



Request for 2729 @ surf.

Head to 8800 ft =
8800 ft x 0.433 psi/ft =
3810.4 psi

Breakover from step rate
test = 5550 psi

5550 psi
- 3810.4 psi
1739.6 psi surf inj.
no friction

Friction
16 bpm
4 1/2" casing
± 9.2 psi/100 ft
± 0.692 psi/ft

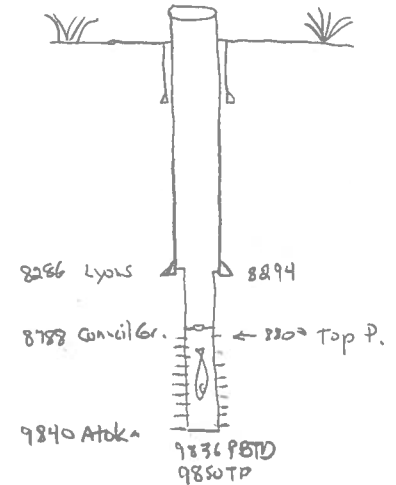
8800 ft x 0.092 psi/ft = 809.6 psi

1739.6
809.6

2549.2 psi = 100% Friction

Table 1: Reservoir parameters.

Reservoir Parameter	Pressure Falloff Test
Effective reservoir permeability (md)	36.5
Flow capacity (md-ft)	4,300
Net pay thickness (ft)	118
Skin factor (-)	-4.0
Reservoir pressure (psi)	3,250
Reservoir pressure gradient (psi/ft)	0.37



Frac Gradient from Letter $\frac{5550 \text{ psi}}{8800 \text{ ft}} = 0.63 \text{ psi/ft}$

Table 2: Injection rates and pressures during test.

Rate (bpm)	Rate (bpd)	Surface Pressure ¹ (psig)	BH Pressure (psig)	BH Pressure Gradient (psi/ft)	Calculated Pipe Friction ² (psi)	Hydrostatic Pressure ³ (psig)	Est. Surface Injection Pressure (psig)
3.0	4,320	0	3,850	0.44	52	3,797	105
6.0	8,640	300	4,060	0.46	162	3,797	424
9.0	12,960	750	4,480	0.51	341	3,797	1,024
12.0	17,280	1,240	4,920	0.56	586	3,797	1,709
15.0	21,600	1,740	5,343	0.61	891	3,797	2,437
16.0	23,040	N/A	5,550	0.63	910 ⁴	3,797	2,724 ⁴
18.0	25,920	2,170	5,677	0.65	1,249	3,797	3,128
21.0	30,240	2,520	6,016	0.69	1,629	3,797	3,848
24.0	34,560	2,835	6,144	0.70	2,174	3,797	4,521

¹ Step rate test pumped down 2-3/8" x 7" annulus.

² Calculated pipe friction for normal operations based on 4-1/2" IPC set at 8,150' MD, 618' of 4-1/2" blank casing and the packer-fish.

³ Fresh water used during the step rate test (8.33 ppg).

⁴ Requested injection pressure based on estimated fracture gradient and calculated pipe friction. Rate not use during test.

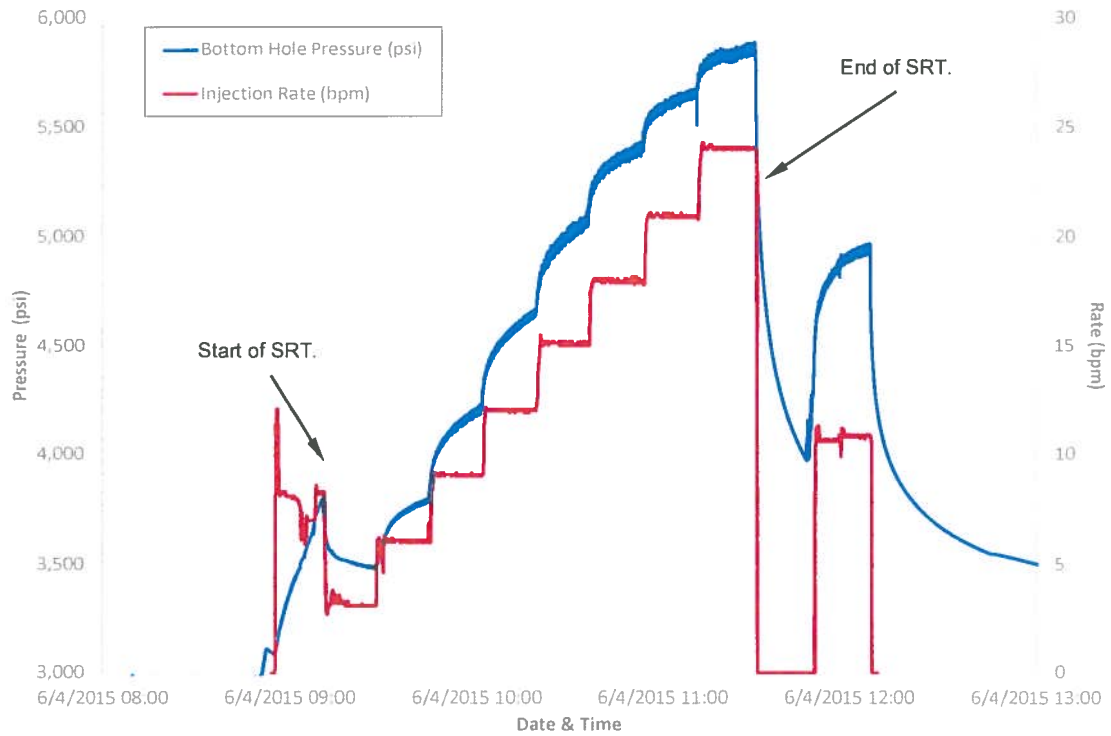


Figure 1: SRT time chart.

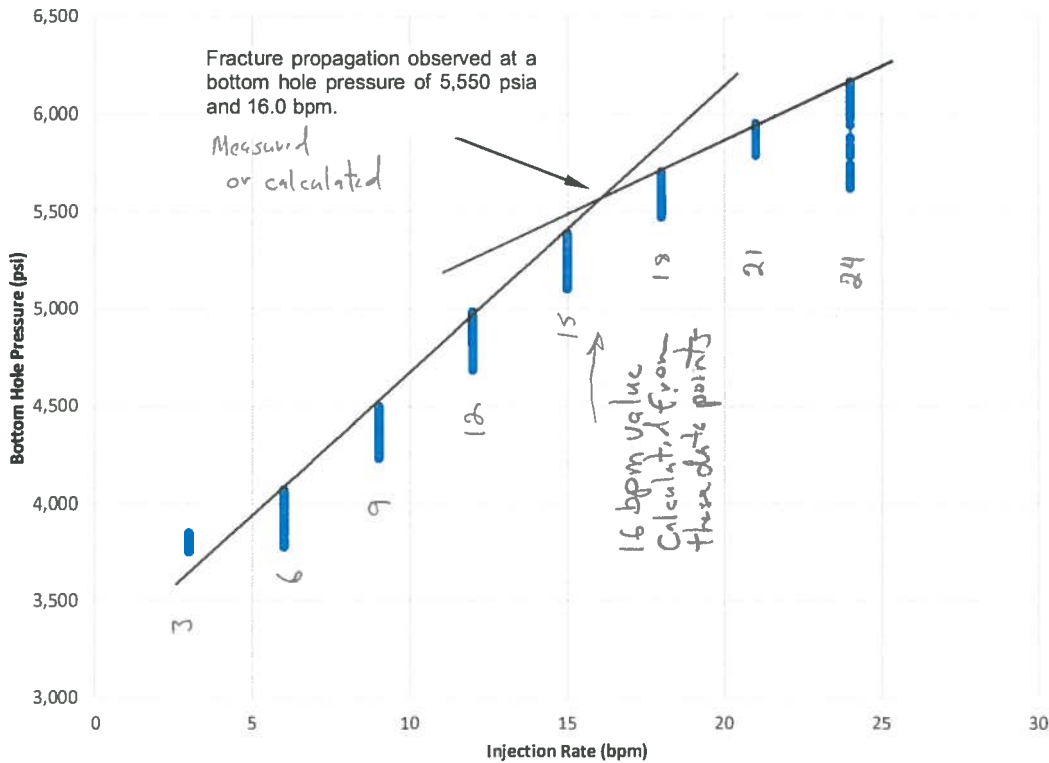


Figure 2: SRT rate chart.

Pressure (psi) vs Pump Rate (bpm)

