

# Noble Energy

Weld County, CO (NAD 83)

Sec. 22-T9N-R58W (Gracie LD22 PAD)

Gracie LD22-740

05-123-41563

Plan A

Design: Actual Surveys

## Sperry Drilling Services

### Final Survey Report

16 September, 2015

Surface UWI : 05-123-41563

Well Coordinates: 1,513,431.05 N, 3,458,238.78 E (40° 43' 51.71" N, 103° 50' 47.44" W)

Ground Level: 4,828.00 usft

Local Coordinate Origin:

Centered on Well Gracie LD22-740

Viewing Datum:

KB = 30' @ 4858.00usft (H&P 321)

TVDs to System:

N

North Reference:

Grid

Unit System:

Dec-Deg - API - US Survey Feet - Custom

Geodetic Scale Factor Applied

Version: 5000.1 Build: 73

**HALLIBURTON**

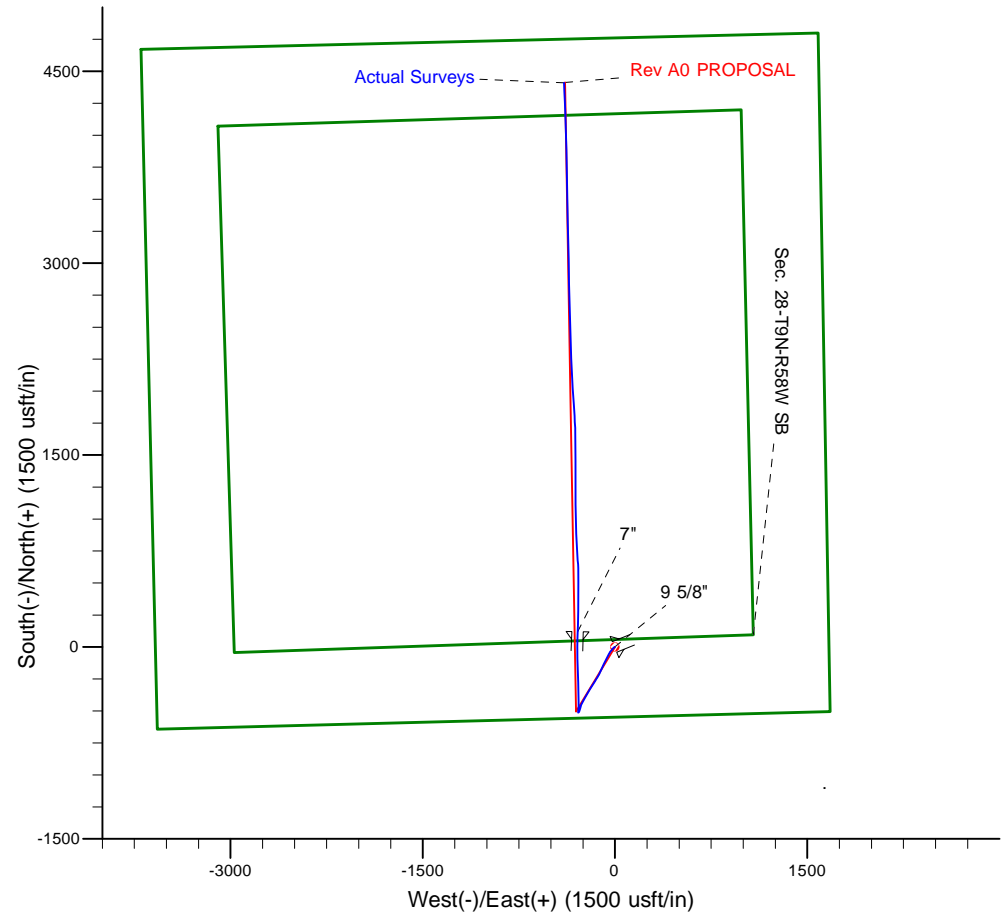
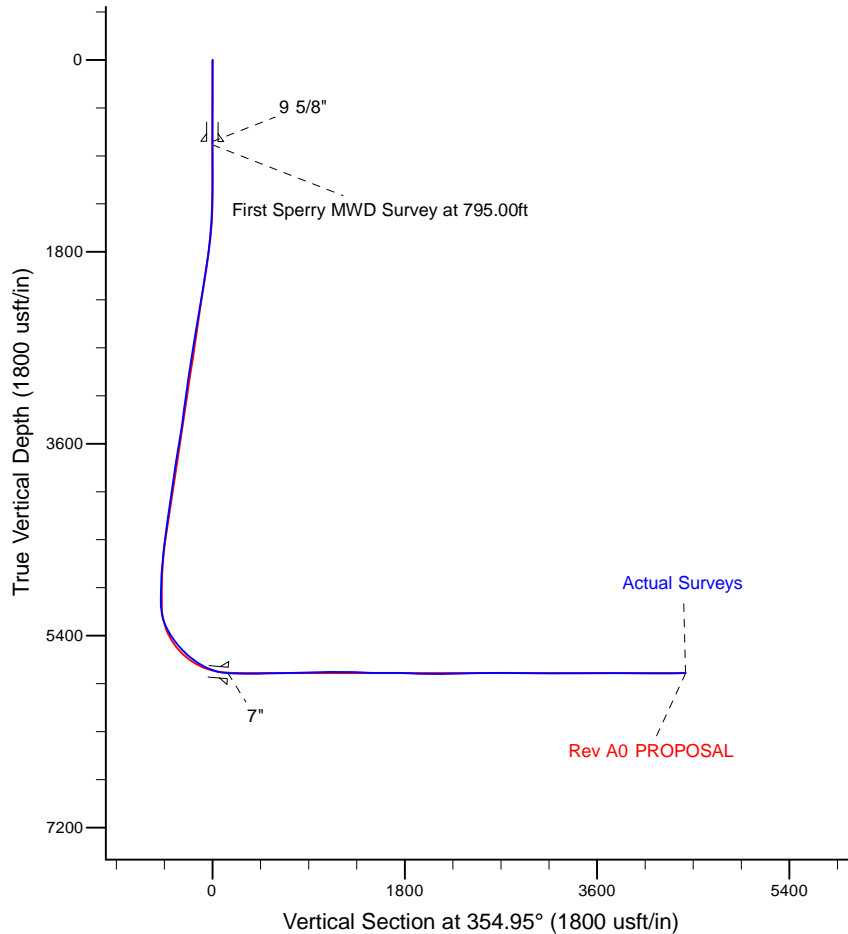
Project: Weld County, CO (NAD 83)  
 Site: Sec. 22-T9N-R58W (Gracie LD22 PAD)  
 Well: Gracie LD22-740  
 Wellbore: Plan A  
 Design: Actual Surveys



Platted SHL: 550 FSL, 1669' FEL  
 Platted Lat/Long: 40.731030, -103.846510  
 Location: Sec. 22-T9N-R58W

~7" Casing: 662' FSL, 1958' FEL  
 Lat/Long: 40.731371 N, -103.847551 W  
 State Planes - CO Northern: 1,513,549.79 N, 3,457,948.17 E  
 Sec. 22-T9N-R58W

Platted BHL: 330' FNL, 1980' FEL  
 Platted Lat/Long: 40.742967 N, -103.847641 W  
 State Planes - CO Northern: 1,517,773.59 N, 3,457,844.44 E  
 Location: Sec. 22-T9N-R58W



LEGEND	
	Gracie LD22-740, Plan A, Rev A0 PROPOSAL V0
	Actual Surveys

WELL DETAILS: Gracie LD22-740	
Ground Level:	4828.00
KB = 30' @ 4858.00usft (H&P 321)	
Created By:	Tatiana Gomez
Created On:	9/16/2015

**Design Report for Gracie LD22-740 - 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
<b>Gracie LD22-740_Rev A0_SHL</b>							
765.00	0.57	247.67	764.99	-1.44	-3.51	-1.13	0.07
<b>9 5/8"</b>							
795.00	0.59	247.67	794.99	-1.56	-3.79	-1.22	0.07
<b>First Sperry MWD Survey at 795.00ft</b>							
854.00	0.40	226.62	853.98	-1.81	-4.22	-1.43	0.44
1,039.00	0.28	245.39	1,038.98	-2.44	-5.10	-1.99	0.09
1,133.00	0.35	245.84	1,132.98	-2.66	-5.57	-2.16	0.07
1,234.00	0.44	270.22	1,233.98	-2.78	-6.24	-2.22	0.19
1,327.00	1.76	232.13	1,326.96	-3.66	-7.72	-2.96	1.55
1,515.00	5.34	222.06	1,514.57	-11.93	-15.86	-10.48	1.93
1,607.00	7.64	221.92	1,605.97	-19.66	-22.82	-17.57	2.50
1,701.00	7.71	218.36	1,699.13	-29.25	-30.91	-26.42	0.51
1,793.00	8.98	214.80	1,790.16	-39.99	-38.83	-36.41	1.49
1,886.00	10.52	208.21	1,881.81	-53.43	-46.99	-49.09	2.04
1,979.00	10.77	206.93	1,973.21	-68.66	-54.94	-63.56	0.37
2,071.00	10.67	206.76	2,063.61	-83.93	-62.67	-78.08	0.11
2,163.00	10.80	205.73	2,154.00	-99.30	-70.24	-92.73	0.25
2,256.00	10.55	205.24	2,245.39	-114.85	-77.66	-107.57	0.29
2,441.00	10.37	205.17	2,427.31	-145.24	-91.96	-136.58	0.10
2,625.00	11.03	205.89	2,608.11	-176.06	-106.69	-165.98	0.37
2,717.00	11.28	205.41	2,698.37	-192.10	-114.39	-181.29	0.29
2,810.00	11.22	204.85	2,789.59	-208.53	-122.10	-196.97	0.13
2,903.00	10.32	211.10	2,880.95	-223.87	-130.20	-211.54	1.58
2,997.00	9.85	210.93	2,973.50	-237.98	-138.69	-224.85	0.50
3,091.00	9.47	211.34	3,066.17	-251.48	-146.84	-237.58	0.41
3,186.00	9.32	212.39	3,159.89	-264.65	-155.03	-249.98	0.24
3,280.00	9.76	211.63	3,252.59	-277.86	-163.28	-262.41	0.49
3,374.00	10.05	212.14	3,345.19	-291.59	-171.82	-275.34	0.32
3,468.00	10.47	212.04	3,437.69	-305.78	-180.72	-288.68	0.45
3,562.00	10.98	211.53	3,530.04	-320.65	-189.93	-302.69	0.55
3,656.00	11.48	212.32	3,622.24	-336.18	-199.61	-317.31	0.56
3,751.00	11.43	210.58	3,715.35	-352.28	-209.46	-332.47	0.37
3,845.00	11.07	209.73	3,807.55	-368.13	-218.67	-347.46	0.42
3,939.00	10.35	210.43	3,899.91	-383.25	-227.42	-361.74	0.78
4,034.00	9.76	209.60	3,993.45	-397.61	-235.72	-375.32	0.64
4,128.00	9.49	207.71	4,086.13	-411.40	-243.26	-388.39	0.44
4,222.00	9.46	207.40	4,178.84	-425.12	-250.42	-401.42	0.06
4,316.00	9.27	205.16	4,271.59	-438.83	-257.19	-414.49	0.44
4,411.00	8.69	202.70	4,365.43	-452.37	-263.22	-427.45	0.73
4,505.00	8.31	199.66	4,458.39	-465.32	-268.24	-439.91	0.63
4,599.00	7.24	192.45	4,551.53	-477.50	-271.80	-451.73	1.54
4,694.00	6.15	190.38	4,645.88	-488.35	-274.01	-462.34	1.17
4,788.00	4.59	202.93	4,739.47	-496.77	-276.38	-470.52	2.07
4,882.00	4.05	209.10	4,833.20	-503.14	-279.46	-476.59	0.76
4,977.00	3.17	218.11	4,928.01	-508.13	-282.72	-481.28	1.10
5,071.00	2.54	219.69	5,021.90	-511.78	-285.65	-484.65	0.68
5,166.00	2.14	343.37	5,116.86	-511.70	-287.50	-484.41	4.35
5,260.00	13.31	9.87	5,209.87	-499.32	-286.15	-472.20	12.16

## Design Report for Gracie LD22-740 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
5,354.00	23.74	0.88	5,298.90	-469.65	-284.00	-442.83	11.47
5,449.00	31.94	358.64	5,382.83	-425.33	-284.30	-398.66	8.70
5,543.00	37.90	358.46	5,459.87	-371.57	-285.67	-344.98	6.34
5,638.00	43.30	359.50	5,531.98	-309.78	-286.74	-283.34	5.73
5,732.00	49.02	358.12	5,597.06	-242.02	-288.18	-215.72	6.18
5,826.00	56.45	357.83	5,653.94	-167.31	-290.83	-141.07	7.91
5,920.00	64.15	358.92	5,700.48	-85.76	-293.12	-59.62	8.25
6,014.00	75.77	0.17	5,732.63	2.40	-293.78	28.24	12.42
6,087.00	82.55	2.28	5,746.36	74.03	-292.23	99.46	9.71
6,132.00	85.26	1.87	5,751.13	118.74	-290.61	143.86	6.10
7"							
6,184.00	88.40	1.40	5,754.01	170.63	-289.13	195.42	6.10
6,322.00	89.82	0.06	5,756.15	308.60	-287.38	332.70	1.41
6,415.00	90.43	0.65	5,755.95	401.60	-286.80	425.28	0.91
6,508.00	91.05	0.36	5,754.74	494.59	-285.98	517.84	0.74
6,600.00	91.39	358.82	5,752.79	586.56	-286.64	609.51	1.71
6,692.00	90.96	356.28	5,750.90	678.45	-290.57	701.39	2.80
6,784.00	91.76	356.23	5,748.72	770.22	-296.58	793.34	0.87
6,876.00	92.03	357.21	5,745.67	862.02	-301.84	885.24	1.10
6,969.00	92.13	358.57	5,742.30	954.90	-305.26	978.06	1.47
7,063.00	90.43	358.87	5,740.20	1,048.85	-307.36	1,071.83	1.84
7,158.00	89.82	359.98	5,739.99	1,143.84	-308.31	1,166.54	1.33
7,253.00	89.41	1.53	5,740.63	1,238.83	-307.06	1,261.04	1.69
7,348.00	87.23	358.46	5,743.41	1,333.77	-307.07	1,355.62	3.96
7,443.00	88.15	359.04	5,747.24	1,428.67	-309.14	1,450.33	1.14
7,538.00	89.94	0.22	5,748.83	1,523.65	-309.75	1,545.00	2.26
7,632.00	90.65	0.12	5,748.34	1,617.64	-309.47	1,638.60	0.76
7,727.00	88.18	357.95	5,749.31	1,712.61	-311.07	1,733.35	3.46
7,822.00	87.90	356.67	5,752.56	1,807.45	-315.53	1,828.21	1.38
7,916.00	88.43	356.34	5,755.57	1,901.23	-321.26	1,922.12	0.66
8,011.00	88.67	355.91	5,757.98	1,995.98	-327.67	2,017.07	0.52
8,105.00	90.77	357.12	5,758.44	2,089.80	-333.39	2,111.03	2.58
8,200.00	90.99	356.63	5,756.98	2,184.64	-338.56	2,205.96	0.57
8,294.00	91.36	357.50	5,755.05	2,278.50	-343.38	2,299.88	1.01
8,389.00	91.08	358.71	5,753.03	2,373.42	-346.52	2,394.71	1.31
8,484.00	91.88	359.22	5,750.57	2,468.38	-348.23	2,489.45	1.00
8,673.00	89.17	358.06	5,748.84	2,657.29	-352.72	2,678.03	1.56
8,767.00	89.91	357.56	5,749.60	2,751.22	-356.31	2,771.91	0.95
8,862.00	89.69	359.21	5,749.93	2,846.18	-358.99	2,866.73	1.75
8,957.00	89.23	359.47	5,750.82	2,941.17	-360.08	2,961.45	0.56
9,052.00	88.98	358.96	5,752.31	3,036.15	-361.38	3,056.17	0.60
9,146.00	89.26	359.07	5,753.75	3,130.12	-363.00	3,149.92	0.32
9,241.00	89.97	358.21	5,754.39	3,225.09	-365.25	3,244.72	1.17
9,335.00	90.89	357.36	5,753.68	3,319.02	-368.89	3,338.60	1.33
9,430.00	90.71	359.93	5,752.36	3,413.97	-371.13	3,433.39	2.71
9,525.00	90.43	359.50	5,751.41	3,508.97	-371.61	3,528.06	0.54
9,619.00	89.88	359.09	5,751.16	3,602.96	-372.76	3,621.79	0.73
9,714.00	89.63	358.56	5,751.56	3,697.94	-374.71	3,716.57	0.62
9,809.00	90.00	358.94	5,751.87	3,792.91	-376.78	3,811.36	0.56
9,904.00	89.75	357.58	5,752.08	3,887.87	-379.67	3,906.20	1.46
9,999.00	89.14	358.42	5,753.00	3,982.80	-382.98	4,001.06	1.09

## Design Report for Gracie LD22-740 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
10,093.00	89.78	358.83	5,753.88	4,076.77	-385.24	4,094.86	0.81
10,188.00	89.69	358.06	5,754.32	4,171.74	-387.82	4,189.68	0.82
10,283.00	91.05	357.80	5,753.71	4,266.67	-391.25	4,284.55	1.46
10,359.00	92.28	357.53	5,751.50	4,342.57	-394.34	4,360.43	1.66
Final Sperry MWD Survey at 10359.00ft							
10,427.00	92.28	357.53	5,748.80	4,410.46	-397.27	4,428.31	0.00
Straight Line Projection to TD at 10427.00ft - Gracie LD22-740_Rev A0_BHL							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
795.00	794.99	-1.56	-3.79	First Sperry MWD Survey at 795.00ft
10,359.00	5,751.50	4,342.57	-394.34	Final Sperry MWD Survey at 10359.00ft
10,427.00	5,748.80	4,410.46	-397.27	Straight Line Projection to TD at 10427.00ft

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/-S (usft)	+E/-W (usft)	
Target	Gracie LD22-740_Rev A0_BHL	354.95	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
795.00	6,087.00	Intermediate Surveys	MWD
6,184.00	10,427.00	Production Surveys	MWD

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
765.00	764.99	9 5/8"	9-5/8	13-3/4
6,132.00	5,751.13	7"	7	8-3/4

Wellbore Targets

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Gracie LD22-740_Rev	0.00	0.00	0.00	0.02	0.00	1,513,431.07	3,458,238.78	40.731030	-103.846510
- hit/miss target									
- Shape									
- actual wellpath misses target center by 0.02usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Point									
Gracie LD22-740_Rev	0.00	0.00	5,750.00	4,412.87	-389.93	1,517,843.89	3,457,848.85	40.743160	-103.847620
- hit/miss target									
- Shape									
- actual wellpath misses target center by 7.82usft at 10427.00usft MD (5748.80 TVD, 4410.46 N, -397.27 E)									
- Point									

Design Report for Gracie LD22-740 - Actual Surveys

Directional Difficulty Index

Average Dogleg over Survey:	1.71 °/100usft	Maximum Dogleg over Survey:	12.42 °/100usft at 6,014.00 usft
Net Tortousity applicable to Plans:	0.64 °/100usft	Directional Difficulty Index:	6.250

Audit Info

North Reference Sheet for Sec. 22-T9N-R58W (Gracie LD22 PAD) - Gracie LD22-740 - 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 KB = 30' @ 4858.00usft (H&P 321). Northing and Easting are relative to Gracie LD22-740

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: 0.99999193

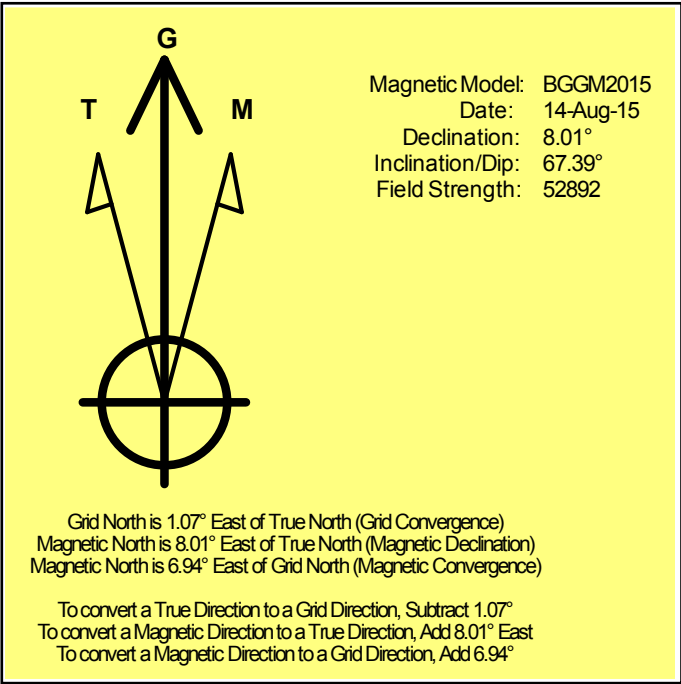
Grid Coordinates of Well: 1,513,431.05 usft N, 3,458,238.78 usft E

Geographical Coordinates of Well: 40° 43' 51.71" N, 103° 50' 47.44" W

Grid Convergence at Surface is: 1.07°

Based upon Minimum Curvature type calculations, at a Measured Depth of 10,427.00usft the Bottom Hole Displacement is 4,428.31usft in the Direction of 354.85° (Grid).

Magnetic Convergence at surface is: -6.94° (14 August 2015, , BGGM2015)



# Noble Energy

Weld County, CO (NAD 83)

Sec. 22-T9N-R58W (Gracie LD22 PAD)

Gracie LD22-740

05-123-41563

Plan A

Design: Actual Surveys

## Sperry Drilling Services

### Geodetic Report

16 September, 2015

Well Coordinates: 1,513,431.05 N, 3,458,238.78 E (40° 43' 51.71" N, 103° 50' 47.44" W)

Ground Level: 4,828.00 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 Gracie LD22-740

KB = 30' @ 4858.00usft (H&P 321)

N

Grid

Dec-Deg - API - US Survey Feet - Custom

**HALLIBURTON**



## Design Report for Gracie LD22-740 - 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)	Latitude (usft)	Longitude (usft)	Northing (usft)	Easting (usft)
0.00	0.00	0.00	0.00	0.00	0.00	40.731030	-103.846510	40.731030	-103.846510	1,513,431.05	3,458,238.78
765.00	0.57	247.67	764.99	-1.44	-3.51	40.731026	-103.846523	40.731026	-103.846523	1,513,429.61	3,458,235.27
795.00	0.59	247.67	794.99	-1.56	-3.79	40.731026	-103.846524	40.731026	-103.846524	1,513,429.50	3,458,234.99
854.00	0.40	226.62	853.98	-1.81	-4.22	40.731025	-103.846526	40.731025	-103.846526	1,513,429.24	3,458,234.56
1,039.00	0.28	245.39	1,038.98	-2.44	-5.10	40.731024	-103.846529	40.731024	-103.846529	1,513,428.61	3,458,233.68
1,133.00	0.35	245.84	1,132.98	-2.66	-5.57	40.731023	-103.846531	40.731023	-103.846531	1,513,428.39	3,458,233.21
1,234.00	0.44	270.22	1,233.98	-2.78	-6.24	40.731023	-103.846533	40.731023	-103.846533	1,513,428.27	3,458,232.54
1,327.00	1.76	232.13	1,326.96	-3.66	-7.72	40.731020	-103.846538	40.731020	-103.846538	1,513,427.39	3,458,231.06
1,515.00	5.34	222.06	1,514.57	-11.93	-15.86	40.730998	-103.846568	40.730998	-103.846568	1,513,419.12	3,458,222.91
1,607.00	7.64	221.92	1,605.97	-19.66	-22.82	40.730977	-103.846594	40.730977	-103.846594	1,513,411.39	3,458,215.96
1,701.00	7.71	218.36	1,699.13	-29.25	-30.91	40.730951	-103.846624	40.730951	-103.846624	1,513,401.80	3,458,207.87
1,793.00	8.98	214.80	1,790.16	-39.99	-38.83	40.730922	-103.846653	40.730922	-103.846653	1,513,391.07	3,458,199.94
1,886.00	10.52	208.21	1,881.81	-53.43	-46.99	40.730886	-103.846683	40.730886	-103.846683	1,513,377.62	3,458,191.79
1,979.00	10.77	206.93	1,973.21	-68.66	-54.94	40.730844	-103.846713	40.730844	-103.846713	1,513,362.39	3,458,183.84
2,071.00	10.67	206.76	2,063.61	-83.93	-62.67	40.730803	-103.846742	40.730803	-103.846742	1,513,347.13	3,458,176.11
2,163.00	10.80	205.73	2,154.00	-99.30	-70.24	40.730761	-103.846770	40.730761	-103.846770	1,513,331.76	3,458,168.53
2,256.00	10.55	205.24	2,245.39	-114.85	-77.66	40.730719	-103.846798	40.730719	-103.846798	1,513,316.21	3,458,161.12
2,441.00	10.37	205.17	2,427.31	-145.24	-91.96	40.730636	-103.846852	40.730636	-103.846852	1,513,285.82	3,458,146.82
2,625.00	11.03	205.89	2,608.11	-176.06	-106.69	40.730552	-103.846907	40.730552	-103.846907	1,513,254.99	3,458,132.09
2,717.00	11.28	205.41	2,698.37	-192.10	-114.39	40.730509	-103.846936	40.730509	-103.846936	1,513,238.95	3,458,124.39
2,810.00	11.22	204.85	2,789.59	-208.53	-122.10	40.730464	-103.846965	40.730464	-103.846965	1,513,222.52	3,458,116.68
2,903.00	10.32	211.10	2,880.95	-223.87	-130.20	40.730422	-103.846995	40.730422	-103.846995	1,513,207.18	3,458,108.58
2,997.00	9.85	210.93	2,973.50	-237.98	-138.69	40.730384	-103.847027	40.730384	-103.847027	1,513,193.07	3,458,100.09
3,091.00	9.47	211.34	3,066.17	-251.48	-146.84	40.730347	-103.847057	40.730347	-103.847057	1,513,179.57	3,458,091.94
3,186.00	9.32	212.39	3,159.89	-264.65	-155.03	40.730312	-103.847087	40.730312	-103.847087	1,513,166.40	3,458,083.75
3,280.00	9.76	211.63	3,252.59	-277.86	-163.28	40.730276	-103.847118	40.730276	-103.847118	1,513,153.19	3,458,075.50
3,374.00	10.05	212.14	3,345.19	-291.59	-171.82	40.730239	-103.847150	40.730239	-103.847150	1,513,139.46	3,458,066.96
3,468.00	10.47	212.04	3,437.69	-305.78	-180.72	40.730200	-103.847183	40.730200	-103.847183	1,513,125.28	3,458,058.06
3,562.00	10.98	211.53	3,530.04	-320.65	-189.93	40.730160	-103.847217	40.730160	-103.847217	1,513,110.41	3,458,048.85
3,656.00	11.48	212.32	3,622.24	-336.18	-199.61	40.730118	-103.847253	40.730118	-103.847253	1,513,094.87	3,458,039.17
3,751.00	11.43	210.58	3,715.35	-352.28	-209.46	40.730074	-103.847290	40.730074	-103.847290	1,513,078.78	3,458,029.32
3,845.00	11.07	209.73	3,807.55	-368.13	-218.67	40.730031	-103.847324	40.730031	-103.847324	1,513,062.92	3,458,020.11
3,939.00	10.35	210.43	3,899.91	-383.25	-227.42	40.729990	-103.847356	40.729990	-103.847356	1,513,047.81	3,458,011.36
4,034.00	9.76	209.60	3,993.45	-397.61	-235.72	40.729951	-103.847387	40.729951	-103.847387	1,513,033.45	3,458,003.06
4,128.00	9.49	207.71	4,086.13	-411.40	-243.26	40.729914	-103.847415	40.729914	-103.847415	1,513,019.66	3,457,995.52
4,222.00	9.46	207.40	4,178.84	-425.12	-250.42	40.729876	-103.847442	40.729876	-103.847442	1,513,005.94	3,457,988.36
4,316.00	9.27	205.16	4,271.59	-438.83	-257.19	40.729839	-103.847468	40.729839	-103.847468	1,512,992.23	3,457,981.59
4,411.00	8.69	202.70	4,365.43	-452.37	-263.22	40.729802	-103.847490	40.729802	-103.847490	1,512,978.68	3,457,975.56
4,505.00	8.31	199.66	4,458.39	-465.32	-268.24	40.729767	-103.847509	40.729767	-103.847509	1,512,965.73	3,457,970.54
4,599.00	7.24	192.45	4,551.53	-477.50	-271.80	40.729734	-103.847523	40.729734	-103.847523	1,512,953.55	3,457,966.98
4,694.00	6.15	190.38	4,645.88	-488.35	-274.01	40.729704	-103.847532	40.729704	-103.847532	1,512,942.70	3,457,964.77
4,788.00	4.59	202.93	4,739.47	-496.77	-276.38	40.729681	-103.847541	40.729681	-103.847541	1,512,934.28	3,457,962.40

## Design Report for Gracie LD22-740 - 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)
4,882.00	4.05	209.10	4,833.20	-503.14	-279.46	40.729664	-103.847552	1,512,927.92	3,457,959.32
4,977.00	3.17	218.11	4,928.01	-508.13	-282.72	40.729650	-103.847564	1,512,922.92	3,457,956.06
5,071.00	2.54	219.69	5,021.90	-511.78	-285.65	40.729640	-103.847575	1,512,919.27	3,457,953.13
5,166.00	2.14	343.37	5,116.86	-511.70	-287.50	40.729641	-103.847582	1,512,919.35	3,457,951.28
5,260.00	13.31	9.87	5,209.87	-499.32	-286.15	40.729674	-103.847576	1,512,931.74	3,457,952.63
5,354.00	23.74	0.88	5,298.90	-469.65	-284.00	40.729756	-103.847566	1,512,961.40	3,457,954.79
5,449.00	31.94	358.64	5,382.83	-425.33	-284.30	40.729877	-103.847564	1,513,005.72	3,457,954.48
5,543.00	37.90	358.46	5,459.87	-371.57	-285.67	40.730025	-103.847566	1,513,059.49	3,457,953.11
5,638.00	43.30	359.50	5,531.98	-309.78	-286.74	40.730195	-103.847565	1,513,121.28	3,457,952.05
5,732.00	49.02	358.12	5,597.06	-242.02	-288.18	40.730381	-103.847566	1,513,189.03	3,457,950.60
5,826.00	56.45	357.83	5,653.94	-167.31	-290.83	40.730586	-103.847571	1,513,263.74	3,457,947.95
5,920.00	64.15	358.92	5,700.48	-85.76	-293.12	40.730810	-103.847573	1,513,345.29	3,457,945.66
6,014.00	75.77	0.17	5,732.63	2.40	-293.78	40.731052	-103.847570	1,513,433.45	3,457,945.00
6,087.00	82.55	2.28	5,746.36	74.03	-292.23	40.731248	-103.847560	1,513,505.08	3,457,946.55
6,132.00	85.26	1.87	5,751.13	118.74	-290.61	40.731371	-103.847551	1,513,549.79	3,457,948.17
6,184.00	88.40	1.40	5,754.01	170.63	-289.13	40.731513	-103.847542	1,513,601.68	3,457,949.65
6,322.00	89.82	0.06	5,756.15	308.60	-287.38	40.731892	-103.847526	1,513,739.65	3,457,951.40
6,415.00	90.43	0.65	5,755.95	401.60	-286.80	40.732147	-103.847518	1,513,832.65	3,457,951.98
6,508.00	91.05	0.36	5,754.74	494.59	-285.98	40.732402	-103.847509	1,513,925.63	3,457,952.80
6,600.00	91.39	358.82	5,752.79	586.56	-286.64	40.732654	-103.847505	1,514,017.61	3,457,952.14
6,692.00	90.96	356.28	5,750.90	678.45	-290.57	40.732907	-103.847513	1,514,109.49	3,457,948.21
6,784.00	91.76	356.23	5,748.72	770.22	-296.58	40.733159	-103.847528	1,514,201.27	3,457,942.20
6,876.00	92.03	357.21	5,745.67	862.02	-301.84	40.733411	-103.847541	1,514,293.07	3,457,936.94
6,969.00	92.13	358.57	5,742.30	954.90	-305.26	40.733666	-103.847547	1,514,385.94	3,457,933.52
7,063.00	90.43	358.87	5,740.20	1,048.85	-307.36	40.733924	-103.847549	1,514,479.89	3,457,931.42
7,158.00	89.82	359.98	5,739.99	1,143.84	-308.31	40.734185	-103.847546	1,514,574.88	3,457,930.47
7,253.00	89.41	1.53	5,740.63	1,238.83	-307.06	40.734445	-103.847535	1,514,669.87	3,457,931.72
7,348.00	87.23	358.46	5,743.41	1,333.77	-307.07	40.734706	-103.847528	1,514,764.81	3,457,931.71
7,443.00	88.15	359.04	5,747.24	1,428.67	-309.14	40.734967	-103.847529	1,514,859.71	3,457,929.64
7,538.00	89.94	0.22	5,748.83	1,523.65	-309.75	40.735227	-103.847525	1,514,954.68	3,457,929.03
7,632.00	90.65	0.12	5,748.34	1,617.64	-309.47	40.735485	-103.847518	1,515,048.68	3,457,929.31
7,727.00	88.18	357.95	5,749.31	1,712.61	-311.07	40.735746	-103.847517	1,515,143.65	3,457,927.71
7,822.00	87.90	356.67	5,752.56	1,807.45	-315.53	40.736006	-103.847527	1,515,238.49	3,457,923.25
7,916.00	88.43	356.34	5,755.57	1,901.23	-321.26	40.736264	-103.847541	1,515,332.26	3,457,917.53
8,011.00	88.67	355.91	5,757.98	1,995.98	-327.67	40.736524	-103.847558	1,515,427.01	3,457,911.11
8,105.00	90.77	357.12	5,758.44	2,089.80	-333.39	40.736782	-103.847572	1,515,520.83	3,457,905.39
8,200.00	90.99	356.63	5,756.98	2,184.64	-338.56	40.737043	-103.847585	1,515,615.68	3,457,900.22
8,294.00	91.36	357.50	5,755.05	2,278.50	-343.38	40.737300	-103.847596	1,515,709.53	3,457,895.40
8,389.00	91.08	358.71	5,753.03	2,373.42	-346.52	40.737561	-103.847601	1,515,804.46	3,457,892.26
8,484.00	91.88	359.22	5,750.57	2,468.38	-348.23	40.737822	-103.847601	1,515,899.41	3,457,890.55
8,673.00	89.17	358.06	5,748.84	2,657.29	-352.72	40.738340	-103.847604	1,516,088.32	3,457,886.06
8,767.00	89.91	357.56	5,749.60	2,751.22	-356.31	40.738598	-103.847611	1,516,182.25	3,457,882.47

## Design Report for Gracie LD22-740 - 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)
8,862.00	89.69	359.21	5,749.93	2,846.18	-358.99	40.738859	-103.847614	1,516,277.21	3,457,879.79
8,957.00	89.23	359.47	5,750.82	2,941.17	-360.08	40.739120	-103.847612	1,516,372.20	3,457,878.70
9,052.00	88.98	358.96	5,752.31	3,036.15	-361.38	40.739381	-103.847610	1,516,467.17	3,457,877.40
9,146.00	89.26	359.07	5,753.75	3,130.12	-363.00	40.739639	-103.847609	1,516,561.15	3,457,875.78
9,241.00	89.97	358.21	5,754.39	3,225.09	-365.25	40.739899	-103.847611	1,516,656.12	3,457,873.53
9,335.00	90.89	357.36	5,753.68	3,319.02	-368.89	40.740157	-103.847618	1,516,750.04	3,457,869.89
9,430.00	90.71	359.93	5,752.36	3,413.97	-371.13	40.740418	-103.847620	1,516,845.00	3,457,867.65
9,525.00	90.43	359.50	5,751.41	3,508.97	-371.61	40.740679	-103.847615	1,516,939.99	3,457,867.18
9,619.00	89.88	359.09	5,751.16	3,602.96	-372.76	40.740937	-103.847613	1,517,033.98	3,457,866.02
9,714.00	89.63	358.56	5,751.56	3,697.94	-374.71	40.741197	-103.847613	1,517,128.96	3,457,864.07
9,809.00	90.00	358.94	5,751.87	3,792.91	-376.78	40.741458	-103.847615	1,517,223.94	3,457,862.00
9,904.00	89.75	357.58	5,752.08	3,887.87	-379.67	40.741719	-103.847619	1,517,318.89	3,457,859.11
9,999.00	89.14	358.42	5,753.00	3,982.80	-382.98	40.741980	-103.847624	1,517,413.82	3,457,855.80
10,093.00	89.78	358.83	5,753.88	4,076.77	-385.24	40.742238	-103.847626	1,517,507.79	3,457,853.54
10,188.00	89.69	358.06	5,754.32	4,171.74	-387.82	40.742498	-103.847629	1,517,602.75	3,457,850.97
10,283.00	91.05	357.80	5,753.71	4,266.67	-391.25	40.742759	-103.847635	1,517,697.69	3,457,847.53
10,359.00	92.28	357.53	5,751.50	4,342.57	-394.34	40.742967	-103.847641	1,517,773.59	3,457,844.44
10,427.00	92.28	357.53	5,748.80	4,410.46	-397.27	40.743154	-103.847647	1,517,841.47	3,457,841.51

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
795.00	794.99	-1.56	-3.79	First Sperry MWD Survey at 795.00ft
10,359.00	5,751.50	4,342.57	-394.34	Final Sperry MWD Survey at 10359.00ft
10,427.00	5,748.80	4,410.46	-397.27	Straight Line Projection to TD at 10427.00ft

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
Target	Gracie LD22-740_Rev A0_BHL	354.95	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
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## Design Report for Gracie LD22-740 - Actual Surveys

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
795.00	6,087.00	Intermediate Surveys	MWD
6,184.00	10,427.00	Production Surveys	MWD

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
765.00	764.99	9 5/8"	9-5/8	13-3/4
6,132.00		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:	1.71 °/100usft	Maximum Dogleg over Survey:	12.42 °/100usft at 6,014.00 usft
Net Tortousity applicable to Plans:	0.64 °/100usft	Directional Difficulty Index:	6.250

Audit Info

**North Reference Sheet for Sec. 22-T9N-R58W (Gracie LD22 PAD) - Gracie LD22-740 - 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 KB = 30' @ 4858.00usft (H&P 321). Northing and Easting are relative to Gracie LD22-740

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: 0.99999193

Grid Coordinates of Well: 1,513,431.05 usft N, 3,458,238.78 usft E

Geographical Coordinates of Well: 40° 43' 51.71" N, 103° 50' 47.44" W

Grid Convergence at Surface is: 1.07°

Based upon Minimum Curvature type calculations, at a Measured Depth of 10,427.00usft

the Bottom Hole Displacement is 4,428.31usft in the Direction of 354.85° (Grid).

Magnetic Convergence at surface is: -6.94° (14 August 2015, , BGGM2015)

