1. Geological Formations

TVD of target 9,919
MD at TD 19,671

Pilot Hole TD N/A
Deepest expected fresh water

Formation	Depth (TVD) from KB	Water/Mineral Bearing/Target Zone	Hazards
Rustler	984	N/A	
Salado	1270	N/A	
Castille	4690	N/A	
Delaware Sands	4890	N/A	
Bone Spirng	9023	Hydrocarbons	
Leonard Shale	9081	Hydrocarbons	
Avalon Shale	9320	Hydrocarbons	
Lower Avalon Target	9919	Hydrocarbons	
1st Bone Spring Sand	10021	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
17 1/2	0	1000	13-3/8"	48.00	H-40/J-55 Hybrid	ST&C	1.62	3.78	6.71
12 1/4	0	4870	9-5/8"	40.00	J-55	LT&C	1.47	1.53	2.67
8 3/4	0	9416	5-1/2"	17.00	L-80	LT&C	1.40	1.72	2.00
8 3/4	9416	19671	5-1/2"	17.00	L-80	BT&C	1.33	1.63	46.43
					BLM Minimum Safety Factor		1.125	1	1.6 Dry 1.8 Wet

TVD was used on all calculations.
All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h

	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

3. Cementing Program

Casing	# Sks	Wt. lb/gal	Yld ft3/sack	H2O gal/sk	500# Comp. Strength (hours)	Slurry Description
Surface	424	13.50	1.72	9.15	15.5	Lead: Class C + Bentonite
	195	14.80	1.34	6.32	9.5	Tail: Class C + LCM
Intermediate	925	12.90	1.88	9.65	12	Lead: 35:65 (Poz:C) + Salt + Bentonite
	285	14.80	1.34	6.32	9.5	Tail: Class C + LCM
Production	432	10.50	3.45	22.18	N/A	Lead: NeoCem
	2193	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	43
Intermediate	0	44
Production	4670	15

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		3M
			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.

	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 1000'	FW Spud Mud	8.30 - 8.80	30-32	N/C
1000' to 4870'	Brine Water	9.70 - 10.20	30-32	N/C
4870' to 19671'	FW/Cut Brine	8.70 - 9.20	30-32	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 fromTD 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	4745 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

9. Wellhead

A multi-bowl wellhead system will be utilized.

After running the 13-3/8" surface casing, a 13 5/8" BOP/BOPE system with a minimum working pressure of 3000 psi will be installed on the wellhead system and will be pressure tested to 250 psi low followed by a 3000 psi test. Annular will be tested to 50% of working pressure. The pressure test will be repeated at least every 30 days, as per Onshore Order No. 2.

The multi-bowl wellhead will be installed by vendor's representative. A copy of the installation instructions has been sent to the BLM field office.

The wellhead will be installed by a third-party welder while being monitored by the wellhead vendor representative.

All BOP equipment will be tested utilizing a conventional test plug. Not a cup or J-packer type.

A solid steel body pack-off will be utilized after running and cementing the intermediate casing. After installation the pack-off and lower flange will be pressure tested to 3000 psi.

The surface casing string will be tested as per Onshore Order No. 2 to at least 0.22 psi/ft or 1500 psi, whichever is greater.

The casing string utilizing steel body pack-off will be tested to 70% of casing burst.

If well conditions dictate conventional slips will be set and BOPE will be tested to appropriate pressures based on permitted pressure requirements.

Exhibit F – Co-Flex Hose

Vaca Draw 20-17 Fed 5H

Cimarex Energy Co.

20-25S-33E

Lea County, NM

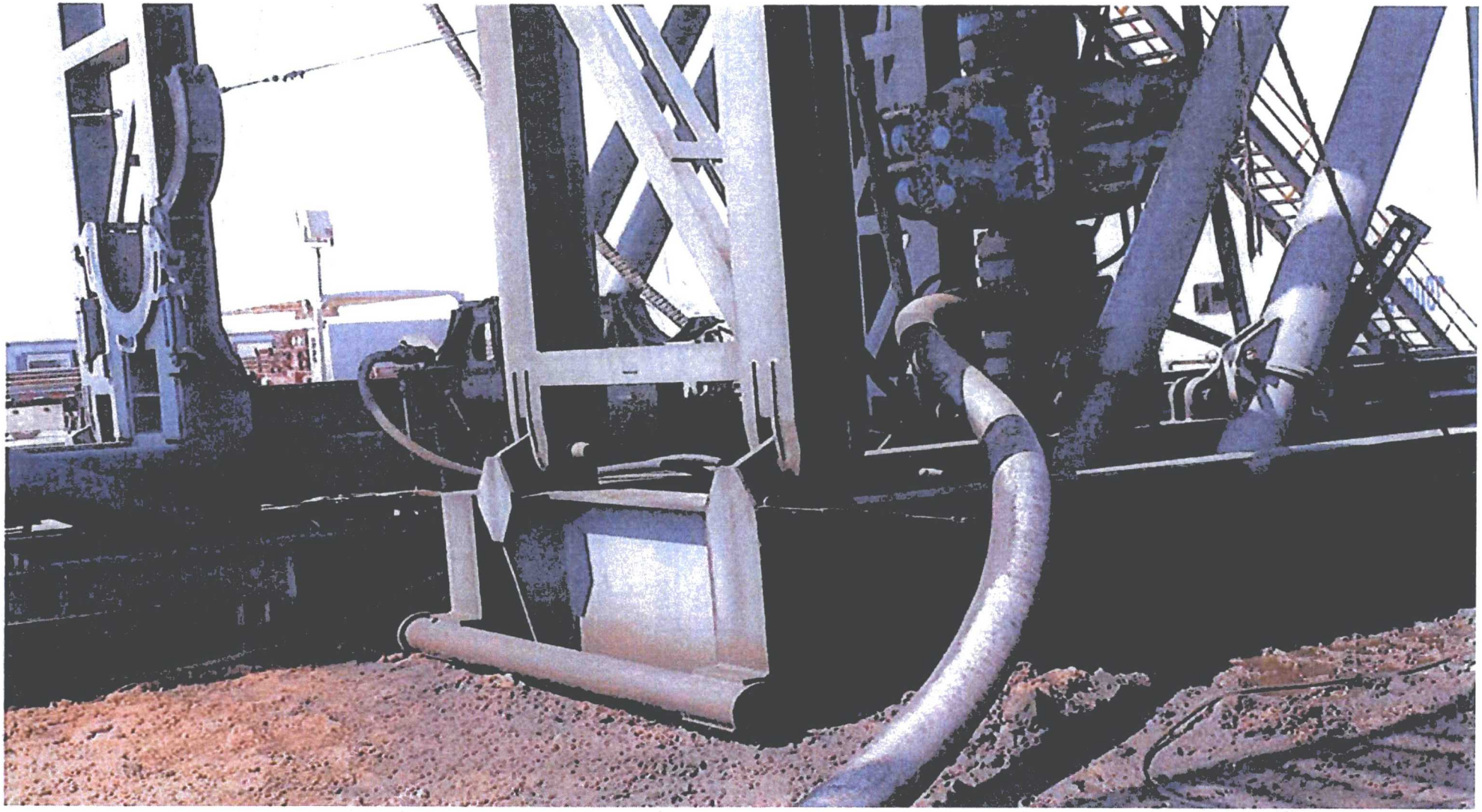


Exhibit F-1 – Co-Flex Hose Hydrostatic Test
Vaca Draw 20-17 Fed 5H
Cimarex Energy Co.
20-25S-33E
Lea County, NM

Midwest Hose
& Specialty, Inc.

INTERNAL HYDROSTATIC TEST REPORT

Customer:	P.O. Number:
Oderco Inc	odyd-271

HOSE SPECIFICATIONS

Type:	Hose Length:
Stainless Steel Armor Choke & Kill Hose	45'ft.

I.D.	O.D.
4 *INCHES*	9 *INCHES*

WORKING PRESSURE	TEST PRESSURE	BURST PRESSURE
10,000 *PSI*	15,000 *PSI*	0 *PSI*

COUPLINGS

Stem Part No.	Ferrule No.
OKC OKC	OKC OKC
Type of Coupling:	
Swage-It	

PROCEDURE

Hose assembly pressure tested with water at ambient temperature.

TIME HELD AT TEST PRESSURE	ACTUAL BURST PRESSURE:
15 *MIN.*	0 *PSI*

Hose Assembly Serial Number:	Hose Serial Number:
79793	OKC

Comments:

Date:	Tested:	Approved:
3/8/2011		

Midwest Hose & Specialty, Inc.

Internal Hydrostatic Test Graph

March 3, 2011

Customer: Houston

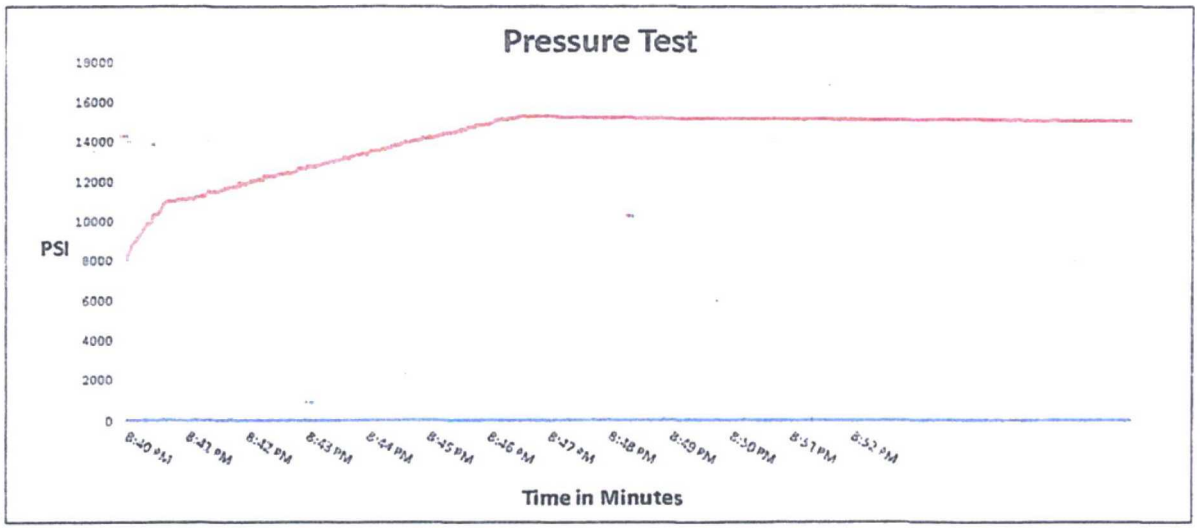
Pick Ticket #: 94260

Hose Specifications

Hose Type	Length
C & K	45'
I.D.	O.D.
4"	6.09"
Working Pressure	Burst Pressure
10000 PSI	Standard Safety Multiplier Applies

Verification

Type of Fitting	Coupling Method
4 1/16 10K	Swage
Die Size	Final O.D.
6.38"	6.25"
Hose Serial #	Hose Assembly Serial #
5544	79793



Test Pressure	Time Held at Test Pressure	Actual Burst Pressure	Peak Pressure
15000 PSI	11 Minutes		15483 PSI

Comments: Hose assembly pressure tested with water at ambient temperature.

Tested By: *Zac Mcconnell*

Approved By: *Kim Thomas*

Exhibit F-1 – Co-Flex Hose Hydrostatic Test
Vaca Draw 20-17 Fed 5H
Cimarex Energy Co.
20-25S-33E
Lea County, NM

Exhibit F-2 – Co-Flex Hose
Vaca Draw 20-17 Fed 5H
Cimarex Energy Co.
20-25S-33E
Lea County, NM

Midwest Hose
& Specialty, Inc.

Certificate of Conformity	
Customer: DEM	**PO** ODYD-271
SPECIFICATIONS	
Sales Order 79793	**Dated:** 3/8/2011

We hereby cerify that the material supplied for the referenced purchase order to be true according to the requirements of the purchase order and current industry standards

Supplier:
Midwest Hose & Specialty, Inc.
10640 Tanner Road
Houston, Texas 77041

Comments:	
Approved: Jamal Garcia	**Date:** 3/8/2011

Midwest Hose & Specialty, Inc.

Exhibit F -3– Co-Flex Hose
Vaca Draw 20-17 Fed 5H
Cimarex Energy Co.
20-25S-33E
Lea County, NM

Specification Sheet
Choke & Kill Hose

The Midwest Hose & Specialty Choke & Kill hose is manufactured with only premium componets.The reinforcement cables, inner liner and cover are made of the highest quality material to handle the tough drilling applications of today's industry. The end connections are available with API flanges, API male threads, hubs, hammer unions or other special fittings upon request. Hose assembly is manufactured to API 7K. This assembly is wrapped with fire resistant vermculite coated fiberglass insulation, rated at 2000 degrees with stainless steel armor cover.

Working Pressure:	5,000 or 10,000 psi working pressure
Test Pressure:	10,000 or 15,000 psi test pressure
Reinforcement:	Multiple steel cables
Cover:	Stainless Steel Armor
Inner Tube:	Petroleum resistant, Abrasion resistant
End Fitting:	API flanges, API male threads, threaded or butt weld hammer unions, unibolt and other special connections
Maximum Length:	110 Feet
ID:	2-1/2", 3", 3-1/2", 4"
Operating Temperature:	-22 deg F to +180 deg F (-30 deg C to +82 deg C)

P.O. Box 96558 – 1421 S.E. 29th St. Oklahoma City, OK 73143 • (405) 670-6718 • Fax: (405) 670-6816

Vaca Draw 20-17 Fed 5H

Casing Assumptions

Cimarex Energy Co.

20-25S-33E

Lea Cty, NM

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	1000	13-3/8"	48.00	H-40/J-55 Hybrid	ST&C	1.62	3.78	6.71
12 1/4	0	4870	9-5/8"	40.00	J-55	LT&C	1.47	1.53	2.67
8 3/4	0	9416	5-1/2"	17.00	L-80	LT&C	1.40	1.72	2.00
8 3/4	9416	19671	5-1/2"	17.00	L-80	BT&C	1.33	1.63	46.43
				BLM Minimum Safety Factor			1.125	1	1.6 Dry 1.8 Wet

TVD was used on all calculations.

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

Vaca Draw 20-17 Fed 5H

Casing Assumptions

Cimarex Energy Co.

20-25S-33E

Lea Cty, NM

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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Vaca Draw 20-17 Fed 5H

Casing Assumptions

Cimarex Energy Co.

20-25S-33E

Lea Cty, NM

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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TVD was used on all calculations.

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

Vaca Draw 20-17 Fed 5H

Casing Assumptions

Cimarex Energy Co.

20-25S-33E

Lea Cty, NM

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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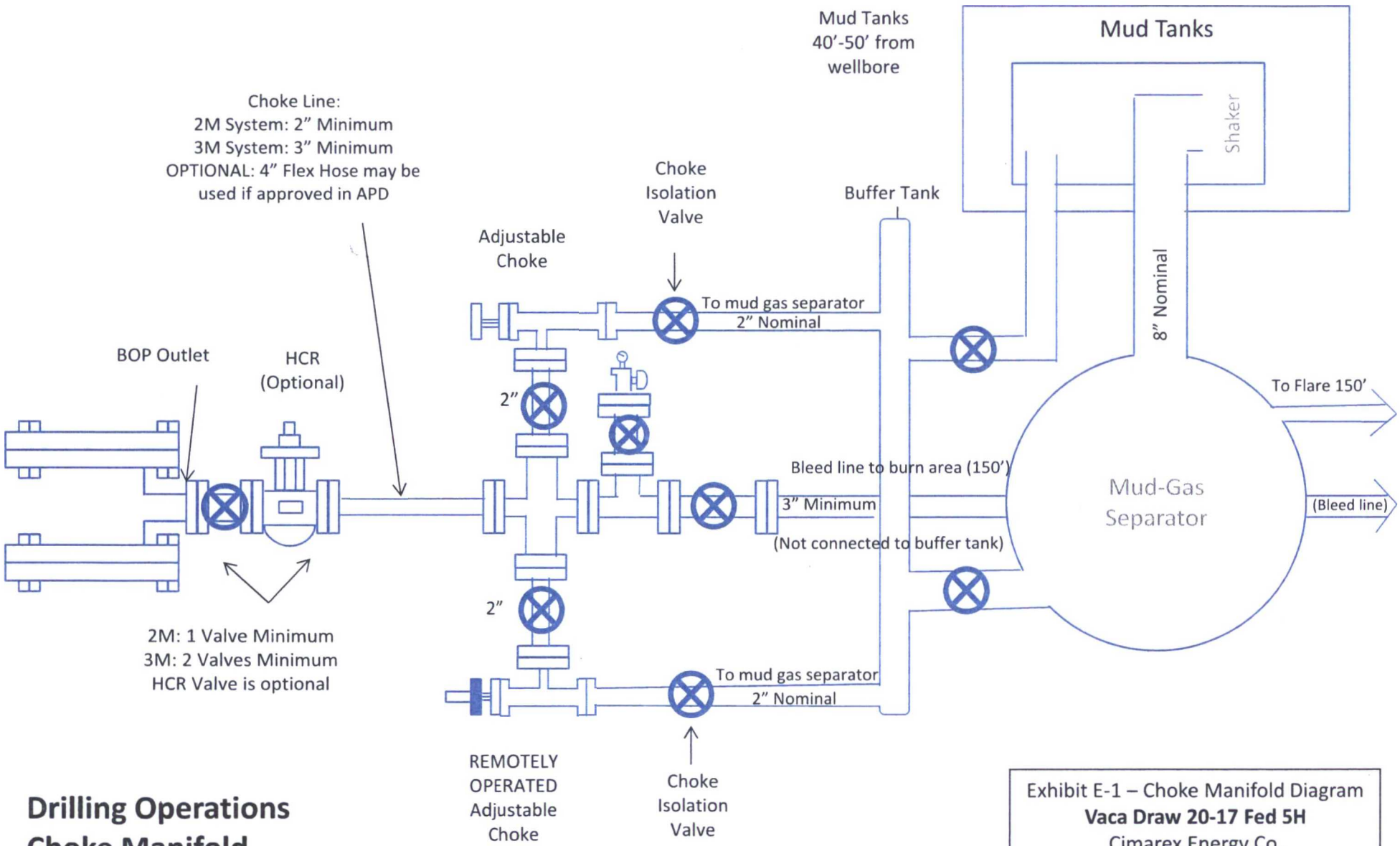
				BLM Minimum Safety Factor			1.125	1	1.6 Dry 1.8 Wet

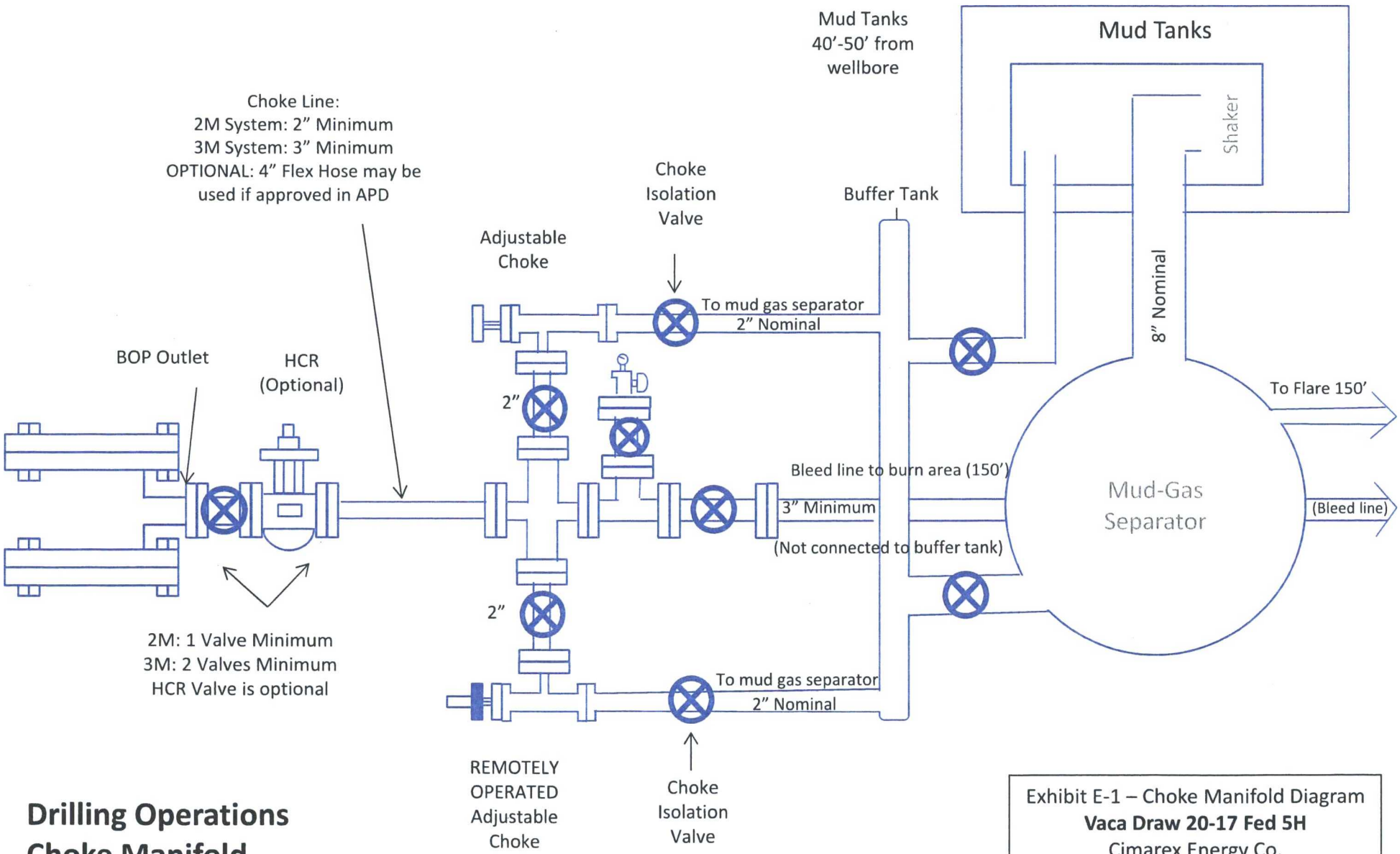
TVD was used on all calculations.

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



Drilling Operations
Choke Manifold
2M/3M Service

Exhibit E-1 – Choke Manifold Diagram
Vaca Draw 20-17 Fed 5H
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 5H
Cimarex Energy Co.
20-25S-33E
Lea County, NM

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

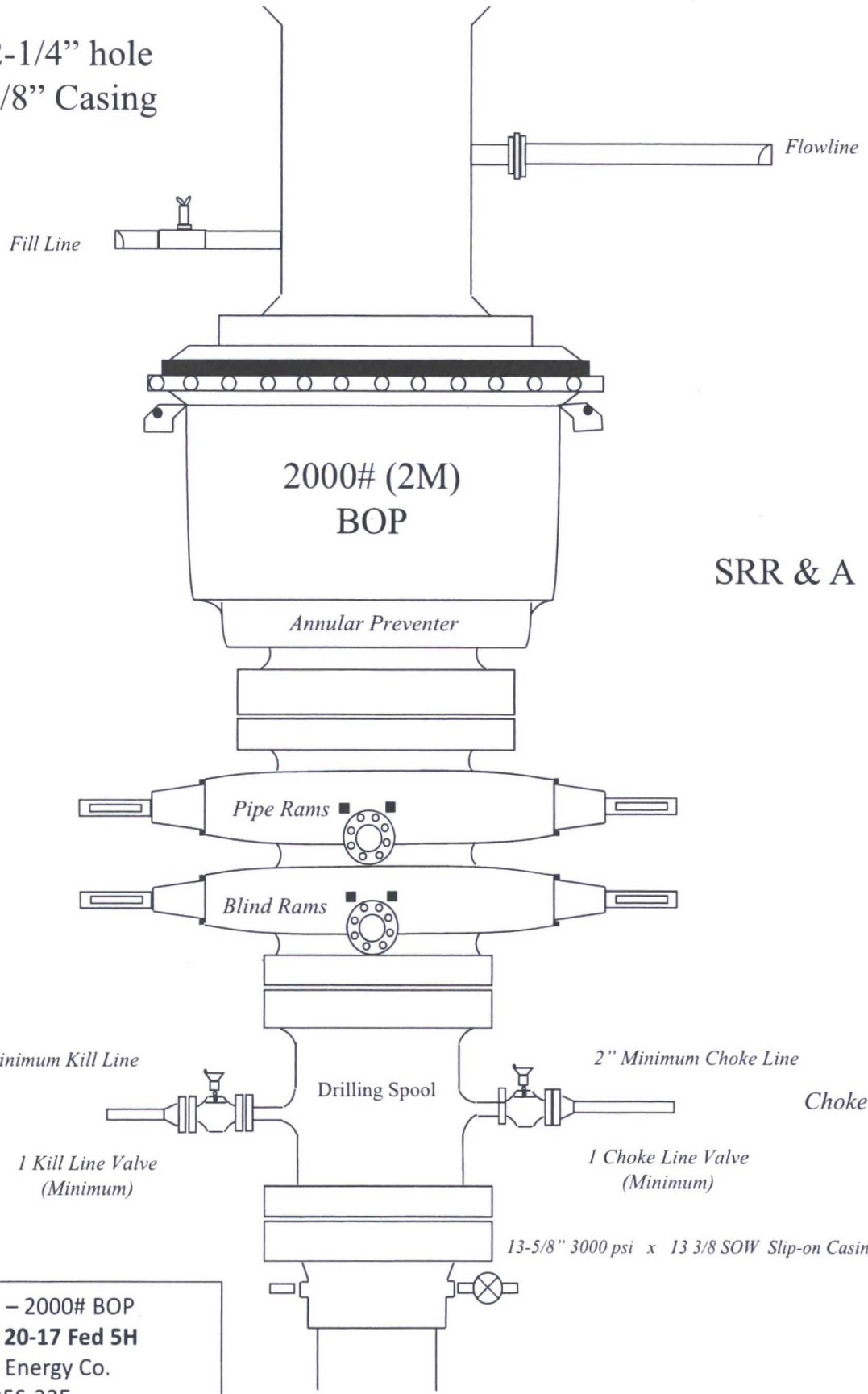


Exhibit E-1 – 2000# BOP
Vaca Draw 20-17 Fed 5H
Cimarex Energy Co.
20-25S-33E
Lea County, NM

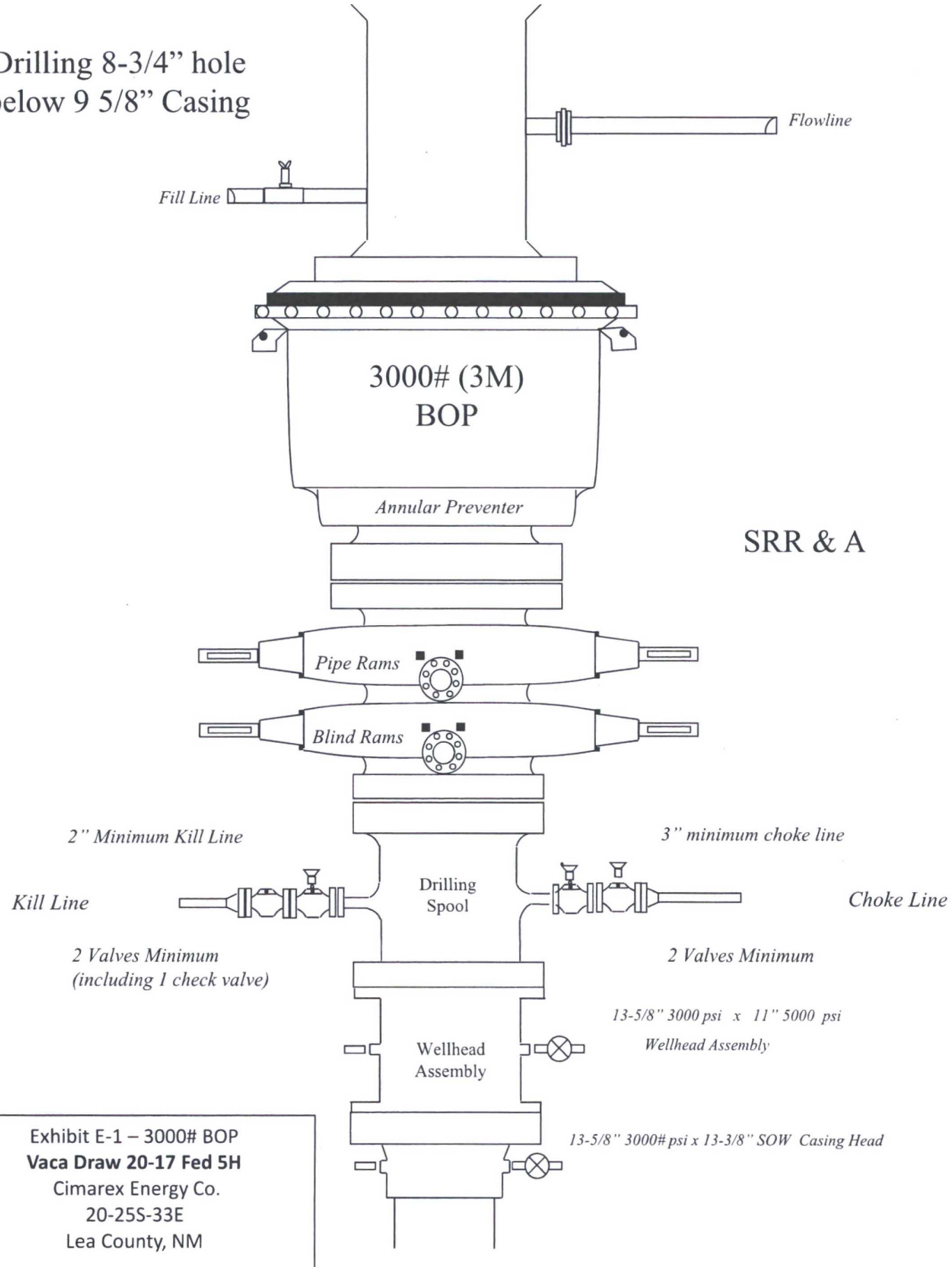


Exhibit E-1 – 3000# BOP
Vaca Draw 20-17 Fed 5H
Cimarex Energy Co.
20-25S-33E
Lea County, NM

Print

EVRAZ

OCTG Performance Data

Casing Performance

Availability: ERW

Pipe Body Geometry

Outside Diameter:	13.375 in	Inside Diameter:	12.715 in
Wall Thickness:	0.330 in	Cross Section Area:	13.524 sq in
Nominal Weight:	48.00 lb/ft	Drift Diameter:	12.559 in
Plain End Weight:	46.02 lb/ft	Alternate Drift Diameter:	-

Pipe Body Performance

Grade:	H40	Collapse Strength (ERW):	740 psi
Pipe Body Yield Strength:	541000 lbf	Collapse Strength (SMLS):	-

SC Connection

Connection Geometry

	Optimum	Minimum	Maximum
Make Up Torque:	3220 lb·ft	2420 lb·ft	4030 lb·ft
Coupling Outside Diameter:	14.375 in		

Connection Performance

Grade:	H40	Minimum Internal Yield Pressure:	1730 psi
Joint Strength:	322000 lbf		

LC Connection

Connection Geometry

	Optimum	Minimum	Maximum
Make Up Torque:	-	-	-
Coupling Outside Diameter:	14.375 in		

Connection Performance

Grade:	H40	Minimum Internal Yield Pressure:	-
Joint Strength:	-		

BC Connection

Connection Geometry

	Optimum	Minimum	Maximum
Make Up Torque:	-	-	-
Coupling Outside Diameter:	14.375 in		

Connection Performance

Grade:	H40	Minimum Internal Yield Pressure:	-
Joint Strength:	-		

PE Connection

Connection Geometry

	Optimum	Minimum	Maximum
Make Up Torque:	-	-	-
Coupling Outside Diameter:	14.375 in		

Connection Performance

Grade:	H40	Minimum Internal Yield Pressure:	1730 psi
Joint Strength:	-		

AFMSS

U.S. Department of the Interior
BUREAU OF LAND MANAGEMENT

Drilling Plan Data Report

10/26/2017

APD ID: 10400013526 **Submission Date:** 05/03/2017

Operator Name: CIMAREX ENERGY COMPANY

Well Name: VACA DRAW 20-17 FEDERAL **Well Number:** 5H

Well Type: CONVENTIONAL GAS WELL **Well Work Type:** Drill

Highlighted data reflects the most recent changes

Show Final Text

Section 1 - Geologic Formations

Formation ID	Formation Name	Elevation	True Vertical Depth	Measured Depth	Lithologies	Mineral Resources	Producing Formation
1	RUSTLER	3423	984	984		USEABLE WATER	No
2	SALADO	2153	1270	1270		NONE	No
3	CASTILE	-1267	4690	4690		NONE	No
4	DELAWARE SAND	-1467	4890	4890		NONE	No
5	CHERRY CANYON	-2551	5974	5974			No
6	BRUSHY CANYON	-4061	7484	7484			No
7	BONE SPRING	-5600	9023	9023		NATURAL GAS,OIL	Yes
8	BONE SPRING 1ST	-6598	10021	10021		NATURAL GAS,OIL	No
9	BONE SPRING 3RD	-8303	11726	11726			No
10	WOLFCAMP	-8773	12196	12196			Yes

Section 2 - Blowout Prevention

Pressure Rating (PSI): 2M **Rating Depth:** 1000

Equipment: Exhibit "E-1". A BOP consisting of three rams, including one blind ram and two pipe rams and one annular preventer. An accumulator that meets the requirements in Onshore Order #2 for the pressure rating of the BOP stack. A rotating head may be installed as needed. A Kelly clock will be installed and maintained in operable condition and a drill string safety valve in the open position will be available on the rig floor.

Requesting Variance? YES

Variance request: Co-flex line between the BOP and choke manifold. Certification for proposed co-flex hose is attached (Please see Exhibit F, F-1, F-2, F-3). The hose is not required by the manufacturer to be anchored. In the event the specific hose is not available, one of equal or higher rating will be used. Variance to include Hammer Union connections on lines downstream of the buffer tank only.

Testing Procedure: A multi-bowl wellhead system will be utilized. After running the 13-3/8" surface casing, a 13 5/8" BOP/BOPE system with a minimum working pressure of 3000 psi will be installed on the wellhead system and will be pressure tested to 250 psi low followed by a 3000 psi test. Annular will be tested to 50% of working pressure. The pressure

EXHIBIT NO. 1

Date of Issue:
8/21/2017

Bureau of Land Management, Carlsbad Field Office
620 E. Greene Street Carlsbad, NM 88220

Cultural and Archaeological Resources

BLM Report No.
17-0295

NOTICE OF STIPULATIONS

17-0334

Historic properties in the vicinity of this project are protected by federal law. In order to ensure that they are not damaged or destroyed by construction activities, the project proponent and construction supervisors shall ensure that the following stipulations are implemented.

Project Name:	**Vaca Draw 20-17**
	1). A 3-day preconstruction call-in notification. Contact BLM Inspection and Enforcement at
Required	***2. Professional archaeological monitoring***. Contact your BLM project archaeologist at (575) 234-5917 for assistance.
A. ☒	These stipulations must be given to your monitor at least **5 days** prior to the start of construction.
B. ☒	No construction, including vegetation removal or other site prep may begin prior to the arrival of the monitor.
	3. Cultural site barrier fencing. (Your monitor will assist you).
A. ☐	**A temporary site protection barrier**(s) shall be erected prior to all ground-disturbing activities. The minimum barrier(s) shall consist of upright wooden survey lath spaced no more than ten (10) feet apart and marked with blue ribbon flagging or blue paint. There shall be no construction activities or vehicular traffic past the barrier(s) at any time.
B. ☐	**A permanent, 4-strand barbed wire fence** strung on standard "T-posts" shall be erected prior to all ground-disturbing activities. No construction activities or vehicle traffic are allowed past the fence.
Required	***4. The archaeological monitor shall:***
A. ☐	
B. ☒	Observe all ground-disturbing activities within 100 feet of cultural sites LA 128148 and LA 128149.
C. ☐	Ensure that the proposed
D. ☒	Ensure the proposed reroute for LA 128149 is adhered to.
E. ☒	Submit a brief monitoring report within 30 days of completion of monitoring.
	If subsurface cultural resources are encountered during the monitoring, all activities shall cease and a BLM-CFO archaeologist shall be notified immediately.
Other:	**IF THE CONTRACT ARCHAEOLOGIST DOES NOT KNOW WHERE THE SITE(S) ARE LOCATED AT PLEASE COME BY THE CARLSBAD BLM AND MAPS AND OTHER DATA WILL BE PROVIDED UPON REQUEST TO THE CONTRACT ARCHAEOLOGIST**

Site Protection and Employee Education: It is the responsibility of the project proponent and his construction supervisor to inform all employees and subcontractors that cultural and archaeological sites are to be avoided by all personnel, vehicles, and equipment; and that it is illegal to collect, damage, or disturb cultural resources on Public Lands.

For assistance contact: Bruce Boeke (575) 234-5917