Gruy Petroleum Mgmt. Co.
600 Las Colinas Blvd.
Suite 1200
Irving, Texas 75039-5518

Rhodes Federal Unit #4-3

Lea County, NM

CO2 Foam Frac Recommendations

Prepared for: Mr. Howard Miller

3/4/98

Version
1

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Halliburton appreciates the opportunity to present this proposal and looks forward to being of service to you.

Foreword

Purpose:

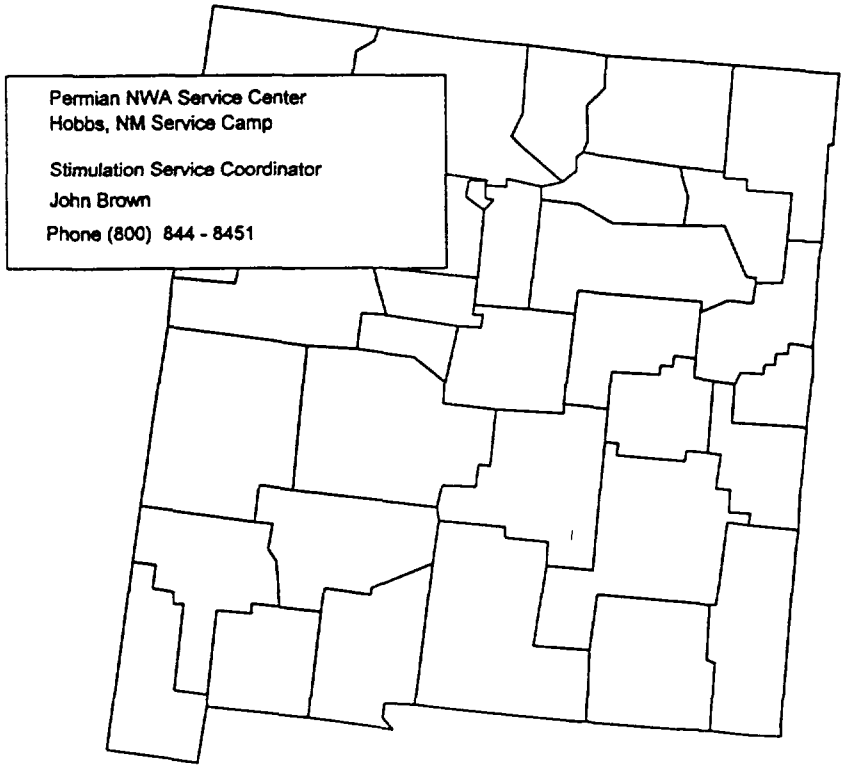
To determine the equipment and materials necessary to perform the stimulating services in the referenced well. The information in this report includes well data, calculations, materials, and cost estimate. This proposal is based on information from our field personnel and previous treatments in the area.

Howard,

We appreciate the opportunity to provide this recommendation to you. If you have any further questions, please do not hesitate to call.

Jay Ringhoffer

Jay Ringhoffer



Well Information

Formation	Yates Formation
Permeability	.3 md
Porosity	18 %
BHTP	2282 psi
BHP	300 psi
E	4500000 psi
Skin Factor	0
BHT	95 °F
Well Bore Diameter	8.00 in
Well Spacing	80 acres
Reservoir Compressibility	8.3e-005 1/psi
Reservoir Fluid Viscosity	.02 cp
Closure Stress	2100 psi
Gross Interval	2675 - 2950 ft
No. of Perforations	114 - 0.43 in holes
Perforated Interval # 1	2680 - 2693 ft
Perforated Interval # 2	2740 - 2753 ft
Perforated Interval # 3	2760 - 2775 ft
Perforated Interval # 4	2782 - 2785 ft
Perforated Interval # 5	2789 - 2792 ft
Perforated Interval # 6	2805 - 2815 ft
Perforated Interval # 7	2820 - 2836 ft
Perforated Interval # 8	2846 - 2852 ft
Perforated Interval # 9	2865 - 2877 ft
Perforated Interval #10	2900 - 2923 ft

Calculations

Pw = Wellhead Treating Pressure
HHP = Hydraulic Horsepower

HHP = (WHTP * Rate) / 40.8

Pw = 1200 psi (From Computer Design)

Liquid Phase Horsepower:

HHP = (1200 * 35.0) / 40.8
HHP = 1029

CO2 Phase Horsepower:

HHP = (1200 * 23.37) / 40.8
HHP = 687

Job Recommendation

40# WATER FRAC G DETAILS: (31,000 gal)

Base Fluid	40 lb WATERFRAC G
Mixing Fluid	Fresh Water*
Foamer	6 gal/M AQF-2
Breaker	0.5 lbs/M GBW-30
Clay Control	167 lbs/M KCl (Potassium Chloride)
Surfactant	1 gal/M LOSURF-300

*Customer Supplied

Job Procedure

1. Hold safety meeting with customer and crew.
2. Rig up to wellhead and pressure test lines to pressure set by customer.
3. Stimulate down 7" casing at 50 BPM with 77,000 lbs of 16/30 Brady Sand with 120 Tons of CO2 as follows:

STAGE	FLUID	CONC	PROPPANT
1 - Pad	25,000 gal 50% CO2 Foam		
2 - SLF	15,000 gal 50% CO2 Foam	1-4 lb/gal	16/30 Brown Sand (37,039 lb)
3 - SLF	10,000 gal 50% CO2 Foam	4 lb/gal	16/30 Brown Sand (40,000 lb)
4 - Flush	±4,324 gal 50% CO2 Foam		

4. Shut down and get ISIP, 5 min., 10 min., 15 min. pressure readings.
5. Shut in wellhead and rig down.

JOB SUMMARY

Total 40# Linear Gel	31,000 gallons
Total Water on Location	31,000 gallons
Clean Frac Tanks needed	2 each
Total 16/30 Brady Sand	77,000 pounds
Anticipated Surface Pressure	1,277 psi
Injection Rate	50 bpm
HHP Required Liquid	741 HHP
HHP Required CO2	693 HHP
Total CO2 needed (cool down included)	120 Tons

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C-O-TWO Foam Frac

Cost Estimate

Price Ref	Description	Qty	U/M	Unit Price	Total
	**** Stimulation Equipment ****				
300-111	MILEAGE FOR STIMULATION EQUIP	100	MI	$ 3.65	$ 3,650.00
		10	UNT		
300-112	MILEAGE FOR STIMULATION CREW	100	MI	2.15	430.00
		2	UNT		
300-131	DELIVERY CHARGE (CHEMICALS)	4	HR	115.00	460.00
		1	UNT		
999-026	ENVIRONMENTAL SURCHARGE	1	JOB	55.00	55.00
301-010	ON LOCATION PUMPING EQUIP CHRG	2	HR	0.55	5,500.00
		5000	HHP		
301-085	MINIMUM PUMP CHG HT-400 V-12	1	HR	2,451.75	9,807.00
	(PER 4 HR)	4	PMP		
301-135	STAND BY PUMPS HT-400 V-12 ENG	1	HR	762.20	1,524.40
	(PER 4 HR)	2	PMP		
301-267	ON LOC PROPORTIONER EQUP CHRG	1	UNT	326.70	653.40
		2	HR		
301-200	PROPORTIONER	33	BPM	3,927.00	3,927.00
		1	EA		
307-220	MOUNTAIN MOVER SAND SYSTEM	1	DAY	1,236.25	1,236.25
		1	UNT		
300-111	MILEAGE FOR MOUNTAIN MOVER	100	MI	3.65	365.00
		1	UNT		
307-686	HALLIBURTON CRANE/IRON TRUCK	1	JOB	392.15	392.15
		1	EA		
390-740	FRAC MANIFOLD TRAILER	1	JOB	1,020.75	1,020.75
307-015	FRACTURING VALVE 3.5-4.5	1	DAY	704.95	704.95
		1	EA		
307-785	FRACVAN II	1	JOB	1,995.00	1,995.00
307-962	MOBILE LAB VAN W/TECH	1	DAY	2,546.25	2,546.25
	**** Co2 Equipment & Materials ****				
310-002	SERVICE CHARGE FOR CO2	120	TON	38.00	4,560.00
310-034	MINIMUM PUMP CHARGE LIQUID CO2	1	HR	2,942.10	8,826.30
	(PER 4 HR)	3	PMP		
310-035	PUMPING EQUIPMENT STANDBY	1	HR	762.20	762.20
	(PER 4 HR)	1	PMP		
	**** Stimulation Chemicals ****				
310-106	WATERFRAC G	40	LB	8.95	11,098.00
	(PER 1000 GAL)	31000	GAL		
308-877	AQF-2	186	GAL	20.65	3,840.90
311-065	GBW-30	16	LB	24.30	388.80

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C-O-TWO Foam Frac

Price Ref	Description	Qty	U/M	Unit Price	Total
314-153	POTASSIUM CHLORIDE	5177	LB	0.43	2,226.11
218-703	LOSURF 300	31	GAL	37.00	1,147.00
	**** Stimulation Proppants ****				
510-120	SAND 16/30 BROWN BULK (PER 100 LB)	77000	LB	10.09	7,769.30
308-882	FLUID PROPPANT HANDLING CHARGE	2.0	PPG	0.06	206.20
		3586	GAL		
308-882	FLUID PROPPANT HANDLING CHARGE	5.0	PPG	0.15	513.08
		3432	GAL		
308-882	FLUID PROPPANT HANDLING CHARGE	7.5	PPG	0.25	1,828.43
		7227	GAL		
500-340	MILEAGE FOR BULK FRAC.MATERIAL	1928	TMI	1.18	2,275.04

	TOTAL AMOUNT	$ 79,708.51
	DISCOUNTED TOTAL	$ 42,271.36

THIRD PARTY CHARGES

309-997	LIQUID CO2	120	TON	$ 95.00	$ 11,400.00
309-998	BOOSTER PUMP LIQUID CO2	1	HR	700.00	700.00
		1	PMP		
310-008	CO2 H.P. 2-TRUCK MANIFOLD	1	JOB	610.00	610.00
310-009	CO2 SUCTION HOSE HIGH PRESSURE	1	DAY	42.50	42.50

	ADDITIONAL AMOUNT	$ 12,752.50
	NET TOTAL	$ 12,752.50

NOTE: Service Location - Hobbs

Engineering Program Results

PROP
Halliburton Energy Services' Fracture Design Program

Gruy; Rhodes Federal Unit #4-3; Rhodes/Yates SR Field
Lea County, NM; Yates Formation; 50% CO2 Foam

Treatment Summary

Job Type - C-O-TWO* Fracturing Service
Daneshy Fracture Geometry

Treatment Data

Injection rate	50.0	bpm
Treatment fluid sp gr (pad)	.918	
Cw (1000. psi)	.00320	ft/SQRT(min)
Cw (1982. psi)	.00451	ft/SQRT(min)
Cvc	.00066	ft/SQRT(min)
C-overall (pay)	.00065	ft/SQRT(min)
Ceff (non-producing zones)	.00100	ft/SQRT(min)
Surface temperature	70.	deg F
Surface fluid temperature	70.	deg F
Apparent viscosity	312.	cp at .3" width

Fluid parameters:

	Base Fluid	Two-Phase Fluid (pad)	
n'	.4828	.4828	n'
K'(slot)	.030260	.062590	lbf-sec /sq ft
Yield stress	--	.004	lbf/sq ft

Design No.	Volume Total (1000 gal)	Volume Pad (1000 gal)	Created Length (ft)	Created Wid. (in.)	Pad Width (in.)	Propped Length (ft)	Propped Ht. (ft)	Total Prop (sx)	Prod Incr	Fluid Eff (pct)
1	53.5	25.0	350.5	.30	.23	208.9	274.9	770.	3.6	67.8

Well & Formation Data

Young's modulus	4.50E+06	psi
Permeability	.3000	md
Porosity	18.0	pct
Reservoir fluid compressibility	8.30E-05	1/psi
Reservoir fluid viscosity	.02	cp
BHTP	2282.	psi
Reservoir fluid pressure	300.	psi
Closure stress	2100.	psi
Gross fracture height	275.	ft
Net fracture height	114.	ft
Wellbore diameter	8.00	in.
Drainage radius	933.	ft
Well spacing	80.	acres
Skin factor	.0	
Bottom-hole temperature	95.	deg F

C-O-TWO* Fluid Treatment & Pumping Schedule for Design No. 1

C-O-TWO* Fracturing Calculations Based on Constant Downhole Slurry Rate and Specified Internal-Phase Volume Fraction (IPF) at Perforations with Proppant Added to Specified Stage Volumes

* A patented process of Halliburton Company;
Patent No. 4,480,696; Nov. 6, 1984.
Reissued Dec. 9, 1986; Reissue No. RE32302

Treating Schedule

Stage No.	gal Foam	IPF at Perfs	Prop Conc lb/gal Foam	lb Proppant Stage	lb Proppant Cumulative
1	25000.	.50	0.00	0.	0.
2	15000.	.50	1.00- 4.00	37042.	37042.
3	10000.	.50	4.00	40000.	77042.
4A	4324. gal of foam displacement (IPF = .50)				
or 4 B-C	93.08 bbl of carbon dioxide displacement				

Blender Operations Schedule

Stage No.	Pumping Time (mm:ss)	Liquid Volume (gal)	Proppant Conc. (lb/gal liq)	Liquid + Prop Vol (gal)	Rate Out (bpm)
1	11:54	12500.	.00	12500.	25.00
2	7:57	8339.	1.91-6.77	10017.	27.17-32.67
3	5:37	5906.	6.77	7718.	32.67
Total	25:28	26745.		30235.	
4A	2:01	2120.	.00	2120.	25.00
or 4B	5:47	CO2 displacement at 16.12 bpm			
or 4C	2:00	CO2 displacement at 46.50 bpm			

Gas Injection Schedule

Stage No.	Pumping Time (mm:ss)	CO2 Volume (bbl)**	CO2 Rate (bpm)**	Surface Vol Tot (gal)	WHTP (psi)
1	11:54	277.4	23.30	25548.	1277.
2	7:57	147.7	21.28-16.14	16220.	1099.
3	5:37	90.7	16.12	11525.	1004.
Total	25:28	515.8		53293.	
4A	2:01	46.9	23.25	4324.	
or 4B	5:47	CO2 displacement at 16.12 bpm			
or 4C	2:00	CO2 displacement at 46.50 bpm			

** 1 bbl (liquid, 0 F)=3063 scf (60 F, 14.7 psia)=0.1787 ton

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Injection down.	Casing	
Flow rate in wellbore	50.00	bpm
Total volume of foam less flush . . .	50000.	gal
Average wellhead fluid temperature. .	50.	F
Final bottom-hole wellbore fluid temp	54.	F
Liquid density.	8.43	lb/gal
Bottom-hole treating pressure in frac	2282.	psi
Instantaneous shut-in pressure - CO2.	1238.	psi
Instantaneous shut-in pressure - foam	1174.	psi
Maximum friction loss in wellbore . .	134.	psi
Number of perforations.	114	
Perforation diameter.	.43	in.
Perforation discharge coefficient . .	.90	
Average perforation friction.	15.	psi
CO2 for treatment and gas flush . . .	109.06	tons--plus cool-down
CO2 for treatment and foam flush. . .	100.80	tons--plus cool-down

Tubular Goods

Measured Depth (ft) Top	Bottom	Tubing ID (in.)	Tubing OD (in.)	Casing ID (in.)	Casing OD (in.)
0.	2680.	--	--	6.260	7.000

Proppant Schedule for Design No. 1

Pumping Schedule

25000. gal of pad volume
15000. gal w/ 1.00 - 4.00 lb/gal of 16/30 Brady sand
10000. gal with 4.00 lb/gal of 16/30 Brady sand
50000. gal total fluid
770. sacks total proppant

Bed Deposition for Design No. 1

Deposition Profiles

At the end of pumping:

Carry distance	208.9 ft
Max bed height	.0 ft
Avg bed height	.0 ft
Pct prop deposited	.0 pct

Distance From Well (ft)	Deposited Height (ft)	Suspended Proppant Height (ft)	Suspended Proppant Concentration (lb/gal)	Suspended Proppant Concentration (lb/sq ft)
4.0	.0	275.0	4.0	.82
16.0	.0	275.0	4.0	.82
28.0	.0	275.0	4.1	.83
40.0	.0	275.0	4.1	.83
52.0	.0	275.0	4.2	.84
64.0	.0	275.0	4.2	.83
76.0	.0	275.0	4.3	.84
88.0	.0	275.0	4.4	.86
100.0	.0	274.9	4.1	.79
112.0	.0	274.9	3.7	.73
124.0	.0	274.9	3.4	.66
136.0	.0	274.9	3.1	.60
148.0	.0	274.9	2.7	.53
160.0	.0	274.9	2.4	.46
172.0	.0	274.9	2.4	.45
184.0	.0	274.8	2.0	.38
196.0	.0	274.8	1.7	.31
208.0	.0	274.8	1.3	.24

Fracture depth: 2675. - 2950. ft

Producing Interval (ft)	Propped Length (ft)	Propped Height in Zone (ft)	Proppant Conc. (lb/sq ft)	Flow Capacity (md-ft)	Dim'less Capacity	Cr
2680.- 2693.	209.	13.	.665	2013.	40.56	10.22
2740.- 2753.	209.	13.	.665	2013.	40.56	10.22
2760.- 2775.	209.	15.	.665	2013.	40.56	10.22
2782.- 2785.	209.	3.	.665	2013.	40.56	10.22
2789.- 2792.	209.	3.	.665	2013.	40.56	10.22
2805.- 2815.	209.	10.	.665	2013.	40.56	10.22
2820.- 2836.	209.	16.	.665	2013.	40.56	10.22
2846.- 2852.	209.	6.	.665	2013.	40.56	10.22
2865.- 2877.	209.	12.	.665	2013.	40.56	10.22
2900.- 2923.	209.	23.	.665	2013.	40.56	10.22

PROP

Halliburton Energy Services' Fracture Design Program

Gruy; Rhodes Federal Unit #4-3; Rhodes/Yates SR Field
Lea County, NM; Yates Formation; 50% CO2 Foam

The above report is based on sound engineering practices, but because of variable well conditions and other information which must be relied upon, Halliburton makes no warranty, express or implied, as to the accuracy of the data or of any calculations or opinions expressed herein. You agree that Halliburton shall not be liable for any loss or damage whether due to negligence or otherwise arising out of or in connection with such data calculations or opinions.

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Conditions

NOTE

The cost in this analysis is good for the materials and/or services outlined within. These prices are based on Halliburton being awarded the work on a first call basis. Prices will be reviewed for adjustments if awarded on 2nd or 3rd call basis and/or after 30 days of this written analysis. This is in an effort to schedule our work and maintain a high quality of performance for our customers.

The unit prices stated in the proposal are based on our current published prices. The projected equipment, personnel, and material needs are only estimates based on information about the work presently available to us. At the time the work is actually performed, conditions then existing may require an increase or decrease in the equipment, personnel, and/or material needs. Charges will be based upon unit prices in effect at the time the work is performed and the amount of equipment, personnel, and/or material actually utilized in the work. Taxes, if any, are not included. Applicable taxes, if any, will be added to the actual invoice.

It is understood and agreed between the parties that with exception of the subject discounts, all said services and materials will be furnished in accordance with the terms and conditions of Halliburton's regular work orders applicable to the particular item. In this connection, it is also understood and agreed that Customer will continue to execute Halliburton usual field work orders and/or tickets customarily required by Halliburton in connection with the furnishing of said services and materials.

All services performed and equipment and materials sold are provided subject to Halliburton's General Terms and Conditions (which include LIMITATION OF LIABILITY and WARRANTY provisions), and pursuant to the applicable Halliburton Work Order Contract (whether or not executed by you), unless a signed Master Service and/or Sales Contract exists between your company and Halliburton, in which case the negotiated Master Contract shall govern the relationship between the parties. We enclose a copy of the General Terms and Conditions, for your convenient review, and we would appreciate receiving any questions you may have about them. Should your company be interested in negotiating a Master Contract with Halliburton, our Legal Department would be pleased to work with you to finalize a mutually agreeable contract.

If customer does not have an approved open account with Halliburton or a mutually executed written contract with Halliburton, which dictates payment terms different than those set forth in this clause, all sums due are payable in cash at the time of performance of services or delivery of equipment, products, or materials. If customer has an approved open account, invoices are payable on the twentieth day after date of invoice. Customer agrees to pay interest on any unpaid balance from the date payable until paid at the highest lawful contract rate applicable, but never to exceed 18% per annum. In the event Halliburton employs an attorney for collection of any account, customer agrees to pay attorney fees of 20% of the unpaid account, plus all collection and court costs.