

District I
1625 N. French Dr., Hobbs, NM 88240
Phone:(575) 393-6161 Fax:(575) 393-6100

District II
811 S. First St., Artesia, NM 88210
Phone:(575) 748-1283 Fax:(575) 748-9720

District III
1000 Rio Brazos Rd., Aztec, NM 87410
Phone:(505) 334-6178 Fax:(505) 334-6170

District IV
1220 S. St Francis Dr., Santa Fe, NM 87505
Phone:(505) 476-3470 Fax:(505) 476-3462

State of New Mexico
Energy, Minerals and Natural Resources
Oil Conservation Division
1220 S. St Francis Dr.
Santa Fe, NM 87505

Form C-101
August 1, 2011
Permit 166153

APPLICATION FOR PERMIT TO DRILL, RE-ENTER, DEEPEN, PLUGBACK, OR ADD A ZONE

1. Operator Name and Address OXY USA INC PO Box 4294 Houston, TX 77210		2. OGRID Number 16696
		3. API Number 30-015-41324
4. Property Code 39876	5. Property Name CEDAR CANYON 16 SWD	6. Well No. 003

7. Surface Location

UL - Lot	Section	Township	Range	Lot Idn	Feet From	N/S Line	Feet From	E/W Line	County
D	16	24S	29E	D	725	N	660	W	EDDY

8. Proposed Bottom Hole Location

UL - Lot	Section	Township	Range	Lot Idn	Feet From	N/S Line	Feet From	E/W Line	County
D	16	24S	29E	D	725	N	660	W	Eddy

9. Pool Information

SWD;DELAWARE	96100
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Additional Well Information

11. Work Type New Well	12. Well Type OIL	13. Cable/Rotary	14. Lease Type Private	15. Ground Level Elevation 2927
16. Multiple N	17. Proposed Depth 4400	18. Formation Delaware	19. Contractor	20. Spud Date 7/1/2013
Depth to Ground water		Distance from nearest fresh water well		Distance to nearest surface water

21. Proposed Casing and Cement Program

Type	Hole Size	Casing Type	Casing Weight/ft	Setting Depth	Sacks of Cement	Estimated TOC
Surf	12.25	9.625	36	310	210	0
Prod	8.75	7	26	4400	1230	0

Casing/Cement Program: Additional Comments

Additional information will be sent with the C-144 CLEZ & H2S Plan.

22. Proposed Blowout Prevention Program

Type	Working Pressure	Test Pressure	Manufacturer
DoubleRam	5000	5000	
Annular	3000	3000	

23. I hereby certify that the information given above is true and complete to the best of my knowledge and belief. I further certify I have complied with 19.15.14.9 (A) NMAC <input checked="" type="checkbox"/> and/or 19.15.14.9 (B) NMAC <input checked="" type="checkbox"/> if applicable. Signature: Printed Name: Electronically filed by KAREN M SINARD Title: Email Address: karen_sinard@oxy.com Date: 4/25/2013 Phone: 713-366-5485	OIL CONSERVATION DIVISION	
	Approved By: <i>K. Sinard</i>	
	Title: <i>6674-DP-151</i>	
	Approved Date: <i>5/16/2013</i> Expiration Date: <i>5/16/2015</i>	

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State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, New Mexico 87505

Form C-102
Revised August 1, 2011
Submit one copy to appropriate
District Office

□ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

API Number 30-015-41324	Pool Code 4545 96100	Pool Name SWD, Delaware Cedar Canyon Delaware
Property Code 32045 39876	Property Name CEDAR CANYON 16 SWD	Well Number 3
OGRID No. 16696	Operator Name OXY U.S.A. INC.	Elevation 2927'

Surface Location

UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
D	16	24-S	29-E		725	NORTH	660	WEST	EDDY

Bottom Hole Location If Different From Surface

UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County

Dedicated Acres 0	Joint or Infill N	Consolidation Code	Order No.
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NO ALLOWABLE WILL BE ASSIGNED TO THIS COMPLETION UNTIL ALL INTERESTS HAVE BEEN CONSOLIDATED OR A NON-STANDARD UNIT HAS BEEN APPROVED BY THE DIVISION

<p>GEODETTIC COORDINATES NAD 27 NME</p> <p>SURFACE LOCATION Y=444915.5 N X=604501.4 E</p> <p>LAT.=32.222738° N LONG.=103.995408° W</p>	<p>OPERATOR CERTIFICATION</p> <p>I hereby certify that the information herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.</p> <p><i>David Stewart</i> 4/24/13 Signature Date</p> <p>David Stewart Sr. Reg. Ado. Printed Name</p> <p>david_stewart@oxy.com E-mail Address</p>
	<p>SURVEYOR CERTIFICATION</p> <p>I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.</p> <p>MARCH 15, 2013</p> <p>Date of Survey</p> <p>Signature & Seal of Professional Surveyor:</p>
	<p>Certificate Number Gary G. Eidson 12641 Ronald J. Eidson 3239</p> <p>BKL</p>
	<p>W.O.: 13:11.0263</p>

Operator Name/Number: OXY USA Inc. 16696
 Lease Name/Number: Cedar Canyon 16 SWD #3 39045
 Pool Name/Number: Cedar Canyon Delaware 11540
 Surface Location: 725 FNL 660 FWL D Sec 16 T24S R29E

C-102 Plats: 3/15/13 3/27/13 4/18/13 Elevation: 2927' GL

Proposed TD: 4400' TVD
 SL - Lat: 32.2222738 Long: 103.995408 X=604501.4 Y=4444915.5 NAD - 1927

Casing Program:

<u>Hole Size</u>	<u>Interval</u>	<u>OD Csg</u>	<u>Weight</u>	<u>Collar</u>	<u>Grade</u>	<u>Condition</u>	<u>Collapse Design Factor</u>	<u>Burst Design Factor</u>	<u>Tension Design Factor</u>
12-1/4"	0-310'	9-5/8"	36	ST&C	J-55	New	14.92	2.38	3.54
				Hole filled with 8.4# Mud			2020#	3520#	
8-3/4"	0-4400'	7"	26	LT&C	L-80	New	2.46	4.12	3.38
				Hole filled with 9.6# Mud			5410#	7240#	

Collapse and burst loads calculated using Stress Check with anticipated loads

Cement Program:

- a. 9-5/8" Surface Circulate cement to surface w/ 210sx PP cmt w/ 1% CaCl₂, 14.8ppg 1.35 yield 1346# 24hr CS 165% Excess
- c. 7" Production Circulate cement w/ 850sx HES light PP cmt w/ .5% salt + .35% HR-800, 12.9ppg 1.85 yield 734# 24hr CS, 125% Excess followed by 380sx PP cmt w/ .5% Halad R-344 + .2% WellLife 734 + 5#/sx Microbond + .3% Econolite + .3% CFR-3, 14.2ppg 1.55 yield 1914# 24hr CS 125% Excess

Description of Cement Additives: Calcium Chloride, Salt (Accelerator); WellLife 734 (Cement Enhancer); D-Air 6000 (Defoamer); CFR-3 (Dispersant); Microbond (Expander); Kol Seal, Poly-E-Flake (Lost Circulation Additive); Halad R-344 (Low Fluid Loss Control); HR-601, HR-800 (Retarder)

The above cement volumes could be revised pending the caliper measurement.

Proposed Mud Circulation System:

<u>Depth</u>	<u>Mud Wt. ppg</u>	<u>Visc sec</u>	<u>Fluid Loss</u>	<u>Type System</u>
0 - 310'	8.4-8.8	27-38	NC	Fresh Water/Spud Mud
310' - TD	9.6-10.0	28-40	NC	Cut Brine/Salt Gel-Starch

Pump high viscosity sweeps as needed for hole cleaning. The mud system will be monitored visually/manually as well as with an electronic PVT. The necessary mud products for additional weight and fluid loss control will be on location at all times.

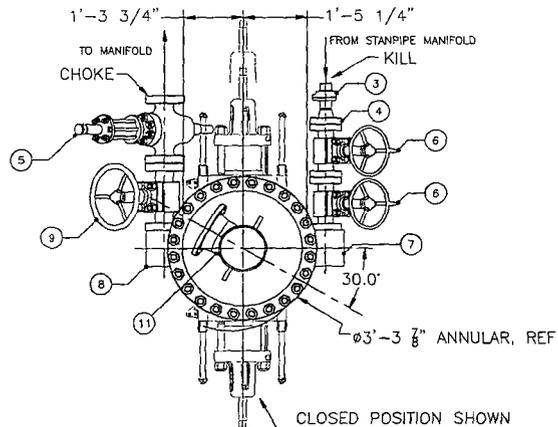
BOP Program:

Surface None
 Intermediate/Production 11" 5M two ram stack w/ 3M annular preventer, 5M Choke Manifold

Estimated Tops of Geological Markers & Depths of Anticipated Fresh Water, Oil or Gas:

<u>Geological Marker</u>	<u>Depth</u>	<u>Type</u>
a. Rustler	285'	Formation
b. Top Salt	330'	Formation
c. Bottom Salt	2690'	Formation
d. Base Anhydrite	2875'	Formation
e. Delaware-Bell Canyon	2968'	Oil/Gas
f. Delaware-Brushy Canyon	3720'	Oil/Gas

Fresh water may be present above the Rustler formation. Surface casing will be set below the top of the Rustler, which will cover potential fresh water sources.



PROPER TORQUE FOR BOLTS

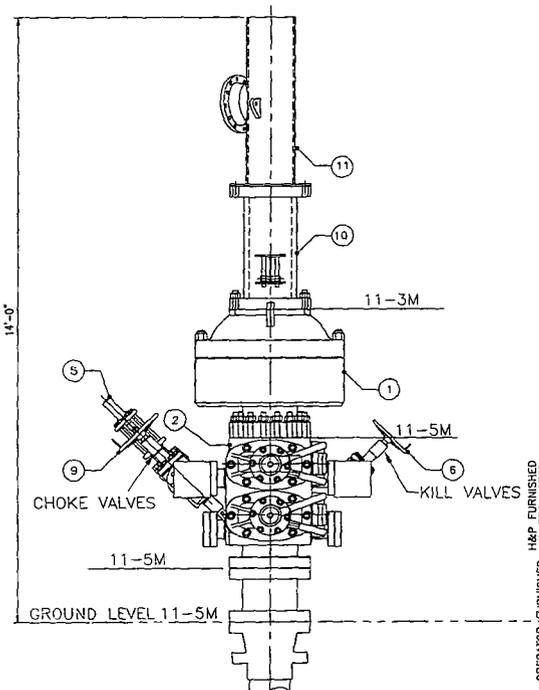
COMPONENT	FLANGE SIZE & RATING	BOLT SIZE	TORQUE	
			CF=0.07	CF=0.13
SPOOLS, ANNULAR & RAMS	11"x5M	1 7/8" DIA.	1890	3330
BLOCKS	3 1/8x5M	1 1/8" DIA.	401	686
CHOKE VALVES	3 1/8x5M	1 1/8" DIA.	401	686
KILL VALVES	2 1/16x5M	7/8" DIA.	188	319

BILL OF MATERIAL

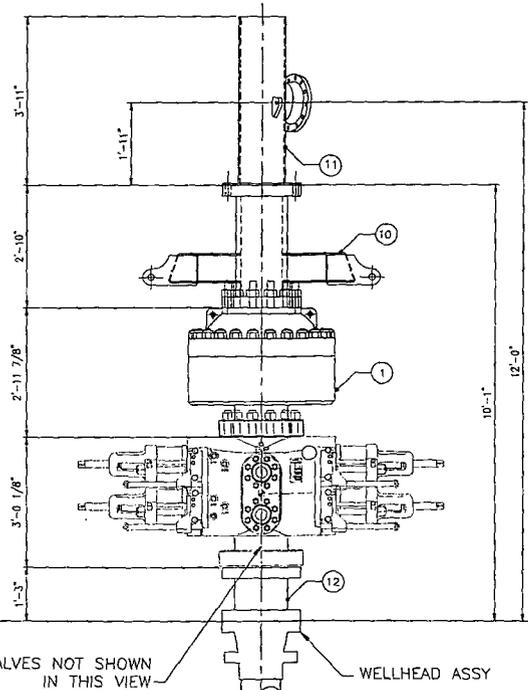
ITEM NO.	QUAN.	DESCRIPTION	PART NUMBER	WEIGHT
		11"-5M BOP ASSEMBLY		
1	1	ANNULAR, 11x3M BOLTED TYPE		6005
2	1	BOP DOUBLE RAM		7600
4		RAM ELEMENTS		444
3	1	HAMMER UNION, 2-1502# XXH (BW)		5
4	1	FLANGE, WN 2 1/16-5M API		42
5	1	VALVE, GATE FLS-HCR 3 1/8-5M		396
6	2	VALVE, GATE 2 1/16-5M		350
7	1	90° STUDDED BLOCK, 3 1/8-5M X 2 1/16-5M		240
8	1	90° STUDDED BLOCK, 3 1/8-5M X 3 1/8-5M		250
9	2	VALVE, GATE 3 1/8-5M		720
10	1	BELL NIPPLE BOP LIFTING SECTION	MX F4M-H-318.01A	780
11	1	BELL NIPPLE EXTENSION	MX F4M-H-318.01A	396
12	1	11"-5M x 11"-5M x 1'-3" LONG SPACER		600
		SPOOL- WORKING PRESSURE 5000 PSI		

HARDWARE

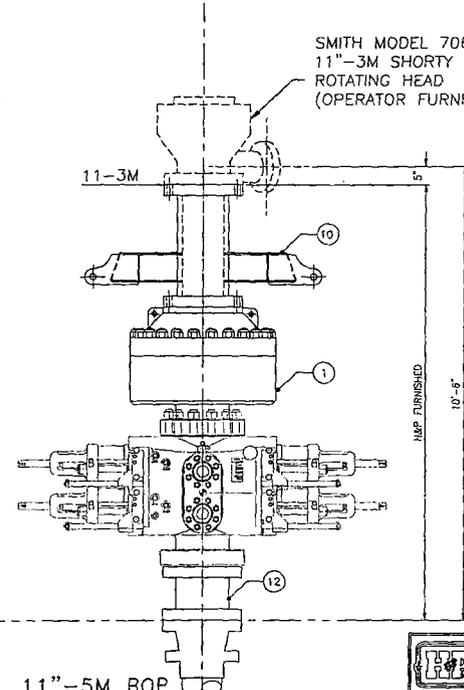
ITEM NO.	QUAN.	DESCRIPTION	PART NUMBER	WEIGHT
		RINGS AND BOLTS		400



11"-5M BOP
W/ BELL NIPPLE



11"-5M BOP
W/ BELL NIPPLE



11"-5M BOP
W/ ROTATING HEAD

SMITH MODEL 7068
11"-3M SHORTY
ROTATING HEAD
(OPERATOR FURNISHED)

APPROX. TOTAL WEIGHT = 18,228 LBS.

ISSUED FOR FABRICATION
 August-08-2008
 DRAFTSMAN _____
 ENGINEER _____

HELMERICH & PAYNE INTERNATIONAL DRILLING CO.

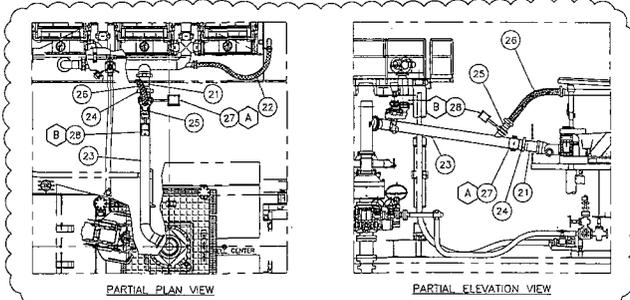
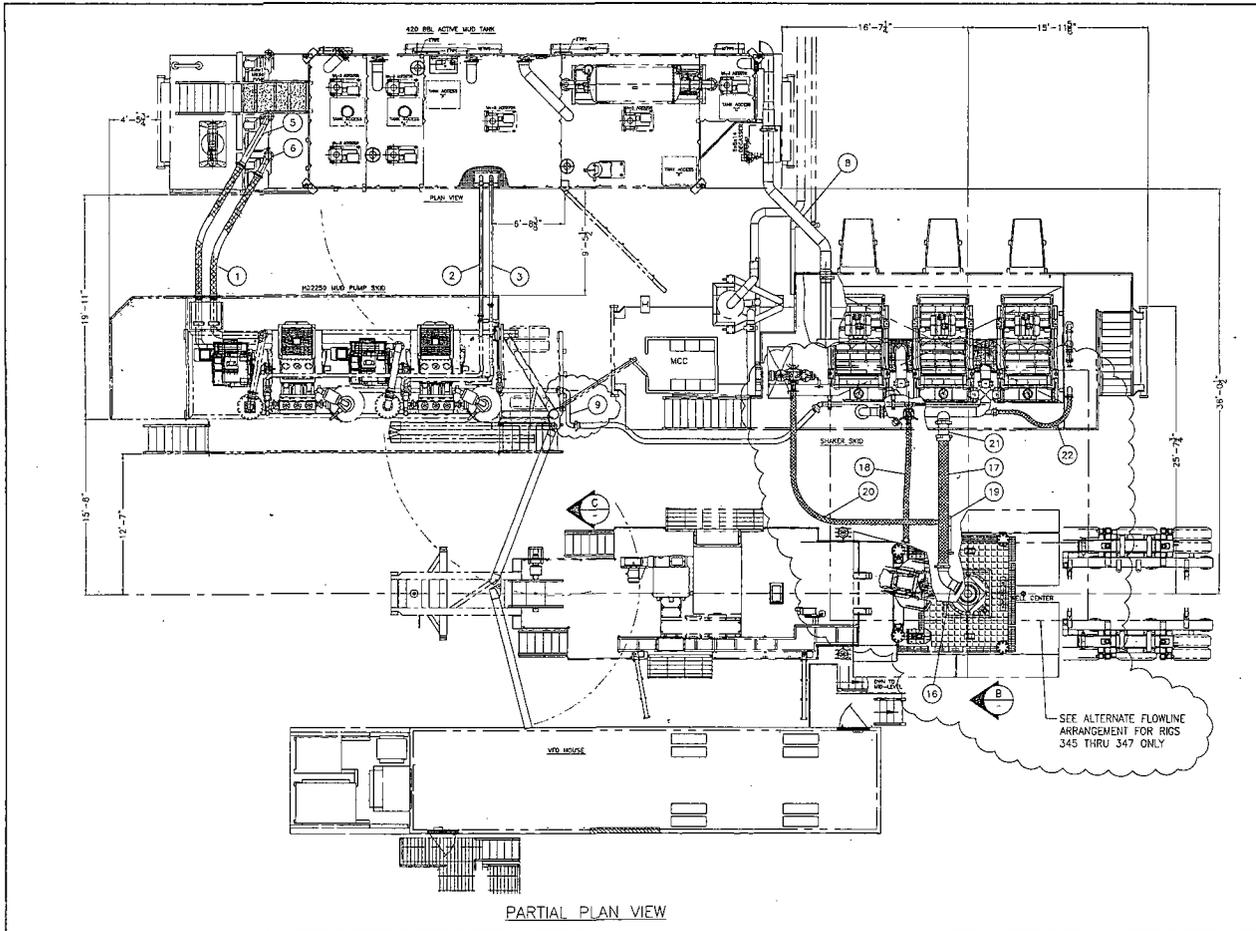
11"-5M BOP EQUIPMENT
GENERAL ARRANGEMENT

CUSTOMER: OXY-PERMIAN
PROJECT: F4M

REVISION	DATE	DESCRIPTION
1	08/08/08	ADDED 1 OF 4 SHITS WAS 1 OF 3

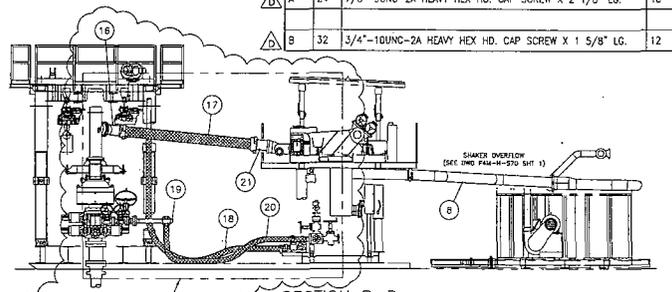
PROPRIETARY

NOTES:



ALTERNATE FLOWLINE ARRANGEMENT
(FOR RIGS 345 THRU 347 ONLY)

ISSUED FOR FABRICATION
October-23-2008
DRAFTSMAN _____
ENGINEER _____



SECTION B-B
HELMERICH & PAYNE
INTERNATIONAL DRILLING CO.

BILL OF MATERIAL					
ITEM NO.	QUAN.	DESCRIPTION	PART NUMBER	WT.	
1	2	LOW PRESSURE SPOOL #1	MKCF4M-H-570.01F	239	
2	1	POP-OFF/BLEED SPOOL #1	MKCF4M-H-570.01A	157	
3	1	POP-OFF/BLEED SPOOL #2	MKCF4M-H-570.01B	140	
4		DELETED			
5	1	LOW PRESSURE SUCTION SPOOL #1	MKCF4M-H-570.01D	189	
6	1	LOW PRESSURE SUCTION SPOOL #2	MKCF4M-H-570.01H	101	
7	1	HOSE-HIGH PRESSURE	MKCF4M-H-570.01C	276	
8	1	OVERFLOW RETURN SPOOL	MKCF4M-H-563.06A	678	
9	1	MUD PUMP/SHAKER SKID SPOOL	MKCF4M-H-570.01E	181	
10	22FT	TS 1 1/2x1 1/2x3/16 (A500)		150	
11	1	POP-OFF PIPE HANGER SUPPORT	MKCF4M-H-570.01C	30	
12	1	L3x3x1/4 (1'-6" LG) (A35)		7	
13	1	L3x3x1/4 (1'-6" LG) (A35)		7	
14	1	PLATE, 1/4" THK, 4x2'-3 1/4" (A35)		8	
15	1	L3x3x1/4 (4'-11 3/4" LG) (A35)		25	
16	1	SHAKER FLOWLINE	MKCF4M-H-562.02A	230	
17	1	SHAKER FLOWLINE	MKCF4M-H-562.02B	281	
18	1	HOSE	MKCF4M-H-563.03C		
19	1	SPOOL #1	MKCF4M-H-564.02A	182	
20	1	HIGH PRESSURE HOSE, 3" I.D. x 29'-0" LG. WITH 3 1/8" - SM FLANGED ENDS	PHOENIX BEATTY	73	
21	1	SHAKER FLOWLINE	MKCF4M-H-562.02C	173	
22	1	SHAKER SPOOL	MKCF4M-H-562.01B	177	

RIGS 345 - 347 ONLY					
BILL OF MATERIAL					
ITEM NO.	QUAN.	DESCRIPTION	PART NUMBER	WT.	
23	1	SHAKER FLOWLINE	MKCF4M-H-569-04A	656	
24	1	SHAKER FLOWLINE	MKCF4M-H-569-04B	118	
25	1	SHAKER FLOWLINE	MKCF4M-H-569-04C	67	
26	1	SHAKER FLOWLINE HOSE	MKCF4M-H-569-04D	77	
27	1	FABRI - 10" AIR ACTUATED KNIFE GATE VALVE		66	
28	1	FABRI - 6" AIR ACTUATED KNIFE GATE VALVE		52	
HARDWARE					
A	24	7/8"-9UNC-2A HEAVY HEX HD. CAP SCREW X 2 1/8" LG.		18	
B	32	3/4"-10UNC-2A HEAVY HEX HD. CAP SCREW X 1 5/8" LG.		12	

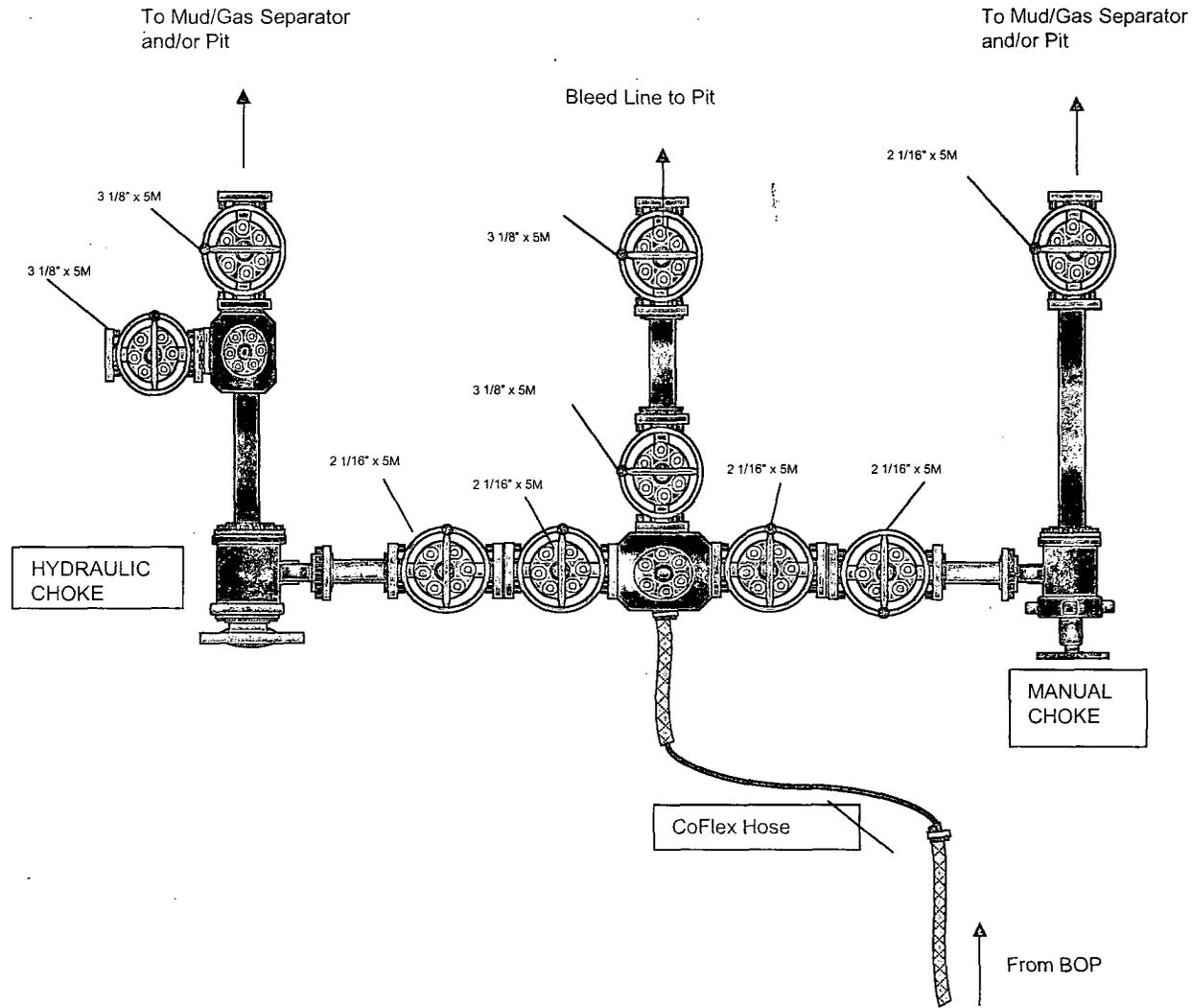
THESE ITEMS REPLACE ITEMS 16 & 17

REV	DATE	DESCRIPTION	BY
△	10/23/08	NOTE REV 4 RE: REV 308 SHAKER AND NOT FLOWLINE AND REV 14 REV 308 IS A HARDWARE & B. CURRENT MKCF4M-H-570.01C 1 THRU 2 & 11	CC/AMR
△	09/04/08	NOTE NEW HOSE ORDER TO SHAKER (UPDATED PIPING)	DRJ
△	08/05/08	ADDED SH-2 & BDM	DRJ
△	07/17/08	ADDED XX-HVY PIPING TO POP-OFF	DRJ

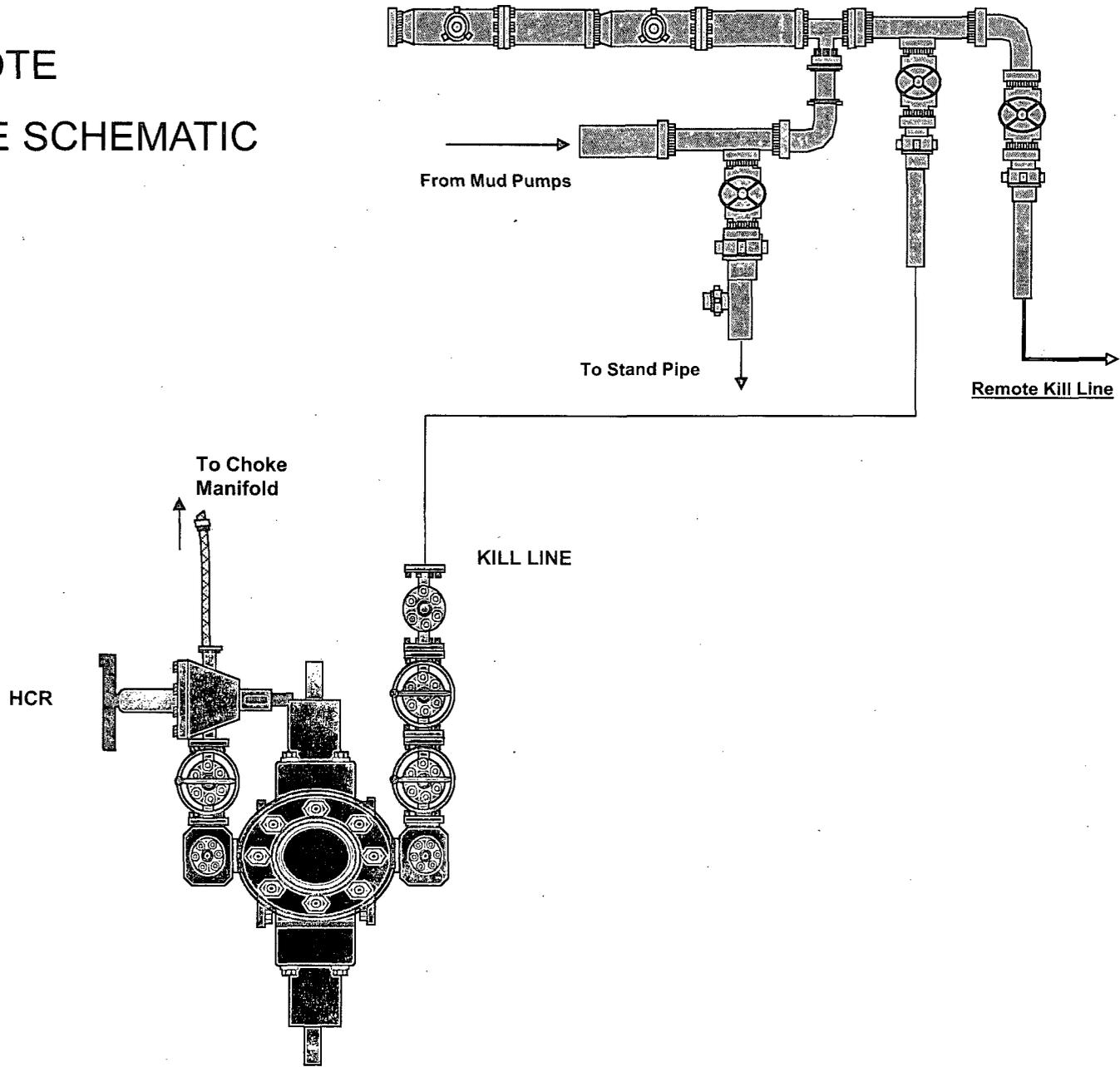
ENGINEERING APPROVAL	DATE	TITLE:
		MUD SYSTEM INTERCONNECT PIPING ASSEMBLY
CUSTOMER:	OXY PERMIAN	PROJECT:
	F4M	
DRAWN:	DJOHNSON	DATE:
	07/08/08	DWG. NO.:
		F4M-H-568
SCALE:	3/16"=1'-0"	SHEET:
	1 OF 2	

PROPRIETARY
THIS DRAWING AND THE IDEAS AND INFORMATION INCLUDED IN THIS DRAWING ARE PROPRIETARY AND ARE NOT TO BE REPRODUCED, DISTRIBUTED OR DISCLOSED IN ANY MANNER, WITHOUT THE PRIOR, WRITTEN CONSENT OF A DULY AUTHORIZED OFFICER OF HELMERICH & PAYNE INTL. DRILLING CO.

5M CHOKE MANIFOLD CONFIGURATION

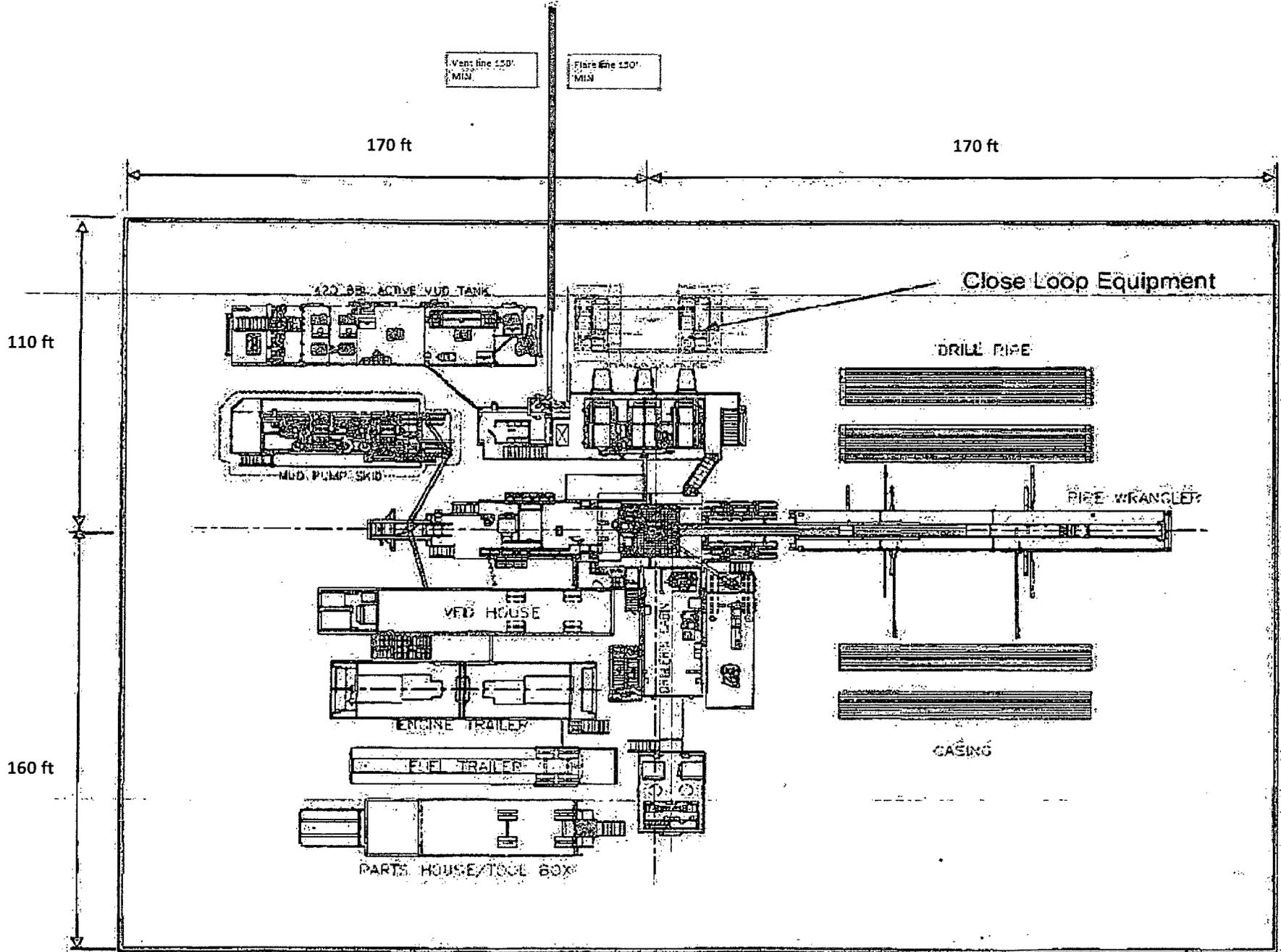


5M REMOTE KILL LINE SCHEMATIC



OXY FLEX IV PAD (Closed Loop System)

REVISED 05/14/2009



170 ft

170 ft

110 ft

160 ft

Close Loop Equipment

DRILL PIPE

PIPE WRANGLERS

CASING

420' BE ACTIVE MUD TANK

MUD PUMP SKID

MED HOUSE

ENGINE TRAILER

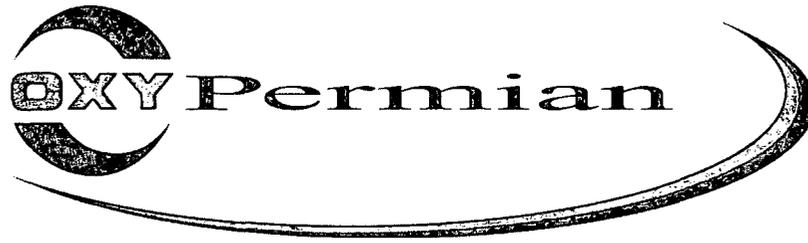
FUEL TRAILER

PARTS HOUSE/TOOL BOX

Flare line 150' MIN

Vent line 150' MIN

DRILLER LEG



Permian Drilling Hydrogen Sulfide Drilling Operations Plan New Mexico

Scope

This contingency plan establishes guidelines for the public, all company employees, and contract employees who's work activities may involve exposure to hydrogen sulfide (H₂S) gas.

While drilling this well, it is possible to encounter H₂S bearing formations. At all times, the first barrier to control H₂S emissions will be the drilling fluid, which will have a density high enough to control influx.

Objective

1. Provide an immediate and predetermined response plan to any condition when H₂S is detected. All H₂S detections in excess of 10 parts per million (ppm) concentration are considered an Emergency.
2. Prevent any and all accidents, and prevent the uncontrolled release of hydrogen sulfide into the atmosphere.
3. Provide proper evacuation procedures to cope with emergencies.
4. Provide immediate and adequate medical attention should an injury occur.

Discussion

Implementation:	This plan with all details is to be fully implemented before drilling to <u>commence</u> .
Emergency response Procedure:	This section outlines the conditions and denotes steps to be taken in the event of an emergency.
Emergency equipment Procedure:	This section outlines the safety and emergency equipment that will be required for the drilling of this well.
Training provisions:	This section outlines the training provisions that must be adhered to prior to drilling.
Drilling emergency call lists:	Included are the telephone numbers of all persons to be contacted should an emergency exist.
Briefing:	This section deals with the briefing of all people involved in the drilling operation.
Public safety:	Public safety personnel will be made aware of any potential evacuation and any additional support needed.
Check lists:	Status check lists and procedural check lists have been included to insure adherence to the plan.
General information:	A general information section has been included to supply support information.

Hydrogen Sulfide Training

All personnel, whether regularly assigned, contracted, or employed on an unscheduled basis, will receive training from a qualified instructor in the following areas prior to commencing drilling operations on the well:

1. The hazards and characteristics of H₂S.
2. Proper use and maintenance of personal protective equipment and life support systems.
3. H₂S detection.
4. Proper use of H₂S detectors, alarms, warning systems, briefing areas, evacuation procedures and prevailing winds.
5. Proper techniques for first aid and rescue procedures.
6. Physical effects of hydrogen sulfide on the human body.
7. Toxicity of hydrogen sulfide and sulfur dioxide.
8. Use of SCBA and supplied air equipment.
9. First aid and artificial respiration.
10. Emergency rescue.

In addition, supervisory personnel will be trained in the following areas:

1. The effects of H₂S on metal components. If high tensile strength tubular is to be used, personnel will be trained in their special maintenance requirements.
2. Corrective action and shut-in procedures when drilling a well, blowout prevention and well control procedures.
3. The contents and requirements of the H₂S Drilling Operations Plan.

H₂S training refresher must have been taken within one year prior to drilling the well. Specifics on the well to be drilled will be discussed during the pre-spud meeting. H₂S and well control (choke) drills will be performed while drilling the well, at least on a weekly basis. This plan shall be available in the well site. All personnel will be required to carry the documentation proving that the H₂S training has been taken.

Service company and visiting personnel

- A. Each service company that will be on this well will be notified if the zone contains H₂S.
- B. Each service company must provide for the training and equipment of their employees before they arrive at the well site.
- C. Each service company will be expected to attend a well site briefing

Emergency Equipment Requirements

1. Well control equipment

The well shall have hydraulic BOP equipment for the anticipated pressures. Equipment is to be tested on installation and follow Oxy Well Control standard, as well as BLM Onshore Order #2.

Special control equipment:

- A. Hydraulic BOP equipment with remote control on ground.
- B. Rotating head
- C. Gas buster equipment shall be installed before drilling out of surface pipe.

2. Protective equipment for personnel

- A. Four (4) 30-minute positive pressure air packs (2 at each briefing area) on location.
- B. Adequate fire extinguishers shall be located at strategic locations.
- C. Radio / cell telephone communication will be available at the rig.
 - Rig floor and trailers.
 - Vehicle.

3. Hydrogen sulfide sensors and alarms

- A. H₂S sensor with alarms will be located on the rig floor, at the bell nipple, and at the flow line. These monitors will be set to alarm at 10 ppm with strobe light, and audible alarm.
- B. Hand operated detectors with tubes.
- C. H₂S monitor tester (to be provided by contract Safety Company.)
- D. There shall be one combustible gas detector on location at all times.

4. Visual Warning Systems

- A. One sign located at each location entrance with the following language:

**Caution – potential poison gas
Hydrogen sulfide
No admittance without authorization**

Wind sock – wind streamers:

- A. One 36” (in length) wind sock located at protection center, at height visible from rig floor.
- B. One 36” (in length) wind sock located at height visible from pit areas.

Condition flags

- A. One each condition flag to be displayed to denote conditions.

green – normal conditions

yellow – potential danger

red – danger, H2S present

- B. Condition flag shall be posted at each location sign entrance.

5. Mud Program

The mud program is designed to minimize the risk of having H2S and other formation fluids at surface. Proper mud weight and safe drilling practices will be applied. H2S scavengers will be used to minimize the hazards while drilling. Below is a summary of the drilling program.

Mud inspection devices:

Garrett gas train or hatch tester for inspection of sulfide concentration in mud system.

6. Metallurgy

- A. Drill string, casing, tubing, wellhead, blowout preventers, drilling spools or adapters, kill lines, choke manifold, lines and valves shall be suitable for the H2S service.
- B. All the elastomers, packing, seals and ring gaskets shall be suitable for H2S service.

7. Well Testing

No drill stem test will be performed on this well.

8. Evacuation plan

Evacuation routes should be established prior to well spud for each well and discussed with all rig personnel.

9. Designated area

- A. Parking and visitor area: all vehicles are to be parked at a predetermined safe distance from the wellhead.
- B. There will be a designated smoking area.
- C. Two briefing areas on either side of the location at the maximum allowable distance from the well bore so they offset prevailing winds perpendicularly, or at a 45-degree angle if wind direction tends to shift in the area.

Emergency procedures

- A. In the event of any evidence of H₂S level above 10 ppm, take the following steps:
 - 1. The Driller will pick up off bottom, shut down the pumps, slow down the pipe rotation.
 - 2. Secure and don escape breathing equipment, report to the upwind designated safe briefing / muster area.
 - 3. All personnel on location will be accounted for and emergency search should begin for any missing, the Buddy System will be implemented.
 - 4. Order non-essential personnel to leave the well site, order all essential personnel out of the danger zone and upwind to the nearest designated safe briefing / muster area.
 - 5. Entrance to the location will be secured to a higher level than our usual "Meet and Greet" requirement, and the proper condition flag will be displayed at the entrance to the location.
 - 6. Take steps to determine if the H₂S level can be corrected or suppressed and, if so, proceed as required.
- B. If uncontrollable conditions occur:
 - 1. Take steps to protect and/or remove any public in the down-wind area from the rig – partial evacuation and isolation. Notify necessary public safety personnel and appropriate regulatory entities (i.e. BLM) of the situation.

2. Remove all personnel to the nearest upwind designated safe briefing / muster area or off location.
3. Notify public safety personnel of safe briefing / muster area.
4. An assigned crew member will blockade the entrance to the location. No unauthorized personnel will be allowed entry to the location.
5. Proceed with best plan (at the time) to regain control of the well. Maintain tight security and safety procedures.

C. Responsibility:

1. Designated personnel.
 - a. Shall be responsible for the total implementation of this plan.
 - b. Shall be in complete command during any emergency.
 - c. Shall designate a back-up.

- All personnel:
1. On alarm, don escape unit and report to the nearest upwind designated safe briefing / muster area upw
 2. Check status of personnel (buddy system).
 3. Secure breathing equipment.
 4. Await orders from supervisor.

- Drill site manager:
1. Don escape unit if necessary and report to nearest upwind designated safe briefing / muster area.
 2. Coordinate preparations of individuals to return to point of release with tool pusher and driller (using the buddy system).
 3. Determine H₂S concentrations.
 4. Assess situation and take control measures.

- Tool pusher:
1. Don escape unit Report to up nearest upwind designated safe briefing / muster area.
 2. Coordinate preparation of individuals to return to point of release with tool pusher drill site manager (using the buddy system).
 3. Determine H₂S concentration.
 4. Assess situation and take control measures.

- Driller:
1. Don escape unit, shut down pumps, continue rotating DP.

2. Check monitor for point of release.
3. Report to nearest upwind designated safe briefing / muster area.
4. Check status of personnel (in an attempt to rescue, use the buddy system).
5. Assigns least essential person to notify Drill Site Manager and tool pusher by quickest means in case of their absence.
6. Assumes the responsibilities of the Drill Site Manager and tool pusher until they arrive should they be absent.

Derrick man
 Floor man #1
 Floor man #2

1. Will remain in briefing / muster area until instructed by supervisor.

Mud engineer:

1. Report to nearest upwind designated safe briefing / muster area.
2. When instructed, begin check of mud for ph and H2S level. (Garett gas train.)

Safety personnel:

1. Mask up and check status of all personnel and secure operations as instructed by drill site manager.

Taking a kick

When taking a kick during an H2S emergency, all personnel will follow standard Well control procedures after reporting to briefing area and masking up.

Open-hole logging

All unnecessary personnel off floor. Drill Site Manager and safety personnel should monitor condition, advise status and determine need for use of air equipment.

Running casing or plugging

Following the same “tripping” procedure as above. Drill Site Manager and safety personnel should determine if all personnel have access to protective equipment.

Ignition procedures

The decision to ignite the well is the responsibility of the operator (Oxy Drilling Management). The decision should be made only as a last resort and in a situation where it is clear that:

1. Human life and property are endangered.
2. There is no hope controlling the blowout under the prevailing conditions at the well.

Instructions for igniting the well

1. Two people are required for the actual igniting operation. They must wear self-contained breathing units and have a safety rope attached. One man (tool pusher or safety engineer) will check the atmosphere for explosive gases with the gas monitor. The other man is responsible for igniting the well.
2. Primary method to ignite: 25 mm flare gun with range of approximately 500 feet.
3. Ignite upwind and do not approach any closer than is warranted.
4. Select the ignition site best for protection, and which offers an easy escape route.
5. Before firing, check for presence of combustible gas.
6. After lighting, continue emergency action and procedure as before.
7. All unassigned personnel will remain in briefing area until instructed by supervisor or directed by the Drill Site Manager.

Remember: After well is ignited, burning hydrogen sulfide will convert to sulfur dioxide, which is also highly toxic. **Do not assume the area is safe after the well is ignited.**

Status check list

Note: All items on this list must be completed before drilling to production casing point.

1. H2S sign at location entrance.
2. Two (2) wind socks located as required.
3. Four (4) 30-minute positive pressure air packs (2 at each Briefing area) on location for all rig personnel and mud loggers.
4. Air packs inspected and ready for use.
5. Cascade system and hose line hook-up as needed.
6. Cascade system for refilling air bottles as needed.
7. Condition flag on location and ready for use.
8. H2S detection system hooked up and tested.
9. H2S alarm system hooked up and tested.
10. Hand operated H2S detector with tubes on location.
11. 1 – 100' length of nylon rope on location.
12. All rig crew and supervisors trained as required.
13. All outside service contractors advised of potential H2S hazard on well.
14. No smoking sign posted and a designated smoking area identified.
15. Calibration of all H2S equipment shall be noted on the IADC report.

Checked by: _____ Date: _____

Procedural check list during H2S events

Perform each tour:

1. Check fire extinguishers to see that they have the proper charge.
2. Check breathing equipment to ensure that it is in proper working order.
3. Make sure all the H2S detection system is operative.

Perform each week:

1. Check each piece of breathing equipment to make sure that demand or forced air regulator is working. This requires that the bottle be opened and the mask assembly be put on tight enough so that when you inhale, you receive air or feel air flow.
2. BOP skills (well control drills).
3. Check supply pressure on BOP accumulator stand by source.
4. Check breathing equipment mask assembly to see that straps are loosened and turned back, ready to put on.
5. Check pressure on breathing equipment air bottles to make sure they are charged to full volume. (Air quality checked for proper air grade "D" before bringing to location)
6. Confirm pressure on all supply air bottles.
7. Perform breathing equipment drills with on-site personnel.
8. Check the following supplies for availability.
 - A. Emergency telephone list.
 - B. Hand operated H2S detectors and tubes.

General evacuation plan

1. When the company approved supervisor (Drill Site Manager, consultant, rig pusher, or driller) determines the H₂S gas cannot be limited to the well location and the public will be involved, he will activate the evacuation plan.
2. Drill Site Manager or designee will notify local government agency that a hazardous condition exists and evacuation needs to be implemented.
3. Company or contractor safety personnel that have been trained in the use of H₂S detection equipment and self-contained breathing equipment will monitor H₂S concentrations, wind directions, and area of exposure. They will delineate the outer perimeter of the hazardous gas area. Extension to the evacuation area will be determined from information gathered.
4. Law enforcement personnel (state police, police dept., fire dept., and sheriff's dept.) Will be called to aid in setting up and maintaining road blocks. Also, they will aid in evacuation of the public if necessary.
5. After the discharge of gas has been controlled, company safety personnel will determine when the area is safe for re-entry.

Important: Law enforcement personnel will not be asked to come into a contaminated area. Their assistance will be limited to uncontaminated areas. Constant radio contact will be maintained with them.

Emergency actions

Well blowout – if emergency

1. Evacuate all personnel to “Safe Briefing / Muster Areas” or off location if needed.
2. If sour gas – evacuate rig personnel.
3. If sour gas – evacuate public within 3000 ft radius of exposure.
4. Don SCBA and shut well in if possible using the buddy system.
5. Notify Drilling Superintendent and call 911 for emergency help (fire dept and ambulance) if needed.
6. Implement the Blowout Contingency Plan, and Drilling Emergency Action Plan.
6. Give first aid as needed.

Person down location/facility

1. If immediately possible, contact 911. Give location and wait for confirmation.
2. Don SCBA and perform rescue operation using buddy system.

Toxic effects of hydrogen sulfide

Hydrogen sulfide is extremely toxic. The acceptable ceiling concentration for eight-hour exposure is 10 ppm, which is .001% by volume. Hydrogen sulfide is heavier than air (specific gravity – 1.192) and colorless. It forms an explosive mixture with air between 4.3 and 46.0 percent by volume. Hydrogen sulfide is almost as toxic as hydrogen cyanide and is between five and six times more toxic than carbon monoxide. Toxicity data for hydrogen sulfide and various other gases are compared in table i. Physical effects at various hydrogen sulfide exposure levels are shown in table ii.

Table i
Toxicity of various gases

Common name	Chemical formula	Specific gravity (sc=1)	Threshold limit (1)	Hazardous limit (2)	Lethal concentration (3)
Hydrogen Cyanide	Hcn	0.94	10 ppm	150 ppm/hr	300 ppm
Hydrogen Sulfide	H2S	1.18	10 ppm	250 ppm/hr	600 ppm
Sulfur Dioxide	So2	2.21	5 ppm	-	1000 ppm
Chlorine	Cl2	2.45	1 ppm	4 ppm/hr	1000 ppm
Carbon Monoxide	Co	0.97	50 ppm	400 ppm/hr	1000 ppm
Carbon Dioxide	Co2	1.52	5000 ppm	5%	10%
Methane	Ch4	0.55	90,000 ppm	Combustible above 5% in air	

- 1) threshold limit – concentration at which it is believed that all workers may be repeatedly exposed day after day without adverse effects.
- 2) hazardous limit – concentration that will cause death with short-term exposure.
- 3) lethal concentration – concentration that will cause death with short-term exposure.

Toxic effects of hydrogen sulfide

Table ii
Physical effects of hydrogen sulfide

<u>Percent (%)</u>	<u>Ppm</u>	<u>Concentration</u> Grains 100 std. Ft3*	<u>Physical effects</u>
0.001	<10	00.65	Obvious and unpleasant odor.

0.002	10	01.30	Safe for 8 hours of exposure.
0.010	100	06.48	Kill smell in 3 – 15 minutes. May sting eyes and throat.
0.020	200	12.96	Kills smell shortly; stings eyes and throat.
0.050	500	32.96	Dizziness; breathing ceases in a few minutes; needs prompt artificial respiration.
0.070	700	45.36	Unconscious quickly; death will result if not rescued promptly.
0.100	1000	64.30	Unconscious at once; followed by death within minutes.

*at 15.00 psia and 60'f.

Use of self-contained breathing equipment (SCBA)

1. Written procedures shall be prepared covering safe use of SCBA's in dangerous atmosphere, which might be encountered in normal operations or in emergencies. Personnel shall be familiar with these procedures and the available SCBA.
2. SCBA's shall be inspected frequently at random to insure that they are properly used, cleaned, and maintained.
3. Anyone who may use the SCBA's shall be trained in how to insure proper face-piece to face seal. They shall wear SCBA's in normal air and then wear them in a test atmosphere. (note: such items as facial hair {beard or sideburns} and eyeglasses will not allow proper seal.) Anyone that may be reasonably expected to wear SCBA's should have these items removed before entering a toxic atmosphere. A special mask must be obtained for anyone who must wear eyeglasses or contact lenses.
4. Maintenance and care of SCBA's:
 - a. A program for maintenance and care of SCBA's shall include the following:
 1. Inspection for defects, including leak checks.
 2. Cleaning and disinfecting.
 3. Repair.
 4. Storage.
 - b. Inspection, self-contained breathing apparatus for emergency use shall be inspected monthly.
 1. Fully charged cylinders.
 2. Regulator and warning device operation.
 3. Condition of face piece and connections.
 4. Rubber parts shall be maintained to keep them pliable and prevent deterioration.
 - c. Routinely used SCBA's shall be collected, cleaned and disinfected as frequently as necessary to insure proper protection is provided.
5. Persons assigned tasks that requires use of self-contained breathing equipment shall be certified physically fit (medically cleared) for breathing equipment usage at least annually.
6. SCBA's should be worn when:
 - A. Any employee works near the top or on top of any tank unless test reveals less than 10 ppm of H₂S.

- B. When breaking out any line where H₂S can reasonably be expected.
- C. When sampling air in areas to determine if toxic concentrations of H₂S exists.
- D. When working in areas where over 10 ppm H₂S has been detected.
- E. At any time there is a doubt as to the H₂S level in the area to be entered.

Rescue
First aid for H₂S poisoning

Do not panic!

Remain calm – think!

1. Don SCBA breathing equipment.
2. Remove victim(s) utilizing buddy system to fresh air as quickly as possible. (go up-wind from source or at right angle to the wind. Not down wind.)
3. Briefly apply chest pressure – arm lift method of artificial respiration to clean the victim's lungs and to avoid inhaling any toxic gas directly from the victim's lungs.
4. Provide for prompt transportation to the hospital, and continue giving artificial respiration if needed.
5. Hospital(s) or medical facilities need to be informed, before-hand, of the possibility of H₂S gas poisoning – no matter how remote the possibility is.
6. Notify emergency room personnel that the victim(s) has been exposed to H₂S gas.

Besides basic first aid, everyone on location should have a good working knowledge of artificial respiration.

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