

Noble Energy

Weld County, CO (NAD 83)

Sec. 29-T6N-R62W (Wells Ranch AE29-30A PAD)

Wells Ranch AE30-68-1BHNA

901116541

Plan C

Design: Field Surveys

Sperry Drilling Services

Standard Report

16 July, 2014

Surface UWI : 901116541

Well Coordinates: 1,413,936.22 N, 3,318,314.48 E (40° 27' 50.47" N, 104° 21' 21.49" W)

Ground Level: 4,775.00 usft

Local Coordinate Origin:

Viewing Datum:

TVDs to System:

North Reference:

Unit System:

Geodetic Scale Factor Applied

Version: 5000.1 Build: 70

Centered on Well Wells Ranch AE30-68-1BHNA

RKB=24 @ 4799.00usft (H&P 322)

N

Grid

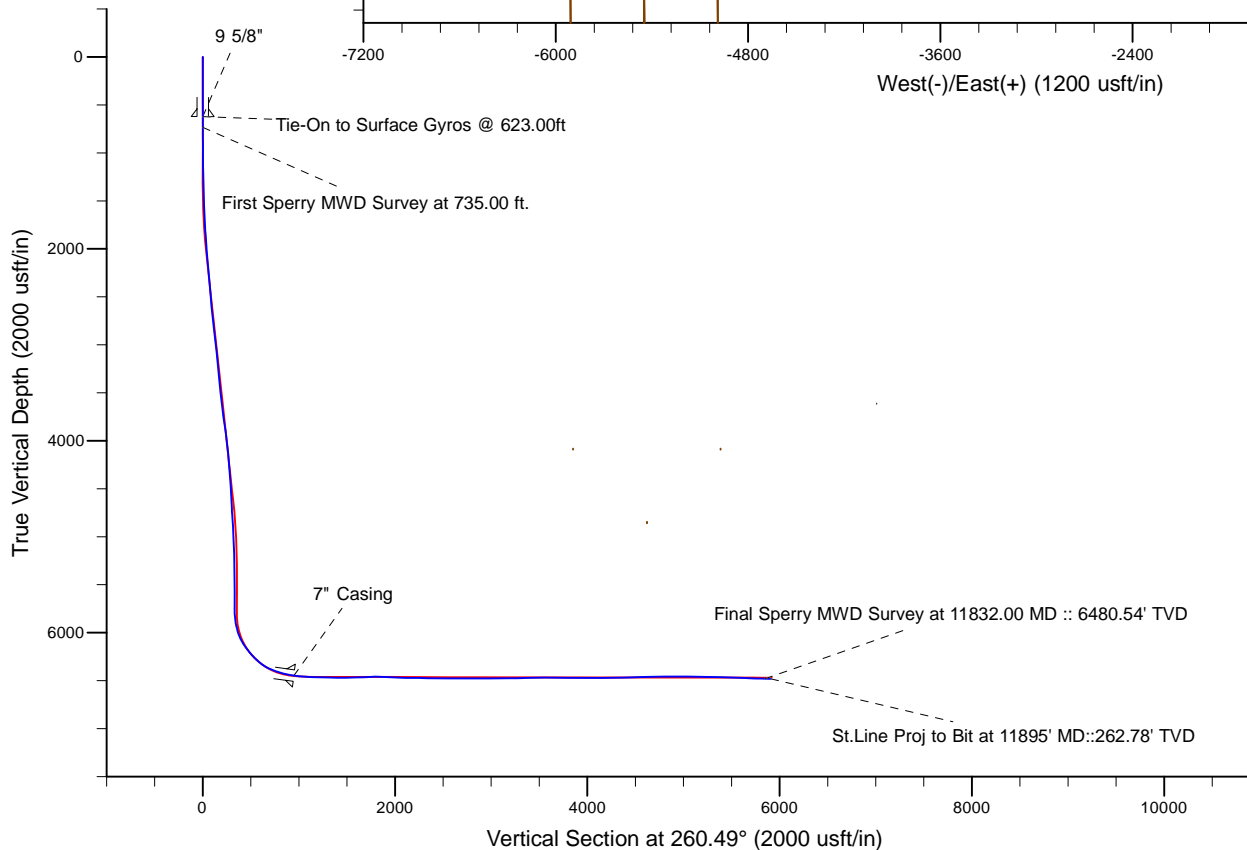
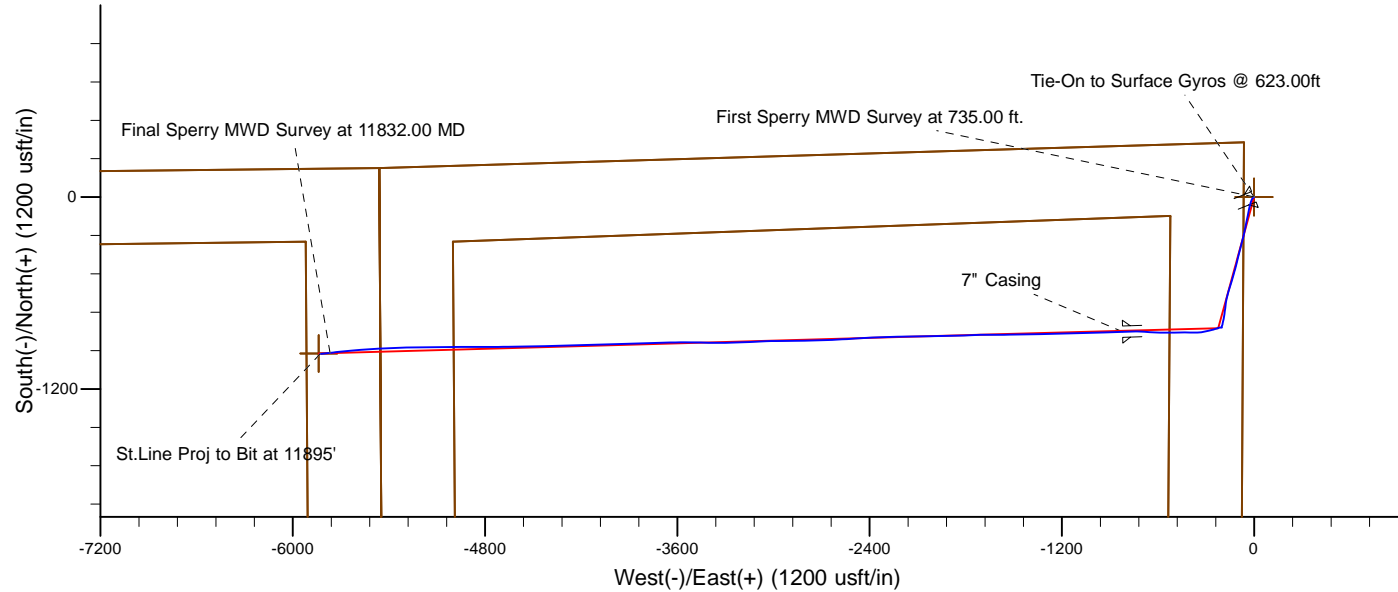
Dec-Deg - API - US Survey Feet - Custom

HALLIBURTON

Project: Weld County, CO (NAD 83)
 Site: Sec. 29-T6N-R62W (Wells Ranch AE29-30A PAD)
 Well: Wells Ranch AE30-68-1BHNA
 Wellbore: Plan C
 Design: Field Surveys

Noble Energy

HALLIBURTON
 Sperry Drilling



LEGEND

- Wells Ranch AE30-68-1BHNA, Plan C, Rev C0 - PROPOSAL V0
- Field Surveys

Platted SHL: 342' FNL, 65' FWL
 Platted Lat/Long: 40.46402 N, 104.35597 W
 Location: Sec. 29-T6N-R62W

7" Casing: ~1155' FNL, ~735' FEL
 Lat/Long: 40.461738 N, 104.358957 W
 State Planes - CO Northern: 1,413,094.03' N, 3,317,494.13' E
 Location: Sec. 30-T6N-R62W

BHL: ~1155' FNL, ~385' FEL
 Lat/Long: 40.461529 N, 104.376961 W
 State Planes - CO Northern: 1,412,954.17 N, 3,312,485.80 E
 Location: Sec. 25-T6N-R62W

WELL DETAILS: Wells Ranch AE30-68-1BHNA

Ground Level: 4775.00
 RKB=24 @ 4799.00usft (H&P 322)

Created By: Tatiana Gomez
 Created On: 16:58, July 16 2014

Design Report for Wells Ranch AE30-68-1BHNA - Field 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
271.00	0.30	304.33	271.00	0.40	-0.59	0.51	0.11
623.00	0.20	68.23	623.00	1.15	-0.78	0.58	0.13
Tie-On to Surface Gyros @ 623.00ft - 9 5/8"							
735.00	0.53	216.76	735.00	0.81	-0.90	0.76	0.63
First Sperry MWD Survey at 735.00 ft.							
828.00	0.60	196.19	827.99	-0.01	-1.30	1.28	0.23
921.00	0.82	222.80	920.98	-0.96	-1.89	2.02	0.42
1,014.00	0.81	230.28	1,013.97	-1.87	-2.84	3.11	0.11
1,107.00	1.06	220.32	1,106.96	-2.95	-3.91	4.34	0.32
1,200.00	1.27	230.59	1,199.94	-4.26	-5.26	5.89	0.32
1,293.00	1.11	229.89	1,292.92	-5.49	-6.74	7.56	0.17
1,386.00	1.79	223.35	1,385.89	-7.13	-8.43	9.49	0.75
1,479.00	3.07	216.58	1,478.81	-10.18	-10.91	12.44	1.41
1,574.00	3.60	205.69	1,573.65	-14.92	-13.72	16.00	0.87
1,669.00	5.19	203.05	1,668.37	-21.56	-16.70	20.03	1.69
1,764.00	6.72	197.06	1,762.85	-30.83	-20.01	24.83	1.74
1,858.00	8.68	197.43	1,856.00	-42.85	-23.75	30.50	2.09
1,953.00	11.03	193.57	1,949.59	-58.53	-28.03	37.32	2.57
2,048.00	12.27	191.03	2,042.63	-77.27	-32.09	44.42	1.41
2,143.00	12.91	189.76	2,135.35	-97.64	-35.82	51.47	0.73
2,238.00	14.13	194.52	2,227.72	-119.32	-40.53	59.69	1.74
2,333.00	13.96	191.84	2,319.88	-141.77	-45.79	68.59	0.71
2,427.00	13.19	188.81	2,411.25	-163.46	-49.76	76.09	1.11
2,522.00	14.05	189.90	2,503.58	-185.53	-53.40	83.33	0.94
2,617.00	15.92	191.08	2,595.35	-209.68	-57.89	91.75	1.99
2,712.00	15.45	193.69	2,686.81	-234.76	-63.38	101.31	0.89
2,806.00	15.43	193.76	2,777.42	-259.07	-69.32	111.19	0.03
2,901.00	14.93	195.89	2,869.10	-283.12	-75.68	121.43	0.79
2,996.00	15.39	197.30	2,960.80	-306.92	-82.78	132.37	0.62
3,091.00	14.65	192.11	3,052.55	-330.71	-89.05	142.48	1.62
3,186.00	13.88	192.38	3,144.62	-353.58	-94.01	151.16	0.81
3,281.00	14.24	192.65	3,236.78	-376.11	-99.01	159.81	0.39
3,376.00	14.09	194.07	3,328.89	-398.73	-104.38	168.85	0.40
3,471.00	13.18	196.94	3,421.21	-420.31	-110.35	178.30	1.19
3,565.00	14.21	194.20	3,512.54	-441.75	-116.30	187.71	1.29
3,661.00	15.54	195.45	3,605.32	-465.57	-122.62	197.88	1.43
3,756.00	16.63	196.60	3,696.60	-490.86	-129.89	209.24	1.20
3,851.00	18.01	195.23	3,787.29	-518.06	-137.64	221.37	1.51
3,945.00	17.47	198.01	3,876.82	-545.50	-145.82	233.97	1.07
4,040.00	15.59	198.42	3,967.89	-571.17	-154.26	246.54	1.98
4,135.00	14.84	194.36	4,059.56	-595.07	-161.31	257.44	1.37
4,230.00	13.84	195.47	4,151.60	-617.81	-167.36	267.17	1.09
4,325.00	12.70	192.93	4,244.07	-638.94	-172.73	275.95	1.35
4,420.00	11.95	187.11	4,336.88	-658.88	-176.28	282.75	1.53
4,515.00	11.37	186.24	4,429.92	-677.95	-178.52	288.11	0.64
4,609.00	11.21	186.63	4,522.10	-696.23	-180.58	293.17	0.19
4,704.00	11.17	187.19	4,615.29	-714.54	-182.80	298.38	0.12
4,799.00	11.67	188.72	4,708.41	-733.16	-185.40	304.03	0.62
4,894.00	9.57	189.15	4,801.78	-750.46	-188.12	309.56	2.21

Design Report for Wells Ranch AE30-68-1BHNA - Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
4,989.00	8.93	190.40	4,895.54	-765.51	-190.70	314.60	0.71
5,178.00	5.50	195.54	5,083.02	-788.67	-195.78	323.44	1.84
5,273.00	4.48	192.59	5,177.66	-796.68	-197.81	326.76	1.11
5,368.00	2.90	204.61	5,272.46	-802.48	-199.62	329.50	1.84
5,463.00	2.44	193.42	5,367.36	-806.63	-201.09	331.64	0.73
5,558.00	1.82	182.68	5,462.29	-810.11	-201.63	332.75	0.77
5,653.00	1.39	170.67	5,557.26	-812.75	-201.51	333.07	0.57
5,748.00	0.96	162.64	5,652.24	-814.65	-201.09	332.97	0.48
5,839.00	0.86	167.74	5,743.23	-816.04	-200.71	332.83	0.14
5,934.00	3.97	280.56	5,838.15	-816.14	-203.80	335.88	4.61
5,981.00	10.92	269.34	5,884.73	-815.89	-209.86	341.82	15.04
6,029.00	11.61	255.14	5,931.81	-817.18	-219.07	351.12	5.94
6,076.00	14.62	248.68	5,977.58	-820.55	-229.17	361.64	7.11
6,124.00	20.23	252.43	6,023.36	-825.26	-242.74	375.80	11.91
6,171.00	26.50	255.93	6,066.49	-830.27	-260.68	394.32	13.66
6,218.00	31.44	255.41	6,107.60	-835.91	-282.72	416.99	10.52
6,265.00	34.87	258.23	6,146.94	-841.74	-307.75	442.64	8.00
6,313.00	38.36	264.34	6,185.48	-846.01	-336.02	471.23	10.51
6,360.00	41.25	270.38	6,221.59	-847.35	-366.04	501.06	10.27
6,408.00	45.23	271.47	6,256.55	-846.81	-398.92	533.39	8.44
6,455.00	48.05	270.74	6,288.82	-846.15	-433.08	566.97	6.11
6,503.00	50.92	268.25	6,320.00	-846.49	-469.56	603.01	7.16
6,550.00	58.14	267.45	6,347.26	-847.94	-507.78	640.94	15.42
6,598.00	64.82	270.24	6,370.17	-848.75	-549.92	682.64	14.82
6,645.00	68.88	272.67	6,388.64	-847.64	-593.11	725.05	9.86
6,693.00	71.60	273.99	6,404.87	-845.02	-638.20	769.08	6.23
6,740.00	73.63	273.63	6,418.91	-842.04	-682.95	812.73	4.38
6,788.00	75.69	270.52	6,431.61	-840.37	-729.20	858.07	7.58
6,832.00	78.52	268.37	6,441.43	-840.79	-772.08	900.43	8.00
6,881.00	82.42	268.24	6,449.54	-842.21	-820.38	948.29	7.97
7" Casing							
6,918.00	85.37	268.15	6,453.48	-843.37	-857.14	984.75	7.97
6,966.00	85.56	267.41	6,457.27	-845.23	-904.96	1,032.21	1.59
7,059.00	87.63	267.78	6,462.80	-849.12	-997.71	1,124.33	2.26
7,151.00	88.33	269.12	6,466.04	-851.61	-1,089.61	1,215.38	1.64
7,244.00	88.65	268.21	6,468.49	-853.77	-1,182.55	1,307.40	1.04
7,337.00	88.64	269.24	6,470.69	-855.84	-1,275.50	1,399.41	1.11
7,432.00	91.91	268.76	6,470.23	-857.50	-1,370.47	1,493.35	3.48
7,527.00	90.89	268.46	6,467.91	-859.80	-1,465.42	1,587.37	1.12
7,621.00	93.02	269.67	6,464.70	-861.34	-1,559.34	1,680.26	2.61
7,716.00	92.22	269.84	6,460.36	-861.74	-1,654.24	1,773.92	0.86
7,811.00	86.36	268.38	6,461.54	-863.22	-1,749.18	1,867.79	6.36
7,906.00	88.18	267.74	6,466.06	-866.43	-1,844.01	1,961.85	2.03
8,001.00	87.97	268.83	6,469.25	-869.27	-1,938.91	2,055.92	1.17
8,096.00	88.09	269.08	6,472.52	-871.00	-2,033.84	2,149.83	0.29
8,191.00	90.28	270.07	6,473.87	-871.71	-2,128.82	2,243.62	2.53
8,285.00	89.35	268.38	6,474.17	-872.98	-2,222.81	2,336.52	2.05
8,380.00	89.17	267.34	6,475.40	-876.53	-2,317.73	2,430.73	1.11
8,476.00	89.88	266.64	6,476.20	-881.57	-2,413.60	2,526.11	1.04
8,570.00	89.97	267.64	6,476.32	-886.26	-2,507.48	2,619.47	1.07
8,665.00	88.09	266.11	6,477.93	-891.43	-2,602.32	2,713.86	2.55

Design Report for Wells Ranch AE30-68-1BHNA - Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
8,760.00	89.88	268.39	6,479.61	-895.99	-2,697.18	2,808.18	3.05
8,855.00	91.94	268.92	6,478.10	-898.22	-2,792.14	2,902.20	2.24
8,949.00	91.42	269.63	6,475.35	-899.41	-2,886.09	2,995.05	0.94
9,044.00	89.75	269.60	6,474.38	-900.05	-2,981.08	3,088.84	1.76
9,139.00	89.35	267.15	6,475.12	-902.74	-3,076.03	3,182.93	2.61
9,233.00	91.02	267.21	6,474.82	-907.36	-3,169.91	3,276.29	1.78
9,328.00	90.86	269.10	6,473.26	-910.42	-3,264.85	3,370.42	2.00
9,423.00	91.36	269.94	6,471.42	-911.22	-3,359.83	3,464.22	1.03
9,518.00	90.77	271.15	6,469.66	-910.31	-3,454.80	3,557.74	1.42
9,613.00	89.14	270.39	6,469.73	-909.04	-3,549.79	3,651.21	1.89
9,707.00	88.64	268.21	6,471.55	-910.19	-3,643.76	3,744.08	2.38
9,802.00	89.85	269.10	6,472.80	-912.42	-3,738.72	3,838.11	1.58
9,897.00	90.43	267.66	6,472.57	-915.10	-3,833.68	3,932.20	1.63
9,992.00	90.25	267.99	6,472.01	-918.71	-3,928.61	4,026.42	0.40
10,087.00	89.01	268.04	6,472.62	-922.00	-4,023.55	4,120.60	1.31
10,181.00	90.86	268.57	6,472.73	-924.78	-4,117.50	4,213.72	2.05
10,276.00	91.94	268.97	6,470.41	-926.82	-4,212.45	4,307.70	1.21
10,371.00	90.77	269.09	6,468.16	-928.42	-4,307.41	4,401.62	1.24
10,466.00	91.88	267.85	6,465.96	-930.96	-4,402.35	4,495.67	1.75
10,561.00	91.11	268.37	6,463.48	-934.09	-4,497.26	4,589.80	0.98
10,656.00	92.59	270.10	6,460.42	-935.36	-4,592.20	4,683.64	2.40
10,751.00	91.26	268.39	6,457.23	-936.61	-4,687.13	4,777.47	2.28
10,845.00	89.11	270.22	6,456.92	-937.75	-4,781.11	4,870.35	3.00
10,940.00	88.83	269.74	6,458.63	-937.78	-4,876.10	4,964.03	0.58
11,035.00	89.38	269.69	6,460.11	-938.26	-4,971.09	5,057.79	0.58
11,130.00	90.00	269.93	6,460.63	-938.57	-5,066.08	5,151.53	0.70
11,225.00	89.23	270.15	6,461.27	-938.51	-5,161.08	5,245.21	0.84
11,319.00	88.18	268.18	6,463.39	-939.87	-5,255.04	5,338.11	2.37
11,414.00	88.12	267.76	6,466.46	-943.24	-5,349.93	5,432.25	0.45
11,509.00	87.32	266.91	6,470.24	-947.65	-5,444.75	5,526.50	1.23
11,604.00	88.61	266.69	6,473.61	-952.95	-5,539.54	5,620.86	1.38
11,698.00	87.63	264.37	6,476.70	-960.27	-5,633.20	5,714.44	2.68
11,793.00	88.86	264.18	6,479.60	-969.74	-5,727.68	5,809.18	1.31
11,832.00	88.40	262.78	6,480.54	-974.17	-5,766.41	5,848.12	3.78
Final Sperry MWD Survey at 11832.00 MD :: 6480.54' TVD							
11,895.00	88.40	262.78	6,482.30	-982.09	-5,828.89	5,911.04	0.00
St.Line Proj to Bit at 11895' MD::262.78' TVD							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
623.00	623.00	1.15	-0.78	Tie-On to Surface Gyros @ 623.00ft
735.00	735.00	0.81	-0.90	First Sperry MWD Survey at 735.00 ft.
11,832.00	6,480.54	-974.17	-5,766.41	Final Sperry MWD Survey at 11832.00 MD :: 6480.54' TVD
11,895.00	6,482.30	-982.09	-5,828.89	St.Line Proj to Bit at 11895' MD::262.78' TVD

Design Report for Wells Ranch AE30-68-1BHNA - Field Surveys

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/_S (usft)	Origin +E/-W (usft)	Start TVD (usft)
Target	Wells Ranch AE30-68-1BHNA_BHL2	260.49	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
271.00	623.00	Surface Gyros	Flexi-Shot
735.00	6,832.00	MWD Surveys - Intermediate	MWD+IFR1+MS_WY
6,918.00	11,832.00	MWD Surveys - Production	MWD+IFR1+MS_WY

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
6,881.00	6,449.54	7" Casing	7	8-3/4
623.00	623.00	9 5/8"	9-5/8	13-3/4

Design Report for Wells Ranch AE30-68-1BHNA - Field Surveys

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 AE30-68-	0.00	0.00	0.00	0.01	0.00	1,413,936.23	3,318,314.48	40.464020	-104.355970
- actual wellpath misses target center by 0.01usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				0.00	125.96	-10,751.49	1,414,062.18	3,307,563.38	
Point 2				0.00	-5,189.24	-10,704.71	1,408,747.18	3,307,610.16	
Point 3				0.00	-5,122.92	-5,431.07	1,408,813.49	3,312,883.61	
Point 4				0.00	181.56	-5,459.37	1,414,117.78	3,312,855.31	
Point 5				0.00	-5,122.92	-5,431.07	1,408,813.49	3,312,883.61	
Point 6				0.00	-4,959.93	-91.87	1,408,976.48	3,318,222.61	
Point 7				0.00	341.68	-62.84	1,414,277.89	3,318,251.64	
Point 8				0.00	181.56	-5,459.37	1,414,117.78	3,312,855.31	
Point 9				0.00	125.96	-10,751.49	1,414,062.18	3,307,563.38	
Wells Ranch AE30-68-	0.00	0.00	0.00	0.01	0.00	1,413,936.23	3,318,314.48	40.464020	-104.355970
- actual wellpath misses target center by 0.01usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Point									
Wells Ranch AE30-68-	0.00	0.00	0.00	0.01	0.00	1,413,936.23	3,318,314.48	40.464020	-104.355970
- actual wellpath misses target center by 0.01usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				0.00	-278.46	-4,999.35	1,413,657.78	3,313,315.31	
Point 2				0.00	-4,662.91	-4,971.05	1,409,273.49	3,313,343.61	
Point 3				0.00	-4,499.91	-551.89	1,409,436.48	3,317,762.61	
Point 4				0.00	-118.34	-522.86	1,413,817.89	3,317,791.64	
Point 5				0.00	-278.46	-4,999.35	1,413,657.78	3,313,315.31	
Wells Ranch AE30-68-	0.00	0.00	0.00	0.01	0.00	1,413,936.23	3,318,314.48	40.464020	-104.355970
- actual wellpath misses target center by 0.01usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				0.00	-334.06	-10,291.47	1,413,602.18	3,308,023.38	
Point 2				0.00	-4,729.22	-10,244.69	1,409,207.18	3,308,070.16	
Point 3				0.00	-4,662.91	-5,891.08	1,409,273.49	3,312,423.61	
Point 4				0.00	-278.46	-5,919.38	1,413,657.78	3,312,395.31	
Point 5				0.00	-334.06	-10,291.47	1,413,602.18	3,308,023.38	
Wells Ranch AE30-68-	0.00	0.00	6,470.33	-978.19	-5,837.05	1,412,958.06	3,312,477.64	40.461540	-104.376990
- actual wellpath misses target center by 15.00usft at 11895.00usft MD (6482.30 TVD, -982.09 N, -5828.89 E)									
- Point									
Wells Ranch AE30-68-	0.00	0.00	6,500.33	-978.19	-5,837.05	1,412,958.07	3,312,477.64	40.461540	-104.376990
- actual wellpath misses target center by 20.18usft at 11895.00usft MD (6482.30 TVD, -982.09 N, -5828.89 E)									
- Point									

Directional Difficulty Index

Average Dogleg over Survey:	1.98 °/100usft	Maximum Dogleg over Survey:	15.42 °/100usft at 6,550.00 usft
Net Tortousity applicable to Plans:	0.98 °/100usft	Directional Difficulty Index:	6.448

Audit Info

North Reference Sheet for Sec. 29-T6N-R62W (Wells Ranch AE29-30A PAD) - Wells Ranch AE30-68-1BHNA - Plan C

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

Vertical Depths are relative to RKB=24 @ 4799.00usft (H&P 322). Northing and Easting are relative to Wells Ranch AE30-68-1BHNA

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: 0.99996376

Grid Coordinates of Well: 1,413,936.22 usft N, 3,318,314.48 usft E

Geographical Coordinates of Well: 40° 27' 50.47" N, 104° 21' 21.49" W

Grid Convergence at Surface is: 0.74°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,895.00usft the Bottom Hole Displacement is 5,911.04usft in the Direction of 260.44° (Grid).

Magnetic Convergence at surface is: -7.56° (19 May 2014, , BGGM2013)

