

OCD-HOBBS

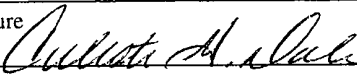
FORM APPROVED  
OMB No. 1004-0137  
Expires March 31, 2007UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT

## 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 type="checkbox"/> Single Zone <input type="checkbox"/> Multiple Zone                                        |                                                      | 8. Lease Name and Well No. <b>31422</b><br>MCA Unit 421                           |                                         |
| 2. Name of Operator<br>ConocoPhillips Company                                                                                                                                                                                                      |                                                      | 9. API Well No.<br>30-025- <b>38988</b>                                           |                                         |
| 3a. Address <b>3300 N. "A" Street, Bldg. 6 Midland, TX 79705</b>                                                                                                                                                                                   |                                                      | 10. Field and Pool, or Exploratory<br>Maljamar; Grayburg-San Andres               |                                         |
| 3b. Phone No (include area code)<br>(432)688-6884                                                                                                                                                                                                  |                                                      | 11. Sec., T. R. M. or Blk. and Survey or Area<br>UL "P", Sec: 28 Twn:17S Rng: 32E |                                         |
| 4. Location of Well (Report location clearly and in accordance with any State requirements. *)<br>At surface 1210' FSL & 525' FEL, Sec. 28, T-17-S, R-32-E, UL "P"<br>At proposed prod. zone 1210' FSL & 525' FEL, Sec. 28, T-17-S, R-32-E, UL "P" |                                                      | 12. County or Parish<br>Lea                                                       |                                         |
| 14. Distance in miles and direction from nearest town or post office*<br>Approximately 4.5 miles south from Maljamar, NM                                                                                                                           |                                                      | 13. State<br>New Mexico                                                           |                                         |
| 15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drig. unit line, if any)                                                                                                                              | 3850' FSL & 8445' FEL                                | 16. No. of acres in lease                                                         | 17. Spacing Unit dedicated to this well |
|                                                                                                                                                                                                                                                    |                                                      | 13,786.66                                                                         | 40                                      |
| 18. Distance from proposed location* to nearest well, drilling, completed, applied for, on this lease, ft.                                                                                                                                         | 615' from #321                                       | 19. Proposed Depth                                                                | 20. BLM/BIA Bond No. on file            |
|                                                                                                                                                                                                                                                    |                                                      | 4430'                                                                             | ES0085                                  |
| 21. Elevations (Show whether DF, KDB, RT, GL, etc.)<br>3959' GR                                                                                                                                                                                    | 2.2. Approximate date work will start*<br>11/22/2008 | 2.3. Estimated duration<br>8 Days                                                 |                                         |
| 24. Attachments                                                                                                                                                                                                                                    |                                                      |                                                                                   |                                         |

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

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

|                                                                                                      |                                               |                     |
|------------------------------------------------------------------------------------------------------|-----------------------------------------------|---------------------|
| 25. Signature<br> | Name (Printed/Typed)<br>Celeste G. Dale       | Date<br>04/21/2008  |
| Title<br>Regulatory Specialist                                                                       |                                               |                     |
| Approved by (Signature)<br><b>DAVID D. EVANS</b>                                                     | Name (Printed/Typed)<br><b>DAVID D. EVANS</b> | Date<br>JUN 11 2008 |
| Title<br><b>FIELD MANAGER</b>                                                                        |                                               |                     |
| Office<br><b>CARLSBAD FIELD OFFICE</b>                                                               |                                               |                     |

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 APPROVAL

RECEIVED

JUN 13 2008

HOBBS OCD

APPROVAL SUBJECT TO  
GENERAL REQUIREMENTS  
AND SPECIAL STIPULATIONS  
ATTACHED

## DISTRICT I

1625 N. Francis Dr., Hobbs, NM 88240

## DISTRICT II

1301 W. Grand Avenue, Artesia, NM 88210

## DISTRICT III

1000 Rio Brazos Rd., Aztec, NM 87410

## DISTRICT IV

1220 S. St. Francis Dr., Santa Fe, NM 87505

## State of New Mexico

Energy, Minerals &amp; Natural Resources Department

OIL CONSERVATION DIVISION  
1220 South St. Frances Dr.  
Santa Fe, NM 87505

Form C-102

Revised October 12, 2005

Submit to Appropriate District Office

State Lease - 4 Copies

Fee Lease - 3 Copies

☐ AMENDED REPORT

## WELL LOCATION AND ACREAGE DEDICATION PLAT

|                        |                                         |                                            |
|------------------------|-----------------------------------------|--------------------------------------------|
| API Number<br>30-025-  | Pool Code<br>43329                      | Pool Name<br>Maljamar; Grayburg-San Andres |
| Property Code<br>31422 | Property Name<br>MCA UNIT               | Well Number<br>421                         |
| OGRID No.<br>217817    | Operator Name<br>CONOCOPHILLIPS COMPANY | Elevation<br>3959'                         |

## Surface Location

| UL or lot No. | Section | Township | Range | Lot Idn | Feet from the | North/South line | Feet from the | East/West line | County |
|---------------|---------|----------|-------|---------|---------------|------------------|---------------|----------------|--------|
| P             | 28      | 17 S     | 32 E  |         | 1210          | SOUTH            | 525           | EAST           | LEA    |

## 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 |
|---------------|---------|----------|-------|---------|---------------|------------------|---------------|----------------|--------|
|               |         |          |       |         |               |                  |               |                |        |

|                       |                 |                    |           |
|-----------------------|-----------------|--------------------|-----------|
| Dedicated Acres<br>40 | 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>NOTE:</p> <p>1) Plane Coordinates shown hereon are Transverse Mercator Grid and Conform to the "New Mexico Coordinate System", New Mexico East Zone, North American Datum of 1927. Distances shown hereon are mean horizontal surface values.</p> |  |  |  |
|                                                                                                                                                                                                                                                      |  |  |  |
|                                                                                                                                                                                                                                                      |  |  |  |
|                                                                                                                                                                                                                                                      |  |  |  |

Plane Coordinate  
X = 674,929.3  
Y = 655,785.8

**OPERATOR CERTIFICATION**

I hereby certify the the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or undivided 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 a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.

04/08/08  
 Signature Date  
 Celeste G. Dale  
 Printed Name

**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

November 28, 2007

Date of Survey

Signature & Seal of Professional Surveyor

W.O. Nurn 2007-1101

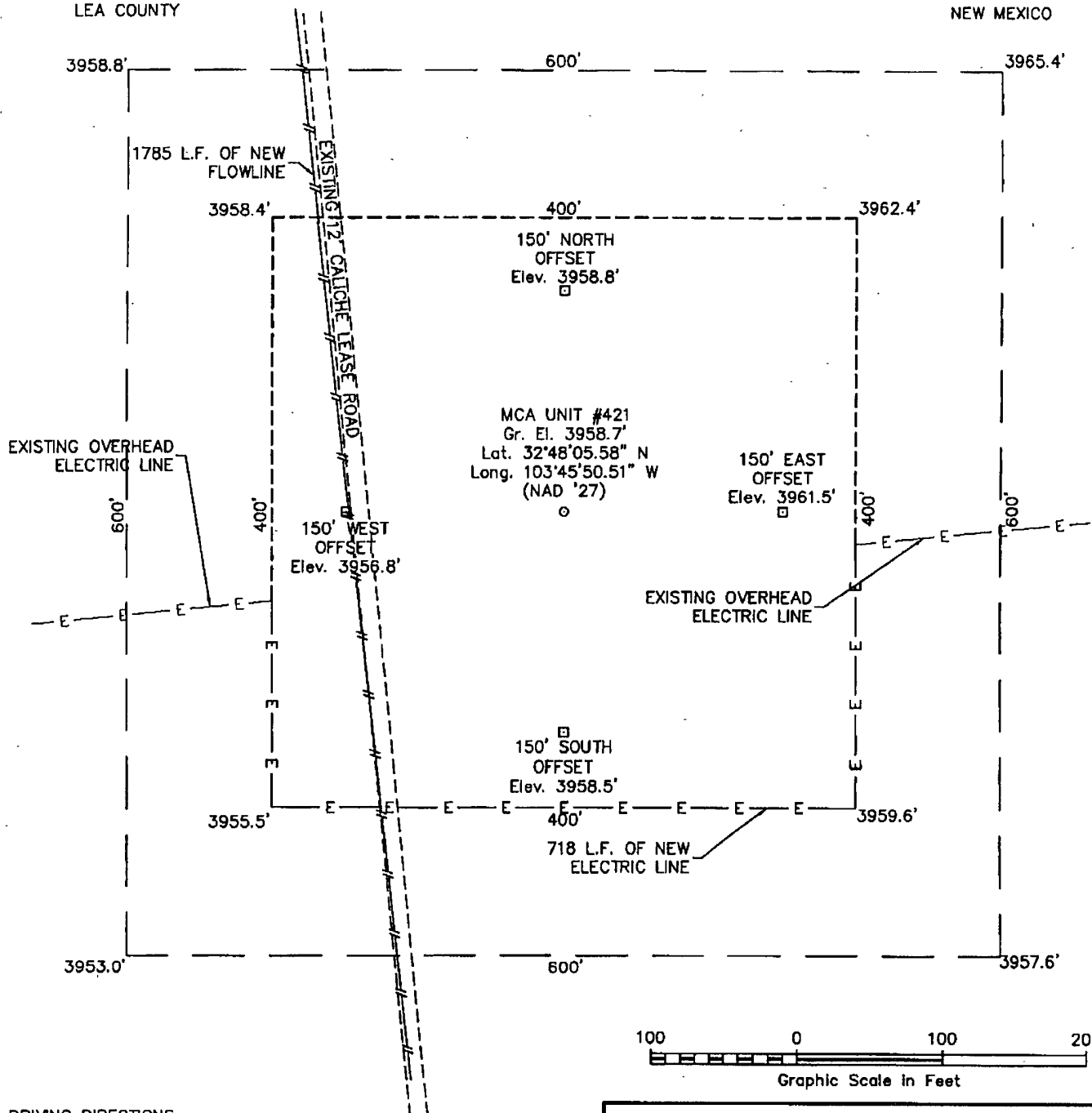
Certificate No. MACON, McDONALD 12185

# SECTION 28, TOWNSHIP 17 SOUTH, RANGE 32 EAST, N.M.P.M.

LEA COUNTY

NEW MEXICO

L-2007-1101-A



## DRIVING DIRECTIONS

FROM THE INTERSECTION OF STATE HIGHWAY 529 AND STATE HIGHWAY 33 4.5 MILES SOUTH OF MALJAMAR, NM GO NORTH ON SAID STATE HIGHWAY 33, 1.0 MILE TO A LEASE ROAD ON THE WEST (LEFT) SIDE OF SAID HIGHWAY, THEN GO WEST ALONG SAID LEASE ROAD 0.1 MILE TO A 2-TRACK TRAIL ROAD ON SOUTH (LEFT) SIDE OF ROAD, THEN GO SOUTH ON SAID TRAIL ROAD 0.1 MILE TO A POINT BEING APPROXIMATELY 100 FEET WEST OF THE PROPOSED LOCATION.



110 W. LOUISIANA, STE. 110  
MIDLAND TEXAS, 79701  
(432) 687-0865 - (432) 687-0868 FAX

## CONOCOPHILLIPS

### MCA UNIT #421

Located 1210' FSL & 525' FEL, Section 28  
Township 17 South, Range 32 East, N.M.P.M.  
Lea County, New Mexico

|                          |                         |
|--------------------------|-------------------------|
| Drawn By: LVA            | Date: December 18, 2007 |
| Scale: 1"=100'           | Field Book: 379 / 25-32 |
| Revision Date: 4-16-2008 | Quadrangle: Maljamar    |
| W.O. No: 2008-0419       | Dwg. No.: L-2007-1101-A |

# LOCATION VERIFICATION MAP



SCALE: 1" = 2000'

CONTOUR INTERVAL:  
MALJAMAR - 10'

SEC. 28 TWP. 17-S RGE. 32-E

SURVEY N.M.P.M.

COUNTY LEA

DESCRIPTION 1210' FSL & 525' FEL

ELEVATION 3959'

OPERATOR CONOCOPHILLIPS

LEASE MCA UNIT

U.S.G.S. TOPOGRAPHIC MAP  
MALJAMAR



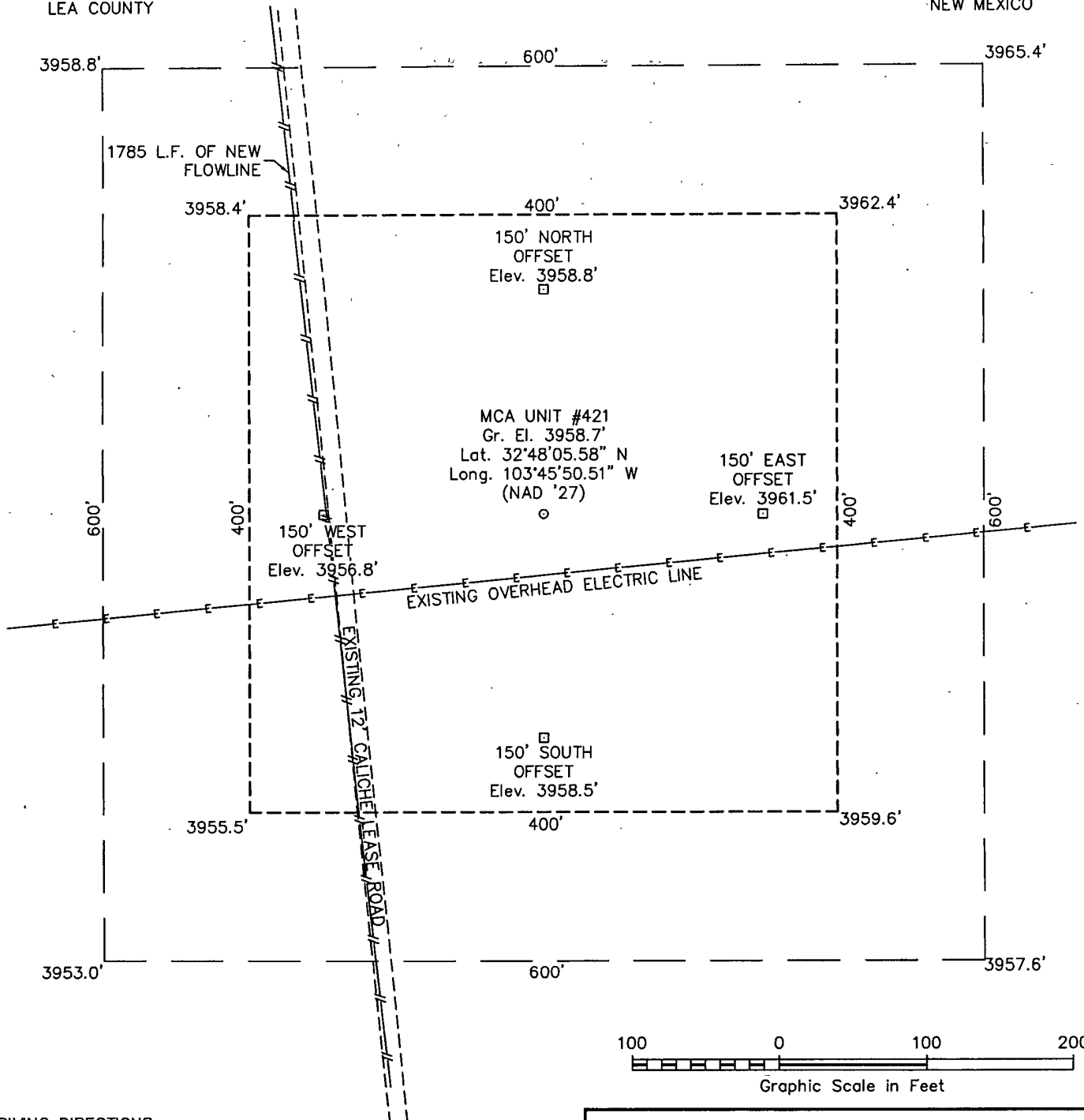
110 W. LOUISIANA, STE. 110  
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# SECTION 28, TOWNSHIP 17 SOUTH, RANGE 32 EAST, N.M.P.M.

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## CONOCOPHILLIPS

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Township 17 South, Range 32 East, N.M.P.M.  
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|                    |                         |
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110 W. LOUISIANA, STE. 110  
MIDLAND TEXAS, 79701  
(432) 687-0865 - (432) 687-0868 FAX

[illegible]

CONTOUR INTERVAL:  
MALJAMAR - 10'

U.S.G.S. TOPOGRAPHIC MAP  
MALJAMAR



**WEST  
COMPANY**  
of Midland, Inc.

110 W. LOUISIANA, STE. 110  
MIDLAND TEXAS, 79701  
(432) 687-0865 - (432) 687-0868 FAX

# LOCATION VERIFICATION MAP



SCALE: 1" = 2000'

CONTOUR INTERVAL:  
MALJAMAR - 10'

SEC. 28 TWP. 17-S RGE. 32-E

SURVEY N.M.P.M.

COUNTY LEA

DESCRIPTION 1210' FSL & 525' FEL

ELEVATION 3959'

OPERATOR CONOCOPHILLIPS

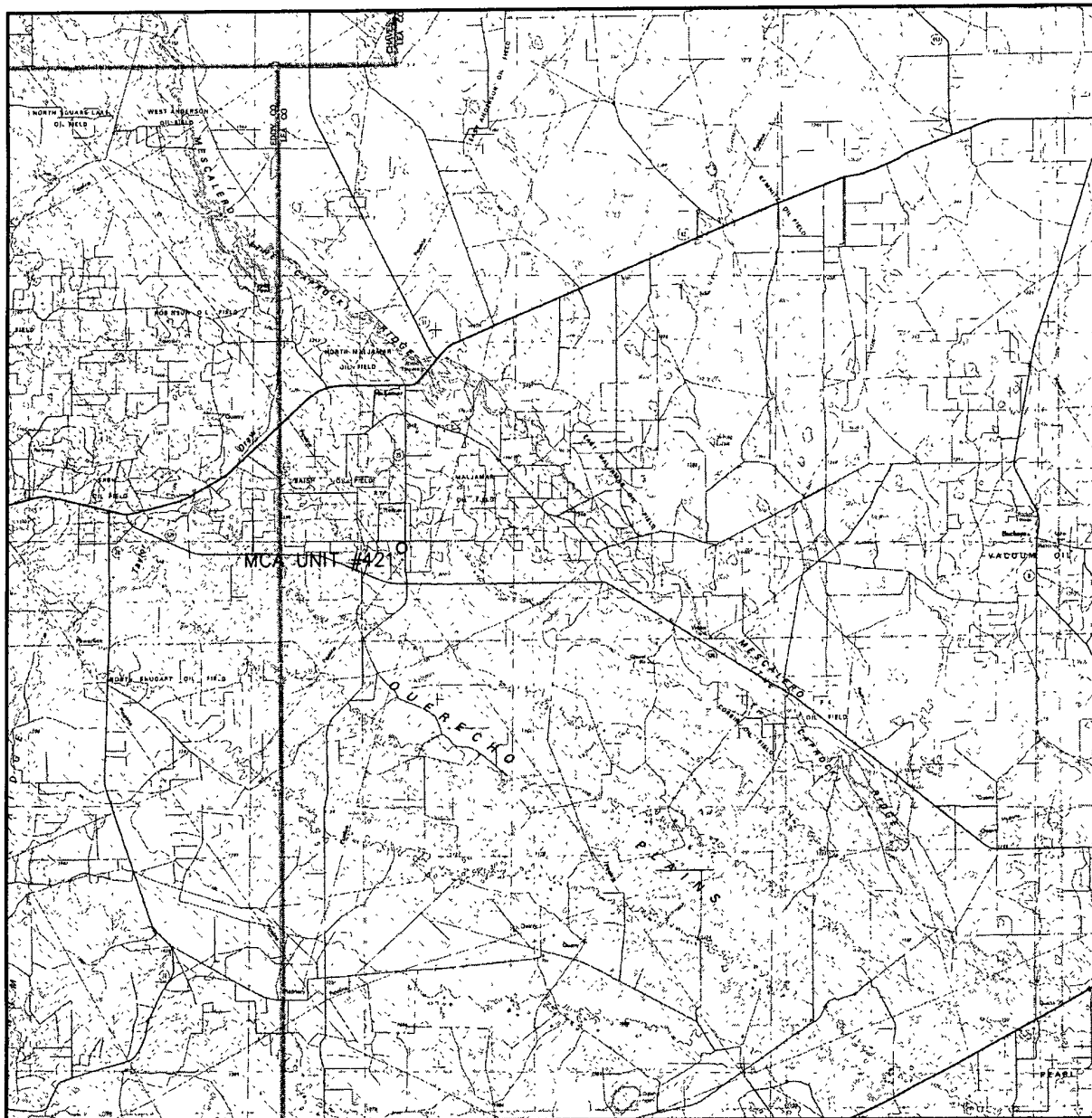
LEASE MCA UNIT

U.S.G.S. TOPOGRAPHIC MAP  
MALJAMAR



110 W. LOUISIANA, STE. 110  
MIDLAND TEXAS, 79701  
(432) 687-0865 - (432) 687-0868 FAX

# VICINITY MAP



SCALE: 1" = 4 MILES

SEC. 28 TWP. 17-S RGE. 32-E

SURVEY N.M.P.M.

COUNTY LEA

DESCRIPTION 1210' FSL & 525' FEL

ELEVATION 3959'

OPERATOR CONOCO PHILLIPS

LEASE MCA UNIT



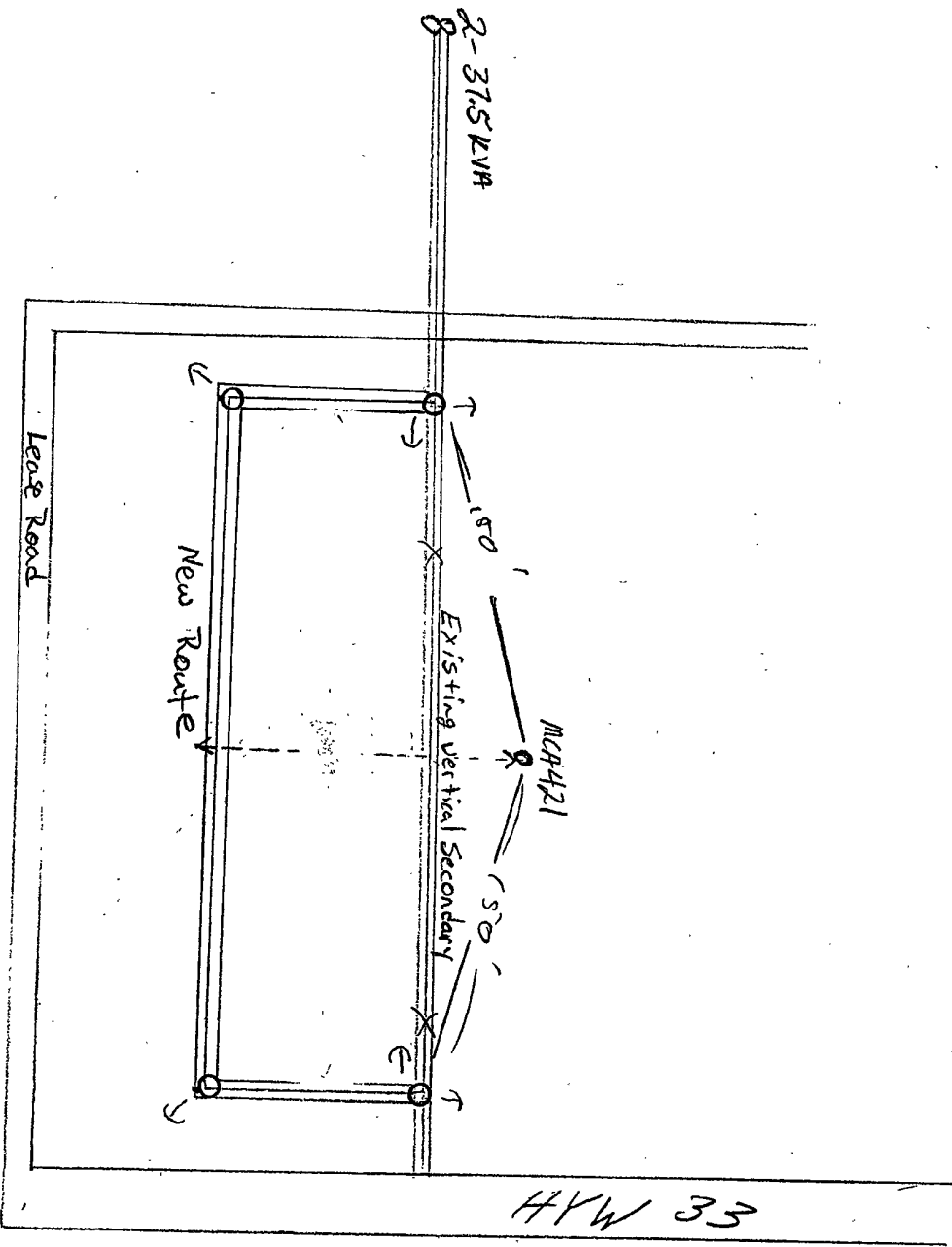
110 W. LOUISIANA, STE. 110  
MIDLAND TEXAS, 79701  
(432) 687-0865 - (432) 687-0868 FAX

MCA Well 421; 2800' of flowline to 2C header. Power line from corner of road (light blue)



MCA 421

N



┆ = Guy Wire

Master Drilling Plan  
ConocoPhillips Company  
MCA Unit  
February 28, 2008

Lea County, NM  
Pool: Maljamar, Grayburg-San Andres

**MCA UNIT AREA**

| Lease  | Sfx | Lessor                        | Tw<br>n | Rng | Sec | QQ                      |
|--------|-----|-------------------------------|---------|-----|-----|-------------------------|
| N/A    |     | USA LC 061842                 | 17      | 32  | 14  | E2                      |
| N/A    |     | Fee                           | 17      | 32  | 14  | W2                      |
| N/A    |     | USA LC 059576                 | 17      | 32  | 15  | NE                      |
| 088907 | 000 | USA LC 054687                 | 17      | 32  | 15  | N2, SW, W2SE            |
| 269411 | 000 | USA NM-080258                 | 17      | 32  | 15  | E2SE                    |
| N/A    |     | State of New Mexico B-2366-16 | 17      | 32  | 16  | NE, N2SE                |
| N/A    |     | State of New Mexico VO-3555   | 17      | 32  | 16  | N2SW                    |
| 109063 | 000 | State of New Mexico B 155-5   | 17      | 32  | 16  | S2SW                    |
| 109063 | 000 | State of New Mexico B 155-5   | 17      | 32  | 16  | NW                      |
| 088913 | 000 | State of New Mexico B 2366-11 | 17      | 32  | 16  | SWSE                    |
| 088908 | 000 | State of New Mexico B 4062-3  | 17      | 32  | 16  | SESE                    |
| 088912 | 000 | USA LC 029405-B               | 17      | 32  | 17  | W2                      |
| 088912 | 000 | USA LC 029405-B               | 17      | 32  | 17  | W2E2                    |
| 109069 | 000 | USA NM LC 060329              | 17      | 32  | 17  | E2E2                    |
| 088912 | 000 | USA LC 029405-B               | 17      | 32  | 18  | E2                      |
| 088912 | 000 | USA LC 029405-B               | 17      | 32  | 18  | E2W2                    |
| 109069 | 000 | USA NM LC 060329              | 17      | 32  | 18  | NWNW                    |
| 109069 | 000 | USA NM LC 060329              | 17      | 32  | 18  | SWSW                    |
| 088911 | 000 | USA LC 029405-A               | 17      | 32  | 19  | N2                      |
| 088912 | 000 | USA LC 029405-B               | 17      | 32  | 19  | S2                      |
| 088911 | 000 | USA LC 029405-A               | 17      | 32  | 20  | N2                      |
| 088912 | 000 | USA LC 029405-B               | 17      | 32  | 20  | S2                      |
| 088909 | 000 | USA LC 029509-A               | 17      | 32  | 21  | N2, SW, N2SE            |
| 088910 | 000 | USA LC 029509-B               | 17      | 32  | 21  | S2SE                    |
| 088909 | 000 | USA LC 029509-A               | 17      | 32  | 22  | W2NW                    |
| 088910 | 000 | USA LC 029509-B               | 17      | 32  | 22  | NE                      |
| 088910 | 000 | USA LC 029509-B               | 17      | 32  | 22  | E2NW                    |
| 088910 | 000 | USA LC 029509-B               | 17      | 32  | 22  | NWSE                    |
| 088910 | 000 | USA LC 029509-B               | 17      | 32  | 22  | SW                      |
| 253943 | 000 | USA LC 058395                 | 17      | 32  | 22  | E2SE                    |
| 253943 | 000 | USA LC 058395                 | 17      | 32  | 22  | SWSE                    |
| 101798 | 000 | USA LC 029400-A               | 17      | 32  | 23  | NWSW                    |
| 109067 | 000 | USA LC 058697-A               | 17      | 32  | 23  | S2SE                    |
| 109066 | 000 | USA LC 058698-A               | 17      | 32  | 23  | N2SE                    |
| 109066 | 000 | USA LC 058698-A               | 17      | 32  | 23  | NESW                    |
| 109066 | 000 | USA LC 058698-A               | 17      | 32  | 23  | S2SW                    |
| 109068 | 000 | USA LC 058698-B               | 17      | 32  | 23  | N2                      |
| N/A    |     | USA LC 058697-B               | 17      | 32  | 25  | All                     |
| 262724 | 000 | USA LC 058408-A               | 17      | 32  | 26  | W2NE<br>NESE, NWSE,     |
| 262723 | 000 | USA LC 058408-B               | 17      | 32  | 26  | S2SE                    |
| 109066 | 000 | USA LC 058698-A               | 17      | 32  | 26  | S2NW                    |
| 253944 | 000 | USA LC 058699                 | 17      | 32  | 26  | SW                      |
| 109062 | 000 | USA LC 061841                 | 17      | 32  | 26  | N2NW                    |
| 256034 | 000 | USA NM 94188                  | 17      | 32  | 26  | E2NE<br>NENE, SE, SWNE, |
| 109065 | 000 | USA LC 057210                 | 17      | 32  | 27  | W2                      |

|        |     |                     |    |    |    |                         |
|--------|-----|---------------------|----|----|----|-------------------------|
| 253947 | 000 | USA LC 058396       | 17 | 32 | 27 | NWNE, SENE              |
| 109065 | 000 | USA LC 057210       | 17 | 32 | 28 | All                     |
| 256050 | 000 | USA LC 029410-A     | 17 | 32 | 29 | All                     |
| N/A    |     | USA LC 029410-B     | 17 | 32 | 30 | W2, SE, W2NE            |
| 253946 | 000 | USA LC 060199-B     | 17 | 32 | 30 | E2NE                    |
| N/A    |     | USA LC 029410-B     | 17 | 32 | 31 | E2SE, N2                |
| N/A    |     | USA LC 069105       | 17 | 32 | 31 | E2SE                    |
|        |     | USA NM 03428        | 17 | 32 | 31 | SW                      |
| N/A    |     | State of NM B-4109  | 17 | 32 | 32 | NE, N2NW,               |
| N/A    |     | State of NM B-6768  | 17 | 32 | 32 | SE, NESW<br>S2SW, NWSW, |
| N/A    |     | State of NM OG-5119 | 17 | 32 | 32 | S2NW                    |
| 109072 | 000 | USA LC 029409-A     | 17 | 32 | 33 | SW                      |
| 109071 | 000 | USA LC 059001-A     | 17 | 32 | 33 | E2, N2NW, S2NW          |
| 109060 | 000 | USA LC 058514       | 17 | 32 | 34 | NE                      |
| 109059 | 000 | USA LC 058728       | 17 | 32 | 34 | E2NW                    |
| 109061 | 000 | USA LC 059002       | 17 | 32 | 34 | W2NW                    |
| N/A    |     | USA LC 068140       | 17 | 32 | 34 | SW                      |
| N/A    |     | USA LC 060503       | 17 | 32 | 34 | N2SE                    |
| N/A    |     | USA NM 036852       | 17 | 32 | 34 | S2SE                    |
| 109068 | 000 | USA LC 058698-B     | 17 | 32 | 35 | W2                      |
| 109068 | 000 | USA LC 058407-B     | 17 | 32 | 35 | NE                      |
| 109068 | 000 | USA LC 058409-B     | 17 | 32 | 35 | SE                      |
| 109070 | 000 | USA LC 058697-B     | 17 | 33 | 30 | W2                      |

**1. Geologic Name of Surface Formation:**

- Quaternary Alluvium and Dunes

**2. Estimated tops of geological markers and estimated depths to water, oil, or gas formations:**

In the MCA Unit, the estimated tops of the geological markers and proposed Total Depth (TD) vary within a range of approximately 550 to 775'. The range of minimum to maximum depth for these markers and proposed TD range is presented in the table below. The datum for these depths is RKB or Rig Floor (which is 10' - 12' above Ground Level).

| Formation Call       | Top (MD) |         | Contents                                                         |
|----------------------|----------|---------|------------------------------------------------------------------|
|                      | Minimum  | Maximum |                                                                  |
| Above top of Rustler |          |         | Fresh Water                                                      |
| Rustler              | 600      | 1170    |                                                                  |
| Salado               | 775      | 1380    |                                                                  |
| Grayburg             | 3270     | 3940    | Oil, Gas, Salt Water and possible CO2 from old injection Program |
| Grayburg 6           | 3480     | 4170    | Oil, Gas, Salt Water and possible CO2 from old injection Program |
| San Andres 7         | 3610     | 4345    | Oil, Gas, Salt Water and possible CO2 from old injection Program |
| San Andres 9         | 3810     | 4585    | Oil, Gas, Salt Water and possible CO2 from old injection Program |
| Proposed TD          | 4155     | 4705    | Oil, Gas, Salt Water and possible CO2 from old injection Program |

Note: For each individual well we will include with our Application for Permit to Drill (APD) our correlation pick depths for the formation tops and proposed TD for that individual well.

Protection of fresh water will be accomplished by setting the surface casing 25' - 70' into the Rustler Anhydrite formation and **cementing** the surface casing from the casing shoe **to the surface of ground** in accordance with the provisions of Onshore Oil and Gas Order No. 2 and New Mexico Oil Conservation Division Title 19.

### 3. Proposed casing program:

| Type | Hole Size | Interval MD RKB (ft) |                              | OD       | Wt      | Gr   | Conn | Condition | Safety Factors<br>Calculated per BLM Load Formulas |          |                        |
|------|-----------|----------------------|------------------------------|----------|---------|------|------|-----------|----------------------------------------------------|----------|------------------------|
|      | (in)      | From                 | To                           | (inches) | (lb/ft) |      |      |           | Burst                                              | Collapse | Tension<br>Dry/Buoyant |
| Cond | 17-1/2"   | 0                    | 40' – 87'<br>(30' – 75' BGL) | 13-3/8"  | 48#     | H-40 | STC  | New       | NA                                                 | NA       | NA                     |
| Surf | 12-1/4"   | 0                    | 625' – 1240'                 | 8-5/8"   | 24#     | J-55 | STC  | New       | 5.49                                               | 2.5      | 8.2 / 9.42             |
| Prod | 7-7/8"    | 0                    | 4155' – 4705'                | 5-1/2"   | 17#     | J-55 | LTC  | New       | 2.17                                               | 2.01     | 3.09 / 3.64            |

We propose to set the surface and production casing approximately 10' off bottom and to drill the hole to fit the casing string so that the cementing head is positioned at the floor for the cement job.

#### Casing Design (Safety) Factors – BLM Criteria:

BLM Criteria for Minimum Design Factors

|                              | Burst | Collapse | Tension               |
|------------------------------|-------|----------|-----------------------|
| Casing Design Safety Factors | 1.0   | 1.125    | 1.6 dry / 1.8 Buoyant |

Joint Strength Design (Safety) Factor: SFt

$$SFt = Fj / Wt;$$

Where

- Fj is the rated pipe Joint Strength in pounds (lbs)
- Wt is the weight of the casing string in pounds (lbs)

The criteria for Minimum Acceptable Joint Strength Design (Safety) Factor SFT = 1.6 dry or 1.8 buoyant

Collapse Design (Safety) Factor: SFc

$$SFc = Pc / (MW \times .052 \times Ls)$$

Where

- Pc is the rated pipe Collapse Pressure in pounds per square inch (psi)
- MW is mud weight in pounds per gallon (ppg)
- Ls is the length of the string in feet (ft)

The criteria for Minimum Acceptable Collapse Design (Safety) Factor SFc = 1.125

Burst Design (Safety) Factor: SFb

$$SFb = Pi / BHP$$

Where

- Pi is the rated pipe Burst (Minimum Internal Yield) Pressure in pounds per square inch (psi)
- BHP is bottom hole pressure in pounds per square inch (psi)

The criteria for Minimum Acceptable Burst Design (Safety) Factor SFb = 1.0

### **Joint Strength Design (Safety) Factors – BLM Criteria**

Surface Casing:

- SFj Dry = 244,000 lbs / (1240 ft x 24 lb/ft) = 244,000 lbs / 29,760 lbs = 8.20 Dry
- SFj Buoyant = 244,000 lbs / (1240 ft x 24 lb/ft) [1-(8.5/65.5)] = 244,000 lbs / 25,898 lbs = 9.42 buoyant

Production Casing:

- SFj Dry = 247,000 lbs / (4705 ft x 17 lb/ft) = 247,000 lbs / 79,985 lbs = 3.09 Dry
- SFj Buoyant = 247,000 lbs / (4705 ft x 17 lb/ft) [1-(10.0/65.5)] = 247,000 lbs / 67,773 lbs = 3.64 Buoyant

### **Collapse Design (Safety) Factors – BLM Criteria**

Surface Casing:

$$SF_c = 1370 \text{ psi} / (8.5 \text{ ppg} \times .052 \times 1240 \text{ ft}) = 1370 \text{ psi} / 548 \text{ psi} = 2.50$$

Production Casing:

$$SF_c = 4910 \text{ psi} / (10 \text{ ppg} \times .052 \times 4705 \text{ ft}) = 4910 \text{ psi} / 2447 \text{ psi} = 2.01$$

### **Burst Design (Safety) Factors – BLM Criteria**

Surface Casing:

$$SF_b = 2950 \text{ psi} / (8.33 \text{ ppg} \times .052 \times 1240 \text{ ft}) = 2950 \text{ psi} / 537 \text{ psi} = 5.49$$

Production Casing:

$$SF_b = 5320 \text{ psi} / (7.15 \text{ ppg} \times .052 \times 4705 \text{ ft}) = 5320 \text{ psi} / 1750 \text{ psi} = 3.04 \text{ based on reservoir pressure data}$$

$$SF_b = 5320 \text{ psi} / (10 \text{ ppg} \times .052 \times 4705 \text{ ft}) = 5320 \text{ psi} / 2447 \text{ psi} = 2.17 \text{ based on brine density used to drill to TD}$$

### **Casing Design (Safety) Factors – Additional ConocoPhillips Criteria:**

ConocoPhillips casing design policy establishes Corporate Minimum Design Factors (see table below) and requires that service life load cases be considered and provided for in the casing design.

ConocoPhillips Corporate Criteria for Minimum Design Factors

|                       | Burst | Collapse | Axial |
|-----------------------|-------|----------|-------|
| Casing Design Factors | 1.15  | 1.05     | 1.4   |

Surface Casing:

The maximum internal (burst) load on the Surface Casing occurs when the surface casing is tested to 1500 psi. We will pressure up to 1600 psi and let the pressure settle for 1 minute after shutting down the pump. Therefore the maximum pressure that the surface casing will be exposed to will be 1600 psi.

Surface Casing Burst Design Factor

$$DF_{\text{Burst}} = \text{Burst Rating} / \text{Maximum Pressure During Casing Pressure Test} = 2950 \text{ psi} / 1600 \text{ psi} = 1.84$$

The maximum collapse load on the Surface Casing occurs when we release the pressure after bumping the plug on the surface casing cement job.

Surface Casing Collapse Design Factor

$$DF_{\text{Collapse}} = \text{Collapse Rating} / (\text{Cement Column Hydrostatic Pressure} - \text{Displacement Fluid Hydrostatic Pressure})$$

$$DF_{\text{Collapse}} = 1370 \text{ psi} / \{[(300 \text{ ft} \times .052 \times 14.8 \text{ ppg}) + (940 \text{ ft} \times .052 \times 13.1 \text{ ppg})] - (1240 \text{ ft} \times .052 \times 8.33 \text{ ppg})\}$$

$$DF_{\text{Collapse}} = 1370 \text{ psi} / 334 \text{ psi}$$

$$DF_{\text{Collapse}} = 4.10$$

The maximum axial load on the Surface Casing would be the buoyant weight of the full string of casing plus an allowance for potential overpull in the amount of 30,000 lbs.

Surface Casing Axial (Tension) Design Factor

DF Tension = Joint Strength Rating / Buoyant Weight + Overpull Margin

Buoyancy Factor for fresh water (8.34 ppg fluid) =  $1 - (8.34 / 65.5) = .873$

Overpull Margin is selected to be 30,000 lbs

DF Tension = 244,000 lbs / [(1240 ft x 24 lb/ft x .873) + 30,000 lbs]

DF Tension = 244,000 lbs / 55980 lbs

DF Tension = 4.36

Production Casing:

The maximum internal (burst) load would occur either during fracture initiation or screen out. Fracture initiation occurs with 2% KCL water in the hole. Screen-out might occur with up to 12 ppg frac fluid in the hole.

For the fracture initiation load case, the design factor calculated at surface is:

DF Burst @ Surface for Fracture Initiation = Burst Rating / Maximum Applied Surface Pressure

DF Burst @ Surface for Fracture Initiation = 5320 psi / 4260 psi

DF Burst @ Surface for Fracture Initiation = 1.25

For the fracture initiation load case, the design factor calculated at TD is:

DF Burst @ TD for Fracture Initiation = Burst Rating / (Internal Pressure – Pore Pressure)

Internal Pressure at TD = Surface Pressure + Hydrostatic Pressure at TD of 2% KCL Water Column

Hydrostatic Pressure at TD of 2% KCL Water Column = 4705 ft x .052 x 8.6 ppg = 2104 psi

Surface Pressure at the time of Fracture Initiation = 4260 psi maximum

Internal Pressure at TD = 4260 psi + 2104 psi = 6364 psi

Pore Pressure in the Reservoir = 1750 psi approximately

DF Burst @ TD for Fracture Initiation = 5320 psi / (6364 psi - 1750 psi)

DF Burst @ TD for Fracture Initiation = 5320 psi / 4614 psi

DF Burst @ TD for Fracture Initiation = 1.15

For the screen out load case, the maximum burst loading occurs at TD and is calculated as follows:

DF Burst @ TD for Screen Out = Burst Rating / (Internal Pressure – Pore Pressure)

Internal Pressure at TD = Surface Pressure + Hydrostatic Pressure at TD of 12 ppg frac fluid

Hydrostatic Pressure at TD of 12 ppg frac fluid = 4705 ft x .052 x 12.0 ppg = 2936 psi

Maximum Allowable Surface Pressure at the time of Screen Out = 3450 psi maximum

Internal Pressure at TD at time of Screen Out = 3450 psi + 2936 psi = 6386 psi

Pore Pressure in the Reservoir = 1750 psi approximately

DF Burst @ TD for Fracture Initiation = 5320 psi / (6386 psi - 1750 psi)

DF Burst @ TD for Fracture Initiation = 5320 psi / 4636 psi

DF Burst @ TD for Fracture Initiation = 1.15

The maximum collapse load on the production casing occurs with the well pumped off on production. The maximum potential pore pressure in the well would be equal to or less 10 ppg which is the density of the brine drilling fluid used in drilling production hole interval from the Surface Casing Shoe to TD.

DF Collapse = Collapse Rating / Maximum Possible Pore Pressure

DF Collapse = 4910 / (10 ppg x .052 x 4705 ft) = 4910 psi / 2447 psi = 2.01

Production Casing Axial (Tension) Design Factor

DF Tension = Joint Strength Rating / Buoyant Weight + Overpull Margin

Buoyancy Factor for 10 ppg brine =  $1 - (10.0 / 65.5) = .847$

Overpull Margin is selected to be 30,000 lbs

DF Tension = 247,000 lbs / [(4705 ft x 17 lb/ft x .847) + 30,000 lbs]

DF Tension = 247,000 lbs / 97,747 lbs

DF Tension = 2.53

We propose options to our casing program as follows:

- **Single Stage Cementing:** We propose an option to perform a Single Stage cement job on the 5-1/2" production casing.
- **Two Stage Cementing:** We propose an option to run a Stage Tool in the 5-1/2" production casing and perform a two-stage cement job if losses are observed to occur while drilling the 7-7/8" production hole. The stage tool would be positioned near the top of the Grayburg formation. In any event in which we would propose to implement this contingency, a call would be made to the authorized officers at BLM and NMOCD to confirm permission prior to proceeding. **Also, if we do not circulate out any cement from the top of the Stage Tool, we must and will contact BLM and NMOCD to report this and obtain permission prior to proceeding with the 2<sup>nd</sup> Stage. A Cement Bond Log or other cement evaluation log will be run after moving off the drilling rig and prior to perforating to determine the top of cement on the Stage 1 cement job and this information will be communicated to BLM and NMOCD and permission will be obtained prior to continuing with the completion.**
- **Two Stage Cementing with External Casing Packers:** In the event that a waterflow is experienced while drilling the 7-7/8" production hole, we propose an option / contingency plan to run a Stage Tool with two each External Casing Packers (ECP's) in the 5-1/2" production casing and to perform a two stage cement job.

The placement of the Stage Tool and External Casing Packers would be as follows:

- The Lower External Casing Packer would be placed approximately 200 to 270' below the top of the Grayburg formation and would be above the shallowest planned perforation depth.
- The Upper External Casing Packer would be placed approximately 500' to 1600' above the top of the Grayburg formation and would be above the waterflow.
- The Stage Tool would be placed immediately above the Upper External Casing Packer.

The execution of the Two Stage cement job with External Casing Packers would be as follows

- a. The Stage 1 cement would be pumped, placing cement from the casing shoe to the Stage Tool.
- b. The two ECP's would be simultaneously set by hydraulic pressure after bumping the Stage 1 cement Wiper Dart on the baffle on the float collar. The setting of the ECP's should shut off the water flow – isolating it between the ECP's.
- c. After setting the ECP's the Stage Tool would be opened by hydraulic pressure (or with the free fall opening cone if necessary) and the excess cement above the top of the Stage Tool would be circulated out.  
**Note: If we do not circulate out any cement from the top of the Stage Tool, we must and will contact BLM and NMOCD to report this and obtain permission prior to proceeding with the 2<sup>nd</sup> Stage. A Cement Bond Log or other cement evaluation log will be run after moving off the drilling rig and prior to perforating to determine the top of cement on the Stage 1 cement job and this information will be communicated to BLM and NMOCD and permission will be obtained prior to continuing with the completion.**
- d. The Stage 2 cement would be pumped placing cement from the Stage Tool to Surface. The closing wiper plug would be bumped on the stage tool and the Stage Tool would be closed with hydraulic pressure.

In any event in which we would propose to implement this contingency, a call would be made to the authorized officers at BLM and NMOCD to confirm permission prior to proceeding.

Diagrams / schematics of the proposed casing program alternatives are attached.

#### 4. Proposed cementing program:

For the cementing program a range is presented for the number of sacks of cement and for the bottom, top, and length of the lead slurries and tail slurries due to the variation in formation tops and planned TD for the planned / contemplated wells for which this Master Drilling Plan is intended.

##### 13-3/8" Conductor:

Cement to surface with ready mix or Class C Neat cement. TOC at surface.

##### 8-5/8" Surface Casing:

The intention for the cementing program for the Surface Casing is to:

- Place the Tail Slurry from the casing shoe to 300' above the casing shoe,
- Bring the Lead Slurry to surface.

Spacer: 20 bbls Fresh Water

| Lead Slurry                                                                                                    |                   |                |                  |                  |                    |                   |                                                   |                                           |
|----------------------------------------------------------------------------------------------------------------|-------------------|----------------|------------------|------------------|--------------------|-------------------|---------------------------------------------------|-------------------------------------------|
| Volume (sx)<br>& Recipe & Excess %                                                                             | Bottom<br>(ft MD) | Top<br>(ft MD) | Length<br>(ft)   | Density<br>(ppg) | Yield<br>(cuft/sx) | Mix Wtr<br>gal/sx | Compressive Strengths<br>@ 85 deg F by UCA Method |                                           |
| 185 – 535 sx<br>Class C<br>+ 6% bentonite<br>+ 2% CaCl <sub>2</sub><br>+ 0.125% Polyflake<br><br>Excess = 170% | 325<br>to<br>940  | Surface        | 325<br>to<br>940 | 13.1             | 1.96               | 10.69             | Time<br>12 hrs<br>18 hrs<br>24 hrs                | Strength<br>316 psi<br>417 psi<br>506 psi |

| Tail Slurry                                                                            |                     |                    |                |                  |                    |                   |                                                      |                                                                  |
|----------------------------------------------------------------------------------------|---------------------|--------------------|----------------|------------------|--------------------|-------------------|------------------------------------------------------|------------------------------------------------------------------|
| Volume (sx)<br>& Recipe & Excess %                                                     | Bottom<br>(ft MD)   | Top<br>(ft MD)     | Length<br>(ft) | Density<br>(ppg) | Yield<br>(cuft/sx) | Mix Wtr<br>gal/sx | Compressive Strengths<br>@ 91 deg F by UCA Method    |                                                                  |
| 220 sx<br>Class C<br>+ 2% CaCl <sub>2</sub><br>+ 0.125% Polyflake<br><br>Excess = 100% | 625'<br>to<br>1240' | 325'<br>to<br>940' | 300'           | 14.8             | 1.35               | 6.36              | Time<br>3 hrs<br>9 hrs<br>12 hrs<br>24 hrs<br>48 hrs | Strength<br>50 psi<br>500 psi<br>793 psi<br>1266 psi<br>2183 psi |

Displacement: Fresh Water

**Note:** In accordance with the Pecos District Conditions of Approval, we will Wait on Cement (WOC) for a period of not less than 24 hrs after placement of the cement on the Surface Casing in order to achieve at least 500 psi compressive strength in both the Lead Slurry and Tail Slurry cements prior to drilling out of the Surface Casing.

### 5-1/2" Production Casing Cementing Program - Single Stage Cementing Option:

The intention for the cementing program for the Production Casing – Single Stage Cementing Option is to:

- Place the Tail Slurry from the casing shoe to the top of the Grayburg formation,
- Bring the Lead Slurry to surface.

Spacer: 20 bbls Fresh Water with an option to follow this with 1000 gallons SuperFlush 102 and 20 additional bbls Fresh Water.

| Lead Slurry                                                                                                                     |                      |                |                      |                  |                    |                   |                                                            |                                                      |
|---------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------|----------------------|------------------|--------------------|-------------------|------------------------------------------------------------|------------------------------------------------------|
| Volume (sx)<br>& Recipe & Excess %                                                                                              | Bottom<br>(ft MD)    | Top<br>(ft MD) | Length<br>(ft)       | Density<br>(ppg) | Yield<br>(cuft/sx) | Mix Wtr<br>gal/sx | Compressive<br>Strengths<br>@ 113 deg F by<br>Crush Method |                                                      |
| 433 – 644 sx<br>50% Class C<br>50% POZ<br>+ 10% bentonite<br>+ 8 lb/sx Salt<br>+ 0.2% Fluid Loss Additive<br>+ 0.125% Polyflake | 3270'<br>to<br>3940' | Surface        | 3270'<br>to<br>3940' | 11.8             | 2.55               | 14.88             | Time<br>12 hrs<br>24 hrs<br>48 hrs<br>72 hrs               | Strength<br>100 psi<br>200 psi<br>245 psi<br>310 psi |
| Excess = 88% - 135% (based on caliper if available)                                                                             |                      |                |                      |                  |                    |                   |                                                            |                                                      |

| Tail Slurry (this is a CO <sub>2</sub> resistant cement)    |                      |                      |                    |                  |                    |                   |                                                                    |                                                                   |
|-------------------------------------------------------------|----------------------|----------------------|--------------------|------------------|--------------------|-------------------|--------------------------------------------------------------------|-------------------------------------------------------------------|
| Volume (sx)<br>& Recipe & Excess %                          | Bottom<br>(ft MD)    | Top<br>(ft MD)       | Length<br>(ft)     | Density<br>(ppg) | Yield<br>(cuft/sx) | Mix Wtr<br>gal/sx | Compressive Strengths<br>@ 115 deg F by UCA Method                 |                                                                   |
| 150 – 285 sx<br>65% Class C<br>35% POZ<br>+ 0.4% Dispersant | 4155'<br>to<br>4705' | 3270'<br>to<br>3940' | 636'<br>to<br>885' | 16.4             | 0.98               | 3.76              | Time<br>5 hrs 56 min<br>8 hrs 12 min<br>24 hrs<br>48 hrs<br>72 hrs | Strength<br>50 psi<br>500 psi<br>2806 psi<br>4690 psi<br>5661 psi |
| Excess = 26% - 83% (based on caliper if available)          |                      |                      |                    |                  |                    |                   |                                                                    |                                                                   |

Displacement: 2% KCL water with approximately 250 ppm gluteraldehyde biocide.

### **5-1/2" Production Casing Cementing Program - Two-Stage Cementing Option (for Loss of Circulation Events):**

We propose an option to use the two-stage cementing method for cementing the production casing if any loss of circulation events or heavy seepage is experienced while drilling the 7-7/8" hole. (see discussion in Item 3 above). The proposed two-stage cementing program would be as follows:

- Stage 1: Would place cement from the casing shoe to the stage tool.
- Stage 2: Would place cement from the stage tool to Surface.

#### **Stage 1:**

Spacer: 20 bbls Fresh Water with an option to follow this with 1000 gallons SuperFlush 102 and 20 additional bbls Fresh Water

Stage 1 – Lead Slurry: None

| Stage 1 – Tail Slurry                                       |                      |                      |                    |                  |                    |                   |                                                                    |                                                                   |
|-------------------------------------------------------------|----------------------|----------------------|--------------------|------------------|--------------------|-------------------|--------------------------------------------------------------------|-------------------------------------------------------------------|
| Volume (sx)<br>& Recipe & Excess %                          | Bottom<br>(ft MD)    | Top<br>(ft MD)       | Length<br>(ft)     | Density<br>(ppg) | Yield<br>(cuft/sx) | Mix Wtr<br>gal/sx | Compressive Strengths<br>@ 113 deg F by Crush Method               |                                                                   |
| 150 – 285 sx<br>65% Class C<br>35% POZ<br>+ 0.4% Dispersant | 4155'<br>to<br>4705' | 3270'<br>to<br>3940' | 636'<br>to<br>885' | 16.4             | 0.98               | 3.76              | Time<br>5 hrs 56 min<br>8 hrs 12 min<br>24 hrs<br>48 hrs<br>72 hrs | Strength<br>50 psi<br>500 psi<br>2806 psi<br>4690 psi<br>5661 psi |
| Excess = 26% - 83% based on caliper if available            |                      |                      |                    |                  |                    |                   |                                                                    |                                                                   |

Displacement: A volume of Fresh Water equal to the capacity volume from the stage tool to the float collar, followed by brine based mud.

**Stage 2:**

Spacer: 20 bbls Fresh Water with an option to follow this with 1000 gallons SuperFlush 102 and 20 additional bbls Fresh Water

| Stage 2 – Lead Slurry                                                                                                           |                      |                |                      |                  |                    |                   |                                                      |                                                      |
|---------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------|----------------------|------------------|--------------------|-------------------|------------------------------------------------------|------------------------------------------------------|
| Volume (sx)<br>& Recipe & Excess %                                                                                              | Bottom<br>(ft MD)    | Top<br>(ft MD) | Length<br>(ft)       | Density<br>(ppg) | Yield<br>(cuft/sx) | Mix Wtr<br>gal/sx | Compressive Strengths<br>@ 113 deg F by Crush Method |                                                      |
| 382 – 592 sx<br>50% Class C<br>50% POZ<br>+ 10% bentonite<br>+ 8 lb/sx Salt<br>+ 0.2% Fluid Loss Additive<br>+ 0.125% Polyflake | 3000'<br>to<br>3670' | Surface        | 3000'<br>to<br>3670' | 11.8             | 2.55               | 14.88             | Time<br>12 hrs<br>24 hrs<br>48 hrs<br>72 hrs         | Strength<br>100 psi<br>200 psi<br>245 psi<br>310 psi |
| Excess = 81% - 130% based on caliper if available                                                                               |                      |                |                      |                  |                    |                   |                                                      |                                                      |

| Stage 2 – Tail Slurry                               |                      |                      |                |                  |                    |                   |                                                          |                                                       |
|-----------------------------------------------------|----------------------|----------------------|----------------|------------------|--------------------|-------------------|----------------------------------------------------------|-------------------------------------------------------|
| Volume (sx)<br>& Recipe & Excess %                  | Bottom<br>(ft MD)    | Top<br>(ft MD)       | Length<br>(ft) | Density<br>(ppg) | Yield<br>(cuft/sx) | Mix Wtr<br>gal/sx | Compressive Strengths<br>@ 113 deg F by Crush Method     |                                                       |
| 100 sx<br>Class C<br>+ 0.1% Retarder<br>(if needed) | 3270'<br>to<br>3940' | 3000'<br>to<br>3670' | 270'           | 14.8             | 1.33               | 6.359             | Time<br>1 hrs 05 min<br>2 hrs 38 min<br>24 hrs<br>72 hrs | Strength<br>50 psi<br>500 psi<br>2800 psi<br>3182 psi |
| Excess = 184%                                       |                      |                      |                |                  |                    |                   |                                                          |                                                       |

Displacement: Fresh Water

**5-1/2" Production Casing Cementing Program – Two-Stage Cementing Option with Stage Tool and External Casing Packers (for Water Flow Events):**

We propose an option to use the two-stage cementing method with a Stage Tool and two each External Casing Packers if any waterflow event is experienced while drilling the 7-7/8" hole as discussed above in Item 3. The proposed two-stage cementing program would be as follows:

- Stage 1: Would place cement from the casing shoe to the stage tool
- Stage 2: Would place cement from the stage tool to Surface.

**Stage 1:**

Spacer: 20 bbls Fresh Water with an option to follow this with 1000 gallons SuperFlush 102 and 20 additional bbls Fresh Water

| Stage 1 – Lead Slurry                                                                                                          |                      |                      |                     |                  |                    |                   |                                                      |                                                      |
|--------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------|---------------------|------------------|--------------------|-------------------|------------------------------------------------------|------------------------------------------------------|
| Volume (sx)<br>& Recipe & Excess %                                                                                             | Bottom<br>(ft MD)    | Top<br>(ft MD)       | Length<br>(ft)      | Density<br>(ppg) | Yield<br>(cuft/sx) | Mix Wtr<br>gal/sx | Compressive Strengths<br>@ 113 deg F by Crush Method |                                                      |
| 77 – 363 sx<br>50% Class C<br>50% POZ<br>+ 10% bentonite<br>+ 8 lb/sx Salt<br>+ 0.2% Fluid Loss Additive<br>+ 0.125% Polyflake | 3270'<br>to<br>3940' | 1670'<br>to<br>3440' | 500'<br>to<br>1600' | 11.8             | 2.55               | 14.88             | Time<br>12 hrs<br>24 hrs<br>48 hrs<br>72 hrs         | Strength<br>100 psi<br>200 psi<br>245 psi<br>310 psi |
| Excess = 126% - 234% based on caliper if available                                                                             |                      |                      |                     |                  |                    |                   |                                                      |                                                      |

| Stage 1 – Tail Slurry                                       |                      |                      |                    |                  |                    |                   |                                                                    |                                                                   |
|-------------------------------------------------------------|----------------------|----------------------|--------------------|------------------|--------------------|-------------------|--------------------------------------------------------------------|-------------------------------------------------------------------|
| Volume (sx)<br>& Recipe & Excess %                          | Bottom<br>(ft MD)    | Top<br>(ft MD)       | Length<br>(ft)     | Density<br>(ppg) | Yield<br>(cuft/sx) | Mix Wtr<br>gal/sx | Compressive Strengths<br>@ 113 deg F by Crush Method               |                                                                   |
| 150 – 285 sx<br>65% Class C<br>35% POZ<br>+ 0.4% Dispersant | 4155'<br>to<br>4705' | 3270'<br>to<br>3940' | 636'<br>to<br>885' | 16.4             | 0.98               | 3.76              | Time<br>5 hrs 56 min<br>8 hrs 12 min<br>24 hrs<br>48 hrs<br>72 hrs | Strength<br>50 psi<br>500 psi<br>2806 psi<br>4690 psi<br>5661 psi |
| Excess = 26% - 83% based on caliper if available            |                      |                      |                    |                  |                    |                   |                                                                    |                                                                   |

Displacement: A volume of Fresh Water equal to the capacity volume from the stage tool to the float collar, followed by brine based mud.

**Stage 2:**

Spacer: 20 bbls Fresh Water with an option to follow this with 1000 gallons SuperFlush 102 and 20 additional bbls Fresh Water

| Stage 2 – Lead Slurry                                                                                                           |                      |                |                      |                  |                    |                   |                                                      |                                                      |
|---------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------|----------------------|------------------|--------------------|-------------------|------------------------------------------------------|------------------------------------------------------|
| Volume (sx)<br>& Recipe & Excess %                                                                                              | Bottom<br>(ft MD)    | Top<br>(ft MD) | Length<br>(ft)       | Density<br>(ppg) | Yield<br>(cuft/sx) | Mix Wtr<br>gal/sx | Compressive Strengths<br>@ 113 deg F by Crush Method |                                                      |
| 145 – 584 sx<br>50% Class C<br>50% POZ<br>+ 10% bentonite<br>+ 8 lb/sx Salt<br>+ 0.2% Fluid Loss Additive<br>+ 0.125% Polyflake | 1400'<br>to<br>3170' | Surface        | 1400'<br>to<br>3170' | 11.8             | 2.55               | 14.88             | Time<br>12 hrs<br>24 hrs<br>48 hrs<br>72 hrs         | Strength<br>100 psi<br>200 psi<br>245 psi<br>310 psi |
| Excess = 42% - 162% based on caliper if available                                                                               |                      |                |                      |                  |                    |                   |                                                      |                                                      |

| Stage 2 – Tail Slurry                               |                      |                      |                |                  |                    |                   |                                                          |                                                       |
|-----------------------------------------------------|----------------------|----------------------|----------------|------------------|--------------------|-------------------|----------------------------------------------------------|-------------------------------------------------------|
| Volume (sx)<br>& Recipe & Excess %                  | Bottom<br>(ft MD)    | Top<br>(ft MD)       | Length<br>(ft) | Density<br>(ppg) | Yield<br>(cuft/sx) | Mix Wtr<br>gal/sx | Compressive Strengths<br>@ 113 deg F by Crush Method     |                                                       |
| 100 sx<br>Class C<br>+ 0.1% Retarder<br>(if needed) | 1670'<br>to<br>3440' | 1400'<br>to<br>3170' | 270'           | 14.8             | 1.33               | 6.359             | Time<br>1 hrs 05 min<br>2 hrs 38 min<br>24 hrs<br>72 hrs | Strength<br>50 psi<br>500 psi<br>2800 psi<br>3182 psi |
| Excess = 184%                                       |                      |                      |                |                  |                    |                   |                                                          |                                                       |

Displacement: Fresh Water

**Proposal for Option to Adjust Production Casing Cement Volumes:**

The production casing cement volumes for the proposed single stage and two-stage options presented above are estimates based on data from previous wells. We propose an option to adjust these volumes based on the caliper log data for this proposed well if available. Also, if no caliper log is available for this proposed well, we would propose an option to possibly increase the production casing cement volumes to account for any uncertainty in regard to the hole volume.

## 5. Pressure Control Equipment:

The blowout preventer equipment (BOP) will consist of 11", 2M equipment to conform to the requirements for a 2M System as described in Onshore Oil and Gas Order No. 2, III.A.2.a.ii. The blowout preventer equipment will be installed after running and cementing the surface casing and installing the wellhead and will be tested by a third party using a test plug. Ram type preventers and associated equipment will be tested to approved stack working pressure of 2000 psi. Annular type preventers, if used, will be tested to 50 percent of rated working pressure, and therefore will be tested to 1000 psi. The above tests will be performed:

- When initially installed
- Whenever any seal subject to test pressure is broken
- Following related repairs, and
- At 30 day intervals

Annular preventers, if used, will be functionally operated at least weekly.

Pipe and Blind rams shall be activated each trip, but not more than once per day.

All of the above described tests will be recorded in the drilling log.

A diagram of the proposed BOPs and choke manifold is attached.

## 6. Proposed Wellhead Program:

Casing Head: 8-5/8" Slip on and Weld x 11" 5M Casing Head installed on 8-5/8" surface casing  
Tubing Head: 11" 5M x 7-1/6" 5M Tubing Head installed after setting 5-1/2" production casing

Or, alternatively:

Casing Head: 8-5/8" Slip on and Weld x 11" 3M Casing Head installed on 8-5/8" surface casing  
Tubing Head: 11" 3M x 7-1/6" 5M Tubing Head installed after setting 5-1/2" production casing

## 7. Proposed Mud System:

The mud systems that are proposed for use are as follows:

| DEPTH                      | TYPE and VOLUME                                       | WEIGHT        | VISCOSITY   | WATERLOSS        |
|----------------------------|-------------------------------------------------------|---------------|-------------|------------------|
| 0 – Surface Casing Point   | Fresh Water Native Mud<br>320 bbls in lined earth pit | 8.5 – 9.0 ppg | 28 – 40 sec | N.C.             |
| Surface Casing Point to TD | Brine<br>640 bbls in lined earth pit                  | 10 ppg        | 29 sec      | N.C.             |
| Conversion to Mud at TD    | Brine Based Mud<br>300 bbls in steel mud pits         | 10 ppg        | 34 – 45 sec | 5 – 10 cc/30 min |

12-1/4" hole from surface of ground to surface casing point: The circulating media will be either a native mud or fresh water with high viscosity sweeps. The mud components will be:

- Fresh Water
- Bentonite (if needed)
- Lime
- Soda Ash
- Starch (if needed)
- Drilling Paper
- Other loss of circulation material if needed (nut plug or fibrous material)
- Soap sticks (if needed)

7-7/8" hole from the surface casing shoe to TD: The circulating media will be 10 ppg brine and will be converted to a mud with starch, attapulgate, and lime upon reaching Total Depth (TD). The mud components will be:

- Brine (approximately 10 lb/gal density)
- Attapulgate
- Lime
- Starch
- Drilling Paper
- Other loss of circulation material if needed (nut plug, fibrous material, gilsonite, or asphalt)
- Soap Sticks if needed
- Diesel in sweeps if needed
- Lease crude oil as a spotting fluid if needed in the event of differential sticking

We do not plan to keep any weighting material at the wellsite.

The circulating system we plan to use while drilling would be a "U" shaped brine reserve pit. We plan to monitor the pit level visually, not with float type pit level monitoring system.

After reaching TD, if the well is not flowing from a waterflow, then we would bring circulation into the steel mud pits and circulate the hole and convert to a brine based mud circulating through the steel mud pits. In such event we would propose to monitor the pit level visually, not with a float type pit level monitoring system.

Gas detecting equipment will be installed in the mud return system and will be monitored.

A mud gas separator will be installed and operable before drilling out from the Surface Casing.

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

- a. No drill stem tests will be done
- b. No mud logging is planned
- c. No whole cores are planned
- d. The open hole electrical logging program is planned to be as follows:
  - Total Depth to top of Grayburg or possibly to the surface casing shoe: Resistivity, Density, Spectral Gamma Ray and possibly BHC Sonic.
  - Total Depth to Surface Casing Shoe: Caliper
  - Total Depth to 200' MD, Gamma Ray and Neutron
  - Formation pressure data (XPT) on electric line if needed (optional)
  - Rotary Sidewall Cores on electric line if needed (optional)

## 9. Abnormal Pressures and Temperatures:

- It is possible that abnormal pressures may be encountered while drilling in the 7-7/8" hole interval from the surface casing shoe to TD. If encountered, it is expected that a water flow would occur with some gas, oil, and/or CO<sub>2</sub> associated with it. The source of any such abnormal pressure would be from CO<sub>2</sub> injection (from our previous CO<sub>2</sub> injection program) and water injection that got out of zone and charged up in natural fractures above the reservoir. On three of the six wells drilled by ConocoPhillips in MCA Unit in 2006, such waterflows with associated gas, oil, or CO<sub>2</sub> were encountered. In these wells, the waterflow was encountered in the upper Queen or Grayburg interval above the reservoir. However there have also been cases in the history of this field in which occurrences of water flow, or in some cases CO<sub>2</sub> flow, have occurred at shallower depths. But in all such cases that we are aware of, the flow has been somewhere below the surface casing shoe. We are not aware of any such flows occurring above the surface casing shoe. Other than these occasional charged up zones, no abnormal pressures are expected. We plan to shut in and bleed off our injectors in the area before drilling each well in order to relieve the injection pressure in reservoir in the area. Our experience is that this is very helpful in regard to reducing the pressure in the reservoir, but may not relieve all pressure from charged up zones above the reservoir.

If a waterflow is encountered, our proposed plan is to let it flow while drilling to TD, and then run and cement the production casing using the two-stage method and employing a Stage Tool and two each External Casing Packers as described and discussed above. Our proposed plan in this regard is to shut off any such waterflow by the action of setting the External Casing Packers – containing any such waterflow zone between the two External Casing Packers.

We will ensure that we have sufficient storage capacity at surface to provide for the possibility that the well may flow water. The estimated maximum rate of water flow (based on observations on past wells) is 120 bbl/hr flow rate.

- The expected maximum bottom hole pressure in the reservoir is approximately 1750 psi. However with our injectors operating we have some wells that exhibit higher pressure up to approximately 2750 psi in the reservoir. In this regard we judge that these wells have a highly permeable avenue of communication to the injectors thus causing them to exhibit this higher pressure in the reservoir. We anticipate that when we shut down and bleed off the injectors in the respective areas in preparation for the drilling program the pressure in the reservoir on these wells will be reduced to the normal reservoir pressure in the field which is approximately 1750 psi.
- Above the reservoir, it is possible that there may be charged up zones (charged up from water injection and/or CO<sub>2</sub> injection that got out of zone). Such charged up zones are not found on each well drilled in this field, but are found occasionally. We do not have any measurement of the pressure of such charged up zones – but we feel it is not practical to attempt to control such zones with hydrostatic mud weight. The typical practices in this field have been to let these zones flow while drilling to TD, and our observation is that these zones will typically deplete and stop flowing water after several days or can be isolated between external casing packers as is proposed in this Master Drilling Plan.
- The expected bottom hole temperature is 110 degrees F during logging or 115 degrees F bottom hole static temperature.
- The estimated H<sub>2</sub>S concentrations in the MCA Field is 11,000 – 14,000 ppm H<sub>2</sub>S with a gas rate of zero to 38 MCFPD. The 100 ppm H<sub>2</sub>S ROE is 0 - 59'. The 500 ppm ROE is 0 - 27'. ConocoPhillips will comply with the provisions of Oil and Gas Order # 6, Hydrogen Sulfide Operations and will provide H<sub>2</sub>S monitoring equipment which will be rigged up, tested, and operational prior to drilling out from surface casing. All persons arriving on location will have H<sub>2</sub>S certification & training that occurred within the last year. Each occurrence of H<sub>2</sub>S gas at surface is to be noted on the daily reports and any occurrence of H<sub>2</sub>S in excess of 100 ppm will be reported to the authorized officer as soon as possible but no later than the next business day per the provisions of Oil and Gas Order # 6, Hydrogen Sulfide Operations. Also, ConocoPhillips will provide an H<sub>2</sub>S Contingency Plan (please see copy attached) and will keep this plan updated and posted at the wellsite during drilling operations.

#### **10. Anticipated starting date and duration of operations:**

Road and location construction will begin after the BLM and NMOCD have approved the APD and will take into account any closure stipulations that may be attached or specified in order to avoid operations in any closure period. Also, rig availability may impact our schedule. With consideration of these limiting factors, we would intend / plan to drill the wells in our proposed program MCA Unit within two years after receiving approval of the APD.

#### **Attachments:**

- Attachment # 1 ..... Proposed Casing and Cementing Program with Single Stage Cementing of Production Casing
- Attachment # 2 ..... Proposed Casing and Cementing Program with Two-Stage Cementing of Production Casing
- Attachment # 3 ..... Proposed Casing and Cementing Program with External Casing Packers and Two-Stage Cementing of Production Casing
- Attachment # 4 ..... Diagram of Choke Manifold Equipment (Excerpted 54 FR 39528, Sept 27, 1989)
- Attachment # 5 ..... BOP and Choke Manifold Schematic – 2M System (Figure 3-1, Appendix G, from BLM)
- Attachment # 6 ..... BOP and Choke Manifold Schematic – 2M System (Figure 3-1A, Appendix G, from BLM)

#### **Contact Information:**

Program prepared by:  
Steven O. Moore, Staff Drilling Engineer, ConocoPhillips Company  
Phone 832 486 2459  
Cell Phone 281 467 7596

**MCA Unit**  
**Proposed Casing & Cementing Program**  
**with Single-Stage Cementing of Production Casing**  
**(Alternative # 1)**

Datum: RKB (10' -12' above ground level)

The intent of this alternative casing program is to provide a contingency plan for using Single-Stage Cementing for the production casing cement job if hole conditions are favorable (with no severe loss of circulation, heavy seepage, or waterflow events occurring during the drilling operations).

Conductor: 13-3/8" 48# H-40 ST&C set at 30' to 75' below ground level (40' to 87' MD RKB) and cemented to surface.

Surface Casing: 8-5/8" 24# J-55 ST&C set in the Rustler formation and cemented to surface.

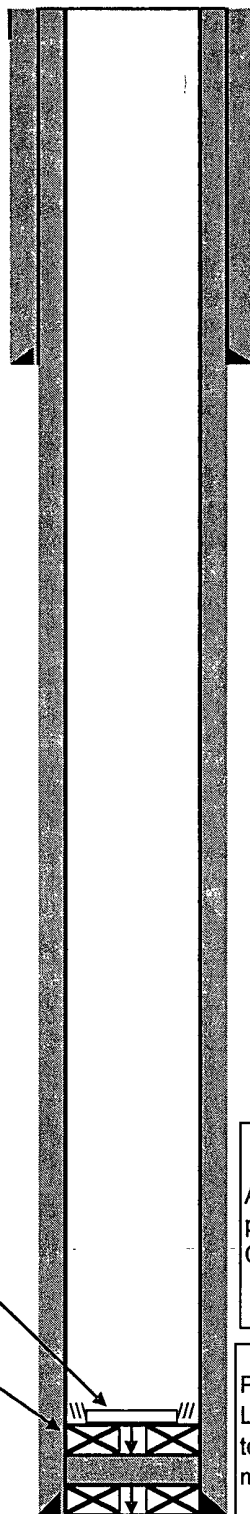
A Single-Stage cement job is pumped placing cement from the Production Casing shoe to surface.

Production casing: 5-1/2" 17# J-55 LT&C set 10' above TD and cemented to surface with single-stage cementing method.

Cement Wiper Plug

Float Shoe, one joint of casing, and Float Collar

Schematic prepared by:  
 Steven O. Moore, Staff Drilling Engineer  
 28-February-2008



**MCA Unit**  
**Proposed Casing & Cementing Program**  
**with Two-Stage Cementing of Production Casing**  
**(Alternative # 2)**

Datum: RKB (10' - 12' above ground level)

The intent of this alternative casing program is to provide a contingency plan for using Two-Stage Cementing for the production casing cement job if loss of circulation occurs during the drilling operations. See comments in "Step 1" to "Step 3" of this schematic.

Stage 2 Wiper Plug / Closing Plug

Stage Tool at top of Grayburg

Stage 1 Wiper Dart

Float Shoe, one joint of casing, and Float Collar

Schematic prepared by:  
 Steven O. Moore, Staff Drilling Engineer  
 28-February-2008

Conductor: 13-3/8" 48# H-40 ST&C set at 30' to 75' below ground level (40' to 87' MD RKB) and cemented to surface.

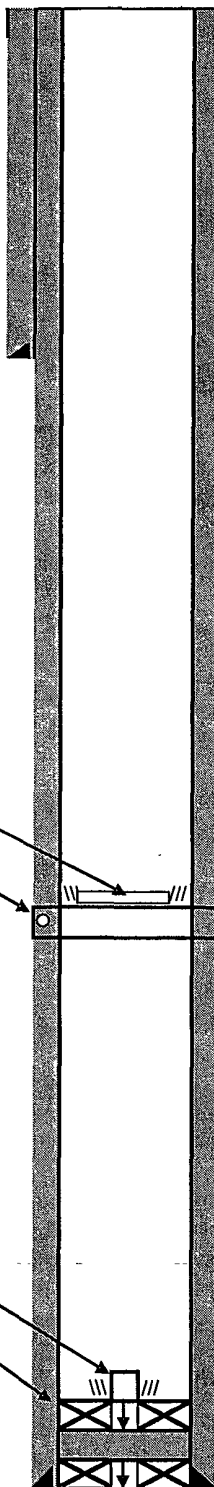
Surface Casing: 8-5/8" 24# J-55 ST&C set in Rustler formation and cemented to surface.

**Step 3:**  
 Stage 2 Cement is pumped placing cement from the Stage Tool to surface.

**Step 2:**  
 The Stage Tool is opened by hydraulic pressure and the excess cement is circulated out from above the stage-tool. Circulation is continued for approximately 4 to 6 hrs until the Stage 1 cement has set and thus isolated the potential loss of circulation zone(s).

**Step 1:**  
 Stage 1 Cement is pumped placing cement from Production Casing shoe to the Stage Tool.

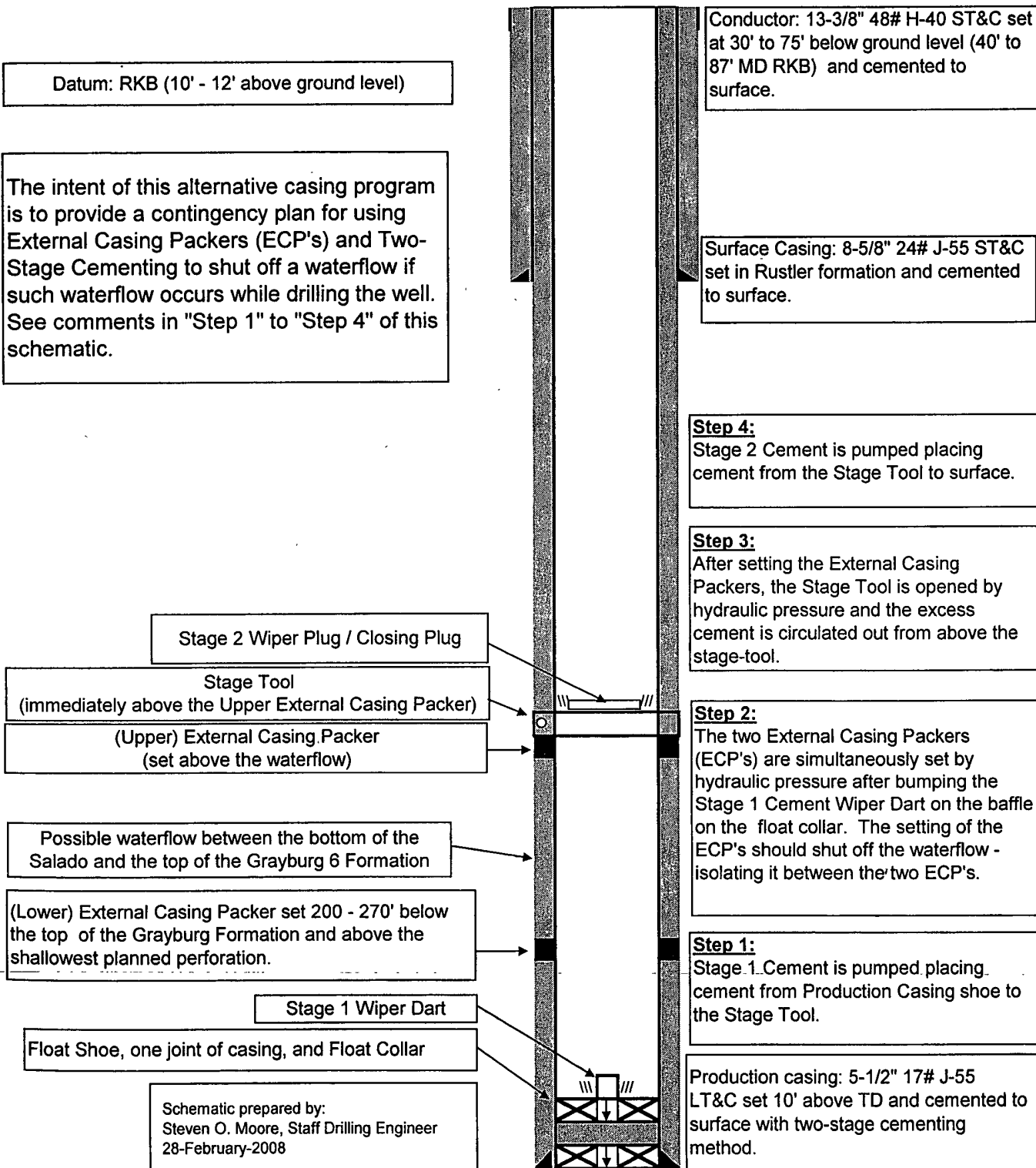
Production casing: 5-1/2" 17# J-55 LT&C set 10' above TD and cemented to surface with two-stage cementing method.



**MCA Unit**  
**Proposed Casing & Cementing Program**  
**with ECP's and Two-Stage Cementing of Production Casing**  
**(Alternative # 3)**

Datum: RKB (10' - 12' above ground level)

The intent of this alternative casing program is to provide a contingency plan for using External Casing Packers (ECP's) and Two-Stage Cementing to shut off a waterflow if such waterflow occurs while drilling the well. See comments in "Step 1" to "Step 4" of this schematic.



Schematic prepared by:  
 Steven O. Moore, Staff Drilling Engineer  
 28-February-2008

## MCA 421

### Formation Tops and Planned Total Depth

| Formation Call Points | Top (ft MD) |
|-----------------------|-------------|
| Rustler               | 901         |
| Salado                | 1088        |
| Grayburg              | 3574        |
| Grayburg - 6U         | 3827        |
| Grayburg - 6L         | 3879        |
| San Andres            | 3972        |
| San Andres - 7U       | 3972        |
| San Andres - 7L       | 4052        |
| San Andres - 9        | 4122        |
| Total Depth (minimum) | 4230        |
| Total Depth (maximum) | 4430        |

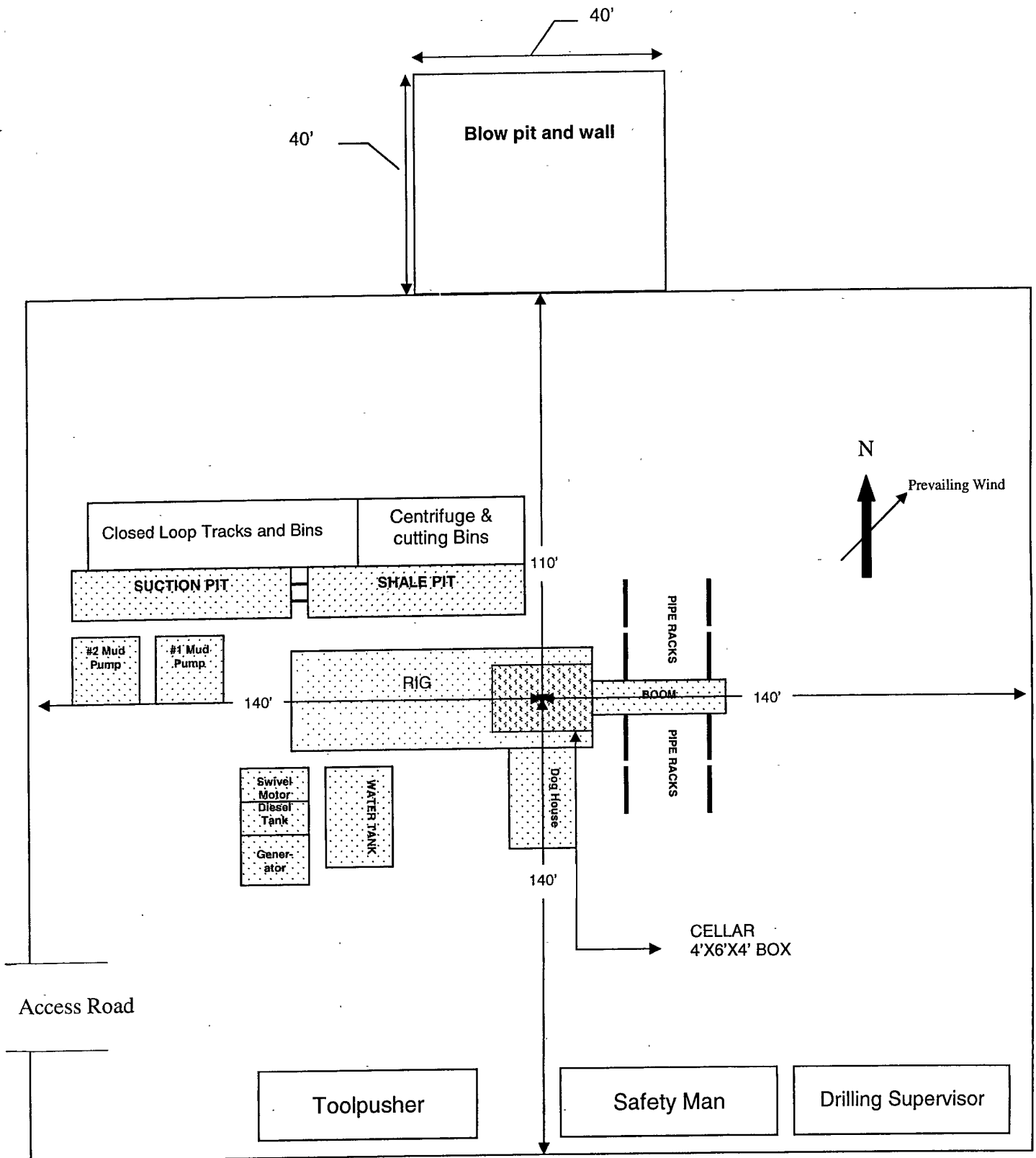
### Casing Depths

| String            | Minimum Depth | Maximum Depth |
|-------------------|---------------|---------------|
| Surface Casing    | 926           | 971           |
| Production Casing | 4220          | 4420          |

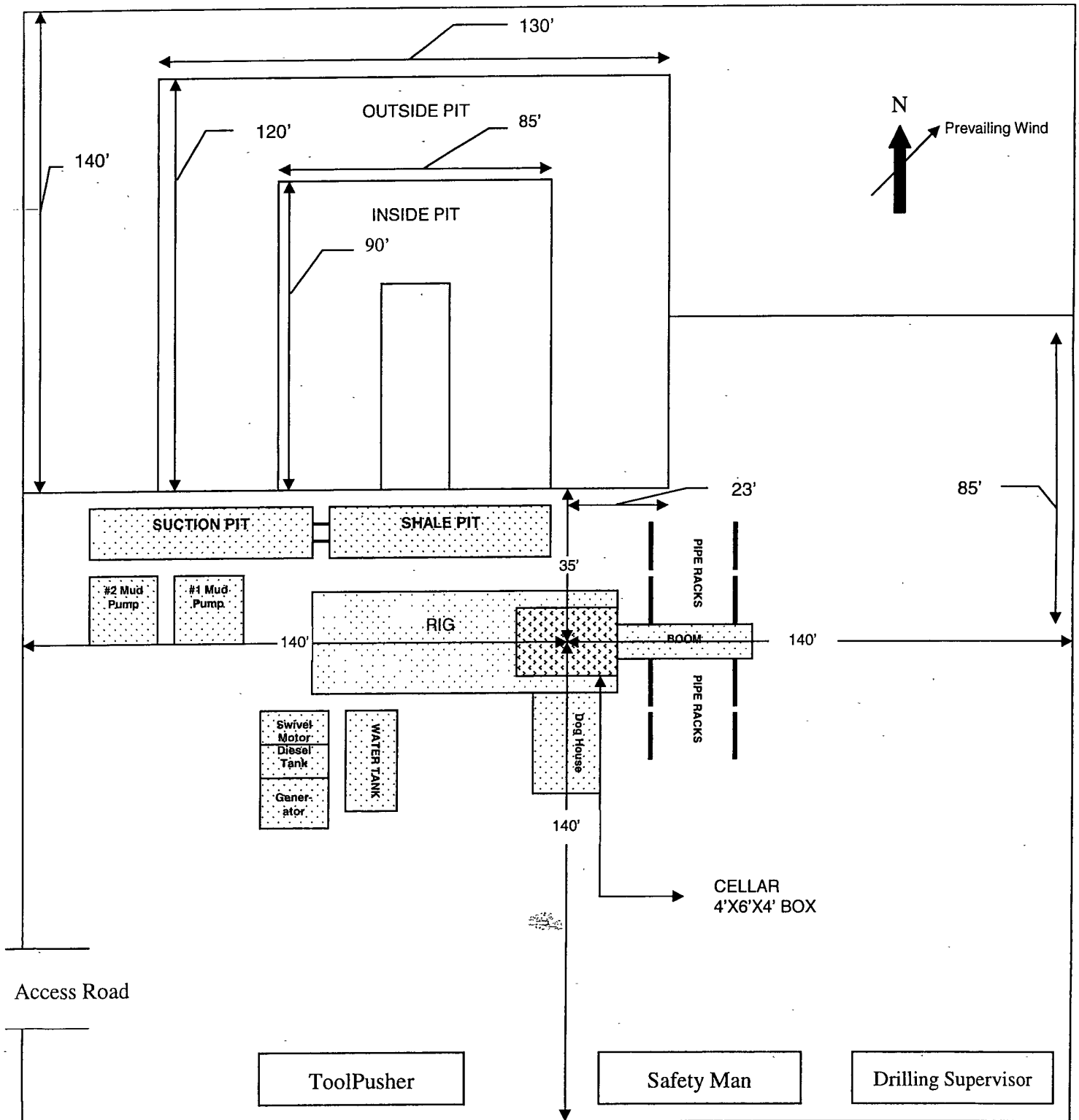
Note: The Surface Casing Program reflects an uncertainty of 45' in the set depth of the Surface Casing because that is the approximate length of a full joint of Range 3 casing. This range for our Surface Casing setting depth will allow us to drill the hole to fit the casing string based on how the tally comes out and will provide for the cementing head to be positioned at the rig floor for safety and efficiency in cementing operations. The casing will be set approximately 10 ft off bottom.

Note: The Production Casing Program reflects an uncertainty of 200' in the setting depth for the Production Casing to allow us to provide additional rathole if needed for the planned pumping completion and to allow us to drill the hole to fit the casing string based on how the tally comes out and will provide for the cementing head to be positioned at the rig floor for safety and efficiency in cementing operations. The casing will be set approximately 10 ft off bottom.

**ConocoPhillips**  
**Location Schematic and Rig Layout**  
**for Closed Loop System**  
(PICTURE NOT TO SCALE)



**ConocoPhillips**  
**Location Schematic and Rig Layout**  
**for Temporary Earthen Pit System**  
(PICTURE NOT TO SCALE)



## PECOS DISTRICT CONDITIONS OF APPROVAL

|                       |                                      |
|-----------------------|--------------------------------------|
| OPERATOR'S NAME:      | CONOCOPHILLIPS CSOMPANY              |
| LEASE NO.:            | LC-057210                            |
| WELL NAME & NO.:      | MCA Unit No. 421                     |
| SURFACE HOLE FOOTAGE: | 1210' FSL & 525' FEL                 |
| BOTTOM HOLE FOOTAGE   |                                      |
| LOCATION:             | Section 28, T. 17 S., R. 32 E., NMPM |
| COUNTY:               | Lea County, New Mexico               |

### TABLE OF CONTENTS

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.

- ☐ **General Provisions**
- ☐ **Permit Expiration**
- ☐ **Archaeology, Paleontology, and Historical Sites**
- ☐ **Noxious Weeds**
- ☒ **Special Requirements**
  - Lesser Prairie Chicken
- ☒ **Construction**
  - Notification
  - Topsoil
  - Closed Loop System
  - Federal Mineral Material Pits
  - Well Pads
  - Roads
- ☒ **Road Section Diagram**
- ☒ **Drilling**
- ☒ **Production (Post Drilling)**
  - Well Structures & Facilities
  - Pipelines
  - Electric Lines
- ☒ **Closed Loop System/Interim Reclamation**
- ☐ **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)**

**Mitigation Measures:** The mitigation measures include the Pecos District Conditions of Approval, the standard stipulation for the Lesser Prairie Chicken Timing Stipulations, the standard stipulation for surface flowlines, the standard stipulation for overhead electrical lines, and the standard stipulations for permanent resource roads.

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 15 through June 15 annually. During that period, other activities that produce noise or involve human activity, such as the maintenance of oil and gas facilities, geophysical exploration other than 3-D operations, and 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 ft. from the source of the noise.

**MCA Unit # 421: Pit North V-Door East**

## **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. TOPSOIL**

The topsoil shall not be used to backfill the reserve pit and will be used for interim and final reclamation.

**Closed Loop System-V-Door East**

Tanks are required for drilling operations: No Pits.

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

#### **C. FEDERAL MINERAL MATERIALS PIT**

If the operator elects to surface the access road and/or well pad, mineral materials extracted during construction of the reserve pit may be used for surfacing the well pad and access road and other facilities on the lease.

Payment shall be made to the BLM prior to removal of any additional federal mineral materials from any site other than the reserve pit. Call the Carlsbad Field Office at (575) 234-5972.

#### **D. 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.

#### **E. 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 fourteen (14) 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**

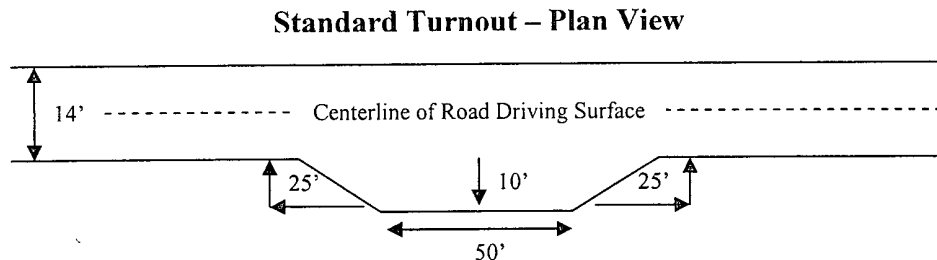
Crowning shall be done on the access road driving surface. The road crown shall have a grade of approximately 2% (i.e., a 1" crown on a 14' wide road). The road shall conform to Figure 1; cross section and plans for typical road construction.

### **Ditching**

Ditching shall be required on both sides of the road.

### **Turnouts**

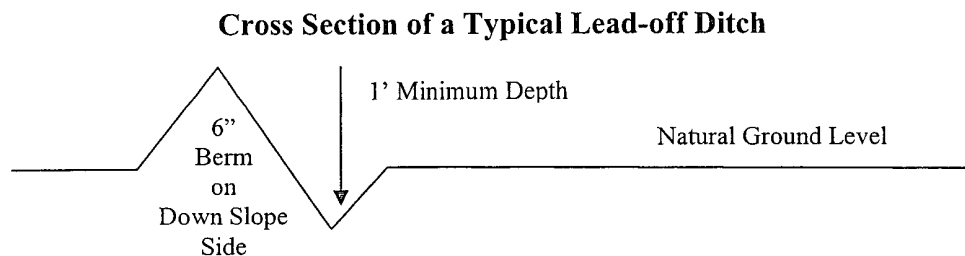
Vehicle turnouts shall be constructed on the road. Turnouts shall be intervisible with interval spacing distance less than 1000 feet. Turnouts shall be constructed on all blind curves. Turnouts shall conform to the following diagram:



### **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.



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**

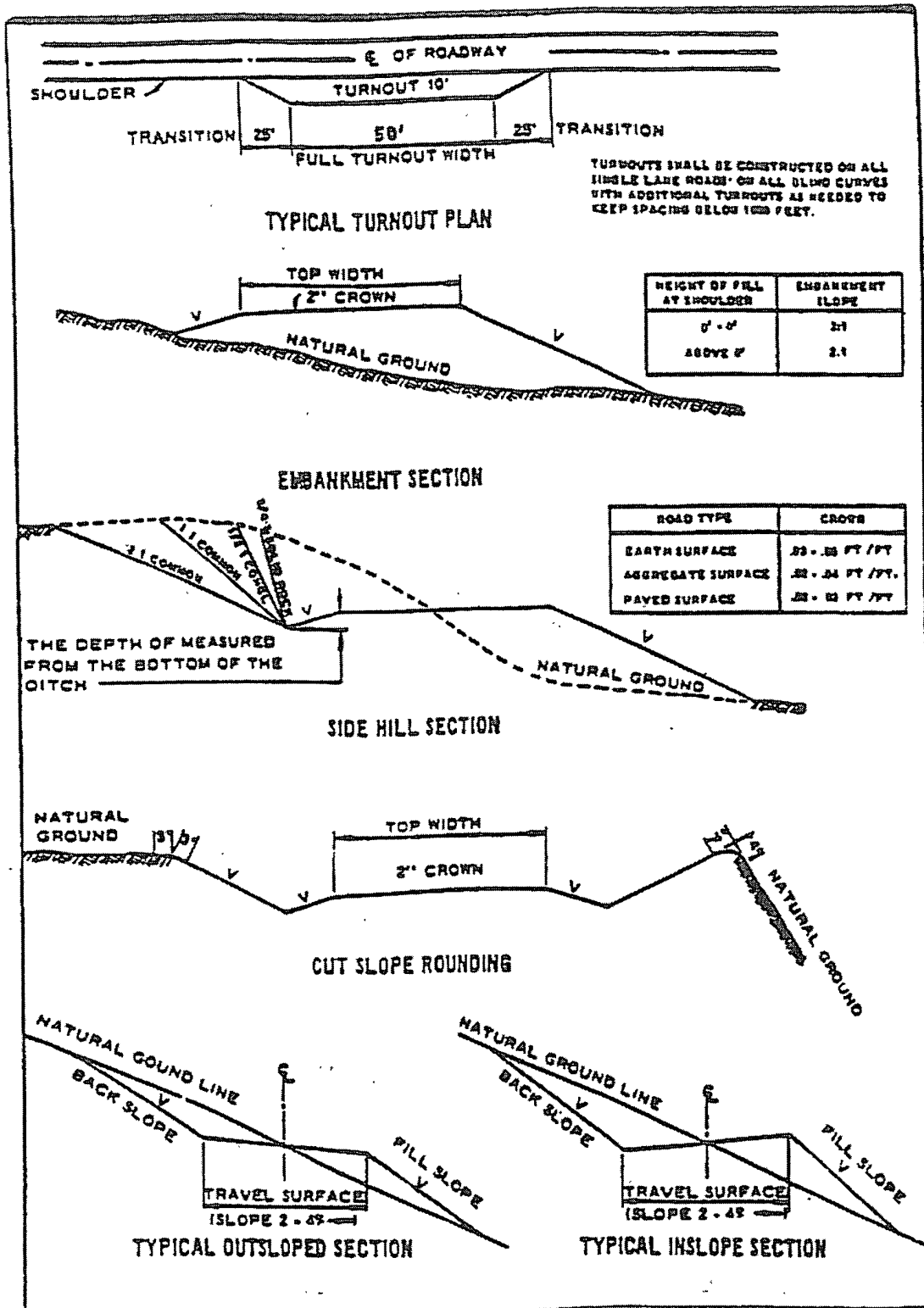
Where entry is required across a fence line, the fence shall be braced and tied off on both sides of the passageway prior to cutting.

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. BOP/BOPE tests

☒ **Lea County**

Call the Hobbs Field Station, 414 West Taylor, Hobbs NM 88240,  
(575) 393-3612

1. **A Hydrogen Sulfide (H<sub>2</sub>S) Drilling Plan should be activated 500 feet prior to drilling into the Yates Formation. If H<sub>2</sub>S is encountered please report amounts 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.

### **B. CASING**

**Changes to the approved APD casing and cement program require submitting a sundry and receiving approval prior to work.**

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

**Provide compressive strengths including hours to reach required 500 pounds compressive strength prior to cementing each casing string**

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

**H<sub>2</sub>S has been reported in the area**

**Possible lost circulation in Grayburg, San Andres Formations**

**Possible H<sub>2</sub>O/brine flows in Salado & Artesia Group**

**Probability of abnormally high pressures in Artesia Group**

**Possibility of high pressure air pockets in Rustler, Salado Formations**

1. The 8-5/8 inch surface casing shall be set at approximately 1200 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.
  - b. 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. (This is to include the lead cement).
  - 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.
2. The minimum required fill of cement behind the 5-1/2 inch production casing is:
  - a. **Single Stage Cement Job**  
☒ Cement to surface. If cement does not circulate see B.1.a-d above.
  - b. **Two Stage Cement Job: Contact BLM for permission as per Master Drilling Plan prior to running. Follow Master Drilling Plan with notification to BLM and perform job as approved in Master Drilling Plan.**
  - c. **Two Stage Cement Job with External Casing Packers: Contact BLM for permission as per Master Drilling Plan prior to running. Follow Master Drilling plan with notification to BLM and perform job as approved in Master Drilling Plan.**
3. 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. The appropriate BLM office shall be notified a minimum of **4 hours** in advance for a representative to witness the tests.
  - a. The tests shall be done by an independent service company.
  - b. The results of the test shall be reported to the appropriate BLM office.
  - c. 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.
  - d. 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.

LB 5/21/08

## **VIII. PRODUCTION (POST DRILLING)**

### **A. WELL STRUCTURES & FACILITIES**

#### **Placement of Production Facilities**

Production facilities should be placed on the well pad to allow for maximum interim recontouring and revegetation of the well location.

#### **Containment Structures**

The containment structure shall be constructed to hold the capacity of the entire contents of the largest tank, plus 24 hour production, unless more stringent protective requirements are deemed necessary by the Authorized Officer.

#### **Painting Requirement**

All above-ground structures including meter housing that are not subject to safety requirements shall be painted a flat non-reflective paint color Shale Green, Munsell Soil Color Chart # 5Y 4/2

### **B. PIPELINES**

#### **STANDARD STIPULATIONS FOR SURFACE INSTALLED PIPELINES**

**A copy of the APD and attachments, including stipulations, survey plat and/or map, will be on location during construction. BLM personnel may request to you a copy of your permit during construction to ensure compliance with all stipulations.**

Holder agrees to comply with the following stipulations to the satisfaction of the Authorized Officer:

1. The holder shall indemnify the United States against any liability for damage to life or property arising from the occupancy or use of public lands under this grant.
2. The holder shall comply with all applicable Federal laws and regulations existing or hereafter enacted or promulgated. In any event, the holder shall comply with the Toxic Substances Control Act of 1976 as amended, 15 USC 2601 et seq. (1982) with regards to any toxic substances that are used, generated by or stored on the right-of-way or on facilities authorized under this right-of-way grant. (See 40 CFR, Part 702-799 and especially, provisions on polychlorinated biphenyls, 40 CFR 761.1-761.193.) Additionally, any release of toxic substances (leaks, spills, etc.) in excess of the reportable quantity established by 40 CFR, Part 117 shall be reported as required by the Comprehensive Environmental Response, Compensation, and Liability Act, section 102b. A copy of any report required or requested by any Federal agency or State government as a result of a reportable release or spill of any toxic substances shall be furnished to the authorized officer concurrent with the filing of the reports to the involved Federal agency or State government.
3. The holder agrees to indemnify the United States against any liability arising from the

release of any hazardous substance or hazardous waste (as these terms are defined in the Comprehensive Environmental Response, Compensation and Liability Act of 1980, 42 U.S.C. 9601, et seq. or the Resource Conservation and Recovery Act, 42 U.S.C. 6901, et seq.) on the Right-of-Way (unless the release or threatened release is wholly unrelated to activity of the Right-of-Way holder's activity on the Right-of-Way), or resulting from the activity of the Right-of-Way holder on the Right-of-Way. This agreement applies without regard to whether a release is caused by the holder, its agent, or unrelated third parties.

4. The holder shall be liable for damage or injury to the United States to the extent provided by 43 CFR Sec. 2883.1-4. The holder shall be held to a standard of strict liability for damage or injury to the United States resulting from pipe rupture, fire, or spills caused or substantially aggravated by any of the following within the right-of-way or permit area:

- a. Activities of the holder including, but not limited to construction, operation, maintenance, and termination of the facility.
- b. Activities of other parties including, but not limited to:
  - (1) Land clearing.
  - (2) Earth-disturbing and earth-moving work.
  - (3) Blasting.
  - (4) Vandalism and sabotage.
- c. Acts of God.

The maximum limitation for such strict liability damages shall not exceed one million dollars (\$1,000,000) for any one event, and any liability in excess of such amount shall be determined by the ordinary rules of negligence of the jurisdiction in which the damage or injury occurred.

This section shall not impose strict liability for damage or injury resulting primarily from an act of war or from the negligent acts or omissions of the United States.

5. If, during any phase of the construction, operation, maintenance, or termination of the pipeline, any oil, salt water, or other pollutant should be discharged from the pipeline system, impacting Federal lands, the control and total removal, disposal, and cleaning up of such oil, salt water, or other pollutant, wherever found, shall be the responsibility of the holder, regardless of fault. Upon failure of the holder to control, dispose of, or clean up such discharge on or affecting Federal lands, or to repair all damages resulting therefrom, on the Federal lands, the Authorized Officer may take such measures as he deems necessary to control and clean up the discharge and restore the area, including, where appropriate, the aquatic environment and fish and wildlife habitats, at the full expense of the holder. Such action by the Authorized Officer shall not relieve the holder of any responsibility as provided herein.

6. All construction and maintenance activity will be confined to the authorized right-of-way width of 25 feet.
7. No blading or clearing of any vegetation will be allowed unless approved in writing by the Authorized Officer.
8. The holder shall install the pipeline on the surface in such a manner that will minimize suspension of the pipeline across low areas in the terrain. In hummocky or dune areas, the pipeline will be "snaked" around hummocks and dunes rather than suspended across these features.
9. The pipeline shall be buried with a minimum of 24 inches under all roads, "two-tracks," and trails. Burial of the pipe will continue for 20 feet on each side of each crossing. The condition of the road, upon completion of construction, shall be returned to at least its former state with no bumps or dips remaining in the road surface.
10. The holder shall minimize disturbance to existing fences and other improvements on public lands. The holder is required to promptly repair improvements to at least their former state. Functional use of these improvements will be maintained at all times. The holder will contact the owner of any improvements prior to disturbing them. When necessary to pass through a fence line, the fence shall be braced on both sides of the passageway prior to cutting of the fence. No permanent gates will be allowed unless approved by the Authorized Officer.
11. In those areas where erosion control structures are required to stabilize soil conditions, the holder will install such structures as are suitable for the specific soil conditions being encountered and which are in accordance with sound resource management practices.
12. Excluding the pipe, all above-ground structures not subject to safety requirement shall be painted by the holder to blend with the natural color of the landscape. The paint used shall be a color which simulates "Standard Environmental Colors" – **Shale Green**, Munsell Soil Color No. 5Y 4/2; designated by the Rocky Mountain Five State Interagency Committee.
13. The pipeline will be identified by signs at the point of origin and completion of the right-of-way and at all road crossings. At a minimum, signs will state the holder's name, BLM serial number, and the product being transported. Signs will be maintained in a legible condition for the life of the pipeline.
14. The holder shall not use the pipeline route as a road for purposes other than routine maintenance as determined necessary by the Authorized Officer in consultation with the holder. The holder will take whatever steps are necessary to ensure that the pipeline route is not used as a roadway.

15. Any cultural and/or paleontological resource (historic or prehistoric site or object) discovered by the holder, or any person working on his behalf, on public or Federal land shall be immediately reported to the authorized officer. Holder 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 will be made by the authorized officer to determine appropriate cultural or scientific values. The holder will be responsible for the cost of evaluation and any decision as to proper mitigation measures will be made by the authorized officer after consulting with the holder.

(March 1989)

### **C. ELECTRIC LINES**

#### **STANDARD STIPULATIONS FOR OVERHEAD ELECTRIC DISTRIBUTION LINES**

**A copy of the APD and attachments, including stipulations, survey plat and/or map, will be on location during construction. BLM personnel may request to you a copy of your permit during construction to ensure compliance with all stipulations.**

Holder agrees to comply with the following stipulations to the satisfaction of the Authorized Officer:

1. The holder shall indemnify the United States against any liability for damage to life or property arising from the occupancy or use of public lands under this grant.
2. The holder shall comply with all applicable Federal laws and regulations existing or hereafter enacted or promulgated. In any event, the holder shall comply with the Toxic Substances Control Act of 1976 as amended, 15 USC 2601 et seq. (1982) with regards to any toxic substances that are used, generated by or stored on the right-of-way or on facilities authorized under this right-of-way grant. (See 40 CFR, Part 702-799 and especially, provisions on polychlorinated biphenyls, 40 CFR 761.1-761.193.) Additionally, any release of toxic substances (leaks, spills, etc.) in excess of the reportable quantity established by 40 CFR, Part 117 shall be reported as required by the Comprehensive Environmental Response, Compensation, and Liability Act, section 102b. A copy of any report required or requested by any Federal agency or State government as a result of a reportable release or spill of any toxic substances shall be furnished to the authorized officer concurrent with the filing of the reports to the involved Federal agency or State government.
3. The holder agrees to indemnify the United States against any liability arising from the release of any hazardous substance or hazardous waste (as these terms are defined in the Comprehensive Environmental Response, Compensation and Liability Act of 1980, 42 U.S.C. 9601, et seq. or the Resource Conservation and Recovery Act, 42 U.S.C. 6901, et seq.) on the Right-of-Way (unless the release or threatened release is wholly unrelated to the Right-of-Way holder's activity on the Right-of-Way), or resulting from the activity of the Right-of-Way holder on the Right-of-Way. This agreement applies without regard to whether a release is caused by the holder, its agent, or unrelated third parties.

4. There will be no clearing or blading of the right-of-way unless otherwise agreed to in writing by the Authorized Officer.
5. Powerlines shall be constructed in accordance to standards outlined in "Suggested Practices for Raptor Protection on Powerlines, " Raptor Research Foundation, Inc., 1981. The holder shall assume the burden and expense of proving that pole designs not shown in the above publication are "raptor safe." Such proof shall be provided by a raptor expert approved by the Authorized Officer. The BLM reserves the right to require modification or additions to all powerline structures placed on this right-of-way, should they be necessary to ensure the safety of large perching birds. Such modifications and/or additions shall be made by the holder without liability or expense to the United States.
6. The holder shall minimize disturbance to existing fences and other improvements on public lands. The holder is required to promptly repair improvements to at least their former state. Functional use of these improvements will be maintained at all times. The holder will contact the owner of any improvements prior to disturbing them. When necessary to pass through a fence line, the fence shall be braced on both sides of the passageway prior to cutting the fence. No permanent gates will be allowed unless approved by the Authorized Officer.
7. The BLM serial number assigned to this authorization shall be posted in a permanent, conspicuous manner where the power line crosses roads and at all serviced facilities. Numbers will be at least two inches high and will be affixed to the pole nearest the road crossing and at the facilities served.
8. Upon cancellation, relinquishment, or expiration of this grant, the holder shall comply with those abandonment procedures as prescribed by the Authorized Officer.
9. All surface structures (poles, lines, transformers, etc.) shall be removed within 180 days of abandonment, relinquishment, or termination of use of the serviced facility or facilities or within 180 days of abandonment, relinquishment, cancellation, or expiration of this grant, whichever comes first. This will not apply where the power line extends service to an active, adjoining facility or facilities.
10. Any cultural and/or paleontological resource (historic or prehistoric site or object) discovered by the holder, or any person working on his behalf, on public or Federal land shall be immediately reported to the Authorized Officer. Holder 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 will be made by the Authorized Officer to determine appropriate actions to prevent the loss of significant cultural or scientific values. The holder will be responsible for the cost of evaluation and any decision as to proper mitigation measures will be made by the Authorized Officer after consulting with the holder.
11. Special Stipulations:

- For reclamation remove poles, lines, transformer, etc. and dispose of properly.
- Fill in any holes from the poles removed.
- See attached reclamation plans.

## **IX. INTERIM RECLAMATION & RESERVE PIT CLOSURE**

### **A. INTERIM RECLAMATION**

If the well is a producer, interim reclamation shall be conducted on the well site in accordance with the orders of the Authorized Officer. The operator shall submit a Sundry Notices and Reports on Wells (Notice of Intent), Form 3160-5, prior to conducting interim reclamation.

During the life of the development, all disturbed areas not needed for active support of production operations should undergo interim reclamation in order to minimize the environmental impacts of development on other resources and uses.

At the time the well pad is to be reclaimed, operators should work with BLM surface management specialists to devise the best strategies to reduce the size of the location. Any reductions should allow for remedial well operations, as well as safe and efficient removal of oil and gas.

During reclamation, the removal of caliche is important to increasing the success of revegetating the site. Removed caliche may be used for road repairs, fire walls or for building other roads and locations. In order to operate the well or complete workover operations, it may be necessary to drive, park and operate on restored interim vegetation within the previously disturbed area. Disturbing revegetated areas for production or workover operations will be allowed. If there is significant disturbance and loss of vegetation, the area will need to be revegetated. Communicate with the appropriate BLM office for any exceptions/exemptions if needed.

## Seed Mixture 2, for Sandy 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> |
|-----------------------------------------------------|----------------|
| Sand dropseed ( <i>Sporobolus cryptandrus</i> )     | 1.0            |
| Sand love grass ( <i>Eragrostis trichodes</i> )     | 1.0            |
| Plains bristlegrass ( <i>Setaria macrostachya</i> ) | 2.0            |

\*Pounds of pure live seed:

Pounds of seed x percent purity x percent germination = pounds pure live seed  
(Insert Seed Mixture Here)

## **X. FINAL ABANDONMENT & REHABILITATION REQUIREMENTS**

Upon abandonment of the well and/or when the access road is no longer in service the Authorized Officer shall issue instructions and/or orders for surface reclamation and restoration of all disturbed areas.

On private surface/federal mineral estate land the reclamation procedures on the road and well pad shall be accomplished in accordance with the private surface land owner agreement.