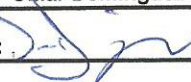
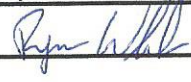




SPERRY-SUN DRILLING SERVICES

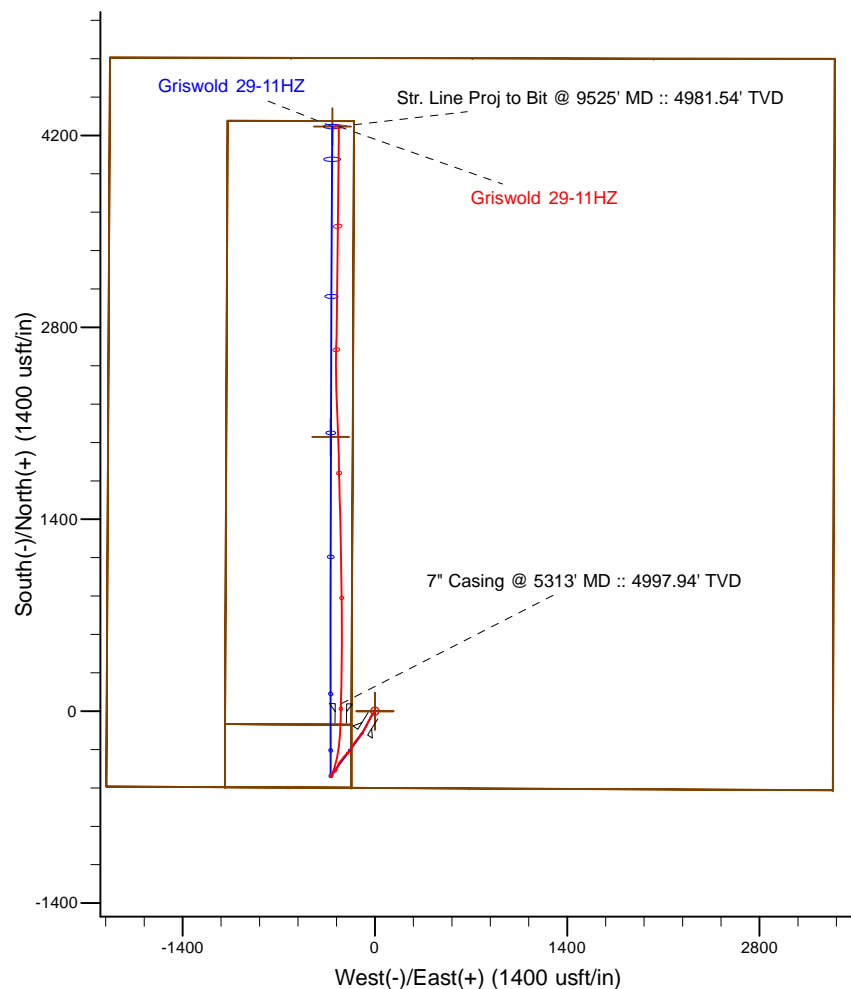
CERTIFIED SURVEY WORK SHEET

OPERATOR:	Anadarko Petroleum Corp
WELL:	Griswold 29-11HZ
FIELD:	Wattenberg
RIG:	Ensign 145
LEGALS:	Sec 11-T1N-R66W
COUNTY:	Weld
STATE:	Colorado
CAL. METHOD:	Minimum Curvature
MAG. DECL. APPLIED:	8.26
VERTICAL SEC. DIR. :	0.020

SSDS Job Number :	902109867
Start Date of Job :	22-Mar-15
End Date of Job :	28-Mar-15
Lead Directional Driller:	Omar Dominguez
Other SSDS DD's :	Ryan White
SSDS MWD Engineers :	Matt Busche
	Matt Shields

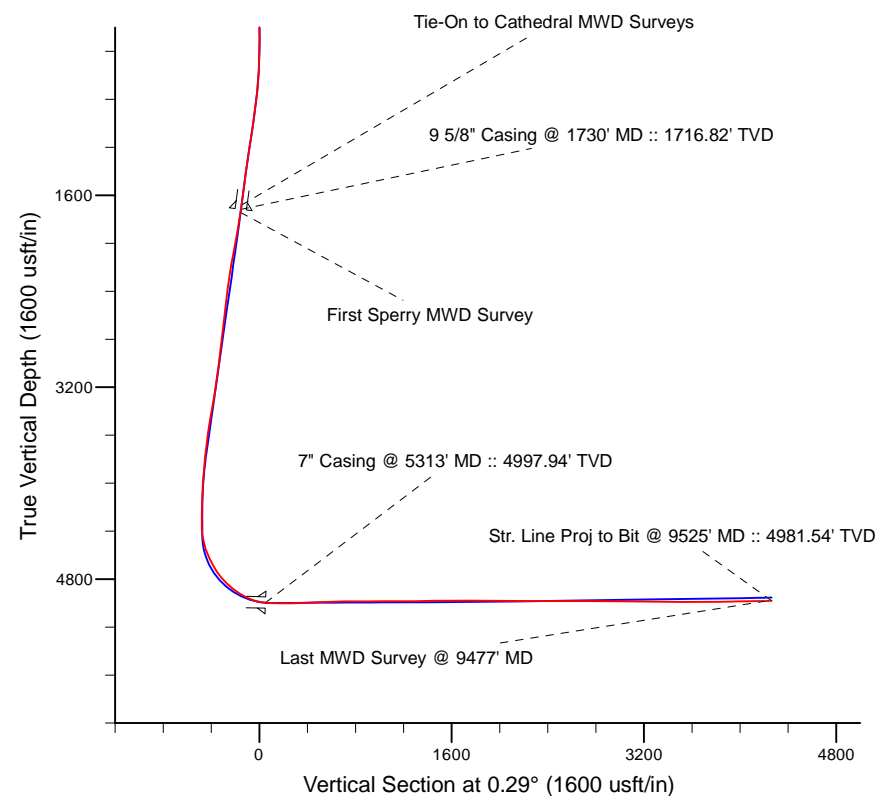
	Main Hole =====>	1st Side Track =====>	2nd Side Track =====>	3rd Side Track =====>	4th Side Track =====>
		Tie On		Tie On	
Tie On Point	1695.00 Gyro				
First Survey	1756.00 MWD				
KOP Depth	4433.00 KOP	KOP-ST1	KOP-ST2	KOP-ST3	KOP-ST4
Last Survey Depth	9477.00 MWD				
		MWD	MWD	MWD	MWD
Bit Extrapolation to TD	9525.00 Projection		MWD	MWD	MWD
		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 : Omar Dominguez		Print Name : Ryan White		Print Name :	
Sign Name : 		Sign Name : 		Sign Name :	
Print Name : Matt Busche		Print Name : Matt Shields		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. 11-T1N-R66W
 Well: Griswold 29-11HZ
 Wellbore: Plan A
 Design: Actual Surveys



LEGEND

- △ Griswold 29-11HZ, Plan A, Rev A2 V0
- Actual Surveys



7" Casing: ~613.50' FSL, ~1707.00' FWL
 Lat/Long: 40.060235 N, -104.747699 E
 State Planes - CO Northern: 1,265,682.19' N, 3,210,571.21' E
 Location: Sec. 11-T1N-R66W

BHL: ~498.50' FNL, ~1669.00' FWL
 Lat/Long: 40.071793 N, -104.747755 E
 State Planes - CO Northern: 1,269,892.31' N, 3,210,519.72' E
 Location: Sec. 11-T1N-R66W

WELL DETAILS: Griswold 29-11HZ	
Ground Level: 5142.00	
RKB = 13' @ 5155.00usft (Ensign 145)	
Design: Actual Surveys (Griswold 29-11HZ/Plan A)	
Created By: Clint Eshelman	Date: 4/13/2015
Reviewed: _____	Date: _____

Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 11-T1N-R66W

Griswold 29-11HZ

05-123-41025

Plan A

Design: Actual Surveys

Sperry Drilling Services

Standard Report

13 April, 2015

Surface UWI : 05-123-41025

Well Coordinates: 1,265,630.32 N, 3,210,818.75 E (40° 03' 36.31" N, 104° 44' 48.54" W)

Ground Level: 5,142.00 usft

Local Coordinate Origin:

Centered on Well Griswold 29-11HZ

Viewing Datum:

RKB = 13' @ 5155.00usft (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: 73

HALLIBURTON

Design Report for Griswold 29-11HZ - 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
119.00	0.50	11.80	119.00	0.51	0.11	0.51	0.42
First Cathedral MWD Survey							
209.00	0.60	53.30	208.99	1.17	0.56	1.18	0.45
295.00	0.30	19.10	294.99	1.66	1.00	1.66	0.45
382.00	0.60	194.20	381.99	1.43	0.96	1.43	1.03
472.00	2.00	203.20	471.97	-0.47	0.23	-0.47	1.57
566.00	3.80	211.10	565.84	-4.65	-2.03	-4.66	1.96
661.00	5.40	214.30	660.53	-11.03	-6.17	-11.07	1.71
757.00	7.30	220.40	755.94	-19.41	-12.67	-19.48	2.10
852.00	8.40	215.50	850.05	-29.66	-20.61	-29.76	1.35
948.00	9.80	212.70	944.84	-42.24	-29.10	-42.39	1.53
1,043.00	9.80	206.50	1,038.46	-56.28	-37.08	-56.47	1.11
1,139.00	10.20	207.30	1,133.00	-71.15	-44.62	-71.37	0.44
1,233.00	9.40	209.20	1,225.63	-85.24	-52.18	-85.51	0.92
1,327.00	9.20	203.70	1,318.39	-98.83	-58.95	-99.12	0.97
1,423.00	8.40	211.70	1,413.26	-111.82	-65.72	-112.15	1.52
1,519.00	8.80	207.20	1,508.19	-124.32	-72.76	-124.68	0.82
1,613.00	8.70	208.60	1,601.09	-136.95	-79.45	-137.35	0.25
1,695.00	8.20	209.50	1,682.20	-147.49	-85.30	-147.92	0.63
Tie-On to Cathedral MWD Surveys							
1,730.00	8.73	212.23	1,716.82	-151.91	-87.94	-152.35	1.89
9 5/8" Casing @ 1730' MD :: 1716.82' TVD							
1,756.00	9.13	214.05	1,742.51	-155.28	-90.15	-155.74	1.89
First Sperry MWD Survey							
1,849.00	12.59	219.62	1,833.83	-169.21	-100.75	-169.72	3.88
1,942.00	13.50	220.38	1,924.43	-185.29	-114.24	-185.86	1.00
2,036.00	13.88	220.12	2,015.76	-202.27	-128.62	-202.92	0.41
2,130.00	13.08	215.60	2,107.17	-219.54	-142.07	-220.25	1.41
2,223.00	10.31	207.18	2,198.24	-235.50	-152.01	-236.27	3.49
2,317.00	8.88	208.14	2,290.92	-249.38	-159.27	-250.19	1.53
2,410.00	8.52	209.10	2,382.85	-261.73	-166.01	-262.57	0.42
2,504.00	7.92	207.72	2,475.88	-273.55	-172.40	-274.42	0.67
2,597.00	8.58	218.26	2,567.92	-284.67	-179.68	-285.58	1.77
2,691.00	9.30	224.08	2,660.78	-295.63	-189.31	-296.59	1.23
2,784.00	9.13	225.72	2,752.58	-306.18	-199.82	-307.19	0.34
2,878.00	8.64	225.62	2,845.46	-316.33	-210.20	-317.39	0.52
2,971.00	8.80	221.71	2,937.38	-326.52	-219.93	-327.63	0.66
3,065.00	10.42	218.36	3,030.06	-338.56	-229.99	-339.72	1.82
3,158.00	9.60	219.55	3,121.64	-351.13	-240.15	-352.34	0.91
3,252.00	10.28	217.41	3,214.23	-363.84	-250.23	-365.10	0.82
3,345.00	11.55	209.09	3,305.55	-378.57	-259.80	-379.88	2.17
3,435.00	11.76	204.40	3,393.70	-394.79	-267.97	-396.14	1.08
3,525.00	10.34	211.42	3,482.03	-410.04	-275.97	-411.43	2.17
3,615.00	9.15	215.20	3,570.73	-422.78	-284.31	-424.21	1.50
3,705.00	8.94	211.62	3,659.62	-434.58	-292.10	-436.06	0.67
3,795.00	7.66	211.78	3,748.67	-445.64	-298.92	-447.14	1.42
3,885.00	6.23	213.27	3,838.01	-454.82	-304.76	-456.36	1.60
3,976.00	4.91	214.47	3,928.58	-462.16	-309.68	-463.72	1.46
4,066.00	4.09	211.70	4,018.30	-468.06	-313.54	-469.65	0.94

Design Report for Griswold 29-11HZ - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
4,156.00	3.30	210.38	4,108.11	-473.03	-316.54	-474.63	0.88
4,246.00	1.66	238.48	4,198.03	-475.95	-318.96	-477.56	2.22
4,335.00	0.93	261.41	4,287.00	-476.73	-320.77	-478.35	0.99
4,425.00	0.55	303.88	4,377.00	-476.60	-321.85	-478.22	0.71
4,470.00	6.54	22.65	4,421.90	-474.11	-321.05	-475.73	14.35
4,515.00	13.05	25.39	4,466.22	-467.15	-317.88	-468.75	14.50
4,605.00	20.47	23.29	4,552.33	-443.48	-307.28	-445.03	8.27
4,695.00	26.06	19.73	4,634.99	-410.39	-294.38	-411.87	6.40
4,785.00	32.49	12.21	4,713.48	-368.10	-282.57	-369.52	8.22
4,875.00	40.39	10.82	4,785.83	-315.75	-271.97	-317.12	8.83
4,965.00	47.91	6.92	4,850.37	-253.85	-262.46	-255.18	8.88
5,055.00	55.48	3.11	4,906.13	-183.56	-256.41	-184.86	9.04
5,145.00	63.57	2.70	4,951.73	-106.16	-252.50	-107.44	9.00
5,190.00	68.60	2.20	4,969.97	-65.07	-250.74	-66.34	11.22
5,236.00	72.84	2.43	4,985.15	-21.70	-248.99	-22.96	9.23
5,277.00	80.88	1.07	4,994.47	18.18	-247.78	16.92	19.87
5,313.00	88.04	1.07	4,997.94	53.98	-247.11	52.73	19.88
7" Casing @ 5313' MD :: 4997.94' TVD							
5,320.00	89.43	1.07	4,998.10	60.98	-246.98	59.72	19.88
5,338.00	86.66	0.43	4,998.71	78.96	-246.74	77.71	15.79
5,431.00	89.32	1.20	5,001.97	171.89	-245.42	170.64	2.98
5,525.00	90.80	1.19	5,001.87	265.86	-243.46	264.63	1.57
5,618.00	92.78	0.36	4,998.97	358.80	-242.20	357.57	2.31
5,712.00	92.78	0.56	4,994.41	452.69	-241.45	451.46	0.21
5,805.00	91.24	359.96	4,991.15	545.63	-241.03	544.40	1.78
5,899.00	92.29	0.38	4,988.25	639.58	-240.75	638.35	1.20
5,992.00	89.81	359.28	4,986.55	732.56	-241.02	731.33	2.92
6,086.00	90.74	359.18	4,986.10	826.55	-242.29	825.31	1.00
6,180.00	89.57	358.55	4,985.84	920.53	-244.15	919.28	1.41
6,273.00	90.74	359.24	4,985.59	1,013.51	-245.94	1,012.25	1.46
6,367.00	90.06	359.40	4,984.94	1,107.50	-247.06	1,106.23	0.74
6,457.00	90.00	359.52	4,984.89	1,197.49	-247.91	1,196.22	0.15
6,547.00	90.56	358.68	4,984.45	1,287.48	-249.32	1,286.20	1.12
6,637.00	91.23	358.61	4,983.04	1,377.44	-251.45	1,376.15	0.75
6,727.00	89.75	357.95	4,982.27	1,467.40	-254.15	1,466.09	1.80
6,817.00	90.74	358.07	4,981.89	1,557.34	-257.27	1,556.02	1.11
6,907.00	90.56	358.74	4,980.87	1,647.30	-259.78	1,645.96	0.77
6,997.00	89.38	359.12	4,980.91	1,737.28	-261.46	1,735.93	1.38
7,087.00	90.06	358.80	4,981.35	1,827.26	-263.09	1,825.91	0.84
7,177.00	90.74	358.43	4,980.73	1,917.23	-265.27	1,915.87	0.86
7,267.00	90.00	358.35	4,980.14	2,007.20	-267.80	2,005.82	0.83
7,357.00	89.07	357.73	4,980.88	2,097.14	-270.88	2,095.74	1.24
7,447.00	88.70	356.80	4,982.63	2,187.02	-275.17	2,185.60	1.11
7,585.00	89.63	358.32	4,984.64	2,324.87	-281.04	2,323.42	1.29
7,627.00	90.25	359.69	4,984.68	2,366.87	-281.77	2,365.41	3.58
7,717.00	90.56	359.12	4,984.05	2,456.86	-282.71	2,455.40	0.72
7,807.00	90.25	0.83	4,983.41	2,546.85	-282.75	2,545.39	1.93
7,897.00	89.94	1.25	4,983.26	2,636.84	-281.11	2,635.38	0.58
7,986.00	89.57	0.74	4,983.64	2,725.82	-279.57	2,724.37	0.71
8,076.00	89.63	0.90	4,984.27	2,815.81	-278.28	2,814.37	0.19
8,166.00	89.51	0.82	4,984.94	2,905.80	-276.93	2,904.36	0.16

Design Report for Griswold 29-11HZ - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
8,257.00	89.32	0.83	4,985.87	2,996.78	-275.62	2,995.35	0.21
8,346.00	88.58	0.42	4,987.50	3,085.76	-274.65	3,084.33	0.95
8,437.00	90.49	0.49	4,988.24	3,176.75	-273.92	3,175.33	2.10
8,528.00	89.81	0.11	4,988.00	3,267.75	-273.45	3,266.33	0.86
8,618.00	89.44	0.48	4,988.59	3,357.75	-272.98	3,356.32	0.58
8,708.00	89.01	0.46	4,989.81	3,447.74	-272.25	3,446.31	0.48
8,798.00	89.44	1.04	4,991.03	3,537.72	-271.07	3,536.30	0.80
8,888.00	89.20	0.84	4,992.10	3,627.70	-269.59	3,626.29	0.35
8,978.00	90.74	1.02	4,992.14	3,717.69	-268.13	3,716.28	1.72
9,068.00	91.98	0.82	4,990.01	3,807.65	-266.69	3,806.25	1.40
9,158.00	91.24	0.69	4,987.48	3,897.60	-265.50	3,896.21	0.83
9,248.00	90.74	0.23	4,985.92	3,987.59	-264.78	3,986.20	0.75
9,338.00	90.37	0.36	4,985.05	4,077.58	-264.32	4,076.19	0.44
9,428.00	91.05	0.49	4,983.94	4,167.57	-263.65	4,166.18	0.77
9,477.00	91.54	0.48	4,982.83	4,216.56	-263.23	4,215.17	1.00
Last MWD Survey @ 9477' MD							
9,525.00	91.54	0.48	4,981.54	4,264.54	-262.83	4,263.15	0.00
Str. Line Proj to Bit @ 9525' MD :: 4981.54' TVD							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
119.00	119.00	0.51	0.11	First Cathedral MWD Survey
1,695.00	1,682.20	-147.49	-85.30	Tie-On to Cathedral MWD Surveys
1,756.00	1,742.51	-155.28	-90.15	First Sperry MWD Survey
9,477.00	4,982.83	4,216.56	-263.23	Last MWD Survey @ 9477' MD
9,525.00	4,981.54	4,264.54	-262.83	Str. Line Proj to Bit @ 9525' MD :: 4981.54' TVD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
User	No Target (Freehand)	0.29	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
119.00	1,695.00	Cathedral Surface MWD Surveys	MWD
1,756.00	5,320.00	MWD Vertical/Build Surveys	MWD+IFR1+SC
5,338.00	9,477.00	MWD Lateral Surveys	MWD+IFR1+SC

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,730.00	1,716.82	9 5/8" Casing @ 1730' MD :: 1716.82' TVD	9-5/8	13-3/4
5,313.00	4,997.94	7" Casing @ 5313' MD :: 4997.94' TVD	7	8-3/4

Design Report for Griswold 29-11HZ - 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
GRISWOLD 29-11HZ_	0.00	0.00	0.00	0.03	0.00	1,265,630.34	3,210,818.75	40.060087	-104.746816
- actual wellpath misses target center by 0.03usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				0.00	-550.08	-1,955.58	1,265,063.69	3,208,867.99	
Point 2				0.00	2,109.05	-1,943.06	1,267,722.73	3,208,857.92	
Point 3				0.00	4,768.32	-1,929.78	1,270,381.92	3,208,848.62	
Point 4				0.00	4,765.79	-610.39	1,270,390.60	3,210,167.93	
Point 5				0.00	4,763.38	709.04	1,270,399.39	3,211,487.29	
Point 6				0.00	4,760.75	2,028.43	1,270,407.97	3,212,806.60	
Point 7				0.00	4,758.41	3,348.03	1,270,416.84	3,214,126.12	
Point 8				0.00	2,091.23	3,341.12	1,267,749.80	3,214,141.87	
Point 9				0.00	-576.13	3,334.19	1,265,082.57	3,214,157.59	
Point 10				0.00	-563.48	688.98	1,265,072.76	3,211,512.47	
Point 11				0.00	-556.67	-633.25	1,265,068.34	3,210,190.28	
GRISWOLD 29-11HZ_	0.00	0.00	0.00	0.03	0.00	1,265,630.34	3,210,818.75	40.060087	-104.746816
- actual wellpath misses target center by 0.03usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				0.00	-94.20	-1,091.47	1,265,526.88	3,209,728.16	
Point 2				0.00	775.82	-1,087.78	1,266,396.87	3,209,724.47	
Point 3				0.00	2,106.17	-1,082.09	1,267,727.17	3,209,718.86	
Point 4				0.00	3,436.42	-1,076.33	1,269,057.37	3,209,713.32	
Point 5				0.00	4,306.49	-1,072.56	1,269,927.41	3,209,709.70	
Point 6				0.00	4,304.78	-152.20	1,269,933.51	3,210,630.00	
Point 7				0.00	3,434.00	-155.97	1,269,062.77	3,210,633.63	
Point 8				0.00	2,103.04	-161.73	1,267,731.85	3,210,639.17	
Point 9				0.00	771.93	-167.42	1,266,400.79	3,210,644.79	
Point 10				0.00	-98.87	-171.12	1,265,530.03	3,210,648.49	
GRISWOLD 29-11HZ_	0.00	0.00	0.00	0.02	0.00	1,265,630.34	3,210,818.75	40.060087	-104.746816
- actual wellpath misses target center by 0.02usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				0.00	-94.19	-1,091.47	1,265,526.89	3,209,728.16	
Point 2				0.00	-98.86	-171.12	1,265,530.03	3,210,648.49	
Point 3				0.00	-558.86	-171.11	1,265,070.07	3,210,652.40	
Point 4				0.00	-554.19	-1,091.47	1,265,066.92	3,209,732.07	
GRISWOLD 29-11HZ_	0.00	0.00	4,955.00	4,265.14	-310.10	1,269,892.51	3,210,472.46	40.071795	-104.747924
- actual wellpath misses target center by 54.21usft at 9525.00usft MD (4981.54 TVD, 4264.54 N, -262.83 E)									
- Point									
GRISWOLD 29-11HZ_	0.00	0.00	4,989.00	2,000.11	-321.60	1,267,627.55	3,210,480.19	40.065577	-104.747965
- actual wellpath misses target center by 54.71usft at 7261.37usft MD (4980.15 TVD, 2001.57 N, -267.64 E)									
- Point									

Directional Difficulty Index

Average Dogleg over Survey:	2.05 °/100usft	Maximum Dogleg over Survey:	19.88 °/100usft at 5,320.00 usft
Net Tortosity applicable to Plans:	0.78 °/100usft	Directional Difficulty Index:	6.298

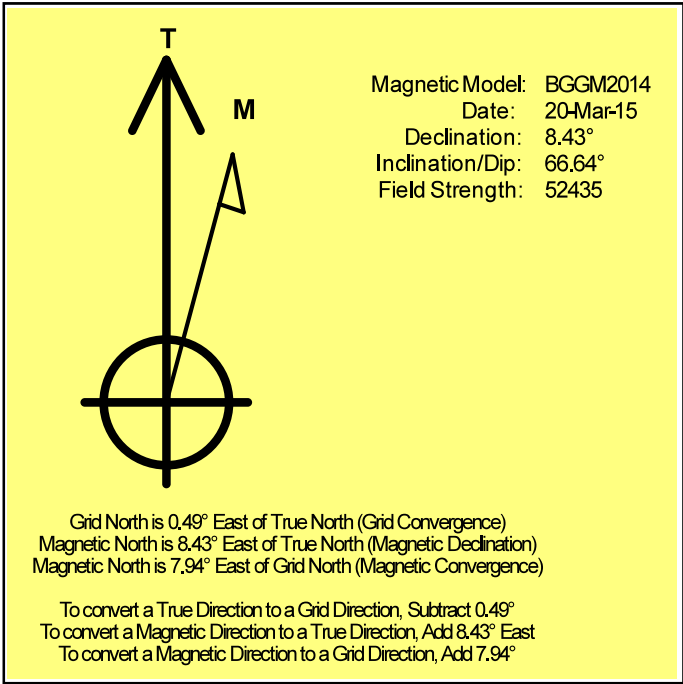
Audit Info

North Reference Sheet for Sec. 11-T1N-R66W - Griswold 29-11HZ - 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' @ 5155.00usft (Ensign 145). Northing and Easting are relative to Griswold 29- 11HZ
 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: 0.99996235

Grid Coordinates of Well: 1,265,630.32 usft N, 3,210,818.75 usft E
 Geographical Coordinates of Well: 40° 03' 36.31" N, 104° 44' 48.54" W
 Grid Convergence at Surface is: 0.49°

Based upon Minimum Curvature type calculations, at a Measured Depth of 9,525.00usft
 the Bottom Hole Displacement is 4,272.63usft in the Direction of 356.47° (True).
 Magnetic Convergence at surface is: -7.94° (20 March 2015, , BGGM2014)



Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 11-T1N-R66W

Griswold 29-11HZ

05-123-41025

Plan A

Design: Actual Surveys

Sperry Drilling Services

Geodetic Report

13 April, 2015

Well Coordinates: 1,265,630.32 N, 3,210,818.75 E (40° 03' 36.31" N, 104° 44' 48.54" W)

Ground Level: 5,142.00 usft

Local Coordinate Origin:

Viewing Datum:

TVDs to System:

North Reference:

Unit System:

Geodetic Scale Factor Applied

Version: 5000.1 Build: 73

Centered on Well Griswold 29-11HZ

RKB = 13' @ 5155.00usft (Ensign 145)

N

True

Dec-Deg - API - US Survey Feet - Custom

HALLIBURTON

Design Report for Griswold 29-11HZ - 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	40.060087	-104.746816	1,265,630.32	3,210,818.75
119.00	0.50	11.80	119.00	0.51	0.11	40.060088	-104.746816	1,265,630.83	3,210,818.86
209.00	0.60	53.30	208.99	1.17	0.56	40.060090	-104.746814	1,265,631.50	3,210,819.31
295.00	0.30	19.10	294.99	1.66	1.00	40.060092	-104.746813	1,265,631.98	3,210,819.74
382.00	0.60	194.20	381.99	1.43	0.96	40.060091	-104.746813	1,265,631.76	3,210,819.70
472.00	2.00	203.20	471.97	-0.47	0.23	40.060086	-104.746815	1,265,629.85	3,210,818.99
566.00	3.80	211.10	565.84	-4.65	-2.03	40.060074	-104.746824	1,265,625.66	3,210,816.77
661.00	5.40	214.30	660.53	-11.03	-6.17	40.060057	-104.746838	1,265,619.23	3,210,812.68
757.00	7.30	220.40	755.94	-19.41	-12.67	40.060034	-104.746862	1,265,610.80	3,210,806.25
852.00	8.40	215.50	850.05	-29.66	-20.61	40.060006	-104.746890	1,265,600.49	3,210,798.39
948.00	9.80	212.70	944.84	-42.24	-29.10	40.059971	-104.746920	1,265,587.83	3,210,790.02
1,043.00	9.80	206.50	1,038.46	-56.28	-37.08	40.059933	-104.746949	1,265,573.73	3,210,782.16
1,139.00	10.20	207.30	1,133.00	-71.15	-44.62	40.059892	-104.746976	1,265,558.80	3,210,774.74
1,233.00	9.40	209.20	1,225.63	-85.24	-52.18	40.059853	-104.747003	1,265,544.64	3,210,767.30
1,327.00	9.20	203.70	1,318.39	-98.83	-58.95	40.059816	-104.747027	1,265,531.00	3,210,760.65
1,423.00	8.40	211.70	1,413.26	-111.82	-65.72	40.059780	-104.747051	1,265,517.95	3,210,753.99
1,519.00	8.80	207.20	1,508.19	-124.32	-72.76	40.059746	-104.747076	1,265,505.39	3,210,747.06
1,613.00	8.70	208.60	1,601.09	-136.95	-79.45	40.059711	-104.747100	1,265,492.70	3,210,740.48
1,695.00	8.20	209.50	1,682.20	-147.49	-85.30	40.059682	-104.747121	1,265,482.12	3,210,734.72
1,730.00	8.73	212.23	1,716.82	-151.91	-87.94	40.059670	-104.747130	1,265,477.68	3,210,732.11
1,756.00	9.13	214.05	1,742.51	-155.28	-90.15	40.059661	-104.747138	1,265,474.28	3,210,729.93
1,849.00	12.59	219.62	1,833.83	-169.21	-100.75	40.059623	-104.747176	1,265,460.27	3,210,719.45
1,942.00	13.50	220.38	1,924.43	-185.29	-114.24	40.059578	-104.747224	1,265,444.07	3,210,706.09
2,036.00	13.88	220.12	2,015.76	-202.27	-128.62	40.059532	-104.747276	1,265,426.97	3,210,691.86
2,130.00	13.08	215.60	2,107.17	-219.54	-142.07	40.059484	-104.747324	1,265,409.59	3,210,678.55
2,223.00	10.31	207.18	2,198.24	-235.50	-152.01	40.059441	-104.747359	1,265,393.54	3,210,668.76
2,317.00	8.88	208.14	2,290.92	-249.38	-159.27	40.059402	-104.747385	1,265,379.60	3,210,661.61
2,410.00	8.52	209.10	2,382.85	-261.73	-166.01	40.059369	-104.747409	1,265,367.19	3,210,654.98
2,504.00	7.92	207.72	2,475.88	-273.55	-172.40	40.059336	-104.747432	1,265,355.32	3,210,648.69
2,597.00	8.58	218.26	2,567.92	-284.67	-179.68	40.059306	-104.747458	1,265,344.14	3,210,641.50
2,691.00	9.30	224.08	2,660.78	-295.63	-189.31	40.059275	-104.747493	1,265,333.10	3,210,631.97
2,784.00	9.13	225.72	2,752.58	-306.18	-199.82	40.059247	-104.747530	1,265,322.46	3,210,621.55
2,878.00	8.64	225.62	2,845.46	-316.33	-210.20	40.059219	-104.747567	1,265,312.23	3,210,611.25
2,971.00	8.80	221.71	2,937.38	-326.52	-219.93	40.059191	-104.747602	1,265,301.95	3,210,601.62
3,065.00	10.42	218.36	3,030.06	-338.56	-229.99	40.059158	-104.747638	1,265,289.83	3,210,591.66
3,158.00	9.60	219.55	3,121.64	-351.13	-240.15	40.059123	-104.747674	1,265,277.17	3,210,581.61
3,252.00	10.28	217.41	3,214.23	-363.84	-250.23	40.059088	-104.747710	1,265,264.38	3,210,571.63
3,345.00	11.55	209.09	3,305.55	-378.57	-259.80	40.059048	-104.747744	1,265,249.57	3,210,562.19
3,435.00	11.76	204.40	3,393.70	-394.79	-267.97	40.059003	-104.747774	1,265,233.28	3,210,554.16
3,525.00	10.34	211.42	3,482.03	-410.04	-275.97	40.058961	-104.747802	1,265,217.96	3,210,546.29
3,615.00	9.15	215.20	3,570.73	-422.78	-284.31	40.058926	-104.747832	1,265,205.15	3,210,538.06
3,705.00	8.94	211.62	3,659.62	-434.58	-292.10	40.058894	-104.747860	1,265,193.29	3,210,530.37

Design Report for Griswold 29-11HZ - 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)
3,795.00	7.66	211.78	3,748.67	-445.64	-298.92	40.058864	-104.747884	1,265,182.18	3,210,523.64
3,885.00	6.23	213.27	3,838.01	-454.82	-304.76	40.058838	-104.747905	1,265,172.94	3,210,517.88
3,976.00	4.91	214.47	3,928.58	-462.16	-309.68	40.058818	-104.747923	1,265,165.56	3,210,513.03
4,066.00	4.09	211.70	4,018.30	-468.06	-313.54	40.058802	-104.747936	1,265,159.62	3,210,509.21
4,156.00	3.30	210.38	4,108.11	-473.03	-316.54	40.058788	-104.747947	1,265,154.63	3,210,506.26
4,246.00	1.66	238.48	4,198.03	-475.95	-318.96	40.058780	-104.747956	1,265,151.70	3,210,503.86
4,335.00	0.93	261.41	4,287.00	-476.73	-320.77	40.058778	-104.747962	1,265,150.90	3,210,502.05
4,425.00	0.55	303.88	4,377.00	-476.60	-321.85	40.058779	-104.747966	1,265,151.02	3,210,500.97
4,470.00	6.54	22.65	4,421.90	-474.11	-321.05	40.058786	-104.747963	1,265,153.52	3,210,501.76
4,515.00	13.05	25.39	4,466.22	-467.15	-317.88	40.058805	-104.747952	1,265,160.51	3,210,504.87
4,605.00	20.47	23.29	4,552.33	-443.48	-307.28	40.058870	-104.747914	1,265,184.26	3,210,515.26
4,695.00	26.06	19.73	4,634.99	-410.39	-294.38	40.058960	-104.747868	1,265,217.46	3,210,527.89
4,785.00	32.49	12.21	4,713.48	-368.10	-282.57	40.059077	-104.747826	1,265,259.85	3,210,539.33
4,875.00	40.39	10.82	4,785.83	-315.75	-271.97	40.059220	-104.747788	1,265,312.29	3,210,549.49
4,965.00	47.91	6.92	4,850.37	-253.85	-262.46	40.059390	-104.747754	1,265,374.25	3,210,558.47
5,055.00	55.48	3.11	4,906.13	-183.56	-256.41	40.059583	-104.747732	1,265,444.59	3,210,563.92
5,145.00	63.57	2.70	4,951.73	-106.16	-252.50	40.059796	-104.747718	1,265,522.02	3,210,567.18
5,190.00	68.60	2.20	4,969.97	-65.07	-250.74	40.059908	-104.747712	1,265,563.12	3,210,568.58
5,236.00	72.84	2.43	4,985.15	-21.70	-248.99	40.060027	-104.747706	1,265,606.51	3,210,569.97
5,277.00	80.88	1.07	4,994.47	18.18	-247.78	40.060137	-104.747701	1,265,646.39	3,210,570.84
5,313.00	88.04	1.07	4,997.94	53.98	-247.11	40.060235	-104.747699	1,265,682.19	3,210,571.21
5,320.00	89.43	1.07	4,998.10	60.98	-246.98	40.060254	-104.747699	1,265,689.19	3,210,571.28
5,338.00	86.66	0.43	4,998.71	78.96	-246.74	40.060304	-104.747698	1,265,707.18	3,210,571.36
5,431.00	89.32	1.20	5,001.97	171.89	-245.42	40.060559	-104.747693	1,265,800.11	3,210,571.89
5,525.00	90.80	1.19	5,001.87	265.86	-243.46	40.060817	-104.747686	1,265,894.09	3,210,573.05
5,618.00	92.78	0.36	4,998.97	358.80	-242.20	40.061072	-104.747682	1,265,987.04	3,210,573.52
5,712.00	92.78	0.56	4,994.41	452.69	-241.45	40.061330	-104.747679	1,266,080.92	3,210,573.48
5,805.00	91.24	359.96	4,991.15	545.63	-241.03	40.061585	-104.747677	1,266,173.86	3,210,573.11
5,899.00	92.29	0.38	4,988.25	639.58	-240.75	40.061843	-104.747676	1,266,267.81	3,210,572.59
5,992.00	89.81	359.28	4,986.55	732.56	-241.02	40.062098	-104.747677	1,266,360.77	3,210,571.53
6,086.00	90.74	359.18	4,986.10	826.55	-242.29	40.062356	-104.747682	1,266,454.75	3,210,569.46
6,180.00	89.57	358.55	4,985.84	920.53	-244.15	40.062614	-104.747689	1,266,548.70	3,210,566.80
6,273.00	90.74	359.24	4,985.59	1,013.51	-245.94	40.062869	-104.747695	1,266,641.66	3,210,564.22
6,367.00	90.06	359.40	4,984.94	1,107.50	-247.06	40.063127	-104.747699	1,266,735.63	3,210,562.31
6,457.00	90.00	359.52	4,984.89	1,197.49	-247.91	40.063374	-104.747702	1,266,825.62	3,210,560.70
6,547.00	90.56	358.68	4,984.45	1,287.48	-249.32	40.063621	-104.747707	1,266,915.58	3,210,558.52
6,637.00	91.23	358.61	4,983.04	1,377.44	-251.45	40.063868	-104.747715	1,267,005.52	3,210,555.63
6,727.00	89.75	357.95	4,982.27	1,467.40	-254.15	40.064115	-104.747724	1,267,095.45	3,210,552.16
6,817.00	90.74	358.07	4,981.89	1,557.34	-257.27	40.064362	-104.747735	1,267,185.36	3,210,548.27
6,907.00	90.56	358.74	4,980.87	1,647.30	-259.78	40.064609	-104.747744	1,267,275.29	3,210,545.00
6,997.00	89.38	359.12	4,980.91	1,737.28	-261.46	40.064856	-104.747750	1,267,365.25	3,210,542.56
7,087.00	90.06	358.80	4,981.35	1,827.26	-263.09	40.065103	-104.747756	1,267,455.21	3,210,540.16

Design Report for Griswold 29-11HZ - 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)
7,177.00	90.74	358.43	4,980.73	1,917.23	-265.27	40.065350	-104.747764	1,267,545.16	3,210,537.22
7,267.00	90.00	358.35	4,980.14	2,007.20	-267.80	40.065597	-104.747773	1,267,635.09	3,210,533.93
7,357.00	89.07	357.73	4,980.88	2,097.14	-270.88	40.065844	-104.747784	1,267,725.00	3,210,530.09
7,447.00	88.70	356.80	4,982.63	2,187.02	-275.17	40.066091	-104.747799	1,267,814.84	3,210,525.03
7,585.00	89.63	358.32	4,984.64	2,324.87	-281.04	40.066469	-104.747820	1,267,952.63	3,210,517.99
7,627.00	90.25	359.69	4,984.68	2,366.87	-281.77	40.066584	-104.747823	1,267,994.62	3,210,516.90
7,717.00	90.56	359.12	4,984.05	2,456.86	-282.71	40.066831	-104.747826	1,268,084.59	3,210,515.20
7,807.00	90.25	0.83	4,983.41	2,546.85	-282.75	40.067078	-104.747826	1,268,174.58	3,210,514.40
7,897.00	89.94	1.25	4,983.26	2,636.84	-281.11	40.067325	-104.747821	1,268,264.57	3,210,515.27
7,986.00	89.57	0.74	4,983.64	2,725.82	-279.57	40.067570	-104.747815	1,268,353.57	3,210,516.06
8,076.00	89.63	0.90	4,984.27	2,815.81	-278.28	40.067817	-104.747811	1,268,443.56	3,210,516.58
8,166.00	89.51	0.82	4,984.94	2,905.80	-276.93	40.068064	-104.747806	1,268,533.55	3,210,517.17
8,257.00	89.32	0.83	4,985.87	2,996.78	-275.62	40.068313	-104.747801	1,268,624.54	3,210,517.70
8,346.00	88.58	0.42	4,987.50	3,085.76	-274.65	40.068558	-104.747798	1,268,713.52	3,210,517.92
8,437.00	90.49	0.49	4,988.24	3,176.75	-273.92	40.068807	-104.747795	1,268,804.51	3,210,517.87
8,528.00	89.81	0.11	4,988.00	3,267.75	-273.45	40.069057	-104.747793	1,268,895.51	3,210,517.57
8,618.00	89.44	0.48	4,988.59	3,357.75	-272.98	40.069304	-104.747792	1,268,985.50	3,210,517.27
8,708.00	89.01	0.46	4,989.81	3,447.74	-272.25	40.069551	-104.747789	1,269,075.49	3,210,517.25
8,798.00	89.44	1.04	4,991.03	3,537.72	-271.07	40.069798	-104.747785	1,269,165.47	3,210,517.66
8,888.00	89.20	0.84	4,992.10	3,627.70	-269.59	40.070045	-104.747780	1,269,255.46	3,210,518.37
8,978.00	90.74	1.02	4,992.14	3,717.69	-268.13	40.070292	-104.747774	1,269,345.45	3,210,519.07
9,068.00	91.98	0.82	4,990.01	3,807.65	-266.69	40.070539	-104.747769	1,269,435.42	3,210,519.75
9,158.00	91.24	0.69	4,987.48	3,897.60	-265.50	40.070786	-104.747765	1,269,525.38	3,210,520.17
9,248.00	90.74	0.23	4,985.92	3,987.59	-264.78	40.071033	-104.747762	1,269,615.36	3,210,520.13
9,338.00	90.37	0.36	4,985.05	4,077.58	-264.32	40.071280	-104.747761	1,269,705.35	3,210,519.83
9,428.00	91.05	0.49	4,983.94	4,167.57	-263.65	40.071527	-104.747758	1,269,795.34	3,210,519.73
9,477.00	91.54	0.48	4,982.83	4,216.56	-263.23	40.071662	-104.747757	1,269,844.33	3,210,519.73
9,525.00	91.54	0.48	4,981.54	4,264.54	-262.83	40.071793	-104.747755	1,269,892.31	3,210,519.72

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
119.00	119.00	0.51	0.11	First Cathedral MWD Survey
1,695.00	1,682.20	-147.49	-85.30	Tie-On to Cathedral MWD Surveys
1,756.00	1,742.51	-155.28	-90.15	First Sperry MWD Survey
9,477.00	4,982.83	4,216.56	-263.23	Last MWD Survey @ 9477' MD
9,525.00	4,981.54	4,264.54	-262.83	Str. Line Proj to Bit @ 9525' MD :: 4981.54' TVD

Design Report for Griswold 29-11HZ - 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)	0.29	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
119.00	1,695.00	Cathedral Surface MWD Surveys	MWD
1,756.00	5,320.00	MWD Vertical/Build Surveys	MWD+IFR1+SC
5,338.00	9,477.00	MWD Lateral Surveys	MWD+IFR1+SC

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,730.00	1,716.82	9 5/8" Casing @ 1730' MD :: 1716.82' TVD	9-5/8	13-3/4
5,313.00	4,997.94	7" Casing @ 5313' MD :: 4997.94' TVD	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:	2.05 °/100usft	Maximum Dogleg over Survey:	19.88 °/100usft at 5,320.00 usft
Net Tortousity applicable to Plans:	0.78 °/100usft	Directional Difficulty Index:	6.298

Design Report for Griswold 29-11HZ - Actual Surveys

Audit Info

North Reference Sheet for Sec. 11-T1N-R66W - Griswold 29-11HZ - 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' @ 5155.00usft (Ensign 145). Northing and Easting are relative to Griswold 29- 11HZ

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: 0.99996235

Grid Coordinates of Well: 1,265,630.32 usft N, 3,210,818.75 usft E

Geographical Coordinates of Well: 40° 03' 36.31" N, 104° 44' 48.54" W

Grid Convergence at Surface is: 0.49°

Based upon Minimum Curvature type calculations, at a Measured Depth of 9,525.00usft

the Bottom Hole Displacement is 4,272.63usft in the Direction of 356.47° (True).

Magnetic Convergence at surface is: -7.94° (20 March 2015, , BGGM2014)

