

	OXY PERMIAN DRILLING 9 POINT DRILLING PLAN SHEEP MOUNTAIN 1-12-B	SDP No: 1
		Revision No: 0
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1. GEOLOGICAL MARKERS & FORMATION TOP

The SMU 1-12-B will be a new drill from Pad Site #5 near Sheep Mountain in Huerfano County, CO. The objective of the 1-12-B is to target the Dakota and Entrada formations along with repeat sections of each zone by drilling through faulted zones. A 13 3/8" surface casing string will be set in the Pierre Shale at 1400 ft, with 9 5/8" intermediate casing above the 1st repeat section of the Dakota formation. Then an 8 3/4" hole will be drilled to a TD point of 8617 ft MD (7427 ft TVD) with 7" liner run to bottom and 300 ft inside the 9 5/8" intermediate string.

The names and depths of estimated formation tops are given below in the chart. The chart provides the formation tops for reservoir zones, including the repeat sections.

Formation Top	TVD
Apache Creek	1287
Pierre	1337
Niobrara	1916
Fort Hays	2711
Codell	2758
Carlile	2834
Greenhorn	2986
Dakota	3056
Morrison	3296
Entrada	3596
Sangre De Cristo	3716
Fault 1	4209
Repeat Section 1 Dakota	5188
Repeat Section 1 Entrada	5728
Fault 2	5909
Repeat Section 2 Dakota	6019
Repeat Section 2 Entrada	6559
Fault 3	6920
TD	7427

Table 1: Formation Tops for **SMU 1-12-B**

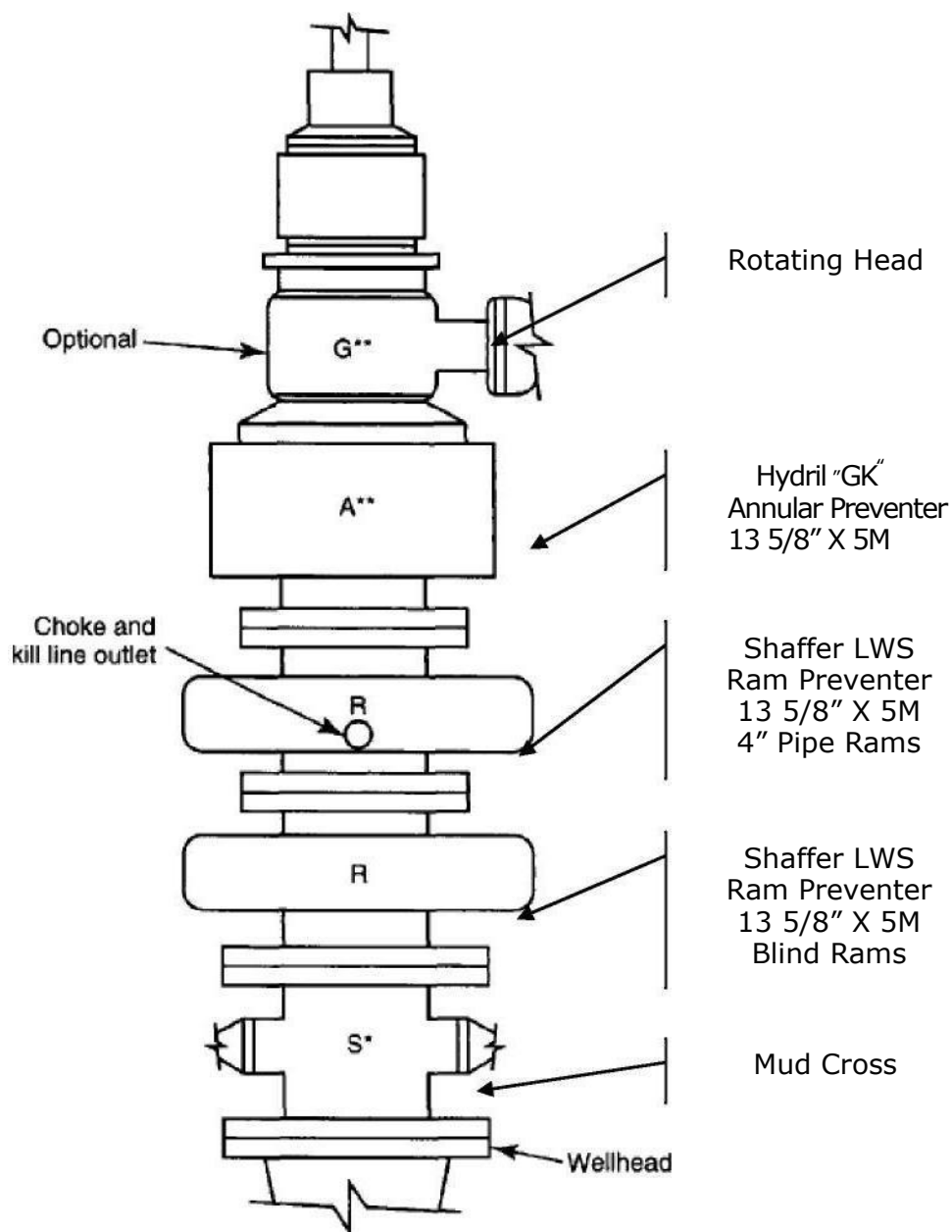
2. ESTIMATED TOPS OF ANTICIPATED WATER, OIL, GAS, OR MINERALS

The cells highlighted in green in **Table 1** represent the formation tops of the producing zones. Casing and cementing will be designed to protect hydrocarbon bearing, lost circulation, and usable quality water zones.

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3. THE OPERATORS MINIMUM SPECIFICATIONS FOR PRESSURE CONTROL

A schematic of the BOP is provided below as per the example provided in API RP 53. This schematic is a double ram type preventer with a mud cross, blind ram, pipe ram, annular, and a rotating head. The rated working pressure of the BOP stack is 5,000 psi. The BOP stack will be nipped up after surface casing has been cemented and the "A" section of the wellhead installed. All BOPE will be tested to a minimum of 500 psi over the calculated MASP for the hole interval. The pressure test will be conducted at 2500 psi. A low pressure test of 250 psi will also be performed. The BOPE will be tested every 21 days.



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4. PROPOSED CASING SETTING DEPTHS AND CEMENTING PROGRAM

The casing program for the SMU 1-12-B is outlined in the table below. The table contains specific details including weight, grades, makeup torque, and design ratings.

SMU 1-12-B Casing Program

String	Depth (ft) MD	OD (in)	ID (in)	Coupling OD (in)	Drift (in)	Weight (#/ft)	Grade	CXN	Burst (psi)	Collapse (psi)	Tension (k-lbs)	Torque (ft-lbs)		
												Minimum	Optimum	Maximum
Surface	0 – 1400"	13.375	12.615	14.375	12.459	54.5	J-55	STC	3070	1510	477	3860	5140	6430
Intermediate	0 – 5800"	9.625	8.921	10.625	8.765	36	J-55	LTC	3520	2020	453	3400	4530	5660
Production	5500" – 8617'	7	6.276	7.656	6.151	26	J-55	LTC	4980	4330	367	2750	3670	4590

Cement Program

Cement Design 13 3/8" Surface Casing								
Stage	Weight (ppg)	TOC (ft)	BOC (ft)	Hole Size (in)	% Open Hole Excess	Cement Volume (sacks)	Slurry Volume (bbls)	Remarks
Tail	13	Surface	1400	17.5	100%	990	352.54	Adjust if hole conditions change.
Top Out	15.8	Surface	-	17.5	-	200	41.32	Top out cement will be pumped if there's not any cement to surface
TAIL SLURRY								
Cement Type: VARICEM								
Additive: Mix			0.125lb/sk Poly-E-Flake (Lost Circulation Additive)					
Water Slurry			10.80 Gal/sk					
Density: 13 ppg								
Yield: 2.00 ft ³ /sack								
TOP OUT CEMENT								
Cement Type: Premium								
Additive: Mix			2% Calcium Chloride Pellets (Accelerator)					
Water Slurry			5.00 Gal/sk					
Density: 15.80 ppg								
Yield: 1.16 ft ³ /sack								

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Detailed Pumping Schedule – 13 3/8” Surface				
Fluid #	Fluid Type	Fluid Name	Surface Density lbm/gal	Volume bbl
1	Spacer	Fresh Water	8.3	50
2	Cement	Tail Cement	13	352.54
DROP PLUG				
4	Spacer	Displacement Fluid	8.3	210.12
5	Cement	Top Out Cement	15.8	41.32

Cement Design 9 5/8" Intermediate Casing								
Stage	Weight (ppg)	TOC (ft)	BOC (ft)	Hole Size (in)	% Open Hole Excess	Cement Volume (sacks)	Slurry Volume (bbls)	Remarks
Lead	13	0	5500	12.25	25%	1140	376.30	Adjust if hole conditions change.
Tail	13	5500	5800	12.25	25%	110	27.88	Adjust if hole conditions change.
LEAD SLURRY			Cement Type: EXTENDASEAL Additive: 1.5% CHEM-FOAMER 760, TOTETANK (Foamer) Additive: Mix 1 lb/sk FDP-C708-03 (Additive Material) Water Slurry 6.86 gal/sack Density: 13 ppg Yield: 1.46 ft ³ /sack					
TAIL SLURRY			Cement Type: EXTENDACEM SYSTEM Additive: Mix 1 lb/sk FDP-C708-03 (Additive Material) Water Slurry 6.86 Gal/sk Density: 13 ppg Yield: 1.46 ft3/sack					

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Detailed Pumping Schedule – 9 5/8" Intermediate Casing				
Fluid #	Fluid Type	Fluid Name	Surface Density lbm/gal	Volume bbl
1	Spacer	Tuned Spacer	11	40
2	Cement	Lead Cement	13	376.30
3	Cement	Tail Cement	13	27.88
DROP PLUG				
4	Spacer	Displacement Fluid	8.7	441.44

Cement Design 9 5/8" Intermediate Casing - CONTINGENCY								
Stage	Weight (ppg)	TOC (ft)	BOC (ft)	Hole Size (in)	% Open Hole Excess	Cement Volume (sacks)	Slurry Volume (bbls)	Remarks
Stage 1 (Tail)	13.5	3650	5800	12.25	25%	660	156.87	Adjust if hole conditions change.
Stage 2 (Lead)	12.30	0	3150	12.25	25%	610	212.43	Adjust if hole conditions change.
Stage 2 (Tail)	15.80	3150	3650	12.25	25%	100	34.86	Adjust if hole conditions change.
STAGE 1 -TAIL SLURRY								
Cement Type:			EXTENDACEM SYSTEM					
Additive: Mix			1 lb/sk FDP-C708-03 (Additive Material)					
Water Slurry			5.47 Gal/sk					
Density:			13.50 ppg					
Yield:			1.34 ft ³ /sack					
STAGE 2 - LEAD SLURRY								
Cement Type:			ECONOCCEM					
Additive:			0.4% HR-5 (Retarder)					
Additive:			1 lb/sk FDP-C708-03 (Additive Material)					
Additive: Mix			5 lb/sk Kol-Seal (Lost Circulation					
Water Slurry			Additive) 10.12 gal/sack					
Density:			12.30 ppg					
Yield:			1.97 ft ³ /sack					
STAGE 2 - TAIL SLURRY								
Cement Type:			Premium					
Mix Water			Cement 4.99					
Slurry Density:			Gal/sk 15.80 ppg					

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Yield: 1.15 ft³/sack

Cement Design 7" Production Liner								
Stage	Weight (ppg)	TOC (ft)	BOC (ft)	Hole Size (in)	% Open Hole Excess	Cement Volume (sacks)	Slurry Volume (bbls)	Remarks
Lead	13	5500	8328	8.75	25%	280	93.50	Adjust if hole conditions change.
Tail	13	8328	8617	8.75	25%	55	13.48	Adjust if hole conditions change.
LEAD SLURRY								
Cement Type:			EXTENDASEAL					
Additive:			1.5% CHEM-FOAMER 760, TOTETANK (Foamer)					
Additive: Mix			1 lb/sk FDP-C708-03 (Additive Material)					
Water Slurry			6.86 gal/sack					
Density:			13 ppg					
Yield:			1.46 ft ³ /sack					
TAIL SLURRY								
Cement Type:			EXTENDACEM SYSTEM					
Additive: Mix			1 lb/sk FDP-C708-03 (Additive Material)					
Water Slurry			6.86 Gal/sk					
Density:			13 ppg					
Yield:			1.46 ft ³ /sk					

Detailed Pumping Schedule - 7" Production Liner				
Fluid #	Fluid Type	Fluid Name	Surface Density lbm/gal	Volume bbl
1	Spacer	Tuned Spacer	11	30
2	Cement	Lead Cement	13	93.50
3	Cement	Tail Cement	13	13.48
DROP PLUG				
4	Spacer	Displacement Fluid	8.3	217.36

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Cement Design 7" Production Liner - CONTINGENCY								
Stage	Weight (ppg)	TOC (ft)	BOC (ft)	Hole Size (in)	% Open Hole Excess	Cement Volume (sacks)	Slurry Volume (bbls)	Remarks
Tail	13.50	5500	8617	8.75	25%	435	103.98	Adjust if hole conditions change.
TAIL SLURRY								
Cement Type:			EXTENDACEM SYSTEM					
Additive:			1 lb/sk FDP-C708-03 (Additive Material)					
Additive:			5 lb/sk Kol-Seal (Lost Circulation Additive)					
Additive: Mix			0.2% Super CBL (Additive Material)					
Water Slurry			5.48 Gal/sk					
Density:			13.50 ppg					
Yield:			1.35 ft ³ /sack					

5. MUD PROGRAM

Mud specifications are provided in the table below. The properties will be followed, but may change depending on hole conditions. Materials to control a lost circulation event or well control will be on site, too. These products are contained in sacks and delivered to the rigs on a pallet wrapped in plastic. The drilling operation will have a closed looped system with all returns going through a shale shaker and back into the rig's mud pit system. All cuttings will be removed via the cuttings disposal procedure and hauled off to a designated disposal site.

Hole Size (in)	Depth Interval (ft)	Fluid Type	Mud Weight (ppg)	Funnel Visc (s/qt)	PV	YP	Drill Solids (%)
17 1/2"	0 - 1400	FW spud mud	8.4 – 9.2	28-34	10-15	12-15	<8
12 1/4"	1400 – 5800	OBM*	8.7 – 9.2	40 – 45	8 – 12	10 – 14	< 6
8 3/4"	5800 – 8617	OBM*	7.9 – 8.2	40 – 45	8 – 12	10 – 14	< 6

*The OBM will contain an oil/water ratio of 80/20 – to 85/15.

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6. **LOGGING PROGRAM**

The mud logging program will consist of a quad combo log, which includes Gamma Ray, Formation Density, Neutron, and Sonic. The quad combo will be run in both intermediate and production hole intervals.

7. **ANTICIPATED PRESSURES AND TEMPERATURES**

The Dakota and Entrada formations are prone to lost circulation. The repeat sections of both the Dakota and Entrada may have the same reservoir pressure as the first set of zones above the fault, which can lead to lower pressures in the deeper repeat sections resulting in lost circulation. The Dakota pressure gradient has been estimated at 0.38 psi/ft and the Entrada at 0.35 psi/ft. Records indicate an injection test of 2500 psi was performed on a Sheep Mountain well with a TD of 4282 ft and did not break down the reservoir.

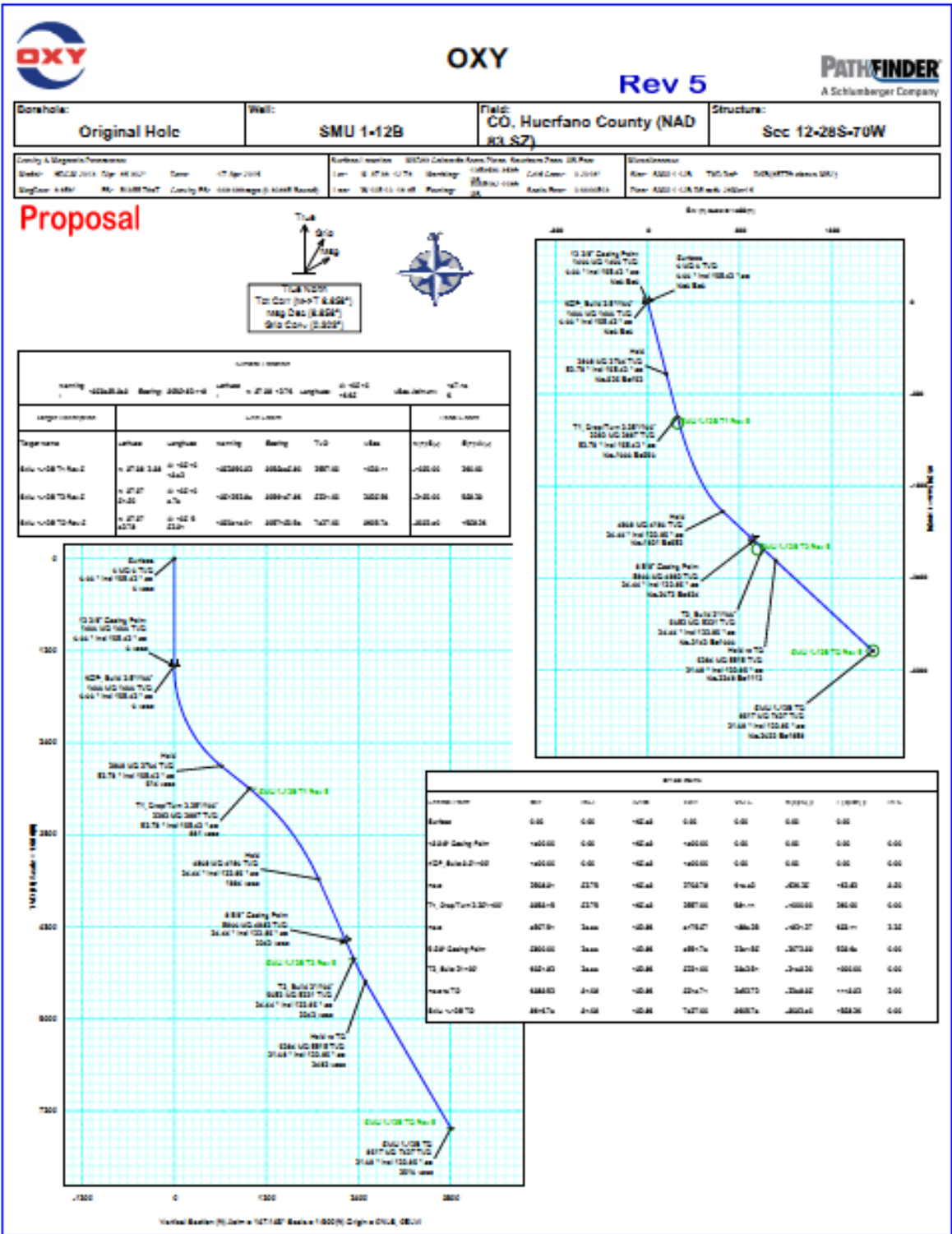
The Morrison shale can lead to wellbore instability and may be seen while drilling through the faulted zones.

Maximum bottom hole temperature will be less than 150°F.

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8. DIRECTIONAL PROGRAM

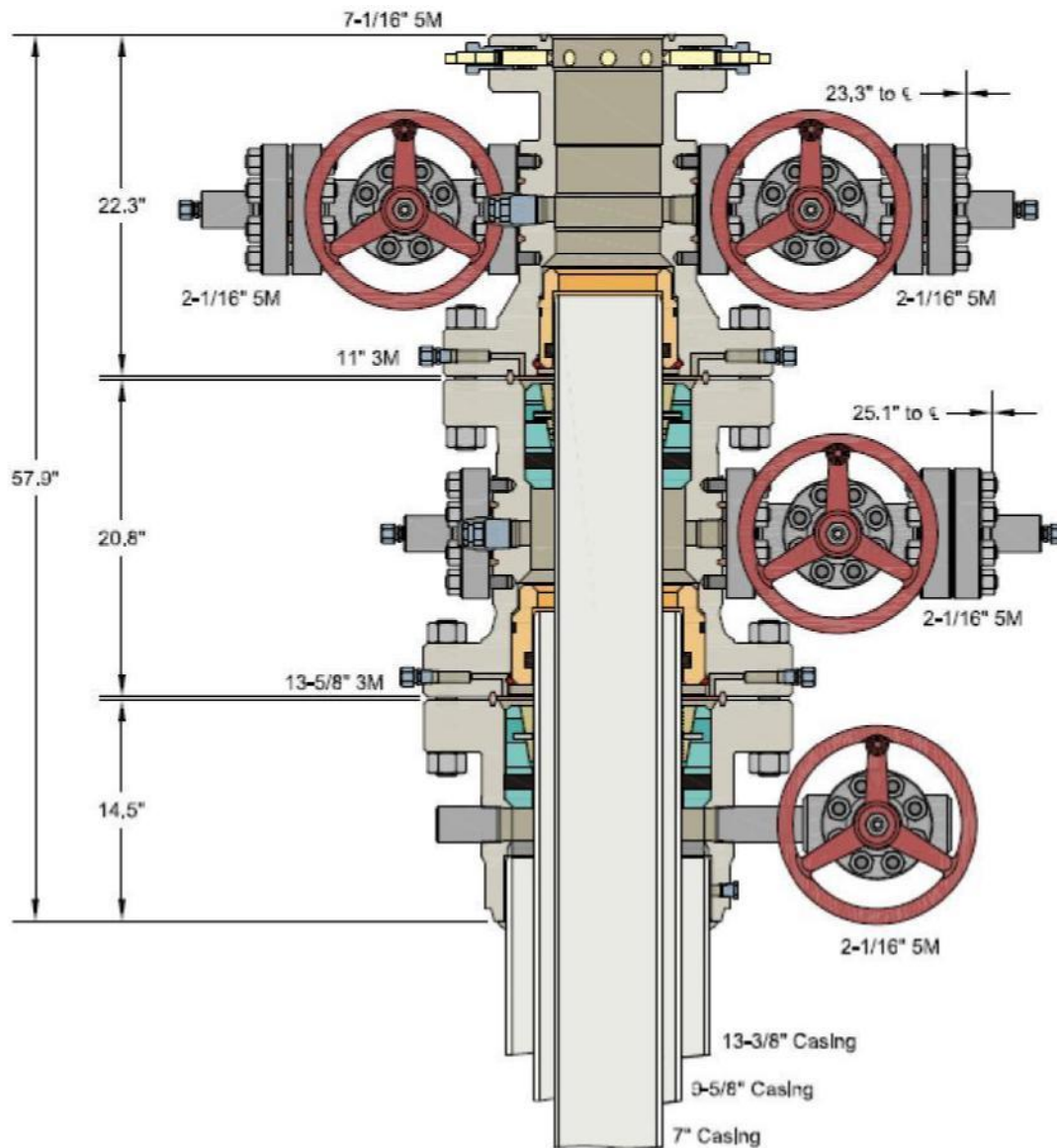
The directional plan consists of a 3D well trajectory with a maximum inclination planned for 36.69°, which is shown below in the drawing.



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9. WELLHEAD SCHEMATIC

The drawing below is a schematic of the 13-3/8" x 9-5/8" x 7" 5M Conventional Wellhead that will be used on the SMU 1-12-B.



ALL DIMENSIONS ARE APPROXIMATE

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13-3/8" x 9-5/8" x 7" 5M Conventional Wellhead
Assembly, With W2-EBS Casing Spool
and T-EBS Tubing Head

OXY USA INCORPORATED
SHEEP MOUNTAIN

DRAWN	VJK	11DEC13
APPRV	KN	11DEC13

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