

FracCADE^{*} STIMULATION PROPOSAL

Operator : Caza Petroleum
Well : Forehand 27-5
Field :
Formation : Cherry Canyon

Well Location :
County : Eddy
State : New Mexico
Country : United States

Prepared for : Tony Sams
Proposal No. :
Date Prepared : 11-25-2013

Service Point :
Business Phone :
FAX No. :

Ex. 8

Prepared by :
Phone :
E-Mail Address :

* Mark of Schlumberger

Schlumberger Private

Disclaimer Notice:

This information is presented in good faith, but no warranty is given by and Schlumberger assumes no liability for advice or recommendations made concerning results to be obtained from the use of any product or service. The results given are estimates based on calculations produced by a computer model including various assumptions on the well, reservoir and treatment. The results depend on input data provided by the Operator and estimates as to unknown data and can be no more accurate than the model, the assumptions and such input data. The information presented is Schlumberger's best estimate of the actual results that may be achieved and should be used for comparison purposes rather than absolute values. The quality of input data, and hence results, may be improved through the use of certain tests and procedures which Schlumberger can assist in selecting.

The Operator has superior knowledge of the well, the reservoir, the field and conditions affecting them. If the Operator is aware of any conditions whereby a neighboring well or wells might be affected by the treatment proposed herein it is the Operator's responsibility to notify the owner or owners of the well or wells accordingly.

Prices quoted are estimates only and are good for 30 days from the date of issue. Actual charges may vary depending upon time, equipment, and material ultimately required to perform these services.

Freedom from infringement of patents of Schlumberger or others is not to be inferred.

Client : Caza Petroleum
 Well : Forehand 27-5 SWD
 Formation : Cherry Canyon
 District :
 Country : United States
 Loadcase : Stage 1

Schlumberger

Section 1: Wellbore Configuration

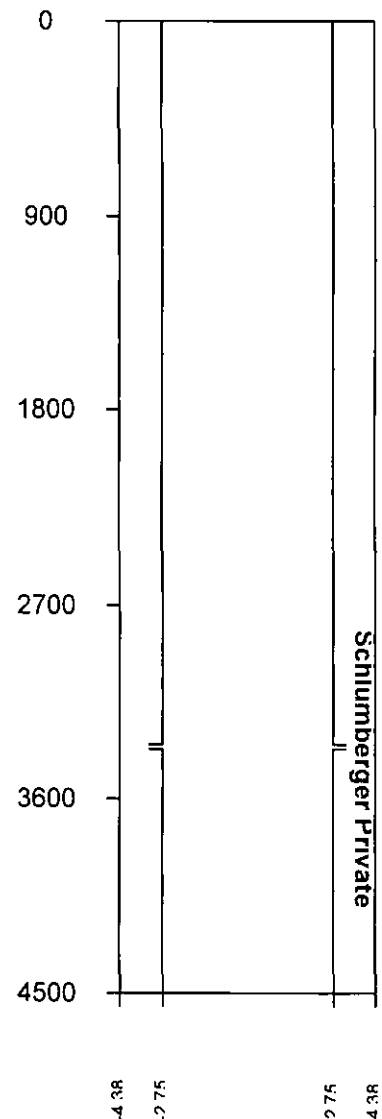
Bottom Hole Temperature.....115 degF
 Deviated Hole.....NO
 Treat Down.....CASING

Well Type.....Vertical
 Well Location.....OnShore

No Tubing.

Casing Data			
OD (in)	Weight (lb/ft)	ID (in)	Depth (ft)
5.500	17.0	4.892	4500.0

Perforation Data						
Top MD (ft)	Top TVD (ft)	Bottom MD (ft)	Bottom TVD (ft)	Shot Density (shot/ft)	Number	Diameter (in)
3350.0	3350.0	3370.0	3370.0	2.00	40	0.32



Client : Caza Petroleum
 Well : Forehand 27-5 SWD
 Formation : Cherry Canyon
 District :
 Country : United States
 Loadcase : Stage 1



Section 2: Zone Data

Formation Mechanical Properties							
Zone Name	Top TVD (ft)	Zone Height (ft)	Frac Grad. (psi/ft)	Insitu Stress (psi)	Young's Modulus (psi)	Poisson's Ratio	Toughness (psi.in0.5)
CLEAN-SANDSTONE	2900.0	100.0	0.700	2065	7.953E+6	0.20	2400
CLEAN-SANDSTONE	3000.0	40.0	0.700	2114	8.674E+6	0.20	2400
CLEAN-SANDSTONE	3040.0	80.0	0.700	2156	5.619E+6	0.20	1200
CLEAN-SANDSTONE	3120.0	130.0	0.700	2229	7.953E+6	0.20	2400
CLEAN-SANDSTONE	3250.0	100.0	0.680	2244	5.619E+6	0.20	1200
CLEAN-SANDSTONE	3350.0	150.0	0.680	2329	4.343E+6	0.20	1200
CLEAN-SANDSTONE	3500.0	100.0	0.700	2485	5.028E+6	0.20	1200

Formation Transmissibility Properties								
Zone Name	Top TVD (ft)	Net Height (ft)	Perm (md)	Porosity (%)	Res. Pressure (psi)	Gas Sat. (%)	Oil Sat. (%)	Water Sat. (%)
CLEAN-SANDSTONE	2900.0	100.0	1.000	5.0	1381	65.0	10.0	25.0
CLEAN-SANDSTONE	3000.0	40.0	1.000	4.0	1413	65.0	10.0	25.0
CLEAN-SANDSTONE	3040.0	80.0	1.000	10.0	1432	65.0	10.0	25.0
CLEAN-SANDSTONE	3120.0	130.0	1.000	5.0	1500	65.0	10.0	25.0
CLEAN-SANDSTONE	3250.0	100.0	1.000	10.0	1544	65.0	10.0	25.0
CLEAN-SANDSTONE	3350.0	150.0	1.000	15.0	1603	65.0	10.0	25.0
CLEAN-SANDSTONE	3500.0	100.0	1.000	12.0	1661	65.0	10.0	25.0

Schlumberger Private

Client : Caza Petroleum
Well : Forehand 27-5 SWD
Formation : Cherry Canyon
District :
Country : United States
Loadcase : Stage 1

Schlumberger

Section 3: Propped Fracture Schedule

Pumping Schedule

The following is the Pumping Schedule to achieve a propped fracture half-length (X_f) of 445.0 ft with an average conductivity (K_{fw}) of 1658 md.ft.

Job Description						
Step Name	Pump Rate (bbl/min)	Fluid Name	Step Fluid Volume (gal)	Gel Conc. (lb/mgal)	Prop. Type and Mesh	Prop. Conc. (PPA)
Pad	60.0	YF120-Flex	40000	20.0		0.00
0.5 PPA	60.0	YF120-Flex	10000	20.0	Jordan Unimin 16/30	0.50
1.0 PPA	60.0	YF120-Flex	12000	20.0	Jordan Unimin 16/30	1.00
2.0 PPA	60.0	YF120-Flex	14000	20.0	Jordan Unimin 16/30	2.00
3.0 PPA	60.0	YF120-Flex	15000	20.0	Jordan Unimin 16/30	3.00
4.0 PPA	60.0	YF120-Flex	15000	20.0	Jordan Unimin 16/30	4.00
5.0 PPA	60.0	YF120-Flex	10000	20.0	Jordan Unimin 16/30	5.00
Flush	60.0	WF120	3271	20.0		0.00

Fluid Totals		
116000 gal	of	YF120-Flex
3271 gal	of	WF120

Proppant Totals		
200000 lb	of	Jordan Unimin 16/30

Pad Percentages	
% PAD Clean	34.5
% PAD Dirty	32.0

Job Execution									
Step Name	Step Fluid Volume (gal)	Cum. Fluid Volume (gal)	Step Slurry Volume (bbl)	Cum. Slurry Volume (bbl)	Step Prop (lb)	Cum. Prop. (lb)	Avg. Surface Pressure (psi)	Step Time (min)	Cum. Time (min)
Pad	40000	40000	952.4	952.4	0	0	3257	15.9	15.9
0.5 PPA	10000	50000	243.5	1195.9	5000	5000	3223	4.1	19.9
1.0 PPA	12000	62000	298.7	1494.6	12000	17000	3185	5.0	24.9
2.0 PPA	14000	76000	363.6	1858.1	28000	45000	3076	6.1	31.0
3.0 PPA	15000	91000	405.8	2263.9	45000	90000	2881	6.8	37.7
4.0 PPA	15000	106000	422.0	2685.9	60000	150000	2628	7.0	44.8
5.0 PPA	10000	116000	292.1	2978.0	50000	200000	2433	4.9	49.6
Flush	3271	119271	77.9	3055.8	0	200000	2347	1.3	50.9

Schlumberger Private

Client : Caza Petroleum
 Well : Forehand 27-5 SWD
 Formation : Cherry Canyon
 District :
 Country : United States
 Loadcase : Stage 1



Pumping Schedule Totals

Summary for This Stage:

Average Pump Rate 60.0 bbl/min
 Volume Weighted Average Rate 60.0 bbl/min
 Total Fluid Volume 119271 gal
 Total Proppant Mass 200000 lb
 Total Slurry Volume 3055.8 bbl
 Total Pump Time 50.9 min

Fluid Based Totals for This Stage						
Fluid	Average Pump Rate (bbl/min)	Volume Weighted Average Rate (bbl/min)	Total Fluid Volume (gal)	Total Proppant Mass (lb)	Total Slurry Volume (bbl)	Total Pump Time (min)
YF120-Flex	60.0	60.0	116000	200000	2978.0	49.6
WF120	60.0	60.0	3271	0	77.9	1.3

Proppant Based Totals for This Stage						
Proppant	Average Pump Rate (bbl/min)	Volume Weighted Average Rate (bbl/min)	Total Fluid Volume (gal)	Total Proppant Mass (lb)	Total Slurry Volume (bbl)	Total Pump Time (min)
Jordan Unimin 16/30	60.0	60.0	76000	200000	2025.6	33.8

Summary for Each Treatment						
Treatment Type	Average Pump Rate (bbl/min)	Volume Weighted Average Rate (bbl/min)	Total Fluid Volume (gal)	Total Proppant Mass (lb)	Total Slurry Volume (bbl)	Total Pump Time (min)
Propped Fracture	60.0	60.0	119271	200000	3055.8	50.9

Summary for Each Fluid in Each Treatment							
Treatment Type	Fluid	Average Pump Rate (bbl/min)	Volume Weighted Average Rate (bbl/min)	Total Fluid Volume (gal)	Total Proppant Mass (lb)	Total Slurry Volume (bbl)	Total Pump Time (min)
Propped Fracture	YF120-Flex	60.0	60.0	116000	200000	2978.0	49.6
Propped Fracture	WF120	60.0	60.0	3271	0	77.9	1.3

Schlumberger Private

Client : Caza Petroleum
 Well : Forehand 27-5 SWD
 Formation : Cherry Canyon
 District :
 Country : United States
 Loadcase : Stage 1



Section 4: Propped Fracture Simulation

The following are the results of the computer simulation of this Fracturing Proposal using a Pseudo 3-D Vertical model. Effective Conductivity and Effective Fcd are calculated based on perforated intervals with positive net heights.

Initial Fracture Top TVD 3350.0 ft
 Initial Fracture Bottom TVD 3500.0 ft

 Propped Fracture Half-Length 445.0 ft
 EOJ Hyd Height at Well 639.0 ft
 Average Propped Width 0.044 in
 Average Gel Concentration 1120.2 lb/mgal
 Average Gel Fluid Retained Factor... 1.00
 Net Pressure 139 psi
 Efficiency 0.544
 Effective Conductivity 540 md.ft
 Effective Fcd 1.2
 Max Surface Pressure 3297 psi

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/ft2)	Frac. Gel Conc. (lb/mgal)	Fracture Conductivity (md.ft)
0.0	111.3	4.9	0.081	297.8	0.73	323.7	3102
111.3	222.5	3.3	0.060	451.4	0.59	391.3	2238
222.5	333.8	1.5	0.034	361.5	0.40	659.7	1271
333.8	445.0	0.1	0.011	247.6	0.19	3105.9	376

Client : Caza Petroleum
 Well : Forehand 27-5 SWD
 Formation : Cherry Canyon
 District :
 Country : United States
 Loadcase : Stage 1

Schlumberger

Schlumberger Private

Fracture Geometry Data Per Zone for Production Prediction							
Zone Name	Top MD (ft)	Top TVD (ft)	Gross Height (ft)	Net Height	Fracture Width (in)	Fracture Length (ft)	Fracture Conductivity (md.ft)
CLEAN-SANDSTONE	2900.0	2900.0	100.0	100.0	0.000	24.5	0
CLEAN-SANDSTONE	3000.0	3000.0	40.0	40.0	0.017	119.9	623
CLEAN-SANDSTONE	3040.0	3040.0	80.0	80.0	0.046	320.6	1740
CLEAN-SANDSTONE	3120.0	3120.0	130.0	130.0	0.074	424.4	2742
CLEAN-SANDSTONE	3250.0	3250.0	100.0	100.0	0.063	445.0	2303
CLEAN-SANDSTONE	3350.0	3350.0	150.0	150.0	0.015	445.0	540
CLEAN-SANDSTONE	3500.0	3500.0	100.0	100.0	0.000	404.3	0

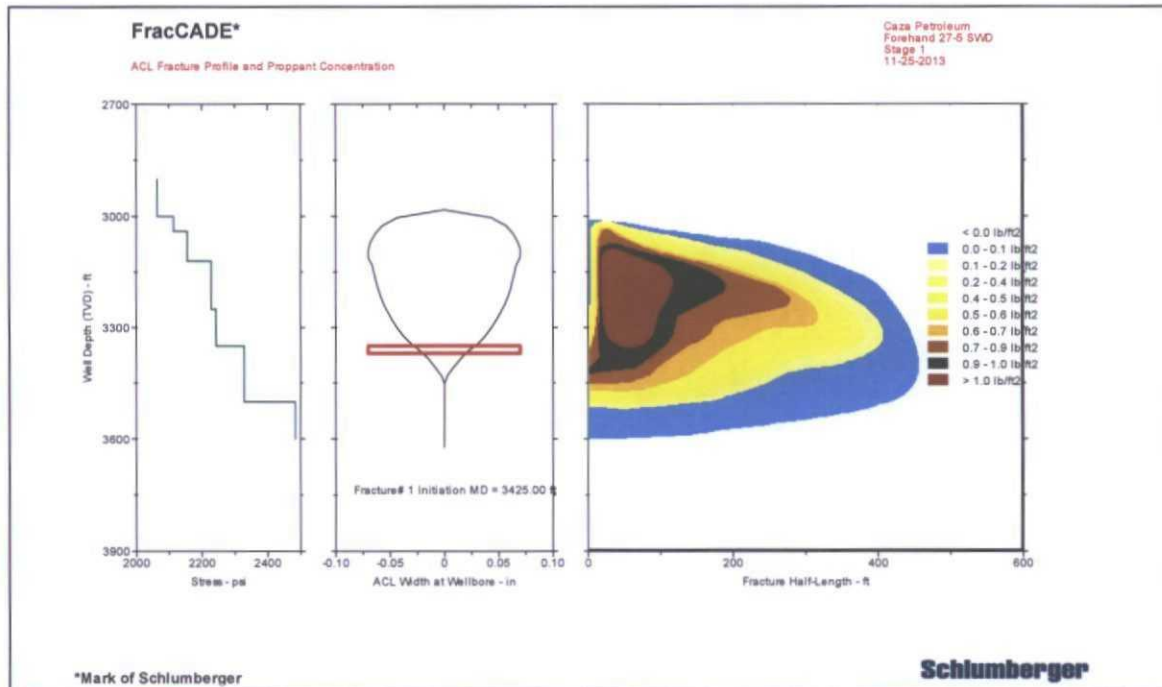
Exposure Time Prediction by Step						
Step Name	Fluid Name	Pump Rate (bbl/min)	Fluid Volume (gal)	Perforation Injection Temp. (degF)	Exposure at BHST of 115 degF (min)	Exposure above Watch Temp. of 110 degF (min)
Pad	YF120-Flex	60.0	40000	84	31.7	31.7
0.5 PPA	YF120-Flex	60.0	10000	83	23.7	23.7
1.0 PPA	YF120-Flex	60.0	12000	83	17.5	17.5
2.0 PPA	YF120-Flex	60.0	14000	83	10.9	10.9
3.0 PPA	YF120-Flex	60.0	15000	83	3.7	3.7
4.0 PPA	YF120-Flex	60.0	15000	83	0.0	0.0
5.0 PPA	YF120-Flex	60.0	10000	83	0.0	0.0
Flush	WF120	60.0	3271			

Client : Caza Petroleum
 Well : Forehand 27-5 SWD
 Formation : Cherry Canyon
 District :
 Country : United States
 Loadcase : Stage 1

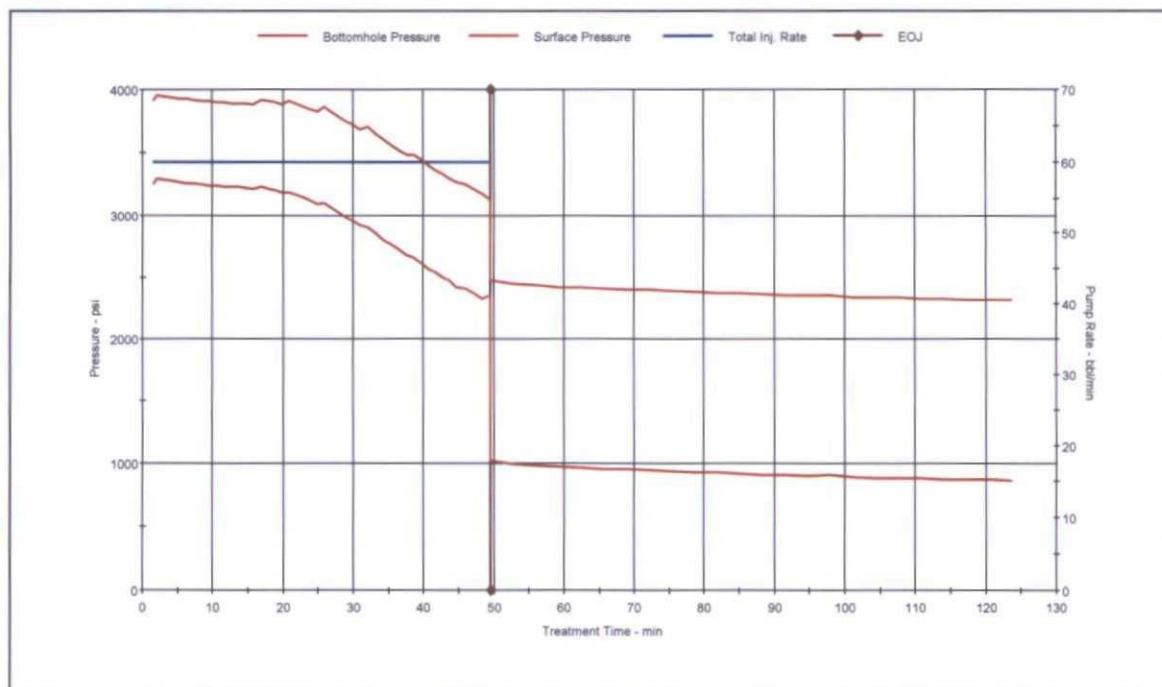


Section 5: Propped Fracture Simulation Results

(1) ACL Fracture Profile and Proppant Concentration Plot



(2) Treating Plot



Client : Caza Petroleum
 Well : Forehand 27-5 SWD
 Formation : Cherry Canyon
 District :
 Country : United States
 Loadcase : Stage 1



Section 6: Fluid Descriptions

Brine {8.43ppg 2% KCl}

- L071, Temporary Clay Stabilizer 2.00 gal/mgal

YF120-Flex

- J580, Gelling Agent 20.00 lb/mgal
- L071, Temporary Clay Stabilizer 2.00 gal/mgal
- J610, Crosslinker 2.00 gal/mgal
- J475, EB-CLEAN Breaker 4.00 lb/mgal
- J218, Breaker 1.00 lb/mgal
- J318, Liquid Breaker Aid 1.00 gal/mgal
- W064, Emulsion and Sludge Preventer 2.00 gal/mgal
- B244B, Microbiocide 0.20 gal/mgal

WF120

- J580, Gelling Agent 20.00 lb/mgal
- B244B, Microbiocide 0.20 gal/mgal
- J218, Breaker 2.00 lb/mgal
- L071, Temporary Clay Stabilizer 2.00 gal/mgal

Client : Caza Petroleum
 Well : Forehand 27-5 SWD
 Formation : Cherry Canyon
 District :
 Country : United States
 Loadcase : Stage 1



Section 7: Proppant Data

Proppant Permeability is calculated based on the following parameters:

BH Static Temperature: 115 degF
 Stress on Proppant: 2315 psi
 Propped Fracture Conc.: 1.00 lb/ft2
 Average Young's Modulus: 4.343E+06 psi

Proppant Data				
Proppant Name	Specific Gravity	Mean Diameter (in)	Pack Porosity (%)	Permeability (md)
Jordan Unimin 16/30	2.64	0.031	35.1	424735

Proppant Permeability Plot

