

Vaca Draw 20-17 Fed 1H Casing Assumptions

Casing Program

| Hole Size | Casing Depth From | Casing Depth To | Casing Size | Weight (lb/ft) | Grade | Conn. | SF Collapse | SF Burst | SF Tension |
|---------------------------|-------------------|-----------------|-------------|----------------|------------------|-------|-------------|----------|--------------------|
| 17 1/2 | 0 | 1034 | 13-3/8" | 48.00 | H-40/J-55 Hybrid | ST&C | 1.56 | 3.66 | 6.49 |
| 12 1/4 | 0 | 4936 | 9-5/8" | 40.00 | J-55 | LT&C | 1.12 | 1.51 | 2.63 |
| 8 3/4 | 0 | 11867 | 7" | 32.00 | L-80 | LT&C | 1.55 | 1.63 | 1.70 |
| 8 3/4 | 11867 | 12492 | 7" | 32.00 | L-80 | BT&C | 1.49 | 1.46 | 46.19 |
| 6 | 11867 | 22025 | 4-1/2" | 11.60 | P-110 | BT&C | 1.16 | 1.63 | 62.77 |
| BLM Minimum Safety Factor | | | | | | | 1.125 | 1 | 1.6 Dry 1.8 Wet |

All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h

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All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h

Drilling below 7" Casing

Fill Line

Flowline

5000# (5M)
BOP

Annular Preventer

SRR & A

Pipe Rams

Blind Rams

2" Minimum Kill Line

3" minimum choke line

Kill Line

Drilling Spool

Choke Line

2 Valves Minimum
(HCR Required)

2 Valves and a check valve

Wellhead Assembly

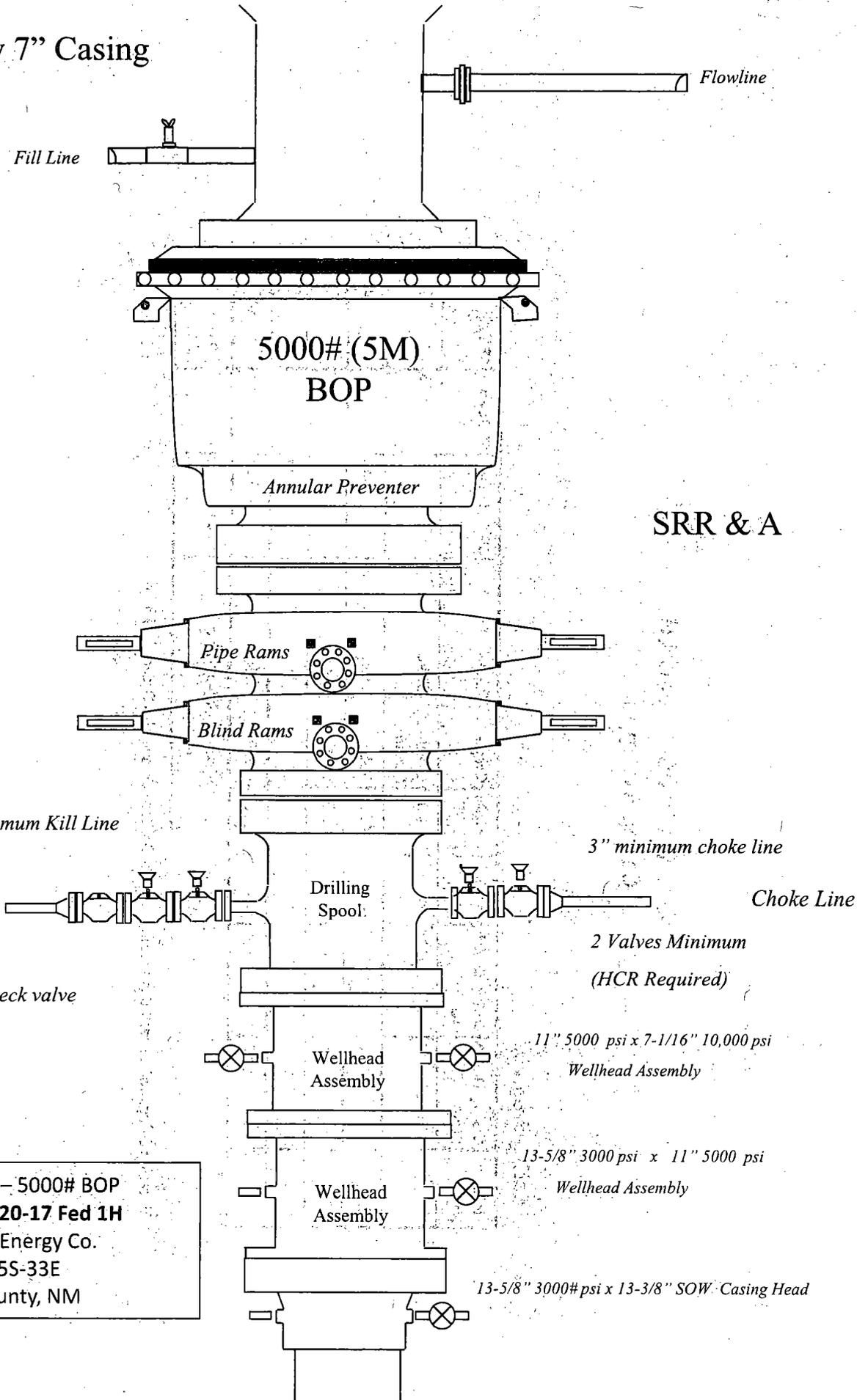
11" 5000 psi x 7-1/16" 10,000 psi
Wellhead Assembly

Wellhead Assembly

13-5/8" 3000 psi x 11" 5000 psi
Wellhead Assembly

13-5/8" 3000#psi x 13-3/8" SOW Casing Head

Exhibit E-1 – 5000# BOP
Vaca Draw 20-17 Fed 1H
Cimarex Energy Co.
20-25S-33E
Lea County, NM



Drilling 8-3/4" hole
below 9 5/8" Casing

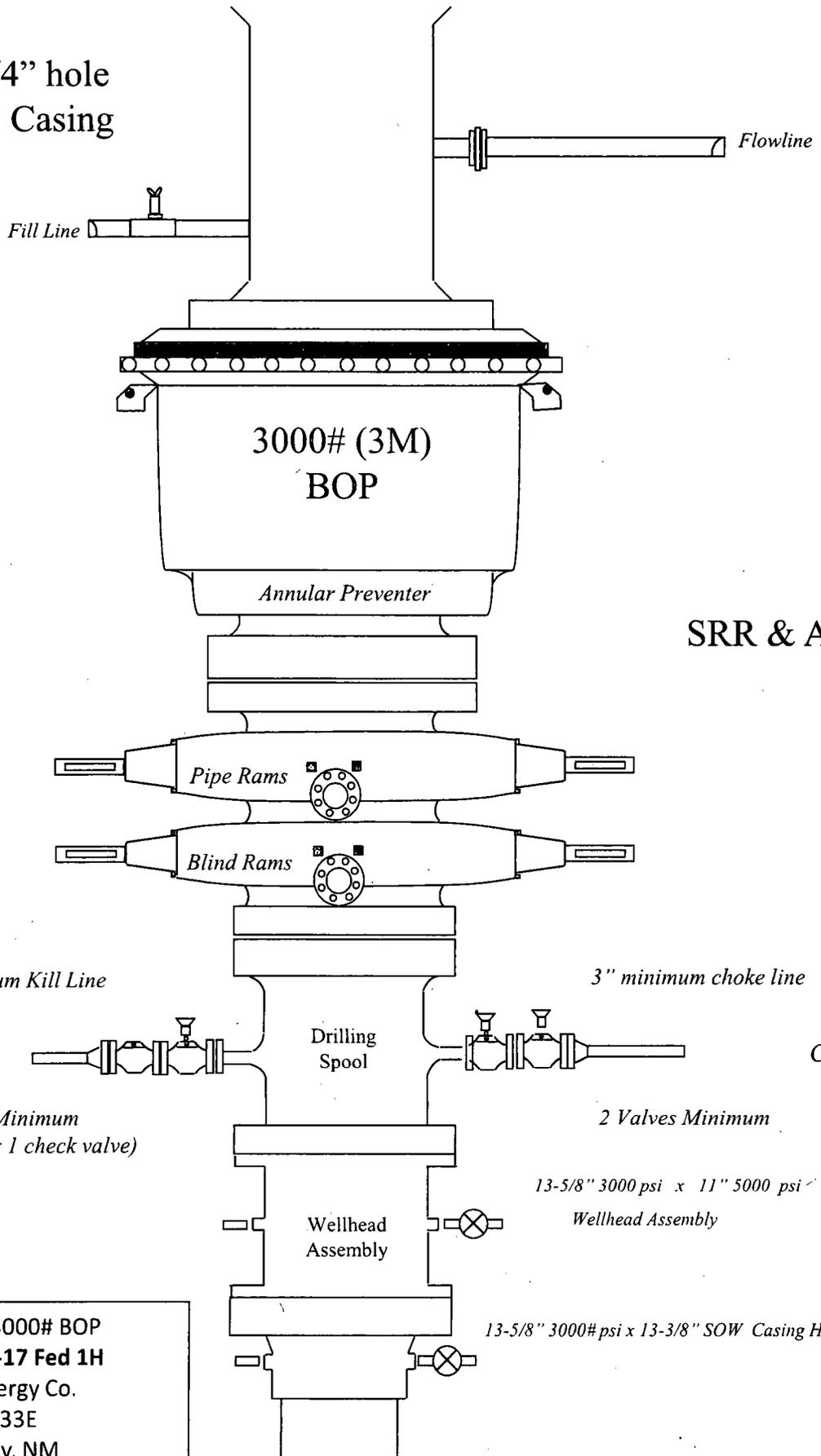
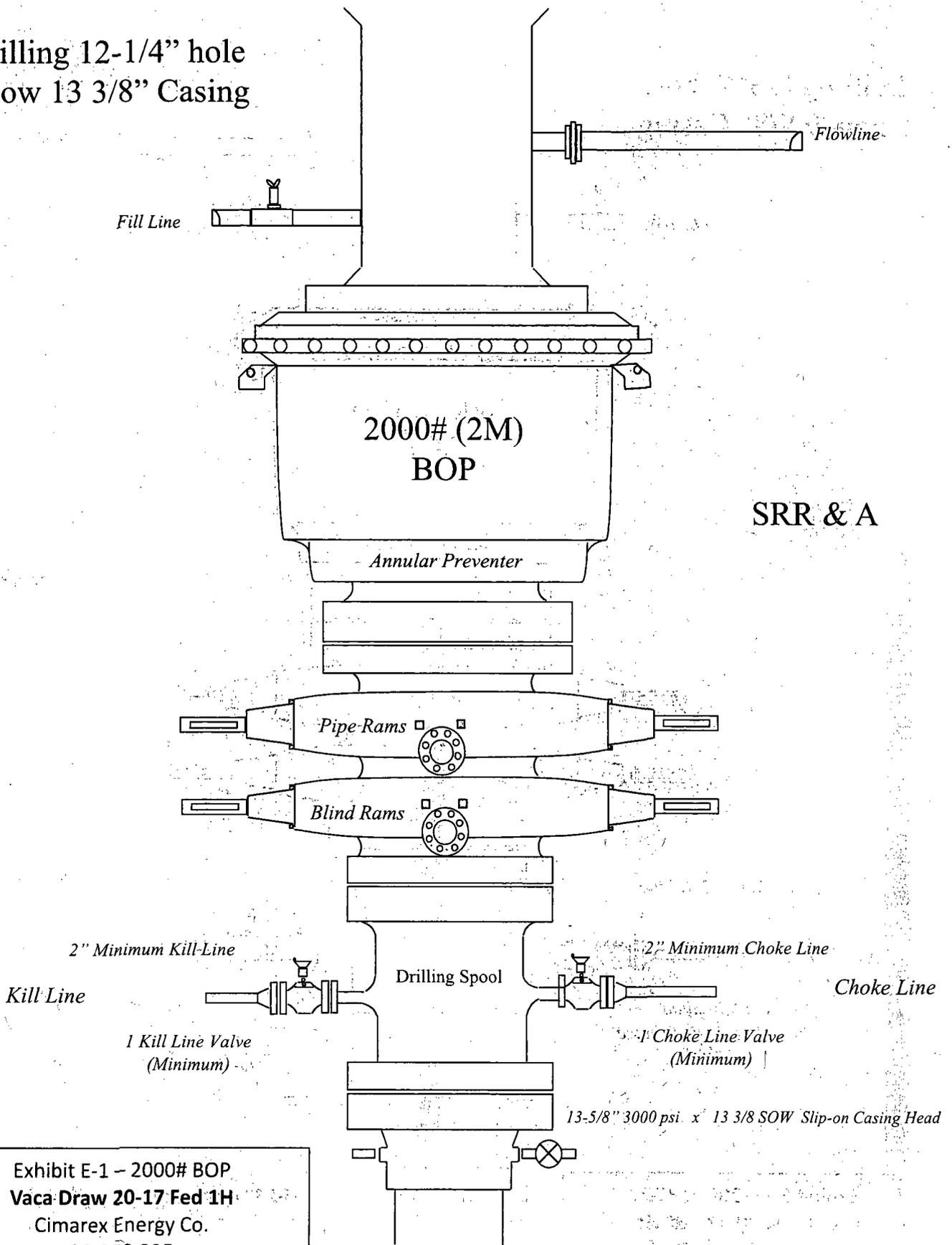


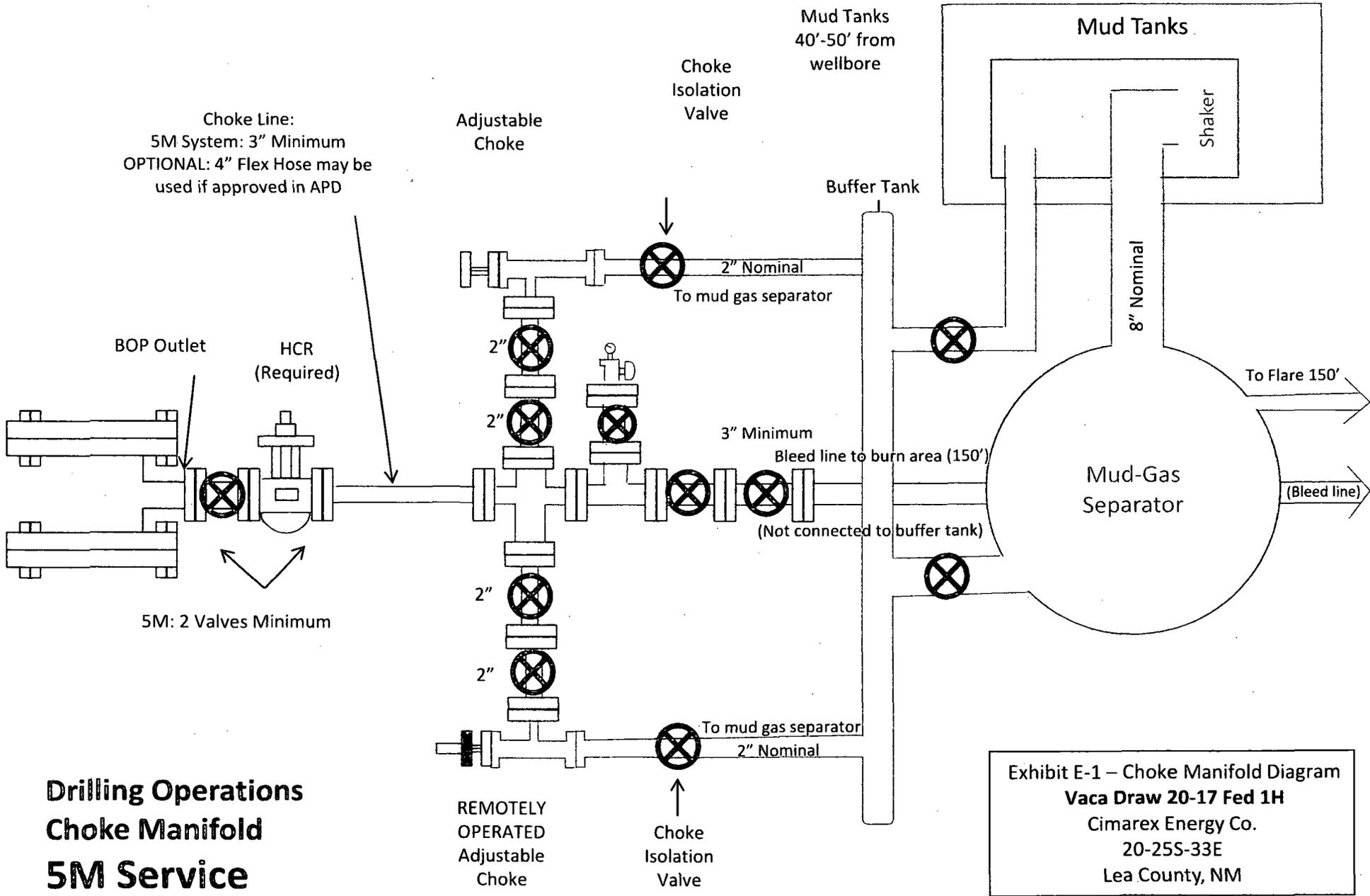
Exhibit E-1 – 3000# BOP
Vaca Draw 20-17 Fed 1H
Cimarex Energy Co.
20-25S-33E
Lea County, NM

Drilling 12-1/4" hole
below 13 3/8" Casing



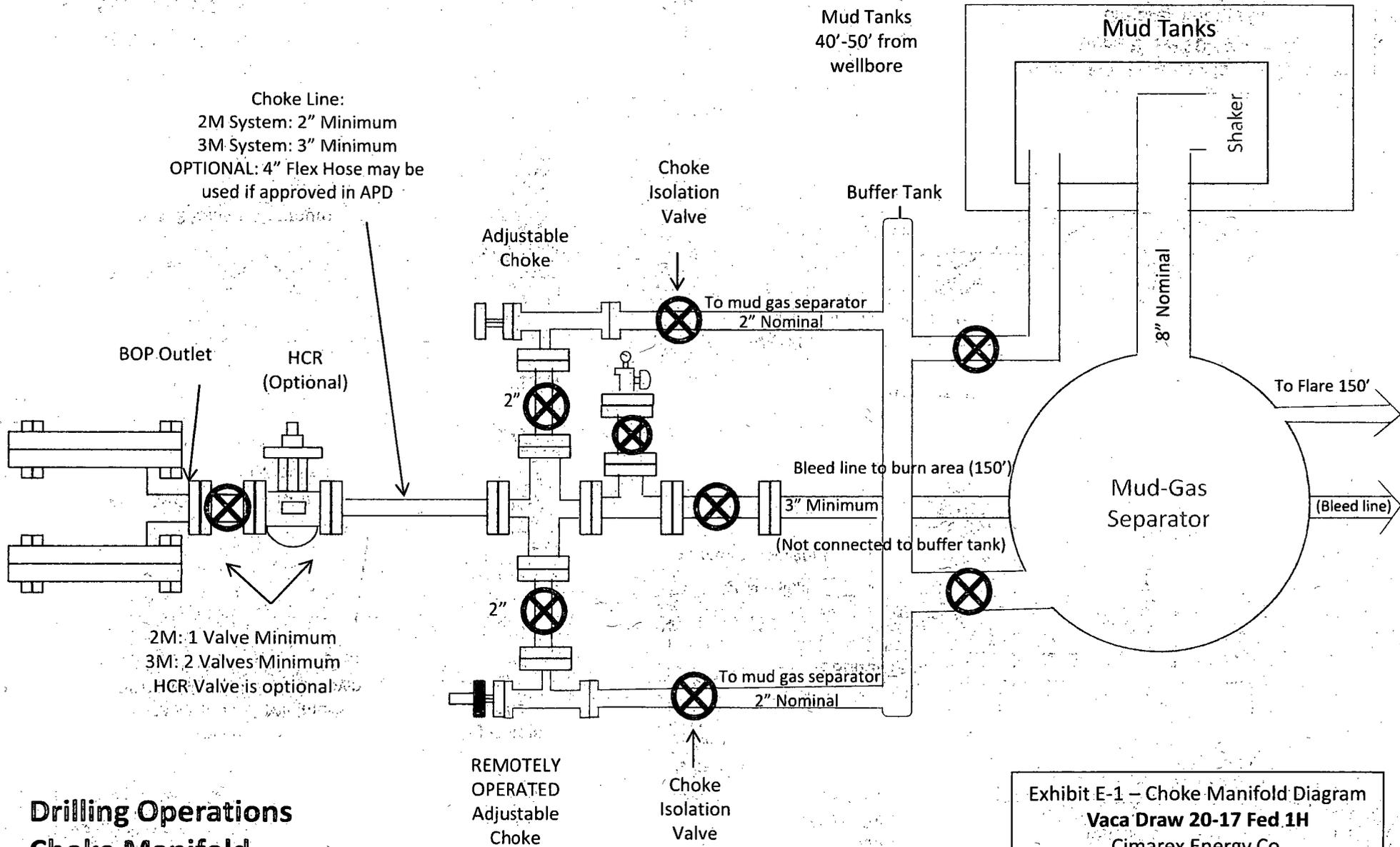
SRR & A

Exhibit E-1 – 2000# BOP
Vaca Draw 20-17 Fed 1H
Cimarex Energy Co.
20-25S-33E
Lea County, NM



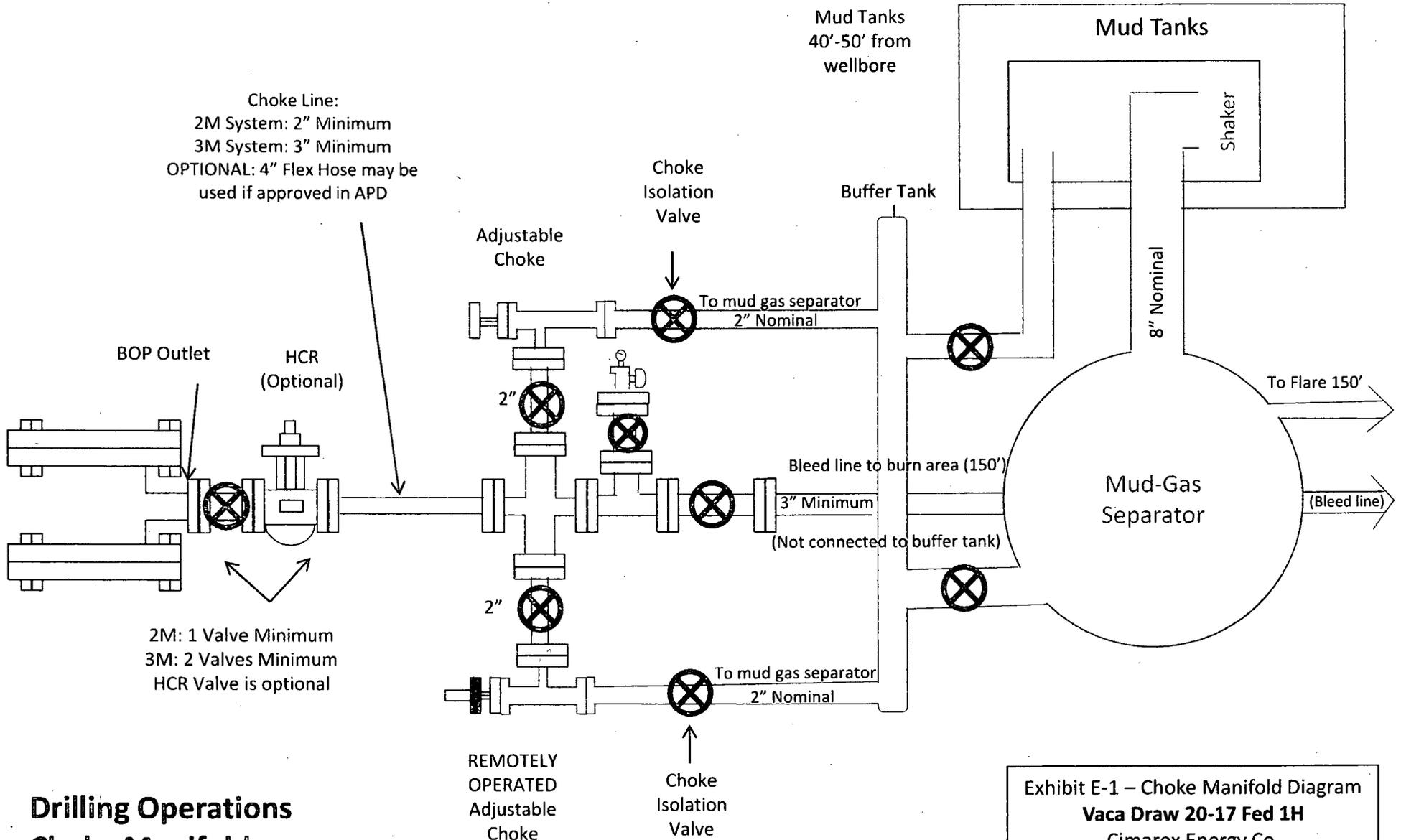
**Drilling Operations
Choke Manifold
5M Service**

Exhibit E-1 – Choke Manifold Diagram
Vaca Draw 20-17 Fed 1H
Cimarex Energy Co.
20-25S-33E
Lea County, NM



**Drilling Operations
 Choke Manifold
 2M/3M Service**

**Exhibit E-1 – Choke Manifold Diagram
 Vaca Draw 20-17 Fed 1H
 Cimarex Energy Co.
 20-25S-33E
 Lea County, NM**



**Drilling Operations
 Choke Manifold
 2M/3M Service**

2M: 1 Valve Minimum
 3M: 2 Valves Minimum
 HCR Valve is optional

**Exhibit E-1 – Choke Manifold Diagram
 Vaca Draw 20-17 Fed 1H
 Cimarex Energy Co.
 20-25S-33E
 Lea County, NM**

| | Y or N |
|--|--------|
| Is casing new? If used, attach certification as required in Onshore Order #1 | Y |
| Does casing meet API specifications? If no, attach casing specification sheet. | Y |
| Is premium or uncommon casing planned? If yes attach casing specification sheet. | N |
| Does the above casing design meet or exceed BLM's minimum standards? If not provide justification (loading assumptions, casing design criteria). | Y |
| Will the intermediate pipe be kept at a minimum 1/3 fluid filled to avoid approaching the collapse pressure rating of the casing? | Y |
| Is well located within Capitan Reef? | N |
| If yes, does production casing cement tie back a minimum of 50' above the Reef? | N |
| Is well within the designated 4 string boundary. | N |
| Is well located in SOPA but not in R-111-P? | N |
| If yes, are the first 2 strings cemented to surface and 3rd string cement tied back 500' into previous casing? | N |
| Is well located in R-111-P and SOPA? | N |
| If yes, are the first three strings cemented to surface? | N |
| Is 2nd string set 100' to 600' below the base of salt? | N |
| Is well located in high Cave/Karst? | N |
| If yes, are there two strings cemented to surface? | N |
| (For 2 string wells) If yes, is there a contingency casing if lost circulation occurs? | N |
| Is well located in critical Cave/Karst? | N |
| If yes, are there three strings cemented to surface? | N |

1. Geological Formations

TVD of target 12,371
MD at TD 22,025

Pilot Hole TD 13,000
Deepest expected fresh water

| Formation | Depth (TVD) from KB | Water/Mineral Bearing/Target Zone | Hazards |
|----------------------|---------------------|-----------------------------------|---------|
| Rustler | 984 | N/A | |
| Top of Salt | 1128 | N/A | |
| Base of Salt | 4687 | N/A | |
| Bell Canyon | 4956 | N/A | |
| Cherry Canyon | 5974 | Hydrocarbons | |
| Brushy Canyon | 7484 | Hydrocarbons | |
| Bone Spring | 9040 | Hydrocarbons | |
| 2nd Bone Spring | 10573 | Hydrocarbons | |
| 3rd Bone Spring Sand | 11726 | Hydrocarbons | |
| Wolfcamp | 12196 | Hydrocarbons | |
| Wolfcamp A1 Shale | 12361 | Hydrocarbons | |

2. Casing Program

| Hole Size | Casing Depth From | Casing Depth To | Casing Size | Weight (lb/ft) | Grade | Conn. | SF Collapse | SF Burst | SF Tension |
|---------------------------|-------------------|-----------------|-------------|----------------|------------------|-------|-------------|----------|--------------------|
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| BLM Minimum Safety Factor | | | | | | | 1.125 | 1 | 1.6 Dry 1.8 Wet |

All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h

3. Cementing Program

| Casing | # Sks | Wt. lb/gal | Yld ft ³ /sack | H ₂ O gal/sk | 500# Comp. Strength (hours) | Slurry Description |
|-------------------|-------|------------|---------------------------|-------------------------|-----------------------------|--|
| Surface | 501 | 13.50 | 1.72 | 9.15 | 15.5 | Lead: Class C + Bentonite |
| | 134 | 14.80 | 1.34 | 6.32 | 9.5 | Tail: Class C + LCM |
| Intermediate | 936 | 12.90 | 1.88 | 9.65 | 12 | Lead: 35:65 (Poz:C) + Salt + Bentonite |
| | 284 | 14.80 | 1.36 | 6.57 | 9.5 | Tail: Class C + Retarder |
| Production | 568 | 10.80 | 2.35 | 9.60 | 17:43 | Lead: Tuned Light I Class H |
| | 80 | 14.20 | 1.30 | 5.86 | 14:30 | Tail: 50:50 (Poz:H) + Salt + Bentonite + Fluid Loss + Dispersant + SMS |
| Completion System | 693 | 14.20 | 1.30 | 5.86 | 14:30 | Tail: 50:50 (Poz:H) + Salt + Bentonite + Fluid Loss + Dispersant + SMS |

| Casing String | TOC | % Excess |
|-------------------|-------|----------|
| Surface | 0 | 45 |
| Intermediate | 0 | 44 |
| Production | 4736 | 24 |
| Completion System | 12492 | 10 |

Pilot Hole Cementing Specs
 Pilot Hole Depth: 13000
 KOP: 11867

4. Pressure Control Equipment

| A variance is requested for the use of a diverter on the surface casing. See attached for schematic. | | | | | |
|--|--------|-----------------|------------|---|-------------------------|
| BOP installed and tested before drilling which hole? | Size | Min Required WP | Type | | Tested To |
| 12 1/4 | 13 5/8 | 2M | Annular | X | 50% of working pressure |
| | | | Blind Ram | | 2M |
| | | | Pipe Ram | | |
| | | | Double Ram | X | |
| | | | Other | | |
| 8 3/4 | 13 5/8 | 3M | Annular | X | 50% of working pressure |
| | | | Blind Ram | X | 3M |
| | | | Pipe Ram | | |
| | | | Double Ram | X | |
| | | | Other | | |
| 6 | 13 5/8 | 5M | Annular | X | 50% of working pressure |
| | | | Blind Ram | | 5M |
| | | | Pipe Ram | X | |
| | | | Double Ram | X | |
| | | | Other | | |

BOP/BOPE will be tested by an independent service company to 250 psi low and the high pressure indicated above per Onshore Order 2 requirements. The System may be upgraded to a higher pressure but still tested to the working pressure listed in the table above. If the system is upgraded all the components installed will be functional and tested.

Pipe rams will be operationally checked each 24 hour period. Blind rams will be operationally checked on each trip out of the hole. These checks will be noted on the daily tour sheets. Other accessories to the BOP equipment will include a Kelly cock and floor safety valve (inside BOP) and choke lines and choke manifold. See attached schematics.

| | |
|---|--|
| X | Formation integrity test will be performed per Onshore Order #2. On Exploratory wells or on that portion of any well approved for a 5M BOPE system or greater, a pressure integrity test of each casing shoe shall be performed. Will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.i. |
| X | A variance is requested for the use of a flexible choke line from the BOP to Choke Manifold. See attached for specs and hydrostatic test chart. |
| N | Are anchors required by manufacturer? |

5. Mud Program

| Depth | Type | Weight (ppg) | Viscosity | Water Loss |
|------------------|---------------|--------------|-----------|------------|
| 0' to 1034' | FW Spud Mud | 8.30 - 8.80 | 28 | N/C |
| 1034' to 4936' | Brine Water | 9.70 - 10.20 | 30-32 | N/C |
| 4936' to 12492' | FW/Cut Brine | 8.50 - 9.00 | 30-32 | N/C |
| 12740' to 22025' | Oil Based Mud | 9.70 - 10.20 | 50-70 | N/C |

Sufficient mud materials to maintain mud properties and meet minimum lost circulation and weight increase requirements will be kept on location at all times.

| | |
|---|-----------------------------|
| What will be used to monitor the loss or gain of fluid? | PVT/Pason/Visual Monitoring |
|---|-----------------------------|

6. Logging and Testing Procedures

| Logging, Coring and Testing | |
|-----------------------------|---|
| X | Will run GR/CNL from TD to surface (horizontal well – vertical portion of hole). Stated logs run will be in the Completion Report and submitted to the BLM. |
| | No logs are planned based on well control or offset log information. |
| | Drill stem test? |
| | Coring? |

| Additional Logs Planned | Interval |
|-------------------------|----------|
| | |

7. Drilling Conditions

| Condition | |
|----------------------------|----------|
| BH Pressure at deepest TVD | 5789 psi |
| Abnormal Temperature | No |

Hydrogen Sulfide (H2S) monitors will be installed prior to drilling out the surface shoe. If H2S is detected in concentrations greater than 100 ppm, the operator will comply with the provisions of Onshore Oil and Gas Order #6. If Hydrogen Sulfide is encountered, measured values and formations will be provided to the BLM.

| | |
|---|----------------------|
| X | H2S is present |
| X | H2S plan is attached |

8. Other Facets of Operation

Construction Steps

1. Salvage topsoil
2. Construct road

3. Redistribute topsoil
4. Revegetate slopes

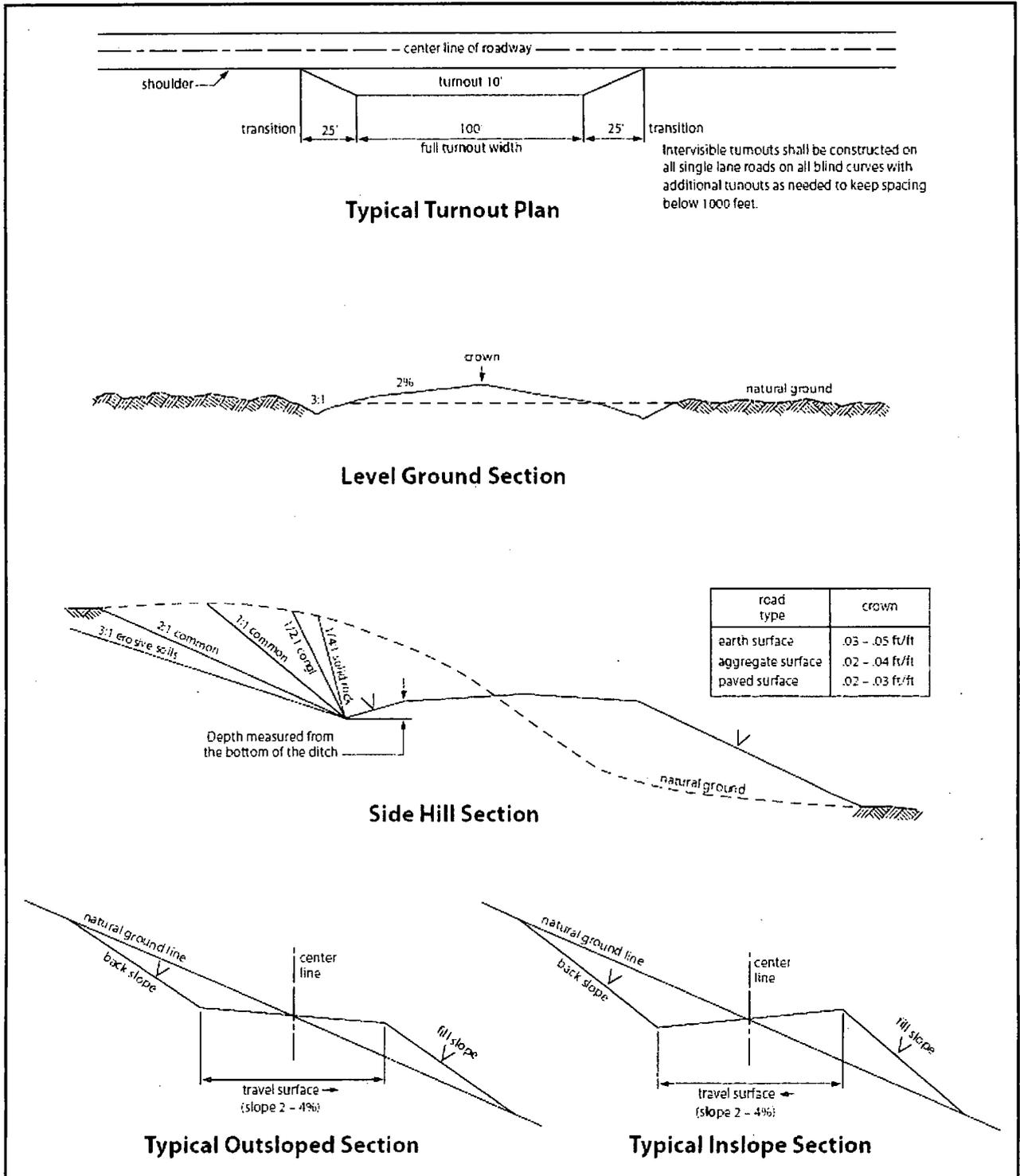


Figure 1. Cross-sections and plans for typical road sections representative of BLM resource or FS local and higher-class roads.