

# Noble Energy

Weld County, CO (NAD 83)

Sec. 32-T6N-R62W (Wells Ranch AE32)

Wells Ranch AE32-665

05-123-41726

Plan A

Design: Actual Surveys

## Sperry Drilling Services

### Final Survey Report

07 October, 2015

Surface UWI : 05-123-41726

Well Coordinates: 1,406,984.56 N, 3,318,863.45 E (40° 26' 41.71" N, 104° 21' 15.55" W)

Ground Level: 4,728.00 usft

Local Coordinate Origin:

Viewing Datum:

TVDs to System:

North Reference:

Unit System:

Geodetic Scale Factor Applied

Version: 5000.1 Build: 73

Centered on Well Wells Ranch AE32-665

KB = 30 @ 4758.00usft (H&P 321)

N

Grid

Dec-Deg - API - US Survey Feet - Custom

**HALLIBURTON**

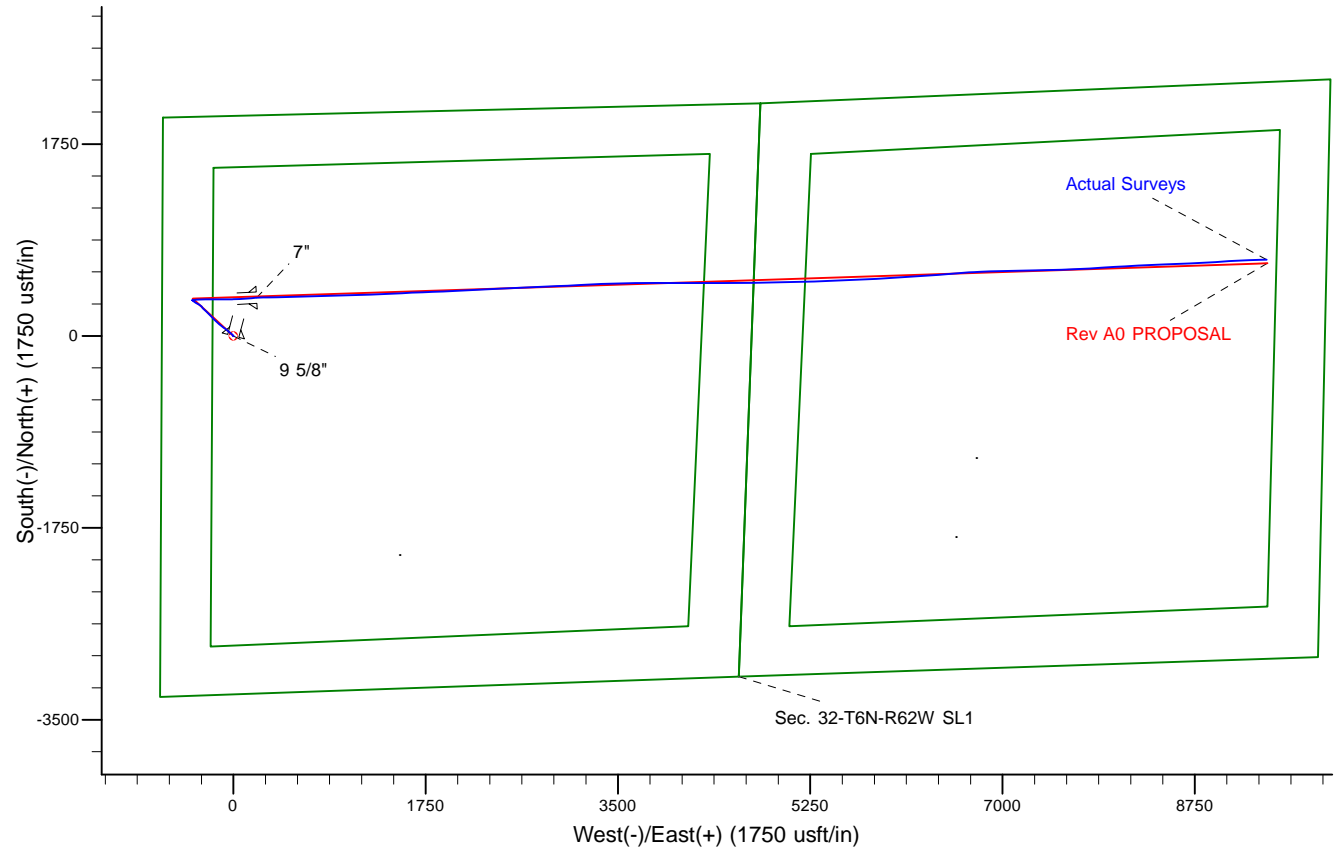
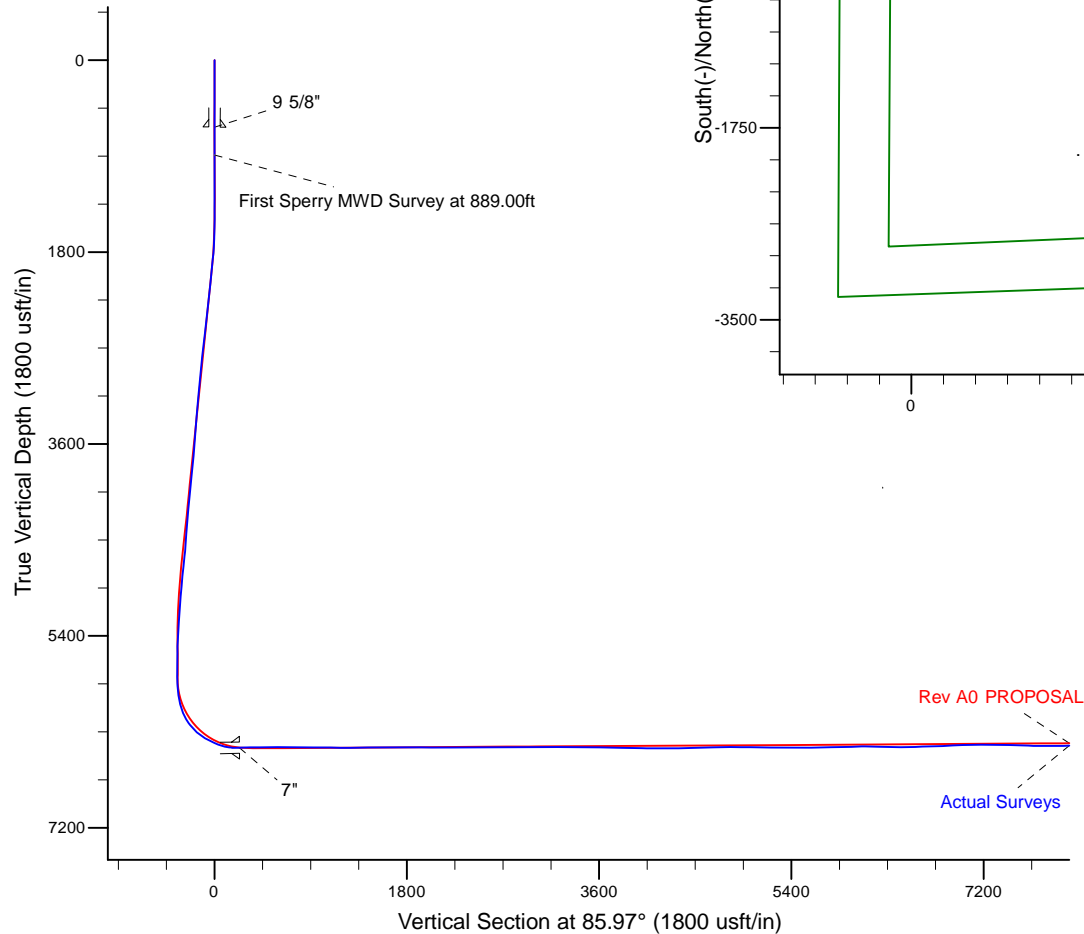
Project: Weld County, CO (NAD 83)  
 Site: Sec. 32-T6N-R62W (Wells Ranch AE32)  
 Well: Wells Ranch AE32-665  
 Wellbore: Plan A  
 Design: Actual Surveys



Platted SHL: 2009' FNL, 650' FWL  
 Platted Lat/Long: 40.444920, -104.354320  
 Location: Sec. 32-T6N-R62W

~7" Casing: 1668' FSL, 831' FWL  
 Lat/Long: 40.445868 N, -104.353547 W  
 State Planes - CO Northern: 1,407,332.64 N, 3,319,074.31 E  
 Location: Sec. 32-T6N-R62W

Platted BHL: 1650' FNL, 535' FEL  
 Platted Lat/Long: 40.446489 N, -104.320742 W  
 State Planes - CO Northern: 1,407,678.50 N, 3,328,200.68 E  
 Location: Sec. 33-T6N-R62W



# LEGEND

- Wells Ranch AE32-665, Plan A, Rev A0 PROPOSAL V0
- Actual Surveys

WELL DETAILS: Wells Ranch AE32-665

Ground Level: 4728.00

KB = 30 @ 4758.00usft (H&P 321)

Created By: Tatiana Gomez  
 Created On: 10/7/2015

**Design Report for Wells Ranch AE32-665 - Actual Surveys**

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Wells Ranch AE32-665_Rev A0_SHL</b>							
627.00	0.05	194.91	627.00	-0.26	-0.07	-0.09	0.01
<b>9 5/8"</b>							
889.00	0.07	194.91	889.00	-0.52	-0.14	-0.18	0.01
<b>First Sperry MWD Survey at 889.00ft</b>							
919.00	0.00	308.19	919.00	-0.54	-0.14	-0.18	0.23
1,011.00	0.10	104.27	1,011.00	-0.56	-0.07	-0.11	0.11
1,210.00	0.16	135.47	1,210.00	-0.80	0.30	0.24	0.05
1,397.00	0.20	157.34	1,397.00	-1.29	0.61	0.51	0.04
1,490.00	0.19	240.67	1,490.00	-1.52	0.53	0.43	0.28
1,582.00	2.52	333.21	1,581.97	0.22	-0.51	-0.49	2.76
1,674.00	3.97	321.71	1,673.82	4.52	-3.40	-3.07	1.72
1,767.00	6.07	314.38	1,766.46	10.49	-8.91	-8.15	2.36
1,860.00	7.50	311.38	1,858.80	17.94	-16.98	-15.67	1.58
2,138.00	8.04	309.39	2,134.25	42.27	-45.61	-42.53	0.22
2,231.00	7.89	306.62	2,226.36	50.20	-55.76	-52.10	0.44
2,324.00	9.15	307.21	2,318.33	58.48	-66.78	-62.50	1.36
2,417.00	8.50	306.67	2,410.23	67.06	-78.18	-73.28	0.70
2,509.00	8.40	305.32	2,501.23	75.01	-89.11	-83.63	0.24
2,694.00	8.99	308.74	2,684.10	91.86	-111.42	-104.69	0.42
2,786.00	8.72	306.82	2,775.00	100.54	-122.60	-115.24	0.44
2,881.00	8.12	315.62	2,868.98	109.65	-133.06	-125.03	1.49
2,976.00	7.97	315.71	2,963.05	119.16	-142.35	-133.63	0.16
3,070.00	7.58	312.35	3,056.19	128.00	-151.49	-142.12	0.64
3,165.00	7.71	311.01	3,150.34	136.41	-160.93	-150.95	0.23
3,260.00	7.81	317.03	3,244.47	145.31	-170.13	-159.51	0.86
3,355.00	7.12	312.79	3,338.67	154.03	-178.85	-167.59	0.93
3,449.00	6.82	316.81	3,431.97	162.06	-186.95	-175.11	0.61
3,544.00	7.14	317.75	3,526.27	170.54	-194.78	-182.32	0.36
3,639.00	7.56	316.02	3,620.49	179.41	-203.09	-189.99	0.50
3,733.00	8.02	315.59	3,713.62	188.54	-211.97	-198.21	0.49
3,828.00	8.17	316.36	3,807.67	198.16	-221.27	-206.80	0.19
3,923.00	8.11	315.70	3,901.72	207.84	-230.61	-215.44	0.12
4,017.00	8.28	313.84	3,994.76	217.28	-240.12	-224.27	0.34
4,112.00	8.64	312.54	4,088.72	226.84	-250.31	-233.76	0.43
4,207.00	7.53	310.64	4,182.78	235.72	-260.29	-243.09	1.20
4,301.00	6.69	312.13	4,276.05	243.40	-269.03	-251.27	0.91
4,396.00	7.44	320.27	4,370.33	251.85	-277.06	-258.69	1.31
4,491.00	8.18	323.35	4,464.45	262.00	-285.03	-265.92	0.89
4,586.00	6.23	317.99	4,558.70	271.25	-292.51	-272.74	2.17
4,680.00	7.37	305.25	4,652.04	278.52	-300.85	-280.54	2.00
4,775.00	7.32	299.64	4,746.26	285.03	-311.09	-290.30	0.76
4,869.00	6.50	296.39	4,839.58	290.36	-321.06	-299.87	0.97
4,964.00	5.84	296.55	4,934.03	294.91	-330.20	-308.67	0.69
5,059.00	5.07	300.68	5,028.60	299.21	-338.13	-316.28	0.91
5,154.00	5.54	302.95	5,123.19	303.85	-345.59	-323.40	0.54
5,248.00	6.02	311.86	5,216.72	309.61	-353.07	-330.45	1.08
5,343.00	5.46	312.24	5,311.24	315.97	-360.13	-337.04	0.59
5,437.00	4.89	312.18	5,404.86	321.66	-366.41	-342.91	0.61

## Design Report for Wells Ranch AE32-665 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
5,532.00	2.48	313.40	5,499.65	325.80	-370.90	-347.10	2.54
5,627.00	0.49	171.53	5,594.63	326.81	-372.33	-348.46	3.03
5,722.00	0.63	174.68	5,689.62	325.89	-372.23	-348.42	0.15
5,816.00	0.70	196.95	5,783.62	324.82	-372.35	-348.61	0.28
5,911.00	3.43	89.10	5,878.56	324.31	-369.67	-345.98	3.90
6,006.00	9.23	75.47	5,972.94	326.27	-359.45	-335.64	6.26
6,100.00	16.63	82.40	6,064.50	329.94	-338.79	-314.77	8.03
6,195.00	26.37	87.15	6,152.79	332.80	-304.15	-280.03	10.41
6,290.00	37.67	89.68	6,233.21	334.01	-253.89	-229.80	11.98
6,385.00	48.25	91.13	6,302.64	333.48	-189.25	-165.36	11.18
6,479.00	58.82	89.23	6,358.43	333.32	-113.76	-90.07	11.36
6,574.00	65.99	89.41	6,402.41	334.32	-29.63	-6.07	7.55
6,668.00	74.15	86.30	6,434.43	337.68	58.59	82.16	9.22
6,777.00	90.25	85.76	6,449.17	345.15	165.97	189.80	14.78
6,822.00	90.87	86.74	6,448.74	348.09	210.87	234.80	2.57
7"							
6,919.00	92.19	88.85	6,446.15	351.82	307.75	331.70	2.57
7,013.00	89.69	88.61	6,444.61	353.90	401.71	425.57	2.67
7,107.00	91.23	88.93	6,443.85	355.92	495.68	519.46	1.67
7,202.00	89.75	88.83	6,443.04	357.78	590.66	614.33	1.56
7,296.00	89.45	88.39	6,443.70	360.06	684.63	708.23	0.57
7,391.00	89.54	88.30	6,444.53	362.80	779.58	803.14	0.13
7,485.00	89.51	88.38	6,445.31	365.53	873.54	897.06	0.09
7,579.00	89.23	88.29	6,446.35	368.26	967.50	990.97	0.31
7,673.00	89.35	88.27	6,447.51	371.08	1,061.45	1,084.89	0.13
7,767.00	89.23	87.94	6,448.68	374.19	1,155.39	1,178.82	0.37
7,861.00	90.55	88.11	6,448.86	377.43	1,249.33	1,272.75	1.42
7,956.00	90.49	87.45	6,448.00	381.11	1,344.25	1,367.70	0.70
8,050.00	90.59	87.13	6,447.11	385.55	1,438.14	1,461.67	0.36
8,144.00	89.94	87.31	6,446.67	390.11	1,532.03	1,555.65	0.72
8,238.00	91.08	87.60	6,445.84	394.28	1,625.93	1,649.61	1.25
8,333.00	89.69	87.51	6,445.20	398.33	1,720.84	1,744.57	1.47
8,427.00	90.71	87.95	6,444.87	402.06	1,814.77	1,838.52	1.18
8,521.00	88.98	87.13	6,445.13	406.09	1,908.68	1,932.49	2.04
8,616.00	89.11	86.89	6,446.71	411.05	2,003.53	2,027.46	0.29
8,710.00	89.81	87.20	6,447.59	415.89	2,097.40	2,121.43	0.81
8,803.00	89.91	87.49	6,447.82	420.20	2,190.30	2,214.41	0.33
8,898.00	90.46	87.47	6,447.52	424.38	2,285.21	2,309.37	0.58
8,993.00	90.89	87.30	6,446.40	428.71	2,380.10	2,404.34	0.49
9,087.00	89.91	87.42	6,445.74	433.04	2,474.00	2,498.31	1.05
9,182.00	90.37	87.13	6,445.51	437.56	2,568.89	2,593.28	0.57
9,277.00	91.11	87.04	6,444.28	442.39	2,663.76	2,688.26	0.78
9,372.00	90.62	88.22	6,442.85	446.32	2,758.67	2,783.20	1.34
9,466.00	90.34	87.54	6,442.06	449.79	2,852.60	2,877.15	0.78
9,561.00	89.14	87.63	6,442.49	453.80	2,947.51	2,972.11	1.27
9,655.00	89.60	87.24	6,443.52	458.00	3,041.41	3,066.07	0.64
9,750.00	90.46	87.14	6,443.47	462.66	3,136.30	3,161.05	0.91
9,845.00	89.94	87.98	6,443.14	466.70	3,231.21	3,256.01	1.04
9,938.00	89.78	86.99	6,443.37	470.79	3,324.12	3,348.98	1.08
10,031.00	90.34	86.59	6,443.27	475.99	3,416.97	3,441.97	0.74
10,125.00	88.83	88.00	6,443.95	480.43	3,510.86	3,535.93	2.20

## Design Report for Wells Ranch AE32-665 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
10,217.00	89.04	89.93	6,445.66	482.09	3,602.82	3,627.79	2.11
10,308.00	89.17	90.35	6,447.08	481.87	3,693.81	3,718.54	0.48
10,402.00	88.83	90.18	6,448.73	481.43	3,787.80	3,812.26	0.40
10,495.00	88.80	89.79	6,450.65	481.46	3,880.78	3,905.01	0.42
10,588.00	88.40	89.60	6,452.92	481.95	3,973.75	3,997.78	0.48
10,680.00	89.54	90.31	6,454.57	482.02	4,065.73	4,089.55	1.46
10,773.00	89.88	89.75	6,455.05	481.98	4,158.73	4,182.31	0.70
10,866.00	91.02	89.98	6,454.32	482.19	4,251.72	4,275.09	1.25
10,959.00	90.83	89.61	6,452.81	482.53	4,344.71	4,367.87	0.45
11,052.00	91.11	89.51	6,451.24	483.24	4,437.69	4,460.68	0.32
11,144.00	91.79	89.69	6,448.91	483.88	4,529.66	4,552.46	0.76
11,236.00	92.62	89.86	6,445.37	484.24	4,621.59	4,644.19	0.92
11,329.00	90.68	89.10	6,442.69	485.09	4,714.55	4,736.97	2.24
11,421.00	89.72	88.94	6,442.37	486.66	4,806.53	4,828.84	1.06
11,515.00	89.29	89.05	6,443.18	488.31	4,900.51	4,922.71	0.47
11,610.00	89.45	89.17	6,444.23	489.79	4,995.49	5,017.56	0.21
11,705.00	89.20	88.94	6,445.35	491.35	5,090.48	5,112.41	0.36
11,799.00	89.23	88.87	6,446.64	493.15	5,184.45	5,206.28	0.08
11,894.00	89.66	88.29	6,447.56	495.50	5,279.42	5,301.18	0.76
11,989.00	89.51	87.89	6,448.24	498.67	5,374.36	5,396.11	0.45
12,084.00	90.71	87.02	6,448.06	502.89	5,469.26	5,491.08	1.56
12,178.00	91.39	86.66	6,446.34	508.07	5,563.10	5,585.05	0.82
12,273.00	90.52	87.73	6,444.76	512.72	5,657.97	5,680.01	1.45
12,368.00	90.86	87.48	6,443.61	516.69	5,752.88	5,774.97	0.44
12,462.00	91.14	86.86	6,441.97	521.33	5,846.75	5,868.93	0.72
12,556.00	91.94	86.83	6,439.45	526.50	5,940.58	5,962.89	0.85
12,651.00	90.86	87.62	6,437.12	531.10	6,035.44	6,057.83	1.41
12,746.00	88.64	86.13	6,437.54	536.27	6,130.28	6,152.81	2.81
12,840.00	88.09	85.71	6,440.22	542.96	6,224.01	6,246.77	0.74
12,935.00	89.11	85.88	6,442.54	549.92	6,318.72	6,341.74	1.09
13,029.00	90.71	85.09	6,442.69	557.32	6,412.43	6,435.74	1.90
13,124.00	91.51	85.74	6,440.85	564.92	6,507.10	6,530.71	1.08
13,219.00	90.89	84.85	6,438.86	572.71	6,601.76	6,625.68	1.14
13,408.00	92.74	87.76	6,432.87	584.88	6,790.25	6,814.56	1.82
13,503.00	92.99	87.49	6,428.12	588.81	6,885.05	6,909.40	0.39
13,597.00	92.10	88.12	6,423.95	592.41	6,978.88	7,003.26	1.16
13,692.00	91.11	89.42	6,421.29	594.45	7,073.82	7,098.10	1.72
13,787.00	91.32	89.44	6,419.28	595.39	7,168.79	7,192.91	0.22
13,882.00	88.43	88.90	6,419.48	596.77	7,263.77	7,287.75	3.09
13,977.00	87.93	89.08	6,422.50	598.44	7,358.71	7,382.57	0.56
14,071.00	88.80	88.17	6,425.18	600.70	7,452.64	7,476.43	1.34
14,166.00	87.84	87.55	6,427.97	604.24	7,547.53	7,571.33	1.20
14,261.00	89.29	87.43	6,430.35	608.40	7,642.41	7,666.27	1.53
14,356.00	90.37	86.60	6,430.63	613.35	7,737.28	7,761.25	1.43
14,450.00	90.18	86.52	6,430.18	618.99	7,831.11	7,855.24	0.22
14,545.00	89.91	86.37	6,430.10	624.88	7,925.93	7,950.24	0.33
14,640.00	90.77	87.08	6,429.54	630.31	8,020.77	8,045.23	1.17
14,734.00	91.33	86.72	6,427.82	635.39	8,114.61	8,139.20	0.71
14,829.00	91.32	86.37	6,425.62	641.11	8,209.42	8,234.17	0.37
14,924.00	90.46	87.91	6,424.14	645.85	8,304.28	8,329.14	1.86
15,018.00	91.63	88.38	6,422.43	648.89	8,398.22	8,423.05	1.34

## Design Report for Wells Ranch AE32-665 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
15,113.00	91.39	87.82	6,419.93	652.04	8,493.13	8,517.95	0.64
15,208.00	91.11	87.41	6,417.85	655.99	8,588.02	8,612.89	0.52
15,303.00	91.76	87.38	6,415.47	660.31	8,682.90	8,707.83	0.68
15,397.00	91.57	86.96	6,412.74	664.95	8,776.74	8,801.77	0.49
15,492.00	92.07	86.65	6,409.73	670.24	8,871.55	8,896.71	0.62
15,586.00	91.82	86.11	6,406.54	676.17	8,965.30	8,990.65	0.63
15,681.00	92.71	87.16	6,402.78	681.75	9,060.06	9,085.57	1.45
15,774.00	93.08	86.85	6,398.08	686.60	9,152.82	9,178.44	0.52
15,869.00	90.83	87.82	6,394.84	691.01	9,247.65	9,273.35	2.58
15,959.00	91.63	88.42	6,392.91	693.96	9,337.58	9,363.26	1.11
<b>Final Sperry MWD Survey at 15959.00ft</b>							
16,025.00	91.63	88.42	6,391.03	695.78	9,403.53	9,429.18	0.00
<b>Straight Line Projection to TD at 16025.00ft - Wells Ranch AE32-665_Rev A0_BHL</b>							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
889.00	889.00	-0.52	-0.14	First Sperry MWD Survey at 889.00ft
15,959.00	6,392.91	693.96	9,337.58	Final Sperry MWD Survey at 15959.00ft
16,025.00	6,391.03	695.78	9,403.53	Straight Line Projection to TD at 16025.00ft

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
Target	Wells Ranch AE32-665_Rev A0_BHL	85.97	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
889.00	6,777.00	Intermediate Surveys	MWD
6,919.00	16,025.00	Production Surveys	MWD+IFR1+MS_WY

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
627.00	627.00	9 5/8"	9-5/8	13-3/4
6,822.00	6,448.74	7"	7	8-3/4