6.5×10^{-11}	9.7×10^{-11}	1.7×10^{-10}	EW	6.5×10^{-11}	NS
		EW	1.7×10^{-10}					
		TB	8.8×10^{-11}					
	Run 4	NS	1.1×10^{-10}	1.2×10^{-10}	1.8×10^{-10}	EW	9.5×10^{-11}	TB
		EW	1.8×10^{-10}					
		TB	9.5×10^{-11}					

Note: Run 1, Run 2, Run 3 and Run 4 are defined in Table 5.

TABLE DR4. THE COMPLETE DESIGN MATRIX FOR THE 2^2 FACTORIAL ANALYSIS FOR EACH HYDROSTRUCTURAL DOMAIN.

Domain	Run	b	g_{sp}	$b*g_{sp}$	Y_{NS} (m^2)	Y_{EW} (m^2)	Y_{TB} (m^2)
LFSS	1	-	-	+	-3.5×10^{-14}	-6.0×10^{-14}	-5.7×10^{-14}
	2	-	+	-	-3.5×10^{-14}	-6.0×10^{-14}	-5.7×10^{-14}
	3	+	-	-	3.3×10^{-11}	1.3×10^{-10}	6.2×10^{-11}
	4	+	+	+	5.1×10^{-11}	1.3×10^{-10}	7.1×10^{-11}
IBMS-SS	1	-	-	+	-3.8×10^{-13}	-3.7×10^{-13}	-1.8×10^{-13}
	2	-	+	-	-3.8×10^{-13}	-3.7×10^{-13}	-1.8×10^{-13}
	3	+	-	-	3.4×10^{-10}	3.6×10^{-10}	1.9×10^{-10}
	4	+	+	+	4.8×10^{-10}	3.9×10^{-10}	2.1×10^{-10}
FZ	1	-	-	+	-8.0×10^{-14}	-1.9×10^{-13}	-8.4×10^{-14}
	2	-	+	-	-8.0×10^{-14}	-1.9×10^{-13}	-8.4×10^{-14}
	3	+	-	-	6.5×10^{-11}	1.7×10^{-10}	8.8×10^{-11}
	4	+	+	+	1.1×10^{-10}	1.8×10^{-10}	9.5×10^{-11}

Note: *b* is fracture aperture, g_{sp} is EPM model grid spacing. *Y* is the difference between the relative potential permeability of the MLM and each of the four models for the specified flow direction (N-S, E-W, T-B).