



# **EPW\_RMP**

**CONCEPT WELL PLANNING - COLORADO (NAD83)**

**Sasquatch Niobrara - Freeman 3-24**

**Freeman 3-24**

**WB #2 - ST Horizontal**

**Plan: Plan #2 - Toe Up**

## **Survey Report - Geographic**

**10 May, 2012**





# Shell

## Survey Report - Geographic



<b>Company:</b>	EPW_RMP	<b>Local Co-ordinate Reference:</b>	Site Sasquatch Niobrara - Freeman 3-24
<b>Project:</b>	CONCEPT WELL PLANNING - COLORADO (NAD83)	<b>TVD Reference:</b>	DF @ 7085.00ft
<b>Site:</b>	Sasquatch Niobrara - Freeman 3-24	<b>MD Reference:</b>	DF @ 7085.00ft
<b>Well:</b>	Freeman 3-24	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	WB #2 - ST Horizontal	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Plan #2 - Toe Up	<b>Database:</b>	EDM_UA_Production

<b>Project</b>	CONCEPT WELL PLANNING - COLORADO (NAD83)		
<b>Map System:</b>	EPW NAD83	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	NAD83 [1188_4269]		
<b>Map Zone:</b>	NAD83 / UTM 13N [1188_26913]		

Site		Sasquatch Niobrara - Freeman 3-24, Colorado			
Site Position:		Northing:	13,683,861.75 usft	Latitude:	37° 41' 5.390 N
From:	Lat/Long	Easting:	1,620,852.71 usft	Longitude:	105° 4' 3.470 W
Position Uncertainty:	0.00 ft	Slot Radius:	13.200 in	Grid Convergence:	-0.04 °

Well	Freeman 3-24					
Well Position	+N/-S	0.00 ft	Northing:	13,683,861.75 usft	Latitude:	37° 41' 5.390 N
	+E/-W	0.00 ft	Easting:	1,620,852.71 usft	Longitude:	105° 4' 3.470 W
Position Uncertainty		0.00 ft	Wellhead Elevation:	7,070.01 ft	Ground Level:	7,070.01 ft

<b>Wellbore</b>	WB #2 - ST Horizontal				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	BGGM2009	1/31/2012	8.66	64.78	51,571

<b>Design</b>	Plan #2 - Toe Up				
<b>Audit Notes:</b>					
<b>Version:</b>	1	<b>Phase:</b>	PROTOTYPE	<b>Tie On Depth:</b>	3,000.00
<b>Vertical Section:</b>	<b>Depth From (TVD) (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Direction (°)</b>	
	0.00	0.00	0.00	357.93	

<b>Survey Tool Program</b>	<b>Date</b>	5/10/2012			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
3,000.00	10,553.84	Plan #2 - Toe Up (WB #2 - ST Horizontal)	EPW UNKNOWN	Survey tool used to measure well is unknown	

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
0.00	0.00	0.00	0.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
100.00	0.00	0.00	100.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
200.00	0.00	0.00	200.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
300.00	0.00	0.00	300.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
400.00	0.00	0.00	400.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
500.00	0.00	0.00	500.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
600.00	0.00	0.00	600.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
700.00	0.00	0.00	700.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
800.00	0.00	0.00	800.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
815.00	0.00	0.00	815.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
13 3/8"									



# Shell

## Survey Report - Geographic



<b>Company:</b>	EPW_RMP	<b>Local Co-ordinate Reference:</b>	Site Sasquatch Niobrara - Freeman 3-24
<b>Project:</b>	CONCEPT WELL PLANNING - COLORADO (NAD83)	<b>TVD Reference:</b>	DF @ 7085.00ft
<b>Site:</b>	Sasquatch Niobrara - Freeman 3-24	<b>MD Reference:</b>	DF @ 7085.00ft
<b>Well:</b>	Freeman 3-24	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	WB #2 - ST Horizontal	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Plan #2 - Toe Up	<b>Database:</b>	EDM_UA_Production

### Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
900.00	0.00	0.00	900.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
1,000.00	0.00	0.00	1,000.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
1,100.00	0.00	0.00	1,100.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
1,200.00	0.00	0.00	1,200.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
1,300.00	0.00	0.00	1,300.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
1,400.00	0.00	0.00	1,400.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
1,500.00	0.00	0.00	1,500.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
1,600.00	0.00	0.00	1,600.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
1,700.00	0.00	0.00	1,700.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
1,800.00	0.00	0.00	1,800.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
1,900.00	0.00	0.00	1,900.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
2,000.00	0.00	0.00	2,000.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
2,100.00	0.00	0.00	2,100.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
2,200.00	0.00	0.00	2,200.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
2,300.00	0.00	0.00	2,300.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
2,400.00	0.00	0.00	2,400.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
2,500.00	0.00	0.00	2,500.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
2,600.00	0.00	0.00	2,600.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
2,700.00	0.00	0.00	2,700.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
2,800.00	0.00	0.00	2,800.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
2,900.00	0.00	0.00	2,900.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
2,959.00	0.00	0.00	2,959.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
<b>9 5/8"</b>									
3,000.00	0.00	0.00	3,000.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
3,100.00	0.00	0.00	3,100.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
3,200.00	0.00	0.00	3,200.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
3,300.00	0.00	0.00	3,300.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
3,400.00	0.00	0.00	3,400.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
3,500.00	0.00	0.00	3,500.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
3,600.00	0.00	0.00	3,600.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
3,700.00	0.00	0.00	3,700.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
3,800.00	0.00	0.00	3,800.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
3,900.00	0.00	0.00	3,900.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
4,000.00	0.00	0.00	4,000.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
4,100.00	0.00	0.00	4,100.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
4,200.00	0.00	0.00	4,200.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
4,300.00	0.00	0.00	4,300.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
4,400.00	0.00	0.00	4,400.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
4,500.00	0.00	0.00	4,500.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
4,600.00	0.00	0.00	4,600.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
4,700.00	0.00	0.00	4,700.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
4,800.00	0.00	0.00	4,800.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
4,900.00	0.00	0.00	4,900.00	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
4,905.40	0.00	0.00	4,905.40	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
5,000.00	5.68	357.92	4,999.85	4.68	-0.17	13,683,866.43	1,620,852.54	37° 41' 5.436 N	105° 4' 3.472 W
5,100.00	11.68	357.92	5,098.66	19.75	-0.72	13,683,881.50	1,620,851.99	37° 41' 5.585 N	105° 4' 3.479 W
5,200.00	17.68	357.92	5,195.35	45.05	-1.64	13,683,906.81	1,620,851.07	37° 41' 5.836 N	105° 4' 3.491 W
5,300.00	23.68	357.92	5,288.87	80.32	-2.92	13,683,942.08	1,620,849.79	37° 41' 6.184 N	105° 4' 3.507 W
5,400.00	29.68	357.92	5,378.18	125.17	-4.55	13,683,986.92	1,620,848.17	37° 41' 6.628 N	105° 4' 3.528 W
5,500.00	35.68	357.92	5,462.32	179.10	-6.51	13,684,040.85	1,620,846.21	37° 41' 7.161 N	105° 4' 3.553 W
5,600.00	41.68	357.92	5,540.35	241.52	-8.77	13,684,103.27	1,620,843.94	37° 41' 7.779 N	105° 4' 3.581 W
5,700.00	47.68	357.92	5,611.43	311.75	-11.32	13,684,173.50	1,620,841.39	37° 41' 8.473 N	105° 4' 3.614 W
5,800.00	53.68	357.92	5,674.77	389.02	-14.13	13,684,250.77	1,620,838.58	37° 41' 9.237 N	105° 4' 3.649 W
5,900.00	59.68	357.92	5,729.68	472.49	-17.16	13,684,334.24	1,620,835.55	37° 41' 10.063 N	105° 4' 3.688 W



# Shell

## Survey Report - Geographic



<b>Company:</b>	EPW_RMP	<b>Local Co-ordinate Reference:</b>	Site Sasquatch Niobrara - Freeman 3-24
<b>Project:</b>	CONCEPT WELL PLANNING - COLORADO (NAD83)	<b>TVD Reference:</b>	DF @ 7085.00ft
<b>Site:</b>	Sasquatch Niobrara - Freeman 3-24	<b>MD Reference:</b>	DF @ 7085.00ft
<b>Well:</b>	Freeman 3-24	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	WB #2 - ST Horizontal	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Plan #2 - Toe Up	<b>Database:</b>	EDM_UA_Production

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
5,905.40	60.00	357.92	5,732.39	477.15	-17.33	13,684,338.90	1,620,835.38	37° 41' 10.109 N	105° 4' 3.690 W
6,000.00	60.00	357.92	5,779.69	559.03	-20.30	13,684,420.78	1,620,832.41	37° 41' 10.919 N	105° 4' 3.728 W
6,100.00	60.00	357.92	5,829.69	645.57	-23.45	13,684,507.32	1,620,829.26	37° 41' 11.775 N	105° 4' 3.768 W
6,105.40	60.00	357.92	5,832.39	650.24	-23.62	13,684,511.99	1,620,829.09	37° 41' 11.821 N	105° 4' 3.770 W
6,200.00	67.76	357.92	5,874.01	735.06	-26.70	13,684,596.81	1,620,826.01	37° 41' 12.660 N	105° 4' 3.809 W
6,300.00	75.96	357.92	5,905.12	829.95	-30.14	13,684,691.70	1,620,822.57	37° 41' 13.598 N	105° 4' 3.853 W
6,400.00	84.16	357.92	5,922.38	928.29	-33.72	13,684,790.04	1,620,818.99	37° 41' 14.571 N	105° 4' 3.898 W
6,471.29	90.00	357.92	5,926.01	999.41	-36.30	13,684,861.16	1,620,816.41	37° 41' 15.274 N	105° 4' 3.931 W
6,471.30	90.00	357.92	5,926.01	999.42	-36.30	13,684,861.17	1,620,816.41	37° 41' 15.274 N	105° 4' 3.931 W
7"									
6,500.00	90.29	357.92	5,925.94	1,028.10	-37.34	13,684,889.85	1,620,815.37	37° 41' 15.558 N	105° 4' 3.944 W
6,600.00	91.29	357.92	5,924.57	1,128.03	-40.97	13,684,989.78	1,620,811.74	37° 41' 16.546 N	105° 4' 3.990 W
6,700.00	92.29	357.92	5,921.45	1,227.91	-44.60	13,685,089.66	1,620,808.11	37° 41' 17.534 N	105° 4' 4.036 W
6,800.00	93.29	357.92	5,916.59	1,327.73	-48.22	13,685,189.48	1,620,804.49	37° 41' 18.521 N	105° 4' 4.082 W
6,900.00	94.29	357.92	5,909.98	1,427.44	-51.85	13,685,289.19	1,620,800.86	37° 41' 19.507 N	105° 4' 4.128 W
7,000.00	95.29	357.92	5,901.64	1,527.03	-55.46	13,685,388.77	1,620,797.25	37° 41' 20.492 N	105° 4' 4.174 W
7,100.00	96.29	357.92	5,891.55	1,626.45	-59.07	13,685,488.20	1,620,793.64	37° 41' 21.475 N	105° 4' 4.220 W
7,200.00	97.29	357.92	5,879.73	1,725.68	-62.68	13,685,587.43	1,620,790.03	37° 41' 22.457 N	105° 4' 4.266 W
7,300.00	98.29	357.92	5,866.18	1,824.69	-66.28	13,685,686.44	1,620,786.44	37° 41' 23.436 N	105° 4' 4.311 W
7,400.00	99.29	357.92	5,850.91	1,923.45	-69.86	13,685,785.20	1,620,782.85	37° 41' 24.413 N	105° 4' 4.357 W
7,500.00	100.29	357.92	5,833.91	2,021.93	-73.44	13,685,883.68	1,620,779.27	37° 41' 25.387 N	105° 4' 4.402 W
7,600.00	101.29	357.92	5,815.19	2,120.10	-77.00	13,685,981.85	1,620,775.71	37° 41' 26.358 N	105° 4' 4.447 W
7,700.00	102.29	357.92	5,794.77	2,217.92	-80.56	13,686,079.67	1,620,772.15	37° 41' 27.325 N	105° 4' 4.493 W
7,713.25	102.42	357.94	5,791.93	2,230.87	-80.62	13,686,092.62	1,620,772.09	37° 41' 27.453 N	105° 4' 4.493 W
7,800.00	102.42	357.94	5,773.28	2,315.54	-83.67	13,686,177.29	1,620,769.04	37° 41' 28.291 N	105° 4' 4.532 W
7,900.00	102.42	357.94	5,751.77	2,413.13	-87.18	13,686,274.88	1,620,765.53	37° 41' 29.256 N	105° 4' 4.577 W
8,000.00	102.42	357.94	5,730.26	2,510.73	-90.69	13,686,372.48	1,620,762.02	37° 41' 30.221 N	105° 4' 4.621 W
8,100.00	102.42	357.94	5,708.75	2,608.33	-94.21	13,686,470.08	1,620,758.51	37° 41' 31.186 N	105° 4' 4.666 W
8,200.00	102.42	357.94	5,687.25	2,705.92	-97.72	13,686,567.67	1,620,754.99	37° 41' 32.151 N	105° 4' 4.711 W
8,300.00	102.42	357.94	5,665.74	2,803.52	-101.23	13,686,665.27	1,620,751.48	37° 41' 33.117 N	105° 4' 4.755 W
8,400.00	102.42	357.94	5,644.23	2,901.12	-104.74	13,686,762.86	1,620,747.97	37° 41' 34.082 N	105° 4' 4.800 W
8,500.00	102.42	357.94	5,622.73	2,998.72	-108.26	13,686,860.46	1,620,744.45	37° 41' 35.047 N	105° 4' 4.844 W
8,600.00	102.42	357.94	5,601.22	3,096.31	-111.77	13,686,958.06	1,620,740.94	37° 41' 36.012 N	105° 4' 4.889 W
8,700.00	102.42	357.94	5,579.71	3,193.91	-115.28	13,687,055.65	1,620,737.43	37° 41' 36.978 N	105° 4' 4.934 W
8,800.00	102.42	357.94	5,558.21	3,291.51	-118.79	13,687,153.25	1,620,733.92	37° 41' 37.943 N	105° 4' 4.978 W
8,900.00	102.42	357.94	5,536.70	3,389.10	-122.31	13,687,250.85	1,620,730.40	37° 41' 38.908 N	105° 4' 5.023 W
9,000.00	102.42	357.94	5,515.19	3,486.70	-125.82	13,687,348.44	1,620,726.89	37° 41' 39.873 N	105° 4' 5.067 W
9,100.00	102.42	357.94	5,493.69	3,584.30	-129.33	13,687,446.04	1,620,723.38	37° 41' 40.838 N	105° 4' 5.112 W
9,200.00	102.42	357.94	5,472.18	3,681.89	-132.85	13,687,543.64	1,620,719.87	37° 41' 41.804 N	105° 4' 5.157 W
9,300.00	102.42	357.94	5,450.67	3,779.49	-136.36	13,687,641.23	1,620,716.35	37° 41' 42.769 N	105° 4' 5.201 W
9,400.00	102.42	357.94	5,429.16	3,877.09	-139.87	13,687,738.83	1,620,712.84	37° 41' 43.734 N	105° 4' 5.246 W
9,500.00	102.42	357.94	5,407.66	3,974.68	-143.38	13,687,836.43	1,620,709.33	37° 41' 44.699 N	105° 4' 5.290 W
9,600.00	102.42	357.94	5,386.15	4,072.28	-146.90	13,687,934.02	1,620,705.82	37° 41' 45.665 N	105° 4' 5.335 W
9,700.00	102.42	357.94	5,364.64	4,169.88	-150.41	13,688,031.62	1,620,702.30	37° 41' 46.630 N	105° 4' 5.380 W
9,800.00	102.42	357.94	5,343.14	4,267.47	-153.92	13,688,129.22	1,620,698.79	37° 41' 47.595 N	105° 4' 5.424 W
9,900.00	102.42	357.94	5,321.63	4,365.07	-157.43	13,688,226.81	1,620,695.28	37° 41' 48.560 N	105° 4' 5.469 W
10,000.00	102.42	357.94	5,300.12	4,462.67	-160.95	13,688,324.41	1,620,691.77	37° 41' 49.525 N	105° 4' 5.513 W
10,100.00	102.42	357.94	5,278.62	4,560.26	-164.46	13,688,422.01	1,620,688.25	37° 41' 50.491 N	105° 4' 5.558 W
10,200.00	102.42	357.94	5,257.11	4,657.86	-167.97	13,688,519.60	1,620,684.74	37° 41' 51.456 N	105° 4' 5.603 W
10,300.00	102.42	357.94	5,235.60	4,755.46	-171.48	13,688,617.20	1,620,681.23	37° 41' 52.421 N	105° 4' 5.647 W
10,400.00	102.42	357.94	5,214.10	4,853.05	-175.00	13,688,714.79	1,620,677.72	37° 41' 53.386 N	105° 4' 5.692 W
10,500.00	102.42	357.94	5,192.59	4,950.65	-178.51	13,688,812.39	1,620,674.20	37° 41' 54.352 N	105° 4' 5.736 W
10,553.00	102.42	357.94	5,181.19	5,002.38	-180.37	13,688,864.12	1,620,672.34	37° 41' 54.863 N	105° 4' 5.760 W
4 1/2"									



# Shell

## Survey Report - Geographic



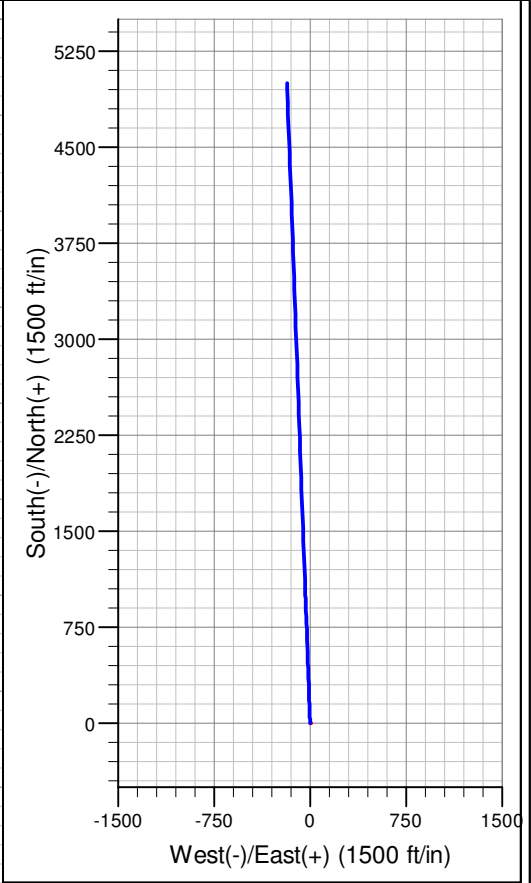
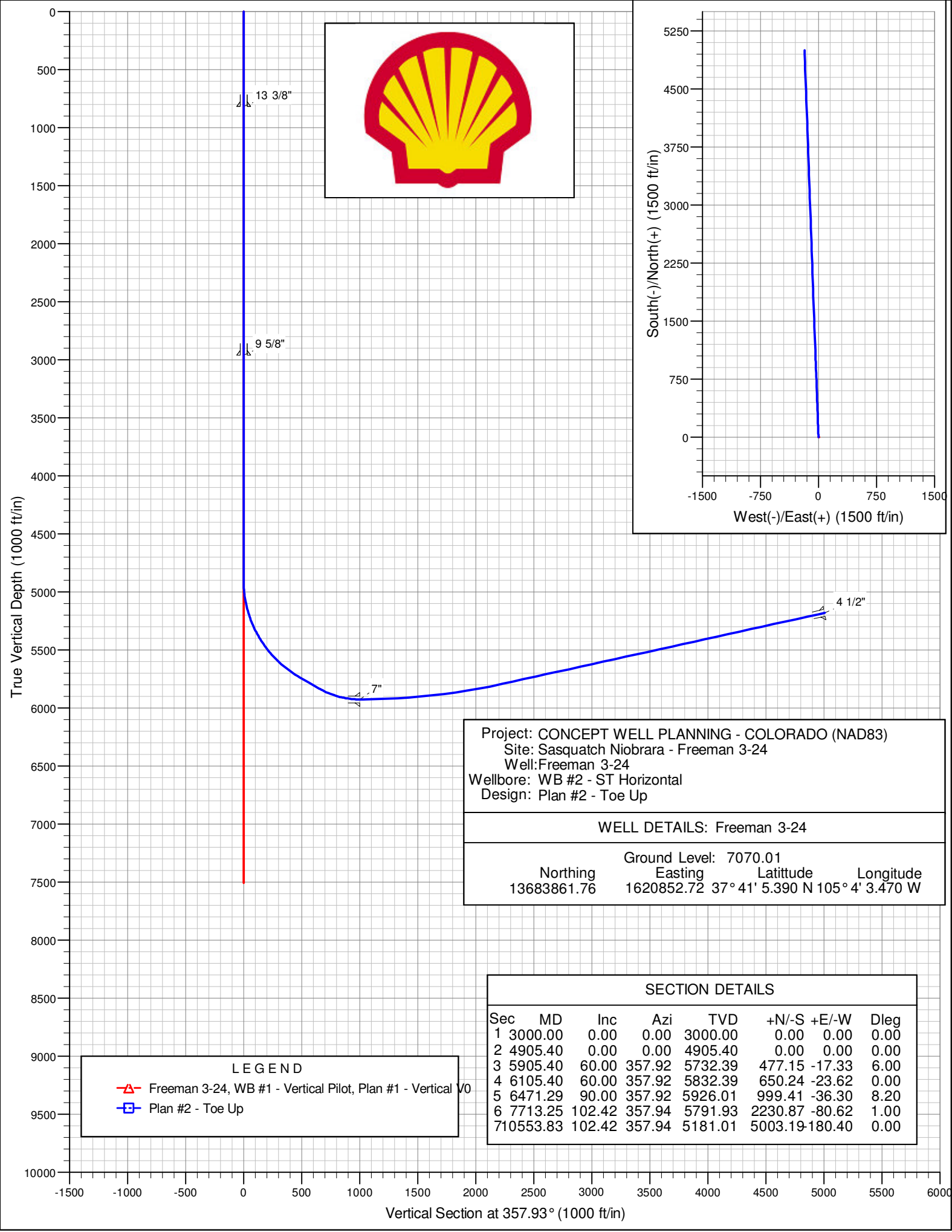
<b>Company:</b>	EPW_RMP	<b>Local Co-ordinate Reference:</b>	Site Sasquatch Niobrara - Freeman 3-24
<b>Project:</b>	CONCEPT WELL PLANNING - COLORADO (NAD83)	<b>TVD Reference:</b>	DF @ 7085.00ft
<b>Site:</b>	Sasquatch Niobrara - Freeman 3-24	<b>MD Reference:</b>	DF @ 7085.00ft
<b>Well:</b>	Freeman 3-24	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	WB #2 - ST Horizontal	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Plan #2 - Toe Up	<b>Database:</b>	EDM-UA_Production

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
10,553.84	102.42	357.94	5,181.01	5,003.19	-180.40	13,688,864.93	1,620,672.31	37° 41' 54.871 N	105° 4' 5.760 W

Design Targets									
Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Vulcan 4,000' TVD - plan hits target center - Point	0.00	0.01	4,015.01	0.00	0.00	13,683,861.75	1,620,852.71	37° 41' 5.390 N	105° 4' 3.470 W
V5 - plan hits target center - Point	0.00	0.01	5,181.01	5,003.19	-180.40	13,688,864.93	1,620,672.31	37° 41' 54.871 N	105° 4' 5.760 W
V3 - plan misses target center by 660.05ft at 6437.63ft MD (5925.20 TVD, 965.78 N, -35.08 E) - Point	0.00	0.01	5,266.01	999.41	-36.40	13,684,861.16	1,620,816.31	37° 41' 15.274 N	105° 4' 3.932 W
V6 - plan misses target center by 652.37ft at 10410.17ft MD (5211.91 TVD, 4862.98 N, -175.35 E) - Point	0.00	0.01	5,849.01	5,003.19	-180.40	13,688,864.93	1,620,672.31	37° 41' 54.871 N	105° 4' 5.760 W
V4 - plan hits target center - Point	0.00	0.01	5,926.01	999.41	-36.30	13,684,861.16	1,620,816.41	37° 41' 15.274 N	105° 4' 3.931 W

Casing Points					
Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (in)	Hole Diameter (in)	
815.00	815.00	13 3/8"	13.375	17.500	
2,959.00	2,959.00	9 5/8"	9.625	12.250	
6,471.30	5,926.01	7"	7.000	8.500	
10,553.00	5,181.19	4 1/2"	4.500	6.125	

Checked By: _____	Approved By: _____	Date: _____
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Project: CONCEPT WELL PLANNING - COLORADO (NAD83)  
Site: Sasquatch Niobrara - Freeman 3-24  
Well:Freeman 3-24  
Wellbore: WB #2 - ST Horizontal  
Design: Plan #2 - Toe Up

WELL DETAILS: Freeman 3-24

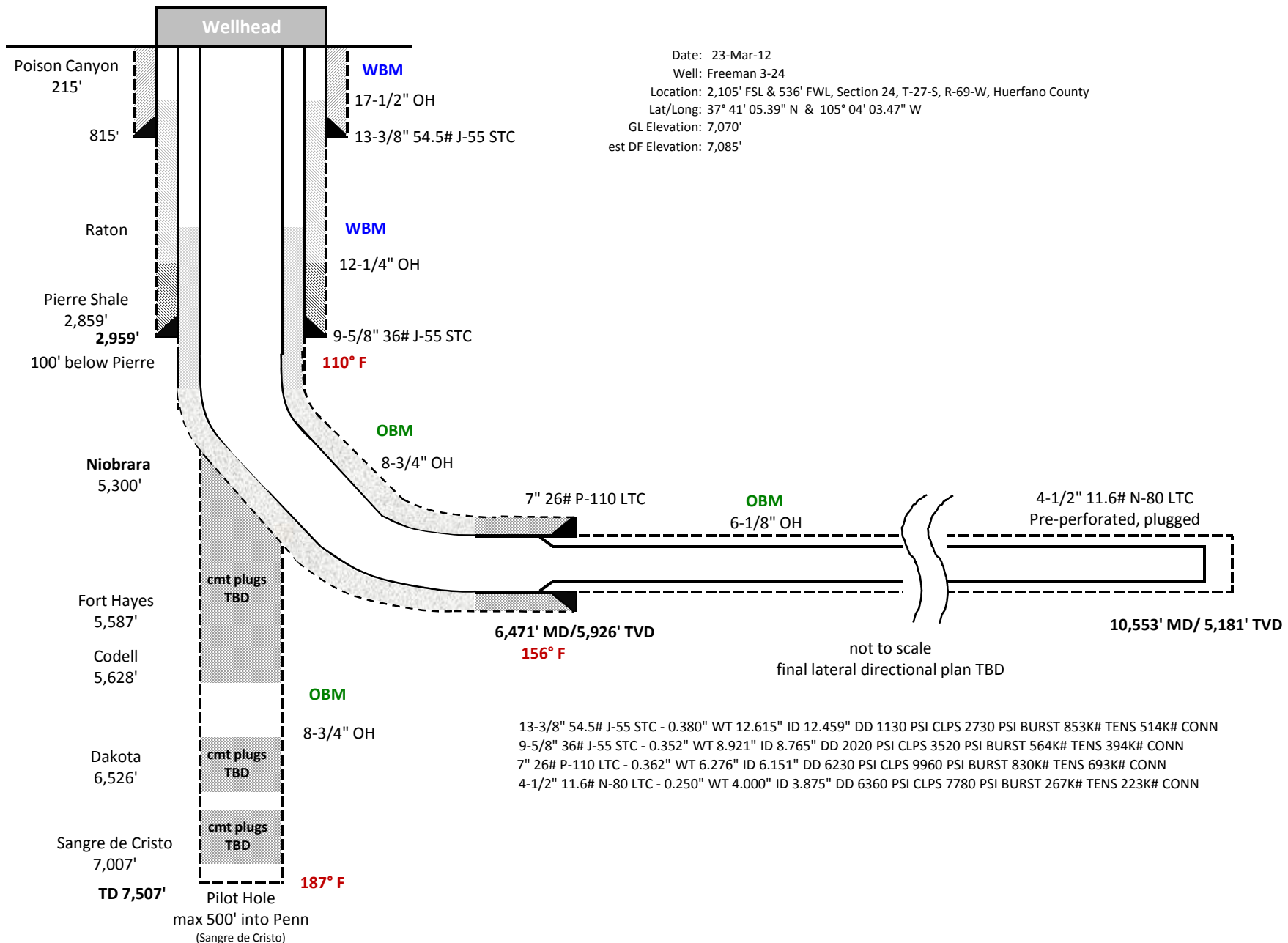
Ground Level: 7070.01			
Northing 13683861.76	Easting 1620852.72	Latitude 37° 41' 5.390 N	Longitude 105° 4' 3.470 W

LEGEND

- Freeman 3-24, WB #1 - Vertical Pilot, Plan #1 - Vertical V0
- Plan #2 - Toe Up

SECTION DETAILS							
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg
1	3000.00	0.00	0.00	3000.00	0.00	0.00	0.00
2	4905.40	0.00	0.00	4905.40	0.00	0.00	0.00
3	5905.40	60.00	357.92	5732.39	477.15	-17.33	6.00
4	6105.40	60.00	357.92	5832.39	650.24	-23.62	0.00
5	6471.29	90.00	357.92	5926.01	999.41	-36.30	8.20
6	7713.25	102.42	357.94	5791.93	2230.87	-80.62	1.00
7	10553.83	102.42	357.94	5181.01	5003.19	180.40	0.00

# Freeman 3-24



SASQUATCH NIOBRARA  
HUERFANO COUNTY, COLORADO

## Drilling and Completion Plan – Pilot and Horizontal Hole

This well is a “toe-up” horizontal well with a pilot hole. See attached directional plan for well.

Hole sizes and depths of casing strings will vary by hole and are detailed on Form 2. All casing will be new, range 3 casing.

After setting the intermediate casing on this well, a vertical or near-vertical pilot hole will be drilled penetrating the Niobrara, into the underlying Carlile formation. After obtaining appropriate geological data from the pilot hole, the main lateral borehole will be sidetracked away from the pilot hole and drilled to TD.

The purpose of the pilot hole is to obtain subsurface data that cannot easily be obtained in the horizontal production section. The pilot hole provides the following:

- Wellbore for obtaining core samples,
- The near-vertical trajectory of pilot hole is preferred for open hole logs over the toe-up horizontal section,
- Formation data obtained from the pilot hole greatly improves accuracy of depth control during drilling of the subsequent horizontal section.

Subsequent to obtaining all necessary subsurface data from pilot hole, the pilot hole will be plugged back with cement and an open-hole sidetrack will be performed to drill the lateral portion of the wellbore.

Completion of the main lateral borehole will consist of an open-hole section covered by a perforated or slotted liner run to the well TD by the drilling rig. The producing interval will be the Niobrara Formation and will start below the intermediate casing string set point near the top of the Niobrara Formation. If drilling with casing is required, a contingency will be to perforate the liner once landed in the well.

Artificial lift will consist of a sucker rod and pump jack system. The tubing will be run near the low spot of the well, the “heel”, and anchored above the producing interval. The sucker rods will be run with the pump set near the end of the tubing. All tubing and sucker rod equipment will be run with a BOP package and a kill weight completion fluid system. The well will be initially swabbed for fluid clean up and flow testing. Frac'ing or additional reservoir stimulation methods will not be applied to this first exploration well.