District I
PO Box 1980. Hobbs. NM 88241 1980
District II
PO Drawer DD, Artesia, NM 88211-0719
District III
1000 Rio Brazos Rd., Aztec, NM 87410
District IV
PO Box 2088, Santa Fe, NM 87504-2088

State of New Mexico
Energy, Minerals & Natural Resources Department

OIL CONSERVATION DIVISION
PO Box 2088
Santa Fe, NM 87504-2088

Form C-101
Revised February 10. 1994
Instructions on back
Submit to Appropnate District Offico
State Lease - 6 Copies
Fee Lease - 5 Copies

☐ AMENDED REPORT

APPLICATION FOR PERMIT TO DR1LL, RE-ENTER, DEEPEN, PLUGBACK, OR ADD A ZONE

' Operator Name and Address.	' OGRID No_
Conoco Inc 10 Desta Dr. Ste. 100W Midland, Tx. 79705-4500	005073
	' API Number 30 - 0025-34794

' Property Code	' Property Name	' Well No.
13396	Hardy 36 State	#27

' Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
J	36	20S	37E		2200	South	1650	East	Lea

s Proposed Bottom Hole Location If Different From Surface

UL or lot no	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
I	36	20S	37E		1900	South	700	East	Lea

' Proposed Pool 1	" Proposed Pool 2
North Hardy Strawn	

" Work Type Code	" Well Type Code	" Cable/Rotary	" Lease type Code	14 Ground Level Elevation
				3493'
16 Multiple	17 Proposed Depth	18 Formation	19 Contractor	20 Spud Date
		Strawn		

21 Proposed Casiing and Cement Program

Hole Size	Casing Size	Casing weight/foot	Setting Depth	Sacks of Cement	Estimated TOC
Same as original					

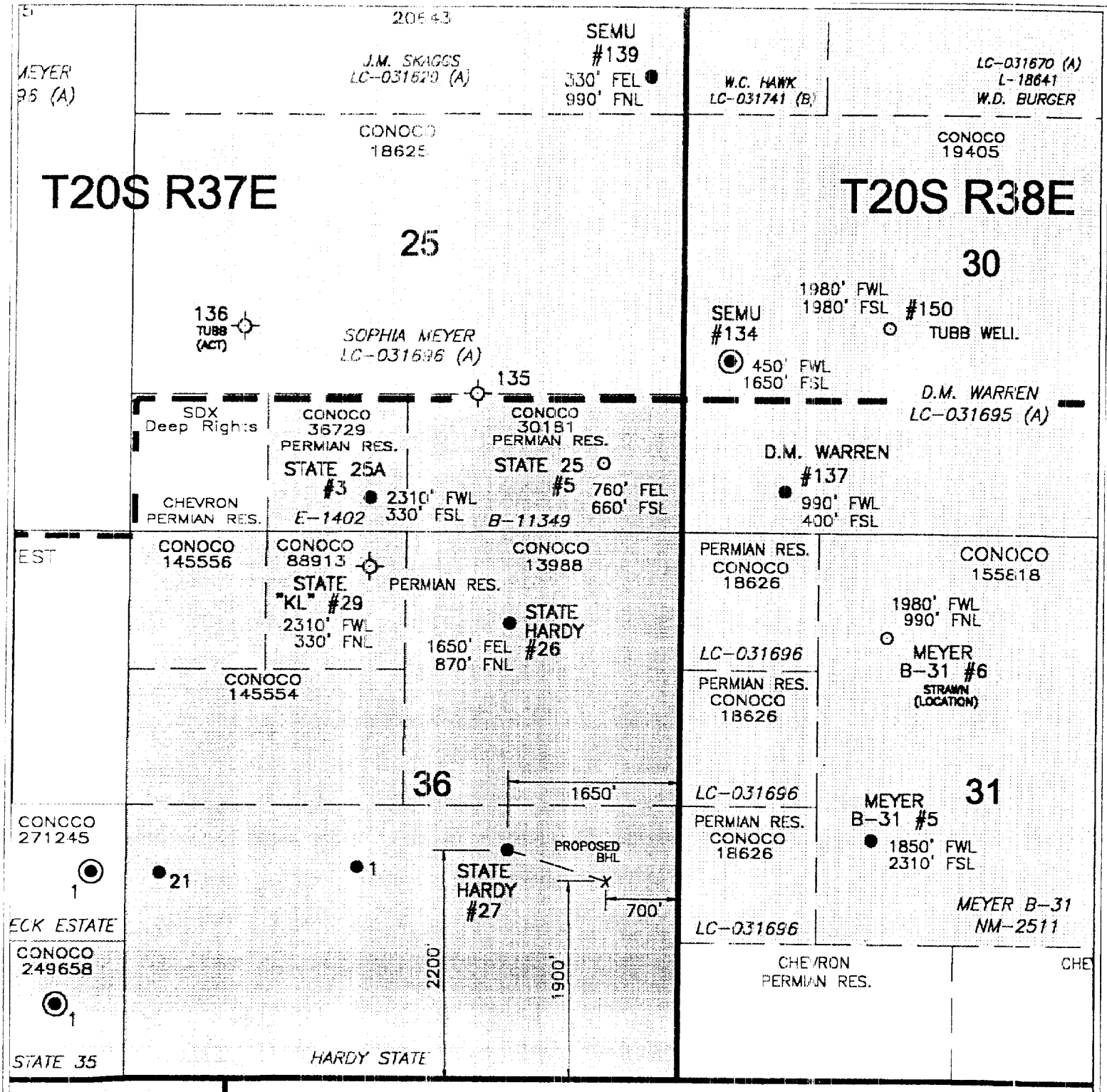
Describe the proposed program. If this application is to DEEPEN or PLUG BACK give the data on the present productive zone and proposed new productive zone. **Describe the** blowout prevention_program, if any._Use additional sheets if necrssary.

Conoco proposes to horizontal drill this well using the attached procedure. See attached NSL Order # 4430-A

Permit Expires 1 Year From Approval
Date Unless Drilling Underway

Horizontal

23 I hereby cenify that the information given above is true and complute to the best of my knowledge and belief.	OIL CONSERVATION DIVISION
Signature: Kay Maddox	Approved by: Orig. Signed by Paul Kautz Geologist
Printed name: Kay Maddox	Title:
Title: Regulatory Agent	Approval Date: Expiration Date:
Date: February 1, 2001 / Phone (915) 686-5798	Conditions of Approval: Attached



NOTES

- CONOCO FEDERAL LEASE
- CONOCO STATE LEASE
- CONOCO LEASE
- ● ACTIVE STRAWN WELL
- o PROPOSED STRAWN WELL
- -☼- DRY STRAWN WELL
- ◉ INACTIVE STRAWN WELL

DATE: 10/19/2000
DRAWN BY: glg
CHECKED BY:
APPROVED BY:
SCALE: 1" = 1320'
STATE PLANE COORDINATES REFERRED TO NAD27 -- NEW MEXICO EAST STATE PLANE COORDINATES ZONE -- 3001

CONOCO EXPLORATION PRODUCTION AMERICAS

HARDY STATE #27
SECTION 36, T-2-S, R-37-E
LEA COUNTY
NEW MEXICO

STATE	API COUNTY	WELL	DRAWING
30	025	-	HARD3627

CONOCO INC. OFFICE
0 DESTA DRIVE WEST
MIDLAND, TEXAS 79705

District I
PO Box 1980, Hobbs. NM 88241-1980

District II
PO Drawer DD, Artesia, NM 88211-0719

District III
1000 Rio Brazos Rd. Aztec, NM 87410

District IV
PO Box 2088, Santa Fe. NM 87504-2088

State of New Mexico
Energy, Minerals & Natural Resources Department

OIL CONSERVATION DIVISION
PO Box 2088
Santa Fe, NM 87504-2088

Form C-102
Revised February 21, 1994
instructions on back
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State Lease - 4 Copies
Fee Lease - 3 Copies

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

API Number	2 Pool Code	3 Pool Name
30-025-34794	96893	North Hardy Strawn

4 Property Code	5 Property Name	6 Well Number
13396	Hardy "36" State	#27

7 OGRID No.	8 Operator Name	9 Elevation
005073	Conoco Inc., 10 Desta Drive, Ste. 100W, Midland, TX 79705-4500	3493'

10 Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
J	36	20S	37E		2200'	South	1650'	East	Lea

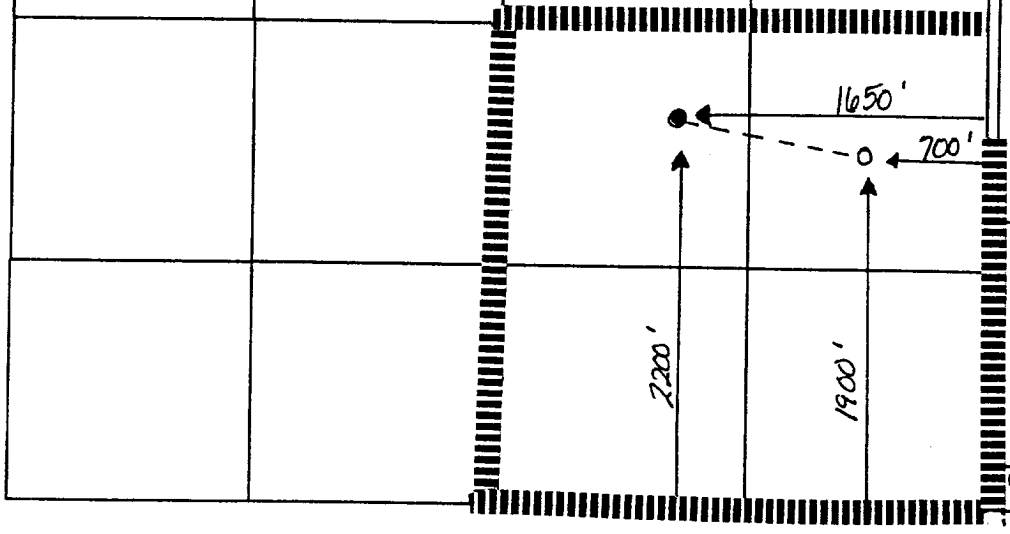
11 Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
I	36	20S	37E		1900'	South	700'	East	Lea

12 Dedicated Acres	13 Joint or Infil	14 Consolidation Code	15 Order No.
160			NSL-4430-A (BHL) Amendment To NSL #4430

NO ALLOWABLE WILL BE ASSIGNED TO THIS COMPLETION UNTIL ALL INTERESTS HAVE BEEN CONSOLIDATED OR A NON-STANDARD UNIT HAS BEEN APPROVED BY THE DIVISION

16



17 OPERATOR CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief

Kay Maddox

Signature

Kay Maddox

Printed Name

Regulatory Agent

Title

October 3, 2000

Date

18 SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

Date of Survey

Signature and Seal of Professional Surveyor:

Certificate Number

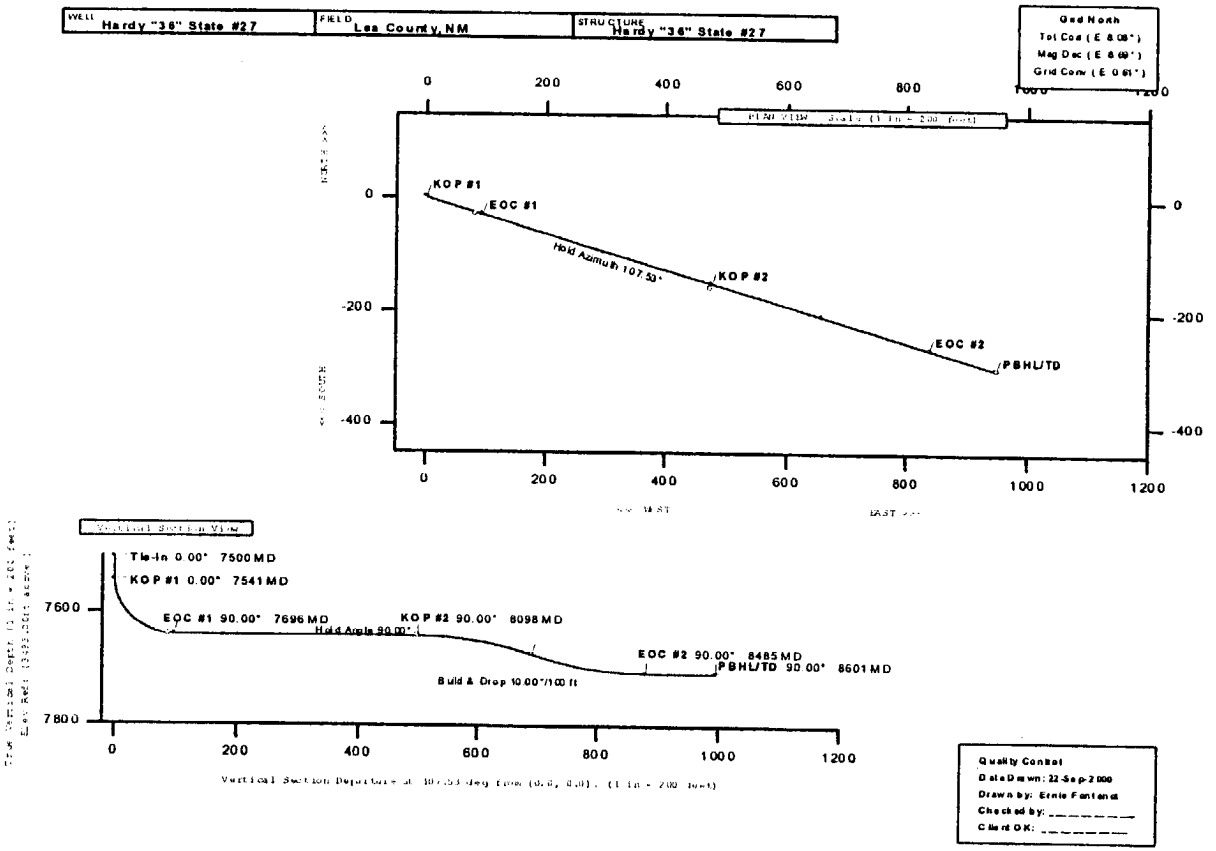
Schlumberger

Proposed Well Profile

Client:	Conoco	**Survey Computation Method:**	Minimum Curvature
Field:	Lea County, NM	**DLS Computation Method:**	Lubinski
Structure:	Hardy "36" State #27	**Vertical Section Azimuth:**	107.530°
Well:	Hardy "36" State #27	**Vertical Section Origin:**	N 0.000 ft, E 0.000 ft
Borehole:	Hardy "36" State #27	**TVD Reference:**	3493.0 ft above
UWI/API#:		**Magnetic Declination:**	8.690°
Date:	September 22, 2000	**Total Field Strength:**	49943.071 nT
Grid Convergence:	0.60842825°	**Dip:**	60.871°
Scale Factor:	1.00004835	**Declination Date:**	September 28, 2000
Location:	N 32 31 43.000, W 103 12 7.000	**Magnetic Declination Model:**	BGGM 1999
:	N 557872.538 ftUS, E 848707.175 ftUS	**North Reference:**	Grid North
Coordinate System:	NAD27 New Mexico State Planes, Eastern Zone, US Feet	**Coordinate Reference To:**	Structure Reference Point

Station ID	MD (ft)	Incl (°)	Azim (°)	TVD (ft)	VSec (ft)	N/-S (ft)	E/-W (ft)	Closure (ft)	at Azim (°)	DLS (°/100ft)	TF (°)
Tie-In	7500.00	0.00	107.53	7500.00	0.00	0.00	0.00	0.00	0.00	0.00	107.5MTF
KOP #1	7541.21	0.00	107.53	7541.21	0.00	0.00	0.00	0.00	0.00	0.00	107.5MTF
	7600.00	34.10	107.53	7596.59	16.98	-5.11	16.19	16.98	107.53	58.00	0.0
EOC #1	7696.39	90.00	107.53	7640.00	98.79	-29.75	94.20	98.79	107.53	58.00	0.0
	7700.00	90.00	107.53	7640.00	102.40	-30.84	97.65	102.40	107.53	0.00	0.0
	7800.00	90.00	107.53	7640.00	202.40	-60.95	193.01	202.40	107.53	0.00	0.0
	7900.00	90.00	107.53	7640.00	302.40	-91.06	288.37	302.40	107.53	0.00	0.0
	8000.00	90.00	107.53	7640.00	402.40	-121.17	383.72	402.40	107.53	0.00	0.0
KOP #2	8097.60	90.00	107.53	7640.00	500.00	-150.56	476.79	500.00	107.53	0.00	180.0
	8100.00	89.76	107.53	7640.01	502.40	-151.28	479.08	502.40	107.53	10.00	180.0
	8200.00	79.76	107.53	7649.13	601.86	-181.23	573.92	601.86	107.53	10.00	180.0
	8291.50	70.61	107.53	7672.50	690.22	-207.84	658.18	690.22	107.53	10.00	0.0
	8300.00	71.46	107.53	7675.26	698.26	-210.26	665.85	698.26	107.53	10.00	0.0
	8400.00	81.46	107.53	7698.64	795.36	-239.50	758.44	795.36	107.53	10.00	0.0
EOC #2	8485.40	90.00	107.53	7705.00	880.44	-265.12	839.57	880.44	107.53	10.00	113.9
	8500.00	90.00	107.53	7705.00	895.04	-269.52	853.50	895.04	107.53	0.00	113.9
	8600.00	90.00	107.53	7705.00	995.04	-299.63	948.86	995.04	107.53	0.00	113.9
PBHL/TD	8601.20	90.00	107.53	7705.00	996.24	-300.00	950.00	996.24	107.53	0.01	0.0

Survey Program: *(No Error Model Selected)*


WELL
Hardy "36" State #27
FIELD
Lea County, NM
STRUCTURE
Hardy "36" State #27
Grid North
Tot Cor (E 8.08°)
Mag Dec (E 8.69°)
Grid Conv (E 0.61°)
KOP #1
EOC #1
Hold Azimuth 107.53°
KOP #2
EOC #2
PBHL/TD
Vertical Section View
Tie-In 0.00° 7500 MD
KOP #1 0.00° 7541 MD
EOC #1 90.00° 7696 MD
Hold Angle 90.00°
KOP #2 90.00° 8098 MD
EOC #2 90.00° 8485 MD
PBHL/TD 90.00° 8601 MD
Build & Drop 10.00°/100 ft
Quality Control
Date Drawn: 22-Sep-2000
Drawn by: Ernie Fontenot
Checked by:
Client OK:

Hardy 36 State #27
South Cass (Strawn) Field
Lea County, New Mexico

Drilling Procedure

January 2001

Contact List		
Drilling Engineer	David DeLaO	Work: 915-686-5432 Home: 915-520-7387 Pager: 877-527-5190
Drilling Engineer (Backup)	Yong Cho	Work: 915-686-6524 Home: 915-694-8133 Mobile: 915-425-4321
Production Foreman	Larry Johansen	Work: 915-686-5533 Home: 915-682-0543 Pager: 800-573-9601
Field Production Supervisor	Bob Pauli	Work: 505-391-3127 Mobile: 505-390-3413 Pager: 800-588-4606
Production Engineer	Mike O'Connor	Work: 915-686-6124 Home: 915-684-6750
Geologist	Joe Huck	Work: 915-686-5715 Home: 915-699-5619
Geologist	Brandi Sellepack	Work: 915-686-6553 Home: 915-697-5919
Materials	Peggy James-Marszal	Work: 915-686-5783
Asset Manager	Pete Miller	Work: 915-686-6161 Home: 915-697-5129 Pager: 800-999-6710 pin# 9986211
Shear Safety & Health Coordinator	Tad Buchanan	Work: 915-686-5447 Home: 915-697-6500 Pager: 800-999-6710 pin# 9972927
Shear Environmental Coordinator	Neal Goates	Work: 915-686-5488 Home: 915-520-9027 Pager: 800-999-6710 pin# 9956302
Field Safety Representative	Leo Gatson	Work: 915-686-5427 Home: 915-550-9228 Pager: 800-573-9602
Field Safety Representative	John Coy	Work: 915-676-2371 (X-20) Home: 505-394-2955 Pager: 800-413-5097

Vendor List			
Service	**Vendor**	**Telephone Number**	**Contact / Location**
Conoco Supervision	Conoco Trailer House	On-site: 915-556-5329	
Rig Contractor	Key Energy	Office 915-570-5721	Odessa, Texas
	Rig #115	Rig 915-556-xxxx	
BOP	Star Tools	Office: 505-397-1533	John Brown - Hobbs
BOP Testers	Monahans Nipple Up	Office: 915-943-7643	
Bits (Tricone)	Smith	Office: 915-337-5541	Robert Morris
	Reed	915-561-5161	Dean Setzler
	Hughes	915-498-9898	Scott Williams
Cementing Services	BJ	Office: 505-392-5556 Fax: 915-392-7307	
Casing/Drillpipe Inspection	Hobbs Rental	Office: 505-393-3085	
Conductor / Cellar	Abbott Brothers Rat Hole Service	Office: 505-393-8866	
Corrosion Control	Corrosion Ltd.	Office: 800-669-8023	Tommy Furrow
Directional Drillers	Anadrill	Office: 915-563-3057	Travis Shacklett
Drillpipe	Quail Rentals	Office: 915-366-1491	David Blair
Ground Beds	Hobbs Anchor Service	Office: 505-393-5718	
H2S Equipment	Callaway Safety	Office: 505-392-2973	
Locations / Roads	Walton Construction	Office: 505-393-3174	Hobbs
		Mobile 505-390-4191	Clury Flowers
Mud and Chemicals	MI Drilling Fluids	Office: 915-683-2065	Tom Jones
	Lone Star Distribution	Office: 505-392-4932	
Mud Loggers	Advance Mud Logging	Office: 915-683-6276	Vic Frigow
New Mexico Oil Commission	NMOCD	Office: 505-393-6161	Hobbs
Open Hole Electric Logs	Schlumberger Wireline & Testing	Office: 915-694-0000	
Pickup/Laydown Service	Weatherford	Office: 915-530-4900	
Rotating Head	Smith Tools	Office: 915-550-2322	
Roustabout Crews	Dawson	Office: 505-393-9171	
Septic Service	Crown Equipment Rental	Office: 915-366-9522	
Supplies	National-Oilwell	Office: 505-393-2141	
Survey	Scientific Drilling	Office: 915-563-1339	
Trailer	Frontier Mobile Housing, Inc.	Office: 915-362-2594	
Trash Trailer	Hobbs Rental	Office: 505-393-3085	
Water Hauling	Pool Trucking	Office: 505-392-2577	First Call
	Pate Trucking	Office: 505-397-6264	Second Call
Wellhead	Wood Group	Office: 915-368-0661	
Whipstock	Smith Tools	Office: 915-550-2322	

General Information:

Lease:	Hardy 36 State	AFE No.:	9020
Well No.:	27H	AFE Total:	$402M
Field:	South Cass (Strawn)	AFE Dry/Susp:	$305M/$305M
County	Lea	AFE Compl:	$97
State:	New Mexico	AFE RLE:	$0M
Section:	36	AFE Type:	05 Development Drlg
Township:	20S	Budget Proj. No.:	D510500
Range:	37E	Conoco WI:	100%
Surface Location:	2,200' FSL & 1,650' FEL	Lease Code:	6863269
BH Location:	xxxxx		
Elevation:	3,493'		
Permit No.:	xxxxx		
Permit TD:	xxxxx		
Proposed TD:	8,601' MD/7,705' TVD		
API No.:	30-025-34794		
Rig Contractor:	Key Energy Services		
Rig Number:	#115		
Est Drilling Days:	14 (MIRU to rig release)		

Project Overview:

The project's objective is to drill a horizontal lateral with a vertical section of 996' in the Strawn formation. The well currently produces from perforations in the Strawn using a submersible pump system. The well was drilled in February 2000. A pulling unit will be used to prepare the wellbore. This will entail laying down the submersible pump; running a gyroscope to survey the wellbore and setting a big bore packer which will support the whipstock.

Key Rig #115 will be used to carry out the remainder of the project. After setting a whipstock, a window will be milled. A 99' radius curve will be drilled and landed at 90°. The lateral will be drilled horizontally until reaching a vertical section of 500' where it will be drilled downward and potentially landed horizontally towards the end of the lateral. A fresh water fluid system will be used. If needed, lubricants and beads will be used to improve the penetration rate. After drilling the lateral, the well will be logged using drillpipe conveyed tools. The whipstock will be left in place to be used to complete the well. It will be retrieved at the end of the completion phase to produce from below the lateral.

Special Drilling Considerations:

1. The location is already built but will require some modification prior to commencing operations. The work pits will be covered and submersible pump surface equipment will have to be removed. The electrical sub pump equipment shall be disconnected by a certified electrician.

2. Assure that all drillpipe and drill collars delivered to location has been inspected and that the appropriate inspection documents are readily available.

3. Run corrosion rings in the drillpipe. Replace rings on each trip and monitor effectiveness of corrosion treatments. Record results on morning reports. Monitor corrosion rates and assure a rate of < 2 lbs/ft^2/yr.

4. Do not run hardbanded/hardfaced drillpipe in casing.

5. Key Energy is required to furnish H2S training for all the drilling crews. Equip the rig/location with the following equipment as a minimum but not limited to:

    1. Post a copy of the ROE calculations worksheet in the "doghouse", Tool Pusher's and Conoco Drilling Supervisor's living quarters.
    2. Four channel AC/DC electronic monitor with sensor heads at the flow line, pit, bell nipple and rig floor.
    3. Lighted wind socks.
    4. Fixed warning light and audible alarm set at 10 – 15 ppm H_2S.
    5. Portable H_2S sample pump with low-high range tubes, or Portable H_2S detector.
    6. Two, 30 minute work, rescue SCBA units.
    7. Six, 5 minute escape units, hood type.
    8. Entrance sign: "Caution – Poison Gas May be Present" with flags.
    9. Briefing area sign(s).
    10. H_2S training for all personnel on location.
    11. Facial hair policy to be enforced at all times.

SHEAR Considerations:

1. Notify the NMOCD (505-393-6161) 24 hours prior to starting project. The contact should be documented on the IADC Drilling Report and on the Conoco Daily Drilling Report. Include the date, time and person contacted.

2. All potential loss of well control and/or spills of formation fluids must be reported to the necessary governing agency(ies) and the drilling engineer immediately. The drilling engineer will notify Conoco SHEAR and management as required.

3. Material Safety Data Sheets (MSDS) must be maintained on location for all materials and fluids except for standard lubricants.

4. Complete and submit SARA III forms at the end of the project.

5. Contractor shall immediately provide verbal notification to Conoco of accidents involving personal injury, fire, explosions, spills or releases of substances that occur at the work site and shall within (24) twenty-four hours after the occurrence, provide the drilling supervisor with a written accident report. Notify the drilling engineer immediately.

6. BOPs should be function tested once per week or on each trip. Pressure test all BOP equipment **every two weeks.** Document all tests on the IADC and Conoco drilling reports.

7. The drilling supervisor and toolpusher will have BOP drills with each tour daily. Document all drills on the IADC and Conoco drilling reports.

8. The choke manifold will have two remote hydraulically operated chokes and a hydraulically operated flowline valve.

9. A SPCC plan will be required. Key Energy should have a plan in place for Rig #115. Rig personnel should become familiar with the plan in an event of a spill.

10. A certified electrician should disconnect the sub pump equipment prior to beginning the pre-work. Follow proper lock out/tag out procedures.

11. Complete and file Hot Work Permits and Confined Space Permits as required. A copy of each permit should be sent to the drilling engineer upon releasing the rig. Assure that all personnel involved in confined space entry work are adequately trained with their respective responsibilities.

12. An Emergency Response Plan (ERP) for Hobbs Drilling Operations should be on location and posted in the doghouse, toolpushers' quarters and rig supervisors' quarters. Follow the directions provided with the plan. Prior to spudding the well, designate an area near the rig site that will serve as a staging area as outlined on the ERP.

Wellbore Preparation:

OBJECTIVE:

The objective of this phase is to prepare the wellbore for the work to be performed by the drilling rig. A pulling unit will execute this work. The phase will consist of laying down the submersible pump equipment and tubing; surveying the well with a gyroscope and setting a big bore packer

FORMATION TOPS:

Formation Name	Depth	Remarks
Strawn	7,627' – 7,647' (OA)	Perforated interval
Strawn	7,684' – 7,724' (OA)	Perforated interval

DRILLING FLUID:

Use fresh water to conduct all the work in this phase. If pressure becomes a problem, use a fresh water/brine mixture to achieve the desired. The Strawn reservoir pressure is estimated at 2,400 to 2,800 psi (6.1 to 7.1 ppge).

BITS/MILLS:

Use a 6-1/8" watermelon mill and dress mill to assure a clean wellbore.

BOTTOMHOLE ASSEMBLY & DRILLSTRING:

The well is currently equipped with 238 jts (+/- 7,524') of 2-7/8", 6.5#, L80, EUE tubing + 6' - 2-7/8", 6.5#, L80, EUE sub + 44' long sub pump and motor assembly + 7565' of #4 ESP cable. Lay down all sub pump equipment and tubing. Install thread protectors on the tubing.

SURVEYS:

Scientific Drilling will conduct a gyroscope survey from TD to surface. Data from this survey will be used to derive the actual wellpath. Scientific Drilling will also take the azimuth reading of the keyway in the big bore packer.

CASING DESIGN:

The casing currently in the well is 7", 23#, USS-95/P-110, LT&C casing. The burst and collapse ratings are as follows:

Burst:	8,720 psi	Max load:	6,100 psi
Collapse:	5,650 psi	Max load:	4,520 psi

WELLHEAD:

The wellhead is equipped with Wood Group equipment. The tree has been removed and a Hercules submersible wellhead is mounted on the 7-1/16", 5M x 11", 5M tubing head. No service work should be required on the wellhead.

CASING AND BOP PRESSURE TEST:

Nipple up a 7-1/16", 3M triple BOP (blinds + 2-7/8" ram + 2-7/8" ram w/ sub pump cable). Follow the procedure below in nippling up and testing the BOP.

WELLBORE PREPARATION PROCEDURE:

1. Prior to moving in the pulling unit, a backhoe should back drag the location and prepare the site. The work pits should be filled. Check all anchors and assure test date prior to rigging up.

2. MIRU Pool DDPU. Lay and tie down blow down lines from the casing to the reserve pit. Bleed off pressure. Kill well with 200 bbls FW down casing to keep well from gassing.

3. ND Hercules adapter and 7-1/16", 5K bolt on flange. NU 7-1/16", 3K BOP (triple).

4. MIRU Baker Centrilift spoolers. POOH. Stand back tubing and spool cable. Lay down submersible pump equipment. Have equipment transported to Baker Centrilift shop for testing and servicing.

5. Prepare to test BOP. Set 7" plug for TCM profile plug in tubing head. Test BOPs to 2,500 psig (high) and 250 psig (low). Report results.

6. RIH w/ Smith's 6-1/8" watermelon mill + dress mill on tubing. Run mills to PBTD (7,799'). POOH and LD tubing and mills. Install thread protectors and rack tubing off location.

7. Prepare to set Smith Millennium Big Bore packer. MIRU Baker Wireline. Install lubricator. RIH w/ packer and GR/CCL. Correlate GR/CCL to Schlumberger Natural Gamma Ray (3/18/00). Set packer at 7,547'. PU Scientific Drilling gyro w/ Smith orientation survey lug tool on end of gyro. Lower and sting into packer. Take azimuth reading. Repeat until 3 consistent readings are recorded. Record reading on daily report. Survey well from packer depth to surface. Verify lead pin on the survey lug tool has sheared. RD and release Scientific Drilling and Baker Hughs.

8. ND BOP. NU wellhead. Clean location. RD and release Pool rig.

WINDOW CONSTRUCTION (7,529' – 7,541'):

OBJECTIVE:

A single window will be milled using Smith's Trackmaster system. The window will be milled from 7,529' to 7,541'. The window will be milled in the Strawn dolomite. The proposed BHA (milling system) should be effective milling the casing and approximately 6' of rat-hole.

FORMATION TOPS:

Formation Name	Formation Top	Remarks
Strawn	7,530' (MD)	Window located below shale

DRILLING FLUID:

The window will be milled using fresh water. Assure that a pH of 9.5 or greater is maintained. Pour and pump 1 –3 gallon sweep of Xan-Vis L down drillpipe as needed to sweep wellbore. Use two ditch magnets to reduce metal concentration in the system.

BITS/MILL:

					Estimated		Recommended	
Run #	Mill Size	Mill Type	Manufac.	*Ftg	*Hrs	ROP	WOM	RPM
1	6.125"	Lead	Smith	15	10	-	2/12	60/120
1	5.875"	Follow	Smith	15	10	-	2/12	60/120
1	6.125"	Dress	Smith	15	10	-	2/12	60/120

* Total footage and hours

BOTTOM HOLE ASSEMBLY & DRILLSTRING:

	Drill Pipe		Connection		
Component	O.D.	I.D.	O.D.	I.D.	Length
Smith Trackmaster Whipstock w/ mills	5.38"	-	-	-	14.98'
Lead/Follow/Dress mills	6.13"	-	-	-	7.07'
3-1/2",13.30# DP w/ NC-38 conn	3.50"	2.76"	5.00"	2.125"	7,725.00'

HYDRAULICS PROGRAM:

The hydraulics presented below is for an 8.5 ppg fluid system. This is only to serve as a guide. The actual conditions at the well site will determine the actual flow rates required.

Mud Weight (ppg)	Meas. Depth (feet)	Flow Rate (gpm)	Nozzle Size (32nds)	*ΔP Mill (psi)	ΔP DP (psi)	ΔP Annulus (psi)	ΔP Total (psi)	Min. A.V. (fpm)
8.5	7,550	225	n/a	200	825	41	1,080	195

* Estimated pressure drop

Estimated Drilling Loads at 7,550' (excludes block weight):

Pick-up ..... 104 M lbs
Slack-off..... 92 M lbs
Rotating..... 98 M lbs
Milling ..... 94 M lbs (4 M lbs WOB, 100 rpm and 5,000 ft-lbs torque at mill)

SURVEY:

No surveying will be required during this phase.

CASING AND BOP PRESSURE TEST:

Nipple up 7-1/16", 5K Shaffer LWS double (blind/3-1/2" ram) and 5K Hydril GK annular with 5K lower connection. Install Grant Model 7368 rotating head with load bearing table. Pressure test the equipment as follows:

Casing Size	Shoe Depth	Min BOP Size	Min BOP Rating	Min Arrang.	BOP Test Press High	Low	Annular	Csg Test PSI/min
7"	8,000'	7-1/16"	5,000 psi	RRAG	3,000	250	1,000	NA

Record test information on daily report.

PROCEDURE:

1) PU Smith Trackmaster whipstock system w/ latch. Makeup whipstock face/latch keyway to orient whipstock face to 107.53° (this azimuth may change once the gyro survey is taken). RIH w/ whipstock and latch into packer. Pull up and confirm latch in.

2) Mark drillpipe for milling start distance. Set 15K lbs force down on the break bolt to shear. Position mill 2-3 ft above whipstock and begin rotation. Note rotary speed, torque and circulation pressure. The recommended values are 2-7 Klbs WOB and 60-120 rpm.

3) The window will be complete after milling/drilling a total of 14'-16'. This will give a window height of ±10' with 6'-8' of penetration outside of the casing. Assure good returns throughout milling operations. Consider pumping LCM should returns are loss. Circulate clean and sweep as needed.

4) POOH LD mills and release Smith.

BUILD SECTION (7,541' – 7,696'):

OBJECTIVE:

Drill a 150 ft radius curve with a 6-1/8" bit from 7,541' (7,541' TVD) to 7,696' MD (7,640' TVD). The expected build rate is 58°/100'. The curve will be landed at a 90° inclination. The projected azimuth is 107.53° (true). The pore pressure gradient can range from 6.1 ppge to 7.1 ppge. It is proposed to drill the build section with 8.34 ppg fluid (fresh water) unless conditions dictate otherwise.

FORMATION TOPS:

Formation Name	Formation Top	Remarks
Shale	7,530' MD	Bottom of shale
Strawn	7,530' MD	

DRILLING FLUID:

Continue to use the fluid system used to mill the window adding fresh water as needed. Monitor the fluid's pH and maintain in a range from 9 to 10. Add MF-55 to flocculate drilled solids and reduce friction of the drilling fluid. For solids control, divert returns through shale shaker. Although not expected to be a problem, additional solids control equipment should be considered if solids content cannot be maintained to less than 3%. Pour and pump 1 – 3 gallons of Xan-Vis L down drillpipe to sweep hole if deemed necessary.

BIT:

Either of the following bits is recommended to drill the curve section.

				Estimated			Recommended		
Bit Size	Bit Type	Manufac.	IADC	Ftg	Hrs	ROP	WOB	RPM	Jets
6-1/8"	XR-30TYPS	Smith	547Y	155	31	5	20	180	3x13
6-1/8"	STR-30C	Hughes	537Y	155	31	5	20	180	3x13
6-1/8"	SL-62KPR	Reed	627Y	155	31	5	20	180	3x13

BOTTOM HOLE AND DRILL STRING ASSEMBLY:

	Drill Pipe		Connection		
Component	O.D.	I.D.	O.D.	I.D.	Length
Bit w/ 3-1/2" Reg conn	6.13"	-	-	-	0.75'
A475M motor set @ 3.68°	4.75"	3.75"	-	-	9.62'
Float sub w/ NC-38 conn	4.75"	2.25"	-	-	2.00'
Flex NMDC w/ NC-38 conn	4.75"	2.25"	-	-	31.00'
UBHO w/ NC-38 conn	4.75"	2.25"	-	-	2.15'

Flex NMDC w/ NC-38 conn	4.75"	2.25"	-	-	31.00'
X-O sub w/ NC-38 x PH-6 conn	4.75"	2.00"	-	-	2.00'
2-7/8",7.9#,S-135,PH-6 tubing	2.88"	2.26"	3.44"	2.27"	1,300.00'
2-7/8" PH-6 conn X NC-38 conn xover	2.88"	2.26"	5.00"	2.13"	2.00'
3-1/2",13.30#,S135 DP w/ NC-38 conn	3.50"	2.76"	5.00"	2.13"	6,000.00'

HYDRAULICS PROGRAM:

The hydraulics presented below is for a 8.5 ppg fluid system. This is only to serve as a guide. The actual conditions at the well site will determine the actual flow rates and nozzle sizes required.

Mud Weight (ppg)	Meas. Depth (feet)	Flow Rate (gpm)	Nozzle Size (32nds)	ΔP Bit (psi)	*ΔP DP (psi)	ΔP Annulus (psi)	ΔP Total (psi)	Min. A.V. (fpm)
8.5	7,696	225	3 x 13	234	1,106	39	1,394	171

* Assume 250 psi pressure drop across motor and 100 psi for MWD

ECD: 8.6 ppg

Estimated Drilling Loads at 7,696' (excludes block weight):

Pick-up..... 101 M lbs
Slack-off..... 87 M lbs
Rotating ..... Not applicable in build section
Drilling ..... 74 M lbs (20 M lbs WOB, 100 rpm and 5,000 ft-lbs torque at bit)

SURVEY PROGRAM:

Use Scientific Drilling's 1.85" OD gyro (this size tool has a heat shield) to kick off (up to 5° inclination or 10' away from casing). Use MWD to survey remainder of curve.

LOGGING:

Mud loggers will take samples in this section of the hole.

CASING PROGRAM:

None planned for this section of the hole.

LATERAL SECTION (7,696' – 8,601'):

OBJECTIVE:

Drill a ±905' horizontal lateral (996' vertical section) ending with a 90° inclination and 107.53° azimuth (grid). The lateral will be drilled from 7,696' MD (7,640' TVD) to 8,601' MD (7,705' TVD). Mid way the TVD of the lateral will be deepened to contact the lower Strawn.

Pore pressure is expected to range from 6.1 ppge to 7.1 ppge. A gamma ray log will be recorded while drilling. After drilling the lateral, the lateral will be logged using drillpipe conveyed logging tools. No casing will be run in the wellbore.

FORMATION TOPS:

Formation Name	Formation Top	Remarks
Strawn (upper)	7,627' (MD)	@ VS = 0'
Strawn (lower)	7,684' (MD)	@ VS = 0'

DRILLING FLUID:

Continue to use the fluid system used to drill the curve. Add fresh water as needed. Monitor the fluid's pH and maintain it in a range from 9 to 10. Add MF-55 to flocculate drilled solids and reduce friction of the drilling fluid. For solids control, divert returns through shale shaker. Although not expected to be a problem, additional solids control equipment should be considered if solids content cannot be maintained to less than 3%. Pour and pump 1 – 3 gallons of Xan-Vis L down drillpipe to sweep hole if deemed necessary.

Should torque and drag loads become excessive, add Alpine's Aqua Lube in concentrations of 1 to 3% by volume. Consider reducing pit volume to defray product cost. If drag and torque persists and shale **has not** been exposed, add Alpine Drill Beads in a 3 -- 4 ppb concentration.

BIT:

Either of the following bits is recommended to drill the curve section.

				Estimated			Recommended		
Bit Size	Bit Type	Manufac.	IADC	Ftg	Hrs	ROP	WOB	RPM	Jets
6-1/8"	XR-30TYPS	Smith	547Y	450	38	12	20	200	3x13
6-1/8"	STR-30C	Hughes	537Y	450	38	12	20	200	3x13
6-1/8"	SL-53KPR	Reed	537Y	155	31	5	20	180	3x13

BOTTOM HOLE AND DRILL STRING ASSEMBLY:

Component	Drill Pipe O.D.	Drill Pipe I.D.	Connection O.D.	Connection I.D.	Length
Bit w/ 3-1/2" Reg conn	6.13"	-	-	-	0.75'
A475M motor set @ 1.83°	4.75"	3.75"	-	-	14.00'
Flex pony w/ NC-38 conn	4.75"	2.25"	-	-	5.00'
Float sub w/ NC-38 conn	4.75"	2.25"	-	-	2.00'
UBHO sub w/ NC-38 conn	4.75"	2.25"	-	-	2.00'
Flex NMDC w/ NC-38 conn	4.75"	2.25"	-	-	31.00'
Flex NMDC w/ NC-38 conn	4.75"	2.25"	-	-	31.00'
X-O sub w/ NC-38 x PH-6 conn	4.75"	2.00"	-	-	2.00'
2-7/8",7.9#,S-135,PH-6 tubing	2.88"	2.32"	3.44"	2.27"	1,300.00'
2-7/8" PH-6 conn X NC-38 conn Xover	2.88"	2.32"	5.00"	2.13"	2.00'
3-1/2",13.30#,S135 DP w/ NC-38 conn	3.50"	2.76"	5.00"	2.13"	8,300.00'

HYDRAULICS PROGRAM:

The hydraulics presented below is for a 8.5 ppg fluid system. This is only to serve as a guide. The actual conditions at the well site will determine the actual flow rates and nozzle sizes required.

Mud Weight (ppg)	Meas. Depth (feet)	Flow Rate (gpm)	Nozzle Size (32nds)	ΔP Bit (psi)	*ΔP DP (psi)	ΔP Annulus (psi)	ΔP Total (psi)	Min. A.V. (fpm)
8.5	8,601	225	3 x 13	234	1,360	92	1,699	203

* Assume 210 psi pressure drop across motor and 90 psi for MWD

ECD: 8.7 ppg

Estimated Drilling Loads at 8,601' (excludes block weight):

Pick-up..... 152 M lbs
Slack-off..... 121 M lbs
Rotating ..... 136 M lbs
Drilling ..... 115 M lbs (20 M lbs WOB, 110 rpm and 1,000 ft-lbs torque at bit)

SURVEY PROGRAM:

Use the MWD to survey the lateral as needed (every connection).

LOGGING:

A GR log will be recorded while drilling. Mud loggers will take samples in this section of the hole.

Schlumberger's Tough Logging Condition System (TLC) will be used to log the open hole section. **A 24 hr notice is required (tools are located in Victoria, Texas).** The following procedure should be used to run the suite of logs.

1. Pick up Schlumberger tools. The total length is 56.6' with a max diameter of 2.75". Tools include LithoDensity/Compensated Neutron/GR/Caliper. Assure shock absorber is installed and operational.
2. Add wet connector and cable latch assembly.
3. RIH w/ tools + 1300' of 2-7/8" PH-6 tubing. Makeup side door sub onto 2-7/8" tubing.
4. Pump down wet connect locomotive until connection with head is established. Check tools.
5. RIH w/ 3-1/2" drillpipe. Lower to TD.
6. Circulate 1-1/2 bottoms up. Assure lateral is free of hydrocarbon gas.
7. Begin logging operations (log will be taken while RIH and POOH).
8. POOH to side door sub. Retrieve latch and wireline.
9. POOH w/ remainder of tubing. POOH and LD Schlumberger tools.
10. RD & release Schlumberger.

CASING PROGRAM:

No casing will be run.

RDMO:

RIH w/ 7" RBP and drillstring. Lower and set RBP at 7,400'. Test RBP to 500 psig.

MIRU pickup/laydown machine. POOH and LD drillstring.

ND BOP and NU WH.

RD and release Key Rig #115.

APPENDIX

1. Proposed Wellbore Schematic
2. AFE Sheet
3. Day-Depth Curve
4. Cost-Depth Curve
5. Location Survey
6. Drilling Permit
7. Proposed Well Plan
8. Key Rig #115 Rig Plat
9. Key Rig #115 Inventory List
10. ROE Calculation Sheet
11. SARA III Form