
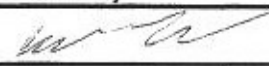


SPERRY-SUN DRILLING SERVICES

CERTIFIED SURVEY WORK SHEET

OPERATOR:	Anadarko
WELL:	Sater 24N-5HZ
FIELD:	Wattenberg
RIG:	Ensign 123
LEGALS:	Sec. 8-T2N-R67W
COUNTY:	Weld
STATE:	CO
CAL. METHOD:	True North
MAG. DECL. APPLIED:	8.6195
VERTICAL SEC. DIR. :	359.660

SSDS Job Number :	900930433
Start Date of Job :	12/28/2013
End Date of Job :	1/7/2014
Lead Directional Driller:	Jordan Timbs
Directional Driller	
Directional Trainee	
SSDS MWD Engineers :	James Tilley
MWD :	
MWD Trainee	

	Main Hole =====>	1st Side Track =====>	2nd Side Track =====>	3rd Side Track =====>	4th Side Track =====>
Surface Casing	1030.00	Tie-on	Tie On	Tie On	Tie On
First Wireline Survey	113.00	Gyro	MWD		
Last Wireline Survey	963.00	Gyro			
KOP Depth/Sidetrack MD	6699.00	KOP	KOP-ST1	KOP-ST2	KOP-ST3
MWD Tie-on	963.00	Gyro			
First MWD Survey Depth	1208.00	MWD	MWD	MWD	MWD
Last MWD Survey Depth	12806.00	MWD	MWD	MWD	MWD
Bit Extrapolation @ TD	12851.00	T.D.	T.D.	T.D.	T.D.
The following Sperry Drilling Services personnel, certify the above survey information to be accurate to the best of our knowledge:					
Print Name : Jordan Timbs		Print Name : James Tilley		Print Name :	
Sign Name : 		Sign Name : 		Sign Name :	
Print Name :		Print Name :		Print Name :	
Sign Name :		Sign Name :		Sign Name :	
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.			

Examples of

Survey Types:

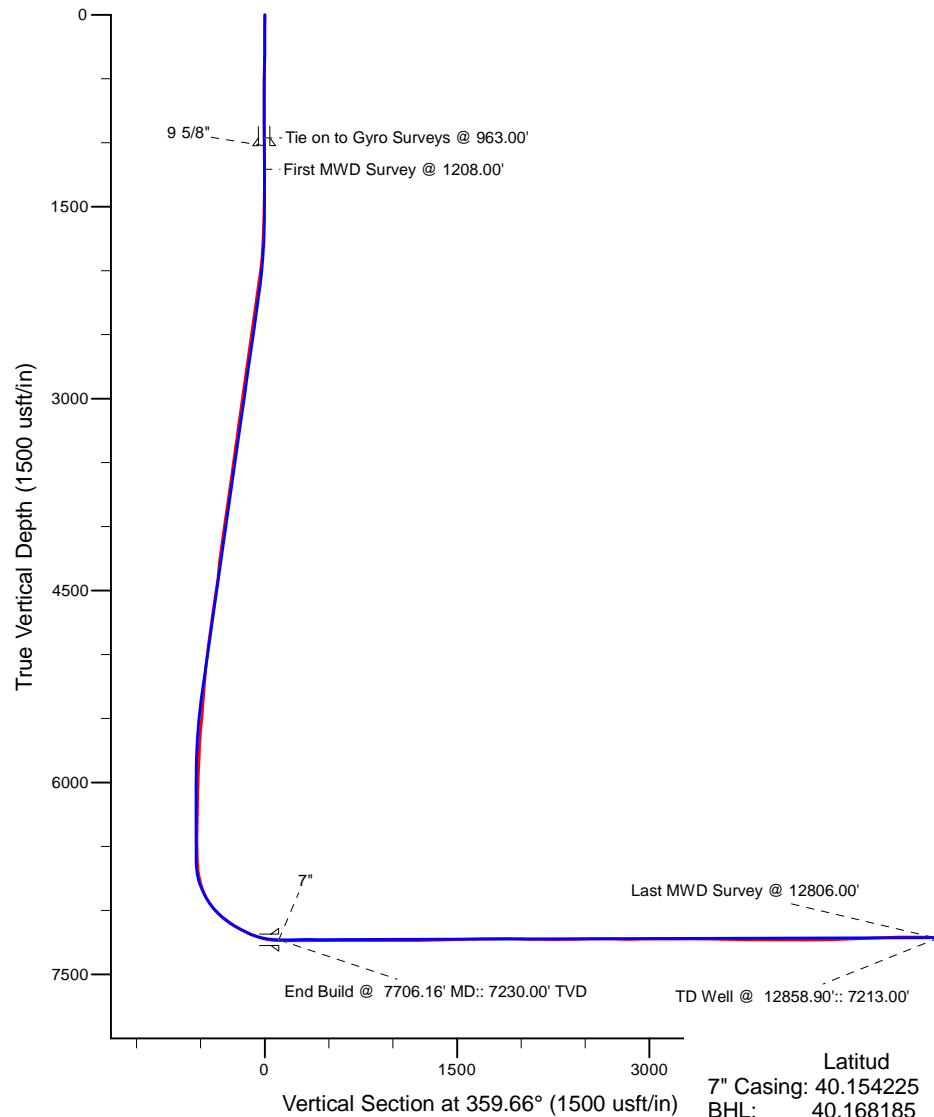
Project: Weld County, CO (NAD 83)
 Site: Sec. 8-T2N-R67W
 Well: Sater 24N-5HZ
 Wellbore: Plan D
 Design: Rev D0



HALLIBURTON
 Sperry Drilling

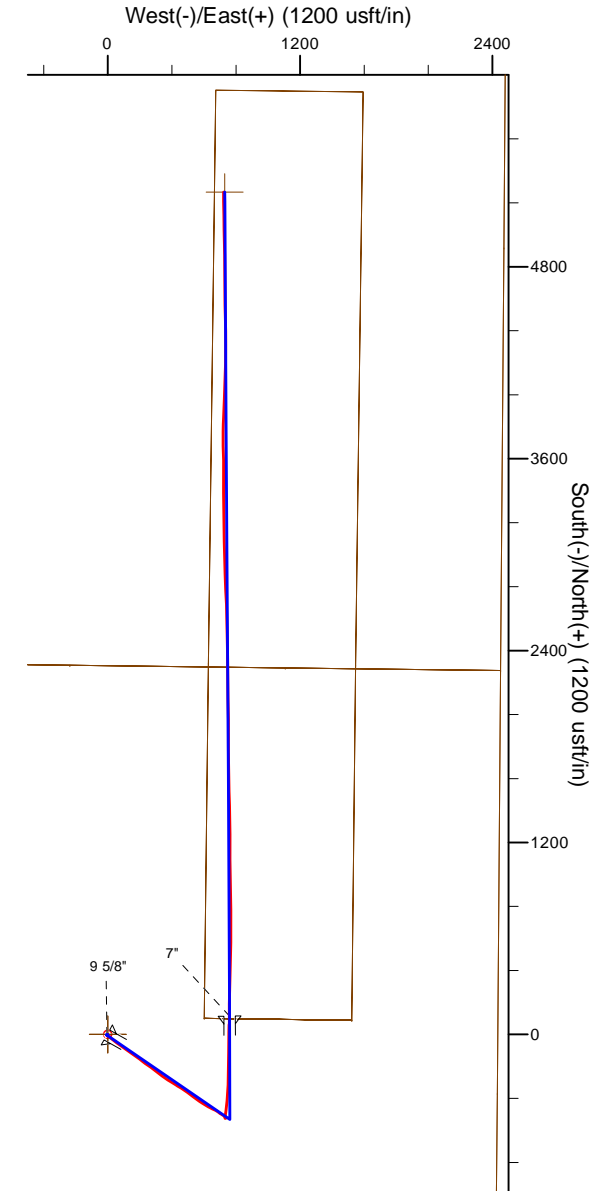
LEGEND

- Sater 24N-5HZ, Plan D, Actual Surveys V0
- Rev D0



BHL
 FNL: 2551'
 FEL: 1731'

7" Casing
 FSL: 3128'
 FEL: 1656'



WELL DETAILS: Sater 24N-5HZ	
Ground Level:	4913.00
RKB=13' @ 4926.00usft (Ensign 123)	
Plan: Rev D0 (Sater 24N-5HZ/Plan D)	
Created By: Pari Amanlou	Date: 1/6/2014

	Latitude	Longitude	Northing	Easting
7" Casing:	40.154225	-104.910481	1,299,575.16	3,164,781.21
BHL:	40.168185	-104.910609	1,304,660.16	3,164,711.72

Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 8-T2N-R67W

Sater 24N-5HZ

API: 05-123-38325 :: Job# 900930433

Plan D

Design: Actual Surveys

Sperry Drilling Services

Standard Report

21 August, 2014

Surface UWI : API: 05-123-38325 :: Job# 900930433

Well Coordinates: 1,299,439.73 N, 3,164,023.98 E (40° 09' 13.92" N, 104° 54' 47.49" W)

Ground Level: 4,913.00 usft

Local Coordinate Origin:

Viewing Datum:

TVDs to System:

North Reference:

Unit System:

Geodetic Scale Factor Applied

Version: 5000.1 Build: 70

Centered on Well Sater 24N-5HZ

RKB=13' @ 4926.00usft (Ensign 123)

N

True

API - US Survey Feet - Custom

HALLIBURTON

Design Report for Sater 24N-5HZ - 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
13.00	0.00	0.00	13.00	0.00	0.00	0.00	0.00
113.00	0.69	261.51	113.00	-0.09	-0.60	-0.09	0.69
213.00	0.62	218.89	212.99	-0.60	-1.53	-0.59	0.48
313.00	0.56	195.94	312.99	-1.49	-2.00	-1.48	0.24
413.00	0.58	210.77	412.98	-2.39	-2.40	-2.38	0.15
513.00	0.62	200.03	512.98	-3.34	-2.84	-3.32	0.12
613.00	0.36	210.90	612.97	-4.12	-3.19	-4.10	0.27
713.00	0.09	82.39	712.97	-4.37	-3.27	-4.36	0.42
813.00	0.03	172.22	812.97	-4.39	-3.19	-4.37	0.09
913.00	0.62	287.30	912.97	-4.26	-3.70	-4.23	0.63
963.00	0.56	299.62	962.97	-4.05	-4.17	-4.03	0.28
Tie-On to Surface Gyro @ 963.00 FT - Tie on to Gyro Surveys @ 963.00'							
1,023.30	0.46	294.58	1,023.26	-3.81	-4.65	-3.78	0.18
9 5/8"							
1,208.00	0.22	251.36	1,207.96	-3.61	-5.66	-3.58	0.18
First MWD Survey @ 1208.00'							
1,346.00	0.17	252.19	1,345.96	-3.76	-6.11	-3.72	0.04
1,395.00	0.25	246.55	1,394.96	-3.83	-6.27	-3.79	0.17
1,488.00	0.24	253.89	1,487.96	-3.96	-6.65	-3.92	0.04
1,589.00	1.89	141.05	1,588.94	-5.31	-5.80	-5.28	1.98
1,683.00	4.30	129.31	1,682.80	-8.75	-2.10	-8.74	2.64
1,776.00	6.14	121.55	1,775.41	-13.56	4.83	-13.59	2.11
1,870.00	8.17	123.98	1,868.67	-19.93	14.66	-20.01	2.18
1,963.00	9.93	125.21	1,960.51	-28.25	26.69	-28.40	1.90
2,057.00	10.87	133.87	2,052.97	-39.06	39.70	-39.30	1.94
2,150.00	13.41	128.33	2,143.89	-51.83	54.49	-52.15	3.00
2,244.00	14.91	125.30	2,235.03	-65.58	72.91	-66.01	1.78
2,337.00	13.38	124.86	2,325.21	-78.64	91.50	-79.19	1.65
2,525.00	14.50	124.66	2,507.67	-104.46	128.71	-105.22	0.60
2,618.00	13.28	124.33	2,597.95	-117.11	147.11	-117.98	1.31
2,712.00	12.52	123.38	2,689.57	-128.80	164.54	-129.78	0.84
2,805.00	13.96	128.14	2,780.10	-141.28	181.78	-142.35	1.94
2,899.00	12.58	127.04	2,871.59	-154.45	198.87	-155.63	1.49
2,992.00	13.92	127.08	2,962.11	-167.29	215.88	-168.57	1.44
3,086.00	13.15	128.00	3,053.50	-180.69	233.32	-182.08	0.85
3,179.00	14.47	124.13	3,143.81	-193.73	251.28	-195.21	1.73
3,273.00	11.85	123.03	3,235.34	-205.58	269.09	-207.17	2.80
3,366.00	12.85	128.60	3,326.19	-217.24	285.18	-218.92	1.67
3,456.00	14.31	129.69	3,413.67	-230.58	301.56	-232.37	1.65
3,546.00	11.22	127.53	3,501.43	-243.02	317.07	-244.90	3.47
3,636.00	12.39	125.90	3,589.53	-254.02	331.84	-255.99	1.35
3,726.00	12.54	125.94	3,677.41	-265.42	347.57	-267.47	0.17
3,816.00	14.32	124.02	3,764.94	-277.38	364.71	-279.54	2.04
3,906.00	15.50	122.89	3,851.91	-290.14	384.03	-292.41	1.35
3,996.00	14.63	122.34	3,938.82	-302.75	403.73	-305.14	0.98
4,086.00	16.84	121.39	4,025.44	-315.62	424.47	-318.13	2.47
4,176.00	15.24	122.87	4,111.93	-328.83	445.53	-331.47	1.83
4,357.00	10.93	120.69	4,288.19	-350.51	480.28	-353.35	2.40
4,447.00	10.77	124.70	4,376.59	-359.65	494.53	-362.58	0.86

Design Report for Sater 24N-5HZ - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
4,537.00	12.91	127.84	4,464.67	-370.61	509.39	-373.63	2.48
4,627.00	13.95	129.16	4,552.21	-383.63	525.74	-386.74	1.20
4,717.00	13.83	126.05	4,639.57	-396.81	542.85	-400.02	0.84
4,807.00	12.06	127.74	4,727.28	-408.90	558.98	-412.20	2.01
4,897.00	12.91	124.74	4,815.16	-420.38	574.68	-423.78	1.19
4,987.00	13.89	122.28	4,902.71	-431.88	592.08	-435.38	1.26
5,167.00	13.22	118.28	5,077.69	-453.17	628.47	-456.89	0.64
5,347.00	8.71	113.71	5,254.37	-468.41	659.09	-472.31	2.55
5,437.00	9.13	116.55	5,343.28	-474.34	671.72	-478.32	0.68
5,527.00	9.07	126.28	5,432.15	-481.73	683.82	-485.78	1.71
5,617.00	9.28	127.66	5,521.00	-490.36	695.29	-494.48	0.34
5,707.00	7.92	119.71	5,609.99	-497.87	706.42	-502.05	2.00
5,977.00	3.21	122.90	5,878.64	-511.20	728.93	-515.52	1.75
6,067.00	3.52	141.64	5,968.49	-514.74	732.77	-519.08	1.26
6,157.00	2.13	148.14	6,058.38	-518.32	735.36	-522.68	1.58
6,247.00	1.29	170.66	6,148.34	-520.74	736.41	-525.11	1.18
6,337.00	0.92	197.64	6,238.32	-522.43	736.36	-526.79	0.70
6,427.00	0.94	235.84	6,328.31	-523.54	735.53	-527.89	0.68
6,517.00	1.12	251.34	6,418.30	-524.23	734.08	-528.58	0.37
6,607.00	0.61	284.67	6,508.29	-524.39	732.78	-528.73	0.77
6,652.00	0.28	282.36	6,553.28	-524.31	732.45	-528.64	0.73
6,697.00	1.12	336.75	6,598.28	-523.88	732.16	-528.22	2.19
6,742.00	4.72	356.33	6,643.22	-521.63	731.87	-525.96	8.19
6,787.00	7.97	6.53	6,687.93	-516.68	732.11	-521.01	7.62
6,832.00	11.27	8.86	6,732.30	-509.23	733.14	-513.57	7.38
6,877.00	14.41	9.80	6,776.17	-499.37	734.77	-503.72	6.99
6,922.00	18.63	9.12	6,819.30	-486.75	736.87	-491.11	9.39
6,967.00	23.26	8.22	6,861.31	-470.85	739.28	-475.23	10.31
7,012.00	28.07	6.19	6,901.86	-451.52	741.69	-455.91	10.86
7,057.00	33.59	3.39	6,940.49	-428.55	743.57	-432.95	12.67
7,102.00	38.14	3.82	6,976.95	-402.24	745.23	-406.66	10.13
7,147.00	42.51	4.34	7,011.25	-373.20	747.31	-377.63	9.74
7,192.00	48.28	2.92	7,042.84	-341.24	749.32	-345.68	13.02
7,237.00	52.03	1.91	7,071.66	-306.73	750.76	-311.18	8.51
7,282.00	55.74	0.63	7,098.18	-270.39	751.56	-274.85	8.56
7,327.00	59.63	1.13	7,122.23	-232.37	752.15	-236.83	8.70
7,372.00	62.28	1.72	7,144.08	-193.05	753.13	-197.51	6.00
7,417.00	64.09	1.38	7,164.38	-152.90	754.21	-157.38	4.08
7,462.00	66.62	0.46	7,183.14	-112.01	754.87	-116.49	5.92
7,507.00	69.17	0.19	7,200.07	-70.32	755.10	-74.80	5.69
7,552.00	72.88	0.84	7,214.70	-27.78	755.49	-32.26	8.36
7,597.00	77.83	1.29	7,226.08	15.74	756.30	11.25	11.04
7,642.00	83.89	1.66	7,233.22	60.13	757.44	55.63	13.49
7,675.00	87.57	0.23	7,235.68	93.03	757.98	88.53	11.96
7,712.40	88.66	0.26	7,236.91	130.41	758.14	125.91	2.91
7"							
7,749.00	89.72	0.28	7,237.43	167.00	758.31	162.50	2.91
7,842.00	90.25	1.10	7,237.45	259.99	759.43	255.48	1.05
8,022.00	90.65	1.85	7,236.04	439.93	764.07	435.39	0.47
8,112.00	90.40	1.27	7,235.22	529.89	766.52	525.33	0.70
8,202.00	89.41	0.10	7,235.36	619.88	767.59	615.31	1.70

Design Report for Sater 24N-5HZ - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
8,292.00	91.17	0.80	7,234.91	709.87	768.30	705.30	2.10
8,382.00	89.04	358.79	7,234.74	799.86	767.98	795.29	3.25
8,472.00	90.03	358.38	7,235.47	889.83	765.75	885.27	1.19
8,562.00	90.06	359.44	7,235.40	979.81	764.04	975.26	1.18
8,652.00	89.72	359.72	7,235.58	1,069.81	763.38	1,065.26	0.49
8,742.00	89.97	0.14	7,235.82	1,159.81	763.27	1,155.26	0.54
8,833.00	91.20	359.40	7,234.89	1,250.80	762.91	1,246.25	1.58
9,012.00	91.97	358.19	7,229.94	1,429.69	759.15	1,425.16	0.80
9,102.00	91.36	358.92	7,227.32	1,519.62	756.88	1,515.10	1.06
9,282.00	91.29	359.04	7,223.16	1,699.54	753.67	1,695.04	0.08
9,372.00	91.36	359.45	7,221.08	1,789.51	752.49	1,785.02	0.46
9,462.00	88.74	0.17	7,221.00	1,879.50	752.19	1,875.01	3.02
9,552.00	87.87	359.52	7,223.66	1,969.46	751.95	1,964.97	1.21
9,642.00	89.26	358.86	7,225.92	2,059.42	750.67	2,054.93	1.71
9,732.00	89.63	359.52	7,226.79	2,149.41	749.40	2,144.92	0.84
9,822.00	89.94	359.57	7,227.13	2,239.41	748.69	2,234.92	0.35
9,912.00	90.22	359.26	7,227.00	2,329.40	747.77	2,324.92	0.46
10,002.00	90.96	359.08	7,226.08	2,419.39	746.46	2,414.91	0.85
10,092.00	90.43	359.29	7,224.98	2,509.37	745.18	2,504.90	0.63
10,272.00	89.97	357.62	7,224.36	2,689.30	740.33	2,684.86	0.96
10,362.00	88.15	356.40	7,225.83	2,779.16	735.64	2,774.74	2.43
10,452.00	91.11	358.95	7,226.41	2,869.06	731.99	2,864.67	4.34
10,542.00	91.29	358.63	7,224.53	2,959.02	730.09	2,954.64	0.41
10,723.00	88.95	358.54	7,224.15	3,139.95	725.62	3,135.59	1.29
10,813.00	89.88	358.75	7,225.07	3,229.92	723.49	3,225.57	1.06
10,903.00	90.09	359.94	7,225.09	3,319.92	722.46	3,315.57	1.34
11,083.00	89.97	0.29	7,225.00	3,499.91	722.82	3,495.56	0.21
11,173.00	88.34	358.46	7,226.32	3,589.89	721.84	3,585.55	2.72
11,263.00	89.14	359.05	7,228.30	3,679.85	719.89	3,675.51	1.10
11,353.00	89.35	0.78	7,229.49	3,769.84	719.75	3,765.50	1.94
11,443.00	89.20	2.16	7,230.63	3,859.80	722.06	3,855.45	1.54
11,533.00	90.18	3.17	7,231.12	3,949.70	726.25	3,945.32	1.56
11,623.00	90.06	1.82	7,230.93	4,039.61	730.16	4,035.21	1.51
11,713.00	89.63	1.34	7,231.17	4,129.57	732.65	4,125.15	0.72
11,803.00	90.00	0.84	7,231.46	4,219.56	734.36	4,215.13	0.69
11,893.00	90.06	0.51	7,231.41	4,309.55	735.42	4,305.11	0.37
11,983.00	92.07	359.82	7,229.74	4,399.53	735.68	4,395.09	2.36
12,073.00	90.92	358.40	7,227.39	4,489.48	734.28	4,485.05	2.03
12,163.00	92.44	358.41	7,224.75	4,579.41	731.78	4,574.99	1.69
12,253.00	93.21	359.06	7,220.32	4,669.28	729.79	4,664.86	1.12
12,343.00	92.44	0.63	7,215.88	4,759.16	729.55	4,754.75	1.94
12,433.00	91.91	359.37	7,212.47	4,849.10	729.55	4,844.68	1.52
12,524.00	91.11	358.91	7,210.07	4,940.05	728.18	4,935.65	1.01
12,614.00	90.18	358.70	7,209.06	5,030.03	726.31	5,025.63	1.06
12,704.00	89.48	358.74	7,209.32	5,120.00	724.30	5,115.62	0.78
12,794.00	88.89	358.86	7,210.60	5,209.97	722.41	5,205.60	0.67
12,806.00	88.71	359.25	7,210.85	5,221.97	722.21	5,217.59	3.58
Last MWD Survey @ 12806.00'							
12,851.00	88.71	359.25	7,211.87	5,266.95	721.62	5,262.58	0.00
St. Line Projection to Bit @ 12851' MD							

Design Report for Sater 24N-5HZ - Actual Surveys

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
963.00	962.97	-4.05	-4.17	Tie-On to Surface Gyro @ 963.00 FT
963.00	962.97	-4.05	-4.17	Tie on to Gyro Surveys @ 963.00'
1,208.00	1,207.96	-3.61	-5.66	First MWD Survey @ 1208.00'
12,806.00	7,210.85	5,221.97	722.21	Last MWD Survey @ 12806.00'
12,851.00	7,211.87	5,266.95	721.62	St. Line Projection to Bit @ 12851' MD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/-S (usft)	+E/-W (usft)	
User	No Target (Freehand)	359.66	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
13.00	963.00	Actual Field Surveys	NS-GYRO-MS
963.00	7,675.00	MWD Surveys-Vertical and Build	MWD+IFR1+SC
7,749.00	12,806.00	MWD Surveys- Lateral	MWD+IFR1+SC

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,023.30		9 5/8"	9-5/8	28
7,712.40		7"	7	8-3/4

Design Report for Sater 24N-5HZ - 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
Sater 24N-5HZ_Sec. L	0.00	0.00	0.00	0.01	0.00	1,299,439.75	3,164,023.98	40° 9' 13.921 N	104° 54' 47.495 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	7,787.91	-2,806.58	1,307,208.59	3,161,166.04	
Point 2				0.00	7,755.78	-137.33	1,307,194.12	3,163,835.34	
Point 3				0.00	7,739.98	1,177.52	1,307,187.03	3,165,150.21	
Point 4				0.00	7,724.44	2,492.27	1,307,180.19	3,166,464.98	
Point 5				0.00	4,917.89	2,471.49	1,304,373.68	3,166,462.77	
Point 6				0.00	2,275.19	2,451.40	1,301,731.01	3,166,460.17	
Point 7				0.00	2,292.28	1,107.34	1,301,739.21	3,165,116.08	
Point 8				0.00	2,309.56	-236.76	1,301,747.59	3,163,771.95	
Point 9				0.00	2,327.95	-2,925.18	1,301,748.19	3,161,083.58	
Point 10				0.00	2,309.56	-236.76	1,301,747.59	3,163,771.95	
Point 11				0.00	2,292.28	1,107.34	1,301,739.21	3,165,116.08	
Point 12				0.00	2,275.19	2,451.40	1,301,731.01	3,166,460.17	
Point 13				0.00	-369.75	2,430.53	1,299,086.10	3,166,456.80	
Point 14				0.00	-1,692.83	2,420.77	1,297,763.04	3,166,455.80	
Point 15				0.00	-3,016.09	2,411.15	1,296,439.80	3,166,454.93	
Point 16				0.00	-3,022.02	-314.75	1,296,415.84	3,163,729.25	
Point 17				0.00	-3,027.63	-3,040.30	1,296,392.19	3,161,003.91	
Point 18				0.00	-330.25	-2,982.18	1,299,089.78	3,161,044.17	
Point 19				0.00	2,327.95	-2,925.18	1,301,748.19	3,161,083.58	
Point 20				0.00	4,976.75	-2,868.12	1,304,397.20	3,161,123.11	
Point 21				0.00	7,787.91	-2,806.58	1,307,208.59	3,161,166.04	
Sater 24N-5HZ_SHL	0.00	0.00	0.00	0.01	0.00	1,299,439.75	3,164,023.98	40° 9' 13.921 N	104° 54' 47.495 W
- actual wellpath misses target center by 0.01usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Point									
Sater 24N-5HZ_LD	0.00	0.00	0.00	0.01	0.00	1,299,439.75	3,164,023.98	40° 9' 13.921 N	104° 54' 47.495 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	100.45	602.19	1,299,544.17	3,164,625.47	
Point 2				0.00	88.68	1,522.17	1,299,538.49	3,165,545.46	
Point 3				0.00	2,308.63	1,547.18	1,301,758.47	3,165,555.78	
Point 4				0.00	5,893.28	1,593.65	1,305,343.20	3,165,578.53	
Point 5				0.00	5,903.86	673.67	1,305,347.69	3,164,658.54	
Point 6				0.00	2,320.40	627.22	1,301,764.15	3,164,635.80	
Point 7				0.00	100.45	602.19	1,299,544.17	3,164,625.47	
Point 8				0.00	88.68	1,522.17	1,299,538.49	3,165,545.46	
Sater 24N-5HZ_BHL_I	0.00	0.00	7,213.00	5,260.01	772.00	1,304,704.52	3,164,761.12	40° 10' 5.901 N	104° 54' 37.550 W
- actual wellpath misses target center by 50.30usft at 12843.43usft MD (7211.70 TVD, 5259.38 N, 721.72 E)									
- Point									
Sater 24N-5HZ_BHL_I	0.00	0.00	7,213.00	5,267.14	730.00	1,304,711.37	3,164,719.08	40° 10' 5.971 N	104° 54' 38.091 W
- actual wellpath misses target center by 8.45usft at 12851.00usft MD (7211.87 TVD, 5266.95 N, 721.62 E)									
- Point									
Sater 24N-5HZ_BHL	0.00	0.00	7,217.00	5,127.14	713.50	1,304,571.27	3,164,703.51	40° 10' 4.588 N	104° 54' 38.304 W
- actual wellpath misses target center by 13.08usft at 12711.47usft MD (7209.39 TVD, 5127.48 N, 724.13 E)									
- Point									

Directional Difficulty Index

Average Dogleg over Survey:	1.84 °/100usft	Maximum Dogleg over Survey:	13.49 °/100usft at 7,642.00 usft
Net Tortousity applicable to Plans:	0.89 °/100usft	Directional Difficulty Index:	6.451

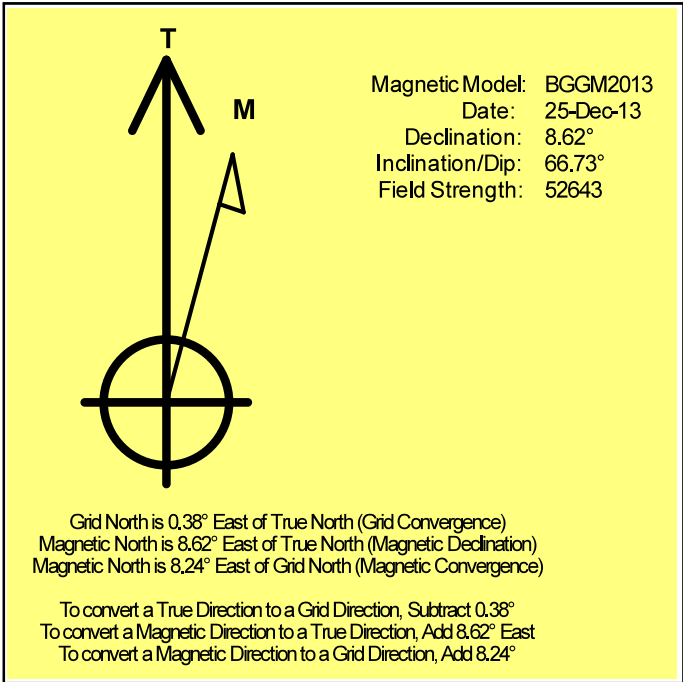
Audit Info

North Reference Sheet for Sec. 8-T2N-R67W - Sater 24N-5HZ - Plan D

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' @ 4926.00usft (Ensign 123). Northing and Easting are relative to Sater 24N-5HZ
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: 0.99995827

Grid Coordinates of Well: 1,299,439.73 usft N, 3,164,023.98 usft E
Geographical Coordinates of Well: 40° 09' 13.92" N, 104° 54' 47.49" W
Grid Convergence at Surface is: 0.38°

Based upon Minimum Curvature type calculations, at a Measured Depth of 12,851.00usft
the Bottom Hole Displacement is 5,316.16usft in the Direction of 7.80° (True).
Magnetic Convergence at surface is: -8.24° (25 December 2013, , BGGM2013)



Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 8-T2N-R67W

Sater 24N-5HZ

API: 05-123-38325 :: Job# 900930433

Plan D

Design: Actual Surveys

Sperry Drilling Services

Geodetic Report

21 August, 2014

Well Coordinates: 1,299,439.73 N, 3,164,023.98 E (40° 09' 13.92" N, 104° 54' 47.49" W)

Ground Level: 4,913.00 usft

Local Coordinate Origin:

Viewing Datum:

TVDs to System:

North Reference:

Unit System:

Geodetic Scale Factor Applied

Version: 5000.1 Build: 70

Centered on Well Sater 24N-5HZ

RKB=13' @ 4926.00usft (Ensign 123)

N

True

API - US Survey Feet - Custom

HALLIBURTON

Design Report for Sater 24N-5HZ - Actual Surveys

Measured			Vertical	Local Coordinates		Geographic Coordinates		UTM Coordinates	
Depth (usft)	Inclination (°)	Azimuth (°)	Depth (usft)	+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° 9' 13.921 N	104° 54' 47.495 W	1,299,439.73	3,164,023.98
13.00	0.00	0.00	13.00	0.00	0.00	40° 9' 13.921 N	104° 54' 47.495 W	1,299,439.73	3,164,023.98
113.00	0.69	261.51	113.00	-0.09	-0.60	40° 9' 13.920 N	104° 54' 47.502 W	1,299,439.64	3,164,023.38
213.00	0.62	218.89	212.99	-0.60	-1.53	40° 9' 13.915 N	104° 54' 47.515 W	1,299,439.12	3,164,022.45
313.00	0.56	195.94	312.99	-1.49	-2.00	40° 9' 13.906 N	104° 54' 47.521 W	1,299,438.23	3,164,021.98
413.00	0.58	210.77	412.98	-2.39	-2.40	40° 9' 13.897 N	104° 54' 47.526 W	1,299,437.32	3,164,021.60
513.00	0.62	200.03	512.98	-3.34	-2.84	40° 9' 13.888 N	104° 54' 47.531 W	1,299,436.38	3,164,021.16
613.00	0.36	210.90	612.97	-4.12	-3.19	40° 9' 13.880 N	104° 54' 47.536 W	1,299,435.60	3,164,020.82
713.00	0.09	82.39	712.97	-4.37	-3.27	40° 9' 13.878 N	104° 54' 47.537 W	1,299,435.34	3,164,020.74
813.00	0.03	172.22	812.97	-4.39	-3.19	40° 9' 13.877 N	104° 54' 47.536 W	1,299,435.32	3,164,020.82
913.00	0.62	287.30	912.97	-4.26	-3.70	40° 9' 13.879 N	104° 54' 47.542 W	1,299,435.45	3,164,020.30
963.00	0.56	299.62	962.97	-4.05	-4.17	40° 9' 13.881 N	104° 54' 47.549 W	1,299,435.65	3,164,019.83
1,023.30	0.46	294.58	1,023.26	-3.81	-4.65	40° 9' 13.883 N	104° 54' 47.555 W	1,299,435.89	3,164,019.35
1,208.00	0.22	251.36	1,207.96	-3.61	-5.66	40° 9' 13.885 N	104° 54' 47.568 W	1,299,436.08	3,164,018.34
1,346.00	0.17	252.19	1,345.96	-3.76	-6.11	40° 9' 13.884 N	104° 54' 47.573 W	1,299,435.93	3,164,017.90
1,395.00	0.25	246.55	1,394.96	-3.83	-6.27	40° 9' 13.883 N	104° 54' 47.576 W	1,299,435.87	3,164,017.73
1,488.00	0.24	253.89	1,487.96	-3.96	-6.65	40° 9' 13.882 N	104° 54' 47.580 W	1,299,435.73	3,164,017.36
1,589.00	1.89	141.05	1,588.94	-5.31	-5.80	40° 9' 13.868 N	104° 54' 47.570 W	1,299,434.38	3,164,018.21
1,683.00	4.30	129.31	1,682.80	-8.75	-2.10	40° 9' 13.834 N	104° 54' 47.522 W	1,299,430.97	3,164,021.93
1,776.00	6.14	121.55	1,775.41	-13.56	4.83	40° 9' 13.787 N	104° 54' 47.433 W	1,299,426.20	3,164,028.90
1,870.00	8.17	123.98	1,868.67	-19.93	14.66	40° 9' 13.724 N	104° 54' 47.306 W	1,299,419.90	3,164,038.77
1,963.00	9.93	125.21	1,960.51	-28.25	26.69	40° 9' 13.642 N	104° 54' 47.151 W	1,299,411.67	3,164,050.85
2,057.00	10.87	133.87	2,052.97	-39.06	39.70	40° 9' 13.535 N	104° 54' 46.983 W	1,299,400.94	3,164,063.94
2,150.00	13.41	128.33	2,143.89	-51.83	54.49	40° 9' 13.409 N	104° 54' 46.793 W	1,299,388.27	3,164,078.81
2,244.00	14.91	125.30	2,235.03	-65.58	72.91	40° 9' 13.273 N	104° 54' 46.556 W	1,299,374.64	3,164,097.32
2,337.00	13.38	124.86	2,325.21	-78.64	91.50	40° 9' 13.144 N	104° 54' 46.316 W	1,299,361.70	3,164,116.00
2,525.00	14.50	124.66	2,507.67	-104.46	128.71	40° 9' 12.889 N	104° 54' 45.837 W	1,299,336.13	3,164,153.38
2,618.00	13.28	124.33	2,597.95	-117.11	147.11	40° 9' 12.764 N	104° 54' 45.600 W	1,299,323.61	3,164,171.86
2,712.00	12.52	123.38	2,689.57	-128.80	164.54	40° 9' 12.648 N	104° 54' 45.376 W	1,299,312.03	3,164,189.36
2,805.00	13.96	128.14	2,780.10	-141.28	181.78	40° 9' 12.525 N	104° 54' 45.154 W	1,299,299.67	3,164,206.68
2,899.00	12.58	127.04	2,871.59	-154.45	198.87	40° 9' 12.395 N	104° 54' 44.934 W	1,299,286.61	3,164,223.86
2,992.00	13.92	127.08	2,962.11	-167.29	215.88	40° 9' 12.268 N	104° 54' 44.715 W	1,299,273.88	3,164,240.95
3,086.00	13.15	128.00	3,053.50	-180.69	233.32	40° 9' 12.135 N	104° 54' 44.490 W	1,299,260.59	3,164,258.48
3,179.00	14.47	124.13	3,143.81	-193.73	251.28	40° 9' 12.006 N	104° 54' 44.259 W	1,299,247.68	3,164,276.52
3,273.00	11.85	123.03	3,235.34	-205.58	269.09	40° 9' 11.889 N	104° 54' 44.029 W	1,299,235.95	3,164,294.42
3,366.00	12.85	128.60	3,326.19	-217.24	285.18	40° 9' 11.774 N	104° 54' 43.822 W	1,299,224.40	3,164,310.58
3,456.00	14.31	129.69	3,413.67	-230.58	301.56	40° 9' 11.642 N	104° 54' 43.611 W	1,299,211.16	3,164,327.05
3,546.00	11.22	127.53	3,501.43	-243.02	317.07	40° 9' 11.519 N	104° 54' 43.411 W	1,299,198.82	3,164,342.64
3,636.00	12.39	125.90	3,589.53	-254.02	331.84	40° 9' 11.411 N	104° 54' 43.221 W	1,299,187.92	3,164,357.48
3,726.00	12.54	125.94	3,677.41	-265.42	347.57	40° 9' 11.298 N	104° 54' 43.019 W	1,299,176.63	3,164,373.28
3,816.00	14.32	124.02	3,764.94	-277.38	364.71	40° 9' 11.180 N	104° 54' 42.798 W	1,299,164.78	3,164,390.50
3,906.00	15.50	122.89	3,851.91	-290.14	384.03	40° 9' 11.054 N	104° 54' 42.549 W	1,299,152.16	3,164,409.90

Design Report for Sater 24N-5HZ - 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)
3,996.00	14.63	122.34	3,938.82	-302.75	403.73	40° 9' 10.929 N	104° 54' 42.295 W	1,299,139.68	3,164,429.69
4,086.00	16.84	121.39	4,025.44	-315.62	424.47	40° 9' 10.802 N	104° 54' 42.028 W	1,299,126.94	3,164,450.51
4,176.00	15.24	122.87	4,111.93	-328.83	445.53	40° 9' 10.671 N	104° 54' 41.757 W	1,299,113.87	3,164,471.66
4,357.00	10.93	120.69	4,288.19	-350.51	480.28	40° 9' 10.457 N	104° 54' 41.309 W	1,299,092.42	3,164,506.55
4,447.00	10.77	124.70	4,376.59	-359.65	494.53	40° 9' 10.367 N	104° 54' 41.126 W	1,299,083.38	3,164,520.86
4,537.00	12.91	127.84	4,464.67	-370.61	509.39	40° 9' 10.258 N	104° 54' 40.935 W	1,299,072.52	3,164,535.79
4,627.00	13.95	129.16	4,552.21	-383.63	525.74	40° 9' 10.130 N	104° 54' 40.724 W	1,299,059.61	3,164,552.23
4,717.00	13.83	126.05	4,639.57	-396.81	542.85	40° 9' 10.000 N	104° 54' 40.504 W	1,299,046.54	3,164,569.42
4,807.00	12.06	127.74	4,727.28	-408.90	558.98	40° 9' 9.880 N	104° 54' 40.296 W	1,299,034.56	3,164,585.63
4,897.00	12.91	124.74	4,815.16	-420.38	574.68	40° 9' 9.767 N	104° 54' 40.094 W	1,299,023.18	3,164,601.41
4,987.00	13.89	122.28	4,902.71	-431.88	592.08	40° 9' 9.653 N	104° 54' 39.870 W	1,299,011.80	3,164,618.88
5,167.00	13.22	118.28	5,077.69	-453.17	628.47	40° 9' 9.443 N	104° 54' 39.401 W	1,298,990.75	3,164,655.41
5,347.00	8.71	113.71	5,254.37	-468.41	659.09	40° 9' 9.292 N	104° 54' 39.007 W	1,298,975.72	3,164,686.13
5,437.00	9.13	116.55	5,343.28	-474.34	671.72	40° 9' 9.233 N	104° 54' 38.844 W	1,298,969.87	3,164,698.79
5,527.00	9.07	126.28	5,432.15	-481.73	683.82	40° 9' 9.160 N	104° 54' 38.688 W	1,298,962.56	3,164,710.95
5,617.00	9.28	127.66	5,521.00	-490.36	695.29	40° 9' 9.075 N	104° 54' 38.541 W	1,298,954.00	3,164,722.47
5,707.00	7.92	119.71	5,609.99	-497.87	706.42	40° 9' 9.001 N	104° 54' 38.397 W	1,298,946.57	3,164,733.65
5,977.00	3.21	122.90	5,878.64	-511.20	728.93	40° 9' 8.869 N	104° 54' 38.107 W	1,298,933.39	3,164,756.25
6,067.00	3.52	141.64	5,968.49	-514.74	732.77	40° 9' 8.834 N	104° 54' 38.058 W	1,298,929.88	3,164,760.10
6,157.00	2.13	148.14	6,058.38	-518.32	735.36	40° 9' 8.799 N	104° 54' 38.025 W	1,298,926.31	3,164,762.72
6,247.00	1.29	170.66	6,148.34	-520.74	736.41	40° 9' 8.775 N	104° 54' 38.011 W	1,298,923.89	3,164,763.79
6,337.00	0.92	197.64	6,238.32	-522.43	736.36	40° 9' 8.758 N	104° 54' 38.012 W	1,298,922.21	3,164,763.74
6,427.00	0.94	235.84	6,328.31	-523.54	735.53	40° 9' 8.747 N	104° 54' 38.022 W	1,298,921.10	3,164,762.92
6,517.00	1.12	251.34	6,418.30	-524.23	734.08	40° 9' 8.740 N	104° 54' 38.041 W	1,298,920.39	3,164,761.48
6,607.00	0.61	284.67	6,508.29	-524.39	732.78	40° 9' 8.739 N	104° 54' 38.058 W	1,298,920.22	3,164,760.19
6,652.00	0.28	282.36	6,553.28	-524.31	732.45	40° 9' 8.740 N	104° 54' 38.062 W	1,298,920.31	3,164,759.85
6,697.00	1.12	336.75	6,598.28	-523.88	732.16	40° 9' 8.744 N	104° 54' 38.066 W	1,298,920.73	3,164,759.56
6,742.00	4.72	356.33	6,643.22	-521.63	731.87	40° 9' 8.766 N	104° 54' 38.069 W	1,298,922.98	3,164,759.26
6,787.00	7.97	6.53	6,687.93	-516.68	732.11	40° 9' 8.815 N	104° 54' 38.066 W	1,298,927.93	3,164,759.46
6,832.00	11.27	8.86	6,732.30	-509.23	733.14	40° 9' 8.888 N	104° 54' 38.053 W	1,298,935.38	3,164,760.44
6,877.00	14.41	9.80	6,776.17	-499.37	734.77	40° 9' 8.986 N	104° 54' 38.032 W	1,298,945.26	3,164,762.01
6,922.00	18.63	9.12	6,819.30	-486.75	736.87	40° 9' 9.111 N	104° 54' 38.005 W	1,298,957.89	3,164,764.02
6,967.00	23.26	8.22	6,861.31	-470.85	739.28	40° 9' 9.268 N	104° 54' 37.974 W	1,298,973.81	3,164,766.32
7,012.00	28.07	6.19	6,901.86	-451.52	741.69	40° 9' 9.459 N	104° 54' 37.943 W	1,298,993.15	3,164,768.61
7,057.00	33.59	3.39	6,940.49	-428.55	743.57	40° 9' 9.686 N	104° 54' 37.919 W	1,299,016.14	3,164,770.34
7,102.00	38.14	3.82	6,976.95	-402.24	745.23	40° 9' 9.946 N	104° 54' 37.897 W	1,299,042.45	3,164,771.82
7,147.00	42.51	4.34	7,011.25	-373.20	747.31	40° 9' 10.233 N	104° 54' 37.871 W	1,299,071.50	3,164,773.71
7,192.00	48.28	2.92	7,042.84	-341.24	749.32	40° 9' 10.549 N	104° 54' 37.845 W	1,299,103.47	3,164,775.51
7,237.00	52.03	1.91	7,071.66	-306.73	750.76	40° 9' 10.890 N	104° 54' 37.826 W	1,299,137.99	3,164,776.72
7,282.00	55.74	0.63	7,098.18	-270.39	751.56	40° 9' 11.249 N	104° 54' 37.816 W	1,299,174.33	3,164,777.28
7,327.00	59.63	1.13	7,122.23	-232.37	752.15	40° 9' 11.624 N	104° 54' 37.808 W	1,299,212.35	3,164,777.62
7,372.00	62.28	1.72	7,144.08	-193.05	753.13	40° 9' 12.013 N	104° 54' 37.796 W	1,299,251.68	3,164,778.34

Design Report for Sater 24N-5HZ - 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)
7,417.00	64.09	1.38	7,164.38	-152.90	754.21	40° 9' 12.410 N	104° 54' 37.782 W	1,299,291.83	3,164,779.16
7,462.00	66.62	0.46	7,183.14	-112.01	754.87	40° 9' 12.814 N	104° 54' 37.773 W	1,299,332.72	3,164,779.54
7,507.00	69.17	0.19	7,200.07	-70.32	755.10	40° 9' 13.226 N	104° 54' 37.770 W	1,299,374.41	3,164,779.50
7,552.00	72.88	0.84	7,214.70	-27.78	755.49	40° 9' 13.646 N	104° 54' 37.765 W	1,299,416.95	3,164,779.60
7,597.00	77.83	1.29	7,226.08	15.74	756.30	40° 9' 14.076 N	104° 54' 37.755 W	1,299,460.47	3,164,780.12
7,642.00	83.89	1.66	7,233.22	60.13	757.44	40° 9' 14.515 N	104° 54' 37.740 W	1,299,504.87	3,164,780.98
7,675.00	87.57	0.23	7,235.68	93.03	757.98	40° 9' 14.840 N	104° 54' 37.733 W	1,299,537.77	3,164,781.30
7,712.40	88.66	0.26	7,236.91	130.41	758.14	40° 9' 15.209 N	104° 54' 37.731 W	1,299,575.15	3,164,781.21
7,749.00	89.72	0.28	7,237.43	167.00	758.31	40° 9' 15.571 N	104° 54' 37.729 W	1,299,611.74	3,164,781.14
7,842.00	90.25	1.10	7,237.45	259.99	759.43	40° 9' 16.490 N	104° 54' 37.714 W	1,299,704.74	3,164,781.64
8,022.00	90.65	1.85	7,236.04	439.93	764.07	40° 9' 18.268 N	104° 54' 37.655 W	1,299,884.69	3,164,785.09
8,112.00	90.40	1.27	7,235.22	529.89	766.52	40° 9' 19.157 N	104° 54' 37.623 W	1,299,974.66	3,164,786.94
8,202.00	89.41	0.10	7,235.36	619.88	767.59	40° 9' 20.046 N	104° 54' 37.609 W	1,300,064.65	3,164,787.42
8,292.00	91.17	0.80	7,234.91	709.87	768.30	40° 9' 20.936 N	104° 54' 37.600 W	1,300,154.64	3,164,787.53
8,382.00	89.04	358.79	7,234.74	799.86	767.98	40° 9' 21.825 N	104° 54' 37.604 W	1,300,244.63	3,164,786.61
8,472.00	90.03	358.38	7,235.47	889.83	765.75	40° 9' 22.714 N	104° 54' 37.633 W	1,300,334.57	3,164,783.80
8,562.00	90.06	359.44	7,235.40	979.81	764.04	40° 9' 23.603 N	104° 54' 37.655 W	1,300,424.54	3,164,781.49
8,652.00	89.72	359.72	7,235.58	1,069.81	763.38	40° 9' 24.493 N	104° 54' 37.663 W	1,300,514.53	3,164,780.23
8,742.00	89.97	0.14	7,235.82	1,159.81	763.27	40° 9' 25.382 N	104° 54' 37.664 W	1,300,604.52	3,164,779.53
8,833.00	91.20	359.40	7,234.89	1,250.80	762.91	40° 9' 26.281 N	104° 54' 37.669 W	1,300,695.50	3,164,778.56
9,012.00	91.97	358.19	7,229.94	1,429.69	759.15	40° 9' 28.049 N	104° 54' 37.717 W	1,300,874.35	3,164,773.62
9,102.00	91.36	358.92	7,227.32	1,519.62	756.88	40° 9' 28.938 N	104° 54' 37.747 W	1,300,964.27	3,164,770.75
9,282.00	91.29	359.04	7,223.16	1,699.54	753.67	40° 9' 30.716 N	104° 54' 37.788 W	1,301,144.16	3,164,766.36
9,372.00	91.36	359.45	7,221.08	1,789.51	752.49	40° 9' 31.605 N	104° 54' 37.803 W	1,301,234.11	3,164,764.58
9,462.00	88.74	0.17	7,221.00	1,879.50	752.19	40° 9' 32.494 N	104° 54' 37.807 W	1,301,324.09	3,164,763.68
9,552.00	87.87	359.52	7,223.66	1,969.46	751.95	40° 9' 33.383 N	104° 54' 37.810 W	1,301,414.05	3,164,762.84
9,642.00	89.26	358.86	7,225.92	2,059.42	750.67	40° 9' 34.272 N	104° 54' 37.826 W	1,301,503.99	3,164,760.98
9,732.00	89.63	359.52	7,226.79	2,149.41	749.40	40° 9' 35.161 N	104° 54' 37.843 W	1,301,593.96	3,164,759.11
9,822.00	89.94	359.57	7,227.13	2,239.41	748.69	40° 9' 36.051 N	104° 54' 37.852 W	1,301,683.95	3,164,757.80
9,912.00	90.22	359.26	7,227.00	2,329.40	747.77	40° 9' 36.940 N	104° 54' 37.864 W	1,301,773.93	3,164,756.29
10,002.00	90.96	359.08	7,226.08	2,419.39	746.46	40° 9' 37.829 N	104° 54' 37.880 W	1,301,863.90	3,164,754.39
10,092.00	90.43	359.29	7,224.98	2,509.37	745.18	40° 9' 38.719 N	104° 54' 37.897 W	1,301,953.87	3,164,752.51
10,272.00	89.97	357.62	7,224.36	2,689.30	740.33	40° 9' 40.497 N	104° 54' 37.959 W	1,302,133.76	3,164,746.47
10,362.00	88.15	356.40	7,225.83	2,779.16	735.64	40° 9' 41.385 N	104° 54' 38.020 W	1,302,223.58	3,164,741.18
10,452.00	91.11	358.95	7,226.41	2,869.06	731.99	40° 9' 42.273 N	104° 54' 38.067 W	1,302,313.46	3,164,736.94
10,542.00	91.29	358.63	7,224.53	2,959.02	730.09	40° 9' 43.162 N	104° 54' 38.091 W	1,302,403.40	3,164,734.44
10,723.00	88.95	358.54	7,224.15	3,139.95	725.62	40° 9' 44.950 N	104° 54' 38.149 W	1,302,584.29	3,164,728.77
10,813.00	89.88	358.75	7,225.07	3,229.92	723.49	40° 9' 45.839 N	104° 54' 38.176 W	1,302,674.24	3,164,726.05
10,903.00	90.09	359.94	7,225.09	3,319.92	722.46	40° 9' 46.728 N	104° 54' 38.189 W	1,302,764.22	3,164,724.43
11,083.00	89.97	0.29	7,225.00	3,499.91	722.82	40° 9' 48.507 N	104° 54' 38.185 W	1,302,944.21	3,164,723.60
11,173.00	88.34	358.46	7,226.32	3,589.89	721.84	40° 9' 49.396 N	104° 54' 38.197 W	1,303,034.17	3,164,722.02
11,263.00	89.14	359.05	7,228.30	3,679.85	719.89	40° 9' 50.285 N	104° 54' 38.222 W	1,303,124.11	3,164,719.47

Design Report for Sater 24N-5HZ - 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)
11,353.00	89.35	0.78	7,229.49	3,769.84	719.75	40° 9' 51.175 N	104° 54' 38.224 W	1,303,214.09	3,164,718.74
11,443.00	89.20	2.16	7,230.63	3,859.80	722.06	40° 9' 52.064 N	104° 54' 38.194 W	1,303,304.06	3,164,720.45
11,533.00	90.18	3.17	7,231.12	3,949.70	726.25	40° 9' 52.952 N	104° 54' 38.140 W	1,303,393.99	3,164,724.04
11,623.00	90.06	1.82	7,230.93	4,039.61	730.16	40° 9' 53.840 N	104° 54' 38.090 W	1,303,483.92	3,164,727.37
11,713.00	89.63	1.34	7,231.17	4,129.57	732.65	40° 9' 54.730 N	104° 54' 38.058 W	1,303,573.89	3,164,729.25
11,803.00	90.00	0.84	7,231.46	4,219.56	734.36	40° 9' 55.619 N	104° 54' 38.036 W	1,303,663.88	3,164,730.37
11,893.00	90.06	0.51	7,231.41	4,309.55	735.42	40° 9' 56.508 N	104° 54' 38.022 W	1,303,753.88	3,164,730.83
11,983.00	92.07	359.82	7,229.74	4,399.53	735.68	40° 9' 57.397 N	104° 54' 38.019 W	1,303,843.85	3,164,730.50
12,073.00	90.92	358.40	7,227.39	4,489.48	734.28	40° 9' 58.286 N	104° 54' 38.037 W	1,303,933.79	3,164,728.50
12,163.00	92.44	358.41	7,224.75	4,579.41	731.78	40° 9' 59.175 N	104° 54' 38.069 W	1,304,023.69	3,164,725.41
12,253.00	93.21	359.06	7,220.32	4,669.28	729.79	40° 10' 0.063 N	104° 54' 38.094 W	1,304,113.54	3,164,722.83
12,343.00	92.44	0.63	7,215.88	4,759.16	729.55	40° 10' 0.951 N	104° 54' 38.097 W	1,304,203.42	3,164,721.99
12,433.00	91.91	359.37	7,212.47	4,849.10	729.55	40° 10' 1.840 N	104° 54' 38.097 W	1,304,293.35	3,164,721.39
12,524.00	91.11	358.91	7,210.07	4,940.05	728.18	40° 10' 2.739 N	104° 54' 38.115 W	1,304,384.29	3,164,719.43
12,614.00	90.18	358.70	7,209.06	5,030.03	726.31	40° 10' 3.628 N	104° 54' 38.139 W	1,304,474.25	3,164,716.95
12,704.00	89.48	358.74	7,209.32	5,120.00	724.30	40° 10' 4.517 N	104° 54' 38.165 W	1,304,564.20	3,164,714.35
12,794.00	88.89	358.86	7,210.60	5,209.97	722.41	40° 10' 5.406 N	104° 54' 38.189 W	1,304,654.16	3,164,711.87
12,806.00	88.71	359.25	7,210.85	5,221.97	722.21	40° 10' 5.525 N	104° 54' 38.192 W	1,304,666.15	3,164,711.59
12,851.00	88.71	359.25	7,211.87	5,266.95	721.62	40° 10' 5.969 N	104° 54' 38.199 W	1,304,711.13	3,164,710.70

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
963.00	962.97	-4.05	-4.17	Tie-On to Surface Gyro @ 963.00 FT
963.00	962.97	-4.05	-4.17	Tie on to Gyro Surveys @ 963.00'
1,208.00	1,207.96	-3.61	-5.66	First MWD Survey @ 1208.00'
12,806.00	7,210.85	5,221.97	722.21	Last MWD Survey @ 12806.00'
12,851.00	7,211.87	5,266.95	721.62	St. Line Projection to Bit @ 12851' MD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
User	No Target (Freehand)	359.66	Slot	0.00	0.00	0.00

Design Report for Sater 24N-5HZ - Actual Surveys

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
13.00	963.00	Actual Field Surveys	NS-GYRO-MS
963.00	7,675.00	MWD Surveys-Vertical and Build	MWD+IFR1+SC
7,749.00	12,806.00	MWD Surveys- Lateral	MWD+IFR1+SC

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,023.30	1,023.26	9 5/8"	9-5/8	28
7,712.40	7,236.91	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:	1.84 °/100usft	Maximum Dogleg over Survey:	13.49 °/100usft at 7,642.00 usft
Net Tortousity applicable to Plans:	0.89 °/100usft	Directional Difficulty Index:	6.451

Audit Info

North Reference Sheet for Sec. 8-T2N-R67W - Sater 24N-5HZ - Plan D

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' @ 4926.00usft (Ensign 123). Northing and Easting are relative to Sater 24N-5HZ

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: 0.99995827

Grid Coordinates of Well: 1,299,439.73 usft N, 3,164,023.98 usft E

Geographical Coordinates of Well: 40° 09' 13.92" N, 104° 54' 47.49" W

Grid Convergence at Surface is: 0.38°

Based upon Minimum Curvature type calculations, at a Measured Depth of 12,851.00usft

the Bottom Hole Displacement is 5,316.16usft in the Direction of 7.80° (True).

Magnetic Convergence at surface is: -8.24° (25 December 2013, , BGGM2013)

