August 18, 1997

GOV-STATE AND LOCAL GOVERNMENTS
Application to Fracture the West Dollarhide Drinkard Well #146 WIW
Dollarhide Tubb Drinkard
API# (30-025-32374)
Unit Letter C, Sec. 32, 24S, 38E
Lea County, New Mexico

State of New Mexico
Energy and Minerals Department
Oil Conservation Commission
2040 South Pacheco
Santa Fe, New Mexico 87505

Attention: Mr. Ben Stone

Texaco Exploration and Production Inc. respectfully requests approval to fracture the West Dollarhide Drinkard Unit #146 WIW. This well is a unique injector in that it has never allowed sufficient injection under the fracturing pressure limitation since it was drilled in June 1994.

Please find attached, an explanation of the fracture stimulation proposal and also a procedure.

If you have any question concerning this application, please contact Alan Holly or Paula Ives at (505) 397-0449 or (505) 397-0432.

Yours very truly,

Paula S. Ives
Engineer Assistant

Approval_____/_____
Date

Attachments

cc: Chris Williams/NMOCD/Hobbs

9/8/17
Chris talked to
Ben both
agree they
will not approve.
Ben will send
letter.

West Dollarhide Drinkard Unit
#146 WIW

The WDDU #146 is a unique injector in that it has never allowed sufficient injection under the fracturing pressure limitation since it was drilled (6/94). Eventhough this well was acidized with 7,500 gallons of 15% NEFE upon completion, the injection rate has never exceeded 170 bwpd under the maximum pressure of 1,350 psi that was determined from a Step-Rate test soon after it was completed. As a result, attempts to inject into this well have been unsuccessful and it has been shut in since June of 1996.

In an attempt to establish a sufficient injection rate and consequently an increased sweep efficiency, I propose that a hydraulic fracturing treatment be performed on this well. The purpose would be to increase the conductivity of the formation further away from the wellbore so that a flow path will be created between the injector and producers. Once this flow path is established, I believe we will see an increase in the adjacent wells production. The challenge is realized, though, that height growth must be limited, but there are many ways to contain height growth. I feel that this is the only way that communication between the adjacent producers and the subject well will be attained.

WDDU #146 WIW WORKOVER PROCEDURE

DATE:	**8/15/97**
WELL:	**West Dollarhide Drinkard Unit #146 WIW**
CURRENT:	**Perf's: 6,495' - 6,659', 432 holes, 120°, 4jspf, 108ft**
TUBING:	**2 3/8"HDPE, 4.7#, J-55, 8rd EUE**
CASING:	**5 1/2" 15.5#, WC-50 LTC**
DEPTH:	**TD: 6,920' PBTD: 6,886' KBD:13'**
WORK:	**Frac the Drinkard to induce injection.**
PREPARED BY:	**Alan Holly**

1.) Install BOP and EWRAP unit.

2.) Release Packer, strap while coming out of hole with 2 3/8" injection tubing and packer. Install thread protectors. **If sulfate scale or paraffin are evident contact engineer or workover foreman.**

4.) Change rams to 2 7/8" and TIH with 2 7/8" Workstring and Sonic Hammer tool. **Acidize the perfs through the Sonic Hammer tool as per the attached recommendation.**

5.) TOH with 2 7/8" WS and Sonic Hammer tool.

6.) Change rams to 3 1/2" and TIH with 3 1/2" 9.3# frac tubing with a 5 1/2" 10K Frac Packer. Test tubing into hole to 8,000 psi. Set packer at +/- 6,450' and load backside.

7.) Test annulus to 500 psi. Install pressure relief valve on annulus set for 1,000 psi.

8.) RU Dowell. Test surface lines to 8,000 psi. **Frac the zone as per the attached recommendation.**

9.) Flow or Swab back load until well is dead.

10.)TOH with 3 1/2" frac tubing and packer.

11.)TIH with 2 7/8" Work String and bit. Clean out sand to PBTD: +/- 6,880'. If circulation can not be established, trip tubing and run a hydrostatic bailer on tubing to clean out. TOH.

12.)Place well on Injection.

FOREMAN: Fred Reynolds (505)395-2423
ENGINEER: Alan Holly (505)397-0449
LEASE OPERATOR: Larry O'Neal (505)369-6692
DOWELL SCHLUMBERGER: Lori Ward/Hank Horton (505)397-0435

WDDU #146 Acidizing Procedure

Drinkard 6,495' - 6,659'

1.) RU Dowell Schlumberger.

2.) Acidize Perfs w/3,000 gallons of 15% HCL NEFE, at 1-2 BPM(Max TP 4000 psi) as follows:

a. RU stripping head and enough hose to allow the movement of a full stand of tubing (approximately 65ft.)

b. Begin pumping 2% KCL water-when tubing capacity has been pumped, increase rate to 4-5 bpm; reciprocating the Sonic Hammer across the interval.

c. Begin acid stage (determined by dividing total footage and multiplying acid/ft by footage in stage). Displace acid stage across interval with 2% KCL while reciprocating the tool across the interval.

d. Make a connection and once again begin pumping KCL followed by the next acid stage, and flush.

e. Continue with steps b-d until entire perforated interval has been treated.

WDDU #146 Frac Procedure

Drinkard: 6,495' - 6,659'

1.) Frac the Drinkard zone with 15,000 gallons of 40# borate crosslinked gel, 26,500 lbs of 20/40 Ottawa and 8,000 lbs of 20/40 Brady resin coated sand down tubing as follows:

Pad	6,500 gallons	40# Borate Crosslinked
2 ppg	750 gallons	40# Borate Crosslinked
4 ppg	1,000 gallons	40# Borate Crosslinked
6 ppg	1,000 gallons	40# Borate Crosslinked
7 ppg	1,000 gallons	40# Borate Crosslinked
8 ppg	1,000 gallons	40# Borate Crosslinked
8 ppg resin	1,000 gallons	40# Borate Crosslinked
Flush	2,400 gallons	20# Linear Gel

NOTES:

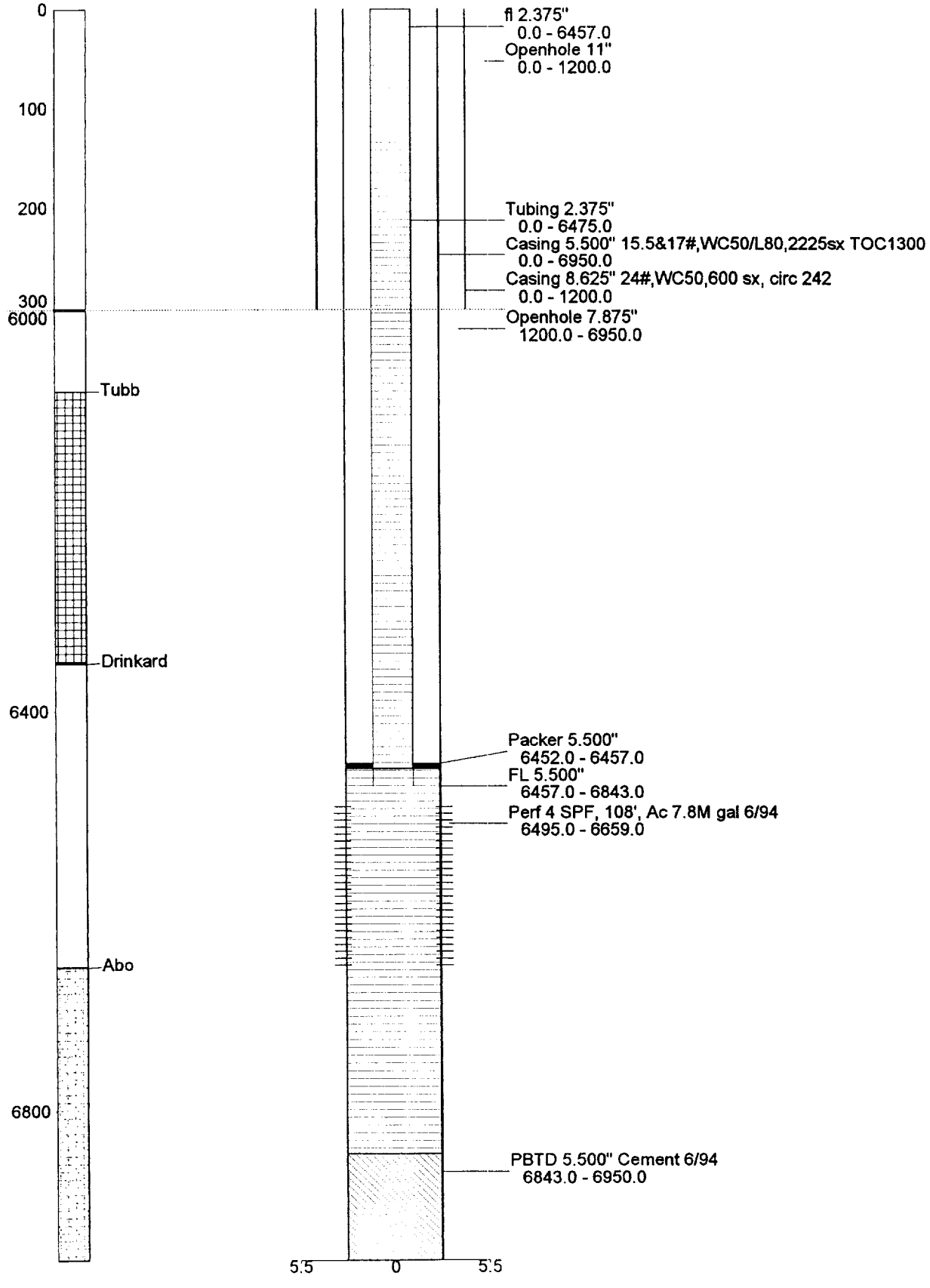
1.) Desired rate: 40 BPM
2.) Maximum Tubing Pressure: 8,000 psi
3.) Anticipated Tubing Pressure: 4,000 psi
4.) Stair Step sand (do not ramp)
5.) Flush will be called as soon as sand concentration begins to drop at the blender.

Nipple up flowback equipment (flowback lines should be oriented so that flow can be directed to a pit or tank. All right angle bends to have targeted tees).

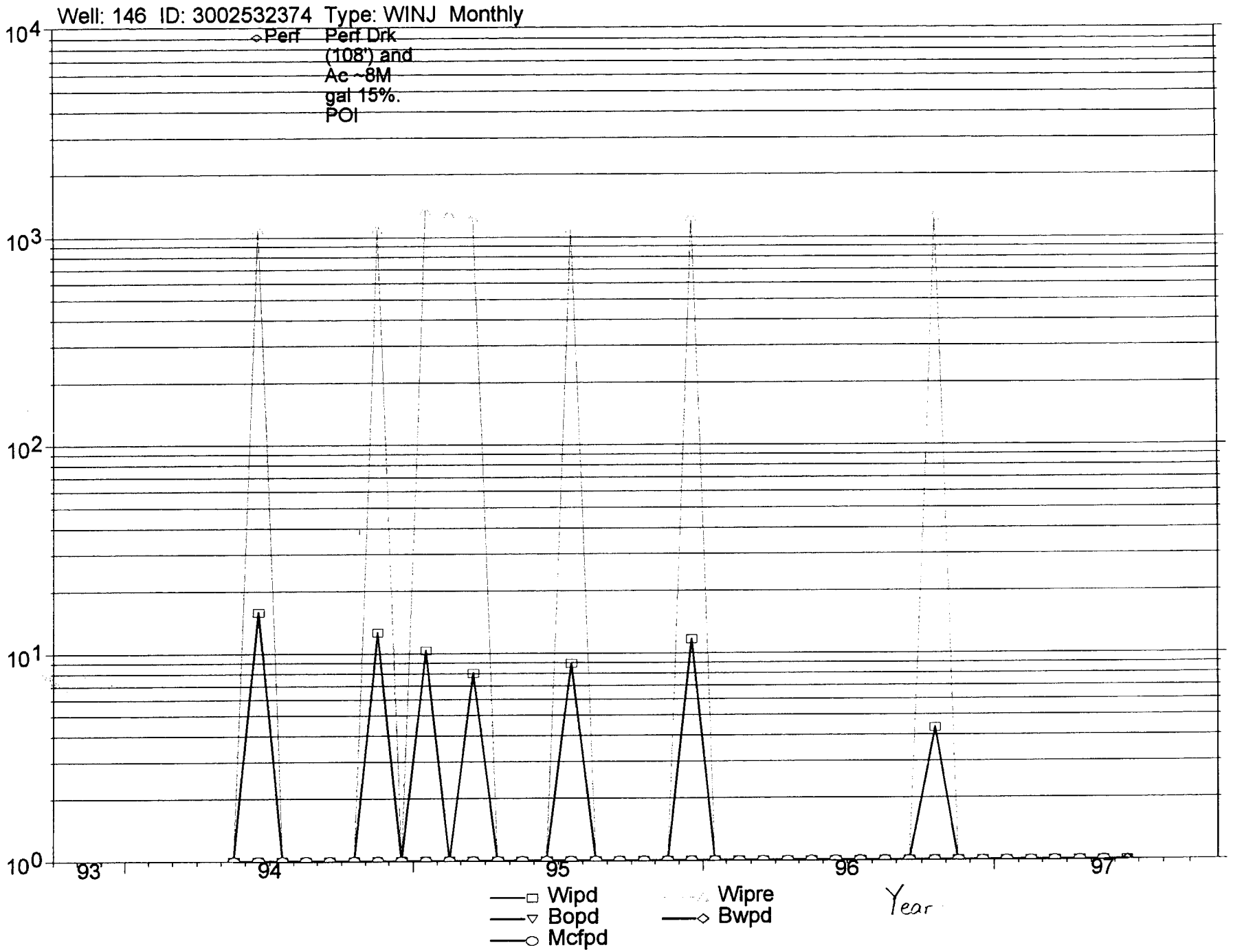
2.) Flush 2 bbls short of top perf with slickwater.

WDDU #146
Frac WIW (8/5/97)

Name: 146 ID: 3002532374 Type: WINJ Date: 19970805
KB: 0.0 TD: 0.0 PBTD: 0.0 Comp Date: 0



WDDU #146: WINJ
Injection Increase-(8/5/97)



Schlumberger Dowell

FracCADE*
STIMULATION PROPOSAL

Operator : Texaco
Well : WDDU #146wiw
Field : West Dollarhide
Formation : Drinkard - Limestone/Dolomite

Well Location : 7 mi. NE of Jal NM
County : Lea
State : New Mexico
Country : U.S.A.

Prepared for : Hobbs OU - Eunice FMT
Proposal No. :
Date Prepared : 06-26-1997

Service Point : Hobbs, New Mexico
Business Phone : (505) 393-6186
FAX No. : (505) 393-2132

Prepared by : Alan Holly
Phone : (505)397-0449
E-Mail Address :

* Mark of Schlumberger

Section 1: Definitions

The following are definitions of terms used in this proposal.

FRACTURE HALF-LENGTH
refers to the length of one fracture wing from the wellbore to the fracture tip.

FLUID LENGTH
refers to the fracture half-length occupied by fluid and may include length without proppant which does not contribute to production.

PROPPED LENGTH
refers to the fracture half-length occupied by proppant and may include length which does not contribute to production due to low proppant concentration, proppant damage or other effects.

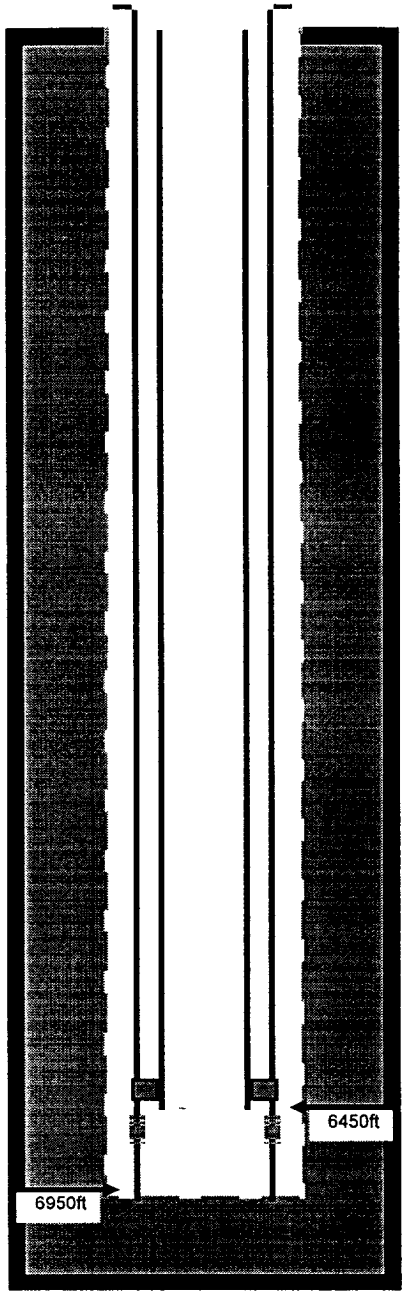
EFFECTIVE or APPARENT LENGTH
refers to the fracture half-length through which formation fluid can be produced and which may be expected to contribute to well productivity improvement.

Schlumberger
Dowell

Client	Texaco
Well	WDDU #146wiw
Formation	Drinkard - Limestone/Dolomite
District	Hobbs, New Mexico
Country	U.S.A.

Section 3: Wellbore Configuration

Deviated Hole ..... NO
Treat Down ..... TUBING
Flush Volume to 6495.0 ft .... 57.2 bbl



Tubing Data			
OD (in)	Weight (lb/ft)	ID (in)	Depth (ft)
3.500	9.3	2.992	6450.0

Casing Data			
OD (in)	Weight (lb/ft)	ID (in)	Depth (ft)
5.500	15.5	4.950	6950.0

Perforation Data						
Top MD (ft)	Top TVD (ft)	Bottom MD (ft)	Bottom TVD (ft)	Shot Density (shot/ft)	Number	Diameter (in)
6495.0	6495.0	6507.0	6507.0	4.00	48	0.32
6510.0	6510.0	6524.0	6524.0	4.00	56	0.32
6529.0	6529.0	6545.0	6545.0	4.00	64	0.32

Schlumberger
Dowell

Client : Texaco
Well : WDDU #146wiw
Formation : Drinkard - Limestone/Dolomite
District : Hobbs, New Mexico
Country : U.S.A.

Perforation Data						
Top MD (ft)	Top TVD (ft)	Bottom MD (ft)	Bottom TVD (ft)	Shot Density (shot/ft)	Number	Diameter (in)
6495.0	6495.0	6507.0	6507.0	4.00	48	0.32
6510.0	6510.0	6524.0	6524.0	4.00	56	0.32
6529.0	6529.0	6545.0	6545.0	4.00	64	0.32
6552.0	6552.0	6578.0	6578.0	4.00	104	0.32
6580.0	6580.0	6586.0	6586.0	4.00	24	0.32
6594.0	6594.0	6613.0	6613.0	4.00	76	0.32
6617.0	6617.0	6621.0	6621.0	4.00	16	0.32
6625.0	6625.0	6630.0	6630.0	4.00	20	0.32
6653.0	6653.0	6659.0	6659.0	4.00	24	0.32

Section 2: Zone Data

Formation Transmissibility Properties								
Zone Name	Top MD (ft)	Height (ft)	Perm (md)	Porosity (%)	Res. Pressure (psi)	Gas Sat. (%)	Oil Sat. (%)	Water Sat. (%)
Blinebry	5535.0	555.0	0.01	2.0	2200	35.0	40.0	25.0
Tubb Upper	6090.0	85.0	0.01	2.0	2200	35.0	40.0	25.0
Tubb Main 1	6175.0	225.0	0.1	1.0	2200	35.0	40.0	25.0
Tubb Main 2	6400.0	130.0	0.5	1.0	2200	35.0	40.0	25.0
Drinkard	6530.0	125.0	1	6.0	2200	35.0	40.0	25.0
Abo Upper	6655.0	100.0	1	3.0	2200	35.0	40.0	25.0
Abo Lower	6755.0	48.8	1	3.0	2200	35.0	40.0	25.0
Below	6803.8	48.7	1	10.0	3196	35.0	40.0	25.0

Section 3: Zone Data

Formation Mechanical Properties							
Zone Name	Top MD (ft)	Zone Height (ft)	Frac Grad. (psi/ft)	Insitu Stress (psi)	Youngs Modulus (psi)	Poissons Ratio	Tough-ness (psi.in0.5)
Blinebry	5535.0	555.0	0.850	4941	3.924E+06	0.30	500
Tubb Upper	6090.0	85.0	0.682	4182	3.924E+06	0.30	500
Tubb Main 1	6175.0	225.0	0.620	3898	1.203E+07	0.25	750
Tubb Main 2	6400.0	130.0	0.597	3858	1.203E+07	0.25	750
Drinkard	6530.0	125.0	0.599	3949	5.264E+06	0.25	500
Abo Upper	6655.0	100.0	0.585	3920	1.080E+07	0.25	750
Abo Lower	6755.0	48.8	0.578	3920	1.080E+07	0.25	750
Below	6803.8	48.7	0.626	4274	5.619E+06	0.20	1200

Schlumberger
Dowell

Client : Texaco
Well : WDDU #146wiw
Formation : Drinkard - Limestone/Dolomite
District : Hobbs, New Mexico
Country : U.S.A.

Section 4: Zone Data

Zone Properties			
Zone Number	**1**	**2**	**3**
Zone Name	**Blinebry**	**Tubb Upper**	**Tubb Main 1**
Top MD (ft)	**5535.0**	**6090.0**	**6175.0**
Top TVD (ft)	**5535.0**	**6090.0**	**6175.0**
Zone Height Data			
Gross Height (ft)	555.0	85.0	225.0
Leakoff Height (ft)	555.0	85.0	225.0
Net Height (ft)	555.0	85.0	225.0
Rock Type	SILTSTONE	SILTSTONE	DOLOMITE
Depth Stress Profile			
Frac Gradient (psi/ft)	0.850	0.682	0.620
Insitu Stress (psi)	4941	4182	3898
Reservoir Pressure (psi)	2200	2200	2200
Mechanical Properties			
Young's Modulus (psi)	3.924E+06	3.924E+06	1.203E+07
Poisson's Ratio	0.30	0.30	0.25
Toughness (psi.in0.5)	500	500	750
Specific Gravity	2.65	2.65	2.95
Embedment Strength (psi)	60000	60000	100000
Limestone (%)	10.0	10.0	0.0
Dolomite (%)	30.0	30.0	100.0
Transmissibility Properties			
Permeability (md)	0.01	0.01	0.1
Porosity (%)	2.0	2.0	1.0
Form. Volume Factor (bbl/stb)	1.01	1.01	1.01
Total Compressibility (1/psi)	1.02E-5	1.02E-5	1.34E-5
Oil Saturation (%)	40.0	40.0	40.0
Gas Saturation (%)	35.0	35.0	35.0
H_2O Saturation (%)	25.0	25.0	25.0

Schlumberger
Dowell

Client : Texaco
Well : WDDU #146wiw
Formation : Drinkard - Limestone/Dolomite
District : Hobbs, New Mexico
Country : U.S.A.

Zone Properties (continued)			
Zone Number	**4**	**5**	**6**
Zone Name	**Tubb Main 2**	**Drinkard**	**Abo Upper**
Top MD (ft)	**6400.0**	**6530.0**	**6655.0**
Top TVD (ft)	**6400.0**	**6530.0**	**6655.0**
Zone Height Data			
Gross Height (ft)	130.0	125.0	100.0
Leakoff Height (ft)	130.0	125.0	100.0
Net Height (ft)	130.0	125.0	100.0
Rock Type	DOLOMITE	LIMESTONE	DOLOMITE
Depth Stress Profile			
Frac Gradient (psi/ft)	0.597	0.599	0.585
Insitu Stress (psi)	3858	3949	3920
Reservoir Pressure (psi)	2200	2200	2200
Mechanical Properties			
Young's Modulus (psi)	1.203E+07	5.264E+06	1.080E+07
Poisson's Ratio	0.25	0.25	0.25
Toughness (psi.in0.5)	750	500	750
Specific Gravity	2.95	2.71	2.95
Embedment Strength (psi)	100000	60000	100000
Limestone (%)	0.0	75.0	20.0
Dolomite (%)	100.0	5.0	80.0
Transmissibility Properties			
Permeability (md)	0.5	1	1
Porosity (%)	1.0	6.0	3.0
Form. Volume Factor (bbl/stb)	1.01	1.01	1.01
Total Compressibility (1/psi)	1.34E-5	6.76E-6	8.76E-6
Oil Saturation (%)	40.0	40.0	40.0
Gas Saturation (%)	35.0	35.0	35.0
H_2O Saturation (%)	25.0	25.0	25.0

Zone Properties (continued)		
Zone Number	**7**	**8**
Zone Name	**Abo Lower**	**Below**
Top MD (ft)	**6755.0**	**6803.8**
Top TVD (ft)	**6755.0**	**6803.8**

Zone Height Data

Gross Height (ft)	48.8	48.7
Leakoff Height (ft)	48.8	48.7
Net Height (ft)	48.8	48.7
Rock Type	DOLOMITE	CLEAN-SANDSTONE

Depth Stress Profile

Frac Gradient (psi/ft)	0.578	0.626
Insitu Stress (psi)	3920	4274
Reservoir Pressure (psi)	2200	3196

Mechanical Properties

Young's Modulus (psi)	1.080E+07	5.619E+06
Poisson's Ratio	0.25	0.20
Toughness (psi.in0.5)	750	1200
Specific Gravity	2.95	2.50
Embedment Strength (psi)	100000	60000
Limestone (%)	20.0	0.0
Dolomite (%)	80.0	0.0

Transmissibility Properties

Permeability (md)	1	1
Porosity (%)	3.0	10.0
Form. Volume Factor (bbl/stb)	1.01	1.01
Total Compressibility (1/psi)	8.76E-6	5.61E-6
Oil Saturation (%)	40.0	40.0
Gas Saturation (%)	35.0	35.0
H_2O Saturation (%)	25.0	25.0

Section 5: Propped Fracture Schedule

The following is the Pumping Schedule to achieve a propped fracture half-length (X_f) of 105.9 ft with an average conductivity (K_fw) of 731 md.ft.

Job Description						
Stage Name	**Pump Rate** (bbl/min)	**Fluid Name**	**Stage Fluid Volume** (gal)	**Gel Conc.** (lb/mgal)	**Prop. Type and Mesh**	**Prop. Conc.** (PPA)
PAD	40.0	YF140D	6500	40.0		0.0

Schlumberger
Dowell

Client : Texaco
Well : WDDU #146wiw
Formation : Drinkard - Limestone/Dolomite
District : Hobbs, New Mexico
Country : U.S.A.

Job Description

Stage Name	Pump Rate (bbl/min)	Fluid Name	Stage Fluid Volume (gal)	Gel Conc. (lb/mgal)	Prop. Type and Mesh	Prop. Conc. (PPA)
2 PPA	40.0	YF140D	750	40.0	20/40Brady 20/40	2.0
4 PPA	40.0	YF140D	1000	40.0	20/40Brady 20/40	4.0
6 PPA	40.0	YF140D	1000	40.0	20/40Brady 20/40	6.0
7 PPA	40.0	YF140D	1000	40.0	20/40Brady 20/40	7.0
8 PPA	40.0	YF140D	2000	40.0	20/40Brady 20/40	8.0
Flush	40.0	WF120	2401	20.0		0.0

Fluid Totals

12250 gal	of	YF140D
2401 gal	of	WF120

Proppant Totals

34500 lb	of	20/40Brady 20/40

Job Execution

Stage Name	Stage Fluid Volume (gal)	Cum. Fluid Volume (gal)	Stage Slurry Volume (bbl)	Cum. Slurry Volume (bbl)	Stage Prop (lb)	Cum. Prop. (lb)	Avg. Surface Pressure (psi)	Stage Time (min)	Cum. Time (min)
PAD	6500	6500	154.8	154.8	0	0	3886	3.9	3.9
2 PPA	750	7250	19.5	174.2	1500	1500	3835	0.5	4.4
4 PPA	1000	8250	28.1	202.3	4000	5500	3883	0.7	5.1
6 PPA	1000	9250	30.3	232.6	6000	11500	3970	0.8	5.8
7 PPA	1000	10250	31.3	264.0	7000	18500	4049	0.8	6.6
8 PPA	2000	12250	64.8	328.8	16000	34500	5212	1.6	8.2
Flush	2401	14651	57.2	386.0	0	34500	3104	1.4	9.6

Section 6: Propped Fracture Simulation

The following are the results of the computer simulation of this Fracturing Proposal using a Pseudo 3-D Vertical model.

Propped Fracture Half-Length ..... **105.9 ft**
EOJ Hyd Height at Well ..... **313.1 ft**
Average Propped Width ..... **0.074 in**
Average Gel Concentration ..... **2268.2 lb/mgal**
Average Gel Fluid Retained Factor **0.90**
Average Conductivity ..... **731 md.ft**
Average Fcd **21.8**
Net Pressure ..... **306 psi**
Efficiency **0.739**

Schlumberger
Dowell

Client : Te, J
Well : WDDU #146wiw
Formation : Drinkard - Limestone/Dolomite
District : Hobbs, New Mexico
Country : U.S.A.

Simulation Results by Fracture Segment

From (ft)	To (ft)	Prop. Conc. at End of Pumping (PPA)	Propped Width (in)	Propped Height (ft)	Frac. Prop. Conc. (lb/ft^2)	Frac. Gel Conc. (lb/mgal)	Fracture Conductivity (md.ft)
0.0	26.5	7.6	0.088	298.8	0.79	266.6	841
26.5	52.9	7.3	0.083	294.8	0.74	318.0	801
52.9	79.4	5.4	0.059	237.7	0.53	435.8	618
79.4	105.9	0.6	0.035	199.1	0.32	659.8	438

Exposure Time Prediction by Stage

Stage Name	Fluid Name	Pump Rate (bbl/min)	Fluid Volume (gal)	Perforation Injection Temp. (degF)	Exposure at BHST of 125 degF (min)	Exposure at Watch Temp. of 125 degF (min)
PAD	YF140D	40.0	6500	99	8.1	8.1
2 PPA	YF140D	40.0	750	90	1.3	1.3
4 PPA	YF140D	40.0	1000	90	0.5	0.5
6 PPA	YF140D	40.0	1000	90	0.0	0.0
7 PPA	YF140D	40.0	1000	90	0.0	0.0
8 PPA	YF140D	40.0	2000	90	0.0	0.0
Flush	WF120	40.0	2401			