

15-43841

WPXENERGY

Company: WPX Energy

Site: Cavern State 16

Well: 1H

Project: Eddy County, New Mexico (NAD 83)

Rig Name: Orion Phoenix

MS Energy Services
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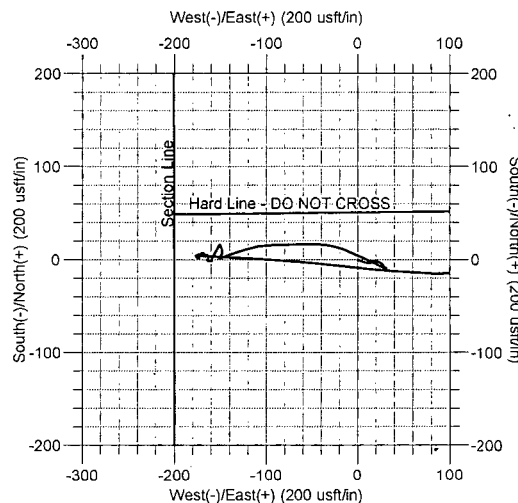
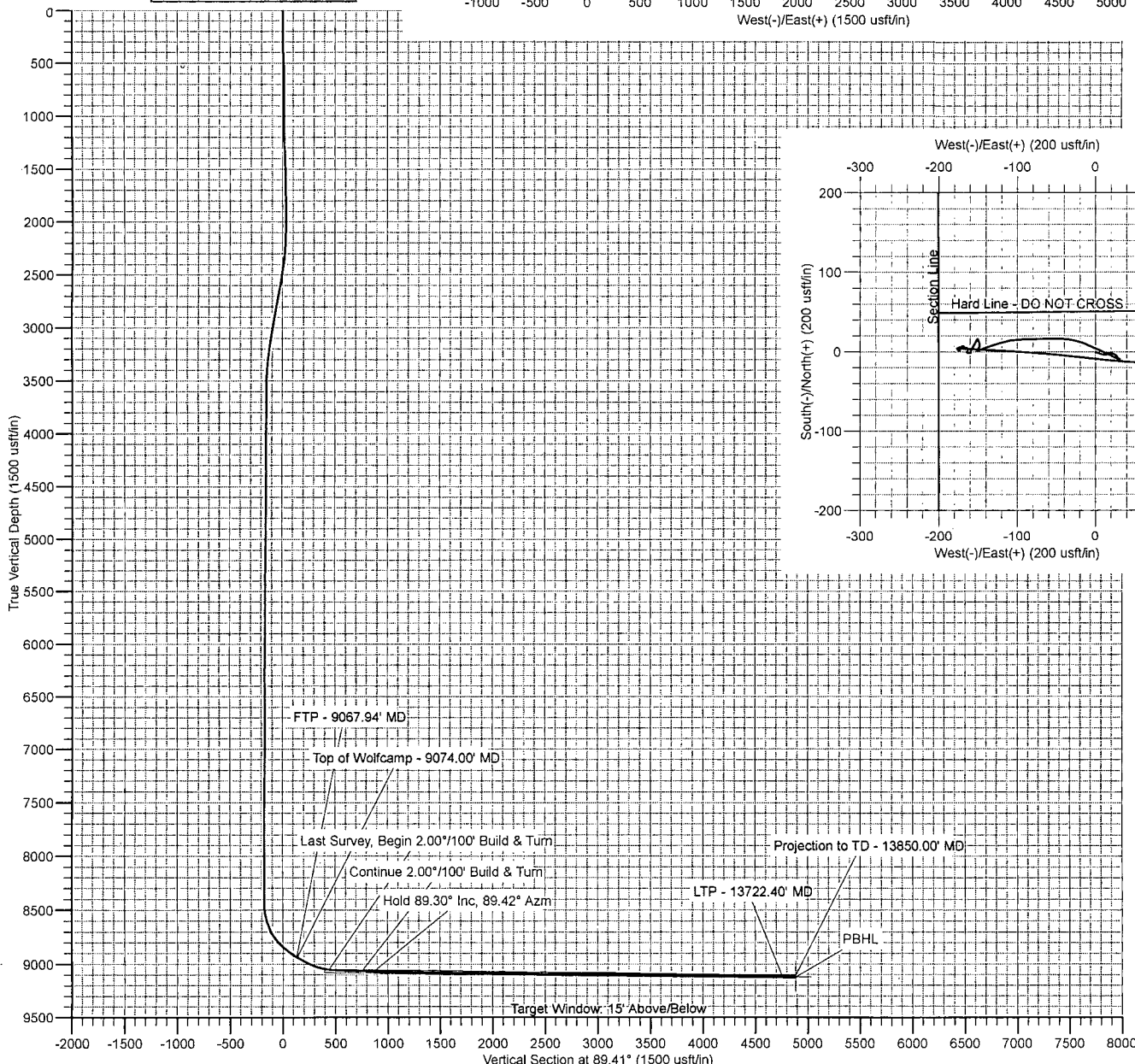
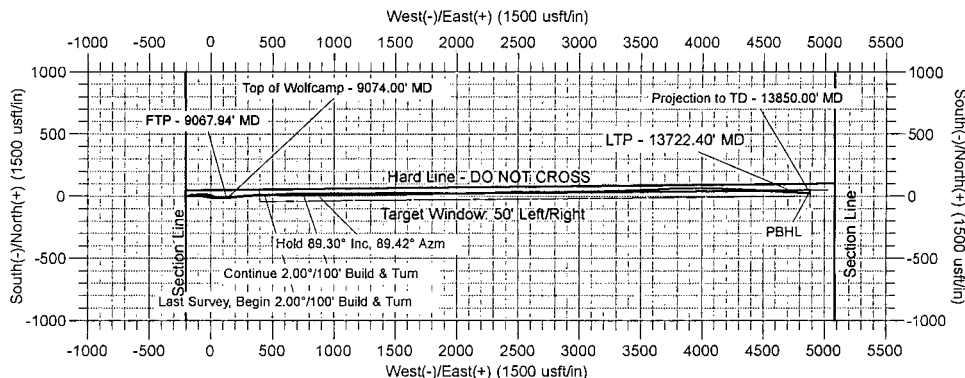
US State Plane 1983
New Mexico Eastern Zone

ANNOTATIONS

Created By: HLH
Date: 10.05, August 29 2016
Plan: Design #4

MD	Inc	Azi	TVD	+N/-S	+E/-W	VSec	Departure	Annotation
9400.00	84.21	88.02	9050.69	9.98	436.66	436.74	0.00	Last Survey, Begin 2.00°/100' Build & Turn
9714.58	89.25	91.76	9068.63	10.55	750.57	750.64	313.97	Continue 2.00°/100' Build & Turn
9832.19	89.30	89.42	9070.11	9.34	868.15	868.20	431.57	Hold 89.30° Inc, 89.42° Azm
13850.18	89.30	89.42	9119.20	50.01	4885.64	4885.90	4449.26	PBHL

FTP 9067.94' MD 8933.63' TVD 330' FWL 2295.03' FSL
POP (Wolfcamp Top) 9074.00' MD 8936.71' TVD 335.21' FWL 2293.61' FSL
LTP 13722.40' MD 9109.79' TVD 330' FEL 2292.21' FSL
Projection to TD 13850.00' MD 9110.84' TVD 202.72' FEL 2282.19' FSL



The customer should only rely on this document after independently verifying all paths, targets, coordinates, lease and hard lines represented.

Any decisions made or wells drilled utilizing this or any other information supplied by MS Energy are at the sole risk and responsibility of the customer. MS Energy is not responsible for the accuracy of this schematic or the information contained herein.

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OCT 18 2016

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WPX Energy

Eddy County, New Mexico (NAD 83)

Cavern State 16

1H

Wellbore #1

Design: Surveys

Standard Survey Report

29 August, 2016

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Company:	WPX Energy	Local Co-ordinate Reference:	Well 1H
Project:	Eddy County, New Mexico (NAD 83)	TVD Reference:	WELL @ 3182.50usft (Orion Phoenix)
Site:	Cavern State 16	MD Reference:	WELL @ 3182.50usft (Orion Phoenix)
Well:	1H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Surveys	Database:	EDM Conroe

Project	Eddy County, New Mexico (NAD 83)		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		

Well	1H		
Well Position	+N/-S	0.00 usft	Northing: 474,317.18 usft
	+E/-W	0.00 usft	Easting: 581,628.88 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft
		Latitude:	32° 18' 14.054 N
		Longitude:	104° 12' 10.527 W
		Ground Level:	3,157.50 usft

Wellbore	Wellbore #1		
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Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	User Defined	8/10/2016	7.66	60.10	48,142

Design	Surveys		
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Audit Notes:				
Version:	1.0	Phase:	ACTUAL	Tie On Depth: 0.00

Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.00	0.00	0.00	89.41

Survey Program		Date	8/29/2016		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
155.00	2,106.00	MS MWD (Wellbore #1)	MWD	OWSG MWD - Standard	
2,162.00	13,850.00	MS MWD + Surcon MSA (Wellbore #1)	MWD	OWSG MWD - Standard	

Survey	Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	155.00	0.60	105.00	155.00	-0.21	0.78	0.78	0.39	0.39	0.00
	307.00	1.30	114.10	306.98	-1.12	3.13	3.11	0.47	0.46	5.99
	404.00	1.90	107.40	403.94	-2.05	5.67	5.64	0.65	0.62	-6.91
	518.00	2.10	105.00	517.87	-3.16	9.49	9.45	0.19	0.18	-2.11
	698.00	0.60	67.20	697.82	-3.64	13.54	13.50	0.93	-0.83	-21.00
	789.00	0.50	33.80	788.81	-3.13	14.20	14.17	0.36	-0.11	-36.70
	879.00	0.50	43.50	878.81	-2.52	14.69	14.66	0.09	0.00	10.78
	970.00	0.40	32.70	969.80	-1.96	15.13	15.11	0.14	-0.11	-11.87
	1,060.00	0.40	41.20	1,059.80	-1.46	15.51	15.50	0.07	0.00	9.44
	1,150.00	0.70	84.00	1,149.80	-1.17	16.27	16.25	0.54	0.33	47.56
	1,240.00	2.00	100.50	1,239.77	-1.40	18.36	18.34	1.49	1.44	18.33
	1,331.00	3.00	105.80	1,330.68	-2.34	22.21	22.18	1.13	1.10	5.82
	1,420.00	2.10	126.40	1,419.60	-3.94	25.76	25.72	1.43	-1.01	23.15
	1,511.00	0.70	164.90	1,510.57	-5.46	27.25	27.19	1.77	-1.54	42.31

Company:	WPX Energy	Local Co-ordinate Reference:	Well 1H
Project:	Eddy County, New Mexico (NAD 83)	TVD Reference:	WELL @ 3182.50usft (Orion Phoenix)
Site:	Cavern State 16	MD Reference:	WELL @ 3182.50usft (Orion Phoenix)
Well:	1H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Surveys	Database:	EDM Conroe

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
1,601.00	0.90	147.80	1,600.56	-6.59	27.77	27.70	0.34	0.22	-19.00
1,695.00	2.20	121.00	1,694.53	-8.15	29.71	29.62	1.55	1.38	-28.51
1,790.00	0.30	103.10	1,789.50	-9.14	31.51	31.42	2.02	-2.00	-18.84
1,885.00	0.20	298.90	1,884.50	-9.12	31.61	31.52	0.52	-0.11	-172.84
1,979.00	0.40	272.30	1,978.50	-9.03	31.14	31.05	0.25	0.21	-28.30
2,074.00	0.40	226.20	2,073.49	-9.24	30.57	30.47	0.33	0.00	-48.53
2,106.00	0.40	231.40	2,105.49	-9.39	30.40	30.30	0.11	0.00	16.25
2,162.00	0.71	277.13	2,161.49	-9.47	29.91	29.81	0.92	0.54	81.67
2,258.00	3.39	302.27	2,257.42	-7.88	26.92	26.84	2.89	2.80	26.18
2,353.00	7.01	294.13	2,352.02	-4.01	19.25	19.21	3.87	3.80	-8.56
2,448.00	10.00	293.54	2,445.96	1.66	6.39	6.41	3.16	3.15	-0.63
2,542.00	11.02	294.09	2,538.38	8.59	-9.29	-9.20	1.08	1.08	0.59
2,638.00	10.62	283.34	2,632.69	14.37	-26.27	-26.12	2.14	-0.41	-11.20
2,733.00	10.53	271.43	2,726.08	16.61	-43.47	-43.30	2.30	-0.10	-12.54
2,828.00	10.22	268.81	2,819.53	16.65	-60.58	-60.41	0.59	-0.32	-2.76
2,923.00	10.00	268.85	2,913.05	16.31	-77.26	-77.08	0.24	-0.24	0.04
3,018.00	9.43	268.56	3,006.69	15.95	-93.28	-93.11	0.61	-0.60	-0.30
3,113.00	9.43	260.10	3,100.41	14.42	-108.72	-108.57	1.46	0.00	-8.91
3,208.00	7.62	252.23	3,194.36	11.16	-122.38	-122.26	2.26	-1.90	-8.28
3,302.00	7.40	251.23	3,287.56	7.31	-134.05	-133.97	0.27	-0.23	-1.06
3,397.00	4.71	253.06	3,382.02	4.20	-143.58	-143.53	2.84	-2.83	1.93
3,493.00	2.51	242.73	3,477.82	2.09	-149.22	-149.19	2.38	-2.29	-10.76
3,588.00	0.40	4.97	3,572.80	1.46	-151.05	-151.02	2.89	-2.23	128.67
3,682.00	1.01	39.41	3,666.79	2.43	-150.49	-150.46	0.77	0.66	36.64
3,778.00	0.88	30.97	3,762.77	3.72	-149.57	-149.52	0.20	-0.14	-8.79
3,872.00	0.79	27.37	3,856.76	4.91	-148.90	-148.84	0.11	-0.09	-3.83
3,967.00	0.71	25.97	3,951.76	6.02	-148.34	-148.27	0.09	-0.09	-1.48
4,062.00	0.62	15.55	4,046.75	7.04	-147.95	-147.87	0.16	-0.09	-10.97
4,156.00	0.70	11.33	4,140.74	8.10	-147.70	-147.61	0.11	0.09	-4.49
4,250.00	0.62	347.10	4,234.74	9.16	-147.70	-147.60	0.31	-0.09	-25.77
4,346.00	0.79	339.14	4,330.73	10.28	-148.05	-147.94	0.21	0.18	-8.29
4,441.00	0.88	339.78	4,425.72	11.58	-148.54	-148.41	0.09	0.09	0.68
4,536.00	1.01	339.89	4,520.71	13.06	-149.08	-148.94	0.14	0.14	0.11
4,630.00	1.01	339.82	4,614.69	14.62	-149.65	-149.49	0.00	0.00	-0.07
4,725.00	0.79	339.04	4,709.68	16.02	-150.18	-150.00	0.23	-0.23	-0.83
4,821.00	0.88	211.45	4,805.68	16.01	-150.80	-150.63	1.57	0.09	-132.90
4,916.00	1.19	206.73	4,900.66	14.51	-151.62	-151.47	0.34	0.32	-4.96
5,010.00	1.19	212.57	4,994.64	12.81	-152.59	-152.45	0.13	0.00	6.21
5,105.00	1.32	210.17	5,089.62	11.03	-153.67	-153.55	0.15	0.14	-2.52
5,200.00	1.32	207.48	5,184.59	9.11	-154.73	-154.62	0.07	0.00	-2.83
5,295.00	1.41	207.66	5,279.57	7.11	-155.77	-155.69	0.09	0.09	0.18
5,390.00	1.32	207.82	5,374.54	5.10	-156.83	-156.77	0.09	-0.09	0.17
5,485.00	1.19	213.36	5,469.52	3.31	-157.88	-157.84	0.19	-0.14	5.83

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Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
5,580.00	1.01	210.68	5,564.50	1.76	-158.85	-158.83	0.19	-0.19	-2.82	
5,675.00	0.70	181.28	5,659.49	0.46	-159.29	-159.28	0.56	-0.32	-30.94	
5,770.00	0.62	136.13	5,754.48	-0.50	-158.95	-158.95	0.54	-0.09	-47.53	
5,865.00	0.22	240.10	5,849.48	-0.96	-158.76	-158.76	0.74	-0.42	109.44	
5,960.00	0.62	267.41	5,944.48	-1.07	-159.43	-159.43	0.46	0.42	28.75	
6,055.00	1.10	260.74	6,039.47	-1.24	-160.84	-160.84	0.52	0.51	-7.03	
6,150.00	1.72	277.44	6,134.44	-1.20	-163.15	-163.15	0.77	0.65	17.58	
6,245.00	1.10	30.74	6,229.42	-0.23	-164.10	-164.09	2.50	-0.65	119.26	
6,339.00	1.10	30.30	6,323.40	1.32	-163.18	-163.16	0.01	0.00	-0.47	
6,434.00	0.88	350.42	6,418.39	2.83	-162.84	-162.80	0.74	-0.23	-41.97	
6,528.00	1.10	317.43	6,512.38	4.21	-163.57	-163.52	0.64	0.23	-35.10	
6,624.00	0.40	73.56	6,608.37	4.98	-163.88	-163.82	1.38	-0.73	120.98	
6,718.00	0.09	212.58	6,702.37	5.01	-163.60	-163.54	0.50	-0.33	147.89	
6,813.00	0.62	247.13	6,797.37	4.75	-164.11	-164.06	0.58	0.56	36.37	
6,908.00	0.62	258.97	6,892.36	4.46	-165.09	-165.03	0.13	0.00	12.46	
7,003.00	0.79	307.93	6,987.36	4.76	-166.11	-166.05	0.64	0.19	51.54	
7,097.00	1.10	309.76	7,081.34	5.74	-167.31	-167.25	0.33	0.33	1.95	
7,193.00	1.19	312.85	7,177.32	7.01	-168.75	-168.67	0.11	0.09	3.22	
7,288.00	0.22	193.18	7,272.32	7.50	-169.52	-169.43	1.38	-1.02	-125.97	
7,382.00	0.62	222.24	7,366.32	6.95	-169.90	-169.82	0.47	0.42	30.92	
7,477.00	0.48	247.46	7,461.31	6.42	-170.61	-170.54	0.29	-0.14	26.55	
7,572.00	1.01	261.09	7,556.30	6.13	-171.81	-171.74	0.58	0.56	14.34	
7,667.00	1.32	261.41	7,651.28	5.84	-173.73	-173.66	0.32	0.32	0.33	
7,761.00	1.01	181.13	7,745.27	4.85	-174.81	-174.75	1.62	-0.33	-85.40	
7,856.00	1.19	121.99	7,840.25	3.49	-173.99	-173.95	1.15	0.19	-62.25	
7,951.00	0.31	139.88	7,935.25	2.77	-172.99	-172.96	0.95	-0.93	18.83	
8,046.00	0.62	215.66	8,030.24	2.16	-173.13	-173.10	0.65	0.32	79.77	
8,141.00	0.62	254.55	8,125.24	1.61	-173.92	-173.89	0.43	0.00	40.94	
8,236.00	0.70	323.21	8,220.23	1.94	-174.76	-174.73	0.79	0.09	72.27	
8,331.00	0.88	329.99	8,315.22	3.04	-175.47	-175.43	0.21	0.19	7.14	
8,385.00	0.88	312.83	8,369.22	3.68	-175.99	-175.94	0.49	0.00	-31.78	
8,453.00	0.62	330.02	8,437.21	4.35	-176.55	-176.50	0.51	-0.39	25.28	
8,547.00	8.88	94.33	8,530.85	4.24	-169.56	-169.50	9.83	8.79	132.25	
8,642.00	18.68	93.19	8,623.00	2.84	-147.00	-146.97	10.32	10.32	-1.21	
8,736.00	30.41	92.64	8,708.36	0.90	-108.07	-108.06	12.49	12.48	-0.58	
8,831.00	41.04	95.72	8,785.38	-3.33	-52.85	-52.89	11.34	11.19	3.24	
8,925.00	49.18	95.86	8,851.66	-10.05	13.35	13.24	8.66	8.66	0.15	
9,020.00	57.33	91.67	8,908.46	-14.90	89.22	89.06	9.28	8.58	-4.41	
9,067.94	59.35	86.82	8,933.63	-14.34	130.00	129.85	9.59	4.21	-10.13	
FTP - 9067.94' MD										
9,074.00	59.62	86.22	8,936.71	-14.03	135.21	135.06	9.59	4.42	-9.89	
Top of Wolfcamp - 9074.00' MD										
9,115.00	61.50	82.25	8,956.87	-10.43	170.73	170.61	9.59	4.59	-9.68	
9,210.00	64.77	84.45	8,999.80	-0.64	254.89	254.87	4.02	3.44	2.32	

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Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
9,305.00	74.28	86.98	9,032.99	5.93	343.53	343.57	10.32	10.02	2.66
9,400.00	84.21	88.02	9,050.69	9.98	436.66	436.74	10.51	10.45	1.09
9,478.00	87.29	88.28	9,056.47	12.48	514.39	514.49	3.96	3.94	0.33
9,524.00	86.89	87.14	9,058.80	14.32	560.30	560.41	2.64	-0.87	-2.50
9,614.00	88.00	87.61	9,062.82	18.44	650.11	650.27	1.34	1.23	0.53
9,706.00	89.01	90.05	9,065.22	20.31	742.05	742.22	2.86	1.10	2.64
9,797.00	89.01	90.48	9,066.80	19.89	833.04	833.20	0.48	0.00	0.48
9,887.00	87.69	90.23	9,069.40	19.34	923.00	923.15	1.49	-1.47	-0.28
9,978.00	87.69	90.04	9,073.07	19.12	1,013.92	1,014.06	0.20	0.00	-0.20
10,069.00	86.41	89.35	9,077.76	19.60	1,104.80	1,104.94	1.60	-1.41	-0.76
10,160.00	87.51	89.34	9,082.59	20.64	1,195.66	1,195.81	1.21	1.21	0.00
10,250.00	91.70	90.67	9,083.22	20.63	1,285.64	1,285.78	4.88	4.65	1.47
10,341.00	88.21	88.90	9,083.29	20.98	1,376.62	1,376.76	4.29	-3.83	-1.94
10,432.00	87.60	88.91	9,086.61	22.72	1,467.54	1,467.70	0.68	-0.68	0.01
10,523.00	89.32	90.67	9,089.06	23.06	1,558.50	1,558.66	2.70	1.89	1.93
10,614.00	90.42	90.40	9,089.27	22.22	1,649.49	1,649.64	1.24	1.21	-0.29
10,705.00	90.29	89.88	9,088.71	21.99	1,740.49	1,740.63	0.59	-0.15	-0.57
10,796.00	88.22	89.61	9,089.90	22.40	1,831.48	1,831.61	2.29	-2.27	-0.30
10,887.00	88.39	89.52	9,092.59	23.09	1,922.44	1,922.57	0.21	0.19	-0.09
10,978.00	91.61	90.22	9,092.59	23.30	2,013.42	2,013.56	3.62	3.54	0.76
11,069.00	89.80	89.61	9,091.47	23.44	2,104.41	2,104.54	2.10	-1.98	-0.67
11,160.00	91.12	89.53	9,090.74	24.13	2,195.40	2,195.54	1.45	1.45	-0.09
11,251.00	87.38	86.98	9,091.93	26.89	2,286.33	2,286.49	4.98	-4.12	-2.79
11,342.00	89.89	88.11	9,094.10	30.79	2,377.21	2,377.40	3.02	2.76	1.23
11,433.00	91.12	88.98	9,093.30	33.10	2,468.18	2,468.39	1.66	1.36	0.96
11,524.00	91.30	90.40	9,091.37	33.60	2,559.15	2,559.36	1.57	0.19	1.56
11,615.00	92.09	90.68	9,088.68	32.74	2,650.11	2,650.31	0.92	0.87	0.30
11,707.00	91.52	89.88	9,085.78	32.30	2,742.06	2,742.25	1.07	-0.62	-0.86
11,798.00	90.60	89.07	9,084.10	33.13	2,833.04	2,833.23	1.35	-1.02	-0.89
11,889.00	88.79	88.38	9,084.59	35.15	2,924.01	2,924.22	2.13	-1.99	-0.76
11,980.00	88.22	88.72	9,086.97	37.45	3,014.95	3,015.18	0.73	-0.63	0.38
12,071.00	91.12	89.98	9,087.49	38.48	3,105.93	3,106.16	3.48	3.19	1.38
12,162.00	87.91	88.19	9,088.26	39.93	3,196.90	3,197.14	4.04	-3.53	-1.96
12,252.00	88.48	88.72	9,091.10	42.35	3,286.82	3,287.09	0.86	0.64	0.58
12,343.00	89.49	88.98	9,092.70	44.17	3,377.79	3,378.07	1.15	1.11	0.29
12,434.00	88.30	87.51	9,094.45	46.96	3,468.73	3,469.03	2.08	-1.31	-1.62
12,525.00	89.58	87.39	9,096.13	51.01	3,559.62	3,559.96	1.41	1.40	-0.13
12,616.00	90.29	87.14	9,096.24	55.35	3,650.51	3,650.89	0.82	0.77	-0.27
12,707.00	88.00	86.78	9,097.60	60.17	3,741.37	3,741.79	2.55	-2.52	-0.39
12,798.00	88.30	87.67	9,100.54	64.57	3,832.22	3,832.68	1.04	0.34	0.98
12,889.00	89.01	90.93	9,102.68	65.68	3,923.17	3,923.64	3.66	0.77	3.58
12,980.00	87.11	90.06	9,105.76	64.89	4,014.11	4,014.57	2.29	-2.08	-0.96
13,071.00	90.29	92.51	9,107.82	62.85	4,105.04	4,105.47	4.41	3.49	2.69

Company:	WPX Energy	Local Co-ordinate Reference:	Well 1H
Project:	Eddy County, New Mexico (NAD 83)	TVD Reference:	WELL @ 3182.50usft (Orion Phoenix)
Site:	Cavern State 16	MD Reference:	WELL @ 3182.50usft (Orion Phoenix)
Well:	1H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Surveys	Database:	EDM Conroe

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
13,162.00	90.99	92.25	9,106.81	59.07	4,195.96	4,196.35	0.83	0.77	-0.29	
13,254.00	89.89	92.24	9,106.10	55.47	4,287.89	4,288.23	1.20	-1.20	0.00	
13,344.00	89.19	92.43	9,106.83	51.80	4,377.81	4,378.11	0.81	-0.78	0.20	
13,435.00	89.10	92.77	9,108.19	47.67	4,468.70	4,468.96	0.39	-0.10	0.38	
13,526.00	90.20	93.31	9,108.75	42.84	4,559.57	4,559.77	1.35	1.21	0.59	
13,617.00	89.19	92.95	9,109.24	37.87	4,650.43	4,650.58	1.18	-1.11	-0.40	
13,708.00	90.11	93.92	9,109.80	32.42	4,741.27	4,741.35	1.47	1.02	1.06	
13,722.40	89.97	93.92	9,109.79	31.44	4,755.63	4,755.70	1.01	-1.01	0.00	
LTP - 13722.40' MD										
13,778.00	89.41	93.92	9,110.10	27.64	4,811.10	4,811.13	1.01	-1.01	0.00	
13,850.00	89.41	93.92	9,110.84	22.71	4,882.93	4,882.90	0.00	0.00	0.00	
Projection to TD - 13850.00' MD										

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
9,067.94	8,933.63	-14.34	130.00	FTP - 9067.94' MD	
9,074.00	8,936.71	-14.03	135.21	Top of Wolfcamp - 9074.00' MD	
13,722.40	9,109.79	31.44	4,755.63	LTP - 13722.40' MD	
13,850.00	9,110.84	22.71	4,882.93	Projection to TD - 13850.00' MD	