

## SPERRY-SUN DRILLING SERVICES

### CERTIFIED SURVEY WORK SHEET

<b>OPERATOR:</b>	Anadarko Petroleum Corp
<b>WELL:</b>	Johnson 2N-24HZ
<b>FIELD:</b>	Wattenberg
<b>RIG:</b>	Ensign 145
<b>LEGALS:</b>	Sec 24-T3N-R66W
<b>COUNTY:</b>	Weld
<b>STATE:</b>	Colorado
<b>CAL. METHOD:</b>	Minimum Curvature
<b>MAG. DECL. APPLIED:</b>	8.48
<b>VERTICAL SEC. DIR. :</b>	358.250

<b>SSDS Job Number :</b>	901697694
<b>Start Date of Job :</b>	20-Oct-14
<b>End Date of Job :</b>	26-Oct-14
<b>Lead Directional Driller:</b>	Daniel Dietrich
<b>Other SSDS DD's :</b>	Ryan White
<b>SSDS MWD Engineers :</b>	Aleksey Treskov
	Tam Phan

	Main Hole =====>	1st Side Track =====>	2nd Side Track =====>	3rd Side Track =====>	4th Side Track =====>
Tie On Point	913.00 Gyro	Tie On	Tie On	Tie On	Tie On
First Survey	998.00 MWD				
KOP Depth	6990.00 KOP	KOP-ST1	KOP-ST2	KOP-ST3	KOP-ST4
Last Survey Depth	13482.00 MWD	MWD	MWD	MWD	MWD
Bit Extrapolation to TD	13524.00 Projection	T.D.	T.D.	T.D.	T.D.

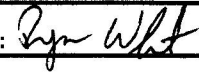
The following personnel listed below, certify the above survey information to be accurate to the their knowledge. :

Print Name : Dan Dietrich

Print Name : Ryan White

Print Name :

Sign Name : 

Sign Name : 

Sign Name :

Print Name : Aleksey Treskov

Print Name : Tam Phan

Print Name :

Sign Name :

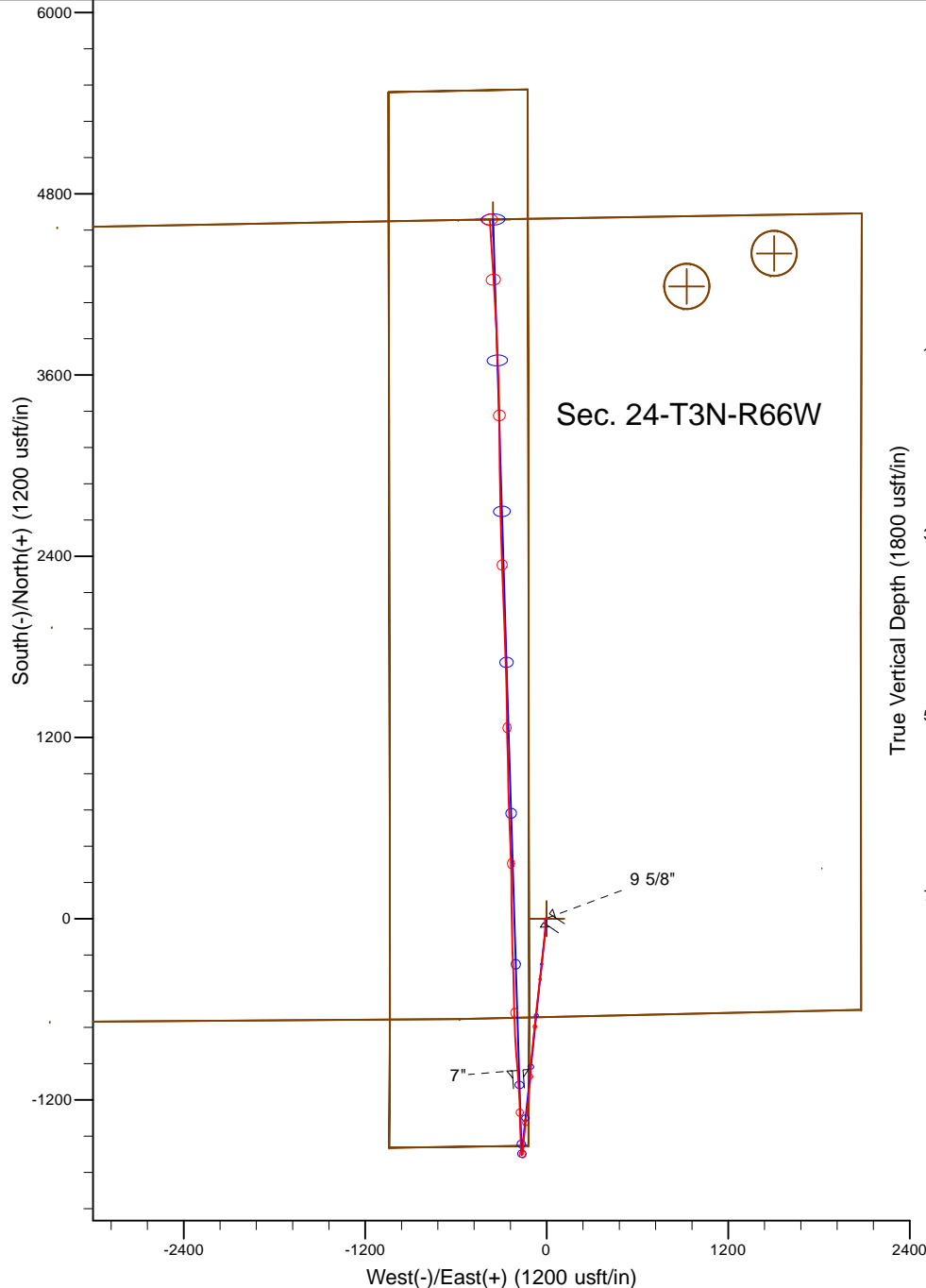
Sign Name : 

Sign Name :

**Examples of Survey Types:**

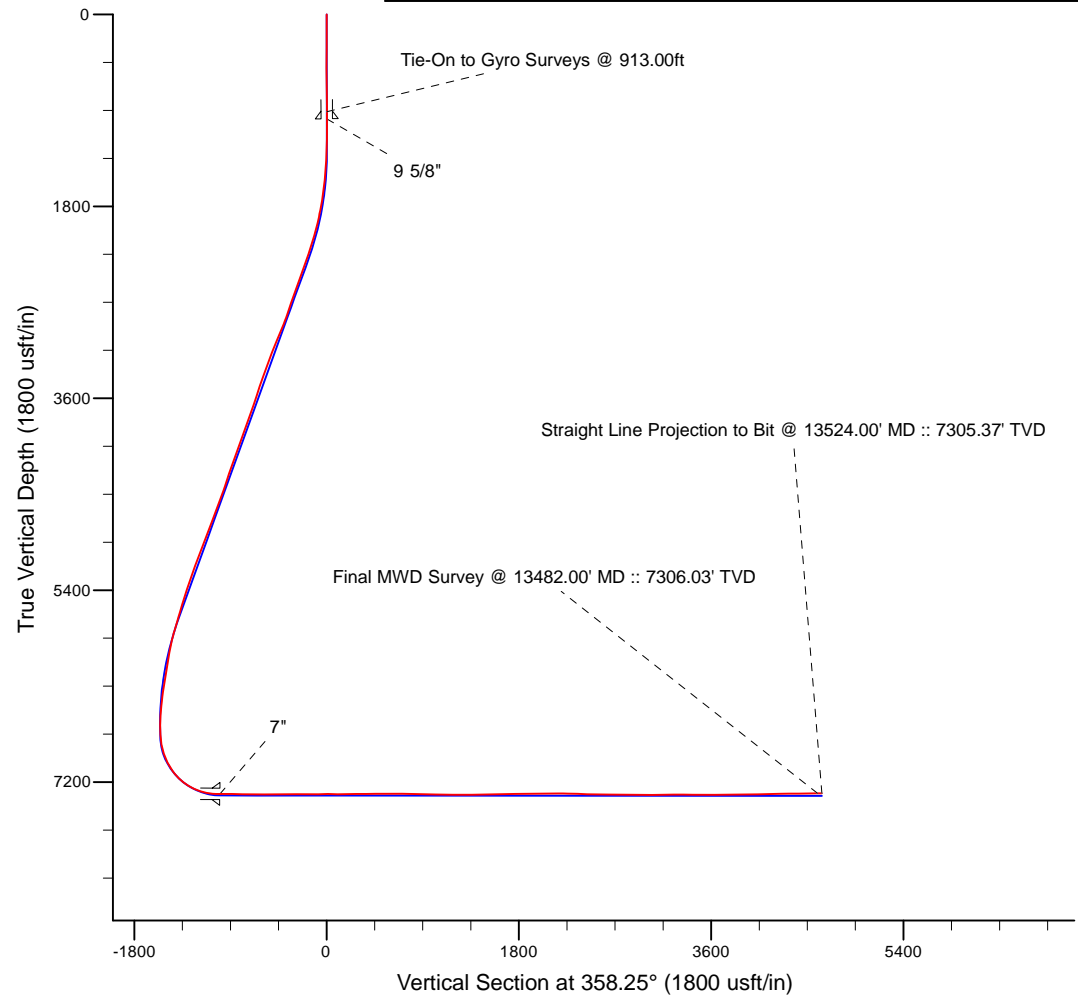
- TieOn Tie On to Surface Casing (Assumed Vertical), Tie On to existing MWD Survey (prior drilled hole)
- MWD Sperry Sun Drilling Services (SSDS) Measurement While Drilling (MWD) Survey's
- ESS Sperry Sun Drilling Services (SSDS) Electronic Survey System (ESS) Survey's
- Gyro Gyro Survey's ; Provided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

Project: Weld County, CO (NAD 83)  
 Site: Sec. 24-T3N-R66W  
 Well: Johnson 2N-24HZ  
 Wellbore: Plan A  
 Design: Actual Field Surveys



LEGEND

- ◆ Johnson 2N-24HZ, Plan A, Rev A0 V0
- Actual Field Surveys



7" Casing: ~348.52' FNL, ~2271.19' FEL  
 Lat/Long: 40.202578 N, -104.723851 E  
 State Planes - CO Northern: 1,317,590.27' N, 3,216,792.32' E  
 Location: Sec. 25-T3N-R66W

BHL: ~1.57' FNL, ~2458.87' FEL  
 Lat/Long: 40.218042 N, -104.724508 E  
 State Planes - CO Northern: 1,323,221.78' N, 3,216,559.58' E  
 Location: Sec. 24-T3N-R66W

WELL DETAILS: Johnson 2N-24HZ	
Ground Level: 5037.00	
RKB = 13' @ 5050.00usft (Ensign 145)	
Design: Actual Field Surveys (Johnson 2N-24HZ/Plan A)	
Created By: Katie Benner	Date: 12/15/2014
Reviewed: _____	Date: _____

# Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 24-T3N-R66W

Johnson 2N-24HZ

API: 05-123-39460 :: Job #: 901697694

Plan A

Design: Actual Field Surveys

## Sperry Drilling Services

### Standard Report

16 December, 2014

Surface UWI : API: 05-123-39460 :: Job #: 901697694

Well Coordinates: 1,318,597.02 N, 3,216,975.34 E (40° 12' 19.21" N, 104° 43' 23.39" W)

Ground Level: 5,037.00 usft

Local Coordinate Origin:

Centered on Well Johnson 2N-24HZ

Viewing Datum:

RKB = 13' @ 5050.00usft (Ensign 145)

TVDs to System:

N

North Reference:

True

Unit System:

Dec-Deg - API - US Survey Feet - Custom

Geodetic Scale Factor Applied

Version: 5000.1 Build: 70

**HALLIBURTON**

**Design Report for Johnson 2N-24HZ - Actual 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
<b>JOHNSON 2N-24HZ_SHL - JOHNSON 2N-24HZ_SEC - JOHNSON 2N-24HZ_LD</b>							
13.00	0.00	0.00	13.00	0.00	0.00	0.00	0.00
24.01	0.05	309.67	24.01	0.00	0.00	0.00	0.41
<b>HPD PLATTEVILLE 2_150 Foot Buffer</b>							
30.01	0.07	309.67	30.01	0.01	-0.01	0.01	0.41
<b>HPD PLATTEVILLE 1_150 Foot Buffer</b>							
113.00	0.41	309.67	113.00	0.23	-0.28	0.24	0.41
213.00	0.33	305.17	213.00	0.62	-0.79	0.65	0.09
313.00	0.21	234.02	313.00	0.68	-1.17	0.72	0.33
413.00	0.13	11.97	413.00	0.68	-1.29	0.72	0.32
513.00	0.30	339.94	513.00	1.04	-1.36	1.08	0.20
613.00	0.25	46.63	612.99	1.44	-1.29	1.48	0.31
713.00	0.20	29.64	712.99	1.74	-1.05	1.77	0.08
813.00	0.10	51.65	812.99	1.94	-0.89	1.97	0.11
913.00	0.32	351.74	912.99	2.27	-0.86	2.30	0.28
<b>Tie-On to Gyro Surveys @ 913.00ft</b>							
979.80	0.58	303.88	979.79	2.65	-1.17	2.68	0.65
<b>9 5/8"</b>							
998.00	0.68	298.42	997.99	2.75	-1.34	2.79	0.65
1,188.00	1.63	263.18	1,187.95	2.97	-5.02	3.12	0.60
1,282.00	2.82	228.37	1,281.88	1.27	-8.07	1.52	1.86
1,469.00	4.57	180.80	1,468.53	-9.24	-11.62	-8.88	1.81
1,562.00	7.00	174.27	1,561.05	-18.58	-11.10	-18.23	2.70
1,656.00	7.23	174.48	1,654.32	-30.17	-9.96	-29.85	0.25
1,750.00	9.16	177.24	1,747.36	-43.53	-9.03	-43.24	2.09
1,843.00	10.57	178.24	1,838.98	-59.45	-8.41	-59.17	1.53
1,937.00	12.67	181.67	1,931.05	-78.38	-8.45	-78.08	2.35
2,030.00	14.74	186.11	2,021.40	-100.34	-10.01	-99.99	2.50
2,124.00	16.12	187.06	2,112.01	-125.18	-12.88	-124.73	1.49
2,217.00	18.51	186.14	2,200.79	-152.67	-16.05	-152.11	2.59
2,311.00	19.70	186.38	2,289.61	-183.26	-19.41	-182.58	1.27
2,405.00	20.63	185.90	2,377.85	-215.47	-22.87	-214.68	1.00
2,498.00	19.39	184.46	2,465.23	-247.16	-25.75	-246.26	1.43
2,591.00	20.33	187.17	2,552.70	-278.59	-28.97	-277.57	1.41
2,685.00	18.06	184.80	2,641.47	-309.31	-32.23	-308.18	2.55
2,779.00	19.34	185.21	2,730.51	-339.33	-34.86	-338.11	1.37
2,872.00	19.92	187.92	2,818.10	-370.36	-38.44	-369.01	1.16
2,962.00	22.39	187.90	2,902.03	-402.53	-42.91	-401.03	2.74
3,052.00	22.29	187.72	2,985.28	-436.42	-47.56	-434.77	0.13
3,142.00	22.51	187.68	3,068.49	-470.41	-52.16	-468.60	0.25
3,232.00	22.24	187.74	3,151.71	-504.36	-56.75	-502.39	0.30
3,322.00	20.00	186.66	3,235.66	-536.53	-60.83	-534.42	2.53
3,412.00	20.72	185.65	3,320.04	-567.66	-64.18	-565.43	0.89
3,502.00	19.16	184.40	3,404.64	-598.23	-66.88	-595.91	1.80
3,592.00	18.69	185.19	3,489.77	-627.32	-69.32	-624.91	0.59
3,682.00	18.41	186.44	3,575.10	-655.80	-72.22	-653.29	0.54
3,772.00	19.21	184.72	3,660.29	-684.68	-75.03	-682.07	1.08
3,862.00	19.63	186.20	3,745.17	-714.46	-77.88	-711.75	0.72
3,952.00	19.69	188.28	3,829.93	-744.50	-81.70	-741.66	0.78

**Design Report for Johnson 2N-24HZ - Actual Field Surveys**

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
4,042.00	20.04	186.27	3,914.57	-774.83	-85.57	-771.86	0.85
4,132.00	20.65	185.20	3,998.96	-805.96	-88.69	-802.88	0.79
4,222.00	19.30	184.84	4,083.54	-836.59	-91.38	-833.41	1.51
4,402.00	20.07	187.51	4,253.02	-896.85	-97.93	-893.44	0.66
4,492.00	17.90	187.34	4,338.12	-925.88	-101.72	-922.34	2.41
4,582.00	18.15	186.71	4,423.71	-953.52	-105.12	-949.87	0.35
4,672.00	19.44	182.83	4,508.91	-982.41	-107.50	-978.66	2.00
4,762.00	20.31	179.17	4,593.55	-1,012.98	-108.01	-1,009.21	1.69
4,852.00	21.01	180.95	4,677.76	-1,044.73	-108.05	-1,040.95	1.04
4,942.00	22.56	184.97	4,761.34	-1,078.07	-109.82	-1,074.21	2.39
5,032.00	22.08	185.89	4,844.59	-1,112.09	-113.05	-1,108.12	0.66
5,122.00	20.90	185.83	4,928.34	-1,144.89	-116.41	-1,140.80	1.31
5,212.00	19.12	184.17	5,012.90	-1,175.57	-119.12	-1,171.38	2.08
5,302.00	19.89	183.70	5,097.73	-1,205.54	-121.18	-1,201.28	0.87
5,391.00	21.05	187.80	5,181.12	-1,236.49	-124.32	-1,232.12	2.07
5,481.00	20.16	188.11	5,265.36	-1,267.86	-128.70	-1,263.34	1.00
5,571.00	19.12	187.84	5,350.12	-1,297.82	-132.90	-1,293.15	1.16
5,661.00	16.34	186.15	5,435.84	-1,325.01	-136.27	-1,320.23	3.14
5,751.00	17.26	187.47	5,522.00	-1,350.84	-139.36	-1,345.95	1.11
5,841.00	17.61	185.53	5,607.86	-1,377.63	-142.41	-1,372.63	0.75
5,931.00	16.25	185.57	5,693.96	-1,403.71	-144.95	-1,398.63	1.51
6,021.00	16.53	187.03	5,780.30	-1,428.95	-147.73	-1,423.77	0.55
6,110.00	13.13	185.35	5,866.33	-1,451.59	-150.23	-1,446.32	3.85
6,290.00	9.31	185.61	6,042.85	-1,486.45	-153.56	-1,481.06	2.12
6,380.00	9.23	188.89	6,131.68	-1,500.82	-155.39	-1,495.38	0.59
6,470.00	9.22	181.60	6,220.52	-1,515.16	-156.70	-1,509.67	1.30
6,560.00	8.71	179.99	6,309.42	-1,529.18	-156.90	-1,523.68	0.63
6,650.00	7.39	179.79	6,398.53	-1,541.79	-156.88	-1,536.28	1.47
6,830.00	3.96	193.52	6,577.63	-1,559.41	-158.29	-1,553.85	2.04
6,920.00	1.00	237.84	6,667.54	-1,562.85	-159.68	-1,557.25	3.69
7,010.00	3.64	331.05	6,757.48	-1,560.77	-161.73	-1,555.10	4.25
7,052.00	6.67	339.19	6,799.30	-1,557.32	-163.24	-1,551.61	7.40
7,100.00	9.89	341.78	6,846.80	-1,550.80	-165.52	-1,545.02	6.75
7,190.00	18.30	352.15	6,934.02	-1,529.42	-169.88	-1,523.52	9.72
7,280.00	26.16	359.57	7,017.28	-1,495.52	-171.96	-1,489.57	9.26
7,371.00	36.18	0.33	7,095.05	-1,448.48	-171.96	-1,442.56	11.02
7,461.00	44.94	356.85	7,163.36	-1,390.06	-173.55	-1,384.11	10.05
7,551.00	55.38	357.57	7,220.94	-1,321.13	-176.88	-1,315.11	11.62
7,595.00	60.38	359.98	7,244.33	-1,283.89	-177.65	-1,277.87	12.27
7,641.00	65.76	359.84	7,265.16	-1,242.89	-177.72	-1,236.89	11.70
7,686.00	70.35	356.87	7,281.97	-1,201.19	-178.94	-1,195.16	11.89
7,731.00	75.27	357.07	7,295.27	-1,158.27	-181.21	-1,152.20	10.94
7,776.00	79.94	356.15	7,304.93	-1,114.41	-183.81	-1,108.28	10.57
7,849.00	88.49	355.58	7,312.28	-1,042.04	-189.04	-1,035.78	11.74
7,886.00	89.57	355.74	7,312.90	-1,005.15	-191.84	-998.82	2.97
<b>7"</b>							
7,908.00	90.22	355.84	7,312.94	-983.21	-193.45	-976.85	2.97
7,998.00	89.32	355.18	7,313.30	-893.49	-200.50	-886.95	1.24
8,088.00	88.98	356.90	7,314.64	-803.72	-206.71	-797.03	1.95
8,178.00	90.00	357.99	7,315.44	-713.81	-210.73	-707.05	1.66
8,268.00	90.15	357.74	7,315.32	-623.88	-214.08	-617.05	0.32

**Design Report for Johnson 2N-24HZ - Actual Field Surveys**

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
8,358.00	90.25	359.41	7,315.01	-533.91	-216.32	-527.05	1.86
8,448.00	90.15	358.47	7,314.69	-443.92	-217.98	-437.06	1.05
8,538.00	90.06	358.53	7,314.53	-353.96	-220.34	-347.06	0.12
8,628.00	89.94	357.31	7,314.53	-264.02	-223.60	-257.07	1.36
8,718.00	90.31	358.70	7,314.33	-174.07	-226.74	-167.07	1.60
8,808.00	90.37	357.96	7,313.80	-84.11	-229.36	-77.07	0.82
8,898.00	90.15	359.79	7,313.39	5.86	-231.13	12.92	2.05
8,988.00	89.78	359.57	7,313.44	95.86	-231.63	102.89	0.48
9,167.00	90.37	358.99	7,313.21	274.85	-233.88	281.86	0.46
9,257.00	90.59	358.46	7,312.46	364.82	-235.88	371.85	0.64
9,347.00	90.59	358.04	7,311.53	454.77	-238.63	461.85	0.47
9,437.00	90.77	357.86	7,310.46	544.71	-241.85	551.84	0.28
9,527.00	90.00	357.39	7,309.86	634.63	-245.58	641.83	1.00
9,617.00	88.52	357.67	7,311.02	724.54	-249.46	731.82	1.67
9,708.00	88.70	359.15	7,313.23	815.47	-251.98	822.79	1.64
9,798.00	89.05	358.81	7,314.99	905.44	-253.58	912.76	0.54
9,888.00	89.07	358.66	7,316.47	995.40	-255.57	1,002.75	0.17
9,978.00	89.20	358.43	7,317.83	1,085.37	-257.85	1,092.73	0.29
10,067.00	89.01	358.35	7,319.22	1,174.32	-260.36	1,181.72	0.23
10,157.00	90.34	359.78	7,319.73	1,264.30	-261.82	1,271.71	2.17
10,247.00	90.43	359.24	7,319.12	1,354.30	-262.59	1,361.68	0.61
10,337.00	91.17	359.24	7,317.87	1,444.28	-263.79	1,451.66	0.82
10,426.00	91.14	358.56	7,316.07	1,533.24	-265.50	1,540.64	0.76
10,516.00	91.42	358.15	7,314.06	1,623.18	-268.08	1,630.61	0.55
10,696.00	90.65	358.01	7,310.81	1,803.05	-274.11	1,810.58	0.43
10,786.00	90.46	357.81	7,309.94	1,892.99	-277.39	1,900.58	0.31
10,876.00	90.83	357.99	7,308.93	1,982.92	-280.69	1,990.57	0.46
10,966.00	90.89	357.09	7,307.58	2,072.83	-284.55	2,080.55	1.00
11,146.00	88.24	358.58	7,308.94	2,252.67	-291.35	2,260.52	1.69
11,236.00	88.46	357.96	7,311.53	2,342.59	-294.07	2,350.48	0.73
11,326.00	88.30	357.64	7,314.08	2,432.49	-297.52	2,440.44	0.40
11,416.00	89.07	358.63	7,316.14	2,522.42	-300.45	2,530.42	1.39
11,506.00	89.14	358.20	7,317.55	2,612.37	-302.94	2,620.41	0.48
11,596.00	89.72	359.18	7,318.44	2,702.34	-304.99	2,710.40	1.27
11,776.00	89.54	358.72	7,319.61	2,882.31	-308.29	2,890.38	0.27
11,866.00	88.74	359.30	7,320.96	2,972.28	-309.85	2,980.36	1.10
11,956.00	90.37	359.36	7,321.66	3,062.27	-310.90	3,070.34	1.81
12,046.00	91.85	359.35	7,319.91	3,152.25	-311.91	3,160.30	1.64
12,136.00	90.34	0.14	7,318.19	3,242.23	-312.31	3,250.25	1.89
12,226.00	89.54	359.44	7,318.29	3,332.22	-312.64	3,340.22	1.18
12,316.00	89.29	358.78	7,319.21	3,422.21	-314.04	3,430.20	0.78
12,406.00	89.72	358.52	7,319.98	3,512.18	-316.16	3,520.20	0.56
12,496.00	90.34	358.23	7,319.94	3,602.14	-318.71	3,610.20	0.76
12,586.00	90.06	357.73	7,319.62	3,692.09	-321.88	3,700.19	0.64
12,676.00	90.68	357.15	7,319.04	3,781.99	-325.90	3,790.18	0.94
12,766.00	91.66	356.94	7,317.20	3,871.85	-330.54	3,880.14	1.11
12,857.00	90.59	356.91	7,315.42	3,962.70	-335.42	3,971.10	1.18
12,946.00	90.83	356.35	7,314.31	4,051.54	-340.66	4,060.06	0.88
13,036.00	91.14	355.87	7,312.77	4,141.32	-346.76	4,149.98	0.63
13,126.00	91.20	356.78	7,310.93	4,231.12	-352.53	4,239.91	1.01
13,216.00	90.62	357.48	7,309.50	4,320.99	-357.03	4,329.88	1.01

**Design Report for Johnson 2N-24HZ - Actual Field Surveys**

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
13,306.00	90.59	356.60	7,308.55	4,410.87	-361.68	4,419.85	0.98
13,396.00	90.90	356.12	7,307.38	4,500.68	-367.39	4,509.80	0.63
13,482.00	90.90	356.67	7,306.03	4,586.50	-372.80	4,595.74	0.64
<b>Final MWD Survey @ 13482.00' MD :: 7306.03' TVD</b>							
13,523.55	90.90	356.67	7,305.38	4,627.97	-375.21	4,637.27	0.00
<b>JOHNSON 2N-24HZ_BHL</b>							
13,524.00	90.90	356.67	7,305.37	4,628.42	-375.24	4,637.72	0.00
<b>Straight Line Projection to Bit @ 13524.00' MD :: 7305.37' TVD</b>							

**Design Annotations**

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
913.00	912.99	2.27	-0.86	Tie-On to Gyro Surveys @ 913.00ft
13,482.00	7,306.03	4,586.50	-372.80	Final MWD Survey @ 13482.00' MD :: 7306.03' TVD
13,524.00	7,305.37	4,628.42	-375.24	Straight Line Projection to Bit @ 13524.00' MD :: 7305.37' TVD

**Vertical Section Information**

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
User	No Target (Freehand)	358.25	Slot	0.00	0.00	0.00

**Survey tool program**

From (usft)	To (usft)	Survey/Plan	Survey Tool
13.00	913.00	MS Energy Gyro Surveys	NS-GYRO-MS
998.00	7,849.00	MWD Vertical/Build Surveys	MWD+IFR1+SC
7,908.00	13,524.00	MWD Lateral Surveys	MWD+IFR1+SC

**Casing Details**

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
979.80	979.79	9 5/8"	9-5/8	13-1/2
7,886.00	7,312.90	7"	7	8-3/4

**Design Report for Johnson 2N-24HZ - Actual 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
JOHNSON 2N-24HZ_I	0.00	0.00	0.00	0.01	0.00	1,318,597.03	3,216,975.34	40.205337	-104.723164
- 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	4,618.08	-1,044.37	1,323,205.59	3,215,890.60	
Point 2				0.00	5,473.52	-1,045.56	1,324,060.95	3,215,881.91	
Point 3				0.00	5,491.52	-125.55	1,324,087.01	3,216,801.69	
Point 4				0.00	4,634.82	-124.36	1,323,230.39	3,216,810.39	
Point 5				0.00	3,312.56	-122.09	1,321,908.25	3,216,824.24	
Point 6				0.00	1,990.07	-119.97	1,320,585.89	3,216,837.94	
Point 7				0.00	667.32	-117.77	1,319,263.27	3,216,851.73	
Point 8				0.00	-655.39	-115.57	1,317,940.68	3,216,865.52	
Point 9				0.00	-1,503.71	-120.35	1,317,092.39	3,216,868.17	
Point 10				0.00	-1,516.43	-1,040.47	1,317,071.61	3,215,948.23	
Point 11				0.00	-668.42	-1,035.67	1,317,919.59	3,215,945.61	
Point 12				0.00	651.98	-1,037.83	1,319,239.87	3,215,931.88	
Point 13				0.00	1,972.32	-1,039.98	1,320,560.08	3,215,918.16	
Point 14				0.00	3,295.35	-1,042.10	1,321,882.99	3,215,904.45	
JOHNSON 2N-24HZ_I	0.00	0.00	0.00	0.01	0.00	1,318,597.03	3,216,975.34	40.205337	-104.723164
- actual wellpath misses target center by 0.01usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Point									
JOHNSON 2N-24HZ_I	0.00	0.00	0.00	0.01	0.00	1,318,597.03	3,216,975.34	40.205337	-104.723164
- 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	4,577.96	-3,237.02	1,323,146.26	3,213,698.48	
Point 2				0.00	4,626.53	-584.44	1,323,218.07	3,216,350.42	
Point 3				0.00	4,670.42	2,083.86	1,323,285.33	3,219,018.11	
Point 4				0.00	2,031.04	2,076.56	1,320,646.10	3,219,033.94	
Point 5				0.00	-604.08	2,079.08	1,318,011.21	3,219,059.54	
Point 6				0.00	-665.41	-575.72	1,317,926.63	3,216,405.49	
Point 7				0.00	-683.47	-3,286.46	1,317,884.83	3,213,695.13	
Point 8				0.00	1,930.35	-3,272.73	1,320,498.56	3,213,685.96	
HPD PLATTEVILLE 2_	0.00	0.00	23.00	4,405.55	1,503.60	1,323,015.39	3,218,440.22	40.217430	-104.717780
- actual wellpath misses target center by 4655.07usft at 24.66usft MD (24.66 TVD, 0.00 N, 0.00 E)									
- Circle (radius 150.00)									
HPD PLATTEVILLE 1_	0.00	0.00	23.00	4,186.94	926.35	1,322,791.74	3,217,864.94	40.216830	-104.719847
- actual wellpath misses target center by 4288.19usft at 24.96usft MD (24.96 TVD, 0.00 N, 0.00 E)									
- Circle (radius 150.00)									
JOHNSON 2N-24HZ_I	0.00	0.00	7,331.00	4,629.55	-354.95	1,323,223.09	3,216,579.86	40.218045	-104.724435
- actual wellpath misses target center by 32.70usft at 13523.55usft MD (7305.38 TVD, 4627.97 N, -375.21 E)									
- Point									

**Directional Difficulty Index**

Average Dogleg over Survey:	1.73 °/100usft	Maximum Dogleg over Survey:	12.27 °/100usft at 7,595.00 usft
Net Tortosity applicable to Plans:	0.75 °/100usft	Directional Difficulty Index:	6.527

**Audit Info**

**North Reference Sheet for Sec. 24-T3N-R66W - Johnson 2N-24HZ - 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 = 13' @ 5050.00usft (Ensign 145). Northing and Easting are relative to Johnson 2N-24HZ

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: 0.99995716

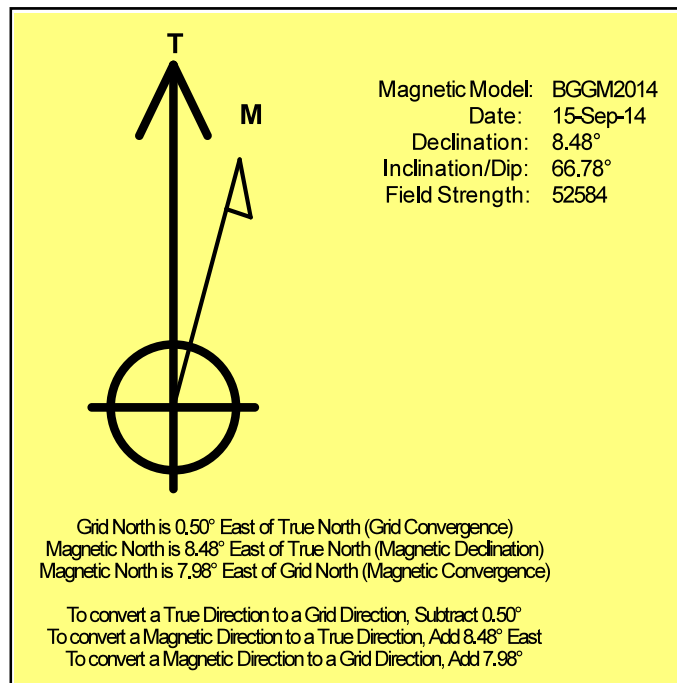
Grid Coordinates of Well: 1,318,597.02 usft N, 3,216,975.34 usft E

Geographical Coordinates of Well: 40° 12' 19.21" N, 104° 43' 23.39" W

Grid Convergence at Surface is: 0.50°

Based upon Minimum Curvature type calculations, at a Measured Depth of 13,524.00usft the Bottom Hole Displacement is 4,643.61usft in the Direction of 355.37° ( True).

Magnetic Convergence at surface is: -7.98° (15 September 2014, , BGGM2014)



# Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 24-T3N-R66W

Johnson 2N-24HZ

API: 05-123-39460 :: Job #: 901697694

Plan A

Design: Actual Field Surveys

## Sperry Drilling Services

### Geodetic Report

16 December, 2014

Well Coordinates: 1,318,597.02 N, 3,216,975.34 E (40° 12' 19.21" N, 104° 43' 23.39" W)

Ground Level: 5,037.00 usft

Local Coordinate Origin:

Centered on Well Johnson 2N-24HZ

Viewing Datum:

RKB = 13' @ 5050.00usft (Ensign 145)

TVDs to System:

N

North Reference:

True

Unit System:

Dec-Deg - API - US Survey Feet - Custom

Geodetic Scale Factor Applied

Version: 5000.1 Build: 70

**HALLIBURTON**

**Design Report for Johnson 2N-24HZ - Actual Field 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	40.205337	-104.723164	1,318,597.02	3,216,975.34
13.00	0.00	0.00	13.00	0.00	0.00	40.205337	-104.723164	1,318,597.02	3,216,975.34
24.01	0.05	309.67	24.01	0.00	0.00	40.205337	-104.723164	1,318,597.03	3,216,975.33
30.01	0.07	309.67	30.01	0.01	-0.01	40.205337	-104.723164	1,318,597.03	3,216,975.33
113.00	0.41	309.67	113.00	0.23	-0.28	40.205338	-104.723165	1,318,597.25	3,216,975.06
213.00	0.33	305.17	213.00	0.62	-0.79	40.205339	-104.723167	1,318,597.64	3,216,974.54
313.00	0.21	234.02	313.00	0.68	-1.17	40.205339	-104.723168	1,318,597.69	3,216,974.16
413.00	0.13	11.97	413.00	0.68	-1.29	40.205339	-104.723169	1,318,597.70	3,216,974.04
513.00	0.30	339.94	513.00	1.04	-1.36	40.205340	-104.723169	1,318,598.05	3,216,973.97
613.00	0.25	46.63	612.99	1.44	-1.29	40.205341	-104.723169	1,318,598.45	3,216,974.03
713.00	0.20	29.64	712.99	1.74	-1.05	40.205342	-104.723168	1,318,598.75	3,216,974.27
813.00	0.10	51.65	812.99	1.94	-0.89	40.205342	-104.723167	1,318,598.96	3,216,974.43
913.00	0.32	351.74	912.99	2.27	-0.86	40.205343	-104.723167	1,318,599.29	3,216,974.45
979.80	0.58	303.88	979.79	2.65	-1.17	40.205344	-104.723168	1,318,599.66	3,216,974.14
998.00	0.68	298.42	997.99	2.75	-1.34	40.205345	-104.723169	1,318,599.76	3,216,973.97
1,188.00	1.63	263.18	1,187.95	2.97	-5.02	40.205345	-104.723182	1,318,599.95	3,216,970.29
1,282.00	2.82	228.37	1,281.88	1.27	-8.07	40.205340	-104.723193	1,318,598.22	3,216,967.25
1,469.00	4.57	180.80	1,468.53	-9.24	-11.62	40.205312	-104.723206	1,318,587.69	3,216,963.80
1,562.00	7.00	174.27	1,561.05	-18.58	-11.10	40.205286	-104.723204	1,318,578.35	3,216,964.40
1,656.00	7.23	174.48	1,654.32	-30.17	-9.96	40.205254	-104.723200	1,318,566.77	3,216,965.64
1,750.00	9.16	177.24	1,747.36	-43.53	-9.03	40.205218	-104.723197	1,318,553.42	3,216,966.69
1,843.00	10.57	178.24	1,838.98	-59.45	-8.41	40.205174	-104.723194	1,318,537.50	3,216,967.44
1,937.00	12.67	181.67	1,931.05	-78.38	-8.45	40.205122	-104.723195	1,318,518.58	3,216,967.57
2,030.00	14.74	186.11	2,021.40	-100.34	-10.01	40.205062	-104.723200	1,318,496.61	3,216,966.21
2,124.00	16.12	187.06	2,112.01	-125.18	-12.88	40.204993	-104.723210	1,318,471.74	3,216,963.55
2,217.00	18.51	186.14	2,200.79	-152.67	-16.05	40.204918	-104.723222	1,318,444.22	3,216,960.63
2,311.00	19.70	186.38	2,289.61	-183.26	-19.41	40.204834	-104.723234	1,318,413.61	3,216,957.54
2,405.00	20.63	185.90	2,377.85	-215.47	-22.87	40.204746	-104.723246	1,318,381.37	3,216,954.36
2,498.00	19.39	184.46	2,465.23	-247.16	-25.75	40.204659	-104.723256	1,318,349.65	3,216,951.75
2,591.00	20.33	187.17	2,552.70	-278.59	-28.97	40.204572	-104.723268	1,318,318.21	3,216,948.81
2,685.00	18.06	184.80	2,641.47	-309.31	-32.23	40.204488	-104.723280	1,318,287.46	3,216,945.82
2,779.00	19.34	185.21	2,730.51	-339.33	-34.86	40.204406	-104.723289	1,318,257.41	3,216,943.45
2,872.00	19.92	187.92	2,818.10	-370.36	-38.44	40.204320	-104.723302	1,318,226.36	3,216,940.14
2,962.00	22.39	187.90	2,902.03	-402.53	-42.91	40.204232	-104.723318	1,318,194.15	3,216,935.95
3,052.00	22.29	187.72	2,985.28	-436.42	-47.56	40.204139	-104.723335	1,318,160.22	3,216,931.60
3,142.00	22.51	187.68	3,068.49	-470.41	-52.16	40.204046	-104.723351	1,318,126.20	3,216,927.31
3,232.00	22.24	187.74	3,151.71	-504.36	-56.75	40.203953	-104.723367	1,318,092.21	3,216,923.01
3,322.00	20.00	186.66	3,235.66	-536.53	-60.83	40.203864	-104.723382	1,318,060.01	3,216,919.21
3,412.00	20.72	185.65	3,320.04	-567.66	-64.18	40.203779	-104.723394	1,318,028.85	3,216,916.13
3,502.00	19.16	184.40	3,404.64	-598.23	-66.88	40.203695	-104.723404	1,317,998.26	3,216,913.70
3,592.00	18.69	185.19	3,489.77	-627.32	-69.32	40.203615	-104.723412	1,317,969.15	3,216,911.52
3,682.00	18.41	186.44	3,575.10	-655.80	-72.22	40.203537	-104.723423	1,317,940.64	3,216,908.87

**Design Report for Johnson 2N-24HZ - Actual Field 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)
3,772.00	19.21	184.72	3,660.29	-684.68	-75.03	40.203458	-104.723433	1,317,911.74	3,216,906.31
3,862.00	19.63	186.20	3,745.17	-714.46	-77.88	40.203376	-104.723443	1,317,881.94	3,216,903.72
3,952.00	19.69	188.28	3,829.93	-744.50	-81.70	40.203293	-104.723457	1,317,851.87	3,216,900.17
4,042.00	20.04	186.27	3,914.57	-774.83	-85.57	40.203210	-104.723471	1,317,821.51	3,216,896.56
4,132.00	20.65	185.20	3,998.96	-805.96	-88.69	40.203125	-104.723482	1,317,790.35	3,216,893.71
4,222.00	19.30	184.84	4,083.54	-836.59	-91.38	40.203041	-104.723491	1,317,759.70	3,216,891.29
4,402.00	20.07	187.51	4,253.02	-896.85	-97.93	40.202875	-104.723515	1,317,699.39	3,216,885.27
4,492.00	17.90	187.34	4,338.12	-925.88	-101.72	40.202795	-104.723528	1,317,670.33	3,216,881.74
4,582.00	18.15	186.71	4,423.71	-953.52	-105.12	40.202720	-104.723541	1,317,642.66	3,216,878.58
4,672.00	19.44	182.83	4,508.91	-982.41	-107.50	40.202640	-104.723549	1,317,613.76	3,216,876.45
4,762.00	20.31	179.17	4,593.55	-1,012.98	-108.01	40.202556	-104.723551	1,317,583.18	3,216,876.21
4,852.00	21.01	180.95	4,677.76	-1,044.73	-108.05	40.202469	-104.723551	1,317,551.43	3,216,876.44
4,942.00	22.56	184.97	4,761.34	-1,078.07	-109.82	40.202378	-104.723557	1,317,518.08	3,216,874.97
5,032.00	22.08	185.89	4,844.59	-1,112.09	-113.05	40.202284	-104.723569	1,317,484.03	3,216,872.04
5,122.00	20.90	185.83	4,928.34	-1,144.89	-116.41	40.202194	-104.723581	1,317,451.21	3,216,868.96
5,212.00	19.12	184.17	5,012.90	-1,175.57	-119.12	40.202110	-104.723591	1,317,420.51	3,216,866.53
5,302.00	19.89	183.70	5,097.73	-1,205.54	-121.18	40.202028	-104.723598	1,317,390.52	3,216,864.73
5,391.00	21.05	187.80	5,181.12	-1,236.49	-124.32	40.201943	-104.723609	1,317,359.54	3,216,861.86
5,481.00	20.16	188.11	5,265.36	-1,267.86	-128.70	40.201857	-104.723625	1,317,328.14	3,216,857.75
5,571.00	19.12	187.84	5,350.12	-1,297.82	-132.90	40.201775	-104.723640	1,317,298.15	3,216,853.81
5,661.00	16.34	186.15	5,435.84	-1,325.01	-136.27	40.201700	-104.723652	1,317,270.93	3,216,850.68
5,751.00	17.26	187.47	5,522.00	-1,350.84	-139.36	40.201629	-104.723663	1,317,245.08	3,216,847.82
5,841.00	17.61	185.53	5,607.86	-1,377.63	-142.41	40.201555	-104.723674	1,317,218.26	3,216,845.00
5,931.00	16.25	185.57	5,693.96	-1,403.71	-144.95	40.201484	-104.723683	1,317,192.16	3,216,842.70
6,021.00	16.53	187.03	5,780.30	-1,428.95	-147.73	40.201415	-104.723693	1,317,166.89	3,216,840.13
6,110.00	13.13	185.35	5,866.33	-1,451.59	-150.23	40.201352	-104.723702	1,317,144.24	3,216,837.84
6,290.00	9.31	185.61	6,042.85	-1,486.45	-153.56	40.201257	-104.723714	1,317,109.35	3,216,834.81
6,380.00	9.23	188.89	6,131.68	-1,500.82	-155.39	40.201217	-104.723721	1,317,094.96	3,216,833.11
6,470.00	9.22	181.60	6,220.52	-1,515.16	-156.70	40.201178	-104.723725	1,317,080.61	3,216,831.92
6,560.00	8.71	179.99	6,309.42	-1,529.18	-156.90	40.201139	-104.723726	1,317,066.59	3,216,831.84
6,650.00	7.39	179.79	6,398.53	-1,541.79	-156.88	40.201105	-104.723726	1,317,053.99	3,216,831.98
6,830.00	3.96	193.52	6,577.63	-1,559.41	-158.29	40.201056	-104.723731	1,317,036.35	3,216,830.72
6,920.00	1.00	237.84	6,667.54	-1,562.85	-159.68	40.201047	-104.723736	1,317,032.90	3,216,829.36
7,010.00	3.64	331.05	6,757.48	-1,560.77	-161.73	40.201053	-104.723743	1,317,034.96	3,216,827.29
7,052.00	6.67	339.19	6,799.30	-1,557.32	-163.24	40.201062	-104.723749	1,317,038.40	3,216,825.75
7,100.00	9.89	341.78	6,846.80	-1,550.80	-165.52	40.201080	-104.723757	1,317,044.90	3,216,823.41
7,190.00	18.30	352.15	6,934.02	-1,529.42	-169.88	40.201139	-104.723772	1,317,066.24	3,216,818.87
7,280.00	26.16	359.57	7,017.28	-1,495.52	-171.96	40.201232	-104.723780	1,317,100.12	3,216,816.49
7,371.00	36.18	0.33	7,095.05	-1,448.48	-171.96	40.201361	-104.723780	1,317,147.15	3,216,816.08
7,461.00	44.94	356.85	7,163.36	-1,390.06	-173.55	40.201521	-104.723786	1,317,205.56	3,216,813.97
7,551.00	55.38	357.57	7,220.94	-1,321.13	-176.88	40.201711	-104.723797	1,317,274.45	3,216,810.04
7,595.00	60.38	359.98	7,244.33	-1,283.89	-177.65	40.201813	-104.723800	1,317,311.68	3,216,808.94

**Design Report for Johnson 2N-24HZ - Actual Field 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)
7,641.00	65.76	359.84	7,265.16	-1,242.89	-177.72	40.201925	-104.723800	1,317,352.67	3,216,808.52
7,686.00	70.35	356.87	7,281.97	-1,201.19	-178.94	40.202040	-104.723805	1,317,394.36	3,216,806.94
7,731.00	75.27	357.07	7,295.27	-1,158.27	-181.21	40.202158	-104.723813	1,317,437.26	3,216,804.29
7,776.00	79.94	356.15	7,304.93	-1,114.41	-183.81	40.202278	-104.723822	1,317,481.09	3,216,801.31
7,849.00	88.49	355.58	7,312.28	-1,042.04	-189.04	40.202477	-104.723841	1,317,553.41	3,216,795.44
7,886.00	89.57	355.74	7,312.90	-1,005.15	-191.84	40.202578	-104.723851	1,317,590.27	3,216,792.32
7,908.00	90.22	355.84	7,312.94	-983.21	-193.45	40.202638	-104.723857	1,317,612.20	3,216,790.51
7,998.00	89.32	355.18	7,313.30	-893.49	-200.50	40.202884	-104.723882	1,317,701.85	3,216,782.68
8,088.00	88.98	356.90	7,314.64	-803.72	-206.71	40.203131	-104.723904	1,317,791.56	3,216,775.68
8,178.00	90.00	357.99	7,315.44	-713.81	-210.73	40.203378	-104.723919	1,317,881.42	3,216,770.88
8,268.00	90.15	357.74	7,315.32	-623.88	-214.08	40.203624	-104.723931	1,317,971.32	3,216,766.74
8,358.00	90.25	359.41	7,315.01	-533.91	-216.32	40.203871	-104.723939	1,318,061.26	3,216,763.71
8,448.00	90.15	358.47	7,314.69	-443.92	-217.98	40.204118	-104.723945	1,318,151.23	3,216,761.26
8,538.00	90.06	358.53	7,314.53	-353.96	-220.34	40.204365	-104.723953	1,318,241.17	3,216,758.12
8,628.00	89.94	357.31	7,314.53	-264.02	-223.60	40.204612	-104.723965	1,318,331.07	3,216,754.06
8,718.00	90.31	358.70	7,314.33	-174.07	-226.74	40.204859	-104.723976	1,318,420.98	3,216,750.14
8,808.00	90.37	357.96	7,313.80	-84.11	-229.36	40.205106	-104.723985	1,318,510.91	3,216,746.73
8,898.00	90.15	359.79	7,313.39	5.86	-231.13	40.205353	-104.723992	1,318,600.86	3,216,744.18
8,988.00	89.78	359.57	7,313.44	95.86	-231.63	40.205600	-104.723994	1,318,690.85	3,216,742.89
9,167.00	90.37	358.99	7,313.21	274.85	-233.88	40.206091	-104.724002	1,318,869.80	3,216,739.07
9,257.00	90.59	358.46	7,312.46	364.82	-235.88	40.206338	-104.724009	1,318,959.75	3,216,736.28
9,347.00	90.59	358.04	7,311.53	454.77	-238.63	40.206585	-104.724019	1,319,049.67	3,216,732.74
9,437.00	90.77	357.86	7,310.46	544.71	-241.85	40.206832	-104.724030	1,319,139.57	3,216,728.73
9,527.00	90.00	357.39	7,309.86	634.63	-245.58	40.207079	-104.724043	1,319,229.45	3,216,724.22
9,617.00	88.52	357.67	7,311.02	724.54	-249.46	40.207326	-104.724057	1,319,319.32	3,216,719.55
9,708.00	88.70	359.15	7,313.23	815.47	-251.98	40.207575	-104.724066	1,319,410.22	3,216,716.23
9,798.00	89.05	358.81	7,314.99	905.44	-253.58	40.207822	-104.724072	1,319,500.17	3,216,713.84
9,888.00	89.07	358.66	7,316.47	995.40	-255.57	40.208069	-104.724079	1,319,590.11	3,216,711.07
9,978.00	89.20	358.43	7,317.83	1,085.37	-257.85	40.208316	-104.724087	1,319,680.04	3,216,707.99
10,067.00	89.01	358.35	7,319.22	1,174.32	-260.36	40.208561	-104.724096	1,319,768.97	3,216,704.72
10,157.00	90.34	359.78	7,319.73	1,264.30	-261.82	40.208808	-104.724102	1,319,858.93	3,216,702.46
10,247.00	90.43	359.24	7,319.12	1,354.30	-262.59	40.209055	-104.724104	1,319,948.91	3,216,700.90
10,337.00	91.17	359.24	7,317.87	1,444.28	-263.79	40.209302	-104.724109	1,320,038.87	3,216,698.92
10,426.00	91.14	358.56	7,316.07	1,533.24	-265.50	40.209546	-104.724115	1,320,127.82	3,216,696.43
10,516.00	91.42	358.15	7,314.06	1,623.18	-268.08	40.209793	-104.724124	1,320,217.73	3,216,693.06
10,696.00	90.65	358.01	7,310.81	1,803.05	-274.11	40.210286	-104.724146	1,320,397.53	3,216,685.46
10,786.00	90.46	357.81	7,309.94	1,892.99	-277.39	40.210533	-104.724157	1,320,487.43	3,216,681.39
10,876.00	90.83	357.99	7,308.93	1,982.92	-280.69	40.210780	-104.724169	1,320,577.33	3,216,677.30
10,966.00	90.89	357.09	7,307.58	2,072.83	-284.55	40.211027	-104.724183	1,320,667.19	3,216,672.65
11,146.00	88.24	358.58	7,308.94	2,252.67	-291.35	40.211521	-104.724207	1,320,846.96	3,216,664.28
11,236.00	88.46	357.96	7,311.53	2,342.59	-294.07	40.211767	-104.724217	1,320,936.85	3,216,660.77
11,326.00	88.30	357.64	7,314.08	2,432.49	-297.52	40.212014	-104.724230	1,321,026.71	3,216,656.53

**Design Report for Johnson 2N-24HZ - Actual Field 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)
11,416.00	89.07	358.63	7,316.14	2,522.42	-300.45	40.212261	-104.724240	1,321,116.61	3,216,652.82
11,506.00	89.14	358.20	7,317.55	2,612.37	-302.94	40.212508	-104.724249	1,321,206.53	3,216,649.54
11,596.00	89.72	359.18	7,318.44	2,702.34	-304.99	40.212755	-104.724256	1,321,296.48	3,216,646.70
11,776.00	89.54	358.72	7,319.61	2,882.31	-308.29	40.213249	-104.724268	1,321,476.40	3,216,641.82
11,866.00	88.74	359.30	7,320.96	2,972.28	-309.85	40.213496	-104.724274	1,321,566.35	3,216,639.48
11,956.00	90.37	359.36	7,321.66	3,062.27	-310.90	40.213743	-104.724277	1,321,656.32	3,216,637.64
12,046.00	91.85	359.35	7,319.91	3,152.25	-311.91	40.213990	-104.724281	1,321,746.28	3,216,635.84
12,136.00	90.34	0.14	7,318.19	3,242.23	-312.31	40.214237	-104.724283	1,321,836.25	3,216,634.65
12,226.00	89.54	359.44	7,318.29	3,332.22	-312.64	40.214484	-104.724284	1,321,926.24	3,216,633.53
12,316.00	89.29	358.78	7,319.21	3,422.21	-314.04	40.214731	-104.724289	1,322,016.20	3,216,631.34
12,406.00	89.72	358.52	7,319.98	3,512.18	-316.16	40.214978	-104.724296	1,322,106.15	3,216,628.43
12,496.00	90.34	358.23	7,319.94	3,602.14	-318.71	40.215225	-104.724305	1,322,196.08	3,216,625.09
12,586.00	90.06	357.73	7,319.62	3,692.09	-321.88	40.215472	-104.724317	1,322,285.99	3,216,621.13
12,676.00	90.68	357.15	7,319.04	3,781.99	-325.90	40.215719	-104.724331	1,322,375.86	3,216,616.33
12,766.00	91.66	356.94	7,317.20	3,871.85	-330.54	40.215965	-104.724348	1,322,465.67	3,216,610.90
12,857.00	90.59	356.91	7,315.42	3,962.70	-335.42	40.216215	-104.724365	1,322,556.47	3,216,605.23
12,946.00	90.83	356.35	7,314.31	4,051.54	-340.66	40.216458	-104.724384	1,322,645.25	3,216,599.22
13,036.00	91.14	355.87	7,312.77	4,141.32	-346.76	40.216705	-104.724406	1,322,734.97	3,216,592.33
13,126.00	91.20	356.78	7,310.93	4,231.12	-352.53	40.216951	-104.724427	1,322,824.71	3,216,585.77
13,216.00	90.62	357.48	7,309.50	4,320.99	-357.03	40.217198	-104.724443	1,322,914.54	3,216,580.48
13,306.00	90.59	356.60	7,308.55	4,410.87	-361.68	40.217445	-104.724459	1,323,004.36	3,216,575.05
13,396.00	90.90	356.12	7,307.38	4,500.68	-367.39	40.217691	-104.724480	1,323,094.12	3,216,568.55
13,482.00	90.90	356.67	7,306.03	4,586.50	-372.80	40.217927	-104.724499	1,323,179.88	3,216,562.39
13,523.55	90.90	356.67	7,305.38	4,627.97	-375.21	40.218041	-104.724508	1,323,221.33	3,216,559.61
13,524.00	90.90	356.67	7,305.37	4,628.42	-375.24	40.218042	-104.724508	1,323,221.78	3,216,559.58

**Design Annotations**

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
913.00	912.99	2.27	-0.86	Tie-On to Gyro Surveys @ 913.00ft
13,482.00	7,306.03	4,586.50	-372.80	Final MWD Survey @ 13482.00' MD :: 7306.03' TVD
13,524.00	7,305.37	4,628.42	-375.24	Straight Line Projection to Bit @ 13524.00' MD :: 7305.37' TVD

## Design Report for Johnson 2N-24HZ - Actual Field 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)	358.25	Slot	0.00	0.00	0.00

### Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
13.00	913.00	MS Energy Gyro Surveys	NS-GYRO-MS
998.00	7,849.00	MWD Vertical/Build Surveys	MWD+IFR1+SC
7,908.00	13,524.00	MWD Lateral Surveys	MWD+IFR1+SC

### Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
979.80	979.79	9 5/8"	9-5/8	13-1/2
7,886.00	7,312.90	7"	7	8-3/4

### 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:	1.73 °/100usft	Maximum Dogleg over Survey:	12.27 °/100usft at 7,595.00 usft
Net Tortousity applicable to Plans:	0.75 °/100usft	Directional Difficulty Index:	6.527

Design Report for Johnson 2N-24HZ - Actual Field Surveys

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Audit Info

**North Reference Sheet for Sec. 24-T3N-R66W - Johnson 2N-24HZ - 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 = 13' @ 5050.00usft (Ensign 145). Northing and Easting are relative to Johnson 2N-24HZ

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: 0.99995716

Grid Coordinates of Well: 1,318,597.02 usft N, 3,216,975.34 usft E

Geographical Coordinates of Well: 40° 12' 19.21" N, 104° 43' 23.39" W

Grid Convergence at Surface is: 0.50°

Based upon Minimum Curvature type calculations, at a Measured Depth of 13,524.00usft

the Bottom Hole Displacement is 4,643.61usft in the Direction of 355.37° (True).

Magnetic Convergence at surface is: -7.98° (15 September 2014, , BGGM2014)

