

3:15-4:00 Art Ratzel Flow prediction around Well Integrity Shut-in

3 ram capping stack – slide 78. All above the BOP, so don't have to deal with it's complexity.

3 methods – slide 80

Clean geometry, 2 pressure gauges, surface vessel recoveries during some periods.

Assumptions: reservoir pressure, and depletion estimates, steady state

Uncertainties: multiphase flow models and EOS. K-factors are uncertain.

Slide 82 – choke pressures under different flow conditions through kill line

Delta pressure analysis (method 1): 52.6 to 52.9, bounds are 48 to 58. Eliminates geometric effects, which simplifies things greatly (slide 84)

Kill line analyses (method 2): flow through kill line, with all the complexities of the piping system. Slide 87: 2 groups (SNL and LLNL) both got about 48 to 51. Avg – 47-52

Choke line analyses (method 3): slide 90 data. March through as valve is shut. 3 Labs analyzed, similar results. Calcs. All showed flow increases as valves are shutting. Counterintuitive, still looking at why.

Slide 95 – summary of 3 methods. Full open will probably allow for bounds (53 plus-minus 5-10 bbl/d), but problem of 2 phase flow calcs.

What does this mean for results at earlier times? Slide 99 – full models can be built

Slide 107 summary: 53k from shut in; working backwards, about 65k on day 1.

Need more work to nail down 2 phase flow issues. Could be a transition from 2 phase to single phase as pressure increases.