

# Great Western Oil & Gas

Weld County, Colorado

Sec. 16-T6N-R67W

Greenspire FD 23-H

Plan A

Plan: Plan A Rev 0

## Sperry Drilling Services

# Proposal Report

30 July, 2012

Well Coordinates: 1,423,006.77 N, 3,167,742.63 E (40° 29' 34.76" N, 104° 53' 48.78" W)

Ground Level: 4,808.00 ft

Local Coordinate Origin:

Centered on Well Greenspire FD 23-H

Viewing Datum:

RKB 14 ft @ 4822.00ft (Cade 25)

TVDs to System:

N

North Reference:

True

Unit System:

API - US Survey Feet - Custom

Geodetic Scale Factor Applied

Version: 2003.16 Build: 431

**HALLIBURTON**

Project: Weld County, Colorado  
Site: Sec. 16-T6N-R67W  
Well: Greenspire FD 23-H  
Wellbore: Plan A  
Design: Plan A Rev 0

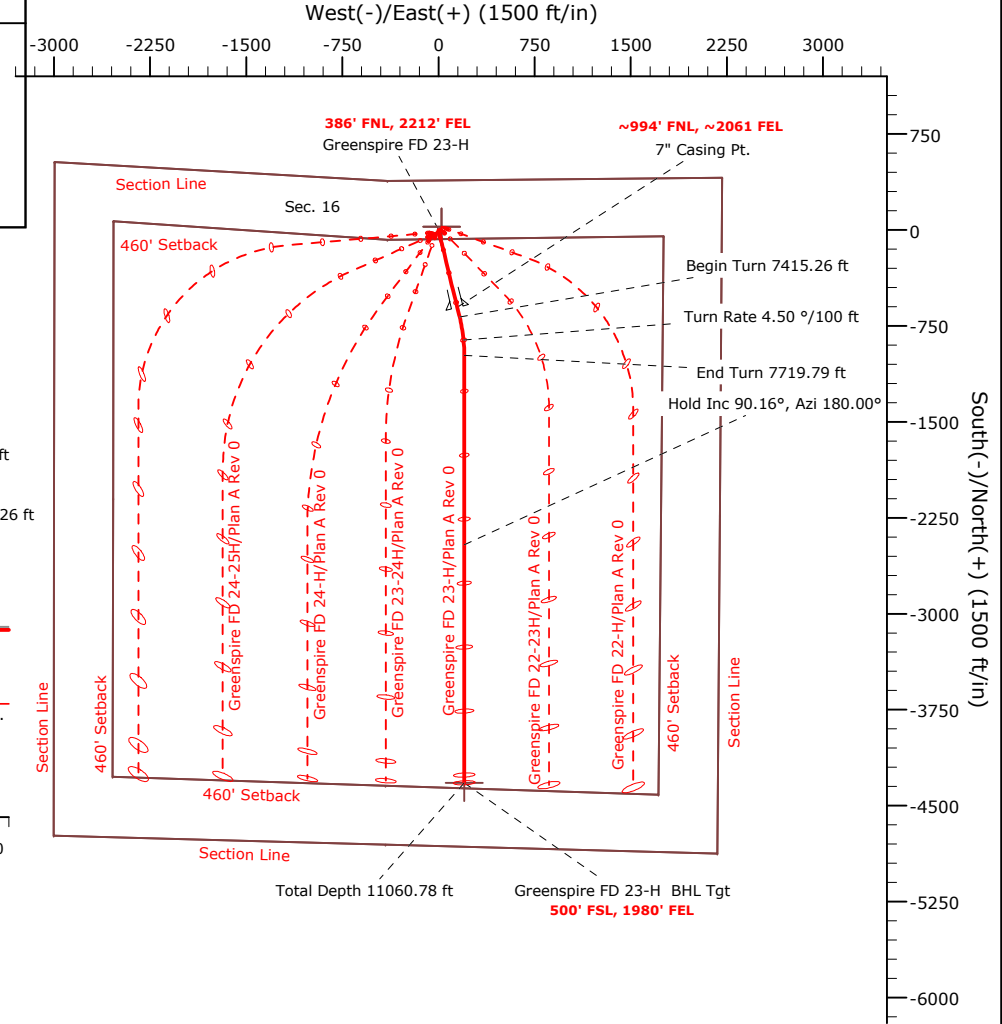
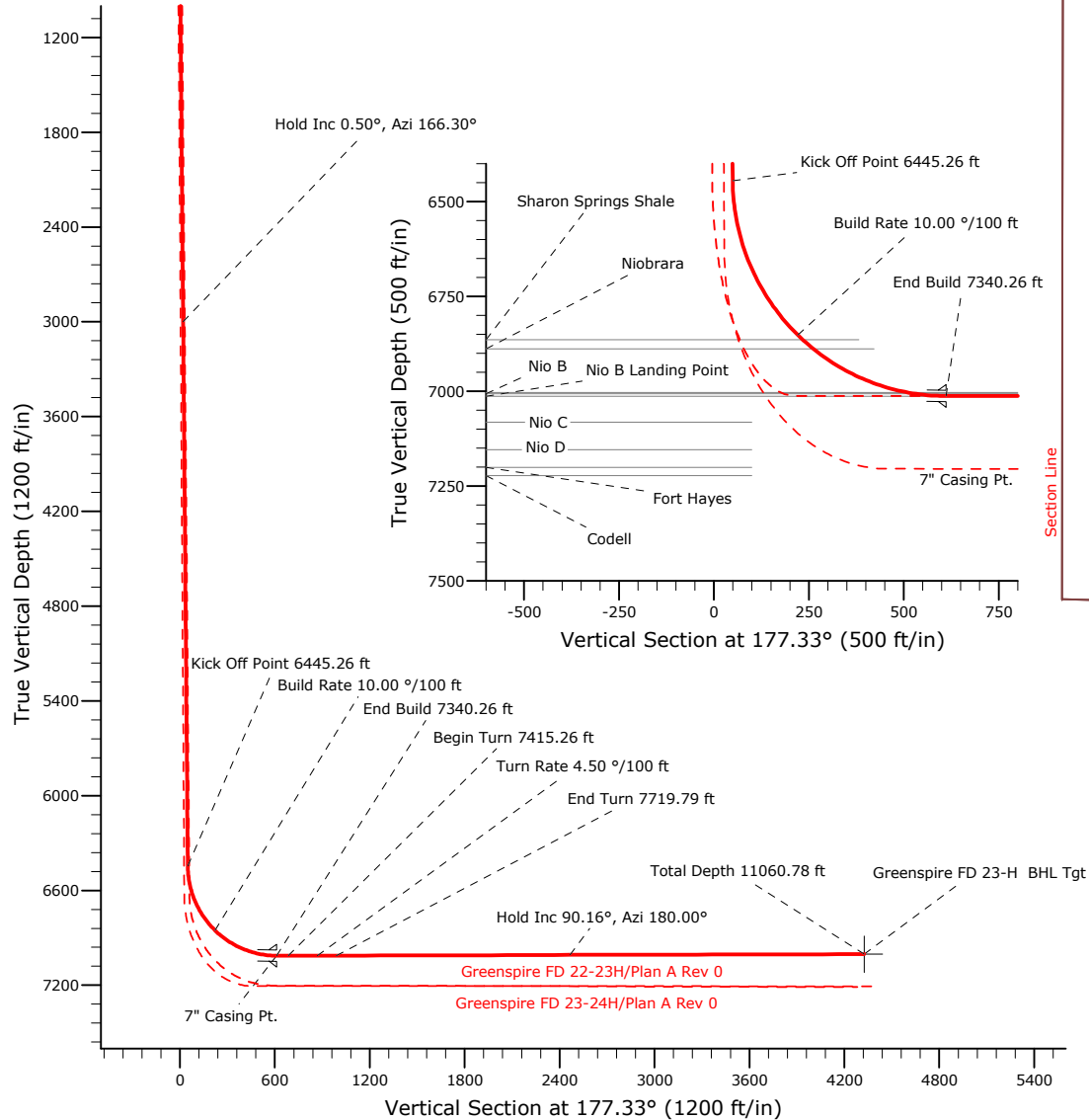
# Great Western Oil & Gas

**HALLIBURTON**

Sperry Drilling

## SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	DLeg	TFace	VSec	Target
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	650.00	0.00	0.00	650.00	0.00	0.00	0.00	0.00	0.00	
3	675.00	0.50	166.30	675.00	-0.11	0.03	2.00	166.30	0.11	
4	6445.26	0.50	166.30	6445.04	-49.03	11.95	0.00	0.00	49.53	
5	7340.26	90.00	166.30	7013.00	-605.66	147.68	10.00	0.00	611.88	
6	7415.26	90.00	166.30	7013.00	-678.52	165.44	0.00	0.00	685.50	
7	7719.79	90.16	180.00	7012.56	-980.16	201.69	4.50	89.31	988.50	
8	11060.78	90.16	180.00	7003.00	-4321.13	201.69	0.00	0.00	4325.84	Greenspire FD 23-H BHL Tgt



## WELL DETAILS: Greenspire FD 23-H

<u>Ground Level:</u> 4808.00	<u>Northing:</u> 1423006.77	<u>Latitude:</u> 40° 29' 34.760 N
<u>Easting:</u> 3167742.63	<u>Longitude:</u> 104° 53' 48.779 W	

## Plan: Plan A Rev 0 (Greenspire FD 23-H/Plan A)

Created By: Matthew R. Epp	Date: 7-30-2012
Checked: _____	Date: _____
Reviewed: _____	Date: _____
Approved: _____	Date: _____

Project: Weld County, Colorado  
Site: Sec. 16-T6N-R67W  
Well: Greenspire FD 23-H  
Wellbore: Plan A  
Design: Plan A Rev 0

# Great Western Oil & Gas

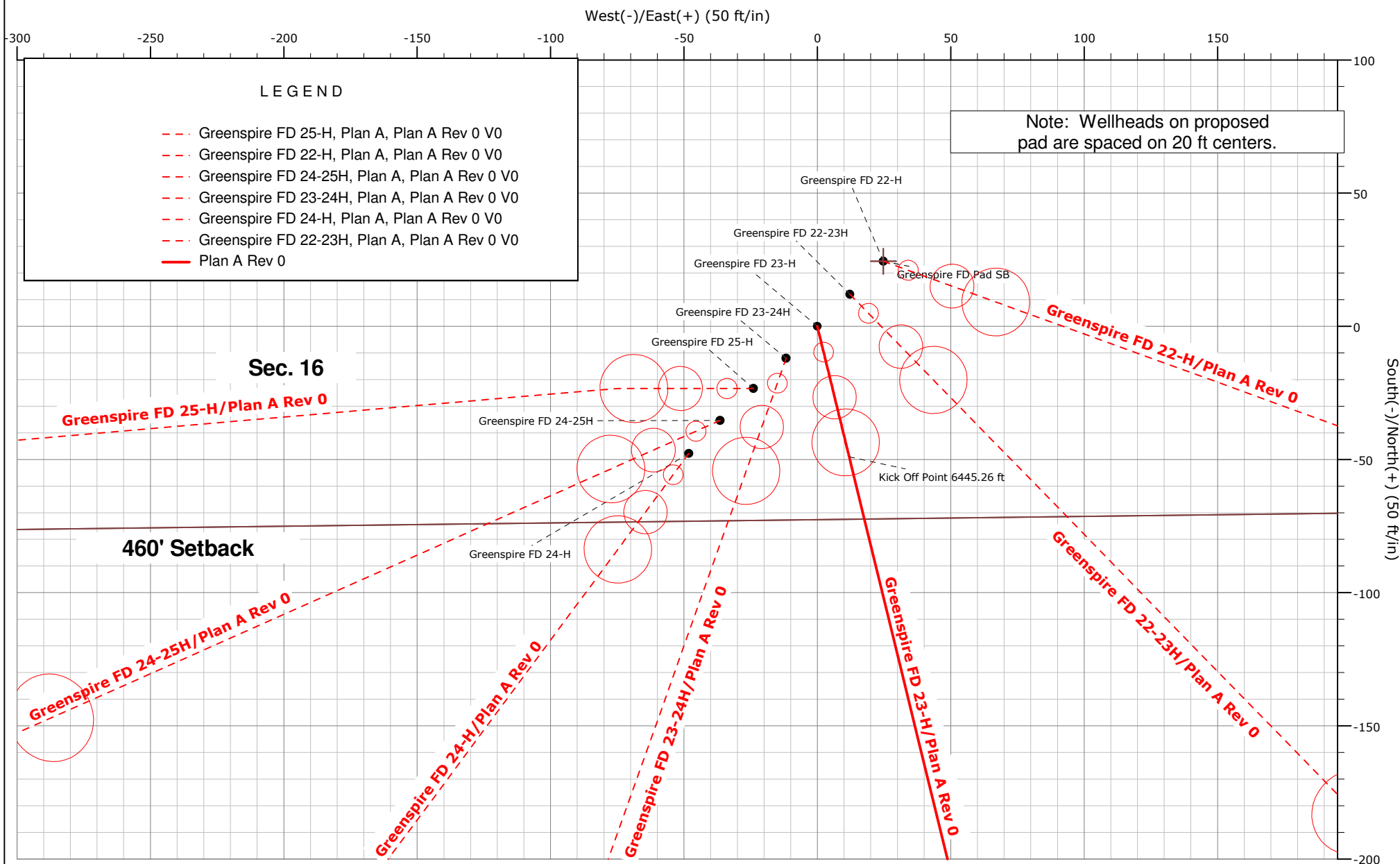
**HALLIBURTON**  
Sperry Drilling

WELL DETAILS: Greenspire FD 23-H

Ground Level: 4808.00 Northing: 1423006.77 Easting: 3167742.63 Latitude: 40° 29' 34.760 N Longitude: 104° 53' 48.779 W

Plan: Plan A Rev 0 (Greenspire FD 23-H/Plan A)

Created By: Matthew R. Epp Date: 7/30/2012



**Plan Report for Greenspire FD 23-H - Plan A Rev 0**

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	Toolface Azimuth (°)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Surface Casing Depth</b>										
650.00	0.00	0.00	650.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Begin Nudge 650.00 ft</b>										
675.00	0.50	166.30	675.00	-0.11	0.03	0.11	2.00	2.00	0.00	166.30
<b>End Nudge 675.00 ft</b>										
700.00	0.50	166.30	700.00	-0.32	0.08	0.32	0.00	0.00	0.00	0.00
800.00	0.50	166.30	799.99	-1.17	0.28	1.18	0.00	0.00	0.00	0.00
900.00	0.50	166.30	899.99	-2.01	0.49	2.03	0.00	0.00	0.00	0.00
1,000.00	0.50	166.30	999.99	-2.86	0.70	2.89	0.00	0.00	0.00	0.00
1,100.00	0.50	166.30	1,099.98	-3.71	0.90	3.75	0.00	0.00	0.00	0.00
1,200.00	0.50	166.30	1,199.98	-4.56	1.11	4.60	0.00	0.00	0.00	0.00
1,300.00	0.50	166.30	1,299.98	-5.40	1.32	5.46	0.00	0.00	0.00	0.00
1,400.00	0.50	166.30	1,399.97	-6.25	1.52	6.32	0.00	0.00	0.00	0.00
1,500.00	0.50	166.30	1,499.97	-7.10	1.73	7.17	0.00	0.00	0.00	0.00
1,600.00	0.50	166.30	1,599.96	-7.95	1.94	8.03	0.00	0.00	0.00	0.00
1,700.00	0.50	166.30	1,699.96	-8.80	2.14	8.89	0.00	0.00	0.00	0.00
1,800.00	0.50	166.30	1,799.96	-9.64	2.35	9.74	0.00	0.00	0.00	0.00
1,900.00	0.50	166.30	1,899.95	-10.49	2.56	10.60	0.00	0.00	0.00	0.00
2,000.00	0.50	166.30	1,999.95	-11.34	2.76	11.46	0.00	0.00	0.00	0.00
2,100.00	0.50	166.30	2,099.95	-12.19	2.97	12.31	0.00	0.00	0.00	0.00
2,200.00	0.50	166.30	2,199.94	-13.04	3.18	13.17	0.00	0.00	0.00	0.00
2,300.00	0.50	166.30	2,299.94	-13.88	3.39	14.03	0.00	0.00	0.00	0.00
2,400.00	0.50	166.30	2,399.93	-14.73	3.59	14.88	0.00	0.00	0.00	0.00
2,424.07	0.50	166.30	2,424.00	-14.93	3.64	15.09	0.00	0.00	0.00	0.00
<b>Greeley Sand</b>										
2,500.00	0.50	166.30	2,499.93	-15.58	3.80	15.74	0.00	0.00	0.00	0.00
2,600.00	0.50	166.30	2,599.93	-16.43	4.01	16.60	0.00	0.00	0.00	0.00
2,700.00	0.50	166.30	2,699.92	-17.27	4.21	17.45	0.00	0.00	0.00	0.00
2,800.00	0.50	166.30	2,799.92	-18.12	4.42	18.31	0.00	0.00	0.00	0.00
2,900.00	0.50	166.30	2,899.91	-18.97	4.63	19.16	0.00	0.00	0.00	0.00
3,000.00	0.50	166.30	2,999.91	-19.82	4.83	20.02	0.00	0.00	0.00	0.00
<b>Hold Inc 0.50°, Azi 166.30°</b>										
3,100.00	0.50	166.30	3,099.91	-20.67	5.04	20.88	0.00	0.00	0.00	0.00
3,200.00	0.50	166.30	3,199.90	-21.51	5.25	21.73	0.00	0.00	0.00	0.00
3,300.00	0.50	166.30	3,299.90	-22.36	5.45	22.59	0.00	0.00	0.00	0.00
3,400.00	0.50	166.30	3,399.90	-23.21	5.66	23.45	0.00	0.00	0.00	0.00
3,500.00	0.50	166.30	3,499.89	-24.06	5.87	24.30	0.00	0.00	0.00	0.00
3,522.11	0.50	166.30	3,522.00	-24.24	5.91	24.49	0.00	0.00	0.00	0.00
<b>Parkman</b>										
3,600.00	0.50	166.30	3,599.89	-24.90	6.07	25.16	0.00	0.00	0.00	0.00
3,700.00	0.50	166.30	3,699.88	-25.75	6.28	26.02	0.00	0.00	0.00	0.00
3,800.00	0.50	166.30	3,799.88	-26.60	6.49	26.87	0.00	0.00	0.00	0.00
3,900.00	0.50	166.30	3,899.88	-27.45	6.69	27.73	0.00	0.00	0.00	0.00
4,000.00	0.50	166.30	3,999.87	-28.30	6.90	28.59	0.00	0.00	0.00	0.00
4,047.13	0.50	166.30	4,047.00	-28.70	7.00	28.99	0.00	0.00	0.00	0.00
<b>Sussex</b>										
4,100.00	0.50	166.30	4,099.87	-29.14	7.11	29.44	0.00	0.00	0.00	0.00
4,200.00	0.50	166.30	4,199.87	-29.99	7.31	30.30	0.00	0.00	0.00	0.00
4,300.00	0.50	166.30	4,299.86	-30.84	7.52	31.16	0.00	0.00	0.00	0.00
4,400.00	0.50	166.30	4,399.86	-31.69	7.73	32.01	0.00	0.00	0.00	0.00

**Plan Report for Greenspire FD 23-H - Plan A Rev 0**

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	Toolface Azimuth (°)
4,500.00	0.50	166.30	4,499.85	-32.53	7.93	32.87	0.00	0.00	0.00	0.00
4,600.00	0.50	166.30	4,599.85	-33.38	8.14	33.73	0.00	0.00	0.00	0.00
4,617.15	0.50	166.30	4,617.00	-33.53	8.18	33.87	0.00	0.00	0.00	0.00
<b>Shannon</b>										
4,700.00	0.50	166.30	4,699.85	-34.23	8.35	34.58	0.00	0.00	0.00	0.00
4,800.00	0.50	166.30	4,799.84	-35.08	8.55	35.44	0.00	0.00	0.00	0.00
4,900.00	0.50	166.30	4,899.84	-35.93	8.76	36.30	0.00	0.00	0.00	0.00
5,000.00	0.50	166.30	4,999.83	-36.77	8.97	37.15	0.00	0.00	0.00	0.00
5,100.00	0.50	166.30	5,099.83	-37.62	9.17	38.01	0.00	0.00	0.00	0.00
5,200.00	0.50	166.30	5,199.83	-38.47	9.38	38.87	0.00	0.00	0.00	0.00
5,300.00	0.50	166.30	5,299.82	-39.32	9.59	39.72	0.00	0.00	0.00	0.00
5,400.00	0.50	166.30	5,399.82	-40.17	9.79	40.58	0.00	0.00	0.00	0.00
5,500.00	0.50	166.30	5,499.82	-41.01	10.00	41.43	0.00	0.00	0.00	0.00
5,600.00	0.50	166.30	5,599.81	-41.86	10.21	42.29	0.00	0.00	0.00	0.00
5,700.00	0.50	166.30	5,699.81	-42.71	10.41	43.15	0.00	0.00	0.00	0.00
5,800.00	0.50	166.30	5,799.80	-43.56	10.62	44.00	0.00	0.00	0.00	0.00
5,900.00	0.50	166.30	5,899.80	-44.40	10.83	44.86	0.00	0.00	0.00	0.00
6,000.00	0.50	166.30	5,999.80	-45.25	11.03	45.72	0.00	0.00	0.00	0.00
6,100.00	0.50	166.30	6,099.79	-46.10	11.24	46.57	0.00	0.00	0.00	0.00
6,200.00	0.50	166.30	6,199.79	-46.95	11.45	47.43	0.00	0.00	0.00	0.00
6,300.00	0.50	166.30	6,299.79	-47.80	11.65	48.29	0.00	0.00	0.00	0.00
6,400.00	0.50	166.30	6,399.78	-48.64	11.86	49.14	0.00	0.00	0.00	0.00
6,445.26	0.50	166.30	6,445.04	-49.03	11.95	49.53	0.00	0.00	0.00	0.00
<b>Kick Off Point 6445.26 ft</b>										
6,500.00	5.97	166.30	6,499.67	-52.03	12.69	52.56	10.00	10.00	0.00	0.00
6,600.00	15.97	166.30	6,597.72	-70.50	17.19	71.22	10.00	10.00	0.00	0.00
6,700.00	25.97	166.30	6,690.97	-105.23	25.66	106.31	10.00	10.00	0.00	0.00
6,800.00	35.97	166.30	6,776.61	-155.17	37.83	156.76	10.00	10.00	0.00	0.00
6,900.00	45.97	166.30	6,852.01	-218.79	53.35	221.04	10.00	10.00	0.00	0.00
<b>Build Rate 10.00 °/100 ft</b>										
6,917.53	47.73	166.30	6,864.00	-231.22	56.38	233.60	10.00	10.00	0.00	0.00
<b>Sharon Springs Shale</b>										
6,954.55	51.43	166.30	6,888.00	-258.59	63.05	261.25	10.00	10.00	0.00	0.00
<b>Niobrara</b>										
7,000.00	55.97	166.30	6,914.90	-294.17	71.73	297.20	10.00	10.00	0.00	0.00
7,100.00	65.97	166.30	6,963.36	-379.01	92.41	382.91	10.00	10.00	0.00	0.00
7,200.00	75.97	166.30	6,995.92	-470.74	114.78	475.58	10.00	10.00	0.00	0.00
7,257.28	81.70	166.30	7,007.00	-525.32	128.09	530.72	10.00	10.00	0.00	0.00
<b>Nio B</b>										
7,300.00	85.97	166.30	7,011.58	-566.57	138.15	572.40	10.00	10.00	0.00	0.00
7,340.26	90.00	166.30	7,013.00	-605.66	147.68	611.88	10.00	10.00	0.00	0.00
<b>End Build 7340.26 ft - Nio B Landing Point - 7" Casing Pt.</b>										
7,400.00	90.00	166.30	7,013.00	-663.70	161.83	670.52	0.00	0.00	0.00	0.00
7,415.26	90.00	166.30	7,013.00	-678.52	165.44	685.50	0.00	0.00	0.00	0.00
<b>Begin Turn 7415.26 ft</b>										
7,500.00	90.05	170.11	7,012.96	-761.46	182.76	769.15	4.50	0.05	4.50	89.31
7,600.00	90.10	174.61	7,012.84	-860.54	196.06	868.75	4.50	0.05	4.50	89.31
<b>Turn Rate 4.50 °/100 ft</b>										
7,700.00	90.15	179.11	7,012.61	-960.37	201.53	968.72	4.50	0.05	4.50	89.32
7,719.79	90.16	180.00	7,012.56	-980.16	201.69	988.49	4.50	0.05	4.50	89.33
<b>End Turn 7719.79 ft</b>										
7,800.00	90.16	180.00	7,012.33	-1,060.37	201.69	1,068.62	0.00	0.00	0.00	89.33
7,900.00	90.16	180.00	7,012.04	-1,160.36	201.69	1,168.51	0.00	0.00	0.00	0.00
8,000.00	90.16	180.00	7,011.76	-1,260.36	201.69	1,268.40	0.00	0.00	0.00	0.00
8,100.00	90.16	180.00	7,011.47	-1,360.36	201.69	1,368.29	0.00	0.00	0.00	0.00
8,200.00	90.16	180.00	7,011.19	-1,460.36	201.69	1,468.18	0.00	0.00	0.00	0.00
8,300.00	90.16	180.00	7,010.90	-1,560.36	201.69	1,568.07	0.00	0.00	0.00	0.00
8,400.00	90.16	180.00	7,010.61	-1,660.36	201.69	1,667.96	0.00	0.00	0.00	0.00
8,500.00	90.16	180.00	7,010.33	-1,760.36	201.69	1,767.85	0.00	0.00	0.00	0.00

**Plan Report for Greenspire FD 23-H - Plan A Rev 0**

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	Toolface Azimuth (°)
8,600.00	90.16	180.00	7,010.04	-1,860.36	201.69	1,867.74	0.00	0.00	0.00	0.00
8,700.00	90.16	180.00	7,009.76	-1,960.36	201.69	1,967.63	0.00	0.00	0.00	0.00
8,800.00	90.16	180.00	7,009.47	-2,060.36	201.69	2,067.52	0.00	0.00	0.00	0.00
8,900.00	90.16	180.00	7,009.18	-2,160.36	201.69	2,167.41	0.00	0.00	0.00	0.00
9,000.00	90.16	180.00	7,008.90	-2,260.36	201.69	2,267.31	0.00	0.00	0.00	0.00
9,100.00	90.16	180.00	7,008.61	-2,360.36	201.69	2,367.20	0.00	0.00	0.00	0.00
9,200.00	90.16	180.00	7,008.32	-2,460.36	201.69	2,467.09	0.00	0.00	0.00	0.00
<b>Hold Inc 90.16°, Azi 180.00°</b>										
9,300.00	90.16	180.00	7,008.04	-2,560.36	201.69	2,566.98	0.00	0.00	0.00	0.00
9,400.00	90.16	180.00	7,007.75	-2,660.36	201.69	2,666.87	0.00	0.00	0.00	0.00
9,500.00	90.16	180.00	7,007.47	-2,760.36	201.69	2,766.76	0.00	0.00	0.00	0.00
9,600.00	90.16	180.00	7,007.18	-2,860.36	201.69	2,866.65	0.00	0.00	0.00	0.00
9,700.00	90.16	180.00	7,006.89	-2,960.36	201.69	2,966.54	0.00	0.00	0.00	0.00
9,800.00	90.16	180.00	7,006.61	-3,060.36	201.69	3,066.43	0.00	0.00	0.00	0.00
9,900.00	90.16	180.00	7,006.32	-3,160.36	201.69	3,166.32	0.00	0.00	0.00	0.00
10,000.00	90.16	180.00	7,006.04	-3,260.36	201.69	3,266.21	0.00	0.00	0.00	0.00
10,100.00	90.16	180.00	7,005.75	-3,360.36	201.69	3,366.10	0.00	0.00	0.00	0.00
10,200.00	90.16	180.00	7,005.46	-3,460.36	201.69	3,466.00	0.00	0.00	0.00	0.00
10,300.00	90.16	180.00	7,005.18	-3,560.35	201.69	3,565.89	0.00	0.00	0.00	0.00
10,400.00	90.16	180.00	7,004.89	-3,660.35	201.69	3,665.78	0.00	0.00	0.00	0.00
10,500.00	90.16	180.00	7,004.60	-3,760.35	201.69	3,765.67	0.00	0.00	0.00	0.00
10,600.00	90.16	180.00	7,004.32	-3,860.35	201.69	3,865.56	0.00	0.00	0.00	0.00
10,700.00	90.16	180.00	7,004.03	-3,960.35	201.69	3,965.45	0.00	0.00	0.00	0.00
10,800.00	90.16	180.00	7,003.75	-4,060.35	201.69	4,065.34	0.00	0.00	0.00	0.00
10,900.00	90.16	180.00	7,003.46	-4,160.35	201.69	4,165.23	0.00	0.00	0.00	0.00
11,000.00	90.16	180.00	7,003.17	-4,260.35	201.69	4,265.12	0.00	0.00	0.00	0.00
11,060.78	90.16	180.00	7,003.00	-4,321.13	201.69	4,325.84	0.00	0.00	0.00	0.00
<b>Greenspire FD 23-H BHL Tgt</b>										

**Plan Annotations**

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
650.00	650.00	0.00	0.00	Begin Nudge 650.00 ft
675.00	675.00	-0.11	0.03	End Nudge 675.00 ft
3,000.00	2,999.91	-19.82	4.83	Hold Inc 0.50°, Azi 166.30°
6,445.26	6,445.04	-49.03	11.95	Kick Off Point 6445.26 ft
6,900.00	6,852.01	-218.79	53.35	Build Rate 10.00 °/100 ft
7,340.26	7,013.00	-605.66	147.68	End Build 7340.26 ft
7,415.26	7,013.00	-678.52	165.44	Begin Turn 7415.26 ft
7,600.00	7,012.84	-860.54	196.06	Turn Rate 4.50 °/100 ft
7,719.79	7,012.56	-980.16	201.69	End Turn 7719.79 ft
9,200.00	7,008.32	-2,460.36	201.69	Hold Inc 90.16°, Azi 180.00°
11,060.78	7,003.00	-4,321.13	201.69	Total Depth 11060.78 ft

**Vertical Section Information**

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (ft)
				+N/_S (ft)	+E/-W (ft)	
Target	Greenspire FD 23-H BHL Tgt	177.33	Slot	0.00	0.00	0.00

**Survey tool program**

From (ft)	To (ft)	Survey/Plan	Survey Tool
0.00	11,060.77	Plan A Rev 0	MWD

**Plan Report for Greenspire FD 23-H - Plan A Rev 0****Casing Details**

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
7,340.26	7,013.00	7" Casing Pt.	7	8-3/4

**Formation Details**

Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
	7,082.00	Nio C			
	7,154.00	Nio D			
	7,201.00	Fort Hayes			
	7,223.00	Codell			
600.00	600.00	Surface Casing Depth			
2,424.07	2,424.00	Greeley Sand			
3,522.11	3,522.00	Parkman			
4,047.13	4,047.00	Sussex			
4,617.15	4,617.00	Shannon			
6,917.53	6,864.00	Sharon Springs Shale			
6,954.55	6,888.00	Niobrara			
7,257.28	7,007.00	Nio B			
7,340.26	7,013.00	Nio B Landing Point			
11,060.78	7,003.00	TD according to directional plan		0.00	

***Targets associated with this wellbore***

Target Name	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Shape
Greenspire FD Pad SB	2.00	24.43	24.75	Polygon
Greenspire FD 23-H BHL Tgt	7,003.00	-4,321.13	201.69	Point
Greenspire FD Pad SL	2.00	24.43	24.75	Polygon

**North Reference Sheet for Sec. 16-T6N-R67W - Greenspire FD 23-H - Plan A**

All data is in US Feet unless otherwise stated. Directions and Coordinates are relative to True North Reference.  
Vertical Depths are relative to RKB 14 ft @ 4822.00ft (Cade 25). Northing and Easting are relative to Greenspire FD 23-H  
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 -105.50°, Longitude Origin:0° 0' 0.000 E°, Latitude Origin:40° 47' 0.000 N°  
False Easting: 3,000,000.00ft, False Northing: 1,000,000.00ft, Scale Reduction: 0.99996576  
Grid Coordinates of Well: 1,423,006.77 ft N, 3,167,742.63 ft E  
Geographical Coordinates of Well: 40° 29' 34.76" N, 104° 53' 48.78" W  
Grid Convergence at Surface is: 0.39°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,060.78ft  
the Bottom Hole Displacement is 4,325.84ft in the Direction of 177.33° (True).  
Magnetic Convergence at surface is: -8.44° (24 July 2012, , BGGM2012)

