

FAX COVER SHEET

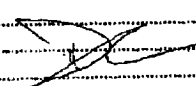
Richardson Operating Company
1300 La Plata Hwy.
Farmington, NM 87401
505-564-3100
505-564-3109

SEND TO Company name <u>OCD</u>	From <u>CARNES</u>
Attention <u>CHARLIE PERAIN</u>	Date <u>11-18-02</u>
Office location	Office location
Fax number <u>334-6170</u>	Phone number

☐ Urgent ☐ Reply ASAP ☐ Please comment ☐ Please review ☐ For your information

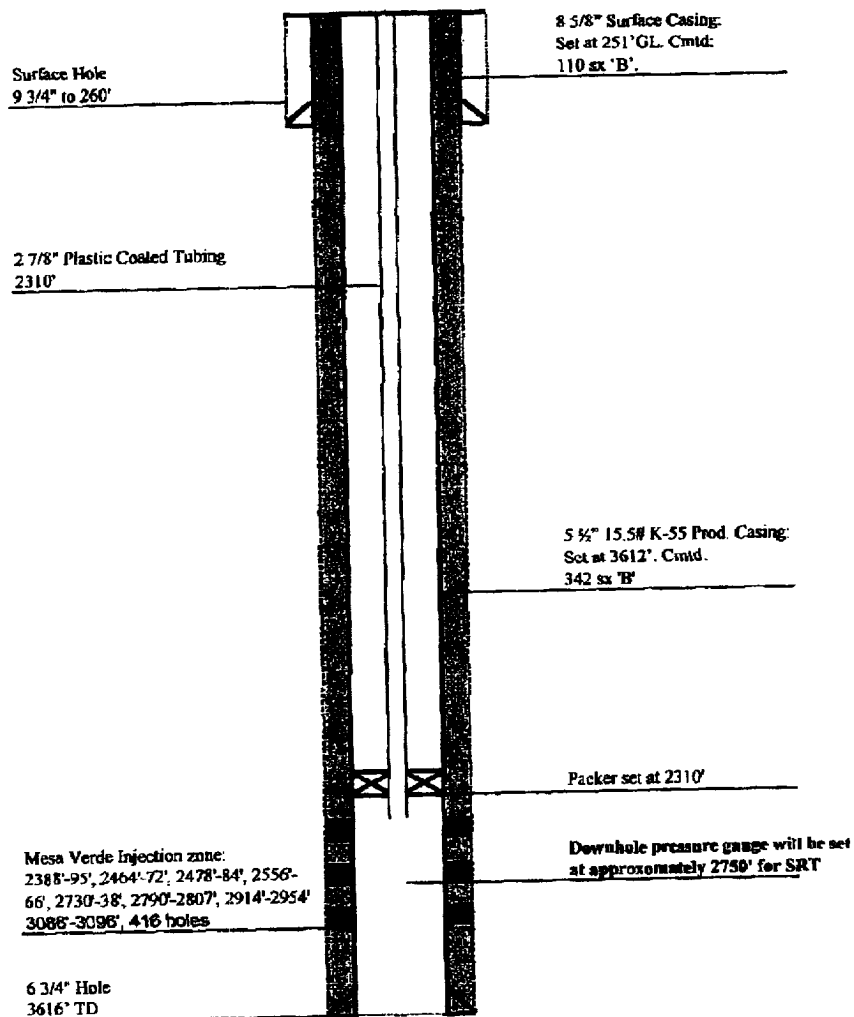
Total pages, including cover: _____

COMMENTS

CHARLIE,
HERE'S OUR PROCEDURE FOR THE SALTY DOL 42 STEP
PLATE TEST. AMERICAN WILLY BARONA SURFACE PRESSURES AND
THE BROADHEAD PRESSURE WILL BE MONITORED


Richardson Operating Company
3100 La Plata Highway
Farmington, NM 87401
(505) 564-3100

Well Name Salty Dog #2
Location 149S FSL & 147E FEL
J Sec 5, T29N, R14W NMPM
County San Juan
Field SWD; Blanco Mesa Verde
API# 30-045-30812
Elevation 5297' UG



Well has been injecting 1000 BPD at 1040 psi.

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NOV-18-2002 10:32

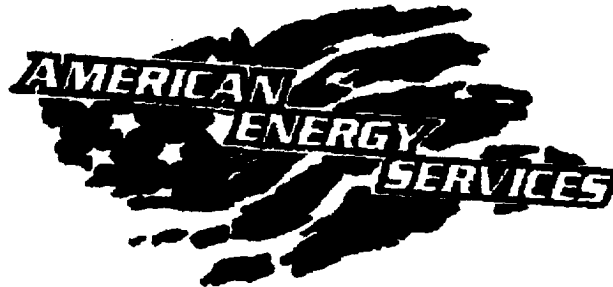
RICHARDSON OIL
AMERICAN ENERGY

505-564-3109

505 564 3524

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Richardson Operating Salty Dog #2

San Juan, New Mexico
Sec.05,T29N,R14W
Mesaverde

Step Rate Test

November 18, 2002

Prepared for: Mr. Drew Carraes
Engineer
Richardson Operating
(505) 564-3400-office; (505) 546-3109-Ext

Prepared by: Mike McNeese
AMERICAN ENERGY SERVICES

Service Point: Farmington
Sales Contact: Mike McNeese

American Energy Services - Disclaimer Notice:

This information is presented in good faith, but no warranty is given by or for American Energy Services. American Energy Services does not warrant the accuracy or completeness of the information presented in this report. The results shown are estimates based on calculations conducted by a computer model using various assumptions on the part of the user and operator. The results shown are estimates and should not be used for comparison purposes. The information presented is for informational purposes only and should not be used for comparison purposes. The quality of input data, and the results, may be improved through the use of more accurate data and procedures with American Energy Services. American Energy Services does not warrant the accuracy or completeness of the information presented in this report.

The Operator has assumed knowledge of the well, the reservoir, the test and conditions affecting them. If the Operator is aware of any conditions which may be prejudicial to the results of the test, the Operator's responsibility to notify the American Energy Services is hereby acknowledged.

Please consult your contract with us and our web site for 24 days from the date of test. Actual charges may vary depending upon time, equipment, and material. Additional charges for other services. Some charges are subject to the rate of the test. Please consult your contract with us for more information.

American Energy Services

AMERICAN ENERGY SERVICES

GENERAL INFORMATION

Customer : **Richardson Operating**
Well Name : **Salty Dog #2**
County, State : **San Juan, New Mexico**
Note : **Step Rate Test**
Prepared for : **Mr. Drew Carnes**
Customer Title: **Engineer**
Phone No. : **(505) 564-3400-office; (505) 546-3109-fax**
Prepared by : **Mike McNeese**
Title: **Technical Sales**
Phone No. : **(505) 325-4192**
Service point :

Farmington	▼
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State : **New Mexico**
Sales Contact: **Mike McNeese**
Sales Title: **Account Manager**
Phone No. : **(505) 325-4192**
Sec., T, R **Sec. 05, T29N, R14W**
Field **Blanco Mesaverde**
Formation: **Mesaverde**
Date: **November 18, 2002**

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Richardson Operating
Salty Dog #2
Sec. 8E, T29N, R14W
Mesaverde
San Juan, New Mexico
Step Rate Test

JOB DATA

Job Type:
Trailing Conductor:
Est. Pump Rate (bpm):
Est. Pressure (psd):

Step Rate Test
Tubing
12.125
2,445

Field Requirements:

3,000 (max psi)

Produced Water

50,450 gallons

Proppant/Divertor Requirements:

Total Water Required:

90,430 gallons

Total Sand Volume:

0

(the sandfoot pay)

0

WELL DATA
Formation: Mesaverde
Top Perforation (ft): 2,300
Bottom Perforation (ft): 2,000
Mid Perforation (ft): 2,742
No. of Perforations: 425
Perforation Diameter (inches): 0.41
Fract Height (ft): n/a
Net Pay (ft): 107
Fracture Gradient (pcf): 0.7043
Bottomhole Pressure (psd): n/a
Bottom Hole Temp (deg. F): 140
Porosity (%): n/a
Permeability (md): n/a
Tubing Size: 2 7/8", 5.62, 6'-3300"
Casing Size: 8 1/2", 11.0W, K-55, 5'-PSTO
Liner Size: n/a
Well Production type: Salt Water Disposal

4 (cgs)

Additional Information: Produced water will be supplied by the customer.

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Frac Calculations

Richardson Operating
Sally Dag #2
Sec. 03, T19N, R14W
Measure site
San Juan, New Mexico
Seep Rate Test

INPUT
Top Perforation (ft): 2,388
Bottom Perforation (ft): 3,096
Mid Perforation (ft): 2,742
Fracture Gradient (ppg): 0.76
Pipe Friction (gal/hr): 560
No. of Perforations: 420
Perforation Diameter (inches): 0.41
Mud S.G.: 1.000
Trailing Size: 2 7/8", 6.5#, 8'-2358'
Casing Size: 5 1/2", 11.4#, K-55, 0'-88TD
Liner Size: n/a
Est. Pump Rate (bpm): 12.13
Cap./IDP Capacity (bbl/hr): 4.04579 1.8238
Flush Volume (gal): 1,561

DEFINITIONS:

BHFP = Bottomhole Frac Pressure (psi)

MH = Hydrostatic Head (psi)

PF = Friction Pressure Loss (psi)

PPF = Perforation Friction Pressure (psi)

$$= [2.93 * (\text{rate}/\text{in}^2)^{1.3} / (\text{perf diameter})^{1.6}]$$
 * specific gravity

ISDP = Instantaneous Shut Down Pressure
 = BHFP - MH

STP = Surface Trailing Pressure (psi)
 = BHFP - MH + PF + PPF

HHP = Hydraulic horsepower (hhp)
 = STP * Rate / 40.8

Calculations:

BHFP = 2,996 psi

MH = 1,189 psi

PF = 1,536 psi

PPF = 0 psi

ISDP = 907 psi

STP = 2,443 psi

HHP = 726



Procedure For Step Rate Test:

- 1. Pump produced water at 0.25 bpm for exactly 15 minutes and record all of the rates and pressure. Use a adjustable choke to pinch back the rate and adjust to the desired rate.***
- 2. Pump produced water at 0.75 bpm for exactly 15 minutes and record all of the rates and pressure. Use a adjustable choke to pinch back the rate and adjust to the desired rate.***
- 3. Pump produced water at 1.25 bpm for exactly 15 minutes and record all of the rates and pressure. Use a adjustable choke to pinch back the rate and adjust to the desired rate.***
- 4. Pump produced water at 1.75 bpm for exactly 15 minutes and record all of the rates and pressure. Use a adjustable choke to pinch back the rate and adjust to the desired rate.***
- 5. Pump produced water at 2.25 bpm for exactly 15 minutes and record all of the rates and pressure. Use a adjustable choke to pinch back the rate and adjust to the desired rate.***
- 6. Pump produced water at 2.75 bpm for exactly 15 minutes and record all of the rates and pressure. Use a adjustable choke to pinch back the rate and adjust to the desired rate.***
- 7. Pump produced water at 3.25 bpm for exactly 15 minutes and record all of the rates and pressure. Use a adjustable choke to pinch back the rate and adjust to the desired rate.***
- 8. Pump produced water at 3.75 bpm for exactly 15 minutes and record all of the rates and pressure. Use a adjustable choke to pinch back the rate and adjust to the desired rate.***
- 9. Pump produced water at 4.25 bpm for exactly 15 minutes and record all of the rates and pressure. Use a adjustable choke to pinch back the rate and adjust to the desired rate.***
- 10. Pump produced water at 4.75 bpm for exactly 15 minutes and record all of the rates and pressure. Use a adjustable choke to pinch back the rate and adjust to the desired rate.***
- 11. Pump produced water at 5.25 bpm for exactly 15 minutes and record all of the rates and pressure.***

12. Pump produced water at 5.75 bpm for exactly 15 minutes and record all of the rates and pressure.
13. Pump produced water at 6.25 bpm for exactly 15 minutes and record all of the rates and pressure.
14. Pump produced water at 6.75 bpm for exactly 15 minutes and record all of the rates and pressure.
15. Pump produced water at 7.25 bpm for exactly 15 minutes and record all of the rates and pressure.
16. Pump produced water at 7.75 bpm for exactly 15 minutes and record all of the rates and pressure.
17. Pump produced water at 8.25 bpm for exactly 15 minutes and record all of the rates and pressure.
18. Pump produced water at 8.75 bpm for exactly 15 minutes and record all of the rates and pressure.
19. Pump produced water at 9.25 bpm for exactly 15 minutes and record all of the rates and pressure.
20. Pump produced water at 9.75 bpm for exactly 15 minutes and record all of the rates and pressure.
21. Pump produced water at 10.25 bpm for exactly 15 minutes and record all of the rates and pressure.
22. Pump produced water at 10.75 bpm for exactly 15 minutes and record all of the rates and pressure.
23. Pump produced water at 11.25 bpm for exactly 15 minutes and record all of the rates and pressure.
24. Pump produced water at 11.75 bpm for exactly 15 minutes and record all of the rates and pressure.
25. Pump produced water at 12.25 bpm for exactly 15 minutes and record all of the rates and pressure.

STP required to fracture the formation =	2,096	psi
(based on ISIP from pump-in) ISDP =	909	psi
Frac Gradient From ISDP =	0.7645	psi/ft

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Pharmaceuticals

**Michigan Operating
Ends Day 88
Sec. 95, ZEPHYRUS CITY
Michigan
Gen. Sec., New Mexico
Deep Blue Trail**

THE UNIVERSITY OF CHICAGO

Number of units using 300 L/min. 200/7000

454

[illegible]

Public Safety

[illegible]

8.30

540 AM

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Richardson Operating
 Salty Dog #2
 Sec.08,T29N,R14W
 Hamsavordo
 San Juan, New Mexico
 Steep Rate Test

CODE

PRICE ESTIMATEUnit CostBook TotalChemicals

Chemical Total:

\$0.00

Proppants/Diverters

Proppant Total:

\$0.00

Equipment

sa0215	1 ea	Minimum Pump Charge for 1000 HHP Pump, first 4 hrs	\$3,500.00	\$3,500.00
sa0362	1 ea	0 - 10 BPM Blender, first 4 hrs	\$1,550.00	\$1,550.00
ts0102	1 job	Computer Van Frac Unit, Real Time Monitoring Unit	\$3,300.00	\$3,300.00
sa001	120 mi	Unit Mileage Charge-Trucks, Cars, and Vans (except bulk units)	\$4.40	\$528.00
sa0108	1 ea	Acid Pump Service I (0 - 300 HHP)	\$1,100.00	\$1,100.00
sa0008	4 job	2" Valve Rental	\$290.00	\$1,180.00

Equipment Total:

\$11,136.00

JOB TOTAL:

\$11,136.00

DISCOUNTED TOTAL:

\$8,805.56

The above pricing does not include Federal, State, and Local taxes.

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