

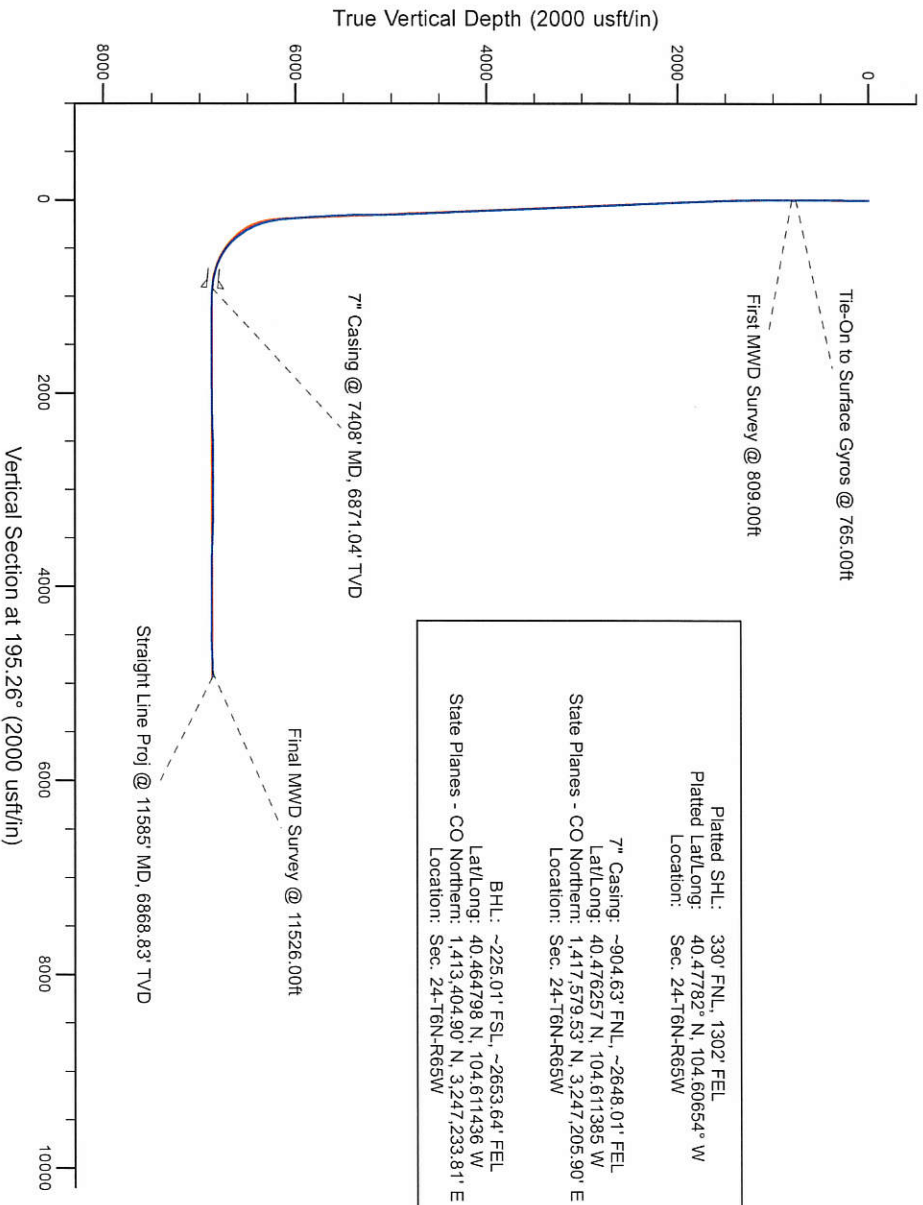
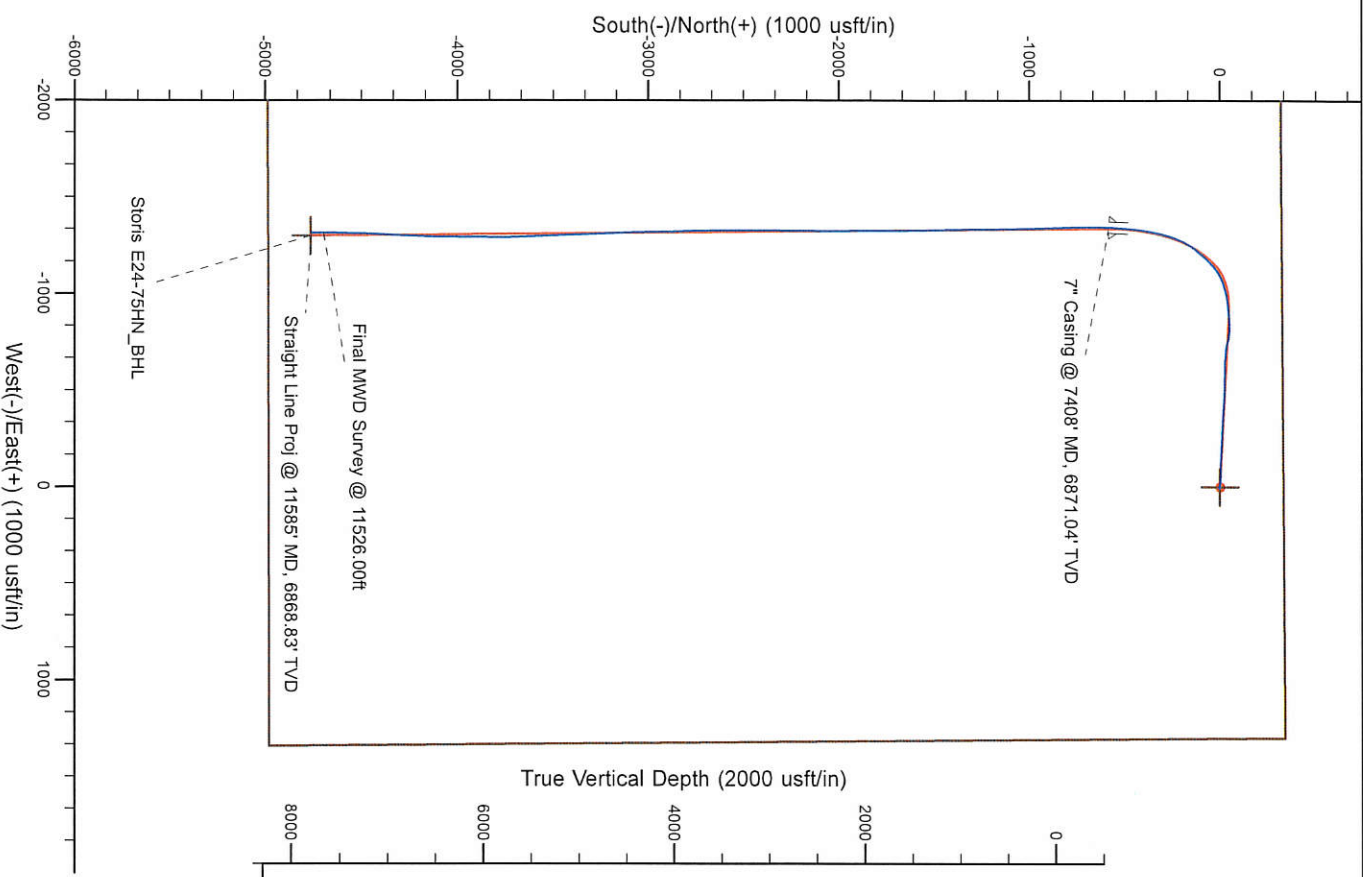
Project: Weld County, CO (NAD 83)
 Site: Sec. 24-T6N-R65W (Storis/Mackinaw Pad)
 Well: Storis E24-75HN
 Wellbore: Plan A
 Design: Final Surveys

Noble Energy



LEGEND

Storis E24-75HN, Plan A, Rev A0 - PROPOSAL V0
 Final Surveys



Platted SHL: 330' FNL, 1302' FEL
 Platted Lat/Long: 40.47782° N, 104.60654° W
 Location: Sec. 24-T6N-R65W

 7" Casing: ~904.63' FNL, ~2648.01' FEL
 Lat/Long: 40.476257° N, 104.611385° W
 State Planes - CO Northern: 1,417,579.53' N, 3,247,205.90' E
 Location: Sec. 24-T6N-R65W

 BHL: ~225.01' FSL, ~2653.64' FEL
 Lat/Long: 40.464798° N, 104.611436° W
 State Planes - CO Northern: 1,413,404.90' N, 3,247,233.81' E
 Location: Sec. 24-T6N-R65W

WELL DETAILS: Storis E24-75HN	
Ground Level:	4685.00
RKB=24ft @ 4709.00usft (H&P 315)	
Created By:	Fred Hartmann
Created On:	04/17/2014

Noble Energy

Weld County, CO (NAD 83)

Sec. 24-T6N-R65W (Storis/Mackinaw Pad)

Storis E24-75HN

Design: Final Surveys

Sperry Drilling Services

Final Survey Report

17 April, 2014

Well Coordinates: 1,418,162.38 N, 3,248,548.01 E (40° 28' 40.15" N, 104° 36' 23.54" W)

Ground Level: 4,685.00 usft

Local Coordinate Origin:

Centered on Well Storis E24-75HN

Viewing Datum:

RKB=24ft @ 4709.00usft (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 Storis E24-75HN - 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
270.00	0.60	105.67	270.00	-0.38	1.36	0.01	0.22
515.00	0.40	103.77	514.99	-0.93	3.43	0.00	0.08
765.00	0.60	271.27	764.98	-1.11	2.97	0.29	0.40
Tie-On to Surface Gyros @ 765.00ft							
809.00	0.22	259.33	808.98	-1.12	2.65	0.38	0.88
First MWD Survey @ 809.00ft							
901.00	0.19	220.22	900.98	-1.27	2.38	0.60	0.15
993.00	0.15	165.44	992.98	-1.50	2.31	0.84	0.17
1,086.00	0.18	172.53	1,085.98	-1.77	2.36	1.08	0.04
1,179.00	2.03	274.79	1,178.96	-1.77	0.74	1.52	2.23
1,273.00	3.28	272.52	1,272.86	-1.52	-3.61	2.41	1.33
1,365.00	5.06	282.43	1,364.61	-0.53	-10.20	3.19	2.08
1,457.00	7.37	280.10	1,456.06	1.38	-19.97	3.92	2.53
1,552.00	9.46	273.24	1,550.04	2.89	-33.77	6.10	2.44
1,647.00	11.49	269.00	1,643.45	3.17	-51.02	10.37	2.28
1,742.00	11.17	270.44	1,736.60	3.07	-69.69	15.38	0.45
1,837.00	11.43	272.37	1,829.76	3.53	-88.29	19.83	0.48
1,932.00	11.23	272.13	1,922.91	4.27	-106.94	24.03	0.22
2,027.00	10.87	270.35	2,016.15	4.66	-125.14	28.44	0.52
2,122.00	10.64	273.35	2,109.48	5.23	-142.86	32.56	0.64
2,217.00	10.53	272.83	2,202.86	6.17	-160.28	36.24	0.15
2,312.00	10.63	276.23	2,296.25	7.55	-177.66	39.48	0.67
2,406.00	10.92	273.94	2,388.59	9.11	-195.16	42.59	0.55
2,501.00	11.56	272.95	2,481.77	10.21	-213.65	46.38	0.70
2,596.00	11.49	271.04	2,574.85	10.87	-232.61	50.74	0.41
2,691.00	11.50	269.88	2,667.95	11.03	-251.54	55.58	0.24
2,786.00	11.76	275.82	2,761.00	11.99	-270.65	59.68	1.29
2,881.00	12.65	272.28	2,853.85	13.38	-290.67	63.60	1.22
2,976.00	10.59	271.74	2,946.90	14.06	-309.79	67.98	2.17
3,071.00	11.92	272.90	3,040.07	14.82	-328.32	72.12	1.42
3,166.00	11.29	272.22	3,133.13	15.68	-347.41	76.32	0.68
3,261.00	9.43	273.90	3,226.58	16.57	-364.47	79.95	1.98
3,356.00	8.36	276.39	3,320.43	17.87	-379.09	82.55	1.20
3,451.00	8.63	275.19	3,414.39	19.28	-393.06	84.86	0.34
3,546.00	10.40	278.06	3,508.08	21.13	-408.65	87.18	1.93
3,641.00	10.86	271.75	3,601.45	22.60	-426.08	90.35	1.32
3,831.00	12.19	272.09	3,787.62	23.88	-464.02	99.10	0.70
3,926.00	12.91	272.96	3,880.35	24.80	-484.64	103.65	0.78
4,020.00	13.40	273.26	3,971.88	25.96	-506.00	108.15	0.53
4,115.00	12.64	272.39	4,064.44	27.02	-527.38	112.76	0.83
4,210.00	10.38	271.81	4,157.52	27.72	-546.32	117.06	2.38
4,305.00	10.11	269.57	4,251.01	27.93	-563.21	121.31	0.51
4,400.00	10.31	270.06	4,344.50	27.88	-580.05	125.79	0.23
4,495.00	10.28	269.73	4,437.98	27.85	-597.03	130.29	0.07
4,590.00	10.18	271.95	4,531.47	28.09	-613.90	134.49	0.43
4,685.00	9.53	268.21	4,625.06	28.13	-630.15	138.73	0.96
4,780.00	10.76	271.11	4,718.58	28.06	-646.88	143.21	1.40
4,875.00	10.89	277.31	4,811.89	29.37	-664.64	146.62	1.23
4,970.00	9.83	274.75	4,905.34	31.18	-681.63	149.34	1.22

Design Report for Storis E24-75HN - Final Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
5,064.00	11.00	271.55	4,997.79	32.09	-698.59	152.93	1.39
5,159.00	10.97	276.93	5,091.05	33.43	-716.62	156.39	1.08
5,254.00	10.62	283.81	5,184.38	36.61	-734.10	157.92	1.40
5,349.00	11.19	286.13	5,277.66	41.26	-751.45	158.00	0.76
5,444.00	11.85	280.90	5,370.75	45.66	-769.89	158.60	1.30
5,539.00	9.99	277.63	5,464.02	48.60	-787.63	160.44	2.06
5,634.00	11.18	272.13	5,557.41	50.04	-805.01	163.63	1.64
5,728.00	10.63	269.73	5,649.71	50.34	-822.78	168.02	0.76
5,823.00	10.64	268.11	5,743.08	50.01	-840.31	172.95	0.31
5,918.00	10.98	269.77	5,836.39	49.68	-858.12	177.95	0.49
6,013.00	11.48	264.99	5,929.58	48.82	-876.59	183.65	1.11
6,106.00	13.36	267.13	6,020.40	47.47	-896.54	190.20	2.08
6,171.00	12.92	264.55	6,083.70	46.41	-911.28	195.10	1.13
6,293.00	20.83	261.68	6,200.35	41.96	-946.37	208.63	6.52
6,341.00	25.27	261.37	6,244.51	39.19	-964.96	216.19	9.25
6,388.00	26.37	258.36	6,286.82	35.58	-985.10	224.98	3.64
6,436.00	29.23	256.58	6,329.27	30.71	-1,006.94	235.43	6.20
6,483.00	33.24	256.03	6,369.45	24.93	-1,030.62	247.23	8.55
6,531.00	35.48	251.18	6,409.08	17.26	-1,056.58	261.47	7.37
6,578.00	36.77	244.72	6,447.06	6.85	-1,082.22	278.26	8.55
6,626.00	37.67	235.38	6,485.31	-7.63	-1,107.30	298.83	11.91
6,673.00	38.85	231.00	6,522.22	-25.07	-1,130.58	321.79	6.29
6,721.00	38.71	229.84	6,559.64	-44.23	-1,153.75	346.36	1.54
6,768.00	40.22	223.70	6,595.94	-64.68	-1,175.47	371.82	8.90
6,816.00	44.05	221.85	6,631.53	-88.33	-1,197.32	400.38	8.39
6,863.00	46.07	218.79	6,664.73	-113.70	-1,218.83	430.52	6.30
6,911.00	50.79	212.86	6,696.59	-142.82	-1,239.77	464.12	13.49
6,958.00	54.88	208.60	6,724.98	-175.01	-1,258.87	500.21	11.31
7,006.00	58.55	205.08	6,751.33	-210.81	-1,276.95	539.51	9.80
7,054.00	61.95	199.72	6,775.16	-249.33	-1,292.79	580.83	12.00
7,102.00	65.10	194.74	6,796.56	-290.35	-1,305.49	623.75	11.37
7,148.00	68.81	191.14	6,814.57	-331.59	-1,314.94	666.03	10.81
7,196.00	72.79	189.05	6,830.36	-376.21	-1,322.88	711.16	9.25
7,243.00	75.97	186.99	6,843.01	-421.03	-1,329.19	756.06	7.97
7,291.00	78.08	185.73	6,853.79	-467.51	-1,334.36	802.26	5.09
7,338.00	80.75	184.29	6,862.42	-513.53	-1,338.40	847.72	6.43
7,364.00	82.49	183.34	6,866.21	-539.19	-1,340.11	872.93	7.61
7,408.00	84.91	182.04	6,871.04	-582.87	-1,342.16	915.61	6.24
7" Casing @ 7408' MD, 6871.04' TVD							
7,478.00	88.77	179.99	6,874.89	-652.74	-1,343.39	983.34	6.24
7,605.00	89.32	178.80	6,877.01	-779.71	-1,342.05	1,105.48	1.03
7,699.00	89.29	177.73	6,878.15	-873.66	-1,339.21	1,195.37	1.14
7,794.00	89.26	178.57	6,879.35	-968.60	-1,336.14	1,286.15	0.88
7,889.00	90.06	178.70	6,879.92	-1,063.57	-1,333.88	1,377.18	0.85
7,984.00	91.73	179.95	6,878.43	-1,158.55	-1,332.76	1,468.51	2.20
8,079.00	90.03	179.72	6,876.97	-1,253.53	-1,332.48	1,560.07	1.81
8,174.00	89.81	178.97	6,877.11	-1,348.53	-1,331.40	1,651.43	0.82
8,268.00	89.41	178.33	6,877.75	-1,442.50	-1,329.18	1,741.50	0.80
8,363.00	90.55	179.55	6,877.78	-1,537.48	-1,327.43	1,832.67	1.76
8,458.00	90.15	178.74	6,877.20	-1,632.47	-1,326.01	1,923.94	0.95
8,553.00	90.22	179.89	6,876.89	-1,727.46	-1,324.87	2,015.28	1.21

Design Report for Storis E24-75HN - Final Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
8,648.00	90.46	179.61	6,876.33	-1,822.45	-1,324.46	2,106.82	0.39
8,742.00	90.46	179.76	6,875.57	-1,916.45	-1,323.94	2,197.36	0.16
8,837.00	90.22	179.35	6,875.01	-2,011.44	-1,323.20	2,288.81	0.50
8,932.00	93.49	180.78	6,871.94	-2,106.38	-1,323.31	2,380.43	3.76
9,027.00	91.79	180.29	6,867.56	-2,201.27	-1,324.20	2,472.20	1.86
9,122.00	91.14	180.81	6,865.13	-2,296.23	-1,325.11	2,564.06	0.88
9,217.00	90.25	180.80	6,863.98	-2,391.22	-1,326.44	2,656.04	0.94
9,312.00	89.01	180.26	6,864.59	-2,486.21	-1,327.32	2,747.92	1.42
9,407.00	89.01	179.66	6,866.23	-2,581.19	-1,327.25	2,839.53	0.63
9,502.00	90.28	178.99	6,866.82	-2,676.18	-1,326.14	2,930.88	1.51
9,596.00	90.34	178.97	6,866.31	-2,770.17	-1,324.46	3,021.11	0.07
9,691.00	88.86	177.92	6,866.98	-2,865.13	-1,321.88	3,112.04	1.91
9,786.00	90.59	178.29	6,867.43	-2,960.07	-1,318.74	3,202.81	1.86
9,881.00	90.43	178.81	6,866.59	-3,055.03	-1,316.34	3,293.79	0.57
9,976.00	87.80	178.65	6,868.05	-3,149.99	-1,314.23	3,384.85	2.77
10,070.00	87.50	177.90	6,871.91	-3,243.87	-1,311.41	3,474.67	0.86
10,165.00	87.72	177.09	6,875.87	-3,338.69	-1,307.26	3,565.06	0.88
10,260.00	89.32	177.23	6,878.32	-3,433.54	-1,302.55	3,655.32	1.69
10,355.00	89.04	177.84	6,879.68	-3,528.44	-1,298.47	3,745.80	0.71
10,450.00	89.35	177.34	6,881.02	-3,623.35	-1,294.47	3,836.31	0.62
10,545.00	90.06	178.99	6,881.51	-3,718.30	-1,291.43	3,927.11	1.89
10,640.00	90.09	179.54	6,881.38	-3,813.29	-1,290.21	4,018.43	0.58
10,735.00	90.68	181.47	6,880.74	-3,908.28	-1,291.05	4,110.29	2.12
10,830.00	89.94	180.10	6,880.23	-4,003.26	-1,292.35	4,202.27	1.64
10,924.00	89.35	180.99	6,880.81	-4,097.26	-1,293.25	4,293.18	1.14
11,019.00	90.19	182.48	6,881.19	-4,192.21	-1,296.12	4,385.54	1.80
11,114.00	89.51	182.08	6,881.44	-4,287.13	-1,299.90	4,478.11	0.83
11,209.00	90.59	182.91	6,881.36	-4,382.04	-1,304.04	4,570.76	1.43
11,304.00	92.28	182.46	6,878.98	-4,476.90	-1,308.49	4,663.45	1.84
11,399.00	91.85	181.43	6,875.56	-4,571.79	-1,311.71	4,755.83	1.17
11,526.00	92.19	180.45	6,871.08	-4,698.69	-1,313.79	4,878.81	0.82
Final MWD Survey @ 11526.00ft							
11,585.00	92.19	180.45	6,868.83	-4,757.64	-1,314.25	4,935.81	0.00
Straight Line Proj @ 11585' MD, 6868.83' TVD							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
765.00	764.98	-1.11	2.97	Tie-On to Surface Gyros @ 765.00ft
809.00	808.98	-1.12	2.65	First MWD Survey @ 809.00ft
11,526.00	6,871.08	-4,698.69	-1,313.79	Final MWD Survey @ 11526.00ft
11,585.00	6,868.83	-4,757.64	-1,314.25	Straight Line Proj @ 11585' MD, 6868.83' TVD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
Target	Storis E24-75HN_BHL	195.26	Slot	0.00	0.00	0.00

Design Report for Storis E24-75HN - Final Surveys

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
270.00	765.00	Surface Gyros	Flexi-Shot
809.00	7,364.00	MWD Surveys - Intermediate	MWD+IFR1+MS_WY
7,478.00	11,526.00	MWD Surveys - Production	MWD+IFR1+MS_WY

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
7,408.00	6,871.04	7" Casing @ 7408' MD, 6871.04' 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
Storis E24-75HN_SHL - actual wellpath hits target center - Point	0.00	0.00	0.00	0.00	0.00	1,418,162.38	3,248,548.01	40.477820	-104.606540
Storis E24-75HN_SL - actual wellpath hits target center - Polygon	0.00	0.00	0.00	0.00	0.00	1,418,162.38	3,248,548.01	40.477820	-104.606540
Point 1				0.00	306.13	-4,000.97	1,418,468.50	3,244,547.18	
Point 2				0.00	-4,997.75	-3,917.78	1,413,164.81	3,244,630.37	
Point 3				0.00	-4,982.66	-1,307.76	1,413,179.90	3,247,240.30	
Point 4				0.00	-4,977.83	1,341.33	1,413,184.73	3,249,889.30	
Point 5				0.00	337.38	1,298.63	1,418,499.75	3,249,846.60	
Point 6				0.00	306.13	-4,000.97	1,418,468.50	3,244,547.18	
Storis E24-75HN_460 - actual wellpath hits target center - Polygon	0.00	0.00	0.00	0.00	0.00	1,418,162.38	3,248,548.01	40.477820	-104.606540
Point 1				0.00	-153.89	-3,540.96	1,418,008.50	3,245,007.18	
Point 2				0.00	-4,537.73	-3,457.77	1,413,624.81	3,245,090.37	
Point 3				0.00	-4,522.64	-1,307.76	1,413,639.90	3,247,240.30	
Point 4				0.00	-4,517.81	881.32	1,413,644.73	3,249,429.30	
Point 5				0.00	-122.64	838.62	1,418,039.75	3,249,386.60	
Point 6				0.00	-153.89	-3,540.96	1,418,008.50	3,245,007.18	
Storis E24-75HN_KOF - actual wellpath misses target center by 3.60usft at 6226.92usft MD (6137.77 TVD, 44.83 N, -925.40 E) - Circle (radius 35.00)	0.00	0.00	6,138.20	48.27	-924.43	1,418,210.65	3,247,623.61	40.477978	-104.609861
Storis E24-75HN_Late - actual wellpath misses target center by 1144.78usft at 6436.00usft MD (6329.27 TVD, 30.71 N, -1006.94 E) - Polygon	0.00	0.00	6,873.00	0.00	0.00	1,418,162.38	3,248,548.01	40.477820	-104.606540
Point 1				6,873.00	-580.42	-1,371.62	1,417,581.98	3,247,176.44	
Point 2				6,873.00	-580.42	-1,301.62	1,417,581.98	3,247,246.44	
Point 3				6,873.00	-4,760.32	-1,263.85	1,413,402.23	3,247,284.21	
Point 4				6,873.00	-4,760.32	-1,333.85	1,413,402.23	3,247,214.21	
Point 5				6,873.00	-580.42	-1,371.62	1,417,581.98	3,247,176.44	
Storis E24-75HN_BHL - actual wellpath misses target center by 16.18usft at 11585.00usft MD (6868.83 TVD, -4757.64 N, -1314.25 E) - Point	0.00	0.00	6,873.00	-4,760.32	-1,298.85	1,413,402.22	3,247,249.21	40.464790	-104.611380

Design Report for Storis E24-75HN - Final Surveys

Directional Difficulty Index

Average Dogleg over Survey:	1.84 °/100usft	Maximum Dogleg over Survey:	13.49 °/100usft at 6,911.00 usft
Net Tortosity applicable to Plans:	0.79 °/100usft	Directional Difficulty Index:	6.330

Audit Info

North Reference Sheet for Sec. 24-T6N-R65W (Storis/Mackinaw Pad) - Storis E24-75HN

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

Vertical Depths are relative to RKB=24ft @ 4709.00usft (H&P 315). Northing and Easting are relative to Storis E24-75HN

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: 0.99996468

Grid Coordinates of Well: 1,418,162.38 usft N, 3,248,548.01 usft E

Geographical Coordinates of Well: 40° 28' 40.15" N, 104° 36' 23.54" W

Grid Convergence at Surface is: 0.58°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,585.00usft the Bottom Hole Displacement is 4,935.83usft in the Direction of 195.44° (Grid).

Magnetic Convergence at surface is: -7.88° (19 March 2014, , BGGM2013)

