

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT

Split Estate

## APPLICATION FOR PERMIT TO DRILL OR REENTER

1a. Type of work: <input checked="" type="checkbox"/> DRILL <input type="checkbox"/> REENTER		7. If Unit or CA Agreement, Name and No.
1b. Type of Well: <input checked="" type="checkbox"/> Oil Well <input type="checkbox"/> Gas Well <input type="checkbox"/> Other <input checked="" type="checkbox"/> Single Zone <input type="checkbox"/> Multiple Zone		8. Lease Name and Well No. Lizard Pot State Com #4H (38297)
2. Name of Operator Marbob Energy Corporation (14049)		9. API Well No. 30-015-38236
3a. Address P.O. Box 227, Artesia, NM 88211-0227	3b. Phone No. (include area code) 575-748-3303	10. Field and Pool, or Exploratory WC Williams Sink; Bone Spring (97650)
4. Location of Well (Report location clearly and in accordance with any State requirements.) At surface (UL I) - 990' FSL & 660' FEL 1650 FSL 750' FEL At proposed prod. zone BHL: 330' FSL & 660' FEL per 6/14/2010		11. Sec., T. R. M. or Bk. and Survey or Area SL: SEC 36, T19S-R31E BHL: SEC 1, T20S-R31E
14. Distance in miles and direction from nearest town or post office* About 6 miles from Halfway, NM		12. County or Parish Eddy County
15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drig. unit line, if any) 660'		13. State NM
16. No. of acres in lease SL: 320.00 BHL: 637.480	17. Spacing Unit dedicated to this well 240 200	
18. Distance from proposed location* to nearest well, drilling, completed, applied for, on this lease, ft.	19. Proposed Depth 9400 15799 TVD: 9405' MD: 15138'	20. BLM/BIA Bond No. on file NMB000412
21. Elevations (Show whether DF, KDB, RT, GL, etc.) 3497' GL	22. Approximate date work will start* 06/04/2010	23. Estimated duration 40 Days

## 24. Attachments

The following, completed in accordance with the requirements of Onshore Oil and Gas Order No. 1, must be attached to this form:

- |  |   |
|--|---|
| 1. Well plat certified by a registered surveyor.   | 4. Bond to cover the operations unless covered by an existing bond on file (see Item 20 above). |
| 2. A Drilling Plan.  | 5. Operator certification   |
| 3. A Surface Use Plan (if the location is on National Forest System Lands, the SUPO must be filed with the appropriate Forest Service Office). | 6. Such other site specific information and/or plans as may be required by the BLM.             |

25. Signature <i>Nancy T. Agnew</i>	Name (Printed Typed) Nancy T. Agnew	Date 05/04/2010
Title Land Department		
Approved by (Signature) /s/ Linda S. C. Rundell	Name (Printed Typed) /s/ Linda S. C. Rundell	Date SEP 27 2010
Title STATE DIRECTOR	Office NM STATE OFFICE	

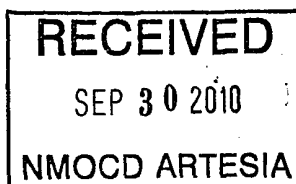
Application approval does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.

Conditions of approval, if any, are attached.

APPROVAL FOR TWO YEARS

Title 18 U.S.C. Section 1001 and Title 43 U.S.C. Section 1212, make 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.

\*(Instructions on page 2)

SEE ATTACHED FOR  
CONDITIONS OF APPROVALApproval Subject to General Requirements  
& Special Stipulations Attached

CAPTAN CONTROLLED WATER BASIN

DISTRICT I  
1625 N. FRENCH DR., HOBBS, NM 88240

State of New Mexico  
Energy, Minerals and Natural Resources Department

Form C-102

Revised October 12, 2005

Submit to Appropriate District Office

State Lease - 4 Copies

Fee Lease - 3 Copies

DISTRICT II  
1301 W. GRAND AVENUE, ARTESIA, NM 88210

OIL CONSERVATION DIVISION

11885 SOUTH ST. FRANCIS DR.  
Santa Fe, New Mexico 87505

DISTRICT III  
1000 RIO BRAZOS RD., AZTEC, NM 87410

DISTRICT IV  
11885 S. ST. FRANCIS DR., SANTA FE, NM 87505

WELL LOCATION AND ACREAGE DEDICATION PLAT

☐ AMENDED REPORT

API Number <b>30-016-38236</b>	Pool Code <b>97650</b>	Pool Name <b>WC Williams Sink; Bone Spring</b>
Property Code <b>38297</b>	Property Name <b>LIZARD POT STATE COM</b>	Well Number <b>4H</b>
OGRID No. <b>14049</b>	Operator Name <b>MARBOB ENERGY CORPORATION</b>	Elevation <b>3500'</b>

Surface Location

UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
I	36	19-S	31-E		1650	SOUTH	750	EAST	EDDY

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
P	1	20-S	31-E		330	SOUTH	660	EAST	EDDY
Dedicated Acres <b>240</b>		Joint or Infill		Consolidation Code		Order No.			

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

<p>GEODETIC COORDINATES NAD 27 NME</p> <p>SURFACE LOCATION Y=587517.3 N X=659269.5 E</p> <p>LAT.=32.614124° N LONG.=103.816078° W</p> <p>BOTTOM HOLE LOCATION Y=580919.6 N X=659392.4 E</p>	<p>T19S T20S</p> <p>LOT 4 LOT 3 LOT 2 LOT 1</p> <p>GRID. AZ=178°55'52" HORZ. DIST.=6600.5'</p> <p>SCALE: 1"=2000'</p>	<p><b>OPERATOR CERTIFICATION</b></p> <p>I hereby certify that the information herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.</p> <p><i>Nancy T. Agnew</i> 6/14/10 Signature Date</p> <p><b>Nancy T. Agnew</b> Printed Name</p> <p><b>SURVEYOR CERTIFICATION</b></p> <p>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.</p> <p>Date Surveyed Signature &amp; Seal of Professional Surveyor <i>Ronald J. Eidson</i> 6/04/2010 3239</p> <p>Certificate No. CARY G. EIDSON 12641 RONALD J. EIDSON 3239</p>
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JUN 07 2010

UNITED STATES **OCD-ARTESIA**  
DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT

FORM APPROVED  
OMB No. 1004-0137  
Expires: July 31, 2010

**SUNDRY NOTICES AND REPORTS ON WELLS**  
**Do not use this form for proposals to drill or to re-enter an  
abandoned well. Use Form 3160-3 (APD) for such proposals.**

5. Lease Serial No.  
SL: VO-6322, BHL: NMNM0057239  
6. If Indian, Allottee or Tribe Name

**SUBMIT IN TRIPLICATE** -- Other instructions on page 2.

7. If Unit of CA/Agreement, Name and/or No.

1. Type of Well

☒ Oil Well ☐ Gas Well ☐ Other

8. Well Name and No.  
Lizard Pot State Corn #4H

2. Name of Operator  
Marbob Energy Corporation

9. API Well No.

3a. Address

P.O. Box 227, Artesia, NM 88211-0227

3b. Phone No. (include area code)

575-748-3303

10. Field and Pool or Exploratory Area  
WC Williams Sink; Bone Spring

4. Location of Well (Footage, Sec., T., R., M., or Survey Description)  
SL: 1650' FSL & 750' FEL, Sec 36, T19S-R31E  
BHL: 330' FSL & 660' FEL, Sec 1, T20S-R31E

11. Country or Parish, State  
Eddy County, New Mexico

**12. CHECK THE APPROPRIATE BOX(ES) 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"/> Acidize	<input type="checkbox"/> Deepen	<input type="checkbox"/> Production (Start/Resume)	<input type="checkbox"/> Water Shut-Off
<input type="checkbox"/> Subsequent Report	<input type="checkbox"/> Alter Casing	<input type="checkbox"/> Fracture Treat	<input type="checkbox"/> Reclamation	<input type="checkbox"/> Well Integrity
<input type="checkbox"/> Final Abandonment Notice	<input type="checkbox"/> Casing Repair	<input type="checkbox"/> New Construction	<input type="checkbox"/> Recomplete	<input checked="" type="checkbox"/> Other <u>Location Change</u>
	<input type="checkbox"/> Change Plans	<input type="checkbox"/> Plug and Abandon	<input type="checkbox"/> Temporarily Abandon	
	<input type="checkbox"/> Convert to Injection	<input type="checkbox"/> Plug Back	<input type="checkbox"/> Water Disposal	

13. Describe Proposed or Completed Operation: Clearly state all pertinent details, including estimated starting date of any proposed work and approximate duration thereof. If the proposal is to deepen directionally or recompleat horizontally, give subsurface locations and measured and true vertical depths of all pertinent markers and zones. Attach the Bond under which the work will be performed or provide the Bond No. on file with BLM/BIA. Required subsequent reports must be filed within 30 days following completion of the involved operations. If the operation results in a multiple completion or recompleat in a new interval, a Form 3160-4 must be filed once testing has been completed. Final Abandonment Notices must be filed only after all requirements, including reclamation, have been completed and the operator has determined that the site is ready for final inspection.)

Marbob Energy Corporation respectfully requests approval for the following change in surface location:

From: 990' FSL & 660' FEL, Sec 36, T19S-R31E  
To: 1650' FSL & 750' FEL, Sec 36, T19S-R31E

14. I hereby certify that the foregoing is true and correct. Name (Printed/Typed)

Nancy T. Agnew

Title Land Department

Signature

*Nancy T. Agnew*

Date 06/14/2010

**THIS SPACE FOR FEDERAL OR STATE OFFICE USE**

Approved by

/s/ Linda S. C. Rundell

**STATE DIRECTOR**

Title

Date

SEP 2 2010

Conditions of approval, if any, are attached. Approval of this notice does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.

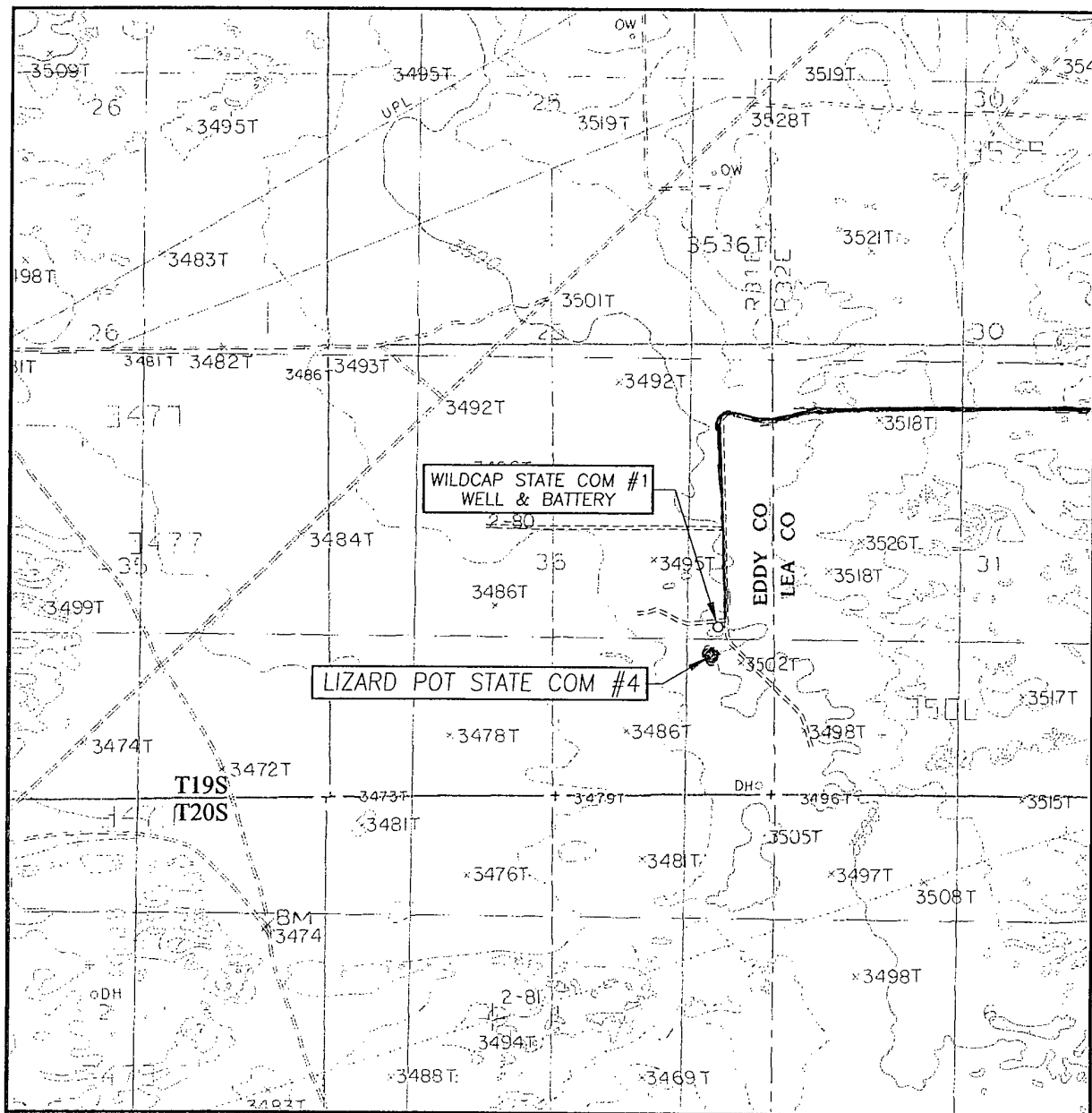
Office

**NM STATE OFFICE**

Title 18 U.S.C. Section 1001 and Title 43 U.S.C. Section 1212, make 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.

(Instructions on page 2)

# LOCATION VERIFICATION MAP



SCALE: 1" = 2000'

CONTOUR INTERVAL:  
WILLIAMS SINK, N.M. - 10'  
GREENWOOD LAKE, N.M. - 10'

SEC. 36 TWP. 19-S RGE. 31-E

SURVEY N.M.P.M.

COUNTY EDDY STATE NEW MEXICO

DESCRIPTION 1650' FSL & 750' FEL

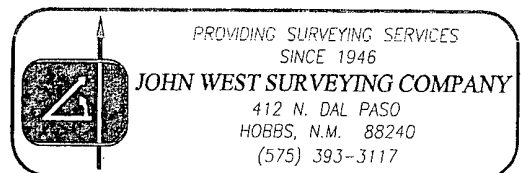
ELEVATION 3500'

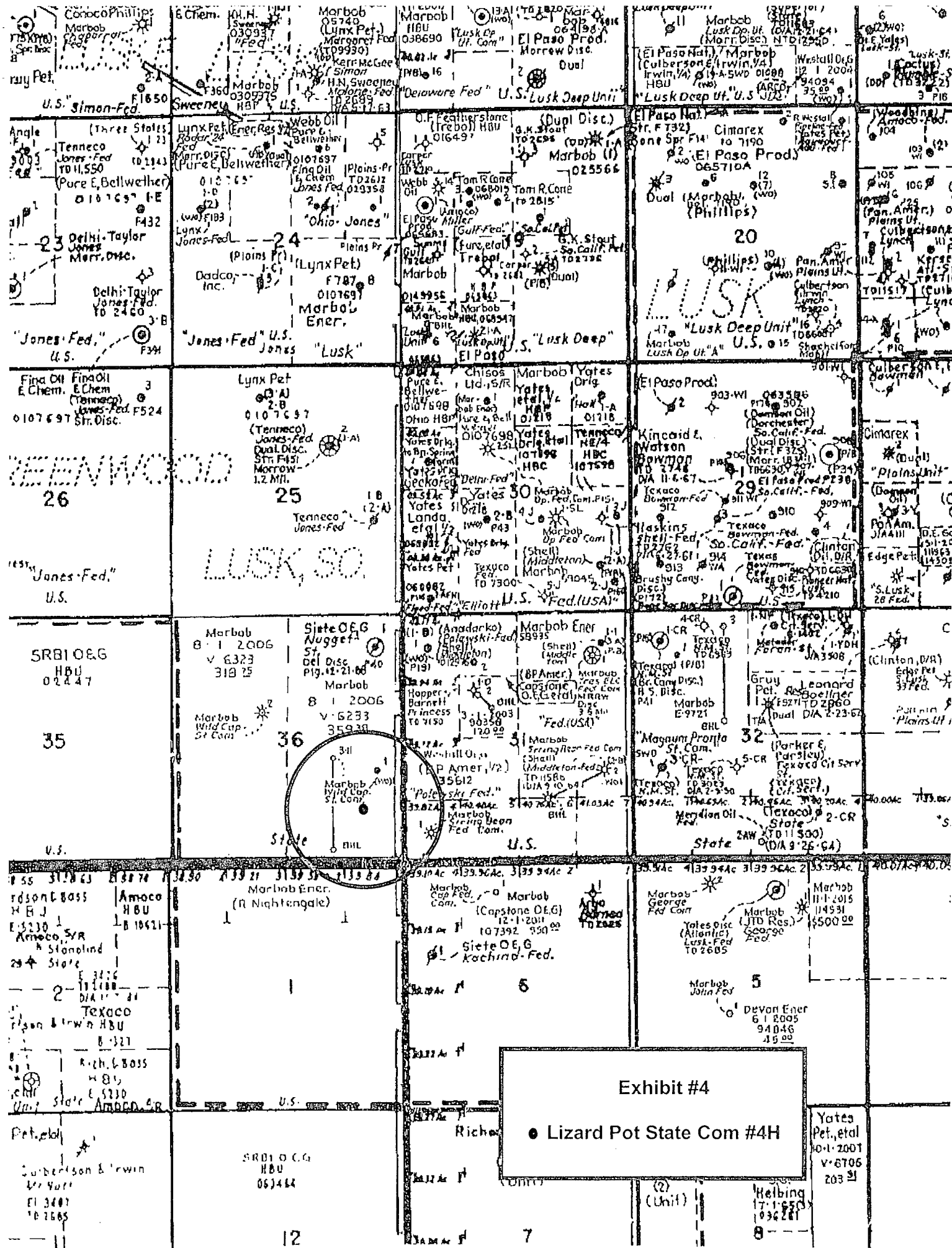
OPERATOR MARBOB ENERGY CORPORATION

LEASE LIZARD POT STATE COM

U.S.G.S. TOPOGRAPHIC MAP  
WILLIAMS SINK, N.M.

— Existing Roads





**MARBOB ENERGY CORPORATION**  
**DRILLING AND OPERATIONS PROGRAM**

*see sundry*  
*6/14/2010* Lizard Pot State Com #4H  
 Surf: 990' FSL & 660' FEL, Sec 36, T19S-R31E  
 BHL: 330' FSL & 660' FEL, Sec 1, T20S-R31E  
 Eddy County, New Mexico

In conjunction with Form 3160-3, Application for Permit to Drill subject well, Marbob Energy Corporation submits the following ten items of pertinent information in accordance with BLM requirements.

1. Geological surface formation: Permian
2. The estimated tops of geologic markers & estimated depths at which anticipated water, oil or gas formations are expected to be encountered are as follows:

Rustler	875'	
Top of Salt	1040'	
Base of Salt	2535'	
Yates	2785'	Oil
7 Rivers	3065'	
Reef	3165'	
Delaware	4450'	Oil
Bone Spring	7310'	
1 <sup>st</sup> BS	8475'	Oil
2 <sup>nd</sup> BS	9065'	Oil
3 <sup>rd</sup> BS	10030'	Oil
Wolfcamp	10615'	
TD	10815'	
TVD	9405'	
TMD	15138'	

No other formations are expected to give up oil, gas, or fresh water in measurable quantities. The surface fresh water sands will be protected by setting 13 3/8" casing at 900' and circulating cement back to surface. All intervals will be isolated by setting 5 1/2" casing to total depth and circulating cement above the base of the 9 5/8" casing.

**3. Proposed Casing Program:**

Hole Size	Interval	OD Casing	New or Used	Wt	Collar	Grade	Collapse Design Factor	Burst Design Factor	Tension Design Factor
17 1/2"	0' - 900'	13 3/8"	New	54.5#	STC	J-55	1.125	1.125	1.6
12 1/4"	0' - 3450'	9 5/8"	New	36#	BUTT	J-55	1.125	1.125	1.6
12 1/4"	3450' - 4100'	9 5/8"	New	40#	BUTT	J-55	1.125	1.125	1.6
7 7/8"	4100' - 14793'	5 1/2"	New	17#	LTC	Top 5000' S95/P110 Bottom 10130' N80	1.125	1.125	1.6

\* Marbob proposes to drill intermediate hole to 4100' with brine water if lost circulation is encountered in the reef will immediately switch to fresh water and drill to csg setting depth

Revised 6/21/10

## 5. Proposed Cement Program:

- a. 13 3/8" Surf Cement to surface with 500 sk "C" light wt 13.5 yield 1.69  
Tail in with 200 sk "c" wt 14.8 yield 1.34
- b. 9 5/8" Int cement 1<sup>st</sup> stage with 300 sk "c" light wt 12.7 yield 1.91  
Tail in with 200 sk "c" wt 14.8 yield 1.34. 2<sup>nd</sup> stage with  
600 sk "c" light wt 12.7 yield 1.91 Tail in with 100 sk "c"  
wt 14.8 yield 1.34 TOC ~~2800'~~ Surf packer stage collar @  
2800' (Surface)
- c. 5 1/2" Prod Cement 1<sup>st</sup> stage with 600 sk acid soluble "H" wt 15.0 yield  
2.6, second stage with 750 sk "H" light wt 12.7 yield 1.91  
Tail in with 100 sk "H" wt 13.0 yield 1.64. DV @ 8850' TOC  
2800'

The above cement volumes could be revised pending the caliper measurement from the open hole logs. The top of cement is designed to reach approximately 200' above the 9 5/8" casing shoe. **All casing is new and API approved.**

## 6. Minimum Specifications for Pressure Control:

Nipple up on 13 3/8 with 2M system tested to 2000 psi, nipple up on 9 5/8 with 3m system tested to 3000# by independent tester

Pipe rams will be operationally checked each 24 hour period. Blind rams will be operationally checked on each trip out of the hole. These checks will be noted on the daily tour sheets. A 2" kill line and a 3" choke line will be included in the drilling spool located below the ram-type BOP. Other accessories to the BOP equipment will include a Kelly cock and floor safety valve (inside BOP) and choke lines and choke manifold with 3000 psi WP rating.

## 7. Estimated BHP: 3912.48 psi

## 8. Mud Program: The applicable depths and properties of this system are as follows:

Depth	Type System	Mud Weight	Viscosity (sec)	Waterloss (cc)
0' – 900'	Fresh Water	8.4	29	N.C.
900' – 4100'	Brine	9.9 – 10.0	29	N.C.
4100' – 15138'	Cut Brine	9.0	29	N.C.

The necessary mud products for weight addition and fluid loss control will be on location at all times.

#### **9. Auxiliary Well Control and Monitoring Equipment:**

- a. A Kelly cock will be in the drill string at all times.
- b. A full opening drill pipe stabbing valve having the appropriate connections will be on the rig floor at all times.
- c. Hydrogen Sulfide detection equipment will be in operation after drilling out the 13 3/8" casing shoe until the 5 1/2" casing is cemented. Breathing equipment will be on location upon drilling the 13 3/8" shoe until total depth is reached.

#### **10. Testing, Logging and Coring Program:**

*See COA*

- a. Drill stem tests will be based on geological sample shows.
- b. The open hole electrical logging program will be:
  - i. Total Depth to Intermediate Casing: Dual Laterolog-Micro Laterolog and Gamma Ray. Compensated Neutron – Z Density log with Gamma Ray and Caliper.
  - ii. Total Depth to Surface: Compensated Neutron with Gamma Ray
  - iii. No coring program is planned
  - iv. Additional testing will be initiated subsequent to setting the 5 1/2" production casing. Specific intervals will be targeted based on log evaluation, geological sample shows and drill stem tests.

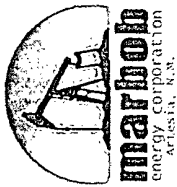
#### **11. Potential Hazards:**

- a. No abnormal pressures or temperatures are expected. There is no known presence of H<sub>2</sub>S in this area. If H<sub>2</sub>S is encountered the operator will comply with the provisions of Onshore Oil and Gas Order No. 6. No lost circulation is expected to occur. All personnel will be familiar with all aspects of safe operation of equipment being used to drill this well. Estimated BHP: 3912.48 psi. No H<sub>2</sub>S is anticipated to be encountered.

#### **12. Anticipated starting date and Duration of Operations:**

- a. Road and location construction will begin after the BLM has approved the APD. Anticipated spud date will be as possible after BLM approval and as soon as a rig will be available. Move in operations and drilling is expected to take 40 days.





**Marbob**  
Eddy County  
Lizard Pot State Com  
#4H  
OH

Plan: Plan #1

## Pathfinder X & Y Planning Report

08 June, 2010

Bureau of Land Management  
RECEIVED  
JUN 15 2010  
Carlsbad Field Office  
Carlsbad, N.M.

# PATHFINDER



# Pathfinder

Pathfinder X & Y Planning Report



<b>Company:</b> Marbop		<b>Local Co-ordinate Reference:</b>	
<b>Project:</b> Eddy County		WELL @ 3518.00ft (18' KB Correction)	
<b>Site:</b> Lizard Pot State Com		WELL @ 3518.00ft (18' KB Correction)	
<b>Well:</b> #4H		Grid	
<b>Wellbore:</b> OH		Minimum Curvature	
<b>Design:</b> Plan #1		Midland Database	

<b>Project</b> Eddy County		<b>System Datum:</b> Mean Sea Level	
<b>Map System:</b> US State Plane 1927 (Exact solution)			
<b>Geo Datum:</b> NAD 1927 (NADCON CONUS)			
<b>Map Zone:</b> New Mexico East 3001			

<b>Site</b> Lizard Pot State Com			
<b>Site Position:</b>	<b>Northings:</b> 586,506.400 ft	<b>Latitude:</b> 32° 36' 41.027 N	
<b>From:</b> Map	<b>Easting:</b> 655,405.700 ft	<b>Longitude:</b> 103° 49' 43.108 W	
<b>Position Uncertainty:</b> 0.00 ft	<b>Slot Radius:</b> "	<b>Grid Convergence:</b> 0.27 °	

<b>Well</b> #4H			
<b>Well Position</b>	<b>Northings:</b> 587,517.300 ft	<b>Latitude:</b> 32° 36' 50.847 N	
	<b>Easting:</b> 659,269.500 ft	<b>Longitude:</b> 103° 48' 57.880 W	
<b>Position Uncertainty</b> 0.00 ft	<b>Wellhead Elevation:</b> ft	<b>Ground Level:</b> 3,500.00 ft	

<b>Wellbore</b> OH			
<b>Magnetics</b>		<b>Dip Angle</b> (°)	<b>Field Strength</b> (nT)
		60.55	48,957
		7.84	

<b>Design</b> Plan #1			
<b>Audit Notes:</b>			
<b>Version:</b>	<b>Phase:</b> PLAN	<b>Tie On Depth:</b> 0.00	
<b>Vertical Section:</b>	<b>Depth From (TVD)</b>	<b>+N/-S</b> (ft)	<b>+E/-W</b> (ft)
	0.00	0.00	0.00
			178.94

<b>Survey Tool Program</b> Date 06/08/2010			
<b>From</b> (ft)	<b>To</b> (ft)	<b>Tool Name</b>	<b>Description</b>
0.00	15,793.90	Plan #1 (OH)	MWD - Standard



# Pathfinder

## Pathfinder X & Y Planning Report



Company:  
Project:  
Site:  
Well:  
Wellbore:  
Design:

Marbob  
Eddy County  
Lizard Pot State Com  
#4H  
OH  
Plan #1

Local Co-ordinate Reference:  
TVD Reference:  
MD Reference:  
North Reference:  
Survey Calculation Method:  
Database:

Well #4H  
WELL @ 3518.00ft (18' KB Correction)  
WELL @ 3518.00ft (18' KB Correction)  
Grid  
Minimum Curvature  
Midland Database

### Planned Survey

MD (ft)	Inc (°)	Azi (°)	TVD (ft)	TVDSS (ft)	N/S (ft)	EW (ft)	V. Sec (ft)	D Leg (°/100ft)	Northing (ft)	Easting (ft)
0.00	0.00	0.00	0.00	-3,518.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
100.00	0.00	0.00	100.00	-3,418.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
200.00	0.00	0.00	200.00	-3,318.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
300.00	0.00	0.00	300.00	-3,218.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
400.00	0.00	0.00	400.00	-3,118.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
500.00	0.00	0.00	500.00	-3,018.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
600.00	0.00	0.00	600.00	-2,918.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
700.00	0.00	0.00	700.00	-2,818.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
800.00	0.00	0.00	800.00	-2,718.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
900.00	0.00	0.00	900.00	-2,618.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
1,000.00	0.00	0.00	1,000.00	-2,518.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
1,100.00	0.00	0.00	1,100.00	-2,418.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
1,200.00	0.00	0.00	1,200.00	-2,318.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
1,300.00	0.00	0.00	1,300.00	-2,218.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
1,400.00	0.00	0.00	1,400.00	-2,118.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
1,500.00	0.00	0.00	1,500.00	-2,018.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
1,600.00	0.00	0.00	1,600.00	-1,918.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
1,700.00	0.00	0.00	1,700.00	-1,818.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
1,800.00	0.00	0.00	1,800.00	-1,718.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
1,900.00	0.00	0.00	1,900.00	-1,618.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
2,000.00	0.00	0.00	2,000.00	-1,518.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
2,100.00	0.00	0.00	2,100.00	-1,418.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
2,200.00	0.00	0.00	2,200.00	-1,318.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
2,300.00	0.00	0.00	2,300.00	-1,218.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
2,400.00	0.00	0.00	2,400.00	-1,118.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
2,500.00	0.00	0.00	2,500.00	-1,018.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
2,600.00	0.00	0.00	2,600.00	-918.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50



# Pathfinder

## Pathfinder X & Y Planning Report



Company: Marbob  
Project: Eddy County  
Site: Lizard Pot State Com  
Well: #4H  
Wellbore: OH  
Design: Plan #1

Local Co-ordinate Reference:  
TVD Reference:  
MD Reference:  
North Reference:  
Survey Calculation Method:  
Database:

Well #4H  
WELL @ 3518.00ft (18' KB Correction)  
WELL @ 3518.00ft (18' KB Correction)  
Grid  
Minimum Curvature  
Midland Database

### Planned Survey

MD (ft)	Inc (°)	Azi (°)	TVD (ft)	TVDSS (ft)	N/S (ft)	EW (ft)	V. Sec (ft)	DLeg (°/100ft)	Northing (ft)	Easting (ft)
2,700.00	0.00	0.00	2,700.00	-818.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
2,800.00	0.00	0.00	2,800.00	-718.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
2,900.00	0.00	0.00	2,900.00	-618.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
3,000.00	0.00	0.00	3,000.00	-518.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
3,100.00	0.00	0.00	3,100.00	-418.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
3,200.00	0.00	0.00	3,200.00	-318.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
3,300.00	0.00	0.00	3,300.00	-218.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
3,400.00	0.00	0.00	3,400.00	-118.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
3,500.00	0.00	0.00	3,500.00	-18.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
3,600.00	0.00	0.00	3,600.00	82.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
3,700.00	0.00	0.00	3,700.00	182.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
3,800.00	0.00	0.00	3,800.00	282.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
3,900.00	0.00	0.00	3,900.00	382.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
4,000.00	0.00	0.00	4,000.00	482.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
4,100.00	0.00	0.00	4,100.00	582.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
4,200.00	0.00	0.00	4,200.00	682.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
4,300.00	0.00	0.00	4,300.00	782.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
4,400.00	0.00	0.00	4,400.00	882.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
4,500.00	0.00	0.00	4,500.00	982.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
4,600.00	0.00	0.00	4,600.00	1,082.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
4,700.00	0.00	0.00	4,700.00	1,182.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
4,800.00	0.00	0.00	4,800.00	1,282.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
4,900.00	0.00	0.00	4,900.00	1,382.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
5,000.00	0.00	0.00	5,000.00	1,482.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
5,100.00	0.00	0.00	5,100.00	1,582.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
5,200.00	0.00	0.00	5,200.00	1,682.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
5,300.00	0.00	0.00	5,300.00	1,782.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50



# Pathfinder

## Pathfinder X & Y Planning Report



Company: Marbob  
Project: Eddy County  
Site: Lizard Pot State Com  
Well: #4H  
Wellbore: OH  
Design: Plan #1

Local Co-ordinate Reference:  
TVD Reference:  
MD Reference:  
North Reference:  
Survey Calculation Method:  
Database:

Well #4H  
WELL @ 3518.00ft (18' KB Correction)  
WELL @ 3518.00ft (18' KB Correction)  
Grid  
Minimum Curvature  
Midland Database

### Planned Survey

MD (ft)	Inc (°)	Azi (°)	TVD (ft)	TVDSS (ft)	N/S (ft)	E/W (ft)	V. Sec (ft)	DLog (°/100ft)	Northing (ft)	Easting (ft)
5,400.00	0.00	0.00	5,400.00	1,882.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
5,500.00	0.00	0.00	5,500.00	1,982.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
5,600.00	0.00	0.00	5,600.00	2,082.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
5,700.00	0.00	0.00	5,700.00	2,182.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
5,800.00	0.00	0.00	5,800.00	2,282.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
5,900.00	0.00	0.00	5,900.00	2,382.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
6,000.00	0.00	0.00	6,000.00	2,482.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
6,100.00	0.00	0.00	6,100.00	2,582.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
6,200.00	0.00	0.00	6,200.00	2,682.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
6,300.00	0.00	0.00	6,300.00	2,782.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
6,400.00	0.00	0.00	6,400.00	2,882.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
6,500.00	0.00	0.00	6,500.00	2,982.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
6,600.00	0.00	0.00	6,600.00	3,082.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
6,700.00	0.00	0.00	6,700.00	3,182.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
6,800.00	0.00	0.00	6,800.00	3,282.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
6,900.00	0.00	0.00	6,900.00	3,382.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
7,000.00	0.00	0.00	7,000.00	3,482.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
7,100.00	0.00	0.00	7,100.00	3,582.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
7,200.00	0.00	0.00	7,200.00	3,682.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
7,300.00	0.00	0.00	7,300.00	3,782.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
7,400.00	0.00	0.00	7,400.00	3,882.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
7,500.00	0.00	0.00	7,500.00	3,982.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
7,600.00	0.00	0.00	7,600.00	4,082.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
7,700.00	0.00	0.00	7,700.00	4,182.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
7,800.00	0.00	0.00	7,800.00	4,282.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
7,900.00	0.00	0.00	7,900.00	4,382.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
8,000.00	0.00	0.00	8,000.00	4,482.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50



# Pathfinder

## Pathfinder X & Y Planning Report

# PATHFINDER

Company:  
Project:  
Site:  
Well:  
Wellbore:  
Design:

Marbob  
Eddy County  
Lizard Pot State Com  
#4H  
OH  
Plan #1

Local Co-ordinate Reference:  
TVD Reference:  
MD Reference:  
North Reference:  
Survey Calculation Method:  
Database:

Well #4H  
WELL @ 3518.00ft (18' KB Correction)  
WELL @ 3518.00ft (18' KB Correction)  
Grid  
Minimum Curvature  
Midland Database

### Planned Survey

MD (ft)	Inc (°)	Azi (°)	TVD (ft)	TVDSS (ft)	N/S (ft)	E/W (ft)	V. Sec (ft)	DLeg (°/100ft)	Northing (ft)	Easting (ft)
8,100.00	0.00	0.00	8,100.00	4,582.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
8,200.00	0.00	0.00	8,200.00	4,682.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
8,300.00	0.00	0.00	8,300.00	4,782.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
8,400.00	0.00	0.00	8,400.00	4,882.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
8,500.00	0.00	0.00	8,500.00	4,982.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
8,600.00	0.00	0.00	8,600.00	5,082.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
8,700.00	0.00	0.00	8,700.00	5,182.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
8,800.00	0.00	0.00	8,800.00	5,282.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
8,900.00	0.00	0.00	8,900.00	5,382.00	0.00	0.00	0.00	0.00	587,517.30	659,269.50
8,922.50	0.00	0.00	8,922.50	5,404.50	0.00	0.00	0.00	0.00	587,517.30	659,269.50
8,925.00	0.30	178.94	8,925.00	5,407.00	-0.01	0.00	0.01	12.00	587,517.29	659,269.50
8,950.00	3.30	178.94	8,949.98	5,431.98	-0.79	0.01	0.79	12.00	587,516.51	659,269.51
8,975.00	6.30	178.94	8,974.89	5,456.89	-2.88	0.05	2.88	12.00	587,514.42	659,269.55
9,000.00	9.30	178.94	8,999.66	5,481.66	-6.27	0.12	6.28	12.00	587,511.03	659,269.62
9,025.00	12.30	178.94	9,024.21	5,506.21	-10.96	0.20	10.96	12.00	587,506.34	659,269.70
9,050.00	15.30	178.94	9,048.49	5,530.49	-16.92	0.31	16.92	12.00	587,500.38	659,269.81
9,075.00	18.30	178.94	9,072.42	5,554.42	-24.14	0.45	24.15	12.00	587,493.16	659,269.95
9,100.00	21.30	178.94	9,095.94	5,577.94	-32.61	0.60	32.61	12.00	587,484.89	659,270.10
9,125.00	24.30	178.94	9,118.98	5,600.98	-42.29	0.78	42.30	12.00	587,475.01	659,270.28
9,150.00	27.30	178.94	9,141.49	5,623.49	-53.17	0.98	53.18	12.00	587,464.13	659,270.48
9,175.00	30.30	178.94	9,163.40	5,645.40	-65.21	1.21	65.22	12.00	587,452.09	659,270.71
9,200.00	33.30	178.94	9,184.64	5,666.64	-78.38	1.45	78.39	12.00	587,438.92	659,270.95
9,225.00	36.30	178.94	9,205.17	5,687.17	-92.64	1.71	92.66	12.00	587,424.66	659,271.21
9,250.00	39.30	178.94	9,224.92	5,706.92	-107.96	2.00	107.98	12.00	587,409.34	659,271.50
9,275.00	42.30	178.94	9,243.84	5,725.84	-124.29	2.30	124.31	12.00	587,393.01	659,271.80
9,300.00	45.30	178.94	9,261.89	5,743.89	-141.59	2.62	141.61	12.00	587,375.71	659,272.12
9,325.00	48.30	178.94	9,279.00	5,761.00	-159.80	2.96	159.83	12.00	587,357.50	659,272.46



# Pathfinder

## Pathfinder X & Y Planning Report



Company: Marion  
Project: Eddy County  
Site: Lizard Pot State Com  
Well: #4H  
Wellbore: OH  
Design: Plan #1

Local Co-ordinate Reference:  
TVD Reference:  
MD Reference:  
North Reference:  
Survey Calculation Method:  
Database:

Well #4H  
WELL @ 3518.00ft (18' KB Correction)  
WELL @ 3518.00ft (18' KB Correction)  
Grid  
Minimum Curvature  
Midland Database

### Planned Survey

MD (ft)	Inc (°)	Azi (°)	TVD (ft)	TVDSS (ft)	N/S (ft)	E/W (ft)	V. Sec (ft)	DLeg (°/100ft)	Northing (ft)	Easting (ft)
9,350.00	51.30	178.94	9,295.14	5,777.14	-178.89	3.31	178.92	12.00	587,338.41	659,272.81
9,375.00	54.30	178.94	9,310.25	5,792.25	-198.80	3.68	198.83	12.00	587,318.50	659,273.18
9,400.00	57.30	178.94	9,324.30	5,806.30	-219.47	4.06	219.51	12.00	587,297.83	659,273.56
9,425.00	60.30	178.94	9,337.25	5,819.25	-240.85	4.46	240.89	12.00	587,276.45	659,273.96
9,450.00	63.30	178.94	9,349.07	5,831.07	-262.87	4.86	262.92	12.00	587,254.43	659,274.36
9,475.00	66.30	178.94	9,359.71	5,841.71	-285.48	5.28	285.53	12.00	587,231.82	659,274.78
9,500.00	69.29	178.94	9,369.16	5,851.16	-308.62	5.71	308.68	12.00	587,208.68	659,275.21
9,525.00	72.29	178.94	9,377.38	5,859.38	-332.23	6.15	332.28	12.00	587,185.07	659,275.65
9,550.00	75.29	178.94	9,384.36	5,866.36	-356.22	6.59	356.29	12.00	587,161.08	659,276.09
9,575.00	78.29	178.94	9,390.07	5,872.07	-380.56	7.04	380.62	12.00	587,136.74	659,276.54
9,600.00	81.29	178.94	9,394.50	5,876.50	-405.15	7.50	405.22	12.00	587,112.15	659,277.00
9,625.00	84.29	178.94	9,397.63	5,879.63	-429.95	7.96	430.02	12.00	587,087.35	659,277.46
9,650.00	87.29	178.94	9,399.47	5,881.47	-454.88	8.42	454.95	12.00	587,062.42	659,277.92
9,672.56	90.00	178.94	9,400.00	5,882.00	-477.42	8.83	477.50	12.00	587,039.88	659,278.33
9,700.00	90.00	178.94	9,400.00	5,882.00	-504.86	9.34	504.94	0.00	587,012.44	659,278.84
9,800.00	90.00	178.94	9,400.00	5,882.00	-604.84	11.19	604.94	0.00	586,912.46	659,280.69
9,900.00	90.00	178.94	9,400.00	5,882.00	-704.82	13.04	704.94	0.00	586,812.48	659,282.54
10,000.00	90.00	178.94	9,400.00	5,882.00	-804.81	14.89	804.94	0.00	586,712.49	659,284.39
10,100.00	90.00	178.94	9,400.00	5,882.00	-904.79	16.74	904.94	0.00	586,612.51	659,286.24
10,200.00	90.00	178.94	9,400.00	5,882.00	-1,004.77	18.59	1,004.94	0.00	586,512.53	659,288.09
10,300.00	90.00	178.94	9,400.00	5,882.00	-1,104.76	20.44	1,104.94	0.00	586,412.54	659,289.94
10,400.00	90.00	178.94	9,400.00	5,882.00	-1,204.74	22.29	1,204.94	0.00	586,312.56	659,291.79
10,500.00	90.00	178.94	9,400.00	5,882.00	-1,304.72	24.14	1,304.94	0.00	586,212.58	659,293.64
10,600.00	90.00	178.94	9,400.00	5,882.00	-1,404.70	25.99	1,404.94	0.00	586,112.60	659,295.49
10,700.00	90.00	178.94	9,400.00	5,882.00	-1,504.69	27.84	1,504.94	0.00	586,012.61	659,297.34
10,800.00	90.00	178.94	9,400.00	5,882.00	-1,604.67	29.69	1,604.94	0.00	585,912.63	659,299.19
10,900.00	90.00	178.94	9,400.00	5,882.00	-1,704.65	31.54	1,704.94	0.00	585,812.65	659,301.04



# Pathfinder

## Pathfinder X & Y Planning Report



Company: Marathon  
Project: Eddy County  
Site: Lizard Pot State Com  
Well: #4H  
Wellbore: OH  
Design: Plan #1

Local Co-ordinate Reference:  
TVD Reference:  
MD Reference:  
North Reference:  
Survey Calculation Method:  
Database:

Well #4H  
WELL @ 3518.00ft (18' KB Correction)  
WELL @ 3518.00ft (18' KB Correction)  
Grid  
Minimum Curvature  
Midland Database

### Planned Survey

MD (ft)	Inc (°)	Azi (°)	TVD (ft)	TVDSS (ft)	N/S (ft)	E/W (ft)	V. Sec (ft)	D Leg (°/100ft)	Northing (ft)	Easting (ft)
11,000.00	90.00	178.94	9,400.00	5,882.00	-1,804.64	33.39	1,804.94	0.00	585,712.66	659,302.89
11,100.00	90.00	178.94	9,400.00	5,882.00	-1,904.62	35.24	1,904.94	0.00	585,612.68	659,304.74
11,200.00	90.00	178.94	9,400.00	5,882.00	-2,004.60	37.09	2,004.94	0.00	585,512.70	659,306.59
11,300.00	90.00	178.94	9,400.00	5,882.00	-2,104.58	38.94	2,104.94	0.00	585,412.72	659,308.44
11,400.00	90.00	178.94	9,400.00	5,882.00	-2,204.57	40.79	2,204.94	0.00	585,312.73	659,310.29
11,500.00	90.00	178.94	9,400.00	5,882.00	-2,304.55	42.64	2,304.94	0.00	585,212.75	659,312.14
11,600.00	90.00	178.94	9,400.00	5,882.00	-2,404.53	44.49	2,404.94	0.00	585,112.77	659,313.99
11,700.00	90.00	178.94	9,400.00	5,882.00	-2,504.52	46.34	2,504.94	0.00	585,012.78	659,315.84
11,800.00	90.00	178.94	9,400.00	5,882.00	-2,604.50	48.19	2,604.94	0.00	584,912.80	659,317.69
11,900.00	90.00	178.94	9,400.00	5,882.00	-2,704.48	50.04	2,704.94	0.00	584,812.82	659,319.54
12,000.00	90.00	178.94	9,400.00	5,882.00	-2,804.46	51.89	2,804.94	0.00	584,712.84	659,321.39
12,100.00	90.00	178.94	9,400.00	5,882.00	-2,904.45	53.74	2,904.94	0.00	584,612.85	659,323.24
12,200.00	90.00	178.94	9,400.00	5,882.00	-3,004.43	55.59	3,004.94	0.00	584,512.87	659,325.09
12,300.00	90.00	178.94	9,400.00	5,882.00	-3,104.41	57.44	3,104.94	0.00	584,412.89	659,326.94
12,400.00	90.00	178.94	9,400.00	5,882.00	-3,204.40	59.29	3,204.94	0.00	584,312.90	659,328.79
12,500.00	90.00	178.94	9,400.00	5,882.00	-3,304.38	61.14	3,304.94	0.00	584,212.92	659,330.64
12,600.00	90.00	178.94	9,400.00	5,882.00	-3,404.36	62.99	3,404.94	0.00	584,112.94	659,332.49
12,700.00	90.00	178.94	9,400.00	5,882.00	-3,504.34	64.84	3,504.94	0.00	584,012.96	659,334.34
12,800.00	90.00	178.94	9,400.00	5,882.00	-3,604.33	66.69	3,604.94	0.00	583,912.97	659,336.19
12,900.00	90.00	178.94	9,400.00	5,882.00	-3,704.31	68.54	3,704.94	0.00	583,812.99	659,338.04
13,000.00	90.00	178.94	9,400.00	5,882.00	-3,804.29	70.39	3,804.94	0.00	583,713.01	659,339.89
13,100.00	90.00	178.94	9,400.00	5,882.00	-3,904.28	72.24	3,904.94	0.00	583,613.02	659,341.74
13,200.00	90.00	178.94	9,400.00	5,882.00	-4,004.26	74.09	4,004.94	0.00	583,513.04	659,343.59
13,300.00	90.00	178.94	9,400.00	5,882.00	-4,104.24	75.94	4,104.94	0.00	583,413.06	659,345.44
13,400.00	90.00	178.94	9,400.00	5,882.00	-4,204.23	77.79	4,204.94	0.00	583,313.07	659,347.29
13,500.00	90.00	178.94	9,400.00	5,882.00	-4,304.21	79.64	4,304.94	0.00	583,213.09	659,349.14
13,600.00	90.00	178.94	9,400.00	5,882.00	-4,404.19	81.49	4,404.94	0.00	583,113.11	659,350.99





# Pathfinder

## Pathfinder X & Y Planning Report



Company: Marbob  
Project: Eddy County  
Site: Lizard Pot State Com  
Well: #4H  
Wellbore: OH  
Design: Plan #1

Local Co-ordinate Reference:  
TVD Reference:  
MD Reference:  
North Reference:  
Survey Calculation Method:  
Database:

Well #4H  
WELL @ 3518.00ft (18' KB Correction)  
WELL @ 3518.00ft (18' KB Correction)  
Grid  
Minimum Curvature  
Midland Database

### Planned Survey

MD (ft)	Inc (°)	Azi (°)	TVD (ft)	TVDSS (ft)	N/S (ft)	EW (ft)	V. Sec (ft)	DLeg (°/100ft)	Northing (ft)	Easting (ft)
13,700.00	90.00	178.94	9,400.00	5,882.00	-4,504.17	83.34	4,504.94	0.00	583,013.13	659,352.84
13,800.00	90.00	178.94	9,400.00	5,882.00	-4,604.16	85.19	4,604.94	0.00	582,913.14	659,354.69
13,900.00	90.00	178.94	9,400.00	5,882.00	-4,704.14	87.04	4,704.94	0.00	582,813.16	659,356.54
14,000.00	90.00	178.94	9,400.00	5,882.00	-4,804.12	88.89	4,804.94	0.00	582,713.18	659,358.39
14,100.00	90.00	178.94	9,400.00	5,882.00	-4,904.11	90.74	4,904.94	0.00	582,613.19	659,360.24
14,200.00	90.00	178.94	9,400.00	5,882.00	-5,004.09	92.59	5,004.94	0.00	582,513.21	659,362.09
14,300.00	90.00	178.94	9,400.00	5,882.00	-5,104.07	94.44	5,104.94	0.00	582,413.23	659,363.94
14,400.00	90.00	178.94	9,400.00	5,882.00	-5,204.05	96.29	5,204.94	0.00	582,313.25	659,365.79
14,500.00	90.00	178.94	9,400.00	5,882.00	-5,304.04	98.14	5,304.94	0.00	582,213.26	659,367.64
14,600.00	90.00	178.94	9,400.00	5,882.00	-5,404.02	99.99	5,404.94	0.00	582,113.28	659,369.49
14,700.00	90.00	178.94	9,400.00	5,882.00	-5,504.00	101.84	5,504.94	0.00	582,013.30	659,371.34
14,800.00	90.00	178.94	9,400.00	5,882.00	-5,603.99	103.69	5,604.94	0.00	581,913.31	659,373.19
14,900.00	90.00	178.94	9,400.00	5,882.00	-5,703.97	105.54	5,704.94	0.00	581,813.33	659,375.04
15,000.00	90.00	178.94	9,400.00	5,882.00	-5,803.95	107.39	5,804.94	0.00	581,713.35	659,376.89
15,100.00	90.00	178.94	9,400.00	5,882.00	-5,903.93	109.24	5,904.94	0.00	581,613.37	659,378.74
15,200.00	90.00	178.94	9,400.00	5,882.00	-6,003.92	111.09	6,004.94	0.00	581,513.38	659,380.59
15,300.00	90.00	178.94	9,400.00	5,882.00	-6,103.90	112.94	6,104.94	0.00	581,413.40	659,382.44
15,400.00	90.00	178.94	9,400.00	5,882.00	-6,203.88	114.79	6,204.94	0.00	581,313.42	659,384.29
15,500.00	90.00	178.94	9,400.00	5,882.00	-6,303.87	116.64	6,304.94	0.00	581,213.43	659,386.14
15,600.00	90.00	178.94	9,400.00	5,882.00	-6,403.85	118.49	6,404.94	0.00	581,113.45	659,387.99
15,700.00	90.00	178.94	9,400.00	5,882.00	-6,503.83	120.34	6,504.94	0.00	581,013.47	659,389.84
15,793.90	90.00	178.94	9,400.00	5,882.00	-6,597.72	122.07	6,598.84	0.00	580,919.58	659,391.57
PBHL(LP#4)										



# Pathfinder

## Pathfinder X & Y Planning Report



Company: Project: Site: Well: Design:	Marbob Eddy County Lizard Pot State Com #4H OH Plan #1	Local Co-ordinate Reference: TVD Reference: MD Reference: North Reference: Survey Calculation Method: Database:	Well #4H WELL @ 3518.00ft (18' KB Correction) WELL @ 3518.00ft (18' KB Correction) Grid Minimum Curvature Midland Database
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### Targets

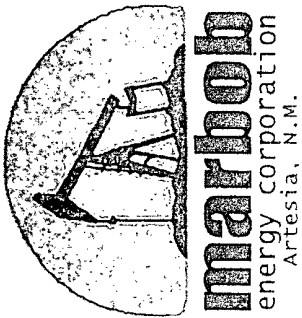
Target Name  
- hit/miss target  
- Shape

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
PBHL(LP#4) - plan hits target center - Point	0.00	0.00	9,400.00	-6,597.70	122.90	580,919.600	659,392.400	32° 35' 45.554 N	103° 48' 56.818 W

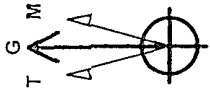
Checked By: \_\_\_\_\_

Approved By: \_\_\_\_\_

Date: \_\_\_\_\_



Project: Eddy County  
 Site: Lizard Pot State Co  
 Well: #4H  
 Wellbore: OH  
 Plan: Plan #1 (#4H/OH)



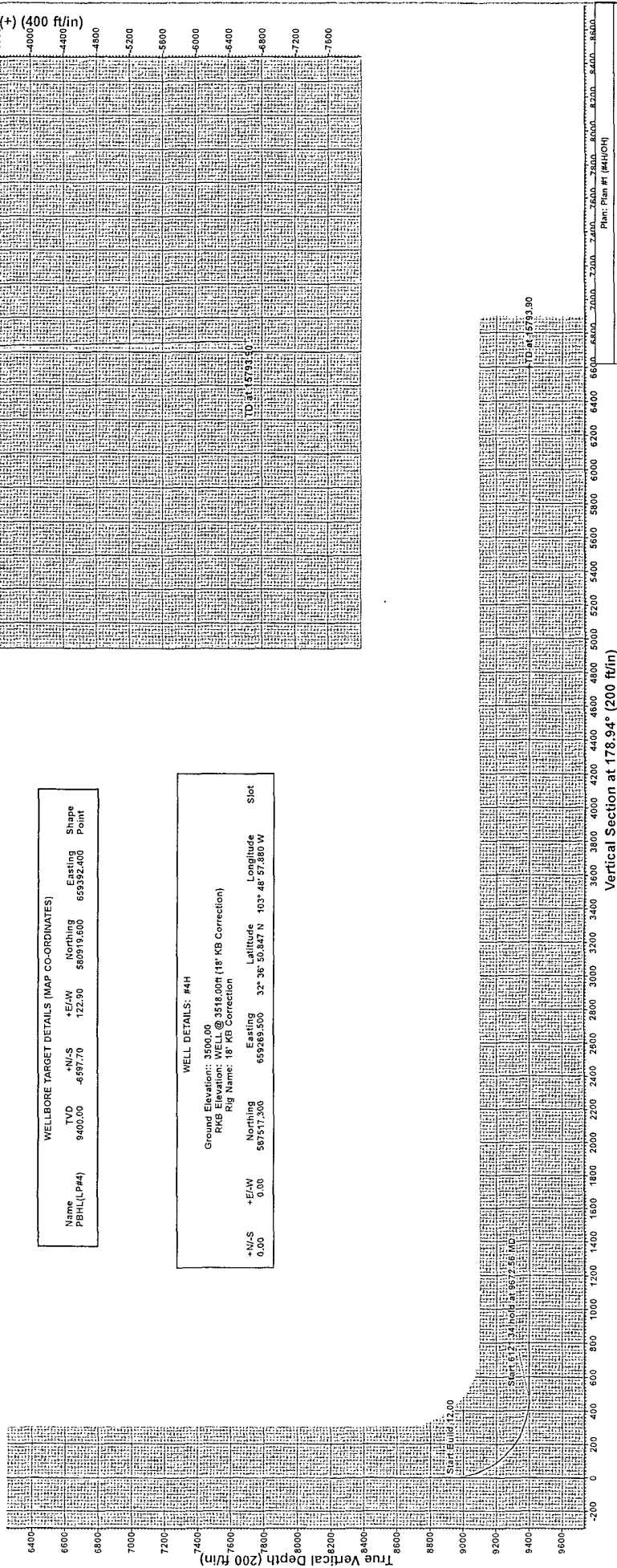
Azimuths to Grid North  
 True North: -0.28°  
 Magnetic North: 7.56°  
 Magnetic Field  
 Strength: 48957.25nT  
 Dip Angle: 60.55°  
 Date: 06/08/2010  
 Model: IGRF200510

PROJECT DETAILS: Eddy County  
 Geodetic System: US State Plane 1927 (Exact solution)  
 Datum: NAD 1927 (NADCON CONUS)  
 Ellipsoid: Clarke 1866  
 Zone: New Mexico East 3001  
 System Datum: Mean Sea Level  
 Local North: Grid

Sec	MD	Inc	Asl	TVD	+N/S	+E/W	DLeg	TFace	VSec	Target
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	8922.50	0.00	0.00	8922.50	0.00	0.00	0.00	0.00	0.00	0.00
3	9672.56	90.00	178.94	9400.00	-477.42	8.83	12.00	178.94	477.50	0.00
4	15793.30	90.00	178.94	9400.00	-6597.72	122.07	0.00	0.00	6598.84	PBHL(LP#4)

WELLBORE TARGET DETAILS (MAP CO-ORDINATES)					
Name	TVD	+N/S	+E/W	Northing	Easting
PBHL(LP#4)	9400.00	-6597.72	122.30	589917.500	659392.400

WELL DETAILS: #4H					
Ground Elevation: 3500.00					
RKB Elevation: WELL @ 3518.00ft (18' KB Correction)					
Rig Name: 18' KB Correction					
+N/S	+E/W	Northing	Easting	Latitude	Longitude
0.00	0.00	589517.300	659269.500	32° 36' 30.347" N	103° 48' 37.860" W



**PATHFINDER**

West(-)/East(+) (400 ft/in)

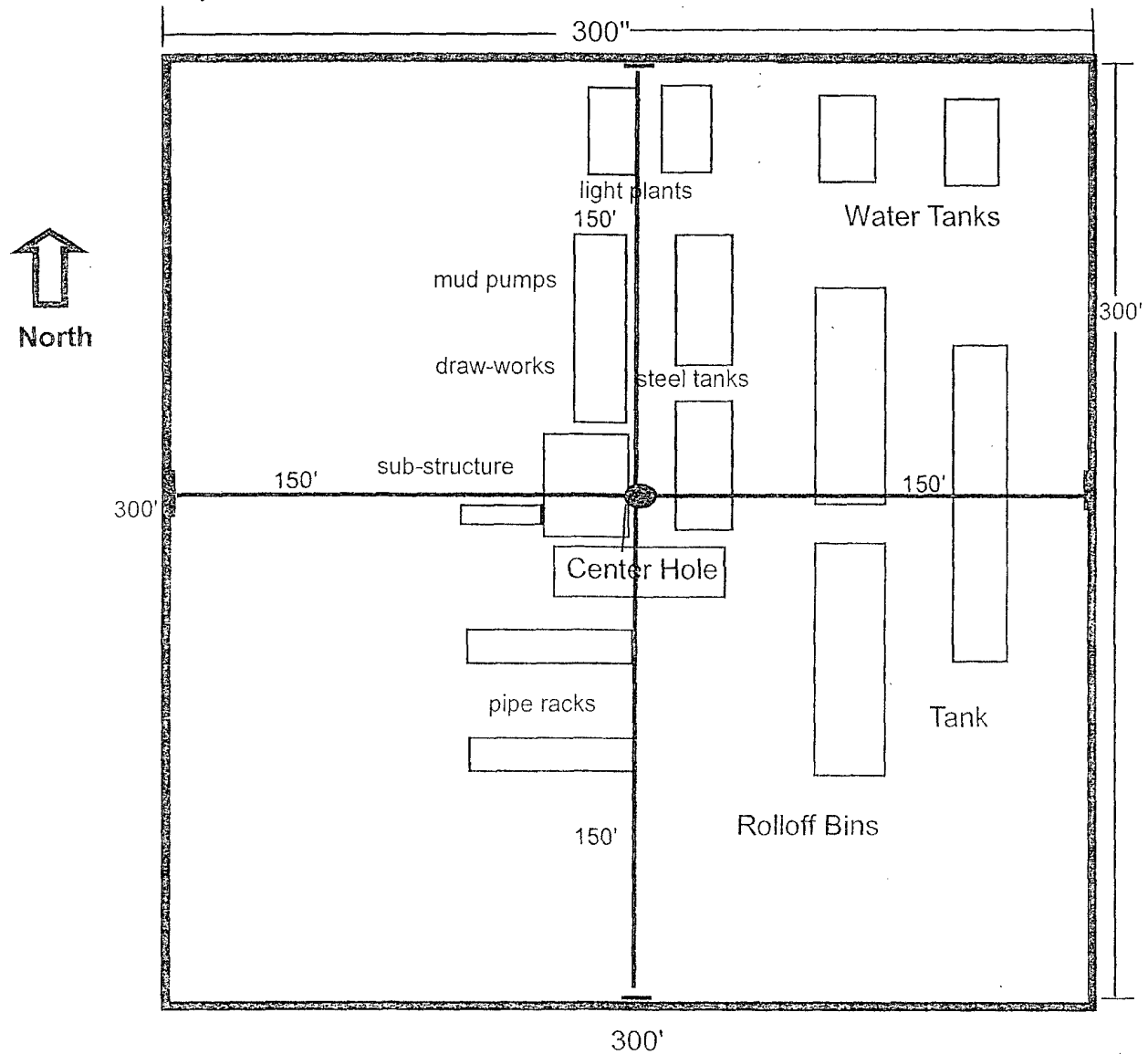
South(-)/North(+) (400 ft/in)

Vertical Section at 178.94° (200 ft/in)

Plan: Plan #1 (#4H/OH)

Created By: Nate Bingham Date: 14.01, June 08 2010

# Well Site Lay-Out Plat

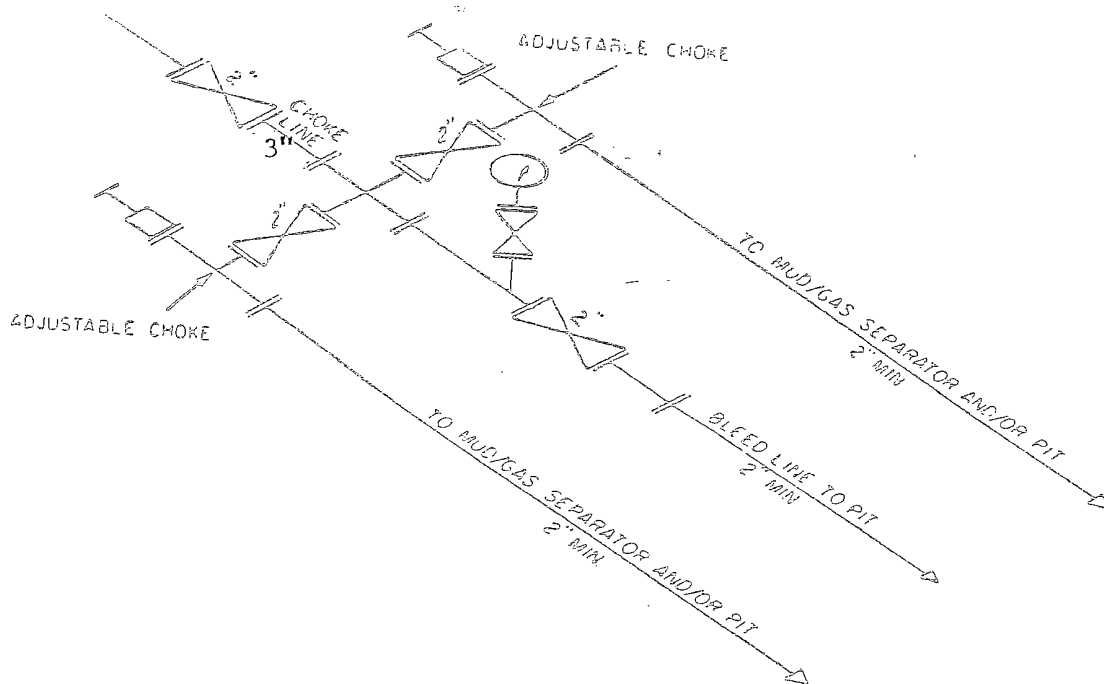
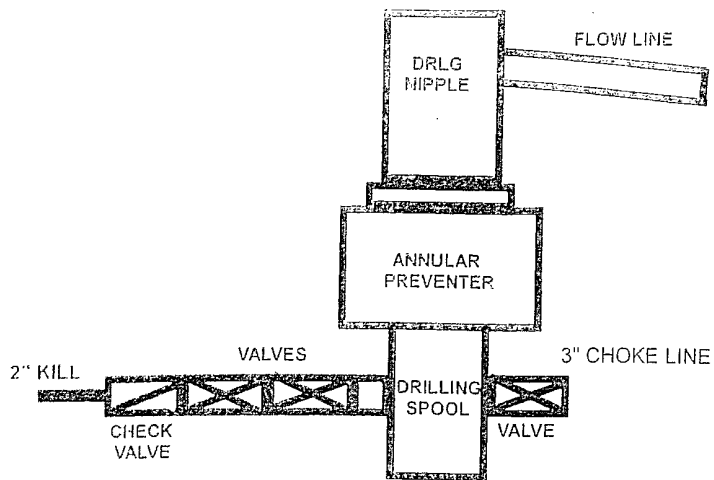


*see sundry  
6/19/10*

**Lizard Pot State Com #4H**  
**Surf: 990' FSL & 660' FEL, Sec 36, T19S-R31E**  
**BHL: 330' FSL & 660' FEL, Sec 1, T20S-R31E**  
**Eddy County, New Mexico**

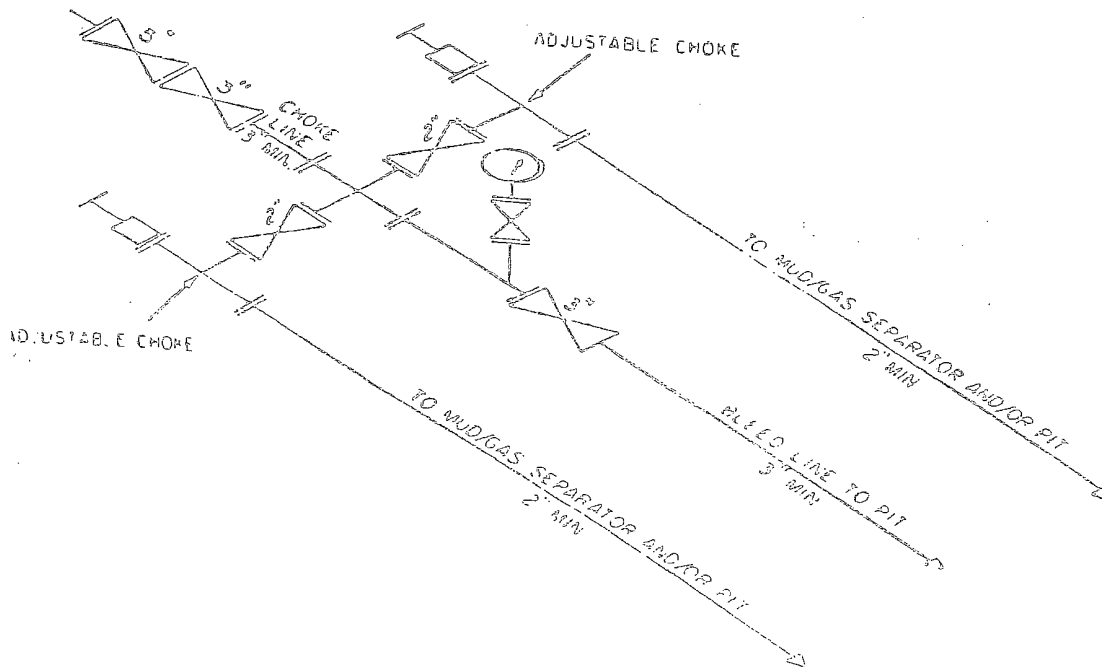
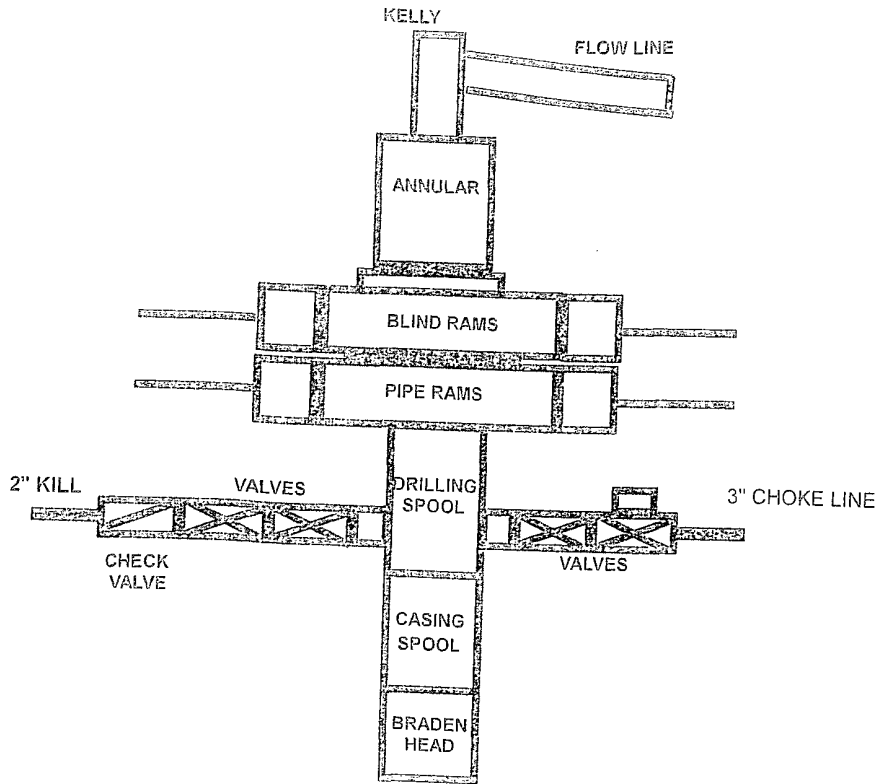
**EXHIBIT THREE**

# 2M SYSTEM



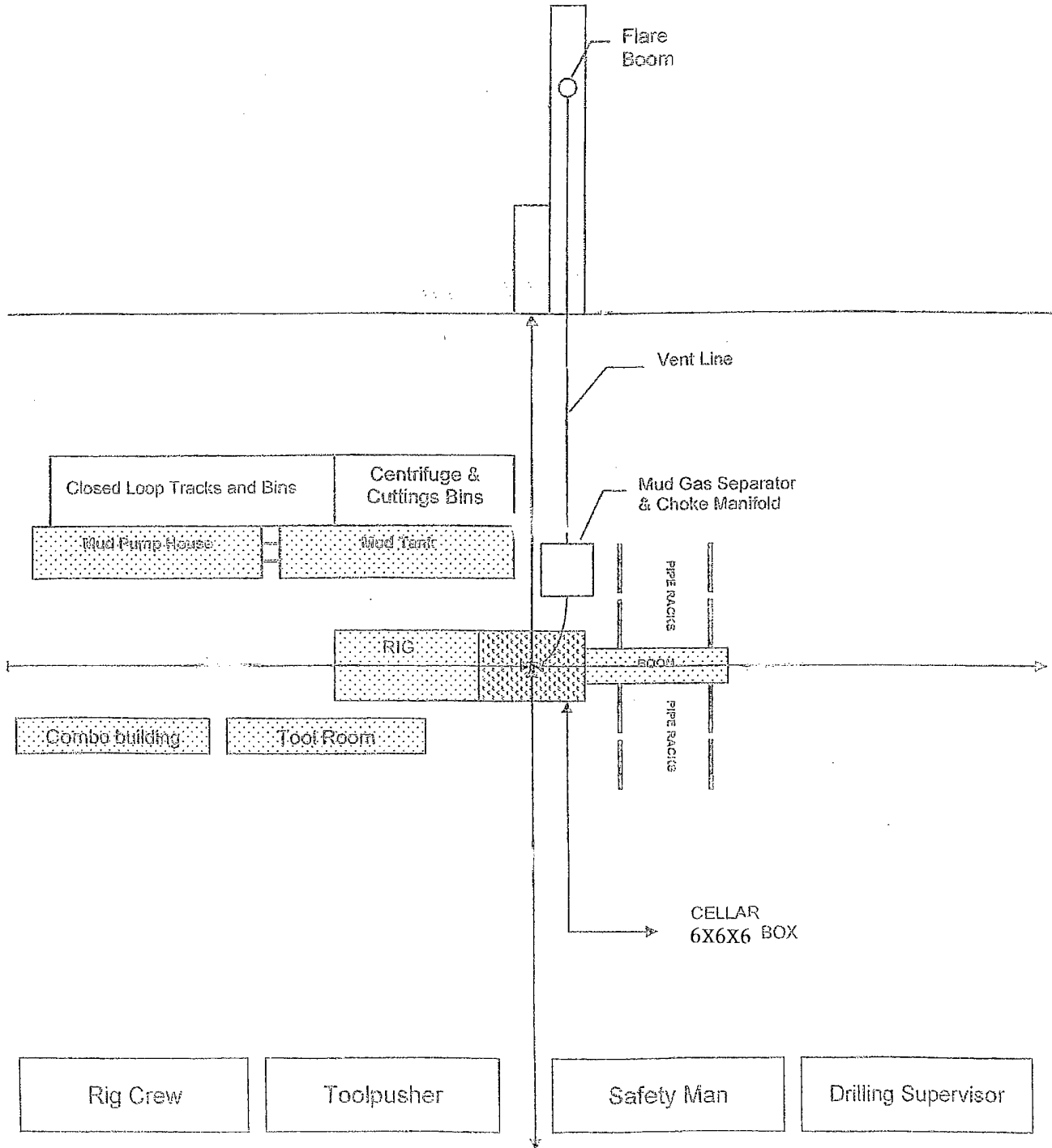
2M CHOKE MANIFOLD EQUIPMENT — CONFIGURATION OF CHOKES  
MAY VARY

# 3M SYSTEM



3M CHOKE MANIFOLD EQUIPMENT — CONFIGURATION OF CHOKES  
MAY VARY

# 3M Choke Manifold Equipment



## **MARBOB ENERGY CORPORATION**

### **HYDROGEN SULFIDE DRILLING OPERATIONS PLAN**

#### **I. HYDROGEN SULFIDE TRAINING**

All personnel, whether regularly assigned, contracted, or employed on an unscheduled basis, will receive training from a qualified instructor in the following areas prior to commencing drilling operations on this well:

- A. The hazards and characteristics of hydrogen sulfide (H<sub>2</sub>S).
- B. The proper use and maintenance of personal protective equipment and life support systems.
- C. The proper use of H<sub>2</sub>S detectors, alarms, warning systems, briefing areas, evacuation procedures, and prevailing winds.
- D. The proper techniques for first aid and rescue procedures.

In addition, supervisory personnel will be trained in the following areas:

- A. The effects of H<sub>2</sub>S on metal components. If high tensile tubulars are to be used, personnel will be trained in their special maintenance requirements.
- B. Corrective action and shut-in procedures when drilling or reworking a well and blowout prevention and well control procedures.
- C. The contents and requirements of the H<sub>2</sub>S Drilling Operations Plan and the Public Protection Plan.

There will be an initial training session just prior to encountering a known or probable H<sub>2</sub>S zone (within 3 days or 500 feet) and weekly H<sub>2</sub>S and well control drills for all personnel in each crew. The initial training session shall include a review of the site specific H<sub>2</sub>S Drilling Operations Plan and the Public Protection Plan. This plan shall be available at the well site. All personnel will be required to carry documentation that they have received the proper training.

#### **II. H<sub>2</sub>S SAFETY EQUIPMENT AND SYSTEMS**



Note: All H<sub>2</sub>S safety equipment and systems will be installed, tested, and operational when drilling reaches a depth of 500 feet above, or three days prior to penetrating the first zone containing or reasonably expected to contain H<sub>2</sub>S.

A. Well Control Equipment:

Flare line.

Choke manifold.

Blind rams and pipe rams to accommodate all pipe sizes with properly sized closing unit.

Auxiliary equipment to include: annular preventer, mud-gas separator, rotating head.

B. Protective equipment for essential personnel:

Mark II Surviveair 30-minute units located in the dog house and at briefing areas.

C. H<sub>2</sub>S detection and monitoring equipment:

2 - portable H<sub>2</sub>S monitor positioned on location for best coverage and response. These units have warning lights and audible sirens when H<sub>2</sub>S levels of 20 ppm are reached.

D. Visual warning systems:

Caution/Danger signs shall be posted on roads providing direct access to location. Signs will be painted a high visibility yellow with black lettering of sufficient size to be readable at a reasonable distance from the immediate location. Bilingual signs will be used, when appropriate. See example attached.

E. Mud Program:

The mud program has been designed to minimize the volume of H<sub>2</sub>S circulated to the surface.

F. Metallurgy:

All drill strings, casings, tubing, wellhead, blowout preventers, drilling spool, kill lines, choke manifold and lines, and valves shall be suitable for H<sub>2</sub>S service.

G. Communication:

Company vehicles equipped with cellular telephone and 2-way radio.

Marbob Energy has conducted a review to determine if an H<sub>2</sub>S contingency plan is required for the above referenced well. We were able to conclude that any potential hazardous volume would be minimal. H<sub>2</sub>S concentrations of wells in this area from surface to TD are low enough; therefore we do not believe that an H<sub>2</sub>S Contingency Plan would be necessary.

## **W A R N I N G**

**YOU ARE ENTERING AN H<sub>2</sub>S AREA  
AUTHORIZED PERSONNEL ONLY**

- 1. BEARDS OR CONTACT LENSES NOT ALLOWED***
- 2. HARD HATS REQUIRED***
- 3. SMOKING IN DESIGNATED AREAS ONLY***
- 4. BE WIND CONSCIOUS AT ALL TIMES***
- 5. CK WITH MARBOB FOREMAN AT MAIN OFFICE***

**MARBOB ENERGY CORPORATION**

**1-575-748-3303**

### **EMERGENCY CALL LIST**

	<u>Office</u>	<u>Mobile</u>	<u>Home</u>
Marbob Energy Corp.	575-748-3303		
Sheryl Baker	575-748-3303	575-748-5489	575-748-2396
Johnny C. Gray	575-748-3303	575-748-5983	575-885-3879
Raye Miller	575-748-3303	575-513-0176	575-746-9577
Dean Chumbley	575-748-3303	575-748-5988	575-748-2426

### **EMERGENCY RESPONSE NUMBERS** **Eddy County, New Mexico**

State Police	575-748-9718
Eddy County Sheriff	575-746-2701
Emergency Medical Services (Ambulance)	911 or 575-746-2701
Eddy County Emergency Management (Harry Burgess)	575-887-9511
State Emergency Response Center (SERC)	575-476-9620
Carlsbad Police Department	575-885-2111
Carlsbad Fire Department	575-885-3125
New Mexico Oil Conservation Division	575-748-1283
Indian Fire & Safety	800-530-8693
Halliburton Services	800-844-8451

**MARBOB ENERGY CORPORATION**  
**MULTI-POINT SURFACE USE AND OPERATIONS PLAN**

**Lizard Pot State Com #4H**  
**Surf: 990' FSL & 660' FEL, Sec 36, T19S-R31E**  
**BHL: 330' FSL & 660' FEL, Sec 1, T20S-R31E**  
**Eddy County, New Mexico**

This plan is submitted with Form 3160-3, Application for Permit to Drill, covering the above described well. The purpose of this plan is to describe the location of the proposed well, the proposed construction activities and operations plan, the magnitude of the surface disturbance involved and the procedures to be followed in rehabilitating the surface after completion of the operations, so that a complete appraisal can be made of the environmental effect associated with the operations.

**1. EXISTING ROADS:**

- a. The well site and elevation plat for the proposed well are reflected on the well site layout; Form C-102. The well was staked by John West Surveying Company.
- b. Exhibit 2 is a portion of a topo map showing the well and roads in the vicinity of the proposed location. The proposed wellsite and the access route to the location are indicated in red on Exhibit 2. Right of way using this proposed route is being requested if necessary.
- c. Routine grading and maintenance of existing roads will be conducted as necessary to maintain their condition as long as any operations continue on this lease.

**DIRECTIONS:**

From the intersection of Lusk Plant Road and Co. Rd. #H126 (Maljamar Rd.), go south on Co. Rd. #H126 approx. 1.9 miles. Turn right and go west approx. 1.1 miles. Turn left and go south approx. 0.5 miles. Turn right at existing Wildcap State Com #1 well and battery and go west approx. 300 feet to a proposed road survey. Turn left at proposed road survey and go south approx. 891 feet. This location stake is approx. 212 feet southeast.

**2. PLANNED ACCESS ROAD:**

Marbob will be using a proposed access road of 891' coming in on the northwestern side of the well pad.

**3. LOCATION OF EXISTING AND/OR PROPOSED FACILITIES:**

- A. In the event the well is found productive, the Lizard Pot State Com #4H tank battery would be utilized and the necessary production equipment will be installed at the well site. A Site Facilities Diagram will be

submitted upon completion of facility. All flowlines will adhere to API standards

- B. If electricity is needed, power will be obtained from Central Valley Electric. Central Valley Electric will apply for ROW for their power lines.
- C. If the well is productive, rehabilitation plans are as follows:
  - i. The original topsoil from the well site will be returned to the location. The drill site will then be contoured as close as possible to the original state.

**4. LOCATION AND TYPES OF WATER SUPPLY:**

This location will be drilled using a combination of water mud systems (outlined in the Drilling Program). The water will be obtained from commercial water stations in the area and hauled to location by transport truck using the existing and proposed roads shown in Exhibit #2. On occasion, water will be obtained from a pre-existing water well, running a pump directly to the drill rig. In these cases where a poly pipeline is used to transport water for drilling purposes, the existing and proposed road shown in Exhibit "2" will be utilized.

**5. CONSTRUCTION MATERIALS:**

All Caliche utilized for the drilling pad and proposed access road will be obtained from an existing BLM approved pit or from prevailing deposits found under the location. All roads will be constructed of 6" rolled and compacted caliche. Will use BLM recommended use of extra caliche from other locations close by for roads, if available.

**6. METHODS OF HANDLING WASTE MATERIAL:**

- a. All trash, junk and other waste material will be removed from the wellsite within 30 days after finishing drilling and/or completion operations. All waste material will be contained in trash cages or trash bins to prevent scattering. When the job is completed, all contents will be removed and disposed of in an approved sanitary landfill.
- b. The supplier, including broken sacks, will pick up slats remaining after completion of well.
- c. A porto-john will be provided for the rig crews. This equipment will be properly maintained during the drilling and completion operations and will be removed when all operations are complete.
- d. Disposal of fluids to be transported by an approved disposal company.

**7. ANCILLARY FACILITIES:**

No campsite or other facilities will be constructed as a result of this well.

**8. WELLSITE LAYOUT:**

- a. Exhibit 3 shows the proposed well site layout with dimensions of the pad layout.
- b. This exhibit indicates proposed location of fresh water sump pits if utilized and living facilities.
- c. Mud pits in the active circulating system will be steel pits and a closed loop system will be utilized.

## 9. PLANS FOR SURFACE RECLAMATION:

- a. After finishing drilling and/or completion operations, if the well is found non-commercial, the caliche will be removed from the pad and transported to the original caliche pit or used for other drilling locations. The road will be reclaimed as directed by the BLM. The original top soil will again be returned to the pad and contoured, as close as possible, to the original state.
- b. The location and road will be rehabilitated as recommended by the BLM.
- a. If the well is deemed commercially productive, caliche from areas of the pad site not required for operations will be reclaimed. The original top soil will be returned to the area of the drill pad not necessary to operate the well. These unused areas of the drill pad will be contoured, as close as possible, to match the original topography. Reserve pit will not be used on this location therefore no reclamation is needed.
- b. Topsoil will be stockpiled on the EAST SIDE of the location until it is needed for interim reclamation described in paragraph above.

## 10. SURFACE OWNERSHIP:

~~US Government~~ **NM**

The surface is owned by the ~~US Government~~ and is administered by the Bureau of Land Management. The surface is multiple use with the primary uses of the region for the grazing of livestock and the production of oil and gas. The proposed road routes and the surface location will be restored as directed by the BLM.

## 11. OTHER INFORMATION:

- a. The area surrounding the well site is grassland. The topsoil is very sandy in nature. The vegetation is moderately sparse with native prairie grass, some mesquite bushes and shinnery oak. No wildlife was observed but it is likely that deer, rabbits, coyotes, and rodents traverse the area.
- b. There is no permanent or live water in the general proximity of the location.
- c. There are no dwellings within 2 miles of location.
- d. A Cultural Resources Examination will be completed by Boone Archeological and forwarded to the BLM office in Carlsbad, New Mexico.

## 12. OPERATOR'S REPRESENTATIVE:

- |   |  |
|---|--|
| A. Through A.P.D. Approval:<br>Dean Chumbley, Landman<br>Marbob Energy Corporation<br>P. O. Box 227<br>Artesia, NM 88211-0227<br>Phone (575)748-3303<br>Cell (575) 748-5988 | B. Through Drilling Operations<br>Sheryl Baker, Drilling Supervisor<br>Marbob Energy Corporation<br>P. O. Box 227<br>Artesia, NM 88211-0227<br>Phone (575)748-3303<br>Cell (575)748-5489 |
|---|--|

**CERTIFICATION:**

I hereby certify that I, or persons under my direct supervision, have inspected the proposed drillsite and access route, that I am familiar with the conditions which presently exist; that the statements made in this plan are to the best of my knowledge, true and correct; and that the work associated with the operations proposed herein will be performed by Marbob Energy Corporation 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 18 U.S.C. 1001 for the filing of a false statement.

5/4/10

Date

Marbob Energy Corporation



William Miller

Land Department

## PECOS DISTRICT CONDITIONS OF APPROVAL

OPERATOR'S NAME:	MARBOB ENERGY
LEASE NO.:	NM057239
WELL NAME & NO.:	4H-LIZARD POT STATE COM
SURFACE HOLE FOOTAGE:	1650' FSL & 0750' FEL
BOTTOM HOLE FOOTAGE:	0330' FSL & 0660' FEL
LOCATION:	Section 36, T. 19 S., R 31 E., NMPM (SHL)
COUNTY:	Section 1, T. 20 S., R 31 E., NMPM (BHL) Eddy County, New Mexico

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Standard Conditions of Approval (COA) apply to this APD. If any deviations to these standards exist or special COAs are required, the section with the deviation or requirement will be checked below.

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☒ **Final Abandonment & Reclamation**

## **I. GENERAL PROVISIONS**

The approval of the Application For Permit To Drill (APD) is in compliance with all applicable laws and regulations: 43 Code of Federal Regulations 3160, the lease terms, Onshore Oil and Gas Orders, Notices To Lessees, New Mexico Oil Conservation Division (NMOCD) Rules, National Historical Preservation Act As Amended, and instructions and orders of the Authorized Officer. Any request for a variance shall be submitted to the Authorized Officer on Form 3160-5, Sundry Notices and Report on Wells.

## **II. PERMIT EXPIRATION**

If the permit terminates prior to drilling and drilling cannot be commenced within 60 days after expiration, an operator is required to submit Form 3160-5, Sundry Notices and Reports on Wells, requesting surface reclamation requirements for any surface disturbance. However, if the operator will be able to initiate drilling within 60 days after the expiration of the permit, the operator must have set the conductor pipe in order to allow for an extension of 60 days beyond the expiration date of the APD. (Filing of a Sundry Notice is required for this 60 day extension.)

## **III. ARCHAEOLOGICAL, PALEONTOLOGY & HISTORICAL SITES**

Any cultural and/or paleontological resource discovered by the operator or by any person working on the operator's behalf shall immediately report such findings to the Authorized Officer. The operator is fully accountable for the actions of their contractors and subcontractors. The operator shall suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the Authorized Officer. An evaluation of the discovery shall be made by the Authorized Officer to determine the appropriate actions that shall be required to prevent the loss of significant cultural or scientific values of the discovery. The operator shall be held responsible for the cost of the proper mitigation measures that the Authorized Officer assesses after consultation with the operator on the evaluation and decisions of the discovery. Any unauthorized collection or disturbance of cultural or paleontological resources may result in a shutdown order by the Authorized Officer.

## **IV. NOXIOUS WEEDS**

The operator shall be held responsible if noxious weeds become established within the areas of operations. Weed control shall be required on the disturbed land where noxious weeds exist, which includes the roads, pads, associated pipeline corridor, and adjacent land affected by the establishment of weeds due to this action. The operator shall consult with the Authorized Officer for acceptable weed control methods, which include following EPA and BLM requirements and policies.

## V. SPECIAL REQUIREMENT(S)

Timing Limitation Stipulation / Condition of Approval for lesser prairie-chicken:

Oil and gas activities including 3-D geophysical exploration, and drilling will not be allowed in lesser prairie-chicken habitat during the period from March 1st through June 15th annually. During that period, other activities that produce noise or involve human activity, such as the maintenance of oil and gas facilities, pipeline, road, and well pad construction, will be allowed except between 3:00 am and 9:00 am. The 3:00 am to 9:00 am restriction will not apply to normal, around-the-clock operations, such as venting, flaring, or pumping, which do not require a human presence during this period.

Additionally, no new drilling will be allowed within up to 200 meters of leks known at the time of permitting. Normal vehicle use on existing roads will not be restricted.

Exhaust noise from pump jack engines must be muffled or otherwise controlled so as not to exceed 75 db measured at 30 feet from the source of the noise.

Ground-level Abandoned Well Marker to avoid raptor perching: Upon the plugging and subsequent abandonment of the well, the well marker will be installed at ground level on a plate containing the pertinent information for the plugged well. For more installation details, contact the Carlsbad Field Office at 575-234-5972.

**Communitization Agreement:** A Communitization Agreement covering the acreage dedicated to this well must be filed for approval with the BLM. The effective date of the agreement shall be prior to any sales

Porto-johns and trash containers will be on-location during fracturing operations or any other crew-intensive operations.

## VI. CONSTRUCTION

### A. NOTIFICATION

The BLM shall administer compliance and monitor construction of the access road and well pad. Notify the Carlsbad Field Office at (575) 234-5972 at least 3 working days prior to commencing construction of the access road and/or well pad.

When construction operations are being conducted on this well, the operator shall have the approved APD and Conditions of Approval (COA) on the well site and they shall be made available upon request by the Authorized Officer.

**B. V-DOOR DIRECTION:** not stipulated

**C. TOPSOIL**

The operator shall stockpile the topsoil in a low profile manner in order to prevent wind/water erosion of the topsoil. The topsoil to be stripped is approximately 8 inches in depth. The topsoil will be used for interim and final reclamation.

#### **D. CLOSED LOOP SYSTEM**

Tanks are required for drilling operations: No Pits.

The operator shall properly dispose of drilling contents at an authorized disposal site.

#### **E. FEDERAL MINERAL MATERIALS PIT**

Payment shall be made to the BLM prior to removal of any federal mineral materials. Call the Carlsbad Field Office at (575) 234-5972.

#### **F. WELL PAD SURFACING**

Surfacing of the well pad is not required.

If the operator elects to surface the well pad, the surfacing material may be required to be removed at the time of reclamation.

The well pad shall be constructed in a manner which creates the smallest possible surface disturbance, consistent with safety and operational needs.

#### **G. ON LEASE ACCESS ROADS**

##### **Road Width**

The access road shall have a driving surface that creates the smallest possible surface disturbance and does not exceed twelve (12) feet in width. The maximum width of surface disturbance, when constructing the access road, shall not exceed thirty (30) feet.

##### **Surfacing**

Surfacing material is not required on the new access road driving surface. If the operator elects to surface the new access road or pad, the surfacing material may be required to be removed at the time of reclamation.

Where possible, no improvements should be made on the unsurfaced access road other than to remove vegetation as necessary, road irregularities, safety issues, or to fill low areas that may sustain standing water.

The Authorized Officer reserves the right to require surfacing of any portion of the access road at any time deemed necessary. Surfacing may be required in the event the road deteriorates, erodes, road traffic increases, or it is determined to be beneficial for future field development. The surfacing depth and type of material will be determined at the time of notification.

### Crowning

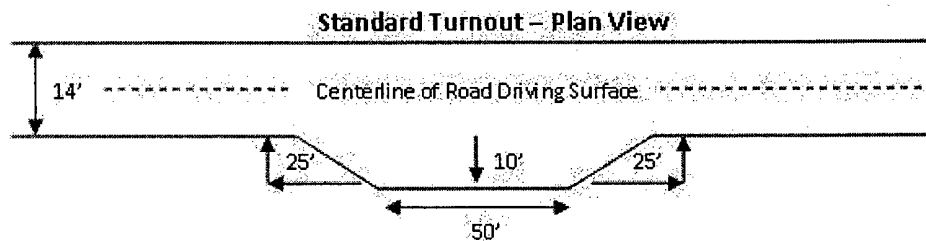
Crowning shall be done on the access road driving surface. The road crown shall have a grade of approximately 2% (i.e., a 1" crown on a 14' wide road). The road shall conform to Figure 1; cross section and plans for typical road construction.

### Ditching

Ditching shall be required on both sides of the road.

### Turnouts

Vehicle turnouts shall be constructed on the road. Turnouts shall be intervisible with interval spacing distance less than 1000 feet. Turnouts shall be constructed on all blind curves. Turnouts shall conform to the following diagram:

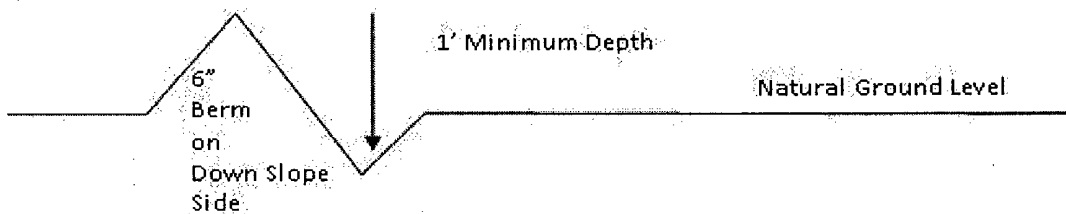


### Drainage

Drainage control systems shall be constructed on the entire length of road (e.g. ditches, sidehill outsloping and insloping, lead-off ditches, culvert installation, and low water crossings).

A typical lead-off ditch has a minimum depth of 1 foot below and a berm of 6 inches above natural ground level. The berm shall be on the down-slope side of the lead-off ditch.

### Cross Section of a Typical Lead-off Ditch



All lead-off ditches shall be graded to drain water with a 1 percent minimum to 3 percent maximum ditch slope. The spacing interval are variable for lead-off ditches and shall be determined according to the formula for spacing intervals of lead-off ditches, but may be amended depending upon existing soil types and centerline road slope (in %);

### **Formula for Spacing Interval of Lead-off Ditches**

Example - On a 4% road slope that is 400 feet long, the water flow shall drain water into a lead-off ditch. Spacing interval shall be determined by the following formula:

$$400 \text{ foot road with } 4\% \text{ road slope: } \frac{400'}{4\%} + 100' = 200' \text{ lead-off ditch interval}$$

### **Culvert Installations**

Appropriately sized culvert(s) shall be installed at the deep waterway channel flow crossing.

### **Cattleguards**

An appropriately sized cattleguard(s) sufficient to carry out the project shall be installed and maintained at fence crossing(s).

Any existing cattleguard(s) on the access road shall be repaired or replaced if they are damaged or have deteriorated beyond practical use. The operator shall be responsible for the condition of the existing cattleguard(s) that are in place and are utilized during lease operations.

A gate shall be constructed and fastened securely to H-braces.

### **Fence Requirement**

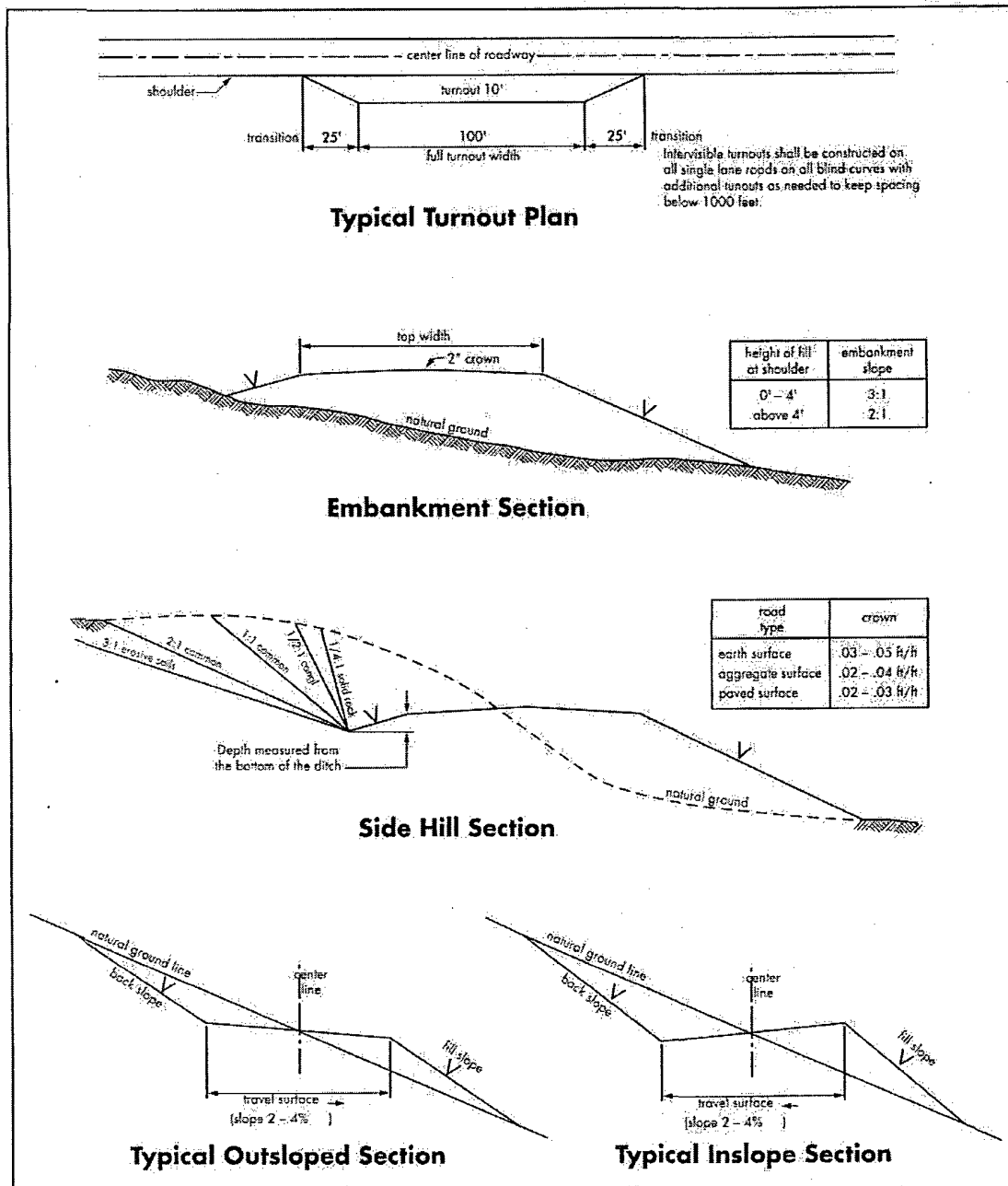
Where entry is required across a fence line, the fence shall be braced and tied off on both sides of the passageway prior to cutting.

The operator shall notify the private surface landowner or the grazing allotment holder prior to crossing any fence(s).

### **Public Access**

Public access on this road shall not be restricted by the operator without specific written approval granted by the Authorized Officer.

Figure 1 – Cross Sections and Plans For Typical Road Sections



## VII. DRILLING

### A. DRILLING OPERATIONS REQUIREMENTS

The BLM is to be notified a minimum of 4 hours in advance for a representative to witness:

- a. Spudding well
- b. Setting and/or Cementing of all casing strings
- c. BOPE tests

☒ **Eddy County**

Call the Carlsbad Field Office, 620 East Greene St., Carlsbad, NM 88220,  
(575) 361-2822

1. A Hydrogen Sulfide (H<sub>2</sub>S) Drilling Plan should be activated 500 feet prior to drilling below the surface casing. **As a result, the Hydrogen Sulfide area must meet Onshore Order 6 requirements, which includes equipment and personnel/public protection items. If Hydrogen Sulfide is encountered, please provide measured values and formations to the BLM.**
2. Unless the production casing has been run and cemented or the well has been properly plugged, the drilling rig shall not be removed from over the hole without prior approval. **If the drilling rig is removed without approval – an Incident of Non-Compliance will be written and will be a “Major” violation.**
3. Floor controls are required for 3M or Greater systems. These controls will be on the rig floor, unobstructed, readily accessible to the driller and will be operational at all times during drilling and/or completion activities. Rig floor is defined as the area immediately around the rotary table; the area immediately above the substructure on which the draw works are located, this does not include the dog house or stairway area.
4. **The record of the drilling rate along with the GR/N well log run from TD to surface will be submitted to the BLM office as well as all other logs run on the borehole 30 days from completion. If available, a digital copy of the logs is to be submitted in addition to the paper copies. The Rustler top and top and bottom of Salt are to be recorded on the Completion Report.**

### B. CASING

**Changes to the approved APD casing and cement program require submitting a sundry and receiving approval prior to work. Failure to obtain approval prior to work will result in an Incident of Non-Compliance being issued.**

**Centralizers required on surface casing per Onshore Order 2.III.B.1.f.**

**Wait on cement (WOC) time for a primary cement job will be a minimum 18 hours for a water basin, 24 hours in the potash area, or 500 pounds compressive strength, whichever is greater for all casing strings. Provide compressive strengths including hours to reach required 500 pounds compressive strength prior to cementing each casing string. See individual casing strings for details regarding lead cement slurry requirements.**

**No pea gravel permitted for remedial or fall back remedial without prior authorization from the BLM engineer.**

**Secretary's Potash**

**Possible lost circulation in the Artesia Group and Capitan Reef.**

**Possible water and brine flows in the Artesia and Salado groups.**

**Possible high pressure gas bursts in the Wolfcamp (if penetrated).**

1. The 13-3/8 inch surface casing shall be set at **approximately 900 feet (a minimum of 25 feet into the Rustler Anhydrite and above the salt)** and cemented to the surface.
  - a. If cement does not circulate to the surface, the appropriate BLM office shall be notified and a temperature survey utilizing an electronic type temperature survey with surface log readout will be used or a cement bond log shall be run to verify the top of the cement. Temperature survey will be run a minimum of six hours after pumping cement and ideally between 8-10 hours after completing the cement job.
  - b. **Wait on cement (WOC) time for a primary cement job is to include the lead cement slurry.**
  - c. Wait on cement (WOC) time for a remedial job will be a minimum of 4 hours after bringing cement to surface or 500 pounds compressive strength, whichever is greater.
  - d. If cement falls back, remedial cementing will be done prior to drilling out that string.

**Special Capitan Reef requirements:**

**If any lost circulation occurs below the Base of the Salt, the operator is to switch to fresh water mud to protect the Capitan Reef and use fresh water mud until setting the intermediate casing. The appropriate BLM office is to be notified for a PET to witness the switch to fresh water.**



In addition, daily drilling reports are to be submitted to the BLM CFO engineering staff via e-mail by 0800 hours each morning from the setting of the surface casing until the intermediate casing is set. Any lost circulation encountered is to be recorded on these drilling reports. The daily drilling report should show mud volume on an hourly basis. Failure to submit these reports will result in an Incidence of Non-Compliance being issued for failure to comply with the Conditions of Approval. If not already planned, the operator shall run a caliper survey for the intermediate well bore and submit to the appropriate BLM office.

2. The minimum required fill of cement behind the 9-5/8 inch intermediate casing is:

a. First stage to DV tool, cement shall:

- ☒ Cement to circulate. If cement does not circulate, contact the appropriate BLM office before proceeding with second stage cement job. Operator should have plans as to how they will achieve circulation on the next stage.

b. Second stage above DV tool, cement shall:

- ☒ Cement to surface. If cement does not circulate see B.1.a, c-d above. **Wait on cement (WOC) time for a primary cement job is to include the lead cement slurry due to potash.**

**Centralizers required on horizontal leg, must be type for horizontal service and minimum of one every other joint.**

3. The minimum required fill of cement behind the 5-1/2 inch production casing is:

a. First stage to DV tool, cement shall:

- ☒ Cement to circulate. If cement does not circulate, contact the appropriate BLM office before proceeding with second stage cement job. Operator should have plans as to how they will achieve circulation on the next stage.

b. Second stage above DV tool, cement shall:

- ☒ Cement should tie-back at least 50 above the top of the Capitan Reef. Operator shall provide method of verification.

4. If hardband drill pipe is rotated inside casing, returns will be monitored for metal. If metal is found in samples, drill pipe will be pulled and rubber protectors which have a larger diameter than the tool joints of the drill pipe will be installed prior to continuing drilling operations.

### C. PRESSURE CONTROL

1. All blowout preventer (BOP) and related equipment (BOPE) shall comply with well control requirements as described in Onshore Oil and Gas Order No. 2 and API RP 53 Sec. 17.
2. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the surface casing shoe shall be **2000 (2M)** psi.
  - a. **For surface casing only:** If the BOP/BOPE is to be tested against casing, the wait on cement (WOC) time for that casing is to be met (see WOC statement at start of casing section). Independent service company required.
3. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the **9-5/8** intermediate casing shoe shall be **3000 (3M)** psi.
4. The appropriate BLM office shall be notified a minimum of 4 hours in advance for a representative to witness the tests.
  - a. Casing cut-off and BOP installation will not be initiated until the cement has had a minimum of 8 hours setup time for a water basin. The casing shall remain stationary and under pressure for at least eight hours after the operator places the cement. In the potash area, the minimum time is 12 hours and the casing shall remain stationary and under pressure during this time period. Casing shall be under pressure if the operator uses some acceptable means of holding pressure or if the operator employs one or more float valves to hold the cement in place. Testing the BOP/BOPE against a plug can commence after meeting the above conditions plus the BOP installation time.
  - b. The tests shall be done by an independent service company utilizing a test plug.
  - c. The results of the test shall be reported to the appropriate BLM office.
  - d. All tests are required to be recorded on a calibrated test chart. **A copy of the BOP/BOPE test chart and a copy of independent service company test will be submitted to the appropriate BLM office.**
  - e. The BOP/BOPE test shall include a low pressure test from 250 to 300 psi. The test will be held for a minimum of 10 minutes if test is done with a test plug and 30 minutes without a test plug.

**D. DRILL STEM TEST**

If drill stem tests are performed, Onshore Order 2.III.D shall be followed.

**DHW 061710**

Upon completion of interim reclamation, the operator shall submit a Sundry Notices and Reports on Wells, Subsequent Report of Reclamation (Form 3160-5).

## **X. FINAL ABANDONMENT & RECLAMATION**

At final abandonment, well locations, production facilities, and access roads must undergo "final" reclamation so that the character and productivity of the land are restored.

Earthwork for final reclamation must be completed within six (6) months of well plugging. All pads, pits, facility locations and roads must be reclaimed to a satisfactory revegetated, safe, and stable condition, unless an agreement is made with the landowner or BLM to keep the road and/or pad intact.

After all disturbed areas have been satisfactorily prepared; these areas need to be revegetated with the seed mixture provided below. Seeding should be accomplished by drilling on the contour whenever practical or by other approved methods. Seeding may need to be repeated until revegetation is successful, as determined by the BLM.

Operators shall contact a BLM surface protection specialist prior to surface abandonment operations for site specific objectives (Jim Amos: 575-234-5909).

Ground-level Abandoned Well Marker to avoid raptor perching: Upon the plugging and subsequent abandonment of the well, the well marker will be installed at ground level on a plate containing the pertinent information for the plugged well.

## Seed Mixture for LPC Sand/Shinnery Sites

The holder shall seed all disturbed areas with the seed mixture listed below. The seed mixture shall be planted in the amounts specified in pounds of pure live seed (PLS)\* per acre. There shall be no primary or secondary noxious weeds in the seed mixture. Seed will be tested and the viability testing of seed will be done in accordance with State law(s) and within nine (9) months prior to purchase. Commercial seed will be either certified or registered seed. The seed container will be tagged in accordance with State law(s) and available for inspection by the authorized officer.

Seed will be planted using a drill equipped with a depth regulator to ensure proper depth of planting where drilling is possible. The seed mixture will be evenly and uniformly planted over the disturbed area (smaller/heavier seeds have a tendency to drop the bottom of the drill and are planted first). The holder shall take appropriate measures to ensure this does not occur. Where drilling is not possible, seed will be broadcast and the area shall be raked or chained to cover the seed. When broadcasting the seed, the pounds per acre are to be doubled. The seeding will be repeated until a satisfactory stand is established as determined by the authorized officer. Evaluation of growth will not be made before completion of at least one full growing season after seeding.

Species to be planted in pounds of pure live seed\* per acre:

<u>Species</u>	<u>lb/acre</u>
Plains Bristlegrass	5lbs/A
Sand Bluestem	5lbs/A
Little Bluestem	3lbs/A
Big Bluestem	6lbs/A
Plains Coreopsis	2lbs/A
Sand Dropseed	1lbs/A
Four-winged Saltbush	5lbs/A

\*Pounds of pure live seed:

Pounds of seed x percent purity x percent germination = pounds pure live seed