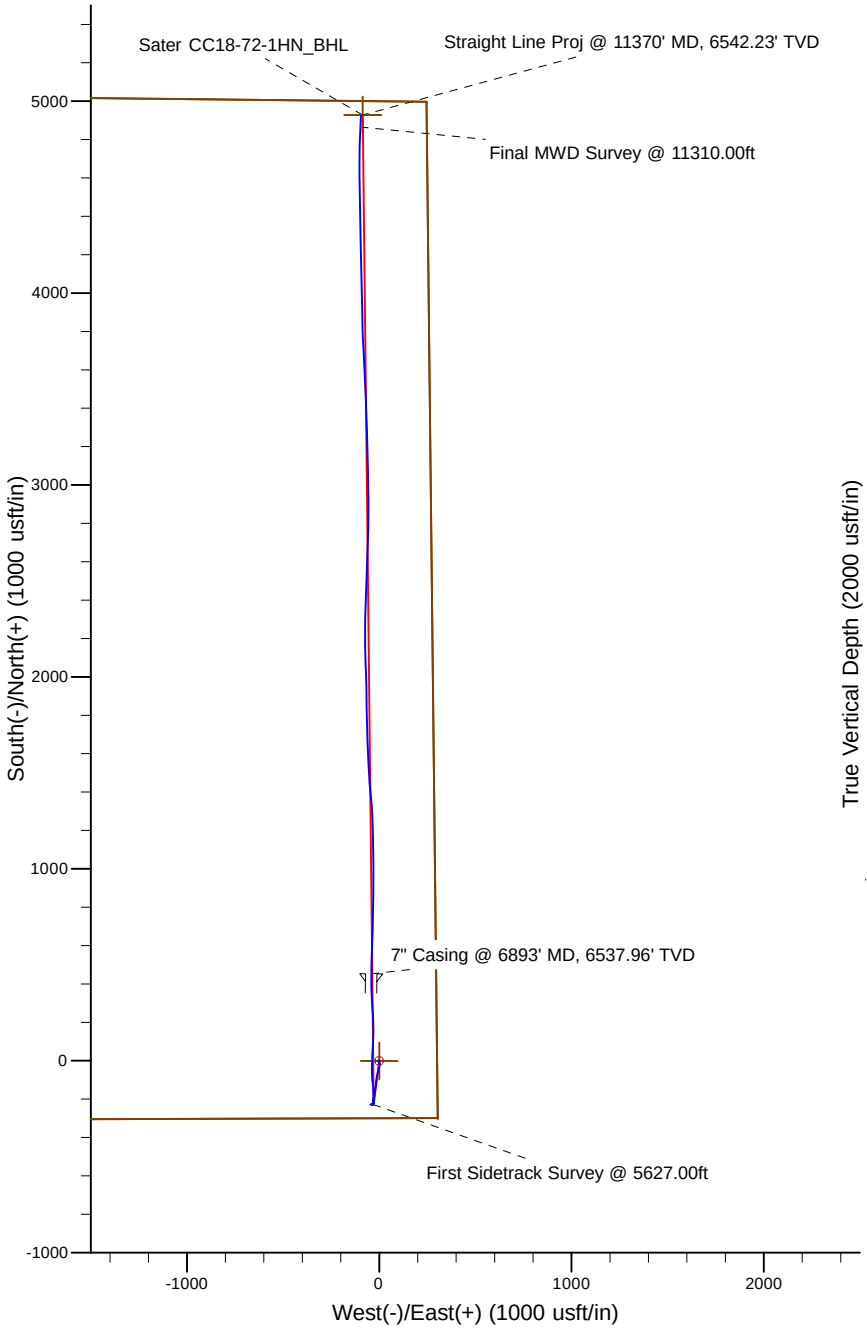
Project: Weld County, CO (NAD 83)
Site: Sec. 18-T4N-R63W (Sater CC18-16-A Pad)
Well: Sater CC18-72-1HN
Wellbore: Plan B
Design: Final Surveys

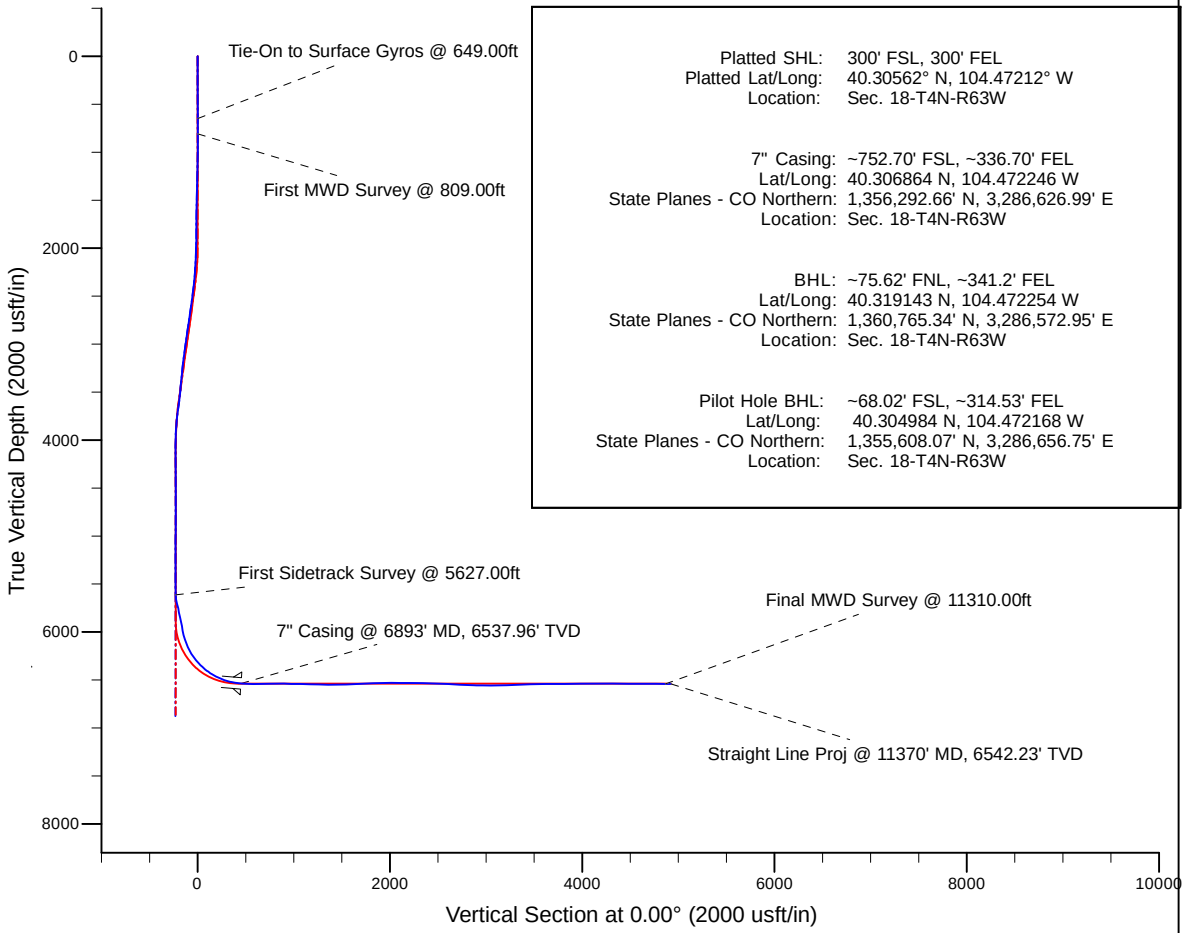
Noble Energy

HALLIBURTON
Sperry Drilling



L E G E N D

- Sater CC18-72-1HN, Plan B, Rev B0 - Sidetrack V0
- Sater CC18-72-1HN, Plan A, Pilot Hole Surveys V0
- Sater CC18-72-1HN, Plan A, Rev A0 - Pilot Hole V0
- Final Surveys



Platted SHL:	300' FSL, 300' FEL
Platted Lat/Long:	40.30562° N, 104.47212° W
Location:	Sec. 18-T4N-R63W
7" Casing:	~752.70' FSL, ~336.70' FEL
Lat/Long:	40.306864 N, 104.472246 W
State Planes - CO Northern:	1,356,292.66' N, 3,286,626.99' E
Location:	Sec. 18-T4N-R63W
BHL:	~75.62' FNL, ~341.2' FEL
Lat/Long:	40.319143 N, 104.472254 W
State Planes - CO Northern:	1,360,765.34' N, 3,286,572.95' E
Location:	Sec. 18-T4N-R63W
Pilot Hole BHL:	~68.02' FSL, ~314.53' FEL
Lat/Long:	40.304984 N, 104.472168 W
State Planes - CO Northern:	1,355,608.07' N, 3,286,656.75' E
Location:	Sec. 18-T4N-R63W

WELL DETAILS: Sater CC18-72-1HN

Ground Level: 4679.00
RKB = 24 @ 4703.00usft (H&P 315)

Created By: Fred Hartmann
Created On: 03/26/2014

Noble Energy

Weld County, CO (NAD 83)
Sec. 18-T4N-R63W (Sater CC18-16-A Pad)
Sater CC18-72-1HN
901119244
Plan A

Design: Pilot Hole Surveys

Sperry Drilling Services

Standard Report

26 March, 2014

Surface UWI : 901119244

Well Coordinates: 1,355,839.86 N, 3,286,667.35 E (40° 18' 20.23" N, 104° 28' 19.63" W)
Ground Level: 4,679.00 usft

Local Coordinate Origin:	Centered on Site Sec. 18-T4N-R63W (Sater CC18-16-A Pad)
Viewing Datum:	RKB = 24 @ 4703.00usft (H&P 315)
TVDs to System:	N
North Reference:	Grid
Unit System:	Dec-Deg - API - US Survey Feet - Custom

Geodetic Scale Factor Applied
Version: 5000.1 Build: 70

HALLIBURTON

Design Report for Sater CC18-72-1HN - Pilot Hole 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	-0.01	0.00	0.00	0.00
280.00	0.60	24.51	279.99	1.32	0.61	-1.40	0.21
649.00	0.40	232.51	648.99	2.30	0.39	-2.34	0.26
Tie-On to Surface Gyros @ 649.00ft							
809.00	0.77	289.53	808.98	2.32	-1.07	-2.18	0.40
First MWD Survey @ 809.00ft							
902.00	0.44	295.41	901.98	2.68	-1.98	-2.43	0.36
994.00	0.88	208.32	993.97	2.21	-2.63	-1.88	1.05
1,087.00	0.83	209.28	1,086.96	0.99	-3.30	-0.59	0.06
1,181.00	1.32	183.74	1,180.95	-0.68	-3.71	1.12	0.72
1,366.00	1.60	152.89	1,365.89	-5.11	-2.67	5.39	0.44
1,457.00	1.56	150.99	1,456.85	-7.32	-1.49	7.44	0.07
1,553.00	1.51	146.33	1,552.82	-9.52	-0.15	9.45	0.14
1,647.00	1.14	134.90	1,646.79	-11.21	1.20	10.96	0.48
1,742.00	0.81	126.14	1,741.78	-12.27	2.41	11.87	0.38
1,837.00	0.77	130.42	1,836.77	-13.08	3.44	12.55	0.08
1,932.00	0.66	129.31	1,931.76	-13.84	4.34	13.19	0.12
2,027.00	1.71	190.80	2,026.74	-15.58	4.50	14.90	1.59
2,122.00	2.64	201.27	2,121.68	-19.01	3.44	18.43	1.06
2,217.00	4.07	194.44	2,216.51	-24.32	1.81	23.90	1.56
2,312.00	5.40	192.04	2,311.18	-31.95	0.04	31.69	1.42
2,407.00	6.33	196.03	2,405.69	-41.36	-2.34	41.32	1.07
2,502.00	8.00	195.04	2,499.94	-52.78	-5.51	53.04	1.76
2,597.00	7.78	190.02	2,594.04	-65.49	-8.34	66.01	0.76
2,691.00	8.40	192.53	2,687.11	-78.46	-10.94	79.20	0.76
2,786.00	9.13	187.16	2,781.00	-92.71	-13.38	93.64	1.15
2,881.00	8.51	185.79	2,874.87	-107.19	-15.03	108.21	0.69
2,976.00	7.30	184.96	2,968.97	-120.19	-16.26	121.27	1.28
3,071.00	7.82	190.43	3,063.15	-132.56	-17.95	133.75	0.93
3,165.00	6.98	186.86	3,156.36	-144.52	-19.79	145.85	1.02
3,260.00	7.09	186.12	3,250.65	-156.08	-21.11	157.48	0.15
3,355.00	4.83	189.17	3,345.13	-165.86	-22.37	167.34	2.40
3,450.00	5.55	189.87	3,439.74	-174.34	-23.79	175.93	0.76
3,545.00	6.59	190.80	3,534.20	-184.22	-25.60	185.96	1.10
3,640.00	7.81	190.52	3,628.45	-195.92	-27.80	197.84	1.28
3,735.00	7.38	180.40	3,722.62	-208.37	-29.02	210.34	1.48
3,829.00	4.76	178.16	3,816.09	-218.30	-28.94	220.19	2.80
3,924.00	2.96	164.55	3,910.87	-224.61	-28.16	226.35	2.11
4,019.00	1.34	159.12	4,005.80	-228.01	-27.11	229.60	1.72
4,114.00	0.34	317.98	4,100.79	-228.84	-26.90	230.40	1.75
4,304.00	0.92	304.25	4,290.78	-227.56	-28.54	229.33	0.31
4,399.00	0.92	288.97	4,385.77	-226.88	-29.89	228.83	0.26
4,494.00	1.26	274.95	4,480.75	-226.55	-31.66	228.71	0.45
4,588.00	1.29	274.15	4,574.73	-226.38	-33.74	228.80	0.04
4,778.00	2.39	272.17	4,764.63	-226.08	-39.83	229.25	0.58
4,873.00	1.34	247.24	4,859.58	-226.43	-42.84	229.97	1.37
4,968.00	0.97	203.18	4,954.56	-227.60	-44.18	231.30	0.98
5,063.00	1.24	97.84	5,049.55	-228.48	-43.48	232.08	1.86
5,252.00	1.62	93.25	5,238.49	-228.91	-38.78	231.93	0.21
5,442.00	1.28	89.42	5,428.43	-229.04	-33.98	231.47	0.19

Design Report for Sater CC18-72-1HN - Pilot Hole Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
5,537.00	0.96	86.97	5,523.41	-228.99	-32.12	231.19	0.34
5,726.00	1.07	87.56	5,712.38	-228.83	-28.78	230.62	0.06
5,821.00	0.73	108.93	5,807.37	-228.99	-27.32	230.60	0.50
5,916.00	0.71	87.41	5,902.36	-229.16	-26.16	230.62	0.28
6,011.00	1.02	68.19	5,997.35	-228.82	-24.79	230.12	0.44
6,106.00	1.03	78.38	6,092.34	-228.33	-23.17	229.43	0.19
6,201.00	1.12	93.52	6,187.32	-228.22	-21.40	229.10	0.31
6,295.00	0.89	100.09	6,281.31	-228.40	-19.77	229.08	0.27
6,485.00	1.08	107.86	6,471.28	-229.21	-16.61	229.50	0.12
6,580.00	0.88	112.38	6,566.26	-229.76	-15.08	229.86	0.23
6,675.00	0.93	116.90	6,661.25	-230.39	-13.72	230.31	0.09
6,770.00	0.99	114.51	6,756.24	-231.08	-12.29	230.82	0.08
6,834.00	0.84	113.19	6,820.23	-231.49	-11.35	231.11	0.24
6,890.00	0.84	113.19	6,876.22	-231.81	-10.60	231.34	0.00
Straight Line Proj @ 6890' MD, 6876.22' TVD							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
649.00	648.99	2.30	0.39	Tie-On to Surface Gyros @ 649.00ft
809.00	808.98	2.32	-1.07	First MWD Survey @ 809.00ft
6,890.00	6,876.22	-231.81	-10.60	Straight Line Proj @ 6890' MD, 6876.22' TVD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/_S (usft)	Origin +E/-W (usft)	Start TVD (usft)
Target	Sater CC18-72-1HN_PH BHL	187.07	Slot	-0.01	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
280.00	649.00	Surface Gyros	Flexi-Shot
809.00	6,834.00	MWD Surveys - Intermediate/Pilot Hole	MWD+SC

Design Report for Sater CC18-72-1HN - Pilot Hole 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 CC18-72-1HN_S	0.00	0.00	0.00	-0.01	0.00	1,355,839.86	3,286,667.35	40.305620	-104.472120
- actual wellpath misses target center by 0.01usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Point									
Sater CC18-72-1HN_4	0.00	0.00	0.00	-0.01	0.00	1,355,839.86	3,286,667.35	40.305620	-104.472120
- 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	4,591.00	-4,489.93	1,360,430.67	3,282,177.61	
Point 2				0.00	145.10	-4,434.37	1,355,984.96	3,282,233.17	
Point 3				0.00	161.16	-155.31	1,356,001.02	3,286,512.04	
Point 4				0.00	4,537.81	-213.99	1,360,377.48	3,286,453.37	
Point 5				0.00	4,591.00	-4,489.93	1,360,430.67	3,282,177.61	
Sater CC18-72-1HN_S	0.00	0.00	0.00	-0.01	0.00	1,355,839.86	3,286,667.35	40.305620	-104.472120
- 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	5,051.02	-4,949.95	1,360,890.67	3,281,717.61	
Point 2				0.00	-314.92	-4,894.39	1,355,524.96	3,281,773.17	
Point 3				0.00	-298.86	304.71	1,355,541.02	3,286,972.04	
Point 4				0.00	4,997.83	246.03	1,360,837.48	3,286,913.37	
Point 5				0.00	5,051.02	-4,949.95	1,360,890.67	3,281,717.61	
Sater CC18-72-1HN_F	0.00	0.00	6,865.00	-226.21	-28.06	1,355,613.67	3,286,639.29	40.305000	-104.472230
- actual wellpath misses target center by 18.17usft at 6878.51usft MD (6864.73 TVD, -231.75 N, -10.75 E)									
- Circle (radius 35.00)									
Sater CC18-72-1HN_F	0.00	0.00	6,865.00	-226.21	-28.06	1,355,613.67	3,286,639.29	40.305000	-104.472230
- actual wellpath misses target center by 18.17usft at 6878.51usft MD (6864.73 TVD, -231.75 N, -10.75 E)									
- Point									

Directional Difficulty Index

Average Dogleg over Survey:	0.66 °/100usft	Maximum Dogleg over Survey:	2.80 °/100usft at 3,829.00 usft
Net Tortousity applicable to Plans:	0.43 °/100usft	Directional Difficulty Index:	4.138

Audit Info

North Reference Sheet for Sec. 18-T4N-R63W (Sater CC18-16-A Pad) - Sater CC18-72-1HN - Plan A

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 @ 4703.00usft (H&P 315). Northing and Easting are relative to Sec. 18-T4N-R63W (Sater CC18-16-A Pad)

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

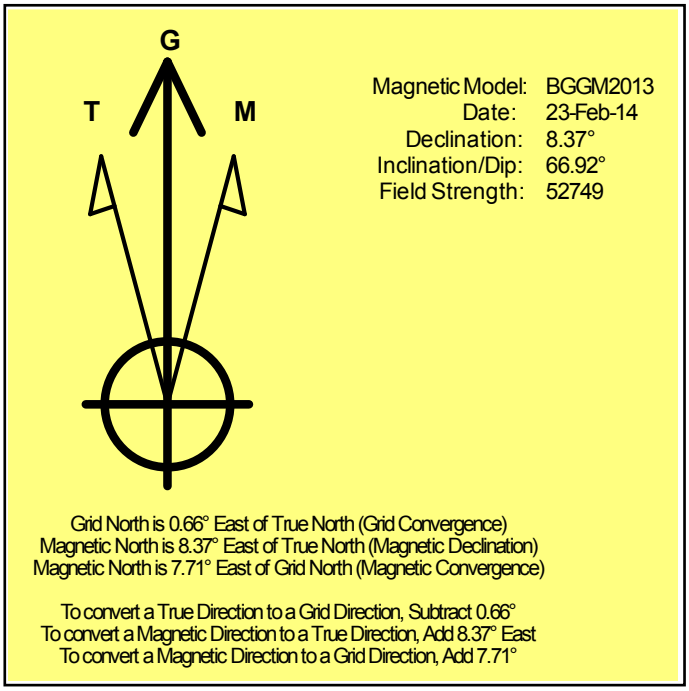
Grid Coordinates of Well: 1,355,839.86 usft N, 3,286,667.35 usft E

Geographical Coordinates of Well: 40° 18' 20.23" N, 104° 28' 19.63" W

Grid Convergence at Surface is: 0.66°

Based upon Minimum Curvature type calculations, at a Measured Depth of 6,890.00usft
the Bottom Hole Displacement is 232.04usft in the Direction of 182.62° (Grid).

Magnetic Convergence at surface is: -7.71° (23 February 2014, , BGGM2013)



Noble Energy

Weld County, CO (NAD 83)
Sec. 18-T4N-R63W (Sater CC18-16-A Pad)
Sater CC18-72-1HN
901119244
Plan A

Design: Pilot Hole Surveys

Sperry Drilling Services

Geodetic Report

26 March, 2014

Well Coordinates: 1,355,839.86 N, 3,286,667.35 E (40° 18' 20.23" N, 104° 28' 19.63" W)
Ground Level: 4,679.00 usft

Local Coordinate Origin:	Centered on Site Sec. 18-T4N-R63W (Sater CC18-16-A Pad)
Viewing Datum:	RKB = 24 @ 4703.00usft (H&P 315)
TVDs to System:	N
North Reference:	Grid
Unit System:	Dec-Deg - API - US Survey Feet - Custom

Geodetic Scale Factor Applied
Version: 5000.1 Build: 70

HALLIBURTON

Design Report for Sater CC18-72-1HN - Pilot Hole Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Geographic Coordinates Latitude (usft)	Geographic Coordinates Longitude (usft)	UTM Coordinates Northing (usft)	UTM Coordinates Easting (usft)
0.00	0.00	0.00	0.00	-0.01	0.00	40.305620	-104.472120	1,355,839.86	3,286,667.35
280.00	0.60	24.51	279.99	1.32	0.61	40.305624	-104.472118	1,355,841.19	3,286,667.95
649.00	0.40	232.51	648.99	2.30	0.39	40.305626	-104.472119	1,355,842.17	3,286,667.73
809.00	0.77	289.53	808.98	2.32	-1.07	40.305626	-104.472124	1,355,842.19	3,286,666.28
902.00	0.44	295.41	901.98	2.68	-1.98	40.305628	-104.472127	1,355,842.55	3,286,665.37
994.00	0.88	208.32	993.97	2.21	-2.63	40.305626	-104.472130	1,355,842.08	3,286,664.71
1,087.00	0.83	209.28	1,086.96	0.99	-3.30	40.305623	-104.472132	1,355,840.86	3,286,664.04
1,181.00	1.32	183.74	1,180.95	-0.68	-3.71	40.305618	-104.472134	1,355,839.19	3,286,663.64
1,366.00	1.60	152.89	1,365.89	-5.11	-2.67	40.305606	-104.472130	1,355,834.76	3,286,664.68
1,457.00	1.56	150.99	1,456.85	-7.32	-1.49	40.305600	-104.472126	1,355,832.55	3,286,665.86
1,553.00	1.51	146.33	1,552.82	-9.52	-0.15	40.305594	-104.472121	1,355,830.35	3,286,667.19
1,647.00	1.14	134.90	1,646.79	-11.21	1.20	40.305589	-104.472116	1,355,828.66	3,286,668.54
1,742.00	0.81	126.14	1,741.78	-12.27	2.41	40.305586	-104.472112	1,355,827.60	3,286,669.75
1,837.00	0.77	130.42	1,836.77	-13.08	3.44	40.305584	-104.472108	1,355,826.79	3,286,670.78
1,932.00	0.66	129.31	1,931.76	-13.84	4.34	40.305582	-104.472105	1,355,826.03	3,286,671.69
2,027.00	1.71	190.80	2,026.74	-15.58	4.50	40.305577	-104.472105	1,355,824.29	3,286,671.85
2,122.00	2.64	201.27	2,121.68	-19.01	3.44	40.305568	-104.472109	1,355,820.86	3,286,670.79
2,217.00	4.07	194.44	2,216.51	-24.32	1.81	40.305553	-104.472115	1,355,815.55	3,286,669.16
2,312.00	5.40	192.04	2,311.18	-31.95	0.04	40.305532	-104.472121	1,355,807.92	3,286,667.38
2,407.00	6.33	196.03	2,405.69	-41.36	-2.34	40.305507	-104.472130	1,355,798.51	3,286,665.00
2,502.00	8.00	195.04	2,499.94	-52.78	-5.51	40.305475	-104.472142	1,355,787.09	3,286,661.84
2,597.00	7.78	190.02	2,594.04	-65.49	-8.34	40.305441	-104.472153	1,355,774.38	3,286,659.01
2,691.00	8.40	192.53	2,687.11	-78.46	-10.94	40.305405	-104.472163	1,355,761.41	3,286,656.41
2,786.00	9.13	187.16	2,781.00	-92.71	-13.38	40.305366	-104.472172	1,355,747.16	3,286,653.97
2,881.00	8.51	185.79	2,874.87	-107.19	-15.03	40.305326	-104.472179	1,355,732.69	3,286,652.32
2,976.00	7.30	184.96	2,968.97	-120.19	-16.26	40.305291	-104.472184	1,355,719.68	3,286,651.09
3,071.00	7.82	190.43	3,063.15	-132.56	-17.95	40.305257	-104.472190	1,355,707.31	3,286,649.40
3,165.00	6.98	186.86	3,156.36	-144.52	-19.79	40.305224	-104.472197	1,355,695.35	3,286,647.56
3,260.00	7.09	186.12	3,250.65	-156.08	-21.11	40.305192	-104.472202	1,355,683.79	3,286,646.24
3,355.00	4.83	189.17	3,345.13	-165.86	-22.37	40.305166	-104.472207	1,355,674.02	3,286,644.98
3,450.00	5.55	189.87	3,439.74	-174.34	-23.79	40.305142	-104.472213	1,355,665.54	3,286,643.55
3,545.00	6.59	190.80	3,534.20	-184.22	-25.60	40.305115	-104.472220	1,355,655.66	3,286,641.74
3,640.00	7.81	190.52	3,628.45	-195.92	-27.80	40.305083	-104.472228	1,355,643.96	3,286,639.54
3,735.00	7.38	180.40	3,722.62	-208.37	-29.02	40.305049	-104.472233	1,355,631.51	3,286,638.32
3,829.00	4.76	178.16	3,816.09	-218.30	-28.94	40.305022	-104.472233	1,355,621.58	3,286,638.41
3,924.00	2.96	164.55	3,910.87	-224.61	-28.16	40.305004	-104.472231	1,355,615.27	3,286,639.19
4,019.00	1.34	159.12	4,005.80	-228.01	-27.11	40.304995	-104.472227	1,355,611.87	3,286,640.24
4,114.00	0.34	317.98	4,100.79	-228.84	-26.90	40.304993	-104.472226	1,355,611.04	3,286,640.44
4,304.00	0.92	304.25	4,290.78	-227.56	-28.54	40.304996	-104.472232	1,355,612.32	3,286,638.81
4,399.00	0.92	288.97	4,385.77	-226.88	-29.89	40.304998	-104.472237	1,355,613.00	3,286,637.45
4,494.00	1.26	274.95	4,480.75	-226.55	-31.66	40.304999	-104.472243	1,355,613.33	3,286,635.69
4,588.00	1.29	274.15	4,574.73	-226.38	-33.74	40.305000	-104.472251	1,355,613.50	3,286,633.61

Design Report for Sater CC18-72-1HN - Pilot Hole Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Geographic Coordinates Latitude (usft)	Geographic Coordinates Longitude (usft)	UTM Coordinates Northing (usft)	UTM Coordinates Easting (usft)
4,778.00	2.39	272.17	4,764.63	-226.08	-39.83	40.305001	-104.472272	1,355,613.80	3,286,627.52
4,873.00	1.34	247.24	4,859.58	-226.43	-42.84	40.305000	-104.472283	1,355,613.45	3,286,624.51
4,968.00	0.97	203.18	4,954.56	-227.60	-44.18	40.304997	-104.472288	1,355,612.28	3,286,623.17
5,063.00	1.24	97.84	5,049.55	-228.48	-43.48	40.304994	-104.472286	1,355,611.40	3,286,623.87
5,252.00	1.62	93.25	5,238.49	-228.91	-38.78	40.304993	-104.472269	1,355,610.97	3,286,628.57
5,442.00	1.28	89.42	5,428.43	-229.04	-33.98	40.304993	-104.472252	1,355,610.84	3,286,633.37
5,537.00	0.96	86.97	5,523.41	-228.99	-32.12	40.304993	-104.472245	1,355,610.89	3,286,635.22
5,726.00	1.07	87.56	5,712.38	-228.83	-28.78	40.304993	-104.472233	1,355,611.05	3,286,638.57
5,821.00	0.73	108.93	5,807.37	-228.99	-27.32	40.304992	-104.472228	1,355,610.89	3,286,640.03
5,916.00	0.71	87.41	5,902.36	-229.16	-26.16	40.304992	-104.472224	1,355,610.72	3,286,641.19
6,011.00	1.02	68.19	5,997.35	-228.82	-24.79	40.304993	-104.472219	1,355,611.06	3,286,642.56
6,106.00	1.03	78.38	6,092.34	-228.33	-23.17	40.304994	-104.472213	1,355,611.55	3,286,644.18
6,201.00	1.12	93.52	6,187.32	-228.22	-21.40	40.304994	-104.472206	1,355,611.67	3,286,645.94
6,295.00	0.89	100.09	6,281.31	-228.40	-19.77	40.304994	-104.472201	1,355,611.48	3,286,647.58
6,485.00	1.08	107.86	6,471.28	-229.21	-16.61	40.304991	-104.472189	1,355,610.67	3,286,650.74
6,580.00	0.88	112.38	6,566.26	-229.76	-15.08	40.304990	-104.472184	1,355,610.12	3,286,652.26
6,675.00	0.93	116.90	6,661.25	-230.39	-13.72	40.304988	-104.472179	1,355,609.49	3,286,653.63
6,770.00	0.99	114.51	6,756.24	-231.08	-12.29	40.304986	-104.472174	1,355,608.81	3,286,655.06
6,834.00	0.84	113.19	6,820.23	-231.49	-11.35	40.304985	-104.472171	1,355,608.39	3,286,655.99
6,890.00	0.84	113.19	6,876.22	-231.81	-10.60	40.304984	-104.472168	1,355,608.07	3,286,656.75

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
649.00	648.99	2.30	0.39	Tie-On to Surface Gyros @ 649.00ft
809.00	808.98	2.32	-1.07	First MWD Survey @ 809.00ft
6,890.00	6,876.22	-231.81	-10.60	Straight Line Proj @ 6890' MD, 6876.22' TVD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/_S (usft)	Origin +E/-W (usft)	Start TVD (usft)
Target	Sater CC18-72-1HN_PH BHL	187.07	Slot	-0.01	0.00	0.00

Design Report for Sater CC18-72-1HN - Pilot Hole Surveys

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
280.00	649.00	Surface Gyros	Flexi-Shot
809.00	6,834.00	MWD Surveys - Intermediate/Pilot Hole	MWD+SC

Design Targets

Shape	Target Name	TVD ()	Northing ()	Easting ()	+N/-S	+E/-W	Created	Updated

Directional Difficulty Index

Average Dogleg over Survey:	0.66 °/100usft	Maximum Dogleg over Survey:	2.80 °/100usft at 3,829.00 usft
Net Tortousity applicable to Plans:	0.43 °/100usft	Directional Difficulty Index:	4.138

Audit Info

North Reference Sheet for Sec. 18-T4N-R63W (Sater CC18-16-A Pad) - Sater CC18-72-1HN - Plan A

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 @ 4703.00usft (H&P 315). Northing and Easting are relative to Sec. 18-T4N-R63W (Sater CC18-16- A Pad)

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: 1,355,839.86 usft N, 3,286,667.35 usft E

Geographical Coordinates of Well: 40° 18' 20.23" N, 104° 28' 19.63" W

Grid Convergence at Surface is: 0.66°

Based upon Minimum Curvature type calculations, at a Measured Depth of 6,890.00usft

the Bottom Hole Displacement is 232.04usft in the Direction of 182.62° (Grid).
Magnetic Convergence at surface is: -7.71° (23 February 2014, , BGGM2013)