

# Chaparral

Energy, L.L.C.

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April 26, 2006

Mr. Bryan Arrant  
State of New Mexico  
OCD  
1301 W. Grand Ave  
Artesia, NM 88210

30-015-34832

Re: Roberts #1-13  
Section 13-17S-26E  
Eddy Co., NM

Gentlemen:

This letter accompanies our Application for Permit to Drill the above referenced well. In order to comply with the NMOCD rules and guidelines Chaparral Energy, LLC will utilize a closed loop mud system. Drilling mud will be contained within the drilling rig's steel pits. Drill cutting will be collected in steel bins to be hauled off location to an approved site. Both fresh and bring water for drilling will be stored in steel tanks. A self contained sanitation system for drilling personnel will be utilized.

Since a closed loop system will be used, no earthen pits will be constructed other than a burn pit for drilling flares. Therefore, we have not submitted a NM Form C-144 for approval

Respectfully,

Chaparral Energy, LLC

Charles Warne  
Drilling Engineer

/dk



**Arrant, Bryan, EMNRD**

**From:** Charles Warne [charles.warne@chaparralenergy.com]  
**Sent:** Wednesday, April 26, 2006 3:06 PM  
**To:** Arrant, Bryan, EMNRD  
**Cc:** Evelyn Smith; Rene St. Pierre  
**Subject:** Roberts #1-13 APD Attachments

**CASING PROGRAM**

<b>STRING TYPE</b>	<b>CSG SIZE</b>	<b>INTERVAL</b>	<b>LENGTH FT.</b>	<b>WT/FT</b>	<b>GRADE</b>	<b>CPLG</b>	<b>IHD</b>	<b>TORQUE FT-LBS</b>
<b>Conductor</b>	<b>20"</b>	<b>0' - 60'</b>	<b>60'</b>					
<b>Surface</b>	<b>13 3/8"</b>	<b>0' - 320'</b>	<b>320'</b>	<b>48.0</b>	<b>H-40</b>	<b>ST&amp;C</b>	<b>8rd</b>	<b>3220</b>
<b>Intermediate</b>	<b>8-5/8"</b>	<b>0' - 1500'</b>	<b>1500'</b>	<b>32.0</b>	<b>J-55</b>	<b>LT&amp;C</b>	<b>8rd</b>	<b>4170</b>
<b>Production</b>	<b>5 1/2"</b>	<b>0' - 9,100'</b>	<b>9,100'</b>	<b>17.0</b>	<b>N-80</b>	<b>LT&amp;C</b>	<b>8rd</b>	<b>3480</b>

**CEMENTING PROGRAM**

<b>CASING</b>	<b>CEMENT DESCRIPTION</b>	<b>YIELD FT/SK</b>	<b>WT #/GAL</b>	<b>PROPOSED CEMENT TOP</b>
<b>13-3/8" Surface Casing</b>	<b>Lead: 360 sx Premium Plus: 1/4 lbm/sk Floccle, 2% CaCl<sub>2</sub></b>	<b>1.35</b>	<b>14.8</b>	<b>Surface</b>
<b>8-5/8" Intermediate Casing</b>	<b>Lead: 335 sx Light Premium Plus: 1/4 lbm/sk Floccle</b>	<b>1.78</b>	<b>12.9</b>	<b>Surface</b>
	<b>Tail: 125 sx Premium Plus: 1/4 lbm/sk Floccle, 2% CaCl<sub>2</sub></b>	<b>1.35</b>	<b>14.8</b>	
<b>5-1/2" Production Casing</b>	<b>Lead: 115 sx Light Premium: 1/4 lbm/sk Floccle</b>	<b>2.00</b>	<b>13.2</b>	<b>6500'</b>
	<b>Tail: 225 sx Super H Cement: 0.5% LAP-1, 1/4 lbm/sk D-AIR 3000, 0.4% CFR-3, 0.2% HR-7, 3 lbm/sk Salt</b>	<b>1.64</b>	<b>13.2</b>	<b>7500'</b>

- (1) **Cement:** Use 10% excess over calipered volume to bring cement to the desired height (on 1/2" string). Blend test cement with the water provided on location after loading and check the pumping time.
- (2) **Centralizers & Turbulators:** Use a stop ring for the centralizer in the center of the shoe joint. All other centralizers are to be placed around collars. Zones requiring centralizations or turbulators are:

**SURFACE STRING:**

Place the Centralizers as follows if surface casing is set @ 320' with TOC @ Surface:

**CENTRALIZERS** The shoe joint should have a centralizer placed in the center of the joint, held by a Stop Collar Clamp or welded. The other centralizers will be placed over the casing collars, nearest the prescribed depth. *Approximate* placement depths for the 2 – 13 3/8 x 17 1/2” centralizers are at 300’ and 100’.

**INTERMEDIATE STRING:**

Place the Centralizers as follows with casing set @ 1500’ and TOC @ Surface:

**CENTRALIZERS** (The shoe joint should have a centralizer placed in the center of the joint, held by a Stop Collar Clamp). The other centralizers will be placed over the casing collars, nearest the prescribed depth. Set centralizers on shoe joint and spaced at 6 joint intervals back to surface.

**Place a Metal Pedal Cement Basket ±100’ below surface.**

**PRODUCTION STRING:**

Place centralizers at 4 joint intervals above the turbulators back to TOC at 6500’. Turbulators will be determined from the open hole logs and will be placed at 20’ spacing.

- (1) Float Equipment:  
**Surface String:** 13 3/8” GS, Insert Float, Stop Collar Clamp & 2 – 13 3/8” x 17 1/2” Centralizers.  
**Intermediate String:** 8 5/8” GS, Float Collar, & 6 – 8 5/8” x 12 1/4” Centralizers.  
**Production String:** 5 1/2” FS, 1 Joint Casing, FC, Stop Collar Clamp and turbulators /centralizers as required.
- (2) Thread Dope: Coat box ends. (Threads should be clean down to white metal.) Tack weld surface casing guide shoe, insert joint collar and 2<sup>nd</sup> joint up.
- (3) Pipe Tally: Tally from the end of the coupling to the first thread on the pin end (threads off) to obtain overall length after make-up.
- (4) Lowering Speed: Approximately 30-40 seconds per joint.
- (5) Fill-up: Fill-up completely every 30 joints and break circulation.
- (6) Where specified, if cement does not circulate to surface, the casing will be cemented to surface by running 1" tubing and filling the annulus, after obtaining permission from the District Office of the New Mexico Oil Conservation Division. If cement height is less than 25' from surface, dump redi-mix down annulus and fill to surface.
- (7) **Special Instructions:** Cement volume on 5 1/2” casing is to be calculated as follows: (Open hole volume minus casing displacement minus casing capacity) times 110%. Check caliper log for correct bit size and calibration prior to determining open hole volume and calibration prior to determining open hole volume.

Charles Warne  
 Drilling Engineer  
 Chaparral Energy LLC.  
 (405)426-4585 office  
 (405)308-6752 cell

# Chaparral

Energy, L.L.C.

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April 26, 2006

Mr. Bryan Arrant  
State of New Mexico  
OCD  
1301 W. Grand Ave  
Artesia, NM 88210

Re: Roberts #1-13  
Section 13-17S-26E  
Eddy Co., NM

Gentlemen:

This letter is in reference to the OCD's requirements for H2S contingency plan for the above referenced well. No H2S is expected in the drilling of the above referenced well. H2S detection equipment will be installed prior to the top of the Delaware formation as a precautionary measure.

Respectfully,

Chaparral Energy, LLC

Charles Warne  
Drilling Engineer

/dk



**HALLIBURTON**

**Chaparral Energy Inc  
701 Cedar Lake Boulevard  
Oklahoma City, Oklahoma 73114**

Roberts 1-13

Eddy County, New Mexico  
United States of America

## **Cementing Cost Estimate**

Prepared for: Rene St. Pierre  
April 17, 2006  
Version: 1

Submitted by:  
Mark R. Briney  
Halliburton Energy Services  
6155 W Murphy  
Odessa, Texas 79763  
432.661.3578

**HALLIBURTON**

# HALLIBURTON

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

## **Foreword**

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Halliburton Energy Services is pleased to have this opportunity to present this proposal for your consideration. We earnestly request the service work to be performed on this well.

These Service Coordinators can be reached in our Customer Service Center, at the following phone numbers :

**432-682-4305 or 1-800-844-8451**

CEMENTING: Joe Briseno  
Steve Luscombe  
Basil Hacker  
Scott Kerby

STIMULATION: Mel Holt  
Larry Staples  
Larry Roberts

LOGGING &  
PERFORATING: Allen Avera

COILED TUBING  
& NITROGEN: Michael Ybaben

TOOLS & TESTING,  
PROD. SVCS., TCP,  
COMPL. PRODUCTS: Steve Engleman

DRILL BITS,  
SECURITY DBS: Bill Stark

PREPARED BY: Mark R. Briney

We look forward to working with you to provide the very best quality services available in the Permian Basin.

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Mark R. Briney, Lead Technical Professional

# HALLIBURTON

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## Job Information

## Surface Casing

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Roberts 1-13

Surface Hole	0 - 320 ft (MD)
Inner Diameter	17.500 in
Job Excess	100 %

Surface Casing	0 - 320 ft (MD)
Outer Diameter	13.375 in
Inner Diameter	12.515 in
Linear Weight	48 lbm/ft
Thread	STC
Casing Grade	H-40

## Calculations

## Surface Casing

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Spacer:

Total Spacer	= 112.29 ft <sup>3</sup>
	= 20.00 bbl

Cement : (320.00 ft fill)

320.00 ft * 0.6946 ft <sup>3</sup> /ft * 100 %	= 444.57 ft <sup>3</sup>
Primary Cement	= 444.57 ft <sup>3</sup>
	= 79.18 bbl

Shoe Joint Volume: (40.00 ft fill)

40.00 ft * 0.8543 ft <sup>3</sup> /ft	= 34.17 ft <sup>3</sup>
	= 6.09 bbl
Tail plus shoe joint	= 478.74 ft <sup>3</sup>
	= 85.27 bbl
Total Tail	= 355 sks

## **Job Recommendation**

## **Surface Casing**

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Install floating equipment, run casing to bottom, and circulate minimum of 2-3 hole volumes prior to cementing as follows:

### Fluid Instructions

Fluid 1: Pump 20 bbl  
Fresh Water

Fluid Density: 8.33 lbm/gal  
Fluid Volume: 20 bbl

Fluid 2: Mix and Pump 360 sks  
Premium Plus Cement

94 lbm/sk Premium Plus Cement  
0.25 lbm/sk Flocele (Lost Circulation Additive)  
2 % Calcium Chloride (Accelerator)

Fluid Weight 14.80 lbm/gal  
Slurry Yield: 1.35 ft<sup>3</sup>/sk  
Total Mixing Fluid: 6.38 Gal/sk  
Top of Fluid: 0 ft  
Calculated Fill: 320 ft  
Volume: 85.27 bbl  
Calculated Sacks: 355.15 sks  
Proposed Sacks: 360 sks

# HALLIBURTON

## Cost Estimate

## Surface Casing

<u>Mtrl Nbr</u>	<u>Description</u>	<u>Qty</u>	<u>U/M</u>	<u>Unit Price</u>	<u>Gross Amt</u>
2	MILEAGE FOR CEMENTING CREW,ZI Number of Units	120 1	MI	5.14	616.80
1	ZI-MILEAGE FROM NEAREST HES BASE,/UNIT Number of Units	120 1	MI	8.74	1,048.80
	<b>0% disc. on surcharge(s) &amp; permit(s)</b>				
7	ENVIRONMENTAL SURCHARGE	1	EA	120.00	120.00
86955	FUEL SURCHG-HEAVY TRKS >1 1/2 TON/PER MI Number of Units	120 1	MI	0.40	48.00
86954	FUEL SURCHG-CARS/PICKUPS<1 1/2TON/PER/MI Number of Units	120 1	MI	0.13	15.60
87605	FUEL SURCHG-CMT & CMT ADDITIVES/PER TNM NUMBER OF TONS	60 17.3	MI	0.13	134.94
372867	Cmt PSL - DOT Vehicle Charge, CMT	2	EA	215.20	430.40
16091	ZI - PUMPING CHARGE DEPTH FEET/METERS (FT/M)	1 320 FT	EA	3,596.00	3,596.00
16092	ADDITIONAL HOURS ON LOC (AS APPLY) HOURS	0 1	EA	828.00	0.00
139	ADC (AUTO DENSITY CTRL) SYS, /JOB,ZI NUMBER OF UNITS	1 1	EA	2,031.00	2,031.00
361922	LO TORC?VLV 2", W/HES,/DAY,ZI TOTAL NUMBER HR/DAY/WEEK/MTH/YEAR/JOB/RUN	1 1 DAY	EA	74.50	74.50
381901	Rotary Steel Hose 2", w/HES,per day, CMT TOTAL NUMBER HR/DAY/WEEK/MTH/YEAR/JOB/RUN	4 1 DAY	EA	78.00	312.00
361923	LEAD-OFF SWING,2", W/HES,/DAY,ZI TOTAL NUMBER HR/DAY/WEEK/MTH/YEAR/JOB/RUN	4 1 DAY	EA	43.40	173.60
74038	PLUG CONTAINER RENTAL DAYS OR FRACTION (MIN1)	1 1	EA	0.00	1,180.00
	<b>25% disc. on plug(s)</b>				
101235693	PLUG,CMTG, TOP,13 3/8,HWE,11.79 MIN/12.72	1	EA	891.00	891.00
100012205	PREMIUM PLUS CEMENT	360	SK	34.51	12,423.60
100005049	FLOCELE	90	LB	6.16	554.40
100005053	CALCIUM CHLORIDE HI TEST PLT	9	SK	199.30	1,793.70
76400	ZI MILEAGE,CMT MTLs DEL/RET MIN NUMBER OF TONS	60 17.3	MI	2.99	3,103.62
3965	HANDLE&DUMP SVC CHRg, CMT&ADDITIVES,ZI NUMBER OF EACH	377 1	CF	4.90	1,847.30
	<b>Total</b>			<b>USD</b>	<b>30,395.26</b>
	<b>Less 51% Discount</b>			<b>USD</b>	<b>14,887.98</b>
	<b>Discounted Total</b>			<b>USD</b>	<b>15,507.28</b>

# HALLIBURTON

## Casing/Sales Equipment

## Surface Casing

<u>Mtrl Nbr</u>	<u>Description</u>	<u>Qty</u>	<u>U/M</u>	<u>Unit Price</u>	<u>Gross Amt</u>
2	MILEAGE FOR CEMENTING CREW,ZI Number of Units	120 1	MI	5.14	616.80
86954	ZI FUEL SURCHG-CARS/PICKUPS<1 1/2TON Number of Units	120 1	MI	0.13	15.60
101314697	SHOE,CSG,TIGER TOOTH,13-3/8 8RD	1	EA	1,321.00	1,321.00
100004705	V ASSY,INSR FLOAT,13 3/8,8RD	1	EA	1,273.00	1,273.00
100004487	CENTRALIZER-13 3/8"-CSG-17 1/2"-HINGED	4	EA	253.00	1,012.00
100004631	CLAMP - LIMIT - 13-3/8 - HINGED -	1	EA	71.40	71.40
100005045	KIT,HALL WELD-A	2	EA	66.30	132.60
	<b>Total</b>			<b>USD</b>	<b>4,442.40</b>
	<b>Less Discount</b>			<b>USD</b>	<b>1,883.81</b>
	<b>Discounted Total</b>			<b>USD</b>	<b>2,558.59</b>

## **Job Information**

## **Intermediate Casing**

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Roberts 1-13

Surface Casing	0 - 320 ft (MD)
Outer Diameter	13.375 in
Inner Diameter	12.515 in
Linear Weight	48 lbm/ft
Thread	STC
Casing Grade	H-40

Intermediate Hole	320 - 1500 ft (MD)
Inner Diameter	11.000 in
Job Excess	100 %

Intermediate Casing	0 - 1500 ft (MD)
Outer Diameter	8.625 in
Inner Diameter	7.921 in
Linear Weight	32 lbm/ft

## Calculations

## Intermediate Casing

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Spacer:

$$\begin{aligned} \text{Total Spacer} &= 224.58 \text{ ft}^3 \\ &= 40.00 \text{ bbl} \end{aligned}$$

Spacer:

$$\begin{aligned} \text{Total Spacer} &= 56.15 \text{ ft}^3 \\ &= 10.00 \text{ bbl} \end{aligned}$$

Cement : (1200.00 ft fill)

$$\begin{aligned} 320.00 \text{ ft} * 0.4485 \text{ ft}^3/\text{ft} * 0 \% &= 143.53 \text{ ft}^3 \\ 880.00 \text{ ft} * 0.2542 \text{ ft}^3/\text{ft} * 100 \% &= 447.42 \text{ ft}^3 \\ \text{Total Lead Cement} &= 590.94 \text{ ft}^3 \\ &= 105.25 \text{ bbl} \\ \text{Sacks of Cement} &= 332 \text{ sks} \end{aligned}$$

Cement : (300.00 ft fill)

$$\begin{aligned} 300.00 \text{ ft} * 0.2542 \text{ ft}^3/\text{ft} * 100 \% &= 152.53 \text{ ft}^3 \\ \text{Tail Cement} &= 152.53 \text{ ft}^3 \\ &= 27.17 \text{ bbl} \end{aligned}$$

Shoe Joint Volume: (40.00 ft fill)

$$\begin{aligned} 40.00 \text{ ft} * 0.3422 \text{ ft}^3/\text{ft} &= 13.69 \text{ ft}^3 \\ &= 2.44 \text{ bbl} \\ \text{Tail plus shoe joint} &= 166.22 \text{ ft}^3 \\ &= 29.60 \text{ bbl} \\ \text{Total Tail} &= 123 \text{ sks} \end{aligned}$$

## Job Recommendation

## Intermediate Casing

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Install floating equipment, run casing to bottom, and circulate minimum of 2-3 hole volumes prior to cementing as follows:

### Fluid Instructions

Fluid 1: Mix and Pump 40 bbl

Fresh Water Gel Pill

2.5 lbm/bbl WG-19 (Gelling Agent)

Fluid Density: 8.33 lbm/gal

Fluid Volume: 40 bbl

Fluid 2: Pump 10 bbl

Fresh Water

Fluid Density: 8.33 lbm/gal

Fluid Volume: 10 bbl

Fluid 3: Mix and Pump 335 sks

Halliburton Light Premium Plus

0.25 lbm/sk Flocele (Lost Circulation Additive)

Fluid Weight 12.90 lbm/gal

Slurry Yield: 1.78 ft<sup>3</sup>/sk

Total Mixing Fluid: 9.54 Gal/sk

Top of Fluid: 0 ft

Calculated Fill: 1200 ft

Volume: 105.25 bbl

Calculated Sacks: 331.62 sks

Proposed Sacks: 335 sks

Fluid 4: Mix and Pump 125 sks

Premium Plus Cement

94 lbm/sk Premium Plus Cement

0.25 lbm/sk Flocele (Lost Circulation Additive)

2 % Calcium Chloride (Accelerator)

Fluid Weight 14.80 lbm/gal

Slurry Yield: 1.35 ft<sup>3</sup>/sk

Total Mixing Fluid: 6.38 Gal/sk

Top of Fluid: 1200 ft

Calculated Fill: 300 ft

Volume: 29.60 bbl

Calculated Sacks: 123.31 sks

Proposed Sacks: 125 sks

# HALLIBURTON

## Cost Estimate

## Intermediate Casing

<u>Mtrl Nbr</u>	<u>Description</u>	<u>Qty</u>	<u>U/M</u>	<u>Unit Price</u>	<u>Gross Amt</u>
2	MILEAGE FOR CEMENTING CREW,ZI Number of Units	120 1	MI	5.14	616.80
1	ZI-MILEAGE FROM NEAREST HES BASE,/UNIT Number of Units	120 1	MI	8.74	1,048.80
11941	FIELD STORAGE BIN DELIVERY Number of Units	120 1	MI	8.74	1,048.80
	<b>0% disc. on surcharge(s) &amp; permit(s)</b>				
7	ENVIRONMENTAL SURCHARGE	1	EA	120.00	120.00
86955	FUEL SURCHG-HEAVY TRKS >1 1/2 TON/PER MI Number of Units	120 2	MI	0.40	96.00
86954	FUEL SURCHG-CARS/PICKUPS<1 1/2TON/PER/MI Number of Units	120 1	MI	0.13	15.60
87605	FUEL SURCHG-CMT & CMT ADDITIVES/PER TNM NUMBER OF TONS	60 21.5	MI	0.13	167.70
372867	Cmt PSL - DOT Vehicle Charge, CMT	2	EA	215.20	430.40
16091	ZI - PUMPING CHARGE DEPTH FEET/METERS (FT/M)	1 1500 FT	EA	3,596.00	3,596.00
16092	ADDITIONAL HOURS ON LOC (AS APPLY) HOURS	0 1	EA	828.00	0.00
139	ADC (AUTO DENSITY CTRL) SYS, /JOB,ZI NUMBER OF UNITS	1 1	EA	2,031.00	2,031.00
16115	FIELD STORAGE BIN >8 HRS,DAY,ZI DAYS OR PARTIAL DAY(WHOLE NO.)	1 1	EA	1,200.00	1,200.00
361922	LO TORC?VLV 2", W/HES,/DAY,ZI TOTAL NUMBER HR/DAY/WEEK/MTH/YEAR/JOB/RUN	1 1 DAY	EA	74.50	74.50
381901	Rotary Steel Hose 2", w/HES,per day, CMT TOTAL NUMBER HR/DAY/WEEK/MTH/YEAR/JOB/RUN	4 1 DAY	EA	78.00	312.00
361923	LEAD-OFF SWING,2", W/HES,/DAY,ZI TOTAL NUMBER HR/DAY/WEEK/MTH/YEAR/JOB/RUN	4 1 DAY	EA	43.40	173.60
74038	PLUG CONTAINER RENTAL DAYS OR FRACTION (MIN1)	1 1	EA	0.00	1,180.00
	<b>25% disc. on plug(s)</b>				
101227839	PLUG,CMTG, TOP,8 5/8,HWE,7.20 MIN/8.09 MA	1	EA	339.00	339.00
100003638	WG-19	100	LB	23.69	2,369.00
14241	HALLIBURTON LIGHT PREMIUM PLUS	335	SK	29.20	9,782.00
100005049	FLOCELE	115	LB	6.16	708.40
100012205	PREMIUM PLUS CEMENT	125	SK	34.51	4,313.75
100005053	CALCIUM CHLORIDE HI TEST PLT	3	SK	199.30	597.90
76400	ZI MILEAGE,CMT MTLs DEL/RET MIN NUMBER OF TONS	60 21.5	MI	2.99	3,857.10
3965	HANDLE&DUMP SVC CHRg, CMT&ADDITIVES,ZI	500	CF	4.90	2,450.00

# HALLIBURTON

<u>Mtrl Nbr</u>	<u>Description</u>	<u>Qty</u>	<u>U/M</u>	<u>Unit Price</u>	<u>Gross Amt</u>
	NUMBER OF EACH	1			
	<b>Total</b>			<b>USD</b>	<b>36,528.35</b>
	<b>Less 51% Discount</b>			<b>USD</b>	<b>18,118.18</b>
	<b>Discounted Total</b>			<b>USD</b>	<b>18,410.17</b>

## Casing/Sales Equipment

## Intermediate Casing

<u>Mtrl Nbr</u>	<u>Description</u>	<u>Qty</u>	<u>U/M</u>	<u>Unit Price</u>	<u>Gross Amt</u>
2	MILEAGE FOR CEMENTING CREW,ZI Number of Units	120 1	MI	5.14	616.80
86954	ZI FUEL SURCHG-CARS/PICKUPS<1 1/2TON Number of Units	120 1	MI	0.13	15.60
101242322	SHOE,FLT,TROPHY SEAL,8 5/8 8RD	1	EA	552.00	552.00
101235370	CLR,FLT,TROPHY SEAL,8-5/8 8RD	1	EA	760.00	760.00
100004483	CENTRALIZER ASSY - API - 8-5/8 CSG X	8	EA	174.00	1,392.00
100004628	CLAMP - LIMIT - 8-5/8 - HINGED -	1	EA	50.70	50.70
100005045	KIT,HALL WELD-A	1	EA	66.30	66.30
	<b>Total</b>			<b>USD</b>	<b>3,453.40</b>
	<b>Less Discount</b>			<b>USD</b>	<b>1,553.59</b>
	<b>Discounted Total</b>			<b>USD</b>	<b>1,899.81</b>

# HALLIBURTON

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## **Job Information**

## **Production Casing (Option 1)**

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Roberts 1-13

Intermediate Casing	0 - 1500 ft (MD)
Outer Diameter	8.625 in
Inner Diameter	7.921 in
Linear Weight	32 lbm/ft
Production Open Hole	1500 - 9100 ft (MD)
Inner Diameter	7.875 in
Job Excess	30 %
Production Casing	0 - 9100 ft (MD)
Outer Diameter	5.500 in
Inner Diameter	4.892 in
Linear Weight	17 lbm/ft

# HALLIBURTON

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## Calculations

## Production Casing (Option 1)

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Spacer:

$$\begin{aligned} 593.00 \text{ ft} * 0.1733 \text{ ft}^3/\text{ft} * 30 \% &= 133.56 \text{ ft}^3 \\ \text{Total Spacer} &= 133.63 \text{ ft}^3 \\ &= 23.80 \text{ bbl} \end{aligned}$$

Spacer:

$$\begin{aligned} 125.00 \text{ ft} * 0.1733 \text{ ft}^3/\text{ft} * 30 \% &= 28.15 \text{ ft}^3 \\ \text{Total Spacer} &= 28.07 \text{ ft}^3 \\ &= 5.00 \text{ bbl} \end{aligned}$$

Cement : (1000.00 ft fill)

$$\begin{aligned} 1000.00 \text{ ft} * 0.1733 \text{ ft}^3/\text{ft} * 30 \% &= 225.23 \text{ ft}^3 \\ \text{Total Lead Cement} &= 225.23 \text{ ft}^3 \\ &= 40.12 \text{ bbl} \\ \text{Sacks of Cement} &= 112 \text{ sks} \end{aligned}$$

Cement : (1600.00 ft fill)

$$\begin{aligned} 1600.00 \text{ ft} * 0.1733 \text{ ft}^3/\text{ft} * 30 \% &= 360.37 \text{ ft}^3 \\ \text{Tail Cement} &= 360.37 \text{ ft}^3 \\ &= 64.18 \text{ bbl} \end{aligned}$$

Shoe Joint Volume: (40.00 ft fill)

$$\begin{aligned} 40.00 \text{ ft} * 0.1305 \text{ ft}^3/\text{ft} &= 5.22 \text{ ft}^3 \\ &= 0.93 \text{ bbl} \\ \text{Tail plus shoe joint} &= 365.59 \text{ ft}^3 \\ &= 65.11 \text{ bbl} \\ \text{Total Tail} &= 223 \text{ sks} \end{aligned}$$

## Job Recommendation

## Production Casing (Option 1)

Install floating equipment, run casing to bottom, and circulate minimum of 2-3 hole volumes prior to cementing as follows:

### Fluid Instructions

Fluid 1: Mix and Pump 1000 gals  
MUD FLUSH

Fluid Density: 8.40 lbm/gal  
Fluid Volume: 23.80 bbl

Fluid 2: Pump 5 bbl  
Fresh Water

Fluid Density: 8.33 lbm/gal  
Fluid Volume: 5 bbl

Fluid 3: Mix and Pump 115 sks  
Halliburton Light Premium  
0.25 lbm/sk Flocele (Lost Circulation Additive)

Fluid Weight 12.40 lbm/gal  
Slurry Yield: 2.00 ft<sup>3</sup>/sk  
Total Mixing Fluid: 11.20 Gal/sk  
Top of Fluid: 6500 ft  
Calculated Fill: 1000 ft  
Volume: 40.12 bbl  
Calculated Sacks: 112.45 sks  
Proposed Sacks: 115 sks

Fluid 4: Mix and Pump 225 sks  
Super H Cement  
0.5 % LAP-1 (Low Fluid Loss Control)  
0.25 lbm/sk D-AIR 3000 (Defoamer)  
0.4 % CFR-3 (Dispersant)  
0.2 % HR-7 (Retarder)  
3 lbm/sk Salt (Salt)

Fluid Weight 13.20 lbm/gal  
Slurry Yield: 1.64 ft<sup>3</sup>/sk  
Total Mixing Fluid: 8.47 Gal/sk  
Top of Fluid: 7500 ft  
Calculated Fill: 1600 ft  
Volume: 65.11 bbl  
Calculated Sacks: 223.19 sks  
Proposed Sacks: 225 sks

These cement volumes are based on field experience in the area and should be recalculated if a caliper log should become available.

Note: Actual retarder concentrations to be determined through lab testing.

# HALLIBURTON

## Cost Estimate

## Production Casing (Option 1)

<u>Mtrl Nbr</u>	<u>Description</u>	<u>Qty</u>	<u>U/M</u>	<u>Unit Price</u>	<u>Gross Amt</u>
2	MILEAGE FOR CEMENTING CREW,ZI Number of Units	120 1	MI	5.14	616.80
1	ZI-MILEAGE FROM NEAREST HES BASE,/UNIT Number of Units	120 1	MI	8.74	1,048.80
11941	FIELD STORAGE BIN DELIVERY Number of Units	120 1	MI	8.74	1,048.80
	<b>0% disc. on surcharge(s) &amp; permit(s)</b>				
7	ENVIRONMENTAL SURCHARGE	1	EA	120.00	120.00
86955	FUEL SURCHG-HEAVY TRKS >1 1/2 TON/PER MI Number of Units	120 2	MI	0.40	96.00
86954	FUEL SURCHG-CARS/PICKUPS<1 1/2TON/PER/MI Number of Units	120 1	MI	0.13	15.60
87605	FUEL SURCHG-CMT & CMT ADDITIVES/PER TNM NUMBER OF TONS	60 15.56	MI	0.13	121.37
372867	Cmt PSL - DOT Vehicle Charge, CMT	3	EA	215.20	645.60
16091	ZI - PUMPING CHARGE DEPTH FEET/METERS (FT/M)	1 9100 FT	EA	8,992.00	8,992.00
16092	ADDITIONAL HOURS ON LOC (AS APPLY) HOURS	0 1	EA	828.00	0.00
139	ADC (AUTO DENSITY CTRL) SYS, /JOB,ZI NUMBER OF UNITS	1 1	EA	2,031.00	2,031.00
16115	FIELD STORAGE BIN >8 HRS,DAY,ZI DAYS OR PARTIAL DAY(WHOLE NO.)	1 1	EA	1,200.00	1,200.00
361922	LO TORC?VLV 2", W/HES,/DAY,ZI TOTAL NUMBER HR/DAY/WEEK/MTH/YEAR/JOB/RUN	1 1 DAY	EA	74.50	74.50
381901	Rotary Steel Hose 2", w/HES,per day, CMT TOTAL NUMBER HR/DAY/WEEK/MTH/YEAR/JOB/RUN	4 1 DAY	EA	78.00	312.00
361923	LEAD-OFF SWING,2", W/HES,/DAY,ZI TOTAL NUMBER HR/DAY/WEEK/MTH/YEAR/JOB/RUN	4 1 DAY	EA	43.40	173.60
74038	PLUG CONTAINER RENTAL DAYS OR FRACTION (MIN1)	1 1	EA	0.00	1,180.00
	<b>25% disc. on plug(s)</b>				
101237390	PLUG,CMTG,TOP,5 1/2,HWE,4.38 MIN/5.09 MA	1	EA	185.00	185.00
13383	MUD FLUSH	1000	GAL	1.93	1,930.00
12311	HALLIBURTON LIGHT PREMIUM	115	SK	28.11	3,232.65
100005049	FLOCELE	29	LB	6.16	178.64
14532	PERMIAN BASIN SUPER H CEMENT	225	SK	56.55	12,723.75
100012766	LAP-1	98	LB	19.92	1,952.16
101007446	D-AIR 3000	57	LB	8.99	512.43
100003653	CFR-3	79	LB	12.89	1,018.31
100003695	SALT,CEM GR	675	LB	0.43	290.25
100005055	HR-7 CEMENT RETARDER	40	LB	4.59	183.60

# HALLIBURTON

<u>Mtrl Nbr</u>	<u>Description</u>	<u>Qty</u>	<u>U/M</u>	<u>Unit Price</u>	<u>Gross Amt</u>
76400	ZI MILEAGE,CMT MTLs DEL/RET MIN NUMBER OF TONS	60 15.58	MI	2.99	2,795.05
3965	HANDLE&DUMP SVC CHRG, CMT&ADDITIVES,ZI NUMBER OF EACH	467 1	CF	4.90	2,288.30
	<b>Total</b>			<b>USD</b>	<b>44,966.21</b>
	<b>Less 51% Discount</b>			<b>USD</b>	<b>22,423.52</b>
	<b>Discounted Total</b>			<b>USD</b>	<b>22,542.69</b>

## Casing/Sales Equipment

## Production Casing (Option 1)

<u>Mtrl Nbr</u>	<u>Description</u>	<u>Qty</u>	<u>U/M</u>	<u>Unit Price</u>	<u>Gross Amt</u>
2	MILEAGE FOR CEMENTING CREW,ZI Number of Units	120 1	MI	5.14	616.80
86954	ZI FUEL SURCHG-CARS/PICKUPS<1 1/2TON Number of Units	120 1	MI	0.13	15.60
100004895	SHOE,FLOAT,5 1/2 8RD,2 3/4 SUPER SEAL	1	EA	680.00	680.00
100004769	CLR,FLT,5-1/2 8RD,14-23PPF,2-3/4	1	EA	797.00	797.00
100004624	CLAMP - LIMIT - 5-1/2 - HINGED -	1	EA	43.20	43.20
100005045	KIT,HALL WELD-A	1	EA	66.30	66.30
	<b>Total</b>			<b>USD</b>	<b>2,218.90</b>
	<b>Less Discount</b>			<b>USD</b>	<b>917.44</b>
	<b>Discounted Total</b>			<b>USD</b>	<b>1,301.46</b>

# HALLIBURTON

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## **Job Information**

## **Production Casing (Option 2)**

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Roberts 1-13

Intermediate Casing	0 - 1500 ft (MD)
Outer Diameter	8.625 in
Inner Diameter	7.921 in
Linear Weight	32 lbm/ft
Production Open Hole	1500 - 9100 ft (MD)
Inner Diameter	7.875 in
Job Excess	30 %
Production Casing	0 - 9100 ft (MD)
Outer Diameter	5.500 in
Inner Diameter	4.892 in
Linear Weight	17 lbm/ft
Multiple Stage Cementer	7500 ft (MD)

## Calculations

## Production Casing (Option 2)

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### Stage 1

Spacer:

$$\begin{aligned} 593.00 \text{ ft} * 0.1733 \text{ ft}^3/\text{ft} * 30 \% &= 133.56 \text{ ft}^3 \\ \text{Total Spacer} &= 133.63 \text{ ft}^3 \\ &= 23.80 \text{ bbl} \end{aligned}$$

Spacer:

$$\begin{aligned} 125.00 \text{ ft} * 0.1733 \text{ ft}^3/\text{ft} * 30 \% &= 28.15 \text{ ft}^3 \\ \text{Total Spacer} &= 28.07 \text{ ft}^3 \\ &= 5.00 \text{ bbl} \end{aligned}$$

Cement : (1800.00 ft fill)

$$\begin{aligned} 1800.00 \text{ ft} * 0.1733 \text{ ft}^3/\text{ft} * 30 \% &= 405.42 \text{ ft}^3 \\ \text{First Stage Lead Cement} &= 405.42 \text{ ft}^3 \\ &= 72.21 \text{ bbl} \end{aligned}$$

Shoe Joint Volume: (40.00 ft fill)

$$\begin{aligned} 40.00 \text{ ft} * 0.1305 \text{ ft}^3/\text{ft} &= 5.22 \text{ ft}^3 \\ &= 0.93 \text{ bbl} \\ \text{Tail plus shoe joint} &= 410.64 \text{ ft}^3 \\ &= 73.14 \text{ bbl} \\ \text{Total Tail} &= 250 \text{ sks} \end{aligned}$$

# HALLIBURTON

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## Stage 2

Spacer:

$$\begin{aligned} 593.00 \text{ ft} * 0.1733 \text{ ft}^3/\text{ft} * 30 \% &= 133.56 \text{ ft}^3 \\ \text{Total Spacer} &= 133.63 \text{ ft}^3 \\ &= 23.80 \text{ bbl} \end{aligned}$$

Spacer:

$$\begin{aligned} 125.00 \text{ ft} * 0.1733 \text{ ft}^3/\text{ft} * 30 \% &= 28.15 \text{ ft}^3 \\ \text{Total Spacer} &= 28.07 \text{ ft}^3 \\ &= 5.00 \text{ bbl} \end{aligned}$$

Cement : (706.00 ft fill)

$$\begin{aligned} 706.00 \text{ ft} * 0.1733 \text{ ft}^3/\text{ft} * 30 \% &= 159.01 \text{ ft}^3 \\ \text{Total Second Stage Lead Cement} &= 159.01 \text{ ft}^3 \\ &= 28.32 \text{ bbl} \\ \text{Sacks of Cement} &= 116 \text{ sks} \end{aligned}$$

Cement : (294.00 ft fill)

$$\begin{aligned} 294.00 \text{ ft} * 0.1733 \text{ ft}^3/\text{ft} * 30 \% &= 66.22 \text{ ft}^3 \\ \text{Second Stage Tail Cement} &= 66.22 \text{ ft}^3 \\ &= 11.79 \text{ bbl} \end{aligned}$$

Shoe Joint Volume: (0.00 ft fill)

$$\begin{aligned} 0.00 \text{ ft} * 0.1305 \text{ ft}^3/\text{ft} &= 0.00 \text{ ft}^3 \\ &= 0.00 \text{ bbl} \\ \text{Tail plus shoe joint} &= 66.22 \text{ ft}^3 \\ &= 11.79 \text{ bbl} \\ \text{Total Tail} &= 50 \text{ sks} \end{aligned}$$

## Job Recommendation

## Production Casing (Option 2)

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Install floating equipment, run casing to bottom, and circulate minimum of 2-3 hole volumes prior to cementing as follows:

### Fluid Instructions

#### Stage 1

Fluid 1: Mix and Pump 1000 gals  
MUD FLUSH

Fluid Density: 8.40 lbm/gal  
Fluid Volume: 23.80 bbl

Fluid 2: Pump 5 bbl  
Fresh Water

Fluid Density: 8.33 lbm/gal  
Fluid Volume: 5 bbl

Fluid 3: Mix and Pump 255 sks

Super H Cement

0.5 % LAP-1 (Low Fluid Loss Control)  
0.4 % CFR-3 (Dispersant)  
0.25 lbm/sk D-AIR 3000 (Defoamer)  
3 lbm/sk Salt (Salt)  
0.7 % HR-7 (Retarder)

Fluid Weight 13.20 lbm/gal  
Slurry Yield: 1.64 ft<sup>3</sup>/sk  
Total Mixing Fluid: 8.46 Gal/sk  
Top of Fluid: 7300 ft  
Calculated Fill: 1800 ft  
Volume: 73.14 bbl  
Calculated Sacks: 250.24 sks  
Proposed Sacks: 255 sks

**DV Tool**

**7500 ft (MD)**

**Circulate a minimum of 4 hours between stages.**

# HALLIBURTON

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## Stage 2

Fluid 1: Mix and Pump 1000 gals  
MUD FLUSH

Fluid Density: 8.40 lbm/gal  
Fluid Volume: 23.80 bbl

Fluid 2: Pump 5 bbl  
Fresh Water

Fluid Density: 8.33 lbm/gal  
Fluid Volume: 5 bbl

Fluid 3: Mix and Pump 120 sks  
50/50 Poz Premium  
0.3 % Halad(R)-322 (Low Fluid Loss Control)

Fluid Weight 13.80 lbm/gal  
Slurry Yield: 1.37 ft<sup>3</sup>/sk  
Total Mixing Fluid: 6.62 Gal/sk  
Top of Fluid: 6500 ft  
Calculated Fill: 706 ft  
Volume: 28.31 bbl  
Calculated Sacks: 116.26 sks  
Proposed Sacks: 120 sks

Fluid 4: Mix and Pump 50 sks  
Premium Plus Cement  
94 lbm/sk Premium Plus Cement

Fluid Weight 14.80 lbm/gal  
Slurry Yield: 1.33 ft<sup>3</sup>/sk  
Total Mixing Fluid: 6.34 Gal/sk  
Top of Fluid: 7206 ft  
Calculated Fill: 294 ft  
Volume: 11.81 bbl  
Calculated Sacks: 50 sks  
Proposed Sacks: 50 sks

These cement volumes are based on field experience in the area and should be recalculated if a caliper log should become available.

Note: Actual retarder concentrations to be determined through lab testing.

# HALLIBURTON

## Cost Estimate

## Production Casing (Option 2)

<u>Mtrl Nbr</u>	<u>Description</u>	<u>Qty</u>	<u>U/M</u>	<u>Unit Price</u>	<u>Gross Amt</u>
2	MILEAGE FOR CEMENTING CREW,ZI Number of Units	120 1	MI	5.14	616.80
1	ZI-MILEAGE FROM NEAREST HES BASE,/UNIT Number of Units	120 1	MI	8.74	1,048.80
11941	FIELD STORAGE BIN DELIVERY Number of Units	120 1	MI	8.74	1,048.80
	<b>0% disc. on surcharge(s) &amp; permit(s)</b>				
7	ENVIRONMENTAL SURCHARGE	1	EA	120.00	120.00
86955	FUEL SURCHG-HEAVY TRKS >1 1/2 TON/PER MI Number of Units	120 2	MI	0.40	96.00
86954	FUEL SURCHG-CARS/PICKUPS<1 1/2TON/PER/MI Number of Units	120 1	MI	0.13	15.60
87605	FUEL SURCHG-CMT & CMT ADDITIVES/PER TNM NUMBER OF TONS	60 19.19	MI	0.13	149.68
372867	Cmt PSL - DOT Vehicle Charge, CMT	4	EA	215.20	860.80
16093	MSC PUMP CHARGE (1ST STAGE), ZI DEPTH FEET/METERS (FT/M)	1 9100 FT	EA	8,992.00	8,992.00
16	MULTIPLE STAGE CEMENTING Number of Units	1 1	STG	4,138.00	4,138.00
17	MSC ON SITE,ADD HR,ZI Number of Units	0 1	H	696.00	0.00
139	ADC (AUTO DENSITY CTRL) SYS, /JOB,ZI NUMBER OF UNITS	1 1	EA	2,031.00	2,031.00
16115	FIELD STORAGE BIN >8 HRS,DAY,ZI DAYS OR PARTIAL DAY(WHOLE NO.)	1 1	EA	1,200.00	1,200.00
116	BOOSTER PUMP-SKID,/DAY,ZI NUMBER OF DAYS	1 1	EA	1,216.00	1,216.00
361922	LO TORC?VLV 2",W/HES,/DAY,ZI TOTAL NUMBER HR/DAY/WEEK/MTH/YEAR/JOB/RUN	1 1 DAY	EA	74.50	74.50
381901	Rotary Steel Hose 2", w/HES,per day, CMT TOTAL NUMBER HR/DAY/WEEK/MTH/YEAR/JOB/RUN	4 1 DAY	EA	78.00	312.00
361923	LEAD-OFF SWING,2",W/HES,/DAY,ZI TOTAL NUMBER HR/DAY/WEEK/MTH/YEAR/JOB/RUN	4 1 DAY	EA	43.40	173.60
74038	PLUG CONTAINER RENTAL DAYS OR FRACTION (MIN1)	1 1	EA	0.00	1,180.00
13383	MUD FLUSH	2000	GAL	1.93	3,860.00
14532	PERMIAN BASIN SUPER H CEMENT	255	SK	56.55	14,420.25
100012766	LAP-1	111	LB	19.92	2,211.12
100003653	CFR-3	89	LB	12.89	1,147.21
101007446	D-AIR 3000	64	LB	8.99	575.36
100003695	SALT,CEM GR	765	LB	0.43	328.95
100005055	HR-7 CEMENT RETARDER	156	LB	4.59	716.04

# HALLIBURTON

<u>Mtrl Nbr</u>	<u>Description</u>	<u>Qty</u>	<u>U/M</u>	<u>Unit Price</u>	<u>Gross Amt</u>
12302	50-50 POZ (PREMIUM)	120	SK	24.64	2,956.80
100003646	HALAD-322	31	LB	16.58	513.98
100012205	PREMIUM PLUS CEMENT	50	SK	34.51	1,725.50
76400	ZI MILEAGE,CMT MTLs DEL/RET MIN NUMBER OF TONS	60 19.19	MI	2.99	3,442.69
3965	HANDLE&DUMP SVC CHRG, CMT&ADDITIVES,ZI NUMBER OF EACH	562 1	CF	4.90	2,753.80
	<b>Total</b>			<b>USD</b>	<b>57,925.28</b>
	<b>Less 51% Discount</b>			<b>USD</b>	<b>28,908.45</b>
	<b>Discounted Total</b>			<b>USD</b>	<b>29,016.83</b>

## Casing/Sales Equipment

## Production Casing (Option 2)

<u>Mtrl Nbr</u>	<u>Description</u>	<u>Qty</u>	<u>U/M</u>	<u>Unit Price</u>	<u>Gross Amt</u>
2	MILEAGE FOR CEMENTING CREW,ZI Number of Units	120 1	MI	5.14	616.80
86954	ZI FUEL SURCHG-CARS/PICKUPS<1 1/2TON Number of Units	120 1	MI	0.13	15.60
100004895	SHOE,FLOAT,5 1/2 8RD,2 3/4 SUPER SEAL	1	EA	680.00	680.00
100004769	CLR,FLT,5-1/2 8RD,14-23PPF,2-3/4	1	EA	797.00	797.00
100013917	CMTR,TY P ES,5-1/2 LG 8RD,17-23 LBS	1	EA	7,945.00	7,945.00
100004672	PLUG SET - FREE FALL - 5-1/2 8RD &	1	EA	965.00	965.00
100004624	CLAMP - LIMIT - 5-1/2 - HINGED -	1	EA	43.20	43.20
100005045	KIT,HALL WELD-A	2	EA	66.30	132.60
	<b>Total</b>			<b>USD</b>	<b>11,195.20</b>
	<b>Less Discount</b>			<b>USD</b>	<b>4,328.44</b>
	<b>Discounted Total</b>			<b>USD</b>	<b>6,866.76</b>

## Conditions

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### 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 2<sup>nd</sup> or 3<sup>rd</sup> 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 the exception of the subject discounts, all services performed and equipment and materials sold are provided subject to Halliburton's General Terms and Conditions contained in our current price list, (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 Master Service and/or Sales Contract applicable to the services, equipment, or materials supplied exists between your company and Halliburton, in which case the negotiated Master Contract shall govern the relationship between the parties. A copy of the latest version of our General Terms and Conditions is available from your Halliburton representative or at:

[http://www.halliburton.com/hes/general\\_terms\\_conditions.pdf](http://www.halliburton.com/hes/general_terms_conditions.pdf) 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 Law Department would be pleased to work with you to finalize a mutually agreeable contract. 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, equipment, and materials.

Any terms and conditions contained in purchase orders or other documents issued by the customer shall be of no effect except to confirm the type and quantity of services, equipment, and materials to be supplied to the customer.

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.