

Booth Steam Project

Location: Sec. 18, TWP25S, RNG21E

Flood Pattern: Inverted 5-Spot

Well Spacing: 330' (producer to producer) center injector
total 2.5 acre pattern, $\frac{1}{2}$ acre spacing.

Wells to follow:

Ave. perm, per

11, 12, 15, 16, 18,

Booth #15: Drilled on October 18, 1980, to a depth of 790' and cased with 785' of 10# 4.5" OD casing. Cemented to surface with 40% Silica flour cement - good returns. Core analysis determined the following:

Average Permeability	389 md (H)
Average Porosity	23.6%
Average Percent Oil Saturation	42.2%
Average Percent Water Saturation	35.3%
Average Oil Content	845 bb/ac-ft
Total Oil Content	19,433 bbl/ac
Length of oil bearing core	23'

12/8/80 Ran CBL - excellent cement bond
5/6/81 Log and perforate 736-758' with 23 shots -
28 gram - PML glass jects 3.5" OD - spot
50 gal 15% HCL on perforations.
5/19/81 Frac well with 1000# 20-40 sand - 700# 10-20
sand. Breakdown at 2000 psi treating pressure
1650 psi @ 18 BPM - used 90 bbl. gelled brine
to frac and 25 bbl. to flush.
5/25/81 SML TD=778.5'
5/29/81 Ran 760' 2-7/8" EUE ABC MOD tubing
7/8/81 12:00 AM preheat 45 min - shut annulus at
12:45 AM - started injection
WHP before inj.=0 psi
1:00 PM WHP = 220 psi
3:25 PM WHP = 440 psi
5:02 PM WHP = 500 psi
7:00 PM WHP = 660 psi
7/9/81 1:30 AM WHP = 650 psi
7/10/81 9:50 AM WHP = 620 psi
7/11/81 5:05 PM WHP = 640 psi
7/12/81 12:50 PM WHP = 690 psi SI @ 10:23 PM?
30 min. after SI 560 psi
12 hrs. after SI well on vacuum
7/13/81 2:30 PM - check BHT
737' T=381 F
744' T=380 F
752' T=378 F
TD by SML = 796'
Ran in 4' x 1½" SS - cup pump on wire -
hold down
7/14/81 Well would not pump. Pull pump had no cups
in pump. Cupped pump and ran back in - pumped
OK
5:00 PM put well on pump 43 hrs. after SI
7/15/81 8:00 AM well test 68.5 BWPD - trace of oil -
surface temp 180° F
7/16/81 Well put 5 BO in stock tank in 15 hrs. - no
test on water
7/19/81 Well test .8 BOPD - .8 BWPD - surface temp 80° F

Booth #15: (continued)

8/7/81 9:00 AM - 10:45 AM - .04 BO - .44 BW PO
8/10/81 10:20 AM - 11:00 AM .04 BO - 4.20 BW PO
8/13/81 7:52 AM - 8:36 AM .74 BW PO
8/18/81 Preheated well from 9:15 AM - 9:35 AM
9:35 AM WHP=220# FTT=430° F
9:55 AM WHP=780# FTT=525° F
10:05 AM WHP=820# FTT=525° F
10:15 AM WHP=920# FTT=540° F
10:47 AM WHP=1265# FTT=565° F

Blew pressure gauge @ 1250 psi - Wellhead pressure levelled off at 10:55 AM at 1250 psi. WHP was equal to output pressure of generator. Total input at 11:20 AM was 44 bbls. at a rate of 720 bbl/D.

8/19/81 Put on pump - 1:45 PM - 2:25 PM 1.32 BW
8/25/81 Pull pump - run thermometer @ 750' 150° F
8/26/81 Pull 32' of 2-7/8" tubing. Tubing was set at 760' now set at 728' - frac well with 160 bbl. - hot (140° F) 32 gravity crude. Pump in 50 gal 15% HCL and flush with 20 bbl. brine. No break on well treating pressure 900 - 1300 psi, SI at 300 psi - used 2000# 12-30 sand and 9000# 10-20 sand flushed with 40 bbl. hot crude flowed well back strong for 30 min. then on vacuum in one hour. Well sanded up to top of perfs.
8/27/81 Wash well clean - run 2-7/8" back to 760' - run in pump and put back on pump at 12:30

8/28/81 2:15 PM test 1.5 min - 20.4 BO - 63.8 BW
8/30/81 8:40AM test 2.5 min. - 6.86 BO - 64.5 BW
8/31/81 Test 2 min. - 10:28 BO - 78.85 BW
9/1/81 Test 3 min. - 3.42 BO - 51.4 BW
9/2/81 Test 2.5 min. - 2.14 BO - 49.80 BW
9/3/81 Test 2.5 min. - 2.75 BO - 60.34 BW
9/4/81 Test 2.5 min. - 4.11 BO - 57.6 BW
9/5/81 Test 3.9 min. - 2.29 BO - 53.71 BW
9/7/81 Test 3.0 min. - 2.29 BO - 53.71 BW
9/8/81 Test 3.0 min. - 1.14 BO - 52.57 BW.
Replaced cups on pump.
9/9/81 8:30 AM test 2 min. 5.14 BO - 72.0 BW
Fluid temp 84° F
4:00 PM test 2 min. - 3.43 BO, 75.43 VW
Fluid temp 88° F. (Ambient temp. 72° F).
9/10/81 9:30 AM test - 2.5 min. 2.74 BO - 63.09 BW
Fluid temp 84° F (Ambient temp. 78° F).
9/11/81 Test 2.5 min. trace oil 67.2 BW
Fluid temp 84° F (Ambient temp 70° F)
9/14/81 Test 3.5 min. 45.06 BW

Booth #15: (Continued - 3)

9/15/81 Test 3.0 min. 46.71 BW. Replaced cups.
9/16/81 Test 2.5 min. Trace of oil 60.34 BW
10/12/81 Test 3.0 min. 57.1 BW
10/13/81 Laid down pumping string - prepare
for injection.
10/14/81 9:15 AM-11:55 AM Preheat wellbore
2:00 PM - WHP 420 psi, WHT - 450°F
2:30 PM - WHP 560 psi, WHT - 480°F
3:00 PM - WHP 660 psi, WHT - 500°F
3:30 PM - WHP 700 psi, WHT - 505°F
4:00 PM - WHP 730 psi, WHT - 510°F
6:35 PM - WHP 740 psi, WHT - 525°F
10/15/81 8:00 AM - WHP 1020 psi, WHT - 550°F
Total injection this cycle 371 bbl.
Turn injection to #18.
10/16/81 8:20 AM Preheat wellbore
9:00 AM - start injection
9:30 AM WHP 900 psi, WHT - 535°F
Switching to #18. Total injected 8.3 bbls.
9:55-10:10 AM - WHP 900 psi
10:10-10:25 AM - WHP 300 psi
10:25-10:40 AM - WHP 900 psi
10:40-11:00 AM - WHP 180 psi
11:00-11:15 AM - WHP 300 psi
Flow to gun barrel.
2:00 PM - WHP 0
2:00-2:35 PM inject 8.6 bbls. WHP 900 psi
2:35-3:25 PM Flowed back, WHP - 0 psi
3:25-3:45 PM inject until WHP = 900 psi
3:45-3:55 PM flowed back WHP 300 psi
10/22/81 8:25 AM preheat well bore for 3 hours 15 min.
Started injection at 1:45 PM.
Switched to #18 at 2:10 PM. WHP 850 psi
WHT - 525°F.
Total injected 7.4 bbls.
10/30/81 Test for 4 min. 42 BW oil temp 109°F
11/2/81 Test for 6 min. 29 BW oil temp 96°F
11/3/81 Test for 6 min 29 BW oil temp 96°F
11/10/81 Test for 31.5 hr. 29 BW oil temp 90°F
11/11/81 Test for 48 hrs. 29 BW oil temp 90°F
11/16/81 Test for 4.5 min 38 BW trace oil, oil temp 92°F

PRESENT OPERATIONS

As of 11 November a total of 40,700 BBL of steamed water has been introduced into this pattern. There has also been produced approximately 5000 BBLS of water, and a negligible amount of oil. On the 20th of October steam output of scale was analyzed by Treatolite and found to contain the following:

75.3%	Sodium Chloride
11.2%	Sodium Sulfate
.7%	Iron Ixide
12.8%	Wt.Loss at 900°C

Scale removed from the #12 downhole pump indicated the following:

34.21	Wt. Loss at 900°C
19.71%	Iron Oxide
36.23%	Calcium Carbonate
9/85%	Calcium Sulfate

Wells # 11, 12, 15, and 16 are being pumped once per week while continuous injection is attempted in the #18. Formation temperatures are being monitored more closely and some indication of temperature response seems to be evident in the #14 and #12. An observation well is being drilled and cored halfway between the #18 and the #15. These cores will be analyzed for residual saturations.

The initial lack of response was believed to have been an emulsion, caused by the heating at the wellbores of the producers.