COG Operating LLC - Mas Federal Com #2H

1. Geologic Formations

TVD of target	11,519' EOL	Pilot hole depth	11,750'
MD at TD:	16,273'	Deepest expected fresh water:	250'

Formation	Depth (TVD) from KB	Water/Mineral Bearing/ Target Zone?	Hazards*
Quaternary Fill	Surface	Water	
Rustler	1608	Water	
Top of Salt	1703	Salt	
Base of Salt	3328	Salt	
Yates	3503	Salt Water	
Capitan Reef	3818	Salt Water	
Base of Reef/ CYCN	5733	Oil/Gas	
Brushy Canyon	6698	Oil/Gas	
Bone Spring Lime	8586	Oil/Gas	
U. Avalon Shale	9058	Oil/Gas	
L. Avalon Shale	9138	Oil/Gas	
1st Bone Spring Sand	9710	Oil/Gas	
2nd Bone Spring Sand	10270	Oil/Gas	
3rd Bone Spring Sand	11071	Oil/Gas	
Wolfcamp	11238	Target Zone	
Wolfcamp B	11488	Not Penetrated	
Wolfcamp C	11543	Not Penetrated	
Wolfcamp D	11703	Not Penetrated	

2. Casing Program

Hole Size	Casing Interval From	To	Csg. Size	Weight (lbs)	Grade	Conn.	SF Collapse	SF Burst	SF Tension
17.5"	0	1685	13.375"	54.5	J55	STC	1.47	3.78	5.60
12.25"	0	5760	9.625"	40	L80	LTC	1.01	1.00	2.26
8.75"	0	16,273	5.5"	17	P110	LTC	1.09	1.85	2.27
			BLM Minimum Safety Factor				1.125	1	1.6 Dry 1.8 Wet

Intermediate casing will be kept at least 1/3 full while running casing.to mitigate collapse. Intermediate burst based on 0.7 frac gradient at the shoe with Gas Gradient 0.1 psi/ft to surface.
All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h

COG Operating LLC - Mas Federal Com #2H

1. Geologic Formations

TVD of target	11,519' EOL	Pilot hole depth	11,750'
MD at TD:	16,273'	Deepest expected fresh water:	250'

Formation	Depth (TVD) from KB	Water/Mineral Bearing/ Target Zone?	Hazards*
Quaternary Fill	Surface	Water	
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12.25"	0	5760	9.625"	40	L80	LTC	1.01	1.00	2.26
8.75"	0	16,273	5.5"	~~17~~ 20	P110	LTC	1.09	1.85	2.27
				BLM Minimum Safety Factor			1.125	1	1.6 Dry 1.8 Wet

Intermediate casing will be kept at least 1/3 full while running casing.to mitigate collapse. Intermediate burst based on 0.7 frac gradient at the shoe with Gas Gradient 0.1 psi/ft to surface.
All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h

Approval Date: 11/17/2017

COG Operating LLC - Mas Federal Com #2H

	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?	Y
If yes, does production casing cement tie back a minimum of 50' above the Reef?	Y
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?	
Is well located in R-111-P and SOPA?	Y
If yes, are the first three strings cemented to surface?	Y
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?	
(For 2 string wells) If yes, is there a contingency casing if lost circulation occurs?	
Is well located in critical Cave/Karst?	N
If yes, are there three strings cemented to surface?	

3. Cementing Program

Casing	# Sks	Wt. lb/ gal	Yld ft3/ sack	H_20 gal/sk	500# Comp. Strength (hours)	Slurry Description
Surf.	670	13.5	1.8	9.2	16	Lead: 35:65:6 C Blend
	250	14.8	1.34	6.34	8	Tail: Class C + 2% CaCl
Inter., Stage 1	550	12.7	1.98	10.6	16	Lead: 35:65:6 C Blend
	200	14.8	1.34	6.34	8	Tail: Class C + 2% CaCl
DV/ECP @ 3720						
Inter., Stage 2	560	12.7	2.0	10.6	16	Lead: Class C + 4% Gel + 1% CaCl2
	200	14.8	1.35	6.34	8	Tail: Class C + 2% CaCl
5.5 Prod	1350	11.9	2.5	19	72	Lead: 50:50:10 H Blend
	1440	14.4	1.24	5.7	19	Tail: 50:50:2 Class H Blend

Volumes Subject to Observed Hole Conditions and/or Fluid Caliper Results
Lab reports with the 500 psi compressive strength time for the cement will be onsite for review.

Casing String	TOC	% Excess
Surface	0'	50%
1st Intermediate	0'	50%
Production	0'	35% OH in Lateral (KOP to EOL) – 40% OH in Vertical

4. Pressure Control Equipment

N	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	x	Tested to:
12-1/4"	13-5/8"	2M	Annular	x	2000 psi
			Blind Ram		2M
			Pipe Ram		
			Double Ram		
			Other*		
8-3/4"	13-5/8"	3M	Annular	x	50% testing pressure
			Blind Ram	x	5M
			Pipe Ram	x	
			Double Ram		
			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.
Y	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?
N	A multibowl wellhead is being used. The BOP will be tested per Onshore Order #2 after installation on the surface casing which will cover testing requirements for a maximum of 30 days. If any seal subject to test pressure is broken the system must be tested.

4. Pressure Control Equipment → SEE COA

N	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	x	Tested to:
12-1/4"	13-5/8"	2M	Annular	x	2000 psi
			Blind Ram		2M
			Pipe Ram		
			Double Ram		
			Other*		
8-3/4"	13-5/8"	~~3M~~ 5M	Annular	x	50% testing pressure
			Blind Ram	x	5M
			Pipe Ram	x	
			Double Ram		
			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.

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N	A multibowl wellhead is being used. The BOP will be tested per Onshore Order #2 after installation on the surface casing which will cover testing requirements for a maximum of 30 days. If any seal subject to test pressure is broken the system must be tested.

5. Mud Program

Depth		Type	Weight (ppg)	Viscosity	Water Loss
From	To				
0	Surf. Shoe	FW Gel	8.6 - 8.8	28-34	N/C
Surf csg	9-5/8" Int shoe	Saturated Brine	9.8 - 10.2	28-34	N/C
9-5/8" Int shoe	Lateral TD	OBM	10.5 - 11.5	28-34	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.	
Y	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.
Y	Wireline Logs are planned for Pilot Hole.
N	Drill stem test? If yes, explain.
N	Coring? If yes, explain.

Additional logs planned		Interval
Y	Resistivity	Pilot Hole TD to ICP
Y	Density	Pilot Hole TD to ICP
Y	CBL	Production casing (If cement not circulated to surface)
Y	Mud log	Intermediate shoe to TD
N	PEX	

7. Drilling Conditions

Condition	Specify what type and where?
BH Pressure at deepest TVD	6890 psi at 11519' TVD
Abnormal Temperature	NO 170 Deg. F.

No abnormal pressure or temperature conditions are anticipated. Sufficient mud materials to maintain mud properties and weight increase requirements will be kept on location at all times.

Sufficient supplies of Paper/LCM for periodic sweeps to control seepage and losses will be maintained on location.

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.	
N	H2S is present
Y	H2S Plan attached

8. Other Facets of Operation

N	Is it a walking operation?
N	Is casing pre-set?

x	H2S Plan.
x	BOP & Choke Schematics.
x	Directional Plan

Casing Program

Hole Size	Casing Interval		Csg. Size	Weight (lbs)	Grade	Conn.	SF Collapse	SF Burst	SF Tension
	From	To							
17.5"	0	1685	13.375"	54.5	J55	STC	1.47	3.78	5.60
12.25"	0	5760	9.625"	40	L80	LTC	1.01	1.00	2.26
8.75"	0	16,273	5.5"	17	P110	LTC	1.09	1.85	2.27
			BLM Minimum Safety Factor				1.125	1.	1.6 Dry 1.8 Wet

Intermediate casing will be kept at least 1/3 full while running casing.to mitigate collapse. Intermediate burst based on 0.7 frac gradient at the shoe with Gas Gradient 0.1 psi/ft to surface.
All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h

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17.5"	0	1685	13.375"	54.5	J55	STC	1.47	3.78	5.60
12.25"	0	5760	9.625"	40	L80	LTC	1.01	1.00	2.26
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All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h

AFMSS

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

Drilling Plan Data Report

11/17/2017

APD ID: 10400015221 **Submission Date:** 06/22/2017

Operator Name: COG OPERATING LLC

Well Name: MAS FEDERAL COM **Well Number:** 2H

Well Type: OIL 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	QUATERNARY	3717	0	0		NONE	No
2	RUSTLER	2109	1608	1608		NONE	No
3	TOP SALT	2014	1703	1703		NONE	No
4	BASE OF SALT	389	3328	3328		NONE	No
5	YATES	214	3503	3503		NONE	No
6	CAPITAN REEF	-101	3818	3818		NONE	No
7	BRUSHY CANYON	-2981	6698	6698		NATURAL GAS,OIL	No
8	BONE SPRING LIME	-4869	8586	8586		NATURAL GAS,OIL	No
9	UPPER AVALON SHALE	-5341	9058	9058		NATURAL GAS,OIL	No
10	BONE SPRING 1ST	-5993	9710	9710		NATURAL GAS,OIL	No
11	BONE SPRING 2ND	-6553	10270	10270		NATURAL GAS,OIL	No
12	BONE SPRING 3RD	-7354	11071	11071		NATURAL GAS,OIL	No
13	WOLFCAMP	-7521	11238	11238		NATURAL GAS,OIL	Yes

Section 2 - Blowout Prevention

Operator Name: COG OPERATING LLC

Well Name: MAS FEDERAL COM **Well Number:** 2H

Pressure Rating (PSI): 3M **Rating Depth:** 5760

Equipment: Annular. The BOP equipment will include a Kelly cock and floor safety valve (inside BOP) and choke lines and choke manifold.
Requesting Variance? YES

Variance request: 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.
Testing Procedure: 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 of the components installed will be functional and tested.

Choke Diagram Attachment:

COG_Mas_2H_3M_Choke_06-19-2017.pdf

BOP Diagram Attachment:

COG_Mas_2H_3M_BOP_06-19-2017.pdf

Pressure Rating (PSI): 5M **Rating Depth:** 11519

Equipment: Annular. The BOP equipment will include a Kelly cock and floor safety valve (inside BOP) and choke lines and choke manifold.
Requesting Variance? NO

Variance request: 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.
Testing Procedure: 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 of the components installed will be functional and tested.

Choke Diagram Attachment:

COG_Mas_2H_5M_Choke_06-19-2017.pdf

BOP Diagram Attachment:

COG_Mas_2H_5M_BOP_06-19-2017.pdf

COG_Mas_2H_Flex_Hose_06-19-2017.pdf

Section 3 - Casing

Casing ID	String Type	Hole Size	Csg Size	Condition	Standard	Tapered String	Top Set MD	Bottom Set MD	Top Set TVD	Bottom Set TVD	Top Set MSL	Bottom Set MSL	Calculated casing length MD	Grade	Weight	Joint Type	Collapse SF	Burst SF	Joint SF Type	Joint SF	Body SF Type	Body SF

Operator Name: COG OPERATING LLC

Well Name: MAS FEDERAL COM **Well Number:** 2H

Casing ID	String Type	Hole Size	Csg Size	Condition	Standard	Tapered String	Top Set MD	Bottom Set MD	Top Set TVD	Bottom Set TVD	Top Set MSL	Bottom Set MSL	Calculated casing length MD	Grade	Weight	Joint Type	Collapse SF	Burst SF	Joint SF Type	Joint SF	Body SF Type	Body SF
1	SURFACE	17.5	13.375	NEW	API	N	0	1685	0	1685	-7761	-9446	1685	J-55	54.5	STC	1.47	3.78	DRY	5.6	DRY	5.6
2	INTERMEDIATE	12.25	9.625	NEW	API	N	0	5760	0	5760	-7761	-13521	5760	L-80	40	LTC	1.01	1	DRY	2.26	DRY	2.26
3	PRODUCTION	8.75	5.5	NEW	API	N	0	16273	0	16273	-7761	-24034	16273	P-110	17	LTC	1.09	1.85	DRY	2.27	DRY	2.27

Casing Attachments

Casing ID: 1 **String Type:** SURFACE

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

COG_Mas_2H_Casing_Prog_06-19-2017.pdf

Casing ID: 2 **String Type:** INTERMEDIATE

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

COG_Mas_2H_Casing_Prog_06-19-2017.pdf

Operator Name: COG OPERATING LLC

Well Name: MAS FEDERAL COM **Well Number:** 2H

Casing Attachments

Casing ID: 3 **String Type:** PRODUCTION

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

COG_Mas_2H_Casing_Prog_06-19-2017.pdf

Section 4 - Cement

String Type	Lead/Tail	Stage Tool Depth	Top MD	Bottom MD	Quantity(sx)	Yield	Density	Cu Ft	Excess%	Cement type	Additives
SURFACE	Lead		0	1685	670	1.8	13.5	1206	50	Lead: 35:65:6 C Blend	As needed
SURFACE	Tail		0	1685	250	1.34	14.8	335	50	C	2% CaCl2
INTERMEDIATE	Lead		0	5760	550	1.98	12.7	1089	50	Lead: 35:65:6 C Blend	No additives
INTERMEDIATE	Tail		0	5760	200	1.34	14.8	268	50	Tail: Class C	2% CaCl
PRODUCTION	Lead		0	16273	1350	2.5	11.9	3375	35	Lead: 50:50:10 H Blend	No additives
PRODUCTION	Tail		0	16273	1440	1.24	14.4	1785	35	Tail: 50:50:2 Class H Blend	No additives

Operator Name: COG OPERATING LLC

Well Name: MAS FEDERAL COM **Well Number:** 2H

Section 5 - Circulating Medium

Mud System Type: Closed

Will an air or gas system be Used? NO

Description of the equipment for the circulating system in accordance with Onshore Order #2:

Diagram of the equipment for the circulating system in accordance with Onshore Order #2:

Describe what will be on location to control well or mitigate other conditions: Sufficient mud materials to maintain mud properties and meet minimum lost circulation and weight increase requirements will be kept on location at all times

Describe the mud monitoring system utilized: PVT/Pason/Visual Monitoring

Circulating Medium Table

Top Depth	Bottom Depth	Mud Type	Min Weight (lbs/gal)	Max Weight (lbs/gal)	Density (lbs/cu ft)	Gel Strength (lbs/100 sqft)	PH	Viscosity (CP)	Salinity (ppm)	Filtration (cc)	Additional Characteristics
1685	5760	OTHER : Saturated Brine	9.8	10.2							Saturated Brine
5760	16273	OIL-BASED MUD	10.5	11.5							
0	1685	OTHER : FW gel	8.6	8.8							FW Gel

Section 6 - Test, Logging, Coring

List of production tests including testing procedures, equipment and safety measures:

None planned

List of open and cased hole logs run in the well:

CNL,GR

Coring operation description for the well:

None planned

Operator Name: COG OPERATING LLC

Well Name: MAS FEDERAL COM **Well Number:** 2H

Section 7 - Pressure

Anticipated Bottom Hole Pressure: 6890 **Anticipated Surface Pressure:** 4355.82

Anticipated Bottom Hole Temperature(F): 170

Anticipated abnormal pressures, temperatures, or potential geologic hazards? NO

Describe:

Contingency Plans geoharzards description:

Contingency Plans geohazards attachment:

Hydrogen Sulfide drilling operations plan required? YES

Hydrogen sulfide drilling operations plan:

COG_Mas_2H_H2S_Schem_06-19-2017.pdf
COG_Mas_2H_H2S_SUP_06-19-2017.pdf

Section 8 - Other Information

Proposed horizontal/directional/multi-lateral plan submission:

COG_Mas_2H_Directional_Plan_06-19-2017.pdf

Other proposed operations facets description:

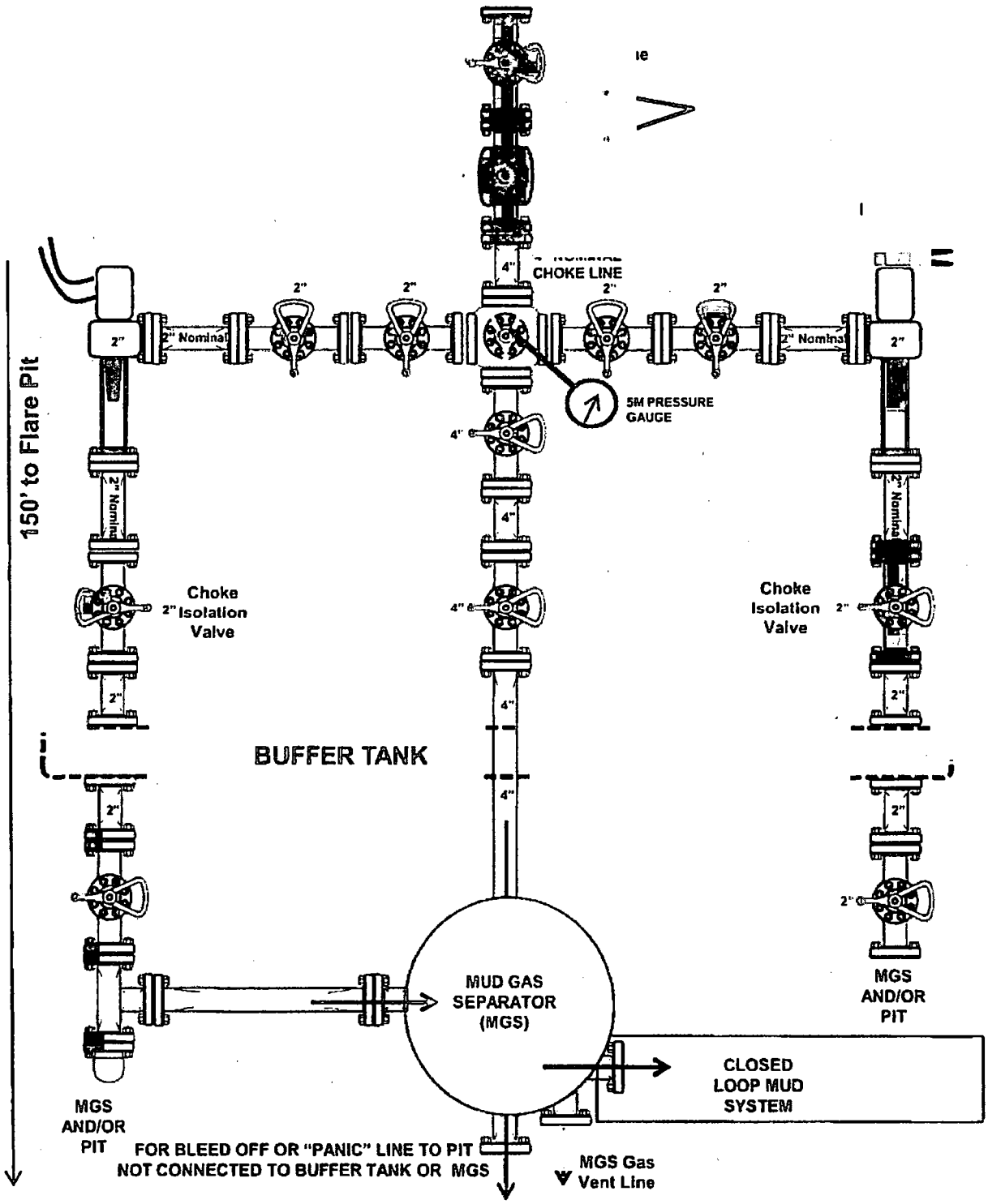
None

Other proposed operations facets attachment:

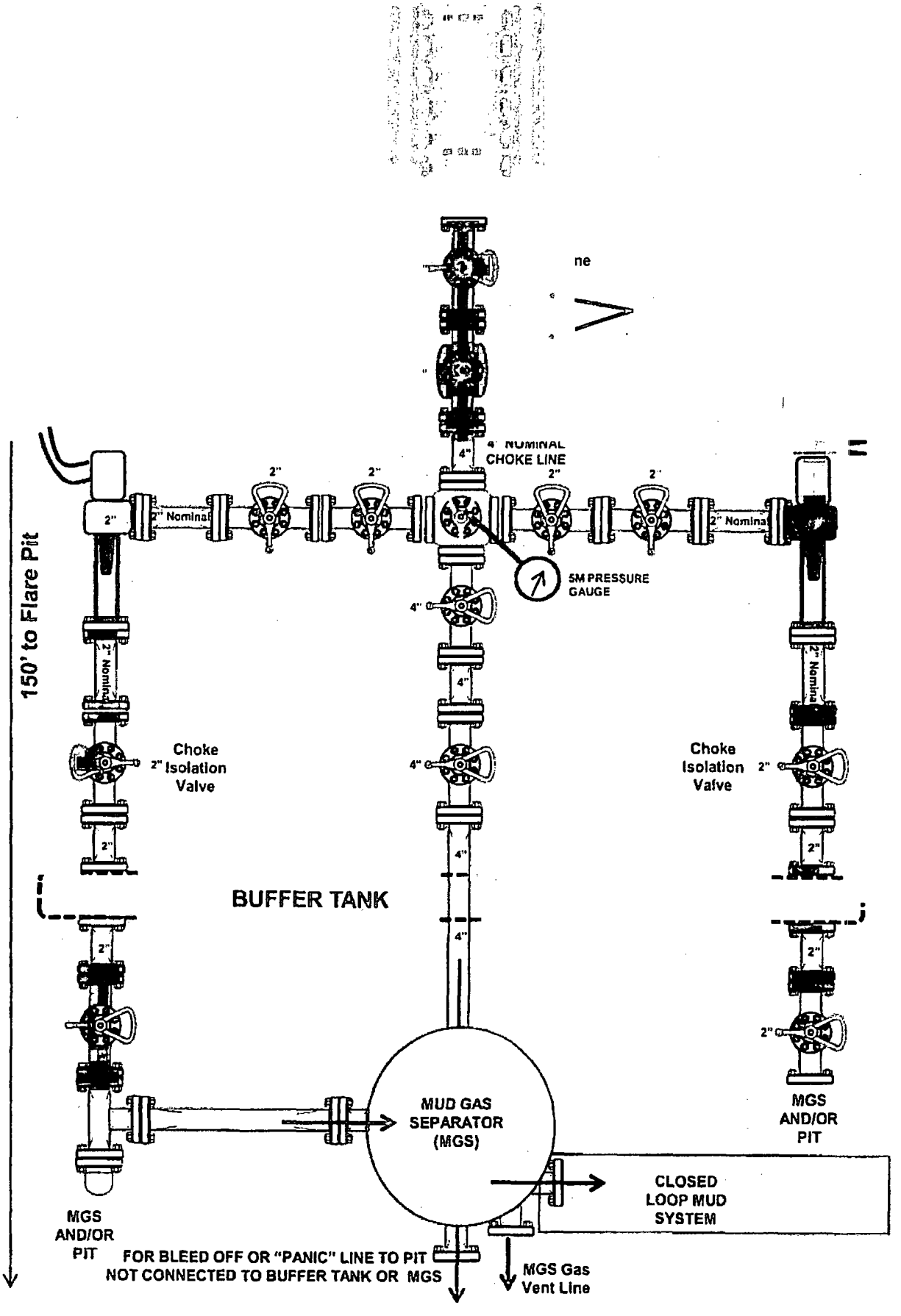
COG_Mas_2H_Drilling_Prog_06-19-2017.pdf

Other Variance attachment:

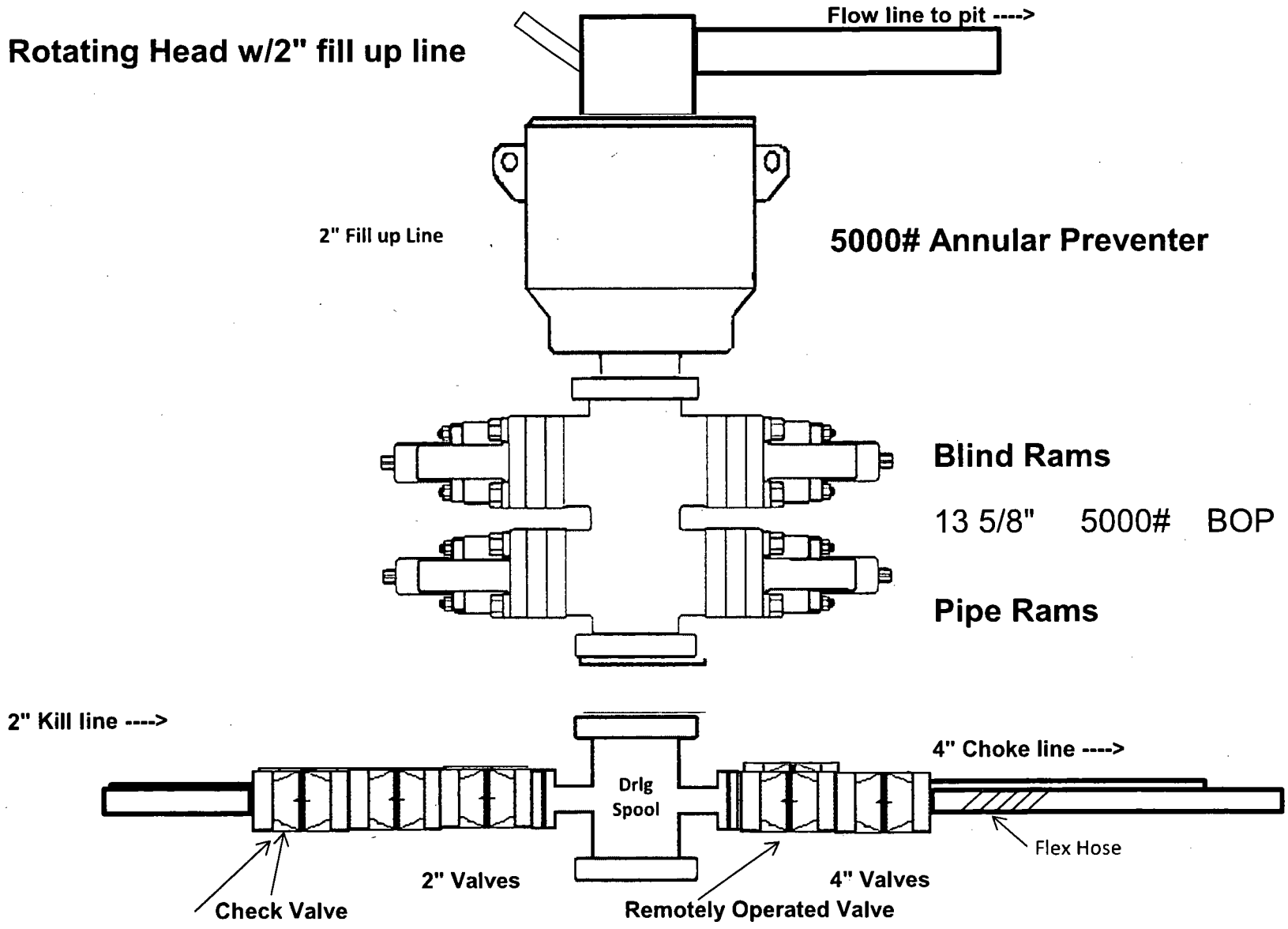
W CLOSED LOOP)



M W CLOSED LOOP)



5,000 psi BOP Schematic



Midwest Hose
& Specialty, Inc.

Internal Hydrostatic Test Certificate

General Information		Hose Specifications	
Customer	Odessa	Hose Assembly Type	Choke & Kill
MWH Sales Representative	Charles Ash	Certification	API 7K/FSL LEVEL2
Date Assembled	11/11/2016	Hose Grade	Mud
Location Assembled	OKC	Hose Working Pressure	100000
Sales Order #	308747	Hose Lot # and Date Code	12354-09/15
Customer Purchase Order #	345144	Hose I.D. (Inches)	3.5"
Assembly Serial # (Pick Ticket #)	371501	Hose O.D. (Inches)	5.87"
Hose Assembly Length	35 Feet	Armor (yes/no)	No

Fittings			
End A		End B	
Stem (Part and Revision #)	R3.5X64WB	Stem (Part and Revision #)	R3.5X64WB
Stem (Heat #)	A112669	Stem (Heat #)	A112669
Ferrule (Part and Revision #)	RF3.5X5750	Ferrule (Part and Revision #)	RF3.5X5750
Ferrule (Heat #)	41632	Ferrule (Heat #)	41632
Connection Flange Hammer Union Part	4-1/16 10K	Connection (Part #)	4-1/16 10K
Connection (Heat #)		Connection (Heat #)	
Nut (Part #)		Nut (Part #)	
Nut (Heat #)		Nut (Heat #)	
Dies Used	5.80"	Dies Used	5.80"

Hydrostatic Test Requirements		
Test Pressure (psi)	15,000	Hose assembly was tested with ambient water temperature.
Test Pressure Hold Time (minutes)	24 1/2	

Date Tested	Tested By	Approved By
11/11/2016	Richard Dias	Charles Ash

Midwest Hose
& Specialty, Inc.

Certificate of Conformity

Customer: **Odessa**	*Customer P.O.#* **345144**
Sales Order # **308747**	*Date Assembled:* **11/11/2016**

Specifications

Hose Assembly Type:	**Choke & Kill**	*Rig #*	**N/A**
Assembly Serial #	**371501**	*Hose Lot # and Date Code*	**12354-09/15**
Hose Working Pressure (psi)	**100000**	*Test Pressure (psi)*	**15000**
Hose Assembly Description:	**CK56-SS-10K-6410K-6410K-35.00' FT-W/LIFTERS**		

We hereby certify that the above 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.
3312 S I-35 Service Rd
Oklahoma City, OK 73129

Comments:

Approved By	***Date***
Charles Ash	**11/11/2016**

Midwest Hose & Specialty, Inc.

Internal Hydrostatic Test Graph

November 11, 2016

Customer: Odessa

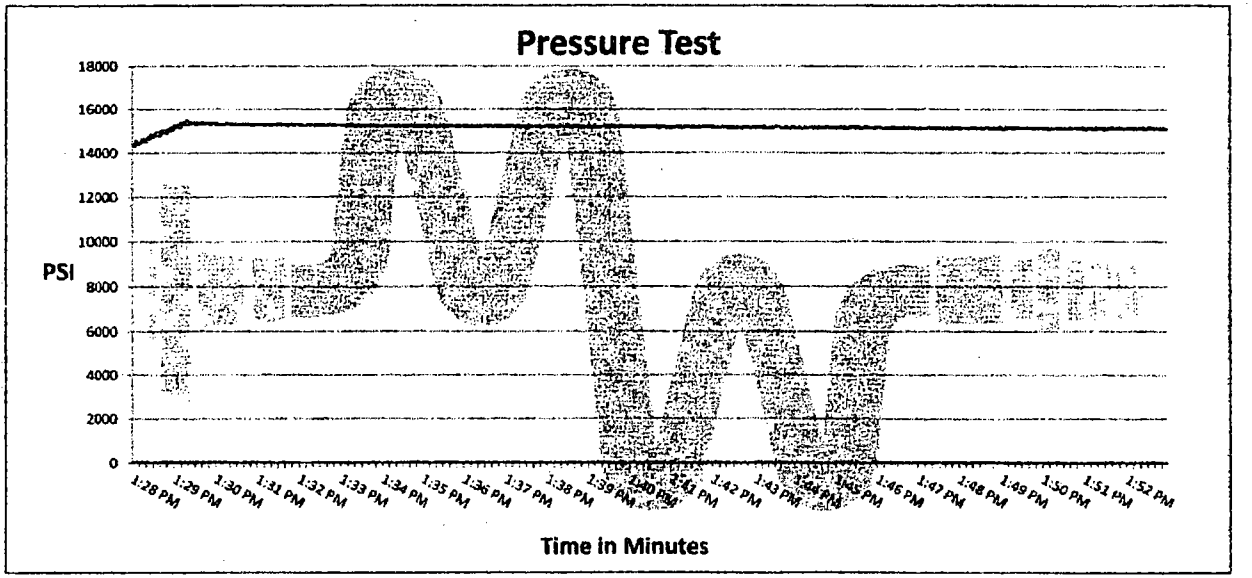
Pick Ticket #: 371501

Hose Specifications

Hose Type	Length
Ck	35'
I.D.	**O.D.**
3.5""	5.30"
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.**
5.80"	5.83"
Hose Serial #	**Hose Assembly Serial #**
12354	371501



Test Pressure	Time Held at Test Pressure	Actual Burst Pressure	Peak Pressure
15000 PSI	24 2/4 Minutes		15512 PSI

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

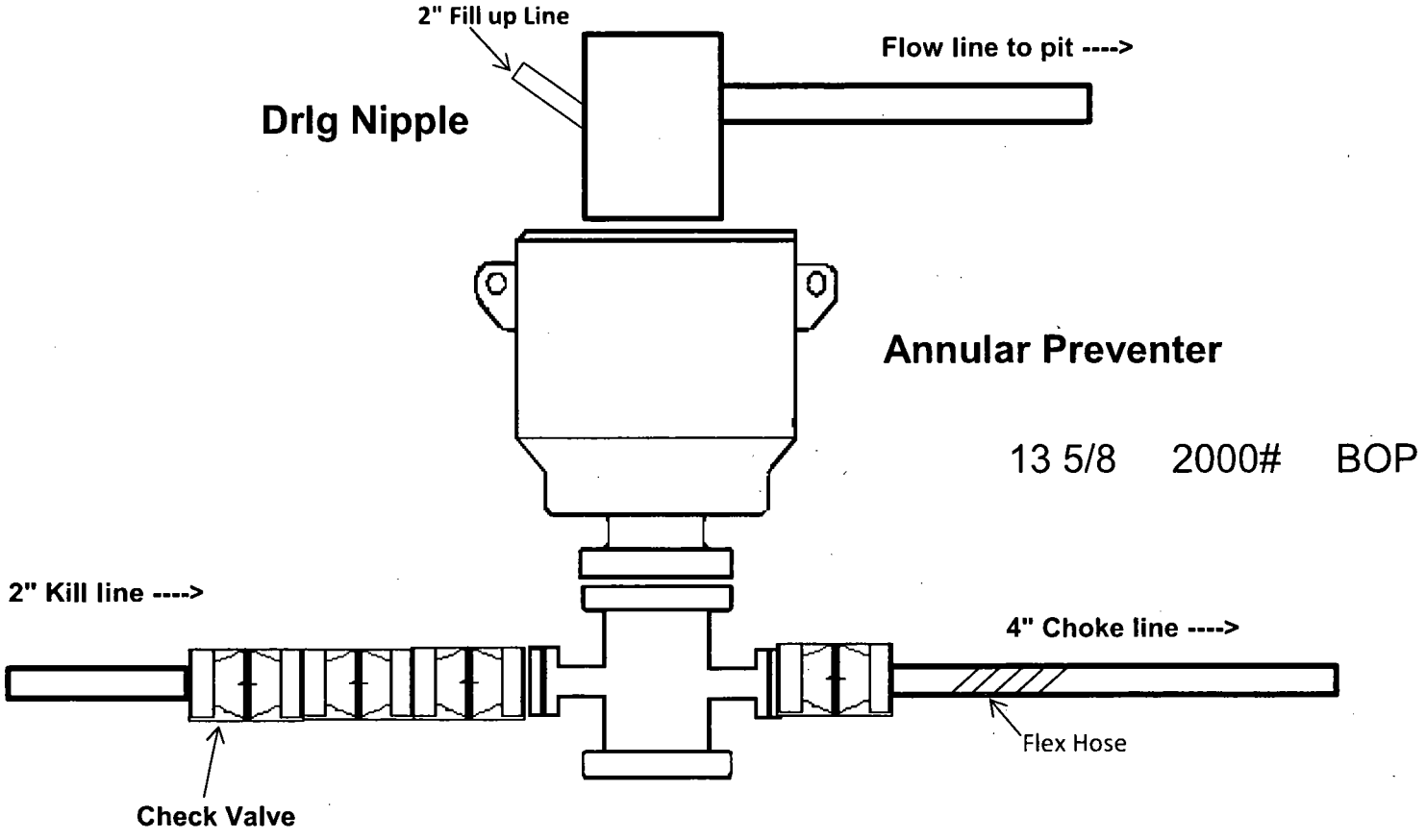
Tested By: *Richard Davis*

x

Approved By: *Charles Ash*

x

2,000 psi BOP Schematic



?ERATOR CERTIFICATION

under my direct supervision, have inspected the drill site and
I am familiar with the conditions that presently exist; that I
and Federal laws applicable to this operation; that the statements
e, to the best of my knowledge, true and correct; and that the work
)perations proposed herein will be performed in conformity with this APD
ıs and conditions under which it is approved. I also certify that I, or COG
responsible for the operations conducted under this application. These
ct to the provisions of 18 U.S.C. 1001 for the filing of false statements.
14th day of JUNE, 2017.

Maite Reyes

:t, Artesia, NM 88210

)ove signatory): Rand French
E-mail: ncho.com