HW-2: Characterizing Reservoir Pressure (u_d=0)

Zero Displacement Pressure in reservoir

ANSWERS

From sea level to sea floor, the hydrostatic and overburden gradient are the same (0.465 psi/ft). Below sea floor (1350 ft BSL), the overburden gradient assumes a value of (0.93 psi/ft).

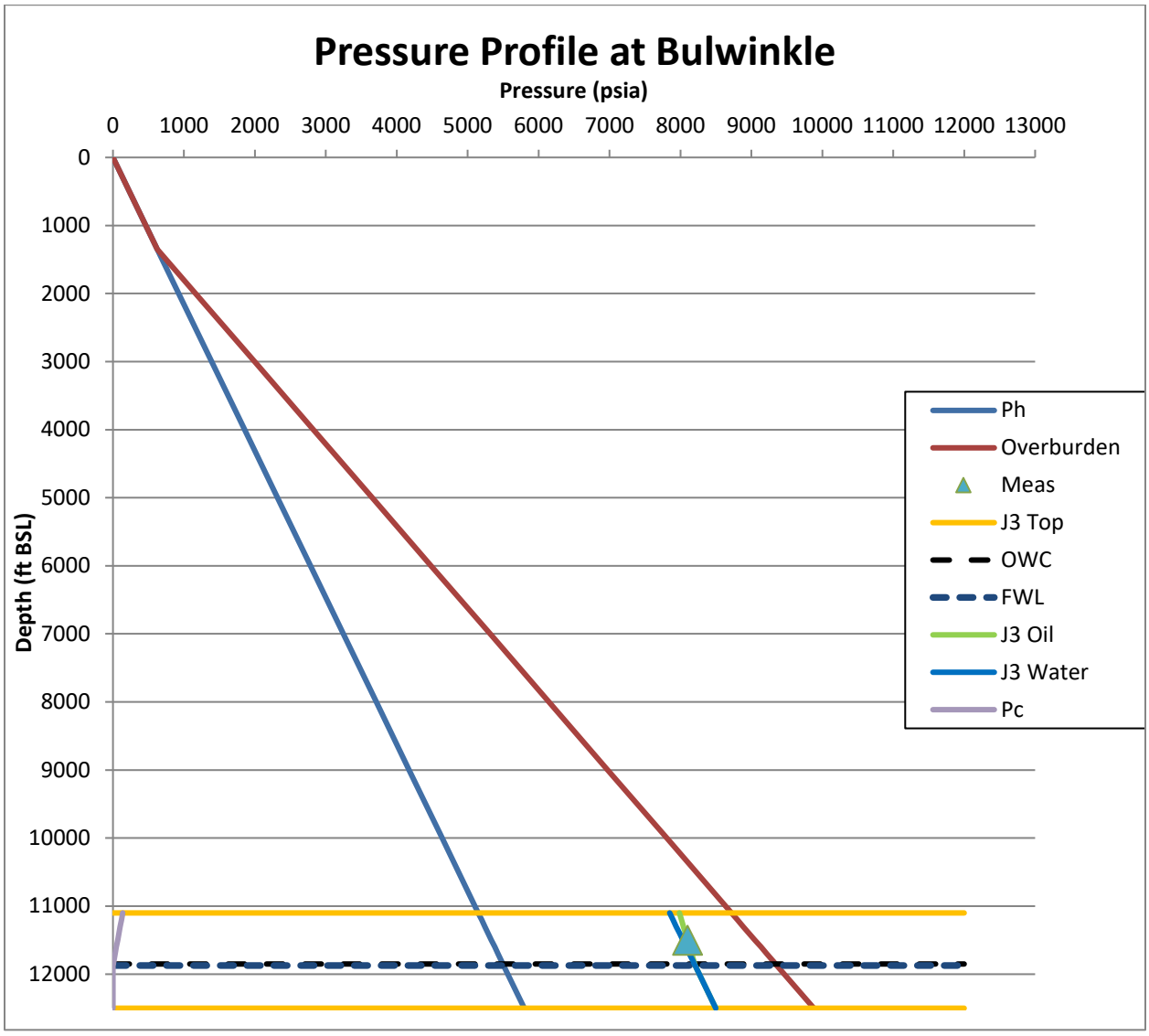

Figure A1: Pressure profiles at Bullwinkle from sea level through the J3 sand.

The direct pressure measurement is made in the oil bearing leg of the J3 reservoir (above the OWC). We therefore follow the oil pressure gradient to the top of the J3 and towards

the base of the J3. At the OWC, the displacement capillary pressure is ~ 0 psi based on the assumption of perfectly segregated oil water zones. As a result the oil pressure equals the water pressure at the OWC, and the FWL and the OWC are at the same depth.

We now have a water pressure and depth measurement in the J3, and can similarly follow the water gradient to the crest of the J3 sand and down to the base of the J3.

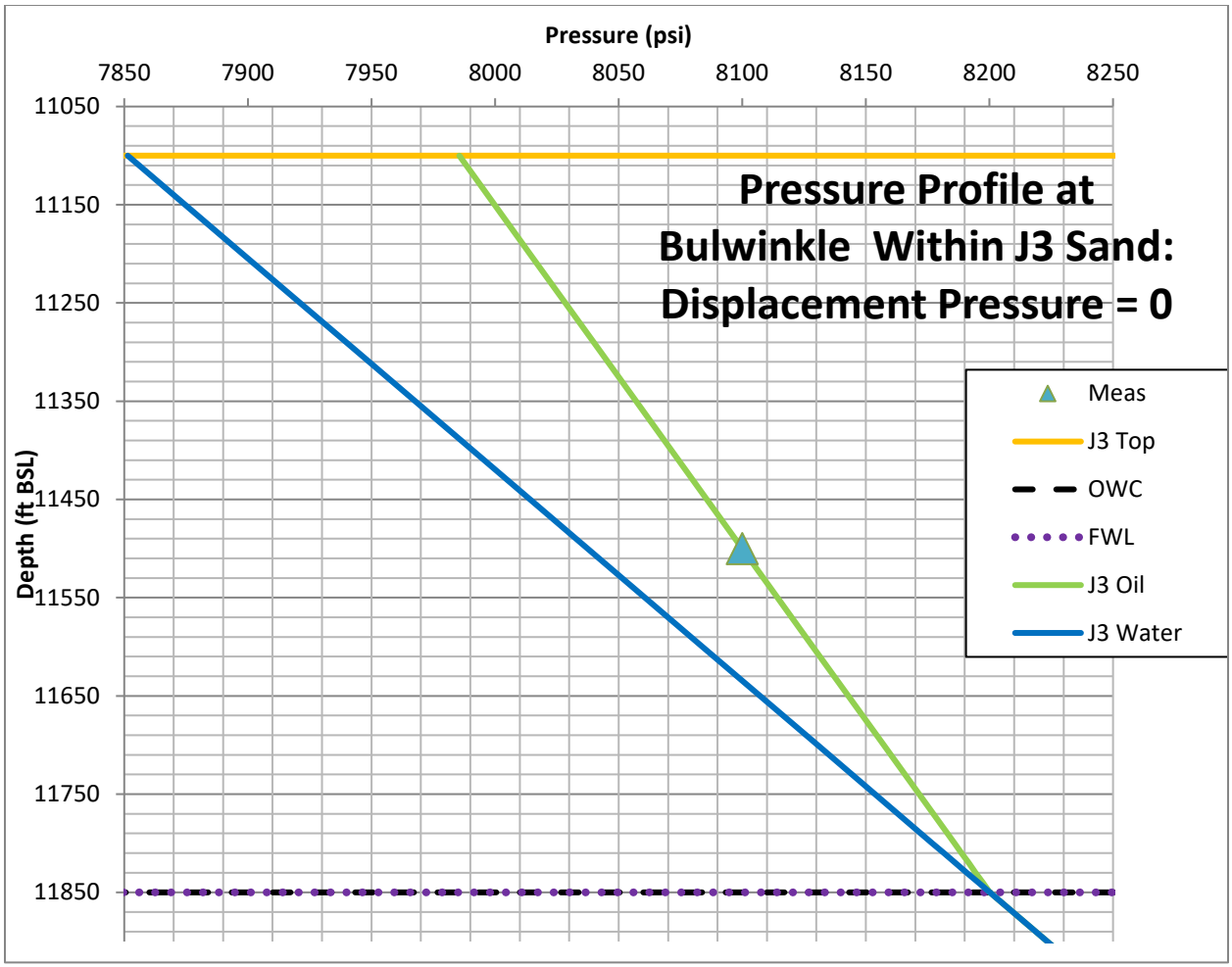

Figure A2: OWC is at 11850, and the FWL is at 11850 ft BSL. At the OWC, Pd = 0 psi, which means that the depth of the OWC and FWL are the same.

At the top of the J3 sands:

Oil Pressure= u_o =7,985psia

Water Pressure= u_w = 7851 psia

Capillary Pressure = $u_o - u_w$ = 134 psia

Aquifer Excess Pressure = $u_{aquifer} - u_h$ = 2,689 psia.

Table A1. Table with answers.

Zero Displacement Pressure Scenario			
Capillary Pressure at OWC (psia)	0		
FWL Depth (ft BSL)	11,850 (same as OWC)		
	Oil	Water	Capillary (Pcow)
Pressures at Top of J3 Sand (psia)	7,985	7,851	134
Aquifer excess pressure (psia)	2,689		