

**GRID AZ.=180°38'12"**  
HORIZ. DIST.=714.9'

**GRID AZ.=180°38'12"**  
HORIZ. DIST.=3986.3'

**CORNER COORDINATES TABLE**

A -	Y=445644.1 N,	X=605160.0 E
B -	Y=445651.9 N,	X=606482.7 E
C -	Y=440342.2 N,	X=606516.2 E
D -	Y=440335.2 N,	X=605192.3 E

**GEODETIC COORDINATES**  
NAD 27 NME

**SURFACE LOCATION**  
Y=445388.5 N  
X=605898.2 E

**PENETRATION POINT**  
NAD 27 NME  
Y=444673.7 N  
X=605890.3 E

**BOTTOM HOLE LOCATION**  
NAD 27 NME  
Y=440688.6 N  
X=605845.9 E

**OPERATOR CERTIFICATION**  
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.

*David Stewart* 2/10/14  
Signature Date  
David Stewart Sr. Reg. Adv.  
Printed Name  
David.Stewart@oxy.com  
E-mail Address

**SURVEYOR CERTIFICATION**  
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.

SEPTEMBER 20, 2013

Date of Survey  
Signature & Seal of Professional Surveyor:  
GARY C. EIDSON  
NEW MEXICO  
12641  
REG. SURV.  
2/7/14  
Certificate Number: Gary C. Eidson 12641  
Professional Engineer Ronald F. Eidson 3239  
ACK REL. W.O.: 13111048 JWSC W.O.: 14.13.0070

Operator Name/Number: OXY USA Inc. 16696  
 Lease Name/Number: Cedar Canyon 16 State #11H  
 Pool Name/Number: Cedar Canyon Delaware 11540  
 Surface Location: 260 FNL 2060 FWL C Sec 16 T24S R29E State Lease No. VA-836  
 Penetration Point: 975 FNL 2048 FWL C Sec 16 T24S R29E  
 Bottom Hole Location: 350 FSL 1980 FWL N Sec 16 T24S R29E

C-102 Plats: 9/20/13 2/7/14 2/8/14 Elevation: 2927' GL Objective: Brushy Canyon

Proposed TD: Horizontal Lateral 5220' TVD 9606' TMD  
 SL - Lat: 32.224026 Long: 103.990886 X=605898.2 Y=445388.5 NAD - 1927  
 PP - Lat: 32.222061 Long: 103.990919 X=605890.3 Y=444673.7 NAD - 1927  
 BH - Lat: 32.211107 Long: 103.991104 X=605845.9 Y=440688.6 NAD - 1927

#### Casing Program:

Hole Size	Interval	OD Csg	Weight	Collar	Grade	Condition	Collapse Design Factor	Burst Design Factor	Tension Design Factor
14-3/4"	0-300'	11-3/4"	47	BT&C	J55	New	15.38	1.43	6.62
				Hole filled with 8.5# Mud			1514#	3070#	
10-5/8"	0-3000'	8-5/8"	32	LT&C	J-55	New	4.18	1.3	2.31
				Hole filled with 10.2# Mud			2530#	3930#	
7-7/8"	0-9606'	5-1/2"	17	BT&C	L-80	New	2.42	1.21	2.25
				Hole filled with 9.2# Mud			6290#	7740#	

Collapse and burst loads calculated using Stress Check with anticipated loads

#### Cement Program:

- 11-3/4" Surface Circulate cement to surface w/ 250sx PPC cmt w/ 1% CaCl<sub>2</sub>, 14.8ppg 1.34 yield 1416# 24hr CS 125% Excess
- 8-5/8" Intermediate Circulate cement to surface w/ 590sx HES Light PPC cmt w/ 5% salt + .25% HR-800, 12.9ppg 1.85 yield 771# 24hr CS 125% Excess followed by 230sx PPC cmt, 14.8ppg 1.33 yield 1779# 24hr CS 125% Excess
- 5-1/2" Production Cement w/ 240sx PP cmt w/ 14.8#/sx Silicalite 50/50 Blend + 15#/sx Scotchlite HGS-6000 + 3#/sx Kol-Seal + .125#/sx Poly-E-Flake + .25#/sx HR-800, 10.2ppg 2.95 yield 947# 24hr CS 100% Excess followed by 770sx Super H cmt w/ 3#/sx salt + .4% CFR-3 + .5% Halad-344 + .3% HR-800 + .125#/sx Poly-E-Flake, 13.2ppg 1.66 yield 615# 24hr CS 40% Excess. Calc TOC-2000'

**Description of Cement Additives:** Calcium Chloride, Salt (Accelerator); Silicalite (Additive Material); CFR-3 (Dispersant); Bentonite, Scotchlite HGS-6000 (Light Weight Additive); Kol-Seal, Poly-E-Flake (Lost Circulation Additive); Halad-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:

Depth	Mud Wt. ppg	Visc sec	Fluid Loss	Type System
0 - 300'	8.5	28-38	NC	Fresh Water/Spud Mud
300 - 3000'	10.2	28-32	NC	Fresh water/NaCl Brine
3000 - 9606'	9.2	28-34	NC	Cut Brine/Sweeps

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 13-5/8" 10M three ram stack w/ 5M annular preventer, 5M Choke Manifold

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

Geological Marker	Depth	Type
a. Rustler	111'	Formation
b. Top Salt	577'	Formation
c. Bottom Salt	1315'	Formation
d. Delaware	2884'	Formation
e. Delaware-Bell Canyon	2951'	Oil/Gas
f. Delaware-Cherry Canyon	3683'	Oil/Gas
g. Delaware-Brushy Canyon	5010'	Oil/Gas
h. 1st Bone Spring	6597'	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.

A closed loop system will be utilized consisting of above ground steel tanks and haul-off bins.  
 Disposal of liquids, drilling fluids and cuttings will be disposed of at an approved facility.

The wells listed below are completed or permitted to be drilled in the Cedar Canyon Delaware (11540).

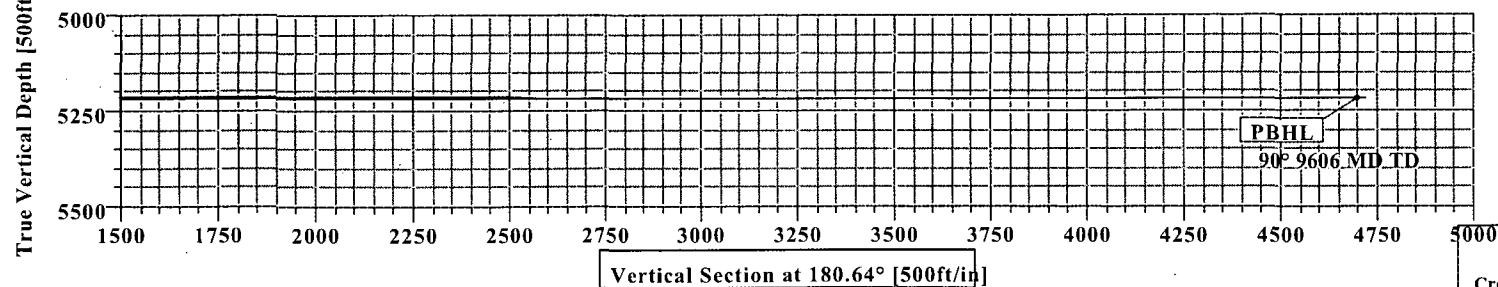
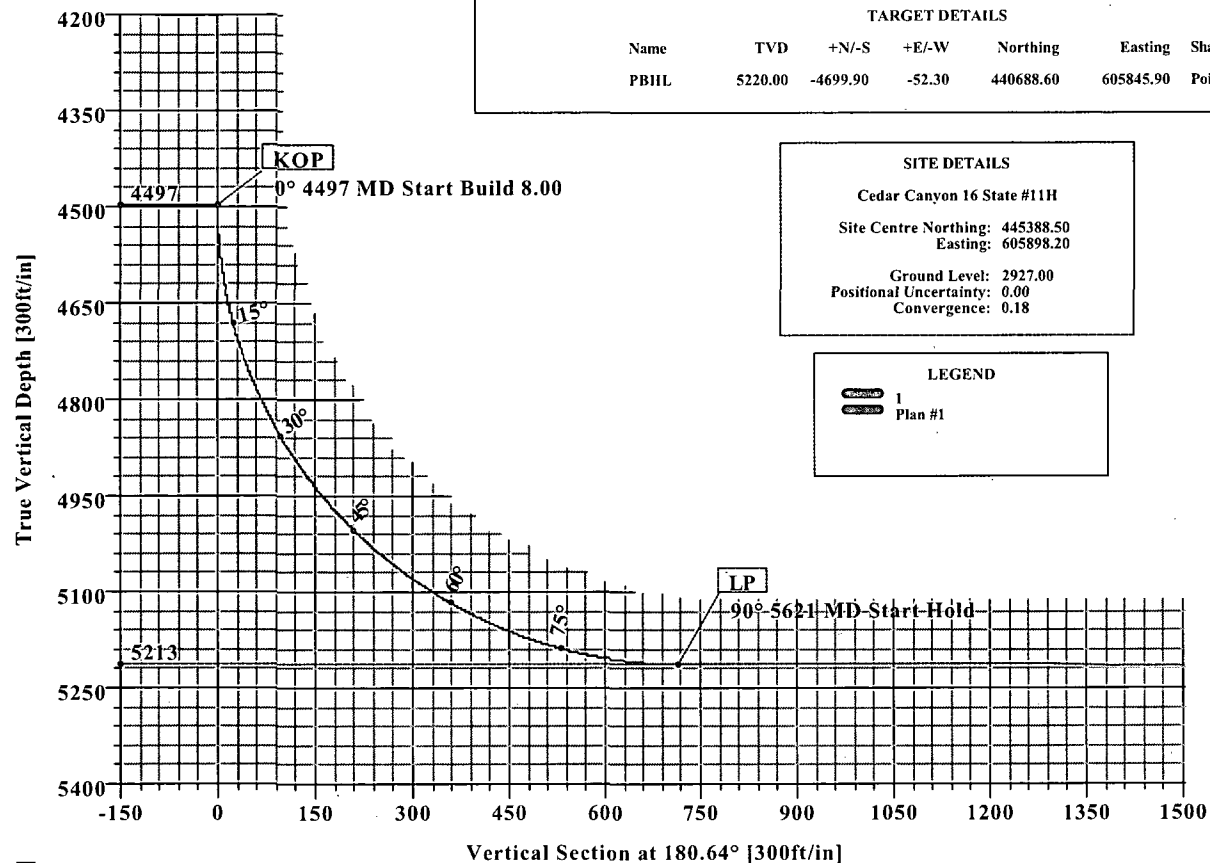
- H. Buck State #1-30-015-27092 - TVD 6521' - Ut J
- H. Buck State #2 - 30-015-28138 - TVD 5216' - Ut H
- H. Buck State #6 - 30-015-28636 - TVD 5214' - Ut P
- Cedar Canyon 16 State #9H - 30-015-PENDING - TVD 5215' - Ut D-E-L-M



# Cedar Canyon 16 State #11H Eddy Co, NM



KB ELEV: 2952.00  
GL ELEV: 2927.00



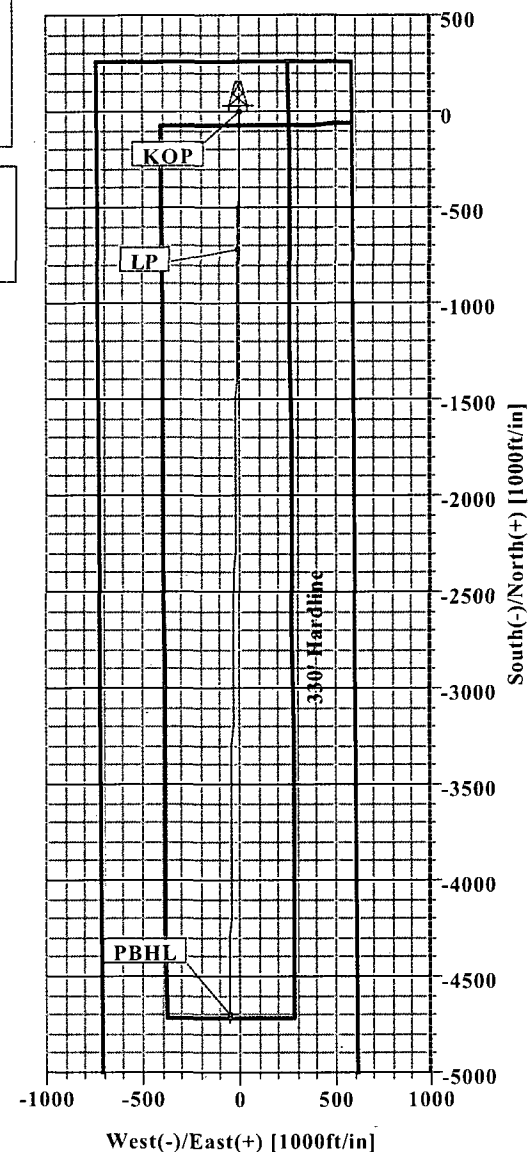
SECTION DETAILS										
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	DLeg	TFace	VSec	Target
1	0.00	0.00	180.64	0.00	0.00	0.00	0.00	0.00	0.00	
2	4496.81	0.00	180.64	4496.81	0.00	0.00	0.00	0.00	0.00	
3	5620.55	89.90	180.64	5213.00	-714.90	-7.96	8.00	180.64	714.94	
4	9605.81	89.90	180.64	5220.00	-4699.90	-52.30	0.00	0.00	4700.19	PBHL

WELL DETAILS								
Name	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot	
Cedar Canyon 16 State #11H	0.00	0.00	445388.50	605898.20	32°13'26.494N	103°59'27.190W	N/A	

TARGET DETAILS						
Name	TVD	+N/-S	+E/-W	Northing	Easting	Shape
PBHL	5220.00	-4699.90	-52.30	440688.60	605845.90	Point

SITE DETAILS	
Cedar Canyon 16 State #11H	
Site Centre Northing:	445388.50
Easting:	605898.20
Ground Level:	2927.00
Positional Uncertainty:	0.00
Convergence:	0.18

LEGEND	
1	Plan #1



Weatherford



# Weatherford International Ltd.

## WFT Plan Report - X & Y's



Weatherford

Company: Occidental Permian Ltd.	Date: 12/30/2013	Time: 10:25:04	Page: 1
Field: Eddy Co. NM (Nad 27)	Co-ordinate(NE) Reference: Well: Cedar Canyon 16 State #11H		
Site: Cedar Canyon 16 State #11H	Vertical (TVD) Reference: SITE 2952.0		
Well: Cedar Canyon 16 State #11H	Section (VS) Reference: Well (0.00N, 0.00E, 180.64Azi)		
Wellpath: 1	Survey Calculation Method: Minimum Curvature	Db: Sybase	

Plan: Plan #1	Date Composed: 12/30/2013
Principal: Yes	Version: 1
	Tied-to: From Surface

Site: Cedar Canyon 16 State #11H

Site Position:	Northing: 445388.50 ft	Latitude: 32 13 26.494 N
From: Map	Easting: 605898.20 ft	Longitude: 103 59 27.190 W
Position Uncertainty: 0.00 ft		North Reference: Grid
Ground Level: 2927.00 ft		Grid Convergence: 0.18 deg

Well: Cedar Canyon 16 State #11H Slot Name:

Well Position: +N/-S 0.00 ft	Northing: 445388.50 ft	Latitude: 32 13 26.494 N
+E/-W 0.00 ft	Easting: 605898.20 ft	Longitude: 103 59 27.190 W
Position Uncertainty: 0.00 ft		

Wellpath: 1

Current Datum: SITE	Height 2952.00 ft	Drilled From: Surface
Magnetic Data: 6/1/2014		Tie-on Depth: 0.00 ft
Field Strength: 48300 nT		Above System Datum: Mean Sea Level
Vertical Section: Depth From (TVD)	+N/-S	Declination: 7.42 deg
ft	ft	Mag Dip Angle: 60.04 deg
		+E/-W
		Direction
		deg
5220.00	0.00	0.00 180.64

### Plan Section Information

MD	Incl	Azim	TVD	+N/-S	+E/-W	DLS	Build	Turn	TFO	Target
ft	deg	deg	ft	ft	ft	deg/100ft	deg/100ft	deg/100ft	deg	
0.00	0.00	180.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
4496.81	0.00	180.64	4496.81	0.00	0.00	0.00	0.00	0.00	0.00	
5620.55	89.90	180.64	5213.00	-714.90	-7.96	8.00	8.00	0.00	180.64	
9605.81	89.90	180.64	5220.00	-4699.90	-52.30	0.00	0.00	0.00	0.00	PBHL

### Survey

MD	Incl	Azim	TVD	N/S	E/W	VS	DLS	MapN	MapE	Comment
ft	deg	deg	ft	ft	ft	ft	deg/100ft	ft	ft	
0.00	0.00	180.64	0.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
100.00	0.00	180.64	100.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
200.00	0.00	180.64	200.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
300.00	0.00	180.64	300.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
400.00	0.00	180.64	400.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
500.00	0.00	180.64	500.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
600.00	0.00	180.64	600.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
700.00	0.00	180.64	700.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
800.00	0.00	180.64	800.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
900.00	0.00	180.64	900.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
1000.00	0.00	180.64	1000.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
1100.00	0.00	180.64	1100.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
1200.00	0.00	180.64	1200.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
1300.00	0.00	180.64	1300.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
1400.00	0.00	180.64	1400.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
1500.00	0.00	180.64	1500.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
1600.00	0.00	180.64	1600.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
1700.00	0.00	180.64	1700.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
1800.00	0.00	180.64	1800.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
1900.00	0.00	180.64	1900.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
2000.00	0.00	180.64	2000.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
2100.00	0.00	180.64	2100.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
2200.00	0.00	180.64	2200.00	0.00	0.00	0.00	0.00	445388.50	605898.20	



# Weatherford International Ltd.

## WFT Plan Report - X & Y's


**Weatherford**

<b>Company:</b> Occidental Permian Ltd.	<b>Date:</b> 12/30/2013	<b>Time:</b> 10:25:04	<b>Page:</b> 2
<b>Field:</b> Eddy Co. NM (Nad 27)	<b>Co-ordinate(NE) Reference:</b> Well: Cedar Canyon 16 State #11H		
<b>Site:</b> Cedar Canyon 16 State #11H	<b>Vertical (TVD) Reference:</b> SITE 2952.0		
<b>Well:</b> Cedar Canyon 16 State #11H	<b>Section (VS) Reference:</b> Well (0.00N,0.00E,180.64Azi)		
<b>Wellpath:</b> 1	<b>Survey Calculation Method:</b> Minimum Curvature	<b>Db:</b> Sybase	

### Survey

MD ft	Incl deg	Azim deg	TVD ft	N/S ft	E/W ft	VS ft	DLS deg/100ft	MapN ft	MapE ft	Comment
2300.00	0.00	180.64	2300.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
2400.00	0.00	180.64	2400.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
2500.00	0.00	180.64	2500.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
2600.00	0.00	180.64	2600.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
2700.00	0.00	180.64	2700.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
2800.00	0.00	180.64	2800.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
2900.00	0.00	180.64	2900.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
3000.00	0.00	180.64	3000.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
3100.00	0.00	180.64	3100.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
3200.00	0.00	180.64	3200.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
3300.00	0.00	180.64	3300.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
3400.00	0.00	180.64	3400.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
3500.00	0.00	180.64	3500.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
3600.00	0.00	180.64	3600.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
3700.00	0.00	180.64	3700.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
3800.00	0.00	180.64	3800.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
3900.00	0.00	180.64	3900.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
4000.00	0.00	180.64	4000.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
4100.00	0.00	180.64	4100.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
4200.00	0.00	180.64	4200.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
4300.00	0.00	180.64	4300.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
4400.00	0.00	180.64	4400.00	0.00	0.00	0.00	0.00	445388.50	605898.20	
4496.81	0.00	180.64	4496.81	0.00	0.00	0.00	0.00	445388.50	605898.20	KOP
4500.00	0.26	180.64	4500.00	-0.01	0.00	0.01	8.00	445388.49	605898.20	
4550.00	4.26	180.64	4549.95	-1.97	-0.02	1.97	8.00	445386.53	605898.18	
4600.00	8.26	180.64	4599.64	-7.42	-0.08	7.42	8.00	445381.08	605898.12	
4650.00	12.26	180.64	4648.83	-16.32	-0.18	16.32	8.00	445372.18	605898.02	
4700.00	16.26	180.64	4697.29	-28.63	-0.32	28.63	8.00	445359.87	605897.88	
4750.00	20.26	180.64	4744.76	-44.29	-0.49	44.29	8.00	445344.21	605897.71	
4800.00	24.26	180.64	4791.02	-63.22	-0.70	63.22	8.00	445325.28	605897.50	
4850.00	28.26	180.64	4835.86	-85.33	-0.95	85.34	8.00	445303.17	605897.25	
4900.00	32.26	180.64	4879.04	-110.52	-1.23	110.53	8.00	445277.98	605896.97	
4950.00	36.26	180.64	4920.36	-138.66	-1.54	138.66	8.00	445249.84	605896.66	
5000.00	40.26	180.64	4959.61	-169.61	-1.89	169.62	8.00	445218.89	605896.31	
5050.00	44.26	180.64	4996.61	-203.22	-2.26	203.23	8.00	445185.28	605895.94	
5100.00	48.26	180.64	5031.18	-239.33	-2.66	239.35	8.00	445149.17	605895.54	
5150.00	52.26	180.64	5063.14	-277.77	-3.09	277.78	8.00	445110.73	605895.11	
5200.00	56.26	180.64	5092.34	-318.34	-3.54	318.36	8.00	445070.16	605894.66	
5250.00	60.26	180.64	5118.64	-360.85	-4.02	360.87	8.00	445027.65	605894.18	
5300.00	64.26	180.64	5141.91	-405.09	-4.51	405.11	8.00	444983.41	605893.69	
5350.00	68.26	180.64	5162.04	-450.84	-5.02	450.87	8.00	444937.66	605893.18	
5400.00	72.26	180.64	5178.93	-497.89	-5.54	497.92	8.00	444890.61	605892.66	
5450.00	76.26	180.64	5192.50	-546.00	-6.08	546.03	8.00	444842.50	605892.12	
5500.00	80.26	180.64	5202.67	-594.94	-6.62	594.98	8.00	444793.56	605891.58	
5550.00	84.26	180.64	5209.41	-644.47	-7.17	644.51	8.00	444744.03	605891.03	
5600.00	88.26	180.64	5212.67	-694.35	-7.73	694.39	8.00	444694.15	605890.47	
5620.55	89.90	180.64	5213.00	-714.90	-7.96	714.94	8.00	444673.60	605890.24	LP
5700.00	89.90	180.64	5213.14	-794.34	-8.84	794.39	0.00	444594.16	605889.36	
5800.00	89.90	180.64	5213.32	-894.34	-9.95	894.39	0.00	444494.16	605888.25	
5900.00	89.90	180.64	5213.49	-994.33	-11.06	994.39	0.00	444394.17	605887.14	
6000.00	89.90	180.64	5213.67	-1094.32	-12.18	1094.39	0.00	444294.18	605886.02	
6100.00	89.90	180.64	5213.84	-1194.32	-13.29	1194.39	0.00	444194.18	605884.91	



# Weatherford International Ltd.

## WFT Plan Report - X & Y's



**Weatherford**

<b>Company:</b> Occidental Permian Ltd.	<b>Date:</b> 12/30/2013	<b>Time:</b> 10:25:04	<b>Page:</b> 3
<b>Field:</b> Eddy Co. NM (Nad:27)	<b>Co-ordinate(NE) Reference:</b> Well: Cedar Canyon 16 State #11H		
<b>Site:</b> Cedar Canyon 16 State #11H	<b>Vertical (TVD) Reference:</b> SITE 2952.0		
<b>Well:</b> Cedar Canyon 16 State #11H	<b>Section (VS) Reference:</b> Well (0.00N,0.00E,180.64Azi)		
<b>Wellpath:</b> 1	<b>Survey Calculation Method:</b> Minimum Curvature	<b>Db:</b> Sybase	

### Survey

MD ft	Incl deg	Azim deg	TVD ft	N/S ft	E/W ft	VS ft	DLS deg/100ft	MapN ft	MapE ft	Comment
6200.00	89.90	180.64	5214.02	-1294.31	-14.40	1294.39	0.00	444094.19	605883.80	
6300.00	89.90	180.64	5214.20	-1394.30	-15.52	1394.39	0.00	443994.20	605882.68	
6400.00	89.90	180.64	5214.37	-1494.30	-16.63	1494.39	0.00	443894.20	605881.57	
6500.00	89.90	180.64	5214.55	-1594.29	-17.74	1594.39	0.00	443794.21	605880.46	
6600.00	89.90	180.64	5214.72	-1694.28	-18.85	1694.39	0.00	443694.22	605879.35	
6700.00	89.90	180.64	5214.90	-1794.28	-19.97	1794.39	0.00	443594.22	605878.23	
6800.00	89.90	180.64	5215.07	-1894.27	-21.08	1894.39	0.00	443494.23	605877.12	
6900.00	89.90	180.64	5215.25	-1994.27	-22.19	1994.39	0.00	443394.23	605876.01	
7000.00	89.90	180.64	5215.42	-2094.26	-23.30	2094.39	0.00	443294.24	605874.90	
7100.00	89.90	180.64	5215.60	-2194.25	-24.42	2194.39	0.00	443194.25	605873.78	
7200.00	89.90	180.64	5215.78	-2294.25	-25.53	2294.39	0.00	443094.25	605872.67	
7300.00	89.90	180.64	5215.95	-2394.24	-26.64	2394.39	0.00	442994.26	605871.56	
7400.00	89.90	180.64	5216.13	-2494.23	-27.76	2494.39	0.00	442894.27	605870.44	
7500.00	89.90	180.64	5216.30	-2594.23	-28.87	2594.39	0.00	442794.27	605869.33	
7600.00	89.90	180.64	5216.48	-2694.22	-29.98	2694.39	0.00	442694.28	605868.22	
7700.00	89.90	180.64	5216.65	-2794.21	-31.09	2794.39	0.00	442594.29	605867.11	
7800.00	89.90	180.64	5216.83	-2894.21	-32.21	2894.39	0.00	442494.29	605865.99	
7900.00	89.90	180.64	5217.00	-2994.20	-33.32	2994.39	0.00	442394.30	605864.88	
8000.00	89.90	180.64	5217.18	-3094.20	-34.43	3094.39	0.00	442294.30	605863.77	
8100.00	89.90	180.64	5217.36	-3194.19	-35.54	3194.39	0.00	442194.31	605862.66	
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8300.00	89.90	180.64	5217.71	-3394.18	-37.77	3394.39	0.00	441994.32	605860.43	
8400.00	89.90	180.64	5217.88	-3494.17	-38.88	3494.39	0.00	441894.33	605859.32	
8500.00	89.90	180.64	5218.06	-3594.16	-40.00	3594.39	0.00	441794.34	605858.20	
8600.00	89.90	180.64	5218.23	-3694.16	-41.11	3694.39	0.00	441694.34	605857.09	
8700.00	89.90	180.64	5218.41	-3794.15	-42.22	3794.39	0.00	441594.35	605855.98	
8800.00	89.90	180.64	5218.59	-3894.14	-43.33	3894.39	0.00	441494.36	605854.87	
8900.00	89.90	180.64	5218.76	-3994.14	-44.45	3994.39	0.00	441394.36	605853.75	
9000.00	89.90	180.64	5218.94	-4094.13	-45.56	4094.39	0.00	441294.37	605852.64	
9100.00	89.90	180.64	5219.11	-4194.13	-46.67	4194.39	0.00	441194.37	605851.53	
9200.00	89.90	180.64	5219.29	-4294.12	-47.78	4294.39	0.00	441094.38	605850.42	
9300.00	89.90	180.64	5219.46	-4394.11	-48.90	4394.39	0.00	440994.39	605849.30	
9400.00	89.90	180.64	5219.64	-4494.11	-50.01	4494.38	0.00	440894.39	605848.19	
9500.00	89.90	180.64	5219.81	-4594.10	-51.12	4594.38	0.00	440794.40	605847.08	
9605.81	89.90	180.64	5220.00	-4699.90	-52.30	4700.19	0.00	440688.60	605845.90	PBHL

### Targets

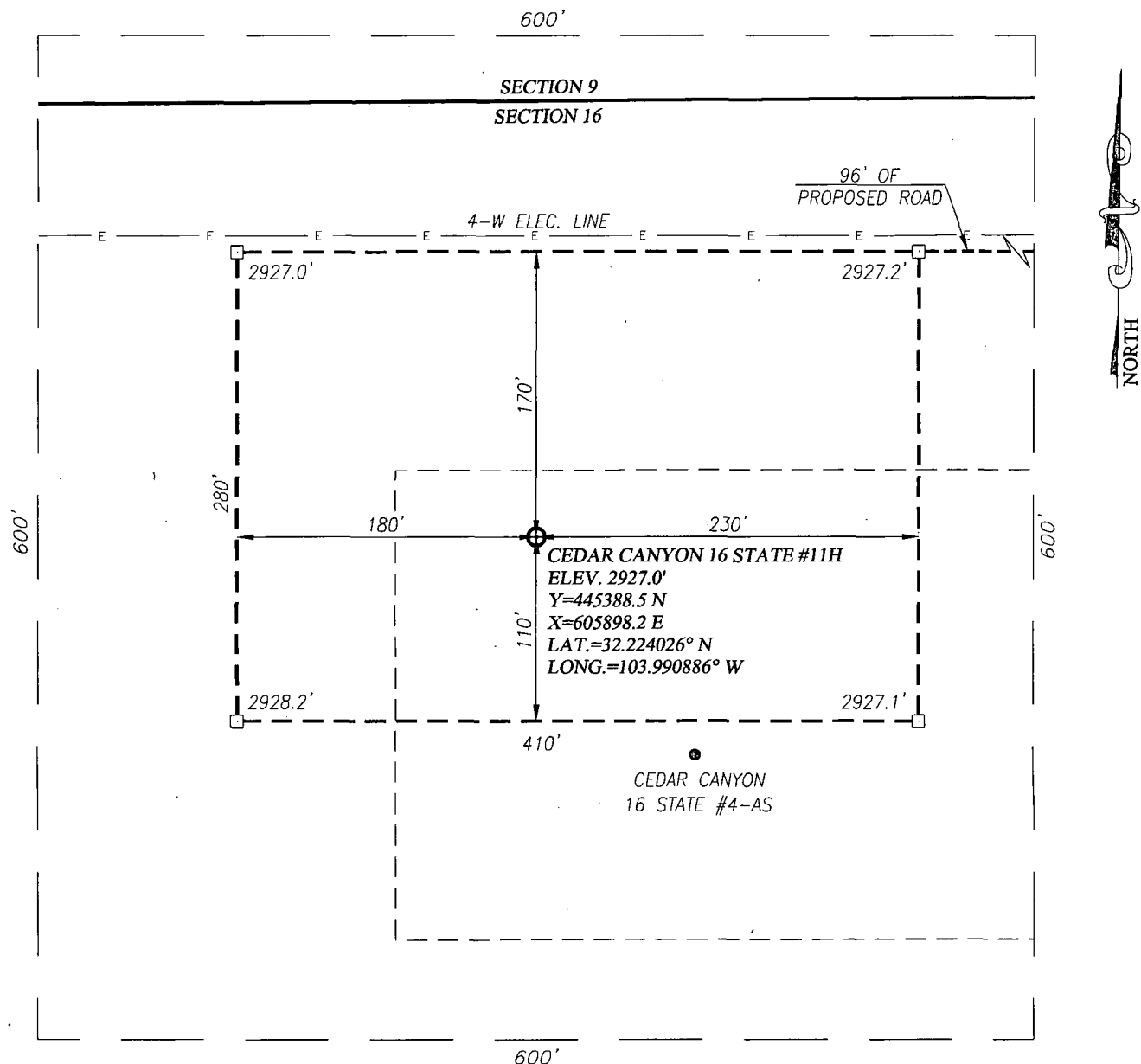
Name	Description Dip Dir	TVD ft	+N/S ft	+E/W ft	Map Northing ft	Map Easting ft	Latitude Deg Min Sec	Longitude Deg Min Sec
PBHL		5220.00	-4699.90	-52.30	440688.60	605845.90	32 12 39.985 N	103 59 27.973 W

### Casing Points

MD	TVD	Diameter	Hole Size	Name

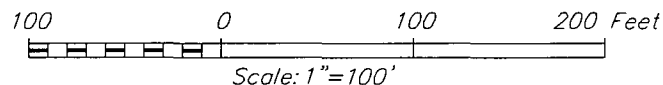
### Annotation

MD ft	TVD ft	
4496.81	4496.81	KOP
5620.55	5213.00	LP
9605.80	5220.00	PBHL



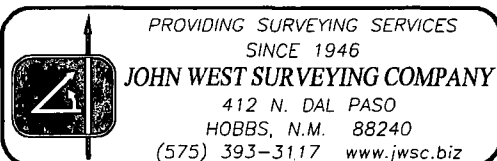
#### DIRECTIONS TO LOCATION

FROM THE INTERSECTION OF CO. RD. 720 (DUARTE RD.) AND CO. RD. 746 (McDONALD RD.) 1.3 MILES EAST OF U.S. HWY. 285 GO SOUTH ON CO. RD. 746 APPROX 0.8 MILES; VEER LEFT AND GO EAST APPROX. 6.8 MILES; TURN LEFT AND GO WEST 0.1 MILES; TURN RIGHT AND GO NORTH APPROX. 0.1 MILES; VEER RIGHT AND GO EAST APPROX. 0.1 MILES; TURN LEFT AND GO NORTHEAST APPROX. 0.3 MILES; VEER RIGHT AND GO EAST APPROX. 0.5 MILES; VEER LEFT AND GO NORTH APPROX. 0.1 MILES; VEER LEFT AND GO NORTHWEST APPROX. 2.1 MILES; TURN LEFT AND GO SOUTH APPROX. 0.2 MILES; TURN RIGHT AND GO WEST APPROX. 0.3 MILES TO STAKED ROAD. FOLLOW STAKED ROAD SOUTH 296 FEET THEN WEST 96 FEET TO THIS LOCATION.



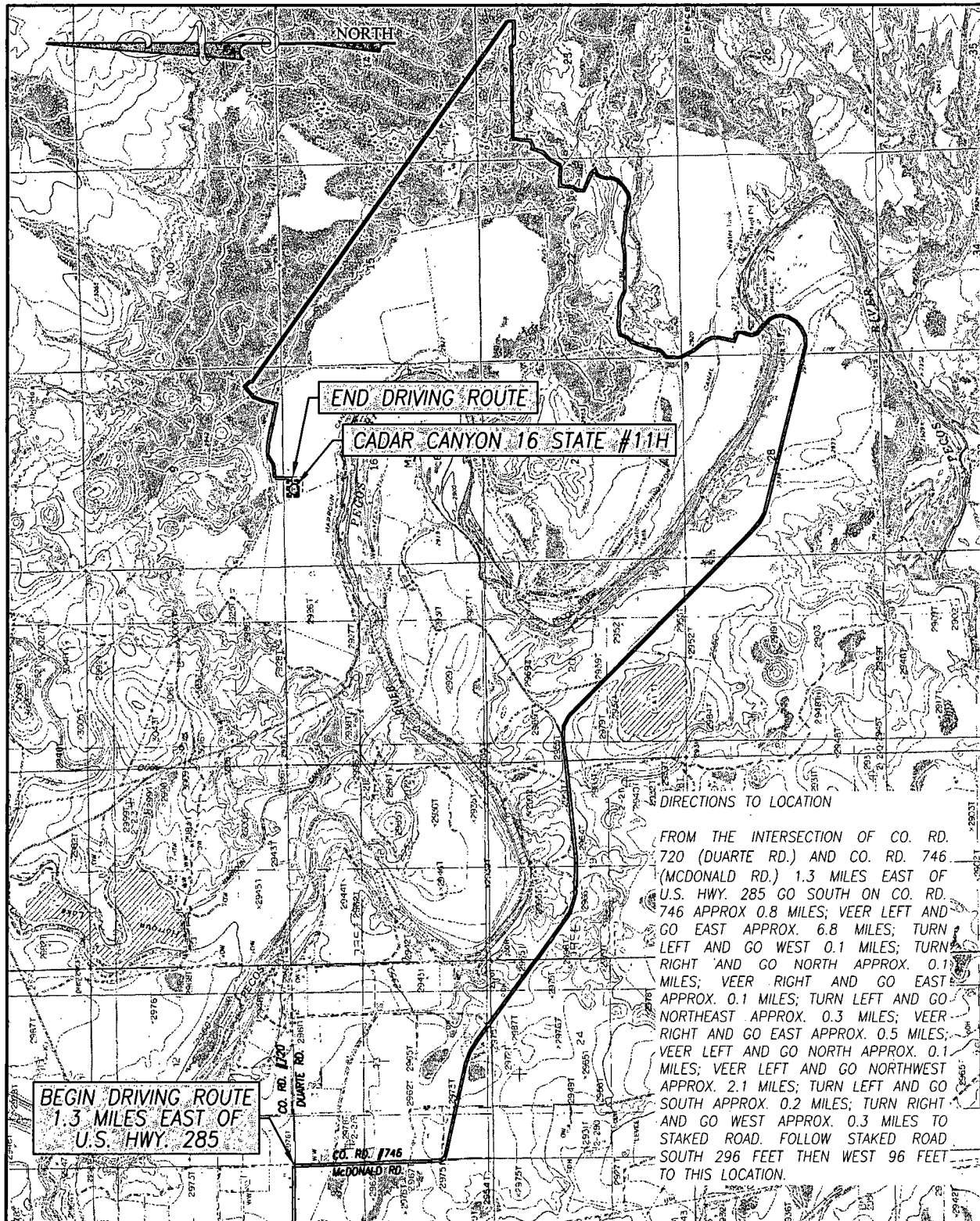
## OXY U.S.A. INC.

**CADAR CANYON 16 STATE #11H WELL  
LOCATED 260 FEET FROM THE NORTH LINE  
AND 2060 FEET FROM THE WEST LINE OF SECTION 16,  
TOWNSHIP 24 SOUTH, RANGE 29 EAST, N.M.P.M.,  
EDDY COUNTY, NEW MEXICO**



Survey Date: 9/20/13	CAD Date: 10/3/13	Drawn By: BKL
W.O. No.: 13111048	Rev.:	Rel. W.O.:
		Sheet 1 of 1

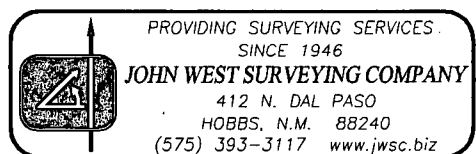
# LOCATION VERIFICATION MAP



SEC. 16 TWP. 24-S RGE. 29-E  
 COUNTY EDDY STATE NEW MEXICO  
 DESCRIPTION 260' FNL & 2060' FWL  
 ELEVATION 2927'  
 OPERATOR OXY U.S.A. INC.  
 LEASE CADAR CANYON 16 STATE  
 U.S.G.S. TOPOGRAPHIC MAP  
 PIERCE CANYON, N.M. SURVEY N.M.P.M.

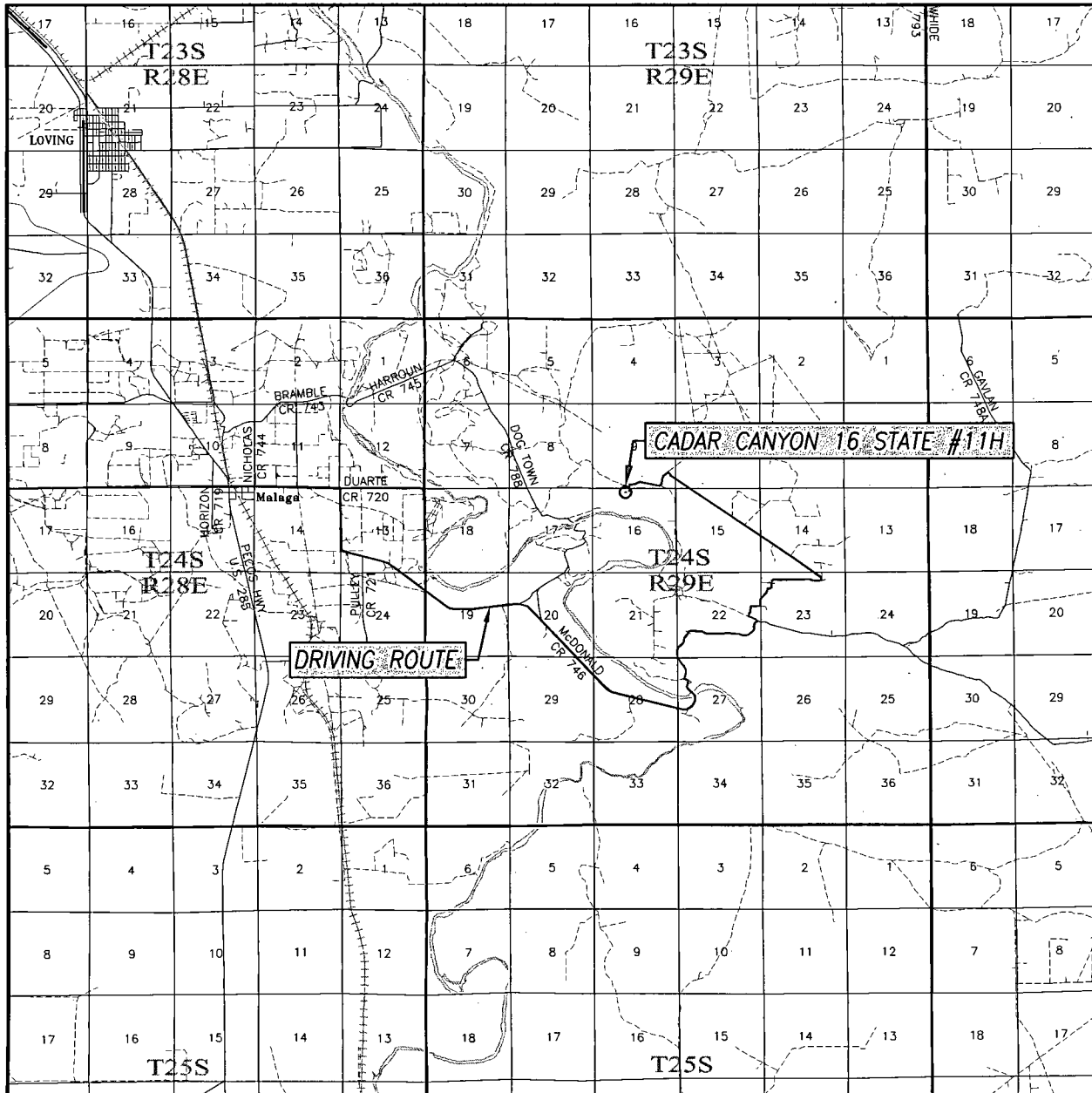
SCALE: 1" = 4000'

CONTOUR INTERVAL:  
 PIERCE CANYON, N.M. - 10'  
 MALAGA, N.M. - 10'





# VICINITY MAP



SCALE: 1" = 2 MILES

DRIVING ROUTE: SEE LOCATION MAP

SEC. 16 TWP. 24-S RGE. 29-E

SURVEY N.M.P.M.

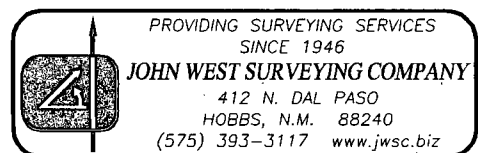
COUNTY EDDY STATE NEW MEXICO

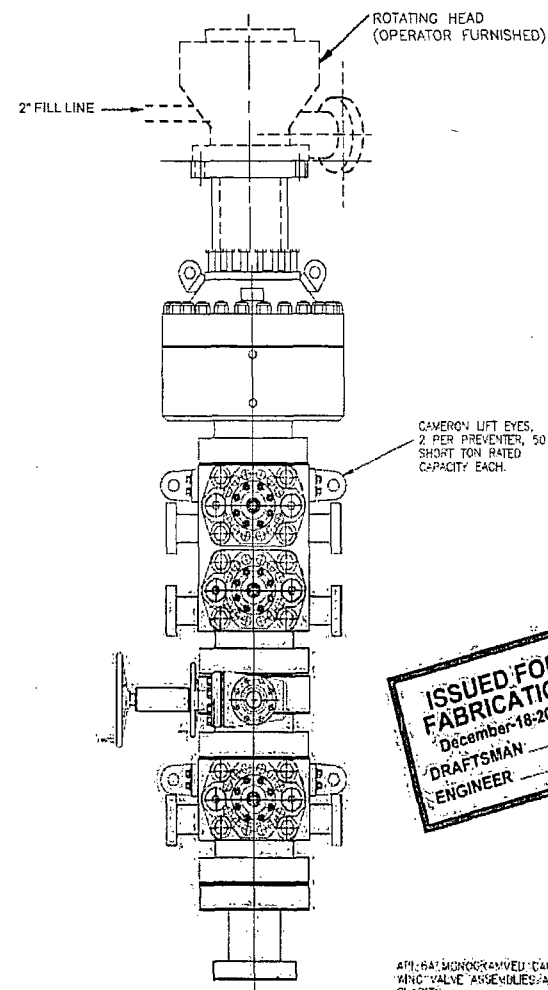
DESCRIPTION 260' FNL & 2060' FWL

ELEVATION 2927'

OPERATOR OXY U.S.A. INC.

LEASE CADAR CANYON 16 STATE





LEGEND

① - 4 1/16" - 10W FLANGED END GATE VALVE  
② - 4 1/16" - 10W FLANGED END GATE VALVE WITH DOUBLE ACTING HYDRAULIC ACTUATOR  
③ - 2 1/16" - 10W FLANGED END GATE VALVE  
④ - 2 1/16" - 10W FLANGED END CHECK VALVE  
⑤ - DOUBLE STUDDED ADAPTER

SHAFFER BOLTED-COVER SPHERICAL  
ANNULAR PREVENTER, (API 16A  
MONOGRANDED, 13 5/8"-5M WP),  
10M BOTTOM FLANGE x 5M  
STUDDED TOP (WEIGHT = 14,300  
LBS WITH SHAFFER API 16A HOT  
OIL RESISTANT ACRYLONITRILE  
ELEVENT)

CAMERON UM DOUBLE  
RAM-TYPE PREVENTER (API 16A  
MONOGRAMMED, 13 5/8"-10M  
WP), WITH 5" CAMERON PIPE  
RAMS (CAMRAM FRONT PACKERS  
& TOP SEALS) IN TOP CAVITY  
AND CAMERON DS SHEARING  
BLIND RAMS IN BOTTOM CMV.  
BOTTOM FLANGE x STUCCO  
TOP (WEIGHT = 21,100 LBS.  
WITH RAMS).

13 5/8"-10W-WP  
CAMERON DRILLING SPOOL  
(421 15A MONOGRAMMED),  
STUDDED TOP, FLANGED BOTTOM,  
WITH 4 1/16"-10W WP, FLANGED OUTLETS  
(WEIGHT APPROXIMATELY 5,000 LBS)

CAMERON QM SINGLE-RAM-TYPE  
PREVENTER (API 16A)  
MONOGRAYED, 12.5/8" (10M WP),  
WITH 5" CAMERON-PIPE RAMS  
(CAMRAM FRONT PACKERS & TOP  
SEALS) BOTTOM FLANGE &  
STUCCO TOP  
WEIGHT = 10,900 LBS

H&P FURNISHED  
13 5/8" - 10M x 13 5/8" - 5M  
ADAPTER SPOOL 2' - 0" LONG

13 5/8 - 10M BOP STACK  
WITH 13 5/8 - 5M ANNULAR

ISSUED FOR  
FABRICATION  
December-18-2007  
DRAFTSMAN  
ENGINEER

ATTACHMENT MONOGRAMMED CAMERON, CHORE AND KILL-  
ING VALVE ASSEMBLIES ARE NOT SHOWN FOR  
CLARITY

WEIGHTS DO NOT INCLUDE HOSES, ADAPTER, SPOOLS OR QUICK CONNECT FITTINGS



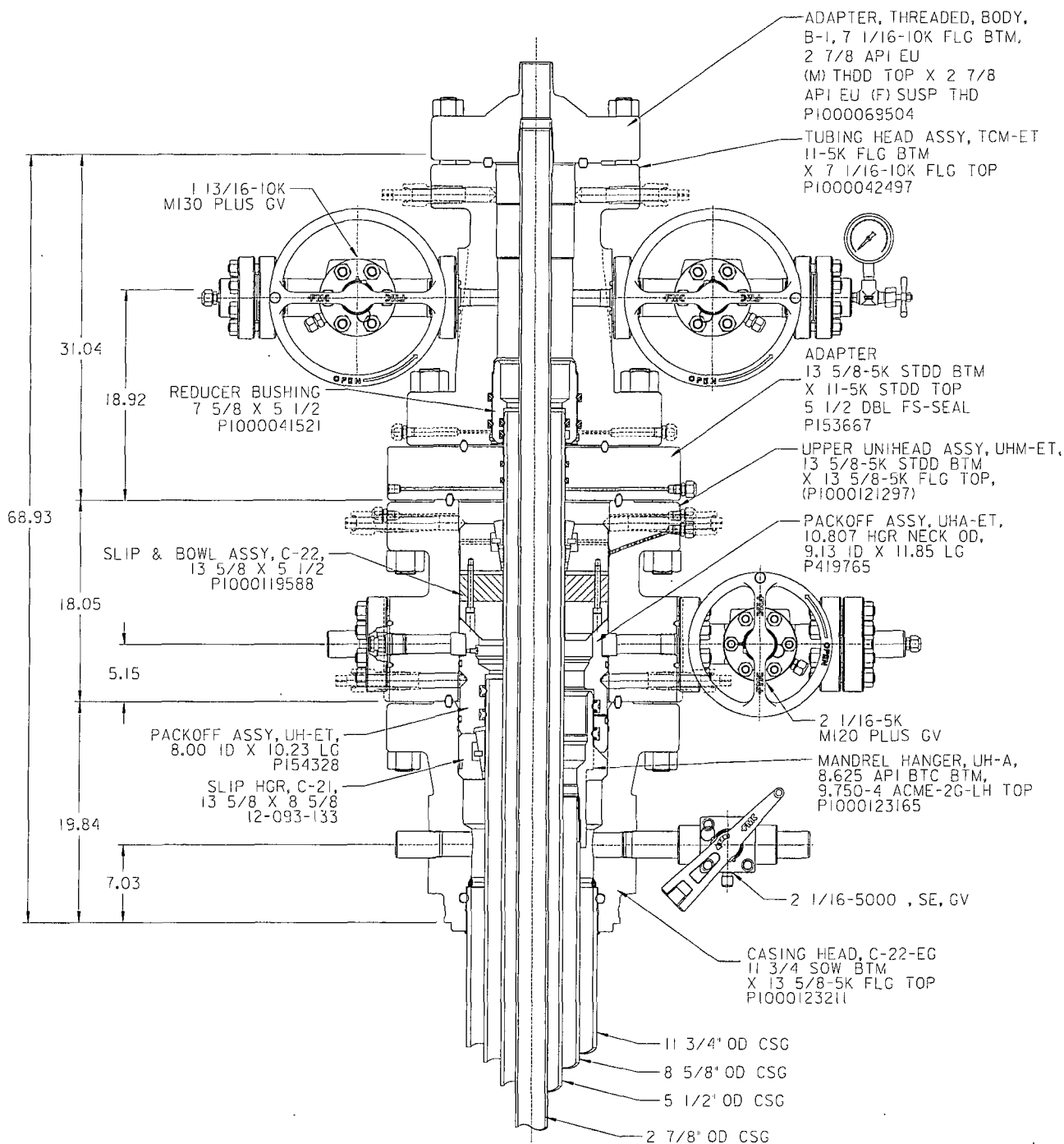
**HELMERICH & PAYNE**  
INTERNATIONAL DRILLING CO.

13 5/8"-10M. BOP 3. RAM STACK  
37 EXRIG 3

CUSTOMER: H&P		PROJECT: FLEXTRON	
TRAIN: MTS	DATE: 8-5-02	ENGR: J	REV: E
SCALE: 3/4"=1'	SHEET: 1 OF 7	210-P1-07	

PROPRIETARY

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OFFICER OF HELMUTH & PAINE, INC. (SEE PAGE 2)



# OCCIDENTAL

## ODESSA

11 3/4 X 8 5/8 X 5 1/2  
RIG (H&P 477)

QUOTE LAYOUT  
F18692  
REF: DM100161780

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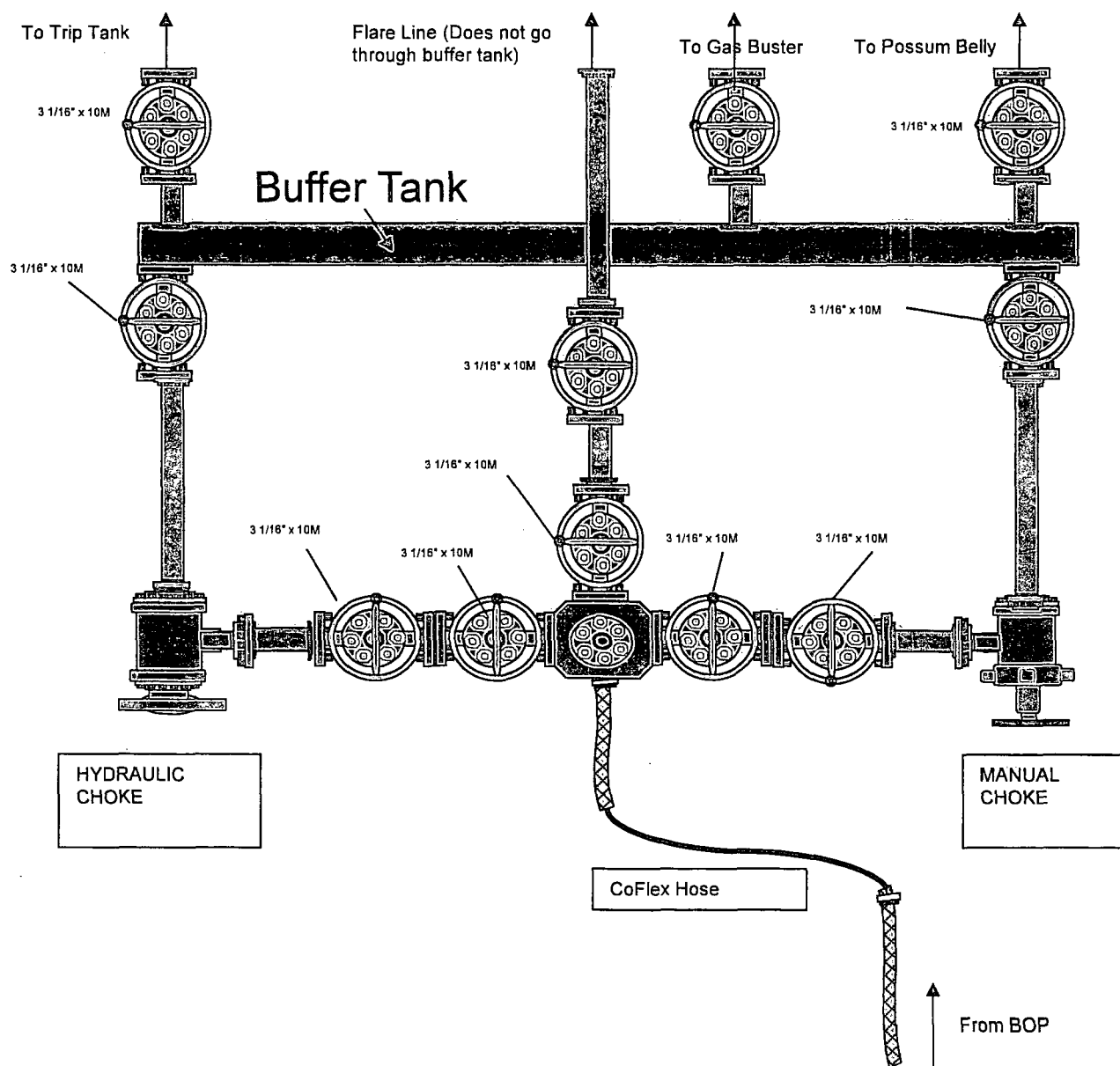
REVISIONS	DESCRIPTION
0105-29-13	

SURFACE WELLHEAD LAYOUT  
BASIC WELLHEAD, SOW,  
ODESSA, OCCIDENTAL

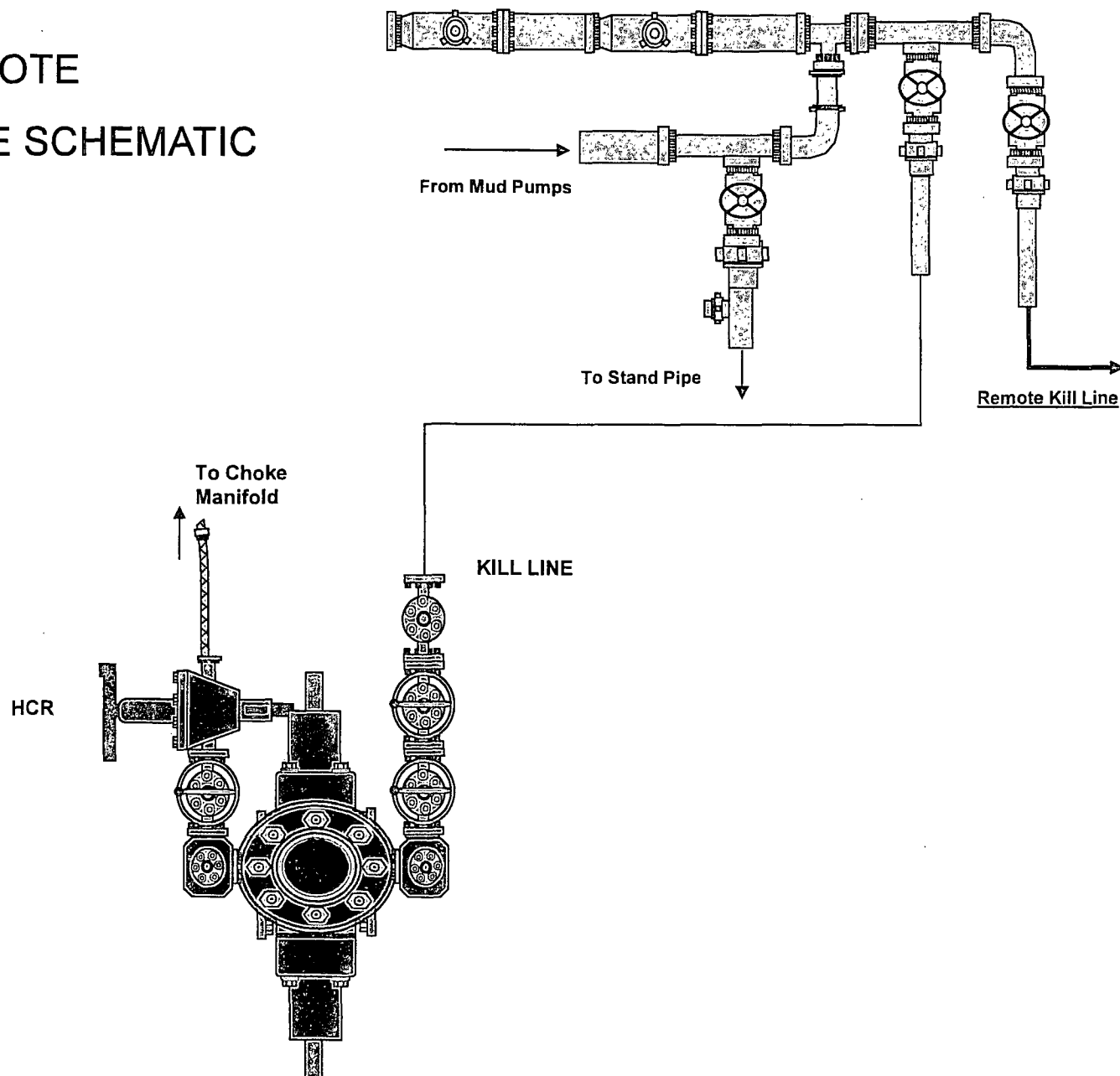
DESIGNED BY	P. LE	05-29-13	
DRAWING REVIEWER	Z. MARQUEZ	05-29-13	
DESIGN REVIEWER	L. MELO	05-29-13	
APPROVED BY	R. HAMILTON	05-29-13	
DRAWING NUMBER	DM100163272-1		

DM100163272-1

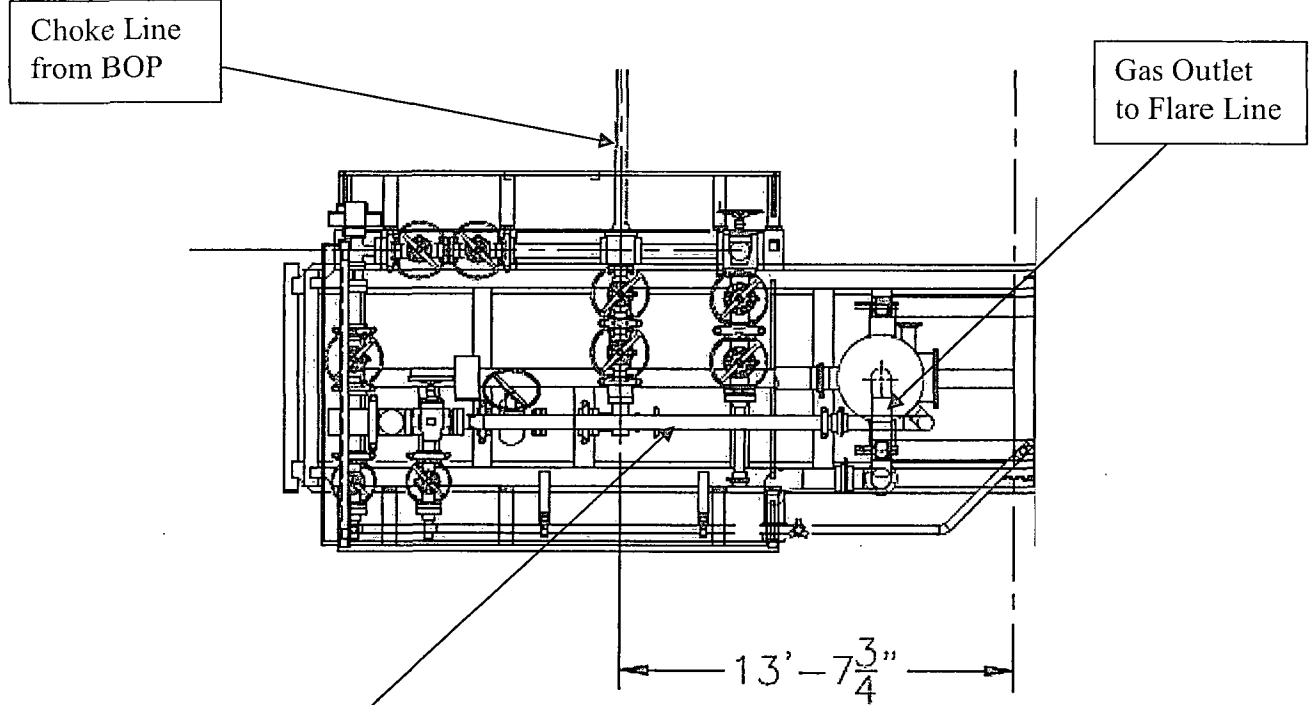
# FLEX3 STD CHOKE MANIFOLD (COMPREHENSIVE)



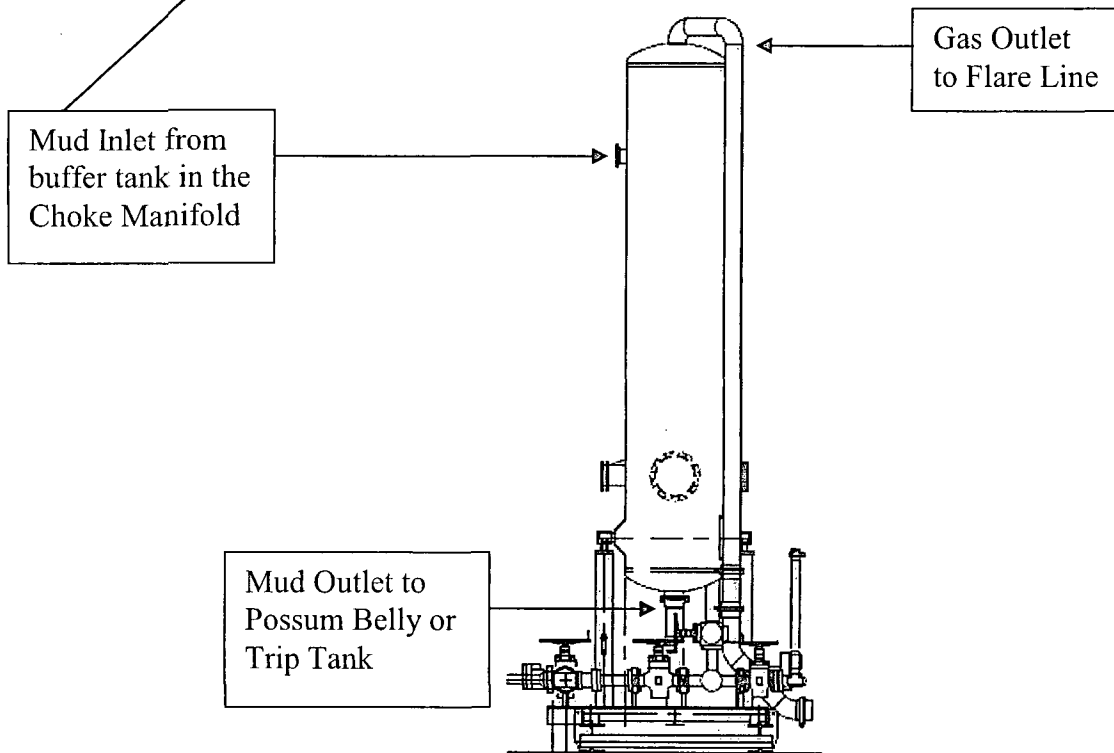
# 10M REMOTE KILL LINE SCHEMATIC



**Choke Manifold – Gas Separator (Top View)**

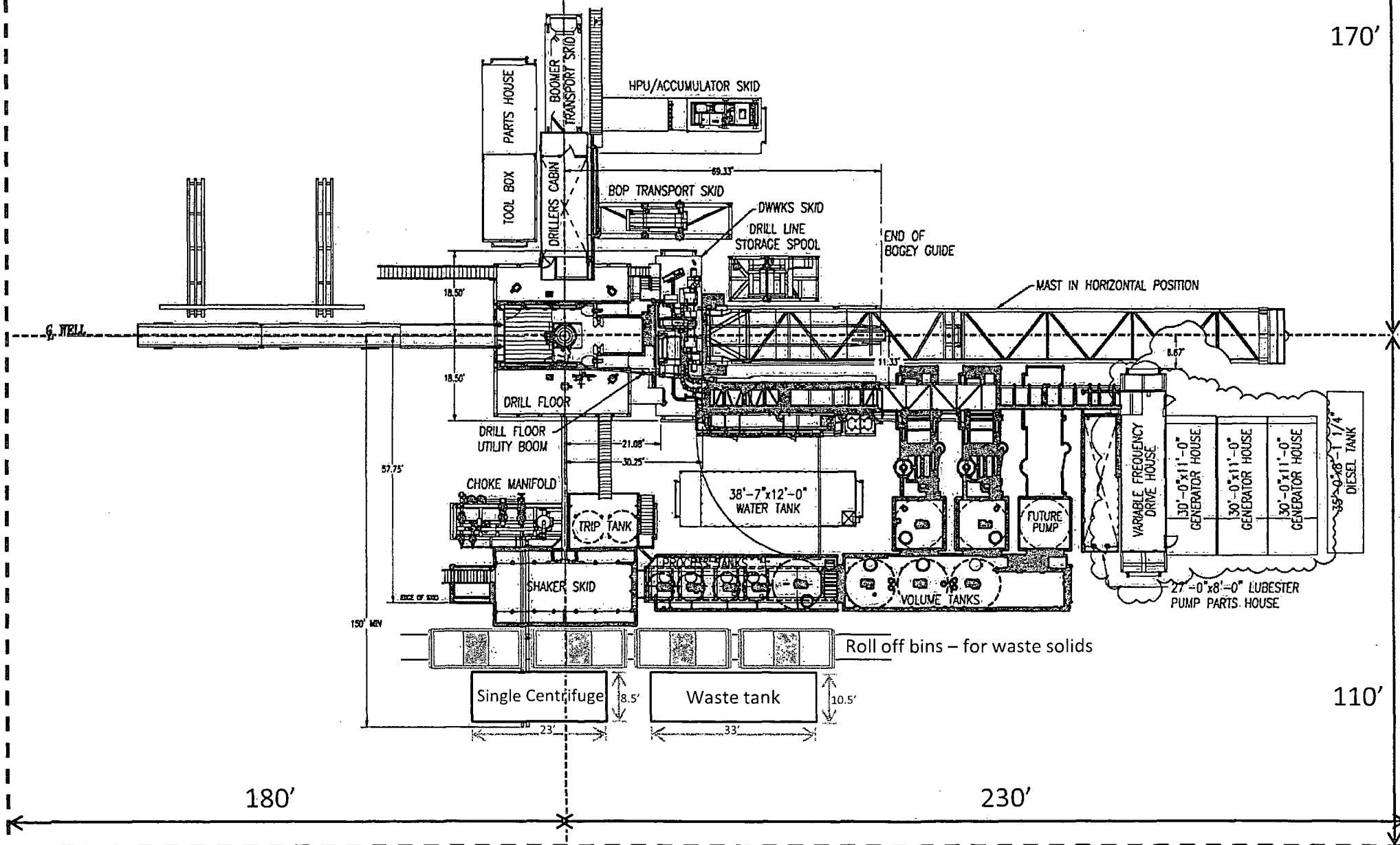


**Choke Manifold – Gas Separator (Side View)**

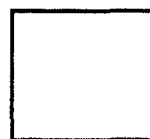
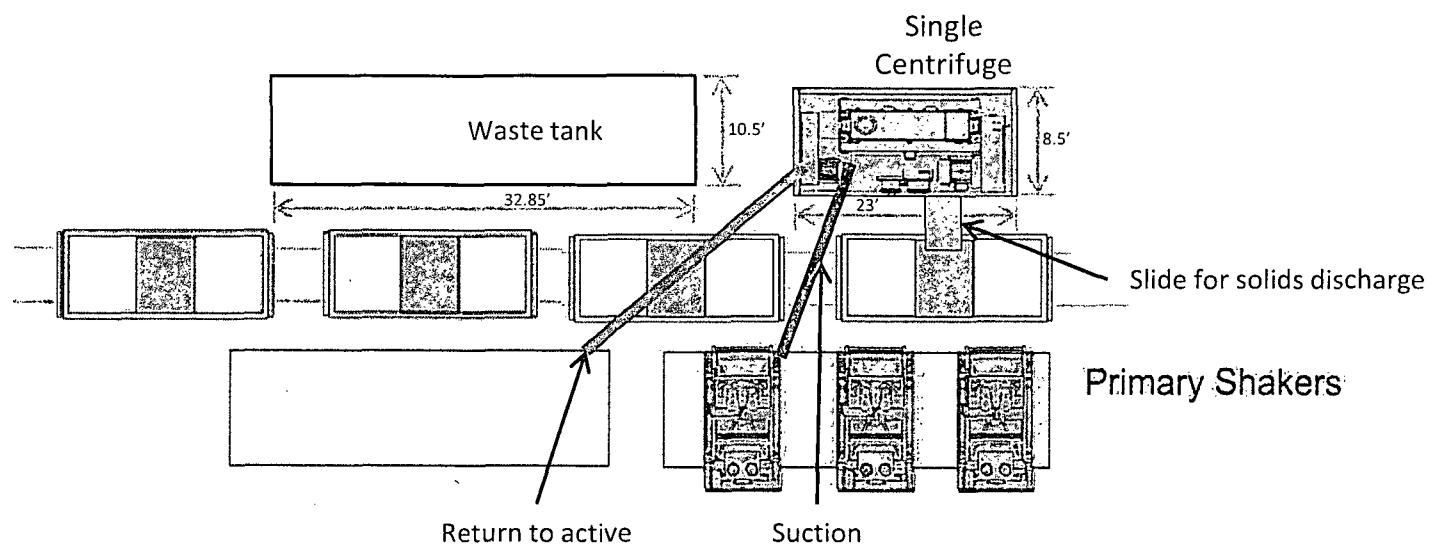


# Oxy Single Centrifuge Closed Loop System – New Mexico Flex III

May 28, 2013



# Oxy



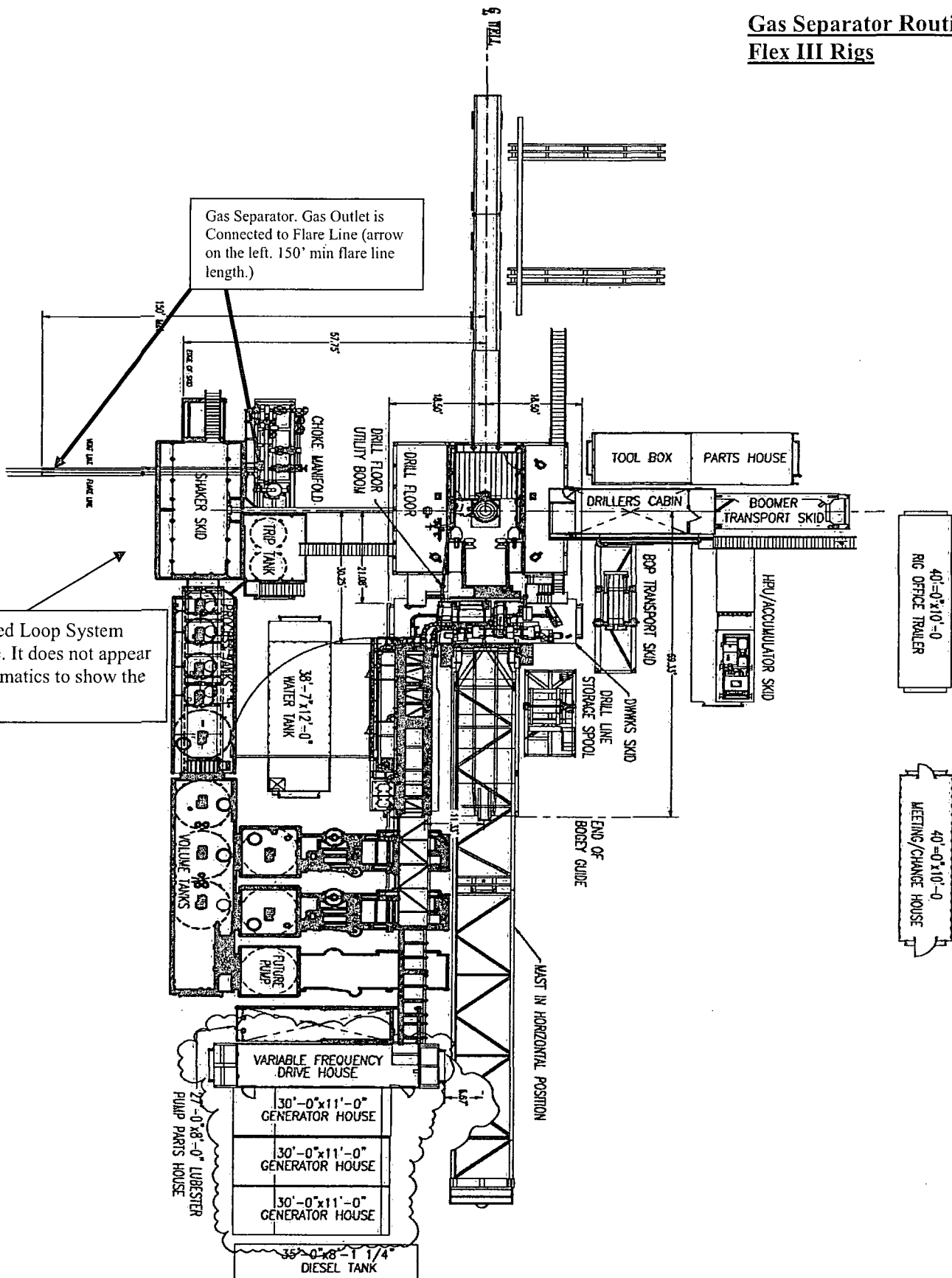
Well Head

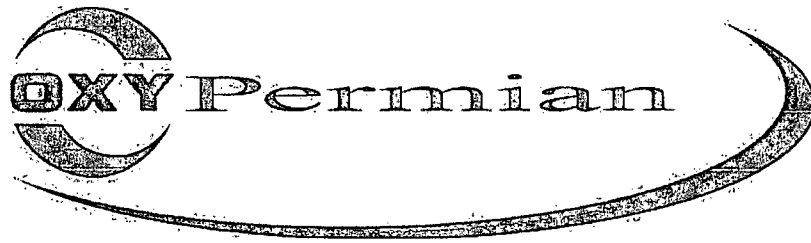


Oxy Single Centrifuge  
Closed Loop System – New  
Mexico Flex III  
May 28, 2013



## Gas Separator Routing





## **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 (H<sub>2</sub>S) gas.

While drilling this well, it is possible to encounter H<sub>2</sub>S bearing formations. At all times, the first barrier to control H<sub>2</sub>S 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 H<sub>2</sub>S is detected. All H<sub>2</sub>S 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 H<sub>2</sub>S.
2. Proper use and maintenance of personal protective equipment and life support systems.
3. H<sub>2</sub>S detection.
4. Proper use of H<sub>2</sub>S 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 H<sub>2</sub>S 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 H<sub>2</sub>S Drilling Operations Plan.

H<sub>2</sub>S 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. H<sub>2</sub>S 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 H<sub>2</sub>S 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 H<sub>2</sub>S.
- 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. Remotely operated choke.
- 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. H<sub>2</sub>S 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. H<sub>2</sub>S 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 H<sub>2</sub>S 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 H<sub>2</sub>S 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:      | <ol style="list-style-type: none"> <li>1. On alarm, don escape unit and report to the nearest upwind designated safe briefing / muster area upw</li> <li>2. Check status of personnel (buddy system).</li> <li>3. Secure breathing equipment.</li> <li>4. Await orders from supervisor.</li> </ol>  |
| Drill site manager: | <ol style="list-style-type: none"> <li>1. Don escape unit if necessary and report to nearest upwind designated safe briefing / muster area.</li> <li>2. Coordinate preparations of individuals to return to point of release with tool pusher and driller (using the buddy system).</li> <li>3. Determine H<sub>2</sub>S concentrations.</li> <li>4. Assess situation and take control measures.</li> </ol> |
| Tool pusher:        | <ol style="list-style-type: none"> <li>1. Don escape unit Report to up nearest upwind designated safe briefing / muster area.</li> <li>2. Coordinate preparation of individuals to return to point of release with tool pusher drill site manager (using the buddy system).</li> <li>3. Determine H<sub>2</sub>S concentration.</li> <li>4. Assess situation and take control measures.</li> </ol>          |
| Driller:            | <ol style="list-style-type: none"> <li>1. Don escape unit, shut down pumps, continue</li> </ol>   |



- |   |  |
|---|--|
|   | 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<br>Floor man #1<br>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 H<sub>2</sub>S 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 H<sub>2</sub>S detection equipment and self-contained breathing equipment will monitor H<sub>2</sub>S 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 <u>100 std. Ft3*</u>	<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 H<sub>2</sub>S.

- B. When breaking out any line where H<sub>2</sub>S can reasonably be expected.
- C. When sampling air in areas to determine if toxic concentrations of H<sub>2</sub>S exists.
- D. When working in areas where over 10 ppm H<sub>2</sub>S has been detected.
- E. At any time there is a doubt as to the H<sub>2</sub>S level in the area to be entered.

**Rescue**  
**First aid for H<sub>2</sub>S 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 H<sub>2</sub>S gas poisoning – no matter how remote the possibility is.
6. Notify emergency room personnel that the victim(s) has been exposed to H<sub>2</sub>S gas.

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

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