

# SPERRY-SUN DRILLING SERVICES

## CERTIFIED SURVEY WORK SHEET

OPERATOR:	Anadarko Petroleum Corp.
WELL:	NRC 27N-4HZ
FIELD:	DJ Basin
WIG:	H&P 308
SEGMENTS:	Sec. 9-T1N-R67W
COUNTY:	Weld
STATE:	Colorado
WELL METHOD:	True N
WELL DECL. APPLIED:	8.68
VERTICAL SEC. DIR. :	359.320

SSDS Job Number :	901205067
Start Date of Job :	4/20/2014
End Date of Job :	4/27/2014
Lead Directional Driller:	Jesse Kysar
	Brian Saunders
Other SSDS DD's :	
SSDS MWD Engineers :	Ryan White
	Patrick Lane

SS Survey  
First Survey Depth  
Last Survey Depth

OP Depth/Sidetrack MD

First Survey Depth  
Last Survey Depth  
Tie Extrapolation to TD

Main Hole =====>		1st Side Track =====>		2nd Side Track =====>		3rd Side Track =====>		4th Side Track =====>	
	Tie On		Tie On		Tie On		Tie On		Tie On
25.00	Gyro								
1017.00									
6894.00	KOP		KOP-ST1		KOP-ST2		KOP-ST3		KOP-ST4
1111.00	MWD		MWD		MWD		MWD		MWD
17028.00	MWD		MWD		MWD		MWD		MWD
17075.00	T.D.		T.D.		T.D.		T.D.		T.D.

The following Sperry Sun Drilling Services personnel listed below, do certify the above survey information to be accurate :

Print Name : Brian Saunders

Print Name :

Patrick Lane

Print Name :

Sign Name :

Sign Name :

Sign Name :

Print Name : Jesse Kysar

Print Name :

Ryan White

Print Name :

Sign Name :

Sign Name :

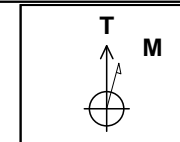
Sign Name :

Examples of  
Survey Types:

TieOn  
MWD  
ESS  
Gyro  
SS

Tie On to Surface Casing (Assumed Vertical), Tie On to existing MWD Survey (prior drilled hole)  
Sperry Sun Drilling Services (SSDS) Measurement While Drilling (MWD) Survey's  
Sperry Sun Drilling Services (SSDS) Electronic Survey System (ESS) Survey's  
Gyro Survey's ; Provided by third party vendor, or by Sperry Sun Drilling Services (SSDS)  
Single Shot (SS) Survey's ; Provided by Sperry Sun Drilling Services (SSDS) or third party vendor.

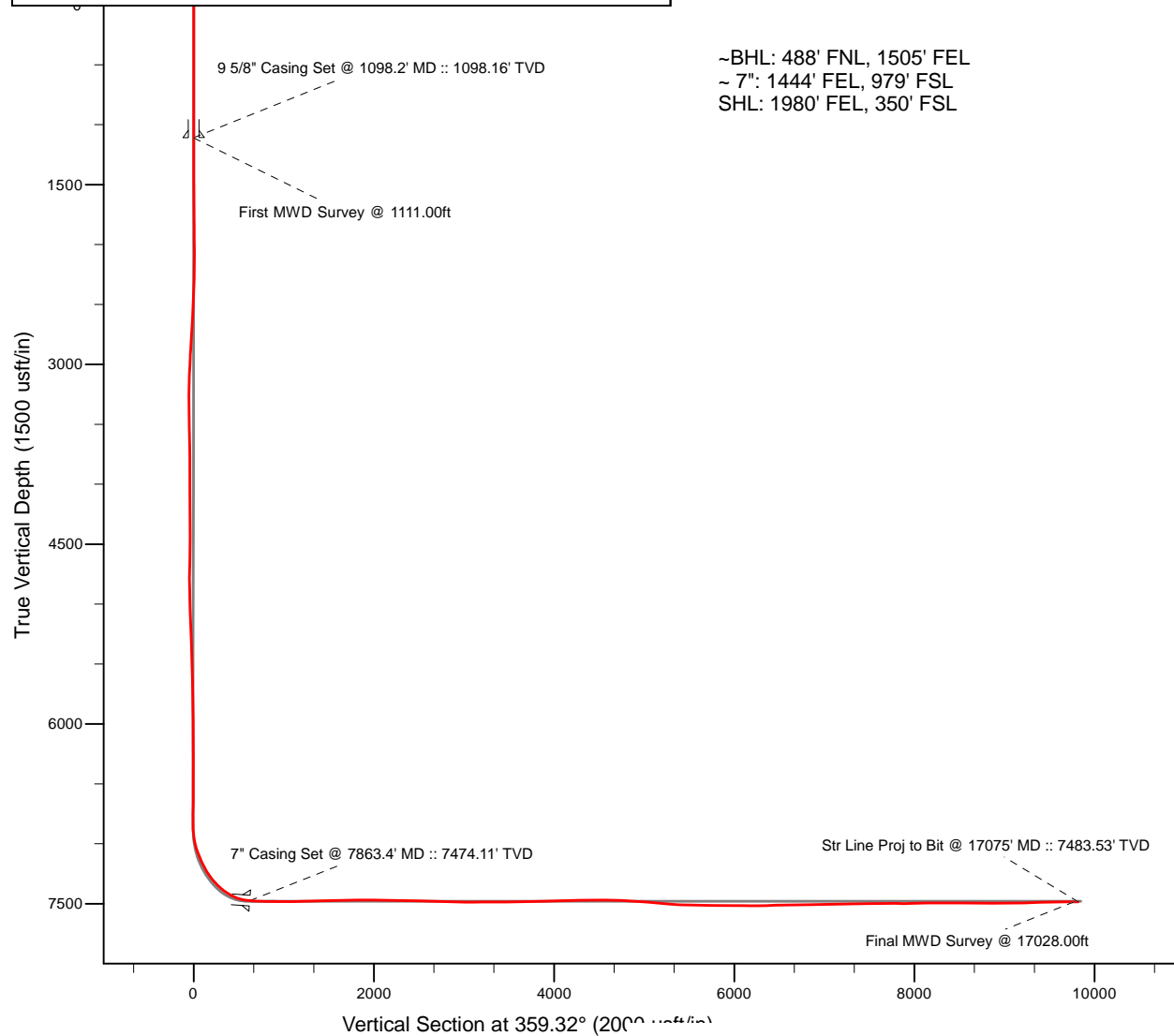
Project: Weld County, CO (NAD 83)  
 Site: Sec. 9-T1N-R67W  
 Well: NRC 27N-4HZ  
 Wellbore: Plan A  
 Design: Actual Surveys



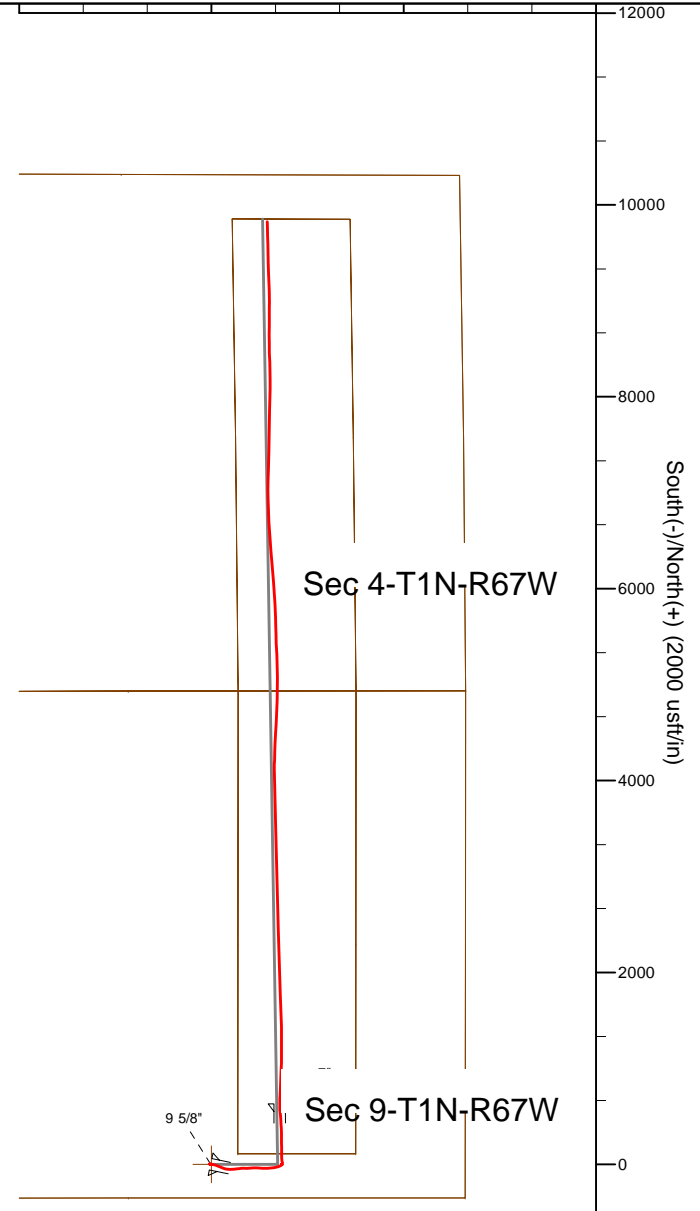
**HALLIBURTON**  
 Sperry Drilling

### LEGEND

- NRC 27N-4HZ, Plan A, Rev A1 V0
- Actual Surveys



~BHL: 488' FNL, 1505' FEL  
 ~ 7": 1444' FEL, 979' FSL  
 SHL: 1980' FEL, 350' FSL



	Latitude	Longitude	Northing	Easting
7" Casing:	40.060959	-104.891485	1,265,637.20	3,170,323.90
BHL:	40.086201	-104.891832	1,274,831.37	3,170,163.72

WELL DETAILS: NRC 27N-4HZ	
Ground Level:	5030.60
RKB=25' @ 5055.60usft	
Design: Actual Surveys (NRC 27N-4HZ/Plan A)	
Created By: Pari Amanlou	Date: 5-8-14

# Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 9-T1N-R67W

NRC 27N-4HZ

Job# 901205067:: API: 05-123-38994

Plan A

Design: Actual Surveys

## Sperry Drilling Services

### Standard Report

22 August, 2014

Surface UWI : Job# 901205067:: API: 05-123-38994

Well Coordinates: 1,265,003.23 N, 3,169,794.49 E (40° 03' 33.22" N, 104° 53' 36.21" W)

Ground Level: 5,030.60 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 NRC 27N-4HZ

RKB=25' @ 5055.60usft

N

True

API - US Survey Feet - Custom

**HALLIBURTON**

**Design Report for NRC 27N-4HZ - 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
25.00	0.00	0.00	25.00	0.00	0.00	0.00	0.00
125.00	0.19	41.35	125.00	0.12	0.11	0.12	0.19
225.00	0.79	277.21	225.00	0.34	-0.46	0.34	0.91
325.00	0.34	160.57	324.99	0.14	-1.05	0.15	0.99
425.00	0.32	357.22	424.99	0.14	-0.96	0.15	0.65
525.00	0.52	314.74	524.99	0.74	-1.30	0.76	0.36
625.00	0.87	285.57	624.98	1.26	-2.35	1.29	0.49
725.00	0.73	240.96	724.97	1.16	-3.64	1.20	0.62
825.00	0.54	207.39	824.97	0.43	-4.42	0.48	0.41
925.00	0.44	117.70	924.97	-0.17	-4.29	-0.12	0.69
1,017.00	0.48	338.04	1,016.97	0.03	-4.12	0.07	0.94
<b>Tie-On to Surface Gyros @ 1017.00ft</b>							
1,108.00	0.40	281.59	1,107.96	0.44	-4.57	0.50	0.46
<b>9 5/8" Casing Set @ 1098.2' MD :: 1098.16' TVD</b>							
1,111.00	0.40	279.70	1,110.96	0.45	-4.60	0.50	0.46
<b>First MWD Survey @ 1111.00ft</b>							
1,206.00	0.61	272.05	1,205.96	0.52	-5.43	0.58	0.23
1,301.00	0.45	292.56	1,300.95	0.68	-6.28	0.76	0.26
1,396.00	0.51	296.58	1,395.95	1.01	-7.00	1.10	0.07
1,491.00	0.47	302.26	1,490.95	1.41	-7.71	1.50	0.07
1,586.00	0.55	305.23	1,585.94	1.88	-8.41	1.98	0.09
1,680.00	0.71	298.92	1,679.94	2.42	-9.29	2.53	0.19
1,771.00	1.01	301.36	1,770.93	3.11	-10.47	3.24	0.33
1,864.00	1.16	301.74	1,863.91	4.04	-11.97	4.18	0.16
1,955.00	1.27	301.41	1,954.89	5.05	-13.61	5.21	0.12
2,049.00	1.09	99.40	2,048.88	5.44	-13.62	5.60	2.46
2,142.00	3.42	101.77	2,141.81	4.73	-10.03	4.85	2.51
2,233.00	4.32	87.14	2,232.60	4.35	-3.95	4.40	1.46
2,325.00	6.84	99.09	2,324.16	3.66	4.92	3.60	3.00
2,417.00	8.06	109.40	2,415.38	0.65	16.42	0.45	1.96
2,510.00	9.53	118.76	2,507.29	-5.22	29.32	-5.57	2.20
2,603.00	10.48	118.06	2,598.88	-12.90	43.53	-13.42	1.03
2,695.00	8.68	116.60	2,689.59	-19.95	57.12	-20.63	1.97
2,787.00	8.91	120.78	2,780.51	-26.70	69.45	-27.53	0.74
2,879.00	6.49	118.36	2,871.67	-32.82	80.15	-33.77	2.65
2,972.00	7.50	115.56	2,963.98	-37.94	90.25	-39.00	1.15
3,063.00	10.14	115.15	3,053.90	-43.90	102.86	-45.12	2.90
3,155.00	12.00	99.42	3,144.20	-48.91	119.63	-50.33	3.84
3,246.00	9.94	95.31	3,233.54	-51.19	136.79	-52.81	2.42
3,339.00	10.23	86.27	3,325.10	-51.39	153.02	-53.21	1.73
3,431.00	9.25	82.07	3,415.78	-49.84	168.50	-51.84	1.32
3,523.00	8.82	80.30	3,506.64	-47.63	182.77	-49.80	0.56
3,615.00	11.11	81.27	3,597.24	-45.10	198.49	-47.45	2.50
3,706.00	10.19	82.88	3,686.67	-42.77	215.14	-45.32	1.06
3,798.00	9.45	83.09	3,777.33	-40.85	230.72	-43.59	0.81
3,890.00	10.28	88.53	3,867.97	-39.73	246.42	-42.66	1.36
3,982.00	11.75	92.94	3,958.27	-40.00	263.98	-43.13	1.84
4,073.00	10.06	87.16	4,047.63	-40.09	281.18	-43.42	2.21
4,165.00	10.03	82.80	4,138.22	-38.68	297.15	-42.21	0.83

**Design Report for NRC 27N-4HZ - Actual Surveys**

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
4,257.00	8.51	80.25	4,229.01	-36.53	311.81	-40.22	1.71
4,352.00	10.43	87.74	4,322.72	-35.00	327.33	-38.88	2.40
4,446.00	13.35	93.19	4,414.70	-35.26	346.67	-39.38	3.32
4,541.00	12.33	95.77	4,507.32	-36.89	367.72	-41.26	1.23
4,635.00	10.56	94.11	4,599.45	-38.52	386.30	-43.10	1.92
4,729.00	12.44	94.06	4,691.56	-39.86	404.99	-44.66	2.00
4,824.00	12.22	92.97	4,784.36	-41.10	425.24	-46.14	0.34
4,918.00	13.36	82.94	4,876.04	-40.28	445.95	-45.57	2.65
5,013.00	12.36	81.06	4,968.66	-37.35	466.89	-42.89	1.14
5,107.00	10.60	76.97	5,060.78	-33.84	485.25	-39.60	2.06
5,202.00	9.43	74.38	5,154.33	-29.77	501.26	-35.72	1.32
5,296.00	8.60	73.11	5,247.17	-25.66	515.40	-31.77	0.91
5,390.00	7.30	64.35	5,340.26	-21.03	527.51	-27.29	1.89
5,485.00	6.48	58.06	5,434.58	-15.58	537.50	-21.96	1.17
5,579.00	4.08	44.50	5,528.18	-10.39	544.35	-16.85	2.86
5,674.00	3.42	41.21	5,622.97	-5.85	548.58	-12.36	0.73
5,768.00	0.83	1.42	5,716.90	-3.06	550.45	-9.59	3.01
5,862.00	0.89	333.58	5,810.89	-1.72	550.14	-8.25	0.44
5,957.00	0.58	345.07	5,905.88	-0.60	549.69	-7.12	0.36
6,051.00	0.44	355.39	5,999.88	0.22	549.54	-6.30	0.18
6,146.00	0.22	341.21	6,094.88	0.76	549.45	-5.76	0.25
6,240.00	0.32	288.52	6,188.88	1.01	549.14	-5.50	0.27
6,335.00	0.61	300.09	6,283.87	1.35	548.45	-5.16	0.32
6,429.00	0.85	291.03	6,377.87	1.85	547.37	-4.64	0.28
6,523.00	0.28	260.06	6,471.86	2.06	546.49	-4.42	0.67
6,618.00	0.26	155.30	6,566.86	1.83	546.35	-4.66	0.45
6,712.00	1.14	111.72	6,660.85	1.29	547.31	-5.21	1.03
6,807.00	1.86	116.23	6,755.82	0.26	549.57	-6.27	0.77
6,901.00	1.04	93.63	6,849.79	-0.47	551.79	-7.02	1.05
6,948.00	5.18	12.00	6,896.72	1.58	552.66	-4.98	10.92
6,996.00	10.57	5.98	6,944.25	8.08	553.57	1.51	11.34
7,043.00	16.39	355.83	6,989.94	18.99	553.53	12.42	13.32
7,090.00	22.54	352.03	7,034.24	34.54	551.80	27.99	13.35
7,137.00	26.60	356.59	7,076.98	53.98	549.93	47.45	9.53
7,185.00	28.97	358.26	7,119.44	76.33	548.93	69.81	5.20
7,232.00	32.51	359.38	7,159.83	100.34	548.45	93.82	7.63
7,279.00	35.30	0.07	7,198.84	126.55	548.33	120.04	5.99
7,326.00	39.29	359.08	7,236.22	155.03	548.11	148.51	8.58
7,374.00	44.04	359.28	7,272.07	186.92	547.65	180.41	9.90
7,421.00	48.62	359.29	7,304.51	220.91	547.23	214.40	9.74
7,468.00	51.44	359.93	7,334.70	256.92	546.99	250.41	6.09
7,515.00	55.19	359.81	7,362.77	294.61	546.90	288.09	7.98
7,563.00	59.71	359.10	7,388.59	335.05	546.51	328.54	9.50
7,610.00	65.11	358.19	7,410.35	376.68	545.52	370.18	11.62
7,658.00	67.92	358.48	7,429.48	420.68	544.24	414.19	5.88
7,705.00	70.71	357.35	7,446.08	464.62	542.64	458.14	6.35
7,752.00	77.25	355.72	7,459.05	509.68	539.90	503.24	14.31
7,799.00	82.86	356.02	7,467.16	555.84	536.57	549.43	11.95
7,822.00	83.32	357.18	7,469.93	578.63	535.21	572.24	5.39
7,874.00	85.54	359.58	7,474.98	630.36	533.75	623.98	6.26

7" Casing Set @ 7863.4' MD :: 7474.11' TVD



**Design Report for NRC 27N-4HZ - Actual Surveys**

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
7,925.00	87.72	1.91	7,477.97	681.26	534.41	674.87	6.26
8,019.00	88.89	1.91	7,480.75	775.16	537.54	768.73	1.24
8,113.00	89.41	1.81	7,482.15	869.10	540.59	862.63	0.56
8,208.00	90.09	1.85	7,482.56	964.05	543.63	957.53	0.72
8,302.00	90.09	1.26	7,482.42	1,058.02	546.18	1,051.46	0.63
8,397.00	90.22	0.13	7,482.16	1,153.01	547.33	1,146.43	1.20
8,491.00	91.08	359.99	7,481.09	1,247.00	547.43	1,240.42	0.93
8,586.00	91.79	359.66	7,478.71	1,341.97	547.14	1,335.38	0.82
8,680.00	90.89	359.43	7,476.52	1,435.94	546.39	1,429.36	0.99
8,775.00	91.88	359.25	7,474.22	1,530.91	545.30	1,524.33	1.06
8,870.00	90.86	358.33	7,471.95	1,625.85	543.29	1,619.29	1.45
8,964.00	90.68	357.83	7,470.68	1,719.79	540.14	1,713.26	0.57
9,058.00	90.80	357.82	7,469.47	1,813.72	536.58	1,807.22	0.13
9,153.00	90.22	358.15	7,468.63	1,908.65	533.24	1,902.19	0.70
9,247.00	89.82	358.66	7,468.59	2,002.62	530.62	1,996.18	0.69
9,341.00	88.27	359.03	7,470.16	2,096.58	528.73	2,090.16	1.70
9,432.00	88.61	358.86	7,472.64	2,187.53	527.05	2,181.12	0.42
9,525.00	89.29	358.77	7,474.34	2,280.50	525.13	2,274.10	0.74
9,616.00	90.03	358.45	7,474.88	2,371.47	522.92	2,365.10	0.89
9,710.00	88.06	359.56	7,476.45	2,465.43	521.29	2,459.07	2.41
9,803.00	88.58	359.42	7,479.17	2,558.39	520.46	2,552.03	0.58
9,894.00	89.26	358.92	7,480.89	2,649.36	519.14	2,643.02	0.93
9,986.00	89.91	358.67	7,481.56	2,741.34	517.21	2,735.01	0.76
10,078.00	88.49	359.30	7,482.84	2,833.31	515.58	2,827.00	1.69
10,171.00	88.92	358.97	7,484.94	2,926.28	514.17	2,919.97	0.58
10,264.00	89.14	358.67	7,486.52	3,019.25	512.26	3,012.95	0.40
10,356.00	90.06	358.20	7,487.16	3,111.21	509.75	3,104.94	1.12
10,448.00	90.77	358.66	7,486.49	3,203.17	507.23	3,196.93	0.92
10,540.00	89.57	358.95	7,486.22	3,295.15	505.31	3,288.92	1.34
10,633.00	90.52	358.81	7,486.15	3,388.13	503.49	3,381.92	1.03
10,724.00	90.59	359.42	7,485.26	3,479.11	502.08	3,472.91	0.67
10,816.00	90.31	359.07	7,484.54	3,571.10	500.87	3,564.91	0.49
10,907.00	91.08	358.84	7,483.44	3,662.08	499.21	3,655.90	0.88
11,000.00	90.25	358.73	7,482.36	3,755.05	497.24	3,748.89	0.90
11,094.00	91.14	358.30	7,481.22	3,849.01	494.81	3,842.87	1.05
11,185.00	91.76	359.01	7,478.92	3,939.96	492.67	3,933.83	1.04
11,277.00	91.51	359.65	7,476.29	4,031.91	491.59	4,025.80	0.75
11,369.00	91.17	0.19	7,474.14	4,123.89	491.47	4,117.76	0.69
11,461.00	90.74	1.20	7,472.61	4,215.87	492.58	4,209.72	1.19
11,553.00	90.55	1.76	7,471.57	4,307.83	494.96	4,301.65	0.64
11,644.00	90.93	1.84	7,470.40	4,398.78	497.82	4,392.56	0.43
11,736.00	89.88	1.79	7,469.74	4,490.73	500.73	4,484.47	1.14
11,828.00	90.15	3.06	7,469.72	4,582.64	504.62	4,576.33	1.41
11,920.00	88.83	1.85	7,470.54	4,674.55	508.56	4,668.19	1.95
12,011.00	87.54	1.46	7,473.42	4,765.47	511.19	4,759.06	1.48
12,106.00	87.50	1.23	7,477.53	4,860.35	513.42	4,853.92	0.25
12,200.00	86.89	0.87	7,482.13	4,954.22	515.14	4,947.76	0.75
12,295.00	86.55	0.15	7,487.57	5,049.06	515.98	5,042.58	0.84
12,389.00	86.08	358.10	7,493.61	5,142.85	514.55	5,136.38	2.23
12,484.00	86.14	357.85	7,500.06	5,237.57	511.20	5,231.14	0.27
12,578.00	87.13	358.96	7,505.57	5,331.37	508.59	5,324.96	1.58

**Design Report for NRC 27N-4HZ - Actual Surveys**

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
12,673.00	88.40	359.09	7,509.28	5,426.28	506.97	5,419.88	1.34
12,768.00	88.46	358.14	7,511.88	5,521.22	504.68	5,514.84	1.00
12,863.00	89.60	358.56	7,513.49	5,616.16	501.94	5,609.81	1.28
12,958.00	89.54	358.63	7,514.20	5,711.13	499.62	5,704.80	0.10
13,053.00	90.03	358.61	7,514.56	5,806.10	497.33	5,799.79	0.52
13,147.00	89.78	357.98	7,514.71	5,900.06	494.53	5,893.78	0.72
13,242.00	89.78	356.85	7,515.08	5,994.96	490.25	5,988.72	1.19
13,337.00	89.32	356.02	7,515.82	6,089.78	484.34	6,083.60	1.00
13,432.00	89.63	355.87	7,516.70	6,184.53	477.62	6,178.43	0.36
13,527.00	90.06	355.85	7,516.95	6,279.29	470.76	6,273.26	0.45
13,621.00	91.60	356.26	7,515.59	6,373.05	464.30	6,367.09	1.70
13,716.00	91.45	357.47	7,513.06	6,467.87	459.10	6,461.97	1.28
13,811.00	90.93	358.02	7,511.09	6,562.78	455.37	6,556.91	0.80
13,905.00	90.06	357.36	7,510.28	6,656.70	451.58	6,650.87	1.16
14,000.00	91.05	358.02	7,509.36	6,751.61	447.75	6,745.82	1.25
14,095.00	90.28	358.07	7,508.25	6,846.55	444.51	6,840.79	0.81
14,189.00	90.80	357.89	7,507.37	6,940.49	441.20	6,934.76	0.59
14,284.00	91.36	1.02	7,505.58	7,035.45	440.29	7,029.73	3.35
14,379.00	90.83	1.46	7,503.76	7,130.41	442.35	7,124.66	0.73
14,474.00	90.06	1.38	7,503.02	7,225.38	444.70	7,219.59	0.81
14,569.00	91.08	0.71	7,502.08	7,320.36	446.43	7,314.54	1.28
14,664.00	90.22	1.56	7,501.00	7,415.33	448.32	7,409.49	1.27
14,758.00	91.30	0.53	7,499.75	7,509.31	450.03	7,503.44	1.59
14,853.00	90.89	0.67	7,497.94	7,604.28	451.02	7,598.39	0.46
14,948.00	89.63	359.98	7,497.51	7,699.28	451.56	7,693.38	1.51
15,043.00	89.26	1.03	7,498.43	7,794.27	452.40	7,788.35	1.17
15,137.00	90.62	1.79	7,498.53	7,888.24	454.71	7,882.28	1.66
15,232.00	90.90	0.97	7,497.27	7,983.20	457.00	7,977.21	0.91
15,327.00	89.75	0.03	7,496.73	8,078.19	457.83	8,072.19	1.56
15,422.00	91.23	359.59	7,495.92	8,173.19	457.51	8,167.18	1.63
15,517.00	91.02	358.99	7,494.05	8,268.16	456.34	8,262.16	0.67
15,611.00	90.46	358.82	7,492.84	8,362.13	454.54	8,356.15	0.62
15,706.00	90.12	359.26	7,492.36	8,457.12	452.95	8,451.15	0.59
15,801.00	89.26	359.21	7,492.87	8,552.11	451.68	8,546.15	0.91
15,895.00	88.86	0.19	7,494.41	8,646.09	451.19	8,640.13	1.13
15,990.00	89.57	0.25	7,495.71	8,741.08	451.55	8,735.11	0.75
16,084.00	89.66	0.20	7,496.34	8,835.08	451.92	8,829.09	0.11
16,179.00	90.06	0.70	7,496.58	8,930.08	452.67	8,924.07	0.67
16,273.00	90.86	359.76	7,495.82	9,024.07	453.05	9,018.06	1.31
16,368.00	89.63	358.15	7,495.42	9,119.05	451.31	9,113.05	2.13
16,462.00	91.88	358.36	7,494.18	9,212.99	448.45	9,207.02	2.40
16,556.00	91.67	358.60	7,491.27	9,306.91	445.96	9,300.96	0.34
16,651.00	91.54	358.75	7,488.60	9,401.85	443.76	9,395.92	0.21
16,745.00	90.65	359.04	7,486.81	9,495.81	441.95	9,489.90	1.00
16,839.00	90.59	359.05	7,485.79	9,589.80	440.39	9,583.89	0.06
16,933.00	90.71	359.19	7,484.72	9,683.78	438.94	9,677.89	0.20
17,028.00	90.37	358.91	7,483.83	9,778.76	437.37	9,772.88	0.46
<b>Final MWD Survey @ 17028.00ft</b>							
17,075.00	90.37	358.91	7,483.53	9,825.75	436.47	9,819.88	0.00
<b>Str Line Proj to Bit @ 17075' MD :: 7483.53' TVD</b>							

## Design Report for NRC 27N-4HZ - Actual Surveys

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,017.00	1,016.97	0.03	-4.12	Tie-On to Surface Gyros @ 1017.00ft
1,111.00	1,110.96	0.45	-4.60	First MWD Survey @ 1111.00ft
17,028.00	7,483.83	9,778.76	437.37	Final MWD Survey @ 17028.00ft
17,075.00	7,483.53	9,825.75	436.47	Str Line Proj to Bit @ 17075' MD :: 7483.53' TVD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
User	No Target (Freehand)	359.32	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
25.00	1,017.00	Surface Gyro Surveys	NS-Gyro-MS
1,111.00	7,822.00	MWD Vertical/Build Surveys	MWD+IFR1+SC
7,925.00	17,028.00	MWD Lateral Surveys	MWD+IFR1+SC

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,108.00	1,107.96	9 5/8" Casing Set @ 1098.2' MD :: 1098.16' TVD	9-5/8	13-1/2
7,874.00	7,474.98	7" Casing Set @ 7863.4' MD :: 7474.11' TVD	7	8-3/4



## Design Report for NRC 27N-4HZ - Actual 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
NRC 27N-4HZ SHL	0.00	0.00	0.00	0.01	0.00	1,265,003.23	3,169,794.49	40° 3' 33.224 N	104° 53' 36.211 W
- actual wellpath misses target center by 0.01usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Point									
NRC 27N-4HZ LD	0.00	0.00	0.00	0.01	0.00	1,265,003.23	3,169,794.49	40° 3' 33.224 N	104° 53' 36.211 W
- 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	110.17	206.15	1,265,114.81	3,169,999.87	
Point 2				0.00	2,292.01	207.30	1,267,296.52	3,169,986.10	
Point 3				0.00	4,933.80	208.70	1,269,938.16	3,169,969.43	
Point 4				0.00	7,578.03	187.58	1,272,582.09	3,169,930.22	
Point 5				0.00	9,854.23	162.34	1,274,857.97	3,169,889.41	
Point 6				0.00	9,850.49	1,082.47	1,274,860.53	3,170,809.51	
Point 7				0.00	7,577.41	1,107.66	1,272,587.76	3,170,850.25	
Point 8				0.00	4,935.19	1,128.75	1,269,945.84	3,170,889.41	
Point 9				0.00	2,292.78	1,127.34	1,267,303.59	3,170,906.08	
Point 10				0.00	110.37	1,126.18	1,265,121.30	3,170,919.85	
Point 11				0.00	110.17	206.15	1,265,114.81	3,169,999.87	
NRC 13-9HZ Pad_Sec	0.00	0.00	-34.00	-0.57	-2,645.53	1,264,984.56	3,167,149.12	40° 3' 33.217 N	104° 54' 10.235 W
- actual wellpath misses target center by 2645.75usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1			-34.00	10,329.15	-698.23	1,275,308.30	3,166,380.28		
Point 2			-34.00	7,581.05	-672.58	1,272,560.54	3,166,424.73		
Point 3			-34.00	4,929.01	-636.91	1,269,908.91	3,166,478.54		
Point 4			-34.00	4,933.30	1,997.48	1,269,931.22	3,169,112.74		
Point 5			-34.00	4,937.55	4,629.98	1,269,953.48	3,171,745.05		
Point 6			-34.00	4,933.30	1,997.48	1,269,931.22	3,169,112.74		
Point 7			-34.00	4,929.01	-636.91	1,269,908.91	3,166,478.54		
Point 8			-34.00	2,289.57	-633.27	1,267,269.66	3,166,500.23		
Point 9			-34.00	-350.08	-629.55	1,264,630.19	3,166,522.01		
Point 10			-34.00	-349.24	1,997.80	1,264,649.01	3,169,149.19		
Point 11			-34.00	-348.39	4,625.17	1,264,667.83	3,171,776.40		
Point 12			-34.00	2,294.58	4,627.58	1,267,310.65	3,171,760.73		
Point 13			-34.00	4,937.55	4,629.98	1,269,953.48	3,171,745.05		
Point 14			-34.00	7,577.90	4,612.90	1,272,593.55	3,171,709.91		
Point 15			-34.00	10,308.11	4,581.57	1,275,323.38	3,171,659.90		
Point 16			-34.00	10,318.54	1,941.91	1,275,315.75	3,169,020.33		
Point 17			-34.00	10,329.15	-698.23	1,275,308.30	3,166,380.28		
NRC 27N-4HZ BHL_R	0.00	0.00	7,480.00	9,852.98	400.00	1,274,858.35	3,170,127.07	40° 5' 10.594 N	104° 53' 31.065 W
- actual wellpath misses target center by 45.65usft at 17075.00usft MD (7483.53 TVD, 9825.75 N, 436.47 E)									
- Point									
NRC 27N-4HZ BHL	0.00	0.00	7,480.00	9,852.98	462.25	1,274,858.77	3,170,189.31	40° 5' 10.594 N	104° 53' 30.264 W
- actual wellpath misses target center by 37.66usft at 17075.00usft MD (7483.53 TVD, 9825.75 N, 436.47 E)									
- Point									

**Directional Difficulty Index**

Average Dogleg over Survey:	1.55 °/100usft	Maximum Dogleg over Survey:	14.31 °/100usft at 7,752.00 usft
Net Tortousity applicable to Plans:	0.87 °/100usft	Directional Difficulty Index:	6.799

**Audit Info**

**North Reference Sheet for Sec. 9-T1N-R67W - NRC 27N-4HZ - Plan A**

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

Vertical Depths are relative to RKB=25' @ 5055.60usft. Northing and Easting are relative to NRC 27N-4HZ

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

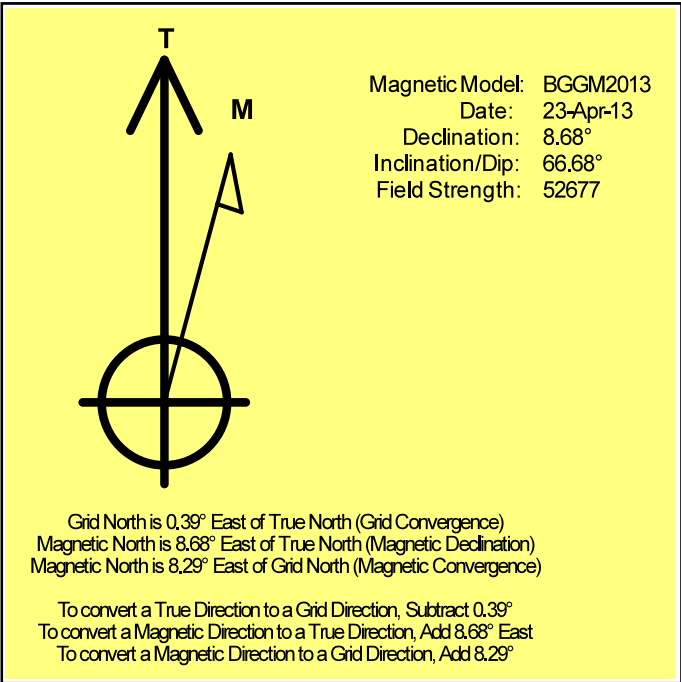
Grid Coordinates of Well: 1,265,003.23 usft N, 3,169,794.49 usft E

Geographical Coordinates of Well: 40° 03' 33.22" N, 104° 53' 36.21" W

Grid Convergence at Surface is: 0.39°

Based upon Minimum Curvature type calculations, at a Measured Depth of 17,075.00usft the Bottom Hole Displacement is 9,835.44usft in the Direction of 2.54° (True).

Magnetic Convergence at surface is: -8.29° (23 April 2013, , BGGM2013)



# Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 9-T1N-R67W

NRC 27N-4HZ

Job# 901205067:: API: 05-123-38994

Plan A

Design: Actual Surveys

## Sperry Drilling Services

### Geodetic Report

25 August, 2014

Well Coordinates: 1,265,003.23 N, 3,169,794.49 E (40° 03' 33.22" N, 104° 53' 36.21" W)

Ground Level: 5,030.60 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 NRC 27N-4HZ

RKB=25' @ 5055.60usft

N

True

Dec-Deg - API - US Survey Feet - Custom

**HALLIBURTON**

## Design Report for NRC 27N-4HZ - 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	40.059229	-104.893392	1,265,003.23	3,169,794.49
25.00	0.00	0.00	25.00	0.00	0.00	40.059229	-104.893392	1,265,003.23	3,169,794.49
125.00	0.19	41.35	125.00	0.12	0.11	40.059229	-104.893392	1,265,003.35	3,169,794.60
225.00	0.79	277.21	225.00	0.34	-0.46	40.059230	-104.893394	1,265,003.56	3,169,794.02
325.00	0.34	160.57	324.99	0.14	-1.05	40.059229	-104.893396	1,265,003.36	3,169,793.44
425.00	0.32	357.22	424.99	0.14	-0.96	40.059229	-104.893396	1,265,003.36	3,169,793.52
525.00	0.52	314.74	524.99	0.74	-1.30	40.059231	-104.893397	1,265,003.96	3,169,793.18
625.00	0.87	285.57	624.98	1.26	-2.35	40.059233	-104.893401	1,265,004.47	3,169,792.13
725.00	0.73	240.96	724.97	1.16	-3.64	40.059232	-104.893405	1,265,004.36	3,169,790.84
825.00	0.54	207.39	824.97	0.43	-4.42	40.059230	-104.893408	1,265,003.63	3,169,790.07
925.00	0.44	117.70	924.97	-0.17	-4.29	40.059229	-104.893408	1,265,003.03	3,169,790.20
1,017.00	0.48	338.04	1,016.97	0.03	-4.12	40.059229	-104.893407	1,265,003.22	3,169,790.37
1,108.00	0.40	281.59	1,107.96	0.44	-4.57	40.059230	-104.893409	1,265,003.64	3,169,789.91
1,111.00	0.40	279.70	1,110.96	0.45	-4.60	40.059230	-104.893409	1,265,003.64	3,169,789.89
1,206.00	0.61	272.05	1,205.96	0.52	-5.43	40.059230	-104.893412	1,265,003.71	3,169,789.06
1,301.00	0.45	292.56	1,300.95	0.68	-6.28	40.059231	-104.893415	1,265,003.86	3,169,788.21
1,396.00	0.51	296.58	1,395.95	1.01	-7.00	40.059232	-104.893417	1,265,004.19	3,169,787.48
1,491.00	0.47	302.26	1,490.95	1.41	-7.71	40.059233	-104.893420	1,265,004.58	3,169,786.77
1,586.00	0.55	305.23	1,585.94	1.88	-8.41	40.059234	-104.893422	1,265,005.05	3,169,786.07
1,680.00	0.71	298.92	1,679.94	2.42	-9.29	40.059236	-104.893425	1,265,005.59	3,169,785.19
1,771.00	1.01	301.36	1,770.93	3.11	-10.47	40.059238	-104.893430	1,265,006.27	3,169,784.00
1,864.00	1.16	301.74	1,863.91	4.04	-11.97	40.059240	-104.893435	1,265,007.18	3,169,782.50
1,955.00	1.27	301.41	1,954.89	5.05	-13.61	40.059243	-104.893441	1,265,008.18	3,169,780.85
2,049.00	1.09	99.40	2,048.88	5.44	-13.62	40.059244	-104.893441	1,265,008.58	3,169,780.84
2,142.00	3.42	101.77	2,141.81	4.73	-10.03	40.059242	-104.893428	1,265,007.89	3,169,784.43
2,233.00	4.32	87.14	2,232.60	4.35	-3.95	40.059241	-104.893406	1,265,007.55	3,169,790.51
2,325.00	6.84	99.09	2,324.16	3.66	4.92	40.059239	-104.893375	1,265,006.92	3,169,799.39
2,417.00	8.06	109.40	2,415.38	0.65	16.42	40.059231	-104.893334	1,265,003.99	3,169,810.90
2,510.00	9.53	118.76	2,507.29	-5.22	29.32	40.059215	-104.893288	1,264,998.21	3,169,823.84
2,603.00	10.48	118.06	2,598.88	-12.90	43.53	40.059194	-104.893237	1,264,990.62	3,169,838.11
2,695.00	8.68	116.60	2,689.59	-19.95	57.12	40.059174	-104.893188	1,264,983.67	3,169,851.75
2,787.00	8.91	120.78	2,780.51	-26.70	69.45	40.059156	-104.893144	1,264,977.00	3,169,864.12
2,879.00	6.49	118.36	2,871.67	-32.82	80.15	40.059139	-104.893106	1,264,970.96	3,169,874.86
2,972.00	7.50	115.56	2,963.98	-37.94	90.25	40.059125	-104.893070	1,264,965.91	3,169,884.99
3,063.00	10.14	115.15	3,053.90	-43.90	102.86	40.059109	-104.893025	1,264,960.03	3,169,897.65
3,155.00	12.00	99.42	3,144.20	-48.91	119.63	40.059095	-104.892965	1,264,955.13	3,169,914.45
3,246.00	9.94	95.31	3,233.54	-51.19	136.79	40.059089	-104.892904	1,264,952.98	3,169,931.62
3,339.00	10.23	86.27	3,325.10	-51.39	153.02	40.059088	-104.892846	1,264,952.88	3,169,947.85
3,431.00	9.25	82.07	3,415.78	-49.84	168.50	40.059092	-104.892790	1,264,954.54	3,169,963.32
3,523.00	8.82	80.30	3,506.64	-47.63	182.77	40.059098	-104.892739	1,264,956.85	3,169,977.58
3,615.00	11.11	81.27	3,597.24	-45.10	198.49	40.059105	-104.892683	1,264,959.49	3,169,993.28
3,706.00	10.19	82.88	3,686.67	-42.77	215.14	40.059112	-104.892624	1,264,961.93	3,170,009.91

## Design Report for NRC 27N-4HZ - 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)
3,798.00	9.45	83.09	3,777.33	-40.85	230.72	40.059117	-104.892568	1,264,963.95	3,170,025.47
3,890.00	10.28	88.53	3,867.97	-39.73	246.42	40.059120	-104.892512	1,264,965.18	3,170,041.17
3,982.00	11.75	92.94	3,958.27	-40.00	263.98	40.059119	-104.892449	1,264,965.03	3,170,058.73
4,073.00	10.06	87.16	4,047.63	-40.09	281.18	40.059119	-104.892388	1,264,965.07	3,170,075.93
4,165.00	10.03	82.80	4,138.22	-38.68	297.15	40.059123	-104.892331	1,264,966.58	3,170,091.89
4,257.00	8.51	80.25	4,229.01	-36.53	311.81	40.059129	-104.892278	1,264,968.83	3,170,106.53
4,352.00	10.43	87.74	4,322.72	-35.00	327.33	40.059133	-104.892223	1,264,970.47	3,170,122.04
4,446.00	13.35	93.19	4,414.70	-35.26	346.67	40.059132	-104.892154	1,264,970.33	3,170,141.38
4,541.00	12.33	95.77	4,507.32	-36.89	367.72	40.059128	-104.892079	1,264,968.85	3,170,162.44
4,635.00	10.56	94.11	4,599.45	-38.52	386.30	40.059123	-104.892012	1,264,967.35	3,170,181.03
4,729.00	12.44	94.06	4,691.56	-39.86	404.99	40.059120	-104.891945	1,264,966.14	3,170,199.73
4,824.00	12.22	92.97	4,784.36	-41.10	425.24	40.059116	-104.891873	1,264,965.04	3,170,219.98
4,918.00	13.36	82.94	4,876.04	-40.28	445.95	40.059118	-104.891799	1,264,966.00	3,170,240.69
5,013.00	12.36	81.06	4,968.66	-37.35	466.89	40.059126	-104.891724	1,264,969.07	3,170,261.61
5,107.00	10.60	76.97	5,060.78	-33.84	485.25	40.059136	-104.891659	1,264,972.71	3,170,279.94
5,202.00	9.43	74.38	5,154.33	-29.77	501.26	40.059147	-104.891602	1,264,976.88	3,170,295.92
5,296.00	8.60	73.11	5,247.17	-25.66	515.40	40.059159	-104.891551	1,264,981.09	3,170,310.04
5,390.00	7.30	64.35	5,340.26	-21.03	527.51	40.059171	-104.891508	1,264,985.80	3,170,322.11
5,485.00	6.48	58.06	5,434.58	-15.58	537.50	40.059186	-104.891472	1,264,991.32	3,170,332.07
5,579.00	4.08	44.50	5,528.18	-10.39	544.35	40.059201	-104.891448	1,264,996.56	3,170,338.88
5,674.00	3.42	41.21	5,622.97	-5.85	548.58	40.059213	-104.891432	1,265,001.13	3,170,343.08
5,768.00	0.83	1.42	5,716.90	-3.06	550.45	40.059221	-104.891426	1,265,003.93	3,170,344.93
5,862.00	0.89	333.58	5,810.89	-1.72	550.14	40.059224	-104.891427	1,265,005.27	3,170,344.61
5,957.00	0.58	345.07	5,905.88	-0.60	549.69	40.059227	-104.891429	1,265,006.39	3,170,344.15
6,051.00	0.44	355.39	5,999.88	0.22	549.54	40.059230	-104.891429	1,265,007.21	3,170,343.99
6,146.00	0.22	341.21	6,094.88	0.76	549.45	40.059231	-104.891429	1,265,007.74	3,170,343.90
6,240.00	0.32	288.52	6,188.88	1.01	549.14	40.059232	-104.891430	1,265,007.99	3,170,343.59
6,335.00	0.61	300.09	6,283.87	1.35	548.45	40.059233	-104.891433	1,265,008.33	3,170,342.90
6,429.00	0.85	291.03	6,377.87	1.85	547.37	40.059234	-104.891437	1,265,008.82	3,170,341.81
6,523.00	0.28	260.06	6,471.86	2.06	546.49	40.059235	-104.891440	1,265,009.03	3,170,340.93
6,618.00	0.26	155.30	6,566.86	1.83	546.35	40.059234	-104.891440	1,265,008.79	3,170,340.80
6,712.00	1.14	111.72	6,660.85	1.29	547.31	40.059233	-104.891437	1,265,008.26	3,170,341.76
6,807.00	1.86	116.23	6,755.82	0.26	549.57	40.059230	-104.891429	1,265,007.24	3,170,344.03
6,901.00	1.04	93.63	6,849.79	-0.47	551.79	40.059228	-104.891421	1,265,006.53	3,170,346.25
6,948.00	5.18	12.00	6,896.72	1.58	552.66	40.059233	-104.891418	1,265,008.58	3,170,347.10
6,996.00	10.57	5.98	6,944.25	8.08	553.57	40.059251	-104.891415	1,265,015.09	3,170,347.97
7,043.00	16.39	355.83	6,989.94	18.99	553.53	40.059281	-104.891415	1,265,026.00	3,170,347.86
7,090.00	22.54	352.03	7,034.24	34.54	551.80	40.059324	-104.891421	1,265,041.54	3,170,346.02
7,137.00	26.60	356.59	7,076.98	53.98	549.93	40.059377	-104.891428	1,265,060.96	3,170,344.01
7,185.00	28.97	358.26	7,119.44	76.33	548.93	40.059439	-104.891431	1,265,083.30	3,170,342.87
7,232.00	32.51	359.38	7,159.83	100.34	548.45	40.059504	-104.891433	1,265,107.31	3,170,342.22
7,279.00	35.30	0.07	7,198.84	126.55	548.33	40.059576	-104.891433	1,265,133.52	3,170,341.92



## Design Report for NRC 27N-4HZ - 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)
7,326.00	39.29	359.08	7,236.22	155.03	548.11	40.059655	-104.891434	1,265,161.99	3,170,341.51
7,374.00	44.04	359.28	7,272.07	186.92	547.65	40.059742	-104.891436	1,265,193.88	3,170,340.83
7,421.00	48.62	359.29	7,304.51	220.91	547.23	40.059835	-104.891437	1,265,227.86	3,170,340.18
7,468.00	51.44	359.93	7,334.70	256.92	546.99	40.059934	-104.891438	1,265,263.87	3,170,339.69
7,515.00	55.19	359.81	7,362.77	294.61	546.90	40.060038	-104.891438	1,265,301.55	3,170,339.35
7,563.00	59.71	359.10	7,388.59	335.05	546.51	40.060149	-104.891440	1,265,342.00	3,170,338.68
7,610.00	65.11	358.19	7,410.35	376.68	545.52	40.060263	-104.891443	1,265,383.62	3,170,337.40
7,658.00	67.92	358.48	7,429.48	420.68	544.24	40.060384	-104.891448	1,265,427.60	3,170,335.82
7,705.00	70.71	357.35	7,446.08	464.62	542.64	40.060504	-104.891454	1,265,471.53	3,170,333.92
7,752.00	77.25	355.72	7,459.05	509.68	539.90	40.060628	-104.891463	1,265,516.57	3,170,330.87
7,799.00	82.86	356.02	7,467.16	555.84	536.57	40.060755	-104.891475	1,265,562.70	3,170,327.22
7,822.00	83.32	357.18	7,469.93	578.63	535.21	40.060817	-104.891480	1,265,585.48	3,170,325.71
7,874.00	85.54	359.58	7,474.98	630.36	533.75	40.060959	-104.891485	1,265,637.20	3,170,323.90
7,925.00	87.72	1.91	7,477.97	681.26	534.41	40.061099	-104.891483	1,265,688.10	3,170,324.21
8,019.00	88.89	1.91	7,480.75	775.16	537.54	40.061357	-104.891472	1,265,782.02	3,170,326.70
8,113.00	89.41	1.81	7,482.15	869.10	540.59	40.061615	-104.891461	1,265,875.97	3,170,329.11
8,208.00	90.09	1.85	7,482.56	964.05	543.63	40.061875	-104.891450	1,265,970.94	3,170,331.49
8,302.00	90.09	1.26	7,482.42	1,058.02	546.18	40.062133	-104.891441	1,266,064.91	3,170,333.40
8,397.00	90.22	0.13	7,482.16	1,153.01	547.33	40.062394	-104.891437	1,266,159.91	3,170,333.90
8,491.00	91.08	359.99	7,481.09	1,247.00	547.43	40.062652	-104.891437	1,266,253.90	3,170,333.36
8,586.00	91.79	359.66	7,478.71	1,341.97	547.14	40.062913	-104.891438	1,266,348.86	3,170,332.42
8,680.00	90.89	359.43	7,476.52	1,435.94	546.39	40.063171	-104.891440	1,266,442.82	3,170,331.03
8,775.00	91.88	359.25	7,474.22	1,530.91	545.30	40.063431	-104.891444	1,266,537.77	3,170,329.28
8,870.00	90.86	358.33	7,471.95	1,625.85	543.29	40.063692	-104.891451	1,266,632.70	3,170,326.63
8,964.00	90.68	357.83	7,470.68	1,719.79	540.14	40.063950	-104.891463	1,266,726.61	3,170,322.84
9,058.00	90.80	357.82	7,469.47	1,813.72	536.58	40.064208	-104.891475	1,266,820.50	3,170,318.63
9,153.00	90.22	358.15	7,468.63	1,908.65	533.24	40.064468	-104.891487	1,266,915.41	3,170,314.64
9,247.00	89.82	358.66	7,468.59	2,002.62	530.62	40.064726	-104.891497	1,267,009.35	3,170,311.38
9,341.00	88.27	359.03	7,470.16	2,096.58	528.73	40.064984	-104.891503	1,267,103.30	3,170,308.84
9,432.00	88.61	358.86	7,472.64	2,187.53	527.05	40.065234	-104.891509	1,267,194.23	3,170,306.55
9,525.00	89.29	358.77	7,474.34	2,280.50	525.13	40.065489	-104.891516	1,267,287.18	3,170,303.99
9,616.00	90.03	358.45	7,474.88	2,371.47	522.92	40.065739	-104.891524	1,267,378.13	3,170,301.16
9,710.00	88.06	359.56	7,476.45	2,465.43	521.29	40.065997	-104.891530	1,267,472.08	3,170,298.88
9,803.00	88.58	359.42	7,479.17	2,558.39	520.46	40.066252	-104.891533	1,267,565.02	3,170,297.42
9,894.00	89.26	358.92	7,480.89	2,649.36	519.14	40.066502	-104.891537	1,267,655.98	3,170,295.48
9,986.00	89.91	358.67	7,481.56	2,741.34	517.21	40.066754	-104.891544	1,267,747.94	3,170,292.91
10,078.00	88.49	359.30	7,482.84	2,833.31	515.58	40.067007	-104.891550	1,267,839.89	3,170,290.66
10,171.00	88.92	358.97	7,484.94	2,926.28	514.17	40.067262	-104.891555	1,267,932.84	3,170,288.62
10,264.00	89.14	358.67	7,486.52	3,019.25	512.26	40.067517	-104.891562	1,268,025.79	3,170,286.07
10,356.00	90.06	358.20	7,487.16	3,111.21	509.75	40.067770	-104.891571	1,268,117.73	3,170,282.92
10,448.00	90.77	358.66	7,486.49	3,203.17	507.23	40.068022	-104.891580	1,268,209.67	3,170,279.77
10,540.00	89.57	358.95	7,486.22	3,295.15	505.31	40.068274	-104.891587	1,268,301.63	3,170,277.23



## Design Report for NRC 27N-4HZ - 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)
10,633.00	90.52	358.81	7,486.15	3,388.13	503.49	40.068530	-104.891593	1,268,394.59	3,170,274.77
10,724.00	90.59	359.42	7,485.26	3,479.11	502.08	40.068779	-104.891598	1,268,485.56	3,170,272.75
10,816.00	90.31	359.07	7,484.54	3,571.10	500.87	40.069032	-104.891603	1,268,577.54	3,170,270.90
10,907.00	91.08	358.84	7,483.44	3,662.08	499.21	40.069282	-104.891609	1,268,668.50	3,170,268.62
11,000.00	90.25	358.73	7,482.36	3,755.05	497.24	40.069537	-104.891616	1,268,761.45	3,170,266.01
11,094.00	91.14	358.30	7,481.22	3,849.01	494.81	40.069795	-104.891624	1,268,855.39	3,170,262.94
11,185.00	91.76	359.01	7,478.92	3,939.96	492.67	40.070044	-104.891632	1,268,946.31	3,170,260.18
11,277.00	91.51	359.65	7,476.29	4,031.91	491.59	40.070297	-104.891636	1,269,038.26	3,170,258.47
11,369.00	91.17	0.19	7,474.14	4,123.89	491.47	40.070549	-104.891636	1,269,130.22	3,170,257.72
11,461.00	90.74	1.20	7,472.61	4,215.87	492.58	40.070802	-104.891632	1,269,222.21	3,170,258.20
11,553.00	90.55	1.76	7,471.57	4,307.83	494.96	40.071054	-104.891624	1,269,314.18	3,170,259.95
11,644.00	90.93	1.84	7,470.40	4,398.78	497.82	40.071304	-104.891614	1,269,405.14	3,170,262.19
11,736.00	89.88	1.79	7,469.74	4,490.73	500.73	40.071556	-104.891603	1,269,497.10	3,170,264.47
11,828.00	90.15	3.06	7,469.72	4,582.64	504.62	40.071809	-104.891589	1,269,589.04	3,170,267.73
11,920.00	88.83	1.85	7,470.54	4,674.55	508.56	40.072061	-104.891575	1,269,680.97	3,170,271.05
12,011.00	87.54	1.46	7,473.42	4,765.47	511.19	40.072311	-104.891566	1,269,771.90	3,170,273.05
12,106.00	87.50	1.23	7,477.53	4,860.35	513.42	40.072571	-104.891558	1,269,866.79	3,170,274.63
12,200.00	86.89	0.87	7,482.13	4,954.22	515.14	40.072829	-104.891552	1,269,960.67	3,170,275.71
12,295.00	86.55	0.15	7,487.57	5,049.06	515.98	40.073089	-104.891549	1,270,055.51	3,170,275.90
12,389.00	86.08	358.10	7,493.61	5,142.85	514.55	40.073346	-104.891554	1,270,149.28	3,170,273.83
12,484.00	86.14	357.85	7,500.06	5,237.57	511.20	40.073607	-104.891566	1,270,243.98	3,170,269.83
12,578.00	87.13	358.96	7,505.57	5,331.37	508.59	40.073864	-104.891575	1,270,337.75	3,170,266.58
12,673.00	88.40	359.09	7,509.28	5,426.28	506.97	40.074125	-104.891581	1,270,432.65	3,170,264.32
12,768.00	88.46	358.14	7,511.88	5,521.22	504.68	40.074385	-104.891589	1,270,527.56	3,170,261.37
12,863.00	89.60	358.56	7,513.49	5,616.16	501.94	40.074646	-104.891599	1,270,622.48	3,170,257.99
12,958.00	89.54	358.63	7,514.20	5,711.13	499.62	40.074906	-104.891607	1,270,717.43	3,170,255.01
13,053.00	90.03	358.61	7,514.56	5,806.10	497.33	40.075167	-104.891615	1,270,812.38	3,170,252.07
13,147.00	89.78	357.98	7,514.71	5,900.06	494.53	40.075425	-104.891625	1,270,906.31	3,170,248.63
13,242.00	89.78	356.85	7,515.08	5,994.96	490.25	40.075686	-104.891640	1,271,001.18	3,170,243.70
13,337.00	89.32	356.02	7,515.82	6,089.78	484.34	40.075946	-104.891662	1,271,095.94	3,170,237.14
13,432.00	89.63	355.87	7,516.70	6,184.53	477.62	40.076206	-104.891686	1,271,190.65	3,170,229.78
13,527.00	90.06	355.85	7,516.95	6,279.29	470.76	40.076466	-104.891710	1,271,285.35	3,170,222.27
13,621.00	91.60	356.26	7,515.59	6,373.05	464.30	40.076723	-104.891733	1,271,379.06	3,170,215.16
13,716.00	91.45	357.47	7,513.06	6,467.87	459.10	40.076984	-104.891752	1,271,473.84	3,170,209.32
13,811.00	90.93	358.02	7,511.09	6,562.78	455.37	40.077244	-104.891765	1,271,568.72	3,170,204.94
13,905.00	90.06	357.36	7,510.28	6,656.70	451.58	40.077502	-104.891779	1,271,662.60	3,170,200.51
14,000.00	91.05	358.02	7,509.36	6,751.61	447.75	40.077763	-104.891792	1,271,757.49	3,170,196.03
14,095.00	90.28	358.07	7,508.25	6,846.55	444.51	40.078023	-104.891804	1,271,852.40	3,170,192.14
14,189.00	90.80	357.89	7,507.37	6,940.49	441.20	40.078281	-104.891816	1,271,946.31	3,170,188.18
14,284.00	91.36	1.02	7,505.58	7,035.45	440.29	40.078542	-104.891819	1,272,041.26	3,170,186.63
14,379.00	90.83	1.46	7,503.76	7,130.41	442.35	40.078802	-104.891812	1,272,136.23	3,170,188.04
14,474.00	90.06	1.38	7,503.02	7,225.38	444.70	40.079063	-104.891803	1,272,231.21	3,170,189.74

## Design Report for NRC 27N-4HZ - 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)
14,569.00	91.08	0.71	7,502.08	7,320.36	446.43	40.079324	-104.891797	1,272,326.19	3,170,190.82
14,664.00	90.22	1.56	7,501.00	7,415.33	448.32	40.079585	-104.891790	1,272,421.17	3,170,192.05
14,758.00	91.30	0.53	7,499.75	7,509.31	450.03	40.079843	-104.891784	1,272,515.15	3,170,193.13
14,853.00	90.89	0.67	7,497.94	7,604.28	451.02	40.080103	-104.891781	1,272,610.13	3,170,193.47
14,948.00	89.63	359.98	7,497.51	7,699.28	451.56	40.080364	-104.891779	1,272,705.12	3,170,193.36
15,043.00	89.26	1.03	7,498.43	7,794.27	452.40	40.080625	-104.891776	1,272,800.11	3,170,193.55
15,137.00	90.62	1.79	7,498.53	7,888.24	454.71	40.080883	-104.891767	1,272,894.09	3,170,195.22
15,232.00	90.90	0.97	7,497.27	7,983.20	457.00	40.081143	-104.891759	1,272,989.06	3,170,196.85
15,327.00	89.75	0.03	7,496.73	8,078.19	457.83	40.081404	-104.891756	1,273,084.06	3,170,197.03
15,422.00	91.23	359.59	7,495.92	8,173.19	457.51	40.081665	-104.891757	1,273,179.04	3,170,196.07
15,517.00	91.02	358.99	7,494.05	8,268.16	456.34	40.081926	-104.891761	1,273,274.00	3,170,194.24
15,611.00	90.46	358.82	7,492.84	8,362.13	454.54	40.082184	-104.891768	1,273,367.96	3,170,191.80
15,706.00	90.12	359.26	7,492.36	8,457.12	452.95	40.082444	-104.891774	1,273,462.93	3,170,189.56
15,801.00	89.26	359.21	7,492.87	8,552.11	451.68	40.082705	-104.891778	1,273,557.90	3,170,187.64
15,895.00	88.86	0.19	7,494.41	8,646.09	451.19	40.082963	-104.891780	1,273,651.88	3,170,186.51
15,990.00	89.57	0.25	7,495.71	8,741.08	451.55	40.083224	-104.891779	1,273,746.86	3,170,186.22
16,084.00	89.66	0.20	7,496.34	8,835.08	451.92	40.083482	-104.891777	1,273,840.86	3,170,185.95
16,179.00	90.06	0.70	7,496.58	8,930.08	452.67	40.083743	-104.891775	1,273,935.85	3,170,186.05
16,273.00	90.86	359.76	7,495.82	9,024.07	453.05	40.084001	-104.891773	1,274,029.84	3,170,185.78
16,368.00	89.63	358.15	7,495.42	9,119.05	451.31	40.084261	-104.891779	1,274,124.81	3,170,183.40
16,462.00	91.88	358.36	7,494.18	9,212.99	448.45	40.084519	-104.891790	1,274,218.72	3,170,179.89
16,556.00	91.67	358.60	7,491.27	9,306.91	445.96	40.084777	-104.891799	1,274,312.62	3,170,176.76
16,651.00	91.54	358.75	7,488.60	9,401.85	443.76	40.085038	-104.891806	1,274,407.54	3,170,173.91
16,745.00	90.65	359.04	7,486.81	9,495.81	441.95	40.085296	-104.891813	1,274,501.48	3,170,171.46
16,839.00	90.59	359.05	7,485.79	9,589.80	440.39	40.085554	-104.891818	1,274,595.45	3,170,169.25
16,933.00	90.71	359.19	7,484.72	9,683.78	438.94	40.085812	-104.891824	1,274,689.42	3,170,167.16
17,028.00	90.37	358.91	7,483.83	9,778.76	437.37	40.086072	-104.891829	1,274,784.38	3,170,164.94
17,075.00	90.37	358.91	7,483.53	9,825.75	436.47	40.086201	-104.891832	1,274,831.36	3,170,163.72

### Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,017.00	1,016.97	0.03	-4.12	Tie-On to Surface Gyros @ 1017.00ft
1,111.00	1,110.96	0.45	-4.60	First MWD Survey @ 1111.00ft
17,028.00	7,483.83	9,778.76	437.37	Final MWD Survey @ 17028.00ft
17,075.00	7,483.53	9,825.75	436.47	Str Line Proj to Bit @ 17075' MD :: 7483.53' TVD

## Design Report for NRC 27N-4HZ - Actual Surveys

### Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/_S (usft)	Origin +E/-W (usft)	Start TVD (usft)
User	No Target (Freehand)	359.32	Slot	0.00	0.00	0.00

### Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
25.00	1,017.00	Surface Gyro Surveys	NS-Gyro-MS
1,111.00	7,822.00	MWD Vertical/Build Surveys	MWD+IFR1+SC
7,925.00	17,028.00	MWD Lateral Surveys	MWD+IFR1+SC

### Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,108.00	1,107.96	9 5/8" Casing Set @ 1098.2' MD :: 1098.16' TVD	9-5/8	13-1/2
7,874.00	7,474.98	7" Casing Set @ 7863.4' MD :: 7474.11' TVD	7	8-3/4

### Design Targets

Shape	Target Name	TVD (usft)	Northing (usft)	Easting (usft)	+N/-S usft	+E/-W usft	Created	Updated
Polygon	NRC 27N-4HZ LD	0.00	1,265,003.23	3,169,794.49	0.01	0.00	3/27/2014	3/27/2014
Polygon	NRC 13-9HZ Pad_Sec. Lir	-34.00	1,264,984.56	3,167,149.12	-0.57	-2,645.53	3/2/2014	3/2/2014

### Directional Difficulty Index

Average Dogleg over Survey:	1.55 °/100usft	Maximum Dogleg over Survey:	14.31 °/100usft at 7,752.00 usft
Net Tortousity applicable to Plans:	0.87 °/100usft	Directional Difficulty Index:	6.799

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**Design Report for NRC 27N-4HZ - Actual Surveys**

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**Audit Info**

## North Reference Sheet for Sec. 9-T1N-R67W - NRC 27N-4HZ - Plan A

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

Vertical Depths are relative to RKB=25' @ 5055.60usft. Northing and Easting are relative to NRC 27N-4HZ

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: 1,265,003.23 usft N, 3,169,794.49 usft E

Geographical Coordinates of Well: 40° 03' 33.22" N, 104° 53' 36.21" W

Grid Convergence at Surface is: 0.39°

Based upon Minimum Curvature type calculations, at a Measured Depth of 17,075.00usft

the Bottom Hole Displacement is 9,835.44usft in the Direction of 2.54° (True).

Magnetic Convergence at surface is: -8.29° (23 April 2013, , BGGM2013)

