

# Noble Energy

Weld County, CO (NAD 83)

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

Wells Ranch AE32-620

05-123-41785

Plan A

Design: Final Surveys

## Sperry Drilling Services

### Final Survey Report

06 October, 2015

Surface UWI : 05-123-41785

Well Coordinates: 1,404,408.56 N, 3,318,849.41 E (40° 26' 16.26" N, 104° 21' 16.16" W)

Ground Level: 4,719.00 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 AE32-620

KB = 24' @ 4743.00usft (H&P 273)

N

Grid

Dec-Deg - API - US Survey Feet - Custom

**HALLIBURTON**

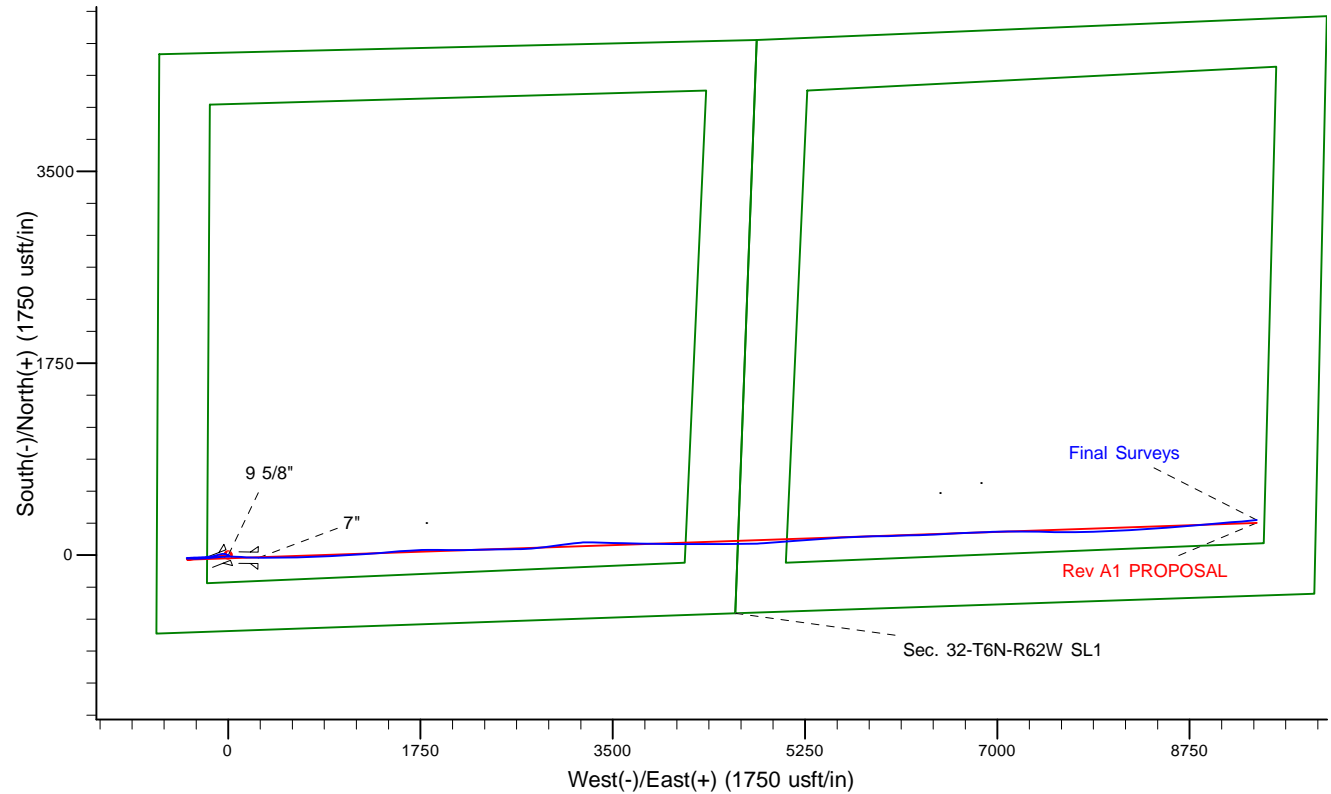
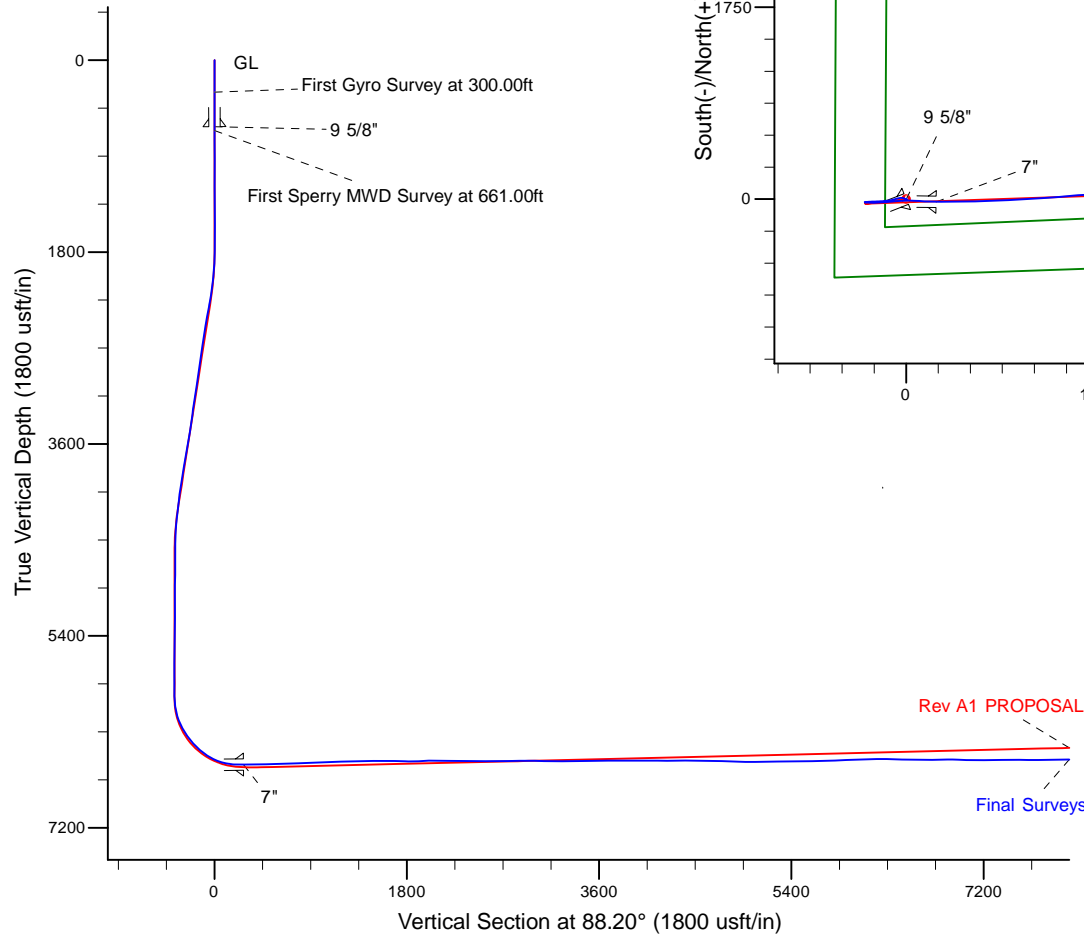
Project: Weld County, CO (NAD 83)  
 Site: Sec. 32-T6N-R62W (Wells Ranch AE32)  
 Well: Wells Ranch AE32-620  
 Wellbore: Plan A  
 Design: Final Surveys



Platted SHL: 690' FSL, 650' FWL  
 Platted Lat/Long: 40.43785, -104.35449  
 Location: Sec. 32-T6N-R62W

~7" Casing: 656' FSL, 916' FWL  
 Lat/Long: 40.437770 N, -104.353509 W  
 State Planes - CO Northern: 1,404,383.03 N, 3,319,122.86 E  
 Sec. 32-T6N-R62W

Platted BHL: 660' FSL, 535' FEL  
 Platted Lat/Long: 40.438392 N, -104.320858 W  
 State Planes - CO Northern: 1,404,728.78 N, 3,328,207.75 E  
 Location: Sec. 33-T6N-R62W



# LEGEND

- Wells Ranch AE32-620, Plan A, Rev A1 PROPOSAL V0
- Final Surveys

WELL DETAILS: Wells Ranch AE32-620

Ground Level: 4719.00  
 KB = 24' @ 4743.00usft (H&P 273)

Created By: Tatiana Gomez  
 Created On: 10/6/2015

## Design Report for Wells Ranch AE32-620 - Final 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
300.00	0.05	68.42	300.00	0.05	0.12	0.12	0.02
<b>First Gyro Survey at 300.00ft</b>							
625.00	0.10	68.42	625.00	0.20	0.51	0.52	0.01
<b>9 5/8"</b>							
637.00	0.10	68.42	637.00	0.21	0.53	0.54	0.01
<b>Final Gyro Survey at 637.00ft</b>							
661.00	0.10	68.42	661.00	0.23	0.57	0.58	0.00
<b>First Sperry MWD Survey at 661.00ft</b>							
755.00	0.11	144.23	755.00	0.18	0.70	0.71	0.14
943.00	0.22	140.95	943.00	-0.24	1.03	1.02	0.06
1,037.00	0.28	149.27	1,037.00	-0.58	1.26	1.24	0.07
1,222.00	0.22	147.50	1,222.00	-1.27	1.69	1.64	0.03
1,496.00	0.19	86.15	1,495.99	-1.68	2.42	2.37	0.08
1,588.00	0.21	103.88	1,587.99	-1.71	2.74	2.68	0.07
1,680.00	0.17	68.31	1,679.99	-1.70	3.03	2.97	0.13
1,770.00	0.17	341.75	1,769.99	-1.53	3.11	3.06	0.26
1,862.00	3.17	288.82	1,861.94	-0.58	0.66	0.64	3.34
1,954.00	4.60	293.28	1,953.73	1.70	-5.14	-5.08	1.59
2,045.00	5.76	292.14	2,044.36	4.87	-12.72	-12.56	1.28
2,137.00	8.29	287.29	2,135.66	8.58	-23.33	-23.05	2.82
2,228.00	9.65	276.22	2,225.55	11.35	-37.18	-36.80	2.41
2,319.00	10.95	260.71	2,315.10	10.78	-53.29	-52.93	3.35
2,411.00	10.26	258.55	2,405.53	7.75	-69.95	-69.67	0.87
2,502.00	9.70	256.98	2,495.15	4.41	-85.36	-85.18	0.68
2,594.00	9.19	256.20	2,585.91	0.91	-100.05	-99.97	0.57
2,685.00	8.52	254.39	2,675.82	-2.63	-113.60	-113.62	0.80
2,777.00	8.04	252.90	2,766.86	-6.36	-126.31	-126.45	0.57
2,869.00	8.58	257.50	2,857.90	-9.74	-139.16	-139.40	0.93
2,963.00	8.03	257.95	2,950.91	-12.63	-152.42	-152.75	0.59
3,057.00	8.36	267.25	3,043.95	-14.32	-165.67	-166.04	1.45
3,151.00	9.32	267.91	3,136.84	-14.93	-180.10	-180.48	1.03
3,246.00	8.15	262.49	3,230.73	-16.09	-194.47	-194.88	1.50
3,341.00	7.09	260.74	3,324.89	-17.91	-206.93	-207.39	1.14
3,436.00	8.95	268.69	3,418.96	-19.03	-220.11	-220.60	2.28
3,530.00	8.99	267.62	3,511.81	-19.50	-234.76	-235.25	0.18
3,625.00	9.24	267.58	3,605.61	-20.13	-249.79	-250.30	0.26
3,720.00	9.74	267.79	3,699.31	-20.76	-265.44	-265.96	0.53
3,815.00	9.96	268.28	3,792.91	-21.32	-281.68	-282.21	0.25
3,909.00	9.46	267.19	3,885.57	-21.94	-297.52	-298.07	0.57
4,004.00	8.82	267.94	3,979.36	-22.58	-312.60	-313.16	0.69
4,099.00	8.05	265.95	4,073.33	-23.32	-326.52	-327.09	0.87
4,194.00	6.85	265.63	4,167.53	-24.22	-338.80	-339.39	1.26
4,288.00	6.36	264.25	4,260.90	-25.17	-349.57	-350.19	0.55
4,383.00	4.72	259.83	4,355.46	-26.38	-358.65	-359.30	1.78
4,478.00	2.87	250.72	4,450.25	-27.86	-364.75	-365.44	2.04
4,573.00	0.75	231.36	4,545.19	-29.03	-367.48	-368.21	2.29
4,667.00	0.39	232.26	4,639.19	-29.61	-368.21	-368.96	0.38
4,762.00	0.24	263.31	4,734.19	-29.83	-368.66	-369.42	0.23
4,857.00	0.35	288.81	4,829.19	-29.76	-369.14	-369.89	0.18

## Design Report for Wells Ranch AE32-620 - Final Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
4,951.00	0.30	294.40	4,923.18	-29.57	-369.63	-370.38	0.06
5,046.00	0.25	324.87	5,018.18	-29.30	-369.98	-370.71	0.16
5,141.00	0.33	357.34	5,113.18	-28.85	-370.11	-370.83	0.19
5,236.00	0.70	12.28	5,208.18	-28.01	-370.00	-370.70	0.41
5,330.00	1.05	0.26	5,302.17	-26.59	-369.87	-370.52	0.42
5,425.00	1.27	262.94	5,397.16	-25.85	-370.91	-371.54	1.84
5,520.00	1.41	276.42	5,492.13	-25.85	-373.12	-373.75	0.36
5,614.00	0.94	254.88	5,586.11	-25.92	-375.01	-375.64	0.68
5,709.00	0.34	212.73	5,681.10	-26.36	-375.92	-376.56	0.76
5,804.00	0.54	175.74	5,776.10	-27.04	-376.04	-376.70	0.36
5,898.00	0.74	158.81	5,870.10	-28.05	-375.78	-376.48	0.29
5,993.00	0.53	147.11	5,965.09	-28.99	-375.32	-376.05	0.26
6,088.00	8.19	94.39	6,059.75	-29.88	-368.33	-369.08	8.29
6,182.00	16.49	93.71	6,151.50	-31.26	-348.30	-349.11	8.83
6,277.00	25.87	92.92	6,239.98	-33.19	-314.07	-314.96	9.88
6,372.00	35.52	88.42	6,321.59	-33.49	-265.67	-266.59	10.44
6,466.00	40.71	84.75	6,395.53	-29.93	-207.80	-208.64	6.02
6,528.00	45.42	83.18	6,440.81	-25.45	-165.72	-166.43	7.79
6,623.00	52.16	84.31	6,503.37	-17.71	-94.71	-95.22	7.15
6,718.00	64.17	89.27	6,553.41	-13.43	-14.30	-14.72	13.39
6,766.00	69.64	91.70	6,572.23	-13.82	29.83	29.38	12.31
6,812.00	73.94	92.75	6,586.60	-15.52	73.48	72.96	9.60
6,860.00	80.03	92.56	6,597.41	-17.68	120.17	119.56	12.69
6,907.00	85.03	93.34	6,603.52	-20.08	166.70	165.99	10.76
6,963.00	88.92	93.60	6,606.47	-23.47	222.51	221.66	6.96
7,014.00	90.66	91.04	6,606.66	-25.53	273.46	272.52	6.06
7"							
7,045.00	91.72	89.49	6,606.01	-25.68	304.45	303.49	6.06
7,140.00	89.69	88.22	6,604.84	-23.78	399.42	398.47	2.52
7,235.00	91.73	88.22	6,603.67	-20.83	494.36	493.46	2.15
7,329.00	92.93	88.60	6,599.85	-18.22	588.24	587.38	1.34
7,519.00	91.35	88.39	6,592.75	-13.24	778.04	777.24	0.84
7,613.00	91.29	88.26	6,590.59	-10.49	871.97	871.22	0.15
7,802.00	92.37	87.21	6,584.55	-3.02	1,060.72	1,060.11	0.80
7,897.00	91.48	85.80	6,581.36	2.76	1,155.49	1,155.01	1.75
7,992.00	92.53	85.82	6,578.04	9.70	1,250.18	1,249.87	1.11
8,086.00	91.20	85.79	6,574.98	16.57	1,343.87	1,343.73	1.42
8,181.00	91.29	84.26	6,572.91	24.81	1,438.49	1,438.56	1.61
8,276.00	90.65	85.62	6,571.30	33.19	1,533.10	1,533.39	1.58
8,370.00	88.55	86.97	6,571.96	39.26	1,626.90	1,627.33	2.66
8,465.00	88.43	86.74	6,574.46	44.47	1,721.72	1,722.27	0.27
8,559.00	89.57	89.15	6,576.10	47.84	1,815.64	1,816.25	2.84
8,653.00	92.50	91.06	6,574.41	47.67	1,909.61	1,910.16	3.72
8,748.00	92.74	90.39	6,570.06	46.47	2,004.50	2,004.97	0.75
8,842.00	89.05	89.60	6,568.60	46.48	2,098.47	2,098.90	4.01
8,937.00	88.52	89.32	6,570.61	47.37	2,193.45	2,193.85	0.63
9,031.00	88.71	89.03	6,572.88	48.73	2,287.41	2,287.81	0.37
9,220.00	89.85	88.66	6,575.26	52.53	2,476.35	2,476.78	0.63
9,314.00	91.48	89.62	6,574.17	53.95	2,570.33	2,570.76	2.01
9,409.00	90.68	88.37	6,572.38	55.61	2,665.30	2,665.73	1.56
9,503.00	91.02	85.60	6,570.98	60.55	2,759.15	2,759.69	2.97

## Design Report for Wells Ranch AE32-620 - Final Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
9,598.00	89.20	82.66	6,570.80	70.27	2,853.64	2,854.43	3.64
9,692.00	89.69	83.20	6,571.71	81.84	2,946.92	2,948.03	0.78
9,787.00	88.61	81.70	6,573.12	94.32	3,041.08	3,042.54	1.95
9,881.00	89.91	82.74	6,574.33	107.04	3,134.20	3,136.02	1.77
9,976.00	89.82	87.23	6,574.56	115.34	3,228.81	3,230.84	4.73
10,068.00	90.18	91.52	6,574.56	116.35	3,320.79	3,322.80	4.68
10,159.00	90.77	91.77	6,573.80	113.73	3,411.74	3,413.63	0.70
10,250.00	90.68	91.72	6,572.65	110.96	3,502.70	3,504.45	0.11
10,342.00	91.23	91.56	6,571.12	108.33	3,594.64	3,596.27	0.62
10,433.00	90.55	91.75	6,569.70	105.70	3,685.60	3,687.10	0.78
10,525.00	89.54	90.47	6,569.63	103.92	3,777.57	3,778.98	1.77
10,616.00	89.91	90.22	6,570.07	103.37	3,868.57	3,869.91	0.49
10,707.00	89.78	89.98	6,570.31	103.21	3,959.57	3,960.86	0.30
10,799.00	90.34	90.44	6,570.22	102.88	4,051.57	4,052.80	0.79
10,891.00	89.91	91.13	6,570.02	101.62	4,143.56	4,144.71	0.88
10,982.00	89.38	89.77	6,570.58	100.90	4,234.55	4,235.63	1.60
11,073.00	90.86	90.37	6,570.39	100.79	4,325.55	4,326.58	1.75
11,165.00	90.12	89.64	6,569.60	100.78	4,417.55	4,418.53	1.13
11,256.00	89.35	89.47	6,570.02	101.49	4,508.54	4,509.51	0.87
11,348.00	89.57	88.88	6,570.89	102.81	4,600.53	4,601.49	0.68
11,439.00	88.21	89.32	6,572.65	104.24	4,691.50	4,692.46	1.57
11,531.00	87.90	89.17	6,575.78	105.45	4,783.44	4,784.39	0.37
11,623.00	87.75	86.18	6,579.27	109.18	4,875.28	4,876.31	3.25
11,715.00	89.54	85.96	6,581.44	115.49	4,967.04	4,968.21	1.96
11,809.00	89.85	85.67	6,581.94	122.35	5,060.78	5,062.13	0.45
11,904.00	90.83	85.61	6,581.38	129.57	5,155.51	5,157.03	1.03
11,999.00	91.72	85.28	6,579.27	137.11	5,250.18	5,251.90	1.00
12,093.00	90.89	85.23	6,577.13	144.89	5,343.84	5,345.75	0.88
12,188.00	90.99	86.01	6,575.57	152.14	5,438.54	5,440.64	0.83
12,283.00	90.65	86.75	6,574.21	158.14	5,533.34	5,535.58	0.86
12,377.00	89.97	87.88	6,573.70	162.54	5,627.24	5,629.57	1.40
12,472.00	91.33	87.38	6,572.62	166.47	5,722.15	5,724.55	1.53
12,567.00	92.90	88.93	6,569.12	169.53	5,817.03	5,819.48	2.32
12,661.00	93.02	88.72	6,564.26	171.45	5,910.88	5,913.35	0.26
12,756.00	92.07	88.21	6,560.04	173.99	6,005.75	6,008.26	1.13
12,851.00	91.76	87.97	6,556.87	177.16	6,100.65	6,103.20	0.41
12,946.00	90.92	88.03	6,554.65	180.47	6,195.56	6,198.17	0.89
13,040.00	89.41	88.34	6,554.38	183.45	6,289.51	6,292.17	1.64
13,135.00	88.24	87.80	6,556.32	186.65	6,384.44	6,387.15	1.36
13,230.00	87.75	86.72	6,559.65	191.19	6,479.27	6,482.08	1.25
13,325.00	89.60	87.54	6,561.85	195.94	6,574.12	6,577.03	2.13
13,419.00	89.78	86.96	6,562.35	200.45	6,668.01	6,671.01	0.65
13,514.00	92.09	87.61	6,560.80	204.95	6,762.88	6,765.98	2.53
13,609.00	89.88	87.62	6,559.17	208.90	6,857.78	6,860.96	2.33
13,703.00	88.74	88.98	6,560.30	211.69	6,951.73	6,954.95	1.89
13,798.00	87.72	88.14	6,563.24	214.08	7,046.65	7,049.90	1.39
13,893.00	89.23	88.71	6,565.77	216.69	7,141.58	7,144.86	1.70
13,988.00	91.66	91.16	6,565.03	216.79	7,236.56	7,239.80	3.63
14,082.00	91.02	91.43	6,562.83	214.67	7,330.51	7,333.64	0.74
14,177.00	89.94	91.21	6,562.03	212.48	7,425.48	7,428.49	1.16
14,272.00	89.41	90.42	6,562.57	211.13	7,520.47	7,523.39	1.00

## Design Report for Wells Ranch AE32-620 - Final Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
14,366.00	89.51	90.28	6,563.46	210.56	7,614.46	7,617.32	0.18
14,461.00	90.15	88.91	6,563.74	211.23	7,709.46	7,712.29	1.59
14,556.00	91.72	89.21	6,562.19	212.79	7,804.43	7,807.26	1.68
14,651.00	90.71	88.67	6,560.18	214.54	7,899.39	7,902.23	1.21
14,746.00	90.37	87.59	6,559.28	217.64	7,994.33	7,997.23	1.19
14,840.00	90.12	86.83	6,558.88	222.22	8,088.22	8,091.21	0.85
14,935.00	91.75	86.53	6,557.33	227.72	8,183.04	8,186.16	1.74
15,030.00	91.75	86.35	6,554.43	233.62	8,277.82	8,281.07	0.19
15,125.00	90.86	86.56	6,552.26	239.49	8,372.61	8,376.00	0.96
15,219.00	90.28	86.11	6,551.33	245.50	8,466.41	8,469.95	0.78
15,314.00	90.52	86.11	6,550.66	251.94	8,561.19	8,564.88	0.25
15,409.00	90.22	85.44	6,550.05	258.94	8,655.93	8,659.79	0.77
15,504.00	90.46	85.21	6,549.49	266.68	8,750.61	8,754.67	0.35
15,599.00	90.77	84.99	6,548.47	274.80	8,845.26	8,849.53	0.40
15,693.00	91.32	85.00	6,546.75	283.00	8,938.88	8,943.36	0.59
15,788.00	90.12	85.09	6,545.56	291.20	9,033.52	9,038.21	1.27
15,883.00	90.12	85.21	6,545.36	299.23	9,128.18	9,133.07	0.13
15,978.00	91.91	84.91	6,543.68	307.41	9,222.81	9,227.91	1.91
16,048.00	92.56	84.51	6,540.95	313.86	9,292.46	9,297.73	1.09
<b>Final Sperry MWD Survey at 16048.00ft</b>							
16,114.61	92.56	84.51	6,537.97	320.23	9,358.70	9,364.14	0.00
<b>Wells Ranch AE32-620_Rev A0_BHL</b>							
16,116.00	92.56	84.51	6,537.91	320.36	9,360.08	9,365.52	0.00
<b>Straight Line Projection to TD at 16116.00ft - Wells Ranch AE32-620_Rev A1_BHL</b>							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
300.00	300.00	0.05	0.12	First Gyro Survey at 300.00ft
637.00	637.00	0.21	0.53	Final Gyro Survey at 637.00ft
661.00	661.00	0.23	0.57	First Sperry MWD Survey at 661.00ft
16,048.00	6,540.95	313.86	9,292.46	Final Sperry MWD Survey at 16048.00ft
16,116.00	6,537.91	320.36	9,360.08	Straight Line Projection to TD at 16116.00ft

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
Target	Wells Ranch AE32-620_Rev A1_BHL	88.20	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
300.00	637.00	Surface Surveys	NS-GYRO-MS
637.00	6,963.00	Intermediate Survey	MWD
6,963.00	16,116.00	Production Surveys	MWD+IFR1+MS_WY

## Design Report for Wells Ranch AE32-620 - Final Surveys

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
625.00	625.00	9 5/8"	9-5/8	13-3/4
7,014.00	6,606.66	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 AE32-620 - actual wellpath misses target center by 0.02usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E) - Point	0.00	0.00	0.00	0.02	0.00	1,404,408.58	3,318,849.41	40.437850	-104.354490
Wells Ranch AE32-620 - actual wellpath misses target center by 122.79usft at 16116.00usft MD (6537.91 TVD, 320.36 N, 9360.08 E) - Point	0.00	0.00	6,418.00	293.97	9,361.13	1,404,702.52	3,328,210.18	40.438320	-104.320850
Wells Ranch AE32-620 - actual wellpath misses target center by 26.44usft at 16114.61usft MD (6537.97 TVD, 320.23 N, 9358.70 E) - Point	0.00	0.00	6,536.00	293.97	9,361.13	1,404,702.52	3,328,210.18	40.438320	-104.320850

Directional Difficulty Index

Average Dogleg over Survey:	1.62 °/100usft	Maximum Dogleg over Survey:	13.39 °/100usft at 6,718.00 usft
Net Tortousity applicable to Plans:	0.94 °/100usft	Directional Difficulty Index:	6.811

Audit Info

North Reference Sheet for Sec. 32-T6N-R62W (Wells Ranch AE32) - Wells Ranch  
AE32-620 - 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' @ 4743.00usft (H&P 273). Northing and Easting are relative to Wells Ranch AE32-620

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: 0.99996216

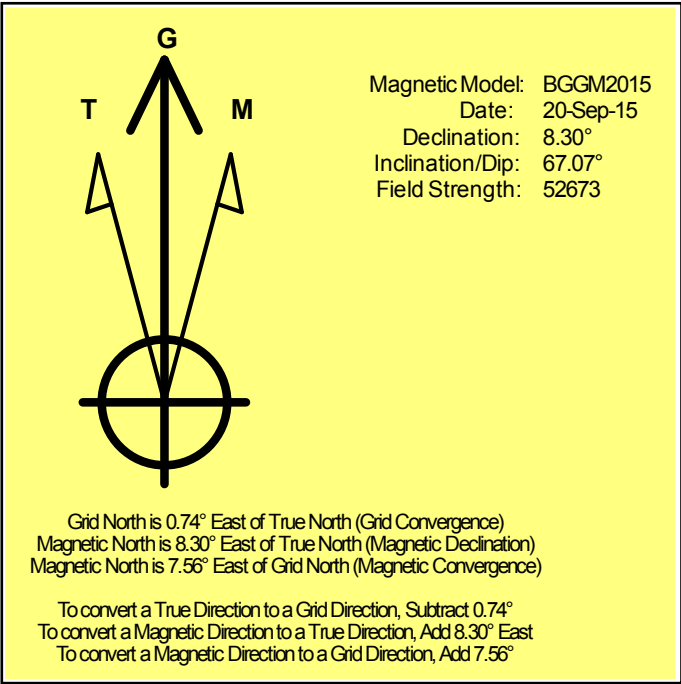
Grid Coordinates of Well: 1,404,408.56 usft N, 3,318,849.41 usft E

Geographical Coordinates of Well: 40° 26' 16.26" N, 104° 21' 16.16" W

Grid Convergence at Surface is: 0.74°

Based upon Minimum Curvature type calculations, at a Measured Depth of 16,116.00usft  
the Bottom Hole Displacement is 9,365.56usft in the Direction of 88.04° (Grid).

Magnetic Convergence at surface is: -7.56° (20 September 2015, , BGGM2015)





# Noble Energy

Weld County, CO (NAD 83)

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

Wells Ranch AE32-620

05-123-41785

Plan A

Design: Final Surveys

## Sperry Drilling Services

### Geodetic Report

06 October, 2015

Well Coordinates: 1,404,408.56 N, 3,318,849.41 E (40° 26' 16.26" N, 104° 21' 16.16" W)

Ground Level: 4,719.00 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 AE32-620

KB = 24' @ 4743.00usft (H&P 273)

N

Grid

Dec-Deg - API - US Survey Feet - Custom

**HALLIBURTON**

## Design Report for Wells Ranch AE32-620 - Final Surveys

Measured			Vertical	Local Coordinates		Geographic Coordinates		UTM Coordinates	
Depth	Inclination	Azimuth	Depth	+N/-S	+E/-W	Latitude	Longitude	Northing	Easting
(usft)	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(usft)
0.00	0.00	0.00	0.00	0.00	0.00	40.437850	-104.354490	1,404,408.56	3,318,849.41
300.00	0.05	68.42	300.00	0.05	0.12	40.437850	-104.354490	1,404,408.61	3,318,849.53
625.00	0.10	68.42	625.00	0.20	0.51	40.437851	-104.354488	1,404,408.77	3,318,849.92
637.00	0.10	68.42	637.00	0.21	0.53	40.437851	-104.354488	1,404,408.77	3,318,849.94
661.00	0.10	68.42	661.00	0.23	0.57	40.437851	-104.354488	1,404,408.79	3,318,849.98
755.00	0.11	144.23	755.00	0.18	0.70	40.437851	-104.354488	1,404,408.75	3,318,850.11
943.00	0.22	140.95	943.00	-0.24	1.03	40.437849	-104.354487	1,404,408.32	3,318,850.44
1,037.00	0.28	149.27	1,037.00	-0.58	1.26	40.437848	-104.354486	1,404,407.98	3,318,850.67
1,222.00	0.22	147.50	1,222.00	-1.27	1.69	40.437847	-104.354484	1,404,407.29	3,318,851.09
1,496.00	0.19	86.15	1,495.99	-1.68	2.42	40.437845	-104.354482	1,404,406.88	3,318,851.83
1,588.00	0.21	103.88	1,587.99	-1.71	2.74	40.437845	-104.354481	1,404,406.85	3,318,852.14
1,680.00	0.17	68.31	1,679.99	-1.70	3.03	40.437845	-104.354479	1,404,406.86	3,318,852.43
1,770.00	0.17	341.75	1,769.99	-1.53	3.11	40.437846	-104.354479	1,404,407.04	3,318,852.52
1,862.00	3.17	288.82	1,861.94	-0.58	0.66	40.437848	-104.354488	1,404,407.99	3,318,850.07
1,954.00	4.60	293.28	1,953.73	1.70	-5.14	40.437855	-104.354509	1,404,410.26	3,318,844.27
2,045.00	5.76	292.14	2,044.36	4.87	-12.72	40.437864	-104.354536	1,404,413.43	3,318,836.69
2,137.00	8.29	287.29	2,135.66	8.58	-23.33	40.437874	-104.354574	1,404,417.14	3,318,826.08
2,228.00	9.65	276.22	2,225.55	11.35	-37.18	40.437883	-104.354623	1,404,419.92	3,318,812.23
2,319.00	10.95	260.71	2,315.10	10.78	-53.29	40.437882	-104.354681	1,404,419.35	3,318,796.11
2,411.00	10.26	258.55	2,405.53	7.75	-69.95	40.437874	-104.354741	1,404,416.31	3,318,779.46
2,502.00	9.70	256.98	2,495.15	4.41	-85.36	40.437865	-104.354797	1,404,412.97	3,318,764.05
2,594.00	9.19	256.20	2,585.91	0.91	-100.05	40.437856	-104.354850	1,404,409.48	3,318,749.36
2,685.00	8.52	254.39	2,675.82	-2.63	-113.60	40.437847	-104.354898	1,404,405.93	3,318,735.82
2,777.00	8.04	252.90	2,766.86	-6.36	-126.31	40.437837	-104.354944	1,404,402.20	3,318,723.10
2,869.00	8.58	257.50	2,857.90	-9.74	-139.16	40.437828	-104.354991	1,404,398.83	3,318,710.25
2,963.00	8.03	257.95	2,950.91	-12.63	-152.42	40.437821	-104.355038	1,404,395.94	3,318,696.99
3,057.00	8.36	267.25	3,043.95	-14.32	-165.67	40.437817	-104.355086	1,404,394.24	3,318,683.74
3,151.00	9.32	267.91	3,136.84	-14.93	-180.10	40.437815	-104.355138	1,404,393.63	3,318,669.31
3,246.00	8.15	262.49	3,230.73	-16.09	-194.47	40.437813	-104.355190	1,404,392.47	3,318,654.95
3,341.00	7.09	260.74	3,324.89	-17.91	-206.93	40.437808	-104.355234	1,404,390.65	3,318,642.48
3,436.00	8.95	268.69	3,418.96	-19.03	-220.11	40.437806	-104.355282	1,404,389.54	3,318,629.31
3,530.00	8.99	267.62	3,511.81	-19.50	-234.76	40.437805	-104.355334	1,404,389.07	3,318,614.66
3,625.00	9.24	267.58	3,605.61	-20.13	-249.79	40.437804	-104.355388	1,404,388.43	3,318,599.62
3,720.00	9.74	267.79	3,699.31	-20.76	-265.44	40.437802	-104.355445	1,404,387.80	3,318,583.97
3,815.00	9.96	268.28	3,792.91	-21.32	-281.68	40.437802	-104.355503	1,404,387.25	3,318,567.73
3,909.00	9.46	267.19	3,885.57	-21.94	-297.52	40.437800	-104.355560	1,404,386.62	3,318,551.89
4,004.00	8.82	267.94	3,979.36	-22.58	-312.60	40.437799	-104.355614	1,404,385.98	3,318,536.82
4,099.00	8.05	265.95	4,073.33	-23.32	-326.52	40.437798	-104.355664	1,404,385.25	3,318,522.90
4,194.00	6.85	265.63	4,167.53	-24.22	-338.80	40.437796	-104.355708	1,404,384.35	3,318,510.62
4,288.00	6.36	264.25	4,260.90	-25.17	-349.57	40.437793	-104.355747	1,404,383.40	3,318,499.85
4,383.00	4.72	259.83	4,355.46	-26.38	-358.65	40.437790	-104.355780	1,404,382.18	3,318,490.77
4,478.00	2.87	250.72	4,450.25	-27.86	-364.75	40.437787	-104.355802	1,404,380.70	3,318,484.68

## Design Report for Wells Ranch AE32-620 - Final 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)
4,573.00	0.75	231.36	4,545.19	-29.03	-367.48	40.437783	-104.355812	1,404,379.53	3,318,481.94
4,667.00	0.39	232.26	4,639.19	-29.61	-368.21	40.437782	-104.355814	1,404,378.95	3,318,481.21
4,762.00	0.24	263.31	4,734.19	-29.83	-368.66	40.437781	-104.355816	1,404,378.73	3,318,480.76
4,857.00	0.35	288.81	4,829.19	-29.76	-369.14	40.437781	-104.355818	1,404,378.80	3,318,480.29
4,951.00	0.30	294.40	4,923.18	-29.57	-369.63	40.437782	-104.355819	1,404,378.99	3,318,479.79
5,046.00	0.25	324.87	5,018.18	-29.30	-369.98	40.437783	-104.355821	1,404,379.27	3,318,479.44
5,141.00	0.33	357.34	5,113.18	-28.85	-370.11	40.437784	-104.355821	1,404,379.71	3,318,479.31
5,236.00	0.70	12.28	5,208.18	-28.01	-370.00	40.437786	-104.355821	1,404,380.55	3,318,479.42
5,330.00	1.05	0.26	5,302.17	-26.59	-369.87	40.437790	-104.355820	1,404,381.97	3,318,479.55
5,425.00	1.27	262.94	5,397.16	-25.85	-370.91	40.437792	-104.355824	1,404,382.71	3,318,478.51
5,520.00	1.41	276.42	5,492.13	-25.85	-373.12	40.437792	-104.355832	1,404,382.71	3,318,476.30
5,614.00	0.94	254.88	5,586.11	-25.92	-375.01	40.437792	-104.355839	1,404,382.64	3,318,474.41
5,709.00	0.34	212.73	5,681.10	-26.36	-375.92	40.437791	-104.355842	1,404,382.20	3,318,473.50
5,804.00	0.54	175.74	5,776.10	-27.04	-376.04	40.437789	-104.355842	1,404,381.52	3,318,473.38
5,898.00	0.74	158.81	5,870.10	-28.05	-375.78	40.437786	-104.355841	1,404,380.51	3,318,473.64
5,993.00	0.53	147.11	5,965.09	-28.99	-375.32	40.437784	-104.355840	1,404,379.57	3,318,474.10
6,088.00	8.19	94.39	6,059.75	-29.88	-368.33	40.437781	-104.355815	1,404,378.68	3,318,481.09
6,182.00	16.49	93.71	6,151.50	-31.26	-348.30	40.437777	-104.355743	1,404,377.30	3,318,501.12
6,277.00	25.87	92.92	6,239.98	-33.19	-314.07	40.437770	-104.355620	1,404,375.37	3,318,535.34
6,372.00	35.52	88.42	6,321.59	-33.49	-265.67	40.437768	-104.355446	1,404,375.08	3,318,583.75
6,466.00	40.71	84.75	6,395.53	-29.93	-207.80	40.437775	-104.355238	1,404,378.64	3,318,641.62
6,528.00	45.42	83.18	6,440.81	-25.45	-165.72	40.437786	-104.355087	1,404,383.11	3,318,683.70
6,623.00	52.16	84.31	6,503.37	-17.71	-94.71	40.437805	-104.354831	1,404,390.86	3,318,754.70
6,718.00	64.17	89.27	6,553.41	-13.43	-14.30	40.437814	-104.354542	1,404,395.14	3,318,835.10
6,766.00	69.64	91.70	6,572.23	-13.82	29.83	40.437811	-104.354384	1,404,394.75	3,318,879.23
6,812.00	73.94	92.75	6,586.60	-15.52	73.48	40.437805	-104.354227	1,404,393.04	3,318,922.88
6,860.00	80.03	92.56	6,597.41	-17.68	120.17	40.437797	-104.354059	1,404,390.88	3,318,969.58
6,907.00	85.03	93.34	6,603.52	-20.08	166.70	40.437789	-104.353892	1,404,388.48	3,319,016.10
6,963.00	88.92	93.60	6,606.47	-23.47	222.51	40.437778	-104.353692	1,404,385.10	3,319,071.91
7,014.00	90.66	91.04	6,606.66	-25.53	273.46	40.437770	-104.353509	1,404,383.03	3,319,122.86
7,045.00	91.72	89.49	6,606.01	-25.68	304.45	40.437769	-104.353398	1,404,382.89	3,319,153.85
7,140.00	89.69	88.22	6,604.84	-23.78	399.42	40.437771	-104.353057	1,404,384.78	3,319,248.81
7,235.00	91.73	88.22	6,603.67	-20.83	494.36	40.437775	-104.352715	1,404,387.73	3,319,343.75
7,329.00	92.93	88.60	6,599.85	-18.22	588.24	40.437779	-104.352378	1,404,390.34	3,319,437.63
7,519.00	91.35	88.39	6,592.75	-13.24	778.04	40.437786	-104.351696	1,404,395.33	3,319,627.42
7,613.00	91.29	88.26	6,590.59	-10.49	871.97	40.437790	-104.351359	1,404,398.07	3,319,721.35
7,802.00	92.37	87.21	6,584.55	-3.02	1,060.72	40.437804	-104.350680	1,404,405.54	3,319,910.09
7,897.00	91.48	85.80	6,581.36	2.76	1,155.49	40.437817	-104.350339	1,404,411.33	3,320,004.85
7,992.00	92.53	85.82	6,578.04	9.70	1,250.18	40.437832	-104.349999	1,404,418.26	3,320,099.54
8,086.00	91.20	85.79	6,574.98	16.57	1,343.87	40.437848	-104.349662	1,404,425.14	3,320,193.23
8,181.00	91.29	84.26	6,572.91	24.81	1,438.49	40.437867	-104.349322	1,404,433.37	3,320,287.84
8,276.00	90.65	85.62	6,571.30	33.19	1,533.10	40.437887	-104.348982	1,404,441.75	3,320,382.45

## Design Report for Wells Ranch AE32-620 - Final 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)
8,370.00	88.55	86.97	6,571.96	39.26	1,626.90	40.437900	-104.348644	1,404,447.82	3,320,476.24
8,465.00	88.43	86.74	6,574.46	44.47	1,721.72	40.437911	-104.348304	1,404,453.03	3,320,571.06
8,559.00	89.57	89.15	6,576.10	47.84	1,815.64	40.437917	-104.347966	1,404,456.40	3,320,664.98
8,653.00	92.50	91.06	6,574.41	47.67	1,909.61	40.437913	-104.347629	1,404,456.23	3,320,758.94
8,748.00	92.74	90.39	6,570.06	46.47	2,004.50	40.437906	-104.347288	1,404,455.03	3,320,853.83
8,842.00	89.05	89.60	6,568.60	46.48	2,098.47	40.437903	-104.346950	1,404,455.04	3,320,947.80
8,937.00	88.52	89.32	6,570.61	47.37	2,193.45	40.437902	-104.346609	1,404,455.93	3,321,042.77
9,031.00	88.71	89.03	6,572.88	48.73	2,287.41	40.437902	-104.346271	1,404,457.29	3,321,136.73
9,220.00	89.85	88.66	6,575.26	52.53	2,476.35	40.437906	-104.345593	1,404,461.10	3,321,325.67
9,314.00	91.48	89.62	6,574.17	53.95	2,570.33	40.437907	-104.345255	1,404,462.51	3,321,419.64
9,409.00	90.68	88.37	6,572.38	55.61	2,665.30	40.437908	-104.344914	1,404,464.17	3,321,514.60
9,503.00	91.02	85.60	6,570.98	60.55	2,759.15	40.437918	-104.344576	1,404,469.11	3,321,608.45
9,598.00	89.20	82.66	6,570.80	70.27	2,853.64	40.437941	-104.344236	1,404,478.83	3,321,702.93
9,692.00	89.69	83.20	6,571.71	81.84	2,946.92	40.437970	-104.343901	1,404,490.40	3,321,796.21
9,787.00	88.61	81.70	6,573.12	94.32	3,041.08	40.438001	-104.343562	1,404,502.88	3,321,890.37
9,881.00	89.91	82.74	6,574.33	107.04	3,134.20	40.438032	-104.343227	1,404,515.60	3,321,983.49
9,976.00	89.82	87.23	6,574.56	115.34	3,228.81	40.438052	-104.342887	1,404,523.90	3,322,078.10
10,068.00	90.18	91.52	6,574.56	116.35	3,320.79	40.438051	-104.342556	1,404,524.91	3,322,170.07
10,159.00	90.77	91.77	6,573.80	113.73	3,411.74	40.438041	-104.342230	1,404,522.29	3,322,261.02
10,250.00	90.68	91.72	6,572.65	110.96	3,502.70	40.438030	-104.341903	1,404,519.52	3,322,351.97
10,342.00	91.23	91.56	6,571.12	108.33	3,594.64	40.438019	-104.341573	1,404,516.89	3,322,443.92
10,433.00	90.55	91.75	6,569.70	105.70	3,685.60	40.438009	-104.341246	1,404,514.26	3,322,534.86
10,525.00	89.54	90.47	6,569.63	103.92	3,777.57	40.438001	-104.340916	1,404,512.48	3,322,626.84
10,616.00	89.91	90.22	6,570.07	103.37	3,868.57	40.437996	-104.340589	1,404,511.93	3,322,717.83
10,707.00	89.78	89.98	6,570.31	103.21	3,959.57	40.437992	-104.340262	1,404,511.77	3,322,808.83
10,799.00	90.34	90.44	6,570.22	102.88	4,051.57	40.437988	-104.339932	1,404,511.44	3,322,900.82
10,891.00	89.91	91.13	6,570.02	101.62	4,143.56	40.437981	-104.339601	1,404,510.18	3,322,992.81
10,982.00	89.38	89.77	6,570.58	100.90	4,234.55	40.437976	-104.339275	1,404,509.46	3,323,083.80
11,073.00	90.86	90.37	6,570.39	100.79	4,325.55	40.437972	-104.338948	1,404,509.35	3,323,174.79
11,165.00	90.12	89.64	6,569.60	100.78	4,417.55	40.437969	-104.338617	1,404,509.34	3,323,266.78
11,256.00	89.35	89.47	6,570.02	101.49	4,508.54	40.437968	-104.338290	1,404,510.05	3,323,357.78
11,348.00	89.57	88.88	6,570.89	102.81	4,600.53	40.437968	-104.337960	1,404,511.37	3,323,449.76
11,439.00	88.21	89.32	6,572.65	104.24	4,691.50	40.437969	-104.337633	1,404,512.80	3,323,540.73
11,531.00	87.90	89.17	6,575.78	105.45	4,783.44	40.437969	-104.337303	1,404,514.01	3,323,632.66
11,623.00	87.75	86.18	6,579.27	109.18	4,875.28	40.437976	-104.336973	1,404,517.74	3,323,724.50
11,715.00	89.54	85.96	6,581.44	115.49	4,967.04	40.437990	-104.336643	1,404,524.05	3,323,816.26
11,809.00	89.85	85.67	6,581.94	122.35	5,060.78	40.438005	-104.336306	1,404,530.91	3,323,910.00
11,904.00	90.83	85.61	6,581.38	129.57	5,155.51	40.438021	-104.335965	1,404,538.13	3,324,004.72
11,999.00	91.72	85.28	6,579.27	137.11	5,250.18	40.438039	-104.335625	1,404,545.67	3,324,099.39
12,093.00	90.89	85.23	6,577.13	144.89	5,343.84	40.438057	-104.335288	1,404,553.44	3,324,193.04
12,188.00	90.99	86.01	6,575.57	152.14	5,438.54	40.438073	-104.334947	1,404,560.70	3,324,287.74
12,283.00	90.65	86.75	6,574.21	158.14	5,533.34	40.438086	-104.334607	1,404,566.69	3,324,382.54

## Design Report for Wells Ranch AE32-620 - Final 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)
12,377.00	89.97	87.88	6,573.70	162.54	5,627.24	40.438095	-104.334269	1,404,571.10	3,324,476.43
12,472.00	91.33	87.38	6,572.62	166.47	5,722.15	40.438102	-104.333928	1,404,575.02	3,324,571.34
12,567.00	92.90	88.93	6,569.12	169.53	5,817.03	40.438107	-104.333587	1,404,578.08	3,324,666.21
12,661.00	93.02	88.72	6,564.26	171.45	5,910.88	40.438109	-104.333250	1,404,580.01	3,324,760.07
12,756.00	92.07	88.21	6,560.04	173.99	6,005.75	40.438113	-104.332909	1,404,582.55	3,324,854.93
12,851.00	91.76	87.97	6,556.87	177.16	6,100.65	40.438118	-104.332568	1,404,585.71	3,324,949.82
12,946.00	90.92	88.03	6,554.65	180.47	6,195.56	40.438124	-104.332227	1,404,589.03	3,325,044.73
13,040.00	89.41	88.34	6,554.38	183.45	6,289.51	40.438128	-104.331889	1,404,592.00	3,325,138.68
13,135.00	88.24	87.80	6,556.32	186.65	6,384.44	40.438134	-104.331548	1,404,595.20	3,325,233.60
13,230.00	87.75	86.72	6,559.65	191.19	6,479.27	40.438143	-104.331207	1,404,599.74	3,325,328.43
13,325.00	89.60	87.54	6,561.85	195.94	6,574.12	40.438152	-104.330866	1,404,604.50	3,325,423.28
13,419.00	89.78	86.96	6,562.35	200.45	6,668.01	40.438161	-104.330529	1,404,609.01	3,325,517.16
13,514.00	92.09	87.61	6,560.80	204.95	6,762.88	40.438170	-104.330188	1,404,613.50	3,325,612.03
13,609.00	89.88	87.62	6,559.17	208.90	6,857.78	40.438178	-104.329847	1,404,617.46	3,325,706.93
13,703.00	88.74	88.98	6,560.30	211.69	6,951.73	40.438182	-104.329509	1,404,620.25	3,325,800.87
13,798.00	87.72	88.14	6,563.24	214.08	7,046.65	40.438185	-104.329168	1,404,622.63	3,325,895.79
13,893.00	89.23	88.71	6,565.77	216.69	7,141.58	40.438189	-104.328827	1,404,625.24	3,325,990.71
13,988.00	91.66	91.16	6,565.03	216.79	7,236.56	40.438186	-104.328486	1,404,625.35	3,326,085.69
14,082.00	91.02	91.43	6,562.83	214.67	7,330.51	40.438176	-104.328148	1,404,623.23	3,326,179.64
14,177.00	89.94	91.21	6,562.03	212.48	7,425.48	40.438167	-104.327807	1,404,621.04	3,326,274.61
14,272.00	89.41	90.42	6,562.57	211.13	7,520.47	40.438160	-104.327466	1,404,619.69	3,326,369.59
14,366.00	89.51	90.28	6,563.46	210.56	7,614.46	40.438155	-104.327128	1,404,619.11	3,326,463.58
14,461.00	90.15	88.91	6,563.74	211.23	7,709.46	40.438153	-104.326787	1,404,619.78	3,326,558.57
14,556.00	91.72	89.21	6,562.19	212.79	7,804.43	40.438154	-104.326446	1,404,621.34	3,326,653.54
14,651.00	90.71	88.67	6,560.18	214.54	7,899.39	40.438155	-104.326105	1,404,623.10	3,326,748.50
14,746.00	90.37	87.59	6,559.28	217.64	7,994.33	40.438160	-104.325764	1,404,626.20	3,326,843.44
14,840.00	90.12	86.83	6,558.88	222.22	8,088.22	40.438170	-104.325426	1,404,630.77	3,326,937.32
14,935.00	91.75	86.53	6,557.33	227.72	8,183.04	40.438181	-104.325085	1,404,636.27	3,327,032.14
15,030.00	91.75	86.35	6,554.43	233.62	8,277.82	40.438194	-104.324745	1,404,642.17	3,327,126.91
15,125.00	90.86	86.56	6,552.26	239.49	8,372.61	40.438207	-104.324404	1,404,648.04	3,327,221.70
15,219.00	90.28	86.11	6,551.33	245.50	8,466.41	40.438220	-104.324066	1,404,654.05	3,327,315.50
15,314.00	90.52	86.11	6,550.66	251.94	8,561.19	40.438234	-104.323726	1,404,660.50	3,327,410.27
15,409.00	90.22	85.44	6,550.05	258.94	8,655.93	40.438250	-104.323385	1,404,667.49	3,327,505.01
15,504.00	90.46	85.21	6,549.49	266.68	8,750.61	40.438267	-104.323045	1,404,675.24	3,327,599.69
15,599.00	90.77	84.99	6,548.47	274.80	8,845.26	40.438286	-104.322704	1,404,683.35	3,327,694.33
15,693.00	91.32	85.00	6,546.75	283.00	8,938.88	40.438305	-104.322368	1,404,691.55	3,327,787.95
15,788.00	90.12	85.09	6,545.56	291.20	9,033.52	40.438324	-104.322027	1,404,699.75	3,327,882.59
15,883.00	90.12	85.21	6,545.36	299.23	9,128.18	40.438343	-104.321687	1,404,707.78	3,327,977.24
15,978.00	91.91	84.91	6,543.68	307.41	9,222.81	40.438362	-104.321346	1,404,715.96	3,328,071.87
16,048.00	92.56	84.51	6,540.95	313.86	9,292.46	40.438377	-104.321096	1,404,722.41	3,328,141.51
16,114.61	92.56	84.51	6,537.97	320.23	9,358.70	40.438392	-104.320858	1,404,728.78	3,328,207.75
16,116.00	92.56	84.51	6,537.91	320.36	9,360.08	40.438393	-104.320853	1,404,728.91	3,328,209.13

## Design Report for Wells Ranch AE32-620 - Final Surveys

### Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
300.00	300.00	0.05	0.12	First Gyro Survey at 300.00ft
637.00	637.00	0.21	0.53	Final Gyro Survey at 637.00ft
661.00	661.00	0.23	0.57	First Sperry MWD Survey at 661.00ft
16,048.00	6,540.95	313.86	9,292.46	Final Sperry MWD Survey at 16048.00ft
16,116.00	6,537.91	320.36	9,360.08	Straight Line Projection to TD at 16116.00ft

### Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
Target	Wells Ranch AE32-620_Rev A1_BHL	88.20	Slot	0.00	0.00	0.00

### Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
300.00	637.00	Surface Surveys	NS-GYRO-MS
637.00	6,963.00	Intermediate Survey	MWD
6,963.00	16,116.00	Production Surveys	MWD+IFR1+MS_WY

### Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
625.00	625.00	9 5/8"	9-5/8	13-3/4
7,014.00	6,606.66	7"	7	8-3/4

## Design Report for Wells Ranch AE32-620 - Final Surveys

### 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:	1.62 °/100usft	Maximum Dogleg over Survey:	13.39 °/100usft at 6,718.00 usft
Net Tortosity applicable to Plans:	0.94 °/100usft	Directional Difficulty Index:	6.811

### Audit Info

**North Reference Sheet for Sec. 32-T6N-R62W (Wells Ranch AE32) - Wells Ranch AE32-620 - 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' @ 4743.00usft (H&P 273). Northing and Easting are relative to Wells Ranch AE32-620

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: 0.99996216

Grid Coordinates of Well: 1,404,408.56 usft N, 3,318,849.41 usft E

Geographical Coordinates of Well: 40° 26' 16.26" N, 104° 21' 16.16" W

Grid Convergence at Surface is: 0.74°

Based upon Minimum Curvature type calculations, at a Measured Depth of 16,116.00usft

the Bottom Hole Displacement is 9,365.56usft in the Direction of 88.04° (Grid).

Magnetic Convergence at surface is: -7.56° (20 September 2015, , BGGM2015)

