

# Noble Energy

Weld County, CO (NAD 83)

Sec. 31-T6N-R63W (Wells Ranch State A36)

Wells Ranch State A36-649

05-123-41514

Plan A

Design: Actual Surveys

## Sperry Drilling Services

### Final Survey Report

12 July, 2015

Surface UWI : 05-123-41514

Well Coordinates: 1,405,517.03 N, 3,286,230.66 E (40° 26' 31.16" N, 104° 28' 17.83" W)

Ground Level: 4,657.00 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 State A36-649

KB = 24' @ 4681.00usft (H&P 273)

N

Grid

Dec-Deg - API - US Survey Feet - Custom

**HALLIBURTON**

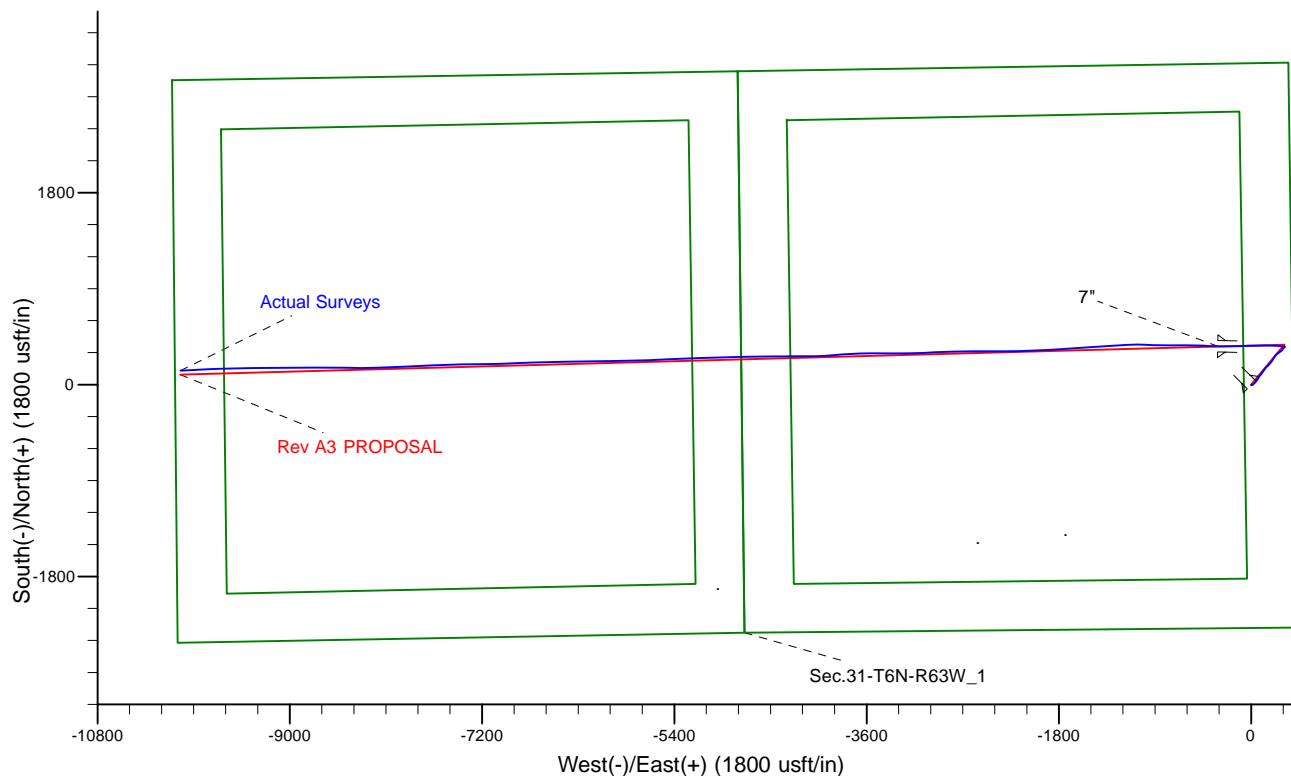
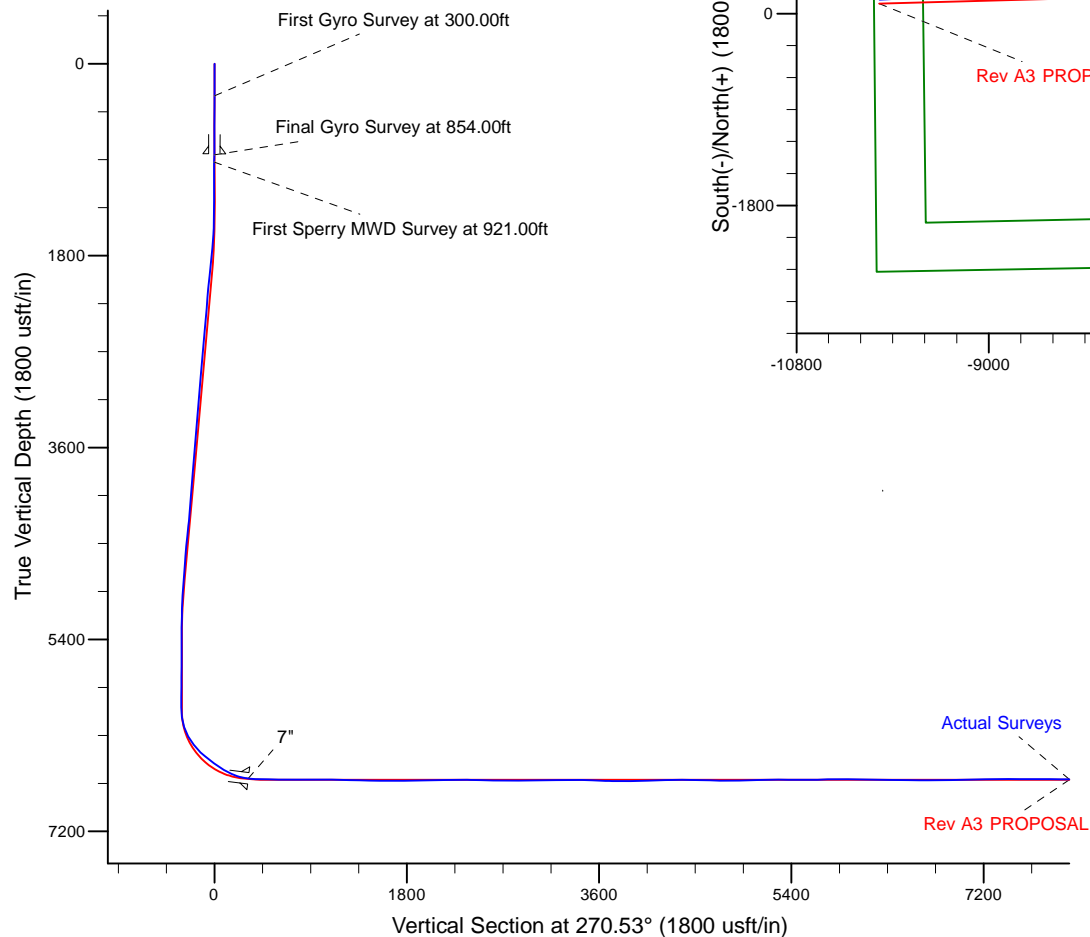
Project: Weld County, CO (NAD 83)  
 Site: Sec. 31-T6N-R63W (Wells Ranch State A36)  
 Well: Wells Ranch State A36-649  
 Wellbore: Plan A  
 Design: Actual Surveys



Platted SHL: 2285' FSL, 390' FEL  
 Platted Lat/Long: 40.441990, -104.471620  
 Location: Sec. 31-T6N-R63W

~7" Casing: 2649' FNL, 689' FEL  
 Lat/Long: 40.442988 N, -104.472730 W  
 State Planes - CO Northern: 1,405,877.12 N, 3,285,917.71 E  
 Sec. 31-T6N-R63W

Platted BHL: 2515' FSL, 50' FWL  
 Platted Lat/Long: 40.442663 N, -104.507610 W  
 State Planes - CO Northern: 1,405,647.97 N, 3,276,211.15 E  
 Location: Sec. 36-T6N-R63W



# LEGEND

- Wells Ranch State A36-649, Plan A, Rev A3 PROPOSAL V0
- Actual Surveys

WELL DETAILS: Wells Ranch State A36-649

Ground Level: 4657.00

KB = 24' @ 4681.00usft (H&P 273)

Created By: Tatiana Gomez  
 Created On: 7/12/2015

**Design Report for Wells Ranch State A36-649 - 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 State A36-649_SHL</b>							
300.00	0.16	134.96	300.00	-0.30	0.30	-0.30	0.05
<b>First Gyro Survey at 300.00ft</b>							
600.00	0.33	134.96	600.00	-1.20	1.20	-1.22	0.06
846.00	0.46	134.96	845.99	-2.39	2.40	-2.42	0.05
<b>9 5/8"</b>							
854.00	0.46	134.96	853.99	-2.44	2.44	-2.47	0.05
<b>Final Gyro Survey at 854.00ft</b>							
921.00	0.50	134.96	920.99	-2.84	2.84	-2.87	0.06
<b>First Sperry MWD Survey at 921.00ft</b>							
1,016.00	0.44	147.17	1,015.99	-3.44	3.33	-3.36	0.12
1,110.00	0.33	108.90	1,109.98	-3.83	3.78	-3.82	0.29
1,201.00	0.28	135.59	1,200.98	-4.07	4.19	-4.22	0.16
1,293.00	0.29	127.50	1,292.98	-4.37	4.53	-4.57	0.05
1,384.00	0.47	119.25	1,383.98	-4.70	5.04	-5.08	0.21
1,475.00	0.62	144.81	1,474.97	-5.28	5.65	-5.70	0.31
1,567.00	3.97	69.60	1,566.90	-4.58	8.92	-8.96	4.19
1,658.00	5.59	50.60	1,657.58	-0.66	15.30	-15.30	2.47
1,842.00	7.72	44.00	1,840.33	13.92	30.81	-30.68	1.23
1,933.00	9.52	43.22	1,930.30	23.80	40.21	-39.99	1.98
2,024.00	9.90	37.49	2,020.00	35.49	50.12	-49.79	1.14
2,116.00	9.79	33.56	2,110.65	48.28	59.26	-58.81	0.74
2,208.00	9.11	28.95	2,201.40	61.17	67.11	-66.54	1.11
2,300.00	8.28	34.65	2,292.34	73.00	74.40	-73.72	1.30
2,484.00	9.06	43.20	2,474.25	94.46	91.85	-90.97	0.82
2,575.00	8.28	37.70	2,564.21	104.86	100.77	-99.78	1.25
2,667.00	8.35	31.42	2,655.24	115.81	108.30	-107.22	0.99
2,758.00	8.37	29.19	2,745.28	127.23	114.97	-113.78	0.36
2,850.00	7.91	40.51	2,836.36	137.89	122.35	-121.06	1.81
2,942.00	7.69	35.24	2,927.50	147.73	130.02	-128.63	0.81
3,037.00	7.78	33.22	3,021.64	158.30	137.21	-135.73	0.30
3,132.00	7.63	53.22	3,115.80	167.46	145.78	-144.22	2.81
3,226.00	6.86	46.12	3,209.05	175.08	154.83	-153.19	1.25
3,321.00	7.10	44.89	3,303.35	183.18	163.06	-161.35	0.30
3,416.00	7.11	41.01	3,397.62	191.77	171.06	-169.27	0.51
3,511.00	6.96	37.10	3,491.90	200.80	178.39	-176.51	0.53
3,605.00	7.46	38.56	3,585.16	210.11	185.63	-183.67	0.57
3,700.00	7.98	36.15	3,679.30	220.26	193.37	-191.30	0.64
3,794.00	8.25	35.43	3,772.36	231.02	201.12	-198.96	0.31
3,889.00	8.59	32.46	3,866.33	242.56	208.88	-206.61	0.58
3,984.00	8.26	29.84	3,960.31	254.47	216.09	-213.71	0.53
4,078.00	8.08	30.00	4,053.35	266.05	222.75	-220.26	0.19
4,268.00	6.64	49.33	4,241.81	284.77	237.76	-235.10	1.50
4,363.00	7.96	55.15	4,336.04	292.11	247.33	-244.59	1.59
4,647.00	5.55	57.57	4,618.05	310.72	275.06	-272.15	0.85
4,741.00	6.87	45.15	4,711.50	317.12	282.88	-279.91	2.00
4,836.00	6.10	40.85	4,805.89	324.95	290.21	-287.17	0.96
4,931.00	6.02	38.71	4,900.36	332.65	296.63	-293.52	0.25
5,120.00	4.75	36.97	5,088.52	346.64	307.53	-304.29	0.68

## Design Report for Wells Ranch State A36-649 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
5,215.00	2.41	8.93	5,183.34	351.75	310.21	-306.92	3.01
5,310.00	1.64	8.08	5,278.28	355.07	310.71	-307.39	0.81
5,405.00	0.77	12.49	5,373.26	357.04	311.04	-307.70	0.92
5,499.00	0.55	43.39	5,467.25	357.99	311.49	-308.14	0.44
5,594.00	0.13	146.13	5,562.25	358.23	311.86	-308.51	0.62
5,689.00	0.33	122.55	5,657.25	357.99	312.15	-308.80	0.23
5,783.00	0.55	131.95	5,751.25	357.55	312.71	-309.37	0.25
5,878.00	0.94	138.07	5,846.24	356.66	313.57	-310.24	0.42
5,973.00	0.98	146.87	5,941.22	355.40	314.54	-311.21	0.16
6,068.00	1.15	143.43	6,036.21	353.95	315.55	-312.24	0.19
6,162.00	7.18	277.63	6,129.98	353.98	310.28	-306.97	8.54
6,257.00	19.56	279.69	6,222.23	357.46	288.64	-285.29	13.04
6,352.00	28.90	275.99	6,308.77	362.54	250.04	-246.65	9.96
6,447.00	37.97	271.86	6,387.98	365.89	197.89	-194.47	9.84
6,542.00	44.14	269.24	6,459.58	366.40	135.54	-132.12	6.74
6,636.00	53.19	268.36	6,521.60	364.89	65.05	-61.64	9.65
6,731.00	56.49	268.65	6,576.30	362.87	-12.58	15.96	3.48
6,826.00	58.75	268.52	6,627.17	360.88	-92.78	96.14	2.38
6,920.00	67.56	269.53	6,669.58	359.49	-176.56	179.90	9.42
7,015.00	79.66	270.38	6,696.34	359.44	-267.52	270.86	12.77
7,061.00	82.61	271.28	6,703.43	360.10	-312.96	316.31	6.70
7"							
7,155.00	88.64	273.09	6,710.60	363.67	-406.58	409.95	6.70
7,250.00	89.08	271.05	6,712.49	367.10	-501.49	504.89	2.20
7,345.00	89.82	270.40	6,713.40	368.31	-596.48	599.88	1.04
7,439.00	90.12	270.33	6,713.45	368.91	-690.47	693.88	0.33
7,534.00	90.59	270.37	6,712.86	369.49	-785.47	788.88	0.50
7,629.00	89.26	270.42	6,712.98	370.14	-880.47	883.88	1.40
7,723.00	90.22	272.91	6,713.41	372.87	-974.42	977.85	2.84
7,818.00	89.26	269.88	6,713.84	375.18	-1,069.38	1,072.83	3.35
7,913.00	88.24	267.30	6,715.91	372.85	-1,164.31	1,167.74	2.92
8,008.00	88.70	266.88	6,718.45	368.03	-1,259.16	1,262.53	0.66
8,103.00	88.89	266.23	6,720.45	362.32	-1,353.96	1,357.28	0.71
8,197.00	89.08	266.03	6,722.11	355.98	-1,447.74	1,450.99	0.29
8,292.00	88.64	264.52	6,724.00	348.15	-1,542.39	1,545.57	1.66
8,387.00	90.37	265.82	6,724.82	340.15	-1,637.04	1,640.14	2.28
8,482.00	90.71	266.43	6,723.93	333.73	-1,731.82	1,734.86	0.74
8,576.00	90.77	267.91	6,722.72	329.09	-1,825.70	1,828.69	1.58
8,671.00	90.55	268.01	6,721.62	325.71	-1,920.63	1,923.58	0.25
8,766.00	90.59	267.36	6,720.68	321.88	-2,015.55	2,018.46	0.69
8,861.00	91.23	266.76	6,719.17	317.00	-2,110.41	2,113.27	0.92
8,955.00	90.86	269.49	6,717.45	313.93	-2,204.34	2,207.17	2.93
9,050.00	90.92	269.93	6,715.98	313.45	-2,299.32	2,302.14	0.47
9,145.00	88.74	270.25	6,716.26	313.60	-2,394.32	2,397.14	2.32
9,239.00	88.46	269.23	6,718.56	313.17	-2,488.29	2,491.10	1.12
9,334.00	89.45	270.32	6,720.29	312.80	-2,583.27	2,586.07	1.55
9,524.00	89.35	268.11	6,722.28	310.20	-2,773.23	2,776.00	1.16
9,619.00	90.03	267.95	6,722.79	306.93	-2,868.17	2,870.90	0.74
9,713.00	90.58	267.54	6,722.29	303.23	-2,962.09	2,964.79	0.73
9,808.00	91.54	267.31	6,720.53	298.96	-3,056.98	3,059.63	1.04
9,903.00	90.43	268.65	6,718.90	295.62	-3,151.90	3,154.52	1.83

## Design Report for Wells Ranch State A36-649 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
9,998.00	90.40	269.39	6,718.21	293.99	-3,246.89	3,249.49	0.78
10,092.00	90.93	269.29	6,717.12	292.91	-3,340.87	3,343.46	0.57
10,187.00	88.83	270.57	6,717.32	292.79	-3,435.87	3,438.45	2.59
10,282.00	87.84	270.61	6,720.08	293.77	-3,530.82	3,533.40	1.04
10,377.00	87.04	268.84	6,724.32	293.32	-3,625.72	3,628.30	2.04
10,471.00	88.83	267.12	6,727.71	290.00	-3,719.59	3,722.13	2.64
10,566.00	90.40	265.95	6,728.35	284.26	-3,814.41	3,816.90	2.06
10,657.00	90.99	265.18	6,727.25	277.23	-3,905.13	3,907.55	1.07
10,748.00	92.16	266.21	6,724.75	270.40	-3,995.84	3,998.18	1.71
10,839.00	91.33	268.99	6,721.97	266.59	-4,086.71	4,089.01	3.19
10,930.00	91.14	269.81	6,720.01	265.64	-4,177.68	4,179.97	0.92
11,022.00	92.13	269.94	6,717.39	265.44	-4,269.64	4,271.93	1.09
11,114.00	90.28	269.73	6,715.45	265.17	-4,361.62	4,363.90	2.02
11,205.00	88.55	269.92	6,716.38	264.89	-4,452.61	4,454.88	1.91
11,297.00	88.77	269.23	6,718.53	264.21	-4,544.58	4,546.84	0.79
11,388.00	88.70	269.02	6,720.54	262.82	-4,635.55	4,637.79	0.24
11,480.00	88.15	268.71	6,723.07	261.00	-4,727.49	4,729.72	0.69
11,571.00	90.77	269.07	6,723.93	259.24	-4,818.46	4,820.67	2.91
11,663.00	91.60	268.55	6,722.03	257.33	-4,910.42	4,912.61	1.06
11,755.00	92.41	268.40	6,718.81	254.88	-5,002.33	5,004.49	0.90
11,847.00	90.49	268.03	6,716.48	252.02	-5,094.25	5,096.38	2.13
11,939.00	90.22	267.74	6,715.91	248.62	-5,186.19	5,188.28	0.43
12,030.00	90.86	267.50	6,715.05	244.84	-5,277.11	5,279.16	0.75
12,122.00	89.29	267.55	6,714.93	240.87	-5,369.02	5,371.03	1.71
12,213.00	89.35	267.91	6,716.01	237.26	-5,459.94	5,461.91	0.40
12,305.00	90.46	267.15	6,716.16	233.30	-5,551.85	5,553.79	1.46
12,397.00	91.70	266.86	6,714.43	228.49	-5,643.71	5,645.59	1.38
12,492.00	90.71	268.65	6,712.43	224.77	-5,738.61	5,740.46	2.15
12,587.00	91.11	268.63	6,710.92	222.52	-5,833.57	5,835.39	0.42
12,682.00	89.20	269.61	6,710.67	221.06	-5,928.55	5,930.36	2.26
12,777.00	88.80	269.72	6,712.32	220.51	-6,023.54	6,025.33	0.44
12,871.00	88.65	269.36	6,714.42	219.75	-6,117.51	6,119.29	0.41
12,966.00	90.62	269.05	6,715.02	218.43	-6,212.49	6,214.26	2.10
13,061.00	88.92	269.14	6,715.40	216.93	-6,307.48	6,309.23	1.79
13,155.00	88.77	268.77	6,717.30	215.22	-6,401.44	6,403.17	0.42
13,250.00	88.49	268.19	6,719.57	212.70	-6,496.38	6,498.08	0.68
13,345.00	89.45	268.13	6,721.28	209.65	-6,591.32	6,592.99	1.01
13,439.00	90.90	267.67	6,720.99	206.20	-6,685.25	6,686.88	1.62
13,534.00	90.62	268.71	6,719.73	203.20	-6,780.19	6,781.79	1.13
13,629.00	90.96	268.37	6,718.42	200.78	-6,875.15	6,876.73	0.51
13,723.00	91.39	267.96	6,716.49	197.78	-6,969.09	6,970.63	0.63
13,818.00	91.30	268.45	6,714.26	194.80	-7,064.01	7,065.52	0.52
13,912.00	90.96	268.37	6,712.41	192.19	-7,157.96	7,159.44	0.37
14,007.00	91.02	268.86	6,710.77	189.90	-7,252.92	7,254.37	0.52
14,102.00	89.63	269.31	6,710.23	188.38	-7,347.90	7,349.34	1.54
14,196.00	90.06	269.01	6,710.48	187.00	-7,441.89	7,443.31	0.56
14,291.00	89.81	268.24	6,710.59	184.72	-7,536.86	7,538.25	0.85
14,384.28	90.11	268.35	6,710.65	181.94	-7,630.10	7,631.46	0.35
<b>Wells Ranch State A36-649 Devries State A36-21</b>							
14,386.00	90.12	268.35	6,710.65	181.90	-7,631.82	7,633.18	0.35
14,481.00	90.18	267.95	6,710.40	178.83	-7,726.77	7,728.10	0.43

**Design Report for Wells Ranch State A36-649 - Actual Surveys**

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
14,576.00	89.63	267.50	6,710.56	175.06	-7,821.69	7,822.98	0.75
14,670.00	89.91	266.29	6,710.93	169.97	-7,915.55	7,916.79	1.32
14,765.00	89.97	266.97	6,711.03	164.38	-8,010.39	8,011.57	0.72
14,859.00	91.30	267.18	6,709.99	159.59	-8,104.26	8,105.39	1.43
14,953.00	90.83	268.50	6,708.24	156.04	-8,198.17	8,199.27	1.49
15,049.00	89.60	269.95	6,707.88	154.74	-8,294.16	8,295.24	1.98
15,143.00	89.57	271.60	6,708.56	156.02	-8,388.14	8,389.23	1.76
15,237.00	89.85	271.28	6,709.04	158.38	-8,482.11	8,483.22	0.45
15,332.00	89.94	269.88	6,709.21	159.34	-8,577.10	8,578.22	1.48
15,427.00	90.28	269.99	6,709.03	159.23	-8,672.10	8,673.21	0.38
15,484.97	89.43	269.92	6,709.18	159.19	-8,730.07	8,731.17	1.47
<b>Wells Ranch State A36-649 Scholfield A36-20 CF</b>							
15,522.00	88.89	269.88	6,709.72	159.12	-8,767.10	8,768.20	1.47
15,617.00	89.26	269.70	6,711.25	158.78	-8,862.09	8,863.18	0.43
15,711.00	89.63	269.68	6,712.16	158.27	-8,956.08	8,957.17	0.39
15,806.00	89.63	269.69	6,712.78	157.75	-9,051.08	9,052.15	0.01
15,901.00	89.26	269.23	6,713.70	156.85	-9,146.07	9,147.13	0.62
15,996.00	89.94	269.35	6,714.36	155.67	-9,241.06	9,242.11	0.73
16,100.00	89.81	269.59	6,714.59	154.71	-9,345.05	9,346.09	0.26
16,195.00	89.45	269.14	6,715.20	153.66	-9,440.04	9,441.07	0.61
16,290.00	89.78	268.52	6,715.84	151.72	-9,535.02	9,536.02	0.74
16,385.00	90.31	268.23	6,715.77	149.02	-9,629.98	9,630.95	0.64
16,479.00	89.91	268.09	6,715.58	146.01	-9,723.93	9,724.87	0.45
16,574.00	89.48	267.53	6,716.09	142.38	-9,818.86	9,819.76	0.74
16,711.00	89.85	266.34	6,716.89	135.05	-9,955.66	9,956.49	0.91
<b>Final Sperry MWD Survey at 16711.00ft</b>							
16,775.36	89.85	266.34	6,717.06	130.94	-10,019.89	10,020.68	0.00
<b>Wells Ranch State A36-649_Rev A2_BHL - Wells Ranch State A36-649_Rev A0_BHL</b>							
16,778.00	89.85	266.34	6,717.07	130.77	-10,022.52	10,023.31	0.00
<b>Stright Line Projection to TD at 16778.00ft - Wells Ranch State A36-649_Rev A3_BHL</b>							

**Design Annotations**

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
300.00	300.00	-0.30	0.30	First Gyro Survey at 300.00ft
854.00	853.99	-2.44	2.44	Final Gyro Survey at 854.00ft
921.00	920.99	-2.84	2.84	First Sperry MWD Survey at 921.00ft
16,711.00	6,716.89	135.05	-9,955.66	Final Sperry MWD Survey at 16711.00ft
16,778.00	6,717.07	130.77	-10,022.52	Stright Line Projection to TD at 16778.00ft

**Vertical Section Information**

Angle Type	Target	Azimuth (°)	Origin Type	+N/_S (usft)	+E/-W (usft)	Start TVD (usft)
Target	Wells Ranch State A36-649_Rev A3_BHL	270.53	Slot	0.00	0.00	0.00

**Survey tool program**

From (usft)	To (usft)	Survey/Plan	Survey Tool
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## Design Report for Wells Ranch State A36-649 - Actual Surveys

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
300.00	854.00	Gyro Surveys	Flexi-Shot
921.00	7,015.00	Intermediate Survey	MWD
7,155.00	16,778.00	Production Surveys	MWD+IFR1+MS_WY

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
846.00	845.99	9 5/8"	9-5/8	13-3/4
7,061.00	6,703.43	7"	7	8-3/4

Wellbore Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Wells Ranch State A36 - actual wellpath misses target center by 0.01usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E) - Point	0.00	0.00	0.00	0.01	0.00	1,405,517.05	3,286,230.66	40.441990	-104.471620
Wells Ranch State A36 - actual wellpath misses target center by 79.23usft at 15484.99usft MD (6709.18 TVD, 159.19 N, -8730.09 E) - Point	0.00	0.00	6,706.35	80.00	-8,730.00	1,405,597.03	3,277,500.99	40.442483	-104.502978
Wells Ranch State A36 - actual wellpath misses target center by 31.86usft at 14384.32usft MD (6710.65 TVD, 181.94 N, -7630.14 E) - Point	0.00	0.00	6,706.35	213.50	-7,631.04	1,405,730.53	3,278,599.91	40.442816	-104.499025
Wells Ranch State A36 - actual wellpath misses target center by 104.80usft at 16775.36usft MD (6717.06 TVD, 130.94 N, -10019.89 E) - Point	0.00	0.00	6,716.00	235.53	-10,026.59	1,405,752.55	3,276,204.45	40.442950	-104.507630
Wells Ranch State A36 - actual wellpath misses target center by 37.42usft at 16778.00usft MD (6717.07 TVD, 130.77 N, -10022.52 E) - Point	0.00	0.00	6,716.00	93.45	-10,025.00	1,405,610.48	3,276,206.04	40.442560	-104.507630
Wells Ranch State A36 - actual wellpath misses target center by 107.07usft at 16775.36usft MD (6717.06 TVD, 130.94 N, -10019.89 E) - Circle (radius 100.00)	0.00	0.00	6,739.00	235.53	-10,026.59	1,405,752.55	3,276,204.45	40.442950	-104.507630

Directional Difficulty Index

Average Dogleg over Survey:	1.49 °/100usft	Maximum Dogleg over Survey:	13.04 °/100usft at 6,257.00 usft
Net Tortousity applicable to Plans:	0.86 °/100usft	Directional Difficulty Index:	6.830

Audit Info

North Reference Sheet for Sec. 31-T6N-R63W (Wells Ranch State A36) - Wells Ranch State A36-649 - Plan A

All data is in US Feet unless otherwise stated. Directions and Coordinates are relative to Grid North Reference.

Vertical Depths are relative to KB = 24' @ 4681.00usft (H&P 273). Northing and Easting are relative to Wells Ranch State A36-649

Coordinate System is US State Plane 1983, Colorado Northern Zone using datum North American Datum 1983, ellipsoid GRS 1980

Projection method is Lambert Conformal Conic (2 parallel)

Central Meridian is -105.500000°, Longitude Origin:0.000000°, Latitude Origin:40.783333°

False Easting: 3,000,000.00usft, False Northing: 1,000,000.00usft, Scale Reduction: 0.99996240

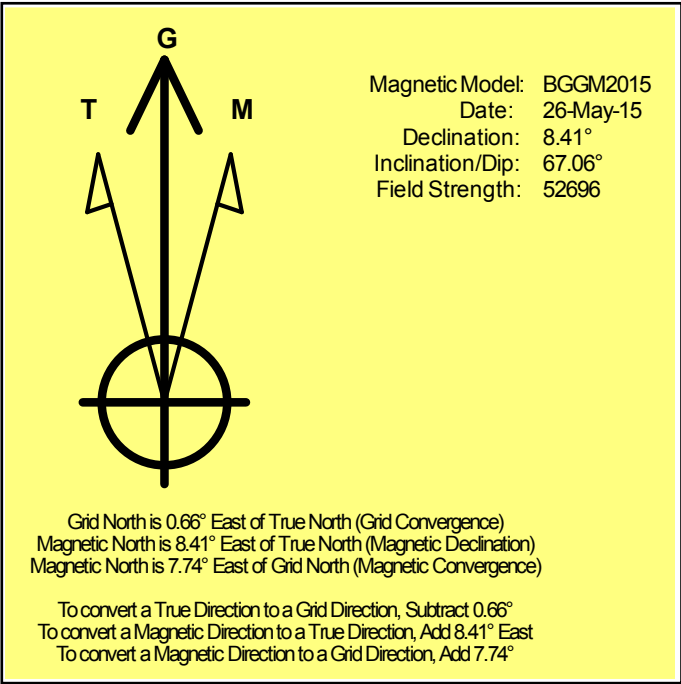
Grid Coordinates of Well: 1,405,517.03 usft N, 3,286,230.66 usft E

Geographical Coordinates of Well: 40° 26' 31.16" N, 104° 28' 17.83" W

Grid Convergence at Surface is: 0.66°

Based upon Minimum Curvature type calculations, at a Measured Depth of 16,778.00usft the Bottom Hole Displacement is 10,023.38usft in the Direction of 270.75° (Grid).

Magnetic Convergence at surface is: -7.74° (26 May 2015, , BGGM2015)





# Noble Energy

Weld County, CO (NAD 83)

Sec. 31-T6N-R63W (Wells Ranch State A36)

Wells Ranch State A36-649

Plan A

Design: Actual Surveys

## Sperry Drilling Services

### Geodetic Report

12 July, 2015

Well Coordinates: 1,405,517.03 N, 3,286,230.66 E (40° 26' 31.16" N, 104° 28' 17.83" W)

Ground Level: 4,657.00 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 State A36-649

KB = 24' @ 4681.00usft (H&P 273)

N

Grid

Dec-Deg - API - US Survey Feet - Custom

**HALLIBURTON**

## Design Report for Wells Ranch State A36-649 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Local Coordinates		Geographic Coordinates		UTM Coordinates	
				+N/-S (usft)	+E/-W (usft)	Latitude (usft)	Longitude (usft)	Northing (usft)	Easting (usft)
0.00	0.00	0.00	0.00	0.00	0.00	40.441990	-104.471620	1,405,517.03	3,286,230.66
300.00	0.16	134.96	300.00	-0.30	0.30	40.441989	-104.471619	1,405,516.74	3,286,230.96
600.00	0.33	134.96	600.00	-1.20	1.20	40.441987	-104.471616	1,405,515.83	3,286,231.87
846.00	0.46	134.96	845.99	-2.39	2.40	40.441983	-104.471612	1,405,514.64	3,286,233.06
854.00	0.46	134.96	853.99	-2.44	2.44	40.441983	-104.471612	1,405,514.59	3,286,233.11
921.00	0.50	134.96	920.99	-2.84	2.84	40.441982	-104.471610	1,405,514.20	3,286,233.50
1,016.00	0.44	147.17	1,015.99	-3.44	3.33	40.441981	-104.471608	1,405,513.60	3,286,233.99
1,110.00	0.33	108.90	1,109.98	-3.83	3.78	40.441979	-104.471607	1,405,513.21	3,286,234.45
1,201.00	0.28	135.59	1,200.98	-4.07	4.19	40.441979	-104.471605	1,405,512.96	3,286,234.85
1,293.00	0.29	127.50	1,292.98	-4.37	4.53	40.441978	-104.471604	1,405,512.66	3,286,235.19
1,384.00	0.47	119.25	1,383.98	-4.70	5.04	40.441977	-104.471602	1,405,512.34	3,286,235.70
1,475.00	0.62	144.81	1,474.97	-5.28	5.65	40.441975	-104.471600	1,405,511.75	3,286,236.31
1,567.00	3.97	69.60	1,566.90	-4.58	8.92	40.441977	-104.471588	1,405,512.46	3,286,239.58
1,658.00	5.59	50.60	1,657.58	-0.66	15.30	40.441988	-104.471565	1,405,516.37	3,286,245.96
1,842.00	7.72	44.00	1,840.33	13.92	30.81	40.442027	-104.471509	1,405,530.95	3,286,261.47
1,933.00	9.52	43.22	1,930.30	23.80	40.21	40.442054	-104.471475	1,405,540.83	3,286,270.87
2,024.00	9.90	37.49	2,020.00	35.49	50.12	40.442086	-104.471439	1,405,552.52	3,286,280.79
2,116.00	9.79	33.56	2,110.65	48.28	59.26	40.442121	-104.471405	1,405,565.31	3,286,289.92
2,208.00	9.11	28.95	2,201.40	61.17	67.11	40.442156	-104.471377	1,405,578.20	3,286,297.77
2,300.00	8.28	34.65	2,292.34	73.00	74.40	40.442188	-104.471350	1,405,590.03	3,286,305.06
2,484.00	9.06	43.20	2,474.25	94.46	91.85	40.442246	-104.471286	1,405,611.49	3,286,322.51
2,575.00	8.28	37.70	2,564.21	104.86	100.77	40.442275	-104.471254	1,405,621.89	3,286,331.43
2,667.00	8.35	31.42	2,655.24	115.81	108.30	40.442304	-104.471226	1,405,632.84	3,286,338.96
2,758.00	8.37	29.19	2,745.28	127.23	114.97	40.442336	-104.471202	1,405,644.26	3,286,345.63
2,850.00	7.91	40.51	2,836.36	137.89	122.35	40.442365	-104.471175	1,405,654.92	3,286,353.01
2,942.00	7.69	35.24	2,927.50	147.73	130.02	40.442391	-104.471147	1,405,664.76	3,286,360.68
3,037.00	7.78	33.22	3,021.64	158.30	137.21	40.442420	-104.471121	1,405,675.33	3,286,367.87
3,132.00	7.63	53.22	3,115.80	167.46	145.78	40.442445	-104.471090	1,405,684.48	3,286,376.44
3,226.00	6.86	46.12	3,209.05	175.08	154.83	40.442466	-104.471057	1,405,692.11	3,286,385.49
3,321.00	7.10	44.89	3,303.35	183.18	163.06	40.442488	-104.471027	1,405,700.20	3,286,393.72
3,416.00	7.11	41.01	3,397.62	191.77	171.06	40.442511	-104.470998	1,405,708.80	3,286,401.72
3,511.00	6.96	37.10	3,491.90	200.80	178.39	40.442536	-104.470971	1,405,717.82	3,286,409.05
3,605.00	7.46	38.56	3,585.16	210.11	185.63	40.442561	-104.470945	1,405,727.14	3,286,416.29
3,700.00	7.98	36.15	3,679.30	220.26	193.37	40.442588	-104.470916	1,405,737.28	3,286,424.02
3,794.00	8.25	35.43	3,772.36	231.02	201.12	40.442618	-104.470888	1,405,748.05	3,286,431.78
3,889.00	8.59	32.46	3,866.33	242.56	208.88	40.442649	-104.470860	1,405,759.59	3,286,439.54
3,984.00	8.26	29.84	3,960.31	254.47	216.09	40.442682	-104.470833	1,405,771.49	3,286,446.74
4,078.00	8.08	30.00	4,053.35	266.05	222.75	40.442713	-104.470809	1,405,783.07	3,286,453.40
4,268.00	6.64	49.33	4,241.81	284.77	237.76	40.442764	-104.470754	1,405,801.80	3,286,468.42
4,363.00	7.96	55.15	4,336.04	292.11	247.33	40.442784	-104.470720	1,405,809.14	3,286,477.98
4,647.00	5.55	57.57	4,618.05	310.72	275.06	40.442834	-104.470619	1,405,827.74	3,286,505.71
4,741.00	6.87	45.15	4,711.50	317.12	282.88	40.442851	-104.470591	1,405,834.14	3,286,513.53

## Design Report for Wells Ranch State A36-649 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Local Coordinates		Geographic Coordinates		UTM Coordinates	
				+N/-S (usft)	+E/-W (usft)	Latitude (usft)	Longitude (usft)	Northing (usft)	Easting (usft)
4,836.00	6.10	40.85	4,805.89	324.95	290.21	40.442873	-104.470564	1,405,841.97	3,286,520.86
4,931.00	6.02	38.71	4,900.36	332.65	296.63	40.442894	-104.470541	1,405,849.67	3,286,527.28
5,120.00	4.75	36.97	5,088.52	346.64	307.53	40.442932	-104.470501	1,405,863.66	3,286,538.19
5,215.00	2.41	8.93	5,183.34	351.75	310.21	40.442946	-104.470491	1,405,868.77	3,286,540.86
5,310.00	1.64	8.08	5,278.28	355.07	310.71	40.442955	-104.470489	1,405,872.09	3,286,541.36
5,405.00	0.77	12.49	5,373.26	357.04	311.04	40.442960	-104.470488	1,405,874.06	3,286,541.69
5,499.00	0.55	43.39	5,467.25	357.99	311.49	40.442963	-104.470486	1,405,875.01	3,286,542.14
5,594.00	0.13	146.13	5,562.25	358.23	311.86	40.442963	-104.470485	1,405,875.25	3,286,542.51
5,689.00	0.33	122.55	5,657.25	357.99	312.15	40.442963	-104.470484	1,405,875.01	3,286,542.80
5,783.00	0.55	131.95	5,751.25	357.55	312.71	40.442961	-104.470482	1,405,874.57	3,286,543.37
5,878.00	0.94	138.07	5,846.24	356.66	313.57	40.442959	-104.470479	1,405,873.68	3,286,544.23
5,973.00	0.98	146.87	5,941.22	355.40	314.54	40.442956	-104.470475	1,405,872.42	3,286,545.19
6,068.00	1.15	143.43	6,036.21	353.95	315.55	40.442952	-104.470472	1,405,870.97	3,286,546.20
6,162.00	7.18	277.63	6,129.98	353.98	310.28	40.442952	-104.470491	1,405,871.00	3,286,540.93
6,257.00	19.56	279.69	6,222.23	357.46	288.64	40.442962	-104.470568	1,405,874.48	3,286,519.29
6,352.00	28.90	275.99	6,308.77	362.54	250.04	40.442977	-104.470707	1,405,879.56	3,286,480.70
6,447.00	37.97	271.86	6,387.98	365.89	197.89	40.442988	-104.470894	1,405,882.91	3,286,428.54
6,542.00	44.14	269.24	6,459.58	366.40	135.54	40.442991	-104.471118	1,405,883.42	3,286,366.20
6,636.00	53.19	268.36	6,521.60	364.89	65.05	40.442989	-104.471371	1,405,881.91	3,286,295.71
6,731.00	56.49	268.65	6,576.30	362.87	-12.58	40.442986	-104.471650	1,405,879.88	3,286,218.08
6,826.00	58.75	268.52	6,627.17	360.88	-92.78	40.442984	-104.471939	1,405,877.90	3,286,137.89
6,920.00	67.56	269.53	6,669.58	359.49	-176.56	40.442982	-104.472240	1,405,876.51	3,286,054.11
7,015.00	79.66	270.38	6,696.34	359.44	-267.52	40.442985	-104.472566	1,405,876.46	3,285,963.15
7,061.00	82.61	271.28	6,703.43	360.10	-312.96	40.442988	-104.472730	1,405,877.12	3,285,917.71
7,155.00	88.64	273.09	6,710.60	363.67	-406.58	40.443001	-104.473066	1,405,880.69	3,285,824.10
7,250.00	89.08	271.05	6,712.49	367.10	-501.49	40.443014	-104.473407	1,405,884.12	3,285,729.19
7,345.00	89.82	270.40	6,713.40	368.31	-596.48	40.443020	-104.473748	1,405,885.33	3,285,634.21
7,439.00	90.12	270.33	6,713.45	368.91	-690.47	40.443025	-104.474085	1,405,885.92	3,285,540.22
7,534.00	90.59	270.37	6,712.86	369.49	-785.47	40.443029	-104.474427	1,405,886.50	3,285,445.22
7,629.00	89.26	270.42	6,712.98	370.14	-880.47	40.443034	-104.474768	1,405,887.16	3,285,350.23
7,723.00	90.22	272.91	6,713.41	372.87	-974.42	40.443044	-104.475105	1,405,889.89	3,285,256.28
7,818.00	89.26	269.88	6,713.84	375.18	-1,069.38	40.443054	-104.475446	1,405,892.20	3,285,161.33
7,913.00	88.24	267.30	6,715.91	372.85	-1,164.31	40.443050	-104.475787	1,405,889.87	3,285,066.39
8,008.00	88.70	266.88	6,718.45	368.03	-1,259.16	40.443040	-104.476128	1,405,885.05	3,284,971.55
8,103.00	88.89	266.23	6,720.45	362.32	-1,353.96	40.443028	-104.476469	1,405,879.34	3,284,876.75
8,197.00	89.08	266.03	6,722.11	355.98	-1,447.74	40.443013	-104.476806	1,405,873.00	3,284,782.98
8,292.00	88.64	264.52	6,724.00	348.15	-1,542.39	40.442995	-104.477147	1,405,865.17	3,284,688.33
8,387.00	90.37	265.82	6,724.82	340.15	-1,637.04	40.442976	-104.477487	1,405,857.17	3,284,593.68
8,482.00	90.71	266.43	6,723.93	333.73	-1,731.82	40.442961	-104.477828	1,405,850.76	3,284,498.91
8,576.00	90.77	267.91	6,722.72	329.09	-1,825.70	40.442951	-104.478165	1,405,846.11	3,284,405.03
8,671.00	90.55	268.01	6,721.62	325.71	-1,920.63	40.442945	-104.478506	1,405,842.73	3,284,310.10
8,766.00	90.59	267.36	6,720.68	321.88	-2,015.55	40.442937	-104.478848	1,405,838.90	3,284,215.19

## Design Report for Wells Ranch State A36-649 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Local Coordinates		Geographic Coordinates		UTM Coordinates	
				+N/-S (usft)	+E/-W (usft)	Latitude (usft)	Longitude (usft)	Northing (usft)	Easting (usft)
8,861.00	91.23	266.76	6,719.17	317.00	-2,110.41	40.442927	-104.479189	1,405,834.02	3,284,120.33
8,955.00	90.86	269.49	6,717.45	313.93	-2,204.34	40.442922	-104.479526	1,405,830.95	3,284,026.41
9,050.00	90.92	269.93	6,715.98	313.45	-2,299.32	40.442923	-104.479867	1,405,830.47	3,283,931.43
9,145.00	88.74	270.25	6,716.26	313.60	-2,394.32	40.442927	-104.480209	1,405,830.62	3,283,836.44
9,239.00	88.46	269.23	6,718.56	313.17	-2,488.29	40.442928	-104.480546	1,405,830.19	3,283,742.47
9,334.00	89.45	270.32	6,720.29	312.80	-2,583.27	40.442930	-104.480887	1,405,829.82	3,283,647.49
9,524.00	89.35	268.11	6,722.28	310.20	-2,773.23	40.442929	-104.481570	1,405,827.22	3,283,457.54
9,619.00	90.03	267.95	6,722.79	306.93	-2,868.17	40.442923	-104.481911	1,405,823.95	3,283,362.60
9,713.00	90.58	267.54	6,722.29	303.23	-2,962.09	40.442916	-104.482249	1,405,820.25	3,283,268.68
9,808.00	91.54	267.31	6,720.53	298.96	-3,056.98	40.442907	-104.482590	1,405,815.99	3,283,173.80
9,903.00	90.43	268.65	6,718.90	295.62	-3,151.90	40.442901	-104.482931	1,405,812.64	3,283,078.88
9,998.00	90.40	269.39	6,718.21	293.99	-3,246.89	40.442900	-104.483272	1,405,811.01	3,282,983.90
10,092.00	90.93	269.29	6,717.12	292.91	-3,340.87	40.442900	-104.483610	1,405,809.93	3,282,889.92
10,187.00	88.83	270.57	6,717.32	292.79	-3,435.87	40.442902	-104.483951	1,405,809.81	3,282,794.93
10,282.00	87.84	270.61	6,720.08	293.77	-3,530.82	40.442908	-104.484292	1,405,810.79	3,282,699.98
10,377.00	87.04	268.84	6,724.32	293.32	-3,625.72	40.442910	-104.484633	1,405,810.34	3,282,605.08
10,471.00	88.83	267.12	6,727.71	290.00	-3,719.59	40.442904	-104.484971	1,405,807.03	3,282,511.21
10,566.00	90.40	265.95	6,728.35	284.26	-3,814.41	40.442891	-104.485311	1,405,801.28	3,282,416.39
10,657.00	90.99	265.18	6,727.25	277.23	-3,905.13	40.442874	-104.485638	1,405,794.25	3,282,325.68
10,748.00	92.16	266.21	6,724.75	270.40	-3,995.84	40.442859	-104.485964	1,405,787.42	3,282,234.98
10,839.00	91.33	268.99	6,721.97	266.59	-4,086.71	40.442851	-104.486290	1,405,783.61	3,282,144.11
10,930.00	91.14	269.81	6,720.01	265.64	-4,177.68	40.442851	-104.486617	1,405,782.66	3,282,053.14
11,022.00	92.13	269.94	6,717.39	265.44	-4,269.64	40.442853	-104.486948	1,405,782.46	3,281,961.18
11,114.00	90.28	269.73	6,715.45	265.17	-4,361.62	40.442856	-104.487278	1,405,782.19	3,281,869.21
11,205.00	88.55	269.92	6,716.38	264.89	-4,452.61	40.442858	-104.487605	1,405,781.92	3,281,778.22
11,297.00	88.77	269.23	6,718.53	264.21	-4,544.58	40.442859	-104.487935	1,405,781.23	3,281,686.26
11,388.00	88.70	269.02	6,720.54	262.82	-4,635.55	40.442858	-104.488262	1,405,779.84	3,281,595.29
11,480.00	88.15	268.71	6,723.07	261.00	-4,727.49	40.442856	-104.488593	1,405,778.02	3,281,503.35
11,571.00	90.77	269.07	6,723.93	259.24	-4,818.46	40.442854	-104.488919	1,405,776.26	3,281,412.38
11,663.00	91.60	268.55	6,722.03	257.33	-4,910.42	40.442851	-104.489250	1,405,774.35	3,281,320.43
11,755.00	92.41	268.40	6,718.81	254.88	-5,002.33	40.442847	-104.489580	1,405,771.90	3,281,228.52
11,847.00	90.49	268.03	6,716.48	252.02	-5,094.25	40.442842	-104.489910	1,405,769.04	3,281,136.60
11,939.00	90.22	267.74	6,715.91	248.62	-5,186.19	40.442836	-104.490241	1,405,765.64	3,281,044.67
12,030.00	90.86	267.50	6,715.05	244.84	-5,277.11	40.442829	-104.490568	1,405,761.87	3,280,953.75
12,122.00	89.29	267.55	6,714.93	240.87	-5,369.02	40.442820	-104.490898	1,405,757.89	3,280,861.85
12,213.00	89.35	267.91	6,716.01	237.26	-5,459.94	40.442813	-104.491225	1,405,754.29	3,280,770.93
12,305.00	90.46	267.15	6,716.16	233.30	-5,551.85	40.442805	-104.491555	1,405,750.32	3,280,679.02
12,397.00	91.70	266.86	6,714.43	228.49	-5,643.71	40.442795	-104.491885	1,405,745.52	3,280,587.17
12,492.00	90.71	268.65	6,712.43	224.77	-5,738.61	40.442788	-104.492226	1,405,741.80	3,280,492.27
12,587.00	91.11	268.63	6,710.92	222.52	-5,833.57	40.442785	-104.492568	1,405,739.54	3,280,397.31
12,682.00	89.20	269.61	6,710.67	221.06	-5,928.55	40.442784	-104.492909	1,405,738.09	3,280,302.33
12,777.00	88.80	269.72	6,712.32	220.51	-6,023.54	40.442785	-104.493250	1,405,737.53	3,280,207.35

## Design Report for Wells Ranch State A36-649 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Local Coordinates		Geographic Coordinates		UTM Coordinates	
				+N/-S (usft)	+E/-W (usft)	Latitude (usft)	Longitude (usft)	Northing (usft)	Easting (usft)
12,871.00	88.65	269.36	6,714.42	219.75	-6,117.51	40.442786	-104.493588	1,405,736.78	3,280,113.38
12,966.00	90.62	269.05	6,715.02	218.43	-6,212.49	40.442785	-104.493929	1,405,735.46	3,280,018.40
13,061.00	88.92	269.14	6,715.40	216.93	-6,307.48	40.442784	-104.494270	1,405,733.96	3,279,923.42
13,155.00	88.77	268.77	6,717.30	215.22	-6,401.44	40.442782	-104.494608	1,405,732.24	3,279,829.46
13,250.00	88.49	268.19	6,719.57	212.70	-6,496.38	40.442778	-104.494949	1,405,729.72	3,279,734.52
13,345.00	89.45	268.13	6,721.28	209.65	-6,591.32	40.442773	-104.495290	1,405,726.67	3,279,639.59
13,439.00	90.90	267.67	6,720.99	206.20	-6,685.25	40.442766	-104.495628	1,405,723.23	3,279,545.66
13,534.00	90.62	268.71	6,719.73	203.20	-6,780.19	40.442761	-104.495969	1,405,720.23	3,279,450.72
13,629.00	90.96	268.37	6,718.42	200.78	-6,875.15	40.442757	-104.496310	1,405,717.81	3,279,355.77
13,723.00	91.39	267.96	6,716.49	197.78	-6,969.09	40.442752	-104.496648	1,405,714.80	3,279,261.84
13,818.00	91.30	268.45	6,714.26	194.80	-7,064.01	40.442747	-104.496989	1,405,711.83	3,279,166.92
13,912.00	90.96	268.37	6,712.41	192.19	-7,157.96	40.442743	-104.497327	1,405,709.22	3,279,072.97
14,007.00	91.02	268.86	6,710.77	189.90	-7,252.92	40.442739	-104.497668	1,405,706.92	3,278,978.02
14,102.00	89.63	269.31	6,710.23	188.38	-7,347.90	40.442738	-104.498009	1,405,705.41	3,278,883.04
14,196.00	90.06	269.01	6,710.48	187.00	-7,441.89	40.442737	-104.498347	1,405,704.03	3,278,789.05
14,291.00	89.81	268.24	6,710.59	184.72	-7,536.86	40.442734	-104.498688	1,405,701.75	3,278,694.09
14,384.28	90.11	268.35	6,710.65	181.94	-7,630.10	40.442729	-104.499023	1,405,698.97	3,278,600.85
14,386.00	90.12	268.35	6,710.65	181.90	-7,631.82	40.442729	-104.499029	1,405,698.92	3,278,599.13
14,481.00	90.18	267.95	6,710.40	178.83	-7,726.77	40.442724	-104.499371	1,405,695.86	3,278,504.19
14,576.00	89.63	267.50	6,710.56	175.06	-7,821.69	40.442716	-104.499712	1,405,692.08	3,278,409.27
14,670.00	89.91	266.29	6,710.93	169.97	-7,915.55	40.442705	-104.500049	1,405,686.99	3,278,315.41
14,765.00	89.97	266.97	6,711.03	164.38	-8,010.39	40.442693	-104.500390	1,405,681.41	3,278,220.58
14,859.00	91.30	267.18	6,709.99	159.59	-8,104.26	40.442682	-104.500727	1,405,676.61	3,278,126.71
14,953.00	90.83	268.50	6,708.24	156.04	-8,198.17	40.442676	-104.501065	1,405,673.07	3,278,032.80
15,049.00	89.60	269.95	6,707.88	154.74	-8,294.16	40.442675	-104.501410	1,405,671.77	3,277,936.82
15,143.00	89.57	271.60	6,708.56	156.02	-8,388.14	40.442681	-104.501747	1,405,673.04	3,277,842.84
15,237.00	89.85	271.28	6,709.04	158.38	-8,482.11	40.442691	-104.502085	1,405,675.41	3,277,748.87
15,332.00	89.94	269.88	6,709.21	159.34	-8,577.10	40.442696	-104.502426	1,405,676.37	3,277,653.88
15,427.00	90.28	269.99	6,709.03	159.23	-8,672.10	40.442699	-104.502767	1,405,676.26	3,277,558.89
15,484.97	89.43	269.92	6,709.18	159.19	-8,730.07	40.442701	-104.502976	1,405,676.22	3,277,500.92
15,522.00	88.89	269.88	6,709.72	159.12	-8,767.10	40.442702	-104.503109	1,405,676.15	3,277,463.89
15,617.00	89.26	269.70	6,711.25	158.78	-8,862.09	40.442704	-104.503450	1,405,675.80	3,277,368.91
15,711.00	89.63	269.68	6,712.16	158.27	-8,956.08	40.442705	-104.503788	1,405,675.29	3,277,274.92
15,806.00	89.63	269.69	6,712.78	157.75	-9,051.08	40.442707	-104.504129	1,405,674.77	3,277,179.93
15,901.00	89.26	269.23	6,713.70	156.85	-9,146.07	40.442707	-104.504470	1,405,673.88	3,277,084.94
15,996.00	89.94	269.35	6,714.36	155.67	-9,241.06	40.442707	-104.504812	1,405,672.70	3,276,989.95
16,100.00	89.81	269.59	6,714.59	154.71	-9,345.05	40.442707	-104.505185	1,405,671.74	3,276,885.96
16,195.00	89.45	269.14	6,715.20	153.66	-9,440.04	40.442707	-104.505526	1,405,670.69	3,276,790.97
16,290.00	89.78	268.52	6,715.84	151.72	-9,535.02	40.442705	-104.505868	1,405,668.75	3,276,696.00
16,385.00	90.31	268.23	6,715.77	149.02	-9,629.98	40.442700	-104.506209	1,405,666.05	3,276,601.04
16,479.00	89.91	268.09	6,715.58	146.01	-9,723.93	40.442695	-104.506547	1,405,663.03	3,276,507.09
16,574.00	89.48	267.53	6,716.09	142.38	-9,818.86	40.442688	-104.506888	1,405,659.40	3,276,412.17

## Design Report for Wells Ranch State A36-649 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	+E/-W (usft)	Geographic Coordinates Latitude (usft)	Longitude (usft)	UTM Coordinates Northing (usft)	Easting (usft)
16,711.00	89.85	266.34	6,716.89	135.05	-9,955.66	40.442672	-104.507380	1,405,652.08	3,276,275.38
16,775.36	89.85	266.34	6,717.06	130.94	-10,019.89	40.442663	-104.507610	1,405,647.97	3,276,211.15
16,778.00	89.85	266.34	6,717.07	130.77	-10,022.52	40.442662	-104.507620	1,405,647.80	3,276,208.52

### Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	+E/-W (usft)	Comment
300.00	300.00	-0.30	0.30	First Gyro Survey at 300.00ft
854.00	853.99	-2.44	2.44	Final Gyro Survey at 854.00ft
921.00	920.99	-2.84	2.84	First Sperry MWD Survey at 921.00ft
16,711.00	6,716.89	135.05	-9,955.66	Final Sperry MWD Survey at 16711.00ft
16,778.00	6,717.07	130.77	-10,022.52	Stright Line Projection to TD at 16778.00ft

### Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/_S (usft)	+E/-W (usft)	Start TVD (usft)
Target	Wells Ranch State A36-649_Rev A3_BHL	270.53	Slot	0.00	0.00	0.00

### Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
300.00	854.00	Gyro Surveys	Flexi-Shot
921.00	7,015.00	Intermediate Survey	MWD
7,155.00	16,778.00	Production Surveys	MWD+IFR1+MS_WY

### Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
846.00	845.99	9 5/8"	9-5/8	13-3/4
7,061.00	6,703.43	7"	7	8-3/4

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Design Report for Wells Ranch State A36-649 - Actual Surveys

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**Design Targets**

Shape	Target Name	TVD ( )	Northing ( )	Easting ( )	+N/-S	+E/-W	Created	Updated
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**Directional Difficulty Index**

Average Dogleg over Survey:	1.49 °/100usft	Maximum Dogleg over Survey:	13.04 °/100usft at 6,257.00 usft
Net Tortosity applicable to Plans:	0.86 °/100usft	Directional Difficulty Index:	6.830

**Audit Info**

**North Reference Sheet for Sec. 31-T6N-R63W (Wells Ranch State A36) - Wells Ranch State A36-649 - Plan A**

All data is in US Feet unless otherwise stated. Directions and Coordinates are relative to Grid North Reference.

Vertical Depths are relative to KB = 24' @ 4681.00usft (H&P 273). Northing and Easting are relative to Wells Ranch State A36-649

Coordinate System is US State Plane 1983, Colorado Northern Zone using datum North American Datum 1983, ellipsoid GRS 1980

Projection method is Lambert Conformal Conic (2 parallel)

Central Meridian is -105.500000°, Longitude Origin:0.000000°, Latitude Origin:40.783333°

False Easting: 3,000,000.00usft, False Northing: 1,000,000.00usft, Scale Reduction: 0.99996240

Grid Coordinates of Well: 1,405,517.03 usft N, 3,286,230.66 usft E

Geographical Coordinates of Well: 40° 26' 31.16" N, 104° 28' 17.83" W

Grid Convergence at Surface is: 0.66°

Based upon Minimum Curvature type calculations, at a Measured Depth of 16,778.00usft

the Bottom Hole Displacement is 10,023.38usft in the Direction of 270.75° (Grid).

Magnetic Convergence at surface is: -7.74° (26 May 2015, , BGGM2015)

