## Summary Of Results

### Buildup Period #1

| | |
|---|---|
| Permeability | 0.22 md |
| Skin | + 31.3 |
| P* Horner | 4054.61 |
| Perm H | 4.64 md ft |

### Buildup Period #2

| | |
|---|---|
| Permeability | 0.20 md |
| Skin | +23.6 |
| P* Horner | 4097.07 |
| Perm H | 4.26 md ft |

The DST performed on the Mule Train 16 Com#1 was mechanically successful, and the quality of data was very good,

Infinite Acting Radial Flow State was reached during both buildup periods. Conventional straight line analysis was used to obtain results. A model was also generated in an attempt to model the data. I would consider the match generated as fair to good.

Extrapolated reservoir pressures reveal no obvious sign of pressure depletion. However, it is evident that toward the end of the second buildup period some deviation in the pressure slope occurred. This type of deviation is most common in reservoirs with some type of constant drive mechanism, i.e. water drive, gas drive. It is also possible that this behavior could be related to interlayer crossflow or phase redistribution within the wellbore.

The test revealed a tight reservoir .20 md, and a damaged wellbore + 23.6.

## Recovery Description

### Drill Pipe

| | | |
|---|---|---|
| **Oil** | **93 ft** | **.456 bbls** |
| **Water** | **0 ft** | |
| **Mud** | **192 ft** | **.941 bbls** |

### Sample Chamber

| | |
|---|---|
| **Oil** | **100 C.C.** |
| **Water** | **0 C.C.** |
| **Gas** | **5.48 CF** |
| **Mud** | **200 C.C.** |

## 16Com1 : Main Results

| | |
|---|---|
| Company | Yates Drilling Co. |
| Field | Red Lake Morrow NE |
| Well | Mule Train16Com1 |
| Test | 16Com1 |

| | |
|---|---|
| Date | Oct 30, 1999 |
| Gauge | Elec |
| Depth | 9675 |
| Formation interval | Upper Morrow |
| Perforated interval | 21ft |

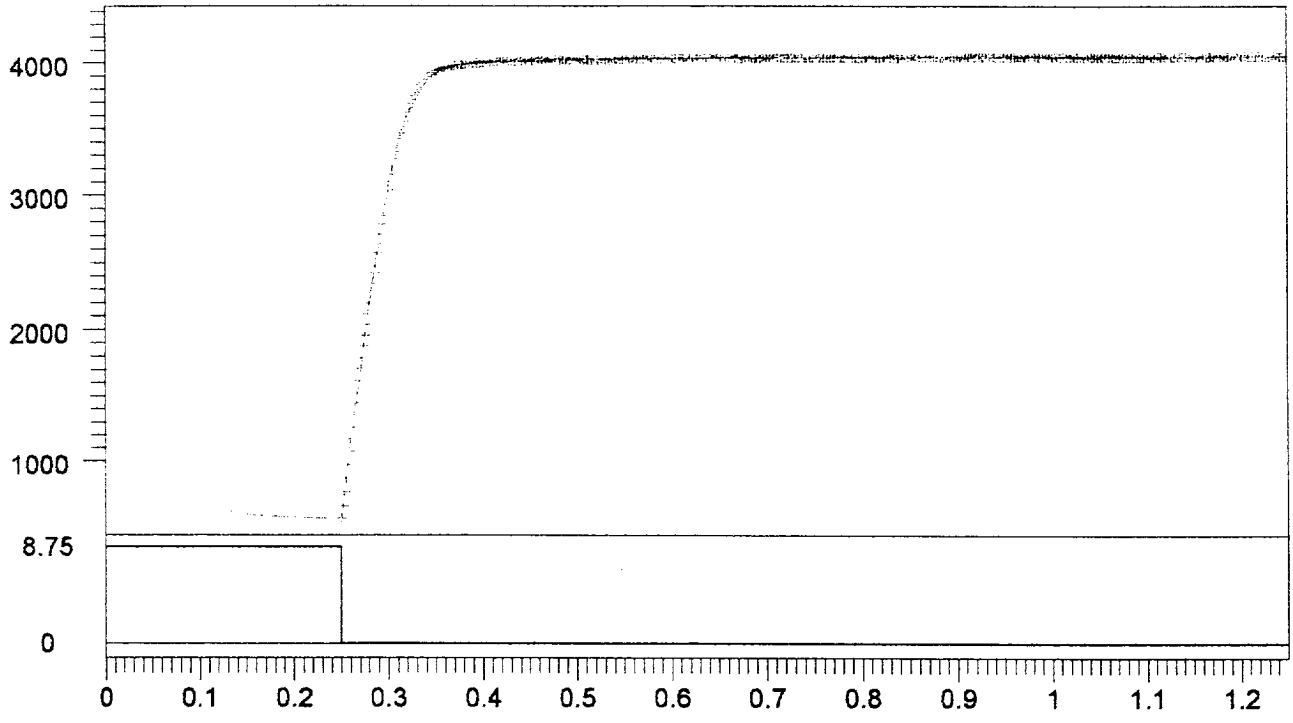
BUPeriod1

| | |
|---|---|
| TEST TYPE | Standard |
| Porosity Phi (%) | 12 |
| Well Radius rw | 0.32 ft |
| Pay Zone h | 21 ft |
| Flow Period # | 2 |
| Rate | 0 STB/day |
| Rate Change | 8.75 STB/day |
| P at dt=0 | 541.85 psia |
| Pi | 4054.61 psia |
| Time Match | 2170 (hr)-1 |
| Pressure Match | 0.0096 (psia)-1 |

| | |
|---|---|
| FLUID TYPE | Oil |
| Volume Factor B | 1.84565 |
| Total Compr. ct | 9.86775E-5 psi-1 |
| Viscosity | 0.212093 cp |
| RESERVOIR | Homogeneous |
| BOUNDARY | Infinite |
| WELL | Storage & Skin |
| Storage C | 2.98E-6 STB/psi |
| Ci/Cf | 2.27652 |
| Alpha | 7.92 |
| Skin factor | 31.3 |
| Delta P Skin | 3263.98 psia |
| kh | 4.64 md.ft |
| k | 0.22 md |
| Mobility k/mu | 1.04 |
| Investig. R | 8.52 ft |
| Tested Volume | 102.309 Barrels |

## 16Com1 : Simulation

| | |
|---|---|
| Company | Yates Drilling Co. |
| Field | Red Lake Morrow NE |
| Well | Mule Train16Com1 |
| Test | 16Com1 |

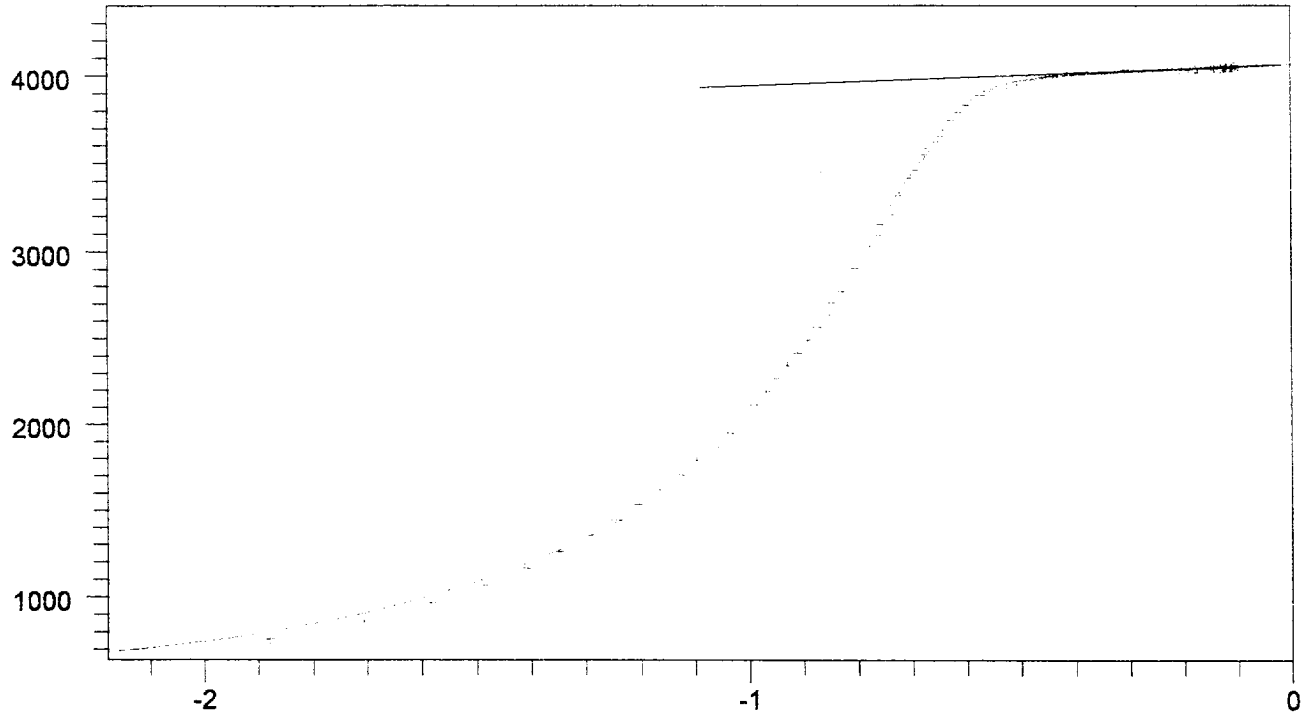



| | |
|---|---|
| Flow Period # | 2 |
| Rate | 0 STB/day |
| Rate Change | 8.75 STB/day |
| P at dt=0 | 541.85 psia |
| Pi | 4054.61 psia |
| Time Match | 2170 (hr)-1 |
| Pressure Match | 0.0096 (psia)-1 |

| | |
|---|---|
| RESERVOIR | Homogeneous |
| BOUNDARY | Infinite |
| WELL | Storage & Skin |
| Storage C | 2.98E-6 STB/psi |
| Ci/Cf | 2.27652 |
| Alpha | 7.92 |
| Skin factor | 31.3 |
| Delta P Skin | 3263.98 psia |
| kh | 4.64 md.ft |
| k | 0.22 md |
| Mobility k/mu | 1.04 |
| Investig. R | 8.52 ft |
| Tested Volume | 102.309 Barrels |

## 16Com1 : Semi-Log

| | |
|---|---|
| Company | Yates Drilling Co. |
| Field | Red Lake Morrow NE |
| Well | Mule Train16Com1 |
| Test | 16Com1 |

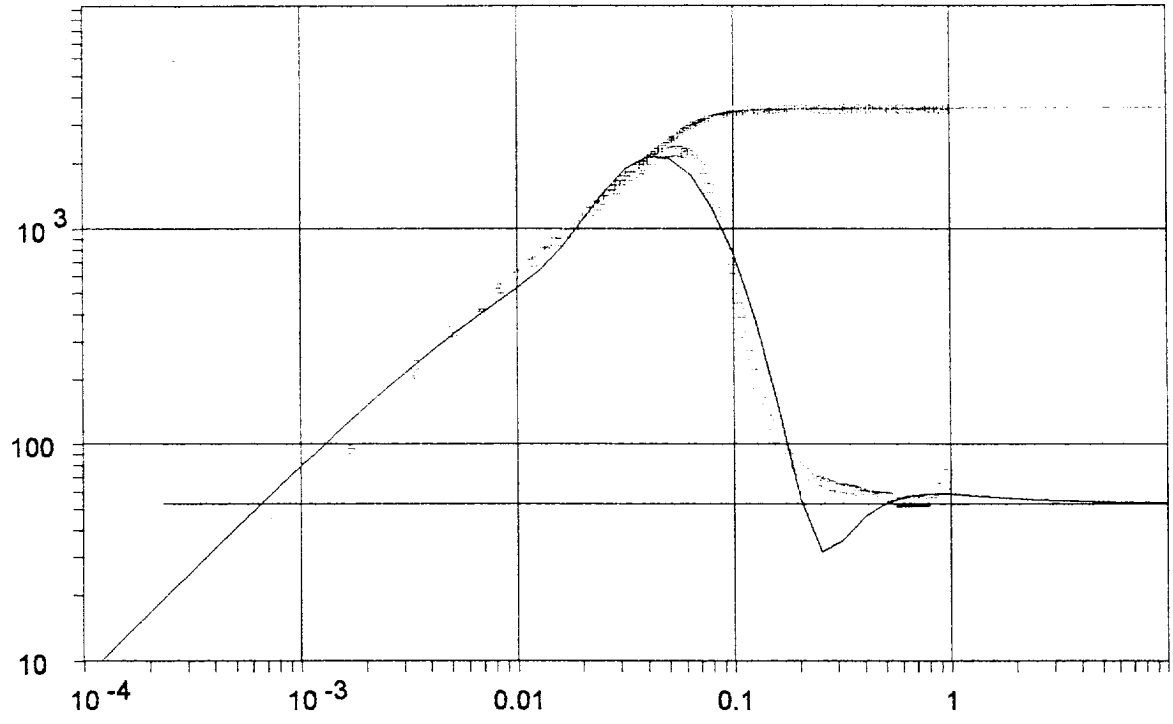



**P [psia] versus Superposition t**

| | | | |
|---|---|---|---|
| Flow Period # | 2 | RESERVOIR | Homogeneous |
| Rate | 0 STB/day | BOUNDARY | Infinite |
| Rate Change | 8.75 STB/day | WELL | Storage & Skin |
| P at dt=0 | 541.85 psia | Storage C | 2.98E-6 STB/psi |
| Pi | 4054.61 psia | Ci/Cf | 2.27652 |
| | | Alpha | 7.92 |
| STRAIGHT | LINE | Skin factor | 31.3 |
| | | Delta P Skin | 3263.98 psia |
| From | 0.565 hr | | |
| To | 0.79167 hr | kh | 4.64 md.ft |
| Slope | 117 psia | k | 0.22 md |
| Intercept | 4050.45 psia | Mobility k/mu | 1.04 |
| value at dt=1hr | 4039.11 psia | Investig. R | 8.52 ft |
| | | Tested Volume | 102.309 Barrels |
| -> p* | 4050.45 psia | | |
| ->PMatch | 0.00983 (psia)-1 | | |
| -> k.h | 4.76 md.ft | | |
| -> k | 0.23 md | | |
| -> Skin | 30.5 | | |
| Delta P Skin | 3100 | | |
| Time Match | 2170 (hr)-1 | | |
| Pressure Match | 0.0096 (psia)-1 | | |

## 16Com1 : Log-Log

| | |
|---|---|
| Company | Yates Drilling Co. |
| Field | Red Lake Morrow NE |
| Well | Mule Train16Com1 |
| Test | 16Com1 |




| | |
|---|---|
| Flow Period # | 2 |
| Rate | 0 STB/day |
| Rate Change | 8.75 STB/day |
| P at dt=0 | 541.85 psia |
| Smoothing | 0.1 |
| Pi | 4054.61 psia |
| Time Match | 2170 (hr)-1 |
| Pressure Match | 0.0096 (psia)-1 |

| | |
|---|---|
| RESERVOIR | Homogeneous |
| BOUNDARY | Infinite |
| WELL | Storage & Skin |
| Storage C | 2.98E-6 STB/psi |
| Ci/Cf | 2.27652 |
| Alpha | 7.92 |
| Skin factor | 31.3 |
| Delta P Skin | 3263.98 psia |
| kh | 4.64 md.ft |
| k | 0.22 md |
| Mobility k/mu | 1.04 |
| Investig. R | 8.52 ft |
| Tested Volume | 102.309 Barrels |

## 16Com#1 : Main Results

| | |
|---|---|
| Company | Yates Drilling Co. |
| Field | Red Lake Morrow NE |
| Well | Mule Train16Com1 |
| Test | 16com#1 |

| | |
|---|---|
| Date | Oct 30, 1999 |
| Gauge | Elec |
| Depth | 9675 |
| Formation interval | Upper Morrow |
| Perforated interval | 21ft |

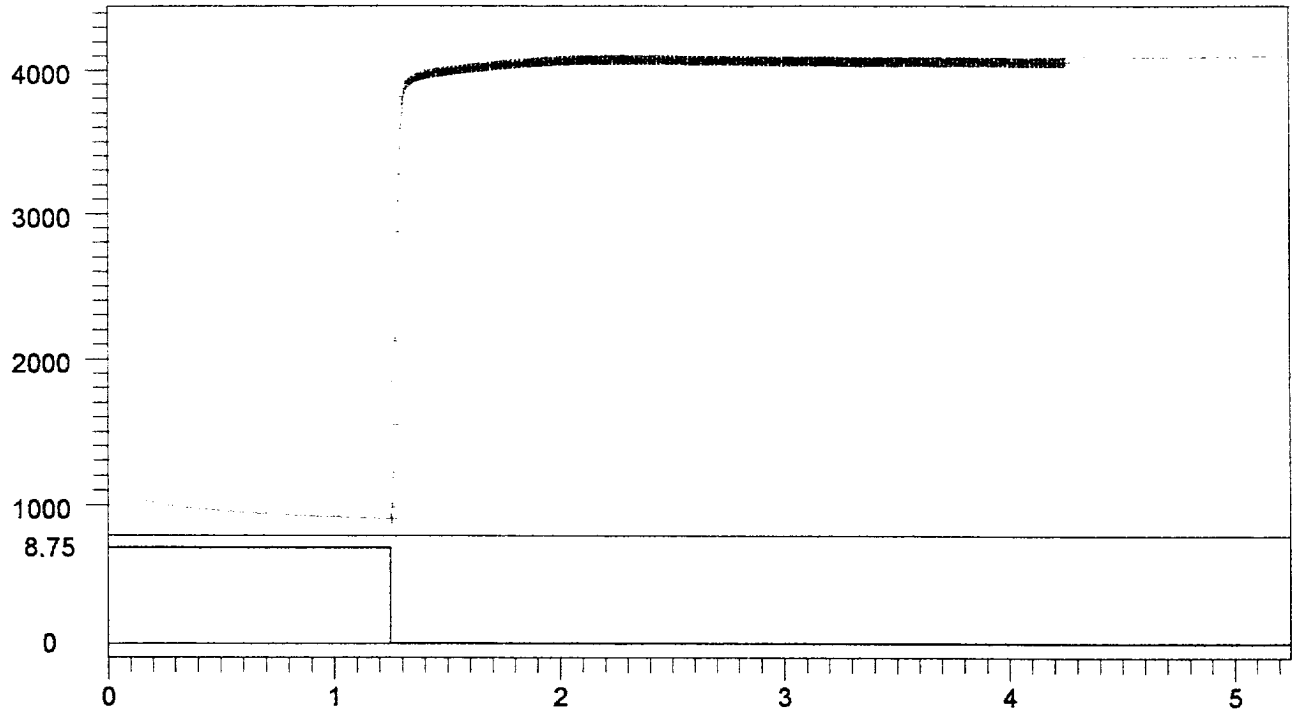
BUPeriod2

| | |
|---|---|
| TEST TYPE | Standard |
| Porosity Phi (%) | 12 |
| Well Radius rw | 0.32 ft |
| Pay Zone h | 21 ft |
| Flow Period # | 2 |
| Rate | 0 STB/day |
| Rate Change | 8.75 STB/day |
| P at dt=0 | 889 psia |
| Pi | 4097.07 psia |
| Time Match | 3020 (hr)-1 |
| Pressure Match | 0.0088 (psia)-1 |

| | |
|---|---|
| FLUID TYPE | Oil |
| Volume Factor B | 1.84565 |
| Total Compr. ct | 5E-6 psi-1 |
| Viscosity | 0.212093 cp |
| RESERVOIR | Homogeneous |
| BOUNDARY | Infinite |
| WELL | Storage & Skin |
| Storage C | 1.96E-6 STB/psi |
| Ci/Cf | 5.5733 |
| Alpha | 79.4 |
| Skin factor | 23.6 |
| Delta P Skin | 2678.44 psia |
| kh | 4.26 md.ft |
| k | 0.2 md |
| Mobility k/mu | 0.96 |
| Investig. R | 63.3 ft |
| Tested Volume | 5653.97 Barrels |

**16Com#1 : Simulation**

| | |
|---|---|
| Company | Yates Drilling Co. |
| Field | Red Lake Morrow NE |
| Well | Mule Train16Com1 |
| Test | 16com#1 |

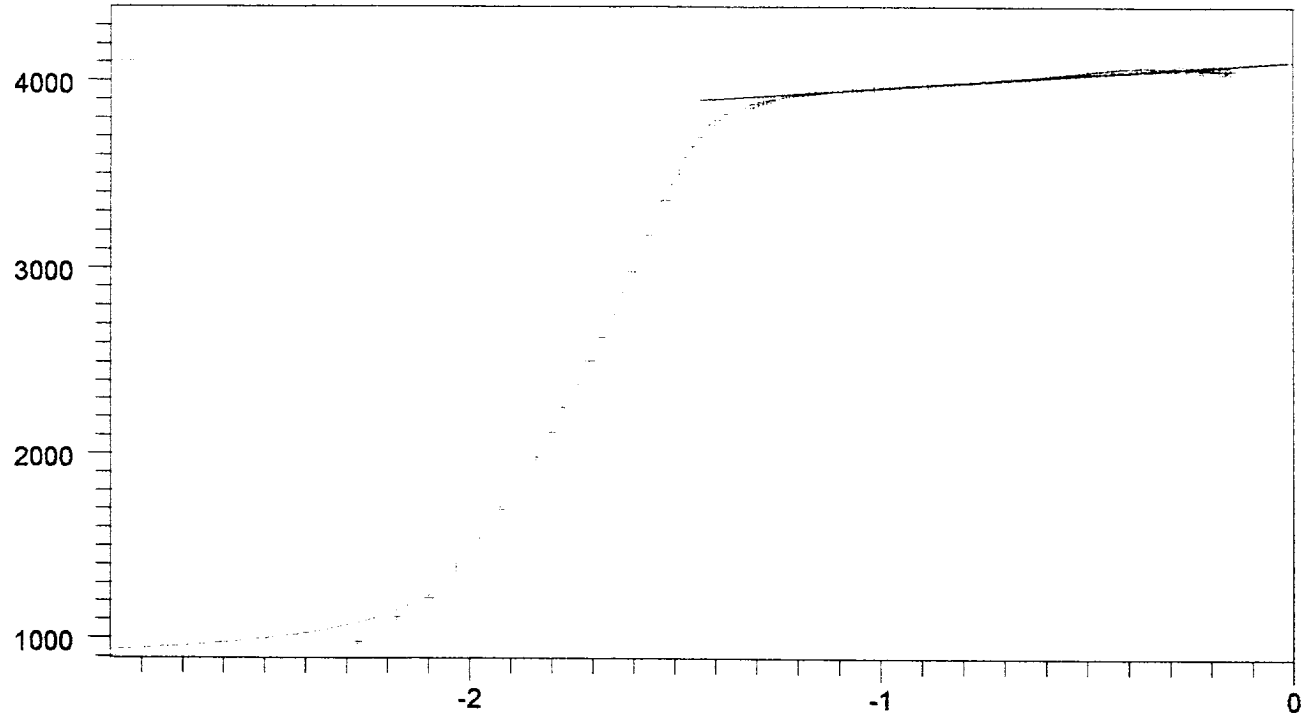



| | |
|---|---|
| Flow Period # | 2 |
| Rate | 0 STB/day |
| Rate Change | 8.75 STB/day |
| P at dt=0 | 889 psia |
| Pi | 4097.07 psia |
| Time Match | 3020 (hr)-1 |
| Pressure Match | 0.0088 (psia)-1 |

| | |
|---|---|
| RESERVOIR | Homogeneous |
| BOUNDARY | Infinite |
| WELL | Storage & Skin |
| Storage C | 1.96E-6 STB/psi |
| Ci/Cf | 5.5733 |
| Alpha | 79.4 |
| Skin factor | 23.6 |
| Delta P Skin | 2678.44 psia |
| kh | 4.26 md.ft |
| k | 0.2 md |
| Mobility k/mu | 0.96 |
| Investig. R | 63.3 ft |
| Tested Volume | 5653.97 Barrels |

**16Com#1 : Semi-Log**

| | |
|---|---|
| Company | Yates Drilling Co. |
| Field | Red Lake Morrow NE |
| Well | Mule Train16Com1 |
| Test | 16com#1 |



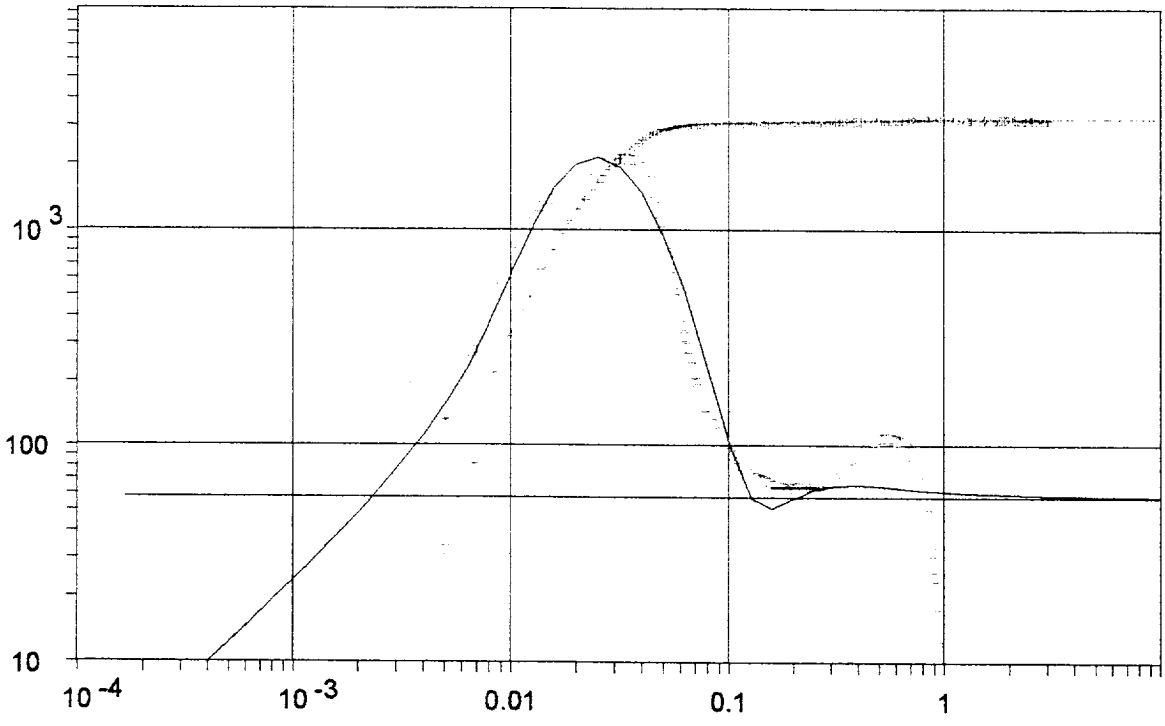

**P [psia] versus Superposition t**

| | |
|---|---|
| Flow Period # | 2 |
| Rate | 0 STB/day |
| Rate Change | 8.75 STB/day |
| P at dt=0 | 889 psia |
| Pi | 4097.07 psia |
| STRAIGHT | LINE |
| From | 0.15667 hr |
| To | 0.26167 hr |
| Slope | 145 psia |
| Intercept | 4095.85 psia |
| value at dt=1hr | 4044.82 psia |
| -> p* | 4095.85 psia |
| ->PMatch | 0.00794 (psia)-1 |
| -> k.h | 3.84 md.ft |
| -> k | 0.18 md |
| -> Skin | 20.3 |
| Delta P Skin | 2550 |
| Time Match | 3020 (hr)-1 |
| Pressure Match | 0.0088 (psia)-1 |

| | |
|---|---|
| RESERVOIR | Homogeneous |
| BOUNDARY | Infinite |
| WELL | Storage & Skin |
| Storage C | 1.96E-6 STB/psi |
| Ci/Cf | 5.5733 |
| Alpha | 79.4 |
| Skin factor | 23.6 |
| Delta P Skin | 2678.44 psia |
| kh | 4.26 md.ft |
| k | 0.2 md |
| Mobility k/mu | 0.96 |
| Investig. R | 63.3 ft |
| Tested Volume | 5653.97 Barrels |

## 16Com#1 : Log-Log

| | |
|---|---|
| Company | Yates Drilling Co. |
| Field | Red Lake Morrow NE |
| Well | Mule Train16Com1 |
| Test | 16com#1 |




| | |
|---|---|
| Flow Period # | 2 |
| Rate | 0 STB/day |
| Rate Change | 8.75 STB/day |
| P at dt=0 | 889 psia |
| Smoothing | 0.1 |
| Pi | 4097.07 psia |
| Time Match | 3020 (hr)-1 |
| Pressure Match | 0.0088 (psia)-1 |

| | |
|---|---|
| RESERVOIR | Homogeneous |
| BOUNDARY | Infinite |
| WELL | Storage & Skin |
| Storage C | 1.96E-6 STB/psi |
| Ci/Cf | 5.5733 |
| Alpha | 79.4 |
| Skin factor | 23.6 |
| Delta P Skin | 2678.44 psia |
| kh | 4.26 md.ft |
| k | 0.2 md |
| Mobility k/mu | 0.96 |
| Investig. R | 63.3 ft |
| Tested Volume | 5653.97 Barrels |

# GUARDIAN FIELD REPORT

| TYPE OF SERVICE | DATE | DISTRICT |
|---|---|---|
| OPEN HOLE DST | 30-OCT-1999 | HOBBS |



(915) 368-5449 - ODESSA, TX
(505) 397-0514 - HOBBS, NM
24 HR.

WELL OWNER: YATES DRILLING CO. SERVICE ORDER NUMBER: 7-2806

REPORTS ADDRESS: 105 S. 4TH STREET ARTESIA NM 88210

WELL NAME & NO.: MULE TRAIN"16" ST.COM.#1 FIELD: RED LAKE MORROW NE LEASE: MULE TRAIN

LOCATION: S16/17S/28E COUNTY: EDDY STATE: NEW MEXICO

TEST NO. ONE TEST INTERVAL FROM 9715 FT TO 9774 FT = 59 FT

**SURFACE DATA**

| DESCRIPTION | DATE | TIME | PRESSURE | MCF/D |
|---|---|---|---|---|
| SET PACKERS | 30-OCT | 11:52 | | |
| START FLOW ON 1/8" CHOKE | | 11:53 | 2"H20 | |
| BOTTOM OF BUCKET | | 11:54 | BB | |
| READ IN PSI STRONG BLOW | | 11:58 | 27.0# | 24.1MCF |
| | | 12:03 | 80.0# | 42.5MCF |
| END FLOW & START SHUTIN | | 12:08 | 125.0# | 58.1MCF |
| GAS TO SURFACE BLOWDOWN | | 12:11 | | |
| END SHUTIN | | 13:08 | 0.0 | |
| START FLOW ON 1/4" CHOKE | | 13:08 | 2.0# | 17.6MCF |
| STRONG BLOW | | 13:13 | 85.0# | 139.7MCF |
| | | 13:18 | 138.0# | 217.6MCF |
| | | 13:23 | 200.0# | 308.7MCF |
| | | 13:28 | 247.0# | 377.8MCF |
| | | 13:33 | 300.0# | 455.7MCF |
| | | 13:38 | 360.0# | 543.9MCF |
| | | 13:48 | 420.0# | 632.1MCF |
| | | 13:58 | 490.0# | 735.0MCF |
| END FLOW & START SHUTIN | | 14:08 | 540.0# | 808.5MCF |
| END SHUTIN | | 17:09 | 0.0 | |
| PULLED LOOSE | | 17:08 | | |

**EQUIPMENT SEQUENCE**

| COMPONENTS | OD | ID | LENGTH | DEPTH |
|---|---|---|---|---|
| DRILL PIPE | 4.50 | 3.826 | 8745.30 | |
| DRILL COLLARS | 6.25 | 2.25 | 735.26 | |
| CIRC. SUB PUMPOUT | 6.00 | 2.25 | 1.00 | |
| DRILL COLLARS | 6.25 | 2.25 | 93.00 | |
| CIRC. SUB KNOCKOUT | 6.00 | 2.25 | 1.00 | |
| DRILL COLLARS | 6.25 | 2.25 | 93.0 | |
| X-O SUB | 6.00 | 2.25 | 0.73 | |
| ELECT. REC. ABV.TEST | 5.00 | 1.12 | 6.00 | 9675 |
| DH SIT WITH SAMPLER | 5.00 | 0.68 | 10.42 | 9686 |
| HT BYPASS | 5.00 | 1.18 | 5.18 | |
| REC.IN. ELECT. | 5.00 | 1.12 | 5.74 | 9697 |
| TEST JAR | 5.00 | 1.67 | 4.71 | |
| SAFETY JOINT | 5.00 | 2.50 | 1.72 | |
| OPEN HOLE PACKER | 7.00 | 1.50 | 6.20 | 9709 |
| OPEN HOLE PACKER | 7.00 | 1.50 | 5.74 | 9715 |
| PERFORATIONS | 4.75 | 2.00 | 5.00 | |
| X-O SUB | 6.00 | 2.25 | 1.00 | |
| DRILLCOLLAR&BITSUB | 6.25 | 2.25 | 34.95 | |
| X-O SUB | 6.00 | 2.25 | 1.00 | |
| PERFORATIONS | 4.75 | 2.00 | 6.05 | |
| REC.IN.MECH. | 5.00 | 1.12 | 5.00 | 9768 |
| REC.OUT.MECH. | 5.00 | 1.12 | 6.00 | 9774 |

SERVICE ORDER NUMBER: 7-2806

MARK LUNA GUARDIAN TESTER

# GUARDIAN REPORT

(915) 368-5449 - ODESSA, TX
(505) 397-0514 - HOBBS, NM
24 HR.

| TYPE OF SERVICE | DATE | DISTRICT |
|---|---|---|
| OPEN HOLE DST | 30-OCT-1999 | HOBBS |



| RECOVERY DESCRIPTION | FEET | BBLS | OIL GRAVITY | RESISTIVITY | CHLORIDES |
|---|---|---|---|---|---|
| OIL | 93 | .456 | 55 @ 60 deg. | | |
| OIL&GAS CUT | | | | | |
| MUD | 192 | .941 | | .072 @ 70 deg | 110000 |

## INSTRUMENT DATA

| | | | | |
|---|---|---|---|---|
| INSTRUMENT NO. | S-70263 | AK1-13645 | AK1-13645 | S-70391 |
| CAPACITY(PSIG) | 10000 | 6525 | 6525 | 10000 |
| DEPTH | 9697 | 9768 | 9774 | 9675 |
| INSIDE-OUTSIDE | INSIDE | INSIDE | OUTSIDE | IN. ABOVE |
| CLOCK CAP | ELECTRONIC | 24 HR. | 24 HR. | ELECTRONIC |
| TEMPERATURE °F | 142 | 141 | 144 | 134 |
| I. HYD. PSIG | 5115 | 5205 | 5209 | |
| I. FLOW PSIG | 568-533 | 453-550 | 455-559 | 18-280 |
| I.S.I. PSIG | 4040 | 4072 | 4073 | |
| 2nd FLOW PSIG | | | | |
| 2nd S.I. PSIG | | | | NO LEAK |
| F. FLOW PSIG | 579-891 | 485-874 | 488-876 | 145-149 |
| F.S.I. PSIG | 4044 | 4072 | 4074 | |
| F. HYD. PSIG | 5131 | 5205 | 5209 | |

## MUD DATA

MUD TYPE SGEL/STAR/KCL MUD WT 9.9 #/gal
VISCOSITY 44 WATER LOSS 10.4 cc
RESISTIVITY: OF MUD .072 @ 70 °F
RESISTIVITY: OF FILTRATE @ °F
CHLORIDES 110000 PPM
H2S DURING TEST NONE PPM

## WELL BORE DATA

FORMATION TESTED UPPER MORROW
NET PRODUCTIVE INTERVAL 21 FT ft. EST POROSITY 12 %
ELEVATION 3559 ft. DEPTH MEASURED FROM GL
TOTAL MEASURED DEPTH 9774 ft.
O H SIZE 7.875 in.
CASING SIZE 8.625

| CUSHION | LENGTH | AMOUNT | SURFACE PRESS | BOTTOM CHOKE SIZE |
|---|---|---|---|---|
| NONE | 0.0 | 0.0 | 0.0 | 0.68 |

## SAMPLER DATA

| RECOVERY | | RESISTIVITY | | CHLORIDES | |
|---|---|---|---|---|---|
| GAS | 5.48 C.F. | RECOVERED WATER | @ 70 deg F | PPM | |
| OIL | 100 C.C. | RECOVERED MUD .072 | @ 70 deg F | 110000 PPM | |
| WATER | C.C. | REC.MUD FILTRATE | @ 70 deg F | PPM | |
| MUD | 200 C.C. | PIT MUD | @ 70 deg F | PPM | |
| GRAVITY 55 @ 60F | | PIT MUD FILTRATE | @ 70 deg F | PPM | |
| GOR 8713 C.F./BBL | | SAMPLER PRESSURE 891 | psig | | |

**REMARKS:** **THIS TEST WAS MECHANICALLY SUCCESSFUL. IF YOU HAVE ANY QUESTIONS CALL THE HOBBS DISTRICT AT (505) 397-0514. THANK YOU FOR USING GUARDIAN.**

| SERVICE ORDER NUMBER: | |
|---|---|
| 7-2806 | MARK LUNA GUARDIAN TESTER |