

PETROLEUM DEVELOPMENT CORP Weld County CO

Well Name: **Thornton 15E-432**

Surface Location: Thornton Pad Sec.15-T7N-R66W
North American Datum 1983 , US State Plane 1983 , Colorado Northern Zone

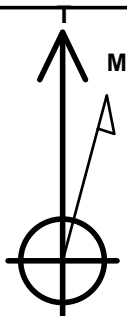
Ground Elevation: 4970.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	1455510.61	3202071.55	40.581500	-104.772500	

Ensign Rig # 14 - RKB - 15' WELL @ 4985.0ft (Ensign Rig # 14 - RKB - 15')

WELLBORE TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Shape
SHL 360'FNL, 285'FWL	1.0	0.0	0.0	Point
BHL 640'FNL, 500'FEL	7495.0	-269.2	4555.5	Point



Azimuths to True North
Magnetic North: 8.45°

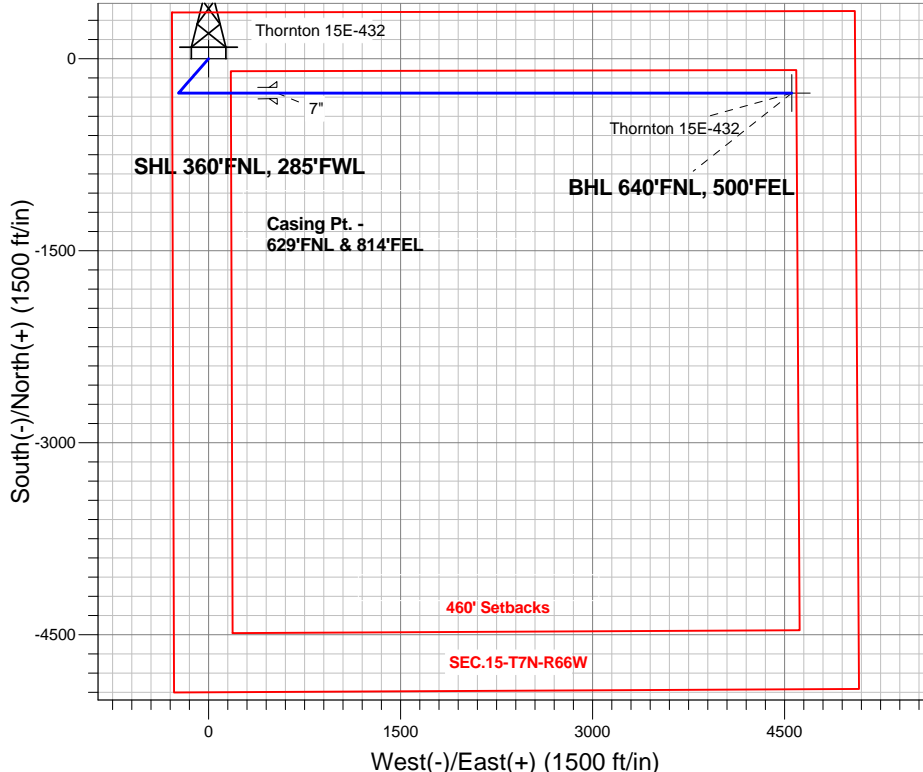
Magnetic Field
Strength: 52886.6srT
Dip Angle: 67.08°
Date: 8/27/2014
Model: IGRF2010

ANNOTATIONS

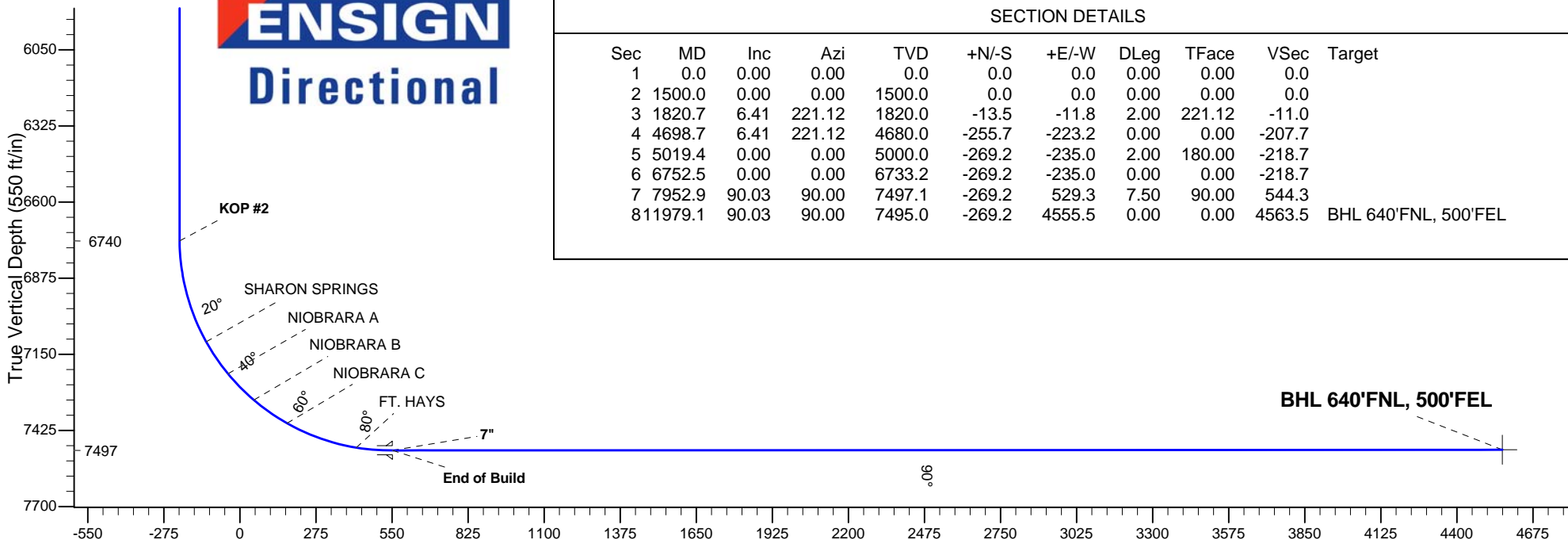
TVD	MD	Annotation
1500.0	1500.0	KOP #1
6733.2	6759.3	KOP #2
7497.1	7959.7	End of Build

Thornton Pad Sec.15-T7N-R66W
Thornton 15E-432
Plan #2 (8-27-14)
8:10, August 27 2014

South(-)/North(+) (1500 ft/in)



ENSIGN
Directional



Vertical Section at 93.38° (550 ft/in)

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	DLeg	TFace	VSec	Target
1	0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
2	1500.0	0.00	0.00	1500.0	0.0	0.0	0.00	0.00	0.0	
3	1820.7	6.41	221.12	1820.0	-13.5	-11.8	2.00	221.12	-11.0	
4	4698.7	6.41	221.12	4680.0	-255.7	-223.2	0.00	0.00	-207.7	
5	5019.4	0.00	0.00	5000.0	-269.2	-235.0	2.00	180.00	-218.7	
6	6752.5	0.00	0.00	6733.2	-269.2	-235.0	0.00	0.00	-218.7	
7	7952.9	90.03	90.00	7497.1	-269.2	529.3	7.50	90.00	544.3	
8	11979.1	90.03	90.00	7495.0	-269.2	4555.5	0.00	0.00	4563.5	BHL 640'FNL, 500'FEL



PETROLEUM DEVELOPMENT CORP Weld County CO

SEC.15-T7N-R66W

Thornton Pad Sec.15-T7N-R66W

Thornton 15E-432

Wellbore #1

Plan: Plan #2 (8-27-14)

Standard Planning Report

27 August, 2014

Database:	Landmark	Local Co-ordinate Reference:	Well Thornton 15E-432
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4985.0ft (Ensign Rig # 14 - RKB - 15')
Project:	SEC.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Ensign Rig # 14 - RKB - 15')
Site:	Thornton Pad Sec.15-T7N-R66W	North Reference:	True
Well:	Thornton 15E-432	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #2 (8-27-14)		

Project	SEC.15-T7N-R66W, Weld County, Colorado		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		Using Well Reference Point
Map Zone:	Colorado Northern Zone		Using geodetic scale factor

Site		Thornton Pad Sec.15-T7N-R66W			
Site Position:		Northing:	1,455,601.69ft	Latitude:	40.581750
From:	Lat/Long	Easting:	3,202,070.80ft	Longitude:	-104.772500
Position Uncertainty:	0.0 ft	Slot Radius:	"	Grid Convergence:	0.47 °

Well	Thornton 15E-432					
Well Position	+N/-S	-91.1 ft	Northing:	1,455,510.61 ft	Latitude:	40.581500
	+E/-W	0.0 ft	Easting:	3,202,071.55 ft	Longitude:	-104.772500
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	4,970.0 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	8/27/2014	8.45	67.08	52,887

Design	Plan #2 (8-27-14)			
Audit Notes:				
Version:	Phase:	PROTOTYPE	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.0	0.0	0.0	93.38

Plan Sections										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	TFO (°)	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00	
1,500.0	0.00	0.00	1,500.0	0.0	0.0	0.00	0.00	0.00	0.00	
1,820.7	6.41	221.12	1,820.0	-13.5	-11.8	2.00	2.00	0.00	221.12	
4,698.7	6.41	221.12	4,680.0	-255.7	-223.2	0.00	0.00	0.00	0.00	
5,019.4	0.00	0.00	5,000.0	-269.2	-235.0	2.00	-2.00	0.00	180.00	
6,752.5	0.00	0.00	6,733.2	-269.2	-235.0	0.00	0.00	0.00	0.00	
7,952.9	90.03	90.00	7,497.1	-269.2	529.3	7.50	7.50	0.00	90.00	
11,979.1	90.03	90.00	7,495.0	-269.2	4,555.5	0.00	0.00	0.00	0.00	BHL 640'FNL, 500'

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Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4985.0ft (Ensign Rig # 14 - RKB - 15')
Project:	SEC.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Ensign Rig # 14 - RKB - 15')
Site:	Thornton Pad Sec.15-T7N-R66W	North Reference:	True
Well:	Thornton 15E-432	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #2 (8-27-14)		

Planned Survey									
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)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
1.0	0.00	0.00	1.0	0.0	0.0	0.0	0.00	0.00	0.00
SECTION LINE 285'W OF SHL (2) - SHL 360'FNL, 285'FWL - HARDLINE SHL 460'FWL (2) - HARDLINE BHL 460'FEL (2)									
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	0.00
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	0.00
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	0.00	0.00
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	0.00
700.0	0.00	0.00	700.0	0.0	0.0	0.0	0.00	0.00	0.00
800.0	0.00	0.00	800.0	0.0	0.0	0.0	0.00	0.00	0.00
900.0	0.00	0.00	900.0	0.0	0.0	0.0	0.00	0.00	0.00
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.0	0.00	0.00	0.00
1,100.0	0.00	0.00	1,100.0	0.0	0.0	0.0	0.00	0.00	0.00
1,200.0	0.00	0.00	1,200.0	0.0	0.0	0.0	0.00	0.00	0.00
1,300.0	0.00	0.00	1,300.0	0.0	0.0	0.0	0.00	0.00	0.00
1,400.0	0.00	0.00	1,400.0	0.0	0.0	0.0	0.00	0.00	0.00
1,500.0	0.00	0.00	1,500.0	0.0	0.0	0.0	0.00	0.00	0.00
KOP #1									
1,600.0	2.00	221.12	1,600.0	-1.3	-1.1	-1.1	2.00	2.00	0.00
1,700.0	4.00	221.12	1,699.8	-5.3	-4.6	-4.3	2.00	2.00	0.00
1,800.0	6.00	221.12	1,799.5	-11.8	-10.3	-9.6	2.00	2.00	0.00
1,820.7	6.41	221.12	1,820.0	-13.5	-11.8	-11.0	2.00	2.00	0.00
1,900.0	6.41	221.12	1,898.8	-20.2	-17.6	-16.4	0.00	0.00	0.00
2,000.0	6.41	221.12	1,998.2	-28.6	-25.0	-23.2	0.00	0.00	0.00
2,100.0	6.41	221.12	2,097.6	-37.0	-32.3	-30.1	0.00	0.00	0.00
2,200.0	6.41	221.12	2,197.0	-45.4	-39.7	-36.9	0.00	0.00	0.00
2,300.0	6.41	221.12	2,296.3	-53.8	-47.0	-43.7	0.00	0.00	0.00
2,400.0	6.41	221.12	2,395.7	-62.3	-54.3	-50.6	0.00	0.00	0.00
2,500.0	6.41	221.12	2,495.1	-70.7	-61.7	-57.4	0.00	0.00	0.00
2,600.0	6.41	221.12	2,594.5	-79.1	-69.0	-64.3	0.00	0.00	0.00
2,700.0	6.41	221.12	2,693.8	-87.5	-76.4	-71.1	0.00	0.00	0.00
2,800.0	6.41	221.12	2,793.2	-95.9	-83.7	-77.9	0.00	0.00	0.00
2,900.0	6.41	221.12	2,892.6	-104.3	-91.1	-84.8	0.00	0.00	0.00
3,000.0	6.41	221.12	2,991.9	-112.7	-98.4	-91.6	0.00	0.00	0.00
3,100.0	6.41	221.12	3,091.3	-121.2	-105.8	-98.4	0.00	0.00	0.00
3,200.0	6.41	221.12	3,190.7	-129.6	-113.1	-105.3	0.00	0.00	0.00
3,300.0	6.41	221.12	3,290.1	-138.0	-120.5	-112.1	0.00	0.00	0.00
3,400.0	6.41	221.12	3,389.4	-146.4	-127.8	-118.9	0.00	0.00	0.00
3,500.0	6.41	221.12	3,488.8	-154.8	-135.2	-125.8	0.00	0.00	0.00
3,600.0	6.41	221.12	3,588.2	-163.2	-142.5	-132.6	0.00	0.00	0.00
3,700.0	6.41	221.12	3,687.6	-171.7	-149.8	-139.5	0.00	0.00	0.00
3,800.0	6.41	221.12	3,786.9	-180.1	-157.2	-146.3	0.00	0.00	0.00
3,900.0	6.41	221.12	3,886.3	-188.5	-164.5	-153.1	0.00	0.00	0.00
3,944.0	6.41	221.12	3,930.0	-192.2	-167.8	-156.1	0.00	0.00	0.00
PARKMAN									
4,000.0	6.41	221.12	3,985.7	-196.9	-171.9	-160.0	0.00	0.00	0.00
4,100.0	6.41	221.12	4,085.1	-205.3	-179.2	-166.8	0.00	0.00	0.00
4,200.0	6.41	221.12	4,184.4	-213.7	-186.6	-173.6	0.00	0.00	0.00
4,300.0	6.41	221.12	4,283.8	-222.1	-193.9	-180.5	0.00	0.00	0.00
4,400.0	6.41	221.12	4,383.2	-230.6	-201.3	-187.3	0.00	0.00	0.00
4,500.0	6.41	221.12	4,482.6	-239.0	-208.6	-194.2	0.00	0.00	0.00

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Project:	SEC.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Ensign Rig # 14 - RKB - 15')
Site:	Thornton Pad Sec.15-T7N-R66W	North Reference:	True
Well:	Thornton 15E-432	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #2 (8-27-14)		

Planned Survey									
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)
4,600.0	6.41	221.12	4,581.9	-247.4	-216.0	-201.0	0.00	0.00	0.00
4,688.6	6.41	221.12	4,670.0	-254.8	-222.5	-207.1	0.00	0.00	0.00
SUSSEX									
4,698.7	6.41	221.12	4,680.0	-255.7	-223.2	-207.7	0.00	0.00	0.00
4,700.0	6.39	221.12	4,681.3	-255.8	-223.3	-207.8	2.00	-2.00	0.00
4,800.0	4.39	221.12	4,780.9	-262.9	-229.5	-213.6	2.00	-2.00	0.00
4,900.0	2.39	221.12	4,880.7	-267.3	-233.4	-217.2	2.00	-2.00	0.00
5,000.0	0.39	221.12	4,980.6	-269.2	-235.0	-218.7	2.00	-2.00	0.00
5,019.4	0.00	0.00	5,000.0	-269.2	-235.0	-218.7	2.00	-2.00	0.00
5,079.4	0.00	0.00	5,060.0	-269.2	-235.0	-218.7	0.00	0.00	0.00
SHANNON									
5,100.0	0.00	0.00	5,080.6	-269.2	-235.0	-218.7	0.00	0.00	0.00
5,200.0	0.00	0.00	5,180.6	-269.2	-235.0	-218.7	0.00	0.00	0.00
5,300.0	0.00	0.00	5,280.6	-269.2	-235.0	-218.7	0.00	0.00	0.00
5,400.0	0.00	0.00	5,380.6	-269.2	-235.0	-218.7	0.00	0.00	0.00
5,500.0	0.00	0.00	5,480.6	-269.2	-235.0	-218.7	0.00	0.00	0.00
5,600.0	0.00	0.00	5,580.6	-269.2	-235.0	-218.7	0.00	0.00	0.00
5,700.0	0.00	0.00	5,680.6	-269.2	-235.0	-218.7	0.00	0.00	0.00
5,800.0	0.00	0.00	5,780.6	-269.2	-235.0	-218.7	0.00	0.00	0.00
5,900.0	0.00	0.00	5,880.6	-269.2	-235.0	-218.7	0.00	0.00	0.00
6,000.0	0.00	0.00	5,980.6	-269.2	-235.0	-218.7	0.00	0.00	0.00
6,100.0	0.00	0.00	6,080.6	-269.2	-235.0	-218.7	0.00	0.00	0.00
6,200.0	0.00	0.00	6,180.6	-269.2	-235.0	-218.7	0.00	0.00	0.00
6,300.0	0.00	0.00	6,280.6	-269.2	-235.0	-218.7	0.00	0.00	0.00
6,400.0	0.00	0.00	6,380.6	-269.2	-235.0	-218.7	0.00	0.00	0.00
6,500.0	0.00	0.00	6,480.6	-269.2	-235.0	-218.7	0.00	0.00	0.00
6,600.0	0.00	0.00	6,580.6	-269.2	-235.0	-218.7	0.00	0.00	0.00
6,700.0	0.00	0.00	6,680.6	-269.2	-235.0	-218.7	0.00	0.00	0.00
6,752.5	0.00	0.00	6,733.2	-269.2	-235.0	-218.7	0.00	0.00	0.00
6,759.3	0.51	90.00	6,739.9	-269.2	-235.0	-218.7	7.50	7.50	0.00
KOP #2									
6,800.0	3.56	90.00	6,780.6	-269.2	-233.5	-217.2	7.50	7.50	0.00
6,900.0	11.06	90.00	6,879.7	-269.2	-220.8	-204.5	7.50	7.50	0.00
7,000.0	18.56	90.00	6,976.3	-269.2	-195.3	-179.0	7.50	7.50	0.00
7,100.0	26.06	90.00	7,068.8	-269.2	-157.3	-141.2	7.50	7.50	0.00
7,140.9	29.13	90.00	7,105.0	-269.2	-138.4	-122.3	7.50	7.50	0.00
SHARON SPRINGS									
7,200.0	33.56	90.00	7,155.5	-269.2	-107.6	-91.6	7.50	7.50	0.00
7,280.4	39.59	90.00	7,220.0	-269.2	-59.8	-43.8	7.50	7.50	0.00
NIORARA A									
7,300.0	41.06	90.00	7,235.0	-269.2	-47.1	-31.1	7.50	7.50	0.00
7,400.0	48.56	90.00	7,305.9	-269.2	23.4	39.2	7.50	7.50	0.00
7,413.9	49.61	90.00	7,315.0	-269.2	33.9	49.7	7.50	7.50	0.00
NIORARA B									
7,500.0	56.06	90.00	7,367.0	-269.2	102.4	118.1	7.50	7.50	0.00
7,561.1	60.64	90.00	7,399.0	-269.2	154.4	170.0	7.50	7.50	0.00
NIORARA C									
7,600.0	63.56	90.00	7,417.2	-269.2	188.8	204.4	7.50	7.50	0.00
7,700.0	71.06	90.00	7,455.8	-269.2	281.0	296.4	7.50	7.50	0.00
7,800.0	78.56	90.00	7,481.9	-269.2	377.4	392.7	7.50	7.50	0.00
7,828.1	80.67	90.00	7,487.0	-269.2	405.1	420.3	7.50	7.50	0.00

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Site:	Thornton Pad Sec.15-T7N-R66W	North Reference:	True
Well:	Thornton 15E-432	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #2 (8-27-14)		

Planned Survey

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)
FT. HAYS									
7,900.0	86.06	90.00	7,495.3	-269.2	476.5	491.5	7.50	7.50	0.00
7,952.9	90.03	90.00	7,497.1	-269.2	529.3	544.3	7.50	7.50	0.00
7,959.7	90.03	90.00	7,497.1	-269.2	536.1	551.1	0.00	0.00	0.00
End of Build - 7"									
8,000.0	90.03	90.00	7,497.1	-269.2	576.4	591.3	0.00	0.00	0.00
8,100.0	90.03	90.00	7,497.0	-269.2	676.4	691.1	0.00	0.00	0.00
8,200.0	90.03	90.00	7,497.0	-269.2	776.4	791.0	0.00	0.00	0.00
8,300.0	90.03	90.00	7,496.9	-269.2	876.4	890.8	0.00	0.00	0.00
8,400.0	90.03	90.00	7,496.9	-269.2	976.4	990.6	0.00	0.00	0.00
8,500.0	90.03	90.00	7,496.8	-269.2	1,076.4	1,090.4	0.00	0.00	0.00
8,600.0	90.03	90.00	7,496.8	-269.2	1,176.4	1,190.3	0.00	0.00	0.00
8,700.0	90.03	90.00	7,496.7	-269.2	1,276.4	1,290.1	0.00	0.00	0.00
8,800.0	90.03	90.00	7,496.7	-269.2	1,376.4	1,389.9	0.00	0.00	0.00
8,900.0	90.03	90.00	7,496.6	-269.2	1,476.4	1,489.7	0.00	0.00	0.00
9,000.0	90.03	90.00	7,496.6	-269.2	1,576.4	1,589.6	0.00	0.00	0.00
9,100.0	90.03	90.00	7,496.5	-269.2	1,676.4	1,689.4	0.00	0.00	0.00
9,200.0	90.03	90.00	7,496.5	-269.2	1,776.4	1,789.2	0.00	0.00	0.00
9,300.0	90.03	90.00	7,496.4	-269.2	1,876.4	1,889.0	0.00	0.00	0.00
9,400.0	90.03	90.00	7,496.4	-269.2	1,976.4	1,988.9	0.00	0.00	0.00
9,500.0	90.03	90.00	7,496.3	-269.2	2,076.4	2,088.7	0.00	0.00	0.00
9,600.0	90.03	90.00	7,496.2	-269.2	2,176.4	2,188.5	0.00	0.00	0.00
9,700.0	90.03	90.00	7,496.2	-269.2	2,276.4	2,288.3	0.00	0.00	0.00
9,800.0	90.03	90.00	7,496.1	-269.2	2,376.4	2,388.2	0.00	0.00	0.00
9,900.0	90.03	90.00	7,496.1	-269.2	2,476.4	2,488.0	0.00	0.00	0.00
10,000.0	90.03	90.00	7,496.0	-269.2	2,576.4	2,587.8	0.00	0.00	0.00
10,100.0	90.03	90.00	7,496.0	-269.2	2,676.4	2,687.6	0.00	0.00	0.00
10,200.0	90.03	90.00	7,495.9	-269.2	2,776.4	2,787.5	0.00	0.00	0.00
10,300.0	90.03	90.00	7,495.9	-269.2	2,876.4	2,887.3	0.00	0.00	0.00
10,400.0	90.03	90.00	7,495.8	-269.2	2,976.4	2,987.1	0.00	0.00	0.00
10,500.0	90.03	90.00	7,495.8	-269.2	3,076.4	3,087.0	0.00	0.00	0.00
10,600.0	90.03	90.00	7,495.7	-269.2	3,176.4	3,186.8	0.00	0.00	0.00
10,700.0	90.03	90.00	7,495.7	-269.2	3,276.4	3,286.6	0.00	0.00	0.00
10,800.0	90.03	90.00	7,495.6	-269.2	3,376.4	3,386.4	0.00	0.00	0.00
10,900.0	90.03	90.00	7,495.6	-269.2	3,476.4	3,486.3	0.00	0.00	0.00
11,000.0	90.03	90.00	7,495.5	-269.2	3,576.4	3,586.1	0.00	0.00	0.00
11,100.0	90.03	90.00	7,495.5	-269.2	3,676.4	3,685.9	0.00	0.00	0.00
11,200.0	90.03	90.00	7,495.4	-269.2	3,776.4	3,785.7	0.00	0.00	0.00
11,300.0	90.03	90.00	7,495.4	-269.2	3,876.4	3,885.6	0.00	0.00	0.00
11,400.0	90.03	90.00	7,495.3	-269.2	3,976.4	3,985.4	0.00	0.00	0.00
11,500.0	90.03	90.00	7,495.3	-269.2	4,076.4	4,085.2	0.00	0.00	0.00
11,600.0	90.03	90.00	7,495.2	-269.2	4,176.4	4,185.0	0.00	0.00	0.00
11,700.0	90.03	90.00	7,495.1	-269.2	4,276.4	4,284.9	0.00	0.00	0.00
11,800.0	90.03	90.00	7,495.1	-269.2	4,376.4	4,384.7	0.00	0.00	0.00
11,900.0	90.03	90.00	7,495.0	-269.2	4,476.4	4,484.5	0.00	0.00	0.00
11,979.1	90.03	90.00	7,495.0	-269.2	4,555.5	4,563.5	0.00	0.00	0.00
BHL 640'FNL, 500'FEL									

Database:	Landmark	Local Co-ordinate Reference:	Well Thornton 15E-432
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4985.0ft (Ensign Rig # 14 - RKB - 15')
Project:	SEC.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Ensign Rig # 14 - RKB - 15')
Site:	Thornton Pad Sec.15-T7N-R66W	North Reference:	True
Well:	Thornton 15E-432	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #2 (8-27-14)		

Targets									
Target Name									
- hit/miss target	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- Shape	(°)	(°)	(ft)	(ft)	(ft)	(ft)	(ft)		
SECTION LINE 285'W	0.00	0.00	1.0	158.3	-285.0	1,455,666.54	3,201,785.27	40.581934	-104.773526
- plan misses target center by 326.0ft at 1.0ft MD (1.0 TVD, 0.0 N, 0.0 E)									
- Polygon									
Point 1			1.0	0.0	0.0	1,455,666.54	3,201,785.27		
Point 2			1.0	-600.0	0.0	1,455,066.58	3,201,790.19		
BHL 640'FNL, 500'FE	0.00	0.00	7,495.0	-269.2	4,555.5	1,455,278.83	3,206,629.00	40.580760	-104.756100
- plan hits target center									
- Point									
SHL 360'FNL, 285'FW	0.00	0.00	1.0	0.0	0.0	1,455,510.62	3,202,071.55	40.581500	-104.772500
- plan hits target center									
- Point									
HARDLINE SHL 460'F	0.00	0.00	1.0	158.3	175.0	1,455,670.32	3,202,245.24	40.581934	-104.771870
- plan misses target center by 236.0ft at 1.0ft MD (1.0 TVD, 0.0 N, 0.0 E)									
- Polygon									
Point 1			1.0	0.0	0.0	1,455,670.32	3,202,245.24		
Point 2			1.0	-600.0	0.0	1,455,070.35	3,202,250.16		
HARDLINE BHL 460'F	0.00	0.00	1.0	158.3	4,595.5	1,455,706.58	3,206,665.47	40.581933	-104.755956
- plan misses target center by 4598.2ft at 1.0ft MD (1.0 TVD, 0.0 N, 0.0 E)									
- Polygon									
Point 1			1.0	0.0	0.0	1,455,706.58	3,206,665.47		
Point 2			1.0	-600.0	0.0	1,455,106.62	3,206,670.39		

Casing Points					
Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")	
7,959.7	7,497.1	7"	7	7-1/2	

Formations						
Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)	
3,944.0	3,930.0	PARKMAN		0.00		
4,688.6	4,670.0	SUSSEX		0.00		
5,079.4	5,060.0	SHANNON		0.00		
7,140.9	7,105.0	SHARON SPRINGS		0.00		
7,280.4	7,220.0	NIOBRARA A		0.00		
7,413.9	7,315.0	NIOBRARA B		0.00		
7,561.1	7,399.0	NIOBRARA C		0.00		
7,828.1	7,487.0	FT. HAYS		0.00		

Database:	Landmark	Local Co-ordinate Reference:	Well Thornton 15E-432
Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	TVD Reference:	WELL @ 4985.0ft (Ensign Rig # 14 - RKB - 15')
Project:	SEC.15-T7N-R66W	MD Reference:	WELL @ 4985.0ft (Ensign Rig # 14 - RKB - 15')
Site:	Thornton Pad Sec.15-T7N-R66W	North Reference:	True
Well:	Thornton 15E-432	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #2 (8-27-14)		

Plan Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
1,500.0	1,500.0	0.0	0.0	KOP #1
6,759.3	6,733.2	-340.0	-235.0	KOP #2
7,959.7	7,497.1	-328.7	529.3	End of Build