

Noble Energy

Weld County, CO (NAD 83)
Sec. 29-T7N-R63W
Ramirez AC29-72HN

Design: MWD Survey

Sperry Drilling Services

Final Survey Report

02 July, 2012

Well Coordinates: 1,445,482.03 N, 3,290,110.84 E (40° 33' 05.62" N, 104° 27' 21.56" W)
Ground Level: 4,778.00 ft

Local Coordinate Origin:	Centered on Well Ramirez AC29-72HN
Viewing Datum:	KB @ 4802.00ft (H&P 322)
TVDs to System:	N
North Reference:	Grid
Unit System:	API - US Survey Feet - Custom
Geodetic Scale Factor Applied	
Version: 2003.16 Build: 43I	

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Design Report for Ramirez AC29-72HN - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
983.00	0.91	262.26	982.96	-1.05	-7.73	-0.16	0.09
First MWD Survey							
1,260.00	1.06	260.03	1,259.92	-1.79	-12.44	-0.15	0.06
1,351.00	1.03	24.06	1,350.91	-1.19	-12.93	-0.82	2.03
1,539.00	3.31	33.49	1,538.76	4.88	-9.25	-6.25	1.22
1,634.00	4.51	43.35	1,633.54	9.88	-5.17	-10.56	1.44
1,729.00	6.31	61.83	1,728.12	15.07	2.00	-14.58	2.61
1,824.00	8.38	80.34	1,822.35	18.69	13.42	-16.39	3.28
1,920.00	10.97	81.74	1,916.98	21.18	29.36	-16.38	2.71
2,014.00	13.52	83.84	2,008.83	23.64	49.14	-15.76	2.75
2,109.00	15.52	79.29	2,100.80	27.20	72.67	-15.63	2.42
2,204.00	15.70	78.35	2,192.29	32.15	97.75	-16.65	0.33
2,299.00	15.81	80.26	2,283.72	36.94	123.10	-17.46	0.56
2,394.00	15.73	81.89	2,375.15	40.95	148.60	-17.47	0.47
2,489.00	15.04	80.00	2,466.74	44.90	173.49	-17.53	0.90
2,584.00	16.03	78.46	2,558.27	49.67	198.48	-18.38	1.13
2,679.00	15.31	78.83	2,649.74	54.72	223.63	-19.48	0.77
2,774.00	15.54	79.98	2,741.32	59.36	248.47	-20.23	0.40
2,870.00	16.35	75.40	2,833.63	65.01	274.21	-21.82	1.56
2,965.00	17.38	76.54	2,924.54	71.68	300.95	-24.28	1.14
3,060.00	17.03	75.46	3,015.29	78.48	328.22	-26.78	0.50
3,154.00	17.61	73.92	3,105.03	85.87	355.20	-29.91	0.79
3,249.00	17.09	72.86	3,195.71	93.97	382.35	-33.71	0.64
3,344.00	18.05	75.37	3,286.27	101.80	409.93	-37.18	1.29
3,439.00	17.00	75.86	3,376.86	108.91	437.64	-39.92	1.12
3,534.00	15.20	77.20	3,468.13	115.06	463.25	-42.04	1.93
3,629.00	16.33	75.67	3,559.56	121.12	488.34	-44.15	1.27
3,724.00	14.99	75.09	3,651.03	127.59	513.15	-46.70	1.42
3,820.00	16.40	74.46	3,743.45	134.42	538.21	-49.57	1.48
3,915.00	16.78	76.08	3,834.50	141.31	564.44	-52.32	0.63
4,010.00	17.98	74.60	3,925.16	148.50	591.89	-55.19	1.35
4,105.00	17.19	73.52	4,015.72	156.38	619.48	-58.70	0.90
4,200.00	16.00	70.83	4,106.76	164.66	645.31	-62.89	1.49
4,247.00	15.79	68.77	4,151.96	169.10	657.39	-65.41	1.28
4,294.00	14.26	70.34	4,197.36	173.37	668.81	-67.86	3.37
4,341.00	12.71	74.43	4,243.06	176.70	679.24	-69.54	3.87
4,390.00	10.15	82.25	4,291.09	178.73	688.71	-70.08	6.10
4,485.00	8.08	94.13	4,384.89	179.38	703.67	-68.41	2.93
4,579.00	6.31	102.28	4,478.15	177.81	715.30	-65.05	2.17
4,674.00	3.70	108.52	4,572.78	175.72	723.31	-61.75	2.80
4,769.00	1.64	117.22	4,667.67	174.13	727.43	-59.54	2.20
4,857.00	0.94	152.65	4,755.65	172.91	728.88	-58.11	1.17
4,952.00	2.86	253.27	4,850.61	171.53	726.97	-57.05	3.34
5,047.00	2.78	257.56	4,945.49	170.35	722.45	-56.59	0.24
5,142.00	2.06	247.01	5,040.41	169.19	718.63	-56.03	0.89
5,237.00	2.07	259.78	5,135.35	168.22	715.37	-55.57	0.48
5,332.00	1.50	243.72	5,230.30	167.37	712.56	-55.16	0.79
5,427.00	1.28	250.16	5,325.27	166.45	710.45	-54.59	0.28
5,521.00	1.05	276.06	5,419.25	166.19	708.61	-54.61	0.60

Design Report for Ramirez AC29-72HN - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
5,616.00	0.44	222.28	5,514.25	166.01	707.50	-54.61	0.91
5,806.00	3.67	326.93	5,704.12	170.57	703.69	-59.70	2.00
5,901.00	0.21	127.84	5,799.06	173.01	702.16	-62.35	4.07
6,035.00	0.29	177.40	5,933.06	172.52	702.37	-61.83	0.17
6,187.00	9.32	203.30	6,084.37	160.81	697.51	-51.01	5.96
6,282.00	14.36	181.81	6,177.36	141.95	694.09	-32.91	6.96
6,329.00	18.76	187.71	6,222.40	128.63	692.89	-19.93	10.01
6,377.00	20.72	178.53	6,267.59	112.48	692.08	-4.11	7.63
6,424.00	24.57	180.82	6,310.96	94.39	692.15	13.78	8.40
6,472.00	26.86	181.58	6,354.20	73.57	691.71	34.28	4.82
6,519.00	30.68	181.03	6,395.39	50.96	691.20	56.54	8.15
6,566.00	34.85	180.87	6,434.91	25.54	690.78	81.59	8.87
6,613.00	35.33	181.73	6,473.36	-1.48	690.17	108.19	1.47
6,662.00	39.67	182.88	6,512.23	-31.27	688.95	137.44	8.97
6,709.00	44.72	182.16	6,547.04	-62.80	687.57	168.37	10.79
6,757.00	50.55	181.84	6,579.37	-98.23	686.34	203.18	12.16
6,804.00	55.86	182.32	6,607.51	-135.83	684.97	240.12	11.33
6,852.00	61.49	180.88	6,632.46	-176.80	683.84	280.42	12.01
6,899.00	63.62	181.57	6,654.12	-218.49	682.95	321.48	4.72
6,947.00	64.81	181.95	6,675.00	-261.69	681.62	363.95	2.58
7,042.00	72.86	182.20	6,709.27	-350.15	678.41	450.85	8.48
7,089.00	76.89	182.77	6,721.53	-395.47	676.44	495.32	8.65
7,147.00	80.89	184.69	6,732.71	-452.25	672.73	550.84	7.62
7,197.00	84.79	183.30	6,738.94	-501.73	669.28	599.19	8.27
7,292.00	86.52	181.64	6,746.13	-596.36	665.20	692.05	2.52
7,387.00	88.83	179.45	6,749.99	-691.27	664.30	785.68	3.35
7,482.00	91.51	179.60	6,749.71	-786.25	665.08	879.65	2.83
7,578.00	90.25	176.60	6,748.23	-882.18	668.27	974.91	3.39
7,672.00	88.98	176.17	6,748.86	-975.99	674.19	1,068.50	1.43
7,767.00	89.75	175.85	6,749.92	-1,070.75	680.80	1,163.15	0.88
7,862.00	90.65	176.57	6,749.59	-1,165.54	687.08	1,257.77	1.21
7,957.00	88.98	176.24	6,749.89	-1,260.35	693.04	1,352.36	1.79
8,051.00	89.11	178.48	6,751.46	-1,354.23	697.37	1,445.78	2.39
8,147.00	89.01	178.69	6,753.03	-1,450.19	699.74	1,540.95	0.24
8,241.00	89.14	177.31	6,754.55	-1,544.12	703.02	1,634.26	1.47
8,337.00	89.41	176.99	6,755.77	-1,639.99	707.79	1,729.71	0.44
8,431.00	91.35	179.44	6,755.14	-1,733.93	710.72	1,822.98	3.32
8,526.00	90.74	179.69	6,753.41	-1,828.91	711.44	1,916.93	0.69
8,622.00	92.56	178.87	6,750.65	-1,924.86	712.65	2,011.91	2.08
8,717.00	91.08	178.87	6,747.63	-2,019.79	714.52	2,105.99	1.56
8,812.00	88.98	178.64	6,747.58	-2,114.76	716.58	2,200.14	2.22
8,907.00	91.08	178.57	6,747.53	-2,209.73	718.89	2,294.32	2.21
9,001.00	91.70	178.23	6,745.25	-2,303.66	721.52	2,387.53	0.75
9,096.00	90.92	178.47	6,743.08	-2,398.60	724.25	2,481.74	0.86
9,191.00	90.03	178.98	6,742.29	-2,493.57	726.37	2,575.90	1.08
9,286.00	88.71	178.54	6,743.33	-2,588.54	728.42	2,670.05	1.46
9,382.00	89.69	180.62	6,744.67	-2,684.52	729.13	2,764.98	2.39
9,477.00	91.17	179.89	6,743.96	-2,779.51	728.70	2,858.77	1.74
9,572.00	91.14	181.90	6,742.05	-2,874.48	727.22	2,952.36	2.12
9,667.00	89.26	182.11	6,741.71	-2,969.42	723.90	3,045.64	1.99
9,762.00	89.07	180.66	6,743.10	-3,064.37	721.60	3,139.10	1.54

Design Report for Ramirez AC29-72HN - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
9,857.00	91.02	182.00	6,743.02	-3,159.34	719.40	3,232.59	2.49
9,953.00	89.14	181.05	6,742.89	-3,255.30	716.84	3,327.00	2.19
10,048.00	88.65	180.56	6,744.72	-3,350.28	715.51	3,420.62	0.73
10,143.00	89.38	179.59	6,746.36	-3,445.26	715.38	3,514.44	1.28
10,238.00	90.43	180.12	6,746.51	-3,540.26	715.62	3,608.34	1.24
10,333.00	90.28	180.28	6,745.92	-3,635.25	715.29	3,702.14	0.23
10,427.00	89.97	180.31	6,745.72	-3,729.25	714.81	3,794.93	0.33
10,522.00	89.97	179.48	6,745.77	-3,824.25	714.98	3,888.81	0.87
10,618.00	89.54	177.89	6,746.18	-3,920.22	717.18	3,983.97	1.72
10,713.00	91.57	179.40	6,745.26	-4,015.18	719.43	4,078.14	2.66
10,807.00	92.77	178.59	6,741.70	-4,109.10	721.08	4,171.18	1.54
10,902.00	93.11	178.46	6,736.83	-4,203.94	723.52	4,265.26	0.38
10,997.00	89.88	179.74	6,734.35	-4,298.88	725.01	4,359.29	3.66
11,093.00	88.49	178.83	6,735.72	-4,394.86	726.21	4,454.30	1.73
11,188.00	89.23	178.06	6,737.61	-4,489.81	728.79	4,548.50	1.12
11,209.00	89.63	178.59	6,737.81	-4,510.80	729.40	4,569.33	3.16
Final MWD Survey							
11,267.00	89.63	178.59	6,738.19	-4,568.78	730.83	4,626.84	0.00
Survey Projection to TD - Estimated BHL: 514' FSL, 647' FEL							

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
983.00	982.96	-1.05	-7.73	First MWD Survey
11,209.00	6,737.81	-4,510.80	729.40	Final MWD Survey
11,267.00	6,738.19	-4,568.78	730.83	Survey Projection to TD
11,267.00	6,738.19	-4,568.78	730.83	Estimated BHL: 514' FSL, 647' FEL

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (ft)
				+N/-S (ft)	+E/-W (ft)	
Target	Ramirez AC29-72HN_PlanA - Rev1_BHL Tgt	171.10	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
983.00	11,267.00	Sperry MWD Surveys	MWD

Design Report for Ramirez AC29-72HN - MWD Survey

Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
Ramirez	0.00	0.00	6,736.65	-4,589.57	718.38	1,440,892.59	3,290,829.19	40° 32' 20.184 N	104° 27' 12.960 W
- actual wellpath misses target center by 24.28ft at 11267.00ft MD (6738.19 TVD, -4568.78 N, 730.83 E)									
- Point									
Ramirez	0.00	0.00	0.00	0.00	0.00	1,445,482.03	3,290,110.84	40° 33' 5.616 N	104° 27' 21.564 W
- actual wellpath hits target center									
- Polygon									
Point 1				1,317.00	245.00	1,445,727.03	3,291,427.80		
Point 2				1,383.00	-5,121.00	1,440,361.18	3,291,493.80		
Point 3				-3,931.00	-5,161.00	1,440,321.18	3,286,179.95		
Point 4				-4,007.00	183.00	1,445,665.03	3,286,103.95		
Point 5				1,317.00	245.00	1,445,727.03	3,291,427.80		
Ramirez	0.00	0.00	0.00	0.00	0.00	1,445,482.03	3,290,110.84	40° 33' 5.616 N	104° 27' 21.564 W
- actual wellpath hits target center									
- Polygon									
Point 1				857.00	-215.00	1,445,267.04	3,290,967.81		
Point 2				923.00	-4,661.00	1,440,821.17	3,291,033.81		
Point 3				-3,471.00	-4,701.00	1,440,781.17	3,286,639.94		
Point 4				-3,547.00	-277.00	1,445,205.04	3,286,563.94		
Point 5				857.00	-215.00	1,445,267.04	3,290,967.81		

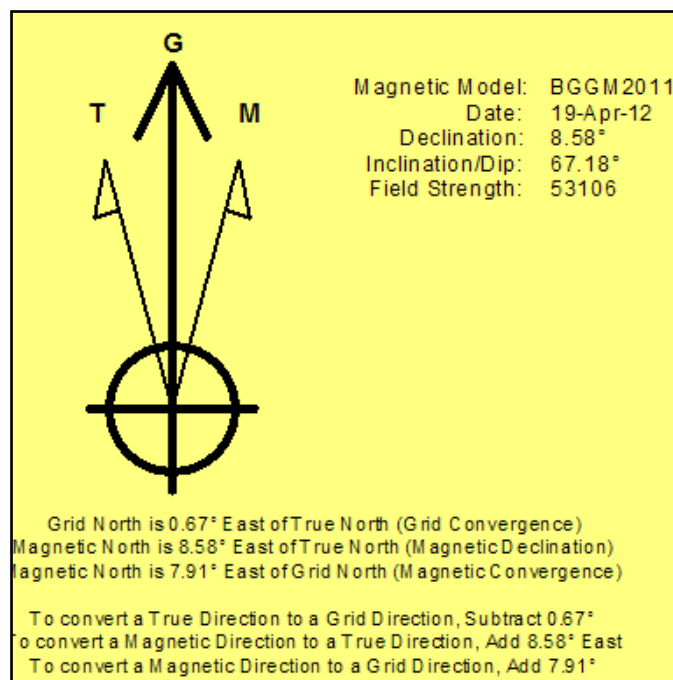
North Reference Sheet for Sec. 29-T7N-R63W - Ramirez AC29-72HN

All data is in US Feet unless otherwise stated. Directions and Coordinates are relative to Grid North Reference.
Vertical Depths are relative to KB @ 4802.00ft (H&P 322). Northing and Easting are relative to Ramirez AC29-72HN
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° 30' 0.000 W°, Longitude Origin:0° 0' 0.000 E°, Latitude Origin:40° 47' 0.000 N°
False Easting: 3,000,000.00ft, False Northing: 1,000,000.00ft, Scale Reduction: 0.99997060

Grid Coordinates of Well: 1,445,482.03 ft N, 3,290,110.84 ft E
Geographical Coordinates of Well: 40° 33' 05.62" N, 104° 27' 21.56" W
Grid Convergence at Surface is: 0.67°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,267.00ft
the Bottom Hole Displacement is 4,626.86ft in the Direction of 170.91° (Grid).

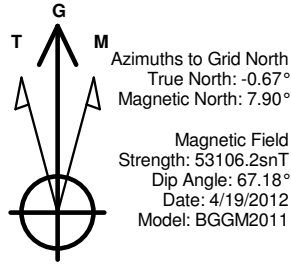
Magnetic Convergence at surface is: -7.91° (19 April 2012, , BGGM2011)



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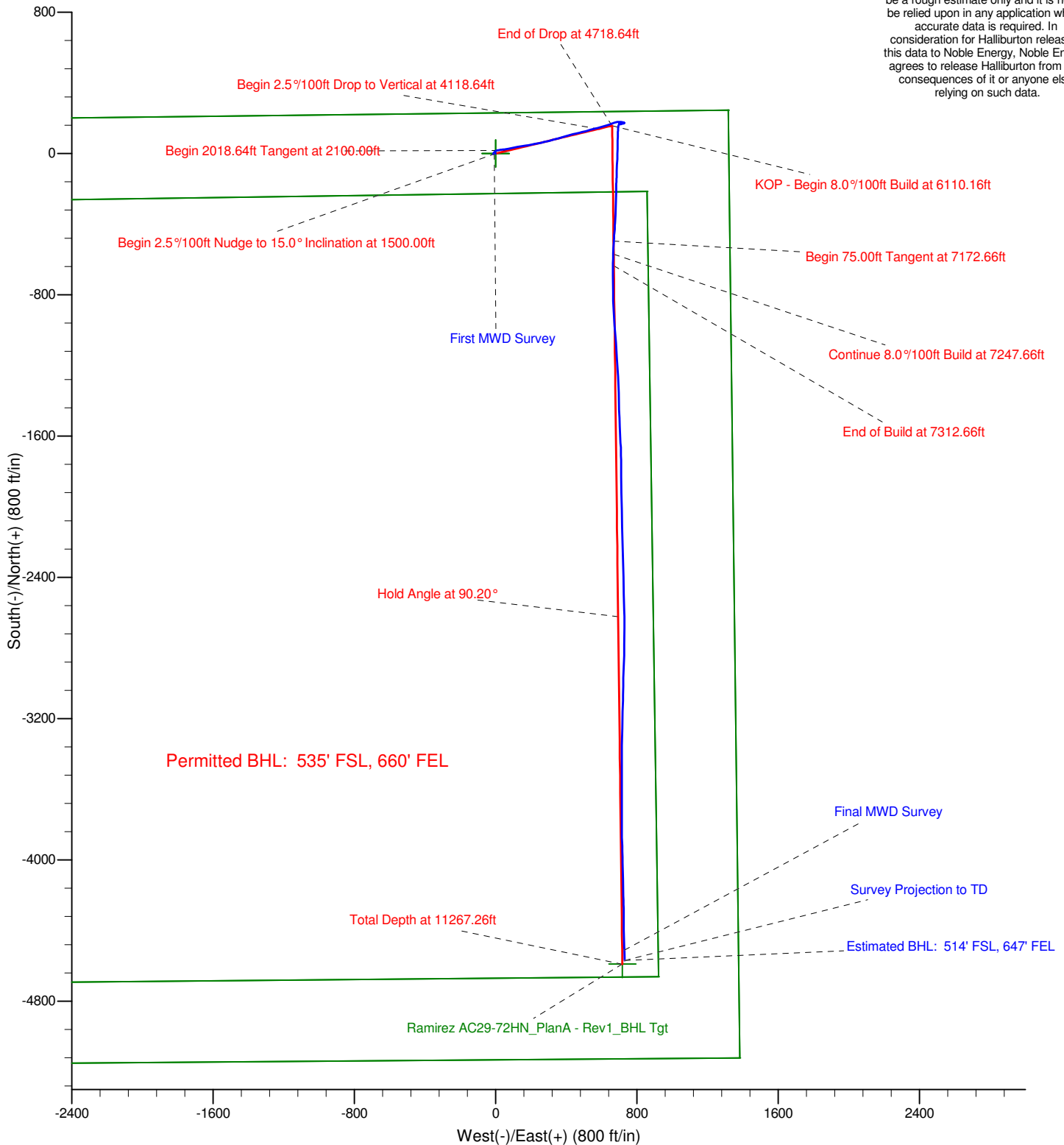
Sperry Drilling



LEGEND

- Ramirez AC29-72HN, Plan A, Plan A - Rev 1 Proposal V0
- MWD Survey

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Ramirez AC29-72HN well located at Weld County, CO. At the conclusion of the job Halliburton performed a final survey on the well. Noble Energy has requested that Halliburton provide them the distances from BHL to section lines from that final survey to allow Noble Energy to meet its requirements under Colorado law. These distances are generated by a mathematical algorithm based on rough data collected after the well is drilled. Halliburton considers it to be a rough estimate only and it is not to be relied upon in any application where accurate data is required. In consideration for Halliburton releasing this data to Noble Energy, Noble Energy agrees to release Halliburton from any consequences of it or anyone else relying on such data.

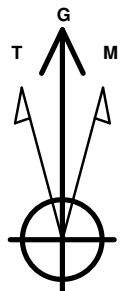


Project: Weld County, CO (NAD 83)
 Site: Sec. 29-T7N-R63W
 Well: Ramirez AC29-72HN

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Sperry Drilling



Azimuths to Grid North
 True North: -0.67°
 Magnetic North: 7.90°

Magnetic Field
 Strength: 53106.2snT
 Dip Angle: 67.18°
 Date: 4/19/2012
 Model: BGGM2011

LEGEND

- Ramirez AC29-72HN, Plan A, Plan A - Rev 1 Proposal V0
- MWD Survey

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Ramirez AC29-72HN well located at Weld County, CO. At the conclusion of the job Halliburton performed a final survey on the well. Noble Energy has requested that Halliburton provide them the distances from BHL to section lines from that final survey to allow Noble Energy to meet its requirements under Colorado law. These distances are generated by a mathematical algorithm based on rough data collected after the well is drilled. Halliburton considers it to be a rough estimate only and it is not to be relied upon in any application where accurate data is required. In consideration for Halliburton releasing this data to Noble Energy, Noble Energy agrees to release Halliburton from any consequences of it or anyone else relying on such data.

