

1. The following data corresponds to a leak-off test in an offshore well in the Gulf of Mexico.

- Estimate S_v at the shoe depth (TVDSS = 8050 ft).
- Assuming the pore pressure is $P_p = 4700$ psi, and fracture closure occurs at time 1:18:00, calculate effective vertical stress σ_v and minimum effective stress σ_3 .
- What is the normal faulting regime? Calculate the effective stress anisotropy ratio σ_v/σ_{hmin} .
- What is the density of the drilling mud?

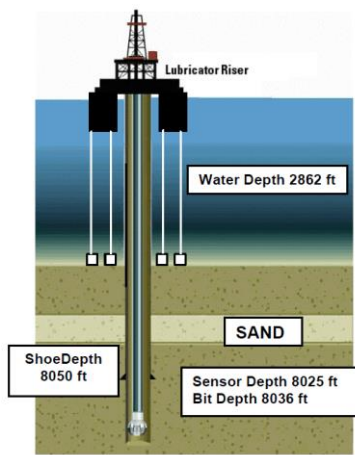
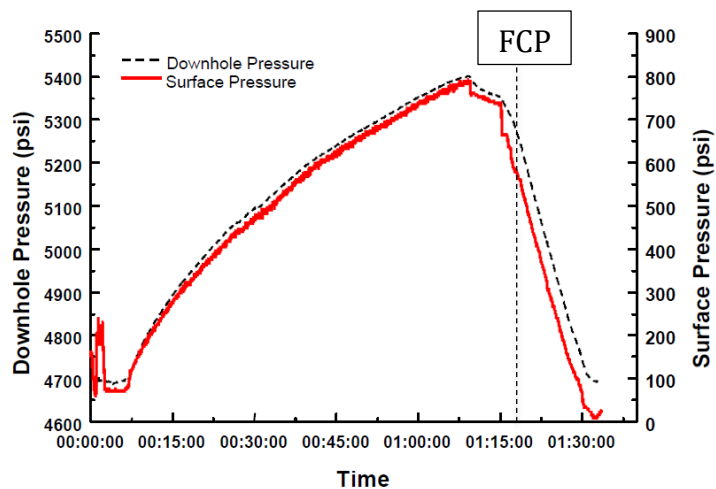


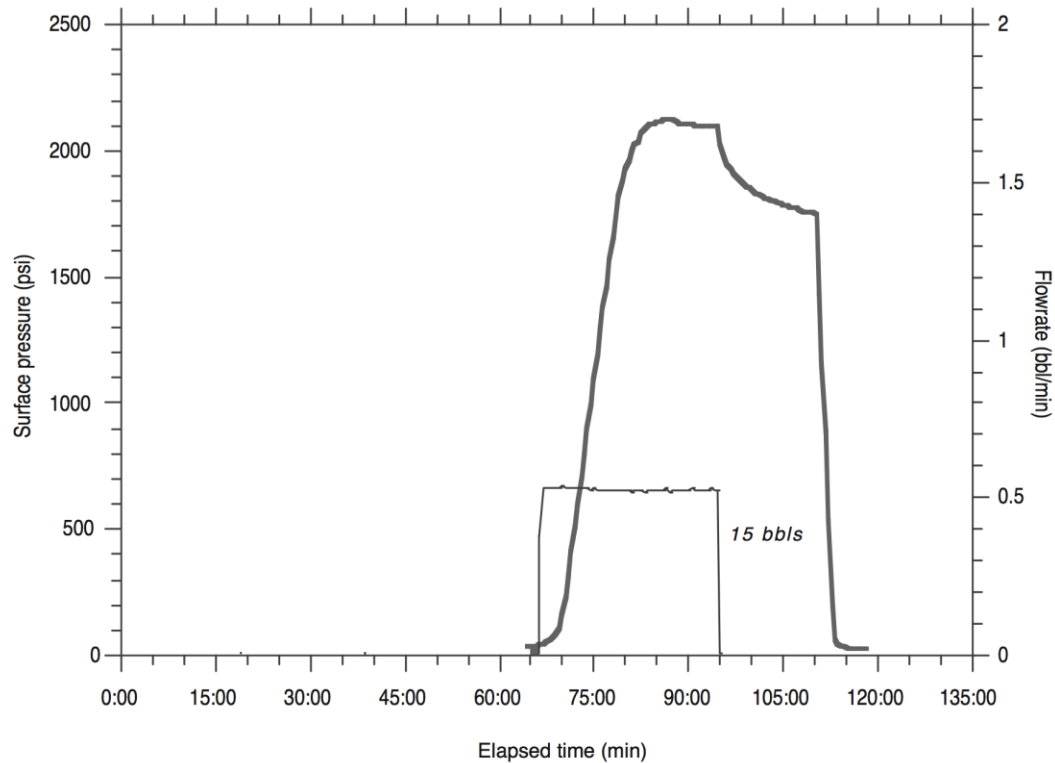
Fig. 5 – Schematic of Anger TLP Well Configuration



2. Download the file “[MicrofracData.xls](#)” which corresponds to a minifrac field test. The pressure reading corresponds to surface pressure.

- Plot surface pressure and injection rate in a double y-axis plot as a function of time. Plot the entire interval and make a zoom from 70 to 90 min.
- Find the instantaneous shut-in pressure (ISIP) and make a plot of surface pressure as a function of square root of time. Find the fracture closure pressure (FCP) [surface pressure].
- The true depth is 7,503 ft. Assuming a hydrostatic pressure gradient inside the wellbore of 0.44 psi/ft, calculate the minimum total principal stress S_3 in this place.

3. The figure below shows the results of a DFIT test (data from Zoback 2007).



- How many barrels of fracturing fluid were used in this test?
- Indicate fracture propagation pressure (FPP), instantaneous shut-in pressure (ISIP) and fracture closure pressure (FCP) (as well as you can without analyzing the data in detail).
- Describe and sketch the flow behavior around the wellbore before and after shut-in.
- At surface pressure of 0 psi the bottom-hole pressure is 5,500 psi. What is the minimum principal stress in this formation?

4. Interpret the following step-rate test data (i.e., find the formation parting pressure). Plot pressure vs. time for all steps.

Step #	Test rate (bbl/min)	Test rate (% of max. rate)								
1	0.2	5	Time (min)	0	5	10	15	20	25	30
			Pressure (psi)	0	99	105	108	109	110	110
2	0.4	10	Time (min)	0	5	10	15	20	25	30
			Pressure (psi)	88	187	204	215	219	220	220
3	0.8	20	Time (min)	0	5	10	15	20	25	30
			Pressure (psi)	209	358	424	431	438	439	440
4	1.6	40	Time (min)	0	5	10	15	20	25	30
			Pressure (psi)	418	770	869	871	875	878	882
5	2.4	60	Time (min)	0	5	10	15	20	25	30
			Pressure (psi)	825	1089	1133	1199	1265	1298	1321
6	3.2	80	Time (min)	0	5	10	15	20	25	30
			Pressure (psi)	1210	1375	1459	1507	1529	1535	1540
7	4	100	Time (min)	0	5	10	15	20	25	30
			Pressure (psi)	1485	1595	1650	1683	1727	1749	1760