



Noble Energy Inc.

Weld County, CO

Sec 2, T9N, R58W

Upchurch State LD02-76-1AHN

Wellbore #1

Design: Wellbore #1 **FINAL**

DDC Survey Report

14 January, 2015



Company:	Noble Energy Inc.	Local Co-ordinate Reference:	Well Upchurch State LD02-76-1AHN
Project:	Weld County, CO	TVD Reference:	well @ 4772.0usft (H&P #326)
Site:	Sec 2, T9N, R58W	MD Reference:	well @ 4772.0usft (H&P #326)
Well:	Upchurch State LD02-76-1AHN	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM Compass

Project	Weld County, CO		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Northern Zone		

Site		Sec 2, T9N, R58W							
Site Position:		Northing:	1,529,499.23	usft	Latitude:	40° 46' 29.928 N			
From:	Lat/Long	Easting:	3,461,069.43	usft	Longitude:	103° 50' 6.756 W			
Position Uncertainty:		0.0	usft	Slot Radius:	13-3/16	"	Grid Convergence:	1.08	°

Well		Upchurch State LD02-76-1AHN				
Well Position	+N/-S	0.0 usft	Northing:	1,529,499.23 usft	Latitude:	40° 46' 29.928 N
	+E/-W	0.0 usft	Easting:	3,461,069.43 usft	Longitude:	103° 50' 6.756 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	4,742.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	12/4/2014	7.91	67.38	53,054

Design	Wellbore #1				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.0	0.0	0.0	6.01	

Survey Program	Date	1/14/2015			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
348.0	906.0	Surface (Wellbore #1)	Good_gyro	Good Gyro	
1,303.0	5,972.0	MWD Survey - Vert/Build (Wellbore #1)	MWD default	MWD - Standard	
6,071.0	9,758.0	MWD Survey - Lateral (Wellbore #1)	MWD default	MWD - Standard	

Survey										
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)	
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00	
348.0	0.40	297.43	348.0	0.6	-1.1	0.4	0.11	0.11	0.00	
626.0	0.40	250.53	626.0	0.7	-2.9	0.4	0.11	0.00	-16.87	
TIE IN @ 906' MD / 906' TVD / END OF SUR HOLE / BEGIN INT HOLE										
906.0	0.60	227.13	906.0	-0.6	-4.9	-1.1	0.10	0.07	-8.36	
1,303.0	0.70	315.68	1,303.0	-0.3	-8.1	-1.2	0.23	0.03	22.30	
1,395.0	0.44	311.48	1,395.0	0.3	-8.7	-0.6	0.29	-0.28	-4.57	
1,488.0	0.53	263.12	1,488.0	0.5	-9.4	-0.5	0.44	0.10	-52.00	
1,582.0	0.35	250.64	1,582.0	0.4	-10.1	-0.7	0.22	-0.19	-13.28	

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Well:	Upchurch State LD02-76-1AHN	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM Compass

Survey									
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)
1,768.0	0.26	232.18	1,768.0	-0.1	-11.0	-1.2	0.07	-0.05	-9.92
1,862.0	0.26	29.86	1,861.9	0.0	-11.1	-1.2	0.54	0.00	167.74
1,954.0	0.35	46.20	1,953.9	0.3	-10.7	-0.8	0.14	0.10	17.76
2,048.0	0.35	66.60	2,047.9	0.6	-10.3	-0.4	0.13	0.00	21.70
2,138.0	0.62	36.19	2,137.9	1.2	-9.7	0.1	0.40	0.30	-33.79
2,230.0	2.20	69.76	2,229.9	2.2	-7.8	1.3	1.87	1.72	36.49
2,323.0	3.87	89.45	2,322.8	2.8	-3.0	2.5	2.09	1.80	21.17
2,415.0	5.80	97.18	2,414.5	2.3	4.7	2.7	2.21	2.10	8.40
2,508.0	7.65	104.92	2,506.8	0.1	15.4	1.7	2.21	1.99	8.32
2,601.0	7.83	101.75	2,599.0	-2.8	27.6	0.1	0.50	0.19	-3.41
2,692.0	8.27	114.41	2,689.1	-6.8	39.6	-2.6	2.00	0.48	13.91
2,786.0	10.29	108.43	2,781.8	-12.2	53.7	-6.5	2.38	2.15	-6.36
2,881.0	10.99	100.70	2,875.2	-16.6	70.7	-9.1	1.67	0.74	-8.14
2,975.0	10.29	92.96	2,967.6	-18.7	87.9	-9.4	1.69	-0.74	-8.23
3,164.0	9.58	93.31	3,153.8	-20.5	120.4	-7.7	0.38	-0.38	0.19
3,354.0	11.08	83.47	3,340.7	-19.3	154.4	-3.0	1.22	0.79	-5.18
3,448.0	11.34	84.70	3,432.9	-17.4	172.5	0.7	0.38	0.28	1.31
3,542.0	11.61	82.77	3,525.0	-15.4	191.1	4.7	0.50	0.29	-2.05
3,637.0	11.52	88.04	3,618.1	-13.8	210.1	8.2	1.12	-0.09	5.55
3,731.0	10.73	86.99	3,710.3	-13.1	228.2	10.9	0.87	-0.84	-1.12
3,826.0	9.85	85.93	3,803.8	-12.0	245.1	13.7	0.95	-0.93	-1.12
3,920.0	10.90	94.72	3,896.3	-12.2	262.0	15.3	2.02	1.12	9.35
4,015.0	12.13	96.65	3,989.4	-14.1	280.9	15.4	1.36	1.29	2.03
4,109.0	10.90	94.72	4,081.5	-16.0	299.5	15.5	1.37	-1.31	-2.05
4,204.0	13.01	97.71	4,174.4	-18.1	319.1	15.4	2.31	2.22	3.15
4,298.0	11.34	97.88	4,266.3	-20.8	338.7	14.8	1.78	-1.78	0.18
4,393.0	11.87	91.73	4,359.3	-22.4	357.8	15.2	1.42	0.56	-6.47
4,487.0	10.02	92.96	4,451.6	-23.1	375.6	16.3	1.98	-1.97	1.31
4,582.0	10.46	86.28	4,545.1	-23.0	392.4	18.2	1.33	0.46	-7.03
4,677.0	8.71	82.06	4,638.8	-21.4	408.2	21.4	1.98	-1.84	-4.44
4,771.0	10.11	93.31	4,731.5	-20.9	423.5	23.5	2.45	1.49	11.97
4,865.0	10.73	88.92	4,824.0	-21.2	440.5	25.0	1.07	0.66	-4.67
4,961.0	8.71	85.23	4,918.6	-20.5	456.6	27.5	2.20	-2.10	-3.84
5,055.0	14.25	63.78	5,010.7	-14.7	474.1	35.0	7.35	5.89	-22.82
5,149.0	22.60	47.08	5,099.9	2.7	497.8	54.8	10.42	8.88	-17.77
5,244.0	21.28	31.09	5,188.1	29.9	520.1	84.2	6.42	-1.39	-16.83
5,339.0	22.95	10.17	5,276.2	63.0	532.3	118.4	8.43	1.76	-22.02
5,433.0	31.83	353.12	5,359.7	105.8	532.5	161.0	12.52	9.45	-18.14
5,527.0	43.70	350.48	5,433.9	162.6	524.2	216.6	12.74	12.63	-2.81
5,621.0	54.17	358.74	5,495.6	233.0	517.9	286.0	12.94	11.14	8.79
5,716.0	64.02	2.26	5,544.4	314.4	518.8	367.0	10.84	10.37	3.71
5,811.0	68.76	2.08	5,582.4	401.4	522.1	453.8	4.99	4.99	-0.19
5,905.0	70.79	2.08	5,614.9	489.5	525.3	541.8	2.16	2.16	0.00

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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM Compass

Survey										
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)	
5,972.0	79.05	4.19	5,632.3	554.0	528.8	606.4	12.70	12.33	3.15	
7" CASING POINT @ 6020' MD / 5640' TVD / END OF INT HOLE / BEGIN LATERAL										
6,020.0	82.50	4.79	5,640.0	601.3	532.5	653.7	7.30	7.19	1.25	
6,071.0	86.17	5.42	5,645.1	651.8	537.1	704.4	7.30	7.19	1.23	
6,164.0	88.11	7.36	5,649.7	744.1	547.4	797.3	2.95	2.09	2.09	
6,256.0	90.13	4.19	5,651.1	835.6	556.6	889.3	4.09	2.20	-3.45	
6,350.0	89.08	2.79	5,651.8	929.4	562.4	983.2	1.86	-1.12	-1.49	
6,442.0	92.24	2.96	5,650.7	1,021.3	567.0	1,075.0	3.44	3.43	0.18	
6,628.0	91.71	2.96	5,644.3	1,206.9	576.6	1,260.7	0.28	-0.28	0.00	
6,722.0	90.92	1.56	5,642.1	1,300.8	580.3	1,354.4	1.71	-0.84	-1.49	
6,817.0	90.66	3.31	5,640.8	1,395.7	584.3	1,449.2	1.86	-0.27	1.84	
6,911.0	88.11	1.73	5,641.8	1,489.6	588.5	1,543.0	3.19	-2.71	-1.68	
7,006.0	91.19	1.21	5,642.4	1,584.6	590.9	1,637.7	3.29	3.24	-0.55	
7,100.0	90.84	1.21	5,640.7	1,678.5	592.9	1,731.4	0.37	-0.37	0.00	
7,194.0	92.95	0.33	5,637.6	1,772.5	594.1	1,824.9	2.43	2.24	-0.94	
7,289.0	93.39	359.62	5,632.4	1,867.3	594.1	1,919.3	0.88	0.46	-0.75	
7,384.0	92.95	358.92	5,627.1	1,962.2	592.9	2,013.5	0.87	-0.46	-0.74	
7,478.0	92.33	0.15	5,622.8	2,056.1	592.1	2,106.8	1.46	-0.66	1.31	
7,573.0	89.16	358.04	5,621.6	2,151.0	590.6	2,201.0	4.01	-3.34	-2.22	
7,667.0	87.49	358.39	5,624.3	2,244.9	587.7	2,294.1	1.82	-1.78	0.37	
7,762.0	90.22	356.99	5,626.2	2,339.8	583.9	2,388.1	3.23	2.87	-1.47	
7,856.0	89.34	357.16	5,626.6	2,433.7	579.1	2,481.0	0.95	-0.94	0.18	
7,951.0	88.72	356.81	5,628.2	2,528.6	574.1	2,574.8	0.75	-0.65	-0.37	
8,046.0	87.67	354.88	5,631.2	2,623.3	567.2	2,668.2	2.31	-1.11	-2.03	
8,140.0	90.84	356.28	5,632.4	2,717.0	560.0	2,760.7	3.69	3.37	1.49	
8,235.0	90.40	355.40	5,631.4	2,811.7	553.1	2,854.2	1.04	-0.46	-0.93	
8,329.0	89.52	355.05	5,631.4	2,905.4	545.2	2,946.5	1.01	-0.94	-0.37	
8,424.0	88.64	354.35	5,633.0	3,000.0	536.5	3,039.6	1.18	-0.93	-0.74	
8,519.0	90.75	356.28	5,633.5	3,094.6	528.7	3,133.0	3.01	2.22	2.03	
8,613.0	91.10	356.11	5,631.9	3,188.4	522.5	3,225.6	0.41	0.37	-0.18	
8,707.0	90.48	354.53	5,630.7	3,282.1	514.8	3,317.9	1.81	-0.66	-1.68	
8,801.0	89.08	352.06	5,631.0	3,375.4	503.8	3,409.6	3.02	-1.49	-2.63	
8,896.0	89.25	355.76	5,632.4	3,469.9	493.8	3,502.5	3.90	0.18	3.89	
8,991.0	88.29	356.63	5,634.4	3,564.6	487.5	3,596.1	1.36	-1.01	0.92	
9,085.0	89.87	356.81	5,635.9	3,658.5	482.1	3,688.8	1.69	1.68	0.19	
9,180.0	90.84	356.99	5,635.4	3,753.3	476.9	3,782.6	1.04	1.02	0.19	
9,275.0	88.72	355.40	5,635.7	3,848.1	470.6	3,876.2	2.79	-2.23	-1.67	
9,369.0	89.78	356.46	5,637.0	3,941.9	464.0	3,968.8	1.59	1.13	1.13	
9,463.0	92.07	357.51	5,635.4	4,035.7	459.0	4,061.6	2.68	2.44	1.12	
9,558.0	92.68	358.22	5,631.5	4,130.6	455.5	4,155.5	0.98	0.64	0.75	
CROSSED 460' HARDLINE @ 9626' MD / 5630' TVD										
9,626.1	89.56	357.45	5,630.2	4,198.6	452.9	4,222.9	4.72	-4.59	-1.13	
9,652.0	88.37	357.16	5,630.6	4,224.5	451.7	4,248.5	4.72	-4.59	-1.13	
9,711.0	87.93	357.51	5,632.5	4,283.4	449.0	4,306.8	0.95	-0.75	0.59	

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Site:	Sec 2, T9N, R58W	MD Reference:	well @ 4772.0usft (H&P #326)
Well:	Upchurch State LD02-76-1AHN	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM Compass

Survey									
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)
TD @ 9758' MD / 5634' TVD									
9,758.0	87.93	357.51	5,634.2	4,330.3	446.9	4,353.3	0.00	0.00	0.00

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
906.0	906.0	-0.6	-4.9	TIE IN @ 906' MD / 906' TVD / END OF SUR HOLE / BEGIN INT HOLE
6,020.0	5,640.0	601.3	532.5	7" CASING POINT @ 6020' MD / 5640' TVD / END OF INT HOLE / BEGIN LAT
9,626.1	5,630.2	4,198.6	452.9	CROSSED 460' HARDLINE @ 9626' MD / 5630' TVD
9,758.0	5,634.2	4,330.3	446.9	TD @ 9758' MD / 5634' TVD

Checked By: _____	Approved By: _____	Date: _____
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Survey Certification Sheet

Noble Energy Inc
Company

RM-141319
Job Number

1/15/15
Date

Sec2,T9N,R58W,6TH PM
Lease

Upchurch State
LD02-76-1AHN
Well Name

Weld, CO
County & State

API: 05-123-39814

Surveyed from a depth of: 906' to 5972' MD (DDC Certified Survey Data)
5972' to 9758' MD (DDC Certified Survey Data)

Type of Survey: MWD

Directional Supervisor/Surveyor: Chris Abbott

The data and calculations for this survey have been checked by me and conform to the standards and procedures set forth by **The Directional Drilling Company (DDC)**. This report represents a true and correct Directional survey of this well based on the original data obtained at the well site. Wellbore Coordinates are calculated using minimum curvature.

Bryon Reed
MWD General Manager
Bryon Reed
Digitally signed by Bryon Reed
DN: cn=Bryon Reed, o=DDC, ou,
email=Bryon.reed@directionaldrillers.co
m, c=US
Date: 2015.01.15 14:47:52 -06'00'

Company Name: Noble Energy Inc.
Upchurch State LD02-76-1AHN
Weld County, CO
Rig: H&P #326
Created By: Jerry Arsenault
Date: 1/14/2015



Upchurch State LD02-76-1AHN
Weld County, CO
Q141323 & RM-141319
Design #4



PROJECT DETAILS:	Weld County, CO
Geodetic System:	US State Plane 1983
Datum:	North American Datum 1983
Ellipsoid:	GRS 1980
Zone:	Colorado Northern Zone
System Datum:	Mean Sea Level

T

G

M

Azimuths to Grid North

Correction: 6.83°

Magnetic Field

Strength: 53054.0snT

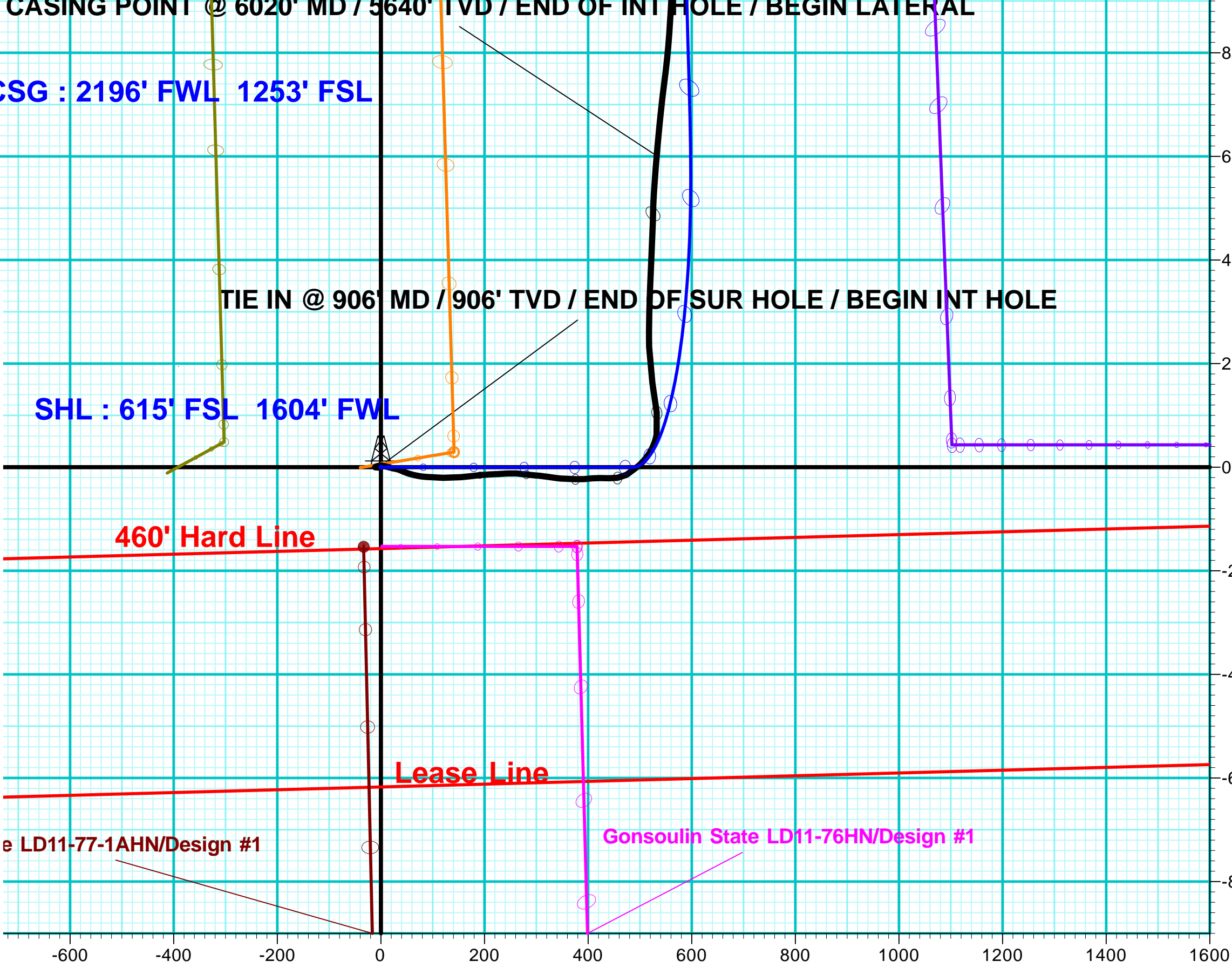
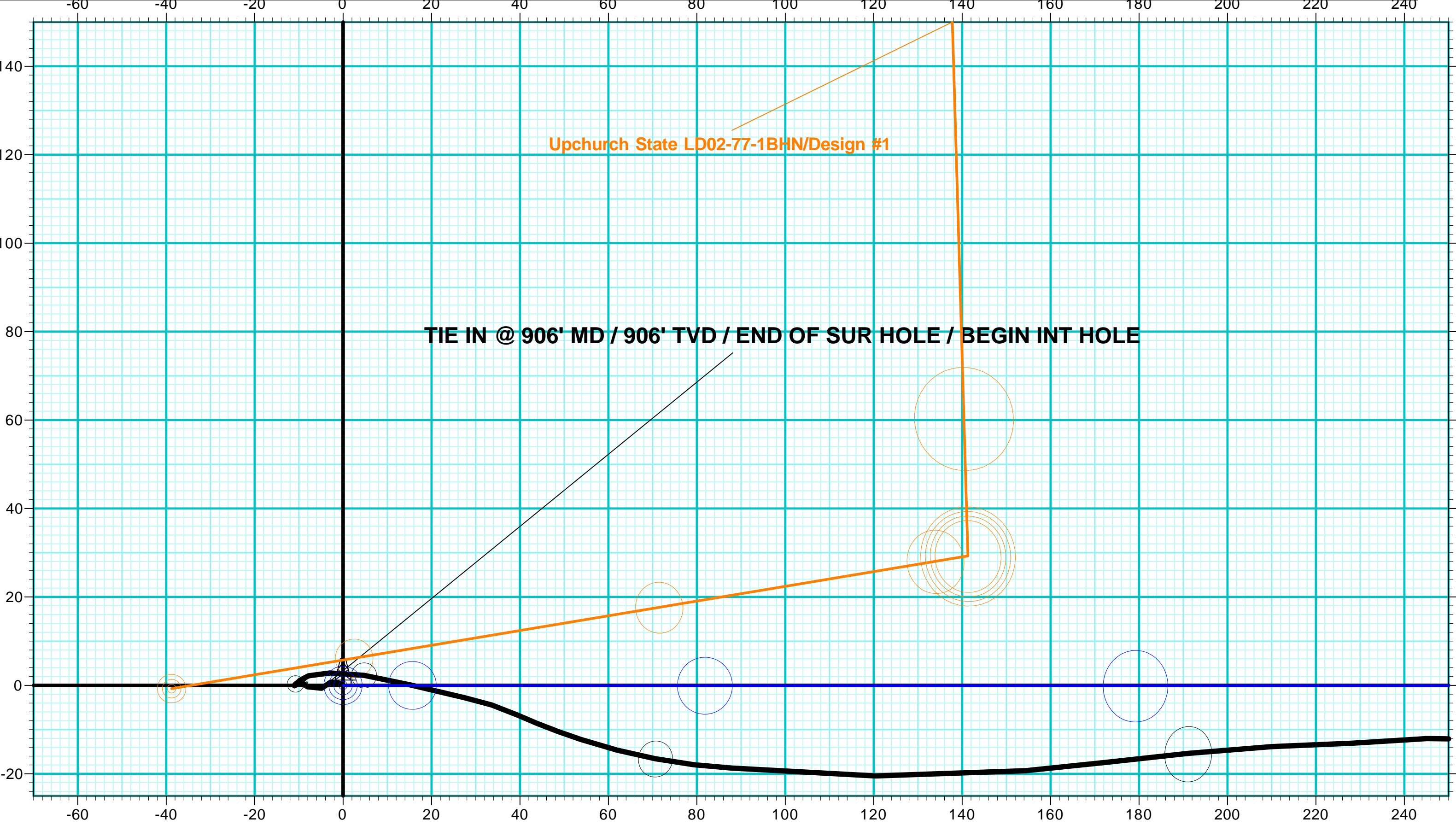
Dip Angle: 67.38°

Date: 12/4/2014

Model: IGRF2010

DESIGN TARGET DETAILS							
Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
PBHL Upchurch State LD02-76-1AHN	5615.0	4330.4	456.0	1533829.58	3461525.44	40° 47' 12.624 N	103° 49' 59.772 W
PBHL Upchurch State LD02-76-1AHN D#4	5615.0	4330.4	456.0	1533829.58	3461525.44	40° 47' 12.624 N	103° 49' 59.772 W
PBHL Upchurch State LD02-76-1AHN D#4. - plan hits target center	5635.0	4330.4	456.0	1533829.58	3461525.44	40° 47' 12.624 N	103° 49' 59.772 W

ANNOTATIONS									
MD	Inc	Azi	TVD	+N/-S	+E/-W	V	Sect	Departure	Annotation
906.0	0.60	227.13	906.0	-0.6	-4.9	-1.1	5.6	TIE IN @ 906' MD / 906' TVD / END OF SUR HOLE / BEGIN INT HOLE	
6020.0	82.50	4.79	5640.0	601.3	532.5	653.7	1147.0	7" CASING POINT @ 6020' MD / 5640' TVD / END OF INT HOLE / BEGIN LATERAL	
9626.1	89.56	357.45	5630.2	4198.6	452.9	4222.9	4751.5	CROSSED 460' HARDLINE @ 9626' MD / 5630' TVD	
9758.0	87.93	357.51	5634.2	4330.3	446.9	4353.3	4883.3	TD @ 9758' MD / 5634' TVD	



WELL DETAILS: Upchurch State LD02-76-1AHN					
+N/-S	+E/-W	Northing	Easting	Ground Level:	4742.0
0.0	0.0	1529499.23	3461069.43	Latitude	40° 46' 29.928 N
				Longitude	103° 50' 6.756 W

7" CASING POINT @ 6020' MD / 5640' TVD / END OF INT HOLE / BEGIN LATERAL

CROSSED 460' HARDLINE @ 9626' MD / 5630' TVD

TD @ 9758' MD / 5634' TVD

Vertical Section at 6.01° (200 usft/in)