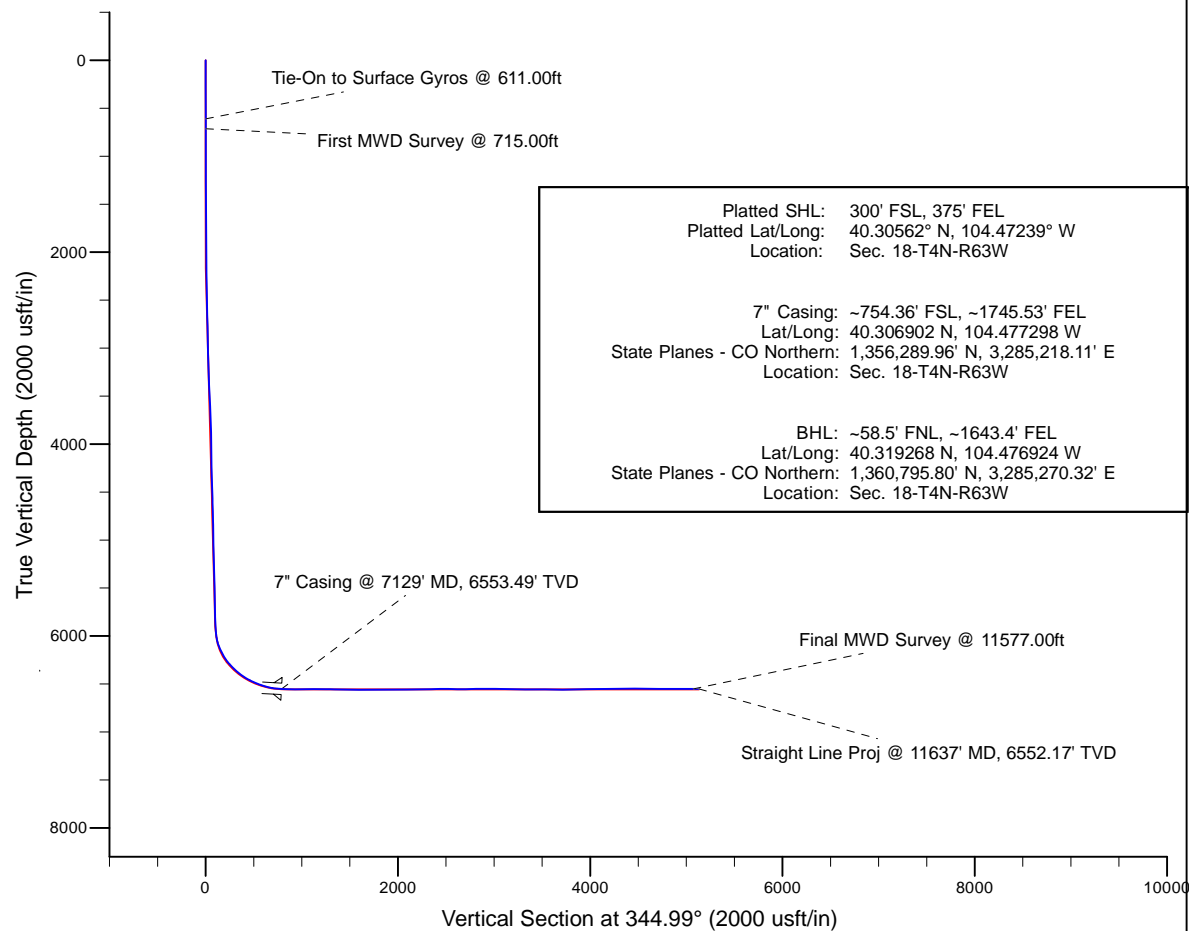
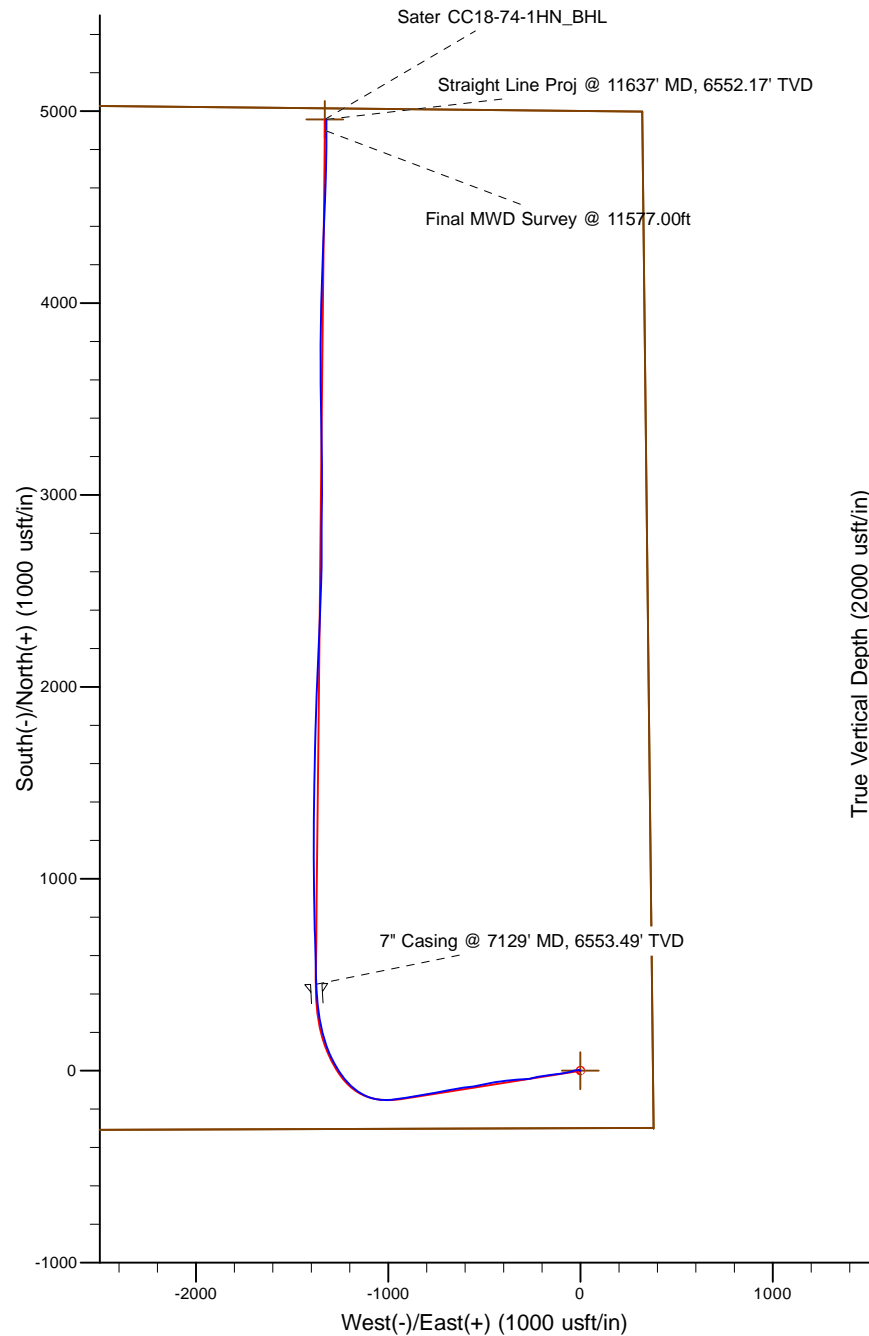


Project: Weld County, CO (NAD 83)
Site: Sec. 18-T4N-R63W (Sater CC18-16-A Pad)
Well: Sater CC18-74-1HN
Wellbore: Plan A
Design: Final Surveys

Noble Energy

HALLIBURTON
Sperry Drilling



LEGEND

- ◇ Sater CC18-74-1HN, Plan A, Rev A0 - PROPOSAL V0
- Final Surveys

Platted SHL: 300' FSL, 375' FEL
Platted Lat/Long: 40.30562° N, 104.47239° W
Location: Sec. 18-T4N-R63W

7" Casing: ~754.36' FSL, ~1745.53' FEL
Lat/Long: 40.306902 N, 104.477298 W
State Planes - CO Northern: 1,356,289.96' N, 3,285,218.11' E
Location: Sec. 18-T4N-R63W

BHL: ~58.5' FNL, ~1643.4' FEL
Lat/Long: 40.319268 N, 104.476924 W
State Planes - CO Northern: 1,360,795.80' N, 3,285,270.32' E
Location: Sec. 18-T4N-R63W

WELL DETAILS: Sater CC18-74-1HN	
Ground Level:	4678.00
RKB = 24 @ 4702.00usft (H&P 315)	
Created By:	Fred Hartmann
Created On:	04/07/2014

Noble Energy

Weld County, CO (NAD 83)

Sec. 18-T4N-R63W (Sater CC18-16-A Pad)

Sater CC18-74-1HN

Design: Final Surveys

Sperry Drilling Services

Final Survey Report

07 April, 2014

Well Coordinates: 1,355,838.98 N, 3,286,592.05 E (40° 18' 20.23" N, 104° 28' 20.60" W)

Ground Level: 4,678.00 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 CC18-74-1HN

RKB = 24 @ 4702.00usft (H&P 315)

N

Grid

Dec-Deg - API - US Survey Feet - Custom

HALLIBURTON

Design Report for Sater CC18-74-1HN - Final 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
271.00	0.60	284.70	271.00	0.36	-1.37	0.70	0.22
611.00	0.50	319.50	610.98	1.94	-4.06	2.92	0.10
Tie-On to Surface Gyros @ 611.00ft							
715.00	0.26	307.30	714.98	2.43	-4.54	3.52	0.24
First MWD Survey @ 715.00ft							
809.00	0.06	127.05	808.98	2.53	-4.67	3.65	0.34
902.00	0.07	271.12	901.98	2.50	-4.69	3.63	0.13
1,088.00	0.11	244.32	1,087.98	2.42	-4.96	3.63	0.03
1,181.00	0.07	130.91	1,180.98	2.35	-5.00	3.56	0.16
1,366.00	0.11	336.15	1,365.98	2.44	-4.99	3.64	0.10
1,553.00	0.13	355.04	1,552.98	2.81	-5.08	4.03	0.02
1,647.00	0.37	311.27	1,646.98	3.12	-5.32	4.39	0.31
1,742.00	2.40	276.80	1,741.94	3.56	-7.52	5.38	2.22
1,837.00	3.75	266.17	1,836.81	3.58	-12.60	6.72	1.54
1,932.00	5.13	264.42	1,931.52	2.96	-19.92	8.02	1.46
2,027.00	5.59	257.39	2,026.10	1.54	-28.67	8.91	0.84
2,121.00	7.74	254.76	2,119.46	-1.12	-39.24	9.08	2.31
2,216.00	8.94	251.26	2,213.46	-5.18	-52.41	8.57	1.37
2,311.00	9.12	259.85	2,307.28	-8.87	-66.81	8.73	1.43
2,406.00	9.88	260.74	2,400.98	-11.51	-82.26	10.18	0.81
2,501.00	10.38	262.15	2,494.50	-13.99	-98.79	12.06	0.59
2,596.00	11.80	261.10	2,587.72	-16.67	-116.86	14.16	1.51
2,691.00	14.19	262.86	2,680.28	-19.62	-138.01	16.79	2.55
2,786.00	15.24	262.65	2,772.17	-22.66	-161.95	20.05	1.11
2,881.00	14.26	261.75	2,864.04	-25.94	-185.92	23.09	1.06
2,976.00	13.27	259.07	2,956.31	-29.68	-208.20	25.24	1.24
3,070.00	13.60	258.28	3,047.73	-33.97	-229.61	26.64	0.40
3,166.00	13.82	256.87	3,141.00	-38.87	-251.83	27.67	0.42
3,261.00	12.90	263.65	3,233.43	-42.62	-273.42	29.63	1.91
3,355.00	13.64	268.57	3,324.93	-44.06	-294.93	33.82	1.44
3,450.00	14.83	265.43	3,417.01	-45.31	-318.25	38.65	1.49
3,545.00	13.40	265.98	3,509.14	-47.05	-341.35	42.95	1.51
3,640.00	15.46	263.00	3,601.14	-49.36	-364.90	46.81	2.30
3,735.00	15.96	262.77	3,692.59	-52.55	-390.43	50.34	0.53
3,829.00	15.34	262.49	3,783.10	-55.80	-415.58	53.71	0.66
3,924.00	13.03	261.80	3,875.20	-58.97	-438.64	56.62	2.44
4,019.00	14.32	262.46	3,967.51	-62.04	-460.89	59.42	1.37
4,114.00	13.54	254.88	4,059.72	-66.48	-483.27	60.92	2.09
4,208.00	13.04	255.75	4,151.20	-71.96	-504.17	61.04	0.57
4,303.00	12.75	259.21	4,243.81	-76.56	-524.86	61.96	0.87
4,398.00	13.82	262.81	4,336.26	-79.95	-546.41	64.27	1.42
4,493.00	13.75	263.57	4,428.53	-82.63	-568.89	67.50	0.20
4,588.00	13.02	263.11	4,520.95	-85.18	-590.73	70.69	0.78
4,683.00	14.37	260.05	4,613.24	-88.50	-612.97	73.24	1.61
4,778.00	13.96	260.48	4,705.36	-92.43	-635.88	75.38	0.45
4,873.00	14.43	259.97	4,797.46	-96.39	-658.84	77.50	0.51
4,968.00	15.46	258.52	4,889.24	-100.97	-682.91	79.31	1.15
5,063.00	14.99	258.14	4,980.91	-106.02	-707.34	80.76	0.51
5,158.00	13.76	258.27	5,072.93	-110.84	-730.42	82.08	1.30

Design Report for Sater CC18-74-1HN - Final Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
5,252.00	13.17	263.53	5,164.35	-114.32	-752.01	84.31	1.45
5,347.00	14.07	259.69	5,256.68	-117.61	-774.13	86.86	1.34
5,442.00	14.74	261.24	5,348.69	-121.51	-797.43	89.12	0.81
5,537.00	15.48	261.59	5,440.41	-125.21	-821.92	91.89	0.78
5,632.00	14.65	259.57	5,532.14	-129.24	-846.28	94.31	1.03
5,727.00	15.19	257.99	5,623.94	-134.00	-870.27	95.92	0.71
5,821.00	14.98	259.19	5,714.70	-138.84	-894.24	97.45	0.40
5,885.00	15.37	262.00	5,776.47	-141.57	-910.77	99.09	1.30
6,007.00	20.68	261.57	5,892.44	-146.99	-948.11	103.54	4.35
6,055.00	25.47	264.58	5,936.59	-149.20	-966.79	106.23	10.27
6,102.00	28.88	264.77	5,978.39	-151.19	-988.15	109.84	7.26
6,150.00	32.31	269.12	6,019.71	-152.45	-1,012.53	114.94	8.50
6,197.00	36.24	274.40	6,058.55	-151.58	-1,038.96	122.63	10.48
6,245.00	37.95	283.20	6,096.86	-147.11	-1,067.50	134.33	11.61
6,292.00	38.20	290.40	6,133.88	-138.74	-1,095.21	149.59	9.46
6,340.00	37.89	294.99	6,171.69	-127.34	-1,122.48	167.66	5.93
6,387.00	38.01	301.75	6,208.77	-113.62	-1,147.88	187.49	8.85
6,435.00	41.45	307.79	6,245.69	-96.10	-1,173.02	210.93	10.77
6,482.00	44.55	313.87	6,280.07	-75.13	-1,197.21	237.45	11.01
6,530.00	45.78	319.78	6,313.93	-50.31	-1,220.47	267.44	9.10
6,576.00	47.59	325.15	6,345.50	-23.78	-1,240.83	298.34	9.36
6,624.00	50.74	328.16	6,376.89	6.56	-1,260.76	332.81	8.10
6,671.00	54.39	330.85	6,405.45	38.72	-1,279.68	368.76	9.00
6,719.00	58.08	334.62	6,432.13	74.19	-1,297.92	407.75	10.08
6,766.00	61.69	338.03	6,455.72	111.42	-1,314.22	447.93	9.92
6,814.00	65.33	342.03	6,477.13	151.78	-1,328.87	490.71	10.63
6,861.00	68.02	345.82	6,495.74	193.24	-1,340.80	533.85	9.36
6,909.00	70.69	349.41	6,512.67	237.11	-1,350.42	578.70	8.94
6,956.00	74.08	351.89	6,526.89	281.30	-1,357.68	623.27	8.79
7,004.00	77.96	353.52	6,538.49	327.49	-1,363.59	669.41	8.73
7,050.00	82.28	354.70	6,546.38	372.56	-1,368.24	714.15	9.73
7,080.00	84.63	355.58	6,549.80	402.25	-1,370.76	743.48	8.36
7,129.00	86.74	356.82	6,553.49	451.00	-1,374.00	791.41	4.99
7" Casing @ 7129' MD, 6553.49' TVD							
7,222.00	90.74	359.17	6,555.53	543.90	-1,377.25	881.98	4.99
7,317.00	90.80	359.10	6,554.26	638.88	-1,378.68	974.09	0.10
7,412.00	89.14	357.79	6,554.31	733.84	-1,381.26	1,066.48	2.23
7,507.00	89.91	358.95	6,555.09	828.79	-1,383.96	1,158.89	1.47
7,601.00	90.03	359.75	6,555.14	922.79	-1,385.03	1,249.96	0.86
7,696.00	88.21	359.57	6,556.60	1,017.77	-1,385.59	1,341.85	1.93
7,791.00	89.26	359.34	6,558.70	1,112.74	-1,386.49	1,433.81	1.13
7,886.00	89.60	359.85	6,559.65	1,207.73	-1,387.17	1,525.74	0.65
7,981.00	89.01	0.37	6,560.80	1,302.73	-1,386.98	1,617.44	0.83
8,076.00	89.23	1.88	6,562.26	1,397.69	-1,385.12	1,708.69	1.61
8,171.00	90.49	1.45	6,562.49	1,492.65	-1,382.36	1,799.69	1.40
8,266.00	90.52	0.11	6,561.65	1,587.64	-1,381.07	1,891.10	1.41
8,360.00	90.59	0.72	6,560.74	1,681.63	-1,380.38	1,981.71	0.65
8,455.00	91.63	2.51	6,558.90	1,776.57	-1,377.71	2,072.72	2.18
8,550.00	91.33	1.19	6,556.45	1,871.48	-1,374.64	2,163.61	1.42
8,645.00	90.03	2.20	6,555.32	1,966.43	-1,371.83	2,254.59	1.73
8,740.00	90.52	3.22	6,554.86	2,061.32	-1,367.34	2,345.08	1.19

Design Report for Sater CC18-74-1HN - Final Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
8,835.00	91.02	1.81	6,553.59	2,156.22	-1,363.17	2,435.66	1.57
8,930.00	88.95	2.63	6,553.61	2,251.14	-1,359.49	2,526.40	2.34
9,025.00	89.29	2.26	6,555.07	2,346.05	-1,355.44	2,617.01	0.53
9,120.00	91.57	1.77	6,554.36	2,440.98	-1,352.10	2,707.84	2.45
9,214.00	90.68	2.27	6,552.51	2,534.90	-1,348.79	2,797.70	1.09
9,309.00	90.22	0.12	6,551.77	2,629.87	-1,346.81	2,888.92	2.31
9,404.00	88.98	0.49	6,552.43	2,724.87	-1,346.30	2,980.54	1.36
9,499.00	89.66	359.79	6,553.56	2,819.86	-1,346.07	3,072.24	1.03
9,594.00	88.80	0.51	6,554.83	2,914.85	-1,345.82	3,163.92	1.18
9,689.00	90.06	0.91	6,555.78	3,009.83	-1,344.64	3,255.36	1.39
9,784.00	89.57	359.84	6,556.09	3,104.83	-1,344.02	3,346.96	1.24
9,878.00	89.54	359.60	6,556.82	3,198.82	-1,344.48	3,437.87	0.26
9,973.00	89.57	358.25	6,557.55	3,293.80	-1,346.26	3,530.07	1.42
10,068.00	88.74	358.88	6,558.95	3,388.76	-1,348.64	3,622.40	1.10
10,163.00	89.66	359.68	6,560.28	3,483.74	-1,349.84	3,714.45	1.28
10,258.00	90.52	358.82	6,560.13	3,578.73	-1,351.08	3,806.52	1.28
10,353.00	91.79	0.38	6,558.22	3,673.71	-1,351.74	3,898.43	2.12
10,448.00	92.65	359.62	6,554.54	3,768.63	-1,351.74	3,990.12	1.21
10,542.00	91.63	1.28	6,551.03	3,862.56	-1,351.00	4,080.65	2.07
10,637.00	89.85	1.60	6,549.80	3,957.52	-1,348.62	4,171.75	1.90
10,732.00	89.38	1.40	6,550.44	4,052.48	-1,346.13	4,262.84	0.54
10,827.00	89.91	1.25	6,551.03	4,147.46	-1,343.93	4,354.00	0.58
10,922.00	90.52	2.65	6,550.67	4,242.40	-1,340.70	4,444.87	1.61
11,017.00	89.20	2.47	6,550.90	4,337.30	-1,336.46	4,535.43	1.40
11,112.00	89.97	2.37	6,551.59	4,432.21	-1,332.45	4,626.07	0.82
11,207.00	89.38	2.42	6,552.13	4,527.13	-1,328.48	4,716.72	0.62
11,302.00	89.82	1.77	6,552.79	4,622.06	-1,325.00	4,807.52	0.83
11,397.00	90.00	0.69	6,552.94	4,717.04	-1,322.97	4,898.72	1.15
11,492.00	89.85	0.59	6,553.07	4,812.03	-1,321.90	4,990.20	0.19
11,577.00	90.56	359.82	6,552.76	4,897.03	-1,321.60	5,072.22	1.23
Final MWD Survey @ 11577.00ft							
11,637.00	90.56	359.82	6,552.17	4,957.03	-1,321.79	5,130.22	0.00
Straight Line Proj @ 11637' MD, 6552.17' TVD							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
611.00	610.98	1.94	-4.06	Tie-On to Surface Gyros @ 611.00ft
715.00	714.98	2.43	-4.54	First MWD Survey @ 715.00ft
11,577.00	6,552.76	4,897.03	-1,321.60	Final MWD Survey @ 11577.00ft
11,637.00	6,552.17	4,957.03	-1,321.79	Straight Line Proj @ 11637' MD, 6552.17' TVD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
Target	Sater CC18-74-1HN_BHL	344.99	Slot	0.00	0.00	0.00

Design Report for Sater CC18-74-1HN - Final Surveys

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
271.00	611.00	Surface Gyros	Flexi-Shot
715.00	7,080.00	MWD Surveys - Intermediate	MWD+SC
7,222.00	11,577.00	MWD Surveys - Production	MWD+SC

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
7,129.00		7" Casing @ 7129' MD, 6553.49' TVD	7	8-3/4

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 CC18-74-1HN_Σ - actual wellpath hits target center - Point	0.00	0.00	0.00	0.00	0.00	1,355,838.99	3,286,592.05	40.305620	-104.472390
Sater CC18-74-1HN_Σ - actual wellpath hits target center - Polygon	0.00	0.00	0.00	0.00	0.00	1,355,838.99	3,286,592.05	40.305620	-104.472390
Point 1				0.00	5,051.90	-4,874.65	1,360,890.67	3,281,717.61	
Point 2				0.00	-314.04	-4,819.09	1,355,524.96	3,281,773.17	
Point 3				0.00	-297.98	380.01	1,355,541.02	3,286,972.04	
Point 4				0.00	4,998.71	321.33	1,360,837.48	3,286,913.37	
Point 5				0.00	5,051.90	-4,874.65	1,360,890.67	3,281,717.61	
Sater CC18-74-1HN_4 - actual wellpath hits target center - Polygon	0.00	0.00	0.00	0.00	0.00	1,355,838.99	3,286,592.05	40.305620	-104.472390
Point 1				0.00	4,591.88	-4,414.63	1,360,430.67	3,282,177.61	
Point 2				0.00	145.98	-4,359.07	1,355,984.96	3,282,233.17	
Point 3				0.00	162.04	-80.01	1,356,001.02	3,286,512.04	
Point 4				0.00	4,538.69	-138.69	1,360,377.48	3,286,453.37	
Point 5				0.00	4,591.88	-4,414.63	1,360,430.67	3,282,177.61	
Sater CC18-74-1HN_k - actual wellpath misses target center by 4.04usft at 5962.84usft MD (5850.87 TVD, -144.82 N, -933.37 E) - Circle (radius 35.00)	0.00	0.00	5,850.03	-148.16	-935.49	1,355,690.83	3,285,656.60	40.305243	-104.475750
Sater CC18-74-1HN_L - actual wellpath misses target center by 1155.03usft at 6102.00usft MD (5978.39 TVD, -151.19 N, -988.15 E) - Polygon	0.00	0.00	6,557.00	0.00	0.00	1,355,838.99	3,286,592.05	40.305620	-104.472390
Point 1				6,557.00	438.68	-1,411.30	1,356,277.65	3,285,180.81	
Point 2				6,557.00	438.68	-1,341.30	1,356,277.65	3,285,250.81	
Point 3				6,557.00	4,957.75	-1,294.11	1,360,796.52	3,285,297.99	
Point 4				6,557.00	4,957.75	-1,364.12	1,360,796.52	3,285,227.99	
Point 5				6,557.00	438.68	-1,411.30	1,356,277.65	3,285,180.81	
Sater CC18-74-1HN_E - actual wellpath misses target center by 8.80usft at 11637.00usft MD (6552.17 TVD, 4957.03 N, -1321.79 E) - Point	0.00	0.00	6,557.00	4,957.76	-1,329.11	1,360,796.53	3,285,262.99	40.319270	-104.476950

Directional Difficulty Index

Average Dogleg over Survey:	1.90 °/100usft	Maximum Dogleg over Survey:	11.61 °/100usft at 6,245.00 usft
Net Tortousity applicable to Plans:	0.81 °/100usft	Directional Difficulty Index:	6.394

Design Report for Sater CC18-74-1HN - Final Surveys

Audit Info

North Reference Sheet for Sec. 18-T4N-R63W (Sater CC18-16-A Pad) - Sater CC18-74-1HN

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

Vertical Depths are relative to RKB = 24 @ 4702.00usft (H&P 315). Northing and Easting are relative to Sater CC18-74-1HN

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: 0.99995730

Grid Coordinates of Well: 1,355,838.98 usft N, 3,286,592.05 usft E

Geographical Coordinates of Well: 40° 18' 20.23" N, 104° 28' 20.60" W

Grid Convergence at Surface is: 0.66°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,637.00usft the Bottom Hole Displacement is 5,130.23usft in the Direction of 345.07° (Grid).

Magnetic Convergence at surface is: -7.71° (9 March 2014, , BGGM2013)

