COG Operating, LLC, Columbus Federal Com 21H

1. Geologic Formations

TVD of target	12409	Pilot hole depth	NA
MD at TD:	22397	Deepest expected fresh water:	200'

Basin

Formation	Depth (TVD) from KB	Water/Mineral Bearing/ Target Zone?	Hazards*
Quaternary Fill	Surface	Water	
Rustler	1000	Water	
Top of Salt	1380	Salt	
Fletcher Anhydrite	4837	Barren	
Lamar (top of Delaware)	4974	Barren	
Bone Spring	9120	Oil/Gas	
Wolfcamp	12223	Target Oil/Gas	
Wolfcamp B	12642	Oil/Gas	

2. Casing Program

Hole Size	Casing Interval From	Casing Interval To	Csg. Size	Weight (lbs)	Grade	Conn.	SF Col	SF Burst	SF Tension
13.5"	0'	~~1025~~1065'	10 ¾"	45.5	L80 /N-80	STC	5.14	.86	14.7
9 7/8"	0'	11,500'	7 5/8"	29.7	HCP110	BTC	1.125	1.27	2.74
6 ¾"	0'	22,397'	5.5"	23	P110	Ultra SF	1.95	1.95	2.5
					BLM Minimum Safety Factor		1.125	1.125	1.6 Dry 1.8 Wet

SEE COA

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

- Burst SF on Surf is 0.86 > 0.7.
- 5.5" Ultra SF connection OD = 5.65".

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?	System Rated WP	Type	✓	Tested to:
9.875"	11"	~~3M~~ 5M	Annular	X	50% of working pressure
			Blind Ram	X	WP
			Pipe Ram	X	
			Double Ram		
			Other*		
6.75"	11"	5M	Annular	X	50% testing pressure
			Blind Ram	X	WP
			Pipe Ram	X	
			Double Ram		
			Other*		
			Annular	X	
			Blind Ram	X	
			Pipe Ram	X	
			Double Ram		
			Other*		

SEE COA

*Specify if additional ram is utilized.

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.

COG Operating LLC, Columbus Federal Com 21H

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	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). (Assumption bulleted above)	N
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?	
Is well within the designated 4 string boundary.	
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?	N
If yes, are the first three strings cemented to surface?	
Is 2nd string set 100' to 600' below the base of salt?	
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?	
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	H_20 gal/sk	500# Comp. Strength (hours)	Slurry Description
Surf.	450	13.5	1.76	9.37	10-15	Class C + 4% Gel + 1% CaCl
	250	14.8	1.36	6.53	5-8	Class C + 2% CaCl
Inter.	700	10.3	3.48	20	50-60	Tuned Light Blend
	350	16.4	1.1	4.45	10-12	Class H
Prod. Csg	300	11.9	2.5	14.7	50-60	50:50:10 H Blend
	1000	14.4	1.23	5.52	15-20	50:50:2 H Blend

Casing String	TOC	% Excess
Surface	0'	50%
Intermediate Stage	0'	50%
Production	0'	35%

4. Pressure Control Equipment

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			Pipe Ram	X	
			Double Ram		
			Other*		

*Specify if additional ram is utilized.

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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.

Y	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. See attached schematic.

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	Int shoe	Brine Diesel Emulsion	8.8-10	28-34	N/C
Int Shoe	TD	OBM	10.5 -11.5	40-60	N/C

The Brine Diesel Emulsion is a completely saturated brine fluid that ties diesel into itself to lower the weight of the fluid. The drilling fluid is completely salt saturated.

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.
N	No Logs are planned based on well control or offset log information.
N	Drill stem test? If yes, explain
N	Coring? If yes, explain – NA

7. Drilling Conditions

Condition	Specify what type and where?
BH Pressure at deepest TVD	7450 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.	
N	H2S is present
Y	H2S Plan attached

8. Other facets of operation

Is this a walking operation? NO. If yes, describe.
Will be pre-setting casing? NO. If yes, describe.

Attachments

- Directional Plan
- Flex Hose Variance
- BOP & Choke Schematics
- C102 and supporting maps
- Rig plat
- H2S schematic
- H2S contingency plan
- Interim reclamation plat

Operator Name: COG OPERATING LLC

Well Name: COLUMBUS FEDERAL COM **Well Number:** 21H

String Type: SURFACE **Other String Type:**

Hole Size: 13.5

Top setting depth MD: 0 **Top setting depth TVD:** 0

Top setting depth MSL: -8653

Bottom setting depth MD: 1025 **Bottom setting depth TVD:** 1025

Bottom setting depth MSL: -9678

Calculated casing length MD: 1025

Casing Size: 10.75 **Other Size**

Grade: L-80 / N-80 **Other Grade:**

Weight: 45.5

Joint Type: STC **Other Joint Type:**

Condition: NEW

Inspection Document:

Standard: API

Spec Document:

Tapered String?: N

Tapered String Spec:

Safety Factors

Collapse Design Safety Factor: 5.14 **Burst Design Safety Factor:** 0.86

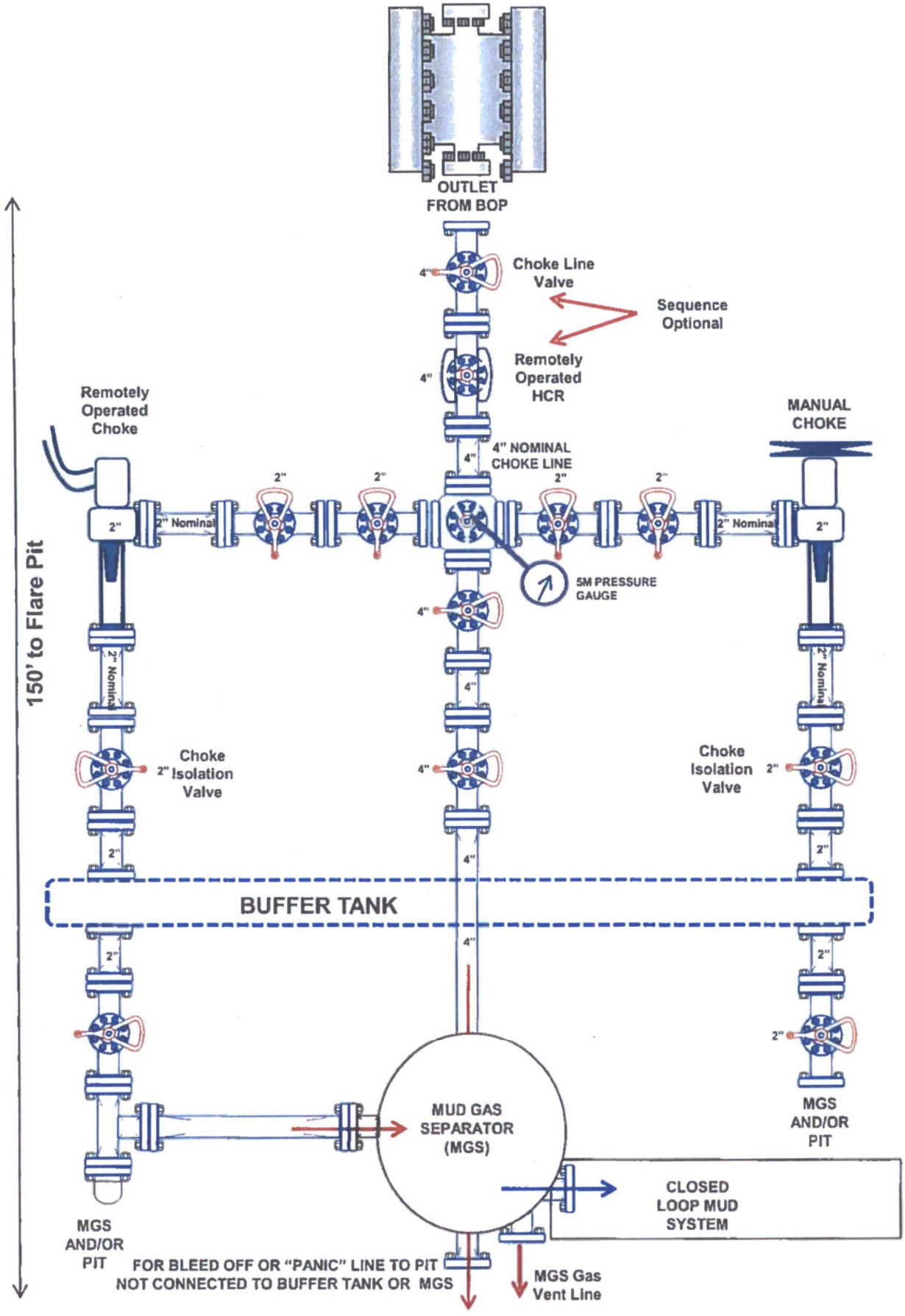
Joint Tensile Design Safety Factor type: DRY **Joint Tensile Design Safety Factor:** 14.7

Body Tensile Design Safety Factor type: DRY **Body Tensile Design Safety Factor:** 14.7

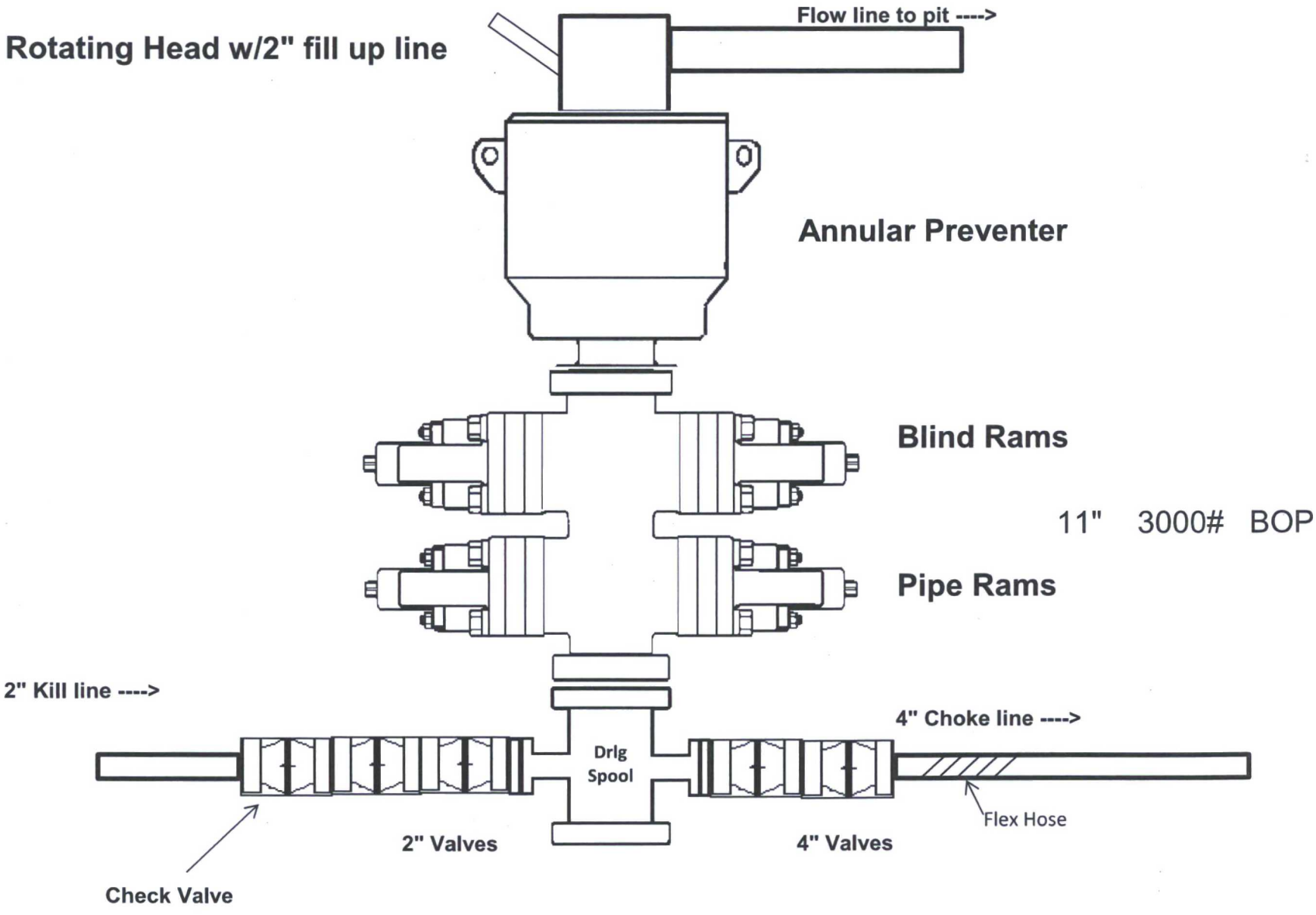
Casing Design Assumptions and Worksheet(s):

COG Columbus 21H_ Casing Prog_02-24-2017.pdf

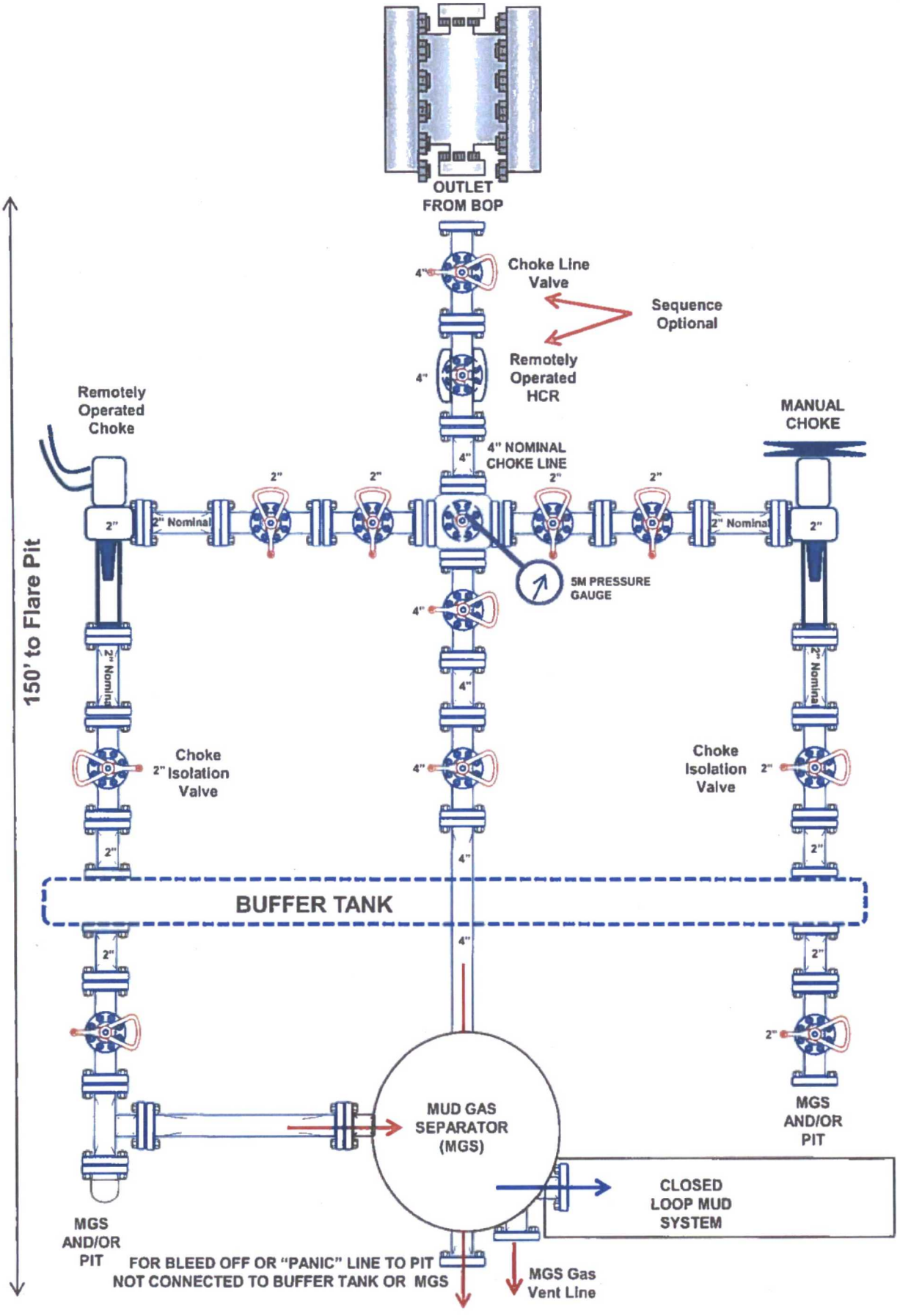
3M Choke Manifold Equipment (WITH MGS + CLOSED LOOP)



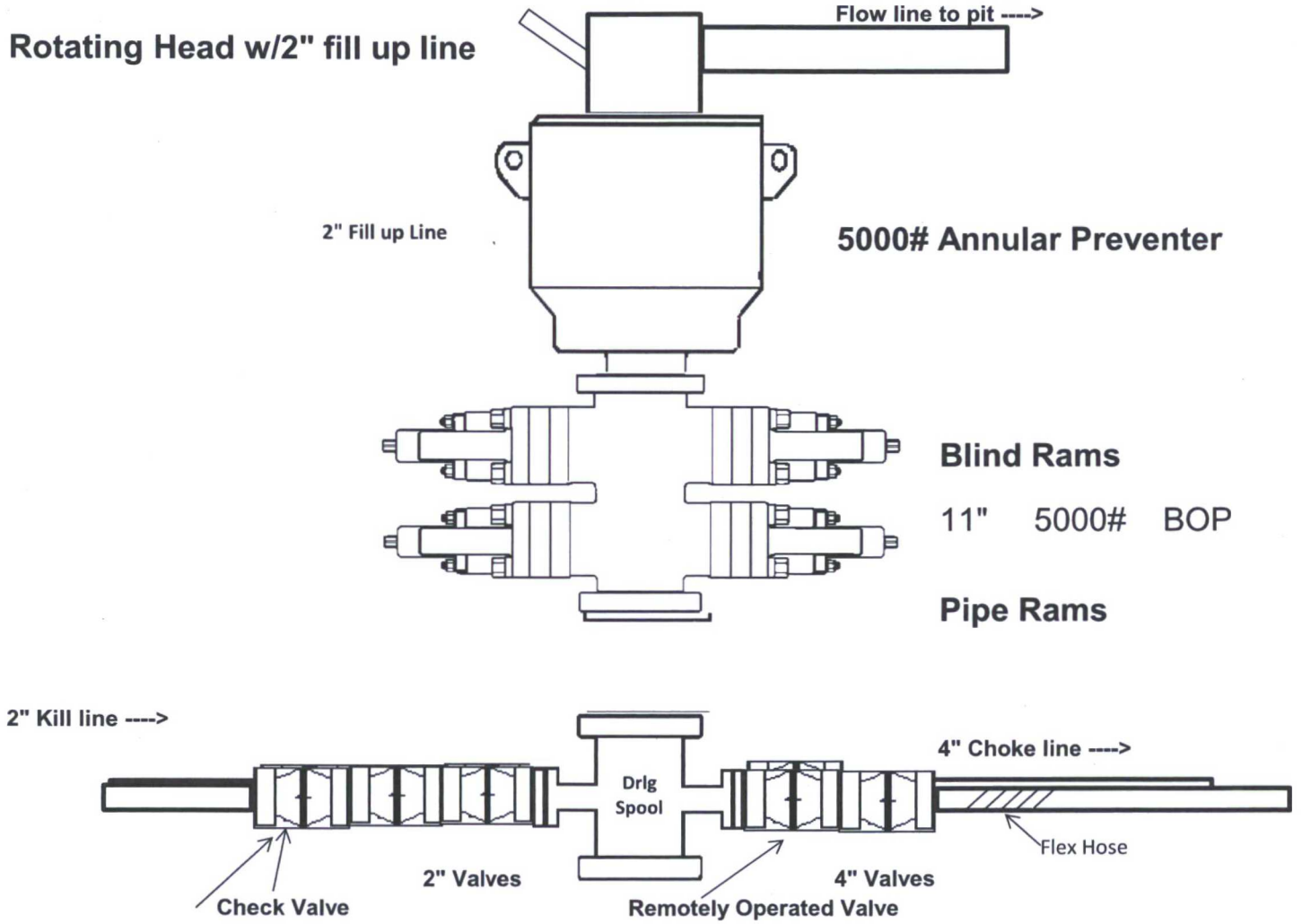
3,000 psi BOP Schematic



5M Choke Manifold Equipment (WITH MGS + CLOSED LOOP)

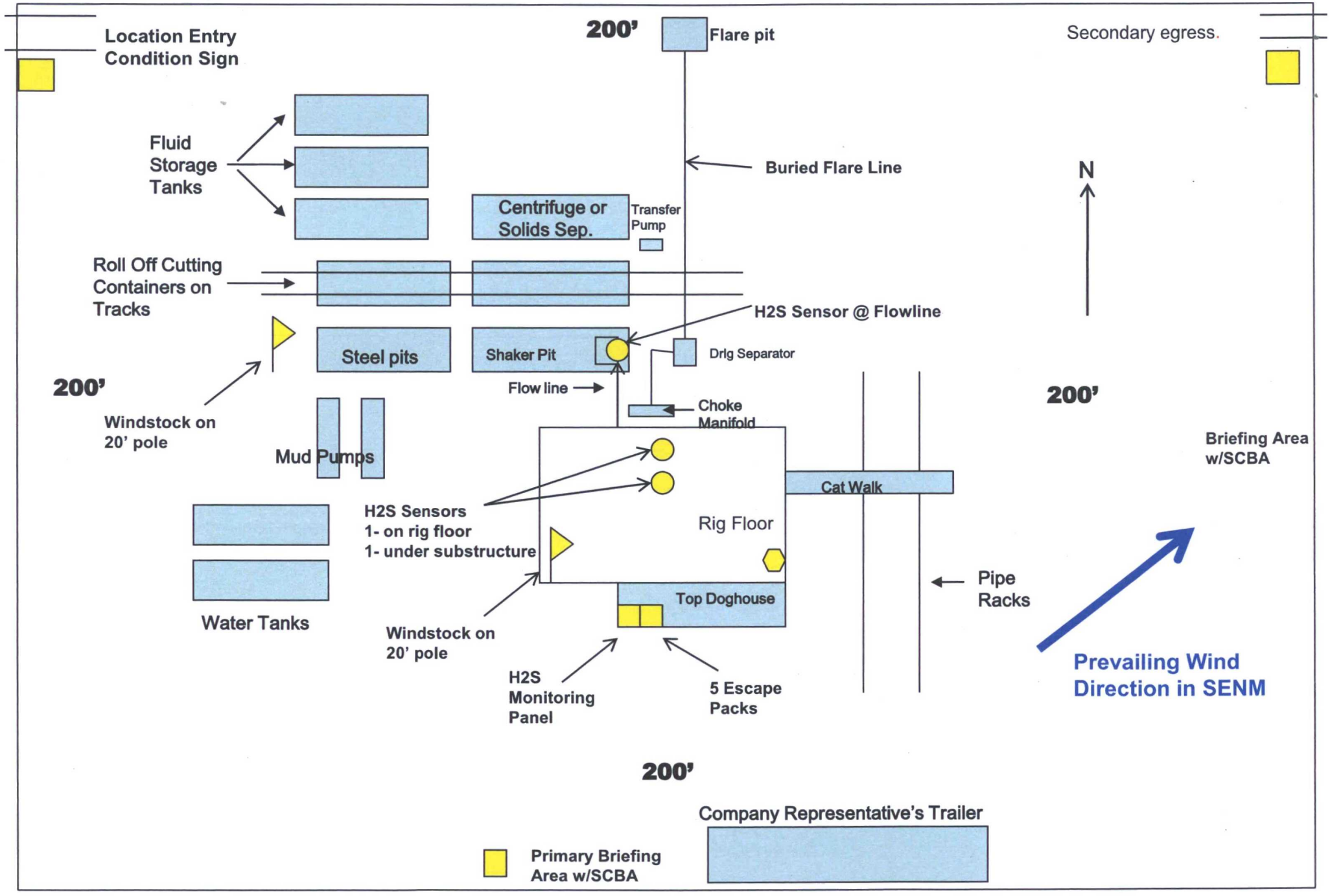


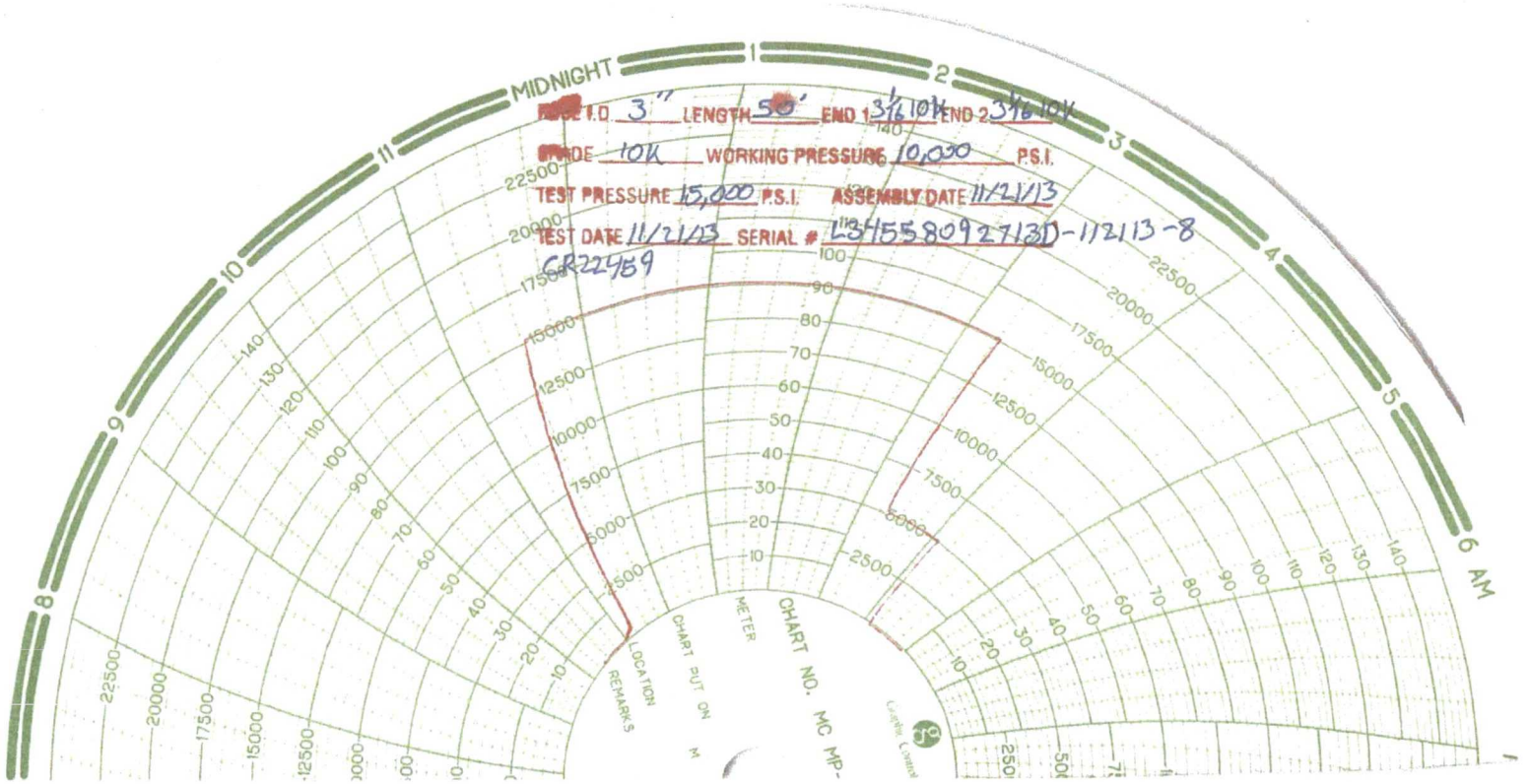
5,000 psi BOP Schematic



COG Operating LLC
H_2S Equipment Schematic
Terrain: Shinnery sand hills.

Well pad will be 400' x 400'
with cellar in center of pad




MIDNIGHT
1
2
3
4
5
6 AM
7
8
9
10
11
HOSE I.D 3"
LENGTH 50'
END 1 3 1/16 10K
END 2 3 1/16 10K
GRADE 10K
WORKING PRESSURE 10,000 P.S.I.
TEST PRESSURE 15,000 P.S.I.
ASSEMBLY DATE 11/21/13
TEST DATE 11/21/13
SERIAL # L3455809271310-112113-8
GR22759
CHART NO. MC MP-
METER
CHART PUT ON
LOCATION
REMARKS
22500
20000
17500
15000
12500
10000
7500
5000
2500
140
130
120
110
100
90
80
70
60
50
40
30
20
10

GATES E & S NORTH AMERICA, INC
DU-TEX
134 44TH STREET
CORPUS CHRISTI, TEXAS 78405

PHONE: 361-887-9807
FAX: 361-887-0812
EMAIL: crpe&s@gates.com
WEB: www.gates.com

10K CHOKE & KILL ASSEMBLY PRESSURE TEST CERTIFICATE

Customer :	SPECIALTY SALES, INC.	Test Date:	11/21/2013
Customer Ref. :	49680-S	Hose Serial No.:	D-112113-8
Invoice No. :	197465	Created By:	Norma M.

Product Description:	10K3.050.0CK31/1610KFLGE/E

End Fitting 1 :	3 1/16 10K FLG	End Fitting 2 :	3 1/16 10K FLG
Gates Part No. :	47773-4290	Assembly Code :	L34558092713D-112113-8
Working Pressure :	10,000 PSI	Test Pressure :	15,000 PSI

Gates E & S North America, Inc. certifies that the following hose assembly has been tested to the Gates Oilfield Roughneck Agreement/Specification requirements and passed the 15 minute hydrostatic test per API Spec 7K/Q1, Fifth Edition, June 2010, Test pressure 9.6.7 and per Table 9 to 15,000 psi in accordance with this product number. Hose burst pressure 9.6.7.2 exceeds the minimum of 2.5 times the working pressure per Table 9.

Quality Manager :	QUALITY	Technical Supervisor :	PRODUCTION
Date :	11/22/2013	Date :	11/22/2013
Signature :		Signature :	

Form PTC - 01 Rev.0 2

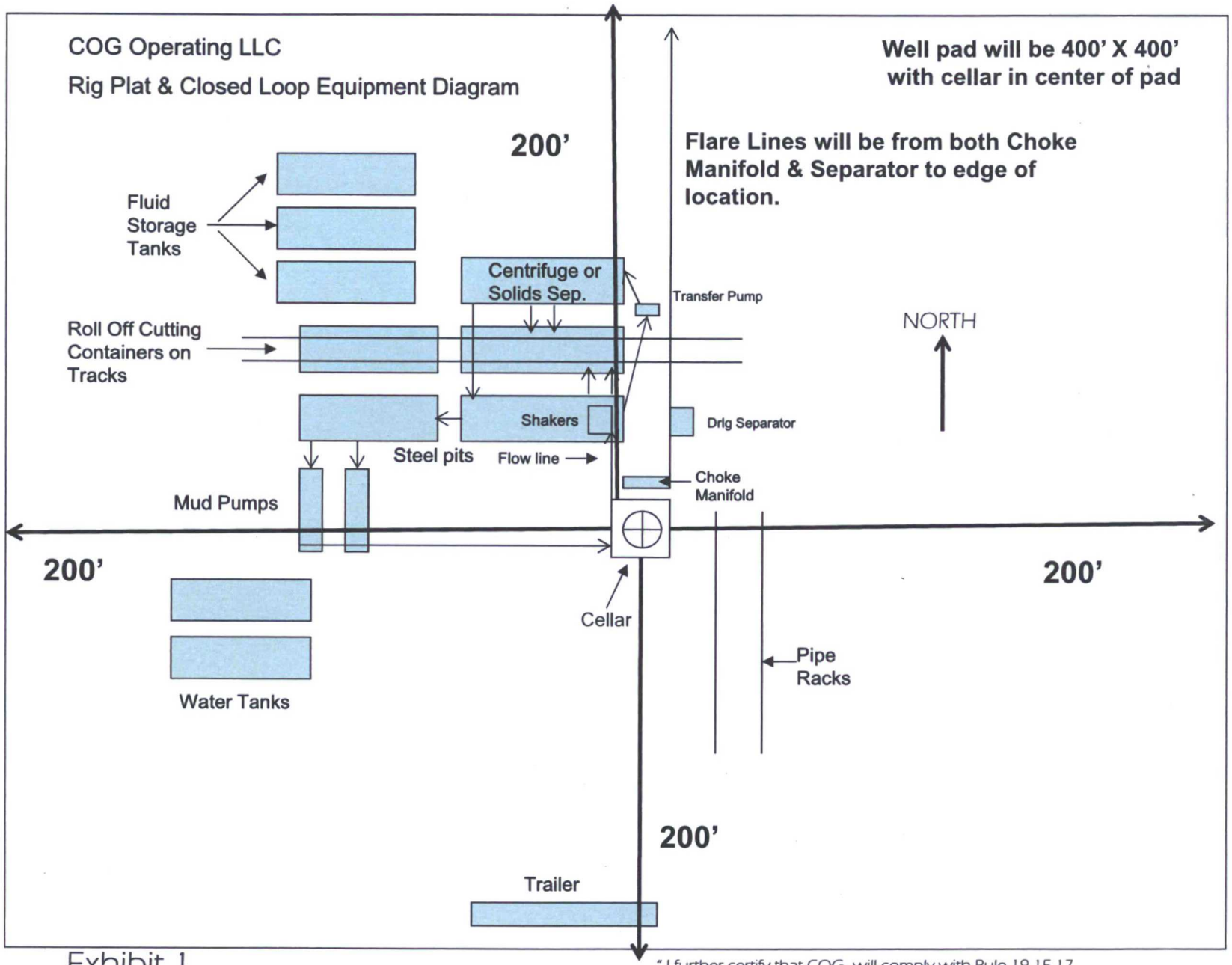


Exhibit 1

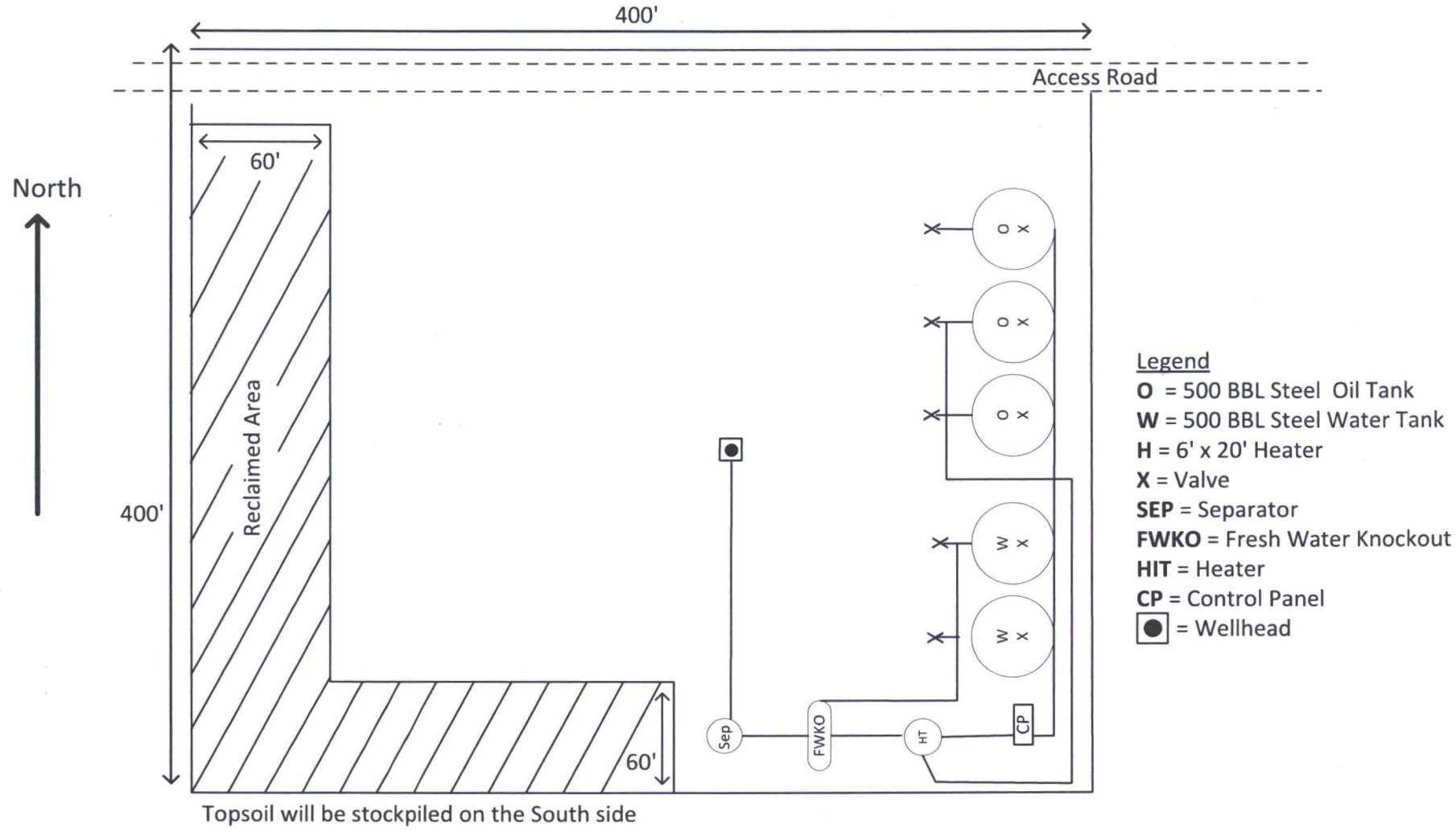
"I further certify that COG will comply with Rule 19.15.17 NMAC by using a Closed Loop System."

CONCHO

COG Operating LLC
2208 West Main Street
Artesia, NM 88210

Well Site Layout
Production Facility Layout
Columbus Federal Com #21H
Section 34- 25S- 33E

Exhibit 3



Topsoil will be stockpiled on the South side