EOG RESOURCES, INC.
ORRTANNA 20 FED NO. 703H

1. GEOLOGIC NAME OF SURFACE FORMATION:

Permian

2. ESTIMATED TOPS OF IMPORTANT GEOLOGICAL MARKERS:

Rustler	805'
Top of Salt	1,156'
Base of Salt / Top Anhydrite	4,617'
Base Anhydrite	4,854'
Lamar	4,854'
Bell Canyon	4,881'
Cherry Canyon	5,898'
Brushy Canyon	7,458'
Bone Spring Lime	9,027'
1st Bone Spring Sand	9,951'
2nd Bone Spring Shale	10,260'
2nd Bone Spring Sand	10,530'
3rd Bone Spring Carb	11,066'
3rd Bone Spring Sand	11,682'
Wolfcamp	12,147'
TD	12,315'

3. ESTIMATED DEPTHS OF ANTICIPATED FRESH WATER, OIL OR GAS:

Upper Permian Sands	0- 400'	Fresh Water
Cherry Canyon	5,898'	Oil
Brushy Canyon	7,458'	Oil
1st Bone Spring Sand	9,951'	Oil
2nd Bone Spring Shale	10,260'	Oil
2nd Bone Spring Sand	10,530'	Oil
3rd Bone Spring Carb	11,066'	Oil
3rd Bone Spring Sand	11,682'	Oil
Wolfcamp	12,147'	Oil

No other Formations are expected to give up oil, gas or fresh water in measurable quantities. Surface fresh water sands will be protected by setting 10.75" casing at 830' and circulating cement back to surface.

4. CASING PROGRAM - NEW

Hole Size	Interval	Csg OD	Weight	Grade	Conn	DF_{min} Collapse	DF_{min} Burst	DF_{min} Tension
14.75"	0 – 830'	10.75"	40.5#	J55	STC	1.125	1.25	1.60
8.75"	0' – 11,100'	7.625"	29.7#	HCP-110	FlushMax III	1.125	1.25	1.60
6.75"	0' – 10,600'	5.5"	23#	HCP-110	VAM Top HT	1.125	1.25	1.60
6.75"	10,600'-17,112'	5.5"	23#	HCP-110	VAM SG	1.125	1.25	1.60

Variance is requested to wave the centralizer requirements for the 7-5/8" FJ casing in the 8-3/4" hole size. An expansion additive will be utilized, in the cement slurry, for the entire length of the 8-3/4" hole interval to maximize cement bond and zonal isolation.

Variance is also requested to wave any centralizer requirements for the 5-1/2" FJ casing in the 6-3/4" hole size. An expansion additive will be utilized, in the cement slurry, for the entire length of the 6-3/4" hole interval to maximize cement bond and zonal isolation.

Cementing Program:

Depth	No. Sacks	Wt. ppg	Yld Ft^3/ft	Mix Water Gal/sk	Slurry Description
10-3/4" 830'	325	13.5	1.73	9.13	Class C + 4.0% Bentonite + 0.6% CD-32 + 0.5% $CaCl_2$ + 0.25 lb/sk Cello-Flake (TOC @ Surface)
	200	14.8	1.34	6.34	Class C + 0.6% FL-62 + 0.25 lb/sk Cello-Flake + 0.2% Sodium Metasilicate
7-5/8" 11,100'	250	14.8	1.38	6.48	Class C + 5% Gypsum + 3% CaCl2
	2000	14.8	1.38	6.48	Class C + 5% Gypsum + 3% CaCl2
	550	14.4	1.20	4.81	50:50 Class H:Poz + 0.25% CPT20A + 0.40% CPT49 + 0.20% CPT35 + 0.80% CPT16A + 0.25% CPT503P
5-1/2" 17,112'	725	14.1	1.26	5.80	Class H + 0.1% C-20 + 0.05% CSA-1000 + 0.20% C-49 + 0.40% C-17 (TOC @ 10,600')

Note: Cement volumes based on bit size plus at least 25% excess in the open hole plus 10% excess in the cased-hole overlap section.

5. MINIMUM SPECIFICATIONS FOR PRESSURE CONTROL:

Variance is requested to use a co-flex line between the BOP and choke manifold (instead of using a 4" OD steel line).

The minimum blowout preventer equipment (BOPE) shown in Exhibit #1 will consist of a single ram, mud cross and double ram-type (10,000 psi WP) preventer and an annular preventer (5000-psi WP). Both units will be hydraulically operated and the ram-type will be equipped with blind rams on bottom and drill pipe rams on top. All BOPE will be tested in accordance with Onshore Oil & Gas order No. 2.

Before drilling out of the surface casing, the ram-type BOP and accessory equipment will be tested to 5000/ 250 psig and the annular preventer to 3500/ 250 psig. The surface casing will be tested to 1500 psi for 30 minutes.

Before drilling out of the intermediate casing, the ram-type BOP and accessory equipment will be tested to 5000/ 250 psig and the annular preventer to 3500/ 250 psig. The intermediate casing will be tested to 2000 psi for 30 minutes.

Pipe rams will be operationally checked each 24-hour period. Blind rams will be operationally checked on each trip out of the hole. These checks will be noted on the daily tour sheets.

A hydraulically operated choke will be installed prior to drilling out of the intermediate casing shoe.

6. TYPES AND CHARACTERISTICS OF THE PROPOSED MUD SYSTEM:

During this procedure we plan to use a Closed-Loop System and haul contents to the required disposal.

The applicable depths and properties of the drilling fluid systems are as follows.

Depth	Type	Weight (ppg)	Viscosity	Water Loss
0 – 830'	Fresh - Gel	8.6-8.8	28-34	N/c
830' – 11,100'	Brine	8.8-10.0	28-34	N/c
11,100' – 17,112' Lateral	Oil Base	10.0-11.5	58-68	3 - 6

An electronic pit volume totalizer (PVT) will be utilized on the circulating system, to monitor pit volume, flow rate, pump pressure and stroke rate.

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

7. AUXILIARY WELL CONTROL AND MONITORING EQUIPMENT:

(A) A kelly cock will be kept in the drill string at all times.

(B) A full opening drill pipe-stabbing valve (inside BOP) with proper drill pipe connections will be on the rig floor at all times.

(C) H_2S monitoring and detection equipment will be utilized from surface casing point to TD.

8. LOGGING, TESTING AND CORING PROGRAM:

Open-hole logs are not planned for this well.

GR–CCL Will be run in cased hole during completions phase of operations.

9. ABNORMAL CONDITIONS, PRESSURES, TEMPERATURES AND POTENTIAL HAZARDS:

The estimated bottom-hole temperature (BHT) at TD is 182 degrees F with an estimated maximum bottom-hole pressure (BHP) at TD of 7354 psig. No hydrogen sulfide or other hazardous gases or fluids have been encountered, reported or are known to exist at this depth in this area. Severe loss circulation is expected from 7,300' to Intermediate casing point.

10. ANTICIPATED STARTING DATE AND DURATION OF OPERATIONS:

The drilling operation should be finished in approximately one month. If the well is productive, an additional 60-90 days will be required for completion and testing before a decision is made to install permanent facilities.

11. WELLHEAD:

A multi-bowl wellhead system will be utilized.

After running the 10-3/4" surface casing, a 13-5/8" BOP/BOPE system with a minimum working pressure of 5000 psi will be installed on the wellhead system and will be pressure tested to 250 psi low followed by a 5000 psi pressure test. This pressure test will be repeated at least every 30 days, as per Onshore Order No. 2

The minimum working pressure of the BOP and related BOPE required for drilling below the surface casing shoe shall be 5000 psi.

The multi-bowl wellhead will be installed by vendor's representative(s). A copy of the installation instructions for the Stream Flo FBD100 Multi-Bowl WH system has been sent to the NM BLM office in Carlsbad, NM.

The wellhead will be installed by a third party welder while being monitored by WH vendor's 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 5000 psi. Prior to running the intermediate casing, the rams will be changed out to accommodate the 7-5/8" casing. The bonnet seals will be tested to 1500 psi. After installing the intermediate casing the casing rams will be removed and replaced with variable bore rams. The remaining BOPE will not be retested after installing the intermediate casing.

Both the surface and intermediate casing strings will be tested as per Onshore Order No. 2 to at least 0.22 psi/ft or 1500 psi, whichever is greater.

Exhibit 1
EOG Resources
5M BOPE

Rig Floor

1. 13 5/8" Rotating Head
2. NOV 13 5/8" 5,000 PSI WP GK Annular Preventor
3. 13 5/8" Cameron Type "U" 10,000 PSI WP Ram Preventors
4. 2 1/16" - 10,000 PSI WP Check Valve
5. 10,000 PSI WP - 1502 Union to kill line
6. 2 1/16" - 10,000 PSI WP Manual Valves
7. 13 5/8" 3,000 PSI WP x 13 5/8" 5,000 PSI WP Spacer Spool
8. 4 1/16" 10,000 PSI WP HCR Valve
9. 4 1/16" 10,000 PSI WP Manual Valve
10. 6" OD x 3" ID 10,000 PSI WP Steel Armoured Flex Choke Line
11. DSA - 13 5/8" 10,000 PSI WP x 13 5/8" 5,000 PSI WP
12. Mud Cross - 13 5/8" 10,000 PSI WP
13. Blind Rams
14. Pipe Rams
15. 13 5/8" Cameron Type "U" 10,000 PSI WP Pipe Rams
16. Flow Line
17. 2" Fill Line

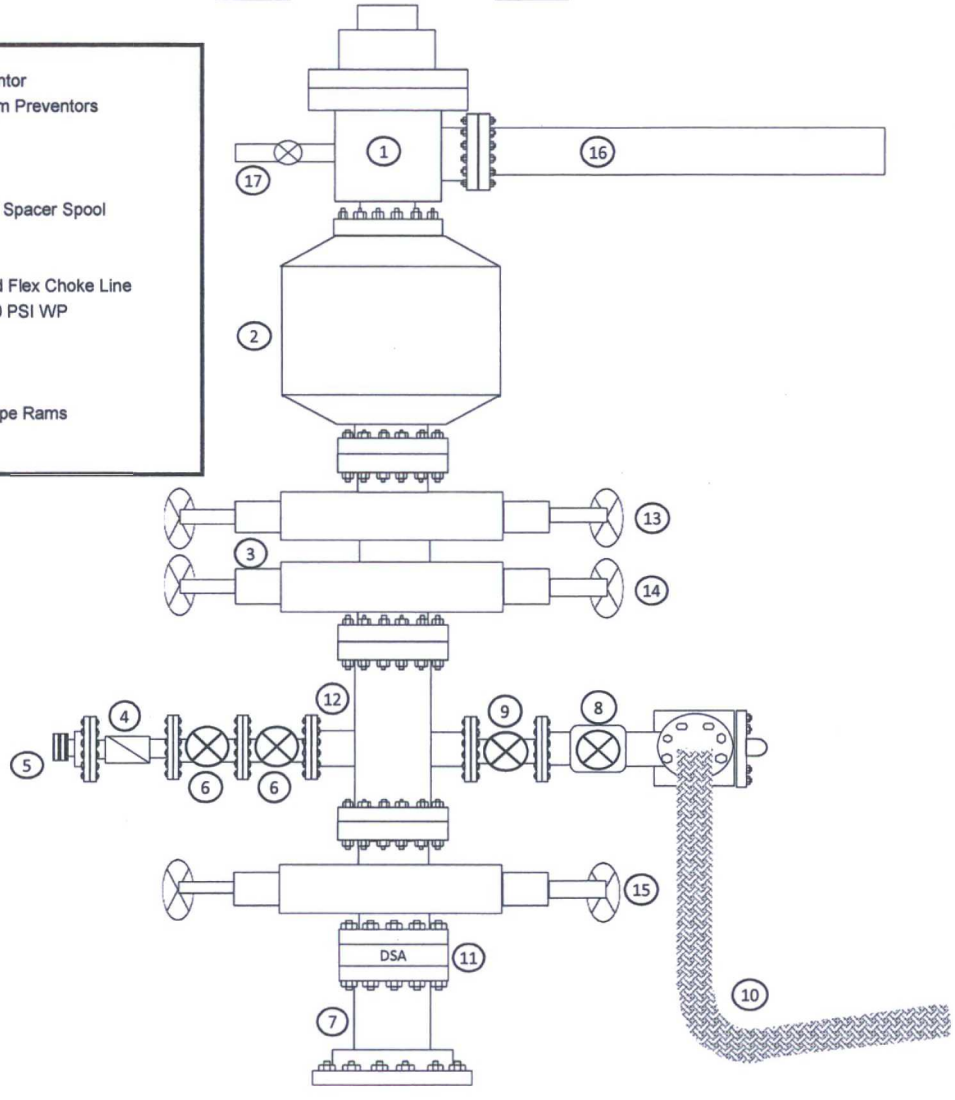
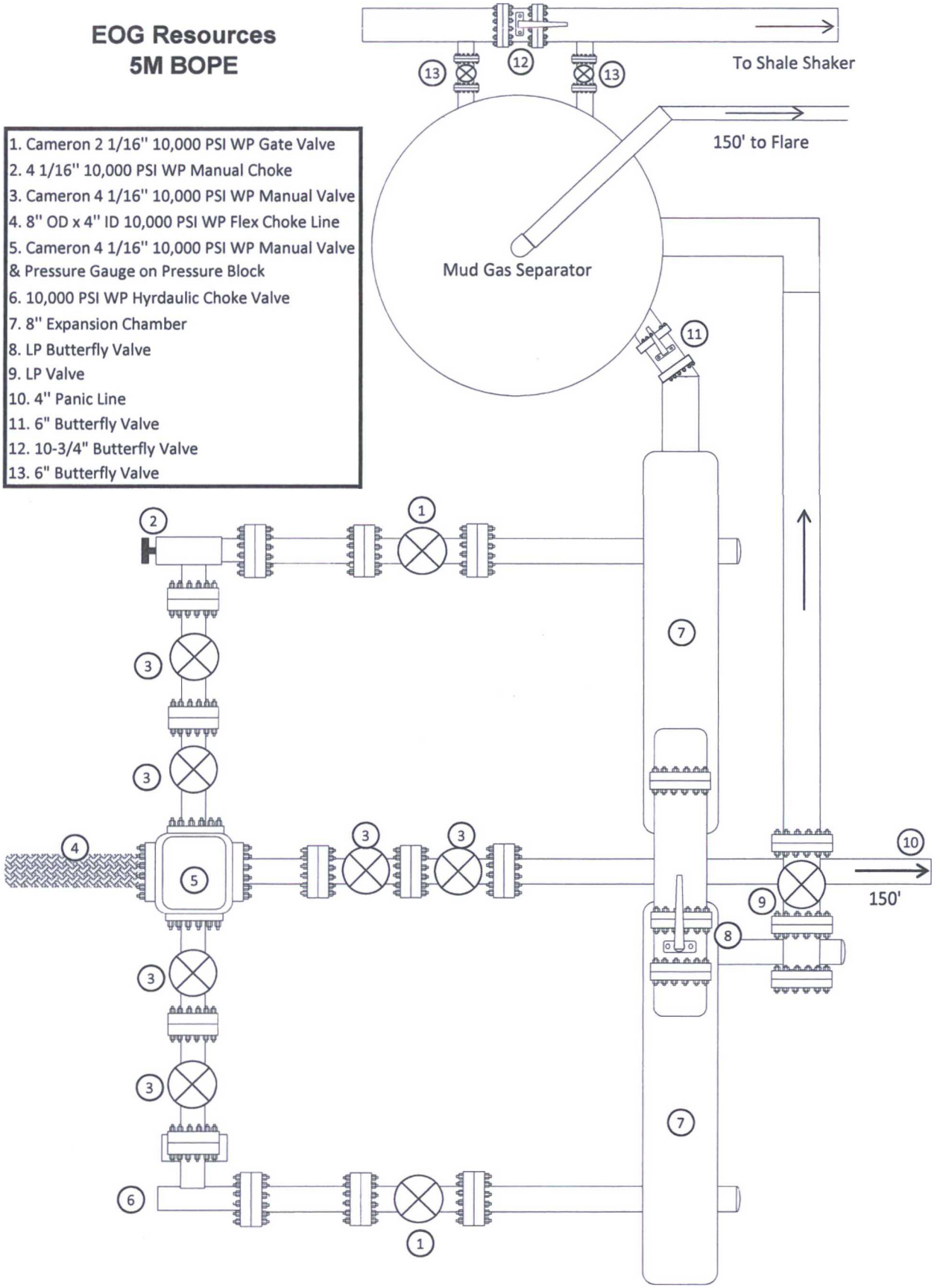


Exhibit 1a

EOG Resources
5M BOPE

1. Cameron 2 1/16" 10,000 PSI WP Gate Valve
2. 4 1/16" 10,000 PSI WP Manual Choke
3. Cameron 4 1/16" 10,000 PSI WP Manual Valve
4. 8" OD x 4" ID 10,000 PSI WP Flex Choke Line
5. Cameron 4 1/16" 10,000 PSI WP Manual Valve & Pressure Gauge on Pressure Block
6. 10,000 PSI WP Hyrdaulic Choke Valve
7. 8" Expansion Chamber
8. LP Butterfly Valve
9. LP Valve
10. 4" Panic Line
11. 6" Butterfly Valve
12. 10-3/4" Butterfly Valve
13. 6" Butterfly Valve



EOG 5M Choke Manifold Diagram (rev. 3/21/14)

Manufacturer: Midwest Hose & Specialty

Serial Number: SN#90067

Length: 35'

Size: OD = 8" ID = 4"

Ends: Flanges Size: 4-1/16"

WP Rating: 10,000 psi Anchors required by manfacturer: No

MIDWEST

HOSE AND SPECIALTY INC.

INTERNAL HYDROSTATIC TEST REPORT		
Customer: CACTUS		**P.O. Number:** RIG #123
		Asset # M10761
HOSE SPECIFICATIONS		
Type: CHOKE LINE		**Length:** 35'
I.D. 4" *INCHES*		**O.D.** 8" *INCHES*
WORKING PRESSURE 10,000 *PSI*	**TEST PRESSURE** 15,000 *PSI*	**BURST PRESSURE** *PSI*
COUPLINGS		
Type of End Fitting 4 1/16 10K FLANGE		
Type of Coupling: SWEDGED	**MANUFACTURED BY** MIDWEST HOSE & SPECIALTY	
PROCEDURE		
Hose assembly pressure tested with water at ambient temperature.		
TIME HELD AT TEST PRESSURE 1 *MIN.*	**ACTUAL BURST PRESSURE:** 0 *PSI*	
COMMENTS: SN#90067 M10761 Hose is covered with stainless steel armour cover and wraped with fire resistant vermiculite coated fiberglass insulation rated for 1500 degrees complete with lifting eyes		
Date: 6/6/2011	**Tested By:** BOBBY FINK	**Approved:** MENDI JACKSON

Midwest Hose & Specialty, Inc.

Internal Hydrostatic Test Graph

Customer: CACTUS

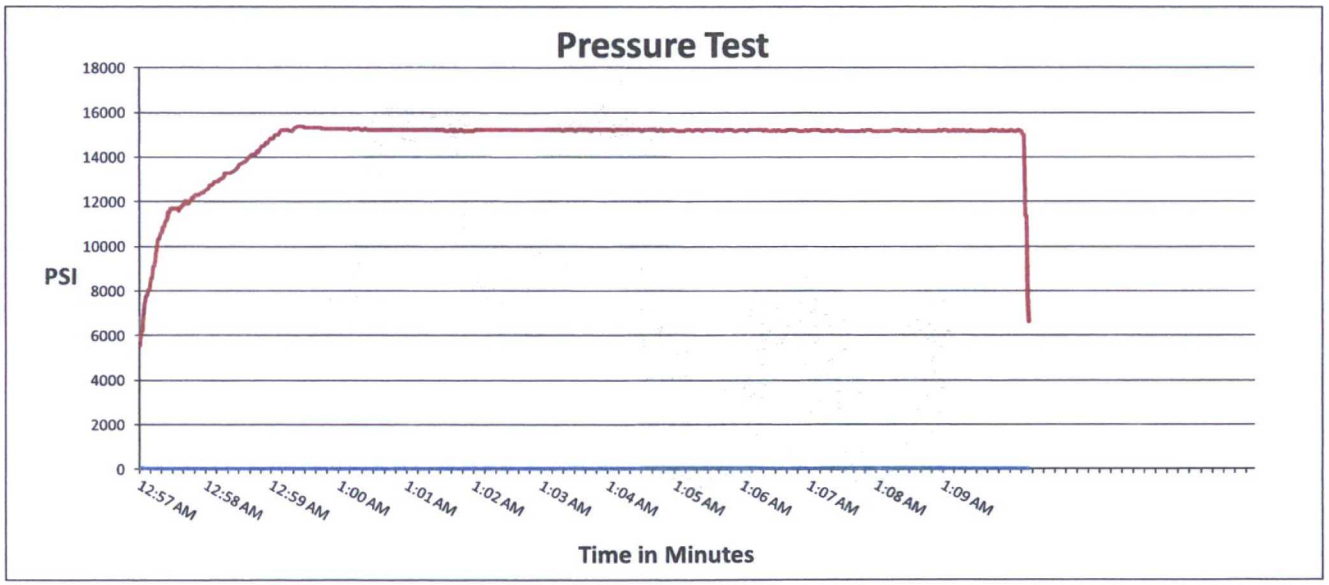
SALES ORDER# 90067

Hose Specifications

Hose Type	Length
C & K	35'
I.D.	**O.D.**
4"	8"
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.**
6.62"	6.68"
Hose Serial #	**Hose Assembly Serial #**
	90067



Test Pressure	Time Held at Test Pressure	Actual Burst Pressure	Peak Pressure
15000 PSI	11 1/4 Minutes		15439 PSI

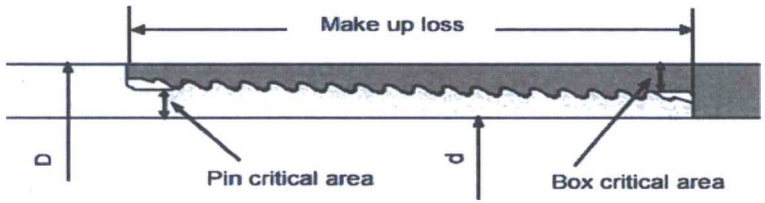
Comments: Hose assembly pressure tested with water at ambient temperature.

Tested By: *Bobby Fink*

Approved By: *Mendi Jackson*

x Mendi Jackson

Metal One Corp	FLUSHMAX-III Connection Data Sheet	Page	44-O
		Date	1-Oct-15
		Rev.	N-0



Pipe Body	Imperial		S.I.	
Grade	P110		P110	
Pipe OD (D)	7 5/8	in	193.68	mm
Weight	29.7	lb/ft	44.25	kg/m
Actual weight	29.0	lb/ft	43.26	kg/m
Wall thickness (t)	0.375	in	9.53	mm
Pipe ID (d)	6.875	in	174.63	mm
Pipe body cross section	8.537	in^2	5,508	mm^2
Drift Dia.	6.750	in	171.45	mm

Connection				
Box OD (W)	7.625	in	193.68	mm
PIN ID	6.875	in	174.63	mm
Pin critical area	4.420	in^2	2,852	mm^2
Box critical area	4.424	in^2	2,854	mm^2
Joint load efficiency	60	%	60	%
Make up loss	3.040	in	77.22	mm
Thread taper	1/16 (3/4 in per ft)			
Number of threads	5 thread per in.			

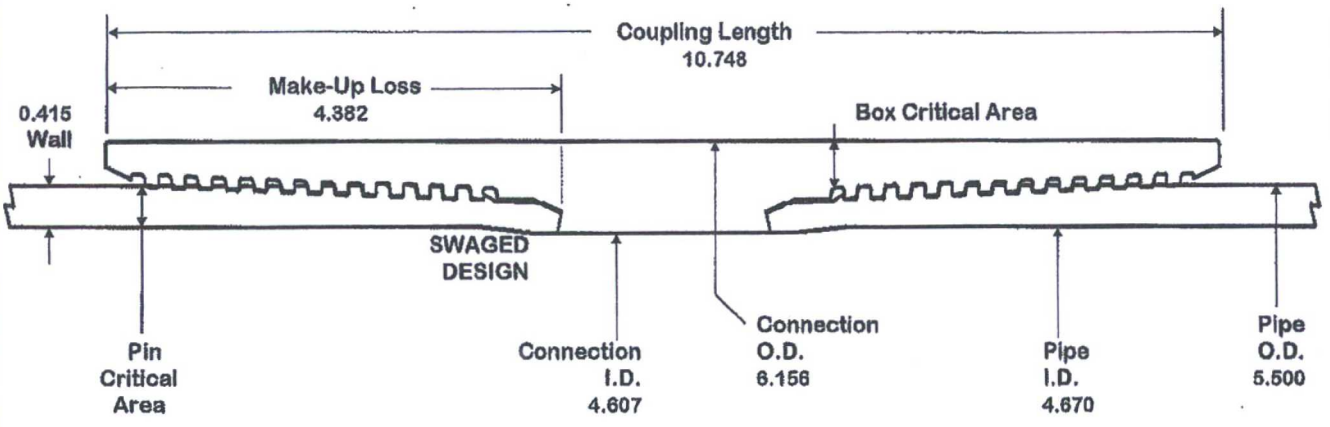
Connection Performance Properties				
Tensile Yield load	563.4	kips	2,506	kN
M.I.Y.P.	7,574	psi	52.2	MPa
Collapse strength	5,350	psi	36.9	MPa

Note
M.I.Y.P. = Minimum Internal Yield Pressure of the connection

Torque Recommended				
Min.	8,700	ft-lb	11,700	N-m
Opti.	9,700	ft-lb	13,100	N-m
Max.	10,700	ft-lb	14,500	N-m
Operational Max.	23,600	ft-lb	32,000	N-m

Note : Operational Max. torque can be applied for high torque application

VAM® TOP HT



O.D.	WEIGHT	WALL	GRADE	DRIFT
5.500	23.00	0.415	NSSMC P110HC	4.545

PIPE BODY PROPERTIES

Material Grade	NSSMC P110HC
Min. Yield Strength	125 ksi
Min. Tensile Strength	125 ksi
Outside Diameter	5.500 in
Inside Diameter	4.670 in
Nominal Area	6.630 sq.in.
Yield Strength	829 kips
Ultimate Strength	829 kips
Min Internal Yield	16,510 psi
*High Collapse	16,220 psi

CONNECTION PROPERTIES

Connection OD	6.156 in
Connection ID	4.607 in
Make up Loss	4.382 in
Coupling Length	10.748 in
Box Critical Area	6.757 sq.in.
%PB Section Area	101.9%
Pin Critical Area	6.630 sq.in.
%PB Section Area	100.0%
Yield Strength	829 kips
Parting Load	829 kips
Min Internal Yield	16,510 psi
*High Collapse	16,220 psi
Wk Compression	663 kips
Max Pure Bending	30 °/100 ft

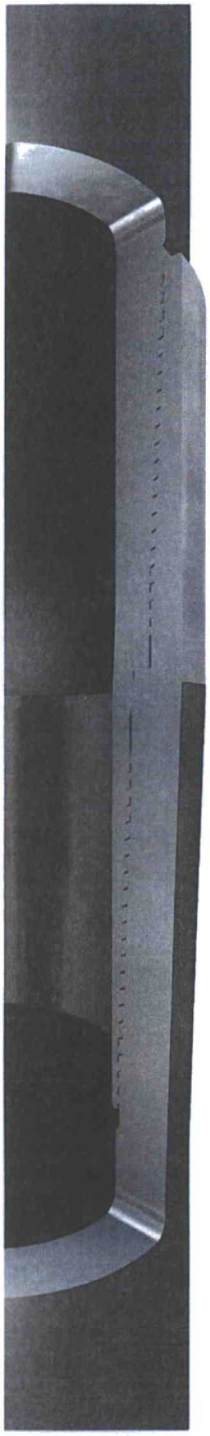
TORQUE DATA ft-lb

min	opt	max
13,700	15,200	16,700

Max. Liner Torque : 20,000 ft-lb

Contact: tech.support@vam-usa.com
Ref. Drawing: SI-PD 100526 Rev.B
Date: 30-Apr-15
Time: 10:24 AM

VAM® SG
Connection Data Sheet



O.D (in)	WEIGHT (lb/ft)	WALL (in)	GRADE	DRIFT	CONNECTION
5.500	23.00	0.415	VST P110EC	4.545	VAM® SG

PIPE PROPERTIES		
Material Grade	VST P110EC	
Min. Yield Strength	125	ksi
Min. Tensile Strength	135	ksi
Nominal OD	5.500	in
Nominal ID	4.670	in
Nominal Area	6.630	sq. in
Yield Strength	829	kips
Ultimate Strength	895	kips
Min Internal Yield	16,510	psi
*High Collapse	16,220	psi

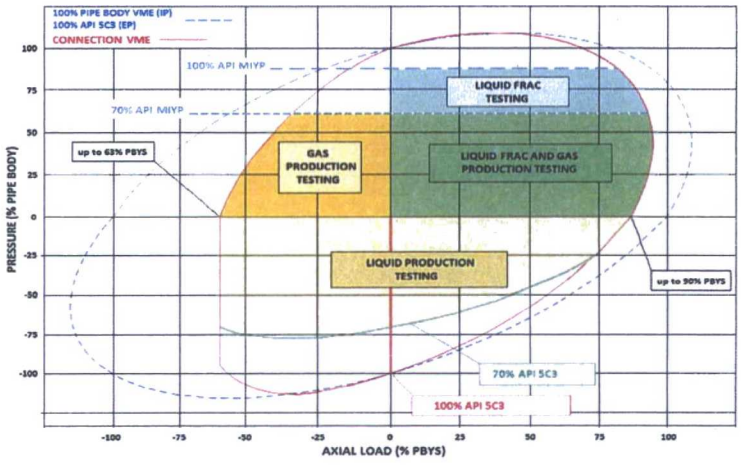
CONNECTION PROPERTIES		
Connection OD	5.720	in
Connection ID	4.603	in
Make up Loss	6.503	in
Connection Critical Area	5.967	sq. in
%PB Section Area	90.0%	
Yield Strength	746	kips
Parting Load	805	kips
Min Internal Yield	16,510	psi
*High Collapse	11,350	psi
Working Compression	522	kips
Max. Bending w/ Sealability	40	°/100 ft

DOCUMENTATION	
Ref. Drawing	SI-PD 100835 Rev.A
Date	11-Aug-14
Time	1:21 PM
Email	tech.support@vam-usa.com

TORQUE VALUES		
Min Make Up Torque	9,100	ft-lb
Opt Make Up Torque	11,200	ft-lb
Max Make Up Torque	13,300	ft-lb
Max Torque w/ Sealability	14,500	ft-lb

The single solution for Shale Play needs

VAM® SG brings VAM® premium sealing performance to a semi-flush connection with extremely high Tension performance and increased Torque capacity, validated to the specific Shale drilling requirements, while remaining highly competitive in North American Shale play economics.

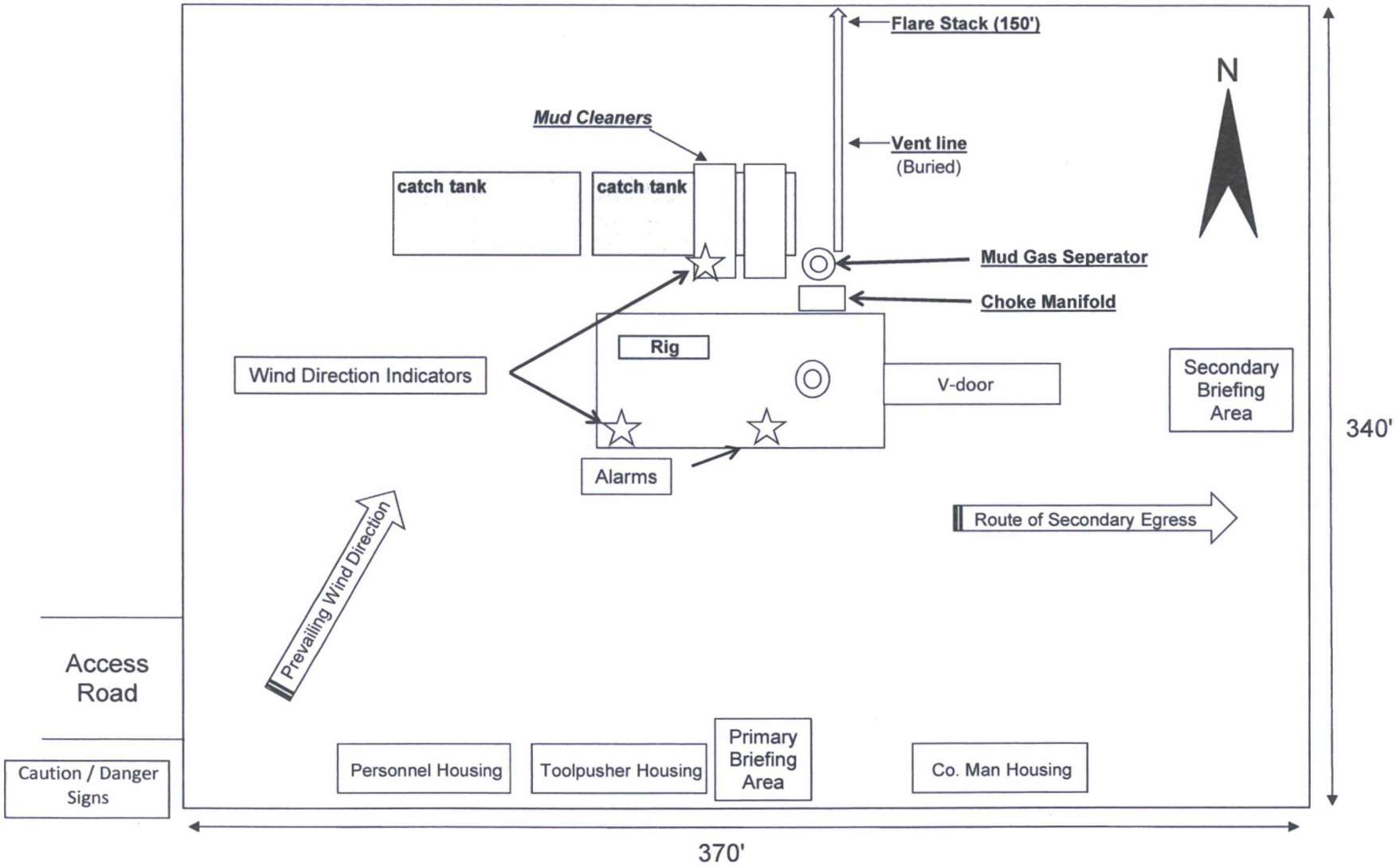


VAM USA

Exhibit 4

EOG Resources
Orrtanna 20 Fed #703H

Well Site Diagram



Serial Register Page Go

BUREAU OF LAND MANAGEMENT
CASE RECORDATION
(LIVE) SERIAL REGISTER PAGE

Run Date/Time: 09/29/16 09:05 AM

Page 1 of ?

01 12-22-1987;101STAT1330;30USC181 ET SEQ

Case Type 312021: O&G LSE COMP PD -1987

Commodity 459: OIL & GAS

Case Disposition: AUTHORIZED

Case File Juris:

Total Acres 640.000

Serial Number NMNM-- - 118727

Serial Number: NMNM-- - 118727

Name & Address			Int Rel	%Interest
EOG RESOURCES INC	PO BOX 2267	MIDLAND TX 79702	OPERATING RIGHTS	0.000000000
EOG RESOURCES INC	PO BOX 2267	MIDLAND TX 79702	LESSEE	99.000000000
MICKEY RESOURCES LLC	500 N SHORELINE BLVD STE 322	CORPUS CHRISTI TX 784010313	OPERATING RIGHTS	0.000000000
R & R ROYALTY LTD	500 N SHORELINE BLVD STE 322	CORPUS CHRISTI TX 78401	LESSEE	1.000000000

Serial Number: NMNM-- - 118727

Mer Twp	Rng	Sec	SType	Nr Suff	Subdivision	District/Resource Area	County	Mgmt Agency	
23 0260S	0330E	020	ALL		ENTIRE SECTION	CARLSBAD FIELD OFFICE	LEA	BUREAU OF LAND MGMT	9

Serial Number: NMNM-- - 118727

Act Date	Code	Action	Action Remarks	Pending Office
05/25/2007	387	CASE ESTABLISHED	200707067;	
07/18/2007	143	BONUS BID PAYMENT RECD	$1280.00;	
07/18/2007	191	SALE HELD		
07/18/2007	267	BID RECEIVED	$96000.00;	
07/26/2007	143	BONUS BID PAYMENT RECD	$94720.00;	
08/31/2007	237	LEASE ISSUED		
08/31/2007	974	AUTOMATED RECORD VERIF	BTM	
09/01/2007	496	FUND CODE	05;145003	
09/01/2007	530	RLTY RATE - 12 1/2%		
09/01/2007	868	EFFECTIVE DATE		
06/12/2014	140	ASGN FILED	R&R ROYAL/ROADRUNNE;3	
06/12/2014	932	TRF OPER RGTS FILED	R&R ROYAL/ROADRUNNE;1	
08/12/2014	932	TRF OPER RGTS FILED	R & R ROY/MICKEY RE;1	
09/05/2014	139	ASGN APPROVED	EFF 07/01/14;	
09/05/2014	933	TRF OPER RGTS APPROVED	EFF 07/01/14;	
09/05/2014	974	AUTOMATED RECORD VERIF	LBO	
10/02/2014	933	TRF OPER RGTS APPROVED	EFF 09/01/14;	
10/02/2014	974	AUTOMATED RECORD VERIF	EMR	
08/17/2015	899	TRF OF ORR FILED	1	
09/23/2015	140	ASGN FILED	ROADRUNNE/EOG RESOU;1	
09/23/2015	932	TRF OPER RGTS FILED	ROADRUNNE/EOG RESOU;1	
10/15/2015	139	ASGN APPROVED	EFF 10/01/15;	
10/15/2015	933	TRF OPER RGTS APPROVED	EFF 10/01/15;	
10/15/2015	974	AUTOMATED RECORD VERIF	JA	
08/31/2017	763	EXPIRES		

Serial Number: NMNM-- - 118727

Line Nr	Remarks
0002	STIPULATIONS ATTACHED TO LEASE:
0003	NM-11-LN SPECIAL CULTURAL RESOURCE

NO WARRANTY IS MADE BY BLM FOR USE OF THE DATA FOR PURPOSES NOT INTENDED BY BLM

OPERATOR CERTIFICATION

I certify that I, or someone under my direct supervision, have inspected the drill site and access route proposed herein; that I am familiar with the conditions that presently exist; that I have full knowledge of State and Federal Laws applicable to this operation; that the statements made in this APD package are, to the best of my knowledge, true, and correct; and that the work associated with the operations proposed herein will be performed in conformity with this APD package and the terms and conditions under which it is approved. I also certify that I, or the company I represent, am responsible for the operations conducted under this application. These statements are subject to the provisions of 18 U.S.C. 1001 for the filing of false statements. Executed this 29th day of August, 2016.

Name: Stan Wagner
Position: Regulatory Specialist
Address: P.O. Box 2267, Midland, TX 79702
Telephone: (432) 686-3689
Email: stan_wagner@eogresources.com
Field Representative (if not above signatory): James Barwis
Address: P.O. Box 2267, Midland, TX 79702
Telephone: (432) 686-3791 office; (432) 425-1204 cell

Signed 

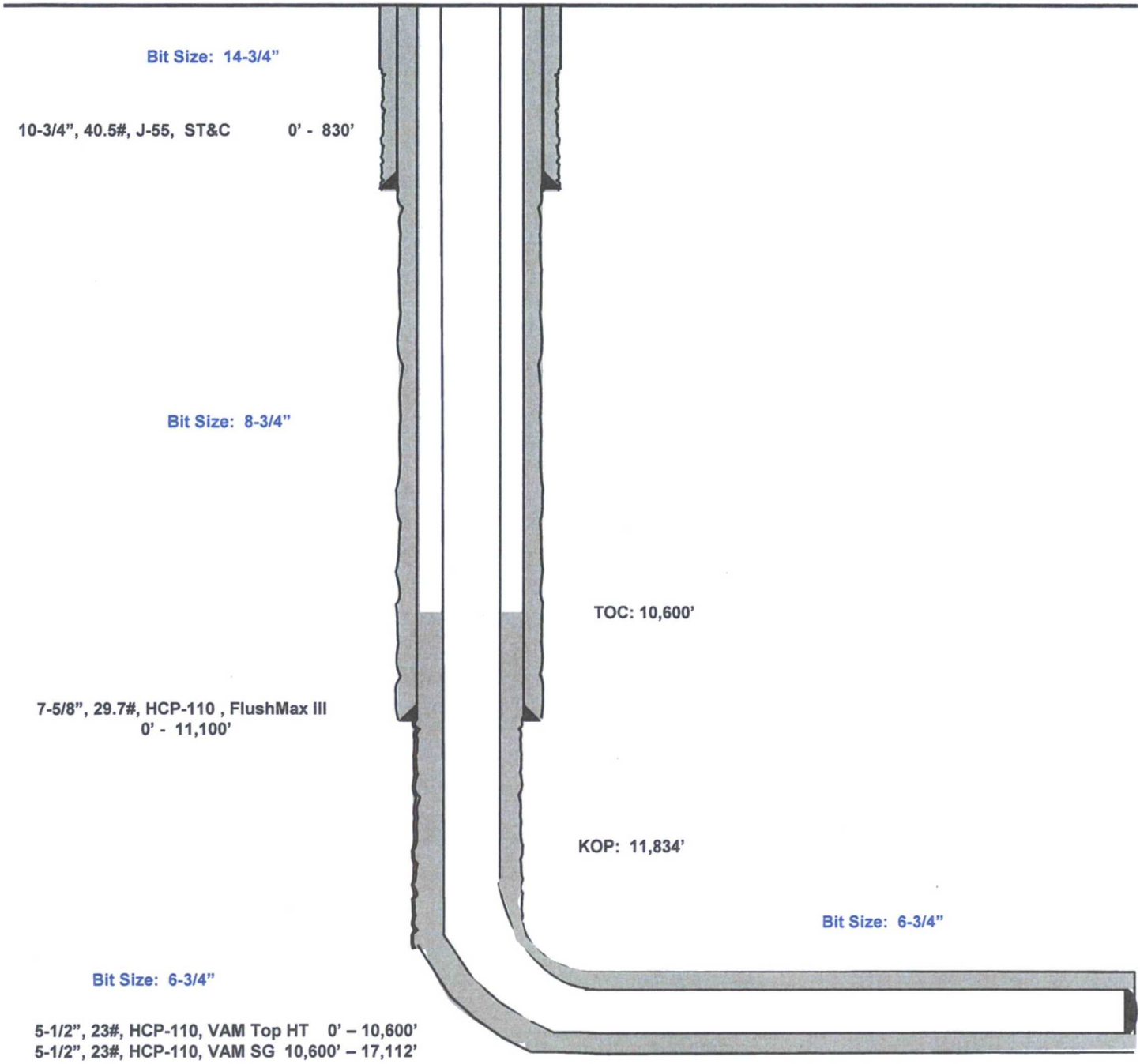
Orrtanna 20 Fed #703H

Lea County, New Mexico
Proposed Wellbore

221' FSL
1969' FWL
Section 20
T-26-S, R-33-E

API: 30-025-*****

KB: 3,257'
GL: 3,232'



Lateral: 17,112' MD, 12,299' TVD
Upper Most Perf:
330' FSL & 1651' FWL Sec. 20
Lower Most Perf:
330' FNL & 1652' FWL Sec. 20
BH Location: 230' FNL & 1652' FWL
Section 20
T-26-S, R-33-E