

# Conoco Phillips Company

Arapahoe County, Colorado

Sec. 17-T4S-R65W

Eastern Hills 4-65 17-18 1H

Plan A (Pilot)

Plan: Rev A0

## Sperry Drilling Services

### Proposal Report

28 April, 2014

Well Coordinates: 1,684,148.42 N, 3,230,705.87 E (39° 42' 32.15" N, 104° 40' 47.94" W)

Ground Level: 5,618.70 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 Eastern Hills 4-65 17-18 1H

KB 24' @ 5642.70usft (H&P 280)

N

True

API - US Survey Feet - Custom

**HALLIBURTON**

Project: Arapahoe County, Colorado  
Site: Sec. 17-T4S-R65W  
Well: Eastern Hills 4-65 17-18 1H  
Wellbore: Plan A (Pilot)  
Plan: Rev A0

Conoco Phillips Company



SECTION DETAILS										
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Target
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	2225.00	0.00	0.00	2225.00	0.00	0.00	0.00	0.00	0.00	
3	2375.00	3.00	0.00	2374.93	3.93	0.00	2.00	0.00	3.93	
4	5851.73	3.00	0.00	5846.90	185.88	0.00	0.00	0.00	185.88	
5	6001.73	0.00	0.00	5996.83	189.81	0.00	2.00	180.00	189.81	
6	8268.90	0.00	0.00	8264.00	189.81	0.00	0.00	0.00	189.81	Eastern Hills 4-65 17-18 1H_Rev A0 (Pilot)_BHL Tgt

Plan: Rev A0 (Eastern Hills 4-65 17-18 1H/Plan A (Pilot))

Created By: Kansa B. Becker      Date: 13:00, April 28 2014

Checked: \_\_\_\_\_      Date: \_\_\_\_\_

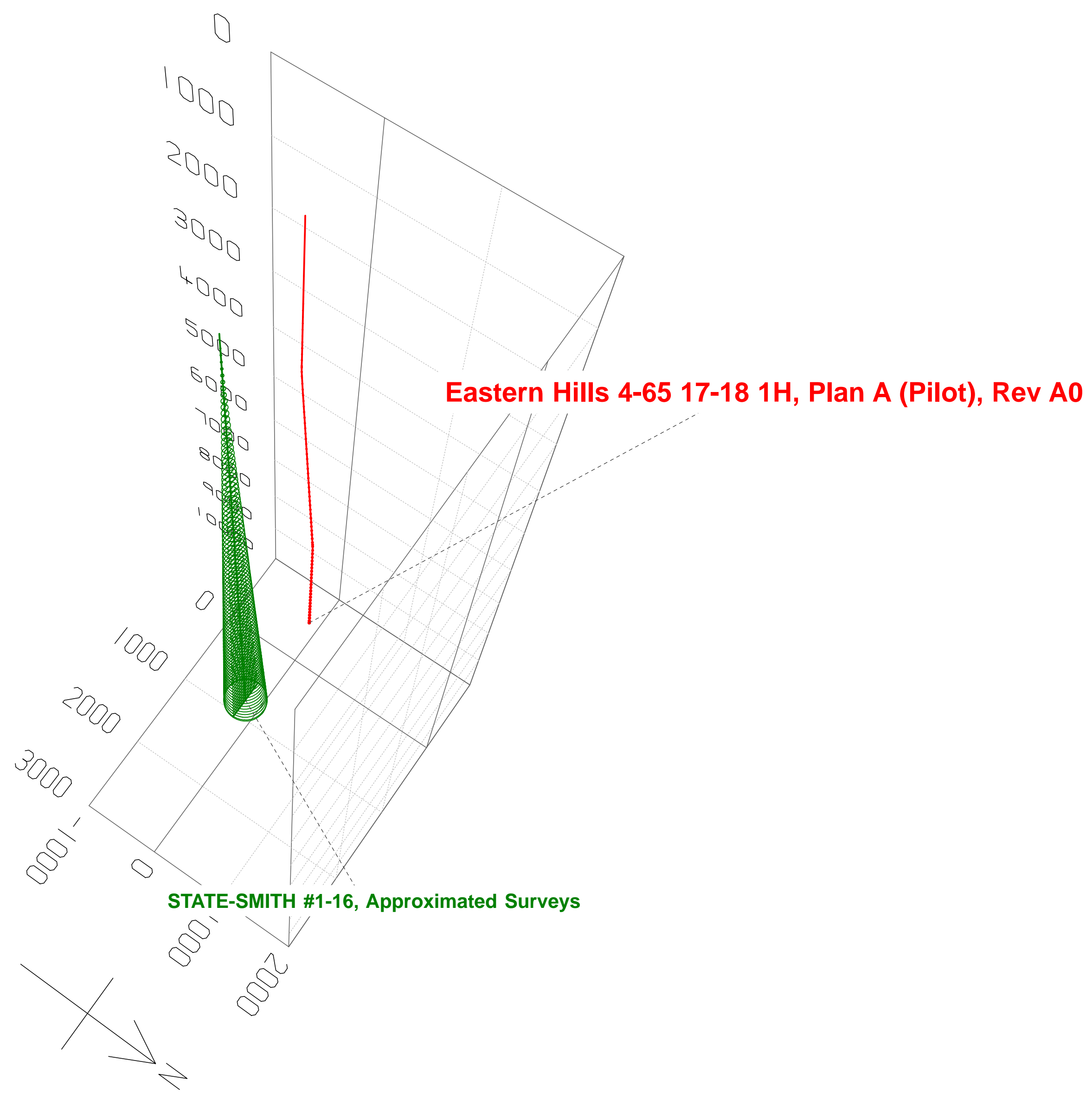
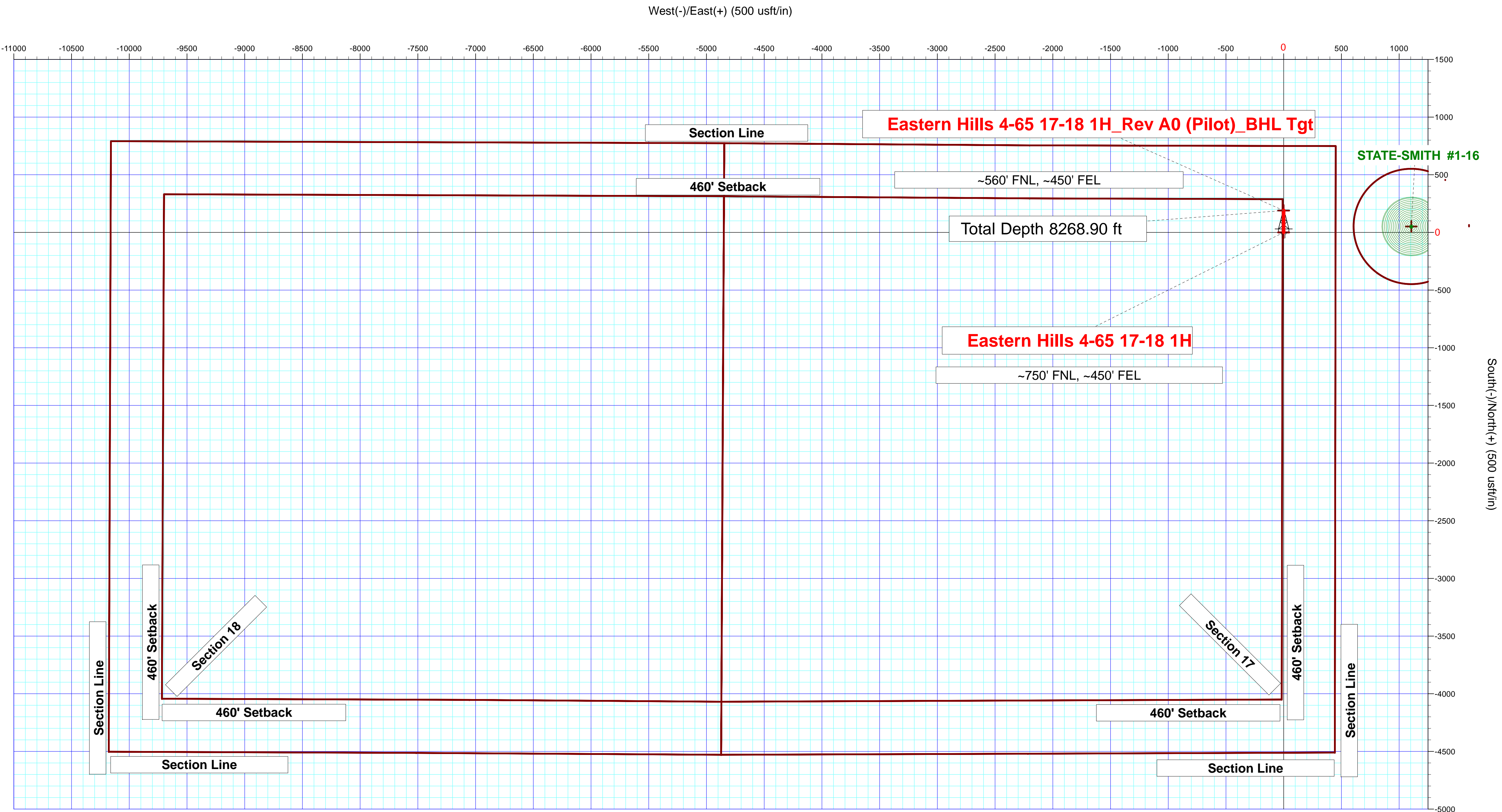
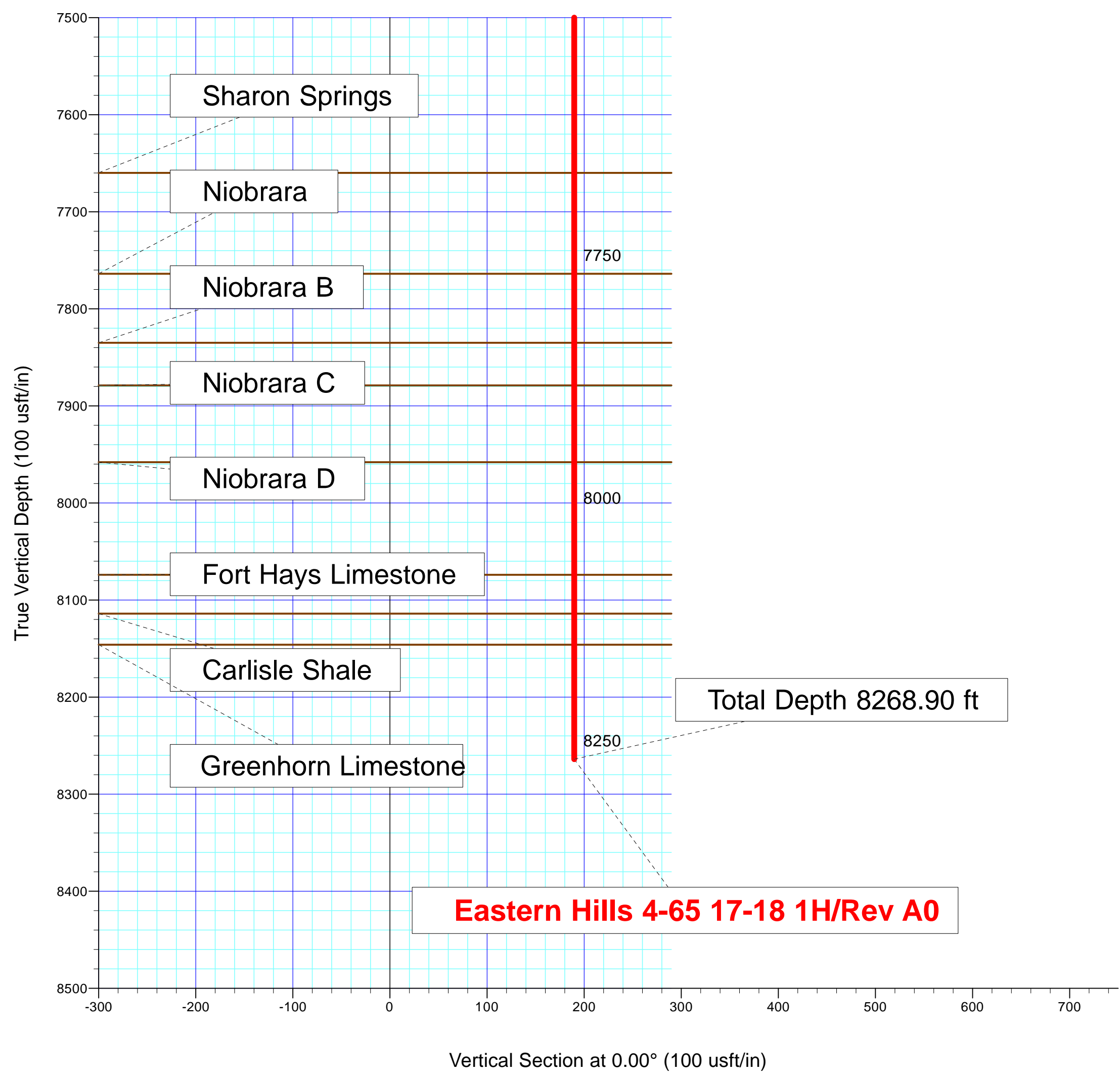
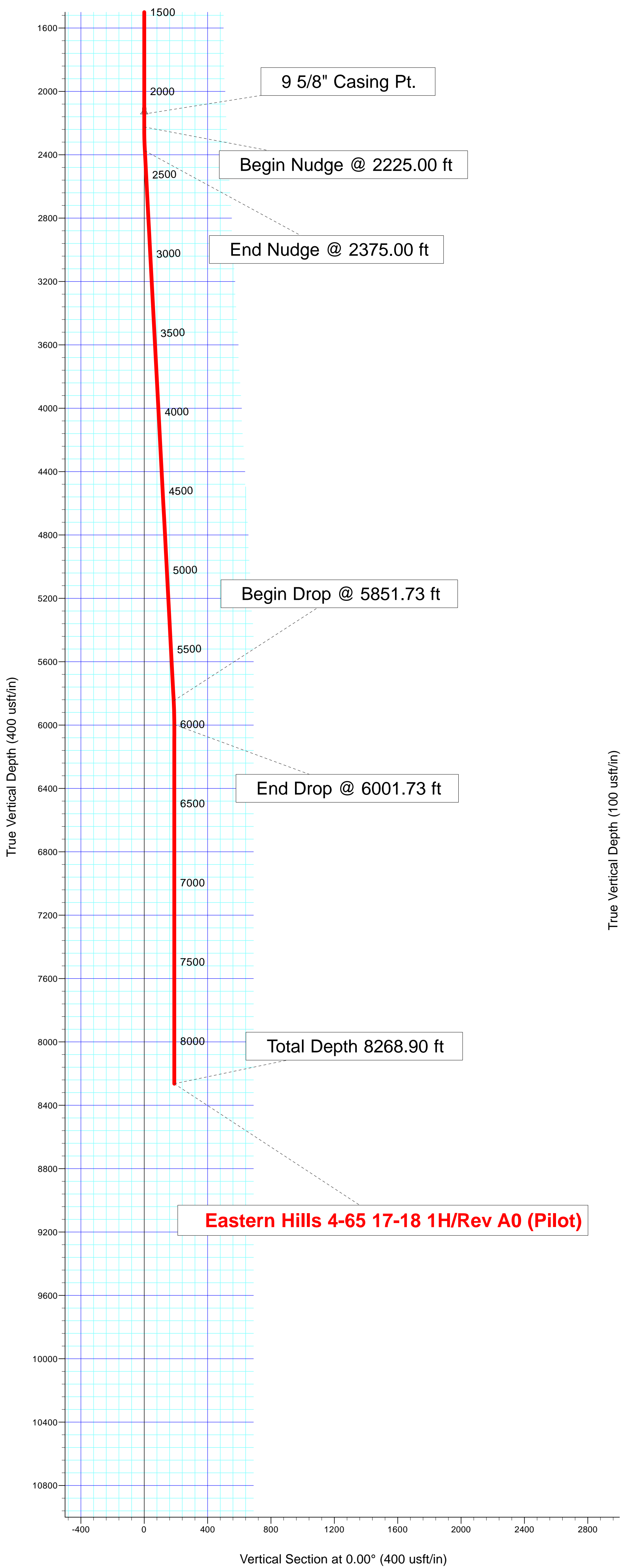
Reviewed: \_\_\_\_\_      Date: \_\_\_\_\_

Approved: \_\_\_\_\_      Date: \_\_\_\_\_

T

M

Azimuths to True North  
Magnetic Field  
Magnetic North: 8.40°  
Strength: 52349.0snT  
Dip Angle: 66.39°  
Date: 7/24/2014  
Model: BGGM2013



## Plan Report for Eastern Hills 4-65 17-18 1H - Rev A0

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	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
700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
900.00	0.00	0.00	900.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,100.00	0.00	0.00	1,100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,300.00	0.00	0.00	1,300.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,400.00	0.00	0.00	1,400.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,500.00	0.00	0.00	1,500.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,600.00	0.00	0.00	1,600.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,700.00	0.00	0.00	1,700.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,717.00	0.00	0.00	1,717.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Fox Hills</b>										
1,800.00	0.00	0.00	1,800.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,900.00	0.00	0.00	1,900.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,943.00	0.00	0.00	1,943.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Pierre Shale</b>										
2,000.00	0.00	0.00	2,000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,100.00	0.00	0.00	2,100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,143.00	0.00	0.00	2,143.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Surface casing - 9 5/8" Casing Pt.</b>										
2,200.00	0.00	0.00	2,200.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,225.00	0.00	0.00	2,225.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Begin Nudge @ 2225.00 ft</b>										
2,300.00	1.50	0.00	2,299.99	0.98	0.00	0.98	2.00	2.00	0.00	0.00
2,375.00	3.00	0.00	2,374.93	3.93	0.00	3.93	2.00	2.00	0.00	0.00
<b>End Nudge @ 2375.00 ft</b>										
2,400.00	3.00	0.00	2,399.90	5.23	0.00	5.23	0.00	0.00	0.00	0.00
2,500.00	3.00	0.00	2,499.76	10.47	0.00	10.47	0.00	0.00	0.00	0.00
2,600.00	3.00	0.00	2,599.62	15.70	0.00	15.70	0.00	0.00	0.00	0.00
2,700.00	3.00	0.00	2,699.49	20.94	0.00	20.94	0.00	0.00	0.00	0.00
2,800.00	3.00	0.00	2,799.35	26.17	0.00	26.17	0.00	0.00	0.00	0.00
2,900.00	3.00	0.00	2,899.21	31.40	0.00	31.40	0.00	0.00	0.00	0.00
3,000.00	3.00	0.00	2,999.07	36.64	0.00	36.64	0.00	0.00	0.00	0.00
3,100.00	3.00	0.00	3,098.94	41.87	0.00	41.87	0.00	0.00	0.00	0.00
3,200.00	3.00	0.00	3,198.80	47.10	0.00	47.10	0.00	0.00	0.00	0.00
3,300.00	3.00	0.00	3,298.66	52.34	0.00	52.34	0.00	0.00	0.00	0.00
3,400.00	3.00	0.00	3,398.53	57.57	0.00	57.57	0.00	0.00	0.00	0.00
3,500.00	3.00	0.00	3,498.39	62.80	0.00	62.80	0.00	0.00	0.00	0.00
3,600.00	3.00	0.00	3,598.25	68.04	0.00	68.04	0.00	0.00	0.00	0.00
3,700.00	3.00	0.00	3,698.12	73.27	0.00	73.27	0.00	0.00	0.00	0.00
3,800.00	3.00	0.00	3,797.98	78.50	0.00	78.50	0.00	0.00	0.00	0.00
3,900.00	3.00	0.00	3,897.84	83.74	0.00	83.74	0.00	0.00	0.00	0.00
4,000.00	3.00	0.00	3,997.70	88.97	0.00	88.97	0.00	0.00	0.00	0.00
4,100.00	3.00	0.00	4,097.57	94.21	0.00	94.21	0.00	0.00	0.00	0.00
4,200.00	3.00	0.00	4,197.43	99.44	0.00	99.44	0.00	0.00	0.00	0.00
4,300.00	3.00	0.00	4,297.29	104.67	0.00	104.67	0.00	0.00	0.00	0.00
4,400.00	3.00	0.00	4,397.16	109.91	0.00	109.91	0.00	0.00	0.00	0.00
4,500.00	3.00	0.00	4,497.02	115.14	0.00	115.14	0.00	0.00	0.00	0.00
4,600.00	3.00	0.00	4,596.88	120.37	0.00	120.37	0.00	0.00	0.00	0.00
4,700.00	3.00	0.00	4,696.75	125.61	0.00	125.61	0.00	0.00	0.00	0.00

## Plan Report for Eastern Hills 4-65 17-18 1H - Rev A0

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	Toolface Azimuth (°)
4,800.00	3.00	0.00	4,796.61	130.84	0.00	130.84	0.00	0.00	0.00	0.00
4,900.00	3.00	0.00	4,896.47	136.07	0.00	136.07	0.00	0.00	0.00	0.00
5,000.00	3.00	0.00	4,996.33	141.31	0.00	141.31	0.00	0.00	0.00	0.00
5,100.00	3.00	0.00	5,096.20	146.54	0.00	146.54	0.00	0.00	0.00	0.00
5,200.00	3.00	0.00	5,196.06	151.78	0.00	151.78	0.00	0.00	0.00	0.00
5,300.00	3.00	0.00	5,295.92	157.01	0.00	157.01	0.00	0.00	0.00	0.00
5,400.00	3.00	0.00	5,395.79	162.24	0.00	162.24	0.00	0.00	0.00	0.00
5,500.00	3.00	0.00	5,495.65	167.48	0.00	167.48	0.00	0.00	0.00	0.00
5,600.00	3.00	0.00	5,595.51	172.71	0.00	172.71	0.00	0.00	0.00	0.00
5,700.00	3.00	0.00	5,695.37	177.94	0.00	177.94	0.00	0.00	0.00	0.00
5,800.00	3.00	0.00	5,795.24	183.18	0.00	183.18	0.00	0.00	0.00	0.00
5,851.73	3.00	0.00	5,846.90	185.88	0.00	185.88	0.00	0.00	0.00	0.00
<b>Begin Drop @ 5851.73 ft</b>										
5,900.00	2.03	0.00	5,895.12	188.00	0.00	188.00	2.00	-2.00	0.00	180.00
6,000.00	0.03	0.00	5,995.10	189.81	0.00	189.81	2.00	-2.00	0.00	-180.00
6,001.73	0.00	0.00	5,996.83	189.81	0.00	189.81	2.00	-2.00	0.00	-180.00
<b>End Drop @ 6001.73 ft</b>										
6,100.00	0.00	0.00	6,095.10	189.81	0.00	189.81	0.00	0.00	0.00	0.00
6,200.00	0.00	0.00	6,195.10	189.81	0.00	189.81	0.00	0.00	0.00	0.00
6,300.00	0.00	0.00	6,295.10	189.81	0.00	189.81	0.00	0.00	0.00	0.00
6,400.00	0.00	0.00	6,395.10	189.81	0.00	189.81	0.00	0.00	0.00	0.00
6,500.00	0.00	0.00	6,495.10	189.81	0.00	189.81	0.00	0.00	0.00	0.00
6,600.00	0.00	0.00	6,595.10	189.81	0.00	189.81	0.00	0.00	0.00	0.00
6,700.00	0.00	0.00	6,695.10	189.81	0.00	189.81	0.00	0.00	0.00	0.00
6,800.00	0.00	0.00	6,795.10	189.81	0.00	189.81	0.00	0.00	0.00	0.00
6,900.00	0.00	0.00	6,895.10	189.81	0.00	189.81	0.00	0.00	0.00	0.00
7,000.00	0.00	0.00	6,995.10	189.81	0.00	189.81	0.00	0.00	0.00	0.00
7,100.00	0.00	0.00	7,095.10	189.81	0.00	189.81	0.00	0.00	0.00	0.00
7,200.00	0.00	0.00	7,195.10	189.81	0.00	189.81	0.00	0.00	0.00	0.00
7,300.00	0.00	0.00	7,295.10	189.81	0.00	189.81	0.00	0.00	0.00	0.00
7,400.00	0.00	0.00	7,395.10	189.81	0.00	189.81	0.00	0.00	0.00	0.00
7,500.00	0.00	0.00	7,495.10	189.81	0.00	189.81	0.00	0.00	0.00	0.00
7,600.00	0.00	0.00	7,595.10	189.81	0.00	189.81	0.00	0.00	0.00	0.00
7,664.90	0.00	0.00	7,660.00	189.81	0.00	189.81	0.00	0.00	0.00	0.00
<b>Sharon Springs</b>										
7,700.00	0.00	0.00	7,695.10	189.81	0.00	189.81	0.00	0.00	0.00	0.00
7,768.90	0.00	0.00	7,764.00	189.81	0.00	189.81	0.00	0.00	0.00	0.00
<b>Niobrara</b>										
7,800.00	0.00	0.00	7,795.10	189.81	0.00	189.81	0.00	0.00	0.00	0.00
7,839.90	0.00	0.00	7,835.00	189.81	0.00	189.81	0.00	0.00	0.00	0.00
<b>Niobrara B</b>										
7,883.90	0.00	0.00	7,879.00	189.81	0.00	189.81	0.00	0.00	0.00	0.00
<b>Niobrara C</b>										
7,900.00	0.00	0.00	7,895.10	189.81	0.00	189.81	0.00	0.00	0.00	0.00
7,962.90	0.00	0.00	7,958.00	189.81	0.00	189.81	0.00	0.00	0.00	0.00
<b>Niobrara D</b>										
8,000.00	0.00	0.00	7,995.10	189.81	0.00	189.81	0.00	0.00	0.00	0.00
8,078.90	0.00	0.00	8,074.00	189.81	0.00	189.81	0.00	0.00	0.00	0.00
<b>Fort Hays Limestone</b>										
8,100.00	0.00	0.00	8,095.10	189.81	0.00	189.81	0.00	0.00	0.00	0.00
8,118.90	0.00	0.00	8,114.00	189.81	0.00	189.81	0.00	0.00	0.00	0.00
<b>Carlisle Shale</b>										
8,150.90	0.00	0.00	8,146.00	189.81	0.00	189.81	0.00	0.00	0.00	0.00
<b>Greenhorn Limestone</b>										
8,200.00	0.00	0.00	8,195.10	189.81	0.00	189.81	0.00	0.00	0.00	0.00
8,268.90	0.00	0.00	8,264.00	189.81	0.00	189.81	0.00	0.00	0.00	0.00
<b>Total Depth 8268.90 ft</b>										

## Plan Report for Eastern Hills 4-65 17-18 1H - Rev A0

### Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
2,225.00	2,225.00	0.00	0.00	Begin Nudge @ 2225.00 ft
2,375.00	2,374.93	3.93	0.00	End Nudge @ 2375.00 ft
5,851.73	5,846.90	185.88	0.00	Begin Drop @ 5851.73 ft
6,001.73	5,996.83	189.81	0.00	End Drop @ 6001.73 ft
8,268.90	8,264.00	189.81	0.00	Total Depth 8268.90 ft

### Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/-S (usft)	+E/-W (usft)	
Target	Eastern Hills 4-65 17-18 1H_Rev A0 (Pilot)_BHL Tgt	0.00	Slot	0.00	0.00	0.00

### Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
0.00	2,143.00	Rev A0	NS-GYRO-MS
2,143.00	8,268.90	Rev A0	MWD

### Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
2,143.00	2,143.00	9 5/8" Casing Pt.	9-5/8	13-1/2

### Formation Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
1,717.00	1,717.00	Fox Hills			
1,943.00	1,943.00	Pierre Shale			
2,143.00	2,143.00	Surface casing			
7,664.90	7,660.00	Sharon Springs			
7,768.90	7,764.00	Niobrara			
7,839.90	7,835.00	Niobrara B			
7,883.90	7,879.00	Niobrara C			
7,962.90	7,958.00	Niobrara D			
8,078.90	8,074.00	Fort Hays Limestone			
8,118.90	8,114.00	Carlisle Shale			
8,150.90	8,146.00	Greenhorn Limestone			

## Plan Report for Eastern Hills 4-65 17-18 1H - Rev A0

### Targets associated with this wellbore

Target Name	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Shape
State-Smith 1-16_(500 ft Radius)	0.00	51.92	1,105.79	Circle
Eastern Hills 4-65 17-18 1H_SL	0.00	0.01	0.00	Polygon
Eastern Hills 4-65 17-18 1H_SB	0.00	0.01	0.00	Polygon
Eastern Hills 4-65 17-18 1H_Rev A0 (Pilot)_BH	8,264.00	189.91	0.00	Point

### Directional Difficulty Index

Average Dogleg over Survey:	0.07 °/100usft	Maximum Dogleg over Survey:	2.00 °/100usft at 2,375.00 usft
Net Tortousity applicable to Plans:	0.07 °/100usft	Directional Difficulty Index:	3.940

### Audit Info

North Reference Sheet for Sec. 17-T4S-R65W - Eastern Hills 4-65 17-18 1H - Plan A  
(Pilot)

All data is in US Feet unless otherwise stated. Directions and Coordinates are relative to True North Reference .  
Vertical Depths are relative to KB 24' @ 5642.70usft (H&P 280). Northing and Easting are relative to Eastern Hills 4-65 17-18 1H  
Coordinate System is US State Plane 1983, Colorado Central 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:39° 45' 0.000 N°  
False Easting: 3,000,000.00usft, False Northing: 1,000,000.00usft, Scale Reduction: 0.99999213  
  
Grid Coordinates of Well: 1,684,148.42 usft N, 3,230,705.87 usft E  
Geographical Coordinates of Well: 39° 42' 32.15" N, 104° 40' 47.94" W  
Grid Convergence at Surface is: 0.52°

Based upon Minimum Curvature type calculations, at a Measured Depth of 8,268.90usft  
the Bottom Hole Displacement is 189.81usft in the Direction of 0.00° ( True).  
Magnetic Convergence at surface is: -7.88° (24 July 2014, , BGGM2013)

