

Pump Canyon SWD #1
Step Rate Test Analysis
Composite Test - 8/24/89

- I. Initial Completion of Entrada zone
- II. Workover Completion of Bluff and Morrison zones
- III. Individual zones and Step rate tests
 - A. Entrada - 35 BPM, .60 psi/ft fracture gradient
5040 psi BHP at 8350' (4910 psi at 8050')
 - B. Bluff - 11 BPM, .65 psi/ft fracture gradient
5200 psi BHP at 7996' (5223 psi at 8050')
 - C. Morrison - 4 BPM, .59 psi/ft fracture gradient
4560 psi BHP at 7736' (4696 psi at 8050')
- IV. Composite Step Rate Test
 - A. Factors affecting pressure/rate profile
 - 1) 1 - 10 BPM - injection below Entrada reservoir pressure
 - 2) 11 - 20 BPM - reached 1000 psi and Entrada starts to take fluid
 - 3) 21 - 30 BPM - parting pressure at 24.5 BPM
 - B. Parting pressure parameters
 - 1) 24.5 BPM, .54 psi/ft fracture gradient
 - 2) 4380 psi BHP at 8050'
 - C. Layered Permeability System
- V. Additional Support Data
 - A. Theoretical fracture gradients
Using Poisson's ratio, pore pressure, and depth, - .54 to .64
 - B. Other Meridian Entrada fracture gradients
3 wells, average fg = .55 psi/ft in Entrada, low .52
30-6 SWD #2, 31-6 SWD #301, Middle Mesa SWD #1