

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

APPLICATION FOR PERMIT TO DRILL, DEEPEN, OR PLUG BACK

1a. TYPE OF WORK
 DRILL DEEPEN PLUG BACK

b. TYPE OF WELL
 OIL WELL GAS WELL OTHER SINGLE ZONE MULTIPLE ZONE

2. NAME OF OPERATOR
 Phillips Oil Company

3. ADDRESS OF OPERATOR
 P. O. Box 2920, Casper, WY 82602

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.)*
 At surface 1705' FNL, 640' FWL (SW NW)
 At proposed prod. zone
 Same

14. DISTANCE IN MILES AND DIRECTION FROM NEAREST TOWN OR POST OFFICE*
 Approximately 3 miles southeast of Montezuma Creek, Utah

15. DISTANCE FROM PROPOSED* LOCATION TO NEAREST PROPERTY OR LEASE LINE, FT. (Also to nearest drlg. unit line, if any)
 1705' south of Rutherford Unit lease line

16. NO. OF ACRES IN LEASE
 1600 Acres

17. NO. OF ACRES ASSIGNED TO THIS WELL
 40 Acres

18. DISTANCE FROM PROPOSED LOCATION* TO NEAREST WELL, DRILLING, COMPLETED, OR APPLIED FOR, ON THIS LEASE, FT.
 1205' south of #13-11

19. PROPOSED DEPTH
 5700'

20. ROTARY OR CABLE TOOLS
 Rotary

21. ELEVATIONS (Show whether DF, RT, GR, etc.)
 4556' ungraded ground

22. APPROX. DATE WORK WILL START*
 First quarter 1985

5. LEASE DESIGNATION AND SERIAL NO.
 14-20-603-247

6. IF INDIAN, ALLOTTEE OR TRIBE NAME
 Navajo

7. UNIT AGREEMENT NAME
 SW-I-4192

8. FARM OR LEASE NAME
 Rutherford Unit

9. WELL NO.
 #13-12

10. FIELD AND POOL, OR WILDCAT
 Greater Aneth

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
 Sec. 13-T41S-R23E

12. COUNTY OR PARISH
 San Juan

13. STATE
 Utah

23. PROPOSED CASING AND CEMENTING PROGRAM

SIZE OF HOLE	SIZE OF CASING	WEIGHT PER FOOT	SETTING DEPTH	QUANTITY OF CEMENT
17-1/2"	13-3/8"	48#	100'	150 sx (Circ to surface)
12-1/4"	9-5/8"	36#	1600'	600 sx (Circ to surface)
8-1/2"	7"	23# & 26#	5700'	600 sx (T.O.C. Approx 2000')

Approval is requested to drill Rutherford Unit #13-12, a Desert Creek Development oil well, to increase the ultimate recovery from the Rutherford Unit.

BOP equipment will be operated daily and tested weekly.

APPROVED BY THE STATE
OF UTAH DIVISION OF
OIL, GAS, AND MINING
DATE: 1/17/85
BY: *John R. Bays*

RECEIVED
JAN 03 1985
DIVISION OF
OIL, GAS & MINING

IN ABOVE SPACE DESCRIBE PROPOSED PROGRAM: If proposal is to deepen or plug back, give data on present productive zone and proposed new productive zone. If proposal is to drill or deepen directionally, give pertinent data on subsurface locations and measured and true vertical depths. Give blowout preventer program, if any.

24. SIGNED *A. E. Stuart* TITLE Area Manager DATE December 26, 1984
 (This space for Federal or State office use)

PERMIT NO. _____ APPROVAL DATE _____
 APPROVED BY _____ TITLE _____ DATE _____
 CONDITIONS OF APPROVAL, IF ANY:

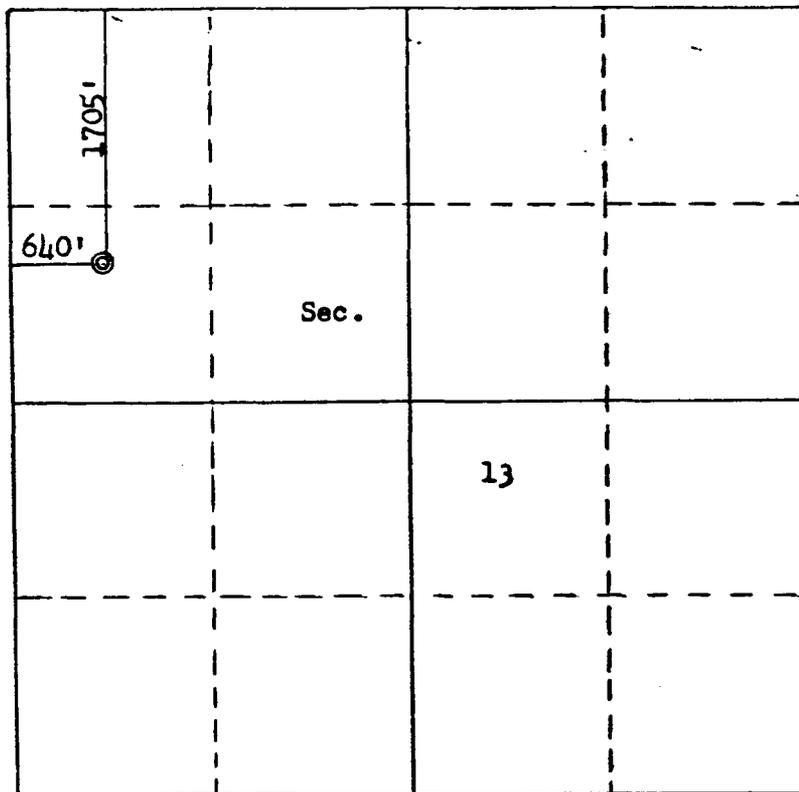
COMPANY PHILLIPS OIL COMPANY

LEASE RATHERFORD UNIT WELL NO. 13-12

SEC. 13, T 41S, R 23E
San Juan County, Utah

LOCATION 1705'FNL 640'FWL

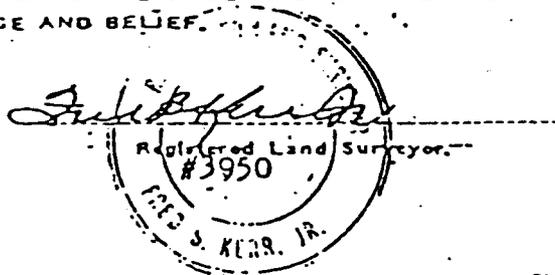
ELEVATION 4556 ungraded ground



SCALE—4 INCHES EQUALS 1 MILE

THIS IS TO CERTIFY THAT THE ABOVE PLAT WAS PREPARED FROM FIELD NOTE OF ACTUAL SURVEYS MADE BY ME UNDER MY SUPERVISION AND THAT THE SAME ARE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

SEAL:



SURVEYED July 1 1984

RATHERFORD UNIT #13-12

Supplement to Form 9-331C "Application for Permit to Drill, Deepen, or Plug Back."

DRILLING PROGRAM

1. Surface formation is the Dune Sand, which consists of loose windblown sand, age-recent.

Estimated tops of geologic markers:

Shinarump	2054'
DeChelly	2391'
Hermosa	4293'
Desert Creek Zone I	5347'

2. Brackish water-bearing sands are expected in the Navajo, Wingate, and DeChelly formations. Oil is expected to be encountered in the Ismay and Desert Creek formations. The top of cement will be approximately at 2000'.
3. Blow-out preventers will be 10" Series 900 equipment to be tested initially to 3000 psi. They will be inspected and operated daily and pressure tested weekly to 1500 psi. Weekly pressure tests will be supervised by representatives of Phillips Oil Company and the drilling contractor. Tests will be recorded on the daily drilling report which will remain on the rig floor during drilling operations. BOP tests will be conducted in accordance with Phillips standards, copy attached.

4. a. Proposed Casing Program:

1. Conductor casing:

100'	13-3/8"	48#/ft	H-40	ST&C	new
------	---------	--------	------	------	-----

2. Surface casing:

1600'	9-5/8"	36#/ft	K-55	ST&C	new
-------	--------	--------	------	------	-----

Surface casing will be tested to 1500# before drilling out.

3. Production casing:

5700'	7"	23# & 26#/ft	K-55	ST&C	new
-------	----	--------------	------	------	-----

Production casing will be tested to 3000#.

b. Proposed Cementing Program:

1. Conductor Casing:

Conductor casing will be cemented with 150 sks Class B cement. Cement will be brought to surface.

2. Surface Casing:

Surface casing will be cemented with 300 sks "light" cement followed with 300 sks Class B cement. Cement will be brought to surface.

3. Production casing:

Production casing will be cemented with "light" cement followed with Class B cement. For cement volume, caliper will be used with 15% excess. The top of the cement should be around 2000'. If other zones with hydrocarbon potential are encountered, they will be covered with cement.

c. Auxiliary Equipment:

Auxiliary equipment will include upper and lower kelly cocks, a drill string safety valve, and a pit level indicator.

5. Drilling Fluid:

Drilling fluid will be a fresh water based mud system. Spud mud is gel and water with a weight of 8.4-8.8 ppg. From the surface to approximately 1600', gel and water will be used. Mud weight may be up to 9 ppg to control water flow from the Wingate formation. A slurry of 8.6-9.5 ppg, 32-38 viscosity, and less than 15cc/30 min. water loss will be used from 1600'-5200'. Mud weight may be increased to 10.4 ppg if a water flow is encountered. From 5200' to total depth mud properties will be 10.5-12.5 ppg, 40-45 viscosity, and below 10 cc water loss.

Adequate quantities of mud materials will be stored at the location to equal the volume of the rigs complete circulating system. A flow sensor will be used.

6. Testing, logging, and coring:

The logging program will consist of DLL, GR, SP, and Caliper from T. D. to the surface casing. A FDC/CNL and a Micro-proximity log will be run from T. D. to 4300'. A temperature or cement bond log will be run to determine cement top. It is proposed to core the Desert Creek Zone I.

7. Downhole Conditions:

Drilling in the area indicates no abnormal pressures, temperatures, or hydrogen sulfide gas.

8. Phillips anticipates starting operations in the first quarter of 1985. Drilling operations are estimated to take fifteen days per well.

CULTURAL RESOURCE REPORT

Abajo Archaeology has prepared a cultural resource inventory of the subject wellsite. A copy of the report has been sent to the BLM Farmington office. Pertinent information regarding the subject well is attached.

SURFACE USE PROGRAM

1. Existing Roads

- a. Access to existing lease roads is approximately 3 miles southeast of Montezuma Creek, Utah.
- b. The existing roads will be maintained in the same or better condition.
- c. Refer to the attached access road map for road information.

2. Access Roads

Planned upgrading of existing access roads is shown on the attached map.

3. Location of Existing Wells.

Locations of existing wells are shown on the attached maps.

4. Production from the proposed well will be piped to Ratherford Unit Tank Battery #2, located in the NW SE Sec. 12-T41S-R23E San Juan County, Utah. The flowline will be visible from the existing lease roads. A plat of the proposed leadline is attached.

5. Water Supply

- a. The source of water to drill the subject well is from the River Booster, NE/4 Sec. 5., or from the Water Injection Plant, SE/4 Sec. 17 in T41S-R24E, San Juan County, Utah.
- b. The drilling water will be trucked from the water source to the subject well.
- c. A water supply well will not be drilled on the lease.

6. Construction Materials

- a. Only native soils will be used for construction of wellsite and the access road.

- b. Pit run rock will be used on the wellsite and access road when needed.
- c. The above materials are owned by the Navajo Tribe.

7. Waste Disposal

- a. Cuttings: Cuttings will be contained in a fenced reserve pit until dry enough to cover. Upon abandonment, the reserve pit area will be backfilled, shaped to natural topography, and seeded.
- b. Drilling Fluid: Drilling fluid will be contained in a fenced reserve pit until dry enough to cover. Upon abandonment, the reserve pit area will be backfilled, shaped to natural topography, and seeded.
- c. Garbage/Trash: All garbage and trash will be put in the burn pit. The burn pit will be fenced on four sides. After the burn pit is no longer in use, the trash and garbage will be covered with a minimum of 4 feet of fill.
- d. Salt: No salts are anticipated on this well. If salt is present, it will be disposed of in the reserve pit.
- e. Chemicals: Chemicals will be disposed of in the reserve pit.
- f. Sewage: Dry chemical toilets will be used.

8. Ancillary Facilities

No ancillary facilities are required.

9. Well Site Layout.

- a. Refer to attached Rig Layout plat
- b. There are no plans to line the reserve pit unless porous soil materials are encountered during construction.

10. Surface Reclamation Plans

- a. Construction Program: A cross section of the drill site showing cuts and fills is attached.
- b. Well Abandonment: All disturbed areas will be shaped to the natural topography and seeded in accordance with BLM requirements.
- c. Producing Well: Those areas not needed for production purposes will be recontoured to the surrounding topography. Seeding will be in accordance with BLM requirements.

- d. Pipelines and flowlines: Flowlines will be above ground and follow or be visable from existing roads.
- e. Rehabilitation will begin as soon as possible, considering weather and other factors, and proceed per recommendation of the BLM. The reserve pit will be reclaimed once it dries.

11. Surface Ownership: The wellsite location, access road and leadline are on the Navajo Indian Reservation. No dwellings are in the proposed drilling area.

12. Other information:

The reserve pit will be fenced on three sides during drilling and on the fourth side after the rig is moved out.

13. Operator's Representative and Certification.

a. Field Representative:

A. E. Stuart
P. O. Box 2920
Casper, Wyoming 82602
307-237-3791

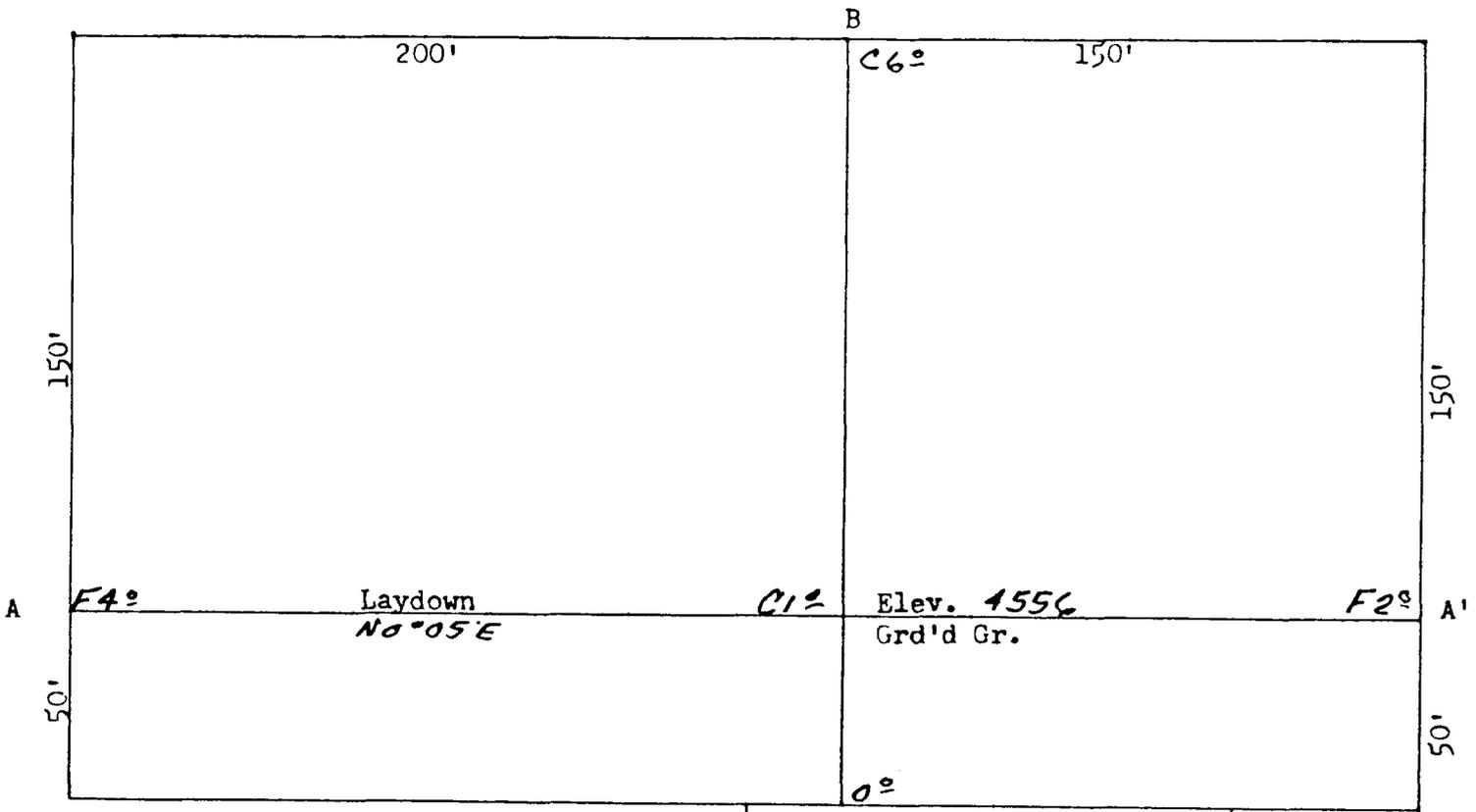
I hereby certify that I or persons under my direct supervision have inspected the proposed drill site and access route; and I am familiar with the conditions which currently exist; that the statements made in this plan are to the best of my knowledge true and correct; and that the work associated with operations proposed herein will be performed by Phillips Oil Company and its contractors and subcontractors in conformity with this plan and the terms and conditions under which it is approved. This statement is subject to the provisions of the 18 U.S.C. 1001 for the filing of a false statement.

Date December 28, 1984

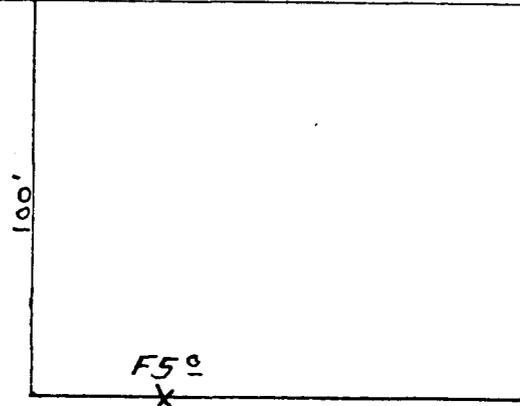

A. E. Stuart
Area Manager

BJM/fb:lt(18)
Casper - RC

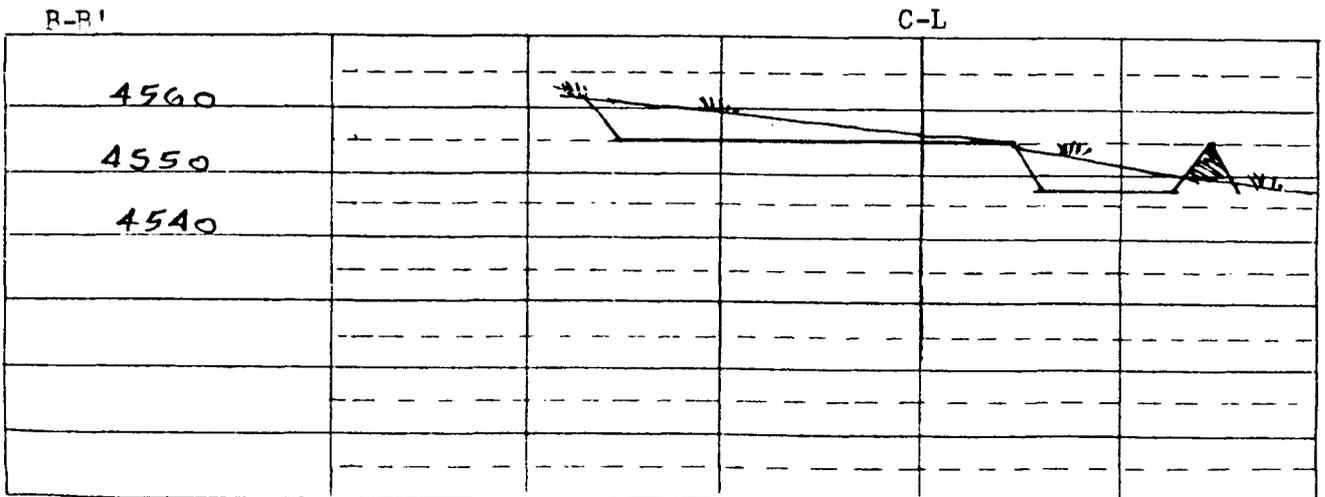
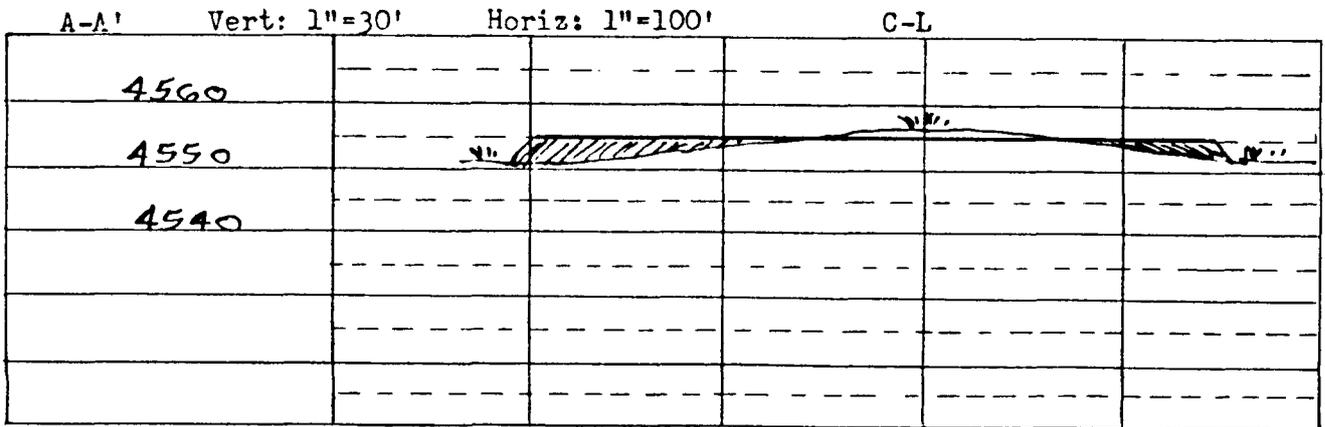
Profile for
 PHILIP'S OIL COMPANY #13-12 RATHERFORD UNIT
 1705'FWL 640'FWL Sec. 13-T41S-R23E
 SAN JUAN COUNTY, UTAH



Scale: 1"=50'



B' 125'



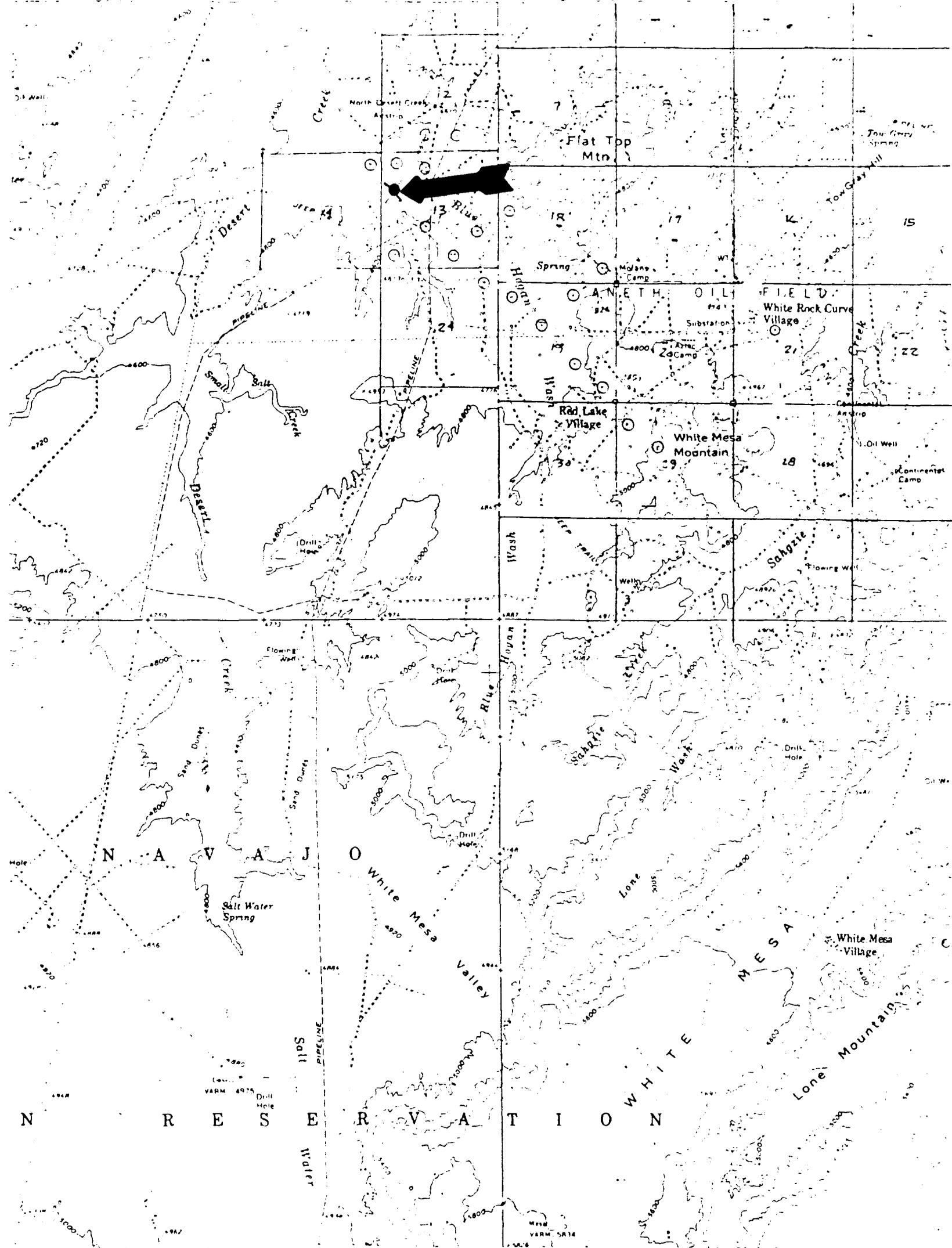
547

547 MONTEZUMA CREEK 545

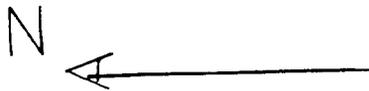
546

548

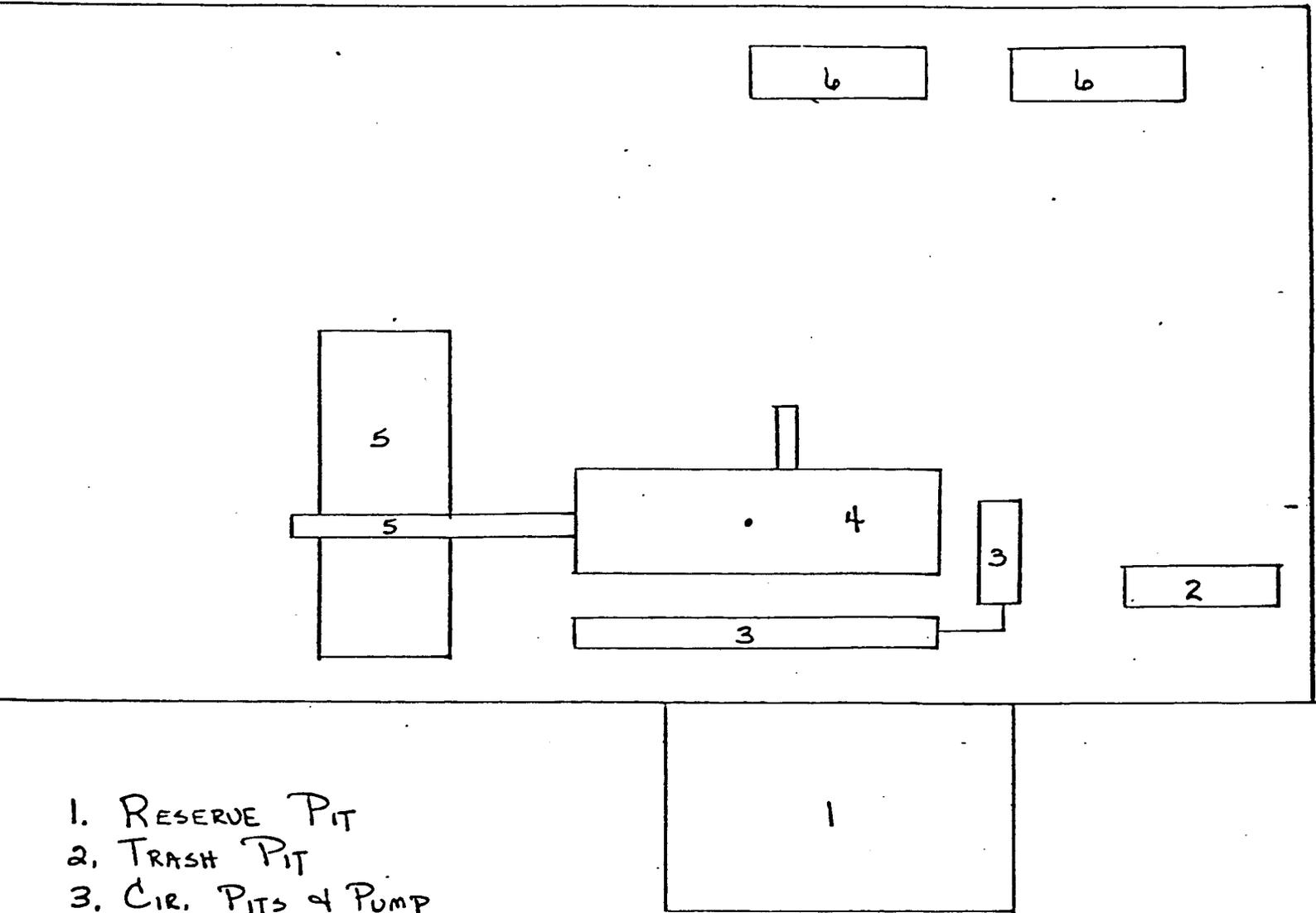
551



Vicinity Map for
 PHILLIPS OIL COMPANY #13-12 RATHERFORD UNIT
 1705'FNL 640'FWL Sec. 13-T4LS-R23E
 SAN JUAN COUNTY, UTAH



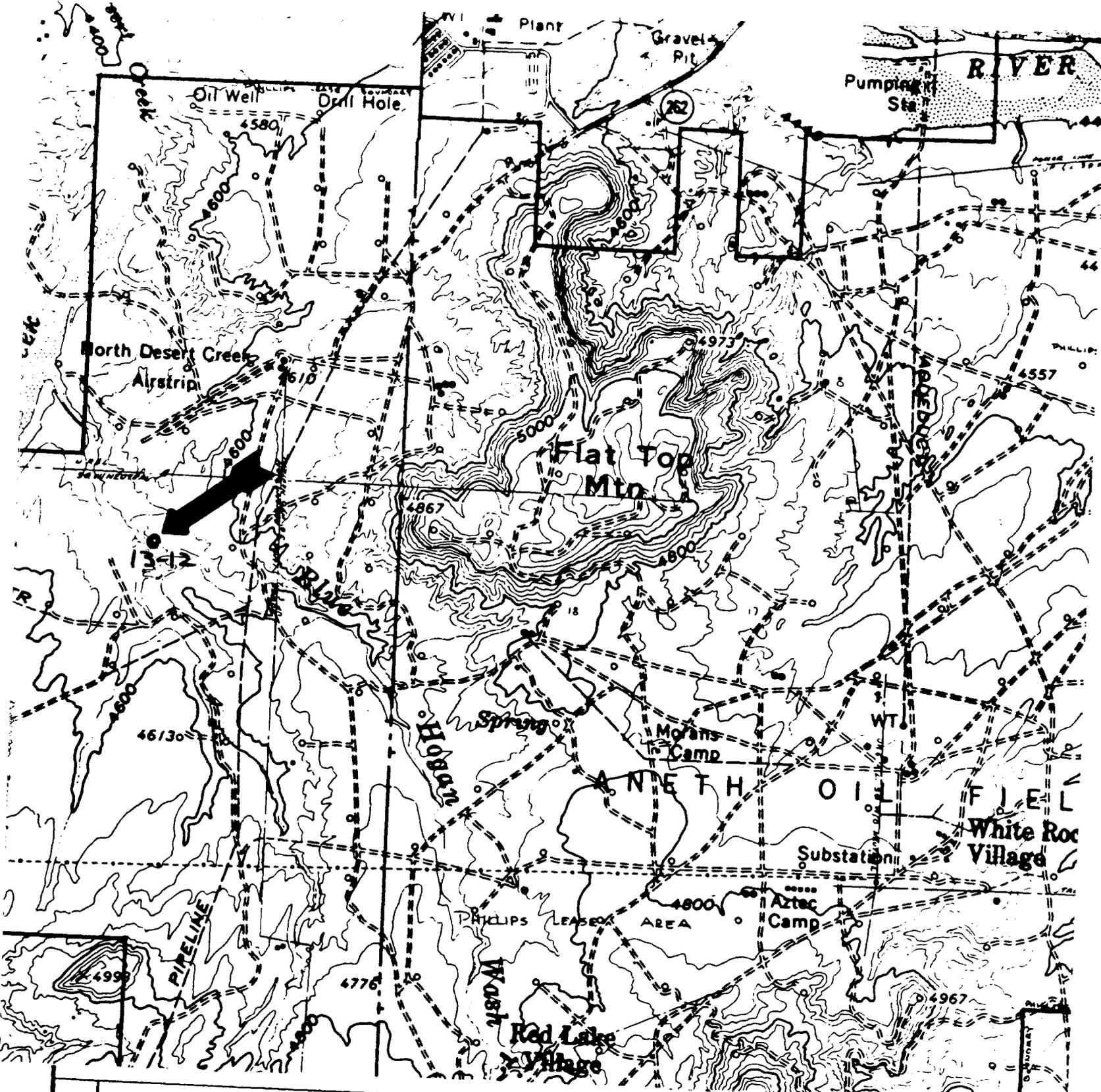
RATHERFORD UNIT
#13-12
SW NW Sec. 13-T41S-R23E



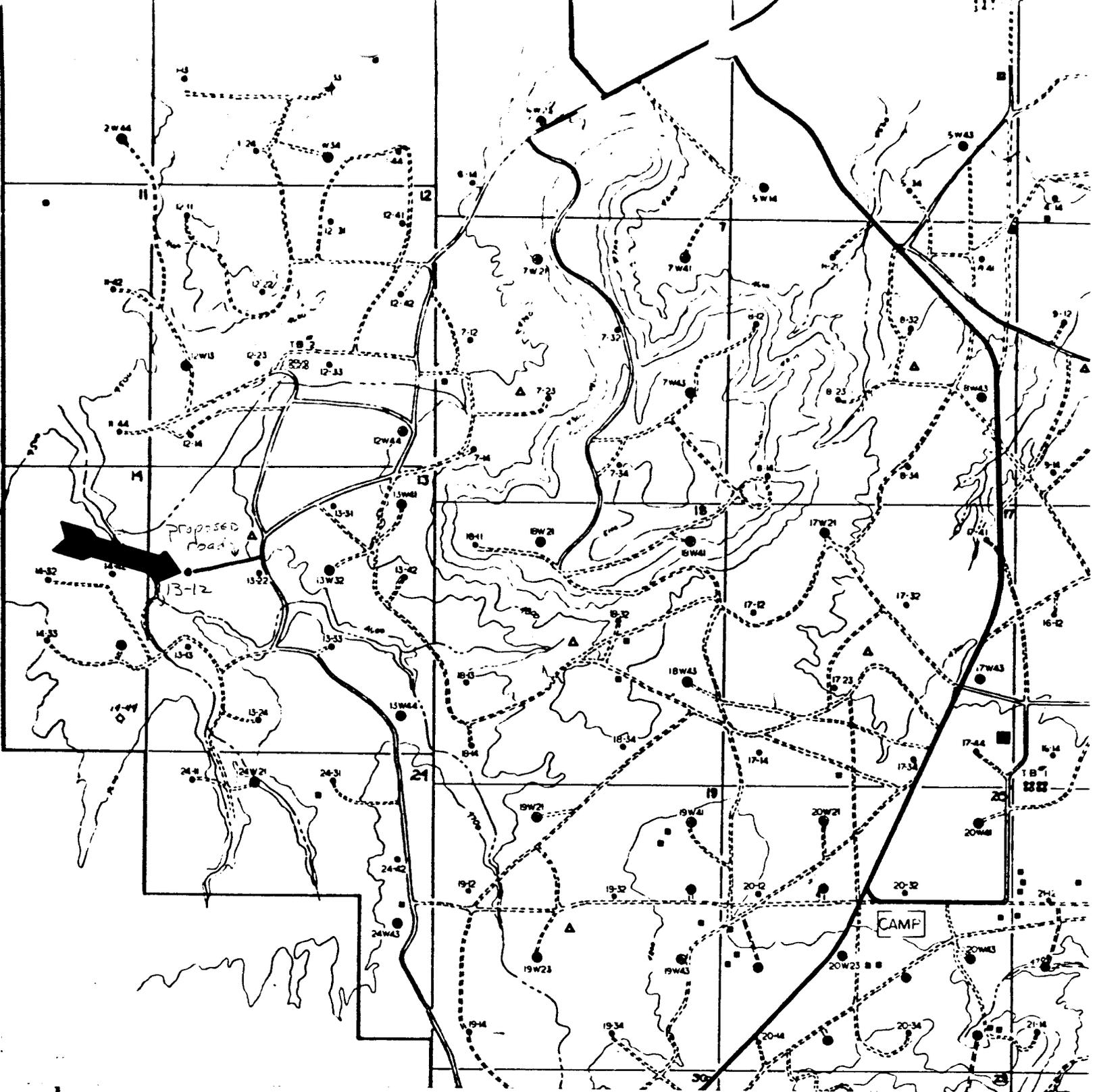
- 1. RESERVE PIT
- 2. TRASH PIT
- 3. CIR. PITS & PUMP
- 4. RIG
- 5. CAT WALK & PIPE RACKS
- 6. TRAILERS

DRILLING RIG LAYOUT

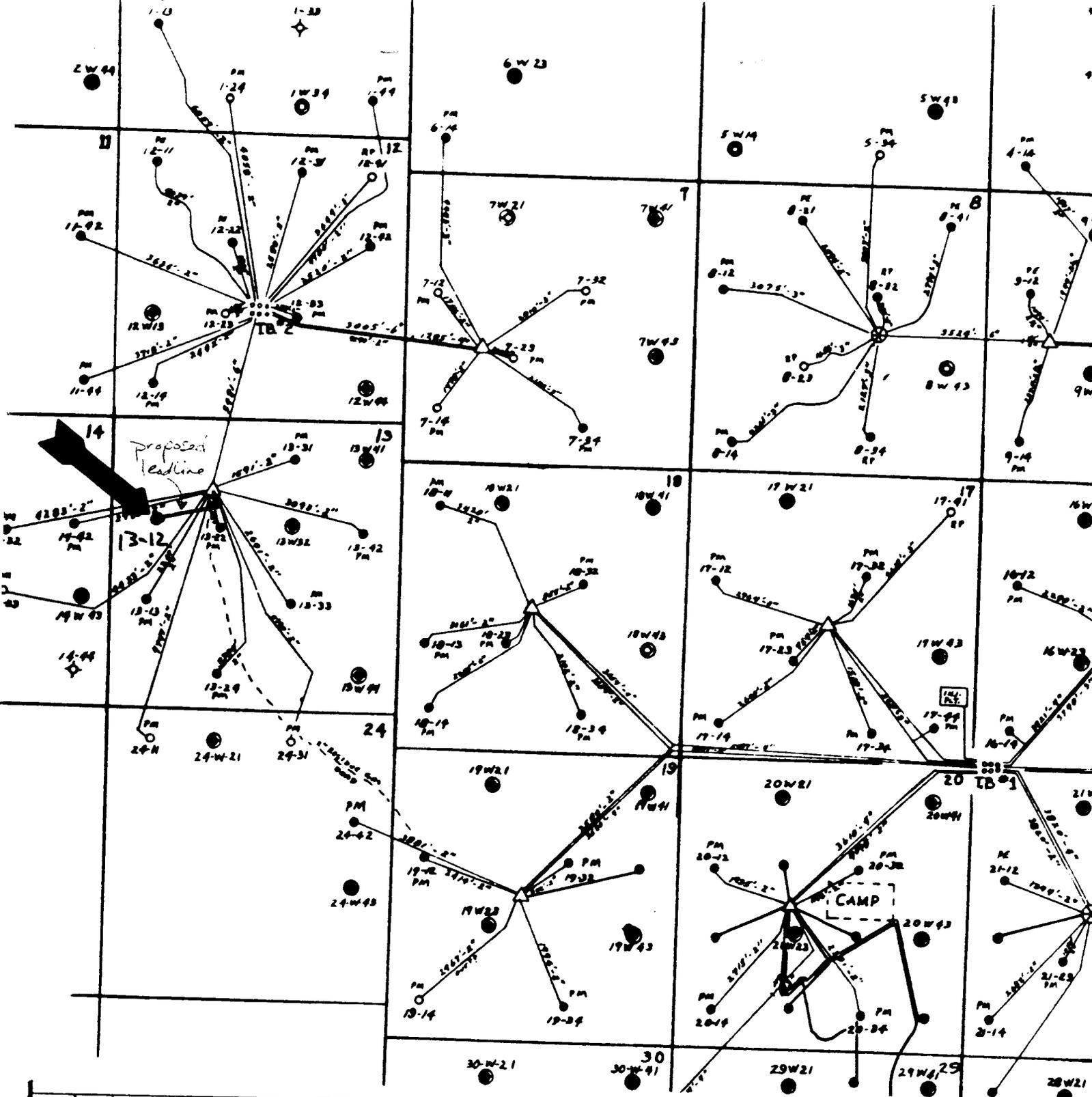
OUTLINE OF LOCATION - APPROXIMATELY 300' x 350'
NOT TO SCALE



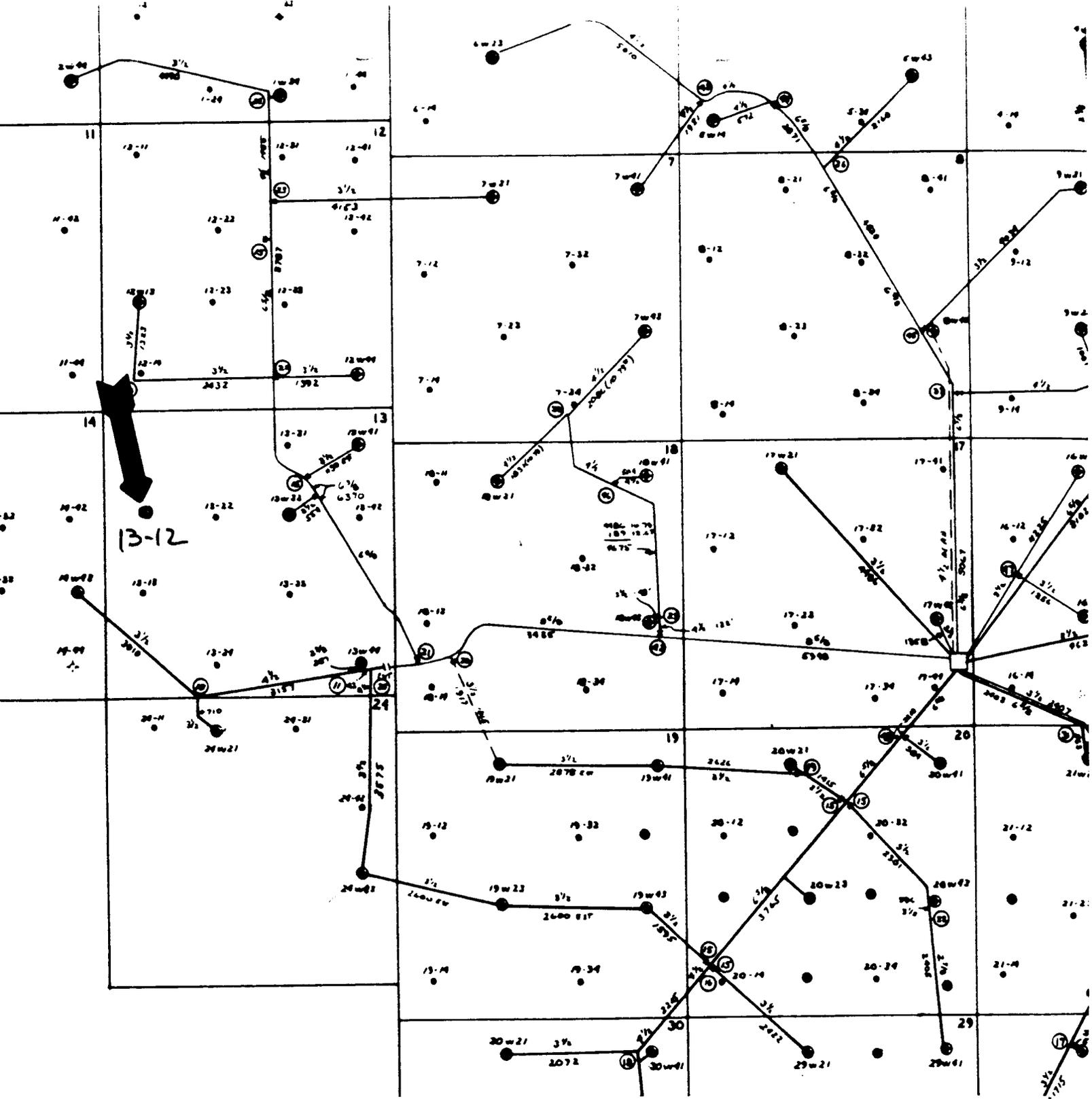
NO.	REVISION	BY	DATE	CHKD	APP'D
FOR BIDS	 PHILLIPS PETROLEUM COMPANY BARTLESVILLE, OKLAHOMA		JA NO.	FILE CODE	
FOR APPR			AFE NO.	SCALE 2.0" = 1 mi.	
FOR CONST			DWG NO.	SH NO.	
DRAWN 3-30-84 BJM		RATHERFORD UNIT WELL 13-12 PROPOSED SW NW SEC 13 T41S-R23E SAN JUAN CO., UTAH			
CHECKED					
APP'D					



NO.	REVISION	BY	DATE	CHKD	APP'D
FOR BIDS	 PHILLIPS PETROLEUM COMPANY BARTLESVILLE, OKLAHOMA		JA NO.	FILE CODE	
FOR APPR			AFE NO.	SCALE 2.0" = 1 mi.	
FOR CONST			DWG NO.		
DRAWN 3-30-84 BJM	RATHERFORD UNIT WELL 13-12			SH NO.	
CHECKED	PROPOSED ROAD PLAT				
APP'D	SW NW SEC 13 T41S-R23E				
	SAN JUAN CO., UTAH				



1		Relocation of proposed leadline		BJM		12/26/84			
NO.		REVISION		BY		DATE		CHKD APP'D	
FOR BIDS		FOR APPR		FOR CONST		DRAWN 3-30-84 BJM		CHECKED APP'D	
		PHILLIPS PETROLEUM COMPANY BARTLESVILLE, OKLAHOMA						JA NO. FILE CODE AFE NO. SCALE 2.2' = 1 MI	
		RATHERFORD UNIT WELL 13-12 PROPOSED LEADLINE PLAT SW NW SEC 13 T41S-R23E SAN JUAN CO., UTAH				DWG NO. SH NO.			



NO.	REVISION	BY	DATE	CHKD	APP'D
FOR BIDS	 PHILLIPS PETROLEUM COMPANY BARTLESVILLE, OKLAHOMA		JA NO	FILE CODE	
FOR APPR			AFE NO.	SCALE 2.2" = 1 mi	
FOR CONST			DWG NO	SH NO.	
DRAWN 12/26/84 BJM	RATHERFORD UNIT WELL 13-12 WATER INJECTION LINES SW NW SEC. 13 T41S-R23E SAN JUAN CO., UTAH				
CHECKED					
APP'D					

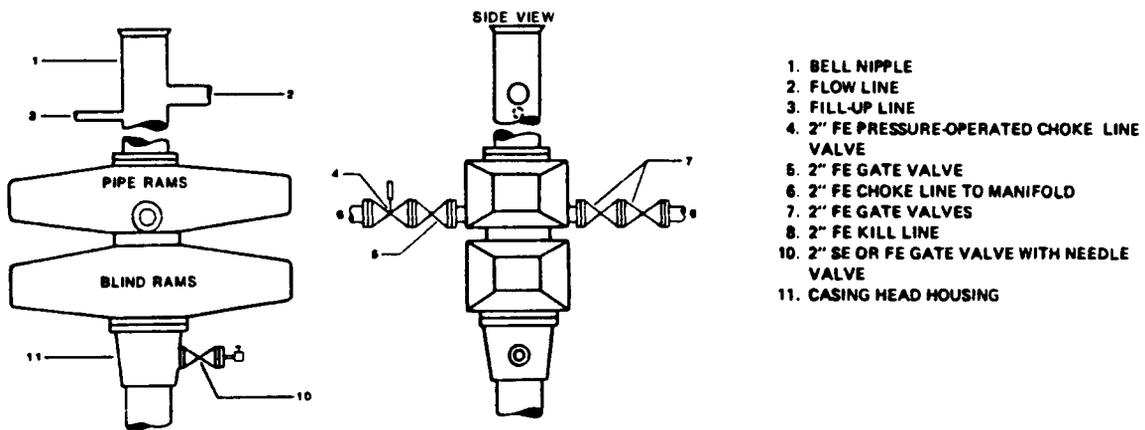


Figure 7-10. Standard Hydraulic Blowout Preventer Assembly
 (2 M or 3 M Working Pressure) Alternative 3 (without Drilling Spool)



7.6 Testing Surface Blowout Preventer Equipment

7.6.1 Pressure Test Frequency

All rams, annulars, valves, choke and kill lines, choke manifold, kelly cocks, and safety valves shall be pressure tested at the following frequencies:

- (1) Initial installation of blowout preventers.
- (2) After setting casing, before drilling cement.
- (3) Every 7 days or on first trip out of hole after 7 days since previous pressure test.
- (4) After any component of the blowout preventer assembly is disturbed, replaced or repaired (this includes lines, valves, or choke manifold). In this case, the component changed may be the only component tested.
- (5) Prior to conducting first drill stem test in a series of one or more DST's.
- (6) Any time the Phillips Wellsite Supervisor deems necessary, such as prior to drilling into suspected high pressure zones.



7.6.2 Function Test Frequency

All rams, annulars, valves, and other items specified below, shall be function tested at the following frequencies.

- (1) On initial installation from driller control and remote panel.
- (2) Each trip out of hole alternating between driller's and remote control panel but not more than once every twenty-four (24) hours. Close pipe rams or annular preventer ONLY on drill pipe.

7.6.3 Test Pressures

Use the following table to identify which test is appropriate and at what pressure.

TEST	DESCRIPTION
Low Pressure	Test to 200-300 psi prior to each high pressure test.
Initial Installation	<p>Test all rams, annulars, valves, choke manifold, kelly cocks, and safety valves to the lesser of the following pressures.</p> <ul style="list-style-type: none"> . Rated working pressure of the component in the blowout preventer assembly with the exception of annular preventer which is to be tested to 70% of the rated working pressure. . The API rated casing burst pressure of the last casing to be utilized in the well with the BOP assembly being tested. . Rated working pressure of the casing head. . If "Cup Tester" is used do not exceed 80% of the API rated burst pressure of the casing.
Repair	Repaired or replaced components are to be tested to the same pressures used in the Initial Test.



FIELD PRACTICES AND STANDARDS

7.6.3, cont'd

TEST	DESCRIPTION
Weekly and After Setting Casing	<p>Test all rams, annulars, valves, choke and kill lines, choke manifold, kelly cocks, and safety valves, to the lesser of the following pressures.</p> <ul style="list-style-type: none"> . 50% of the rated working pressure of the component to be tested. . 80% of the API rating of the casing burst pressure then in the well. . Test blind rams during internal casing pressure test. (Refer to drilling program for test pressures).
DST Operations	<p>Test all pipe rams, annular preventers, valves, choke and kill lines, choke manifold, kelly cocks, and safety valves to the maximum anticipated surface pressure expected while conducting drill stem tests. Do not test annular to more than 70% of its working pressure.</p>
Shallow Casing	<p>Where cased hole is less than 2000 feet measured depth, the test pressure may be 1.5 psi per foot of casing depth, not to exceed 80% of the API rated burst pressure. In the case of shallow conductor casing or drive pipe (500 feet or less) that is equipped with one BOP, then the test pressures do not need to exceed 1.0 psi per foot of casing depth.</p>
Accumulator	<p>Test accumulator to the manufacturer's rated working pressure. Test the accumulator for time to pump up to specifications.</p>

7.6.4 Blowout Preventer Test Practices

- (1) All pressure tests shall be witnessed by Phillips' Representative and the Contractor's Senior Supervisor on Location. All tests shall be recorded on the Phillips' Daily Drilling Report, the IADC Report and the BOP Test Form; see Figure 7-13. A reproducible copy of the BOP Test Form (Figure 7-13) can be found in Section III.



FIELD PRACTICES AND STANDARDS

7.6.4, cont'd

- (2) Hold all low pressure tests for three minutes and high pressure tests for five minutes or until Phillips Representative and the Contractor's Senior Supervisor are satisfied no leaks exist.
- (3) A detail procedure for the testing of blowout preventer and choke manifold equipment will be included in the drilling programs. The procedure is to be distributed for each drilling unit under contract by the operating office. Each operating office must include the following practices:
 - a. Prior to testing, all lines and valves will be thoroughly flushed to ensure the system is clear. Test all opening and closing control lines to 1500 psi and inspect for leaks.
 - b. If necessary, run a stand of drill collars below the test plug to prevent unseating the test tool during testing.
 - c. All precautions must be taken to avoid pressuring the casing below the test tool.
 - d. The running string is to be full of water (or antifreeze solution) for immediate indication of test tool leakage.
 - e. All pipe rams, blind/shear rams, blind rams, annular preventers, valves, fail-safe valves, choke and kill lines are to be tested at the frequencies and pressures outlined in this section.
 - f. Drill pipe safety valve, lower and upper kelly cocks are to be tested from below at pressures and frequencies outlined in this section.
 - g. All test fluids are to be bled back to the pump unit in safe manner.

7.6.5 Testing Wellhead Pack-offs

The wellhead pack-off is to be pressure tested upon installation for five minutes. Test pressure is to be 80% API rated casing collapse or the rated working pressure of the casing head whichever is the lesser. Casing annulus valve(s) must be in open position to prevent casing collapse during pack-off testing.

When testing the wellhead pack-off, use recorded test pressures and volumes to determine if pack-off is leaking. Pressure should be immediately released at the first indication of a leak.



7.6.6 Safety Precautions

One pumping unit operator is to be stationed at the high pressure pumping unit, and is to remain at this station until all testing has been completed. The pump unit operator is to be in continuous communication with the person who is recording the test data. The Phillips Wellsite Supervisor and Contractor's Senior Supervisor on location will be the only personnel who will go into the test area to inspect for leaks when the equipment involved is under pressure. The rig crews are to stay clear of the area until such time that both the Phillips Wellsite Supervisor and the Contractor's Senior Supervisor have contacted the pumping unit operator and all three have agreed that all pressure has been released, and there is no possibility of pressure being trapped. The rig crews may then go into the area to repair leaks or work as directed.

All lines, swings, and connections that are used in the testing of the blowout preventers are to be adequately secured in place.

Pressure is to be released only through the pressure release lines that are vented back into the pump unit tanks. The lines are to be clamped down to direct the flow into unit tanks.



ARCHAEOLOGICAL SURVEYS OF 13 PROPOSED WELL LOCATIONS,
THEIR ASSOCIATED ACCESS ROADS AND FLOW LINE ROUTES,
AND 9 MILES OF PROPOSED WATER INJECTION LINE ROUTES
IN SAN JUAN COUNTY, SOUTHEASTERN UTAH

12-W24	13-12	13-43
12-34	13-14	18-W12
14-41	13-21	24-41
13-11	13-23	29-22
	13-34	

Water Injection Lines: Mainline and Lines A, B, C,
D, E, F, F-1, G, H, I, and J

Prepared by:

Debra Foldi
Archaeological Consultant

Prepared for:

Phillips Oil Company
Cortez, Colorado

Submitted by:

William E. Davis, Director
Abajo Archaeology
Bluff, Utah

August 1984

Navajo Nation Antiquities Permit No. 1984-24
United States Department of the Interior
Bureau of Indian Affairs
Branch of Environmental Quality Control Authorization
BIA-NAO-84-ABA-048-1
and
Utah State Permit No. U-84-8-5-i

TABLE OF CONTENTS

ABSTRACT.....	iv
INTRODUCTION.....	1
DESCRIPTION OF PROJECT AREA.....	6
CULTURE HISTORY.....	7
METHODOLOGY.....	8
RESULTS.....	14
RECOMMENDATIONS.....	22
REFERENCES CITED.....	23

APPENDIX: Site form SJC-1106

LIST OF FIGURES

FIGURE 1.....	2
FIGURE 2.....	9
FIGURE 3.....	10
FIGURE 4.....	15
FIGURE 5.....	18
FIGURE 6.....	19
FIGURE 7.....	20
FIGURE 8.....	21

LIST OF TABLES

TABLE 1.....	3
TABLE 2.....	4
TABLE 3.....	11,12
TABLE 4.....	13
TABLE 5.....	16,17

ABSTRACT

Cultural resource surveys were conducted as part of the Rutherford Unit expansion project for Phillips Oil Company, in southeastern San Juan County, Utah. The surveys were performed on August 4, 6, 7, 9, and 11, 1984 on 13 proposed well location sites, eight associated access roads, portions of six associated flow line routes, and along nine miles of proposed injection line. The project area occurs in Sections 11, 12, 13, 14, and 24 in T 41 S, R 23 E and Sections 7, 17, and 18 in T 41 S, R 24 E, USGS White Mesa Village Quadrangle, Utah, 15'. It is under jurisdiction of the Bureau of Indian Affairs.

Seventeen isolated finds and one Anasazi Basketmaker II to Pueblo I artifact scatter (SJC-1106) were located during the survey. The isolated finds are not considered significant in terms of the eligibility criteria set forth in the National Register of Historic Places, thus, archaeological clearance is recommended for the project area, except the 100 meters of mainline injection pipeline east of its juncture with line J. It is recommended that the pipeline be rerouted or that an archaeologist be present to monitor construction of that portion of pipeline.

INTRODUCTION

On August 4, 6, 7, 9, and 11, 1984, cultural resource surveys were conducted within the Rutherford Unit south of Montezuma Creek, southeast San Juan County, Utah (Figure 1). The surveys were requested by Mr. Max Issacs, supervisor of Phillips Oil Company of Cortez, Colorado, and carried out at the request of Mr. Bob Hogg, engineer, and Mr. John White, who replaced Mr. Max Issacs. Both Mr. Hogg and Mr. White were present in the field during portions of the survey. Mr. Hogg assisted the archaeologist by flagging the access routes and flow lines during the survey. The project consisted of 13 proposed well locations, their associated access routes and flow lines, and approximately nine miles of proposed injection pipeline.

The project area lies within the boundaries of the Navajo Reservation (Tables 1 and 2) which is under the jurisdiction of the United States Department of the Interior, Bureau of Indian Affairs and the Navajo Nation. Cultural resources are administered by the USDI-BIA, Branch of Environmental Quality and by the Navajo Nation Cultural Resource Management Program.

The purpose of the survey was to verify the presence of and document any cultural resources within the proposed project impact areas. The accomplishment of these objectives fulfills compliance requirements for the preservation of archaeological and historical resources set forth by the American Antiquities Act of 1906, the Historic Preservation Act of 1966, the National Environmental Policy Act of 1969, Executive Order No. 11593 of 1971, the Archaeological and Historical Conservation Act of 1974, and the Archaeological Resources Protection Act of 1979. Cultural resources occurring on Navajo Tribal lands are further protected by Tribal laws: CJA-16-72 of 1972, Res. ACAP-86-77 of 1977, and the Navajo Tribal Code, Title Nineteen, Sections 1002 and 1004.

Field work was conducted under the Navajo Nation Antiquities Permit No 1984-24, the USDI-BIA, Environmental Quality Authorizaion No. BIA-NAO-84-048-1, and State of Utah Permit No. U-84-8-5-i. These permits and authorizations were granted to Abajo Archaeology of Bluff, Utah. BIA-NAO-84-ABA-048-1 is a "non-collection, non-disturbance" use authorization to conduct archaeological surveys on Navajo Tribal lands. The surveys were performed by Debra Foldi, an archaeological consultant with Abajo Archaeology. Dr. Anthony Klesert, Director of the Navajo Nation Cultural Resource Management Program and Mr. Terry

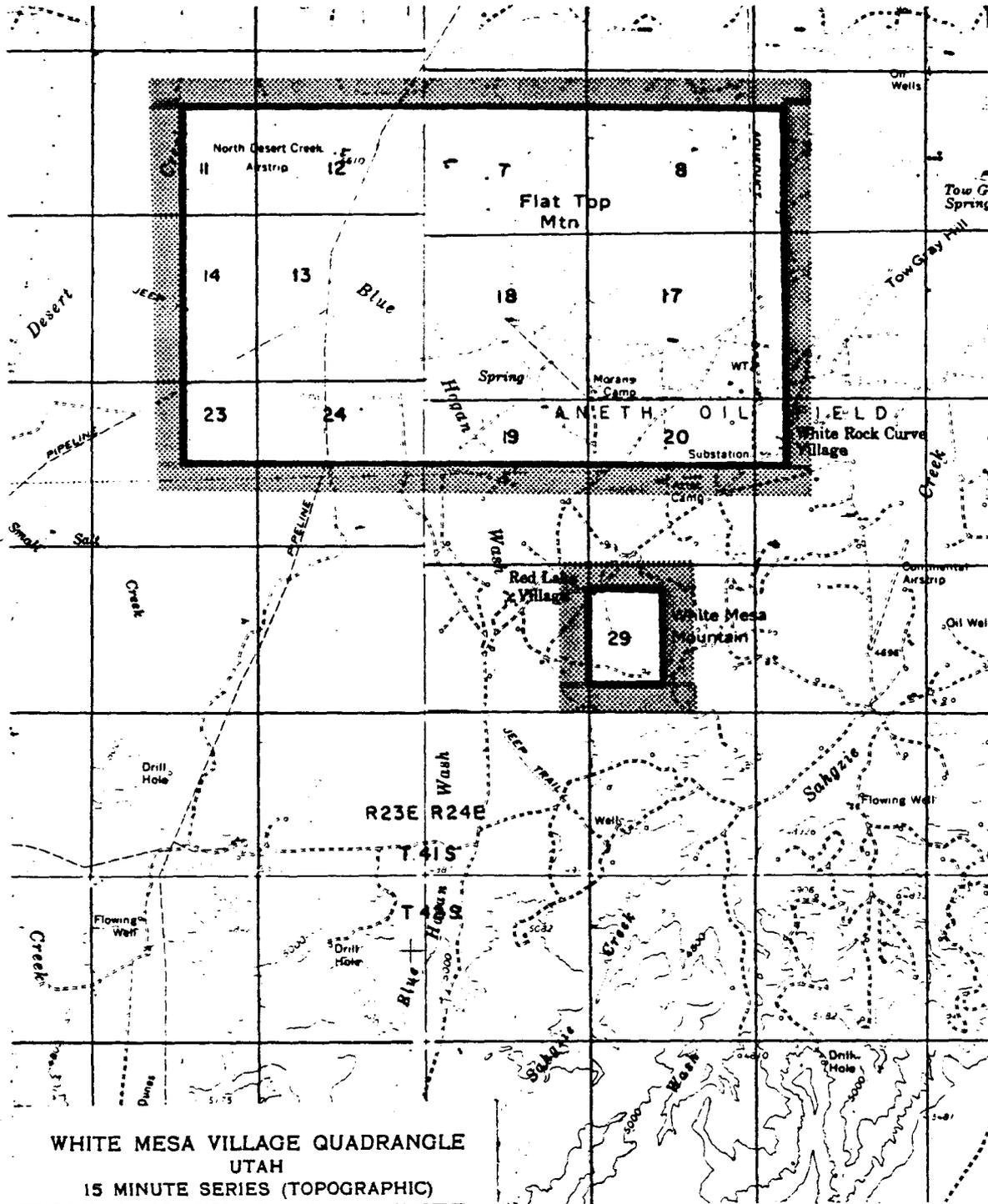


Figure 1. Location of Phillips Oil Company Rutherford Unit - 1984 expansion project. Stippling outlines project area.

Map Scale: 1:62,5000

TABLE 1

Legal Description of Project Area

Jurisdiction: Navajo Nation

Map: White Mesa Village Quadrangle, Utah, 1962, 15'

Well Pad	Legal Location	UTM (Zone 12)	Access Route, Length
12-W24	CTSESW, Sec.12 T 41 S, R 23 E	647,000 m E 4,121,825 m N	300 feet (runs west from location)
12-34	SESWSE, Sec.12 T 41 S, R 23 E	647,700 m E 4,121,800 m N	600 feet (runs SSW from location)
14-41	NENENE, Sec.14 T 41 S, R 23 E	646,250 m E 4,121,950 m N	1000 feet (runs west from location)-flow line follows access
13-11	CTNWNW, Sec.13 T 41 S, R 23 E	646,600 m E 4,121,950 m N	800 feet (runs north from location)-flow line follows access
13-12	NWSWNW, Sec.13 T 41 S, R 23 E	646,600 m E 4,121,075 m N	1300 feet (runs west from location)-flow line follows access
13-14	CTSWSW, Sec.13 T 41 S, R 23 E	646,600 m E 4,120,175 m N	800 feet (runs WSW from location)
13-21	CTNENW, Sec.13 T 41 S, R 23 E	647,000 m E 4,121,400 m N	No access surveyed No flow line surveyed
13-23	CTNWSW, Sec.13 T 41 S, R 23 E	647,000 m E 4,120,600 m N	No access surveyed No flow line surveyed
13-34	CTSWSE, Sec.13 T 41 S, R 23 E	647,700 m E 4,120,200 m N	600 feet (runs south from location)-flow line follows access
13-43	SWNESE, Sec.13 T 41 S, R 23 E	647,750 m E 4,120,500 m N	600 feet (runs NNE from location)-flow line follows access
18-W12	CTSWNW, Sec.18 T 41 S, R 24 E	648,225 m E 4,120,300 m N	500 feet (runs ENE from location)-flow line follows access
24-41	CTNENE, Sec.24 T 41 S, R 23 E	647,825 m E 4,119,800 m N	No access surveyed No flow line surveyed
29-22	SWSENW, Sec.29 T 41 S, R 24 E	650,080 m E 4,117,600 m N	900 feet (runs east from location)-flow line follows access

TABLE 2

Legal Descriptions of Water Injection Lines

Jurisdiction: Navajo Nation

Map: USGS White Mesa Village Quadrangle, Utah, 1962, 15'

Line	Legal Location	Length (Ft.)
Main	SE & SW of SE, SE & SW of SW, Sec.17, T41S, R24E SE & SW of SE, SE & SW of SW, Sec.18, T41S, R24E SE & NW of SE, SE & NW of NW, Sec.13, T41S, R23E SE of SE, Sec.11, T41S, R23E	18,500
A	SE & NE of SE, Sec.17, T41S, R24E	1,250
B	Eastern portion of: SE & NE of SE and SE & NE of NE and NENW of NE, Sec.18, T41S, R24E	6,900
C	SE & NE of SW, Sec.18, T41S, R24E	1,400
D	SW & NW of SW, SW of NW, Sec.18, T41S, R24E SE of NE, Sec.13, T41S, R23E	3,250
E	SE of NW, NW & NE of NE, Sec.13, T41S, R23E SE of SE, Sec.12, T41S, R23E SW of SW, Sec. 7, T41S, R24E	5,500
F	NW of NW, Sec.13, T41S, R23E SE of SW and NW of SE, Sec.12, T41S, R23E	3,850
F-1	SE of SW and SW of SW and NW of SW, Sec.12, T41S, R23E	1,500
G	NW of NW, Sec.13, T41S, R23E/SE of NE, Sec.14, T41S, R23E	1,700
H	SE of NW and NW of SW, Sec.13, T41S, R23E	1,500
I	NE of SE and SE of SW, Sec.13, T41S, R23E	1,700
J	SW of SW, Sec.18, T41S, R24E	300

Del Benee of the USDI-BIA Branch of Environmental Quality
were notified prior to performance of the field surveys.

DESCRIPTION OF THE PROJECT AREA

The Phillips Oil Company, ^ARutherford Unit development project is located in the extreme southeastern portion of San Juan County, just south of Montezuma Creek, Utah. The San Juan River flows to the north (2.5 miles), White Mesa Mountain is to the south, and Flat Top Mountain is situated within the project area. The Rutherford Unit project is within the Blanding Basin of the Colorado Plateau Physiographic Province (Stokes 1977) and is characterized by broken topography ranging in elevation from 4580 feet to 6000 feet above sea level. Most of the project area is flat to rolling terrain, broken by steep-sided mesas, and dissected by intermittent washes and arroyos which feed the San Juan River. The San Juan River is the nearest permanent water source.

The surface geology is reflected in the general broken nature of the landscape. The lower flatlands are fluvial sandstones and mudstones of the Recapture Creek member of the Morrison Formation, which is generally covered by wind blown silts and sands with patches of soil and alluvium (Hintze and Stokes 1964). The lower, light-colored Bluff Sandstone Formation is exposed along Desert Creek (at the east edge of the project area) and portions of Blue Hogan Wash (Hintze and Stokes 1964). The mesas are comprised of the Westwater Canyon and Brushy Basin Members of the Morrison Formation; the later is a dinosaur-bearing, fluvial and lacustrine mudstone and siltstone (Hintze and Stokes 1964) which often contains chert deposits. The coal-bearing sandstone and carbonaceous shales of the Dakota Sandstone cap the higher mesa tops.

The vegetation is in the cool desert climates classified as the Upper Sonoran Life Zone and is characterized by a shadscale (salt desert shrub) plant community. The vegetation noted during the survey included snakeweed, rabbitbrush, shadscale, Mormon tea, big sagebrush, greasewood, saltbush, narrow-leaf yucca, prickly pear cactus, galleta grass, Indian rice grass, cheat grass, locoweed, and Russian thistle. Today, the project area supports a fairly large population of domesticated grazers: sheep, horses, and cattle. Non-domesticates noted during the survey were rabbits, rodents, lizards, and unidentified birds.

CULTURE HISTORY

Broad overviews have been written, synthesizing the known culture history of southeastern Utah (see Nickens 1982, Weber 1982) and of northwestern New Mexico (see Stuart and Gauthier 1981). In general, the San Juan Basin, as was much of the Colorado Plateau, was inhabited prehistorically by the Basketmakers and Anasazi, relatively sedentary people who first incorporated horticulture into a hunting and gathering subsistence strategy, and later practiced agriculture. The Archaic hunter-gatherers and the earlier Paleo-Indian, mega-fauna hunters preceded the Basketmakers and Anasazi.

Historically the San Juan Basin, as was much of the Intermountain West, was inhabited by the Navajo and Ute. Although their entry into this area is as little understood as their early history, it is believed that their arrival barely preceded the Spanish Entrada during the 16th century (Wilcox 1981). From that time on, the area was visited by the Spanish, Anglo explorers, trappers, and traders, and later in the 19th century, by the Mormon settlers. Presently, much of the San Juan Basin, primarily the southern portion, is inhabited by the Navajo.

Archaeological surveys related to energy development to the east and northeast of the Rutherford Unit project (see Hewett et al 1979, Moore 1983, 1984, Swift 1984a, 1984b) have documented a variety of sites from artifact scatters to multiroom structures. Documented sites range from the Anasazi Pueblo I phase through recent Navajo. The highest site density occurs during the Anasazi Pueblo II phase, AD 900-1100. In the immediate project area, numerous isolated finds and Basketmaker II through Pueblo III and recent Navajo sites have been recorded (see Langenfeld and Hooten 1984, Langenfeld 1984).

METHODOLOGY

A total of 13 proposed well location sites and eight access routes were inventoried, along with portions of six flow line routes (above ground pipes). A total of 9.13 miles (48,200 feet) of proposed water injection line (buried pipeline) were also inventoried (Figures 2 and 3). Tables 3 and 4 describe the area surveyed. Each of the well location sites were staked prior to the survey, demarcating the 300 by 350 foot pad site. Each well location was inspected by walking parallel transects spaced 10 meters apart back and forth until the entire location was surveyed. An additional 100 foot (30 meter) buffer zone was also inspected around the staked well pad site.

The access roads and flow line routes were flagged while the archaeologist surveyed the well sites. No access routes were surveyed for well locations that were situated on or at the edge of existing maintained roads. Flow lines are to follow proposed and existing roads and existing flow line routes. Only the portions of proposed flow line routes that paralleled proposed access roads which have yet to be built were surveyed. A 100 foot right-of-way was surveyed by walking a zig-zag pattern along each flagged access route. If a flow line was to follow the access route, an additional 25 feet were inspected in the same manner.

The injection line routes were marked by lath stakes. A 50 foot right-of-way was inspected along the staked route, using the stakes as a center line. This was accomplished by walking a zig-zag pattern down one side of the line and back along the other.

All cultural materials encountered during the survey were noted, described, and often illustrated. Those cultural resources which lacked spacial integrity and the potential for interpretable past human behavior (Plog et al 1978) were noted as isolated finds.

In addition to the field inspection, a search of the site files at the Navajo Nation Cultural Resource Management Program in Window Rock, Arizona, was initiated by phone, August 13, 1984. A records search by the Utah Division of State History found no sites to have been previously recorded within the proposed project impact areas.

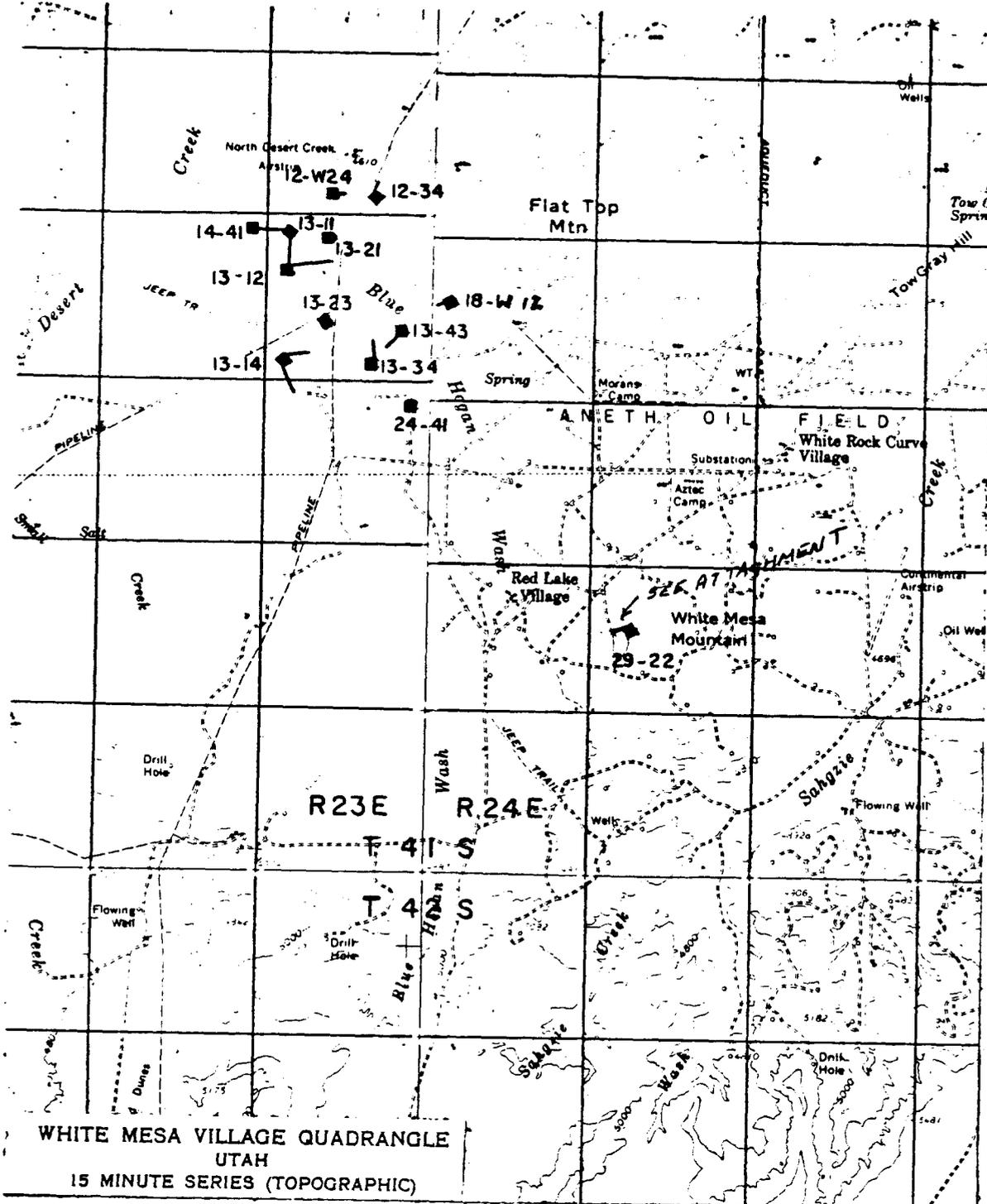


Figure 2. Locations of proposed well locations, access roads and flow line routes.

Map Scale: 1:62,500

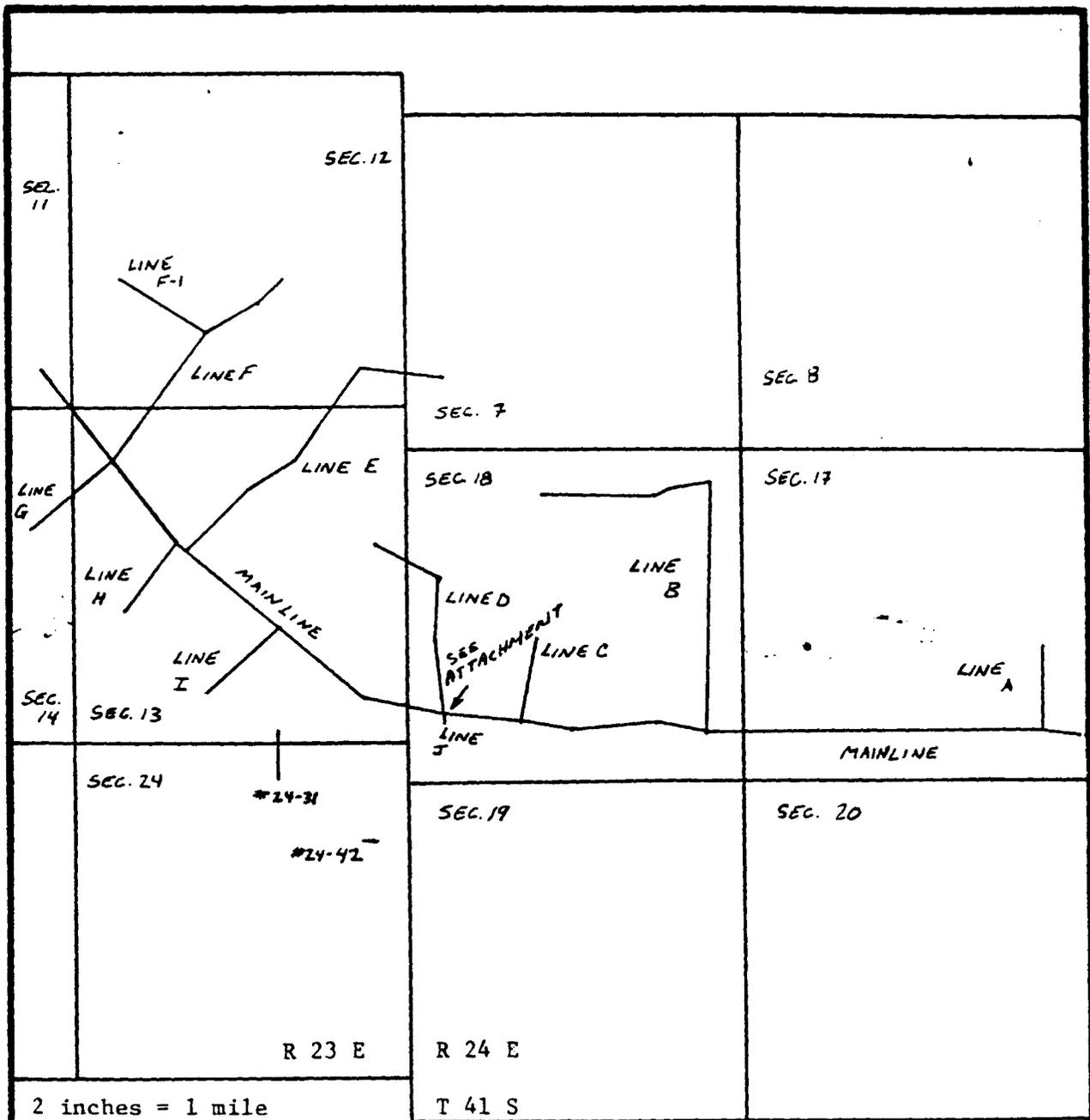


Figure 3. Location and routes of proposed water injection lines.

TABLE 3

Description of Well Pad Project Area and Area Surveyed

Well Pad	Project Area (square feet)	Area Surveyed (square feet)
12-W24	300 ft X 350 ft = 105,000 (2.41 acres) Access route = 300 ft	400 ft X 450 ft = 180,000 (4.13 acres) 300 ft X 100 ft = 30,000 (0.69 acres)
12-34	300 ft X 350 ft = 105,000 (2.41 acres) Access & flow line = 600 ft	400 ft X 450 ft = 180,000 (4.13 acres) 600 ft X 125 ft = 75,000 (1.72 acres)
14-41	300 ft X 350 ft = 105,000 (2.41 acres) Access & flow line = 1,000 ft	400 ft X 450 ft = 180,000 (4.13 acres) 1,000 ft X 125 ft = 125,000 (2.87 acres)
13-11	300 ft X 350 ft = 105,000 (2.41 acres) Access & flow line = 800 ft	400 ft X 450 ft = 180,000 (4.13 acres) 800 ft X 125 ft = 100,000 (2.30 acres)
13-12	300 ft X 350 ft = 105,000 (2.41 acres) Access & flow line = 1,300 ft	400 ft X 450 ft = 180,000 (4.13 acres) 1,300 ft X 125 ft = 162,500 (3.73 acres)
13-14	300 ft X 350 ft = 105,000 (2.41 acres) Access route = 800 ft Flow line = 700 ft	400 ft X 450 ft = 180,000 (4.13 acres) 800 ft X 125 ft = 100,000 (2.30 acres) 700 ft X 100 ft = 70,000 (1.61 acres)
13-21	300 ft X 350 ft = 105,000 (2.41 acres) No access or flow line surveyed	400 ft X 450 ft = 180,000 (4.13 acres)
13-23	300 ft X 350 ft = 105,000 (2.41 acres) No access or flow line surveyed	400 ft X 450 = 180,000 (4.13 acres)
13-34	300 ft X 350 ft = 105,000 (2.41 acres) Access and flow line = 600 ft	400 ft X 450 ft = 180,000 (4.13 acres) 600 ft X 125 ft = 75,000 (1.72 acres)

TABLE 3, continued

Well Pad	Project Area (square feet)	Area Surveyed (square feet)
13-43	300 ft X 350 ft = 105,000 (2.41 acres) Access & flow line = 600 ft	400 ft X 450 ft = 180,000 (4.13 acres) 600 ft X 125 ft = 75,000 (1.72 acres)
18-W12	300 ft X 350 ft = 105,000 (2.41 acres) Access & flow line = 500 ft	400 ft X 450 ft = 180,000 (4.13 acres) 500 ft X 125 ft = 62,500 (1.43 acres)
24-41	300 ft X 350 ft = 105,000 (2.41 acres) No access or flow line surveyed	400 ft X 450 ft = 180,000 (4.13 acres)
29-22	300 ft X 350 ft = 105,000 (2.41 acres) Access & flow line = 900 ft	400 ft X 450 ft = 180,000 (4.13 acres) 900 ft X 125 ft = 112,500 (2.58 acres)

Note: The figures for access route and flow line lengths are only for the portions that cross undisturbed areas. Portions that follow maintained roads or existing flow line routes were not surveyed and those figures are not provided here.

TABLE 4

Description of Water Injection Pipeline Project Length and Area Surveyed

Line	Project Length	Area Surveyed (square feet)
Main	18,500 feet	18,500 ft X 50 ft = 925,000 (21.23 acres)
A	1,250 feet	1,250 ft X 50 ft = 62,500 (1.43 acres)
B	6,900 feet	6,900 ft X 50 ft = 345,000 (7.92 acres)
C	1,400 feet	1,400 ft X 50 ft = 70,000 (1.61 acres)
D	3,250 feet	3,250 ft X 50 ft = 162,500 (3.73 acres)
E	5,500 feet	5,500 ft X 50 ft = 275,000 (6.31 acres)
F	3,850 feet	3,850 ft X 50 ft = 192,500 (4.42 acres)
F-1	1,500 feet	1,500 ft X 50 ft = 75,000 (1.72 acres)
G	1,700 feet	1,700 ft X 50 ft = 85,000 (1.95 acres)
H	1,500 feet	1,500 ft X 50 ft = 75,000 (1.72 acres)
I	1,700 feet	1,700 ft X 50 ft = 85,000 (1.95 acres)
J	300 feet	300 ft X 50 ft = 15,000 (0.34 acres)
Line runs north from 24-31	750 feet	750 ft X 50 ft = 37,500 (0.86 acres)
Line runs east from 24-42	100 feet	Not surveyed, entirely within existing well pad location

RESULTS

One archaeological site and 17 isolated finds were encountered during the survey. The archaeological site, a Basketmaker II to Pueblo I lithic scatter (SJC-1106) had been previously recorded by San Juan College Cultural Resources Management Program (see appendix for site description). The site had been located during the survey of a proposed access route to Phillips Oil Company's proposed well location # 18-24, and relocated during the survey of the Phillips Oil Company proposed injection line pipeline. The site was encountered at the junction of the mainline and line J (Figure 4).

SEE ATTACHMENT
The injection line crosses through the extreme southwest portion of the site, where it has been disturbed by previous pipeline and road construction. Four pieces of lithic debitage were encountered in the pipeline right-of-way outside of the disturbed area. These artifacts appear to be surficial. Resurvey of the site area found artifact concentrations to occur in the existing roadway and bladed pipeline valve area. Approximately 20 pieces of lithic debitage, one biface, one uniface (chopper), and two unidentified Mesa Verde white ware sherds (7 mm thick with sand temper) were noted during the resurvey. Note: the projectile point fragments were not relocated. The integrity of these deposits has been greatly disturbed by blading activities. Despite the disturbed nature of the site, the potential for buried deposits remains. Also, there is good probability that the site is multicomponent due to the presence of the Archaic diagnostic and the relatively late Puebloan white ware ceramics.

Two alternatives are proposed for this 100 meter section of the pipeline: (1) to build the injection line where proposed with an archaeologist monitoring the construction activities, or (2) to reroute the mainline in order to avoid the site area. This alternative would require an archaeologist to survey the new route.

The remaining cultural materials were isolated finds. A total of 17 isolated finds were encountered during the survey. All are surficial occurrences and are described in Table 5.

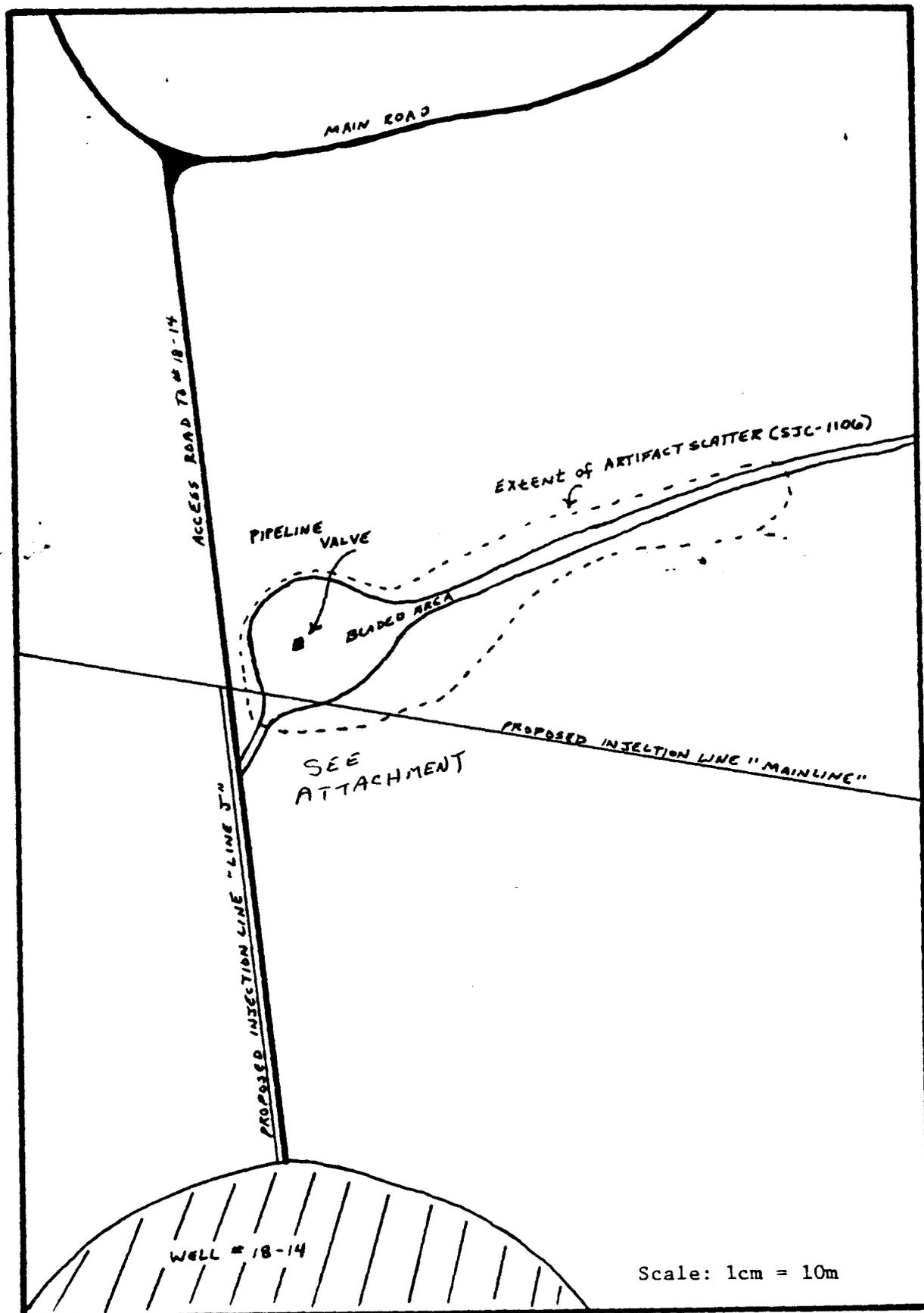


Figure 4. Map showing relationship of proposed injection line route and archaeological site - SJC-1106. Site Location: Center of E 1/2, W 1/2, SW 1/2 of Section 18, T 41 S - R 24 E, San Juan County, Utah.

TABLE 5

Isolated Finds from Phillips Oil Rutherford Unit Project
Legal Locations and Descriptions

Number	Legal Location	Description
RU # A	CTSESW Sec.12 T41S R23E UTM: 647,000 m E 4,121,825 m N	On location 12-W24. Isolated features: semi-circular, slab feature and two slab piles; a broken cup saucer found inside--white ovenware, modern; unidentified pipe fragments, wire and sole of shoe.
RU # B	CTNENW Sec.13 T41S R23E UTM: 647,000 m E 4,121,400 m N	13-21. 3 gray-green chert, interior core reduction flakes.
RU # C	CTNWNW Sec.13 T41S R23E UTM: 646,600 m E 4,121,950 m N	13-11. Gray and red quartzite cobble tool; 3 flakes removed.
RU # D	CTNWSW Sec.13 T41S R23E UTM: 647,000 m E 4,120,600 m N	*13-23. Biface with crude, heavily weathered flake scars, material type is light and dark gray mottled chert with tan cortex.
RU # E	NWSWSE Sec.13 T41S R23E UTM: 647,690 m E 4,120,400 m N	Access road to 13-34. 4 unidentified corrugated sherds; 4 recent Pepsi bottles.
RU # F	CTSWSE Sec.13 T41S R23E UTM: 647,700 m E 4,120,200 m N	*13-43. 1 crude olive-green oolitic chert biface.
RU # G	NENENE Sec.14 T41S R23E UTM: 646,250 m E 4,121,950 m N	1 Mesa Verde white ware sherd.
RU # H	NENWNW Sec.13 T41S R23E UTM: 646,775 m E 4,121,550 m N	*Injection line 12-24 to 13-11. 1 grainy, tan to yellow chert uniface with heavily weathered, yellowish patina; flake scars are smooth.
RU # I	NWNWNE Sec.18 T41S R24E UTM: 648,950 m E 4,121,325 m N	18-21 to 18-41. 3 green quartzite interior core reduction flakes.

TABLE 5, continued

Number	Legal Location	Description
RU # J	NWSESE Sec.18 T41S R24E UTM: 649,300 m E 4,120,150 m N	18-44 to 18-34. 1 gray-tan quartzite, utilized, secondary reduction flake; 1 green quartzite secondary reduction flake.
RU # K	NESWSW Sec.18 T41S R24E UTM: 648,450 m E 4,120,175 m N	18-34 to 18-14. 1 white quartzite, tertiary reduction flake; 1 green-gray quartzite, tertiary reduction flake.
RU # L	NWSWE Sec.17 T41S R24E UTM: 650,400 m E 4,120,100 m N	17-14 to 17-44. 2 white chert, interior core reduction flakes.
RU # M	SWNWSW Sec.18 T41S R24E UTM: 648,200 m E 4,120,350 m N	18-13 to 18-14. 4 gray quartzite, secondary reduction flakes.
RU # N	NWSESE Sec.13 T41S R23E UTM: 647,700 m E 4,120,350 m N	13-33 to 13-44. 3 gray-green quartzite, interior core reduction flakes; 1 secondary reduction flake.
RU # O	SESENW Sec.13 T41S R23E UTM: 647,025 m E 4,121,000 m N	*13-22 to 13-33. 1 green chert uniface with brown patina; 1 tan quartzite, tertiary reduction flake.
RU # P	SWSESE Sec.12 T41S R23E UTM: 647,700 m E 4,121,725 m N	*13-31 to 12-44. 1 green-gray quartzite uniface.
RU # Q	NESESE Sec.13 T41S R23E UTM: 647,075 m E 4,121,100 m N	*13-22 to 13-31. 1 gray quartzite uniface with tan to brown patina.

* illustrated isolated finds.

note: all UTM coordinates are in zone 12.

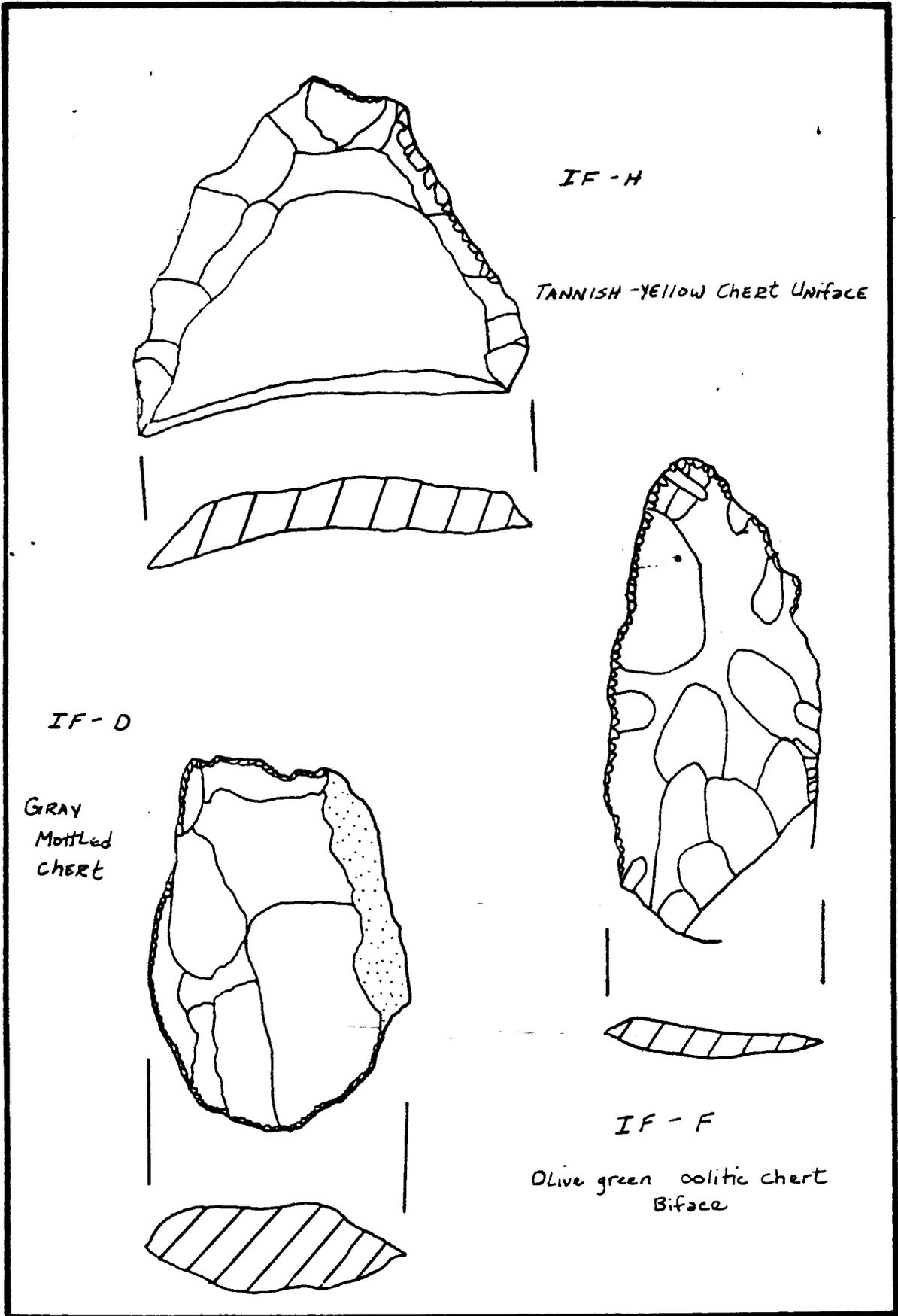


Figure 5. Flaked Stone Tools

IF #0

GREEN CHERT UNIFACE

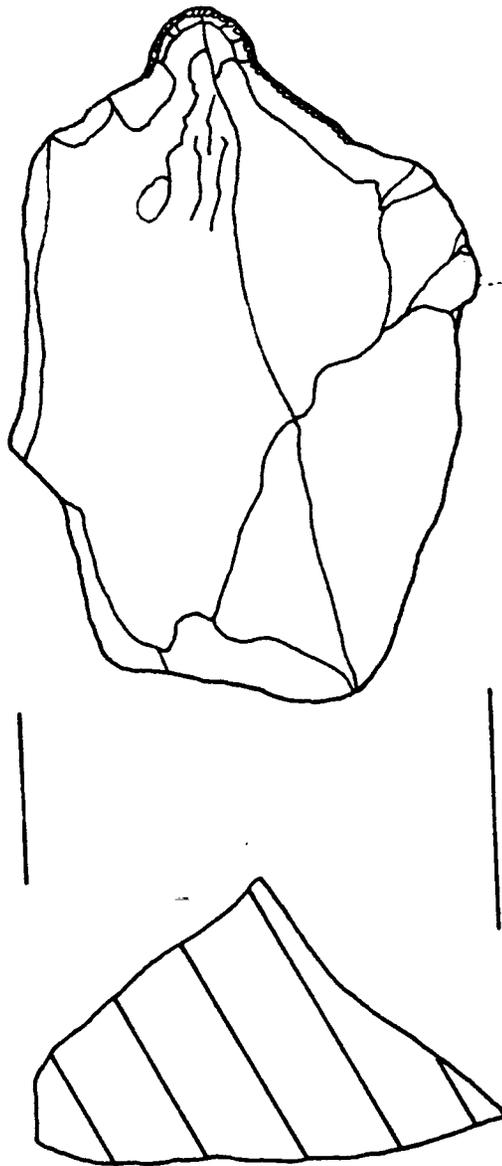


Figure 6. Flaked Stone Tool

IF - P

Greenish-gray quartzite Uniface

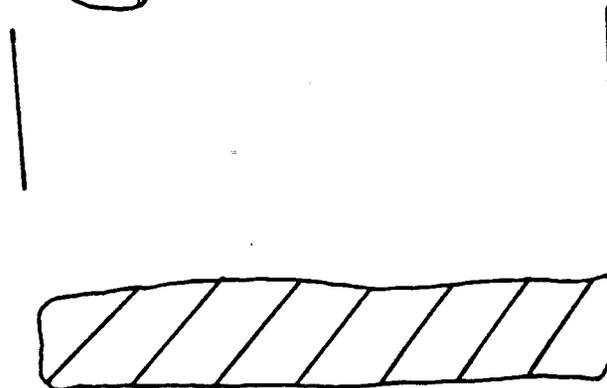
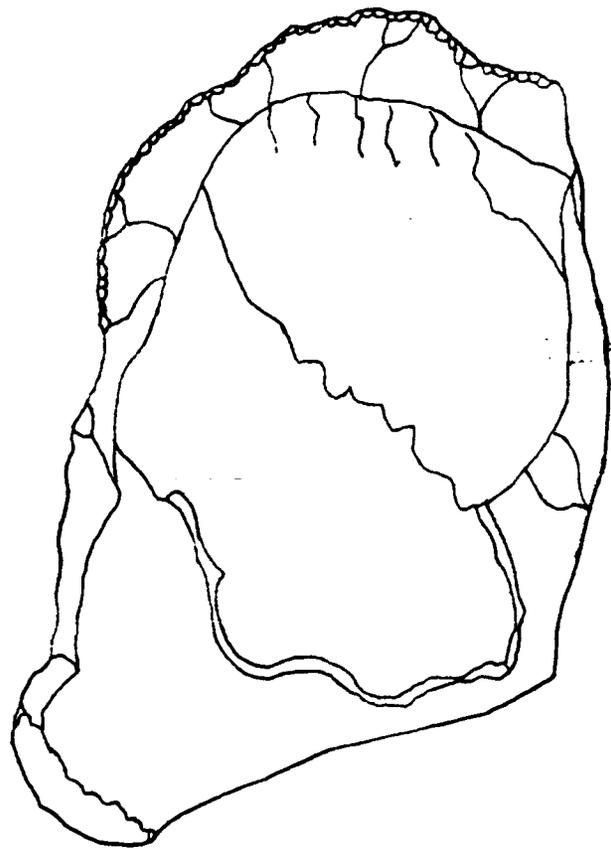
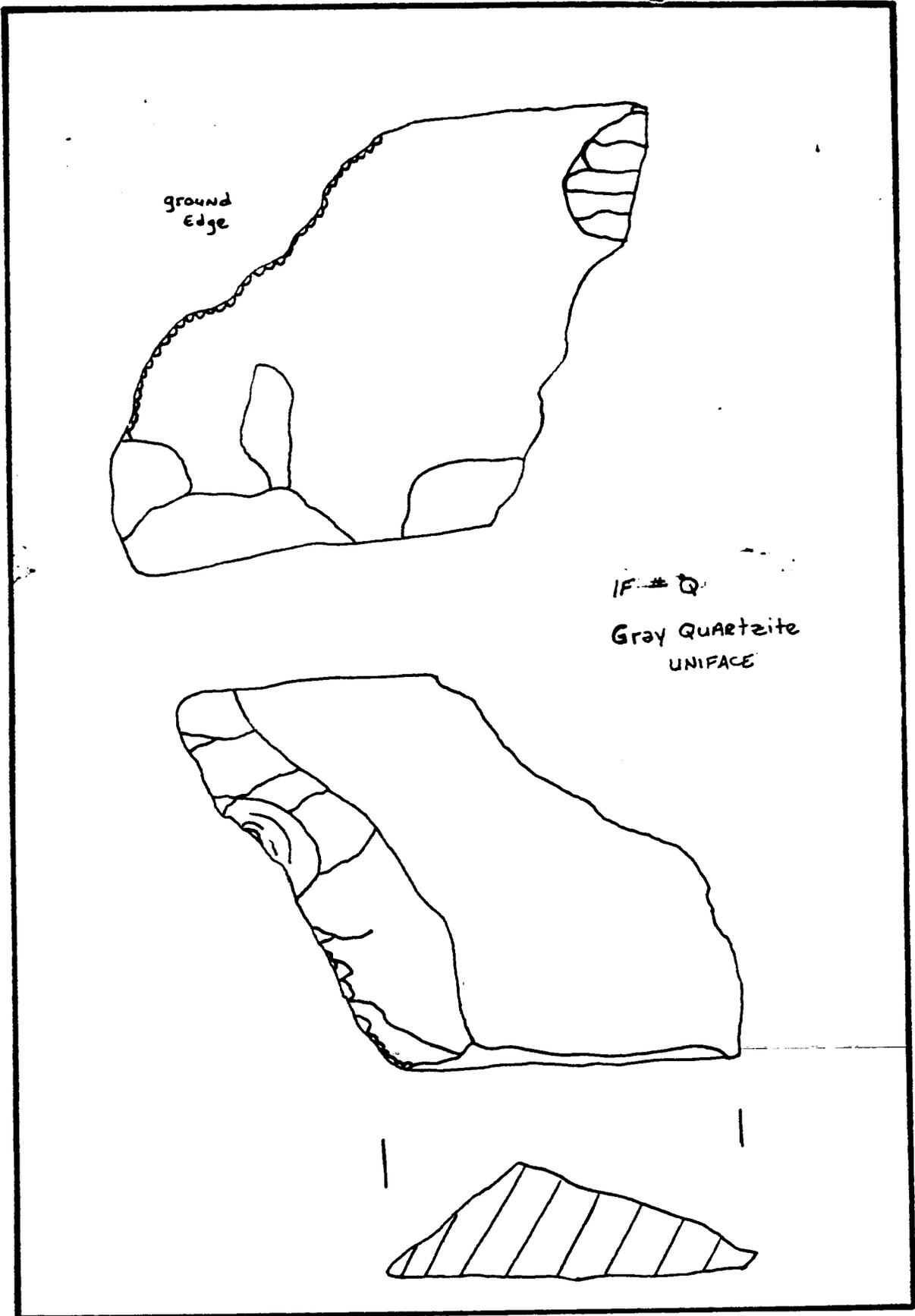


Figure 7. Flaked Stone Tool



IF # Q
Gray Quartzite
UNIFACE

Figure 8. Flaked Stone Tool

RECOMMENDATIONS

SEE ATTACHMENT

One potentially significant archaeological site was encountered during the survey. As outlined in section "Results", the 100 meters of injection line (the mainline) west of line J can either be constructed as planned or rerouted. If the line is positioned as proposed, an archaeologist should be present to monitor construction of the 100 meters of mainline injection pipeline, extending east from line J. In the event that buried cultural deposits are encountered, construction should stop and the BIA area archaeologist be notified. The other alternative would be to reroute a portion of the mainline in order to avoid the site. An archaeological clearance would be needed if a new route is proposed. ← NEW ROUTE HAS BEEN SURVEYED SEE ATTACHMENT

The remaining cultural resources encountered during the survey were isolated finds which indicate prehistoric and modern use of the area. Most of these are the waste products from flint knapping activities. Several unifacial tools and one biface were also found. Recordation has exhausted the research potential of these isolated finds. Archaeological clearance is recommended for the proposed Rutherford Unit development project well locations, associated access roads and flow lines, and for the proposed injection line routes: mainline and lines A, B, C, D, E, F, F-1, G, H, I, and J, except for the 100 meter of mainline extending east from its junction with line J.

REFERENCES CITED

- Hewett, Nancy S., Margaret A. Powers, and Meade F. Kemrer
1979 An Archaeological Survey and Evaluation of Cultural Resources Along the San Juan River Near Aneth, Utah. Division of Conservation Archaeology, San Juan County Archaeological Research Center and Library. Farmington, New Mexico.
- Hintze, Lehi F. and William Lee Stokes
1964 Geologic Map of Southeastern Utah. Williams and Heintze Map Corporation, Washington D.C.
- Langenfeld, Kristin
1984 Archaeological Surveys of Six Proposed Well Locations and Associated Flow Lines and Access Routes in San Juan County, Utah, -Conducted for Phillips Petroleum Company. Cultural Resources Management Program, San Juan College. Farmington, New Mexico.
- Langenfeld, Kristin and L. Jean Hooton
1984 Archaeological Surveys of Thirteen Proposed Well Locations and Associated Flow Lines and Access Routes in San Juan County, Utah, Conducted for Phillips Petroleum. Cultural Resources Management Program, San Juan College. Farmington, New Mexico.
- Moore, Roger A.
1983 An Archaeological Survey of Two Well Locations and Access Routes Near Aneth, Utah. Division of Conservation Archaeology, San Juan County Museum Association. Farmington, New Mexico.
- 1984 An Archaeological Survey of 15 Drill Locations in the White Mesa Unit South of Montezuma Creek in San Juan County, Utah. Division of Conservation Archaeology, San Juan County Museum Association. Farmington, New Mexico.
- Nickens, Paul R.
1982 "A Summary of the Prehistory of Southeastern Utah", IN Contributions to the Prehistory of Southeastern Utah. Assembled by Steven G. Baker. Centuries Research Inc. Utah State Office, Bureau of Land Management, Cultural Resource Series, No. 13.

Plog, Steven, Fred Plog and Walter Wait

- 1978 "Decision Making in Modern Surveys", IN Advances in Archaeological Method and Theory, Vol.1, edited by M.B. Schiffer, pp. 383-421. Academic Press, New York.

Stokes, William L.

- 1977 "Subdivision of the Major Physiographic Provinces in Utah". Utah Geology 4(1).

Stuart, David E. and Rory P. Gauthier

- 1981 Prehistoric New Mexico, Background for Survey. Historic Preservation Bureau, Department of Finance and Administration, State Planning Division. Santa Fe.

Swift, Marilyn

- 1984a An Archaeological Survey of Satellite Area A and a Pipeline Easement for Well I-12 in the White Mesa Unit, San Juan County, Utah. Division of Conservation Archaeology, San Juan County Museum Association. Farmington, New Mexico.

- 1984b An Archaeological Survey of Six Pipeline Easements to Wells K-20, K-22, K-24, L-23, M-18, and M-20 in Sections 7, 18, and 19, T41S, R25E, San Juan County, Utah. Division of Conservation Archaeology, San Juan County Museum Association. Farmington, New Mexico.

Weber, Kenneth R.

- 1980 Cultural Resource Narrative for Class I Cultural Resources Inventory for BLM Lands in South San Juan County, Utah, part 2, "History and Contemporary Cultures". Centuries Research, Inc. (Edition for draft only).

Wilcox, David R.

- 1981 "The Entry of Athapaskans into the American Southwest: the problem today", IN The Protohistoric Period in the North American Southwest, edited by D.R. Wilcox and W.B. Masse. Arizona State University Anthropological Research Papers, No. 24.

OPERATOR Phillips Oil Co. DATE 1-15-85
WELL NAME Rutherford Unit #13-12
SEC SWNW 13 T 41S R 23E COUNTY San Juan

43-037-31129
API NUMBER

Indian
TYPE OF LEASE

CHECK OFF:

- | | | |
|---|---|---|
| <input checked="" type="checkbox"/> PLAT | <input checked="" type="checkbox"/> BOND | <input type="checkbox"/> NEAREST WELL |
| <input checked="" type="checkbox"/> LEASE | <input checked="" type="checkbox"/> FIELD | <input checked="" type="checkbox"/> POTASH OR OIL SHALE |

PROCESSING COMMENTS:

Unit well - α on P.O.D.
Need water permit

APPROVAL LETTER:

SPACING: A-3 Rutherford c-3-a _____
UNIT CAUSE NO. & DATE
 c-3-b c-3-c

STIPULATIONS:

1- Water



STATE OF UTAH
NATURAL RESOURCES
Oil, Gas & Mining

Scott M. Matheson, Governor
Temple A. Reynolds, Executive Director
Dianne R. Nielson, Ph.D., Division Director

4241 State Office Building • Salt Lake City, UT 84114 • 801-533-5771

January 17, 1985

CORRECTED COPY
API

Phillips Oil Company
P. O. Box 2920
Casper, Wyoming 82602

Gentlemen:

Re: Well No. Ratherford Unit #13-12 - SW NW Sec. 13, T. 41S, R. 23E
1705' FNL, 640' FWL - San Juan County, Utah

Approval to drill the above referenced oil well is hereby granted in accordance with Section 40-6-18, Utah Code Annotated, as amended 1983; and predicated on Rule A-3, General Rules and Regulations and Rules of Practice and Procedure, subject to the following stipulations:

1. Prior to commencement of drilling, receipt by the Division of evidence providing assurance of an adequate and approved supply of water.

In addition, the following actions are necessary to fully comply with this approval:

1. Spudding notification to the Division within 24 hours after drilling operations commence.
2. Submittal to the Division of completed Form OGC-8-X, Report of Water Encountered During Drilling.
3. Prompt notification to the Division should you determine that it is necessary to plug and abandon this well. Notify John R. Baza, Petroleum Engineer, (Office) (801) 538-5340, (Home) 298-7695 or R. J. Firth, Associate Director, (Home) 571-6068.
4. Compliance with the requirements and regulations of Rule C-27, Associated Gas Flaring, General Rules and Regulations, Oil and Gas Conservation.

Phillips Oil Company
Well No. Ratherford Unit #13-12
January 17, 1985
Page 2

5. This approval shall expire one (1) year after date of issuance unless substantial and continuous operation is underway or an application for an extension is made prior to the approval expiration date.

The API number assigned to this well is 43-013-31127.

Sincerely,



R. J. Firth
Associate Director, Oil & Gas

as
Enclosures
cc: Branch of Fluid Minerals
Bureau of Indian Affairs



STATE OF UTAH
NATURAL RESOURCES
Oil, Gas & Mining

Scott M. Matheson, Governor
Temple A. Reynolds, Executive Director
Dianne R. Nielson, Ph.D., Division Director

4241 State Office Building • Salt Lake City, UT 84114 • 801-533-5771

January 17, 1985

Phillips Oil Company
P. O. Box 2920
Casper, Wyoming 82602

CORRECTED COPY (API NO.)

Gentlemen:

Re: Well No. Rutherford Unit #13-12 - SW NW Sec. 13, T. 41S, R 23E
1705' FNL, 640' FWL - San Juan County, Utah

Approval to drill the above referenced oil well is hereby granted in accordance with Section 40-6-18, Utah Code Annotated, as amended 1983; and predicated on Rule A-3, General Rules and Regulations and Rules of Practice and Procedure, subject to the following stipulations:

1. Prior to commencement of drilling, receipt by the Division of evidence providing assurance of an adequate and approved supply of water.

In addition, the following actions are necessary to fully comply with this approval:

1. Spudding notification to the Division within 24 hours after drilling operations commence.
2. Submittal to the Division of completed Form OGC-8-X, Report of Water Encountered During Drilling.
3. Prompt notification to the Division should you determine that it is necessary to plug and abandon this well. Notify John R. Baza, Petroleum Engineer, (Office) (801) 538-5340, (Home) 298-7695 or R. J. Firth, Associate Director, (Home) 571-6068.
4. Compliance with the requirements and regulations of Rule C-27, Associated Gas Flaring, General Rules and Regulations, Oil and Gas Conservation.

Phillips Oil Company
Well No. Ratherford Unit #13-12
January 17, 1985

5. This approval shall expire one (1) year after date of issuance unless substantial and continuous operation is underway or an application for an extension is made prior to the approval expiration date.

The API number assigned to this well is 43-037-31127.

Sincerely,

Original Signed by Ronald J. Firth

R. J. Firth
Associate Director, Oil & Gas

as
Enclosures
cc: Branch of Fluid Minerals
Bureau of Indian Affairs

**UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY**

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use Form 9-331-C for such proposals.)

1. oil well gas well other JUN 27 1985

2. NAME OF OPERATOR
Phillips Oil Company DIVISION OF OIL

3. ADDRESS OF OPERATOR GAS & MINING
8055 E. Tufts Ave., Denver, CO 80237

4. LOCATION OF WELL (REPORT LOCATION CLEARLY. See space 17 below.)
AT SURFACE: 1705' FNL, 640' FWL
AT TOP PROD. INTERVAL:
AT TOTAL DEPTH:

5. LEASE
14-20-603-247-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME
Navajo

7. UNIT AGREEMENT NAME
SW-I-4192

8. FARM OR LEASE NAME
Ratherford Unit

9. WELL NO.
#13-12

10. FIELD OR WILDCAT NAME
Greater Aneth

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
Sec. 13-T41S, R23E

12. COUNTY OR PARISH | 13. STATE
San Juan | Utah

14. API NO.
43-037-31127

15. ELEVATIONS (SHOW DF, KDB, AND WD)
4556' ung. G.L.

16. CHECK APPROPRIATE BOX TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

REQUEST FOR APPROVAL TO:		SUBSEQUENT REPORT OF:
TEST WATER SHUT-OFF	<input type="checkbox"/>	<input type="checkbox"/>
FRACTURE TREAT	<input type="checkbox"/>	<input type="checkbox"/>
SHOOT OR ACIDIZE	<input type="checkbox"/>	<input type="checkbox"/>
REPAIR WELL	<input type="checkbox"/>	<input type="checkbox"/>
PULL OR ALTER CASING	<input type="checkbox"/>	<input type="checkbox"/>
MULTIPLE COMPLETE	<input type="checkbox"/>	<input type="checkbox"/>
CHANGE ZONES	<input type="checkbox"/>	<input type="checkbox"/>
ABANDON*	<input type="checkbox"/>	<input type="checkbox"/>
(other)	<input type="checkbox"/>	<input type="checkbox"/>

(NOTE: Report results of multiple completion or zone change on Form 9-330.)

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

Drilled 17-1/2" conductor hole to 116' G.L. on 5-27-85. Ran 115.52' 13-3/8" 54.5# K-55, BT&C casing. Set at 116', cemented with 177 cu.ft. (150 sx) Class B to surface. Finished job and moved out rat hole driller 5-27-85.

Spudded well 6-13-85 with Energy Search Drilling Rig #2. Drilled 12-1/4" hole to 1622'. Ran 9-5/8" 36# K-55 ST&C surface casing set at 1622. Cemented with 726 cu.ft. (300 sx) Class B w/20% Diacel D; tailed with 354 cu.ft. (300 sx) Glass B. Circulated to surface. Job complete 6-15-85.

Subsurface Safety Valve: Manu. and Type _____ Set @ _____ Ft.

18. I hereby certify that the foregoing is true and correct

SIGNED *Sheldon Burt* TITLE Drilling Manager DATE 6-24-85

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

- | | |
|-------------------------|-----------------------------------|
| 6 - BLM, Farmington, NM | 1 - Chevron USA, Inc. |
| 2 - Utah O&GCC, SLC | 1 - Mobil Oil Corp. |
| 1 - Casper | 1 - Texaco, Inc. |
| 1 - File (RC) | *See Instructions on Reverse Side |
| 1 - J. Weichbrodt | 1 - Shell Oil Co. |

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back in different reservoir. Use Form 9-331-C for such proposals.)

RECEIVED

1. oil well gas well other

JUL 11 1985

2. NAME OF OPERATOR
Phillips Oil Company

DIVISION OF OIL

3. ADDRESS OF OPERATOR
8055 E. Tufts Ave., Denver, CO 80237

GAS & MINING

4. LOCATION OF WELL (REPORT LOCATION CLEARLY. See space 17 below.)

AT SURFACE: 1705' FNL, 640' FWL

AT TOP PROD. INTERVAL:

AT TOTAL DEPTH:

16. CHECK APPROPRIATE BOX TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

REQUEST FOR APPROVAL TO:

SUBSEQUENT REPORT OF:

- TEST WATER SHUT-OFF
- FRACTURE TREAT
- SHOOT OR ACIDIZE
- REPAIR WELL
- PULL OR ALTER CASING
- MULTIPLE COMPLETE
- CHANGE ZONES
- ABANDON*

-
-
-
-
-
-
-
-

(other)

5. LEASE
14-20-603-247-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME
Navajo

7. UNIT AGREEMENT NAME
SW-I-4192

8. FARM OR LEASE NAME
Ratherford Unit

9. WELL NO.
#13-12

10. FIELD OR WILDCAT NAME
Greater Aneth

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA

Sec. 13-T41S, R23E

12. COUNTY OR PARISH
San Juan

13. STATE
Utah

14. API NO.
43-037-31127

15. ELEVATIONS (SHOW DF, KDB, AND WD)
4556' ung. G.L.

(NOTE: Report results of multiple completion or zone change on Form 9-330.)

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

Drilled 8-3/4" hole to 5452'. Ran 5451' 7" 23# and 26#, K-55 and N-80, LT&C casing; cemented with 1144 cu.ft. (400 sx) Class "B" w/20% Diacel; tailed with 360 cu.ft. (300 sx) Class "B" w/18% sailt. Pressure tested casing to 1500 psi. Job complete 7-2-85. Plug back total depth 5429'.

Subsurface Safety Valve: Manu. and Type _____ Set @ _____ Ft.

18. I hereby certify that the foregoing is true and correct

SIGNED Charles W. Butz TITLE Drilling Manager DATE 7-8-85

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

- 6 - BLM, Farmington, NM
- 2 - Utah O&CGG, SCL
- 1 - Casper
- 1 - File (RC)
- 1 - J. Weichbrodt
- 1 - Chevron USA, Inc.
- 1 - Mobil Oil Corp.
- 1 - Texaco, Inc.
- 1 - Shell Oil Corp.

*See Instructions on Reverse Side

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

SUBMIT IN DUPLICATE*

(See other In-
structions on
reverse side)

WELL COMPLETION OR RECOMPLETION REPORT AND LOG*

1a. TYPE OF WELL: OIL WELL GAS WELL DRY Other
 b. TYPE OF COMPLETION: NEW WELL WORK OVER DEEP EN PLUG BACK DIFF. RENVR. Other

RECEIVED
NOV 18 1985

5. LEASE DESIGNATION AND SERIAL NO.
14-20-603-247-A
 6. IF INDIAN, ALLOTTEE OR TRIBE NAME
Navajo
 7. UNIT AGREEMENT NAME
SW-I-4192
 8. FARM OR LEASE NAME
Ratherford Unit
 9. WELL NO.
13-12
 10. FIELD AND POOL, OR WILDCAT
Greater Aneth
 11. SEC. T., R., M., OR BLOCK AND SURVEY OR AREA
Sec. 13-T41S-R23E
 12. COUNTY OR PARISH
San Juan
 13. STATE
Utah

2. NAME OF OPERATOR
Phillips Petroleum Company
 3. ADDRESS OF OPERATOR
P. O. Box 2920, Casper, Wyoming 82602
 4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements)*
 At surface 1705' FNL & 640' FWL, SW NW
 At top prod. interval reported below
 At total depth

DIVISION OF OIL
GAS & MINING

14. PERMIT NO. -- DATE ISSUED 1-17-85
 API #43-037-31127

15. DATE SPUDDED 6/13/85 16. DATE T.D. REACHED 7/1/85 17. DATE COMPL. (Ready to prod.) 10/23/85
 18. ELEVATIONS (DF, RKB, RT, GR, ETC.)* Ungr GR 4556', RKB 4569.5'
 19. ELEV. CASINGHEAD --
 20. TOTAL DEPTH, MD & TVD 5452' 21. PLUG, BACK T.D., MD & TVD 5409'
 22. IF MULTIPLE COMPL. HOW MANY* -- 23. INTERVALS DRILLED BY ROTARY TOOLS 0 - 5452' CABLE TOOLS --
 24. PRODUCING INTERVAL(S), OF THIS COMPLETION—TOP, BOTTOM, NAME (MD AND TVD)* 5349' - 5385' Desert Creek Zone I
 25. WAS DIRECTIONAL SURVEY MADE No

26. TYPE ELECTRIC AND OTHER LOGS RUN Dual Guard Forxo, Contact Caliper, CDL-DSN
 27. WAS WELL CORED Yes

28. CASING RECORD (Report all strings set in well)

CASING SIZE	WEIGHT, LB./FT.	DEPTH SET (MD)	HOLE SIZE	CEMENTING RECORD	AMOUNT PULLED
13-3/8"	54.5#	116'	17-1/2"	177 cu. ft. Class "B"	--
9-5/8"	36#	1622'	12-1/4"	1080 cu. ft. Class "B"	--
7"	23# & 26#	5411'	8-3/4"	1504 cu. ft. Class "B"	--

29. LINER RECORD 30. TUBING RECORD

SIZE	TOP (MD)	BOTTOM (MD)	SACKS CEMENT*	SCREEN (MD)	SIZE	DEPTH SET (MD)	PACKER SET (MD)
--	--	--	--	--	2-7/8"	5203'	--

31. PERFORATION RECORD (Interval, size and number)
 5365-5385', 2 SPF, 4" HSC Gun, 40 shots
 5349-5365', 2 SPF, 4" HSC Gun, 32 shots
 32. ACID, SHOT, FRACTURE, CEMENT SQUEEZE, ETC.
 DEPTH INTERVAL (MD) 5349-5385' - Break down ea ft of perfs w/50 gals 28% HCL. Acidized entire interval w/remaining 3600 gals 28% HCL w/2 gal/1000 F-801 fines suspender, 3 gal/1000 W-802 non-emulsifier,

33.* PRODUCTION (CONTINUED ON BACK)
 DATE FIRST PRODUCTION 10/23/85 PRODUCTION METHOD Pumping WELL STATUS Producing
 DATE OF TEST 10/30/85 HOURS TESTED 24 CHOKER SIZE -- PROD'N. FOR TEST PERIOD -- OIL—BBL. 28 GAS—MCF. 11 WATER—BBL. 2 GAS-OIL RATIO 400
 FLOW. TUBING PRBS. -- CASING PRESSURE -- CALCULATED 24-HOUR RATE -- OIL—BBL. 28 GAS—MCF. 11 WATER—BBL. 2 OIL GRAVITY-API (CORR.) 40.0

34. DISPOSITION OF GAS (Sold, used for fuel, vented, etc.) Sold TEST WITNESSED BY --

35. LIST OF ATTACHMENTS None

36. I hereby certify that the foregoing and attached information is complete and correct as determined from all available records
 SIGNED D. C. Gill TITLE Area Manager DATE November 13, 1985

*(See Instructions and Spaces for Additional Data on Reverse Side)

37. SUMMARY OF POROUS ZONES: (Show all important zones of porosity and contents thereof; cored intervals; and all drill-stem, tests, including depth interval tested, cushion used, time tool open, flowing and shut-in pressures, and recoveries):

38. GEOLOGIC MARKERS

FORMATION	TOP	BOTTOM	DESCRIPTION, CONTENTS, ETC.
<u>ACID TREATMENT Continued -</u>			
1 gal/1000 A-250 corrosion inhibitor and 6 gal/1000 U-42 iron agent. Flush w/36 bbls lease wtr. Used 100 ball sealers. Balled out on perms w/11 bbls flush left. Bled off 3000 psi to drop balls and continued w/flush.			
CORE #1	5353	5414	Cut and Recovered 61'.
CORE #2	5414	5434	Cut and Recovered 20'.
Distribution:			
4 - BLM, Farmington, NM			
2 - Utah C&G CC, Salt Lake City, UT			
1 - The Navajo Nation, Window Rock, AZ			
1 - R. Ewing, B'Ville			
1 - L. R. Williamson r) G. W. Berk, Denver			
1 - T. L. Carten r) P. Bertuzzi, Denver			
1 - J. B. Lindemood, Denver			
1 - D. L. Kennedy, Denver			
1 - J. Weichbrodt, Cortez			
16 - W.I. Owners			
1 - File RC			

NAME	TOP	
	MEAS. DEPTH	TRUE VERT. DEPTH
<u>LOG TOPS</u>		
Shinarump	2068	
DeChelly	2393	
Hermosa	4294	
Ismay	5159	
Desert Creek Zone I	5337	

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

SUBMIT IN TRIPI
(Other instructions
verse side)

Form approved.
Budget Bureau No. 1004-0135
Expires August 31, 1985

5

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir.
Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL GAS WELL OTHER

2. NAME OF OPERATOR
Phillips Petroleum Company

3. ADDRESS OF OPERATOR
P. O. Box 1150, Cortez, CO 81321

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.*
See also space 17 below.)
At surface 1705' FNL & 640' FWL

14. PERMIT NO. API# 43-037-31127

15. ELEVATIONS (Show whether DF, RT, OR, etc.)
4556 U.G.L.

RECEIVED
MAY 27 1988

DIVISION OF
OIL, GAS & MINING

5. LEASE DESIGNATION AND SERIAL NO.
14-20-603-247-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME
Navajo

7. UNIT AGREEMENT NAME
SW-I-4192

8. FARM OR LEASE NAME
Ratherford Unit

9. WELL NO.
#13-12

10. FIELD AND POOL, OR WILDCAT
Greater Aneth

11. SEC., T., R., M., OR BLM. AND SURVEY OR AREA
Sec. 13, T41S, R23E

12. COUNTY OR PARISH 13. STATE
San Juan Utah

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:

SUBSEQUENT REPORT OF:

TEST WATER SHUT-OFF

PULL OR ALTER CASING

FRACTURE TREAT

MULTIPLE COMPLETE

SHOOT OR ACIDIZE

ABANDON*

REPAIR WELL

CHANGE PLANS

(Other)

WATER SHUT-OFF

REPAIRING WELL

FRACTURE TREATMENT

ALTERING CASING

SHOOTING OR ACIDIZING

ABANDONMENT*

(Other)

(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

April 12, 1988 through April 27, 1988

Move in and Rig up Well Service 4/12/88. POOH with production equipment. RIH with packer on tubing workstring, set packer @ 5321'. Acidized with 4500 gal. 28% gelled HCl. Swab back load. RIH with production equipment. Release rig 4/27/88 and placed well back on production.

Production before - 15 BOPD, 0 BWPD

Production after - 57 BOPD, 1 BWPD

- 4 - BLM
- 2 - Utah O & G
- 1 - M. Williams, Bartlesville
- 1 - R. J. Rundt (r) Engineering
- 1 - D. C. Gill (r) Denver Files
- 1 - Cortez Office - RC
- 1 - Chieftain
- 1 - Mobil Oil
- 1 - Texaco, Inc.
- 1 - Chevron, USA

18. I hereby certify that the foregoing is true and correct

SIGNED [Signature]

TITLE District Superintendent DATE 5/18/88

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

MONTHLY OIL AND GAS PRODUCTION REPORT

OPERATOR NAME AND ADDRESS:

ACCOUNT NUMBER: N0772

P J KONKEL
PHILLIPS PETROLEUM COMPANY
5525 HWY 64 NBU 3004
FARMINGTON NM 87401

RECEIVED

AUG 16 1993

REPORT PERIOD (MONTH/YEAR):

6 / 93

DIVISION OF
OIL, GAS & MINING

AMENDED REPORT (Highlight Changes)

Well Name API Number	Entity	Location	Producing Zone	Well Status	Days Oper	Production Volumes		
						OIL(BBL)	GAS(MCF)	WATER(BBL)
#21-23 4303713754	06280	41S 24E 21	DSCR	POW	29	1374	883	58
#3-44 4303715031	06280	41S 24E 3	DSCR	POW	30	111	94	2905
#3-14 4303715124	06280	41S 24E 3	DSCR	POW	30	67	23	302
#9-12 4303715126	06280	41S 24E 9	DSCR	POW	30	112	654	17363
#9-14 4303715127	06280	41S 24E 9	DSCR	POW	30	201	315	423
#28-12 4303715336	06280	41S 24E 28	PRDX	POW	29	112	47	2428
#29-12 4303715337	06280	41S 24E 29	PRDX	POW	29	56	0	672
#29-32 4303715339	06280	41S 24E 29	DSCR	POW	29	1402	287	2224
#29-34 4303715340	06280	41S 24E 29	DSCR	POW	29	757	48	0
#30-32 4303715342	06280	41S 24E 30	DSCR	POW	29	588	1049	3744
#3-12 4303715620	06280	41S 24E 3	DSCR	POW	30	268	11	363
#9-34 4303715711	06280	41S 24E 9	DSCR	POW	30	45	46	9800
#10-12 4303715712	06280	41S 24E 10	DSCR	POW	30	45	23	1088
TOTALS						5138	3480	41370

COMMENTS: Effective July 1, 1993, Phillips Petroleum Company has sold its interest in the Ratherford Unit to Mobil Exploration and Producing U.S., Incorporated, P. O. Box 633, Midland, Texas 79702. Mobil assumed operations on July 1, 1993.

I hereby certify that this report is true and complete to the best of my knowledge. Date: 8/11/93

Name and Signature: PAT KONKEL *Pat Konkell*

Telephone Number: 505 599-3452

MONTHLY OIL AND GAS DISPOSITION REPORT

OPERATOR NAME AND ADDRESS:

L.B. Sheffield
 BRIAN BERRY
~~M E P N A~~ MOBIL
 POB 219031 1807A RENTWYR *P.O. DRAWER G*
 DALLAS TX 75221-9031 *CORTEZ, CO. 81321*

UTAH ACCOUNT NUMBER: N7370

REPORT PERIOD (MONTH/YEAR): 7 / 93

AMENDED REPORT (Highlight Changes)

**931006 updated. fee*

ENTITY NUMBER	PRODUCT	GRAVITY BTU	BEGINNING INVENTORY	VOLUME PRODUCED	DISPOSITIONS				ENDING INVENTORY
					TRANSPORTED	USED ON SITE	FLARED/VENTED	OTHER	
05980	OIL			177609	177609	0			
	GAS			72101	66216	5885			
11174	OIL								
	GAS								
	OIL								
	GAS								
	OIL								
	GAS								
	OIL								
	GAS								
	OIL								
	GAS								
	OIL								
	GAS								
TOTALS					249710	243825	5885		

RECEIVED

SEP 13 1993

DIVISION OF OIL, GAS & MINING

COMMENTS: *PLEASE NOTE ADDRESS change. Mobil ~~ASO~~ PRODUCTION REPORTS will be compiled and sent from the Cortez, Co. office IN THE FUTURE.*

I hereby certify that this report is true and complete to the best of my knowledge.

Name and Signature: *L. B. Sheffield*

Date: *9/5/93*

Telephone Number: *303 565 2212 / 241 58 2528*

STATE OF UTAH
DIVISION OF OIL, GAS AND MINING

SUNDRY NOTICES AND REPORTS ON WELLS <small>(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)</small>		3. LEASE DESIGNATION & SERIAL NO. 6. IF INDIAN, ALLOTTEE OR TRIBE NAME NAVAJO TRIBAL
1. OIL WELL <input type="checkbox"/> GAS WELL <input type="checkbox"/> OTHER <input type="checkbox"/>	7. UNIT AGREEMENT NAME RATHERFORD UNIT	
2. NAME OF OPERATOR MOBIL OIL CORPORATION		8. FARM OR LEASE NAME
3. ADDRESS OF OPERATOR P. O. BOX 633 MIDLAND, TX 79702		9. WELL NO.
4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements. See also space 17 below.) At surface At proposed prod. zone		10. FIELD AND POOL, OR WILDCAT GREATER ANETH
DIVISION OF OIL, GAS & MINING		11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
14. API NO.	15. ELEVATIONS (Show whether DF, RT, GR, etc.)	12. COUNTY SAN JUAN
		13. STATE UTAH

RECEIVED
 SEP 15 1993

16. Check Appropriate Box To Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:	SUBSEQUENT REPORT OF:
TEST WATER SHUT-OFF <input type="checkbox"/> FRACTURE TREAT <input type="checkbox"/> SHOOT OR ACIDIZE <input type="checkbox"/> REPAIR WELL <input type="checkbox"/> (Other) <input type="checkbox"/>	WATER SHUT-OFF <input type="checkbox"/> FRACTURE TREATMENT <input type="checkbox"/> SHOOTING OR ACIDIZING <input type="checkbox"/> (Other) <u>CHANGE OF OPERATOR</u> <input type="checkbox"/> <small>(Note: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)</small>
PULL OR ALTER CASING <input type="checkbox"/> MULTIPLE COMPLETE <input type="checkbox"/> ABANDON <input type="checkbox"/> CHANGE PLANS <input type="checkbox"/>	REPAIRING WELL <input type="checkbox"/> ALTERING CASING <input type="checkbox"/> ABANDONMENT* <input type="checkbox"/>
APPROX. DATE WORK WILL START _____	DATE OF COMPLETION _____

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)

* Must be accompanied by a cement verification report.

AS OF JULY1, 1993, MOBIL OIL CORPORATION IS THE OPERATOR OF THE RATHERFORD UNIT. ATTACHED ARE THE INDIVIDUAL WELLS.

18. I hereby certify that the foregoing is true and correct

SIGNED Shirley Dodd TITLE ENV. & REG TECHNICIAN DATE 9-8-93

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

✓ 12W-44	43-037-16405	14-20-603-246A	SEC. 12, T41S, R23E	SE/SE 660 FSL; 660 FEL
✓ 12W-44A	43-037-31543	14-20-603-246A	SEC. 12, T41S, R23E	SE/SE 807 FEL; 772 FSL
✓ 13-11W	43-037-31152	14-20-603-247A	SEC. 13, T41S, R23E	NW/NW 500 FNL; 660 FWL
✓ 13-12	43-037-31127	14-20-603-247A	SEC. 13, T41S, R23E	SW/NW 1705 FNL; 640 FWL
✓ 13W-13	43-037-15851	14-20-603-247A	SEC. 13, T41S, R23E	NW/SW 1980 FSL; 4620 FEL
✓ 13-14	43-037-31589	14-20-603-247A	SEC. 13, T41S, R23E	660 FSL; 660 FWL
✓ 13-21	43-037-31128	14-20-603-247A	SEC. 13, T41S, R23E	NE/NW 660 FNL; 1920 FWL
✓ 13W-22	43-037-15852	14-20-603-247A	SEC. 13, T41S, R23E	SE/NW 1988 FNL; 3300 FEL
✓ 13-23	43-037-31129	14-20-603-247A	SEC. 13, T41S, R23E	NE/SW 1980 FSL; 1930 FWL
13W-44	43-037-15853	14-20-603-247	SEC. 13, T41S, R23E	600 FSL; 3300 FEL
✓ 13W-32	43-037-16406	14-20-603-247A	SEC. 13, T41S, R23E	1881 FNL; 1979 FEL
✓ 13W-33	43-037-15855	14-20-603-247A	SEC. 13, T41S, R23E	NW/SE 1970 FSL; 1979 FEL
✓ 13W-34	43-037-31130	14-20-603-247A	SEC. 13, T41S, R23E	SW/SE 660 FSL; 1980 FEL
✓ 13-41	43-037-15856	14-20-603-247A	SEC. 13, T41S, R23E	NE/NE 660 FNL; 660 FEL
✓ 13W-42	43-037-15857	14-20-603-247A	SEC. 13, T41S, R23E	SE/NE 2139; 585 FEL
✓ 13-43	43-037-31131	14-20-603-247A	SEC. 13, T41S, R23E	NE/SE 1700 FSL; 960 FEL
✓ 13W-44	43-037-16407	14-20-603-247A	SEC. 13, T41S, R23E	SE/SE 635 FSL; 659 FEL
14-02	NA	14-20-603-4037	SEC. 11, T41S, R23E	SW/SW 660 FSL; 660 FEL
✓ 14-32	43-037-15858	14-20-603-247A	SEC. 14, T41S, R23E	2130 FNL; 1830 FEL
✓ 14-41	43-037-31623	14-20-603-247A	SEC. 14, T41S, R23E	NE/NE 521 FEL; 810 FNL
✓ 14W-42	43-037-15860	14-20-603-247A	SEC. 14, T41S, R23E	SE/NE 1976 FNL; 653 FEL
✓ 14W-43	43-037-16410	14-20-603-247A	SEC. 14, T41S, R23E	3300 FSL; 4770 FEL
✓ 14-33	43-037-15859	14-20-603-247	SEC. 14, T41S, R23E	2130 FSL; 1830 FEL
✓ 15-12	43-037-15715	14-20-603-355	SEC. 15, T41S, R24E	1820 FNL; 500 FWL
✓ 15W-21	43-037-16411	14-20-603-355	SEC. 15, T41S, R24E	660 FNL; 1820 FWL
✓ 15-22	43-037-30449	14-20-603-355	SEC. 15, T41S, R24E	SE/NW, 1980 FNL; 2050 FWL
✓ 15-32	43-037-15717	14-20-603-355A	SEC. 15, T41S, R24E	1980 FNL; 1980 FEL
✓ 15-33	43-037-15718	14-20-603-355	SEC. 15, T41S, R24E	NW/SE 1650 FSL; 1980 FEL
✓ 15-41	43-037-15719	14-20-603-355	SEC. 15, T41S, R24E	660 FNL; 660' FEL
✓ 15-42	43-037-30449	14-20-603-355	SEC. 15, T41S, R24E	SE/NE 2020 FNL; 820 FEL
✓ 16W-12	43-037-15720	14-20-603-355	SEC. 16, T41S, R24E	SW/NW 1880 FNL; 660 FWL
✓ 16-13	43-037-31168	14-20-603-355	SEC. 16, T41S, R24E	1980 FSL; 660 FWL
✓ 16W-14	43-037-15721	14-20-603-355	SEC. 16, T41S, R24E	SW/SW 660 FSL; 660 FWL
✓ 16W-21	43-037-16414	14-20-603-355	SEC. 16, T41S, R24E	NE/NW 660 FNL; 1880 FWL
✓ 16W-23	43-037-15722	14-20-603-355	SEC. 16, T41S, R24E	NE/SW 1980 FSL; 1980 FWL
✓ 16-32	43-037-15723	14-20-603-355	SEC. 16, T41S, R24E	1980 FNL; 1980' FEL
✓ 16-34	43-037-15724	14-20-603-355	SEC. 16, T41S, R24E	660 FNL; 1980' FEL
✓ 16-41	43-037-15725	14-20-603-355	SEC. 16, T41S, R24E	660 FNL; 660 FEL
✓ 16W-43	43-037-16415	14-20-603-355	SEC. 16, T41S, R24E	NE/SE 2140 FSL; 820 FEL
✓ 17-11	43-037-31169	14-20-603-353	SEC. 17, T41S, R24E	NW/NW 1075' FNL; 800' FWL
✓ 17W-12	43-037-15726	14-20-603-353	SEC. 17, T41S, R24E	SW/NW 1980' FNL; 510' FWL
✓ 17-13	43-037-31133	14-20-603-353	SEC. 17, T41S, R24E	NW/SW 2100' FSL; 660' FWL
✓ 17W-14	43-037-15727	14-20-603-353	SEC. 17, T41S, R24E	SW/SW 660' FSL; 660' FWL
✓ 17W-21	43-037-16416	14-20-603-353	SEC. 17, T41S, R24E	510' FNL; 1830' FWL
✓ 17-22	43-037-31170	14-20-603-353	SEC. 17, T41S, R24E	1980' FNL; 1980' FWL
✓ 17W-23	43-037-15728	14-20-603-353	SEC. 17, T41S, R24E	NE/SW 1980' FWL; 1880' FSL
✓ 17-31	43-037-31178	14-20-603-353	SEC. 17, T41S, R24E	NW/NE 500' FNL; 1980' FEL
✓ 17-32W	43-037-15729	14-20-603-353	SEC. 17, T41S, R24E	SW/NE 1830' FNL; 2030' FEL
✓ 17-33	43-037-31134	14-20-603-353	SEC. 17, T41S, R24E	NW/SE 1980' FSL; 1845' FEL
✓ 17-34W	43-037-15730	14-20-603-353	SEC. 17, T41S, R24E	SW/SE 560' FSL; 1880' FEL
✓ 17W-41	43-037-15731	14-20-603-353	SEC. 17, T41S, R24E	610' FNL; 510' FEL
✓ 17-42	43-037-31177	14-20-603-353	SEC. 17, T41S, R24E	SE/NE 1980; FNL, 660' FEL
✓ 17-44	43-037-15732	14-20-603-353	SEC. 17, T41S, R24E	660 FSL; 660' FEL
✓ 17W-43	43-037-16417	14-20-603-353	SEC. 17, T41S, R24E	NE/SE 1980' FSL; 660' FEL
✓ 18-11	43-037-15733	14-20-603-353	SEC. 18, T41S, R24E	NW/NW 720' FNL; 730' FWL
✓ 18-12W	43-037-31153	14-20-603-353	SEC. 18, T41S, R24E	SW/NW 1980' FNL; 560' FWL
✓ 18W-21	43-037-16418	14-20-603-353	SEC. 18, T41S, R24E	NE/NW 660' FNL; 1882' FWL
✓ 18-22	43-037-31236	14-20-603-353	SEC. 18, T41S, R24E	SW/NW 2200' FNL; 2210' FWL
✓ 18W-23	43-037-30244	14-20-603-353	SEC. 18, T41S, R24E	NE/SW 2385' FSL; 2040' FWL
✓ 18W-14	43-037-15735	14-20-603-353	SEC. 18, T41S, R24E	SW/SW 810' FSL; 600' FWL
✓ 18-24	43-037-31079	14-20-603-353	SEC. 18, T41S, R24E	SE/SW 760' FSL; 1980' FWL
✓ 18-31	43-037-31181	14-20-603-353	SEC. 18, T41S, R24E	NW/NE 795' FNL; 2090; FEL
18W-32	43-037-15736	14-20-603-353	SEC. 18, T41S, R24E	SW/NE 2140' FNL; 1830' FEL
✓ 18-33	43-037-31135	14-20-603-353	SEC. 18, T41S, R24E	NW/SE 1870' FSL; 1980' FEL
✓ 18-34W	43-037-15737	14-20-603-353	SEC. 18, T41S, R24E	SW/SE 780' FSL; 1860 FEL
✓ 18W-41	43-037-15738	14-20-603-353	SEC. 18, T41S, R24E	NE/NE 660' FNL; 660' FEL
✓ 18-42	43-037-31182	14-20-603-353	SEC. 18, T41S, R24E	SE/NE 2120' FNL; 745' FEL
✓ 18W-43	43-037-16419	14-20-603-353	SEC. 18, T41S, R24E	NE/SE 1980' FSL; 660' FEL
✓ 18-44	43-037-31045	14-20-603-353	SEC. 18, T41S, R24E	SE/SE 660' FSL; 660' FEL
✓ 19-11	43-037-31080	14-20-603-353	SEC. 19, T41S, R24E	NW/NW 660' FNL; 660' FWL
✓ 19-12	43-037-15739	14-20-603-353	SEC. 19, T41S, R24E	600' FWL; 1980' FNL
✓ 19-14	43-037-15740	14-20-603-353	SEC. 19, T41S, R24E	600' FSL; 660' FEL

PA'd

PA'd

Sept 29, 1993

TO: Lisha Cordova - Utah Mining
Oil & Gas

FROM: Janice Easley
BLM Farmington, NM
505 599-6355

Here is copy of Rutherford Unit
Successor Operator,

4 pages including this one.

Re: Ratherford Unit (GC)

RECEIVED
BLM

JUL 27 11:44

Navajo Area Office
P. O. Box 1060
Gallup, New Mexico 87305-1060

070 FARMINGTON, NM

ARES/543

JUL 28 1993

SEARCHED	INDEXED
SERIALIZED	FILED
JUL 28 1993	
FBI - FARMINGTON	
3/2	
ALL SUPPLY	

Mr. G. D. Cox
Mobil Exploration and
Producing North America, Inc.
P. O. Box 633
Midland, Texas 79702

Dear Mr. Cox:

Enclosed for your information and use is the approved Designation of Operator between the Phillips Petroleum Company and Mobil Exploration and Producing North America, Inc. for the Ratherford Unit.

Please note that all other concerned parties will be furnished their copy of the approved document.

Sincerely,

ACTING Area Director

Enclosure

cc: Bureau of Land Management, Farmington District Office w/enc.
TNN, Director, Minerals Department w/enc.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS

RECEIVED
BLM

DESIGNATION OF OPERATOR

Phillips Petroleum Company is, on the records of the Bureau of Indian Affairs, operator of the ^{7/27/93 11:44} Ratherford Unit,

AREA OFFICE: Window Rock, Arizona
LEASE NO: Attached hereto as Exhibit "A"

070 FARMINGTON, NM

and, pursuant to the terms of the Ratherford Unit Agreement, is resigning as Unit Operator effective July 1, 1993, and hereby designates

NAME: Mobil Exploration and Producing North America Inc., duly elected pursuant to the terms of the Ratherford Unit Agreement,

ADDRESS: P. O. Box 633, Midland, Texas 79702
Attn: G. D. Cox

as Operator and local agent, with full authority to act on behalf of the Ratherford Unit lessees in complying with the terms of all leases and regulations applicable thereto and on whom the authorized officer may serve written or oral instructions in securing compliance with the Operating Regulations (43 CFR 3160 and 25 CFR 211 and 212) with respect to (described acreage to which this designation is applicable):

Attached hereto as Exhibit "A"

Bond coverage under 25 CFR 211, 212 or 225 for lease activities conducted by the above named designated operator is under Bond Number 05202782 (attach copy). Evidence of bonding is required prior to the commencement of operations.

It is understood that this designation of operator does not relieve any lessee of responsibility for compliance with the terms of the leases and the Operating Regulations. It is also understood that this designation of operator does not constitute an assignment of any interest in the leases.

In case of default on the part of the designated operator, the lessees will make full and prompt compliance with all regulations, lease terms, stipulations, or orders of the Secretary of the Interior or his representative.

Attached is the appropriate documentation relevant to this document.

The designated operator agrees to promptly notify the authorized officer of any change in the operatorship of said Ratherford Unit.

Phillips Petroleum Company

June 17, 1993

By: M. B. [Signature]
Attorney-in-Fact

Mobil Exploration and Producing
North America Inc.

June 11, 1993

By: B. D. Martiny
Attorney-in-Fact B.D. MARTINY

[Signature] ACTING AREA DIRECTOR
APPROVED BY TITLE DATE
7/9/93

APPROVED PURSUANT, TO SECRETARIAL REDELEGATION ORDER 209 DM 8 AND 230 DM 3.

This form does not constitute an information collection as defined by 44 U.S.C. 3502 and therefore does not require OMB approval.

EXHIBIT "A"

ATTACHED TO AND MADE A PART OF DESIGNATION OF SUCCESSOR OPERATOR, RATHERFORD UNIT

EXHIBIT "C"

Revised as of September 29, 1992
SCHEDULE OF TRACT PERCENTAGE PARTICIPATION

<u>Tract Number</u>	<u>Description of Land</u>	<u>Serial Number and Effective Date of Lease</u>	<u>Tract Percentage Participation</u>
1	S/2 Sec. 1, E/2 SE/4 Sec. 2, E/4 Sec. 11, and all of Sec. 12, T-41-S, R-23-E, S.L.M. San Juan County, Utah	14-20-603-246-A Oct. 5, 1953	11.0652565
2	SE/4 and W/2 SW/4 Sec. 5, the irregular SW/4 Sec. 6, and all of Sec. 7 and 8, T-41-S, R-24-E, San Juan County, Utah	14-20-603-368 Oct. 26, 1953	14.4159942
3	SW/4 of Sec. 4, T-41-S, R-24-E, San Juan County, Utah	14-20-603-5446 Sept. 1, 1959	.5763826
4	SE/4 Sec. 4, and NE/4 Sec. 9, T-41-S, R-24-E, San Juan County, Utah	14-20-603-4035 March 3, 1958	1.2587779
5	SW/4 of Sec. 3, T-41-S, R-24-E, S.L.M., San Juan County, Utah	14-20-603-5445 Sept. 3, 1959	.4667669
6	NW/4 of Sec. 9, T-41-S, R-24-E, S.L.M., San Juan County, Utah	14-20-603-5045 Feb. 4, 1959	1.0187043
7	NW/4, W/2 NE/4, and SW/4 Sec. 10, SE/4 Sec. 9, T-41-S, R-24-E, San Juan County, Utah	14-20-603-4043 Feb. 18, 1958	3.5097575
8	SW/4 Sec. 9, T-41-S, R-24-E, S.L.M. San Juan County, Utah	14-20-603-5046 Feb. 4, 1959	1.1141679
9	SE/4 Sec. 10 and S/2 SW/4 Sec. 11 T-41-S, R-24-E, San Juan County, Utah	14-20-603-4037 Feb. 14, 1958	2.6186804
10	All of Sec. 13, E/2 Sec. 14, and E/2 SE/4 and N/2 Sec. 24, T-41-S, R-23-E, S.L.M., San Juan County, Utah	14-20-603-247-A Oct. 5, 1953	10.3108861
11	Sections 17, 18, 19 and 20, T-41-S, R-24-E, San Juan County Utah	14-20-603-353 Oct. 27, 1953	27.3389265
12	Sections 15, 16, 21, and NW/4, and W/2 SW/4 Sec. 22, T-41-S, R-24-E, San Juan County, Utah	14-20-603-355 Oct. 27, 1953	14.2819339
13	W/2 Section 14, T-41-S, R-24-E, San Juan County, Utah	14-20-603-370 Oct. 26, 1953	1.8500847
14	N/2 and SE/4, and E/2 SW/4 Sec. 29, NE/4 and E/2 SE/4 and E/2 W/2 Irregular Sec. 30, and E/2 NE/4 Sec. 32, T-41-S, R-24-E, San Juan County, Utah	14-20-603-407 Dec. 10, 1953	6.9924969
15	NW/4 Sec. 28, T-41-S, R24-E San Juan County, Utah	14-20-603-409 Dec. 10, 1953	.9416393
16	SE/4 Sec. 3, T-41-S, R-24-E San Juan County, Utah	14-20-0603-6504 July 11, 1961	.5750254
17	NE/4 Sec. 3, T-41-S, R-24-E San Juan County, Utah	14-20-0603-6505 July 11, 1961	.5449292
18	NW/4 Sec. 3, T-41-S, R-24-E San Juan County, Utah	14-20-0603-6506 July 11, 1961	.5482788
19	NE/4 Sec. 4, T-41-S, R24-E San Juan County, Utah	14-20-0603-7171 June 11, 1962	.4720628
20	E/2 NW/4 Sec. 4, T-41-S, R-24-E San Juan County, Utah	14-20-0603-7172 June 11, 1962	.0992482

Division of Oil, Gas and Mining
PHONE CONVERSATION DOCUMENTATION FORM

Route original/copy to:

Well File _____

(Location) Sec ___ Twp ___ Rng ___
(API No.) _____

Suspense
(Return Date) _____
(To - Initials) _____

Other
OPERATOR CHANGE

1. Date of Phone Call: 10-6-93 Time: 9:30

2. DOGM Employee (name) L. CORDOVA (Initiated Call
Talked to:

Name GLEN COX (Initiated Call - Phone No. (915) 688-2114
of (Company/Organization) MOBIL

3. Topic of Conversation: OPERATOR CHANGE FROM PHILLIPS TO MOBIL "RATHERFORD UNIT".
(NEED TO CONFIRM HOW OPERATOR WANTS THE WELLS SET UP - MEPNA AS PER BIA APPROVAL
OR MOBIL OIL CORPORATION AS PER SUNDRY DATED 9-8-93?)

4. Highlights of Conversation: _____

MR. COX CONFIRMED THAT THE WELLS SHOULD BE SET UNDER ACCOUNT N7370/MEPNA AS
PER BIA APPROVAL, ALSO CONFIRMED THAT PRODUCTION & DISPOSITION REPORTS WILL NOW
BE HANDLED OUT OF THEIR CORTEZ OFFICE RATHER THAN DALLAS.

MEPNA-

PO DRAWER G

CORTEZ, CO 81321

(303)565-2212

*ADDRESS CHANGE AFFECTS ALL WELLS CURRENTLY OPERATED BY MEPNA, CURRENTLY
REPORTED OUT OF DALLAS (MCELMO CREEK).

Division of Oil, Gas and Mining
OPERATOR CHANGE WORKSHEET

Routing:

1	VEC/417-93
2	DP/58-93
3	VLC
4	RJF
5	IPC
6	PL

Attach all documentation received by the division regarding this change.
 Initial each listed item when completed. Write N/A if item is not applicable.

- Change of Operator (well sold) Designation of Agent
 Designation of Operator Operator Name Change Only

The operator of the well(s) listed below has changed (EFFECTIVE DATE: 7-1-93)

TO (new operator) <u>M E P N A</u>	FROM (former operator) <u>PHILLIPS PETROLEUM COMPANY</u>
(address) <u>PO DRAWER G</u>	(address) <u>5525 HWY 64 NBU 3004</u>
<u>CORTEZ, CO 81321</u>	<u>FARMINGTON, NM 87401</u>
<u>GLEN COX (915)688-2114</u>	<u>PAT KONKEL</u>
phone <u>(303) 565-2212</u>	phone <u>(505) 599-3452</u>
account no. <u>N7370</u>	account no. <u>N0772(A)</u>

Well(s) (attach additional page if needed): ***RATHERFORD UNIT (NAVAJO)**

Name: **SEE ATTACHED**	API: <u>43037.31127</u>	Entity: _____	Sec _____	Twp _____	Rng _____	Lease Type: _____
Name: _____	API: _____	Entity: _____	Sec _____	Twp _____	Rng _____	Lease Type: _____
Name: _____	API: _____	Entity: _____	Sec _____	Twp _____	Rng _____	Lease Type: _____
Name: _____	API: _____	Entity: _____	Sec _____	Twp _____	Rng _____	Lease Type: _____
Name: _____	API: _____	Entity: _____	Sec _____	Twp _____	Rng _____	Lease Type: _____
Name: _____	API: _____	Entity: _____	Sec _____	Twp _____	Rng _____	Lease Type: _____
Name: _____	API: _____	Entity: _____	Sec _____	Twp _____	Rng _____	Lease Type: _____

OPERATOR CHANGE DOCUMENTATION

- Sec 1. (Rule R615-8-10) Sundry or other legal documentation has been received from former operator (Attach to this form). (Reg. 8-20-93) (6/93 Prod. Rpt. 8-16-93)
- Sec 2. (Rule R615-8-10) Sundry or other legal documentation has been received from new operator (Attach to this form). (Reg. 8-31-93) (Rec'd 9-14-93)
- N/A 3. The Department of Commerce has been contacted if the new operator above is not currently operating any wells in Utah. Is company registered with the state? (yes/no) _____ If yes, show company file number: _____.
- Sec 4. (For Indian and Federal Wells ONLY) The BLM has been contacted regarding this change (attach Telephone Documentation Form to this report). Make note of BLM status in comments section of this form. Management review of Federal and Indian well operator changes should take place prior to completion of steps 5 through 9 below.
- Sec 5. Changes have been entered in the Oil and Gas Information System (Wang/IBM) for each well listed above. (O&G wells 10-6-93) (wiw's 10-26-93)
- Sec 6. Cardex file has been updated for each well listed above. (O&G wells 10-6-93) (wiw's 10-26-93)
- Sec 7. Well file labels have been updated for each well listed above. (O&G wells 10-6-93) (wiw's 10-26-93)
- Sec 8. Changes have been included on the monthly "Operator, Address, and Account Changes" memo for distribution to State Lands and the Tax Commission. (10-6-93)
- Sec 9. A folder has been set up for the Operator Change file, and a copy of this page has been placed there for reference during routing and processing of the original documents.

ENTITY REVIEW

- 1. (Rule R615-8-7) Entity assignments have been reviewed for all wells listed above. Were entity changes made? (yes/no) no (If entity assignments were changed, attach copies of Form 6, Entity Action Form).
- 2. State Lands and the Tax Commission have been notified through normal procedures of entity changes.

BOND VERIFICATION (Fee wells only)

- 1. (Rule R615-3-1) The new operator of any fee lease well listed above has furnished a proper bond.
- 2. A copy of this form has been placed in the new and former operators' bond files.
- 3. The former operator has requested a release of liability from their bond (yes/no) no. Today's date 11-17 1993. If yes, division response was made by letter dated 11-17 1993.

LEASE INTEREST OWNER NOTIFICATION RESPONSIBILITY

- 1. (Rule R615-2-10) The former operator/lessee of any fee lease well listed above has been notified by letter dated 11-17 1993, of their responsibility to notify any person with an interest in such lease of the change of operator. Documentation of such notification has been requested.
- 2. Copies of documents have been sent to State Lands for changes involving State leases.

FILMING

- 1. All attachments to this form have been microfilmed. Date: 11-17 1993.

FILING

- 1. Copies of all attachments to this form have been filed in each well file.
- 2. The original of this form and the original attachments have been filed in the Operator Change file.

COMMENTS

931006 BIA/Btm Approved 7-9-93.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
Budget Bureau No. 1004-0135
Expires: March 31, 1993

SUNDRY NOTICES AND REPORTS ON WELLS

Do not use this form for proposals to drill or to deepen or reentry to a different reservoir.
Use "APPLICATION FOR PERMIT—" for such proposals

5. Lease Designation and Serial No.
14-20-603-247A

6. If Indian, Allottee or Tribe Name

NAVAJO TRIBAL

7. If Unit or CA, Agreement Designation

RATHERFORD UNIT

8. Well Name and No.

13-12

9. API Well No.

43-037-31127

10. Field and Pool, or Exploratory Area

GREATER ANETH

11. County or Parish, State

SAN JUAN, UT

SUBMIT IN TRIPLICATE

1. Type of Well

Oil Well Gas Well Other

2. Name of Operator

MOBIL OIL CORPORATION

3. Address and Telephone No.

P.O. BOX 633, MIDLAND, TX 79702

(915)688-2585

4. Location of Well (Footage, Sec., T., R., M., or Survey Description)

1705' FNL, 640 FWL SEC.13, T41S, R23E

12. CHECK APPROPRIATE BOX(S) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION
<input checked="" type="checkbox"/> Notice of Intent	<input type="checkbox"/> Abandonment
<input type="checkbox"/> Subsequent Report	<input type="checkbox"/> Recompletion
<input type="checkbox"/> Final Abandonment Notice	<input type="checkbox"/> Plugging Back
	<input type="checkbox"/> Casing Repair
	<input type="checkbox"/> Altering Casing
	<input type="checkbox"/> Other <u>CSG. SQUEEZE</u>
	<input type="checkbox"/> Change of Plans
	<input type="checkbox"/> New Construction
	<input type="checkbox"/> Non-Routine Fracturing
	<input type="checkbox"/> Water Shut-Off
	<input type="checkbox"/> Conversion to Injection
	<input type="checkbox"/> Dispose Water

(Note: Report results of multiple completion on Well Completion or Recommendation Report and Log form.)

13. Describe Proposed or Completed Operations (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

SEE ATTACHED PROCEDURE

Verbal approval by Wayne Townsend March 8, 1994

RECEIVED

MAR 11 1994

3/14/94
Shirley Todd

14. I hereby certify that the foregoing is true and correct

Signed Shirley Todd SHIRLEY TODD

Title ENV. & REG. TECH

Date 3-8-94

(This space for Federal or State office use)

Approved by _____

Title _____

Date _____

Conditions of approval, if any:

RATHERFORD UNIT 13-12
CASING LEAK PROCEDURE
TOM COCHRANE (303) 564-5210
3-7-94

* PUMPING DOWN THE TBG/CSG ANNULUS PRODUCED FLUID AT THE BRADENHEAD VALVE ON THIS WELL

1. MIRU PULLING UNIT. POH W/RODS & PUMP. ND WH, NU BOP. UNSET TAC AND POH W/TBG, TAC, TBG, SN, PS & MA. CHECK TO SEE IF SLIPS ON PROD CSG HAVE FAILED (THIS PULLS THE CASING AWAY FROM THE PACKING AND WOULD ALLOW FLUIDS TO COMMUNICATE). IF SO, SPEAR AND PU CSG, SET SLIPS AND REPAIR DAMAGED PACKING.
2. GIH W/PKR & RBP, SET @ 5200', SET PKR @ 5190' TEST RBP TO 1000#. TEST BS (CSG TO SURF) W/1000#. IF NO LEAK, POH, RTP.
3. IF BS LEAKS, PUH FIND LEAK. LEAK IS PROBABLY ABOVE TOC @ 3700'.
7" X 9.625" ANNULUS IS 0.168 FT³/FT VOLUME.
BELOW 1622', 8.75" X 7" VOLUME IS 0.150 FT³/FT
- 4A. IF LEAK IS 1630' OR ABOVE;
SHOOT CIRC HOLES 12 GM CHGS 4 SPF 90 DEGR PHSG @ 1630'. IF LEAK 100' OR MORE ABOVE 1630', SET CMT RET BELOW LEAK AND ABOVE SQZ HOLES, OTHERWISE PUMP FROM SURFACE DN CSG W/411 FT³ HALCO LITE, (65% CLASS B CMT, 35% PCZ, 6% GEL, 2% CACL₂, 1/4#/SX FLOCELE, 12.4 PPG, 1.84 YIELD) CIRC TO SURFACE 10 SX, SI BRADEN HEAD AND SQZ TO 500# (IF USED CMT RET, CO EXCESS, POH W/TBG).
- 4B. IF LEAK IS BELOW 1630', EIR INTO LEAK, CIRC CMT AS IN 4A W/50% EXCESS, CIRC TO SURFACE.
5. DO AND TEST SQZD TO 1000#, IF FAILS, RESQUEEZE AS PER OE AND DRLG FMN AGREE UNTIL SQZ HOLDS PRESSURE. RTP.

TOM COCHRANE 3-7-94

*if mobil has to perf - perf at 1672'. This will
cover future regulations for requiring perfs 50' below
intermediate shoe.*

Rutherford Unit #13-12
Present Setting

7-27-93
TVE

KB: 4569' Z: 13' AGL GL: 4556'

13-3/8", 54.5#/ft Csg
Cmtd w/ 150 sx cmt.

121'

9-5/8", 36#/ft K-55
Cmtd w/ 670 sx Cmt.
Circ to surf.

1622'

Tubing Detail:

166 jts 2-7/8" 6.5# tbg
2-7/8" x 7" TAC
4 jts 2-7/8" 6.5# tbg
2.5" cup type SN

Rod Detail:

1.5" x 22' PR w/ 12' liner
pony rods as needed
(73) 7/8" steel rods
(133) 3/4" steel rods
2.5" x 1.75" x 20' pump

Handwritten:
1630 + 8,9344
7 x 9 5/8" C.16867/A
1630 (.168) = 274 sx
50% excess = 411 sx.

Handwritten:
1516 - 1.18
12.4 1.84

Perfs:

2 SPF 5349-65'
2 SPF 5465-85'

TAC ● 5203'
SN ● 5205'

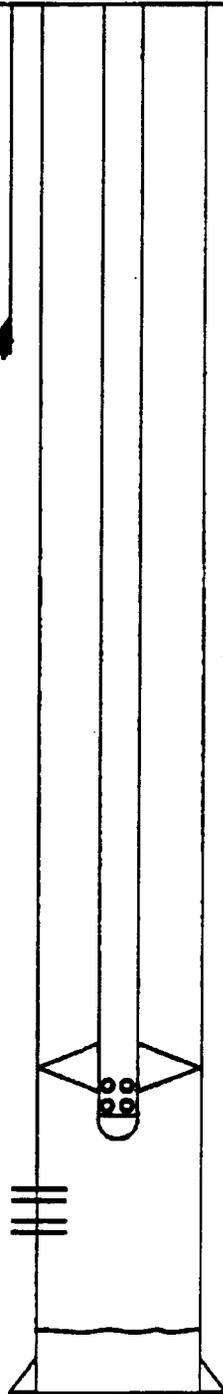
Handwritten:
2 50
3 75 "B"
290 Cmt
1/4 Flood

PBTD: 5408'

7", 26# & 23#/ft K-55
Cmtd w/ 850 sx Cmt.

Handwritten: CBL TOL 3700'

TD: 5452'



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
Budget Bureau No. 1004-0135
Expires: March 31, 1993

SUNDRY NOTICES AND REPORTS ON WELLS

Do not use this form for proposals to drill or to deepen or reentry to a different reservoir.
Use "APPLICATION FOR PERMIT -" for such proposals

5. Lease Designation and Serial No.

14-20-603-247A

6. If Indian, Allottee or Tribe Name

NAVAJO TRIBAL

7. If Unit or CA, Agreement Designation

RATHERFORD UNIT

8. Well Name and No.

RATHERFORD 13-12

9. API Well No.

43-037-31127

10. Field and Pool, or exploratory Area

GREATER ANETH

11. County or Parish, State

SAN JUAN UT

SUBMIT IN TRIPLICATE

1. Type of Well

Oil Well Gas Well Other

2. Name of Operator Mobil Exploration & Producing U.S. Inc.
as Agent for Mobil Producing TX & NM Inc.

3. Address and Telephone No.
P.O. Box 633, Midland, TX 79702 (915) 688-2585

4. Location of Well (Footage, Sec., T., R., M., or Survey Description)
1705' FNL, 640' FWL
SEC 13, T41S, R23E

12. CHECK APPROPRIATE BOX(S) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION

- Notice of Intent
 Subsequent Report
 Final Abandonment Notice

TYPE OF ACTION

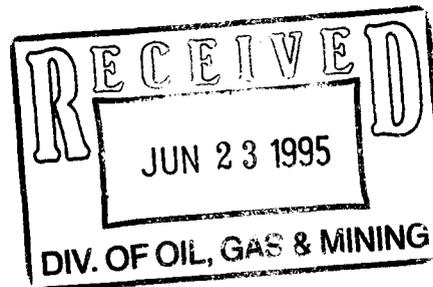
- Abandonment Change of Plans
 Recompletion New Construction
 Plugging Back Non-Routine Fracturing
 Casing Repair Water Shut-Off
 Altering Casing Conversion to Injection
 Other DRILL DEEPER Dispose Water

(Note: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)

13. Describe Proposed or Completed Operations (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

SEE ATTACHED PROCEDURE

(APD)



14. I hereby certify that the foregoing is true and correct

Signed Shuley Robertson

Title ENV. & REG TECHNICIAN

Date 6-19-95

(This space for Federal or State office use)

Approved by [Signature]

Title Petroleum Engineer

Date 6/27/95

Conditions of approval, if any:

Rutherford Unit 13-12
AFE #5AH1

Drill Deeper Procedure

1. Lock out, tag out all power sources. MIRU workover rig. Load well with lease water. RD pumping unit horse head and pump tee. NU and PT BOP's to 2000 psi high and 300 psi low.
 2. POH with laying down sucker rods and rod pump. Release tubing anchor and POH laying down production tubing.
 3. PU 6-1/8" rock bit, ten 3-1/2" drill collars on 2-7/8", 10.4 lb/ft ADH Grade E drillpipe. RIH to PBDT at +/- 5408'. Circulate hole using +/- 8.7 ppg polymer mud to confirm that circulation is possible. If can not circulate, RU air drilling equipment as was used for milling windows on horizontal wells.
 4. Drill well to a TD of 5510' DPM. Circulate out drilling fluid using lease water (if possible). POH laying down drillpipe. RU Schlumberger. RIH with TDT log and log from TD at 5510' DPM to 5300' EL. POH. RD Schlumberger.
 5. PU squeeze packer on 2-7/8", 6.5 lb/ft J-55 EUE 8rd tubing. Hydrotest tubing to 4000 psi while RIH. Set squeeze packer at 5300' and PT backside to 500 psi. Monitor backside pressure.
 6. RU Halliburton. PT lines to 4000 psi. MI 100 bbls of 10 ppg brine. Pump the following acid stimulation treatment at +/- 8 BPM not exceeding 3500 psi surface injection pressure:
 - A) 40 bbls of 15 percent HCL acid
 - B) 15 bbls of rock salt pill
 - C) 40 bbls of 15 percent HCL acid
 - D) 15 bbls of rock salt pill
 - E) 40 bbls of 15 percent HCL acid
 - F) Displace with +/- 50 bbls 10 ppg brine
- NOTE: 1) All acid to contain 5 gal/M Fe-1A, 25 lbs/M Fe-2, 1 gal/M HAI-81, 1 gal/M LOSURF-300, 10 gal/M MUSQL A, 1 gal/M SGA-HT
- 2) Rock salt pill to contain 10 ppg brine, 1 lb/M GBW-3, 10 gal/M LGC-8, 1 ppg TBA-110 diverter
7. Swab well for remainder of daylight hours. Release squeeze packer and POH. RIH with bit and bulldog bailer. CD salt fill to TD of 5510'. POH. Run gas anchor, tubing anchor, production tubing, rod pump, and sucker rods as per Ed Barber's recommendation. Hang well on pumping unit. RDMD workover rig.

PREPARED BY: S. S. Murphy

AFE # 5A11

PRODUCER

Ratherford Unit 13-12

EXISTING

KB: 4569'

Z: 13' AGL

GL: 4556'

13-3/8", 54.5#/ft Csg
Cmtd w/ 150 sx cmt.

121'

9-5/8", 36#/ft K-55
Cmtd w/ 670 sx Cmt.
Circ to surf.

1622'

Tubing Detail:

166 jts 2-7/8" 6.5# tbg

2-7/8" x 7" TAC

4 jts 2-7/8" 6.5# tbg

2.5" cup type SN

Perfs:

2 SPF 5349-65'
2 SPF 5465-85'

TAC @ 5203'
SN @ 5205'

PBTD: 5408'

7", 26# & 23#/ft K-55
Cmtd w/ 850 sx Cmt.

TD: 5452'

*Note: Records show
F.C. was found at 5373'
and drilled out. CIBP
set at ± 5405'*

PRODUCER

Ratherford Unit 13-12

PROPOSED

KB: 4569'

Z: 13' AGL

GL: 4556'

13-3/8", 54.5#/ft Csg
Cmtd w/ 150 sx cmt.

121'

9-5/8", 36#/ft K-55
Cmtd w/ 670 sx Cmt.
Circ to surf.

1622'

Tubing Detail:

166 jts 2-7/8" 6.5# tbg

2-7/8" x 7" TAC

4 jts 2-7/8" 6.5# tbg

2.5" cup type SN

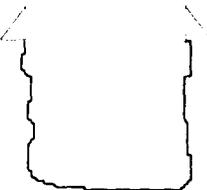
Perfs:

TAC @ 5203'

SN @ 5205'

2 SPF 5349-65'
2 SPF 5465-85'

7", 26# & 23#/ft K-55
Cmtd w/ 850 sx Cmt.



TD 5510'

WORKSHEET
APPLICATION FOR PERMIT TO DRILL

APD RECEIVED: 06/23/95

API NO. ASSIGNED: 43-037-31127

WELL NAME: RATHERFORD 13-12 (RE-ENTRY)
OPERATOR: MOBIL E & P U.S. INC (N7370)

PROPOSED LOCATION:
NENW 13 - T41S - R23E
SURFACE: 1705-FNL-0640-FWL
BOTTOM: 1705-FNL-0640-FWL
SAN JUAN COUNTY
GREATER ANETH FIELD (365)

INSPECT LOCATION BY: / /		
TECH REVIEW	Initials	Date
Engineering		
Geology		
Surface		

LEASE TYPE: IND
LEASE NUMBER: 14-20-603-247A

PROPOSED PRODUCING FORMATION: DSCR

RECEIVED AND/OR REVIEWED:

Plat
 Bond: Federal[] State[] Fee[]
(Number _____)
 Potash (Y/N)
 Oil shale (Y/N)
 Water permit
(Number _____)
 RDCC Review (Y/N)
(Date: _____)

LOCATION AND SITING:

R649-2-3. Unit: _____
 R649-3-2. General.
 R649-3-3. Exception.
 Drilling Unit.
Board Cause no: _____
Date: _____

COMMENTS: _____

STIPULATIONS: _____

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
Budget Bureau No. 1004-0135
Expires: March 31, 1993

SUNDRY NOTICES AND REPORTS ON WELLS

Do not use this form for proposals to drill or to deepen or reentry to a different reservoir.
Use "APPLICATION FOR PERMIT - " for such proposals

SUBMIT IN TRIPLICATE

1. Type of Well <input checked="" type="checkbox"/> Oil Well <input type="checkbox"/> Gas Well <input type="checkbox"/> Other	5. Lease Designation and Serial No. 14-20-603-247A
2. Name of Operator Mobil Exploration & Producing U.S. Inc. as Agent for Mobil Producing TX & NM Inc.	6. If Indian, Allottee or Tribe Name NAVAJO TRIBAL
3. Address and Telephone No. P.O. Box 633, Midland, TX 79702 (915) 688-2585	7. If Unit or CA, Agreement Designation RATHERFORD UNIT
4. Location of Well (Footage, Sec., T., R., M., or Survey Description) 1705' FNL, 640 FWL SEC. 13, T41S, R23E	8. Well Name and No. RATHERFORD 13-12
	9. API Well No. 43-037-31127
	10. Field and Pool, or exploratory Area GREATER ANETH
	11. County or Parish, State SAN JUAN UT

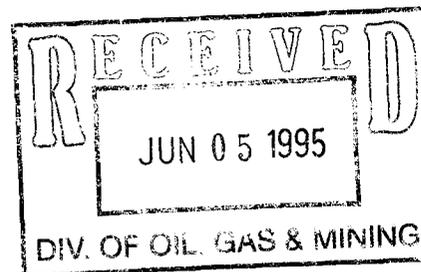
12. CHECK APPROPRIATE BOX(S) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION
<input type="checkbox"/> Notice of Intent	<input type="checkbox"/> Abandonment
<input checked="" type="checkbox"/> Subsequent Report	<input type="checkbox"/> Recompletion
<input type="checkbox"/> Final Abandonment Notice	<input type="checkbox"/> Plugging Back
	<input type="checkbox"/> Casing Repair
	<input type="checkbox"/> Altering Casing
	<input type="checkbox"/> Other WORKOVER
	<input type="checkbox"/> Change of Plans
	<input type="checkbox"/> New Construction
	<input type="checkbox"/> Non-Routine Fracturing
	<input type="checkbox"/> Water Shut-Off
	<input type="checkbox"/> Conversion to Injection
	<input type="checkbox"/> Dispose Water

(Note: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)

13. Describe Proposed or Completed Operations (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

05-09-95 MIRU POOH W/RODS
 05-10-95 POH W/TBG. CIRC. HOLE W/MUD.
 05-11-95 DRILL CIBP. DRILL TO 5484'. CIRC.
 05-12-95 REAM FROM 5460-5484. DRILL TO TD OF 5515'.
 05-13-95 SET PKR AT 5300'. PUMP 120 BBLS 15% HCL.
 05-16-95 POH W/PKR. CLEAN OUT 10' FILL.RIH W/TBG. SN AT 5370' TAC AT 5276' RIH W/RODS.
 RDMO.



14. I hereby certify that the foregoing is true and correct

Signed Shuley Robertson Title ENV. & REG. TECHNICIAN Date 5-30-95

(This space for Federal or State office use)

Approved by _____ Title _____ Date _____
 Conditions of approval, if any:

Title 18 U.S.C. Section 1001, makes it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

STATE OF UTAH
DIVISION OF OIL, GAS AND MINING
 355 West North Temple, 3 Triad, Suite 350, Salt Lake City, UT 84180-1203

MONTHLY OIL AND GAS PRODUCTION REPORT

OPERATOR NAME AND ADDRESS:

C/O MOBIL OIL CORP
 M E P N A
 PO DRAWER G
 CORTEZ CO 81321

UTAH ACCOUNT NUMBER: N7370

REPORT PERIOD (MONTH/YEAR): 6 / 95

AMENDED REPORT (Highlight Changes)

Well Name	API Number	Entity	Location	Producing Zone	Well Status	Days Oper	Production Volumes		
							OIL(BBL)	GAS(MCF)	WATER(BBL)
RATHERFORD UNIT 20-31	4303731050	06280	41S 24E 20	ISMY					
RATHERFORD UNIT 20-42	4303731051	06280	41S 24E 20	DSCR					
RATHERFORD UNIT 21-11	4303731052	06280	41S 24E 21	DSCR					
RATHERFORD UNIT 29-11	4303731053	06280	41S 24E 29	DSCR					
RATHERFORD UNIT #18-24	4303731079	06280	41S 24E 18	DSCR					
RATHERFORD UNIT #19-11	4303731080	06280	41S 24E 19	DSCR					
RATHERFORD UNIT #19-44	4303731081	06280	41S 24E 19	DSCR					
RATHERFORD UNIT #29-22	4303731082	06280	41S 24E 29	DSCR					
RATHERFORD UNIT 12-34	4303731126	06280	41S 23E 12	DSCR					
RATHERFORD UNIT 13-12	4303731127	06280	41S 23E 13	DSCR					
RATHERFORD UNIT #13-21	4303731128	06280	41S 23E 13	DSCR					
RATHERFORD UNIT #13-23	4303731129	06280	41S 23E 13	DSCR					
RATHERFORD UNIT 13-34 (RE-ENTRY)	4303731130	06280	41S 23E 13	DSCR					
TOTALS									

COMMENTS: _____

I hereby certify that this report is true and complete to the best of my knowledge.

Date: _____

Name and Signature: _____

Telephone Number: _____

PHONE CONVERSATION DOCUMENTATION FORM

Route original/copy to:

Well File _____
(Location) Sec _____ Twp _____ Rng _____
(API No.) _____

Suspense
(Return Date) _____
(To - Initials) _____

Other
OPER NM CHG _____

1. Date of Phone Call: 8-3-95 Time: _____

2. DOGM Employee (name) L. CORDOVA (Initiated Call)
Talked to:

Name R. J. FIRTH (Initiated Call) - Phone No. () _____
of (Company/Organization) _____

3. Topic of Conversation: M E P N A / N7370

4. Highlights of Conversation: _____

OPERATOR NAME IS BEING CHANGED FROM M E P N A (MOBIL EXPLORATION AND PRODUCING
NORTH AMERICA INC) TO MOBIL EXPLOR & PROD. THE NAME CHANGE IS BEING DONE AT
THIS TIME TO ALLEVIATE CONFUSION, BOTH IN HOUSE AND AMONGST THE GENERAL PUBLIC.
*SUPERIOR OIL COMPANY MERGED INTO M E P N A 4-24-86 (SEE ATTACHED).

Mobil Oil Corporation

P.O. BOX 5444
DENVER, COLORADO 80217-5444

May 14, 1986

Utah Board of Oil, Gas and Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

Attn: R. J. Firth
Associate Director

RECEIVED
MAY 16 1986

DIVISION OF
OIL, GAS & MINING

SUPERIOR OIL COMPANY MERGER

Dear Mr. Firth:

On September 20, 1984, The Superior Oil Company (Superior) became a wholly owned subsidiary of Mobil Corporation. Since January 1, 1985, Mobil Oil Corporation (MOC), another wholly owned subsidiary of Mobil Corporation, has acted as agent for Superior and has operated the Superior-owned properties.

On April 24, 1986, Superior was merged with Mobil Exploration and Producing North America Inc. (MEPNA), which is also a wholly owned subsidiary of Mobil Corporation. MEPNA is the surviving company of the merger.

This letter is to advise you that all properties held in the name of Superior will now be held in the name of MEPNA; and that these properties will continue to be operated by MOC as agent for MEPNA.

Attached is a listing of all wells and a separate listing of injection-disposal wells, Designation of Agent and an organization chart illustrating the relationships of the various companies. If you have any questions or require additional documentation of this merger, please feel free to contact me at the above address or (303) 298-2577.

Very truly yours,



CNE/rd
CNE8661

R. D. Baker
Environmental Regulatory Manager

Division of Oil, Gas and Mining
OPERATOR CHANGE WORKSHEET

1-LEC	7-PL
2-LWP	8-SJ
3-DES	9-FILE
4-VLC	
5-RJF	
6-LWP	

Attach all documentation received by the division regarding this change.
 Initial each listed item when completed. Write N/A if item is not applicable.

- Change of Operator (well sold) Designation of Agent
 Designation of Operator Operator Name Change Only

The operator of the well(s) listed below has changed (EFFECTIVE DATE: 8-2-95)

TO (new operator) <u>MOBIL EXPLOR & PROD</u>	FROM (former operator) <u>M E P N A</u>
(address) <u>C/O MOBIL OIL CORP</u>	(address) <u>C/O MOBIL OIL CORP</u>
<u>PO DRAWER G</u>	<u>PO DRAWER G</u>
<u>CORTEZ CO 81321</u>	<u>CORTEZ CO 81321</u>
phone <u>(303) 564-5212</u>	phone <u>(303) 564-5212</u>
account no. <u>N7370</u>	account no. <u>N7370</u>

Well(s) (attach additional page if needed):

Name: <u>** SEE ATTACHED **</u>	API: <u>039-31127</u>	Entity: _____	Sec _____	Twp _____	Rng _____	Lease Type: _____
Name: _____	API: _____	Entity: _____	Sec _____	Twp _____	Rng _____	Lease Type: _____
Name: _____	API: _____	Entity: _____	Sec _____	Twp _____	Rng _____	Lease Type: _____
Name: _____	API: _____	Entity: _____	Sec _____	Twp _____	Rng _____	Lease Type: _____
Name: _____	API: _____	Entity: _____	Sec _____	Twp _____	Rng _____	Lease Type: _____
Name: _____	API: _____	Entity: _____	Sec _____	Twp _____	Rng _____	Lease Type: _____
Name: _____	API: _____	Entity: _____	Sec _____	Twp _____	Rng _____	Lease Type: _____

OPERATOR CHANGE DOCUMENTATION

- N/A 1. (Rule R615-8-10) Sundry or other legal documentation has been received from former operator (Attach to this form).
- N/A 2. (Rule R615-8-10) Sundry or other legal documentation has been received from new operator (Attach to this form).
- N/A 3. The Department of Commerce has been contacted if the new operator above is not currently operating any wells in Utah. Is company registered with the state? (yes/no) _____ If yes, show company file number: _____.
- N/A 4. (For Indian and Federal Wells ONLY) The BLM has been contacted regarding this change (attach Telephone Documentation Form to this report). Make note of BLM status in comments section of this form. Management review of **Federal and Indian** well operator changes should take place prior to completion of steps 5 through 9 below.
- See 5. Changes have been entered in the Oil and Gas Information System (Wang/IBM) for each well listed above. (8-3-95)
- LWP 6. Cardex file has been updated for each well listed above. 8-21-95
- LWP 7. Well file labels have been updated for each well listed above. 9-28-95
- See 8. Changes have been included on the monthly "Operator, Address, and Account Changes" memo for distribution to State Lands and the Tax Commission. (8-3-95)
- See 9. A folder has been set up for the Operator Change file, and a copy of this page has been placed there for reference during routing and processing of the original documents.

ENTITY REVIEW

- Lee* 1. (Rule R615-8-7) Entity assignments have been reviewed for all wells listed above. Were entity changes made? (yes/no) no (If entity assignments were changed, attach copies of Form 6, Entity Action Form).
- N/A* 2. State Lands and the Tax Commission have been notified through normal procedures of entity changes.

BOND VERIFICATION (Fee wells only) ** No Fee Lease Wells at this time!*

- N/A/ Lee* 1. (Rule R615-3-1) The new operator of any fee lease well listed above has furnished a proper bond.
2. A copy of this form has been placed in the new and former operators' bond files.
3. The former operator has requested a release of liability from their bond (yes/no) . Today's date 19 . If yes, division response was made by letter dated 19 .

LEASE INTEREST OWNER NOTIFICATION RESPONSIBILITY

- N/A* 1. (Rule R615-2-10) The former operator/lessee of any **fee lease** well listed above has been notified by letter dated 19 , of their responsibility to notify any person with an interest in such lease of the change of operator. Documentation of such notification has been requested. *UTS 8/5/95*
- N/A* 2. Copies of documents have been sent to State Lands for changes involving **State leases**.

FILMING

- ✓* 1. All attachments to this form have been microfilmed. Date: October 6 1995.

FILING

1. Copies of all attachments to this form have been filed in each well file.
2. The original of this form and the original attachments have been filed in the Operator Change file.

COMMENTS

950803 LIC F5/Not necessary!

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
Budget Bureau No. 1004-0135
Expires: March 31, 1993

SUNDRY NOTICES AND REPORTS ON WELLS

Do not use this form for proposals to drill or to deepen or reentry to a different reservoir.

Use "APPLICATION FOR PERMIT -" for such proposals

5. Lease Designation and Serial No.

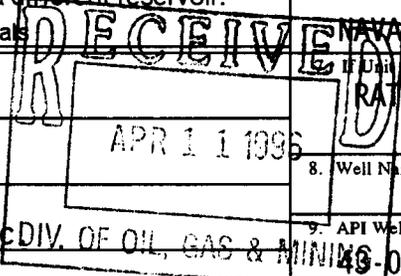
14-20-603-247A

6. If Indian, Allottee or Tribe Name

NAVAJO TRIBAL

If Unit for CA, Agreement Designation
RATHERFORD UNIT

SUBMIT IN TRIPLICATE



1. Type of Well

Oil Well Gas Well Other SIDETRACK

8. Well Name and No.

13-12

2. Name of Operator Mobil Exploration & Producing U.S. Inc.
as Agent for Mobil Producing TX & NM Inc

9. API Well No.

49-037-31127

3. Address and Telephone No.

P.O. Box 633, Midland, TX 79702 915-688-2585

10. Field and Pool, or exploratory Area

GREATER ANETH

4. Location of Well (Footage, Sec., T., R., M., or Survey Description)

SEC. 13, T41S, R23E
1705' FNL, 640' FWL

11. County or Parish, State

SAN JUAN UT

12. CHECK APPROPRIATE BOX(S) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION
<input checked="" type="checkbox"/> Notice of Intent	<input type="checkbox"/> Abandonment
<input type="checkbox"/> Subsequent Report	<input type="checkbox"/> Recompletion
<input type="checkbox"/> Final Abandonment Notice	<input type="checkbox"/> Plugging Back
	<input type="checkbox"/> Casing Repair
	<input type="checkbox"/> Altering Casing
	<input checked="" type="checkbox"/> Other SIDETRACK
	<input type="checkbox"/> Change of Plans
	<input type="checkbox"/> New Construction
	<input type="checkbox"/> Non-Routine Fracturing
	<input type="checkbox"/> Water Shut-Off
	<input type="checkbox"/> Conversion to Injection
	<input type="checkbox"/> Dispose Water

(Note: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)

13. Describe Proposed or Completed Operations (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

BOTTOMHOLE LOCATION
LATERAL 1 (NW) 1170' N & 1091' W OF SURFACE LOCATION
LATERAL 2 (SE) 843' S & 1118' E OF SURFACE

SEE ATTACHED PROCEDURE



14. I hereby certify that the foregoing is true and correct

Signed Shirley Robinson

Title ENV. & REG. TECHNICIAN

Date 4-8-96

(This space for Federal or State office use)

Approved by [Signature]

Title Production Engineer

Date 4/12/96

Conditions of approval, if any:

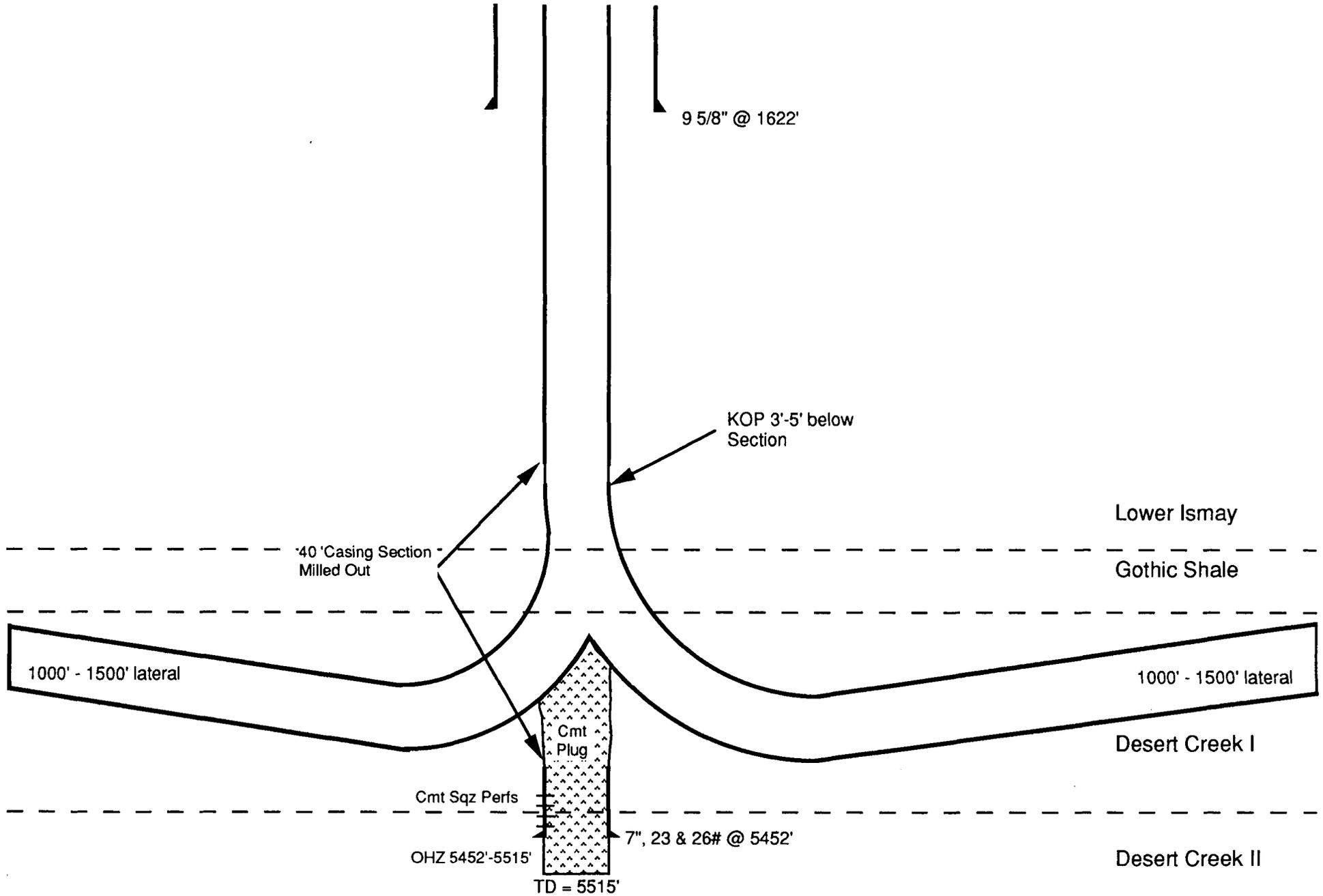
**Ratherford Unit Well No.'s
11-43, 12-23, 13-12, 13-14, 13-21 & 24-41
Multi-lateral Horizontal Drilling Procedure**

The objective of this procedure is to prepare this wellbore for sidetracking, sidetrack the subject well and drill a short radius horizontal well with a multiple (1,000' - 1,500') laterals.

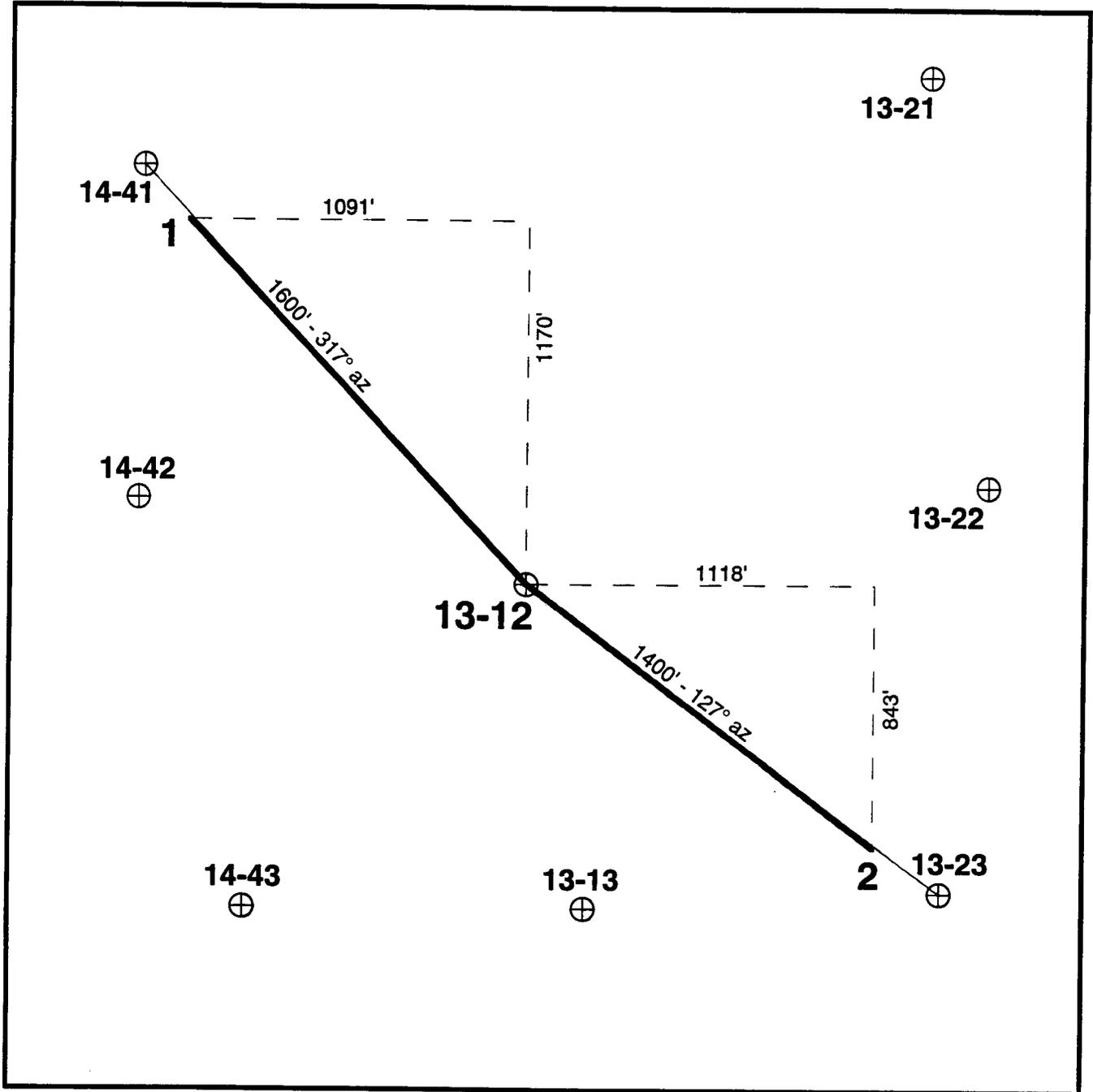
1. Prepare location and dig working pit.
2. MIRU DDPU (daylight workover rig), reverse unit and H2S equipment.
3. TOH and LD rods.
4. ND wellhead, release TAC, and NU BOPs.
5. TIH with full gauge bit and casing scraper to PBTD. TOH with bit and scraper.
6. Attempt to load hole, if hole will not load, pump LCM pills until the well will circulate. POOH.
7. TIH with 4 1/2" section mill dressed with cutter arms for casing size. Cut a 40' section with the top of the section 50' to 100' above the top of the Desert Creek Formation. Circulate the hole clean and TOH with section mill.
8. TIH with 10 jts 2 3/8" tubing on 2 7/8" DP to TD. Circulate the well until static and free of oil and gas. Spot a balanced cement kick-off plug. TOH with workstring. WOC a minimum of 12 hours.
9. TIH with bit and dress off cement plug to the kick off point (3' - 5' below the casing section). POOH.
10. Release workover rig.
11. MIRU 24 hour DDPU with drilling package.
12. PU curve drilling assembly and TIH on 2 7/8" DP to PBTD.
13. RU power swivel and wireline. Gyro survey wellbore and seat gyro in orienting sub.
14. Sidetrack wellbore using gyro orientation. Switch to Magnetic steering tool when free of magnetic interference from casing.
15. Drill curve section using steering tool for orientation. POOH and LD curve drilling motor.
16. PU lateral drilling motor and new bit.
17. TIH with lateral drilling assembly. Steer assembly as necessary with steering tool to reach target. Make bit trips as necessary. Circulate wellbore clean and POOH.

18. Drill additional laterals by sidetracking out of the original curve with a lateral motor. Steer assembly as necessary with steering tool to reach target. Make bit trips as necessary. Circulate wellbore clean and POOH.
19. Complete well as per operations Engineering.

PROPOSED CONDITION RATHERFORD UNIT 13-12 HORIZONTAL MULTILATERAL



Ratherford Unit 13-12 Horizontal Well Design



WORKSHEET
APPLICATION FOR PERMIT TO DRILL

APD RECEIVED: 04/11/96

API NO. ASSIGNED: 43-037-31127

WELL NAME: RU 13-12 (MULTI-LEG) REENTRY
OPERATOR: MOBIL EXPL & PROD (N7370)

PROPOSED LOCATION:
NENW 13 - T41S - R23E
SURFACE: 1705-FNL-0640-FWL
BOTTOM: 0535-FNL-0451-FEL
SAN JUAN COUNTY
GREATER ANETH FIELD (365)

LEASE TYPE: IND
LEASE NUMBER: 14-20-603-247A

PROPOSED PRODUCING FORMATION: DSCR

INSPECT LOCATION BY: / /		
TECH REVIEW	Initials	Date
Engineering		
Geology		
Surface		

RECEIVED AND/OR REVIEWED:

Plat
 Bond: Federal[] State[] Fee[]
(Number _____)
 Potash (Y/N)
 Oil shale (Y/N)
 Water permit
(Number _____)
 RDCC Review (Y/N)
(Date: _____)

LOCATION AND SITING:

R649-2-3. Unit: Ratherford
 R649-3-2. General.
 R649-3-3. Exception.
 Drilling Unit.
Board Cause no: _____
Date: _____

COMMENTS: Reentry.

STIPULATIONS: _____



State of Utah
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

Michael O. Leavitt
Governor

Ted Stewart
Executive Director

James W. Carter
Division Director

355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203
801-538-5340
801-358-3940 (Fax)
801-538-5319 (TDD)

April 12, 1996

Mobil Exploration & Producing U.S., Inc.
P.O. Box 633
Midland, Texas 79702

Re: Ratherford Unit 13-12 (Re-entry) Well, 1705' FNL, 640' FWL,
NE NW, Sec. 13, T. 41 S., R. 23 E., San Juan County, Utah

Gentlemen:

Pursuant to the provisions and requirements of Utah Code Ann. 40-6-1 et seq., Utah Administrative Code R649-3-1 et seq., and the attached Conditions of Approval, approval to re-enter the referenced well is granted.

This approval shall expire one year from the above date unless substantial and continuous operation is underway, or a request for extension is made prior to the expiration date. The API identification number assigned to this well is 43-037-31127.

Sincerely,

A handwritten signature in black ink, appearing to read "R. J. Firth".
R. J. Firth
Associate Director

lwp

Enclosures

cc: San Juan County Assessor

Bureau of Land Management, Moab District Office

WAPD



Operator: Mobil Exploration & Producing U.S, Inc.
Well Name & Number: Ratherford Unit 13-12 (Re-entry)
API Number: 43-037-31127
Lease: 14-20-603-247A
Location: NE NW Sec. 13 T. 41 S. R. 23 E.

Conditions of Approval

1. General

Compliance with the requirements of Utah Admin. R. 649-1 et seq., the Oil and Gas Conservation General Rules, and the applicable terms and provisions of the approved Application for Permit to Drill.

2. Notification Requirements

Notify the Division within 24 hours following spudding the well or commencing drilling operations. Contact Jimmie Thompson at (801)538-5340.

Notify the Division prior to commencing operations to plug and abandon the well. Contact Frank Matthews or Mike Hebertson at (801)538-5340.

3. Reporting Requirements

All required reports, forms and submittals shall be promptly filed with the Division, including but not limited to the Entity Action Form (Form 6), Report of Water Encountered During Drilling (Form 7), Weekly Progress Reports for drilling and completion operations, and Sundry Notices and Reports on Wells requesting approval of change of plans or other operational actions.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

SUNDRY NOTICES AND REPORTS ON WELLS

Do not use this form for proposals to drill or to deepen or reentry to a different reservoir.
Use "APPLICATION FOR PERMIT -" for such proposals

SUBMIT IN TRIPLICATE

1. Type of Well

Oil Well Gas Well Other **SIDETRACK**

2. Name of Operator **Mobil Exploration & Producing U.S. Inc.
as Agent for Mobil Producing TX & NM Inc.**

3. Address and Telephone No.
P.O. Box 633, Midland, TX 79702 915-688-2585

4. Location of Well (Footage, Sec., T., R., M., or Survey Description)
**SEC. 13, T41S, R23E
1705' FNL, 640' FWL**

FORM APPROVED
Budget Bureau No. 1004-0135
Expires: March 31, 1993

5. Lease Designation and Serial No.
14-20-603-247A

6. If Indian, Allottee or Tribe Name
NAVAJO TRIBAL

7. If Unit or CA, Agreement Designation
RATHERFORD UNIT

8. Well Name and No.
13-12

9. API Well No.
43-037-31127

10. Field and Pool, or exploratory Area
GREATER ANETH

11. County or Parish, State
SAN JUAN UT

12. CHECK APPROPRIATE BOX(S) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION
<input checked="" type="checkbox"/> Notice of Intent	<input type="checkbox"/> Abandonment
<input type="checkbox"/> Subsequent Report	<input type="checkbox"/> Recompletion
<input type="checkbox"/> Final Abandonment Notice	<input type="checkbox"/> Plugging Back
	<input type="checkbox"/> Casing Repair
	<input type="checkbox"/> Altering Casing
	<input checked="" type="checkbox"/> Other SIDETRACK
	<input type="checkbox"/> Change of Plans
	<input type="checkbox"/> New Construction
	<input type="checkbox"/> Non-Routine Fracturing
	<input type="checkbox"/> Water Shut-Off
	<input type="checkbox"/> Conversion to Injection
	<input type="checkbox"/> Dispose Water

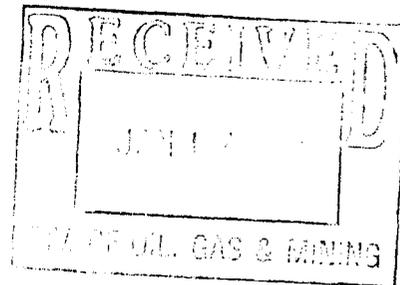
(Note: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)

13. Describe Proposed or Completed Operations (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

BOTTOMHOLE LOCATION

**LATERAL 1: 742' SOUTH & 1187' EAST FROM SURFACE.
LATERAL 2: 1221' NORTH & 954' WEST FROM SURFACE.
LATERAL 3: 992' SOUTH & 1040' EAST FROM SURFACE.
LATERAL 4: 1032' NORTH & 1152' WEST FROM SURFACE.**

SEE ATTACHED PROCEDURE



14. I hereby certify that the foregoing is true and correct

Signed Timothy Houchens

Title **ENV. & REG. TECHNICIAN**

Date **1-13-97**

(This space for Federal or State office use)

Approved by [Signature]

Title [Signature]

Date **1/21/97**

Conditions of approval, if any:

Title 18 U.S.C. Section 1001, makes it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

Ratherford Unit Well #13-12 Multilateral Horizontal Drilling Procedure

The objective of this procedure is to prepare this wellbore for sidetracking, sidetrack the subject well and drill multiple short radius horizontal laterals (1300-1700 ft).

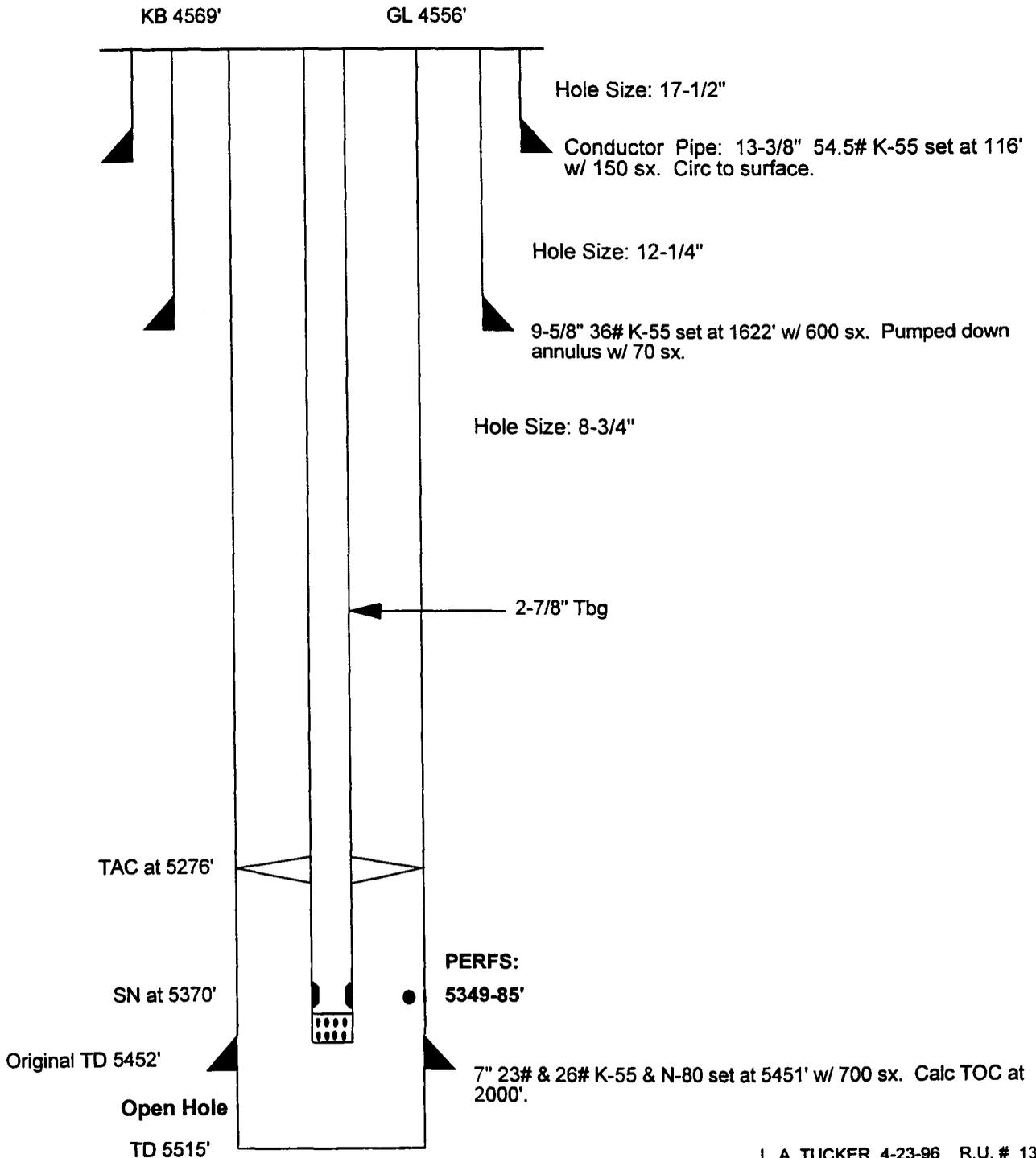
1. Prepare location and dig working pit.
2. MIRU WSU, reverse unit, and H₂S equipment. Bullhead kill weight fluid down tubing.
3. Release packer, and pick up on wellhead to remove. ND wellhead and NU BOP's. Pressure test BOP's.
4. Continue to POH with tubing.
5. THH with full gauge bit and casing scraper to PBTD. TOH with bit and scraper.
6. Ensure well will circulate, and set RTBP above perms. Pressure test casing to 1000 psi.
7. RDMO WSU.
8. MIRU 24 hr WSU.
9. PU tubing, drill collars, and drill pipe in derrick and run in hole. Then POH and stand back.
10. RU wireline company and run gauge ring for casing down to packer setting depth.
11. Run packer on wireline and set using GR/CCL log to correlate with. RD wireline.
12. PU drillpipe with UBHO sub and latch assembly.
13. Latch into packer. Run gyro and obtain orientation of keyway on packer.
14. POH w/ gyro. POH w/ drill pipe and RIH w/ whipstock oriented on the surface for window azimuth desired.
15. Shear pilot mill bolt and start milling window.
16. POH and PU window mill and watermelon mill to finish window and drill 3 ft of formation.
17. POH w/ mills and RBIH w/ new mills to clean up window.
18. PU drill pipe and directional motors to drill curve. Use the gyro to drill until the inclination dictates that the gyro must be pulled.
19. Pull five stands of drill pipe and run steering tool to finish drilling the curve.
20. POH once curve is finished and PU lateral motor to drill the lateral using MWD.

21. Once lateral TD is reached, POH w/ directional equipment.
22. RIH w/ hook and retrieve whipstock.
23. PU new whipstock with extension in body for next window and orient on surface to desired azimuth.
24. Repeat steps 15-23, for each successive planned lateral.

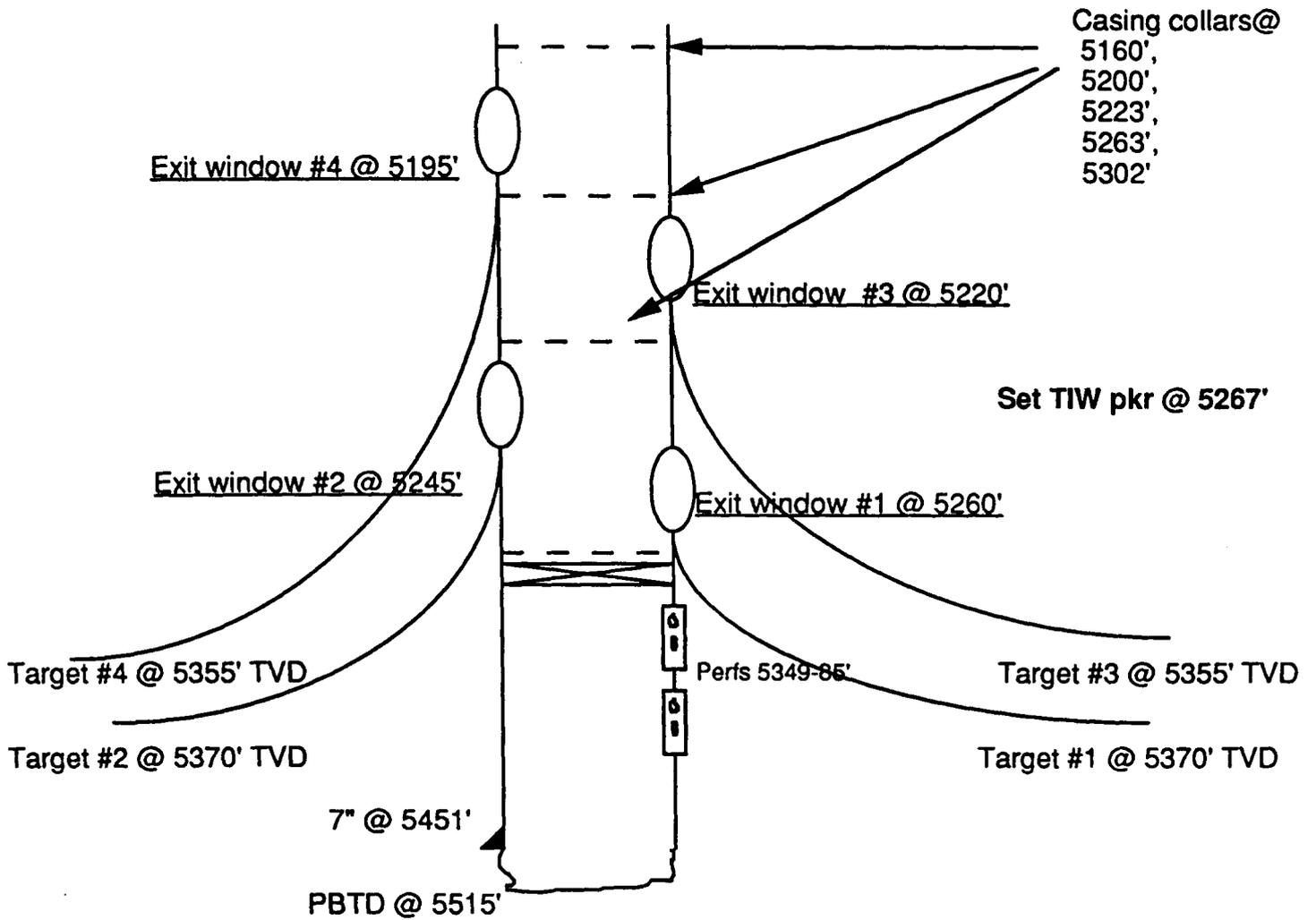
RATHERFORD UNIT # 13-12
GREATER ANETH FIELD
 1705' FNL & 640' FWL
 SEC 13-T41S-R23E
 SAN JUAN COUNTY, UTAH
 API 43-037-31127
 PRISM 0043000

PRODUCER

Capacities:	bbl/ft	gal/ft	cuft/ft
2-7/8" 6.5#	.00579	.2431	.0325
7" 23#	.0393	1.6535	.2210
7" 26#	.0382	1.6070	.2148
2-7/8"x7"23#	.0313	1.3162	.1760
2-7/8"x7"26#	.0302	1.2698	.1697



Whipstock plan for Ratherford #13-12



Window	Btm-Top of window	Extension length	Curve radius	Bearing
1	5260-50	-	110	122
2	5245-35	16	125	322
3	5220-10	38	123	132
4	5195-85	63	160	312

*The double spline is 2.42 ft long and the bottom of the whipstock, latch, and debris sub are 5.68 ft long. These lengths must be added to the extension lengths to determine the entire whipstock assembly length.

WORKSHEET
APPLICATION FOR PERMIT TO DRILL

APD RECEIVED: 01/17/97

API NO. ASSIGNED: 43-037-31127

WELL NAME: 13-12 MULTI-LEG RE-ENTRY
OPERATOR: MOBIL EXPL & PROD (N7370)

PROPOSED LOCATION:
SWNW 13 - T41S - R23E
SURFACE: 1705-FNL-0640-FWL
BOTTOM: 1750-FNL-0320-FEL
SAN JUAN COUNTY
GREATER ANETH FIELD (365)

INSPECT LOCATION BY: / /		
TECH REVIEW	Initials	Date
Engineering		
Geology		
Surface		

LEASE TYPE: IND
LEASE NUMBER: 14-20-603-247A

PROPOSED PRODUCING FORMATION: DSCR

RECEIVED AND/OR REVIEWED:

Plat
 Bond: Federal State Fee
(Number NA)
 Potash (Y/N)
 Oil shale (Y/N)
 Water permit
(Number Navajo Allocation)
 RDCC Review (Y/N)
(Date: _____)

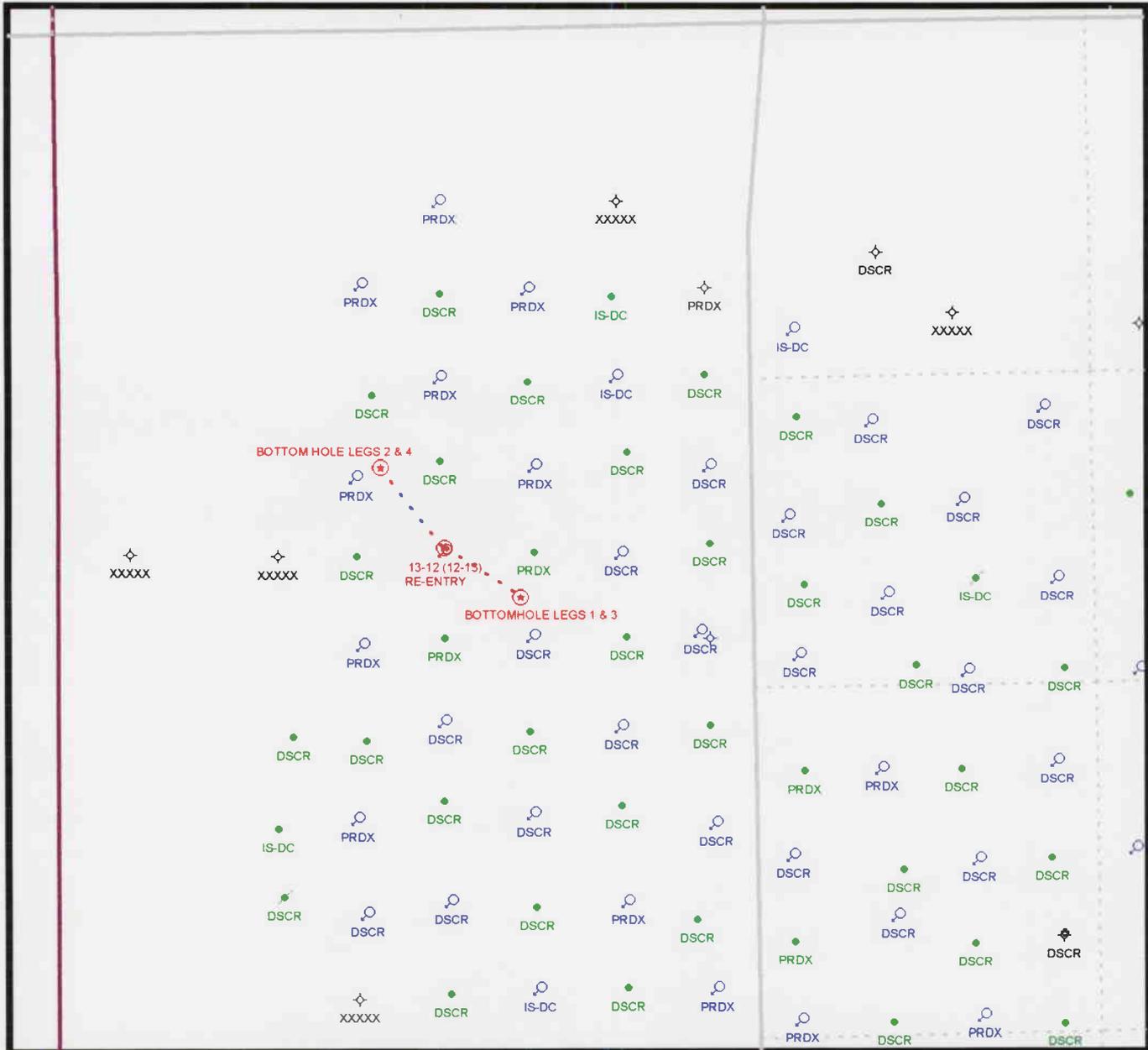
LOCATION AND SITING:

R649-2-3. Unit: Ratherford
 R649-3-2. General.
 R649-3-3. Exception.
 Drilling Unit.
Board Cause no: _____
Date: _____

COMMENTS: _____

STIPULATIONS: _____

OPERATOR: MOBIL EXPL & PROD
FIELD: GREATER ANETH
SEC, TWP, RNG: 12, T41S, R23E
COUNTY: SAN JUAN
UAC: R649-2-3 RATHERFORD UNIT



PREPARED:
DATE: 21-JAN-97



State of Utah
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

Michael O. Leavitt
Governor
Ted Stewart
Executive Director
James W. Carter
Division Director

1594 West North Temple, Suite 1210
Box 145801
Salt Lake City, Utah 84114-5801
801-538-5340
801-359-3940 (Fax)
801-538-7223 (TDD)

January 21, 1997

Mobil Exploration & Producing
P.O. Box 633
Midland, Texas 79702

Re: Ratherford Unit 13-12 (Re-entry) Well, 1705' FNL, 640' FWL,
SW NW, Sec. 13, T. 41 S., R. 23 E., San Juan County, Utah

Gentlemen:

Pursuant to the provisions and requirements of Utah Code Ann. 40-6-1 et seq., Utah Administrative Code R649-3-1 et seq., and the attached Conditions of Approval, approval to re-enter and drill the referenced well is granted.

This approval shall expire one year from the above date unless substantial and continuous operation is underway, or a request for extension is made prior to the expiration date. The API identification number assigned to this well is 43-037-31127.

Sincerely,

A handwritten signature in black ink, appearing to read 'R. J. Firth'.

R. J. Firth
Associate Director

lwp

Enclosures

cc: San Juan County Assessor
Bureau of Land Management, Moab District Office

Operator: Mobil Exploration & Producing
Well Name & Number: Ratherford Unit 13-12 (Re-entry)
API Number: 43-037-31127
Lease: 14-20-603-247A
Location: SW NW Sec. 13 T. 41 S. R. 23 E.

Conditions of Approval

1. General

Compliance with the requirements of Utah Admin. R. 649-1 et seq., the Oil and Gas Conservation General Rules, and the applicable terms and provisions of the approved Application for Permit to Drill.

2. Notification Requirements

Notify the Division within 24 hours following spudding the well or commencing drilling operations. Contact Jimmie Thompson at (801)538-5336.

Notify the Division prior to commencing operations to plug and abandon the well. Contact Frank Matthews at (801)538-5334 or Mike Hebertson at (801)538-5333.

3. Reporting Requirements

All required reports, forms and submittals shall be promptly filed with the Division, including but not limited to the Entity Action Form (Form 6), Report of Water Encountered During Drilling (Form 7), Weekly Progress Reports for drilling and completion operations, and Sundry Notices and Reports on Wells requesting approval of change of plans or other operational actions.

4. In accordance with Utah Admin. R. 649-3-11, Directional Drilling, submittal of a complete angular deviation and directional survey report is required.

DIVISION OF OIL, GAS AND MINING

SPUDDING INFORMATION

Name of Company: MOBIL

Well Name: RATHERFORD UNIT 13-12

Api No. 43-037-31127

Section 13 Township 41S Range 23E County SAN JUAN

Drilling Contractor BIG "A"

Rig # 25

SPUDDED:

Date 1/27/97

Time _____

How ROTARY

Drilling will commence _____

Reported by BENNIE BRIGGS

Telephone # _____

Date: 2/3/97 Signed: JLT

MEMO TO FILE

RU 13-12
Mobil Exploration & Production
API 43-037-31127
13-41S-23E
San Juan County

1/29/97

Per DOGM's Mike Hebertson, Mobil requested, via telephone conversation, that the **APD** for this well, approved **4/12/96**, be cancelled. Mobil submitted a revised APD (on a sundry notice form) which was approved 1/21/97. **LA date** for the 4/12/96 permit is **1/29/97**.

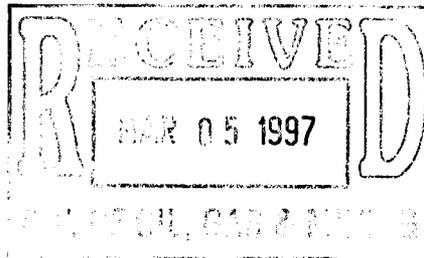
Don Staley



ROCKY MOUNTAIN GEO-ENGINEERING CORP.

Well Logging • Consulting Geology • Coal Bed Methane Services • Computerized Logging Equipment & Software

2450 INDUSTRIAL BLVD. • GRAND JUNCTION, CO 81505
(970) 243-3044 • FAX: 241-1085



Thursday, February 27, 1997

Division of Oil & Gas Mining
State of Utah
355 W. North, Suite 350
Salt Lake City, UT 84180-1203

Re: Ratherford Unit #12-22, Legs 1, 2, & 3 #4
Sec. 12, T41S, R23E
San Juan County, Utah
430373/127 DRL

Dear Sirs:

Enclosed is the final computer colored log and geology report for the above referenced well.

MUD LOSS IN
LOG FILE.

We appreciate the opportunity to be of service to you and look forward to working with you again in the near future.

If you have any questions regarding the enclosed data, please contact us.

Sincerely,

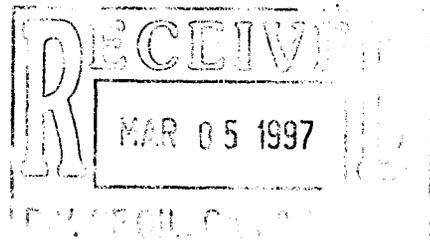
Bill Nagel
Senior Geologist

BN/dn

Enc. 1 Final Computer Colored Log w/Geology Report for Each Leg

cc Letter Only; Dana Larson; Mobil Oil; Midland, TX





SWNW 1705 FNL 64050L

MOBIL

**RATHERFORD UNIT #13-12
HORIZONTAL LATERAL LEG #1
LOWER 1-B POROSITY BENCH DESERT CREEK
SECTION 13, T41S, R23E
SAN JUAN, UTAH**

4303731127 DRL

**GEOLOGY REPORT
by
DAVE MEADE / MARVIN ROANHORSE
ROCKY MOUNTAIN GEO-ENGINEERING CORP.
GRAND JUNCTION, COLORADO
(970) 243-3044**

MICROFICHE

TABLE OF CONTENTS

WELL SUMMARY.....	3
DAILY WELL CHRONOLOGY.....	4
DAILY ACTIVITY.....	5
BIT RECORD.....	6
MUD RECORD.....	7
SAMPLE DESCRIPTIONS.....	8
FORMATION TOPS.....	16
GEOLOGIC SUMMARY AND ZONES OF INTEREST.....	17
WELL PLOTS.....	21

WELL SUMMARY

OPERATOR: MOBIL EXPLORATION & PRODUCTION U.S. INC.

NAME: RATHERFORD UNIT #13-12 SE LOWER HORIZONTAL LATERAL
LEG #1 IN 1B LOWER POROSITY BENCH, DESERT CREEK

LOCATION: SECTION 13, T41S, R23E

COUNTY/STATE: SAN JUAN, UTAH

ELEVATION: KB: 4569' GL:4556'

SPUD DATE: 1/30/97

COMPLETION DATE: 2/04/97

DRILLING ENGINEER: BENNY BRIGGS

WELLSITE GEOLOGY: DAVE MEADE / MARVIN ROANHORSE

MUDLOGGING:
ENGINEERS DAVE MEADE / MARVIN ROANHORSE

CONTRACTOR: BIG "A" RIG 25
TOOLPUSHER: DEAN SIPE

HOLE SIZE: 4 3/4"

CASING RECORD: SIDETRACK IN WINDOW AT 5253' MEASURED DEPTH

DRILLING MUD: M-I
ENGINEER: CHARLIE CIBBS
MUD TYPE: PRODUCTION WATER/POLYMER SWEEPS

ELECTRIC LOGS: NA
ENGINEER: NA
TYPE LOGS: NA

TOTAL DEPTH: 6679' MEASURED DEPTH

STATUS: PULL BACK UP HOLE AND TO SET WHIPSTOCK PRIOR TO
DRILLING LEG #2

DRILLING CHRONOLOGY

MOBIL RATHERFORD UNIT #13-12 SE LOWER 1-B HORIZONTAL LATERAL LEG # 1

<u>DATE</u>	<u>DEPTH</u>	<u>DAILY</u>	<u>ACTIVITY</u>
1/27/97	5260'	0'	MOVE RIG-NIPPLE UP & TEST BOP
1/28/97	5267'	0'	PRESSURE TEST BOP-PICK UP SWIVEL & TI WITH VALVE-TIH WITH DC & PIPE-LATCH ON TO BRIDGE PLUG-OPEN VALVE-TOH-CIR OUT GAS & OIL-TOH-PICK UP K-JET-SET PACKER @ 5267'-RIG DOWN K-JET-PICK UP STRINGER-TIH-SET STRING IN PACKER-RIG UP GYRO & RUN GYRO
1/29/97	5267'	0'	RUN GYRO-RIG DOWN GYRO-SHEAR PINS ON ANCHOR-TOH-PICK UP STARTER MILL-TIH WITH WHIPSTOCK-LATCH ONTO WHIPSTOCK-CIR OUT GAS & OIL-MILL WINDOW 5253'-5255'-CIR OUT-TOH-LAYDOWN MILL-PICK UP NEW MILL-TIH-MILL WINDOW 5255'-5258'- NOTE: RMGE FID UNIT #31 ON LOCATION & RIGGED UP FOR TWO MAN GEOLOGICAL CONSULTING & LOGGING
1/30/97	5258'	9'	MILL 5258'-5262'-PUMP SWEEP-SAFETY MTG(H2S)-TOH-PICK UP BIT & MUD MOTOR & MONEL-TIH-PICK UP SWIVEL-RIG UP K-JET & RUN GYRO-TIME DRILL 5262'-5267'
1/31/97	5367'	64'	DRILL 5267'-5282' PULL GYRO & CHECK SHOT & PULL GYRO FROM STEERING TOOL-RIG STEERING TOOL & TEST-REPAIR STEERING TOOL-TEST-RUN IN W/STEERING TOOL-DRLG CURVE & SURVEYS-CIR. SPLS @ 5431'-HANG SWIVEL-TOH-LAY DOWN 10 JOINTS TO WET CONN-PULL STEERING TOOL & RIG DOWN K-JET-TOH
2/1/97	5431'	445'	TOH-LAY DOWN BHA-P.U. BIT & MUD MOTOR & MWD-TEST MOTOR-TIH-CRI & WASH TO BTM-DRIG AND DIR. SURVEYS
2/2/97	5876'	631'	DRLG & DIR SURVEYS
2/3/97	6507'	120'	DRLG & DIR. SURVEYS-CIR & WORK MUD MOTOR-CIR. SPLS @ 6584'-TOH FOR MUD MOTOR -P.U. & TEST NEW MOTOR-TIH WITH PH-6 & STRAP-P.U. SWIVEL FILL PIPE & CIR OUT OIL & GAS-ORIENTATED TOOL FACE & PUMP UP SURVEY-DRLG & DIR SURVEYS
2/4/97	6627'	52'	DRLG & DIR SURVEYS-CIR. SPLS @ 6679'-CIR. SWEEPS-TOH-LAY DOWN LATERAL BHA-TIH W/ RETRIEVING HOOK-TOH-PICK UP NEW WHIPSTOCK

DAILY ACTIVITY

Operator: MOBIL

Well Name: RATHERFORD UNIT #13-12 SE LOWER 1-B HORIZONTAL LATERAL LEG # 1

DATE	DEPTH	DAILY	DATE	DEPTH	DAILY
1/27/97	5260'	0'			
1/28/97	5267'	0'			
1/29/97	5267'	0'			
1/30/97	5258'	9'			
1/31/97	5267'	164'			
2/1/97	5431'	445'			
2/2/97	5876'	751'			
2/3/97	6507'	120'			
2/4/97	6627'	52'			
TD	6679'				

BIT RECORD

OPERATOR: MOBIL

WELL NAME: RATHERFORD UNIT #13-12 SE LOWER 1-B HORIZONTAL LATERAL

LEG# 1

RUN	SIZE	MAKE	TYPE	IN/OUT	FTG	HRS	FT/HR
#1 BIT	4 3/4"	STC	MF3P	5262'/ 5431'	169'	10.5	15.6
#2 BIT	4 3/4"	HTC	STR-20	5431'/ 6584'	1,153'	49.0	23.5
#3(RR) BIT	4 3/4"	HTC	MF3P	6584'/ 6679'	95'	14.0	6.8

MUD REPORT

OPERATOR: MOBIL

WELL NAME: RATHERFORD UNIT #13-12 SE LOWER 1-B HORIZONTAL LATERAL LEG #1

DATE	DEPTH	WT	VIS	PLS	YLD	GEL	PH	WL	CK	CHL	CA	SD	SOL	WTR
1/28/97	5260'	8.3+	26	-	-	-	8.0	N/C	N/C	600	440	-	-	100
1/29/97	5255'	8.3+	26	-	-	-	8.5	N/C	N/C	800	140	-	-	100
1/30/97	5262'	8.3+	26	-	-	-	11.5	N/C	N/C	1200	20	-	-	100
1/31/97	5330'	8.3+	26	-	-	-	11.5	N/C	N/C	1200	20	-	-	100
2/1/97	5000'	8.3+	26	-	-	-	11.0	N/C	N/C	1000	20	-	-	100
2/2/97	6080'	8.3+	26	-	-	-	11.5	N/C	N/C	1200	20	-	-	100
2/3/97	6584	8.3+	26	-	-	-	11.0	N/C	N/C	1200	20	-	-	100
2/4/97	6627	8.4	26	-	-	-	10.0	N/C	N/C	14000	1200	-	-	100

SAMPLE DESCRIPTIONS

OPERATOR: MOBIL

WELL NAME: RATHERFORD UNIT 13-22 SE LOWER 1-B HORIZONTAL LATERAL LEG #1

DEPTH	LITHOLOGY
5260.00 5270.00	"LS lt-mgybrn,ltbrn,off wh,crpxl-micxl,sft,rthy-chky,arg-sl slty,mot ip,occ grdg to lmy MRLST,tt-vrr intxl POR,v fnt dull yel FLOR,n vis STN,v p res ring CUT,W/ ABNT METAL FRAGS "
5270.00 5280.00	"LS AA/scat dk brn CHT,hd,amor"
5280.00 5290.00	"DOL ltgybrn-brn,micxl,occ crpxl,rthy,v sl slty,chytr brn CHT frag,lmy-v lmy,occ grdg to v dol LS,tt-v rr intxl POR,n-tr fnt dull-v rr bri yel FLOR,n vis STN,n-v rr slow dif-resid ring CUT,w/LS AA,POR-FLOR-STN-CUT AA"
5290.00 5300.00	"LS wh-crm,occ tan,crpxl-micxl,cln,pred dns,occ chk,sl dol,v rr mic fos,occ grdg to lmy DOL,tt-v rr intxl POR,n-v rr spty bri yel FLOR,n vis STN,n-v rr slow dif-resid ring CUT,w/ltbrn CHT frag & ltbrn-brn,occ gran DOL,POR-FLOR-STN-CUT AA"
5300.00 5310.00	"LS & DOL AA,w/tr CHT FRAG & ABNT METAL (?) IN SPL"
5310.00 5320.00	"LS AA,crpxl,occ micxl,sl dol ip,tr mic fos,POR-FLOR-STN-CUT AA,w/DOL ltbrn-brn,occ gybrn,micxl,occ crpxl-micsuc,sl mrlly,w/POR-FLOR-STN-CUT AA,lt-dkbrn CHT frag,tr dkgy-blk carb SH incl,& ABNT METAL FRAG"
5320.00 5330.00	"LS AA,pred wh,crpxl,plty,sl dol,POR-FLOR-STN-CUT AA,w/v rr CHT frag,DOL tan-brn,micxl-micsuc,gran ip,rthy-v sl slty,cln,occ sl lmy,fr intxl POR,tr-fr dull-bri yel FLOR,tr ltbrn STN,tr fr slow stmg mlky CUT"
5330.00 5340.00	"LS wh-crm,tan,crpxl-micxl,plty ip,v sl dol,occ arg,v sl anhy,v rr mic fos,tt-v rr intxl POR,n-v rr spty bri yel FLOR,n vis STN,n-v p slow dif CUT,w/DOL AA,grdg to blk carb dol SH"
5340.00 5350.00	"SH blk,dkgybrn,sbplty-blky,sl slty,dol-v sl calc,mica,carb,sooty,w/v thn LS & DOL AA,n-v rr POR,n-v rr spty FLOR-STN-CUT"
5350.00 5360.00	"LS wh-crm,tan,crpxl-micxl,rthy-slty,v sl sdy,dol,v arg ip,tt-v rr intxl POR,n-v rr spty dull yel FLOR,n vis STN,n-v p slow CUT,w/dkgybrn-blk carb SH & ltbrn-gybrn, micxl-micsuc DOL,tr intxl POR,n-v rr ltbrn STN,v p v slow dif CUT"
5360.00 5370.00	"LS AA,POR-FLOR-STN-CUT AA,w/DOL ltbrn-brn,occ gybrn,crpxl-micxl,micsuc ip,sl slty ip,lmy,occ grdg to dol LS,mrlly ip,v sl arg,tt-fr intxl POR,rr spty dull yel FLOR,n-v rr ltbrn STN,rr-tr slow dif-mod fast stmg CUT"
5370.00 5380.00	"LS AA,bcmg v slty-sl sdy,gran ip,POR-FLOR-STN-CUT AA,w/DOL AA,incr gran,v sl suc ip,tr-fr intxl POR,tr spty dull-bri yel FLOR,tr ltbrn STN,tr fr dif-mod fast stmg CUT,w/v rr blk carb SH prob cvgs "
5380.00 5390.00	"LS wh-crm,occ ltgy,crpxl-micxl,gran ip,sl slty,occ cln,chk,dol ip,sl chytr-dkbrn CHT frag,POR-FLOR-STN-CUT AA,w/DOL AA,POR-FLOR-STN-CUT AA"

DEPTH	LITHOLOGY
5390.00	5400.00 "LS & DOL AA,w/v rr CHT FRAG,tr-fr POR AA,fr-g dull-bri yel FLOR,STN AA,fr-g slow dif-mod fast stmg CUT"
5400.00	5415.00 "DOL tan-ltbrn,brn ip,micxl-micsuc,occ vfxl-gran,v sl slty,rthy,occ sl lmy,arg ip,rr-fr intxl POR,mfr dull yel FLOR,tr ltbrn STN,fr-g slow dif-tr mod fast stmg mlky CUT,w/LS wh-crm,ltgy,crpxl-micxl,chk ip,v sl chty,dol,tt-v rr intxl POR,n-v rr spty bri yel FLOR,n-v rr spty STN,n-v rr slow dif CUT"
5415.00	5431.00 "DOL AA,incr gran-micsuc,fr-g intxl POR,fr dull-bri yel FLOR,tr-fr ltbrn STN,fr-g slow dif-tr-fr mod fast stmg CUT,w/LS wh-crm,occ tan,crpxl-micxl,rthy-chk,occ cln,sl dol,sl slty-v sl sdy ip,occ chty-rr trns-lbf CHT frag,tt-v rr intxl POR,n-v rr spty bri yel FLOR,n vis STN,n-v rr slow dif CUT"
5434.00	5440.00 "DOL ltbrn-brn,micxl-micsuc,occ vfxl-gran,tr Crin fos,rr LS incl,occ ANHY xl-incl,fr-g intxl POR,fr-g dull-bri yel FLOR,g ltbrn STN,fr-g mod fast-fast stmg CUT"
5443.00	5449.00 "DOL AA,POR-FLOR-STN-CUT AA,w/tr LS ltgy-crm,occ wh-tan,crpxl-micxl,rthy-chk,occ cln,dns,tt,NFSOC"
5450.00	5460.00 "DOL ltbrn-brn,micxl-micsuc,vfxl-gran ip,rthy,sl slty,v sl lmy,v rr ANHY xl-incl,w/v rr LS incl AA,tr-g intxl POR,g dull-bri yel FLOR,fr brn STN,fr-g slow-mod fast stmg CUT"
5461.00	5476.00 "DOL AA,bcmg DOL PKST,POR-FLOR-STN-CUT AA,w/v rr ANHY xl-incl,v sl chty,w/LS crm-tan,mot,crpxl-micxl,cln-chk,rthy,dol-v dol,grdg to v lmy DOL,tt,NFSOC"
5470.00	5485.00 "DOL ltbrn-brn,occ mbrn,micxl-micsuc,vfxl-gran,occ bcmg DOL PKST,rthy-v sl slty,w/rr dol LS incl,rr ANHY xl-incl,rr Crin fos,fr-g intxl POR,g dull-bri yel FLOR,tr-g ltbrn STN,fr-g slow-modfast stmg CUT"
5485.00	5500.00 "DOL AA,w/rr scat dkbrn CHT FRAG,scat dol LS incl-ptgs,occ ANHY xl-nod,tt-fr intxl POR,g dull-bri yel FLOR,fr lt-mbrn STN,tr slow dif-fr slow-mod fast stmg CUT"
5500.00	5520.00 "DOL lt-mbrn,brn,micxl-micsuc,v rr crpxl,vfxl-gran,occ grdg to DOL PKST,v sl slty,occ Crin fos,v rr lt-mbrn CHT frag,rr ANHY xl-incl,tr dol LS lams-ptgs,tt-g intxl POR,fr-g dull-bri yel FLOR,tr-fr ltbrn STN,fr-g slow dif-mod fast stmg CUT"
5520.00	5530.00 "DOL AA,POR-FLOR-STN-CUT AA,w/scat CHT frag,rr ANHY xl-incl,LS crm-wh-ltgy,tan ip,crpxl-micxl,dol,sl chk,sl chty ip,v sl anhy,grdg to v lmy DOL,tt,NFSOC"
5530.00	5540.00 "DOL lt-mbrn,brn,micxl-micsuc,v rr crpxl,vfxl-gran,occ grdg to DOL PKST,v sl slty,occ Crin fos,v rr lt-mbrn CHT frag,rr ANHY xl-incl,tr dol LS lams-ptgs,tt-g intxl POR,fr-g dull-bri yel FLOR,tr-fr ltbrn STN,fr-g slow dif-mod fast stmg CUT"
5540.00	5550.00 "DOL & LS AA,w/POR-FLOR-STN-CUT AA"
5550.00	5560.00 "DOL ltbrn-brn,occ mbrn,micxl-micsuc,vfxl-gran,occ crpxl,rthy,v sl slty,v rr Crin fos,v rr trns-lwh CHT frag,rr ANHY xl-incl,occ grdg to tt DOL PKST,tr ltgy-tan,mot crpxl,chk LS incl-ptgs,tr-g intxl POR,fr-g dull-bri yel FLOR,fr ltbrn-brn STN,fr-g slow-mod fast stmg CUT"

DEPTH	LITHOLOGY
5560.00 5570.00	"DOL & LS AA,w/POR-FLOR-STN-CUT AA"
5570.00 5587.00	"DOL ltbrn-brn,occ mbrn,micxl-micsuc,vfxl-gran,occ crpxl,rthy,v sl slty,v rr Crin fos,v rr trnsl-wh CHT frag,rr ANHY xl-incl,occ grdg to tt DOL PKST,tr ltgy-tan,mot crpxl,chk LS incl-ptgs,tr-g intxl POR,fr-g dull-bri yel "
5587.00 5601.00	"DOL ltbrn-brn,occ mbrn,micxl-micsuc,vfxl-gran,occ crpxl,rthy,v sl slty,v rr Crin fos,v rr trnsl-wh CHT frag,rr ANHY xl-incl,occ grdg to tt DOL PKST,rr-tr ltgy-tan,mot crpxl,chk LS incl-ptgs,tr-g intxl POR,fr-g dull-bri yel FLOR,fr ltbrn-brn STN,fr-g slow-mod fast stmg CUT"
5600.00 5610.00	"DOL AA,w/LS AA,sl incr ANHY xl-incl,tr DOL PKST,POR-FLOR-STN-CUT AA"
5610.00 5630.00	"LS ltgy-wh-frm,occ tan-mot,crpxl-micxl,occ chk,cln-dns,dol,grdg to v lmy DOL,anhy,occ arg,tt-v rr intxl POR,NFSOC,pred intbd-incl in gran DOL w/POR-FLOR-STN-CUT AA"
5621.00 5634.00	"DOL brn-mbrn,occ ltbrn,micxl-micsuc,vfxl-gran,rthy-sl slty,cln,tr ANHY xl-incl,tr crm-tan,crpxl-micxl,chk dol LS incl,fr-g intxl-v rr pp vug POR,fr-g dull yel FLOR,fr ltbrn STN,fr slow-mod fast stmg CUT,w/ TR CHT frag-trnsl-clr,occ offwh-tan"
5635.00 5650.00	"DOL AA,incr ANHY xl-incl,occ bcmg DOL PKST,w/ LS AA,POR-FLOR-STN-CUT AA"
5650.00 5660.00	"DOL brn-mbrn,occ ltbrn,micxl-micsuc,vfxl-gran,rthy-sl slty,cln,rr ANHY xl-incl,tr crm-tan,crpxl-micxl,chk dol LS incl,tt-fr intxl POR,g dull yel FLOR,fr ltbrn STN,fr slow-mod fast stmg CUT"
5660.00 5670.00	"DOL brn-mbrn,occ ltbrn,micxl-micsuc,vfxl-gran,rthy-sl slty,cln,rr ANHY xl-incl,tr crm-tan,crpxl-micxl,chk dol LS incl,tt-fr intxl POR,g dull yel FLOR,fr ltbrn STN,fr slow-mod slow stmg CUT"
5670.00 5680.00	"DOL brn-lt-mbrn,micxl-micsuc,occ vfxl-gran,rthy-v sl slty,rr ltgy slty lmy DOL prtq,rr ANHY xln incl,rr crpxl wh LS incl,tt-tr intxl POR,g even yel FLOR,g-fr brn STN,g mod slow strm CUT"
5680.00 5690.00	"DOL brn-mbrn,occ ltbrn,micxl-micsuc,vfxl-gran,rthy-sl slty,cln/tr ltgy slty dol prtq,rr ANHY xl-incl,rr mot crm-tan,crpxl,chk dol LS incl,tt-fr intxl POR,g dull yel FLOR,fr ltbrn STN,fr slow stmg CUT"
5690.00 5700.00	"LS ltgy-wh-mot,crpxl-micxl,occ chk,dol,grdg to v lmy DOL,sl anhy,occ arg,tt-v rr intxl POR,NFSOC,pred intbd-incl in gran DOL w/POR-FLOR-STN-CUT AA"
5700.00 5710.00	"DOL AA,POR-FLOR-STN-CUT AA,rr ANHY xl-incl,LS crm-wh-ltgy,tan ip,crpxl-micxl,dol,sl chk,v sl anhy,grdg to v lmy DOL,tt,NFSOC"
5710.00 5720.00	"DOL brn-mbrn,occ ltbrn,micxl-micsuc,vfxl-gran,rthy-sl slty,cln/tr ltgy slty dol LS AA prtq,rr ANHY xl-inc,fr-p intxl POR,g dull yel FLOR,fr ltbrn STN,fr slow stmg CUT"
5720.00 5730.00	"DOL brn-mbrn,occ ltbrn,micxl-micsuc,vfxl-gran,rthy-sl slty,cln/tr ltgy slty dol prtq,rr ANHY xl-incl,tr mot crm-tan,crpxl,chk dol LS incl,tt-fr intxl POR,g dull yel FLOR,fr ltbrn STN,fr slow stmg CUT"
5730.00 5740.00	"LS ltgy-wh-ltgyrbn-mot,crpxl-micxl,occ chk,dol,grdg to v lmy DOL,sl anhy,tt-v rr intxl POR,NFSOC,pred intbd-incl in gran DOL w/POR-FLOR-STN-CUT AA"

DEPTH	LITHOLOGY
5740.00 5750.00	"DOL AA,POR-FLOR-STN-CUT AA,rr ANHY xl-incl,LS crm-wh-ltgy,tan ip,crpxl-micxl,dol,sl chk,v sl anhy,grdg to v lmy DOL,tt,NFSOC"
5750.00 5760.00	"LS ltgy-wh-mot,crpxl-micxl,occ chk,dol,grdg to v lmy DOL,sl anhy,tt-v rr intxl POR,NFSOC,pred intbd-incl in gran DOL w/POR-FLOR-STN-CUT AA"
5760.00 5770.00	"DOL brn-mbrn,occ ltbrn,micxl-micsuc,vfxl-gran,rthy-sl slty,cln/tr wh-ltgy slty dol LS prtq,tr ANHY xl-inc,tr wh-trnsl CHT,fr-p intxl POR,g dull even yel FLOR,fr ltbrn STN,fr slow strmg CUT"
5770.00 5780.00	"DOL m-ltbrn,occ dkbrn,micxl-micsuc,occ vfxl-gran,rthy,v sl slty,tr trnsl xln ANHY-occ POR fl,tr trnsl-ltgy CHT-sil incl,tr tan LS prtq,tt-tr intxl POR,g even yel FLOR,fr brn STN,g fast strmg CUT"
5780.00 5800.00	"DOL brn,occ m-dkbrn,micsuc-micxl,occ vfxl-gran,rthy,occ v sl slty,tr ltgy-trnsl-mlky wh sil-CHT incl,rr trnsl xln ANHY,tt-fr intxl POR,g even dull yel FLOR,fr brn STN,g fast strmg CUT/tan-occ ltgybrn,crpxl-micxl,LS prtq-incl,g even-rr brit spty FLOR,fr ltbrn STN,p-fr slow strmg CUT"
5800.00 5810.00	"LS tan-ltgybrn,crpxl-micxl,occ v sl chk,dol,grdg to v lmy DOL,anhy,tt-v rr intxl POR,NFSOC,pred intbd-incl in gran DOL w/POR-FLOR-STN-CUT AA"
5810.00 5820.00	"DOL m-ltbrn,occ dkbrn,micxl-micsuc,occ vfxl-gran,rthy,v sl slty,tr trnsl xln ANHY prtq,tr trnsl-wh CHT/slty ltgy sil-chty incl,tr tan LS prtq,tt-tr intxl POR,g even yel FLOR,fr brn STN,g fast strmg CUT"
5820.00 5830.00	"DOL AA/intbd LS AA,POR-FLOR-STN-CUT AA"
5830.00 5840.00	"DOL m-ltbrn,occ dkbrn,micsuc-micxl,occ vfxl-gran,rthy,sl slty,tr ltgy slty sl dol sil prtq,tr tan crpxl/occ wh sl chky LS incl,rr wh CHT incl,tt-tr intxl POR,g even yel FLOR,fr brn STN,g fast strmg CUT"
5840.00 5850.00	"DOL AA/intbd LS AA,POR-FLOR-STN-CUT AA"
5850.00 5860.00	"DOL brn,micsuc-micxl-vfxl,rthy,v sl slty,rr ltgy-trnsl slty sil-chty prtq,rr tan-occ wh chky LS incl,rr trnsl xln ANHY incl,tt-tr intxl-rr pp vug POR,g even yel FLOR,fr brn/tr dkbrnblk-blk dd o STN,g fast strmg CUT"
5860.00 5870.00	"DOL AA/rr ltgy-trnsl slty sil-chty prtq,vrr wh CHTincl,rr tan-occ trnsl-wh dol LS incl,vrr blk sl dol SH lam,tt-tr intxl POR,g even yel FLOR,fr brn/tr dkbrnblk-blk dd o STN,g mod slow-fast strmg CUT"
5870.00 5880.00	"DOL AA/vrr blk dol SH frag in smpl,POR-FLOR-STN-CUT AA"
5880.00 5890.00	"DOL brn,micsuc-micxl-vfxl,rthy,v sl slty,tr ltgy slty sil-chty prtq,tr CRIN fos,rr tan LS incl,vrr blk dol SH frag in smpl,tt-tr intxl POR,g even yel FLOR,fr brn/tr dkbrnblk-blk dd o STN,g fast strmg CUT"
5890.00 5900.00	"DOL AA,tr ltgy slty sil-chty prtq,tr tan-occ wh chky LS prtq,rr trnsl xln ANHY incl,vrr blk dol SH frag in smpl,tt-tr intxl-rr pp vug POR,g even yel FLOR,fr brn/vrr dkbrnblk-blk dd o STN,g fast strmg CUT"
5900.00 5910.00	"DOL AA/vrr blk dol SH frag in smpl,POR-FLOR-STN-CUT AA"

DEPTH	LITHOLOGY
5910.00	5920.00 "DOL brn,micxl-micsuc-vfxl,rthy,v sl slty,tr trnsl-wh xln ANHY incl-grdg to occ lmy chk POR fl,rr ltgy slty sil prtq,vrr wh CHT incl,tt-tr intxl POR,g even dull-rr spotty bri FLOR,g brn-rr pp blk dd o STN,slow strmg CUT"
5920.00	5930.00 "DOL brn,micxl-micsuc-vfxl,rthy,v sl slty,rr ltgy-trnsl slty dol sil prtq,rr tan chky dol LS incl,vrr wh CHT incl,tt-tr intxl POR,g dull even/tr bri spotty yel FLOR,fr brn-tr dkbrnblk-rr blk pp dd o STN,fr slow strmg/v fnt res ring CUT"
5930.00	5940.00 "DOL AA,POR-FLOR-STN-CUT AA"
5940.00	5950.00 "DOL AA/rr ltgy-trnsl slty sil-chty prtq,vrr wh CHTincl,rr-fr intxl POR,g even yel FLOR,fr brn/tr dkbrnblk STN,g mod slow-fast strmg CUT"
5950.00	5960.00 "DOL brn,micxl-micsuc-vfxl,rthy,v sl slty,occ v sl lmy,rr ltgy-trnsl slty dol sil prtq,vrr wh CHT incl,rr-fr intxl POR,g dull even/tr bri spotty yel FLOR,fr brn-tr dkbrnblk STN,fr slow strmg/v fnt res ring CUT"
5960.00	5970.00 "DOL AA,rr trnsl-wh xln ANHY-sl lmy incl,vrr wh CHTincl,rr-fr intxl POR,g even yel FLOR,fr brn/tr dkbrnblk STN,g mod slow-fast strmg CUT"
5970.00	5980.00 "DOL brn,micxl-micsuc-vfxl,rthy,rr trnsl-wh xln ANHY/occ sl chky off wh LS,rr ltgy slty sil prtq,rr-fr intxl POR,g even-rr spotty bri yel FLOR,g brn/occ dkbrn STN,g slow-mod fast strmg CUT"
5980.00	6000.00 "DOL lt-mbrn,brn,vfxl-micsuc,occ gran,crpxl-micxl ip,rthy,sl slty,bcmg DOL PKST ip,w/v rr rr scat ANHY xl-incl & wh-trnsl CHT frag,occ tt,fr-g intxl POR,fr-g dull-v rr bri yel FLOR,fr-g brn STN,rr-g slow dif-mod fast stmg CUT"
6000.00	6010.00 "DOL AA,sl incr DOL PKST,rr tt-pred fr-g intxl POR,fr-g dull-v rr bri yel FLOR,fr brn STN,fr-g slow dif-mod fast stmg CUT"
6010.00	6020.00 "DOL lt-mbrn,occ ltgybrn,micxl-micsuc,vfxl-gran,occ crpxl,rthy-sl slty,rr ANHY xl-incl,v rr wh-tan CHT incl,rr Crin fos,tt-g intxl POR,fr-g dull yel FLOR,fr-g brn STN,fr-g slow dif-mod fast stmg CUT"
6020.00	6030.00 "DOL AA,incr tt,occ grdg to DOL PKST,FLOR-STN-CUT AA"
6030.00	6040.00 "DOL brn-mbrn,micxl-micsuc,vfxl-gran,occ rr crpxl-dns,sl incr DOL PKST,v sl slty,v sl lmy ip,w/rr ANHY-trnsl CHT incl,tt ip,fr-g intxl POR,fr-g dull yel FLOR,g brn stn,fr-g slow dif-mod fast stmg CUT"
6040.00	6050.00 "DOL AA,w/v sl incr v small trnsl-wh-tan CHT incl,v rr ANHY xl-incl,v rr scat wh-ltgy,mot crpxl LS incl,POR-FLOR-STN-CUT AA"
6150.00	6160.00 "DOL & LS AA,sl incr DOL PKST,v rr Ool,tt-tr intxl POR,rr-fr dull yel FLOR,n-tr brn STN,n-fr slow dif-rr slow stmg CUT,rr scat CHT frag,v rr ANHY incl-xl"
6160.00	6170.00 "LS & DOL AA,sl chty,rr Crin fos,POR-FLOR-STN-CUT AA"
6170.00	6180.00 "LS crm-tan,occ ltgy,crpxl-micxl,rthy-chk,occ cln,dol-v dol,grdg to v lmy DOL,rr Crin fos,sl chty-chty,tt,NFSOC,w/DOL ltbrn-tan,crpxl-misuc,occ vfxl,lmy-v lmy,grdg to dol LS,Crin fos,tt-tr intxl POR,rr ltbrn STN,fr slow dif-tr mod fast CUT"
6180.00	6190.00 "LS & DOL AA,sl chty,rr Crin fos,POR-FLOR-STN-CUT AA,w/trnsl-tan,occ CHT frag-incl"

DEPTH	LITHOLOGY
6190.00	6200.00 "LS crm-tan,occ ltgy,crpxl-micxl,rthy-chk,occ cln,dol-v dol,grdg to v lmy DOL,rr Crin fos,sl chty-chty,tt,NFSOC,w/DOL ltbrn-tan,crpxl-misuc,occ vfxl,lmy-v lmy,grdg to dol LS,Crin fos,tt-tr intxl POR,tr ltbrn STN,fr slow dif-tr mod fast CUT"
6200.00	6210.00 "DOL brn-mbrn,occ tan,crpxl-micxl,micsuc-vfxl,occ gran,rthy-sl slty,lmy-v lmy,tr Crin fos,sl chty,rr ANHY xl-incl,tt-fr intxl POR,tr dull yel FLOR,tr-fr ltbrn STN,tr-fr slow dif-mod fast stmg CUT,w/LS AA,scat CHT frag"
6209.00	6220.00 "DOL AA,incr micsuc-vfxl,tr-fr intxl POR,tr-fr dull yel FLOR,tr brn STN,tr fr slow dif-mod fast stmg CUT,w/LS AA,tr Crin fos,occ scat CHT frag"
6220.00	6235.00 "LS crm-tan,occ ltgy,crpxl-micxl,rthy-chk,occ cln,dol-v dol,grdg to v lmy DOL,rr Crin fos,sl chty-chty,tt,NFSOC,w/DOL ltbrn-tan,crpxl-misuc,occ vfxl,lmy-v lmy,grdg to dol LS,Crin fos,tt-tr intxl POR,tr ltbrn STN,fr slow dif-tr mod fast CUT"
6235.00	6250.00 "DOL brn-mbrn,occ tan,crpxl-micxl,micsuc-vfxl,occ gran,rthy-sl slty,lmy-v lmy,tr Crin fos,sl chty,rr ANHY xl-incl,tt-fr intxl POR,tr dull yel FLOR,tr-fr ltbrn STN,tr-fr slow dif-mod fast stmg CUT,w/LS AA,scat CHT frag"
6250.00	6260.00 "LS tan-crm,occ off wh,crpxl,occ micxl,rthy,cln,sl chky,v-sl dol, chty, tr CRIN-mic fos,grdg to lmy DOL,tt-tr intxl POR,fnt even yel FLOR,n vis STN,p fnt res ring CUT/DOL AA,fr intxl-tr pp vug POR,g even-tr spotty bri yel FLOR,g fast strmg CUT"
6260.00	6280.00 "DOL brn-mbrn,occ tan,crpxl-micxl,micsuc-vfxl,occ gran,rthy-sl slty,lmy-v lmy,tr Crin fos,scat bf-wh CHT incl,vrr ANHY xl-incl,tt-fr intxl POR,fr even dull/spotty bri yel FLOR,fr ltbrn-rr dkbrn STN,fr-g slow-mod fast stmg CUT,w/LS AA,POR-FLOR-STN-CUT AA"
6280.00	6290.00 "DOL AA,incr micsuc-vfxl,fr intxl-tr pp vug POR,fr even dull-spotty bri yel FLOR,fr brn STN,fr slow-mod fast stmg CUT,w/LS AA,tr Crin fos,occ scat CHT frag"
6290.00	6300.00 "DOL ltbrn-brn,occ tan,misuc-micxl,occ vfxl-crpxl,rthy-sl slty,tr bf-wh-trnsl-mot-brn CHT frag-incl,v sl anhy,abnt CRIN/tr mic fos,fr-g intxl-vrr pp vug POR,g even dull-spotty bri yel FLOR,fr-g ltbrn-brn STN,g mod fast stmg CUT"
6300.00	6310.00 "DOL brn-mbrn-tan,crpxl-micxl,occ micsuc-vfxl-gran,rthy-sl slty,lmy-v lmy,tr CRIN fos, chty, tr ANHY xl-incl,tt-fr intxl POR,tr dull-rr bri yel FLOR,tr ltbrn STN,fr v slow dif stmg CUT,w/LS AA/scat bf-wh CHT frag"
6310.00	6320.00 "DOL AA,incr micsuc-vfxl,fr intxl-tr pp vug POR,fr even dull-spotty bri yel FLOR,fr brn-tr dkbrn STN,g mod fast stmg CUT,w/LS AA,tr Crin fos,occ scat CHT frag"
6320.00	6340.00 "DOL brn-mbrn,occ tan,micxl-crpxl-micsuc,occ gran,rthy-sl slty,lmy-v lmy,tr CRIN fos,sl chty,rr ANHY incl,tt-fr intxl/vrr pp vug POR,fr even dull-tr spotty bri yel FLOR,fr-g ltbrn/tr dkbrn STN,g-fr slow dif-mod fast stmg CUT,w/LS AA,scat CHT frag"
6340.00	6350.00 "LS tan-crm,occ off wh,crpxl,occ micxl,rthy,cln,sl chky,v sl dol, chty, tr CRIN,occ grdg to lmy DOL,tt-tr intxl POR,fnt even yel FLOR,n vis STN,tr slow dif-p fnt res ring CUT/DOL AA,fr intxl-tr pp vug POR,fr even-tr spotty bri yel FLOR,fr slow dif CUT"
6350.00	6360.00 "DOL & LS AA,rr CHT incl-frag AA,POR-FLOR-STN-CUT AA"

DEPTH	LITHOLOGY
6360.00 6370.00	"DOL tan-occ brn-mbrn,crpxl-micxl,micsuc-vfxl,occ gran,rthy-sl slty,lmy-v lmy,tr Crin fos,sl chty,vrr ANHY xl-incl,grdg to dol LS,tt-rr intxl POR,tr dull/rr spotty bri yel FLOR,fr ltbrn STN,fr slow-mod fast strmg CUT"
6370.00 6380.00	"LS AA,crpxl,occ micxl,rthy,cln,sl-v chky, sl dol, chty, tr CRIN, occ grdg to lmy DOL, tt-tr intxl POR, fnt even yel FLOR, n vis STN, tr slow dif-p fnt res ring CUT/DOL AA, POR-FLOR-STN-CUT AA "
6380.00 6390.00	"DOL & LS AA, rr CHT incl-frag AA, POR-FLOR-STN-CUT AA"
6390.00 6400.00	"DOL brn-mbrn, occ tan, micxl-crpxl, occ micsuc-vfxl, rthy-sl slty, lmy-v lmy, tr Crin fos, sl chty, rr trnsf-wh ANHY xl incl-amor prt, grdg to dol LS ip, tt-rr intxl POR, tr dull/rr spotty bri yel FLOR, tr ltbrn-rr dkbrn STN, fr slow-mod fast strmg CUT"
6400.00 6410.00	"DOL lt-mbrn-occ tan, dk brn, vfxl-micxl-micsuc, rthy, intbd/tan-ltbrn LS AA, grdg to dol PACKST, tr CRIN fos, chty, occ calc-lmy, tt-tr intxl POR, fr bri spotty-dull even FLOR, tr brn-dkbrn STN, fr slow strmg CUT"
6410.00 6430.00	"LS tan-crm, occ off wh, crpxl, occ micxl, rthy, cln, sl chky, v sl dol, chty, tr CRIN, occ grdg to lmy DOL, tt-tr intxl POR, fnt dull even/rr spotty bri yel FLOR, n vis-tr ltbrn STN, v slow dif-v fnt res ring CUT"
6430.00 6440.00	"DOL AA, vfxl-micxl-micsuc, rthy, intbd/tan-ltbrn LS AA, grdg to dol PACKST ip, tr CRIN fos, chty, occ calc-lmy, tt-tr intxl POR, fr bri spotty-dull even FLOR, tr brn-dkbrn STN, fr-g slow-mod slow strmg CUT"
6440.00 6450.00	"LS tan-crm, occ off wh, crpxl, occ micxl, rthy, cln, sl chky, chty, tr trnsf-wh xln ANHY incl-POR fl, tr CRIN fos, occ intbd in DOL AA, tt-tr intxl POR, fnt dull even/rr spotty bri yel FLOR, n-tr ltbrn-rr dkbrn STN, v slow dif/vp res ring CUT"
6450.00 6460.00	"DOL & LS AA, POR-FLOR-STN-CUT AA"
6460.00 6480.00	"DOL brn, occ m-dkbrn-tan, micxl-crpxl, occ vfxl, rthy, pred intbd/tan-ltbrn LS, grdg to dol PACKST, tr CRIN fos, tr wh-trnsf CHT, occ calc-lmy, tt-tr intxl POR, fr bri spotty-dull even FLOR, tr brn-dkbrn/occ blk dd o STN, fr-g mod fast strmg CUT/LS AA"
6480.00 6490.00	"LS tan-crm, occ off wh, crpxl, occ micxl, rthy, cln, sl-mod chky, tr scat trnsf-wh CHT, rr wh ANHY incl-POR fl, tr CRIN fos, intbd in DOL AA, tt-tr intxl POR, fnt dull even/rr spotty bri yel FLOR, n-tr ltbrn STN, v slow dif/p v fnt res ring CUT"
6490.00 6499.00	"DOL & LS AA, incr scat wh-trnsf CHT incl-frag AA, POR-FLOR-STN-CUT AA"
6500.00 6520.00	"DOL brn-ltbrn, occ choc brn, tan, micsuc-micxl, occ vfxl-crpxl, rthy, sl slty, mod tan LS incl-grdg to dol PACKST, tr wh-trnsf/bf incl CHT, tr CRIN fos, rr trnsf-wh xln ANHY, tt-tr intxl POR, fr even dull-tr g spotty bri yel FLOR, fr-g brn-dkbrn/occ blk dd o STN, g slow-mod fast strmg CUT/LS AA, POR-FLOR-STN-CUT AA"
6520.00 6530.00	"DOL AA, incr scat wh-trnsf-brn CHT/tr bf-tan CRIN & mic fos incl, tr CRIN fos, mod tan LS incl-grdg to dol PACKST, tt-fr intxl/rr pp vug POR, fr even dull-tr spotty bri bri yel FLOR, fr-g brn/tr dkbrn-blk dd o STN, g mod fast strmg CUT/LS AA, POR-FLOR-STN-CUT AA"
6530.00 6540.00	"DOL & LS AA, tr scat wh-trnsf CHT AA, POR-FLOR-STN-CUT AA"

FORMATION TOPS

OPERATOR: MOBIL

WELL NAME: RATHERFORD UNIT #13-12 NW LOWER 1-B HORIZONTAL LATERAL LEG #1

FORMATION NAME		SAMPLES	SAMPLES	DATUM
		MEASURED DEPTH	TRUE VERTICAL DEPTH	
LOWER ISMAY				
GOTHIC SHALE		5330'	5323'	-754
DESERT CREEK		5345'	5337'	-768
DC-1A		5359'	5346'	-777
DC-1B		5395'	5363'	-794

GEOLOGICAL SUMMARY

AND

ZONES OF INTEREST

The Mobil Exploration and Production U.S. Inc., Ratherford Unit #13-12 Horizontal Leg #1, Section 13, T41S, R23E, was a re-entry of the Mobil Ratherford Unit #13-12, a sidetrack in a southeasterly direction from 5255' measured depth, 5255' true vertical depth, on January 30, 1997. Leg #1 reached a measured depth of 6679', true vertical depth of 5440' at total depth, horizontal displacement of 1278' and true vertical plane 123 degrees, on February 4, 1997. The lateral was drilled without any significant problems, although 1 trip was made to change out mud motors. Of note is that, since this well was being produced just prior to the reentry, the background gases noted on the accompanying mud log remained high, as well as the samples being contaminated to a certain extent with live oil encountered through out the well.

The primary objective of the Ratherford Unit #13-12 Horizontal Lateral Leg 1 was the upper 1-B Porosity Bench, to identify and define the porosity bench, it's effective porosity, staining and reservoir properties in the Desert Creek Member of the Upper Paradox Formation.

The Gothic Shale Member, the transition zone at the top of the Desert Creek, and the 1-A zone were encountered while drilling Leg 1. Kick off point for this lateral was in the lower Ismay Member, with only minor shows of staining or porosity near the base. The top of the Gothic Shale is 5330' measured depth, 5323' true vertical depth. The Gothic Shale was predominantly dark gray to black, silty, carbonaceous, brittle to firm, subblocky to blocky to platy, calcareous to slightly dolomitic and slightly micaceous. The top of the Gothic was gradational from the very thin interbedding of very argillaceous, carbonaceous limestone and very argillaceous, limy dolomite, with the dolomite grading into very dolomitic, carbonaceous shale. The top of the Gothic was picked predominantly by the decrease in penetration rate and the increased percentage of shale in the samples.

Between the Gothic Shale and Desert Creek Porosity Members is a transitional zone, which appears to be gradational. The top of the Desert Creek is commonly picked at the Gothic Shale, transition zone facies change, which in this well occurred at a measured depth of 5345' and a true vertical depth of 5337'. In this well the zone was predominantly a limestone; which was gray to white to light brown, cryptocrystalline to microcrystalline, with some granular limestone, very slightly sandy, with very thinly interbedded dolomite which was brown to light gray brown, microcrystalline to granular, slightly limy and occasionally silty. The limestone was predominately tight with very rare intercrystalline porosity that showed some anhydrite fillings. Through this transitional zone there appeared to be some interbedding or possibly cyclic deposits consisting of dolomitic to slightly calcareous, black, carbonaceous mudstones and very slightly dolomitic siltstones. The porosities ranged from none to very poor intergranular, with traces of calcite to anhydrite fillings. No visible staining was noted and had predominately a very rare spotty, very poor, faint dull yellow fluorescence, with no to very rare residue ring cut.

The top of the Desert Creek 1-A zone was picked at 5359' measured depth, 5346' true vertical depth. The pick is based on the rate of penetration, as well as sample interpretation. The top was picked in this lateral mainly based on the first significant increase in the dolomite grainstone below the top of the Desert Creek. The dolomites were predominately light brown to brown, occasionally graybrown, cryptocrystalline to microcrystalline, with streaks of microsucrosic to very rare sucrosic dolomite grainstone, and very thin dolomite packstones and white to tan, tight dolomitic limestones. The dolomites had no to fair intercrystalline porosity, some chert fragments, and no to very rare visible fluorescence, with a trace of light brown stain and a poor slow residual ring to rare moderately fast streaming cut.

The top of the Desert Creek 1-B zone appeared to occur at 5395' measured depth, 5363' true vertical depth. The pick was based on decrease in the rate of penetration and an increase in tight limestones, which marked the boundary between the 1-A and the 1-B zones. The top was picked in this lateral mainly based on the overall consistent decrease penetration rate in the limestone below the Desert Creek top of the 1-A. The limestone was predominately tight with very rare, very thin streaks of intercrystalline porosity, some scattered chert fragments, and no to very rare faint fluorescence, stain or cut.

The top of the main objective, the 1-B porosity zone, was picked at a measured depth of 5399', 5364' true vertical depth, in a microcrystalline to microsucrosic dolomite. As the curve was being completed in the 1-B zone the dolomite became cleaner and increasing granular. While drilling curve through the section, it appeared that the 2-C porosity bench was possibly defined by the interval 5399' measured depth, 5364' true vertical depth to a possible 5421' measured depth, 5380' true vertical depth. The top of the porosity Bench was marked by facies change, which was somewhat gradational since the drilling slowly increased. The top of the best porosity in the 1-B bench was marked by increase in rate of penetration and marked increase in intercrystalline porosity. The base of the porosity zone was not encountered while landing the curve.

At a measured depth of 5431', 5368' true vertical depth, with a horizontal displacement of 44' in the dolomite grainstones of the 1-B porosity horizon, a trip was made to change the bottom hole assembly and pick up the MWD tool. While drilling the 1-B lateral to a horizontal displacement of approximately 700', the porosity was predominately in a light to medium brown dolomite grainstone, which was microcrystalline to very fine crystalline, microsucrosic to occasionally sucrosic, slightly anhydritic with traces of anhydrite crystals to rare inclusions, trace to abundant Crinoid fossils, traces of scattered dark brown stain and very rare black oil stain residue* in the intercrystalline matrix. Predominantly fair to good intercrystalline porosity, with rare anhydrite and limestone mud filling and cement in the intercrystalline porosity. Through the interval the staining was moderate to fair and cuts ranging from moderate milky residue/ring to good moderately fast to slow steady streaming. A decrease in porosity and penetration was noted at 6030' measured depth, 5359' true vertical depth, with a horizontal displacement of 636', an increase in dolomite packstone, Crinoid fossil and chert fragments were noted in the samples. The decrease in penetration rate was due to a possible facies change as well as a slide of the drill pipe to turn the bore hole upwards as at that time it was believed that the bore hole was approaching the base of the 1-B zone. After the slide and the pipe was again rotated the penetration rated gradually increased with the lithology being predominately dolomite grainstone and increasing amounts of a clean tan to cream to white, cryptocrystalline to microcrystalline, slightly cherty, dolomitic limestone with no visible porosity. This facies appeared to be a change to a more detridal environment, possibly at or near the interbedded limestones and dolomites at the top of the 1-B zone.

The well was continued gradually upward at a very shallow angle from 6030' measured depth, 5369' true vertical depth, to 6160' measured depth, 5353' true vertical depth, with a horizontal displacement of 760'. During this interval thin scattered limestones, white to cream to tan, cryptocrystalline to microcrystalline, chalky, very slightly cherty, slightly dolomitic, occasionally algal limestones with rare intercrystalline porosity, with no visible staining, and a very poor slow diffuse cut, were encountered in the limestones. This change in facies appeared to be horizontal, with the dolomites being possibly thin inclusions or secondary cementation in the limestone¹.

From measured depth of 6160' to a measured depth of 6464', true vertical depth of 5360.5', with a horizontal displacement of 1062', the lithology remained interbedded tight cryptocrystalline to microcrystalline limestone, and granular to microsucrosic dolomite. The dolomites were predominately light to medium brown to brown, microcrystalline to very fine crystalline and microsucrosic to sucrosic to granular, with slightly algal to good intercrystalline porosities, with fair to good dull to occasionally bright yellow fluorescence, rare to trace black dead oil to fair light brown live oil stain and a fair to good moderately fast streaming cut, and the limestones were cream to tan, occasionally white, cryptocrystalline to microcrystalline, slightly dolomitic, anhydritic and tight. The facies change to an apparently low energy detrital environment, was rather continuous through this interval.

As the lateral continued from 6464' measured depth, to a of 6580' measured depth, 5349' and a horizontal displacement of 1187', the lithology became increasingly dolomitic. The dolomite was a granular to microcrystalline, light brown to medium brown, microcrystalline to very fine crystalline and microsucrosic to sucrosic to granular, with slightly algal to good intercrystalline porosities, with fair to good dull to occasionally bright yellow fluorescence, fair light brown live oil stain and a trace to fair slow diffuse to rare moderately fast streaming cut, with no significant increase in porosity. The limestones were cream to tan, occasionally white, cryptocrystalline to microcrystalline, slightly dolomitic, anhydritic and tight. However the sample show did show a slight increase in fluorescence, stain and cut, which was due to the slight increase in dolomites and an increase in chert fragments and Craned fossils in the samples.

At a measured depth of 6580' a trip was made to replace the mud motor, upon resumption of drilling operations an increase in limestone and cherts were noted in the samples. From 6580 measured depth to a total depth of 6679', true vertical depth of 5340' with a horizontal displacement of 1278', the lithology was predominately cream to tan, occasionally light brown to off white, cryptocrystalline to microcrystalline, very slightly algal, cherty, predominately tight limestone, with interbedded thin brown to light brown, microcrystalline to very finely crystalline to microsucrosic, granular dolomites, and increasing amounts of chert fragments. The porosity was predominately in the dolomite and was intercrystalline to rare pin point vuggular, with traces of light brown stain to very rare spotty black dead oil stain, and a slow diffuse to rare slow steaming cut.

In tracking the target line through the upper bench, there were several facies changes, predominately horizontal, with only one obvious vertical change. Predominant facies changes were associated with the rock type and depositional environment. Even with these classification changes, porosity for the most part was continuous, but the effective or the better porosity was associated with the dolomite facies which had fair to good, intercrystalline porosity, and the absence of any major anhydrite plugging. The limestone supported porosities were predominately tighter, as the dolomite was of possible secondary deposition.

From the top of the 1-B porosity bench to 6080' measured depth, the dolomite lithology was consistent, light brown to brown, microcrystalline to very fine crystalline, occasionally microsucrosic to occasionally granular, with scattered very rare limestone and anhydrite matrixes. The dolomites had fair to good intercrystalline to very rare algal porosities and a good constant dull to bright yellow fluorescence, with noticeable decreases when noticeable amounts of tight limestone was present. The staining in the dolomites ranged from trace to good light brown to traces of black dead oil stain and the associated cuts being trace to good slow to fast streaming and occasion slow diffuse cuts. And from 6080' to a total measured depth of 6679' the limestone were predominantly tight with

micosucrosic to granular dolomite cement. The limestones had no to very rare intercrystalline, grading to or having interbedded cyclic deposits, of very rare microcrystalline to micosucrosic, granular dolomite. These limestones had varying amounts of dark algal material with no to very rare light brown stain and at times calcite, and occasionally anhydrite filled casts having an effect on the porosity. The staining in the dolomite, fair to moderate to occasionally good, however remained rather consistent and continuous through out bench. Fluorescence, like the staining was consistent and continuous, and was a dull to bright yellow gold, with cuts ranging from moderate to good ring (diffuse) to moderate to good steady fast streaming cut.

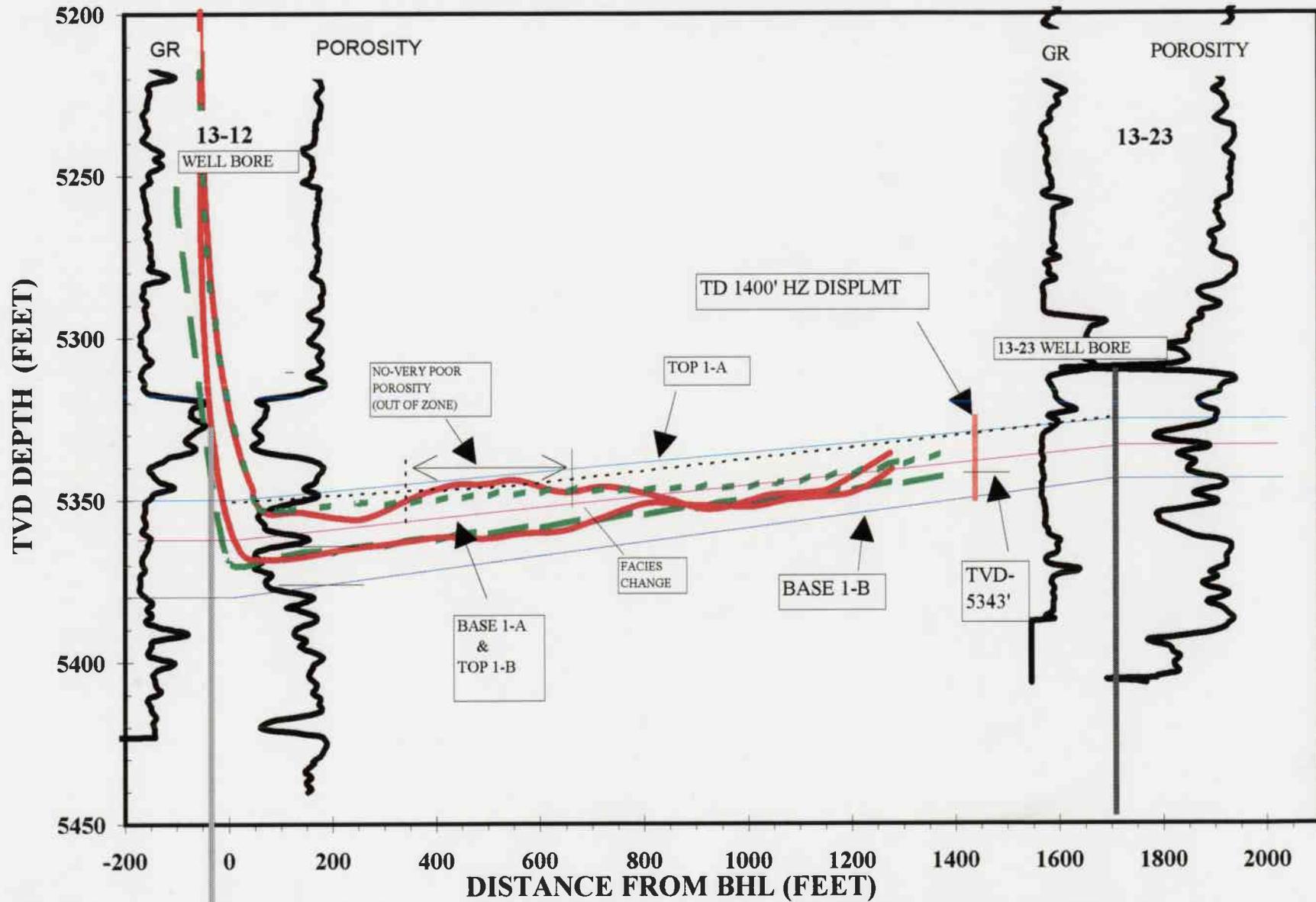
The conclusion drawn from the southwest 1-B porosity bench Lateral Leg 1, is in this area some primary dolomitization (due to the lack of limestone cements and framework), and the secondary dolomitization in the facies change, which enhanced the predominantly tight algal porosity in the limestones. However, the horizontal facies change had an effect on porosity, not well developed at times, and further reducing effective porosity when encountering calcite and anhydrite filled casts. Also, having an effect on the porosity, the cryptocrystalline algal limestone did grade to or was thinly interbedded with microcrystalline to granular dolomite, which in turn grade to very fine grain, dolomitic grainstone with dense limestone matrix, some black dead oil staining was trapped in the matrix and along the anhydrite to limestone contact surfaces. Staining was fair to moderate and there were significant sections where staining was moderately good. The lateral used the a proposed projected target line as a reference point through the bench, drilling tried to follow the target line while maintaining contact with best porosity. It appears that the effective porosity is continuous, even with the horizontal facies encountered.

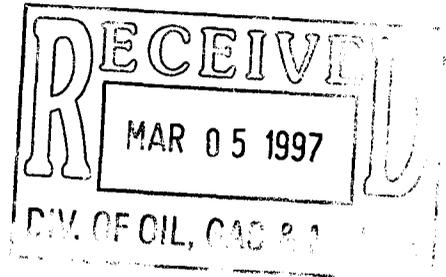
While drilling, the lateral did make varying amounts of live oil, with significant amounts of heavies noted on the chromatograph (C₃ and C₄). I would interpret this lateral to have good reservoir qualities up to the facies change at 700' of horizontal displacement since it did give up some oil and gas while drilling. I believe that the porosities are well enough developed to enhance the overall performance of the zone.

*The black residual staining has been called by Dr. Dave Eby & others as "bitchimum" and is also known as "dead oil" ("dd o stn" on mud logs). This staining is associated with the movement of oil over long periods of time and is a good indicator of producible hydrocarbons when associated with productive porosities, but can also be found in porosities that have been filled by anhydrites and other material at later dates.

¹ Lithology noted in the Harken Southwest/Chuska Energy Lighting Rock wells as noted in the Algal Mounds of the Paradox Basin manual by Dr. Dave Eby, Eby Petrography & Consluting, Englewood, CO; Herb Mosca, Geologist w/ Bligh Petroleum Co., Dallas, TX.

MOBIL, Ratherford #13-12, Southeast Lateral





MOBIL

**RATHERFORD UNIT #13-12
HORIZONTAL LATERAL LEG #2
UPPER 1-B POROSITY BENCH DESERT CREEK
SECTION 13, T41S, R23E
SAN JUAN, UTAH**

**GEOLOGY REPORT
by
DAVE MEADE / MARVIN ROANHORSE
ROCKY MOUNTAIN GEO-ENGINEERING CORP.
GRAND JUNCTION, COLORADO
(970) 243-3044**

MICROFICHE

TABLE OF CONTENTS

WELL SUMMARY.....	3
DAILY WELL CHRONOLOGY.....	4
DAILY ACTIVITY.....	5
BIT RECORD.....	6
SURVEY RECORD.....	7
MUD RECORD.....	9
SAMPLE DESCRIPTIONS.....	10
FORMATION TOPS.....	19
GEOLOGIC SUMMARY AND ZONES OF INTEREST.....	20
WELL PLOTS.....	24

WELL SUMMARY

OPERATOR: MOBIL EXPLORATION & PRODUCTION U.S. INC.
NAME: RATHERFORD UNIT #13-12 NW LOWER HORIZONTAL
 LATERAL
 LEG #2 IN 1B UPPER POROSITY BENCH, DESERT CREEK
LOCATION: SECTION 13, T41S, R23E
COUNTY/STATE: SAN JUAN, UTAH
ELEVATION: KB:4569' GL:4556'
SPUD DATE: 2/05/97
COMPLETION DATE: 2/10/97
DRILLING ENGINEER: BENNY BRIGGS
WELLSITE GEOLOGY: DAVE MEADE / MARVIN ROANHORSE
MUDLOGGING:
ENGINEERS DAVE MEADE / MARVIN ROANHORSE
CONTRACTOR: BIG "A" RIG 25
TOOLPUSHER: DEAN SIPE
HOLE SIZE: 4 3/4"
CASING RECORD: SIDETRACK IN WINDOW AT 5253' MEASURED DEPTH
DRILLING MUD: M-I
ENGINEER: CHARLIE CIBBS / DANNE BEASON
MUD TYPE: PRODUCTION WATER/POLYMER SWEEPS
ELECTRIC LOGS: NA
ENGINEER: NA
TYPE LOGS: NA
TOTAL DEPTH: 6825' MEASURED DEPTH TVD-5394.5'
STATUS: PULL BACK UP HOLE AND PRESSURE TEST BOP PRIOR TO
 SETTING WHIPSTOCK FOR LEG #3

DRILLING CHRONOLOGY

MOBIL

RATHERFORD UNIT #13-12

NW UPPER 1-B HORIZONTAL LATERAL LEG # 2

DATE	DEPTH	DAILY	ACTIVITY
2/4/97	6627'	0'	DRLG & DIR SURVEYS-CIR. SPLS @ 6679'= TD LEG #1-CIR. SWEEPS-TOH-LAY DOWN LATERAL BHA-TIH W/ RETRIEVING HOOK-TOH-PICK UP NEW WHIPSTOCK-TIH-SET & ORIENTATE WHIPSTOCK FOR LEG #2-TOH-PICK UP WINDOW MILL #1-TIH -SET WHIPSTOCK TOP @ 5238'-BREAK CIR & CIR OUT OIL & GAS-MILL WINDOW 5238'-5239'
2/5/97	5239'	1'	MILL WINDOW 5239'-5240'-CIR OUT-TOH-PICK UP WINDOW MILL #2 -TIH-MILL WINDOW 5240'-5248'-CIR OUT-TOH-LAY DOWN MILL & PICK UP CURVE ASSEMBLY W/ BIT #1 (RR)
2/6/97	5248'	9'	PICK UP CURVE ASSEMBLY-TIH-PICK UP SWIVEL-RIG UP K-JET WIRELINE-RUN & ORIENT GYRO-TIME DRG 5248'-5252'-RUN SURVEY-PULL & CHECK GYRO-DRLG-SURVEY-PULL & LAY DOWN GYRO-RIG UP STEERING TOOL & TIH-BREAK CIR & SURVEY-DRLG & DIR SURVEY CURVE #2 5272'-5399'
2/7/97	5399'	151'	DRLG & DIR SURVEY CURVE #2 5399'-5447'-PUMP SWEEP & CIR BTMS UP @ 5447'-TOH 15 JNTS-PULL WET CONN-PULL STEERING TOOL & RIG DOWN K-JET-TOH-PICK UP NEW BIT & LATERAL BHA-TIH-DRLG & DIR. SURVEYS
2/8/97	5733'	571'	DRLG & DIR SURVEYS
2/9/97	6304'	420'	DRLG & DIR SURVEYS
2/10/97	6724'	101'	DRLG & DIR SURVEYS-CIR. SPLS @ 6825'-CIR. SWEEPS-TOH-LAY DOWN LATERAL BHA-PRESSURE TEST BOP-TIH W/ RETRIEVING HOOK TO RETRIEVE OLD WHIPSTOCK

DAILY ACTIVITY

Operator: MOBIL

Well Name: RATHERFORD UNIT #13-12 NW UPPER 1-B HORIZONTAL LATERAL LEG # 2

DATE	DEPTH	DAILY	DATE	DEPTH	DAILY
2/4/97	6627'	0'			
2/5/97	5239'	1'			
2/6/97	5348'	9'			
2/7/97	5399'	151'			
2/8/97	5733'	571'			
2/9/97	6304'	420'			
2/10/97	6724'	101'			
TD	6825'				

BIT RECORD

OPERATOR: MOBIL
WELL NAME: RATHERFORD UNIT #13-12 NW UPPER 1-B HORIZONTAL LATERAL
LEG#2

RUN	SIZE	MAKE	TYPE	IN/OUT	FTG	HRS	FT/HR
#1(RR) BIT	4 3/4"	STC	MF3P	5248'/ 5447'	199'	12.5	15.9
#2 BIT	4 3/4"	HTC	STR-20	5447'/ 6825'	1378'	64	21.5

SPERRY-SUN DRILLING SERVICES
SURVEY DATA

Customer ... : MOBIL
Platform ... : CA-MJ-70028
Slot/Well .. : /13-12,2A1,L2

MEASURED DEPTH	ANGLE DEG	DIRECTION DEG	TVD	NORTHINGS FEET	EASTINGS FEET	VERTICAL SECTION	DOG LEG
5238.00	0.66	351.31	5236.97	17.05 N	52.36 W	45.67	0.00
5246.00	3.30	305.40	5244.96	17.23 N	52.56 W	45.93	36.00
5258.00	7.10	306.50	5256.91	17.87 N	53.43 W	46.98	31.68
5268.00	11.40	307.60	5266.78	18.84 N	54.71 W	48.53	43.03
5278.00	16.10	308.70	5276.49	20.31 N	56.58 W	50.84	47.07
5288.00	21.00	309.80	5285.97	22.33 N	59.04 W	53.94	49.12
5298.00	26.30	310.90	5295.13	24.93 N	62.09 W	57.87	53.18
5308.00	31.70	312.00	5303.87	28.14 N	65.72 W	62.64	54.26
5318.00	36.90	313.10	5312.13	31.95 N	69.87 W	68.19	52.37
5328.00	42.00	314.20	5319.85	36.34 N	74.46 W	74.48	51.47
5338.00	44.70	315.30	5327.12	41.17 N	79.34 W	81.29	28.04
5348.00	46.50	316.40	5334.11	46.30 N	84.31 W	88.39	19.64
5358.00	50.90	317.50	5340.71	51.79 N	89.44 W	95.87	44.77
5368.00	55.40	318.60	5346.71	57.74 N	94.78 W	103.85	45.85
5378.00	60.20	319.70	5352.04	64.14 N	100.32 W	112.30	48.89
5388.00	64.60	320.80	5356.67	70.95 N	105.98 W	121.16	45.07
5398.00	68.90	321.90	5360.61	78.13 N	111.72 W	130.34	44.17
5408.00	72.90	323.00	5363.89	85.62 N	117.47 W	139.79	41.33
5418.00	77.70	324.10	5366.42	93.40 N	123.22 W	149.46	49.16
5428.00	83.00	325.20	5368.10	101.43 N	128.92 W	159.30	54.10
5438.00	86.70	326.60	5369.00	109.68 N	134.50 W	169.24	39.54
5447.00	86.50	328.30	5369.53	117.25 N	139.33 W	178.18	18.99
5477.27	85.20	326.00	5371.72	142.61 N	155.71 W	208.24	8.71
5509.02	87.60	325.00	5373.71	168.73 N	173.66 W	239.87	8.19
5540.76	91.10	325.30	5374.07	194.77 N	191.79 W	271.56	11.07
5572.62	90.40	324.10	5373.66	220.77 N	210.20 W	303.38	4.36
5604.33	90.70	324.80	5373.35	246.56 N	228.63 W	335.06	2.40
5636.09	91.30	325.00	5372.80	272.54 N	246.89 W	366.77	1.99
5667.72	92.50	325.90	5371.75	298.58 N	264.82 W	398.32	4.74
5699.56	90.60	323.80	5370.89	324.60 N	283.14 W	430.11	8.89
5731.30	88.40	321.10	5371.17	349.76 N	302.48 W	461.84	10.97
5763.12	88.20	318.70	5372.11	374.09 N	322.97 W	493.63	7.57
5794.93	88.50	319.70	5373.03	398.16 N	343.74 W	525.38	3.28
5826.77	86.80	318.50	5374.33	422.20 N	364.57 W	557.15	6.53
5858.45	84.60	316.70	5376.71	445.53 N	385.87 W	588.65	8.96
5890.28	85.40	316.00	5379.48	468.47 N	407.76 W	620.20	3.33
5922.00	87.00	315.90	5381.58	491.22 N	429.76 W	651.68	5.05
5953.66	86.80	315.70	5383.29	513.89 N	451.80 W	683.11	0.89

SPERRY-SUN DRILLING SERVICES
SURVEY DATA

Customer ... : MOBIL
Platform ... : CA-MJ-70028
Slot/Well .. : /13-12,2A1,L2

MEASURED DEPTH	ANGLE DEG	DIRECTION DEG	TVD	NORTHINGS FEET	EASTINGS FEET	VERTICAL SECTION	DOG LEG
5985.40	86.80	318.80	5385.07	537.15 N	473.31 W	714.68	9.75
6017.28	92.00	320.20	5385.40	561.38 N	494.01 W	746.52	16.89
6049.03	93.10	321.80	5383.99	586.03 N	513.97 W	778.23	6.11
6080.08	91.90	323.20	5382.63	610.64 N	532.85 W	809.25	5.94
6111.88	91.20	324.60	5381.77	636.33 N	551.58 W	841.02	4.92
6143.54	91.80	325.50	5380.94	662.27 N	569.71 W	872.62	3.42
6175.34	90.40	328.20	5380.33	688.88 N	587.09 W	904.30	9.56
6207.09	89.30	329.90	5380.42	716.11 N	603.42 W	935.81	6.38
6238.92	89.70	329.60	5380.70	743.61 N	619.46 W	967.35	1.57
6270.68	88.80	327.60	5381.11	770.71 N	636.00 W	998.89	6.90
6302.56	86.30	326.40	5382.47	797.42 N	653.35 W	1030.62	8.70
6334.42	84.40	325.50	5385.06	823.73 N	671.13 W	1062.30	6.59
6366.17	84.60	325.50	5388.10	849.78 N	689.03 W	1093.84	0.63
6397.22	87.20	325.00	5390.32	875.22 N	706.68 W	1124.76	8.53
6428.97	88.70	322.90	5391.46	900.87 N	725.35 W	1156.47	8.12
6460.82	89.70	320.10	5391.90	925.79 N	745.17 W	1188.31	9.33
6492.60	89.80	320.80	5392.04	950.30 N	765.41 W	1220.08	2.22
6524.42	91.20	321.30	5391.76	975.04 N	785.41 W	1251.89	4.67
6555.36	91.10	321.10	5391.14	999.15 N	804.79 W	1282.82	0.72
6587.14	90.90	321.10	5390.59	1023.88 N	824.75 W	1314.59	0.63
6619.01	88.60	321.00	5390.72	1048.66 N	844.78 W	1346.45	7.22
6649.64	86.80	320.60	5391.95	1072.38 N	864.12 W	1377.05	6.02
6681.38	86.10	319.70	5393.92	1096.70 N	884.42 W	1408.71	3.59
6713.21	88.90	320.80	5395.31	1121.14 N	904.75 W	1440.50	9.45
6744.91	90.10	321.80	5395.58	1145.88 N	924.57 W	1472.19	4.93
6776.71	90.90	322.00	5395.31	1170.91 N	944.19 W	1503.99	2.59
6791.00	91.00	322.90	5395.07	1182.23 N	952.90 W	1518.28	6.34
* 6825.00	91.50	323.00	5394.33	1209.36 N	973.38 W	1552.26	1.50

THE DOGLEG SEVERITY IS IN DEGREES PER 100.00 FEET.
 N/E COORDINATE VALUES GIVEN RELATIVE TO WELL SYSTEM REFERENCE POINT.
 TVD COORDINATE VALUES GIVEN RELATIVE TO WELL SYSTEM REFERENCE POINT.
 THE VERTICAL SECTION ORIGIN IS WELL HEAD.
 THE VERTICAL SECTION WAS COMPUTED ALONG 322.00 (TRUE).
 CALCULATION METHOD: MINIMUM CURVATURE.

SURVEY @ 6825' MD IS A BIT PROJECTION. *

MUD REPORT

OPERATOR: MOBIL

WELL NAME: RATHERFORD UNIT #13-12 NW UPPER 1-B HORIZONTAL LATERAL LEG #2

DATE	DEPTH	WT	VIS	FLS	YLD	GEL	PH	WL	CK	CHL	CA	SD	SOL	WTR
2/4/97	6679'	8.4	26	-	-	-	10.0	N/C	N/C	14000	1200	-	-	100
2/5/97	5240'	8.5	26	-	-	-	11.0	N/C	N/C	21000	2400	-	-	100
2/6/97	5252'	8.5	26	-	-	-	11.0	N/C	N/C	22000	2480	-	-	100
2/7/97	5447'	8.5	26	-	-	-	11.0	N/C	N/C	22000	2400	-	-	100
2/8/97	6049'	8.5	26	-	-	-	11.0	N/C	N/C	26000	800	-	-	100
2/9/97	6451'	8.6	26	-	-	-	11.5	N/C	N/C	27000	1800	-	-	100
2/10/97	6825	8.6	26	-	-	-	11.5	N/C	N/C	27000	1800	-	-	100

SAMPLE DESCRIPTIONS

OPERATOR: MOBIL

WELL NAME: RATHERFORD UNIT #13-12 NW LOWER 1-B HORIZONTAL LATERAL LEG #2

DEPTH	LITHOLOGY
5248.00 5260.00	"ABNT METAL FRAG IN SPL" "LS crm-wh,occ ltgy,crpxl-micxl,rthy-chk,v sl chty,v rr mic fos,tt-v rr intxl POR,n-v rr bri yel FLOR,n vis STN,n-v p slow dif CUT,w/DOL tan-ltgybrn,micxl,rthy,v sl slty,lmy,arg ip,n-v rr intxl POR,n-v rr fnt dull yel FLOR,n vis STN,n-v p slow dif CUT"
5260.00 5270.00	"LS AA,w/DOL ltbrn-gybrn,micxl,rthy,sl slty,arg,v sl lmy,anhy ip,tt-v rr intxl POR,n-v rr fnt dull yel FLOR,n-v rr brn STN,n-v rr slow dif CUT,w/tr dkgybrn CHT frag"
5270.00 5280.00	"LS-DOL-CHT AA,POR-FLOR-STN-CUT AA,tr dkgy-blk carb dol SH"
5280.00 5290.00	"LS crm-tan,ltgy,crpxl-micxl,rthy-chk,occ chty,v sl dol,arg,tr Crin fos,occ grdg to lmy DOL,tt-v rr intxl POR,tr bri yel FLOR,n-v rr fnt STN,n-v rr slow dif CUT,w/tr dkbrn-dkgybrn CHT frag,w/DOL AA"
5290.00 5300.00	"LS AA,w/DOL ltgybrn-brn,occ dkgybrn,micxl,rthy,sl slty,lmy ip,occ sl anhy,sl arg,grdg to dol MRLST,tt-v rr intxl POR,n-v rr FLOR-STN-CUT,w/tr dkgybrn CHT frag"
5300.00 5320.00	"LS ltgy-off wh,crm-tan,crpxl-micxl,rthy,chk-v chky,occ chty,v sl dol,arg,occ grdg to lmy DOL,tt-rr intxl POR,tr bri yel FLOR,n-v rr fnt STN,n-v rr slow dif CUT,w/tr dkbrn-dkgybrn CHT frag,w/DOL AA"
5320.00 5330.00	"LS ltgybrn-ltgy-wh,crm-tan,crpxl-micxl,rthy,cln,v chky,tr trns lxn ANHY,occ grdg to MRLST,tt-tr intxl POR,fr even dull-tr spty bri yel FLOR,rr ltbrn STN,slow dif/g res ring CUT"
5330.00 5340.00	"SH dkbrnblk-blk,sbply-sbsply-sbblky,sft-frm,occ brit,rthy,slty-vsly,calc-sl lmy,carb,fis ip,occ grdg to carb shy SLTST,sooty"
5340.00 5350.00	"DOL brn-mbrngy,micxl,occ crpxl,rthy,occ calc-sl lmy,v sl chky,sl arg,tt-tr intxl POR,tr dull-bri spty FLOR,p v slow dif/v fnt res ring CUT"
5350.00 5370.00	"SH AA,slty-vsly,calc-sl lmy,carb,fis ip,occ grdg to carb shy SLTST,sooty/DOL brn-tan,occ ltgybrn,rthy,sl arg,tt-rr intxl POR,n-rr spotty bri FLOR,fr slow strmg/g res ring cut"
5370.00 5390.00	"DOL brn,m-ltbrngy,micsuc-micxl,rthy,v slty,sl chky,sl chty,calc-grdg to dol LS ip,tt-tr intxl POR,tr spty dull-bri yel FLOR,tr brn STN,tr v slow dif/v fnt ring CUT/LS AA,POR-FLOR-STN-CUT AA,TR scat brn/trns l CHT"
5370.00 5380.00	"LS ltgy-wh,micsuc-vfxl,gran-suc,slty-sl sdy,cln-occ sl mrlly,chky,sl arg,tr blk SH incl-prtg,tt-tr intxl POR/occ lmy chky fl,tr dull spty yel FLOR,n vis STN,p v fnt res ring CUT"
5400.00 5420.00	"DOI ltbrn-tan,occ ltgybrn-ltgy,micsuc-micxln,occ gran-crpxl,rthy,sl slty-occ arg,cln,occ lmy-sl chky/occ lmy strk,tr LS incl,tr CRIN fos,tr dkbrn CHT,tt-tr intxl POR,fr-even dull/tr spty bri yel FLOR,g brn/tr dkbrn STN,fr slow-mod fast strmg CUT"
5420.00 5430.00	"LS wh-ltgy-ltgybrn,micsuc-vfxl,gran-suc,slty-v sl sdy,cln-chky,sl arg,tr trns lxn ANHY,v rr blk SH incl-prtg,tt-tr intxl POR/occ lmy chky fl,tr dull-bri spty yel FLOR,n vis STN,pfr slow strmg CUT"

DEPTH	LITHOLOGY
5430.00 5440.00	"DOL AA,micsuc-micxln,occ gran-crpxl,rthy,sl slty-occ arg,cln,tr LS incl,tr CRIN fos,tr dkbrn CHT,tr-fr intxl POR/rr pp agl POR,g-fr even dull/tr spty bri yel FLOR,g brn/tr dkbrn STN,gr slow-mod fast stmg CUT/ LS AA,POR-FLOR-STN-CUT AA"
5447.00 5460.00	"TR LS & SH CVGS AFTER TRIP FR-G SPL" "DOL ltbrn-brn,micxl-vfxl,micsuc-gran,sl rthy,v sl slty,occ grdg to DOL PKST,rr ANHY xl-incl,v rr trnsd CHT frag,tt-g intxl POR,fr-mod g dull yel FLOR,fr ltbrn STN,n-v rr spty blk dd o STN,fr-g slow dif-mod fast stmg CUT"
5470.00 5490.00	"DOL ltbrn-brn,micsuc-micxl,vfxl-gran,rthy,v sl slty,rr tan crpxl LS incl,rr ANHY xl-incl,tt-g intxl/tr pp agl POR,fr-mod g dull yel FLOR,fr ltbrn/tr dkbrn STN,n-rr spty blk dd o STN,fr-g slow dif-mod fast stmg CUT"
5490.00 5500.00	"DOL brn-ltbrn,micsuc-micxl,vfxl-gran,rthy,v sl slty,rr tan crpxl LS incl/rr ANHY xl-incl,tt-g intxl/v rr pp agl POR,fr-mod g dull yel FLOR,fr ltbrn/tr dkbrn-rr blk dd o STN,fr-g slow dif-mod fast stmg CUT"
5500.00 5510.00	"DOL AA,POR-FLOR-STN-CUT AA"
5510.00 5530.00	"DOL brn-ltbrn,micsuc-micxl,vfxl-gran,rthy,v sl slty,rr tan crpxl LS incl,v rr ANHY xl-incl,tt-g intxl POR,fr-mod g dull yel FLOR,fr ltbrn/tr dkbrn-rr blk dd o STN,fr-g slow dif-mod fast stmg CUT"
5530.00 5540.00	"DOL brn-ltbrn,micsuc-micxl,vfxl-gran,rthy,v sl slty,rr wh-trnsd CHT incl,v rr tan crpxl LS incl,tt-g intxl/rr pp agl POR,fr-mod g dull yel FLOR,fr brn/tr dkbrn-rr blk dd o STN,fr-g slow dif-mod fast stmg CUT"
5550.00 5570.00	"DOL brn,occ ltbrn,micsuc-micxl,vfxl-gran,rthy,v sl slty,rr wh-trnsd CHT incl,v rr tan crpxl LS incl,tt-g intxl/rr pp agl POR,g even dull-mod bri yel FLOR,g brn-fr dkbrn/rr blk dd o STN,g mod fast stmg CUT"
5570.00 5580.00	"DOL AA,micsuc-micxl-vfxl,occ gran,rthy,v sl slty,rr wh-trnsd CHT incl,rr tan crpxl LS incl,v rr trnsd xln ANHY incl,tt-g intxl/rr pp agl POR,g even dull-mod bri yel FLOR,g brn-fr dkbrn/rr blk dd o STN,g mod fast stmg CUT"
5590.00 5600.00	"DOL AA,tt-g intxl/rr pp agl POR,FLOR-STN-CUT AA/LS tan-ltgybrn-occ trnsd-wh,crpxl-micxl,cln,sl anhy,itbd in DOL,tt-tr inxl PORfr even dull-mod bri FLOR,rr ltbrn STN,n-v slow stmg CUT"
5610.00 5630.00	"DOL AA,micsuc-micxl-vfxl,occ gran,rthy,v sl slty,rr wh-trnsd CHT incl,v rr tan crpxl LS incl,rr trnsd xln ANHY incl,tt-g intxl/rr pp agl POR,g even dull-mod bri yel FLOR,g brn-fr dkbrn/rr blk dd o STN,g mod fast stmg CUT"
5630.00 5650.00	"DOL brn,occ ltbrn,micsuc-micxl,vfxl-gran,rthy,v sl slty,rr wh-trnsd CHT incl,rr trnsd xln ANHY,v rr tan crpxl LS incl,tt-g intxl/rr pp agl POR,g even dull-mod bri yel FLOR,g brn-fr dkbrn/rr blk dd o STN,g mod fast stmg CUT"
5650.00 5660.00	"DOL ltbrn-brn,micxl-micsuc-vfxl,occ gran,rthy,cln,dns,sl slty,rr ANHY xl-incl,v rr trnsd-wh CHT incl,tt-tr intxl/rr pp agl POR,fr even dull/tr spty bri yel FLOR,fr ltbrn STN,n-v rr spty blk dd o STN,fr-g slow dif-mod fast stmg CUT"
5660.00 5680.00	"DOL AA/tr ltgybrn strk,rr ANHY xl-incl,rr CRIN fos,rr trnsd-wh CHT incl,tt-tr intxl/rr pp agl POR,fr even dull/rr spty bri yel FLOR,fr ltbrn STN,n-v rr spty blk dd o STN,fr-g slow dif-mod fast stmg CUT"

DEPTH	LITHOLOGY
5680.00	5700.00 "DOL brn,occ ltbrn,micxl-vfxl-micsuc-micxl,rthy,v sl slty,tr wh-trnsl CHT incl,tr trnsl xln ANHY,rr ltgy-lgybrn slty sil strk,tt-tr intxl POR,g even dull/spty mod bri yel FLOR,g brn-fr dkbrn/rr blk dd o STN,g fast stmg CUT"
5700.00	5720.00 "DOL ltbrn-brn,micxl-vfxl-micsuc,rthy,cln,dns,tr trnsl ANHY xl-incl,rr trnsl-wh CHT incl,tt-tr intxl POR,fr even dull-bri yel FLOR,fr ltbrn-occ dkbrn STN,v rr spty blk dd o STN,g mod fast dif-stmg CUT"
5720.00	5730.00 "DOL AA,tr wh-trnsl CHT incl,tr trnsl xln ANHY incl,tr-fr intxl/rr pp agl POR,g even dull-mod bri yel FLOR,g brn-fr dkbrn/rr blk dd o STN,g mod fast stmg CUT"
5730.00	5740.00 "DOL brn-ltbrn,micxl-micsuc-vfxl,rthy,cln,tr trnsl xln ANHY incl,rr scat wh-trnsl CHT,tt-tr intxl/rr pp agl POR,fr-g dull-mod bri yel FLOR,fr brn/tr dkbrn-rr blk dd o STN,g slow dif-mod fast stmg CUT"
5740.00	5760.00 "DOL brn-ltbrn,micxl-micsuc,vfxl,rthy,cln,occ sl slty,tr trnsl xl ANHY,scat ltgy-crm-occ wh chky calc-lmy frag-grdg to dol LS,tt-tr intxl POR,g even dull-mod bri yel FLOR, fr ltbrn-tr dkbrn-blk dd o STN,g mod fast strmg CUT"
5760.00	5770.00 "DOL AA,POR-FLOR-STN-CUT AA/scat crm-ltgybrn-occ wh crpxl LS,occ chky-dol,sl chky ip,occ sl mot/blk strk,grdg to lmy DOL ip,NFSOC"
5770.00	5790.00 "DOL AA,micxl-micsuc-vfxl,rthy,cln,tr trnsl xln ANHY incl,tt-tr intxl/rr pp agl POR,g even dull-mod bri yel FLOR,fr brn/tr dkbrn-rr blk dd o STN,g mod fast stmg CUT/tr scat crm-ltgybrn-occ wh crpxl LS,chky,occ mot,sl arg,occ mrly,NFSOC"
5790.00	5800.00 "DOL brn-ltbrn,micxl-micsuc,rthy,cln,tr trnsl xl ANHY,tt-tr intxl POR/rr pp alg POR,g even dull-mod bri yel FLOR,fr ltbrn-tr dkbrn-rr blk dd o STN,g mod fast strmg CUT/scat ltgy-ltgybrn crpxl-micxl LS,frag,mot,dol ip,grdg to dol LS"
5800.00	5810.00 "DOL AA,w/rr Crin fos,rr trnsl-wh CHT frag,POR-FLOR-STN-CUT AA"
5810.00	5830.00 "DOL brn-ltbrn,micxl-micsuc,vfxl-gran,occ rthy,v rr ANHY xl,v sl alg,bcmg DOL PKST,tr-g intxl-v rr pp vug POR,g even dull-mod bri yel FLOR,fr-fr ltbrn-dkbrn-rr blk dd o STN,g slow dif-mod fast strmg CUT/scat ltgy-ltgybrn,crpxl-micxl,dol LS frag,tt,NFSOC"
5830.00	5840.00 "DOL AA,n vis alg mat,incr ANHY xl-incl,occ grdg to DOL PKST,tr-g intxl POR,fr-mod g dull yel FLOR,fr-g ltbrn-brn STN,v rr blk dd o STN,fr-mod g slow dif-mod fast stmg CUT,w/v rr dol LS frag tt,NFSOC"
5840.00	5850.00 "DOL AA,incr DOL PKST,w/tr dol LS,rr trnsl-wh CHT frag,POR-FLOR-STN-CUT AA"
5850.00	5870.00 "DOL brn-ltbrn,micxl-micsuc,vfxl-gran,occ rthy,v rr ANHY xl,v sl alg,bcmg DOL PKST,tr-g intxl-v rr pp vug POR,g even dull-mod bri yel FLOR,fr-fr ltbrn-dkbrn-rr blk dd o STN,g slow dif-mod fast strmg CUT/scat ltgy-ltgybrn,crpxl-micxl,dol LS frag,tt,NFSOC"
5870.00	5880.00 "DOL AA,w/tr ANHY xl-incl,occ dol LS frag,fr-g intxl-v rr pp vug POR,mod g dull yel FLOR,fr-g ltbrn STN,rr-tr spty blk dd o STN,fr-mod g slow dif-mod fast stmg CUT"
5880.00	5890.00 "DOL AA,sl incr DOL PKST,w/tr dol LS,rr trnsl-wh CHT frag,POR-FLOR-STN-CUT AA"

DEPTH	LITHOLOGY
5890.00 5900.00	"DOL AA,w/tr ANHY xl-incl,occ dol LS frag,v rr trnsl-clr CHT frag,fr-g intxl-v rr pp vug POR,mod g dull yel FLOR,fr-g ltbrn STN,rr-tr spty blk dd o STN,fr-mod g slow dif-mod fast stmg CUT"
5900.00 5920.00	"DOL ltbrn,rr brn-mbrn,micxl-vfxl,micsuc-gran,rr crpxl DOL PKST,v sl slty,occ rthy,rr ANHY xl,v rr CHT frag,v rr mic fos,v rr tr alg mat,fr-g intxl-v rr pp vug POR,fr-g dull yel FLOR,fr-g ltbrn-tr blk dd o STN,fr-g slow dif-mod fast stmg CUT"
5910.00 5920.00	"DOL AA,POR-FLOR-STN-CUT AA"
5920.00 5940.00	"DOL ltbrn,rr brn-mbrn,micxl-vfxl,micsuc-gran,rr crpxl DOL PKST,v sl slty,occ rthy,rr ANHY xl-incl,rr CHT frag,v rr mic fos,v rr tr alg mat,fr-g intxl-v rr pp vug POR,fr-g dull yel FLOR,fr-g ltbrn-tr blk dd o STN,fr-g slow dif-mod fast stmg CUT"
5940.00 5960.00	"DOL lt-mbrn,brn,occ choc brn,micsuc-vfxl,gran,rr micxl-crpxl DOL PKST,rthy-sl arg,occ ANHY xl-incl,v rr alg mat-mic fos,rr carb mud lams,v rr CHT frag,fr-g intxl-v rr pp vug POR,fr-g dull yel FLOR,fr-v g dkbrn STN,v rr spty blk dd o STN,fr-g stmg CUT"
5960.00 5970.00	"DOL AA,abnt alg mat,rr ANHY incl-POR fl,fr-g intxl-fr pp vug POR,fr-g dull yel FLOR,fr-g brn STN,occ spty blk dd o STN,fr-g mod fast dif-mod fast-fast stmg CUT"
5970.00 5980.00	"DOL AA,incr DOL PKST,v rr trnsl-tan CHT frag,tr ANHY xl-incl-occ POR fl,sl alg-arg,tt-g intxl-rr pp vug POR,FLOR-STN-CUT AA"
5980.00 6000.00	"DOL brn-mbrn,occ choc brn,misuc-suc,vfxl-gran,occ crpxl-micxl,rthy,sl slty,w/v rr scat vf-m QTZ gr,abnt ANHY xl-cmt,occ POR fl,v rr mic fos,alg,fr-g intxl-fr pp vug POR,fr-g dull yel FLOR,g brn STN,rr blk dd o STN,fr-g mod fast-fast stmg CUT"
6000.00 6010.00	"DOL AA,incr crpxl lt brn DOL PKST,v rr trnsl-wh CHT frag,sl incr in ANHY cmt & POR fl,tt-g intxl-fr pp vug POR,fr-g dull yel FLOR,STN-CUT AA"
6010.00 6020.00	"DOL AA,decr QTZ gr,incr alg mat,POR-FLOR-STN-CUT AA"
6020.00 6030.00	"DOL brn-mbrn,occ choc brn,micxl-vfxl,micsuc-gran,v rr crpxl,rthy-v sl slty,rr mic fos,abnt ANHY xl-cmt,v rr intbd crpxl LS frag,rr CHT frag,tt-g intxl-tr pp vug POR,fr-g dull yel FLOR,fr-g brn STN,fr mod fast-fast stmg CUT"
6030.00 6040.00	"DOL AA,w/incr ltgy-offwh,chk,crpxl-micxl,tt,dol LS frag,fr-g intxl-tr pp vug POR,fr-g dull yel FLOR,fr-g brn STN,occ spty blk dd o STN,fr-g fast-mod fast stmg CUT"
6045.00 6050.00	"DOL AA,w/occ crpxl DOL incl,alg,v rr crpxl-micxl LS incl,tr ANHY incl-fr amt ANHY cmt in xls,v rr CHT frag,tt-g intxl-tr-fr pp vug POR,fr-g dull yel FLOR,g brn STN,rr blk dd o STN,g slow-fast stmg CUT"
6050.00 6060.00	"DOL AA,w/LS & CHT AA,sl decr ANHY,POR-FLOR-STN-CUT AA"
6060.00 6070.00	"DOL lt-mbrn,brn,crpxl-vfxl,micsuc-gran,occ alg,incr tt DOL PKST,v rr mic fos,sl decr ANHY xl cmt,rr trnsl-tan CHT frag,occ ltgy-mot,crpxl-micxl dol LS frag,tt-g intxl-rr pp vug POR,rr-fr dull yel FLOR,rr brn-rr blk STN,fr slow dif-tr-fr mod fast CUT"
6070.00 6080.00	"DOL AA,incr DOL PKST,AA,POR-FLOR-STN-CUT AA"

DEPTH	LITHOLOGY
6080.00 6100.00	"DOL ltbrn,occ mbrn-brn,micxl-vfxl,micsuc-gran,rr crpxl-micxl DOL PKST,v sl rthy,occ slty,v rr scat vf-m QTZ gr,tr ANHY xl-incl,occ POR fl,scat trns-l-clr CHT frag,occ chk dol LS lams,tt-g intxl-tr pp vug POR,fr-g dull yel FLORtr-fr brn-rr blk STN,fr-g CUT"
6100.00 6110.00	"DOL AA,v rr-tr trns-l-wh CHT frag,n-rr chk dol LS incl-cmt,rr ANHY cmt,v sl arg,pred DOL PKST,v rr alg mat,tr-g intxl-tr pp vug POR,fr-g dull yel FLOR,rr-tr brn STN,n-v rr blk spty dd o STN,rr-fr slow dif-tr mod fast strmg CUT"
6120.00 6130.00	"DOL lt-mbrn-brn/occ ltgybrn mot,micxl-vfxl-micsuc,occ crpxl-alg,occ grdg to DOL PKST,rr OST& mic fos,tr trns-l-wh CHT,rr xl ANHY incl,rr crpxl-micxl dol LS frag,tt-g intxl-rr pp vug POR,rr-fr dull yel FLOR,rr brn-rr blk STN,fr slow dif-mod fast CUT"
6130.00 6150.00	"DOL brn-ltbrn,occ dkbrn,micxl-vfxl,micsuc-crpxl,sl agl,cln,rr trns-l-xln ANHY incl-cmt,rr mic fos,sl chty,rr LS incl AA,rr-fr intxl POR,g even dull-bri FLOR,fr ltbrn-tr dkbrn STN,g mod fast strmg CUT"
6150.00 6160.00	"DOL AA,micxl-vfxl-micsuc,sl agl,cln,rr trns-l-xln ANHY incl-cmt,rr mic fos,sl chty,rr LS incl AA,rr-fr intxl POR,g even dull-spty bri FLOR,fr ltbrn-tr dkbrn STN,g mod fast strmg CUT"
6160.00 6180.00	"DOL m-ltbrn,occ dkbrn,micxl-vfxl-micsuc,occ crpxl/tr tan-ltgybrn crpxl sl chky LS incl,rr trns-l-wh ANHY incl-fl,sl chty,occ grdg to DOL PACKST,rr-fr intxl/rr pp vug POR,g even dull-bri FLOR,g ltbrn-tr dkbrn-blkbrn dd o STN,g fast strmg-mod fast dif CUT"
6180.00 6200.00	"DOL lt-mbrn,occ dkbrn,micxl-micsuc-vfxl,v sl slty,rr trns-l ANHY incl occ POR fl,rr scat wh-crm crpxl LS,rr agl mat/mic fos,rr trns-l-wh CHT,p-fr intxl/rr pp vug POR,g-fr even dull-mod bri yel FLOR,rr-g lt-dkbrn/rr blk pp dd o STN,g dif-mod fast strmg CUT"
6200.00 6210.00	"DOL m-ltbrn,occ dkbrn,micxl-vfxl-micsuc,occ crpxl,rr ltgybrn calc slty prtq,rr trns-l-wh ANHY,rr scat LS AA,sl chty,POR-FLOR-STN-CUT AA"
6210.00 6220.00	"DOL AA/scat ltgy-gybrn,anhy fl,slty,DOL prtq,rr trns-l-wh xln ANHY,v sl chty,rr-fr intxl/rr pp vug POR,fr-g ltbrn/tr dkbrn-rr pp blk dd o STN,g mod fast strmg CUT"
6220.00 6230.00	"DOL AA/decr ltgy-gybrn prtq,rr trsl CHT intbd in DOL,rr trns-l ANHY,v rr scat wh chky-sl anhy LS,POR-FLOR-STN-CUT AA"
6230.00 6250.00	"DOL m-ltbrn,occ dkbrn,micxl-vfxl-micsuc,rthy,cln,dns,sl-v slty,rr trns-l-xln ANHY incl,v rr scat ltgy-gybrn dol sil frag,rr-tr intxl/rr pp vug POR,fr even dull-mod bri yel FLOR,g brn-dkbrn/occ blk pp dd o STN,mod fast strmg CUT"
6250.00 6260.00	"DOL AA,decr scat ltgy-gybrn sil frag,rr trns-l-xln incl,POR-FLOR-STN-CUT AA"
6260.00 6280.00	"DOL mbrn,ltbrn,occ dk-choc brn,vfxl-micxl-micsuc,rthy,slty-occ v slty,dns,rr xln ANHY incl-prtg,sl chty,rr scat ltgy dol sil frag,g-fr intxl/tr pp vug POR,g even bri-dull yel FLOR,g-fr brn-dkbrn/incr blk dd o STN,g brit blooming-fast strmg CUT"
6280.00 6290.00	"DOL brn-ltbrn,occ dk-choc brn,micxl-vfxl-micsuc,rthy,rr xln ANHY incl,rr trns-l-wh CHTincl-frag,v rr scat wh crpxl sl chky-sl dol LS frag,rr-tr intxl/v rr pp vug POR,fr even dull/tr spty bri yel FLOR,g brn/tr dkbrn-blk dd o STN,g dif-mod fast strmg CUT "

DEPTH	LITHOLOGY
6290.00	6300.00 "DOL AA/tr ltgy-gybrn slty sil-chty prtgs,decr LS AA,POR-FLOR-STN-CUT AA"
6300.00	6320.00 "DOL AA,incr micsuc,tr xln ANHY,tr ltgy-gybrn sil AA,rr trnsl-wh CHT frag,rr scat wh crpxl sl chky-sl dol LS frag,POR-FLOR-STN-CUT AA/scat LS off wh-crm,crpxl,cln-sl chky,v sl dol,tt,tr dull yel FLOR,n STN,p v fnt res ring CUT"
6320.00	6340.00 "DOL brn-mbrn,occ dk-choc brn,misuc-vfxl-gran,occ crpxl-micxl,rthy,sl slty,abnt wh-trnsl CHT,abnt xln-amor-fl ANHY,w/v rr scat vf-m QTZ gr,tr ANHY POR fl,alg,fr-g intxl/tr pp vug POR,g even dull-bri FLOR,g brn/tr blk dd o STN,g dif-mod fast stmg CUT"
6340.00	6350.00 "DOL AA,rthy,sl slty,mod wh-trnsl CHT,mod xln-amor-fl ANHY,v rr scat vf-m QTZ gr,rr ANHY POR fl,v rr mic fos,alg,fr-g intxl-fr pp vug POR,FLOR AA,g brn/tr blk dd o STN,fr-g dif-fast stmg CUT"
6350.00	6360.00 "DOL lt-mbrn-brn,rr tan,crpxl-vfxl,micsuc-gran,rthy,v sl slty,alg ip,rr-tr CHT frag,occ tan-ltgy-mot crpxl-micxl LS ptgs,anhy-tr ANHY incl-xl,tr-g intxl-rr pp vug POR,fr-g dull yel FLOR,fr-g lt-mbrn STN,rr spty dd o STN,fr-g slow dif-mod fast stmg CUT"
6360.00	6370.00 "DOL AA,POR-FLOR-STN-CUT AA,w/sl incr CHT frg,occ LS AA"
6370.00	6380.00 "DOL AA,incr trnsl-wh CHT frag,scat wh-ltgy,occ tan-mot,crpxl-micxl,chky,dol,anhy LS frag,NFSOC,w/rr-tr scat ANHY incl in DOL"
6380.00	6390.00 "DOL brn-mbrn,occ choc brn,micxl-vfxl,micsuc-suc,gran,sl alg,rthy-sl slty ip,v rr ANHY xl-incl,tr-g intxl-rr pp vug POR,fr-g dull yel FLOR,fr-g ltbrn-tr dkbrn STN,tr spty blk dd o STN,tr slow dif-fr mod fast stmg CUT,w/CHT-LS AA"
6390.00	6400.00 "DOL AA,occ bcmg DOL PKST,tr-fr intxl-v rr pp vug POR,fr-g dull yel FLOR,tr-fr brn STN,rr spty blk dd o STN,tr slow dif-fr mod fast stmg CUT,w/CHT & LS AA"
6400.00	6410.00 "DOL ltbrn,occ mbrn-brn,micxl-vfxl,occ crpxl,micsuc-gran,rthy-sl slty,v sl chty-tr CHT frag,scat ANHY xl-incl,occ wh-tan-ltgy crpxl-micxl chk LS frag,rr mic fos,tt-g intxl POR,tr-g dull yel FLOR,n-tr ltbrn-brn STN,v rr dd o STN,fr slow dif-tr stmg CUT"
6410.00	6420.00 "DOL AA,decr POR-FLOR-STN,tr-fr slow dif-tr mod fast stmg CUT,incr DOL PKST,sl incr ANHY xl-incl,decr LS frag,CHT AA"
6420.00	6430.00 "DOL AA,decr POR-FLOR-STN,tr-fr slow dif-tr mod fast stmg CUT,decr DOL PKST,occ ANHY xl-incl,rr LS frag,CHT AA"
6430.00	6440.00 "DOL ltbrn,occ mbrn-brn,micxl-vfxl,occ crpxl,micsuc-gran,rthy-sl slty,bcmg DOL PKST,v sl chty-tr CHT frag,scat ANHY xl-incl,occ wh-ltgy crpxl chk LS frag,rr mic fos,tt-g intxl POR,tr-g dull yel FLOR,n-tr ltbrn-brn STN,v rr dd o STN,fr slow dif-tr stmg CUT"
6440.00	6450.00 "DOL AA,pred ltbrn micxl-micsuc DOL PKST,occ scat ANHY incl-xl & chky wh-tan LS,tt-fr intxl POR,n-v rr pp vug POR,tr-fr dull yel FLOR,rr-tr brn-v rr blk STN,fr slow dif-tr slow-mod fast stmg CUT"
6450.00	6460.00 "DOL,AA,sl incr POR,FLOR-STN-CUT AA,w/tr LS& CHT AA,v rr scat ANHY xl-incl"

DEPTH	LITHOLOGY
6460.00 6470.00	"DOL ltbrn,occ brn,micxl-micsuc,occ vfxl-gran,rthy-sl slty,pred DOL PKST,occ ANHY xl-incl,rr-tr trnsf-tan CHT frag,v rr ltgy chk crpxl LS frag,tr-fr intxl POR,fr-mod g dull yel FLOR,rr-fr ltbrn STN,v rr spty blk dd o STN,fr slow dif-tr-fr slow stmg CUT"
6470.00 6490.00	"DOL AA,pred DOL PKST,rr CHT frag,n-v rr LS incl-ptgs,rr scat ANHY xl-incl,tr-fr intxl POR,n-v rr pp vug POR,tr ltbrn STN,tr-fr slow dif-tr slow-rr mod fast stmg CUT"
6480.00 6500.00	"DOL ltbrn,occ brn,v rr mbrn,micxl-micsuc,tr vfxl-gran,v sl rthy-slty,occ anhy-tr ANHY incl-xl,pred DOL PKST,v rr wh-tan chky LS frag,rr trnsf CHT frag,tt-fr intxl-v rr pp vug POR,fr dull yel FLOR,n-tr ltbrn-v rr blk dd o STN,fr slow dif-tr mod fast CUT"
6500.00 6510.00	"DOL AA,incr DOL GRNST,v rr LS incl,occ scat CHT & ANHY,v sl alg,tt-fr intxl POR,fr dull yel FLOR,tr-fr ltbrn STN,rr spty blk dd o STN,tr-fr slow dif-tr slow-mod fast stmg CUT"
6510.00 6520.00	"DOL lt-mbrn,micxl-micsuc,occ vfxl-gran,tr crpxl DOL PKST,v rr alg mat,rr ANHY xl-incl,v rr trnsf CHT frag,occ wh-tan chk dol LS ptgs,fr-g intxl-n vis alg POR,fr-g dull yel FLOR,tr-fr ltbrn-rr blk STN,tr-fr slow dif-fr mod fast stmg CUT"
6520.00 6530.00	"DOL AA,decr DOL PKST,sl alg,fr-g intxl-tr pp vug POR,mod g dull yel FLOR,tr-fr lt-mbrn STN,rr-tr blk dd o STN,tr-fr slow dif-fr mod fast stmg CUT"
6530.00 6540.00	"DOL AA,POR-FLOR-STN-CUT AA"
6540.00 6550.00	"DOL ltbrn,occ mbrn,micxl-micsuc,vfxl-gran,occ crpxl,rthy-sl slty,occ LS rich cmt,tr DOL PKST,scat CHT frag-ANHY incl-xl,rr dol LS frag,alg ip,tr-g intxl-tr pp vug POR,fr-g dull yel FLOR,tr-fr ltbrn-rr blk STN,fr slow dif-fr mod fast stmg CUT"
6550.00 6560.00	"DOL AA,pred DOL GRNST,v sl alg,fr-g intxl-tr pp vug POR,fr dull yel FLOR,fr ltbrn-rr blk STN,fr-g slow dif-mod fast stmg CUT"
6560.00 6570.00	"DOL lt-mbrn,micxl-vfxl,micsuc-gran,rr crpxl DOL PKST,rthy-sl slty,occ anhy-ANHY xl-incl,sl alg,v rr CHT frag,rr Crin-mic fos,tr-g intxl-tr pp vug POR,fr-g dull yel FLOR,tr-fr ltbrn STN,rr scat blk dd o STN,fr-g slow dif-mod fast stmg CUT"
6570.00 6580.00	"DOL AA,alg ip,incr ANHY xl-incl,occ ANHY cmt,v rr mic fos,POR-FLOR-STN-CUT AA"
6580.00 6590.00	"DOL ltbrn-occ m-dkbrn,micxl-micsuc-vfxl,occ gran-crpxl,rthy,v sl slty,tr trnsf xln-occ wh ANHY incl-fl,tr bf-trnsf-wh CHT incl,rr mic fos,rr agl mat,tt-tr intxl POR,fr-g even dull FLOR,fr ltbrn/rr dkbrn-blk STN,g dif-mod fast strmg CUT"
6590.00 6600.00	"DOL AA/incr ANHY AA,tr dol LS,tan-bf,crpxl,cln,intbd in DOL PACKST,rr CRIN fos,POR-FLOR-STN-CUT AA"
6600.00 6610.00	"DOL ltbrn,occ m-dkbrn,micxl-micsuc-gran,rthy,sl-v sl slty,tr xln ANHY incl-POR fl,rr CRIN & mic fos,tr scat ltgy-gybrn sil-chty sl calc-dol frag,tt-fr intxl/rr pp vug POR,FLOR-STN-CUT AA"
6610.00 6620.00	"DOL AA/decr ltgy-gybrn sil-chty frag-grdg to prtgt,tt-fr intxl POR,g even dull-mod bri yel FLOR,g ltbrn/tr dkbrn-rr blk dd o STN,g dif-mod fast strmg CUT"

DEPTH	LITHOLOGY
6620.00	6630.00 "DOL ltbrn,occ m-dkbrn,micxl-micsuc-gran,rthy,sl-v sl slty,tr xln ANHY incl-POR fl,rr mic fos,tr scat ltgy-gybrn sil-chty frag-prtg,rr wh CHT incl,tt-fr intxl/rr pp vug POR,FLOR-STN-CUT AA"
6630.00	6640.00 "DOL AA/decr ltgy-gybrn sil-chty frag-prtg,tr CRIN & mic fos,tt-fr intxl POR,g even dull-mod bri yel FLOR,g ltbrn/tr dkbrn-rr blk dd o STN,g dif-mod fast strmg CUT"
6640.00	6650.00 "DOL ltbrn,occ m-dkbrn,micxl-micsuc-gran,rthy,sl-v sl slty,rr xln ANHY incl,rr mic fos,tr scat ltgy-gybrn sil-chty frag-prtg/rr wh CHT incl,tt-tr intxl POR,fr even dull-mod bri yel FLOR,g ltbrn/rr dkbrn STN,fr dif-slow strmg CUT"
6650.00	6660.00 "DOL AA/tr scat ltgy-gybrn sil-chty frag-incl,rr CRIN & mic fos,tt-tr intxl POR,fr even dull-mod bri FLOR,g ltbrn/vrr brn STN,g-fr dif-slow strmg CUT"
6660.00	6670.00 "DOL AA,tr ANHY xl-incl,occ ANHY cmt,v rr mic fos,POR-FLOR-STN-CUT AA"
6670.00	6680.00 "DOL AA/incr scat ltgy-gybrn sil-chty frag-incl,tr trnsl xln ANHY,rr CRIN & mic fos,tt-tr intxl POR,fr even dull-mod bri FLOR,g ltbrn/vrr brn STN,g-fr dif-slow strmg CUT"
6680.00	6690.00 "DOL lt-mbrn,occ dkbrn,micxl-micsuc-gran,rthy,sl-v sl slty,rr xln ANHY incl,rr mic fos,tr scat ltgy-gybrn sil-chty frag-prtg/rr wh CHT incl,tt-tr intxl POR,fr even dull-mod bri yel FLOR,g ltbrn/rr dkbrn STN,fr dif-slow strmg CUT"
6690.00	6700.00 "DOL AA/incr scat ltgy-gybrn sil-chty frag-incl,tr trnsl xln ANHY/occ wh lmy-calc chky amor fl,POR-FLOR-STN-CUT AA"
6700.00	6710.00 "DOL AA,vfxl-micxl-micsuc,cln,tr trnsl xln ANHY/occ wh lmy-calc chky fl,tr blk sl dol-chty styl prtg,tr scat ltgy-gybrn sil-chty frag,rr bf-occ trnsl CHT incl,tt-fr intxl POR,fr even dull-mod bri yel FLOR,g ltbrn/tr dkbrn-blk dd o STN,g fast strmg CUT"
6710.00	6720.00 "DOL AA,rr xln ANHY incl,rr ltgy-gybrn sil-chty frag,cln,dns,POR-FLOR-STN-CUT AA"
6720.00	6730.00 "DOL AA,tr scat ltgy-gybrn sil-chty frag,rr xln ANHY incl,cln,dns,POR-FLOR-STN-CUT AA"
6730.00	6740.00 "DOL ltbrn,vfxl-micxl-micsuc,rthy,cln,dns,incr scat trnsl-wh ANHY incl-fl,tr scat ltgy sil-chty frag,rr wh CHT incl,tt-tr intxln POR,fr even dull-mod bri FLOR,g ltbrn-p brn STN,fr dif-slow strmg CUT"
6740.00	6750.00 "DOL AA/incr trnsl-wh xln-sl chky ANHY,incr bf-trnsl-wh scat CHT,tr scat ltgy-gybrn sil-chty frag,cln,dns,POR-FLOR-STN-CUT AA"
6750.00	6760.00 "DOL ltbrn-brn,occ m-dkbrn,tan,vfxl-micsuc-micxl,occ crpxl,rthy,sl slty,incr trnsl-wh xln ANHY/occ wh chky calc-lmy fl,tr ltgy=gybrn sil-chty frag,tr bf-trnsl-wh CHT incl-frag,v rr free f gr QTZ,POR-FLOR-STN-CUT AA"
6760.00	6770.00 "DOL ltbrn-brn,occ mbrn-ltgy,crpxl-micxl,vfxl-micsuc,occ gran,rthy-sl slty,occ mic fos,chty-tr CHT frag,occ ANHY xl-incl,v rr dol LS incl,tt-g intxl POR,tr-fr dull yel FLOR,n-fr brn STN,n-v rr spty blk dd o STN,fr slow dif-tr slow-mod fast stmg CUT"
6770.00	6780.00 "DOL AA,incr DOL PKST,incr crm-ltgy crpxl chky dol LS incl-ptgs,POR-FLOR-STN-CUT AA"

DEPTH	LITHOLOGY
6780.00 6790.00	"DOL AA,incr DOL PKST,incr trnsl-wh CHT frag,tr ANHY incl-xl,occ LS cmt-tr LS frag,POR-FLOR-STN-CUT AA"
6790.00 6800.00	"DOL lt-mbrn,occ dkbrn-dkgybrn,crpxl-micxl,micsuc-vfxl,occ gran,tr DOL PKST,rr dol MRLST,tr trnsl-clr CHT frag,occ ANHY xl-incl,scat ltgy-wh crpxl,chky LS incl,tt-g intxl POR,mod fr-fr dull yel FLOR,tr-fr ltbrn-v rr blk STN,fr-g slow dif-tr slow-fast CUT"
6800.00 6810.00	"DOL ltbrn,occ brn-mbrn,micxl-vfxl,micsuc-gran,occ crpxl DOL PKST,rthy-sl slty,v rr LS incl,tr scat CHT frag,occ ANHY xl-incl,v rr mic fos,fr-g intxl-occ tt,tr-fr dull-rr bri yel FLOR,tr-fr ltbrn-mbrn STN,tr-fr slow dif-slow-mod fast stmg CUT"
6810.00 6820.00	"DOL AA,v rr Crin fos,w/LS-CHT & ANHY AA,POR-FLOR-STN-CUT AA"
6820.00 6825.00	"DOL AA,w/tr-fr intxl POR,tr-g dull yel FLOR,fr ltbrn STN,v rr blk dd o STN,fr-mod g slow dif-tr-fr slow stmg CUT"

FORMATION TOPS

OPERATOR: MOBIL

WELL NAME: RATHERFORD UNIT #13-12 NW UPPER 1-B HORIZONTAL LATERAL LEG #2

FORMATION NAME		SAMPLES	SAMPLES	DATUM
		MEASURED DEPTH	TRUE VERTICAL DEPTH	KB:4569
LOWER ISMAY				
GOTHIC SHALE		5328'	5320'	-751
DESERT CREEK		5361'	5334'	-765
DC-1A		5378'	5352'	-783
DC-1B		5420'	5366'	-797

GEOLOGICAL SUMMARY

AND

ZONES OF INTEREST

The Mobil Exploration and Production U.S. Inc., Ratherford Unit #13-12 Horizontal Leg #2, Section 13, T41S, R23E, was a re-entry of the Mobil Ratherford Unit #13-12, a sidetrack in a southeasterly direction from 5238' measured depth, 5238' true vertical depth, on February 4, 1997. Leg #2 reached a measured depth of 6825', true vertical depth of 5397' at total depth, horizontal displacement of 1552' and true vertical plane 323 degrees, on February 10, 1997. The lateral was drilled without any significant problems. Of note is that, since this well was being produced just prior to the reentry, the background gases noted on the accompanying mud log remained high, as well as the samples being contaminated to a certain extent with live oil encountered through out the well.

The primary objective of the Ratherford Unit #13-12 Horizontal Lateral Leg #2 was the upper 1-B Porosity Bench, to identify and define the porosity bench, its effective porosity, staining and reservoir properties in the Desert Creek Member of the Upper Paradox Formation.

The Gothic Shale Member, the transition zone at the top of the Desert Creek, and the 1-A zone were encountered while drilling Leg #2. Kick off point for this lateral was in the lower Ismay Member, with only minor shows of staining or porosity near the base. The top of the Gothic Shale is 5328' measured depth, 5320' true vertical depth. The Gothic Shale was predominantly dark gray to black, silty, carbonaceous, brittle to firm, subblocky to blocky to platy, calcareous to slightly dolomitic and slightly micaceous. The top of the Gothic was gradational from the very thin interbedding of very argillaceous, carbonaceous limestone and very argillaceous, limy dolomite, with the dolomite grading into very dolomitic, carbonaceous shale. The top of the Gothic was picked predominantly by the decrease in penetration rate and the increased percentage of shale in the samples.

Between the Gothic Shale and Desert Creek Porosity Members is a transitional zone, which appears to be gradational. The top of the Desert Creek is commonly picked at the Gothic Shale, transition zone facies change, which in this well occurred at a measured depth of 5361' and a true vertical depth of 5334'. In this well the zone was predominantly a limestone; which was gray to white to light brown, cryptocrystalline to microcrystalline, with some granular limestone, very slightly sandy, with very thinly interbedded dolomite which was brown to light gray brown, microcrystalline to granular, slightly limy and occasionally silty. The limestone was predominately tight with very rare intercrystalline porosity that showed some anhydrite fillings. Through this transitional zone there appeared to be some interbedding or possibly cyclic deposits consisting of dolomitic to slightly calcareous, black, carbonaceous mudstones and very slightly dolomitic siltstones. The porosities ranged from none to very poor intergranular, with traces of calcite to anhydrite fillings. No visible staining was noted and had predominately a very rare spotty, very poor, faint dull yellow fluorescence, with no to very rare residue ring cut.

The top of the Desert Creek 1-A zone was picked at 5378' measured depth, 5352' true vertical depth. The pick is based on an increase in the rate of penetration, as well as sample interpretation. The top was picked in this lateral mainly based on the first significant increase in the dolomite grainstone below the top of the Desert Creek. The dolomites were predominately light brown to brown, occasionally graybrown, cryptocrystalline to microcrystalline, with streaks of microsucrosic dolomite grainstone, and very thin dolomite packstones and white to tan, tight dolomitic limestones.

The dolomites had no to fair intercrystalline porosity, some chert fragments, and very rare to fair dull yellow fluorescence, with a good light brown stain and a poor slow residual ring to fair moderately fast streaming cut.

The top of the Desert Creek 1-B zone appeared to occur at 5420' measured depth, 5366' true vertical depth. The pick was based on decrease in the rate of penetration and an increase in tight limestones, which marked the boundary between the 1-A and the 1-B zones. The top was picked in this lateral mainly based on the overall consistent decrease penetration rate in the limestone below the Desert Creek top of the 1-A. The limestone was predominately tight with very rare, very thin streaks of intercrystalline porosity, some scattered chert fragments, and no to very rare faint fluorescence, stain or cut.

The top of the main objective, the 1-B porosity zone, was picked at a measured depth of 5422', 5366' true vertical depth, in a microcrystalline to microsucrosic dolomite. As the curve was being completed in the 1-B zone the dolomite became cleaner and increasing granular. While drilling curve through the section, it appeared that the 1-B porosity bench was possibly defined by the interval 5422' measured depth, 5366' true vertical depth to a possible 5433' measured depth, 5380' true vertical depth. The top of the porosity Bench was marked by facies change, which was somewhat gradational to sharp since the drilling rate increased rather sharply. The top of the best porosity in the 1-B bench was marked by increase in rate of penetration and marked increase in intercrystalline porosity. The base of the porosity zone was not encountered while landing the curve.

At a measured depth of 5447', 5369.5' true vertical depth, with a horizontal displacement of 178' in the dolomite grainstones of the 1-B porosity horizon, a trip was made to change the bottom hole assembly and pick up the MWD tool. While drilling the 1-B lateral to a horizontal displacement of approximately 440', the porosity was predominately in a light to medium brown dolomite grainstone, which was microcrystalline to very fine crystalline, microsucrosic to occasionally sucrosic, slightly anhydritic with traces of anhydrite crystals to rare inclusions, rare micro fossils, traces of algal material, traces of scattered dark brown stain and very rare black oil stain residue* in the intercrystalline matrix. Predominantly fair to good intercrystalline and traces of pin point vuggular porosity, with rare anhydrite and very rare dolomitic limestone mud filling and cement in the intercrystalline and vuggular porosity. Through the interval the staining was moderate to fair and cuts ranging from moderate milky residue/ring to good moderately fast to slow steady streaming. A decrease in porosity and penetration was noted at 5712' measured depth, 5371' true vertical depth, with a horizontal displacement of 440', a slight increase in dolomitic limestone, dolomite packstone, Crinoid fossil and chert fragments were noted in the samples. The decrease in penetration rate was due to a vertical facies change as the well bore neared the upper boundary of the 1-B zone. After a series of slides to turn the bore hole to a shallow downward angle, the pipe was again rotated and the penetration rated gradually increased with the lithology again returning to dolomite grainstone and rare scattered clean tan to cream to white, cryptocrystalline to microcrystalline, slightly cherty, dolomitic limestone with no visible porosity. The dolomites had fair to good intercrystalline to pin point vuggular porosity, a fair to good brown stain, scattered black dead oil stain and a good slow diffuse to moderately fast streaming cut.

The well was continued gradually downward at a very shallow angle from 5712' measured depth, 5371' true vertical depth, to 5968' measured depth, 5384' true vertical depth, with a horizontal displacement of 695'. At this point an increase in light brown, tight, dolomite packstones, white to light gray cherts, and very rare cream to tan, dolomitic limestones were noted as the well bore approached the base of the 1-B zone. The dolomites remained predominately microcrystalline to microsucrosic to granular, algal, with intercrystalline to pin point vuggular porosity, with a trace to fair brown stain and rare spotty black dead oil stain, and a fair slow diffuse to fair slow to moderate fast streaming cut. This change in the dolomite facies appeared to be vertical, with the limestones being possibly thin inclusions or secondary cementation in the dolomite.

From measured depth of 5968' to a measured depth of 6103', true vertical depth of 5382', with a horizontal displacement of 835', the lithology remained granular to microsucrosic dolomite, with the cherts and limestone described above. Also noted was an increase in anhydrite inclusions and anhydrite cement in the intercrystalline porosity. The dolomites were predominately light to medium brown to brown, microcrystalline to very fine crystalline and microsucrosic to sucrosic to granular, with slightly algal to good intercrystalline porosities, with fair to good dull to occasionally bright yellow fluorescence, rare to trace black dead oil to fair light brown live oil stain and a fair to good moderately fast streaming cut. The thin scattered limestones were cream to tan, occasionally white, cryptocrystalline to microcrystalline, slightly dolomitic, anhydritic and tight. The facies change was vertical and the well bore was slowly turned upwards until reaching 6103' at which time the well was slowly turned downwards.

As the lateral continued downward at a shallow angle from 6103' measured depth, to 6300' measured depth, 5382' and a horizontal displacement of 1030', the lithology was predominately a granular, slightly algal dolomite. The dolomite was a granular to microcrystalline, light brown to medium brown, microcrystalline to very fine crystalline and microsucrosic to sucrosic to granular, with slightly algal to good intercrystalline porosities, with fair to good dull to occasionally bright yellow fluorescence, fair light brown live oil stain and a trace to fair slow diffuse to rare moderately fast streaming cut, with no significant decrease in porosity. Although minor tight streaks were noted in the dolomites, predominately associated with slight increases in the occurrence of dolomite packstones and anhydrite inclusions.

At a measured depth of 6300' measured depth to a total depth of 6590', true vertical depth of 5390' with a horizontal displacement of 1315', as the well was oriented downward at a very shallow angle, the lithology was remained brown to light brown, microcrystalline to very finely crystalline to microsucrosic, granular dolomites, with chert fragments, and scattered anhydrite crystals and inclusions. The porosity the dolomite and was intercrystalline to rare pin point vuggy, with traces of light brown stain to very rare spotty black dead oil stain, and a slow diffuse to rare slow steaming cut. At 6590' the well bore was oriented upward at a shallow angle in an attempt to stay with the zone of best porosity.

From a measured depth of 6590' to a total measured depth of 6825', true vertical depth of 5394', with a horizontal displacement of 1552', the well was drilled upwards at a very shallow angle. The lithology was a light to medium brown, cryptocrystalline to microcrystalline, microsucrosic to very finely crystalline granular dolomite, thin dolomite packstone, with scattered anhydrite crystals and inclusions, occasionally anhydrite cement in the crystalline porosity. Thin scattered dolomitic marlstones were noted from a measured 6780' to 6800'. From 6760' to 6790' an increase in light to dark brown cherts were noted. Also of note was the increase in porosity and penetration rate from 6790' to 6825', with tvd's of 5395' to 5394' respectively.

In tracking the target line through the upper bench, there were several facies changes with in the dolomites, predominately vertical as the well bore approached the top or base of the 1-B zone, with only one possible horizontal change. The possible horizontal change occurred at a vertical displacement of 800'. This change may have been a change to tight dense dolomite with the zone of best porosity thinning over the top of the zone from 800' to 1050' or the change was actually a vertical change with the bottom of the zone pushing up from below, with the 1-C zone thickening at this point. Another possible scenario is the whole Desert Creek interval doming up at this point. Predominant facies changes were associated with the rock classification with in the dolomites and occasionally the depositional environment. Even with these classification changes, porosity for the most part was continuous, with the effective or the better porosity being associated with the granular dolomite facies which had fair to good, intercrystalline to algal porosities, and the absence of any major anhydrite plugging. The dolomite packstone had porosities which were predominately tighter and with very poor permabilities, as the dolomite was of probable primary deposition.

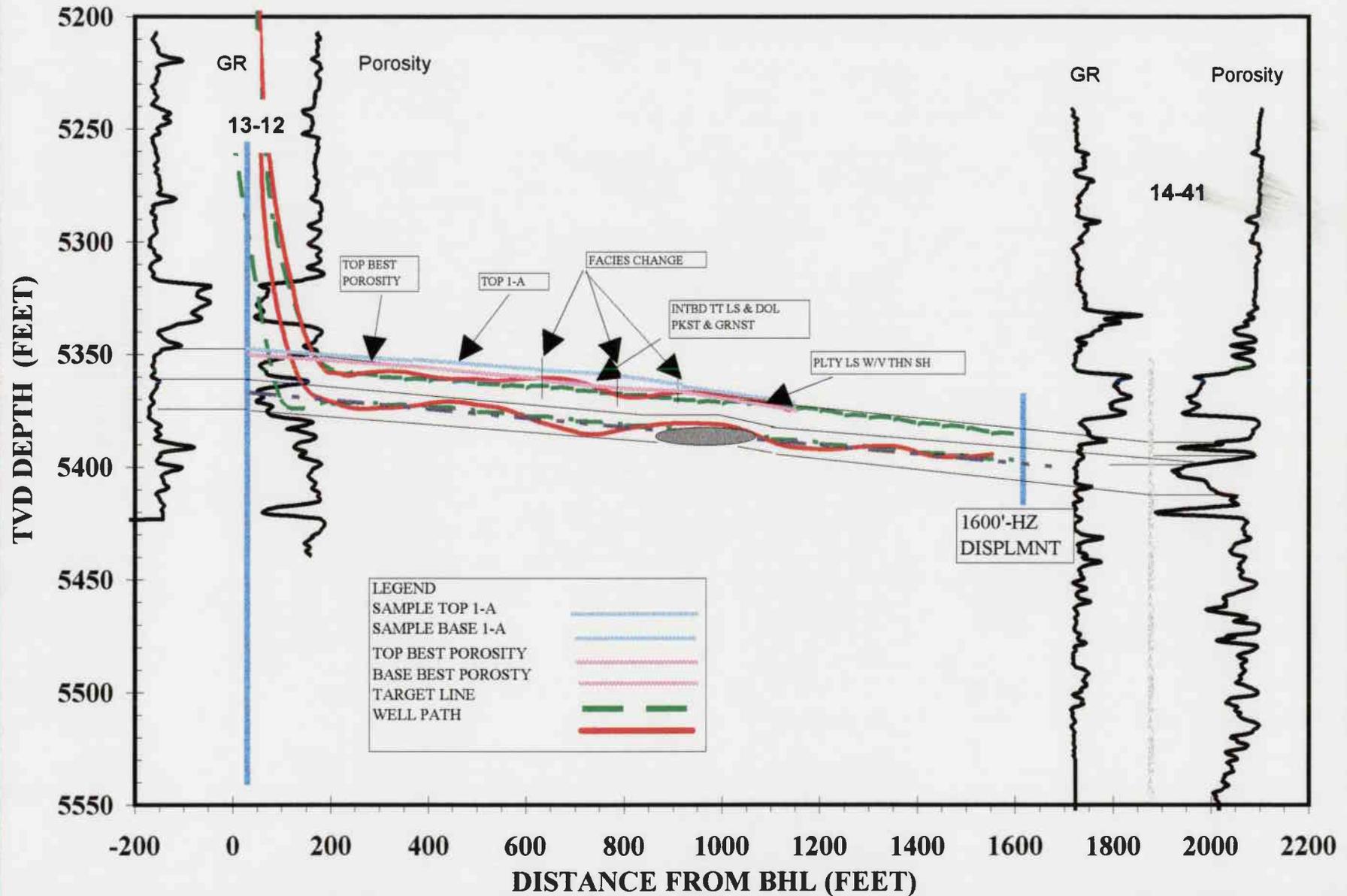
From the top of the 1-B porosity bench to a total measured depth of 6825', the dolomite lithology was consistent, light brown to brown, microcrystalline to very fine crystalline, occasionally microsucrosic to granular, with scattered, tighter dolomite packstone and some anhydrite matrixes. The dolomites had fair to good intercrystalline to very rare algal porosities and a good constant dull to bright yellow fluorescence, with noticeable decreases when noticeable amounts of tight dolomite packstone was present. The staining in the dolomites ranged from trace to good light brown to traces of black dead oil stain and the associated cuts being trace to good slow to fast streaming and occasion slow diffuse cuts. The staining in the dolomite, fair to moderate to occasionally good, however remained rather consistent and continuous through out bench, Fluorescence, like the staining was consistent and continuous, and was a dull to bright yellow gold, with cuts ranging from moderate to good ring (diffuse) to moderate to good steady fast streaming cut. The sample shows were affected in part due to the presence of live oil encountered through out the drilling of curve and lateral sections. In excess of 90 bbls of oil was produced during the drilling operations.

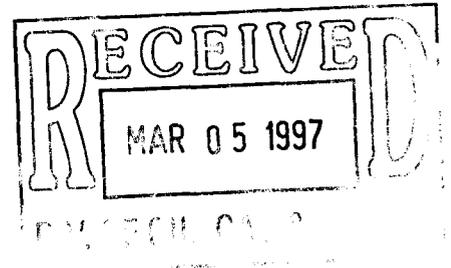
The conclusion drawn from the southwest 1-B porosity bench Lateral Leg 2, is that in this area the primary dolomitization (due to the lack of limestone cements in the framework), was enhanced by the algal porosity. However, the vertical facies changes with in the dolomites, had an effect on porosity, not well developed at times, and further reducing effective porosity when encountering anhydrite filled porosities. Also, having an effect on the porosity, the cryptocrystalline dolomite packstones grade to and were thinly interbedded with microcrystalline to granular dolomite, which in turn grade to very fine grain, dolomitic grainstone with dense limestone matrix, some black dead oil staining was trapped in the matrix and along the anhydrite to dolomite contact surfaces. Staining was fair to moderate and there were significant sections where staining was moderately good. The lateral used the a proposed projected target line as a reference point through the bench, drilling tried to follow the target line while maintaining contact with best porosity. It appears that the effective porosity is continuous, even with the vertical facies changes encountered.

While drilling, the lateral did make varying amounts of live oil, with significant amounts of heavies noted on the chromatograph (C₃ and C₄). I would interpret this lateral to have good reservoir qualities through the entire lateral, since the lateral through the 1-B zone gave up significant oil while drilling. I believe that the porosities are well enough developed to enhance the overall performance of the zone.

*The black residual staining has been called by Dr. Dave Eby & others as "bitchimum" and is also known as "dead oil" ("dd o stn" on mud logs). This staining is associated with the movement of oil over long periods of time and is a good indicator of producible hydrocarbons when associated with productive porosities, but can also be found in porosities that have been filled by anhydrites and other material at later dates.

MOBIL, Ratherforn Unit #13-12, Northwest Laterals





MOBIL

**RATHERFORD UNIT #13-12
HORIZONTAL LATERAL LEG #3
UPPER 1-A POROSITY BENCH DESERT CREEK
SECTION 13, T41S, R23E
SAN JUAN, UTAH**

**GEOLOGY REPORT
by
DAVE MEADE / MARVIN ROANHORSE
ROCKY MOUNTAIN GEO-ENGINEERING CORP.
GRAND JUNCTION, COLORADO
(970) 243-3044**

ENCLOSURE

TABLE OF CONTENTS

WELL SUMMARY.....	3
DAILY WELL CHRONOLOGY.....	4
DAILY ACTIVITY.....	5
BIT RECORD.....	6
SURVEY RECORD.....	7
MUD RECORD.....	9
SAMPLE DESCRIPTIONS.....	10
FORMATION TOPS.....	19
GEOLOGIC SUMMARY AND ZONES OF INTEREST.....	20
WELL PLOTS.....	25

WELL SUMMARY

OPERATOR: MOBIL EXPLORATION & PRODUCTION U.S. INC.

NAME: RATHERFORD UNIT #13-12 SE UPPER HORIZONTAL LATERAL
LEG #3 IN 1-A UPPER POROSITY BENCH, DESERT CREEK

LOCATION: SECTION 13, T41S, R23E

COUNTY/STATE: SAN JUAN, UTAH

ELEVATION: KB:4569' GL:4556'

SPUD DATE: 2/11/97

COMPLETION DATE: 2/17/97

DRILLING ENGINEER: LEWIS SIMONS

WELLSITE GEOLOGY: DAVE MEADE / MARVIN ROANHORSE

MUDLOGGING:
ENGINEERS DAVE MEADE / MARVIN ROANHORSE

CONTRACTOR: BIG "A" RIG 25
TOOLPUSHER: DEAN SIPE

HOLE SIZE: 4 3/4"

CASING RECORD: SIDETRACK IN WINDOW AT 5222' MEASURED DEPTH

DRILLING MUD: M-I
ENGINEER: DANNE BEASON
MUD TYPE: BRINE WATER/POLYMER SWEEPS

ELECTRIC LOGS: NA
ENGINEER: NA
TYPE LOGS: NA

TOTAL DEPTH: 6631' MEASURED DEPTH TVD-5335.8'

STATUS: PULL BACK UP HOLE PRIOR TO SETTING WHIPSTOCK FOR
LEG #4

DRILLING CHRONOLOGY

MOBIL
RATHERFORD UNIT #13-12
SE UPPER 1-A HORIZONTAL LATERAL LEG # 3

DATE	DEPTH	DAILY	ACTIVITY
2/10/97	6724'	101'	DRLG & DIR SURVEYS-CIR. SPLS @ 6825'= TD LEG #3-CIR. SWEEPS-TOH-LAY DOWN LATERAL BHA-TIH W/ RETRIEVING HOOK-TOH-PICK UP NEW WHIPSTOCK
2/11/97	6825'	8'	TIH W/NEW WHIPSTOCK-SET & ORIENT WHIPSTOCK-TOH-TIH W/STARTER MILL-MILL WINDOW 5212-14'-CIR OUT-TOH-PICK UP WINDOW MILL #2 -TIH-MILL WINDOW 5212'-5220'
2/12/97	5220'	34'	MILL 5220' TO 5222'-CIR. OUT-TOH-LAY DOWN MILL-PICK UP CURVE ASSEMBLY-TIH-PICK UP SWIVEL-RIG UP K-JET WIRELINE-RUN & ORIENT GYRO-TIME DRG 5222'-52354'-RUN SURVEY-PULL & CHECK GYRO-DRLG-SURVEY-PULL & LAY DOWN GYRO-RIG UP & RUN IN STEERING TOOL-TEST TOOL-SHORT TRIP & PULL TOOL & REPAIR-TIH-WASH 15' TO BTM-RUN IN W/TOOL & TEST
2/13/97	5254'	479'	DRLG & DIR SURVEY CURVE #3 5254'-5439'-PUMP SWEEP & CIR BTMS UP @ 5439'-TOH 15 JNTS-PULL WET CONN-PULL STEERING TOOL & RIG DOWN K-JET-TOH-PICK UP NEW BIT & LATERAL BHA-TIH-PICK UP SWIVEL & BREAK CIR & CIR OUT GAS & OIL-ORIENT TOOL FACE-DRLG & DIR. SURVEYS
2/14/97	5733'	176'	DRLG & DIR SURVEYS
2/15/97	5909'	361'	DRLG & DIR SURVEYS-SHORT TRIP @ 6154'-LAY DOWN 12 JNTS & SWIVEL-PICK UP 12 JNTS & SWIVEL-DRLG & DIR SURVEYS
2/16/97	6270'	312'	DRLG & DIR SURVEYS
2/17/97	6582'	49'	DRLG & DIR SURVEYS-CIR. OUT @ 6631'-TOH-P.U. RETRIEVING HOOK-TIH-RETRIEVE WHIPSTOCK-P.U. NEW WHIPSTOCK-TIH

DAILY ACTIVITY

Operator: MOBIL

Well Name: RATHERFORD UNIT #13-12 SE UPPER 1-A HORIZONTAL LATERAL LEG #3

DATE	DEPTH	DAILY	DATE	DEPTH	DAILY
2/10/97	6724'	101'			
2/11/97	6825'	8'			
2/12/97	5220'	34'			
2/13/97	5254'	479'			
2/14/97	5733'	176'			
2/15/97	5909'	361'			
2/16/97	6270'	312'			
2/17/97	6582'	49'			
TD	6631'				

BIT RECORD

OPERATOR: MOBIL

WELL NAME: RATHERFORD UNIT #13-12 SE UPPER 1-A HORIZONTAL LATERAL LEG #3

RUN	SIZE	MAKE	TYPE	IN/OUT	FTG	HRS	FT/HR
#1(RR) BIT	4 3/4"	STC	MF3P	5222'/ 5439'	217'	14.5	14.9
#2 BIT	4 3/4"	HTC	STR-20	5439'/ 6631'	1192'	98.5	12.2

SPERRY-SUN DRILLING SERVICES
SURVEY DATA

Customer ... : MOBIL
Platform ... : CA-MJ-70037
Slot/Well .. : /13-12,3A1,L3

MEASURED DEPTH	ANGLE DEG	DIRECTION DEG	TVD	NORTHINGS FEET	EASTINGS FEET	VERTICAL SECTION	DOG LEG
5212.69	0.64	340.41	5211.66	16.77 N	52.29 W	-50.08	0.00
5220.00	2.40	75.20	5218.97	16.85 N	52.16 W	-50.03	34.68
5230.00	4.70	78.53	5228.95	16.98 N	51.55 W	-49.67	23.08
5240.00	8.40	81.86	5238.88	17.17 N	50.43 W	-48.96	37.18
5250.00	12.90	85.19	5248.71	17.37 N	48.59 W	-47.73	45.40
5260.00	17.60	88.52	5258.35	17.50 N	45.97 W	-45.87	47.79
5270.00	22.40	91.85	5267.75	17.48 N	42.55 W	-43.31	49.31
5280.00	27.00	95.18	5276.83	17.21 N	38.38 W	-40.04	48.04
5290.00	31.30	98.51	5285.56	16.62 N	33.55 W	-36.05	45.94
5300.00	35.00	101.84	5293.93	15.65 N	28.17 W	-31.40	41.23
5310.00	38.70	105.17	5301.93	14.24 N	22.34 W	-26.13	42.03
5320.00	43.30	108.50	5309.48	12.33 N	16.07 W	-20.19	50.91
5330.00	48.10	111.83	5316.46	9.86 N	9.36 W	-13.55	53.58
5340.00	52.40	115.16	5322.86	6.79 N	2.31 W	-6.26	50.03
5350.00	56.80	118.49	5328.65	3.11 N	4.95 E	1.60	51.69
5360.00	60.40	121.82	5333.86	1.18 S	12.33 E	9.96	45.86
5370.00	63.90	125.15	5338.53	6.06 S	19.70 E	18.70	45.73
5380.00	65.90	128.48	5342.77	11.49 S	26.95 E	27.71	36.18
5390.00	70.00	131.81	5346.53	17.47 S	34.03 E	36.97	51.31
5400.00	74.40	135.14	5349.59	24.02 S	40.93 E	46.49	54.23
5410.00	78.90	138.47	5351.90	31.11 S	47.58 E	56.18	55.44
5420.00	83.30	141.80	5353.44	38.69 S	53.91 E	65.96	54.93
5437.00	90.80	145.20	5354.32	52.33 S	64.00 E	82.58	48.42
5446.00	91.50	144.28	5354.14	59.68 S	69.20 E	91.35	12.84
5485.63	89.80	139.60	5353.69	90.87 S	93.62 E	130.37	12.56
5517.51	87.90	137.20	5354.33	114.70 S	114.78 E	162.05	9.60
5549.23	88.90	135.00	5355.21	137.54 S	136.76 E	193.67	7.62
5580.99	88.90	131.50	5355.82	159.30 S	159.89 E	225.41	11.02
5612.62	91.40	130.80	5355.74	180.11 S	183.70 E	257.04	8.21
5644.45	94.30	129.50	5354.16	200.61 S	208.00 E	288.81	9.98
5676.18	94.10	131.10	5351.83	221.07 S	232.13 E	320.44	5.07
5707.99	94.50	130.90	5349.45	241.88 S	256.07 E	352.15	1.41
5739.79	93.00	132.00	5347.37	262.89 S	279.86 E	383.88	5.85
5771.63	92.50	133.20	5345.84	284.41 S	303.26 E	415.68	4.08
5803.33	90.40	134.10	5345.04	306.29 S	326.19 E	447.36	7.21
5835.18	89.00	134.80	5345.20	328.59 S	348.93 E	479.17	4.91
5866.92	93.00	135.90	5344.65	351.16 S	371.23 E	510.85	13.07
5898.61	90.20	136.20	5343.77	373.97 S	393.21 E	542.44	8.89

SPERRY-SUN DRILLING SERVICES
SURVEY DATA

Customer ... : MOBIL
Platform ... : CA-MJ-70037
Slot/Well .. : /13-12,3A1,L3

MEASURED DEPTH	ANGLE DEG	DIRECTION DEG	TVD	NORTHINGS FEET	EASTINGS FEET	VERTICAL SECTION	DOG LEG
5930.35	87.10	135.50	5344.51	396.73 S	415.31 E	574.10	10.01
5962.23	86.90	135.90	5346.18	419.52 S	437.54 E	605.87	1.40
5993.97	88.40	134.10	5347.48	441.94 S	459.97 E	637.54	7.38
6025.02	92.10	133.60	5347.35	463.45 S	482.35 E	668.56	12.02
6056.82	91.80	132.50	5346.27	485.14 S	505.58 E	700.34	3.58
6088.48	89.30	131.80	5345.96	506.38 S	529.05 E	732.00	8.20
6120.28	88.40	130.40	5346.60	527.28 S	553.01 E	763.78	5.23
6152.04	87.80	131.80	5347.65	548.15 S	576.93 E	795.52	4.79
6183.87	87.50	131.50	5348.96	569.29 S	600.69 E	827.33	1.33
6215.63	87.40	130.40	5350.37	590.08 S	624.65 E	859.05	3.47
6247.52	87.00	129.20	5351.93	610.47 S	649.12 E	890.88	3.96
6279.27	89.80	129.40	5352.82	630.57 S	673.68 E	922.57	8.84
6311.13	91.80	129.90	5352.37	650.89 S	698.21 E	954.40	6.47
6342.19	93.00	129.20	5351.07	670.65 S	722.14 E	985.41	4.47
6373.97	92.50	129.90	5349.55	690.87 S	746.61 E	1017.12	2.70
6405.72	91.80	130.60	5348.35	711.37 S	770.83 E	1048.83	3.12
6437.56	89.40	131.50	5348.02	732.27 S	794.84 E	1080.66	8.05
6469.33	91.00	131.10	5347.91	753.24 S	818.70 E	1112.43	5.19
6501.11	92.10	131.80	5347.05	774.27 S	842.51 E	1144.20	4.10
6532.06	94.60	132.90	5345.24	795.08 S	865.35 E	1175.09	8.82
6563.94	95.40	132.70	5342.46	816.66 S	888.65 E	1206.85	2.59
6597.00	95.80	132.70	5339.24	838.97 S	912.83 E	1239.75	1.21
6631.00	95.80	132.70	5335.80	861.91 S	937.69 E	1273.57	0.00

THE DOGLEG SEVERITY IS IN DEGREES PER 100.00 FEET.
N/E COORDINATE VALUES GIVEN RELATIVE TO WELL SYSTEM REFERENCE POINT.
TVD COORDINATE VALUES GIVEN RELATIVE TO WELL SYSTEM REFERENCE POINT.
THE VERTICAL SECTION ORIGIN IS WELL HEAD.
THE VERTICAL SECTION WAS COMPUTED ALONG 132.00 (TRUE).
CALCULATION METHOD: MINIMUM CURVATURE.

5220' IS A GYRO SURVEY @ BOTTOM OF WHIPSTOCK.
5230'-5420' HAVE INTERPOLATED AZIMUTHS.
6631' IS PROJECTED TO THE BIT @ T.D.

MUD REPORT

OPERATOR: MOBIL

WELL NAME: RATHERFORD UNIT #13-12 SE UPPER 1-A HORIZONTAL LATERAL LEG #3

DATE	DEPTH	WT	VIS	FLS	YLD	GEL	PH	WL	CK	CHL	CA	SD	SOL	WT R
2/10/97	6825'	8.6	26	-	-	-	11.5	N/C	N/C	29000	1600	-	-	100
2/11/97	5214'	8.6	26	-	-	-	11.5	N/C	N/C	30000	1800	-	-	100
2/12/97	5222'	8.6	26	-	-	-	11.8	N/C	N/C	33000	3600	-	-	100
2/13/97	5439'	9.2	26	-	-	-	11.7	N/C	N/C	105000	1600	-	-	100
2/14/97	5740'	9.2	26	-	-	-	11.9	N/C	N/C	104000	800	-	-	100
2/15/97	5924'	9.2	26	-	-	-	11.8	N/C	N/C	94000	1200	-	-	100
2/16/97	6390'	9.2	N/C	-	-	-	11.8	N/C	N/C	92000	1600	-	-	100
2/17/97	6631	9.2	26	-	-	-	11.7	N/C	N/C	87,000	1200	-	-	100

SAMPLE DESCRIPTIONS

OPERATOR: MOBIL

WELL NAME: RATHERFORD UNIT #13-12 NW UPPER 1-A HORIZONTAL LATERAL LEG #3

DEPTH	LITHOLOGY
5222.00 5230.00	"ABNT METAL FRAG & TR CMT IN SPL" "LS wh-crm,tan,crpxl-micxl,rthy-chk,occ cln,v sl slty,v rr mic fos,sl dol,anhy ip,tt-v rr intxl POR,n-v rr spty bri yel FLOR,n-v rr spty brn STN,n-v p slow dif CUT,w/tr brn CHT frag & lt-mbrn,micxl,arg,lmy DOL,tt,NFSOC"
5230.00 5240.00	"DOL gybrn-brn,micxl-micsuc,occ crpxl,rthy,cln,occ v sl slty,chy,occ sl lmy,v sl chky ip,occ grdg to dol LS,tt-fr intxl/rr pp vug POR,fr even mod bri-dull yel FLOR,g brn-dkbrn/rr blk dd o STN,g mod fast strng CUT"
5240.00 5250.00	"LS AA/scat dkbrn-brnblk CHT"
5250.00 5260.00	"DOL brn,ltbrn-ltbrngy,micxl-micsuc-occ crpxl,rthy,occ sl slty-sl shy,lmy ip,tt-tr intxl POR,tr spty yel FLOR,tr ltbrn STN,fr dif-slow strng CUT"
5262.00 5272.00	"LS wh-crm,tan,crpxl-micxl,rthy-chk,occ cln,v sl slty,v rr mic fos,sl dol,anhy ip,tt-v rr intxl POR,n-v rr spty bri yel FLOR,n-v rr spty brn STN,n-v p slow dif CUT,w/tr brn CHT frag "
5277.00 5290.00	"DOL lt-mgybrn-off wh,brngy,m-dkbrn,micxl-crpxl,occ micsuc-vfxl,rthy,mot,anhy,occ sl slty-sl shy,lmy ip,occ grdg to dol LS ip,tr scat dkbrn CHT,tt-tr intxl POR,n-rr spty bri yel FLOR,tr ltbrn STN,fr dif-slow strng CUT"
5290.00 5300.00	"DOL ltgy-gybrn-wh,mgybrn,occ tan,dkbrn,crpxl-micxl,vfxl-micsuc,chky,arg,anhy,occ sl slty,scat CHT AA,rr xln ANHY incl,rr mic fos,sl calc-lmy ip,occ mot,tt-tr intxl POR,tr spty dull/v rr bri yel FLOR,p v fnt res ring CUT"
5300.00 5310.00	"DOL AA,w/thn dkbrn-brn-trnsl CHT frag & v thn LS AA"
5310.00 5320.00	"DOL ltbrn-brn,occ mgybrn-offwh,crpxl-micxl,occ micsuc-vfxl,rthy,cln,anhy,sl lmy,v rr mic fos,sl alg,w/tr scat dkbrn CHT frag,tt-v rr intxl-v rr pp vug POR,tr spty dull yel FLOR,n-v rr vis STN,tr slow dif- slow strng CUT,w/rr wh-mot,crpxl,chk dol LS"
5320.00 5330.00	"DOL-LS-CHT AA,POR-FLOR-STN-CUT AA,w/dkgybrn-blk carb,dol-sl calc,slty SH"
5330.00 5340.00	"SH blk-dkgybrn,dol-sl calc,carb,sooty,sl slty,mica ip,w/v rr thn intbd arg DOL & v thn v rr arg-dol LS,rr blk-dkbrn CHT frag"
5340.00 5350.00	"SH AA,w/LS wh-ltgy,crpxl-micxl,chky,v sl chy,dol,v rr mic fos,v sl slty,tt-v rr intxl POR,tr dull yel FLOR,n-v rr vis STN,n-v rr slow dif-v slow strng CUT,w/v rr CHT frag & rr ltbrn-brn,crpxl-micxl,lmy DOL,tt,NFSOC"
5350.00 5360.00	"SH AA,w/tr thn LS & DOL AA,w/v rr intxl POR,rr dull yel FLOR,n vis STN,n-p slow dif CUT in LS"

DEPTH	LITHOLOGY
5360.00	5370.00 "LS crm-wh,occ ltgy,tan,crpxl-micxl,rthy-chky,sl slty-sdy,v sl dol,arg ip,occ anhy,tt-v rr intxl POR,n-v rr spty dull yel FLOR,NSOC,v rr ltbrn,crpxl,arg DOL-tt-NFSOC,w/SH AA"
5370.00	5380.00 "LS AA,w/thn blk carb SH lams & DOL lt-mbrn,occ gybrn,micxl,rthy,sl slty,lmy,arg ip,tt-v rr intxl POR,n-v rr dull yel FLOR,NSOC"
5380.00	5390.00 "LS crm-wh-ltgy,occ tan,crpxl-micxl,rthy,chk,occ cln,slty-sl sdy,dol ip,v rr mic fos,w/v thn tt intbd brn DOL,tt-rr intxl POR,v rr dull spty yel FLOR,n-v rr spty brn STN,rr-tr slow dif-slow strmg CUT"
5390.00	5400.00 "LS AA,POR-FLOR-STN-AA,SH AA,tr ltbrn-brn CHT frag,w/DOL lt-mbrn,micxl,occ micsuc,rthy,sl slty,v sl lmy,arg ip,v rr ANHY xl-incl,tt-tr intxl POR,rr fnt dull yel FLOR,v rr brn STN,n-v p slow dif-slow strmg CUT"
5400.00	5410.00 "DOL AA,w/tr-fr intxl POR,FSOC AA,w/LS & CHT AA"
5410.00	5420.00 "DOL ltbrn-brn,micxl-micsuc,vfxl-gran ip,rthy-sl slty,lmy ip,sl anhy,w/v rr ltbrn CHT frag,occ arg,tr-fr intxl POR,tr-fr dull yel FLOR,tr ltbrn STN,tr-fr slow dif-slow strmg CUT,w/v rr slty dol LS incl-NFSOC"
5420.00	5440.00 "DOL ltbrn-brn,crpxl-vfxl,micsuc-gran,occ DOL PKST,rthy-sl slty,v sl arg,lmy ip,v rr alg,v rr ANHY xl,fr-g intxl-v rr pp vug POR,fr-g dull-bri yel FLOR,fr-mod g ltbrn STN,v rr spty blk dd o STN,tr-mod g slow dif-slow-mod fast strmg CUT"
5450.00	5470.00 "DOL AA,vfxl-micsuc-gran,occ crpxl,occ DOL PKST,rthy,slty,occ v sl lmy/tr tan crpxl LS incl,tr CRIN fos,tr ANHY xl,tr trnsl-wh scat CHT,fr-g intxl/rr pp vug POR,fr-g even dull-bri yel FLOR,g ltbrn-brn/rr blk STN,g slow dif-slow strmg CUT"
5470.00	5480.00 "DOL m-ltbrn,micxl-vfxl-micsuc,occ crpxl,rthy,sl slty,tr tan crpxl LS incl/scat sl chky wh crpxl LS,tr trnsl-wh CHT,rr trnsl ANHY incl,tr CRIN fos,fr-tr intxl/rr pp vug POR,g even dull -spty bri FLOR,g brn/rr blk pp dd o STN,g dif/slow-mod fast strmg CUT"
5490.00	5500.00 "DOL lt-mbrn,micxl-vfxl-micsuc,occ crpxl,rthy,v -sl slty ip,cln,incr LS AA,occ grdg to calc DOL ip,incr scat bf-trnsl-wh CHT,tt-tr intxl POR,FLOR AA,fr-tr lt brn STN,fr dif/tr slow strmg CUT"
5500.00	5510.00 "DOL AA/ scat LS,tan-bf,crpxl,cln,occ chky/tr bf-trnsl-wh CHT,sl anhy ip,dns,tt,rr spty dull-mod bri yel FLOR,p fnt res ring CUT"
5510.00	5520.00 "DOL lt-mbrn,micxl-micsuc-gran,rthy,sl slty,cln,tr scat bf-trnsl-wh CHT,tr LS AA,tt-tr intxl POR,fr even dull/occ spty bri yel FLOR,fr ltbrn-rr brn STN,fr dif/tr slow strmg CUT"
5520.00	5530.00 "DOL AA,sl slty,cln,rr scat bf-trnsl-wh CHT,tr LS AA,tt-tr intxl POR,fr even dull/occ spty bri yel FLOR,fr ltbrn-rr brn STN,fr dif/tr slow strmg CUT"
5531.00	5540.00 "DOL AA/tr LS AA,POR-FLOR-STN-CUT AA"
5540.00	5560.00 "DOL lt-mbrn,micxl-micsuc-gran,occ crpxl,occ DOL PKST,rthy,sl-v slty,occ v sl lmy/tr tan crpxl LS incl,rr ANHY xl,tr trnsl-wh scat CHT,tr CRIN fos,tt-tr intxl POR,fr-g even dull yel FLOR,g-fr ltbrn-brn STN,fr dif-tr slow strmg CUT"

DEPTH	LITHOLOGY
5560.00	5570.00 "DOL m-ltbrn,micxl-micsuc-gran,occ crpxl,grdg to DOL PACKST,rthy,sl slty,tr tan crpxl LS incl,tr bf-trnsl-wh CHT,rr trnsl ANHY incl,tr CRIN fos,fr-tr intxl POR,g spty dull-mod bri yel FLOR,g ltbrn/tr brn STN,g dif/slow-mod fast strmg CUT"
5570.00	5590.00 "DOL m-ltbrn,micxl-micsuc-gran,grdg to DOL PACKST ip,rthy,sl slty,cln,tr scat bf-trnsl-wh CHT,tr LS AA,tr CRIN fos,tt-tr intxl POR,fr even dull/occ spty bri yel FLOR,fr ltbrn-rr brn STN,fr dif/tr slow strmg CUT"
5590.00	5600.00 "DOL lt-mbrn,micxl-crpxl-micsuc,vfxl-gran,grdg to DOL PACKST,rthy,occ slty,calc-lmy,tr tan LS incl,tr bf-trnsl-wh CHT,rr mic fos,tt-tr intxl POR,fr spty dull yel FLOR,p-fr ltbrn STN,"
5600.00	5610.00 "DOL AA,grdg to DOL PACKST,sl anhy ip,POR-FLOR-STN-CUT AA"
5610.00	5630.00 "DOL m-ltbrn,micxl-crpxl-micsuc,occ vfxl-gran,grdg to DOL PACKST,rthy,sl slty,calc-lmy ip,tr scat bf-trnsl-wh CHT,tr dol LS tan crpxl sl chky,tr CRIN fos,tt-tr intxl POR,tr spty dull/rr spty bri yel FLOR,fr ltbrn-rr brn STN,fr dif/tr slow strmg CUT"
5630.00	5640.00 "DOL AA,incr calc-lmy ip,POR-FLOR-STN-CUT AA"
5640.00	5650.00 "DOL m-ltbrn,micxl-crpxl-micsuc,occ vfxl-gran,grdg to DOL PACKST,rthy,sl slty,calc-lmy ip,tr scat bf-trnsl-wh CHT/tr dol LS tan crpxl sl chky,tr CRIN fos,tt-tr intxl POR,tr spty dull/rr spty bri yel FLOR,fr ltbrn-rr brn STN,fr-tr p dif CUT"
5650.00	5660.00 "DOL ltbrn-brn,occ tan,crpxl-micxl,occ micsuc,v sl alg,tr LS rich cmt-POR fl,tr Crin fos,v rr ANHY xl,rr CHT frag,tt-fr intxl POR,fr dull yel FLOR,rr-tr ltbrn STN,n-tr slow dif-slow stmg CUT"
5660.00	5670.00 "DOL AA,incr Crin fos,tr Crin fos,occ bcmg DOL PKST,rr DOL WKST,POR-FLOR-STN-CUT AA"
5670.00	5690.00 "DOL ltbrn-brn,crpxl-micxl,occ vfxl-micsuc,gran ip,bcmg DOL PKST & WKST,abnt Crin-tr mic fos,v sl alg,w/LS rich cmt & POR fl,sl anhy-rr ANHY xl,occ wh-tan CHT frag,tt-fr intxl-v rr alg POR,tr dull yel FLOR,fr ltbrn STN,n-fr slow dif-tr slow stmg CUT"
5690.00	5700.00 "DOL AA,CRIN fos,sl alg,pred DOL GRNST,bcmg & intbd w/DOL PKST & DOL WKST,sl chty,occ ANHY xl-incl,tt-tr intxl-v rr alg POR,fr dull yel FLOR,fr ltbrn STN,fr-tr slow dif-slow-mod fast stmg CUT"
5700.00	5710.00 "DOL AA,decr CRIN fos,rr CHT frag,v sl alg,w/crpxl tan-crm DOL PKST incl,tt-tr intxl-rr alg POR,fr dull yel FLOR,n-tr slow ltbrn-v rr spty blk STN,fr-tr slow dif-mod fast stmg CUT"
5710.00	5720.00 "DOL AA,incr DOL WKST,abnt mic fos,tt-tr intxl-alg POR,fr dull yel FLOR,n-tr ltbrn-v rr blk STN,fr of fr slow dif-slow-mod fast stmg CUT"
5720.00	5730.00 "DOL AA,incr LS rich cmt-POR fl,w/occ tan-offwh crpxl-micxl,rthy-cln,sl dol LS incl,v sl chty,v rr CRIN-mic fos,tt-v rr intxl POR,n-tr spty dull yel FLOR,n-v rr ltbrn STN,rr-tr fr slow dif-slow stmg CUT"
5730.00	5740.00 "DOL AA,POR-FLOR-STN-CUT AA,w/tr crm-tan-offwh,crpxl-micxl,cln-chky,dol,tt LS incl-intbd"

DEPTH	LITHOLOGY
5745.00 5750.00	"LS tan-crm,rr wh,crpxl-micxl,cln-chky,dol-v dol,grdg to v lmy DOL,w/DOL AA,sl anhy-rr ANHY xl,n vis POR,n-v rr fnt yel FLOR,n vis STN-CUT"
5750.00 5760.00	"DOL & LS AA,anhy,rr ANHY xl-incl,scat CHT frag,n-tr intxl POR,tr dull-bri yel FLOR,n-v rr STN,n-v p slow dif-v slow stmg CUT"
5760.00 5780.00	"LS tan,occ wh-ltgy,occ gybrn,crpxl-micxl,rthy-cln,chk,v sl arg,dol,occ chty,tt-v rr intxl POR,n-v rr dull-bri yel FLOR,n-v rr ltbrn STN,n-v p slow dif CUT,w/DOL brn-mbrn,crpxl-micxl-micsuc,mrly ip,lmy,arg,w/tr ltgy dol SH lams,tr intxl POR,tr dull yel FLOR,n-v rr ltbrn STN,n-p slow dif CUT"
5780.00 5790.00	"DOL ltgy-brn,occ gybrn,crpxl-micxl,rthy,sl slty,lmy-v lmy,occ grdg to gy dol MRLST,w/tr crm-tan crpxl-micxl,dns,arg SH,rr CHT frag,sl anhy,tt-tr intxl POR,rr-tr spty dull yel FLOR,n-tr brn STN,tr-fr slow dif-v slow stmg CUT"
5790.00 5800.00	"SH ltgy,sbblky,dol,v sl slty,mica,occ sl calc,w/DOL AA,tr intxl POR,FLOR-STN-CUT AA,rr-tr trns-l-brn CHT frag,ltgy-wh-tan,crpxl-micxl,rthy-chk,pred dol LS,tt"
5800.00 5810.00	"DOL pred brn-gybrn-ltgy,crpxl-micxl,occ micsuc-gran,cln-v shy,lmy ip,sl anhy,mrly,tt-tr intxl POR,tr dull yel FLOR,tr ltbrn STN,tr slow dif-mod fast stmg CUT,w/SH-LS-CHT AA"
5810.00 5820.00	"DOL-SH-CHT AA,w/POR-FLOR-STN-CUT AA,tr LS crm-tan,ltgy,crpxl,dns,arg,dol,grdg to v lmy DOL,tt"
5820.00 5830.00	"SH m-ltgy,mgybrn,sbblky-sbplty,occ irreg-sbsplty,rthy,sl-v sl slty,mica,dol,tr dism PYR,rr brn crpxl DOL incl,grdg to shy DOL ip"
5830.00 5840.00	"DOL m-dk-ltbrn,m-ltbrngy,crpxl-micxl,occ vfxl-micsuc,rthy,cln,v sl chky-anhy,sl-v arg-mrly ip,tr CRIN,tr mica,dns,tt-rr intxl POR,n-tr scat even dull-spty mod bri yel FLOR,tr lt-m brn STN,fr slow dif/tr v slow strmg CUT"
5840.00 5850.00	"LS tan,wh-ltgy,occ trns-l-gybrn,crpxl-micxl,occ micsuc,rthy-cln,chk,cht,occ sdy/lmy mtx-fl,v sl arg,sl dol,tt-v rr intxl POR,n-v rr dull-bri yel FLOR,n-v rr ltbrn STN,n-v p res ring CUT"
5850.00 5860.00	"DOL lt-dk-mbrn,occ m-ltgybrn,crpxl-micxl,pred cln,dns,occ rthy-slty,sl arg ip/tr lt-mgy SH strk,mrly,grdg to dol SH,tr scat dkbrn CHT,tt-tr intxl POR,tr scat even dull yel-rr scat dull org FLOR,fr dif-v slow strmg CUT"
5860.00 5870.00	"LS tan,wh-crm-ltgy,occ ltgybrn,crpxl-micxl,rthy,cln,sl chky,occ chky lmy mtx-fl,v sl arg,occ sl dol,tr mic fos,tt-v rr intxl POR,n-v rr dull yel FLOR,n-v rr ltbrn STN,n-v p res ring CUT"
5870.00 5880.00	"SH m-ltgy,occ mgybrn,sbblky-sbplty,occ irreg-sbsplty,frm-hd,rthy,sl-v sl slty,mica,dol,tr dism PYR,rr brn crpxl DOL nod,grdg to shy DOL ip"
5880.00 5890.00	"DOL m-dkbrn,crpxl-micxl,cln,dns,calc-lmy,occ v sl arg ip,tr pp LS incl,tr mic fos & GAST,grdg to lmy DOL PACKST,n-rr v fnt dull org mnrl FLOR,tr brn STN,n CUT"
5890.00 5900.00	"SH m-dk gy,m-dkgybrn,sbblky-sbplty,frm-brit,rthy,sl-occ v slty/rr SLTST strk,mica,v-sl dol/tr brn crpxl DOL nod,occ sl calc-lmy ip,occ grdg to vf gr SS-SLTST/dol-calc mtrx"

DEPTH	LITHOLOGY
5900.00	5910.00 "DOL m-dkbrn,crpxl-micxl,cln,dns,occ sl calc-lmy ip,intbd in SH AA-occ v sl shy ip,rr pp LS incl,rr mic fos & GAST,occ grdg to lmy DOL PACKST,n-rr v fnt dull orgn mnrl FLOR,tr brn STN,n CUT"
5910.00	5920.00 "SH m-dk gy,m-dkgybrn,sbblky-sbplty,hd-brit,rthy,sl-occ v slty/rr SLTST strk,mica,occ imbd DOL nod-incl./DOL m-ltbrn,occ tan,crpxl-micxl,rthy,v sl chky-lmy,tr LS incl,tr mic fos,tt-tr intxl POR/rr chky lmy intxl POR fl,FLOR-STN-CUT AA"
5920.00	5930.00 "DOL m-dkbrn,crpxl-micxl,cln,dns,occ sl calc-lmy ip,imbd in SH AA,rr pp LS incl,rr mic fos & GAST,POR-FLOR-STN-CUT AA"
5930.00	5940.00 "DOL m-dkbrn,crpxl-micxl,cln,dns,occ calc-lmy ip,imbd in SH AA,tr tan-brn crpxl LS incl,tr mic fos,occ grdg to lmy DOL PACKST,tt-tr intxl POR/rr wh chky lmy fl,FLOR-STN-CUT AA"
5940.00	5950.00 "SH m-ltgy,occ mgybrn,sbblky-sbplty,occ irreg-sbsplty,frm-hd,rthy,sl-occ v sl slty,rr SLTST strk,mica,dol-occ sl lmy,tr dism PYR,tr imbd brn crpxl DOL incl-nod,v rr blk carb incl,grdg to shy DOL ip"
5950.00	5960.00 "DOL m-dkbrn,occ ltgybrn,crpxl-micxl,cln,dns,calc-lmy,sl chky ip,occ imbd in SH AA,tr tan-crm-trnsl crpxl LS incl,tr mic fos,grdg to lmy DOL PACKST,tt-tr intxl POR,n-rr v fnt dull orgn mnrl FLOR,tr brn STN,n CUT"
5960.00	5970.00 "DOL m-ltbrn,occ dkbrn,crpxl-micxl,occ vfxl,grdg DOL PAKST,cln,dns,tr tan crpxl incl,tr chky wh-trnsl POR fl-prtg,tr mic fos,occ sl calc-lmy,tt-tr intxl POR,n-rr v fnt dull orgn mnrl FLOR,fr ltbrn STN,n CUT"
5970.00	5980.00 "DOL ltbrn-brn,occ mot,crpxl-micxl,occ micsuc,rthy,v sl slty,rr mrly,w/LS & ANHY incl-POR-v rr frac fl,tr CHT frag,abnt mic fos,v rr alg,tt-tr intxl-v rr pp vug POR,tr dull yel FLOR,n vis-v rr ltbrn STN,n-tr slow dif-v rr slow stmg CUT"
5980.00	5990.00 "DOL AA,pred DOL PKST,POR-FLOR-STN-CUT AA,incr wh-crm crpxl LS-trnsl-wh ANHY,scat trnsl-clr-ltbrn CHT frag,n-v rr ltgy SH"
5990.00	6000.00 "DOL ltbrn-brn,crpxl-micxl-micsuc,rthy,sl slty,occ DOL PKST,w/tan-crm crpxl LS incl & LS rich cmt,tr mic fos,anhy-tr ANHY incl,rr CHT frag,tt-fr intxl POR,tr-fr dull yel FLOR,rr-tr ltbrn STN,fr slow dif-tr slow stmg CUT"
6000.00	6010.00 "DOL AA,incr LS incl-frag,bcmg alg,tr-fr intxl-rr pp vug POR,tr-fr dull yel FLOR,tr ltbrn STN,tr-fr slow dif-slow stmg CUT"
6010.00	6020.00 "DOL ltbrn-brn,occ ltgy,crpxl-micxl,occ micsuc,alg,tr crpxl-micxl,dns-chk LS incl & LS rich cmt & POR fl,rr trnsl-tan CHT frag,v rr anhy-ANHY xl,v rr mic fos,tr-fr intxl-tr vug POR,fr dull yel FLOR,tr-fr ltbrn STN,fr slow dif-tr-fr slow stmg CUT"
6020.00	6030.00 "DOL AA,incr alg,tr LS incl & LS cmt-POR fl,fr intxl-vug POR,fr-g dull yel FLOR,tr-fr ltbrn STN,fr-mod g slow dif-slow-mod fast stmg CUT"
6030.00	6040.00 "DOL ltbrn-brn,occ mbrn,mot ip,crpxl-micxl,micsuc-alg,occ vfxl,rthy-sl slty,lmy,w/crpxl LS incl & POR fl,tr Crin fos,v sl chty,occ anhy-ANHY fl POR,fr-g intxl-tr-fr vug POR,fr-g dull yel FLOR,tr-fr ltbrn STN,fr blk dd o STN,fr-g slow dif-fr mod fast CUT"

DEPTH	LITHOLOGY
6040.00 6050.00	"DOL AA,w/crm-tan,crpxl-micxl LS incl & LS cmt-POR fl,occ ANHY fl POR,fr-g intxl-alg POR,fr-g dull yel FLOR,tr-fr ltbrn STN,tr blk dd o STN,fr slow dif-mod fast stmg CUT"
6050.00 6070.00	"DOL ltbrn-brn,occ mot wh-tan,crpxl-vfxl,micsuc-alg,sl rthy-sl slty,tr ANHY xl-incl,occ POR fl,scat wh-tan,crpxl,sl alg LS-pred incl-POR fl in DOL,v rr scat CHT frag,rr mic-Crin fos,fr-g intxl-alg POR,fr-g dull yel FLOR,fr-g brn STN,tr-fr blk dd o STN, fr-g slow dif-mod fast stmg CUT"
6070.00 6080.00	"DOL AA,v alg,occ grdg to DOL GRNST,some DOL PKST,fr-g intxl-alg POR,fr-g dull yel FLOR,fr ltbrn STN,tr blk dd o STN,fr-g slow dif-mod fast stmg CUT"
6080.00 6090.00	"DOL ltbrn-brn,occ mot,AA,incr DOL PKST,v alg,sl incr in LS & ANHY cmt & POR fl,tr-fr intxl-alg POR,fr dull yel FLOR,tr-fr ltbrn-brn STN,occ blk dd o STN,tr-fr slow dif-fr moc fast stmg CUT"
6090.00 6100.00	"DOL ltbrn-brn,occ mot wh-tan,crpxl-vfxl,micsuc-alg,sl rthy-slty,tr ANHY xl-incl,scat wh-tan,crpxl,sl alg LS,tr ANHY-LS POR fl in DOL,v rr scat CHT frag,rr mic fos,fr-g intxl-alg POR,fr-g dull yel FLOR,fr brn STN,tr blk dd o STN,fr-g slow dif-mod fast CUT"
6100.00 6110.00	"DOL AA,v alg,occ grdg to DOL GRNST,some DOL PKST,fr-g intxl-alg POR,fr-g dull yel FLOR,fr ltbrn STN,tr blk dd o STN,fr-g slow dif-mod fast stmg CUT"
6110.00 6120.00	"DOL ltbrn-brn,crpxl-micxl,occ micsuc-alg,v rr DOL GRNST,pred DOL PKST,tr LS-ANHY incl,LS rich cmt,v rr v thn ltgy SH lams,v rr CHT frag,rr-fr intxl-tr vug POR,rr-fr dull yel FLOR,rr ltbrn-rr blk STN,tr-fr slow dif-mod fast stmg CUT"
6120.00 6130.00	"DOL AA,occ alg,occ grdg DOL PKST,fr-tr intxl-alg POR,scat fr-g dull yel FLOR,fr ltbrn STN,rr blk dd o STN,fr-g slow dif-mod fast stmg CUT"
6130.00 6140.00	"DOL AA,occ alg,grdg DOL PKST,fr-tr intxl-alg POR,incr scat fr-g dull-mod bri yel FLOR,fr-g ltbrn-brn STN,tr blk dd o STN,fr-g slow dif-mod fast stmg CUT"
6140.00 6150.00	"DOL ltbrn,occ mbrn,crpxl-micxl-micsuc,occ alg,bcmg DOL GRNST,occ DOL PKST/tr chky lmy cmt-fl,tr LS-ANHY incl,tr CRIN fos,rr CHT frag,rr-fr intxl-rr pp vug POR,g even dull/spty bri yel FLOR,fr ltbrn-brn/tr blk dd o STN,g slow dif-mod fast stmg CUT"
6160.00 6170.00	"DOL mbrn,occ lt brn,micxl-micsuc,occ vfxl-gran,cln,dns,pred DOL GRNST-occ grdg to DOL PKST,rr scat crm-trnsl-off wh crpxl LS,rr trsl-wh CHT,rr wh-crm lmy-calc POR fl,rr-tr intxl POR,g-even dull-mod bri yel FLOR,g mbrn STN,g dif-fast strmg CUT"
6170.00 6180.00	"DOL AA,micxl-crpxl-vfxl,occ micsuc-agl,cln,dns,pred DOL PKST-occ grdg GRNST,rr scat crm-trnsl-off wh crpxl LS frag-incl,rr trsl-wh CHT,rr trnsl xln ANHY,fr-g intxl/tr pp vug POR,g even mod dull-bri yel FLOR,g mbrn STN,g dif-mod fast strmg CUT"
6180.00 6190.00	"DOL mbrn,occ lt brn,micxl-micsuc,occ vfxl-agl,dns,pred DOL GRNST-occ grdg to DOL PKST,rr trnsl-wh crpxl LS incl,rr wh-trnsl chky lmy POR fl,rr trsl-wh CHTincl,POR-FLOR-STN-CUT AA"
6180.00 6190.00	"DOL AA,POR-FLOR-STN-CUT AA"

DEPTH	LITHOLOGY
6200.00	6210.00 "DOL mbrn,occ lt brn,micxl-micsuc,occ vfxl-gran,cln,dns,pred DOL GRNST-occ grdg to DOL PKST,tr scat crm-trnsl-off wh crpxl LS,tr trsl-wh CHT,rr wh-crm lmy-calc POR fl,tt-tr intxl POR,g-even dull-mod bri yel FLOR,g mbrn STN,g dif-fast strmg CUT"
6210.00	6230.00 "DOL mbrn,occ lt brn,micxl-agl-gran,occ vfxl-crpxl,DOL GRNST,rthy,cln,dns,lmy ip,tr crpxl LS incl,tr trsl-wh CHT,tr wh-crm lmy-calc POR fl,g-tr intxl-agl POR/tr pp vug,g-even dull-mod bri yel FLOR,g mbrn/tr blk dd o STN,g fast blooming-strmg CUT"
6230.00	6250.00 "DOL mbrn,occ lt brn,micxl-gran-agl,occ vfxl-crpxl,DOL GRNST,rthy,cln,dns,sl lmy ip,tr crpxl LS incl,tr trsl-wh CHT,tr wh-crm lmy-calc POR fl,g-tr intxl-agl POR/incr pp vug,g even dull-mod bri yel FLOR,g m-dkbrn/tr blk dd o STN,g dif mod fast strmg CUT"
6250.00	6260.00 "DOL m-ltbrn,occ dkbrn,micxl-gran-agl,occ crpxl,DOL GRNST,rthy,cln,dns,sl-v lmy ip,tr crpxl LS incl,tr trsl-wh CHT,rr lmy-calc POR fl,g-fr intxl-agl POR/occ pp vug,g even dull-mod bri yel FLOR,g m-dkbrn/tr blk dd o STN,g mod fast strmg CUT"
6260.00	6270.00 "DOL AA,DOL GRNST/crpxl LS incl,tr trsl-wh CHT,tr mic fos,g-fr intxl-agl POR/occ pp vug,g even dull-mod bri yel FLOR,g m-dkbrn/tr blk dd o STN,g fast blooming-strmg CUT"
6270.00	6280.00 "DOL m-ltbrn,occ dkbrn,micxl-gran-agl,occ crpxl,DOL GRNST,rthy,cln,dns,sl-v lmy ip,tr crpxl LS incl,tr trsl-wh CHT,rr lmy-calc POR fl,g-fr intxl-agl POR/occ pp vug,g even dull-mod bri yel FLOR,g m-dkbrn/tr blk dd o STN,g mod fast strmg CUT"
6280.00	6290.00 "DOL m-ltbrn,occ dkbrn,micxl-gran-agl,occ crpxl,DOL GRNST,rthy,cln,dns,sl-v lmy ip,tr crpxl LS incl,tr mic fos,tr trsl-wh CHT incl,occ grdg to calc DOL,POR-FLOR-STN-CUT AA"
6290.00	6300.00 "DOL AA,DOL GRNST/crpxl LS incl,tr trsl-wh CHT,tr mic fos,g-fr intxl-agl POR/occ pp vug,g even dull-mod bri yel FLOR,g m-dkbrn/rr blk dd o STN,g fast blooming-strmg CUT"
6300.00	6310.00 "DOL m-ltbrn,micxl-gran-crpxl,occ agl,dns,pred wcmr DOL GRNST-occ grdg to DOL PKST,tr crpxl LS incl,tr mic fos,tr CHTincl,tt-tr intxl-occ agl POR,g even dull/occ spty bri yel FLOR,g brn STN,-CUT AA"
6310.00	6320.00 "DOL AA,gran-micxl-agl,occ crpxl,cln,dns,calc-lmy ip,tr LS incl,tr wh CHT incl,tr CRIN & mic fos,grdg to calc DOL ip,tt-tr intxl-agl/pp vug POR,g-fr even dull-mod bri yel FLOR,g brn STN,g dif-mod fast strmg CUT"
6320.00	6340.00 "DOL m-ltbrn,gran-micxl-crpxl,occ agl,dns,pred wcmr DOL GRNST-occ grdg to DOL PKST,tr crpxl LS incl,tr CRIN & mic fos,tr wh-trnsl CHTincl,tt-tr intxl/occ g agl POR,g even dull/occ spty bri yel FLOR,g brn STN,g blooming dif-mod slow strmg CUT "
6340.00	6350.00 "DOL lt-mbrn,gran-crpxl-micxl,rthy,DOL GRNST,dns,pred cln,calc-sl lmy,tr CRIN & mic fos,tr LS incl,rr wh CHT incl,tt-tr intxl POR,fr-g even dull-spty bri yel FLOR,"
6350.00	6370.00 "DOL mbrn-lt brn,gran-micxl-crpxl,occ agl,DOL GRNST,rthy,cln,dns,v calc-sl lmy ip/tr POR fl,incr scat crpxl LS frag & incl,tr trnsl CHT,occ grdg to calc DOL,tt-tr intxl POR,g-even dull-mod bri yel FLOR,g lt-mbrn/rr blk dd o STN,g-f dif/tr slow strmg CUT"

DEPTH	LITHOLOGY
6370.00	6380.00 "DOL ltbrn-brn,crpxl-micxl-gran,dns,pred DOL GRNSTgrad to DOL PKST/v calc-lmy cmt,tr tan crpxl LS incl,tr CHT frag AA,tt-tr intxl POR,fr even dull yel FLOR,tr ltbrn-rr blk STN,g dif/fr slow stmg CUT"
6380.00	6390.00 "DOL m-lt brn,gran-micxl-crpxl,occ vfxl,cln,dns,pred DOL GRNST-grdg to DOL PKST/lmy cmt,tr scat crm-tan crpxl LS,tr CHT,rr wh-crm lmy-calc POR fl,tt-tr intxl POR,g-even dull yel FLOR,g mbrn STN,g dif-fast strmg CUT"
6390.00	6400.00 "DOL AA/LS tan-crm,off wh-ltgy,crpxl,cln,dns,occ v sl chky,occ sl dol ip,intbd in DOL GRNST,NFSOC"
6400.00	6410.00 "DOL ltbrn,mot,crpxl-micxl,occ micsuc,alg,rthy-v sl slty,ANHY & LS incl-cmt-occ POR fl,tr mic-Crin FOS,tr-fr intxl-alg POR,fr-mod g dull-bri yel FLOR,tr ltbrn-v rr blk STN,g slow dif-tr-fr mod fast stmg CUT"
6410.00	6420.00 "DOL AA,w/incr in LS cmt & POR fl,incr Crin fos,POR-FLOR-STN-CUT AA"
6420.00	6430.00 "DOL ltbrn,mot,crpxl-micxl,occ micsuc,alg,rthy-v sl slty,ANHY & LS incl-cmt-occ POR fl,incr Crin fos-tr mic fos,tr-fr intxl-alg POR,fr-mod g dull-bri yel FLOR,tr ltbrn-v rr blk STN,g slow dif-tr-fr mod fast stmg CUT"
6430.00	6440.00 "DOL AA,w/incr in LS cmt & POR fl,incr mic fos,incr chty,abnt ANHY incl,POR-FLOR-STN-CUT AA"
6440.00	6450.00 "DOL ltbrn,mot,crpxl-micxl,occ micsuc,sl alg,rthy-v sl slty,tr-abnt ANHY & LS incl-cmt-POR fl,incr mic fos,rr Crin fos,tr-fr intxl-alg POR,fr-mod g dull-bri yel FLOR,tr ltbrn-v rr blk STN,g slow dif-tr-fr mod fast stmg CUT"
6450.00	6460.00 "DOL AA,w/incr in LS cmt & POR fl,incr mic fos,incr chty,abnt ANHY incl,POR-FLOR-STN-CUT AA"
6460.00	6470.00 "DOL ltbrn-tan,crpxl,occ micxl-micsuc,alg ip,w/abnt ANHY incl-tr LS incl-cmt,tr mic fos,ANHY-LS cmt fl POR,fr intxl-tr alg POR,fr dull-bri yel FLOR,tr ltbrn STN-rr spty blk dd o STN,tr-fr mod g slow dif-mod fast stmg CUT"
6470.00	6480.00 "DOL AA,incr tan-mot,incr CHT frag,POR-FLOR-STN-CUT AA,w/crpxl tan-crm LS frag,fr-g LS cmt-POR fl"
6480.00	6490.00 "DOL tan-ltbrn,occ mot,crpxl-micxl,occ micsuc,rthy-sl slty,alg ip,w/LS-ANHY incl-frag-cmt & POR fl,v rr mic fos,tt-fr intxl-rr vug POR,fr-mod g dull-bri yel FLOR,rr-tr ltbrn STN,tr-fr slow dif-mod fast stmg CUT"
6490.00	6500.00 "DOL ltbrn,occ tan-mot,crpxl-micxl,occ micsuc,rthy-sl slty,alg ip,w/LS-ANHY incl-frag-cmt & POR fl,v rr mic-Crin fos,tt-fr intxl-rr vug POR,fr-mod g dull-bri yel FLOR,rr-tr ltbrn STN,tr-fr slow dif-mod fast stmg CUT"
6500.00	6510.00 "DOL AA,incr ltbrn,tr trnsl-bf CHT frag,POR-FLOR-STN-CUT AA,w/rr crpxl tan-crm LS frag-cmt,tr LS & ANHY POR fl"

DEPTH	LITHOLOGY
6510.00	6520.00 "DOL ltbrn-brn,crpxl-micxl,occ micsuc-alg,,pred DOL PKST/lmy cmt-occ grdg to DOL GRNST,tr LS-ANHY incl-fl-frag,tr mic fos,rr CHT frag,tr-fr intxl-rr vug POR,tt-fr even dull-rr spty bri yel FLOR,tr lt-mbrn STN,tr slow dif/fr fnt res ring CUT"
6520.00	6530.00 "SH m-lt-dkgy,sbplty-sbblky,frm-occ brit,slty,mica,occ v sl dol,tr imbd brn DOL nod,rr pp blk incl,DOL AA,tt-tr intxl POR,tr dull orng/rr dull yel FLOR,fr ltbrn STN,n CUT"
6530.00	6540.00 "DOL ltbrn-brn,crpxl-micxl,occ gran-agi-micsuc,DOL GRNST-DOL PKST/lmy cmt,tr LS-ANHY incl-fl-frag,tr mic fos,rr CHT,tt-tr intxl-v rr pp vug POR,tr spty dull-bri yel FLOR,fr lt-mbrn STN,tr slow dif/fr fnt res ring CUT"
6540.00	6550.00 "SH lt-mgy,occ dkgy,plty-sbplty-occ sbblky,sft-frm,rthy,v-sl slty/tr scat-strk vf gr QTZ,calc-lmy,tr pp blk mica incl,occ grdg to lmy arg SLTST/DOL brn.m-lt brn,AA.POR-FLOR-STN-CUT AA,w/ltgy,crpxl-micxl,plty,slty LS"
6550.00	6560.00 "DOL brn,lt-mbrn,occ dkbrn,crpxl-micxl,occ gran-vfxl,rthy,cln,DOL GRNST occ grad DOL PKST/lmy cmt,tr LS incl,rr ANHY & CHT,tr mic & GAST fos,tt-tr intxl POR,tr scat spty dull yel FLOR,fr ltbrn/occ brn STN,fr slow dif CUT"
6560.00	6570.00 "DOL AA,POR-FLOR-STN-CUT AA/SH AA"
6570.00	6580.00 "LS ltgy/occ wh chky strk-mgy,occ dkgy,plty,rthy,v-sl slty-arg/tr scat-strk vf gr QTZ,calc-lmy,tr pp blk mica incl,occ grdg to lmy arg SLTST/DOL brn.m-lt brn,AA,tt-tr intxl POR-FLOR-STN-AA,fr dif/tr slow strmg CUT"
6580.00	6590.00 "DOL lt-mbrn,brn,occ dkbrn,crpxl-micxl,occ gran-vfxl,rthy,cln,DOL GRNST grad DOL PKST/lmy cmt,tr LS incl,rr ANHY & CHT,tr mic fos,tr-fr intxl POR,tr scat spty dull-mod bri yel FLOR,fr ltbrn/occ brn STN,g slow dif/tr mod slow strmg CUT"
6590.00	6600.00 "DOL AA,POR-FLOR-STN-CUT AA/LS AA"
6600.00	6610.00 "DOL ltbrn-brn,crpxl,occ micxl-micsuc,pred DOL PKST-WKST,v rr alg,v rr mic fos,w/ANHY xl-incl,v rr CHT frag,w/tr ltgy-wh,crpxl-micxl,slty,chky plty LS frag,DOL-tt-tr intxl-v rr spty vug POR,tr dull-bri yel FLOR,n-v rr vis ltbrn STN,tr p slow dif-v rr "
6610.00	6620.00 "DOL AA,w/tr-abnt ANHY incl-xl-POR fl,POR-FLOR-STN-CUT AA/LS AA, slow-mod fast stmg CUT "
6620.00	6631.00 "DOL ltbrn-brn,crpxl,occ micxl-micsuc,pred DOL PKST-WKST,tr ANHY xl-incl-occ POR fl,v sl alg,v rr mic fos,v rr trnsd CHT frag,tt-tr intxl POR,tr spty dull yel FLOR,n vis STN,tr slow dif-v rr slow stmg CUT,w/wh-ltgy,crpxl,plty,chky,sl slty,arg LS frag"

FORMATION TOPS

OPERATOR: MOBIL

WELL NAME: RATHERFORD UNIT #13-12 SE UPPER 1-A HORIZONTAL LATERAL LEG #3

FORMATION NAME		SAMPLES MEASURED DEPTH	SAMPLES TRUE VERTICAL DEPTH	DATUM KB:4569
LOWER ISMAY		5285'	5281'	-712
GOTHIC SHALE		5333'	5318'	-749
DESERT CREEK		5363'	5335'	-766
DC-1A		5402'	5352'	-784

GEOLOGICAL SUMMARY

AND

ZONES OF INTEREST

The Mobil Exploration and Production U.S. Inc., Ratherford Unit #13-12 Horizontal Leg #3, Section 13, T41S, R23E, was a re-entry of the Mobil Ratherford Unit #13-12, a sidetrack in a southeasterly direction from 5222' measured depth, 5222' true vertical depth, on February 11, 1997. Leg #3 reached a measured depth of 6631', true vertical depth of 5335.8' at total depth, horizontal displacement of 1400' and true vertical plane 132 degrees, on February 17, 1997. The lateral was drilled without any significant problems. Of note is that, since this well was being produced just prior to the reentry, the background gases noted on the accompanying mud log remained high, as well as the samples being contaminated to a certain extent with live oil encountered through out the well.

The primary objective of the Ratherford Unit #13-12 Horizontal Lateral Leg #3 was the upper 1-A Porosity Bench, to identify and define the porosity bench, it's effective porosity, staining and reservoir properties in the Desert Creek Member of the Upper Paradox Formation.

The Lower Ismay, Gothic Shale and the transition zone at the top of the Desert Creek were encountered while drilling Leg #3. Kick off point for this lateral was in the lower 1/3 of the upper Ismay Member, with only minor shows of staining or porosity near the base. The top of the Lower Ismay was picked at 5285' measured depth, 5281' true vertical depth, at the base of the very thin Hovenweep shale. The base of the Upper Ismay was predominately white to cream, occasionally tan, cryptocrystalline to microcrystalline, chalky, fossiliferous limestone, grading to very argillaceous, brown to gray brown, microcrystalline to microsucrosic dolomite. The dolomite graded into the very thin, carbonaceous, dolomitic shale of the Hovenweep. The Lower Ismay was a white to cream to tan, cryptocrystalline to microcrystalline, chalky to clean, slightly dolomitic to anhydritic, slightly cherty limestone with a trace of scattered micro fossils, no to a trace of intercrystalline porosity, a trace of spotty dull to bright yellow fluorescence, none to very rare light brown stain, and only a trace of very poor slow diffuse cut. Interbedded in the Lower Ismay were light to medium gray to gray brown dolomites, which were cryptocrystalline to microcrystalline, with some very finely crystalline to microsucrosic streaks, very slightly cherty, clean to argillaceous. The dolomite increased with depth and lays gradationally over the Gothic Shale. The dolomites had no to a trace of intercrystalline to very rare pin point vuggular porosity with scattered dull yellow fluorescence, none to rare light brown staining, and only very poor slow diffuse to residual ring cut. The top of the Gothic Shale is 5333' measured depth, 5318' true vertical depth.

The Gothic Shale was predominantly dark gray to black, silty, carbonaceous, brittle to firm, subblocky to blocky to platy, calcareous to slightly dolomitic and slightly micaceous. The top of the Gothic was gradational from the very thin interbedding of very argillaceous, carbonaceous limestone and very argillaceous, limy dolomite, with the dolomite grading into very dolomitic, carbonaceous shale. The top of the Gothic was picked predominantly by the decrease in penetration rate and the increased percentage of shale in the samples.

Between the Gothic Shale and Desert Creek Porosity Members is a transitional zone, which appears to be gradational. The top of the Desert Creek is commonly picked at the Gothic Shale, transition zone facies change, which in this well occurred at a measured depth of 5363' and a true vertical depth of 5335'. In this well the zone was predominantly a limestone; which was gray to white to light brown, cryptocrystalline to microcrystalline, with some granular limestone, very slightly sandy, with very thinly interbedded dolomite which was brown to light gray brown, microcrystalline to granular, slightly limy and occasionally silty. The limestone was predominately tight with very rare intercrystalline porosity that showed some anhydrite fillings. Through this transitional zone there appeared to be some interbedding or possibly cyclic deposits consisting of dolomitic to slightly calcareous, black, carbonaceous mudstones and very slightly dolomitic siltstones. The porosities ranged from none to very poor intergranular, with traces of calcite to anhydrite fillings. No visible staining was noted and had predominately a very rare spotty, very poor, faint dull yellow fluorescence, with no to very rare residue ring cut.

The top of the Desert Creek 1-A zone was picked at 5402' measured depth, 5352' true vertical depth. The pick is based on an increase in the rate of penetration, as well as sample interpretation. The top was picked in this lateral mainly based on the first significant increase in the dolomite grainstone below the top of the Desert Creek.

The top of the main objective, the 1-A porosity zone, was picked at a measured depth of 5402', 5352' true vertical depth, in a microcrystalline to microsugrosic dolomite. As the curve was being completed in the 1-A zone the dolomite became cleaner and increasing granular. While drilling curve through the section, it appeared that the 1-A porosity bench was possibly defined by the interval 5402' measured depth, 5352' true vertical depth to a possible 5471' measured depth, 5361' true vertical depth. The top of the porosity Bench was marked by facies change, which was somewhat gradational to sharp since the drilling rate increased rather sharply. The top of the best porosity in the 1-A bench was at 5407' measured depth, 5351' true vertical depth, and was marked by increase in rate of penetration and an increase in intercrystalline porosity. The base of the porosity zone was not encountered while landing the curve.

At a measured depth of 5439', 5349.5' true vertical depth, with a horizontal displacement of 85' in the dolomite grainstones of the 1-A porosity horizon, a trip was made to change the bottom hole assembly and pick up the MWD tool. While drilling the 1-A lateral to a horizontal displacement of approximately 320', the porosity was predominately in a light to medium brown dolomite grainstone, which was microcrystalline to very fine crystalline, microsugrosic to occasionally sugrosic, slightly anhydritic with traces of anhydrite crystals to rare inclusions, rare micro fossils, traces of algal material, traces of scattered dark brown stain and very rare black oil stain residue* in the intercrystalline matrix. Predominantly fair to good intercrystalline and traces of pin point vuggular porosity, with rare anhydrite and very rare dolomitic limestone mud filling and cement in the intercrystalline and vuggular porosity. Through the interval the staining was moderate to fair and cuts ranging from moderate slow diffuse to good moderately fast to slow steady streaming. A decrease in porosity and penetration was noted at 5634' measured depth, 5354' true vertical depth, with a horizontal displacement of 275', a slight increase in dolomitic limestone, dolomite packstone, Crinoid fossil and chert fragments were noted in the samples. The decrease in penetration rate was due to a vertical facies change as the well bore neared and penetrated the upper boundary of the 1-A zone. At 5707' measured depth, 5349.5' true vertical depth and a vertical displacement 352', the very thin light gray calcareous shales and tight crinoidal, cherty, light brown to brown dolomite packstones and thin grain stones were encountered at the very upper limit of the 1-A zone, just below the upper Desert Creek transition zone. After a series of slides and rotates to turn the bore hole to a downward angle, the penetration rated gradually increased with the lithology again returning to algal dolomite grainstone, at 5930' measured depth, 5344' true vertical depth, and a horizontal displacement of 575', as the top of the porosity zone with in the 1-A zone was again penetrated.

The dolomites from 5930' measured depth to 6120' measured depth, 5346.6' true vertical depth, 764' horizontal displacement, were predominately brown to light brown, occasionally mottled, cryptocrystalline to microcrystalline, occasionally microsucrosic to algal, with traces of dolomite packstone, anhydrite inclusions and crystals, scattered Crinoid fossils, very thin scattered clean, tan to cream to white, cryptocrystalline to microcrystalline, slightly cherty, dolomitic limestone fragments and limestone rich cement, with no visible porosity. The dolomites had fair to good intercrystalline to pin point vuggular porosity, fair to good dull yellow fluorescence, a fair to good brown stain, scattered black dead oil stain and a good slow diffuse to moderately fast streaming cut.

The well was continued downward with a thin facies change noted from 6120' measured depth, 5346' true vertical depth, to 6132' measured depth, 5347' true vertical depth, with a horizontal displacement of 770'. Through this interval the lithology was very calcareous dolomite packstone and grainstone with thin very dolomitic limestone and light gray, very dolomitic shale cyclic deposits. A decrease in porosity was also noted through this interval. The dolomites remained predominately microcrystalline to microsucrosic to granular, algal, with intercrystalline to pin point vuggular porosity, with a trace brown stain and rare spotty black dead oil stain, and a fair slow diffuse to trace of slow to moderate fast streaming cut. This change in the dolomite facies appeared to be vertical, with the limestones being probably thin cyclic inclusions and secondary cementation in the dolomite as the top of the 1-A zone was again approached.

From measured depth of 6132' to a measured depth of 6405', true vertical depth of 5348.35', with a horizontal displacement of 1049', the lithology below the thin facies change became a medium brown to chocolate brown, occasionally light brown, granular to microsucrosic dolomite, algal, with thin streaks of light brown dolomite packstone, rare scattered Crinoid fossils and cherts fragments, rare thin limestone fragments and limestone cement. The dolomites had predominately good intercrystalline to a trace of pin point algal porosities, with fair to good dull to occasionally bright yellow fluorescence, rare to trace black dead oil to good light to dark brown live oil stain and a fair to good moderately fast to very fast streaming cut. The facies change appeared to be horizontal as the well bore dropped angle to a measured depth of 6280', true vertical depth 5253' and a horizontal displacement of 923', at which time the well bore responded to the slides up and slowly turned upwards until reaching 6405' at which time the well was slowly turned to a very slight downward angle.

As the lateral continued downward at a shallow angle from 6405' measured depth, to 6437' measured depth, 5348' and a horizontal displacement of 1080', a facies change was encountered. The lithology was predominately an interbedded light brown to brown, occasionally tan to mottled dolomite grainstone and packstone, slightly algal dolomite. The dolomite was a cryptocrystalline to microcrystalline, some microsucrosic, with varying amounts of limestone rich to anhydritic cement, scattered anhydrite inclusions to crystals and translucent chert fragments, rare Crinoid to micro fossils which decreased as the lateral continued. The dolomite had slightly algal to a trace to fair intercrystalline porosity, with fair to good dull to occasionally bright yellow fluorescence, a trace of light brown live oil stain and very rare black dead oil stain, fair to good slow diffuse to a trace of moderately fast streaming cuts, with a significant decrease in porosity. Although minor streaks of fair to good porosity were noted in the dolomites, predominately associated with the short rotates of the drill pipe.

At a measured depth of 6437' measured depth to a measured depth of 6520', true vertical depth of 5346.5' with a horizontal displacement of approximately 1160', as the well was oriented upward at an increasingly steeper angle, the lithology remained brown to light brown, microcrystalline to cryptocrystalline to microsucrosic, occasionally granular to slightly algal dolomites, scattered chert fragments and anhydrite crystals and inclusions, with scattered streaks of dolomite grainstone and becoming increasingly dolomite packstone. The porosity in the dolomite was intercrystalline to rare pin point vuggular, fair to moderately good dull yellow fluorescence, with traces of light brown stain to very rare spotty black dead oil stain, and a fair slow diffuse to steaming cut.

From a measured depth of 6520' to a measured depth of 6600', true vertical depth of 5339', with a horizontal displacement of 1240', the well was drilled upwards at a steep upward angle. The lithology was a light brown to brown, very rare dark brown, cryptocrystalline to microcrystalline, rare streaks of very finely crystalline to granular dolomite, thin dolomite packstone, very slightly algal, with scattered anhydrite crystals and inclusions, occasionally anhydrite and limestone cement, with very rare cryptocrystalline limestone fragments in the algal porosity. Through this interval very thin scattered dolomitic light gray shale to dolomitic marlstones were noted. Also of note was the decrease in porosity and penetration rate. The dolomites had no to a trace of intercrystalline to very rare scattered algal porosity, rare to fair crystalline scattered dull yellow to very rare dull orange mineral fluorescence, none to a trace of brown stain, and no to a trace to fair very slow diffuse cut. The dolomites became increasingly limy, cherty and graded to very dolomitic limestone as the lateral was continued upward through the 1-A zone of the Desert Creek.

At a measured depth of 6600' to a total measured depth of 6631', 5335.8' true vertical depth, and a horizontal displacement of 1273.6', another facies change was encountered which was probably the extreme upper limit of the 1-A zone and the base of the transition zone of the upper Desert Creek. The lithology was predominately cyclic deposits of light brown to brown, microcrystalline to microsucrosic dolomite packstone and wackstones, with interbedded white to light gray, cryptocrystalline, very chalky, silty limestone. The limestones had no visible porosity, stain or cut and appeared to be the limestones of the transition zone. The dolomites showed streaks of fair intercrystalline to very rare scattered algal porosity, spotty dull yellow fluorescence, none to rare spotty brown stain, and traces of slow diffuse to very rare slow streaming cut.

In tracking the well bore through the upper bench, there were several facies changes with in the dolomites, predominately vertical as the well bore approached the top or base of the 1-A zone, with only one possible horizontal change. The possible horizontal change occurred at a vertical displacement of 1050'. This change was a change to very algal, limy dolomite with the zone of best microsucrosic to sucrosic, algal porosity thinning or turning upward sharply and finally pinching out from 1050' to 1273.6'. This change could have been vertical and the 1-B zone penetrated, if the good brown dolomite porosity turned upward at a steeper angle and much sooner than the well bore was turned upward through the 1-A porosity horizon. Predominant facies changes were associated with the rock classification with in the dolomites and occasionally the depositional environment, as the environment of deposition changed from a possible low energy tidal flat to algal mound environment. Even with these classification changes, porosity for the most part was continuous through most of the zone, with the effective or the better porosity being associated with the granular dolomite facies which had fair to good, intercrystalline to algal porosities, and the absence of any major anhydrite plugging. The dolomite packstone had porosities which were predominately tighter and with very poor permabilities. The dolomite was of probable primary deposition.

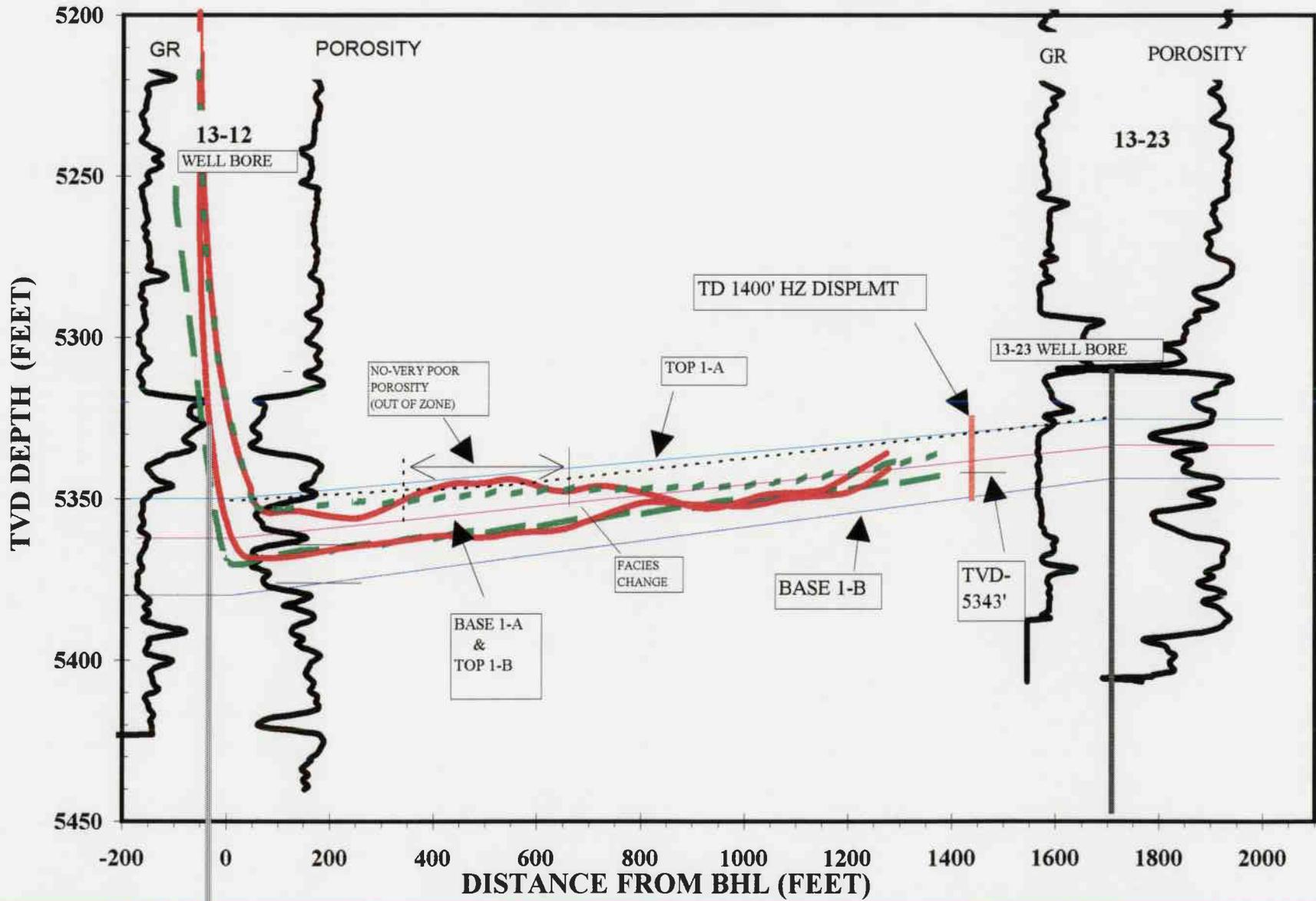
From the top of the 1-A porosity bench to a total measured depth of 6631', the dolomite lithology was inconsistent, ranging from light brown to medium brown, rare dark brown, microcrystalline to very fine crystalline, occasionally microsucrosic to granular, with scattered, tighter dolomite packstone and some anhydrite matrixes. The dolomites had fair to good intercrystalline to algal porosities and a good constant dull to bright yellow fluorescence, with noticeable decreases when noticeable amounts of tight dolomite packstone was present. The staining in the dolomites ranged from trace to good light brown to traces of black dead oil stain and the associated cuts being trace to good slow to fast streaming and occasion slow diffuse cuts. The staining in the dolomite, fair to moderate to occasionally good, however remained rather consistent and continuous through out bench. Fluorescence, like the staining was consistent and continuous, and was a dull to bright yellow gold, with cuts ranging from moderate to good ring (diffuse) to moderate to good steady fast streaming cut. The lateral showed no to very poor sample shows in the dolomite from a horizontal displacement of 510' to 605' where the well bore was above the 1-A porosity and in the extreme upper limit of the 1-A zone. The sample shows were affected in part due to the presence of live oil encountered through out the drilling of curve and lateral sections.

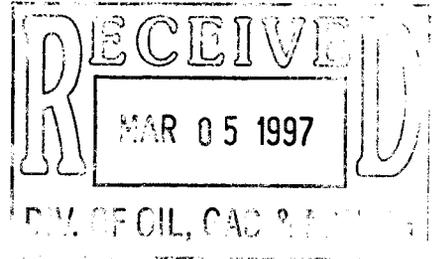
The conclusion drawn from the southwest 1-A porosity bench Lateral Leg 3, is that in this area the primary dolomitization (due to the lack of limestone cements in the framework), was enhanced by the algal porosity. However, the vertical facies changes within the dolomites, had an effect on porosity, not well developed at times, and further reducing effective porosity when encountering anhydrite filled porosities. Also, having an effect on the porosity, were the cryptocrystalline dolomite packstones which graded to and were thinly interbedded with microcrystalline to granular dolomite, which in turn grade to very fine grain, dolomitic grainstone with dense limestone matrix, some black dead oil staining was trapped in the matrix and along the anhydrite to dolomite contact surfaces. Staining was fair to moderate and there were significant sections where staining was moderately good. The lateral used the proposed projected target line as a reference point through the bench, drilling tried to follow the target line while maintaining contact with best porosity. It appears that the effective porosity is continuous through most of the lateral, becoming very thin and of possibly less than 1' in thickness near the end of the lateral, even with the vertical facies changes encountered.

While drilling, the lateral did make varying amounts of live oil, with significant amounts of heavies noted on the chromatograph (C₃ and C₄). This lateral can be interpreted to have good reservoir qualities through most of the lateral, since the lateral through the 1-A zone gave up significant oil while drilling. It appears that the porosities are well enough developed to enhance the overall performance of the zone.

*The black residual staining has been called by Dr. Dave Eby & others as "bitchimum" and is also known as "dead oil" ("dd o stn" on mud logs). This staining is associated with the movement of oil over long periods of time and is a good indicator of producible hydrocarbons when associated with productive porosities, but can also be found in porosities that have been filled by anhydrites and other material at later dates.

MOBIL, Ratherford #13-12, Southeast Lateral





MOBIL

**RATHERFORD UNIT #13-12
HORIZONTAL LATERAL LEG #4
UPPER 1-A POROSITY BENCH DESERT CREEK
SECTION 13, T41S, R23E
SAN JUAN, UTAH**

**GEOLOGY REPORT
by
DAVE MEADE / MARVIN ROANHORSE
ROCKY MOUNTAIN GEO-ENGINEERING CORP.
GRAND JUNCTION, COLORADO
(970) 243-3044**

MICROFICHE

TABLE OF CONTENTS

WELL SUMMARY.....	3
DAILY WELL CHRONOLOGY.....	4
DAILY ACTIVITY.....	5
BIT RECORD.....	6
SURVEY RECORD.....	7
MUD RECORD.....	9
SAMPLE DESCRIPTIONS.....	10
FORMATION TOPS.....	17
GEOLOGIC SUMMARY AND ZONES OF INTEREST.....	18
WELL PLOTS.....	23

WELL SUMMARY

OPERATOR: MOBIL EXPLORATION & PRODUCTION U.S. INC.

NAME: RATHERFORD UNIT #13-12 SE UPPER HORIZONTAL LATERAL
LEG #4 IN 1-A UPPER POROSITY BENCH, DESERT CREEK

LOCATION: SECTION 13, T41S, R23E

COUNTY/STATE: SAN JUAN, UTAH

ELEVATION: KB:4569' GL:4556'

SPUD DATE: 2/18/97

COMPLETION DATE: 2/23/97

DRILLING ENGINEER: LEWIS SIMONS

WELLSITE GEOLOGY: DAVE MEADE / MARVIN ROANHORSE

MUDLOGGING:
ENGINEERS DAVE MEADE / MARVIN ROANHORSE

CONTRACTOR: BIG "A" RIG 25
TOOLPUSHER: DEAN SIPE /MIKE SMITH/JOE VITALE

HOLE SIZE: 4 3/4"

CASING RECORD: SIDETRACK IN WINDOW AT 5197' MEASURED DEPTH

DRILLING MUD: M-I
ENGINEER: DANNE BEASON
MUD TYPE: BRINE WATER/POLYMER SWEEPS

ELECTRIC LOGS: NA
ENGINEER: NA
TYPE LOGS: NA

TOTAL DEPTH: 6379' MEASURED DEPTH TVD-5374.66'

STATUS: TOH & RIGGING DOWN RIG PRIOR TO REESTABLISHING
PRODUCTION EQUIPMENT

DRILLING CHRONOLOGY

MOBIL RATHERFORD UNIT #13-12 NW UPPER 1-A HORIZONTAL LATERAL LEG # 4

DATE	DEPTH	DAILY	ACTIVITY
2/18/97	6631'	49'	TIH-SET WHIPSTOCK-CIR & COND HOLE(50+/- PPM H2S NOTED)-TOH LAY DOWN TOOLS-PICK UP STARTER MILL-TIH-MILL 5187'-5189'-CIR OUT-TOH-PICK UP WINDOW MILL-TIH-MILL WINDOW 5189'-5197'-CIR OUT-TOH
2/19/97	5197'	115'	TOH-LAY DOWN MILLS-PICK UP CURVE BHA & BIT-TIH-CIR OUT-(H2S NOTED)-DRLG W/10+ PPM H2S PRESENT-RIG UP K-JET & RUN GYRO-TIME DRLG 5197'-5201'-DRLG & SURVEY 5201'-5224'-SURVEY & PULL GYRO-RIN IN STEERING TOOL-WASH 5' TO BTM,DRLG & DIR SURVEYS
2/20/97	5310'	205'	DRLG & DIR SURVEYS
2/21/97	5515'	622'	DRLG & DIR SURVEY
2/22/97	6137'	151'	DRLG & DIR SURVEYS-LAY DOWN 1 JNT & HANG SWIVEL-TOH
2/23/97	6288'	91'	BREAK BIT,MWD, & MTR-TEST-LAY DOWN BIT,MWD, & MTR-PICK UP & MAKE UP BIT,MWD, & MTR-TEST-TIH-PICK UP SWIVEL & 1 JNT-BREAK CIR & CIR GAS & OIL OUT-DRLG & DIR SURVEYS-CIR. SPLS @ 6379' (TD)-CIR. & COND.-TOH
2/24/97	6379'	TD	TOH-LAYDOWN MWD & LATERAL BHA-LAY DOWN DRL PIPE & COLLARS & TUBING PRIOR TO RIGGING DOWN RIG FOR MOVE TO RU#13-11 LOCATION

DAILY ACTIVITY

Operator: MOBIL

Well Name: RATHERFORD UNIT #13-12 NW UPPER 1-A HORIZONTAL LATERAL LEG #4

DATE	DEPTH	DAILY	DATE	DEPTH	DAILY
2/18/97	6631'	49'			
2/19/97	5195'	115'			
2/20/97	5310'	205'			
2/21/97	5515'	622'			
2/22/97	6137'	151'			
2/23/97	6288'	91'			
2/24/97	6379'	TD			

BIT RECORD

OPERATOR: MOBIL

WELL NAME: RATHERFORD UNIT #13-12 NW UPPER 1-A HORIZONTAL LATERAL LEG #4

RUN	SIZE	MAKE	TYPE	IN/OUT	FTG	HRS	FT/HR
#1(RR) BIT	4 3/4"	STC	MF3P	5197'/ 5447'	250'	19	13.16
#2 BIT	4 3/4"	HTC	STR-20	5447'/ 6288'	841'	48	17.52
#4	4 3/4"	STC	MF3P	6288'/ 6379'	91'	15.5	5.87

SPERRY-SUN DRILLING SERVICES
SURVEY DATA

Customer ... : MOBIL
Platform ... : CA-MJ-70044
Slot/Well .. : /13-12,4A1,LEG 4

MEASURED DEPTH	ANGLE DEG	DIRECTION DEG	TVD	NORTHINGS FEET	EASTINGS FEET	VERTICAL SECTION	DOG LEG
5187.00	0.62	333.47	5185.97	16.51 N	52.17 W	49.82	0.00
5195.00	3.40	313.80	5193.96	16.71 N	52.36 W	50.10	35.30
5200.00	4.70	313.70	5198.95	16.96 N	52.62 W	50.45	26.00
5210.00	8.10	313.50	5208.89	17.73 N	53.42 W	51.56	34.00
5220.00	12.10	313.30	5218.73	18.93 N	54.70 W	53.32	40.00
5230.00	16.00	313.10	5228.43	20.59 N	56.47 W	55.74	39.00
5240.00	20.50	312.90	5237.92	22.73 N	58.76 W	58.87	45.00
5250.00	25.00	312.70	5247.14	25.35 N	61.60 W	62.74	45.01
5260.00	29.60	312.50	5256.03	28.46 N	64.97 W	67.32	46.01
5270.00	32.70	312.30	5264.58	31.94 N	68.79 W	72.50	31.02
5280.00	34.20	312.10	5272.93	35.65 N	72.87 W	78.01	15.04
5290.00	35.20	311.90	5281.15	39.45 N	77.10 W	83.70	10.06
5300.00	37.60	311.70	5289.20	43.41 N	81.53 W	89.63	24.03
5310.00	42.20	311.50	5296.87	47.67 N	86.32 W	96.05	46.02
5320.00	45.30	311.30	5304.09	52.24 N	91.51 W	102.96	31.03
5330.00	45.70	311.10	5311.10	56.94 N	96.88 W	110.09	4.25
5340.00	46.40	310.90	5318.04	61.66 N	102.31 W	117.29	7.15
5350.00	47.70	310.70	5324.85	66.44 N	107.85 W	124.61	13.08
5360.00	51.50	310.50	5331.33	71.40 N	113.63 W	132.22	38.03
5370.00	55.80	310.30	5337.26	76.62 N	119.77 W	140.27	43.03
5380.00	60.50	310.10	5342.53	82.10 N	126.25 W	148.76	47.03
5390.00	65.00	309.90	5347.11	87.81 N	133.06 W	157.64	45.04
5400.00	69.30	309.70	5350.99	93.71 N	140.14 W	166.85	43.04
5410.00	73.60	309.50	5354.18	99.75 N	147.44 W	176.32	43.04
5420.00	78.50	309.30	5356.58	105.91 N	154.94 W	186.01	49.04
5428.00	82.70	309.15	5357.89	110.90 N	161.05 W	193.89	52.53
5437.00	85.40	309.00	5358.82	116.54 N	168.00 W	202.83	30.05
5447.00	89.50	310.00	5359.27	122.89 N	175.71 W	212.81	42.20
5457.91	90.70	311.50	5359.25	130.01 N	183.97 W	223.71	17.61
5489.79	92.00	313.70	5358.50	151.58 N	207.43 W	255.58	8.01
5521.56	91.20	316.90	5357.61	174.15 N	229.77 W	287.28	10.38
5553.32	90.00	319.90	5357.28	197.90 N	250.85 W	318.84	10.17
5585.20	88.30	320.10	5357.75	222.32 N	271.34 W	350.40	5.37
5616.91	87.30	318.30	5358.97	246.30 N	292.04 W	381.84	6.49
5648.67	88.30	316.90	5360.19	269.74 N	313.44 W	413.42	5.41
5680.30	89.60	315.50	5360.77	292.56 N	335.33 W	444.96	6.04
5712.13	90.40	314.30	5360.77	315.03 N	357.87 W	476.75	4.53
5743.87	88.30	313.40	5361.13	337.02 N	380.76 W	508.47	7.20

SPERRY-SUN DRILLING SERVICES
SURVEY DATA

Customer ... : MOBIL
Platform ... : CA-MJ-70044
Slot/Well .. : /13-12,4A1,LEG 4

MEASURED DEPTH	ANGLE DEG	DIRECTION DEG	TVD	NORTHINGS FEET	EASTINGS FEET	VERTICAL SECTION	DOG LEG
5775.69	89.90	312.00	5361.63	358.59 N	404.14 W	540.28	6.68
5807.50	91.30	311.50	5361.29	379.77 N	427.87 W	572.09	4.67
5839.35	90.90	310.10	5360.68	400.58 N	451.98 W	603.92	4.57
5871.05	90.00	309.00	5360.43	420.76 N	476.42 W	635.59	4.48
5902.90	88.90	308.10	5360.74	440.61 N	501.32 W	667.38	4.46
5934.64	87.30	309.20	5361.79	460.42 N	526.10 W	699.05	6.12
5966.32	85.90	308.60	5363.67	480.28 N	550.71 W	730.63	4.81
5998.08	84.70	306.40	5366.27	499.55 N	575.82 W	762.18	7.87
6029.98	87.20	305.70	5368.53	518.27 N	601.54 W	793.82	8.14
6061.73	91.10	306.20	5369.00	536.90 N	627.24 W	825.39	12.38
6092.79	91.10	308.10	5368.40	555.66 N	651.99 W	856.33	6.12
6124.61	93.00	310.40	5367.26	575.77 N	676.61 W	888.09	9.37
6156.26	89.70	311.80	5366.52	596.57 N	700.45 W	919.72	11.33
6188.07	88.40	311.60	5367.04	617.73 N	724.20 W	951.53	4.13
6219.83	88.80	312.00	5367.82	638.89 N	747.87 W	983.28	1.78
6251.66	89.20	312.50	5368.38	660.29 N	771.42 W	1015.10	2.01
6283.44	88.40	312.30	5369.04	681.71 N	794.89 W	1046.87	2.59
6315.32	86.20	313.40	5370.54	703.37 N	818.23 W	1078.71	7.71
6349.00	86.40	313.00	5372.72	726.38 N	842.73 W	1112.31	1.33
6380.00	86.40	313.00	5374.66	747.48 N	865.36 W	1143.25	0.00

THE DOGLEG SEVERITY IS IN DEGREES PER 100.00 FEET.
N/E COORDINATE VALUES GIVEN RELATIVE TO WELL SYSTEM REFERENCE POINT.
TVD COORDINATE VALUES GIVEN RELATIVE TO WELL HEAD.
THE VERTICAL SECTION ORIGIN IS WELL HEAD.
THE VERTICAL SECTION WAS COMPUTED ALONG 312.00 (TRUE).
CALCULATION METHOD: MINIMUM CURVATURE.

MD 6380' EXTRAPOLATED @ BIT @ T.D.

MUD REPORT

OPERATOR: MOBIL

WELL NAME: RATHERFORD UNIT #13-12 NW UPPER 1-A HORIZONTAL LATERAL LEG #4

DATE	DEPTH	WT	VIS	PLS	YLD	GEL	PH	WL	CK	CHL	CA	SD	SOL	WT R
2/18/97	6631'	9.2	26	-	-	-	11.8	N/C	N/C	95000	800	-	-	100
2/19/97	5197'	9.2	26	-	-	-	11.9	N/C	N/C	89000	800	-	-	100
2/20/97	5320'	9.6	26	-	-	-	11.8	N/C	N/C	139500	1200	-	-	100
2/21/97	5521'	9.6	26	-	-	-	11.8	N/C	N/C	140000	1200	-	-	100
2/22/97	6168'	9.6	26	-	-	-	11.9	N/C	N/C	138000	1000	-	-	100
2/23/97	6301	9.5	26	-	-	-	11.8	N/C	N/C	130000	1000	-	-	100

SAMPLE DESCRIPTIONS

OPERATOR: MOBIL

WELL NAME: RATHERFORD UNIT #13-12 NW UPPER 1-A HORIZONTAL LATERAL LEG #4

DEPTH	LITHOLOGY
5195.00 5200.00	"ABNT METAL FRAG & CVGS IN SPL "LS crm-wh-tan,crpxl,v sl micxl,cln-dns,occ chk,dol ip,sl chty,rr mic fos,tt,NFSOC,w/v rr lt brn,micxl,dns,lmy DOL incl,tt,NFSOC,v rr ltgy,plty,sl calc-dol SH"
5200.00 5210.00	"LS AA,pred wh-mot,chky,anhy,tt,NFSOC,W/DOL & SH AA,rr CHT frag"
5210.00 5220.00	"DOL ltbrn-ltgybrn,crpxl-micxl,rthy,cln ip,sl lmy,dns,tt,NFSOC,w/LS AA,occ styl,v rr blk carb SH frag,"
5220.00 5230.00	"LS wh-tan-crm,occ ltgybrn,crpxl,occ micxl-vfxln,cln-dns,v chky,occ sl dol ip,sl chty,rr mic fos,tt,NFSOC "
5230.00 5250.00	"DOL m-ltbrn-ltbrngy,micxl-crpxl-vfxl,rthy,cln,sl lmy,sl slty,tr dkbrnblk CHT,dns,occ mrly-sl shy ip,tt-tr intxl/vrr pp vug POR,tr spty dull-mod bri yel FLOR,fr brn/rr blk STN,fr-g dif/tr-fr mod slow strmg CUT,w/LS AA,NFSOC,v rr blk carb SH frag,"
5250.00 5260.00	"LS ltgy-ltgybrn,tan-brn,crpxl-micxl,cln,chky,occ sl slty/tr blk-dkbrnblk SH mot,dns,tt,NFSOC,w/ DOL AA,POR-FLOR-STN-CUT AA "
5260.00 5270.00	"DOL brn-ltbrn,occ ltbrngy,crpxl-micsuc,occ gran-vfxl,rthy,sl-occ v slty,lmy/tr LS incl-grdg to dol LS,arg ip,rr mic fos,occ mot,NFSOC,w/LS & CHT AA"
5270.00 5280.00	"LS AA,micxl-vfxl-crpxl,pred mot,bcmg incr chky,slty-v slty,occ grdg to arg LS,tt,NFSOC,W/DOL & SH AA,rr CHT frag"
5280.00 5290.00	"LS m-ltgybrn,brn-dkbrn-blkbrn,micxl-crpxl,mot-occ cln,rhty-slty,occ mrly-arg ip,sl-v chk,tr dkbrn CHT,occ sl dol,NFSOC"
5290.00 5310.00	"LS ltgy-ltgybrn,wh-crm,tan,crpxl-micxl,occ vfxl-micsuc,cln-chk,anhy,v rr mic fos,tt-rr intxl POR,v rr frac prtq/tr free & intgwn xl clus/g blk dd o STN,tr scat dull-mod bri yel FLOR,tr brnblk STN,fr blooming-mod fast strmg CUT"
5310.00 5320.00	"DOL brn-ltbrn,occ ltbrngy,micxl-micsuc,occ crpxl-vfxl,rthy,sl-occ v slty,lmy grdg to dol LS ip,arg ip,cln,dns,NFSOC,w/LS & CHT AA"
5320.00 5340.00	"LS ltgy-ltgybrn,wh-crm,occ tan,crpxl-micxl,occ vfxl-micsuc,cln-chk,occ mot,scat trnsi-wh ANHY-occ POR fl,tr mic fos,rr-rr intxl POR/v rr frac prtq AA,fr-g even dull/tr scat mod bri yel FLOR,tr brnblk STN,fr blooming-mod fast strmg CUT"
5340.00 5350.00	"SH blk-dkgybrn-dkgy,sbplty-sbblky,carb,sooty,sl calc,dol,mica,sl slty,w/brn-tan,micxl,v arg,sl mrly,tt DOL & wh-gybrn crpxl,arg,dol,tt LS & dkbrn CHT frag"
5350.00 5360.00	"SH AA,w/tr DOL-LS AA,v rr CHT frag"

DEPTH	LITHOLOGY
5360.00	5370.00 "SH blk-dkgy,occ dkgybrn,sbblky,carb,sooty,dol-v sl calc,slty ip,w/arg LS & DOL-n-v rr intxl POR,n-v rr dull yel FLOR,n vis STN,n-v p slow CUT,v rr dkbrn CHT frag,v rr ANHY ptgs"
5370.00	5380.00 "SH blk-dkgy,dkgybrn,sbblky,carb,sooty,sl slty,mica,dol-v sl calc,w/thn tan,micxl,arg DOL & wh-crm,mot,crpxl-micxl,arg-dol,v sl anhy LS"
5380.00	5391.00 "LS wh-ltgy,occ mot wh-tan,crpxl,v sl micxl,rthy-slty,chk,y,v sl dol,tt-v rr intxl POR,n vis FSOC,w/carb SH ptgs,rr ltbrn-mot,crpxl-micxl,arg-lmy,tt DOL"
5390.00	5400.00 "LS wh-crm-ltgy,mot,crpxl-micxl,rthy-chk,v slty,occ grdg to v lmy SLTST,sl dol-v rrarg DOL,v rr blk carb SH lams,tt-v rr intxl POR,rr spty dull-bri yel FLOR,n-v rr spty ltbrn STN,n-v p slow dif CUT"
5400.00	5410.00 "LS AA,w/v rr thn carb SH;ltbrn,crpxl,arg-mrly,lmy,tt DOL,w/v rr trnsl CHT frag;LS-tt-tr intxl POR,tr spty dull-bri yel FLOR,n-v rr fnt brn STN,tr slow dif CUT"
5410.00	5420.00 "LS AA,occ alg,dol,tt-v rr intxl-alg POR,FSC AA,w/DOL ltbrn-brn,crpxl-micxl,micsuc-gran,sl alg,v sl lmy,arg,rr ANHY xl-incl,tt-fr intxl POR-v rr alg POR,tr dull yel FLOR,tr ltbrn STN,tr-fr slow dif-rr slow strng CUT"
5420.00	5430.00 "DOL AA,POR-FLOR-STN-CUT AA,w/decr LS cvgs"
5430.00	5447.00 "DOL lt-mbrn,occ brn,crpxl-vfxl,micsuc-gran,alg,v sl slty,alg ip,w/v rr crpxl-tan LS frag,v rr ANHY xl-incl,occ trnsl CHT frag,tt-g intxl-tr alg POR,tr-fr dull yel FLOR,tr ltbrn STN,fr slow dif-mod fast strng CUT"
5450.00	5470.00 "DOL brn-ltbrn,occ ltgybrn,tan,micsuc-vfxl,occ crpxl-micxl,pred GRNST/tr scat PCKST,cln,sl slty,occ dns-sl chk,tr tan LS incl,tr wh sil-cht/rr mic fos,rr anhy incl,fr intxl/tr agl POR,fr-g even dull/tr bri yel FLOR,fr-g brn-tr dkbrn STN,g blooming CUT"
5470.00	5480.00 "DOL AA,micsuc-vfxl,occ micxl-gran,GRNST,cln,rthy,sl-occ v slty,occ dns-sl chk,tr tan LS incl,tr wh-trnsl sil-CHT,tr CRIN fos,rr anhy incl,fr intxl/rr agl POR,FLOR AA,g brn-tr dkbrn STN,fr-g mod slow strng CUT"
5480.00	5490.00 "DOL AA/scat LS tan-trnsl-wh,crpxl-micxl,cln-sl chk,dns,tr mic fos,tt-tr intxl POR,fr mod bri yel FLOR,fr dif CUT/tr trnsl-wh CHT"
5490.00	5500.00 "DOL AA,sl agl,pred GRNST,cln,sl slty,occ dns-sl chk,tr tan LS incl,tr wh sil-cht,tr mic & CRIN fos,rr anhy incl,g intxl/tr agl POR,g even dull/tr spty bri yel FLOR,g-fr brn-dkbrn/rr blk STN,g blooming CUT"
5500.00	5510.00 "DOL AA/LS AA,POR-FLOR-STN AA,fr slow dif CUT"
5510.00	5520.00 "DOL ltbrn-brn,micsuc-micxl-gran,GRNST,rthy,cln,slty-v slty,incr tan-crm-wh crpxl LS incl & frag,rr anhy,tr CRIN fos,fr intxl/rr agl POR,fr-even dull yel FLOR,g-fr ltbrn-tr brn/vrr blk STN,fr slow dif CUT/LS AA"
5520.00	5540.00 "DOL brn-ltbrn,micsuc-vfxl-gran,GRNST,cln,slty,dns,tr tan LS incl AA,vrr wh sil-cht,rr anhy incl,fr intxl/vrr agl POR,fr-g even dull yel FLOR,fr-g brn-tr dkbrn/rr blk STN,g slow dif/tr slow strng CUT"

DEPTH	LITHOLOGY
5540.00 5550.00	"DOL AA,GRNST,cln,slty,dns,tr tan LS incl AA,vrr wh sil-cht,rr anhy incl,fr intxl/vrr agl POR,fr-g even dull yel FLOR,fr-g brn-tr dkbrn/rr blk STN,g slow dif/tr slow strmg CUT"
5550.00 5570.00	"DOL brn-ltbrn,occ ltbrngy,micsuc-gran-vfxl,occ micxl,pred GRNST/vrr fos scat PCKSTfrag,cln,slty-v slty,tr crm-trnsl-tan LS incl,rr wh sil-CHT,tr mic & CRIN fos,vrr anhy incl,fr-g intxl POR,fr-g even dull yel FLOR,fr-g brn-dkbrn/rr blk STN,fr-g dif CUT"
5570.00 5580.00	"DOL ltbrn-brn,micsuc-gran-vfxl,rthy,cln,dns,slty,LS incl,tr bf-wh CHT,tr CRIN fos,fr intxl/rr agl POR,g even dull yel FLOR,fr ltbrn/tr brn STN,fr slow dif-strmg CUT/scat-intbd,crm-wh-tan crpxl LS,cln,v sl chk,tt-rr intxl POR,fr dull yel FLOR,p dif CUT"
5590.00 5600.00	"DOL ltbrn-brn,micsuc-gran-vfxl,GRNST,slty,cln,tr mic & CRIN fos,tr bf-trnsl-wh CHT,POR-FLOR-STN-CUT AA/scat LS AA"
5600.00 5610.00	"DOL AA,micsuc-gran-vfxl,GRNST,rthy,cln,dns,slty,LS incl,tr bf-wh CHT,tr CRIN fos,fr intxl POR,g even dull yel FLOR,fr ltbrn/tr brn STN,fr slow dif-strmg CUT/scat-intbd,crm-wh-tan crpxl LS,cln,v sl chk,tt-rr intxl POR,fr dull yel FLOR,p dif CUT"
5610.00 5620.00	"DOL lt-mbrn,occ brn,micxl-vfxl,gran-micsuc,rthy-sl slty,v sl anhy,rr ANHY xl-incl,tr trnsl CHT frag,scat CRIN fos,w/tr tan crpxl LS frag-incl,fr-g intxl-v rr alg POR,fr-g dull yel FLOR,fr-g brn STN,fr-g slow dif-mod fast stmg CUT"
5620.00 5640.00	"DOL AA,POR-FLOR-STN-CUT AA,w/tr trnsl-wh CHT frag,rr scat tt tan crpxl LS incl,NFSOC"
5640.00 5650.00	"DOL brn-mbrn,micxl-vfxl,gran-micsuc,occ rthy-sl slty,sl lmy,v rr ANHY incl-xl,tr scat tt tan crpxl sl dol LS frag,rr CRIN fos,fr-g intxl-sl alg POR,fr-g dull yel FLOR,fr ltbrn STN,fr-g slow dif-fr-g mod fast stmg CUT"
5650.00 5660.00	"DOL AA,w/incr tan crpxl sl dol tt LS frag-incl,tr trnsl-clr CHT frag,fr-g intxl POR,fr-g dull yel FLOR,fr-ltbrn-brn STN,fr slow dif-fr-g mod fast stmg CUT"
5660.00 5670.00	"DOL ltbrn-brn,occ m brn,micxl-vfxl,gran-micsuc,v rr suc,rthy-sl slty,sl lmy-tr LS frag AA,rr-tr trnsl-wh CHT frag,occ Crin fos,fr-g intxl-sl alg POR,fr-g dull yel FLOR,fr lt-mbrn STN,fr-g slow dif-mod fast stmg CUT"
5670.00 5680.00	"DOL AA,w/LS-CHT frag AA,POR-FLOR-STN-CUT AA"
5680.00 5690.00	"DOL brn-ltbrn,micxl-vfxl,gran-micsuc,occ suc,rthy-sl slty,v sl lmy-tr crpxl LS frag-incl,v rr ANHY xl,tr trnsl-wh CHT frag,v sl alg,v sl styl,fr-g intxl-tr alg POR,fr-g dull yel FLOR,fr-lt-mbrn STN,fr-g slow dif-mod fast stmg CUT"
5690.00 5700.00	"DOL AA,w/LS-CHT AA,tr scat Crin fos,POR-FLOR-STN-CUT AA"
5700.00 5710.00	"TR CVGS-P-FR SPL" "DOL-ltbrn-brn,AA,sl incr LS frag,rr scat Crin fos,rr-tr CHT frag,POR-FLOR-STN-CUT AA"
5710.00 5720.00	"DOL-ltbrn-brn,micxl-vfxl,gran-suc ip,rthy-v sl slty,v rr anhy-scat ANHY xl-incl,w/scat trnsl-wh CHT frag,tr tan-crm crpxl dns dol LS incl-frag,tr Crin fos,fr-g intxl-rr alg POR,fr-g dull yel FLOR,fr-ltbrn-brn STN,fr-g slow dif-mod fast stmg CUT"

DEPTH	LITHOLOGY
5726.00 5730.00	"DOL AA,sl incr CHT-LS frag,scat Crin fos,POR-FLOR-STN-CUT AA"
5730.00 5740.00	"DOL-AA,tr trnsl-wh CHT frag;tan-crm,occ trnsl crpxl cln-dns,sl dol tt LS frag-incl,scat Crin fos,POR-FLOR-STN-CUT AA"
5740.00 5750.00	"DOL ltbrn-brn,occ mbrn,micxl-vfxl,gran-micsuc ip,rr suc,rthy-sl slty,rr scat CRIN fos,tr wh-trnsl CHT frag,tr scat crm-wh,occ tan crpxl LS frag,tr-g intxl-v rr alg POR,fr-g dull yel FLOR,tr-fr lt-mbrn STN,tr-g slow dif-mod fast stmg CUT"
5750.00 5760.00	"DOL-AA,w/sl decr LS frag AA,rr CHT frag,POR-FLOR-STN-CUT AA"
5760.00 5770.00	"DOL AA,incr tan crpxl sl dol dns v sl alg LS,rr CHT frag,incr Crin fos,decr intxl-alg POR,fr-g dull yel FLOR,tr-fr ltbrn-v rr blk STN,tr-fr slow dif-tr mod fast stmg CUT"
5770.00 5780.00	"DOL lt-mbrn,micxl-vfxl,gran-micsuc,rthy-sl slty,lmy ip,w/scat tan-crm crpxl dns dol LS incl-frag,rr trnsl-wh CHT frag,sl alg,rr Crin fos,tr-fr intxl-rr alg POR,tr-fr dull yel FLOR,tr lt-mbrn STN,fr-g slow dif-tr mod fast stmg CUT"
5780.00 5790.00	"DOL AA,w/CHT AA,decr LS AA,fr-g intxl-tr alg POR,fr-g dull yel FLOR,tr-fr ltbrn-v rr blk STN,fr-g slow dif-fr mod fast stmg CUT"
5790.00 5800.00	"DOL AA,POR-FLOR-STN-CUT AA,LS AA,sl incr CHT frag,rr Crin fos"
5800.00 5810.00	"DOL brn-ltbrn,micxl-vfxl,gran-micsuc,sl alg,sl rthy-slty ip,occ DOL GRNST-bcmg DOL PKST ip,rr CHT frag,rr-tr Crin fos,tr crpxl tan-crm dns dol LS frag,tr-fr intxl-v sl alg POR,tr-fr dull yel FLOR,tr-fr ltbrn STN,fr-g slow dif-mod fast stmg CUT"
5810.00 5820.00	"DOL AA,pred DOL GRNST,v rr DOL PKST,w/CHT AA,decr LS AA,scat ANHY incl-xl,POR-FLOR-STN-CUT AA"
5820.00 5829.00	"DOL AA,w/sl incr LS AA,rr-tr wh-trnsl CHT frag,scat trnsl-wh ANHY xl-incl,scat Crin fos,POR-FLOR-STN-CUT AA"
5830.00 5840.00	"DOL AA,pred DOL GRNST,occ DOL PKST,w/incr ANHY incl-xl-occ POR fl,scat Crin fos,tr wh-trnsl CHT frag,wh-crm-tan crpxl dol LS incl-frag,occ LS rich cmt,tr-fr intxl-rr alg POR,tr-fr dull yel FLOR,tr ltbrn STN,fr-g slow dif-tr mod fast stmg CUT"
5840.00 5850.00	"DOL AA,w/incr LS AA,scat CHT frag,ANHY AA,tr-fr intxl-rr alg POR,tr dull yel FLOR,tr ltbrn-v rr spty blk STN,CUT AA"
5850.00 5860.00	"LS wh-crm-tan,crpxl,occ micxl,rthy-cln,occ chky ip,chty,dol,dns,tt,w/incr wh-trnsl CHT frag,DOL-AA,w/POR-FLOR-STN-CUT AA"
5860.00 5870.00	"INTBD LS & DOL AA,w/scat CHT frag,rr Crin fos,tr-fr intxl-rr pp alg POR,tr-fr dull yel FLOR,tr ltbrn STN,tr-fr slow dif-rr mod fast stmg CUT"
5870.00 5880.00	"DOL & LS AA,w/scat CHT frag,rr scat Crin fos POR-FLOR-STN-CUT AA"

DEPTH	LITHOLOGY
5880.00	5890.00 "LS crm-tan,occ ltgy,crpxl-micxl,chk,rthy,cln-dns,sl dol,tt,cht,y,w/intbd DOL brn-ltbrn,crpxl-vfxl,gran-micsuc ip,occ DOL GRNST,bcmg DOL PKST,rr Crin fos,"
5890.00	5900.00 "LS AA,w/DOL ltbrn-brn,occ mbrn,crpxl-micxl,occ micsuc-vfxl,rthy,v sl arg,lmy,occ grdg to dol LS,w/DOL GRNST & DOL PKST,rr Crin fos,scat trip CHT frag,rr-tr intxl POR,tr dull yel FLOR,rr scat brn-blk STN,tr slow dif-slow-mod fast CUT"
5900.00	5910.00 "INTBD LS-DOL AA,w/scat CHT frag,rr mbrn-gybrn,micxl arg DOL,w/POR-FLOR-STN-CUT
5910.00	5930.00 "LS wh-crm-tan,mot ip,crpxl-micxl,pty ip,dol,occ grdg to lmy DOL,chk,v sl chty,w/thn intbd DOL brn-ltbrn,occ mbrn,micxl-micsuc,pred DOL PKST,DOL GRNST ip,tt-tr intxl POR,tr dull yel FLOR,rr-tr lt-mbrn STN,tr slow dif-slow-mod fast stmg CUT,scat CHT frag"
5930.00	5940.00 "LS wh-crm-tan,occ mot,crpxl,dns,chk,dol,grdg to lmy DOL,w/tr trns-l-brn-gybrn CHT frag,intbd ltbrn-brn,mot crpxl-micxl,rr micsuc-gran DOL,sl chty,anhy,v sl gran,lmy,occ arg,w/rr intxl POR,rr-tr dull yel FLOR,n-tr ltbrn STN,n-rr slow dif-slow stmg CUT"
5940.00	5950.00 "INTBD LS & DOL AA,w/tr CHT frag,POR-FLOR-STN-CUT AA"
5950.00	5960.00 "LS ltbrn-tan,crm,occ wh,mot,crpxl-micxl,rthy,dol,occ grdg to lmy DOL,anhy-tr ANHY xl-incl,cht-y-tr trns-ltbrn CHT frag,w/intbd lt-mbrn,DOL crpxl-micxl,micsuc ip,rthy-sl slty,lmy,tt-tr intxl POR,tr dull yel FLOR,rr ltbrn STN,rr slow dif-rr slow stmg CUT"
5970.00	5980.00 "LS tan,brn,mot m-ltbrngy,occ wh,crpxl-micxl,LS PCKST,pred cln,dns-occ slty,v sl chk,tr trns-lf-wh CHT frag,tr scat xln ANHY,POR-FLOR-STN-CUT AA"
5980.00	6000.00 "DOL lt-mbrn,ltbrngy,mot,vfxl-micxl,crpxl-occ micsuc,DOL PCKST/rr scat GRNST,rthy,mot/LS AA,tr-incr CHT AA/depth,sl calc-lmy,tr mic fos,dns,tt-tr intxl POR,scat dull/rr bri yel FLOR,fr-p dif/rr slow strmg CUT/incr scat LS AA,poss cvgs,POR-FLOR-STN-CUT AA "
6000.00	6010.00 "DOL AA,mot,vfxl-micsuc,gran-micxl,occ crpxl,DOL GRNST/tr scat PCKST,tr CHT AA,sl calc-lmy ip,rr LS incl,rr mic fos,rr blk styl prtg,tr-fr intxl POR,FLOR AA,fr-g ltbrn/rr blk dd o STN,CUT AA/scat LS AA"
6010.00	6020.00 "DOL tan-ltbrn,occ brn,mot,micsuc-gran-vfxl,rthy,cln,slty,scat crm-trns-l-wh-bf crpxl LS,tr wh-trns-lf CHT/tr mic fos incl,tr intxl POR,fr spty dull yel FLOR,STN-CUT AA"
6020.00	6040.00 "DOL ltbrn,occ tan,micsuc-gran,vfxl,GRNST,slty,,dns,tr scat trns-l-wh CHT,tr bf-tan occ crm-wh LS incl-frag,fr-g intxl POR,g ltbrn-brn/rr dkbrnblk STN,g even dull-mod bri yel FLOR,fr-g blooming CUT"
6040.00	6050.00 "DOL brn-ltbrn,micsuc-gran,vfxl-micxl,GRNST,rthy,slty,cln,dns,rr CHT & LS AA,fr-g intxl/rr agl POR,FLOR AA,g ltbrn-brn/tr dkbrnblk STN,g dif/fr mod fast strmg CUT"
6050.00	6060.00 "DOL brn,occ ltbrn,micsuc-gran,micxl-vfxl,GRNST,rthy,slty,cln,dns,rr LS & CHT AA,g-fr intxl POR,even mod bri-dull yel FLOR,g brn/rr blk dd o STN,fr-g blooming CUT"
6060.00	6070.00 "DOL AA,DOL GRNST,rthy,cln,dns,g-fr intxl/rr agl POR,FLOR-STN,g-fr blooming CUT"
6070.00	6080.00 "DOL AA,DOL GRNST,rthy,cln,vrr LS & CHT AA,dns,g-fr intxl/rr agl POR,FLOR-STN,g-fr blooming CUT"

DEPTH	LITHOLOGY
6080.00	6090.00 "DOL brn,occ dkbrnblk-choc brn,micsuc-gran,micxl-vfxl,GRNST,rthy,slty,pred cln-occ mot/dkbrn-brnblk dd o STN,tr CRIN fos,rr brn,trnsl-wh CHT,fr-g intxl/tr agl POR,g even mod bri-spty bri yel FLOR,g brn/scat drkbrn-brnblk-blk dd o STN,g blooming CUT"
6090.00	6100.00 "DOL brn,incr dkbrnblk-choc brn,micsuc-gran,micxl-vfxl,GRNST,rthy,slty,cln-mot AA,tr CHT trnsl-wh,occ brn-dkbrnblk,g-fr intxl/incr agl POR,FLOR-STN-CUT AA"
6100.00	6110.00 "DOL AA,tr scat ltgy-gybrn crpxl LS/tr trnsl-wh CHTincl & frag,vrr CRIN fos,fr-g even dull-spty mod bri-bri yel FLOR,g brn-dkbrnblk-occ blk dd o STN,g blooming CUT"
6110.00	6130.00 "DOL choc brn-dkbrnblk,ocbrn,blk ip,micsuc-gran,occ micxl,GRNST,tr LS & CHT AA,g-fr intxl & agl POR,g even dull-mod bri/spty bri yel FLOR,g dkbrnblk-blk dd o STN,g fast blooming CUT"
6130.00	6150.00 "DOL choc brn,occ dkbrnblk-blk,brn,gran-agl-micsuc,GRNST-tr scat PCKST,rthy,dns,incr CHT AA,rr scat LS AA,rr clr-trnsl xln ANHY incl-frag occ intgwn in vug POR,g intxl-agl POR,g even dull-mod bri/tr bri spty yel FLOR,g dkbrn-brnblk-blk dd o STN,CUT AA "
6130.00	6150.00 "DOL choc brn,occ dkbrnblk-blk,brn,gran-agl-micsuc,GRNST-tr scat PCKST,rthy,dns,incr CHT AA,rr scat LS AA,rr clr-trnsl xln ANHY incl-frag occ intgwn in vug POR,g intxl-agl POR,g even dull-mod bri/tr bri spty yel FLOR,g dkbrn-brnblk-blk dd o STN,CUT AA "
6150.00	6170.00 "DOLlt-mbrn,micxl-vfxl,gran-suc,occ crpxl,sl alg,sl slty,w/tr CHT frag,bcmg DOL PKST,tt-fr intxl-alg POR,LS incl-LS rich cmt,rr ANHY incl-xl,fr-g intxl-alg POR,rr tt,fr-fr dull yel FLOR,fr-g brn STN,rr mod g mod fast CUT"
6160.00	6180.00 "DOL AA,incr tt ltbrn DOL PKST,rr DOL WKST,v rr CHT frag,rr Crin fos,tr arg ltgy LS frag-tr LS cmt,w/ltgy pkty calc-sl dol SH frag,tt-tr intxl-v rr alg POR,rr dull yel FLOR,rr ltbrn-rr blk STN,rr of fr slow-mod fast stmg CUT"
6180.00	6190.00 "DOL AA,incr ltgy plty calc-dol SH,w/scat ltgy crpxl plty chk dol LS frag,rr-fr intxl-alg POR,rr mod fr dull yel FLOR,rr brn-dkbrn STN,rr slow-mod fast stmg CUT"
6190.00	6200.00 "DOL ltbrn,occ m-dkbrn,crpxl-micxl,occ gran-micsuc,sl alg,sl lmy,arg ip,w/SH-LS AA,v rr CHT frag,rr Crin fos,w/POR-FLOR-STN-CUT AA"
6200.00	6220.00 "LS ltgy-offwh-crm,crpxl-micxl,plty,arg,v sl slty,dol,occ grd to lmy DOL,tt,NFSOC,w/ltgy,plty,v sl slty,dol-calc SH; DOL-ltbrn-brn,occ dkbrn,crpxl-vfxl,micxl-gran ip,v sl suc,lmy-rr LS incl-cmt,v sl chty,rr Crin FOS,pred "
6216.00	6221.00 "DOL PKST-WKST,occ DOL GRNST,w/n-tr intxl-v rr alg POR,rr dull yel FLOR,occ dull orng mnrl FLOR,rr-tr lt-dkbrn STN,n-fr slow-mod fast stmg CUT"
6220.00	6230.00 "LS AA,incr slty,v arg,sl dol,anhy ip,tt,NFSOC,w/DOL ltbrn-ltgybrn,crpxl-micxl,occ vfxl,gran,sl slty-slty ip,anhy,v rr mic fos,rthy,tt-rr intxl-v rr alg POR,rr dull orng mnrl-rr dull yel FLOR,rr ltbrn STN,rr slow stmg CUT"
6230.00	6240.00 "LS & DOL AA,POR-FLOR-STN-CUT AA,w/tr SLTST ltgy,v lmy-v dol,sl mica,arg"

DEPTH	LITHOLOGY
6230.00	6240.00 "LS & DOL AA,POR-FLOR-STN-CUT AA,w/tr SLTST ltgy,v lmy-v dol,sl mica,arg"
6240.00	6250.00 "LS ltgy-offwh,crm,crpxl-micxl,rthy,arg,sl slty-slty,mica,dol ip,tt,w/scat ANHY incl,rr ltbrn-brn gran DOL lmy rr intxl POR,rr-tr dull yel FLOR,rr ltbrn STN,v p slow dif CUT,scat CHT frag,rr ltgy v arg lmy dol SLTST"
6250.00	6260.00 "LS wh-crm-ltgy,crpxl,pty,arg,slty-v slty,occ grdg to v lmy arg SLST,w/ltgy-mgy pty SH frag,sl tr SLTST lmy-dol v shy,occ DOL AA,POR-FLOR-STN CUT AA"
6260.00	6270.00 "LS AA,grdg to v lmy arg SLTST ip,pty,v arg,tt,NFSOC,w/DOL ltbrn-gybrn,micxl-vfxl,slty-v slty,thn ltgy pty SH,tt-tr intxl POR,n-v rr dull yel FLOR,occ dull orng mnrl FLOR,n-v rr ltbrn STN,rr slow dif-slow stmg CUT"
6270.00	6280.00 "LS ltgy-crm,offwh,crpxl-micxl,pty,arg,sl slty-slty,occ grdg to v lmy SLTST,w/rr ltgy pty calc-dol SH lams,v rr DOL brn-ltbrn,gran-micsuc,micxl,rthy,slty,tt-v rr intxl POR,n-v rr dull yel FLOR,rr orng mnrl FLOR,rr brn STN,rr p slow dif CUT"
6280.00	6290.00 "LS-DOL-SLTST-SH AA,n-v rr vis POR-FLOR-STN-CUT AA"
6280.00	6290.00 "SPL 6280-6290 LAGGED AFTERTRIP(LAT)-ABNT CVGS P-FR SPL"
6290.00	6301.00 "LS ltgy-crm-offwh,crpxl-micxl,pty,rthy,slty-v slty,occ grdg to v lmy SLTST,v arg,tt,w/rr thn ltgy v lmy SLTST incl,tr carb dol,sl calc SH lams,w/tr ltbrn-brn micxl-micxl,gran DOL (pred cvgs)tr intxl POR,v rr dull yel FLOR,scat ltbrn STN,p slow CUT"
6300.00	6310.00 "LS-SH-SLTST AA,DOL AA,bcmg crpxl-micxl,dns-tt ip"
6310.00	6320.00 "DOL brn-ltbrn,occ gybrn,crpxl-micxl,micsuc-gran ip,arg ip,sl slty,occ sl mrly,tt-tr intxl POR,rr fr dull yel FLOR,rr lt-dkbrn STN,fr-g slow dif-mod fast CUT,w/LS ltgy,crpxl-micxl,pty,arg,rr blk carb calc-dol SH;SLTST AA,rr ltbrn-brn CHT frag"
6320.00	6330.00 "PRED LS AA,w/thn SH-SLTST AA,decr DOL-pred DOL PKST,scat ltbrn-trnsl CHT frag"
6330.00	6340.00 "LS ltgy,crm-offwh,crpxl,pty,arg,slty-v slty,grdg to v lmy SLTST,sl dol,tt,NFSOC,w/v rr thn pty SH,thn ltgy v lmy arg SLTST & v rr thn DOL AA,v rr scat CHT frag"
6340.00	6360.00 "LS gy-ltgy,crm-offwh ip,crpxl-micxl,pty,arg,chk,slty-v slty ip,w/wh amor ANHY incl,v rr dkgy carb SH lams,sl tr ltgy lmy SLTST,scat v thn ltbrn crpxl-micsuc DOL w/n-v rr intxl POR,n-v rr spty FLOR-STN-CUT"
6360.00	6370.00 "LS AA,v rr v thn SH AA,rr amor ANHY,scat ltgy SLTST lams,sl incr brn-ltbrn,crpxl-micsuc DOL,pred DOL GRNST(cvgs?),rr DOL PKST,tt-rr intxl POR,rr spty dull yel FLOR,rr brn STN,n-tr slow dif-slow stmg CUT"
6370.00	6380.00 "DOL brn-ltbrn,occ tan,gran-micsuc-micxl,occ sl agl,rthy,cln,dns,sl slty,occ sl shy,rr-fr intxl/rr pp agl POR,scat even dull-mod bri/tr spty bri yel FLOR,g ltbrn/tr brn-dk brn STN,g dif-fr slow strmg CUT/LS,ANHY,SH,SLTST AA"

FORMATION TOPS

OPERATOR: MOBIL

WELL NAME: RATHERFORD UNIT #13-12 NW UPPER 1-A HORIZONTAL LATERAL LEG #4

FORMATION NAME		SAMPLES	SAMPLES	DATUM
		MEASURED DEPTH	TRUE VERTICAL DEPTH	KB:4569
LOWER ISMAY		5290'	5281'	-712
GOTHIC SHALE		5344'	5321'	-752
DESERT CREEK		5372'	5338'	-769
DC-1A		5401'	5351'	-782

GEOLOGICAL SUMMARY

AND

ZONES OF INTEREST

The Mobil Exploration and Production U.S. Inc., Ratherford Unit #13-12 Horizontal Leg #4, Section 13, T41S, R23E, was a re-entry of the Mobil Ratherford Unit #13-12, a sidetrack in a northwesterly direction from 5197' measured depth, 5197' true vertical depth, on February 18, 1997. Leg #4 reached a measured depth of 6379', true vertical depth of 5377.7' at total depth, horizontal displacement of 1143' and true vertical plane 313 degrees, on February 23, 1997. The lateral was drilled without any significant problems. Of note was that several H₂S alerts occurred when circulating up gas and oil after trips, and since this well was being produced just prior to the reentry, the background gases noted on the accompanying mud log remained high, as well as the samples being contaminated to a certain extent with live oil encountered through out the well.

The primary objective of the Ratherford Unit #13-12 Horizontal Lateral Leg #4 was the upper 1-A Porosity Bench, to identify and define the porosity bench, it's effective porosity, staining and reservoir properties in the Desert Creek Member of the Upper Paradox Formation.

The Lower Ismay, Gothic Shale and the transition zone at the top of the Desert Creek were encountered while drilling Leg #4. Kick off point for this lateral was in the lower 1/3 of the Upper Ismay Member, with only minor shows of staining or porosity near the base. The top of the Lower Ismay was picked at 5290' measured depth, 5281' true vertical depth, at the base of the very thin Hovenweep shale. The base of the Upper Ismay was predominately white to cream, occasionally tan, cryptocrystalline to microcrystalline, chalky, fossiliferous limestone, grading to very argillaceous, brown to gray brown, microcrystalline to microsucrosic dolomite. The dolomite graded into the very thin, carbonaceous, dolomitic shale of the Hovenweep. The Lower Ismay was a white to cream to tan, some light gray to light gray brown, cryptocrystalline to microcrystalline, chalky to clean, slightly dolomitic to anhydritic, slightly cherty limestone with a trace of scattered micro fossils, no to a trace of intercrystalline porosity, a trace of spotty dull to bright yellow fluorescence, none to very rare light brown stain, and only a trace of very poor slow diffuse cut. Interbedded in the Lower Ismay were light to medium gray to gray brown dolomites, which were cryptocrystalline to microcrystalline, with some very finely crystalline to microsucrosic streaks, very slightly cherty, clean to argillaceous. The dolomite increased with depth and lays gradationally over the Gothic Shale. The dolomites had no to a trace of intercrystalline to very rare pin point vuggular porosity with scattered dull yellow fluorescence, none to rare light brown staining, and only very poor slow diffuse to residual ring cut. The top of the Gothic Shale is at 5344' measured depth, 5320.7' true vertical depth.

The Gothic Shale was predominantly dark gray to black, silty, carbonaceous, brittle to firm, subblocky to blocky to platy, calcareous to slightly dolomitic and slightly micaceous. The top of the Gothic was gradational from the very thin interbedding of very argillaceous, carbonaceous limestone and very argillaceous, limy dolomite, with the dolomite grading into very dolomitic, carbonaceous shale. The top of the Gothic was picked predominantly by the decrease in penetration rate and the increased percentage of shale in the samples.

As the well bore continued downward, the dolomites from 5950' measured depth to 6000' measured depth, 5366' true vertical depth, 765' horizontal displacement, were predominately brown to light brown, occasionally dark brown to mottled, cryptocrystalline to microcrystalline, occasionally microsucrosic to algal, with traces of dolomite packstone, anhydrite inclusions and crystals, scattered Crinoid fossils, very thin scattered clean, tan to cream to white, cryptocrystalline to microcrystalline, slightly cherty, dolomitic limestone fragments and limestone rich cement, with no visible porosity. The dolomites had fair to good intercrystalline to pin point vuggular porosity, fair to good dull yellow fluorescence, a fair to good brown stain, scattered black dead oil stain and a good slow diffuse to moderately fast streaming cut.

The well turned upwards at 6000' measured depth after encountering a thin zone of very cherty dolomite. As the well bore continued upwards from 6000' to 6148' measured depth, 5366' true vertical depth, with a horizontal displacement of 905'. Through this interval the lithology remained brown to light brown, occasionally dark brown to mottled, cryptocrystalline to microcrystalline, occasionally microsucrosic to algal, dolomite, with traces of dolomite packstone, anhydrite inclusions and crystals, scattered Crinoid fossils, very thin scattered clean, tan to cream to white, cryptocrystalline to microcrystalline, slightly cherty, dolomitic limestone fragments and limestone rich cement, with no visible porosity in the limestones. The dolomites had fair to good intercrystalline to pin point vuggular porosity, fair to good dull yellow fluorescence, a fair to good brown stain, scattered black dead oil stain and a good slow diffuse to moderately fast streaming cut. A no decrease in porosity was also noted through this interval.

At a measured depth of 6148 a facies change was noted as the well bore was slowly turned downward towards the assumed formation dip angle of 89 degrees. The change noted was a vertical change to a very tight dolomite packstone and possible dolomite wackstone as the top of the 1-A zone was again approached. These tight dolomites show very poor to no visible porosity, fluorescence, stain and cut. As the well bore continued at a slowly increasing downward angle, a very thin light gray, dolomitic to slightly calcareous, platy, micaceous, slightly carbonaceous shale was encountered. This shale has a probable true vertical thickness of approximately 1/2' (one half foot), and appeared to mark the upper limit of the 1-A porosity zone. This shaley interval was noted from 6156' measured depth, 5366.5' true vertical depth, a horizontal displacement 920', to a measured depth of 6196', true vertical depth of 5367.5' and a horizontal displacement of 960'.

From measured depth of 6196' to a total measured depth of 6379', true vertical depth of 5374.6', with a horizontal displacement of 11143', the lithology above the thin shaley facies change became light gray to cream to off-white cryptocrystalline to microcrystalline, chalky, argillaceous, slightly dolomitic, silty to very silty limestone; very thin light gray, very limy, micaceous, very slightly dolomitic siltstone and light brown, cryptocrystalline to microsucrosic dolomite, algal, with thin streaks of light brown dolomite packstone, rare scattered crinoid fossils and cherts fragments, rare thin limestone fragments and limestone cement. These dolomites were probably very thin lamination to possible cavings. The limestones had no visible porosity, fluorescence, stain or cut. The scattered, thin dolomites had not to rare good intercrystalline porosities, with rare scattered fair dull yellow fluorescence and as the lateral continued a very rare dull orange mineral fluorescence, rare light brown live oil stain and rare slow diffuse to slow streaming cut. The facies change appeared to be vertical as well as horizontal as the well bore was turned downward at an increasingly sharp downward angle to try to reacquire the porosity of the 1-A zone.

At a total measured depth of 6379', true vertical depth 5374.6' and a horizontal displacement of 11143', the lateral was terminated, after dropping the well bore to 1' below the proposed the center of the target line. The lithology to termination remained a very silty, chalky, platy limestone with very thin interbedded siltstones, which in retrospect was probably the base of the Desert Creek transition zone.

In tracking the well bore through the upper bench, there were several facies changes with in the dolomites, predominately vertical as the well bore approached the top of the 1-A zone, as the base of the 1-A zone was never encountered. The 1-A zone was projected to thin as the lateral continued toward the RU# 14-44 well. Based on the encountering of the probable transition zone, it appears that the thinning occurred at a possible horizontal displacement of 905'. It appears that near this horizontal displacement the top of the 1-A zone turned down sharply toward the 1-B zone.

Predominant facies changes were associated with the rock classification with in the dolomites and occasionally the depositional environment, as the environment of deposition changed when encountering the top of 1-A zone. With the classification changes, porosity in the dolomites encountered of primary deposition and were continuous through the 1-A zone penetrated, until a horizontal displacement of 905', with the effective or the better porosity being associated with the granular dolomite facies which had fair to good, intercrystalline to algal porosities, and the absence of any major anhydrite plugging. The dolomite packstone had porosities which were predominately tighter and with very poor permeability. Due to not reacquiring the porosity at the end of the lateral it is unclear as to whether the dolomite porosity is continuous the RU#14-44 well.

From the top of the 1-A porosity bench to a total measured depth of 6379', the dolomite lithology was consistent, ranging from light brown to medium brown, rare dark brown, micro to very fine crystalline, occasionally microsucrosic to granular, with scattered, tighter dolomite packstone and some anhydrite matrixes. The dolomites had fair to good intercrystalline and algal porosities and a good constant dull to bright yellow fluorescence, with noticeable decreases when noticeable amounts of tight dolomite packstone was present. The staining in the dolomites ranged from trace to good light brown to traces of black dead oil stain and the associated cuts being trace to good slow to fast streaming and occasion slow diffuse cuts. The staining in the dolomite, fair to moderate to occasionally good, however remained rather consistent and continuous through out porosity in the 1-A bench penetrated. Fluorescence, like the staining was consistent and continuous, and was a dull to bright yellow gold, with cuts ranging from moderate to good ring (diffuse) to moderate to good steady fast streaming cut. The lateral showed no to very poor sample shows in the limestones and very thin tight dolomites from a horizontal displacement of 580' to 715' and from 905' to the termination of the lateral at a horizontal displacement of 1143' where the well bore was above the 1-A porosity and in the extreme upper limit of the 1-A zone. The sample shows were affected in part due to the presence of live oil encountered through out the drilling of curve and lateral sections.

The conclusion drawn from the southwest 1-A porosity bench Lateral Leg 1, is that in this area the primary dolomitization (due to the lack of limestone cements in the framework), was enhanced by the algal porosity. Also, having an effect on the porosity, were the cryptocrystalline dolomite packstones which graded to and were thinly interbedded with microcrystalline to granular dolomite, which in turn graded to very fine grain, dolomitic grainstone with dense limestone matrix, some black dead oil staining was trapped in the matrix and along the anhydrite to dolomite contact surfaces. Staining was fair to moderate and there were significant sections where staining was moderately good. The lateral used the a proposed projected target line as a reference point through the bench, drilling tried to follow the target line while maintaining contact with best porosity. It appears that the effective porosity is continuous through most of the lateral, becoming very thin and of possibly less than 1' in thickness below and prior to termination of the lateral.

While drilling, the lateral did make varying amounts of live oil, with significant amounts of heavies noted on the chromatograph (C₃ and C₄). Of note was the H₂S encountered while circulating out gas and oil after trips. This lateral can be interpreted to have good reservoir qualities through most of the lateral, since the lateral through the 1-A zone gave up significant oil while drilling. It appears that the porosities are well enough developed to enhance the overall performance of the zone.

Between the Gothic Shale and Desert Creek Porosity Members is a transitional zone, which appears to be gradational. The top of the Desert Creek is commonly picked at the Gothic Shale to transition zone facies change, which in this well occurred at a measured depth of 5372' and a true vertical depth of 5338'. In this well the zone was predominantly a limestone; which was gray to white to light brown, cryptocrystalline to microcrystalline, with some granular limestone, very slightly sandy, with very thinly interbedded dolomite which was brown to light gray brown, microcrystalline to granular, slightly limy and occasionally silty. The limestone was predominately tight with very rare intercrystalline porosity that showed some anhydrite fillings. Through this transitional zone there appeared to be some interbedding or possibly cyclic deposits consisting of dolomitic to slightly calcareous, black, carbonaceous mudstones and very slightly dolomitic siltstones. The porosities ranged from none to very poor intergranular, with traces of calcite to anhydrite fillings. No visible staining was noted and had predominately a very rare spotty, very poor, faint dull yellow fluorescence, with no to very rare residue ring cut.

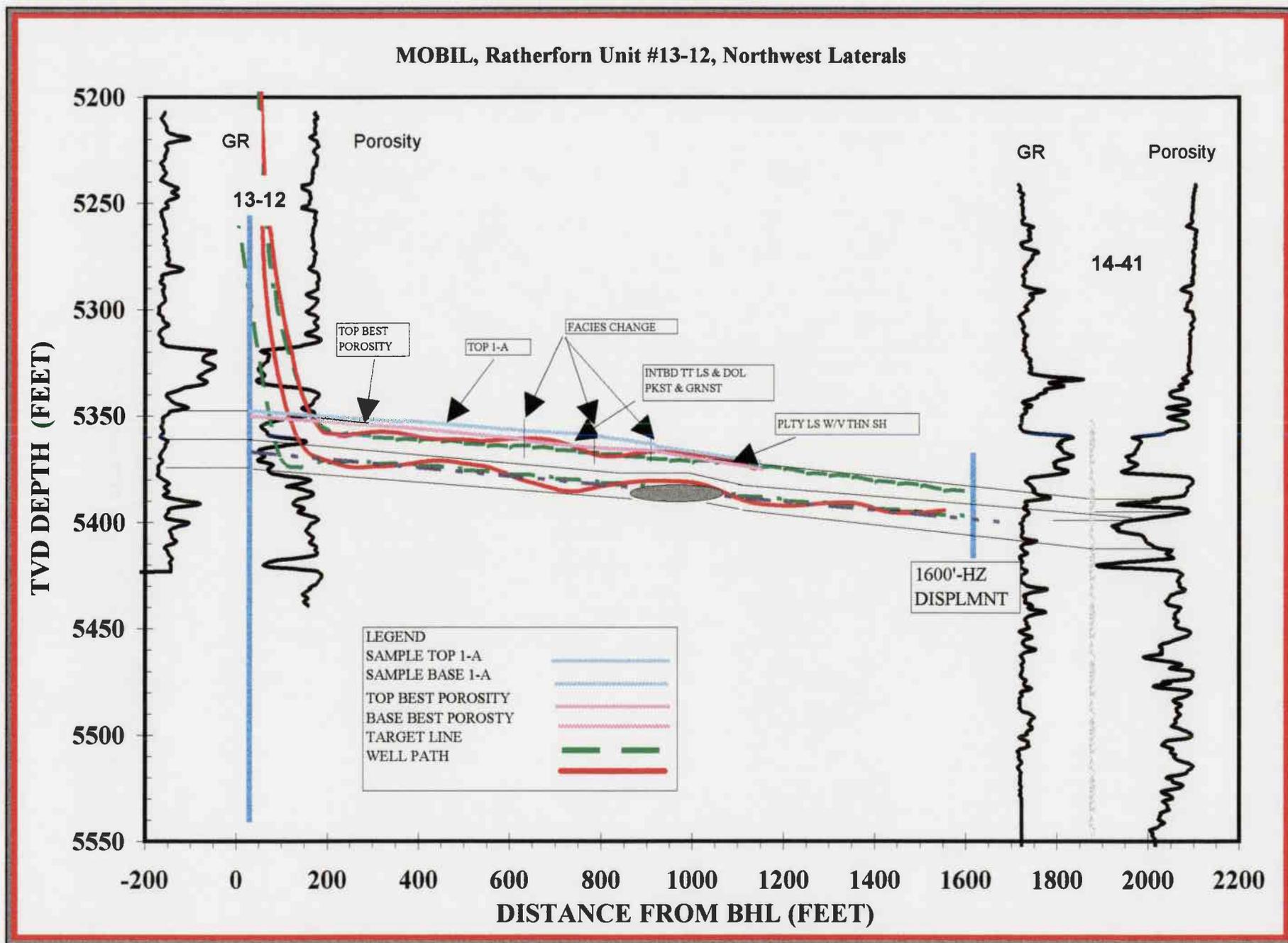
The top of the Desert Creek 1-A zone was picked at 5401' measured depth, 5351' true vertical depth. The pick is based on an increase in the rate of penetration, as well as sample interpretation. The top was picked in this lateral mainly based on the first significant increase in the dolomite grainstone below the top of the Desert Creek.

The top of the main objective, the 1-A porosity zone, was picked at a measured depth of 5401', 5351' true vertical depth, in a microcrystalline to microsucrosic dolomite. As the curve was being completed in the 1-A zone the dolomite became cleaner and increasing granular. While drilling curve through the section, it appeared that the 1-A porosity bench was possibly defined by the interval 5402' measured depth, 5352' true vertical depth to a possible 5481' measured depth, 5361' true vertical depth. The top of the porosity Bench was marked by facies change, which was somewhat gradational to sharp since the drilling rate increased rather sharply. The top of the best porosity in the 1-A bench was at 5411' measured depth, 5354' true vertical depth, and was marked by increase in rate of penetration and an increase in intercrystalline porosity. The base of the porosity zone was not encountered while landing the curve.

At a measured depth of 5447', 5359.27' true vertical depth, with a horizontal displacement of 212' in the dolomite grainstones of the 1-A porosity horizon, a trip was made to change the bottom hole assembly and pick up the MWD tool. While drilling the 1-A lateral to a horizontal displacement of approximately 610', as the well bore was slow turned upwards, the porosity was predominately in a light to medium brown dolomite grainstone. This dolomite was microcrystalline to very fine crystalline, microsucrosic to occasionally sucrosic, slightly anhydritic with traces of anhydrite crystals to rare inclusions, with scattered cryptocrystalline limestone fragment and very limy cement, rare micro fossils, traces of algal material, traces of scattered dark brown stain and very rare black oil stain residue* in the intercrystalline matrix. Predominantly fair to good intercrystalline and traces of pin point vuggy porosity, with rare anhydrite and very rare dolomitic limestone mud filling and cement in the intercrystalline and vuggy porosity. Through the interval the staining was moderate to fair and cuts ranging from moderate slow diffuse to good moderately fast to slow steady streaming. A decrease in porosity and penetration was noted at 5844' measured depth, 5360.5' true vertical depth, with a horizontal displacement of 610'. An increase in dolomitic limestone, dolomite packstone, Crinoid fossil and chert fragments were noted in the samples. The decrease in penetration rate was due to a vertical facies change as the well bore penetrated the upper boundary of the best porosity zone and neared the upper limit of the 1-A zone. The facies change encountered was from the algal dolomite grainstones and packstones to the white to cream to tan, cryptocrystalline to microcrystalline, dolomitic, very cherty anhydritic, tight limestone, very thin anhydrites and tight crinoidal, cherty, light brown to brown dolomite packstones and thin grain stones were encountered at the very upper limit of the 1-A zone, just below the upper Desert Creek transition zone. For After a series of slides and rotates to turn the bore hole to a downward angle, the penetration rated gradually increased with the lithology again returning to algal dolomite grainstone, at 5950' measured depth, 5363' true vertical depth, and a horizontal displacement of 725', as the top of the porosity zone with in the 1-A zone was again penetrated.

***The black residual staining has been called by Dr. Dave Eby & others as "bitchimum" and is also known as "dead oil" ("dd o stn" on mud logs). This staining is associated with the movement of oil over long periods of time and is a good indicator of predicible hydrocarbons when associated with productive porosities, but can also be found in porosities that have been filled by anhydrites and other material at later dates.**

MOBIL, Ratherforn Unit #13-12, Northwest Laterals



ENTITY ACTION FORM - FORM 6

OPERATOR Mobil Explor. & Prod. MOBIL PRODUCING TX & NM, INC.
ADDRESS P. O. BOX 633
MIDLAND, TEXAS 79702

OPERATOR ACCT. NO. N 7370

ACTION CODE	CURRENT ENTITY NO.	NEW ENTITY NO.	API NUMBER	WELL NAME	WELL LOCATION					SPUD DATE	EFFECTIVE DATE
					QQ	SC	TP	RG	COUNTY		
B	99999	06280	43-037-31127	RATHERFORD #13-12		13	41S	23E	SAN JUAN	1-24-97	
WELL 1 COMMENTS: Entity added 4-16-97. (Ratherford Unit) * Re-Entry/multi-leg.											
WELL 2 COMMENTS:											
WELL 3 COMMENTS:											
WELL 4 COMMENTS:											
WELL 5 COMMENTS:											

ACTION CODES (See instructions on back of form)

- A - Establish new entity for new well (single well only)
- B - Add new well to existing entity (group or unit well)
- C - Re-assign well from one existing entity to another existing entity
- D - Re-assign well from one existing entity to a new entity
- E - Other (explain in comments section)

NOTE: Use COMMENT section to explain why each Action Code was selected.

(3/89)

RECEIVED

APR 16 1997

DIV. OF OIL, GAS & MINING

Signature Shirley Houchins
SHIRLEY HOUCHINS
ENV. & REG. TECH
Title
Date 3-31-1997
Phone No. (915) 688-2585

**UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT**

SUBMIT IN DUPLICATE

(See other instructions on reverse side)

FORM APPROVED
OMB NO. 1004-0137
Expires: February 28, 1995

WELL COMPLETION OR RECOMPLETION REPORT AND LOG*

1a. TYPE OF WELL: OIL WELL GAS WELL DRY Other

b. TYPE OF COMPLETION:
NEW WELL WORK OVER DEEP-EN PLUG BACK DIFF. RESVR. Other **SIDETRACK**

2. NAME OF OPERATOR **Mobil Exploration & Producing U.S. Inc.**
as Agent for Mobil Producing TX & NM Inc.

3. ADDRESS AND TELEPHONE NO.
P.O. Box 633, Midland, TX 79702 (915) 688-2585

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements)*
At surface
1705' FNL & 640' FWL
At top prod. interval reported below

At total depth
***** 37**

14. PERMIT NO. DATE ISSUED
1-21-97

5. LEASE DESIGNATION AND SERIAL NO.
14-20-603-247A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME
NAVAJO TRIBAL

7. UNIT AGREEMENT NAME
RATHERFORD UNIT

8. FARM OR LEASE NAME, WELL NO.
RATHERFORD 13-12

9. API WELL NO.
43-037-31127

10. FIELD AND POOL, OR WILDCAT
GREATER ANETH

11. SEC., T., R., M., OR BLOCK AND SURVEY OR AREA
13, T41S, R23E

12. COUNTY OR PARISH **SAN JUAN** 13. STATE **UTAH**

15. DATE SPUDDED **1-24-97** 16. DATE T.D. REACHED **2-25-97** 17. DATE COMPL. (Ready to prod.) **3-14-97** 18. ELEVATIONS (DF, RKB, RT, GR, ETC.)* **4556' GL** 19. ELEV. CASINGHEAD

20. TOTAL DEPTH, MD & TVD ***37** 21. PLUG, BACK T.D., MD & TVD ***37** 22. IF MULTIPLE COMPL., HOW MANY* 23. INTERVALS DRILLED BY **X** ROTARY TOOLS **X** CABLE TOOLS

24. PRODUCING INTERVAL(S), OF THIS COMPLETION - TOP, BOTTOM, NAME (MD AND TVD)* ***37** 25. WAS DIRECTIONAL SURVEY MADE **YES**

26. TYPE ELECTRIC AND OTHER LOGS RUN **MUD LOG LOGS 1, 2, 3 & 4 3-5-97** 27. WAS WELL CORED **NO**

28. CASING RECORD (Report all strings set in well)

CASING SIZE/GRADE	WEIGHT, LB./FT.	DEPTH SET (MD)	HOLE SIZE	TOP OF CEMENT, CEMENTING RECORD	AMOUNT PULLED
13 3/8"	54.5#	116'	17 1/2	150 SXS CIRC	
9 5/8	36#	1622'	12 1/4	600 SXS CIRC	
7	23 & 26#	5451'	8 3/4	700 SXS CALC TOC 2000'	

29. LINER RECORD 30. TUBING RECORD

SIZE	TOP (MD)	BOTTOM (MD)	SACKS CEMENT*	SCREEN (MD)	SIZE	DEPTH SET (MD)	PACKER SET (MD)
					2 7/8	5113'	

31. PERFORATION RECORD (Interval, size and number)

32. ACID, SHOT, FRACTURE, CEMENT SQUEEZE, ETC.	
DEPTH INTERVAL (MD)	AMOUNT AND KIND OF MATERIAL USED
5460-6230'	LATERAL #4A1, ACIDIZE WITH 16000 GALS 15% HCL ACID
** #37	CONTINUED ** #37

33.* PRODUCTION

DATE FIRST PRODUCTION PRODUCTION METHOD (Flowing, gas lift, pumping - size and type of pump) **flowing** WELL STATUS (Producing or shut-in)

DATE OF TEST **04-06-97** HOURS TESTED CHOKE SIZE PROD'N. FOR TEST PERIOD OIL - BBL. **271** GAS - MCF. **180** WATER - BBL. **1302** GAS - OIL RATIO **664**

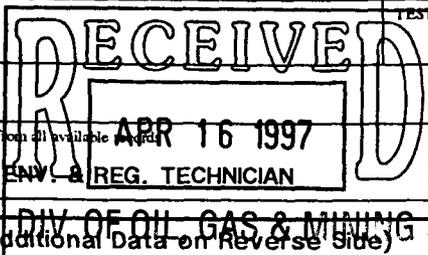
FLOW. TUBING PRESS. **120** CASING PRESSURE CALCULATED 24-HOUR RATE OIL - BBL. GAS - MCF. WATER - BBL. OIL GRAVITY - API (CORR.)

34. DISPOSITION OF GAS (Sold, used for fuel, vented, etc.) TEST WITNESSED BY

35. LIST OF ATTACHMENTS **DIRECTIONAL SURVEY REPORT**

36. I hereby certify that the foregoing and attached information is complete and correct as determined from all available records.

SIGNED Shirley Bouchard TITLE **ENV. & REG. TECHNICIAN** DATE **04-02-97**



*(See Instructions and Spaces for Additional Data on Reverse Side)

37. SUMMARY OF POROUS ZONES: (Show all important zones of porosity and contents thereof; cored intervals; and all drill-stem, tests, including depth interval tested, cushion used, time tool open, flowing and shut-in pressures, and recoveries):

38. GEOLOGIC MARKERS

FORMATION	TOP	BOTTOM	DESCRIPTION, CONTENTS, ETC.	NAME	TOP	
					MEAS. DEPTH	TRUE VERT. DEPTH
*20, 21, 24			LATERAL #1A1 (5431-6679' MD) (5368-5341 TVD) LATERAL #2A1 (5247-6825' MD) (5369-5394 TVD) LATERAL #3A1 (5439-6631' MD) (5354-5336 TVD) LATERAL #4A1 (5447-6379' MD) (5359-5375 TVD)			
** #32	5450'	5870'	LAT. #3A1 ACID W/20000 GALS 15% HCL ACID			
	5480'	6825'	LAT. #2A1 ACID W/24000 GALS 15% HCL ACID			
	5490'	6679'	LAT. #1A1 ACID W/24000 GALS 15% HCL ACID			
*** #4 BHL			680' SOUTH & 1082' EAST FROM SURFACE 1209' NORTH & 973' WEST FROM SURFACE 862' SOUTH & 938' EAST FROM SURFACE 747' NORTH & 865' WEST FROM SURFACE			

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
Budget Bureau No. 1004-0135
Expires: March 31, 1993

SUNDRY NOTICES AND REPORTS ON WELLS

Do not use this form for proposals to drill or to deepen or reentry to a different reservoir.
Use "APPLICATION FOR PERMIT - " for such proposals

SUBMIT IN TRIPLICATE

1. Type of Well

Oil Well Gas Well Other SIDETRACK

2. Name of Operator Mobil Exploration & Producing U.S. Inc.
as Agent for Mobil Producing TX & NM Inc.

3. Address and Telephone No.
P.O. Box 633, Midland, TX 79702 915-688-2585

4. Location of Well (Footage, Sec., T., R., M., or Survey Description)
SEC. 13, T41S, R23E
1705' FNL, 640' FWL

5. Lease Designation and Serial No.

14-20-603-247A

6. If Indian, Allottee or Tribe Name

NAVAJO TRIBAL

7. If Unit or CA, Agreement Designation

RATHERFORD UNIT

8. Well Name and No.

13-12

9. API Well No.

43-037-31127

10. Field and Pool, or exploratory Area

GREATER ANETH

11. County or Parish, State

SAN JUAN UT

12. CHECK APPROPRIATE BOX(S) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION
<input type="checkbox"/> Notice of Intent	<input type="checkbox"/> Abandonment
<input checked="" type="checkbox"/> Subsequent Report	<input type="checkbox"/> Recompletion
<input type="checkbox"/> Final Abandonment Notice	<input type="checkbox"/> Plugging Back
	<input type="checkbox"/> Casing Repair
	<input type="checkbox"/> Altering Casing
	<input checked="" type="checkbox"/> Other SIDETRACK
	<input type="checkbox"/> Change of Plans
	<input type="checkbox"/> New Construction
	<input type="checkbox"/> Non-Routine Fracturing
	<input type="checkbox"/> Water Shut-Off
	<input type="checkbox"/> Conversion to Injection
	<input type="checkbox"/> Dispose Water

(Note: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)

13. Describe Proposed or Completed Operations (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

BOTTOMHOLE LOCATION

LATERAL 1: 680' SOUTH & 1082' EAST FROM SURFACE.
LATERAL 2: 1209' NORTH & 973' WEST FROM SURFACE.
LATERAL 3: 862' SOUTH & 938' EAST FROM SURFACE.
LATERAL 4: 747' NORTH & 865' WEST FROM SURFACE.

SEE ATTACHED

14. I hereby certify that the foregoing is true and correct

Signed Shirley Bouchard

Title ENV. & REG. TECHNICIAN

Date 04-02-97

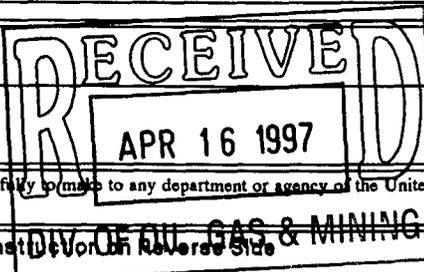
(This space for Federal or State office use)

Approved by _____

Title _____

Date _____

Conditions of approval, if any:



Title 18 U.S.C. Section 1001, makes it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

* See Instructions on Reverse Side

WO tax credit 7/98

ATTACHMENT - FORM 3160-5
RATHERFORD UNIT - WELL #13-12
14-20-603-246A
NAVAJO TRIBAL
SAN JUAN, UTAH

01-24-97 MIRU PU, POOH & LD RODS & TBG. RIH W/RBP, SET @ APPROX. 3200'. SWIFN.

01-25-97 BLEED OFF WELL, ND BOP, NU NEW 10" X 7 1/16" 3000# TBG. HD. TESTED OK TO 1000 PSI. RDMO PULLING UNIT, LOCATION READY FOR DRILLING RIG.

01-27-97 NOTIFY JIM THOMPSON W/STATE OF UTAH, MOVE IN RIG UP NEW RIG #25. FINISH RIGGING UP NWI #25.

01-29-97 RIH W/GAGE RING, SET WHIPSTOCK PKR. RIH W/LATCH, RUN GYRO, POH W/LATCH, FINAL REPORT FOR RE-ENTRY.

DRILLING

01-29-97 RIH W/WHIPSTOCK, TOP @ 5255'. SET @ 122DEG. AZ. CUT WINDOW W/STARTING MILL FROM 5253-5255'.

01-30-97 POH W/STARTING MILL, RIH W/WINDOW & WATERMELLON MILLS, AOHDP TO 5253', CUT WHIPSTOCK WINDOW F/5253-5255', CUT FORMATION F/5261'5263', P/POLYMER SWEEP & CIRC. HOLE CLEAN**LATERAL #1**.

01-31-97 LATERAL #1A1, RIH W/CURVE DRILLING ASSEMBLY, RIH W/GYRO, TIME DRILL CURVE F/5262-5283, POH W/GYRO, RIH W/STEERING TOOL, DRILL CURVE F/5283-5401'.

02-01-97 FINISH DRILLING CURVE 1A1 FROM 5401-5431 TMD, 5368' TVD, AZ-89.5, VS-44'. , POH W/STEERING TOOL, & CURVE ASSEMBLY. RIH W/LATERAL DRILLING ASSEMBLY DRILL LATERAL F/5331-5650'.

02-02-97 SLIDE & ROTATE F/5650-6224'.

02-03-97 SLIDE & ROTATE F/6224-6584'.

02-04-97 SLIDE & ROTATE F/6584-6679', POH W/BIT, LD SPERRY SUN TOOLS, RIH W/WEATHERFORD WHIPSTOCK RET. TOOL. **FINAL REPORT LATERAL 1A1**.

02-05-97 LATERAL #2, FINISH RIH W/WHIPSTOCK RET. TOOL, CAUGHT & SHEARED/POH W/WHIPSTOCK. RIH W/LATCH, SET WHIPSTOCK @ 5238', @ 322 DEG. AZ, SHEARED OFF WHIPSTOCK. MILLED WINDOW W/STARTING MILL F/5238-5240', POH W/MILL, RIH W/WINDOW & WATERMELLON MILL/MILLED & CUT WINDOW FROM 5326-5244'.

02-06-97 MILL & CUT WINDOW F/5244-5246', DRILL FORMATION F/5246-5248', CIRC HOLE CLEAN, POH & LD MILLS. **LATERAL #2**.

02-06-97 LATERAL #2A1 RIH W/GYRO & ORIENT TOOL, TIME DRILL CURVE F/5248-5252', CONTROL DRILLED W/GYRO CURVE #2A1 F/5252-5282', GYRO SHOWED WHIPSTOCK @ 5246', 3.3. DEG. AZ 306.6 , 5244.96 TVD.

02-07-97 RU WET CONNECT F/STEERING TOOL, DRILL CURVE 2A1 F/5282-5447', LANDED CURVE @ 5447' MD, 5369.42 TVD. CIRC HOLE CLEAN, POH W/CURVE DRILLING ASSEMBLY. RIH W/LATERAL DRILLING ASSEMBLY.

02-08-97 DRILLING LATERAL 2A1 SLIDE & ROTATE DRILL F/5447-6083'.

02-09-97 SLIDE & ROTATE DRILL LATERAL 2A1 F/6083-6530'.

02-10-97 SLIDE & ROTATE DRILL LATERAL 2A1 F/6530-6825' TD, LATERAL 2A1, 91.5 ANGLE, 323 AZ, 5394 TVD, 1552 VS. **FINAL LATERAL #2A1**.

02-11-97 LATERAL #3, RIH W/WHIPSTOCK ASSEMBLY & ORIENT TOOL, MILL WINDOW IN 7" CASING F/5212-5214', POH W/START MILL, PU WINDOW MILL & WATERMELON MILL.

ATTACHMENT - FORM 3160-5
RATHERFORD UNIT - WELL #13-12
14-20-603-246A
NAVAJO TRIBAL
SAN JUAN, UTAH
PAGE 2

02-12-97 FINISH TIH W/MILL & WATERMELLON MILL ASSEMBLY, PU SWIVEL BRK CIRC & MILL WINDOW 5220-5223', PUMP & CIRC TWO SWEEPS & CIRC OUT. POH & LD MILL TOOLS.

02-12-97 TAG @ 5223', RIH W/K-JET, RUN GYRO & BEGIN TIME DRILL CURVE OF LATERAL #3 TO 5226'.

02-13-97 TIME DRILL 4 3/4" HOLE FOR CURVE SECTION OF LATERAL #3 TO 5233'. ORIENT DRILL CURVE SECTION F/5322-5254', POH W/GYRO, RU & RIH W/STEERING TOOL, CONT. ORIENTED DRILLING CURVE OF LATERAL #3 TO 5439', PUMP & CIRC SWEEP, POOH FOR LATERAL ASSEMBLY. **LATERAL #3**.

02-14-97 LATERAL #3A1 SLIDE & ROTATE DRILLING TO 5807'.

02-15-97 CONTINUE TO SLIDE & ROTATE DRILLING TO 6090'.

02-16-97 CONTINUE TO SLIDE & ROTATE DRILLING TO 6501'.

02-17-97 CONTINUE DRILLING TO 6631' TD, **LATERAL #3A1**, CIRC TWO SWEEPS TO SURFACE, POOH W/LATERAL DRILLING ASSM. LD SAME & PREPARE TO PICK UP HOOK TO TIH & RETRIEVE WHIPSTOCK ASSM.

02-18-97 RETRIEVE WHIPSTOCK ASSM, POOH W/SAME.

02-18-97 LATERAL #4, PU WHIPSTOCK ASSM & ORIENT TO 312 DEG., PU 6 1/8" STARTING MILL & TIH W/SAME, MILL STARTING WINDOW FOR LATERAL #4 F/5187-5189'.

02-19-97 BREAK CIRC, MILL F/5187-5197', BOTTOM OF WINDOW, CIRC. SWEEPS TO SURFACE, POOH & LD MILLING ASSM.

02-19-97 MIRU K JET & POWER UP GYRO, TIME DRILL F/5197-5201, CONTROL DRILL W/GYRO IN HOLE TO 5217'.

02-20-97 POOH W/GYRO, RIH W/STEER TOOL ASSM, DRILL CURVE SECTION OF LATERAL #4, TO 5447' MD 5359 TVD., CIRC SWEEP TO SURFACE, POOH W/STEERING TOOL ASSM, CONTINUE TRIP FOR LATERAL DRILLING ASSM.

02-21-97 FINISH TIH W/LATERAL DRILLING ASSM. DRILL AHEAD ON LATERAL #4 TO 5298',

02-22-97 DRILL AHEAD ON LATERAL #4 F/5928'-6255'.

02-23-97 DRILL AHEAD TO 6288'.

02-24-97 FIHISH DRILLING AHEAD TO 6379' TD, **LATERAL #4**, TIH W/7" RBP, SET @ 4250'.

02-25-97 FINISH MOVING RIG.

COMPLETION

02-26-97 MIRU NWI RIG #36., INSTALL NEW AIR COMPRESSOR UNIT, TEST HYDRIL TO 1000# FOR 15 MIN. TEST BOPS TO 250# LOW 800# HIGH FOR 15 MIN. ALL OK. SWIFN.

02-27-97 LATCH ONTO RBP @ 4320'. FLOW BACK TO PIT, RU PUMP & E/4" CHOKE. KILL TBG., CIRC UNTIL GAS CIRC. OUT. TOOH W/RBP. RIH W/PH6 PKR & 2 7/8" WS. RIH W/PKR, LOAD CSG W/BRINE, SET & TEST PKR TO 500 PSI. MIRU DOWELL CT UNIT.

02-28-97 RIH W/1.5"CT TO 6230' MD. ACIDIZE LATERAL #4A1 W/16000 GALS 15% HCL ACID. INTERVAL 6230-5460'. RDMO DOWELL.

ATTACHMENT - FORM 3160-5
RATHERFORD UNIT - WELL #13-12
14-20-603-246A
NAVAJO TRIBAL
SAN JUAN, UTAH
PAGE 3

03-01-97 UNSET PKR, POOH W/PKR & WS. PU WHIPSTOCK RETRIEVING TOOL, RIH & LATCH ONTO WHIPSTOCK. POOH, LD 24.5" EXTENSIONS, REORIENT WHIPSTOCK FOR LATERAL 3A1, SET WHIPSTOCK. SWISDFN.

03-02-97 POOH W/WHIPSTOCK RET. TOOL, LD SAME. RIH W/12 JTS PH6 THRU CURVE TO 5438', SET 7" MTN STATES PKR @ 5061', TEST TO 500 PSI FOR 30 MIN. OK. MIRU DOWELL, SPOT TRUCKS, RU CT UNIT. SDFN.

03-03-97 FINISH MIRU DOWELL, ACIDIZE LATERAL #3A1 W/20,000 GALS 15% HCL ACID, TWO INTERVALS 6620-5960' & 5870-5450'. RDMO DOWELL

03-04-97 SHUT IN TBG. PRESSURE AT 7:30 WAS 110 PSI. OPEN TO TEST TANK. WELL DEAD. RELEASE PKR POH. PICK-UP WHIPSTOCK TOOLS. RIH LATCH ONTO WHIPSTOCK. RELEASE, POH. REORIENT WHIPSTOCK. RIH TO 5238'. SET.

03-05-97 SHUT IN TBG. PRESS. AT 7:30 WAS 0 PSI. PUMP 10 BBLs OF 10# BRINE DOWN TBG. POH W/WHIPSTOCK TOOLS. RIH W/TAIL PIPE & PKR., COULD NOT WORK THRU LATERAL. POH. RIH & RESET WHIPSTOCK. POH. RIH W/PKR & TBG. RIG FOR ACID.

03-06-97 SPOT ACID TRANSPORTS, TEST LINES TO 2500 PSI. OK. RIH W/COILED TBG. TO 6825'. ACIDIZE LATERAL #2A1 F/6825'-5480' W/24000 GALS 15% HCL. ACID. POH W/COILED TBG.

03-07-97 SHUT IN TBG PRESSURE @ 7:30 WAS 100 PSI. OPEN TO TEST TANK BLEED DOWN TO 0. RELEASE PKR. POH. RIH W/WHIPSTOCK RETV. TOOLS. RIH TO 5238'. RELEASE WHIPSTOCK. POH. REORIENT WHIPSTOCK. RIH TO 5253', SET POH TO 5059'. SWIFN.

03-08-97 SHUT IN TBG & CSG PRESSURE AT 07:30 WAS 0 PSI. POH W/WHIPSTOCK SETTING TOOLS. RIH W/TAIL PIPE, PACKER, AND 2 7/8" TBG TO 5466'. SET PKR AT 5061'. TEST PACKER & BOPS TO 300 LOW, 750 HIGH. OK. RIG UP COILED TBG. UT. SWIFN.

03-09-97 RIG UP DOWELL ACID UNIT. TEST LINES TO 2500 PSI. OK. RIH W/1.5 COILED TBG. TO 6679' ACIDIZE D/6679-5490' W/24000 GALS 15% HCL ACID. POH W/COILED TBG. RIG DOWN DOWELL. OPEN TO TEST TANK & FLOW WELL. SWIFN. LATERAL 1A1 F/5253-6679'.

03-10-97 SHUT IN TBG. PRESSURE @ 7:30 WAS 0 PSI. PUMP 30 BBLs 10# BRINE DOWN TBG. RELEASE PACKER. POH. LAY DOWN PH6 TAIL PIPE. RIH W/WHIPSTOCK RETV. TOOLS. RECV. WHIPSTOCK. POH RIH W/TENSION PACKER. WOULD NOT GO. POH. RIH TO 5061'.

03-11-97 SHUT IN TBG. PRESSURE @ 7:30 WAS 0 PSI. SWAB WELL 1 RUN. WELL FLOWING. FLOW 2 HRS. PRESSURE TO 0 PSI. RIG UP & SWAB WELL FOR 8 HRS. FLUIDL LEVEL CONSTANT AT 200'. RECV. 343 BBLs TOTAL. 50 BBLs OIL. SWIFN.

03-12-97 SHUT IN TBG. PRESSURE @ 7:30 WAS 200 PSI. OPEN TO TEST TANK. PRESSURE TO 0 IN 1 HR. SWAB WELL 4 HRS. RECV. 150 BBLs TOTAL. RELEASE PKR. POH & LAY DOWN WORKSTRING & PKR. LOAD OUT WORKSTRING. SIFN.

RATHERFORD UNIT - WELL #13-12

14-20-603-246A

NAVAJO TRIBAL

SAN JUAN, UTAH

PAGE 4

- 03-13-97 SHUT IN CSG. PRESSURE @ 7:30 WAS 0 PSI. PICK UP & RIH W/ESP
DOWN HOLE MOTOR. PICK UP & RIH W/2 7/8" PRODUCTION TBG. TO
5113.25'. NIPPLE DOWN BOPE. NIPPLE UP PRODUCTION WELL HEAD.
SHUT IN FOR NIGHT
- 03-14-97 W/ON PRODUCTION TO RIG UP FLOW LINES. OPEN PRODUCITON LINES
AND FLOW LINES. RIG DOWN NAVAJO WEST RIG #36. MOVE OFF
LOCATION.

Sperry-Sun Drilling Services

Survey Report for Ratherford Unit 13-12 - Leg #1



Mobil
Mobil

Ratherford Short Radius
Mobil

Measured Depth (ft)	Incl.	Azim.	Vertical Depth (ft)	Northings (ft)	Eastings (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
0.00	0.000	355.830	0.00	0.00 N	0.00 E	0.00	
200.00	0.660	307.190	200.00	0.70 N	0.92 W	-1.15	0.330
400.00	0.800	302.680	399.98	2.15 N	3.01 W	-3.69	0.076
600.00	1.330	311.590	599.94	4.44 N	5.92 W	-7.38	0.277
800.00	1.550	302.430	799.88	7.43 N	9.94 W	-12.37	0.159
1000.00	1.980	301.180	999.79	10.67 N	15.18 W	-18.53	0.216
1200.00	2.220	301.130	1199.65	14.46 N	21.45 W	-25.86	0.120
1400.00	2.200	303.470	1399.50	18.58 N	27.97 W	-33.57	0.046
1600.00	1.910	323.350	1599.38	23.37 N	33.16 W	-40.51	0.382
1800.00	1.250	332.380	1799.30	27.98 N	36.16 W	-45.50	0.352
2000.00	0.370	303.970	1999.28	30.27 N	37.71 W	-48.02	0.471
2200.00	1.030	167.580	2199.27	28.88 N	37.86 W	-47.41	0.661
2400.00	1.460	148.610	2399.22	24.95 N	36.14 W	-43.87	0.295
2600.00	0.920	121.300	2599.18	21.94 N	33.45 W	-39.99	0.384
2800.00	0.380	139.910	2799.17	20.60 N	31.65 W	-37.75	0.286
3000.00	0.160	137.030	2999.16	19.89 N	31.03 W	-36.85	0.110
3200.00	0.470	188.630	3199.16	18.87 N	30.96 W	-36.26	0.196
3400.00	0.660	223.200	3399.15	17.22 N	31.87 W	-36.16	0.191
3600.00	0.820	206.670	3599.14	15.10 N	33.30 W	-36.25	0.133
3800.00	1.160	245.850	3799.11	13.00 N	35.79 W	-37.24	0.369
4000.00	0.890	260.900	3999.08	11.92 N	39.17 W	-39.54	0.190
4200.00	1.100	297.390	4199.05	12.56 N	42.41 W	-42.62	0.327
4400.00	0.580	299.510	4399.02	13.94 N	45.00 W	-45.55	0.260
4600.00	0.130	235.980	4599.02	14.31 N	46.07 W	-46.65	0.267
4800.00	1.180	273.960	4799.01	14.33 N	48.31 W	-48.56	0.540
5000.00	0.520	309.790	4998.98	15.05 N	51.06 W	-51.28	0.409
5200.00	0.640	334.770	5198.97	16.64 N	52.24 W	-53.12	0.138
5253.00	0.690	357.290	5251.97	17.23 N	52.38 W	-53.55	0.499
5261.00	3.100	61.100	5259.97	17.38 N	52.19 W	-53.47	35.789
5271.00	6.600	91.550	5269.93	17.50 N	51.38 W	-52.84	42.288
5281.00	10.600	92.100	5279.81	17.45 N	49.88 W	-51.55	40.008
5291.00	15.700	92.600	5289.55	17.35 N	47.61 W	-49.57	51.012
5301.00	20.900	93.100	5299.04	17.19 N	44.48 W	-46.83	52.023
5311.00	26.500	93.600	5308.19	16.96 N	40.47 W	-43.30	56.036
5321.00	32.000	94.100	5316.92	16.63 N	35.59 W	-39.00	55.054
5331.00	37.100	94.600	5325.15	16.20 N	29.94 W	-33.97	51.078
5341.00	41.800	95.200	5332.87	15.65 N	23.61 W	-28.32	47.154
5351.00	46.200	95.700	5340.06	14.99 N	16.70 W	-22.10	44.137
5361.00	51.900	96.200	5346.61	14.21 N	9.19 W	-15.32	57.125
5371.00	57.500	96.700	5352.39	13.29 N	1.08 W	-7.96	56.148
5381.00	63.700	97.200	5357.29	12.23 N	7.56 E	-0.07	62.153
5391.00	69.100	97.700	5361.30	11.05 N	16.64 E	8.26	54.194
5401.00	74.500	98.300	5364.42	9.72 N	26.05 E	16.94	54.300
5411.00	79.800	98.800	5366.64	8.27 N	35.69 E	25.88	53.224
5421.00	86.900	99.300	5367.80	6.71 N	45.49 E	35.02	71.173

Continued...

Sperry-Sun Drilling Services

Survey Report for Ratherford Unit 13-12 - Leg #1



Mobil
Mobil

Ratherford Short Radius
Mobil

Measured Depth (ft)	Incl.	Azim.	Vertical Depth (ft)	Northings (ft)	Eastings (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
5431.00	89.500	100.100	5368.11	5.03 N	55.34 E	44.27	27.202
5459.25	90.100	102.300	5368.21	0.46 S	83.05 E	70.67	8.072
5491.06	91.000	105.100	5367.91	7.99 S	113.95 E	100.87	9.245
5522.90	91.300	108.100	5367.27	17.08 S	144.45 E	131.56	9.467
5554.60	91.600	111.100	5366.46	27.71 S	174.30 E	162.50	9.508
5586.46	91.800	112.700	5365.52	39.59 S	203.85 E	193.85	5.059
5618.20	91.200	116.200	5364.69	52.72 S	232.73 E	225.30	11.184
5649.88	90.800	119.000	5364.14	67.40 S	260.80 E	256.88	8.927
5681.64	91.100	119.000	5363.61	82.79 S	288.57 E	288.59	0.945
5713.52	91.200	118.500	5362.97	98.12 S	316.52 E	320.42	1.599
5745.24	91.300	118.300	5362.28	113.21 S	344.41 E	352.07	0.705
5776.28	91.200	117.900	5361.60	127.82 S	371.79 E	383.03	1.328
5808.04	90.000	120.200	5361.27	143.24 S	399.55 E	414.74	8.168
5839.86	89.200	122.800	5361.49	159.87 S	426.67 E	446.56	8.549
5871.74	89.700	125.500	5361.80	177.76 S	453.05 E	478.41	8.613
5903.60	91.400	128.300	5361.49	196.88 S	478.53 E	510.15	10.281
5935.35	91.600	129.200	5360.66	216.75 S	503.28 E	541.67	2.903
5966.40	90.300	128.800	5360.14	236.29 S	527.41 E	572.48	4.380
5998.18	90.200	128.100	5360.01	256.05 S	552.29 E	604.06	2.225
6029.93	91.500	130.100	5359.53	276.07 S	576.93 E	635.56	7.512
6061.78	92.800	132.500	5358.34	297.07 S	600.84 E	666.96	8.565
6093.58	93.500	132.500	5356.59	318.52 S	624.25 E	698.18	2.201
6125.39	93.200	131.300	5354.73	339.73 S	647.88 E	729.47	3.882
6157.06	93.300	132.200	5352.94	360.79 S	671.47 E	760.63	2.855
6188.88	92.200	131.600	5351.41	382.01 S	695.13 E	791.94	3.937
6220.65	89.900	132.500	5350.83	403.29 S	718.71 E	823.21	7.774
6252.45	89.000	130.900	5351.13	424.44 S	742.46 E	854.56	5.773
6283.41	89.600	131.300	5351.51	444.79 S	765.78 E	885.12	2.329
6315.26	89.800	131.300	5351.68	465.81 S	789.71 E	916.55	0.628
6347.00	89.500	131.500	5351.87	486.80 S	813.52 E	947.87	1.136
6378.85	89.500	130.800	5352.15	507.76 S	837.50 E	979.31	2.198
6409.47	90.600	130.200	5352.12	527.64 S	860.78 E	1009.59	4.092
6441.30	92.900	128.300	5351.15	547.77 S	885.42 E	1041.15	9.371
6473.01	91.500	126.500	5349.93	567.01 S	910.59 E	1072.69	7.188
6504.76	90.500	123.200	5349.38	585.15 S	936.64 E	1104.40	10.859
6536.57	90.400	123.200	5349.13	602.57 S	963.25 E	1136.20	0.314
6564.10	91.000	123.500	5348.79	617.70 S	986.25 E	1163.72	2.437
6595.04	91.900	122.700	5348.01	634.59 S	1012.16 E	1194.64	3.891
6626.91	95.100	122.700	5346.07	651.78 S	1038.92 E	1226.45	10.041
6645.00	97.000	123.700	5344.16	661.63 S	1053.98 E	1244.43	11.855
6679.00	95.000	123.700	5340.61	680.39 S	1082.11 E	1278.23	5.882

Continued...

Sperry-Sun Drilling Services

Survey Report for Ratherford Unit 13-12 - Leg #1



**Mobil
Mobil**

**Ratherford Short Radius
Mobil**

All data is in feet unless otherwise stated.
Coordinates are relative to Well. Vertical depths are relative to Well.

The Dogleg Severity is in Degrees per 100ft.
Vertical Section was calculated along an Azimuth of 122.000° (True).

Based Upon Minimum Curvature type calculations, at a Measured Depth of 6679.00ft.,
The Bottom Hole Displacement is 1278.23ft., in the Direction of 122.160° (True).

Sperry-Sun Drilling Services

Survey Report for Ratherford Unit 13-12 - Leg #2



Mobil
Mobil

Ratherford Short Radius
Mobil

Measured Depth (ft)	Incl.	Azim.	Vertical Depth (ft)	Northings (ft)	Eastings (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
0.00	0.000	355.830	0.00	0.00 N	0.00 E	0.00	
200.00	0.660	307.190	200.00	0.70 N	0.92 W	1.11	0.330
400.00	0.800	302.680	399.98	2.15 N	3.01 W	3.54	0.076
600.00	1.330	311.590	599.94	4.44 N	5.92 W	7.15	0.277
800.00	1.550	302.430	799.88	7.43 N	9.94 W	11.98	0.159
1000.00	1.980	301.180	999.79	10.67 N	15.18 W	17.76	0.216
1200.00	2.220	301.130	1199.65	14.46 N	21.45 W	24.60	0.120
1400.00	2.200	303.470	1399.50	18.58 N	27.97 W	31.86	0.046
1600.00	1.910	323.350	1599.38	23.37 N	33.16 W	38.84	0.382
1800.00	1.250	332.380	1799.30	27.98 N	36.16 W	44.31	0.352
2000.00	0.370	303.970	1999.28	30.27 N	37.71 W	47.07	0.471
2200.00	1.030	167.580	2199.27	28.88 N	37.86 W	46.07	0.661
2400.00	1.460	148.610	2399.22	24.95 N	36.14 W	41.91	0.295
2600.00	0.920	121.300	2599.18	21.94 N	33.45 W	37.88	0.384
2800.00	0.380	139.910	2799.17	20.60 N	31.65 W	35.72	0.286
3000.00	0.160	137.030	2999.16	19.89 N	31.03 W	34.77	0.110
3200.00	0.470	188.630	3199.16	18.87 N	30.96 W	33.93	0.196
3400.00	0.660	223.200	3399.15	17.22 N	31.87 W	33.19	0.191
3600.00	0.820	206.670	3599.14	15.10 N	33.30 W	32.40	0.133
3800.00	1.160	245.850	3799.11	13.00 N	35.79 W	32.28	0.369
4000.00	0.890	260.900	3999.08	11.92 N	39.17 W	33.51	0.190
4200.00	1.100	297.390	4199.05	12.56 N	42.41 W	36.01	0.327
4400.00	0.580	299.510	4399.02	13.94 N	45.00 W	38.69	0.260
4600.00	0.130	235.980	4599.02	14.31 N	46.07 W	39.64	0.267
4800.00	1.180	273.960	4799.01	14.33 N	48.31 W	41.03	0.540
5000.00	0.520	309.790	4998.98	15.05 N	51.06 W	43.30	0.409
5200.00	0.640	334.770	5198.97	16.64 N	52.24 W	45.27	0.138
5238.00	0.660	351.310	5236.97	17.05 N	52.36 W	45.67	0.495
5246.00	3.300	305.400	5244.97	17.23 N	52.55 W	45.93	36.000
5258.00	7.100	306.500	5256.91	17.87 N	53.43 W	46.98	31.676
5268.00	11.400	307.600	5266.78	18.84 N	54.71 W	48.53	43.034
5278.00	16.100	308.700	5276.49	20.31 N	56.58 W	50.84	47.071
5288.00	21.000	309.800	5285.97	22.33 N	59.04 W	53.94	49.123
5298.00	26.300	310.900	5295.13	24.93 N	62.09 W	57.87	53.181
5308.00	31.700	312.000	5303.87	28.14 N	65.72 W	62.64	54.261
5318.00	36.900	313.100	5312.13	31.95 N	69.87 W	68.19	52.366
5328.00	42.000	314.200	5319.85	36.34 N	74.46 W	74.48	51.475
5338.00	44.700	315.300	5327.12	41.17 N	79.34 W	81.29	28.035
5348.00	46.500	316.400	5334.12	46.30 N	84.31 W	88.39	19.640
5358.00	50.900	317.500	5340.71	51.79 N	89.44 W	95.87	44.768
5368.00	55.400	318.600	5346.71	57.74 N	94.78 W	103.85	45.852
5378.00	60.200	319.700	5352.04	64.14 N	100.31 W	112.30	48.893
5388.00	64.600	320.800	5356.67	70.95 N	105.98 W	121.16	45.066
5398.00	68.900	321.900	5360.62	78.13 N	111.71 W	130.34	44.171
5408.00	72.900	323.000	5363.89	85.62 N	117.47 W	139.79	41.328

Continued...

Sperry-Sun Drilling Services

Survey Report for Ratherford Unit 13-12 - Leg #2



Mobil
Mobil

Ratherford Short Radius
Mobil

Measured Depth (ft)	Incl.	Azim.	Vertical Depth (ft)	Northings (ft)	Eastings (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
5418.00	77.700	324.100	5366.42	93.39 N	123.21 W	149.45	49.164
5428.00	83.000	325.200	5368.10	101.43 N	128.92 W	159.30	54.097
5438.00	86.700	326.600	5369.00	109.68 N	134.50 W	169.23	39.539
5447.00	86.500	328.300	5369.53	117.25 N	139.33 W	178.18	18.986
5477.27	85.200	326.000	5371.72	142.61 N	155.71 W	208.24	8.711
5509.02	87.600	325.000	5373.72	168.72 N	173.65 W	239.87	8.186
5540.76	91.100	325.300	5374.08	194.77 N	191.79 W	271.55	11.068
5572.62	90.400	324.100	5373.66	220.77 N	210.20 W	303.37	4.360
5604.33	90.700	324.800	5373.35	246.56 N	228.63 W	335.05	2.402
5636.09	91.300	325.000	5372.80	272.54 N	246.89 W	366.77	1.991
5667.72	92.500	325.900	5371.75	298.58 N	264.82 W	398.32	4.741
5699.56	90.600	323.800	5370.89	324.60 N	283.14 W	430.11	8.892
5731.30	88.400	321.100	5371.17	349.76 N	302.48 W	461.84	10.972
5763.12	88.200	318.700	5372.11	374.09 N	322.97 W	493.62	7.565
5794.93	88.500	319.700	5373.03	398.16 N	343.74 W	525.38	3.281
5826.77	86.800	318.500	5374.33	422.20 N	364.57 W	557.15	6.534
5858.43	84.600	316.700	5376.71	445.52 N	385.86 W	588.63	8.968
5890.28	85.400	316.000	5379.48	468.47 N	407.76 W	620.20	3.332
5922.00	87.000	315.900	5381.58	491.22 N	429.76 W	651.67	5.054
5953.66	86.800	315.700	5383.30	513.88 N	451.80 W	683.10	0.893
5985.40	86.800	318.800	5385.07	537.15 N	473.31 W	714.68	9.752
6017.28	92.000	320.200	5385.40	561.38 N	494.01 W	746.52	16.892
6049.03	93.100	321.800	5383.99	586.03 N	513.97 W	778.23	6.111
6080.08	91.900	323.200	5382.64	610.64 N	532.85 W	809.25	5.935
6111.88	91.200	324.600	5381.77	636.33 N	551.58 W	841.02	4.921
6143.54	91.800	325.500	5380.95	662.27 N	569.71 W	872.62	3.416
6175.34	90.400	328.200	5380.34	688.88 N	587.09 W	904.30	9.563
6207.09	89.300	329.900	5380.42	716.11 N	603.42 W	935.81	6.377
6238.93	89.700	329.800	5380.70	743.64 N	619.41 W	967.35	1.295
6270.68	88.800	327.600	5381.11	770.77 N	635.90 W	998.87	7.486
6302.56	86.300	326.400	5382.47	797.48 N	653.25 W	1030.60	8.697
6334.42	84.400	325.500	5385.06	823.79 N	671.03 W	1062.28	6.595
6366.17	84.600	325.500	5388.10	849.83 N	688.93 W	1093.82	0.630
6397.22	87.200	325.000	5390.32	875.28 N	706.58 W	1124.74	8.526
6428.97	88.700	322.900	5391.46	900.93 N	725.25 W	1156.45	8.125
6460.82	89.700	320.100	5391.90	925.85 N	745.08 W	1188.29	9.334
6492.60	89.800	320.800	5392.04	950.35 N	765.31 W	1220.06	2.225
6524.42	91.200	321.300	5391.76	975.10 N	785.31 W	1251.87	4.672
6555.36	91.100	321.100	5391.14	999.20 N	804.70 W	1282.80	0.723
6587.14	90.900	321.100	5390.59	1023.93 N	824.65 W	1314.58	0.629
6619.01	88.600	321.000	5390.73	1048.72 N	844.68 W	1346.44	7.224
6649.64	86.800	320.600	5391.95	1072.43 N	864.03 W	1377.04	6.020
6681.38	86.100	319.700	5393.92	1096.75 N	884.32 W	1408.70	3.588
6713.21	88.900	320.800	5395.31	1121.20 N	904.66 W	1440.48	9.450
6744.91	90.100	321.800	5395.59	1145.94 N	924.47 W	1472.18	4.927

Continued...

Sperry-Sun Drilling Services

Survey Report for Ratherford Unit 13-12 - Leg #2



**Mobil
Mobil**

**Ratherford Short Radius
Mobil**

Measured Depth (ft)	Incl.	Azim.	Vertical Depth (ft)	Northings (ft)	Eastings (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
6776.71	90.900	322.000	5395.31	1170.96 N	944.10 W	1503.97	2.593
6791.00	91.000	322.900	5395.07	1182.29 N	952.80 W	1518.26	6.336
6825.00	91.500	323.000	5394.33	1209.42 N	973.28 W	1552.25	1.500

All data is in feet unless otherwise stated.

Coordinates are relative to Well. Vertical depths are relative to Well.

The Dogleg Severity is in Degrees per 100ft.

Vertical Section was calculated along an Azimuth of 322.000° (True).

Based Upon Minimum Curvature type calculations, at a Measured Depth of 6825.00ft.,
The Bottom Hole Displacement is 1552.41ft., in the Direction of 321.175° (True).

Sperry-Sun Drilling Services

Survey Report for Ratherford Unit 13-12 - Leg #3



Mobil
Mobil

Ratherford Short Radius
Mobil

Measured Depth (ft)	Incl.	Azim.	Vertical Depth (ft)	Northings (ft)	Eastings (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
0.00	0.000	355.830	0.00	0.00 N	0.00 E	0.00	
200.00	0.660	307.190	200.00	0.70 N	0.92 W	-1.15	0.330
400.00	0.800	302.680	399.98	2.15 N	3.01 W	-3.67	0.076
600.00	1.330	311.590	599.94	4.44 N	5.92 W	-7.37	0.277
800.00	1.550	302.430	799.88	7.43 N	9.94 W	-12.36	0.159
1000.00	1.980	301.180	999.79	10.67 N	15.18 W	-18.42	0.216
1200.00	2.220	301.130	1199.65	14.46 N	21.45 W	-25.62	0.120
1400.00	2.200	303.470	1399.50	18.58 N	27.97 W	-33.22	0.046
1600.00	1.910	323.350	1599.38	23.37 N	33.16 W	-40.28	0.382
1800.00	1.250	332.380	1799.30	27.98 N	36.16 W	-45.60	0.352
2000.00	0.370	303.970	1999.28	30.27 N	37.71 W	-48.28	0.471
2200.00	1.030	167.580	2199.27	28.88 N	37.86 W	-47.46	0.661
2400.00	1.460	148.610	2399.22	24.95 N	36.14 W	-43.56	0.295
2600.00	0.920	121.300	2599.18	21.94 N	33.45 W	-39.54	0.384
2800.00	0.380	139.910	2799.17	20.60 N	31.65 W	-37.30	0.286
3000.00	0.160	137.030	2999.16	19.89 N	31.03 W	-36.37	0.110
3200.00	0.470	188.630	3199.16	18.87 N	30.96 W	-35.64	0.196
3400.00	0.660	223.200	3399.15	17.22 N	31.87 W	-35.21	0.191
3600.00	0.820	206.670	3599.14	15.10 N	33.30 W	-34.86	0.133
3800.00	1.160	245.850	3799.11	13.00 N	35.79 W	-35.30	0.369
4000.00	0.890	260.900	3999.08	11.92 N	39.17 W	-37.09	0.190
4200.00	1.100	297.390	4199.05	12.56 N	42.41 W	-39.92	0.327
4400.00	0.580	299.510	4399.02	13.94 N	45.00 W	-42.77	0.260
4600.00	0.130	235.980	4599.02	14.31 N	46.07 W	-43.81	0.267
4800.00	1.180	273.960	4799.01	14.33 N	48.31 W	-45.49	0.540
5000.00	0.520	309.790	4998.98	15.05 N	51.06 W	-48.02	0.409
5200.00	0.640	334.770	5198.97	16.64 N	52.24 W	-49.95	0.138
5212.69	0.640	340.410	5211.66	16.77 N	52.29 W	-50.08	0.496
5220.00	2.400	75.200	5218.97	16.85 N	52.16 W	-50.03	34.677
5230.00	4.700	78.530	5228.95	16.99 N	51.55 W	-49.68	23.083
5240.00	8.400	81.860	5238.88	17.17 N	50.43 W	-48.96	37.179
5250.00	12.900	85.190	5248.71	17.37 N	48.59 W	-47.73	45.400
5260.00	17.600	88.520	5258.35	17.50 N	45.96 W	-45.87	47.790
5270.00	22.400	91.850	5267.75	17.48 N	42.55 W	-43.31	49.314
5280.00	27.000	95.180	5276.83	17.21 N	38.38 W	-40.04	48.042
5290.00	31.300	98.510	5285.56	16.62 N	33.55 W	-36.05	45.943
5300.00	35.000	101.840	5293.94	15.65 N	28.17 W	-31.40	41.226
5310.00	38.700	105.170	5301.94	14.24 N	22.34 W	-26.13	42.034
5320.00	43.300	108.500	5309.48	12.33 N	16.07 W	-20.19	50.911
5330.00	48.100	111.830	5316.47	9.86 N	9.36 W	-13.55	53.578
5340.00	52.400	115.160	5322.86	6.79 N	2.31 W	-6.26	50.035
5350.00	56.800	118.490	5328.65	3.11 N	4.96 E	1.60	51.689
5360.00	60.400	121.820	5333.86	1.18 S	12.33 E	9.95	45.861
5370.00	63.900	125.150	5338.53	6.06 S	19.70 E	18.70	45.731
5380.00	65.900	128.480	5342.78	11.49 S	26.95 E	27.71	36.182

Continued...

Sperry-Sun Drilling Services

Survey Report for Ratherford Unit 13-12 - Leg #3



Mobil
Mobil

Ratherford Short Radius
Mobil

Measured Depth (ft)	Incl.	Azim.	Vertical Depth (ft)	Northings (ft)	Eastings (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
5390.00	70.000	131.890	5346.53	17.47 S	34.02 E	36.97	51.761
5400.00	74.400	135.140	5349.59	24.03 S	40.92 E	46.49	53.786
5410.00	78.900	138.470	5351.90	31.12 S	47.58 E	56.18	55.445
5420.00	83.300	141.800	5353.44	38.70 S	53.91 E	65.95	54.934
5437.00	90.800	145.200	5354.32	52.34 S	63.99 E	82.58	48.422
5446.00	91.500	144.280	5354.14	59.68 S	69.19 E	91.35	12.843
5485.63	89.800	139.600	5353.69	90.88 S	93.61 E	130.37	12.563
5517.51	87.900	137.200	5354.33	114.71 S	114.77 E	162.04	9.600
5549.23	88.900	135.000	5355.21	137.55 S	136.75 E	193.67	7.616
5580.99	88.900	131.500	5355.82	159.31 S	159.88 E	225.41	11.018
5612.62	91.400	130.800	5355.74	180.12 S	183.69 E	257.03	8.208
5644.45	94.300	129.500	5354.16	200.61 S	207.99 E	288.80	9.982
5676.18	94.100	131.100	5351.84	221.08 S	232.12 E	320.43	5.068
5707.99	94.500	130.900	5349.45	241.89 S	256.06 E	352.15	1.405
5739.79	93.000	132.000	5347.37	262.90 S	279.85 E	383.88	5.845
5771.63	92.500	133.200	5345.84	284.42 S	303.26 E	415.68	4.079
5803.33	90.400	134.100	5345.04	306.30 S	326.18 E	447.35	7.207
5835.18	89.000	134.800	5345.21	328.60 S	348.92 E	479.17	4.914
5866.92	93.000	135.900	5344.65	351.17 S	371.22 E	510.85	13.070
5898.61	90.200	136.200	5343.77	373.97 S	393.20 E	542.44	8.886
5930.35	87.100	135.500	5344.52	396.74 S	415.30 E	574.10	10.013
5962.23	86.900	135.900	5346.18	419.52 S	437.54 E	605.87	1.401
5993.97	88.400	134.100	5347.49	441.95 S	459.96 E	637.54	7.378
6025.02	92.100	133.600	5347.35	463.45 S	482.35 E	668.56	12.025
6056.82	91.800	132.500	5346.27	485.15 S	505.57 E	700.34	3.584
6088.48	89.300	131.800	5345.96	506.39 S	529.04 E	732.00	8.200
6120.28	88.400	130.400	5346.60	527.29 S	553.00 E	763.78	5.233
6152.04	87.800	131.800	5347.66	548.16 S	576.92 E	795.52	4.794
6183.87	87.500	131.500	5348.96	569.29 S	600.68 E	827.32	1.332
6215.63	87.400	130.400	5350.37	590.09 S	624.64 E	859.05	3.474
6247.52	87.000	129.200	5351.93	610.48 S	649.12 E	890.87	3.962
6279.27	89.800	129.400	5352.82	630.58 S	673.67 E	922.57	8.841
6311.13	91.800	129.900	5352.37	650.90 S	698.20 E	954.40	6.471
6342.19	93.000	129.200	5351.07	670.66 S	722.13 E	985.41	4.472
6373.97	92.500	129.900	5349.55	690.88 S	746.60 E	1017.12	2.705
6405.72	91.800	130.600	5348.36	711.38 S	770.82 E	1048.83	3.117
6437.56	89.400	131.500	5348.02	732.28 S	794.83 E	1080.66	8.050
6469.33	91.000	131.100	5347.91	753.25 S	818.69 E	1112.43	5.191
6501.11	92.100	131.800	5347.05	774.28 S	842.50 E	1144.20	4.102
6532.06	94.600	132.900	5345.24	795.09 S	865.34 E	1175.09	8.822
6563.94	95.400	132.700	5342.47	816.67 S	888.64 E	1206.85	2.586
6597.00	95.800	132.700	5339.24	838.98 S	912.82 E	1239.75	1.210
6631.00	95.800	132.700	5335.80	861.92 S	937.68 E	1273.57	0.000

Continued...

Sperry-Sun Drilling Services

Survey Report for Ratherford Unit 13-12 - Leg #3



**Mobil
Mobil**

**Ratherford Short Radius
Mobil**

All data is in feet unless otherwise stated.
Coordinates are relative to Well. Vertical depths are relative to Well.

The Dogleg Severity is in Degrees per 100ft.
Vertical Section was calculated along an Azimuth of 132.000° (True).

Based Upon Minimum Curvature type calculations, at a Measured Depth of 6631.00ft.,
The Bottom Hole Displacement is 1273.64ft., in the Direction of 132.589° (True).

Sperry-Sun Drilling Services

Survey Report for Ratherford Unit 13-12 - Leg #4



Mobil
Mobil

Ratherford Short Radius
Mobil

Measured Depth (ft)	Incl.	Azim.	Vertical Depth (ft)	Northings (ft)	Eastings (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
0.00	0.000	355.830	0.00	0.00 N	0.00 E	0.00	
200.00	0.660	307.190	200.00	0.70 N	0.92 W	1.15	0.330
400.00	0.800	302.680	399.98	2.15 N	3.01 W	3.67	0.076
600.00	1.330	311.590	599.94	4.44 N	5.92 W	7.37	0.277
800.00	1.550	302.430	799.88	7.43 N	9.94 W	12.36	0.159
1000.00	1.980	301.180	999.79	10.67 N	15.18 W	18.42	0.216
1200.00	2.220	301.130	1199.65	14.46 N	21.45 W	25.62	0.120
1400.00	2.200	303.470	1399.50	18.58 N	27.97 W	33.22	0.046
1600.00	1.910	323.350	1599.38	23.37 N	33.16 W	40.28	0.382
1800.00	1.250	332.380	1799.30	27.98 N	36.16 W	45.60	0.352
2000.00	0.370	303.970	1999.28	30.27 N	37.71 W	48.28	0.471
2200.00	1.030	167.580	2199.27	28.88 N	37.86 W	47.46	0.661
2400.00	1.460	148.610	2399.22	24.95 N	36.14 W	43.56	0.295
2600.00	0.920	121.300	2599.18	21.94 N	33.45 W	39.54	0.384
2800.00	0.380	139.910	2799.17	20.60 N	31.65 W	37.30	0.286
3000.00	0.160	137.030	2999.16	19.89 N	31.03 W	36.37	0.110
3200.00	0.470	188.630	3199.16	18.87 N	30.96 W	35.64	0.196
3400.00	0.660	223.200	3399.15	17.22 N	31.87 W	35.21	0.191
3600.00	0.820	206.670	3599.14	15.10 N	33.30 W	34.86	0.133
3800.00	1.160	245.850	3799.11	13.00 N	35.79 W	35.30	0.369
4000.00	0.890	260.900	3999.08	11.92 N	39.17 W	37.09	0.190
4200.00	1.100	297.390	4199.05	12.56 N	42.41 W	39.92	0.327
4400.00	0.580	299.510	4399.02	13.94 N	45.00 W	42.77	0.260
4600.00	0.130	235.980	4599.02	14.31 N	46.07 W	43.81	0.267
4800.00	1.180	273.960	4799.01	14.33 N	48.31 W	45.49	0.540
5000.00	0.520	309.790	4998.98	15.05 N	51.06 W	48.02	0.409
5187.00	0.620	333.470	5185.97	16.50 N	52.17 W	49.81	0.136
5195.00	3.400	313.800	5193.97	16.70 N	52.36 W	50.08	35.299
5200.00	4.700	313.700	5198.96	16.95 N	52.61 W	50.44	26.000
5210.00	8.100	313.500	5208.89	17.71 N	53.42 W	51.55	34.001
5220.00	12.100	313.300	5218.74	18.92 N	54.69 W	53.30	40.001
5230.00	16.000	313.100	5228.43	20.58 N	56.46 W	55.73	39.003
5240.00	20.500	312.900	5237.93	22.71 N	58.75 W	58.86	45.004
5250.00	25.000	312.700	5247.15	25.34 N	61.59 W	62.73	45.007
5260.00	29.600	312.500	5256.03	28.44 N	64.97 W	67.31	46.009
5270.00	32.700	312.300	5264.59	31.93 N	68.79 W	72.48	31.017
5280.00	34.200	312.100	5272.93	35.63 N	72.87 W	78.00	15.040
5290.00	35.200	311.900	5281.15	39.44 N	77.10 W	83.69	10.065
5300.00	37.600	311.700	5289.20	43.40 N	81.52 W	89.62	24.029
5310.00	42.200	311.500	5296.87	47.65 N	86.32 W	96.03	46.018
5320.00	45.300	311.300	5304.09	52.23 N	91.51 W	102.95	31.031
5330.00	45.700	311.100	5311.10	56.92 N	96.87 W	110.08	4.247
5340.00	46.400	310.900	5318.04	61.65 N	102.31 W	117.28	7.147
5350.00	47.700	310.700	5324.86	66.43 N	107.85 W	124.60	13.082
5360.00	51.500	310.500	5331.34	71.39 N	113.63 W	132.21	38.030

Continued...

Sperry-Sun Drilling Services

Survey Report for Ratherford Unit 13-12 - Leg #4



Mobil
Mobil

Ratherford Short Radius
Mobil

Measured Depth (ft)	Incl.	Azim.	Vertical Depth (ft)	Northings (ft)	Eastings (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
5370.00	55.800	310.300	5337.26	76.60 N	119.76 W	140.26	43.030
5380.00	60.500	310.100	5342.54	82.08 N	126.25 W	148.75	47.031
5390.00	65.000	309.900	5347.12	87.80 N	133.06 W	157.63	45.035
5400.00	69.300	309.700	5351.00	93.69 N	140.13 W	166.83	43.039
5410.00	73.600	309.500	5354.18	99.74 N	147.44 W	176.30	43.042
5420.00	78.500	309.300	5356.59	105.89 N	154.93 W	186.00	49.038
5428.00	82.700	309.150	5357.90	110.88 N	161.05 W	193.88	52.533
5437.00	85.400	309.000	5358.83	116.53 N	168.00 W	202.82	30.046
5447.00	89.500	310.000	5359.27	122.88 N	175.70 W	212.79	42.199
5457.91	90.700	311.500	5359.25	130.00 N	183.97 W	223.70	17.607
5489.79	92.000	313.700	5358.50	151.57 N	207.43 W	255.57	8.014
5521.56	91.200	316.900	5357.62	174.14 N	229.76 W	287.27	10.378
5553.32	90.000	319.900	5357.28	197.89 N	250.84 W	318.82	10.173
5585.20	88.300	320.100	5357.76	222.31 N	271.33 W	350.39	5.369
5616.91	87.300	318.300	5358.97	246.29 N	292.04 W	381.83	6.490
5648.67	88.300	316.900	5360.19	269.73 N	313.43 W	413.41	5.414
5680.30	89.600	315.500	5360.77	292.55 N	335.32 W	444.95	6.040
5712.13	90.400	314.300	5360.77	315.02 N	357.87 W	476.74	4.531
5743.87	88.300	313.400	5361.13	337.00 N	380.76 W	508.46	7.198
5775.69	89.900	312.000	5361.63	358.58 N	404.14 W	540.27	6.681
5807.50	91.300	311.500	5361.30	379.76 N	427.87 W	572.07	4.673
5839.35	90.900	310.100	5360.69	400.57 N	451.97 W	603.91	4.571
5871.05	90.000	309.000	5360.44	420.75 N	476.41 W	635.58	4.483
5902.90	88.900	308.100	5360.74	440.60 N	501.32 W	667.37	4.462
5934.64	87.300	309.200	5361.80	460.41 N	526.09 W	699.04	6.116
5966.32	85.900	308.600	5363.68	480.27 N	550.70 W	730.61	4.807
5998.08	84.700	306.400	5366.28	499.53 N	575.81 W	762.17	7.870
6029.98	87.200	305.700	5368.53	518.26 N	601.54 W	793.81	8.137
6061.73	91.100	306.200	5369.00	536.89 N	627.23 W	825.38	12.384
6092.79	91.100	308.100	5368.41	555.65 N	651.98 W	856.32	6.116
6124.61	93.000	310.400	5367.27	575.76 N	676.61 W	888.08	9.372
6156.26	89.700	311.800	5366.52	596.56 N	700.45 W	919.71	11.325
6188.07	88.400	311.600	5367.05	617.72 N	724.19 W	951.51	4.135
6219.83	88.800	312.000	5367.83	638.88 N	747.86 W	983.26	1.781
6251.66	89.200	312.500	5368.38	660.28 N	771.42 W	1015.09	2.011
6283.44	88.400	312.300	5369.05	681.70 N	794.88 W	1046.86	2.595
6315.32	86.200	313.400	5370.55	703.36 N	818.23 W	1078.70	7.714
6349.00	86.400	313.000	5372.72	726.37 N	842.73 W	1112.30	1.326
6380.00	86.400	313.000	5374.67	747.47 N	865.35 W	1143.24	0.000

Continued...

Sperry-Sun Drilling Services

Survey Report for Ratherford Unit 13-12 - Leg #4



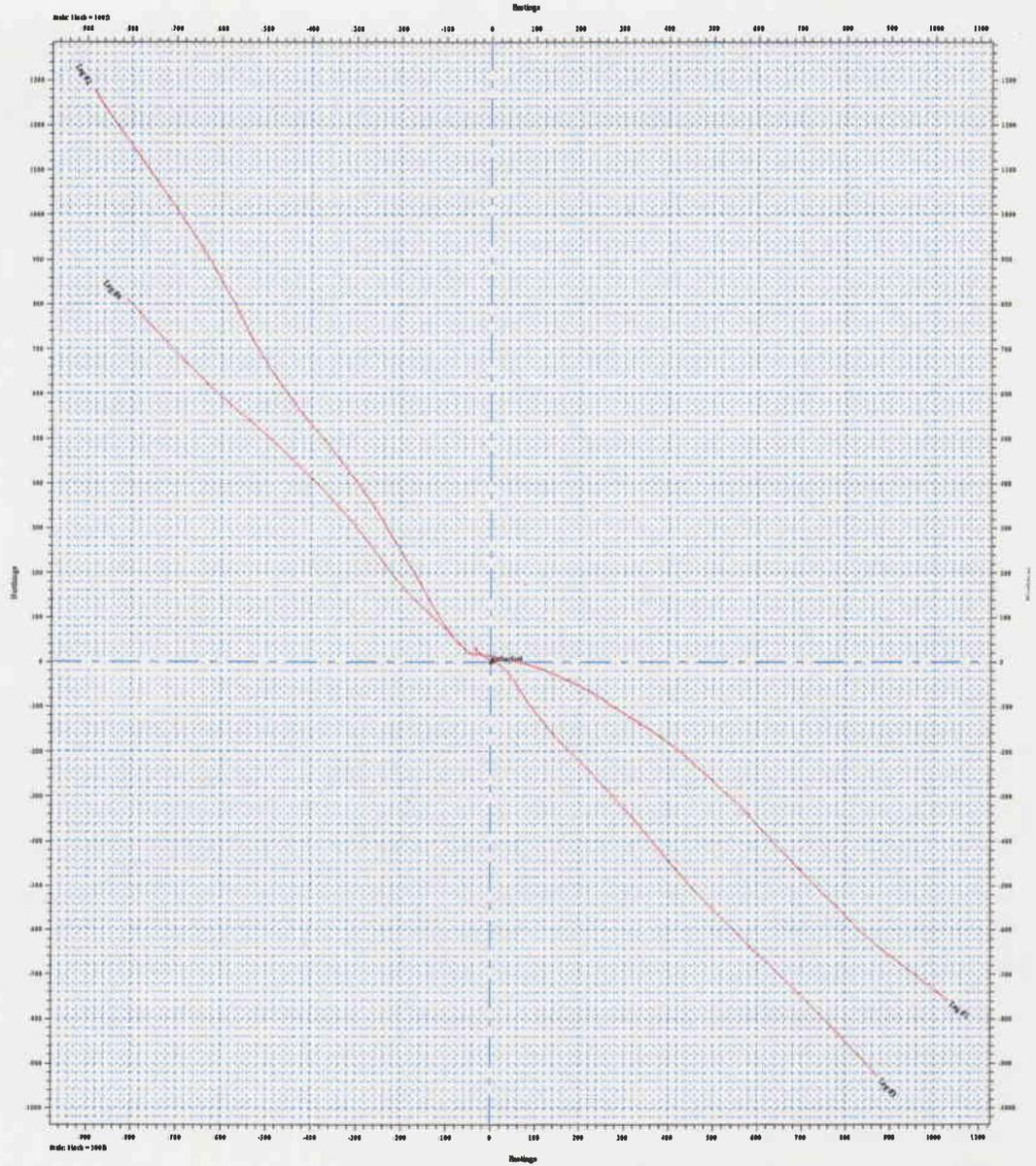
**Mobil
Mobil**

**Ratherford Short Radius
Mobil**

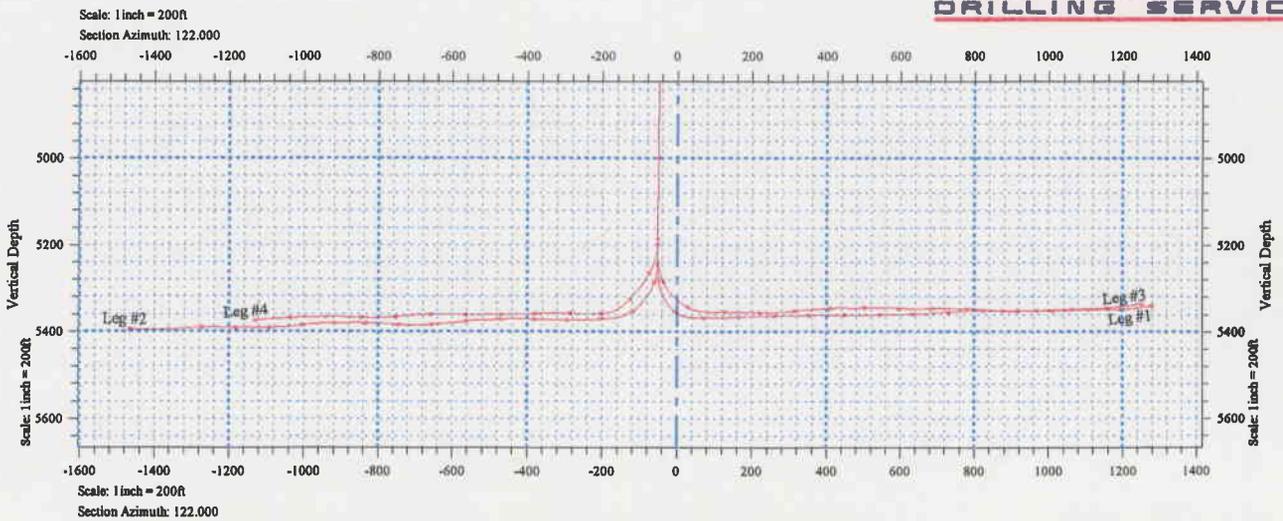
All data is in feet unless otherwise stated.
Coordinates are relative to Well. Vertical depths are relative to Well.

The Dogleg Severity is in Degrees per 100ft.
Vertical Section was calculated along an Azimuth of 312.000° (True).

Based Upon Minimum Curvature type calculations, at a Measured Depth of 6380.00ft.,
The Bottom Hole Displacement is 1143.48ft., in the Direction of 310.819° (True).



sperry-sun
DRILLING SERVICES



Division of Oil, Gas and Mining
OPERATOR CHANGE WORKSHEET

ROUTING
1. DJJ
2. CDW

X Change of Operator (Well Sold)

Operator Name Change/Merger

The operator of the well(s) listed below has changed, effective: 6/1/2006	
FROM: (Old Operator): N1855-ExxonMobil Oil Corporation PO Box 4358 Houston, TX 77210-4358 Phone: 1 (281) 654-1936	TO: (New Operator): N2700-Resolute Natural Resources Company 1675 Broadway, Suite 1950 Denver, CO 80202 Phone: 1 (303) 534-4600
CA No.	Unit: RATHERFORD

OPERATOR CHANGES DOCUMENTATION

Enter date after each listed item is completed

- (R649-8-10) Sundry or legal documentation was received from the **FORMER** operator on: 4/21/2006
- (R649-8-10) Sundry or legal documentation was received from the **NEW** operator on: 4/24/2006
- The new company was checked on the **Department of Commerce, Division of Corporations Database** on: 6/7/2006
- Is the new operator registered in the State of Utah: YES Business Number: 5733505-0143
- If **NO**, the operator was contacted on:
- (R649-9-2) Waste Management Plan has been received on: requested
- Inspections of LA PA state/fee well sites complete on: n/a
- Reports current for Production/Disposition & Sundries on: ok
- Federal and Indian Lease Wells:** The BLM and or the BIA has approved the merger, name change, or operator change for all wells listed on Federal or Indian leases on: BLM n/a BIA not yet
- Federal and Indian Units:**
The BLM or BIA has approved the successor of unit operator for wells listed on: not yet
- Federal and Indian Communization Agreements ("CA"):**
The BLM or BIA has approved the operator for all wells listed within a CA on: n/a
- Underground Injection Control ("UIC")** The Division has approved UIC Form 5, **Transfer of Authority to Inject**, for the enhanced/secondary recovery unit/project for the water disposal well(s) listed on: 6/12/2006

DATA ENTRY:

- Changes entered in the **Oil and Gas Database** on: 6/22/2006
- Changes have been entered on the **Monthly Operator Change Spread Sheet** on: 6/22/2006
- Bond information entered in RBDMS on: n/a
- Fee/State wells attached to bond in RBDMS on: n/a
- Injection Projects to new operator in RBDMS on: 6/22/2006
- Receipt of Acceptance of Drilling Procedures for APD/New on: n/a

BOND VERIFICATION:

- Federal well(s) covered by Bond Number: n/a
- Indian well(s) covered by Bond Number: PA002769
- (R649-3-1) The **NEW** operator of any fee well(s) listed covered by Bond Number n/a
- The **FORMER** operator has requested a release of liability from their bond on: n/a
The Division sent response by letter on: n/a

LEASE INTEREST OWNER NOTIFICATION:

- (R649-2-10) The **FORMER** operator of the fee wells has been contacted and informed by a letter from the Division of their responsibility to notify all interest owners of this change on: n/a

COMMENTS:

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

FORM 9

SUNDRY NOTICES AND REPORTS ON WELLS

Do not use this form for proposals to drill new wells, significantly deepen existing wells below current bottom-hole depth, reenter plugged wells, or to drill horizontal laterals. Use APPLICATION FOR PERMIT TO DRILL form for such proposals.

1. TYPE OF WELL OIL WELL <input type="checkbox"/> GAS WELL <input type="checkbox"/> OTHER <u>Unit Agreement</u>		5. LEASE DESIGNATION AND SERIAL NUMBER: <u>See attached list</u>
2. NAME OF OPERATOR: <u>Resolute Natural Resources Company</u> <u>N2700</u>		6. IF INDIAN, ALLOTTEE OR TRIBE NAME: <u>Navajo Tribe</u>
3. ADDRESS OF OPERATOR: <u>1675 Broadway, Suite 1950</u> CITY <u>Denver</u> STATE <u>CO</u> ZIP <u>80202</u>		7. UNIT or CA AGREEMENT NAME: <u>Ratherford Unit</u>
4. LOCATION OF WELL FOOTAGES AT SURFACE: <u>See attached list</u>		8. WELL NAME and NUMBER: <u>See attached list</u>
PHONE NUMBER: <u>(303) 534-4600</u>		9. API NUMBER: <u>Attached</u>
10. FIELD AND POOL, OR WILDCAT: <u>Greater Aneth</u>		COUNTY: <u>San Juan</u>
QTR/QTR, SECTION, TOWNSHIP, RANGE, MERIDIAN:		STATE: <u>UTAH</u>

11. CHECK APPROPRIATE BOXES TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

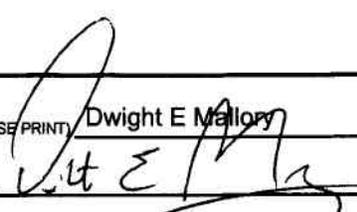
TYPE OF SUBMISSION	TYPE OF ACTION		
<input type="checkbox"/> NOTICE OF INTENT (Submit in Duplicate) Approximate date work will start: _____	<input type="checkbox"/> ACIDIZE	<input type="checkbox"/> DEEPEN	<input type="checkbox"/> REPERFORATE CURRENT FORMATION
<input checked="" type="checkbox"/> SUBSEQUENT REPORT (Submit Original Form Only) Date of work completion: _____	<input type="checkbox"/> ALTER CASING	<input type="checkbox"/> FRACTURE TREAT	<input type="checkbox"/> SIDETRACK TO REPAIR WELL
	<input type="checkbox"/> CASING REPAIR	<input type="checkbox"/> NEW CONSTRUCTION	<input type="checkbox"/> TEMPORARILY ABANDON
	<input type="checkbox"/> CHANGE TO PREVIOUS PLANS	<input checked="" type="checkbox"/> OPERATOR CHANGE	<input type="checkbox"/> TUBING REPAIR
	<input type="checkbox"/> CHANGE TUBING	<input type="checkbox"/> PLUG AND ABANDON	<input type="checkbox"/> VENT OR FLARE
	<input type="checkbox"/> CHANGE WELL NAME	<input type="checkbox"/> PLUG BACK	<input type="checkbox"/> WATER DISPOSAL
	<input type="checkbox"/> CHANGE WELL STATUS	<input type="checkbox"/> PRODUCTION (START/RESUME)	<input type="checkbox"/> WATER SHUT-OFF
	<input type="checkbox"/> COMMINGLE PRODUCING FORMATIONS	<input type="checkbox"/> RECLAMATION OF WELL SITE	<input type="checkbox"/> OTHER: _____
	<input type="checkbox"/> CONVERT WELL TYPE	<input type="checkbox"/> RECOMPLETE - DIFFERENT FORMATION	

12. DESCRIBE PROPOSED OR COMPLETED OPERATIONS. Clearly show all pertinent details including dates, depths, volumes, etc.

Effective June 1, 2006 Exxon Mobil Oil Corporation resigns as operator of the Ratherford Unit. Also effective June 1, 2006 Resolute Natural Resources Company is designated as successor operator of the Ratherford Unit.

A list of affected producing and water source wells is attached. A separate of affected injection wells is being submitted with UIC Form 5, Transfer of Authority to Inject.

As of the effective date, bond coverage for the affected wells will transfer to BIA Bond # PA002769.

NAME (PLEASE PRINT) <u>Dwight E Mallory</u>	TITLE <u>Regulatory Coordinator</u>
SIGNATURE 	DATE <u>4/20/2006</u>

(This space for State use only)

APPROVED 6127106
Earlene Russell
Division of Oil, Gas and Mining
Earlene Russell, Engineering Technician

RECEIVED
APR 24 2006
DIV. OF OIL, GAS & MINING

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

FORM 9

SUNDRY NOTICES AND REPORTS ON WELLS

Do not use this form for proposals to drill new wells, significantly deepen existing wells below current bottom-hole depth, reenter plugged wells, or to drill horizontal laterals. Use APPLICATION FOR PERMIT TO DRILL form for such proposals.

1. TYPE OF WELL OIL WELL <input checked="" type="checkbox"/> GAS WELL <input type="checkbox"/> OTHER _____		5. LEASE DESIGNATION AND SERIAL NUMBER:
2. NAME OF OPERATOR: ExxonMobil Oil Corporation <i>N1855</i>		6. IF INDIAN, ALLOTTEE OR TRIBE NAME: Ship Rock
3. ADDRESS OF OPERATOR: P.O. Box 4358 CITY Houston STATE TX ZIP 77210-4358		7. UNIT or CA AGREEMENT NAME: UTU68931A
4. LOCATION OF WELL FOOTAGES AT SURFACE: QTR/QTR, SECTION, TOWNSHIP, RANGE, MERIDIAN:		8. WELL NAME and NUMBER: Ratherford
PHONE NUMBER: (281) 654-1936		9. API NUMBER: attached
COUNTY: San Juan		10. FIELD AND POOL, OR WILDCAT: Aneth
STATE: UTAH		

11. CHECK APPROPRIATE BOXES TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION		
<input checked="" type="checkbox"/> NOTICE OF INTENT (Submit in Duplicate) Approximate date work will start: <u>6/1/2006</u>	<input type="checkbox"/> ACIDIZE	<input type="checkbox"/> DEEPEN	<input type="checkbox"/> REPERFORATE CURRENT FORMATION
<input type="checkbox"/> SUBSEQUENT REPORT (Submit Original Form Only) Date of work completion:	<input type="checkbox"/> ALTER CASING	<input type="checkbox"/> FRACTURE TREAT	<input type="checkbox"/> SIDETRACK TO REPAIR WELL
	<input type="checkbox"/> CASING REPAIR	<input type="checkbox"/> NEW CONSTRUCTION	<input type="checkbox"/> TEMPORARILY ABANDON
	<input type="checkbox"/> CHANGE TO PREVIOUS PLANS	<input checked="" type="checkbox"/> OPERATOR CHANGE	<input type="checkbox"/> TUBING REPAIR
	<input type="checkbox"/> CHANGE TUBING	<input type="checkbox"/> PLUG AND ABANDON	<input type="checkbox"/> VENT OR FLARE
	<input type="checkbox"/> CHANGE WELL NAME	<input type="checkbox"/> PLUG BACK	<input type="checkbox"/> WATER DISPOSAL
	<input type="checkbox"/> CHANGE WELL STATUS	<input type="checkbox"/> PRODUCTION (START/RESUME)	<input type="checkbox"/> WATER SHUT-OFF
	<input type="checkbox"/> COMMINGLE PRODUCING FORMATIONS	<input type="checkbox"/> RECLAMATION OF WELL SITE	<input type="checkbox"/> OTHER: _____
	<input type="checkbox"/> CONVERT WELL TYPE	<input type="checkbox"/> RECOMPLETE - DIFFERENT FORMATION	

12. DESCRIBE PROPOSED OR COMPLETED OPERATIONS. Clearly show all pertinent details including dates, depths, volumes, etc.

ExxonMobil Oil Corporation is transferring operatorship of Greater Aneth field, Ratherford lease to Resolute Natural Resources Company. All change of operator notices should be made effective as of 7:00 AM MST on June 1, 2006.

Attached please find a listing of producers and water source wells included in the transfer.

NAME (PLEASE PRINT) <u>Laurie Kilbride</u>	TITLE <u>Permitting Supervisor</u>
SIGNATURE <i>Laurie B. Kilbride</i>	DATE <u>4/19/2006</u>

(This space for State use only) **APPROVED** 6/13/06
Earlene Russell
Division of Oil, Gas and Mining
Earlene Russell, Engineering Technician

RECEIVED
APR 21 2006
DIV. OF OIL, GAS & MINING

Ratherford Unit - Producer Well List

minus P&A's

Lease	Number	API #	Status	Lease #	Location					
					Sec	T	R	QTR/QTR	NSFoot	EWFoot
Ratherford	01-14	430373116200S1	Producing	1420603246A	1	41S	23E	SWSW	0660FSL	0660FWL
Ratherford	01-34	430371638501S1	SI	1420603246A	1	41S	23E	SWSE	1133FSL	1980FEL
Ratherford	11-41	430373154400S1	Producing	1420603246A	11	41S	23E	NENE	0860FNL	0350FEL
Ratherford	11-43	430373162201S1	Producing	1420603246A	11	41S	23E	NESE	1980FSL	0660FEL
Ratherford	12-12	430373119000S1	Producing	1420603246A	12	41S	23E	SWNW	1850FNL	0660FWL
Ratherford	12-14	430371584400S1	SI	1420603246A	12	41S	23E	SWSW	0660FSL	4622FEL
Ratherford	12-21	430373120100S1	Producing	1420603246A	12	41S	23E	NENW	0660FNL	1980FWL
Ratherford	12-23	430371584601S1	Producing	1420603246A	12	41S	23E	NESW	1958FSL	3300FEL
Ratherford	12-32	430373120300S1	Producing	1420603246A	12	41S	23E	SWNE	1820FNL	1820FEL
Ratherford	12-34	430373112600S1	Producing	1420603246A	12	41S	23E	SWSE	0675FSL	1905FEL
Ratherford	12-43	430373120200S1	SI	1420603246A	12	41S	23E	NESE	2100FSL	0660FEL
Ratherford	13-12	430373112701S1	Producing	1420603247A	13	41S	23E	SWNW	1705FNL	0640FWL
Ratherford	13-14	430373158900S1	Producing	1420603247A	13	41S	23E	SWSW	0660FSL	0660FWL
Ratherford	13-21	430373112801S1	SI	1420603247A	13	41S	23E	NENW	0660FNL	1920FWL
Ratherford	13-23	430373112900S1	Producing	1420603247A	13	41S	23E	NESW	1980FSL	1930FWL
Ratherford	13-34	430373113001S1	Producing	1420603247A	13	41S	23E	SWSE	0660FSL	1980FEL
Ratherford	13-41	430371585601S1	Producing	1420603247A	13	41S	23E	NENE	660FNL	660FEL
Ratherford	13-43	430373113100S1	Producing	1420603247A	13	41S	23E	NESE	1700FSL	0960FEL
Ratherford	14-32	430371585801S1	Producing	1420603247A	14	41S	23E	SWNE	2130FNL	1830FEL
Ratherford	14-41	430373162300S1	Producing	1420603247A	14	41S	23E	NENE	0521FNL	0810FEL
Ratherford	24-32	430373159300S1	Producing	1420603247A	24	41S	23E	SWNE	2121FNL	1846FEL
Ratherford	24-41	430373113200S1	Producing	1420603247A	24	41S	23E	NENE	0660FNL	0710FEL
Ratherford	17-11	430373116900S1	Producing	1420603353	17	41S	24E	NWNW	1075FNL	0800FWL
Ratherford	17-13	430373113301S1	Producing	1420603353	17	41S	24E	NWSW	2100FSL	0660FWL
Ratherford	17-22	430373117001S1	Producing	1420603353	17	41S	24E	SENW	1882FNL	1910FWL
Ratherford	17-24	430373104400S1	Producing	1420603353	17	41S	24E	SESW	0720FSL	1980FWL
Ratherford	17-31	430373117800S1	Producing	1420603353	17	41S	24E	NWNE	0500FNL	1980FEL
Ratherford	17-33	430373113400S1	Producing	1420603353	17	41S	24E	NWSE	1980FSL	1845FEL
Ratherford	17-42	430373117700S1	Producing	1420603353	17	41S	24E	SENE	1980FNL	0660FEL
Ratherford	17-44	430371573201S1	Producing	1420603353	17	41S	24E	SESE	0660FSL	0660FEL
Ratherford	18-11	430371573300S1	SI	1420603353	18	41S	24E	NWNW	0720FNL	0730FWL
Ratherford	18-13	430371573401S1	Producing	1420603353	18	41S	24E	NWSW	1980FSL	0500FWL
Ratherford	18-22	430373123600S1	Producing	1420603353	18	41S	24E	SENW	2200FNL	2210FWL
Ratherford	18-24	430373107900S1	Producing	1420603353	18	41S	24E	SESW	0760FSL	1980FWL
Ratherford	18-31	430373118101S1	Producing	1420603353	18	41S	24E	NWNE	0795FNL	2090FEL
Ratherford	18-33	430373113501S1	Producing	1420603353	18	41S	24E	NWSE	1870FSL	1980FEL
Ratherford	18-42	430373118200S1	Producing	1420603353	18	41S	24E	SENE	2120FNL	0745FEL
Ratherford	18-44	430373104500S1	SI	1420603353	18	41S	24E	SESE	0660FSL	0660FEL
Ratherford	19-11	430373108000S1	Producing	1420603353	19	41S	24E	NWNW	0660FNL	0660FWL
Ratherford	19-13	430373171900S1	Producing	1420603353	19	41S	24E	NWSW	1980FSL	0660FWL
Ratherford	19-22	430373104601S1	Producing	1420603353	19	41S	24E	SENW	1840FNL	1980FWL
Ratherford	19-24	430373175401S1	Producing	1420603353	19	41S	24E	SESW	0600FSL	1980FWL
Ratherford	19-31	430373104701S1	Producing	1420603353	19	41S	24E	NWNE	510FNL	1980FEL
Ratherford	19-33	430373104800S1	Producing	1420603353	19	41S	24E	NWSE	1980FSL	1980FEL
Ratherford	19-42	430373091600S1	Producing	1420603353	19	41S	24E	SENE	1880FNL	0660FEL
Ratherford	19-44	430373108100S1	Producing	1420603353	19	41S	24E	SESE	0660FSL	0660FEL
Ratherford	19-97	430373159600S1	Producing	1420603353	19	41S	24E	SENE	2562FNL	0030FEL
Ratherford	20-11	430373104900S1	Producing	1420603353	20	41S	24E	NWNW	0500FNL	0660FWL
Ratherford	20-13	430373091700S1	Producing	1420603353	20	41S	24E	NWSW	2140FSL	0500FWL
Ratherford	20-22	430373093000S1	Producing	1420603353	20	41S	24E	SENW	2020FNL	2090FWL
Ratherford	20-24	430373091800S1	Producing	1420603353	20	41S	24E	SESW	0820FSL	1820FWL

Ratherford Unit - Producer Well List

minus P&A's

Lease	Number	API #	Status	Lease #	Location					
					Sec	T	R	QTR/QTR	NSFoot	EWFoot
Ratherford	20-31	430373105001S1	Producing	1420603353	20	41S	24E	NWNE	0660FNL	1880FEL
Ratherford	20-33	430373093100S1	Producing	1420603353	20	41S	24E	NWSE	1910FSL	2140FEL
Ratherford	20-42	430373105100S1	Producing	1420603353	20	41S	24E	SENE	1980FNL	0660FEL
Ratherford	20-44	430373091501S1	Producing	1420603353	20	41S	24E	SESE	0620FSL	0760FEL
Ratherford	20-66	430373159201S1	Producing	1420603353	20	41S	24E	SWNW	1369FNL	1221FWL
Ratherford	20-68	430373159100S1	Producing	1420603353	20	41S	24E	NWSW	1615FSL	1276FWL
Ratherford	15-12	430371571501S1	Producing	1420603355	15	41S	24E	SWNW	1820FNL	0500FWL
Ratherford	15-22	430373044900S1	SI	1420603355	15	41S	24E	SENE	1980FNL	2050FWL
Ratherford	15-32	430371571700S1	Producing	1420603355	15	41S	24E	SWNE	1980FNL	1980FEL
Ratherford	15-33	430371571800S1	Producing	1420603355	15	41S	24E	NWSE	1650FSL	1980FEL
Ratherford	15-41	430371571900S1	TA	1420603355	15	41S	24E	NENE	0660FNL	0660FEL
Ratherford	15-42	430373044800S1	Producing	1420603355	15	41S	24E	SENE	2020FNL	0820FEL
Ratherford	16-13	430373116801S1	Producing	1420603355	16	41S	24E	NWSW	1980FSL	660FWL
Ratherford	16-32	430371572300S1	Producing	1420603355	16	41S	24E	SWNE	1980FNL	1980FEL
Ratherford	16-41	430371572500S1	Producing	1420603355	16	41S	24E	NENE	0660FNL	0660FEL
Ratherford	16-77	430373176800S1	Producing	1420603355	16	41S	24E	NESW	2587FSL	2410FWL
Ratherford	21-23	430371375400S1	Producing	1420603355	21	41S	24E	NESW	1740FSL	1740FWL
Ratherford	21-24	430373172001S1	SI	1420603355	21	41S	24E	SESW	487FSL	2064FWL
Ratherford	21-32	430371575500S1	SI	1420603355	21	41S	24E	SWNE	1880FNL	1980FEL
Ratherford	21-77	430373175801S1	SI	1420603355	21	41S	24E	NWSE	2511FSL	2446FEL
Ratherford	07-11	430373116300S1	Producing	1420603368	7	41S	24E	NWNW	0660FNL	0710FWL
Ratherford	07-13	430373116400S1	Producing	1420603368	7	41S	24E	NWSW	2110FSL	0740FWL
Ratherford	07-22	430373116500S1	Producing	1420603368	7	41S	24E	SENE	1980FNL	1980FWL
Ratherford	07-24	430373116600S1	Producing	1420603368	7	41S	24E	SESW	0880FSL	2414FWL
Ratherford	07-44	430373118900S1	SI	1420603368	7	41S	24E	SESE	0737FSL	0555FEL
Ratherford	08-12	430371599100S1	Producing	1420603368	8	41S	24E	SWNW	1909FNL	0520FWL
Ratherford	08-21	430371599300S1	Producing	1420603368	8	41S	24E	NENW	0616FNL	1911FWL
Ratherford	08-23	430371599400S1	Producing	1420603368	8	41S	24E	NESW	1920FSL	2055FWL
Ratherford	08-32	430371599500S1	Producing	1420603368	8	41S	24E	SWNE	1980FNL	1980FEL
Ratherford	08-34	430371599600S1	Producing	1420603368	8	41S	24E	SWSE	0660FSL	1980FEL
Ratherford	04-34	430371616400S1	Producing	14206034035	4	41S	24E	SWSE	0660FSL	1980FEL
Ratherford	11-14	430371616700S1	Producing	14206034037	11	41S	24E	SWSW	0660FSL	0660FWL
Ratherford	09-34	430371571100S1	SI	14206034043	9	41S	24E	SWSE	0660FSL	1980FEL
Ratherford	10-12	430371571200S1	Producing	14206034043	10	41S	24E	SWNW	1980FNL	0660FWL
Ratherford	10-14	430371571300S1	Producing	14206034043	10	41S	24E	SWSW	0510FSL	0710FWL
Ratherford	10-32	430371571400S1	TA	14206034043	10	41S	24E	SWNE	2080FNL	1910FEL
Ratherford	10-44	430373045100S1	TA	14206034043	10	41S	24E	SESE	0820FSL	0510FEL
Ratherford	29-11	430373105300S1	Producing	1420603407	29	41S	24E	NWNW	0770FNL	0585FWL
Ratherford	29-22	430373108200S1	Producing	1420603407	29	41S	24E	SENE	2130FNL	1370FWL
Ratherford	29-31	430373091401S1	Producing	1420603407	29	41S	24E	NWNE	0700FNL	2140FEL
Ratherford	29-33	430373093200S1	SI	1420603407	29	41S	24E	NWSE	1860FSL	1820FEL
Ratherford	29-34	430371534000S1	SI	1420603407	29	41S	24E	SWSE	0817FSL	2096FEL
Ratherford	29-42	430373093700S1	SI	1420603407	29	41S	24E	SENE	1850FNL	0660FEL
Ratherford	30-32	430371534200S1	Producing	1420603407	30	41S	24E	SWNE	1975FNL	2010FEL
Ratherford	28-11	430373044600S1	Producing	1420603409	28	41S	24E	NWNW	0520FNL	0620FWL

Ratherford Unit - Producer Well List

minus P&A's

Lease	Number	API #	Status	Lease #	Location					
					Sec	T	R	QTR/QTR	NSFoot	EWFoot
Ratherford	09-12	430371512600S1	Producing	14206035045	9	41S	24E	SWNW	1865FNL	0780FWL
Ratherford	09-14	430371512700S1	Producing	14206035046	9	41S	24E	SWSW	0695FSL	0695FWL
Ratherford	04-14	430371616300S1	Producing	14206035446	4	41S	24E	SWSW	0500FSL	0660FWL
Ratherford	03-12	430371562000S1	Producing	14206036506	3	41S	24E	SWNW	2140FNL	0660FWL

Water Source Wells (Feb 2006)

RU	S1	4303700001	Active
RU	S2	4303700002	Active
RU	S3	4303700003	Active
RU	S4	4303700004	Active
RU	S5	4303700005	Active
RU	S6	4303700006	Active
RU	S7	4303700007	Active
RU	S8	4303700008	Active
RU	S9	4303700009	Active
RU	S10	4303700010	Active
RU	S11	4303700011	Active
RU	S12	4303700012	Active
RU	S13	4303700013	Active
RU	S14	4303700014	Active
RU	S16	4303700016	Active
RU	S17	4303700017	Active

STATE OF UTAH DEPARTMENT OF NATURAL RESOURCES DIVISION OF OIL, GAS, AND MINING	FORM 9 5. LEASE DESIGNATION AND SERIAL NUMBER: 14-20-603-247A
SUNDRY NOTICES AND REPORTS ON WELLS Do not use this form for proposals to drill new wells, significantly deepen existing wells below current bottom-hole depth, reenter plugged wells, or to drill horizontal laterals. Use APPLICATION FOR PERMIT TO DRILL form for such proposals.	6. IF INDIAN, ALLOTTEE OR TRIBE NAME: NAVAJO 7. UNIT or CA AGREEMENT NAME: RATHERFORD
1. TYPE OF WELL Oil Well	8. WELL NAME and NUMBER: RATHERFORD UNIT 13-12
2. NAME OF OPERATOR: RESOLUTE NATURAL RESOURCES	9. API NUMBER: 43037311270000
3. ADDRESS OF OPERATOR: 1675 Boradway Ste 1950 , Denver, CO, 80202	PHONE NUMBER: 303 534-4600 Ext
4. LOCATION OF WELL FOOTAGES AT SURFACE: 1705 FNL 0640 FWL QTR/QTR, SECTION, TOWNSHIP, RANGE, MERIDIAN: Qtr/Qtr: SWNW Section: 13 Township: 41.0S Range: 23.0E Meridian: S	9. FIELD and POOL or WILDCAT: GREATER ANETH COUNTY: SAN JUAN STATE: UTAH

11. CHECK APPROPRIATE BOXES TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION		
<input checked="" type="checkbox"/> NOTICE OF INTENT Approximate date work will start: 1/20/2014 <input type="checkbox"/> SUBSEQUENT REPORT Date of Work Completion: <input type="checkbox"/> SPUD REPORT Date of Spud: <input type="checkbox"/> DRILLING REPORT Report Date:	<input type="checkbox"/> ACIDIZE <input type="checkbox"/> CHANGE TO PREVIOUS PLANS <input type="checkbox"/> CHANGE WELL STATUS <input type="checkbox"/> DEEPEN <input type="checkbox"/> OPERATOR CHANGE <input type="checkbox"/> PRODUCTION START OR RESUME <input type="checkbox"/> REPERFORATE CURRENT FORMATION <input checked="" type="checkbox"/> TUBING REPAIR <input type="checkbox"/> WATER SHUTOFF <input type="checkbox"/> WILDCAT WELL DETERMINATION	<input type="checkbox"/> ALTER CASING <input type="checkbox"/> CHANGE TUBING <input type="checkbox"/> COMMINGLE PRODUCING FORMATIONS <input type="checkbox"/> FRACTURE TREAT <input type="checkbox"/> PLUG AND ABANDON <input type="checkbox"/> RECLAMATION OF WELL SITE <input type="checkbox"/> SIDETRACK TO REPAIR WELL <input type="checkbox"/> VENT OR FLARE <input type="checkbox"/> SI TA STATUS EXTENSION <input type="checkbox"/> OTHER	<input type="checkbox"/> CASING REPAIR <input type="checkbox"/> CHANGE WELL NAME <input type="checkbox"/> CONVERT WELL TYPE <input type="checkbox"/> NEW CONSTRUCTION <input type="checkbox"/> PLUG BACK <input type="checkbox"/> RECOMPLETE DIFFERENT FORMATION <input type="checkbox"/> TEMPORARY ABANDON <input type="checkbox"/> WATER DISPOSAL <input type="checkbox"/> APD EXTENSION OTHER: <input style="width: 100px;" type="text"/>

12. DESCRIBE PROPOSED OR COMPLETED OPERATIONS. Clearly show all pertinent details including dates, depths, volumes, etc.

Resolute proposes to attempt to repair tubing and ESP in the subject well to enhance oil production. The proposed procedure and well bore schematic is attached. Work is expected to commence 1-20-14.

**Accepted by the
 Utah Division of
 Oil, Gas and Mining**

Date: January 16, 2014

By: Dark Quist

NAME (PLEASE PRINT) Sherry Glass	PHONE NUMBER 303 573-4886	TITLE Sr Regulatory Technician
SIGNATURE N/A	DATE 1/15/2014	

RESOLUTE

NATURAL RESOURCES

RU 13-12
1705' FNL, 640' FWL
SWNW section 13-T41S-R23E
43-037-31127
ESP Replacement

Job Scope

Job Scope includes: Pull tubing & ESP, Fish 2-7/8 tubing, and run replacement ESP.
(Acid planned? N; Change of tubing size? N; Paraffin expected? N)

Work History

Feb-Mar 1997: Drilled four 4-3/4" horizontal laterals out of 7" csg, two to the NW, two to the SE.

8/27/1997: ESP replacement.

3/11/2004: ESP Replacement - Pulled tbg & ESP; ESP shorted at pig tail cable & good below that; tubing had hole in jt # 27; Ran RBP to 4936' & PT csg back to surface to 500 psi - good test; Acidized w/packer at 4939' - 8000 gal 15% HCl, swabbed back; Ran new ESP.

3/21/2005: Repair Tubing - Pulled tbg & ESP; tubing had multiple holes top to bottom; Ran back 146 jts tubing w/o ESP, circ fresh water & landed tbg; Plan to replace tubing.

11/6/2006: CTU cleanout - Ran 1-11/16 motor & 1-3/4 bit through tbg & tagged at 5400' & milled to 5417', unable to go further; POOH, Ran CT to 5230' between 2nd & 3rd lateral, pumped 28 bbls/1176 gal acid; PU to 5180' above top lateral & pumped 28 bbls more acid, soak; Ran back to 5303', circ btms up; POOH.

12/4/2006: Repair Csg Leak & Install ESP - Tbg was parted at jt #91; tagged tbg fish at 2903', milled tbg down to 3088' (185'), Set plug at 2795' & located 7" csg leaks at 269', 206' & 136'; Backhoe excavated and located surf csg leak, welder patched it, PT surf csg to 500 psi = good test; Circ cement thru 7" leaks & up braden head, cement to surface. Drld out cmt & broke thru at 300'; PT'd 7" 2795' to surface at 1000 psi - good test. Pulled plug from 2795', Ran new ESP ass'v w/bottom @ 3078'.

4/14/2008: Replace failed ESP - Pulled & LD failed ESP; ran new ESP on 2-7/8" SS tbg, btm of Centinel at 3046' KB. Top of 2-7/8 tbg fish below ESP is at 3088', btm est to be at ~4636'.

1/8/2010: Replace tbg hanger - Killed well, picked up tbg & replaced tbg hanger w/EN type, re-did ESP cable & capillary string penetrations, re-landed tbg; RDMO.

Procedure

Horsley Witten: NO

- 1) MIRU WSU. LOTO equipment. Test rig anchors as required.
- 2) Kill well as necessary.
- 3) NDWH. NU BOP. Test BOP.
- 4) MIRU ESP cable spooler & cap string spooler.
- 5) POOH with the 2-7/8" tubing, ESP assembly, ESP cable, and full length 3/8" capillary string.
- 6) Stand back tubing & inspect for tubing condition. Call Bill Albert for tubing inspection at (970) 371-9682 or if unavailable, call Tech Support: Virgil Holly (435) 444-0020 or Julius Claw (435) 444-0156.
- 7) Lay down failed ESP assembly.
- 8) Make bit & scraper trip to 3088' PBD. Circ clean at top of fish. POOH.
- 9) Run impression block and evaluate top of fish (2-7/8 tubing, previously milled up from 2903' to 3088', est bottom at ~4636').
- 10) Run fishing tools and attempt to recover the 2-7/8 tubing fish, 3088 - 4636'.
- 11) If fishing is successful, perform N2 cleanout with workstring run in hole below bottom lateral window (5253-61'), circ several hours to remove as much solids as possible.
- 12) RIH with replacement ESP assembly & Centinel, ESP cable, 2-7/8" tubing, including 2-7/8" check valve two joints above the ESP & 'XA' sliding sleeve w/1.81 X profile 1 joint above the check valve. Run new 1/4" cap string to top of ESP.
NOTE: Save the 3/8" cap string for re-run if it PT's OK & is not plugged. It can be re-run in this well if fishing is unsuccessful.
- 13) Land tubing w/ ESP assembly bottom at ~5100' if fishing is successful; this depth may be adjusted depending on fishing results.
- 14) Perform WH penetrator tie-ins at tubing hanger for ESP cable & capillary string and land tubing.
- 15) ND BOPE. NUWH. Re-connect to VSD and transformer.
- 16) Perform necessary tests to ensure that the pump is ready to be returned to production.
- 17) Notify Operations Supervisor Alfred Redhouse (435) 619-7227 that the well is ready to return to production.
- 18) RDMOL.
- 19) Hook up appropriate chemical treatment equipment.

RATHERFORD UNIT #13-12HZ
 GREATER ANETH FIELD
 Surface Loc: 1705' FNL & 640' FWL
 SEC 13-T41S-R23E
 SAN JUAN COUNTY, UTAH
 API 43-037-31127
 PRISM 0043000

B.H. Location Lateral #1:
 677' S & 1065' E of Surface
 Location

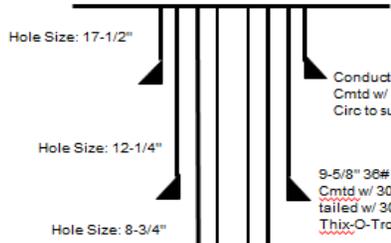
B.H. Location Lateral #3:
 863' S & 1043' E of Surface
 Location

PRODUCER

B.H. Location Lateral #2:
 1210' N & 974' W of Surface
 Location

B.H. Location Lateral #4:
 747' N & 864' W of Surface
 Location

Current as of 1/10/2014-- Jim Styler
 KB 4568' GL 4558'



Conductor Pipe: 13-3/8" 54.5# K-55 set at 116'
 Cmtd w/ 150 sx Cl B + 3% CaCl2 + 1/4#/sx Celloflakes.
 Circ to surface 5-27-85

9-5/8" 36# K-55 set at 1622'
 Cmtd w/ 300sx Cl B + 20% Diacel-D + 2% CaCl2 + 1/4#/sx Celloflakes + 1% Halad 322 and
 tailed w/ 300 sx Cl B + 1% Halad 322 + 2% CaCl2 + 1/4#/sx Celloflakes. Top job w/ 70 sx
 Thix-O-Tropic + 2% CaCl2 + 8% gel + 25#/sx Gilsonite + 10#/sx CalSeal 6-15-85

Tubing Detail 4-22-08:

1	Tubing hanger	7	2,441			1.00	14.0	16.0
1	K-over	2	162	2,441		1.00	15.0	16.0
96	2 7/8" Stainless tubing	2	162	2,441	Hydril CS	2,982.00	16.0	2,998.0
1	K-over	2	162	2,441		1.00	2,998.0	2,999.0
1	2 7/8" Sliding Sleeve	4	2,441			3.00	2,999.0	3,002.0
1	Pump	4	2,441			12.00	3,002.0	3,014.0
1	Gas Separator	4	2,441			3.00	3,014.0	3,017.0
1	Seal	4	2,441			6.00	3,017.0	3,023.0
1	Motor	4	2,441			17.00	3,023.0	3,040.0
1	Centinel	4	2,441			4.00	3,040.0	3,044.0
1	Centralizer	4	2,441			2.00	3,044.0	3,046.0

TOF @ 3088' (1/9/07)
 Fish is 2-7/8" bgs est.
 length ~1548', btm at 4636'.

Openhole Lateral #4 5195-6379' TD MD
 (window in csg at 5187-95')

Lateral #4:
 TMD 6379', TVD 5375
 Inc. 86.4, Azimuth 313,
 North 747', West 864',
 VS -1143'. 3-14-97

Openhole Lateral #2 5246-6825' TD MD
 (window in csg at 5236-46')

Lateral #2:
 TMD 6825', TVD 5394
 Inc. 91.5, Azimuth 323,
 North 1210', West 974',
 VS -1552'. 3-14-97

Openhole Lateral #3 5223-6631' TD MD
 (window in csg at 5212-23')

Lateral #3:
 TMD 6631', TVD 5336
 Inc. 95.8, Azimuth 132.7,
 South 863', East 1043',
 VS 1284'. 3-14-97

Openhole Lateral #1 5261-6679' TD MD
 (window in csg at 5253-61')

Lateral #1:
 TMD 6661', TVD 5343
 Inc. 95.0, Azimuth 123.7,
 South 677', East 1065',
 VS 1260'. 3-14-97

5349-5385' perf d w/ 4 spf 10-24-85

7" 26# & 23# K-55 & N-80 set at 5451'
 Cmtd w/ 7400 sx Halliburton Lite cmt + 20% Diacel-D + 10% salt +
 1/4#/sx Celloflakes + 10#/sx Gilsonite & tailed w/ 300 sx Cl B + 18% salt
 + 1/4#/sx Celloflakes + .75 Halad 302. Calc TOC at 2000' 7-2-85

TD 5515' ~6-30-85

LKB, Dunton 11-14-02 R.U. # 13-12