

# PETROLEUM DEVELOPMENT CORP Weld County CO

## Well Name: Thornton 19X-404

Surface Location: Thornton 19X-404 Pad Sec.19-T7N-R66W  
North American Datum 1983, US State Plane 1983 Colorado Northern Zone

Ground Elevation: 4961.0

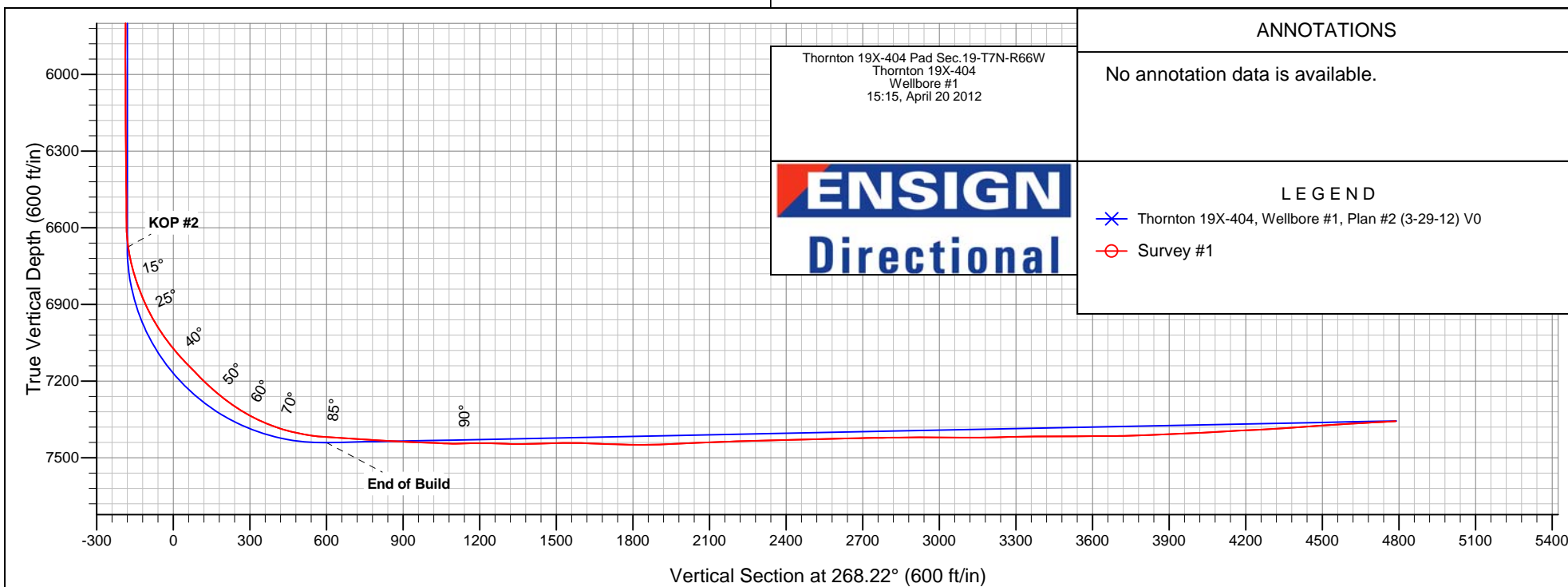
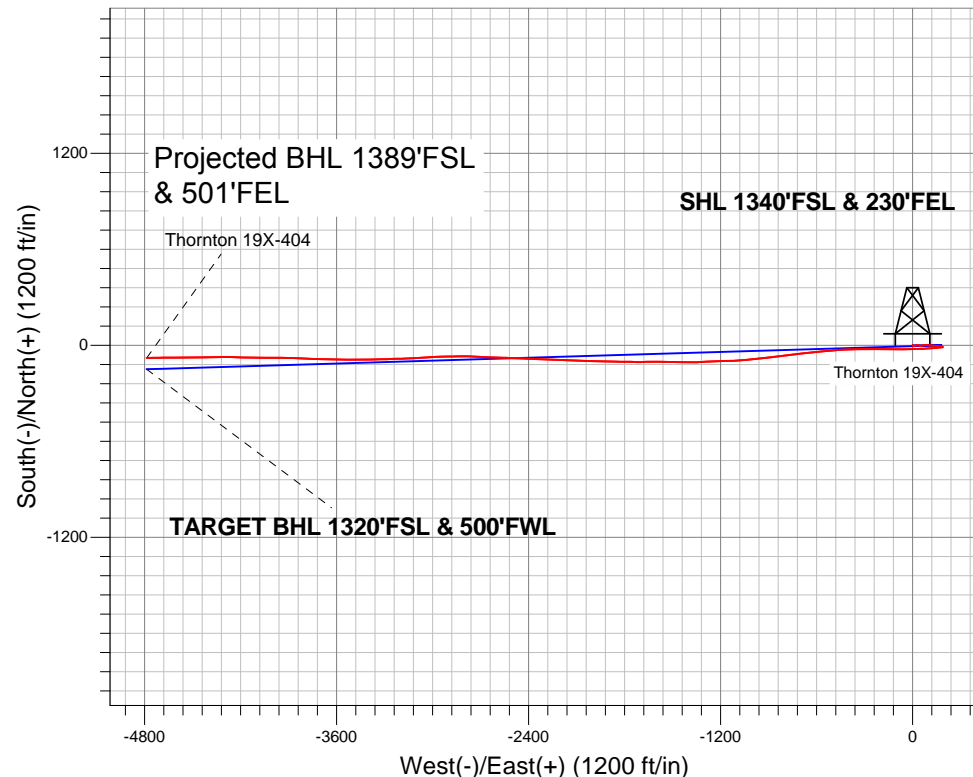
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	1446342.69	3190917.78	40.556580	-104.812910	

RKB Ensign 32 - 15' WELL @ 4976.0ft (RKB Ensign 32 - 15')

## FINAL SURVEY

Projected Bottom Hole Location  
12034'MD 7357'TVD 80'S & 4787'W of SHL

93.20 degree Incl @ 268.20 degree AZM





# **PETROLEUM DEVELOPMENT CORP Weld County CO**

**SEC.19-T7N-R66W**

**Thornton 19X-404 Pad Sec.19-T7N-R66W**

**Thornton 19X-404**

**Wellbore #1**

**Survey: Survey #1**

## **Standard Survey Report**

**20 April, 2012**

<b>Company:</b>	PETROLEUM DEVELOPMENT CORP Weld County CO	<b>Local Co-ordinate Reference:</b>	Well Thornton 19X-404
<b>Project:</b>	SEC.19-T7N-R66W	<b>TVD Reference:</b>	WELL @ 4976.0ft (RKB Ensign 32 - 15')
<b>Site:</b>	Thornton 19X-404 Pad Sec.19-T7N-R66W	<b>MD Reference:</b>	WELL @ 4976.0ft (RKB Ensign 32 - 15')
<b>Well:</b>	Thornton 19X-404	<b>North Reference:</b>	True
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Wellbore #1	<b>Database:</b>	Landmark

<b>Project</b>	SEC.19-T7N-R66W, Weld County, CO		
<b>Map System:</b>	US State Plane 1983	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	North American Datum 1983		Using Well Reference Point
<b>Map Zone:</b>	Colorado Northern Zone		Using geodetic scale factor

Site		Thornton 19X-404 Pad Sec.19-T7N-R66W			
Site Position:		Northing:	1,446,342.71 ft	Latitude:	40.556580
From:	Lat/Long	Easting:	3,190,917.78 ft	Longitude:	-104.812910
Position Uncertainty:	0.0 ft	Slot Radius:	"	Grid Convergence:	0.44 °

Well	Thornton 19X-404					
Well Position	+N-S	0.0 ft	Northing:	1,446,342.69 ft	Latitude:	40.556580
	+E-W	0.0 ft	Easting:	3,190,917.78 ft	Longitude:	-104.812910
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	4,961.0 ft

<b>Wellbore</b>	Wellbore #1				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2010	3/29/2012	8.80	67.14	53,124

<b>Design</b>	Wellbore #1				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0.0
<b>Vertical Section:</b>	<b>Depth From (TVD) (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Direction (°)</b>	
	7,356.0	0.0	0.0	268.22	

<b>Survey Program</b>	<b>Date</b>	4/20/2012			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
916.0	12,034.0	Survey #1 (Wellbore #1)	MWD	MWD - Standard	

<b>Survey</b>										
<b>Measured Depth (ft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Vertical Section (ft)</b>	<b>Dogleg Rate (°/100ft)</b>	<b>Build Rate (°/100ft)</b>	<b>Turn Rate (°/100ft)</b>	
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	
<b>HARDLINE BHL 460'FWL</b>										
1.0	0.00	0.00	1.0	0.0	0.0	0.0	0.00	0.00	0.00	
<b>SECTION LINE 230'E OF SHL</b>										
1.1	0.00	122.40	1.1	0.0	0.0	0.0	0.00	0.00	0.00	
<b>HARDLINE SHL 460'FEL</b>										
916.0	0.70	122.40	916.0	-3.0	4.7	-4.6	0.08	0.08	0.00	
1,008.0	0.80	135.10	1,008.0	-3.8	5.7	-5.5	0.21	0.11	13.80	
1,100.0	0.90	94.50	1,100.0	-4.3	6.8	-6.7	0.65	0.11	-44.13	
1,192.0	1.00	93.10	1,191.9	-4.4	8.3	-8.2	0.11	0.11	-1.52	
1,285.0	0.80	82.90	1,284.9	-4.3	9.8	-9.7	0.27	-0.22	-10.97	

<b>Company:</b>	PETROLEUM DEVELOPMENT CORP Weld County CO	<b>Local Co-ordinate Reference:</b>	Well Thornton 19X-404
<b>Project:</b>	SEC.19-T7N-R66W	<b>TVD Reference:</b>	WELL @ 4976.0ft (RKB Ensign 32 - 15')
<b>Site:</b>	Thornton 19X-404 Pad Sec.19-T7N-R66W	<b>MD Reference:</b>	WELL @ 4976.0ft (RKB Ensign 32 - 15')
<b>Well:</b>	Thornton 19X-404	<b>North Reference:</b>	True
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Wellbore #1	<b>Database:</b>	Landmark

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)
1,378.0	0.70	79.00	1,377.9	-4.1	11.0	-10.9	0.12	-0.11	-4.19
1,472.0	0.60	86.90	1,471.9	-4.0	12.1	-11.9	0.14	-0.11	8.40
1,566.0	0.50	85.60	1,565.9	-3.9	13.0	-12.8	0.11	-0.11	-1.38
1,659.0	0.70	54.90	1,658.9	-3.6	13.8	-13.7	0.40	0.22	-33.01
1,752.0	1.20	81.40	1,751.9	-3.1	15.3	-15.2	0.70	0.54	28.49
1,845.0	0.70	85.70	1,844.9	-2.9	16.8	-16.7	0.54	-0.54	4.62
1,937.0	1.30	62.30	1,936.9	-2.4	18.3	-18.2	0.78	0.65	-25.43
2,031.0	1.20	57.80	2,030.9	-1.4	20.0	-20.0	0.15	-0.11	-4.79
2,124.0	1.00	32.70	2,123.8	-0.2	21.3	-21.3	0.56	-0.22	-26.99
2,217.0	1.10	59.10	2,216.8	1.0	22.5	-22.5	0.53	0.11	28.39
2,310.0	1.10	61.10	2,309.8	1.9	24.1	-24.1	0.04	0.00	2.15
2,403.0	0.80	43.40	2,402.8	2.8	25.3	-25.4	0.45	-0.32	-19.03
2,495.0	0.50	90.80	2,494.8	3.2	26.1	-26.2	0.64	-0.33	51.52
2,589.0	0.90	128.50	2,588.8	2.8	27.1	-27.2	0.63	0.43	40.11
2,682.0	1.90	111.70	2,681.7	1.7	29.1	-29.2	1.15	1.08	-18.06
2,775.0	2.70	106.30	2,774.7	0.5	32.7	-32.7	0.89	0.86	-5.81
2,868.0	2.50	108.00	2,867.6	-0.7	36.7	-36.7	0.23	-0.22	1.83
2,961.0	2.10	110.80	2,960.5	-1.9	40.2	-40.1	0.45	-0.43	3.01
3,054.0	2.40	104.30	3,053.4	-3.0	43.7	-43.6	0.42	0.32	-6.99
3,147.0	2.60	95.90	3,146.3	-3.7	47.7	-47.5	0.45	0.22	-9.03
3,240.0	2.90	86.50	3,239.2	-3.8	52.1	-52.0	0.58	0.32	-10.11
3,333.0	2.80	69.90	3,332.1	-2.9	56.6	-56.5	0.89	-0.11	-17.85
3,427.0	2.90	69.80	3,426.0	-1.3	61.0	-60.9	0.11	0.11	-0.11
3,521.0	2.50	71.20	3,519.9	0.2	65.2	-65.1	0.43	-0.43	1.49
3,614.0	2.80	80.00	3,612.8	1.3	69.3	-69.3	0.54	0.32	9.46
3,708.0	3.70	92.90	3,706.7	1.5	74.6	-74.6	1.23	0.96	13.72
3,801.0	5.00	96.10	3,799.4	0.9	81.6	-81.6	1.42	1.40	3.44
3,894.0	7.40	93.80	3,891.8	0.1	91.6	-91.6	2.59	2.58	-2.47
3,987.0	7.80	93.10	3,984.0	-0.6	103.9	-103.9	0.44	0.43	-0.75
4,081.0	8.40	92.90	4,077.1	-1.3	117.2	-117.1	0.64	0.64	-0.21
4,173.0	8.60	91.70	4,168.1	-1.9	130.7	-130.6	0.29	0.22	-1.30
4,266.0	7.40	96.40	4,260.2	-2.7	143.6	-143.5	1.47	-1.29	5.05
4,359.0	5.90	99.80	4,352.5	-4.2	154.3	-154.1	1.67	-1.61	3.66
4,452.0	4.80	102.30	4,445.1	-5.9	162.8	-162.6	1.21	-1.18	2.69
4,545.0	3.80	97.00	4,537.9	-7.1	169.7	-169.4	1.16	-1.08	-5.70
4,638.0	2.70	89.40	4,630.7	-7.4	174.9	-174.6	1.27	-1.18	-8.17
4,732.0	1.80	87.90	4,724.6	-7.3	178.6	-178.3	0.96	-0.96	-1.60
4,826.0	1.40	99.40	4,818.6	-7.5	181.2	-180.9	0.54	-0.43	12.23
4,917.0	1.20	127.80	4,909.6	-8.2	183.1	-182.7	0.73	-0.22	31.21
5,009.0	0.90	127.00	5,001.6	-9.3	184.4	-184.0	0.33	-0.33	-0.87
5,102.0	0.60	129.30	5,094.6	-10.0	185.4	-185.0	0.32	-0.32	2.47
5,195.0	0.70	135.20	5,187.5	-10.7	186.1	-185.7	0.13	0.11	6.34
5,288.0	0.40	141.30	5,280.5	-11.4	186.8	-186.3	0.33	-0.32	6.56
5,381.0	0.30	138.30	5,373.5	-11.8	187.1	-186.7	0.11	-0.11	-3.23
5,475.0	0.10	77.60	5,467.5	-12.0	187.4	-186.9	0.28	-0.21	-64.57
5,568.0	0.50	349.20	5,560.5	-11.6	187.4	-186.9	0.55	0.43	-95.05
5,661.0	0.70	351.40	5,653.5	-10.6	187.2	-186.8	0.22	0.22	2.37
5,754.0	0.20	47.50	5,746.5	-9.9	187.2	-186.8	0.66	-0.54	60.32
5,847.0	0.30	126.10	5,839.5	-10.0	187.6	-187.2	0.35	0.11	84.52
5,941.0	0.30	180.80	5,933.5	-10.4	187.7	-187.3	0.29	0.00	58.19
6,034.0	0.30	210.40	6,026.5	-10.8	187.6	-187.2	0.16	0.00	31.83
6,127.0	0.40	229.90	6,119.5	-11.2	187.3	-186.8	0.17	0.11	20.97
6,220.0	0.60	240.70	6,212.5	-11.7	186.6	-186.1	0.24	0.22	11.61

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<b>Site:</b>	Thornton 19X-404 Pad Sec.19-T7N-R66W	<b>MD Reference:</b>	WELL @ 4976.0ft (RKB Ensign 32 - 15')
<b>Well:</b>	Thornton 19X-404	<b>North Reference:</b>	True
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Wellbore #1	<b>Database:</b>	Landmark

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)
6,313.0	0.50	256.10	6,305.5	-12.0	185.8	-185.3	0.19	-0.11	16.56
6,407.0	0.60	257.10	6,399.5	-12.2	184.9	-184.4	0.11	0.11	1.06
6,500.0	0.50	280.40	6,492.5	-12.3	184.0	-183.5	0.26	-0.11	25.05
6,531.0	0.50	282.20	6,523.5	-12.2	183.7	-183.3	0.05	0.00	5.81
6,562.0	0.50	296.70	6,554.5	-12.1	183.5	-183.0	0.41	0.00	46.77
6,593.0	0.70	275.80	6,585.5	-12.0	183.2	-182.7	0.95	0.65	-67.42
6,624.0	2.60	265.30	6,616.5	-12.1	182.3	-181.8	6.18	6.13	-33.87
6,655.0	5.50	261.60	6,647.4	-12.4	180.1	-179.6	9.39	9.35	-11.94
6,686.0	8.20	263.40	6,678.2	-12.8	176.5	-176.0	8.74	8.71	5.81
6,717.0	10.80	263.40	6,708.8	-13.4	171.4	-170.9	8.39	8.39	0.00
6,748.0	13.20	265.30	6,739.1	-14.0	165.0	-164.4	7.85	7.74	6.13
6,779.0	15.50	265.70	6,769.1	-14.6	157.3	-156.8	7.43	7.42	1.29
6,810.0	17.70	265.40	6,798.8	-15.3	148.5	-147.9	7.10	7.10	-0.97
6,841.0	19.80	266.30	6,828.2	-16.0	138.5	-138.0	6.84	6.77	2.90
6,872.0	21.70	265.90	6,857.2	-16.8	127.6	-127.0	6.15	6.13	-1.29
6,903.0	23.70	264.40	6,885.8	-17.8	115.7	-115.0	6.72	6.45	-4.84
6,934.0	25.90	264.50	6,913.9	-19.1	102.7	-102.1	7.10	7.10	0.32
6,965.0	28.20	265.00	6,941.5	-20.4	88.7	-88.0	7.46	7.42	1.61
6,996.0	30.50	266.00	6,968.5	-21.5	73.5	-72.8	7.59	7.42	3.23
7,027.0	32.60	266.90	6,994.9	-22.5	57.3	-56.6	6.94	6.77	2.90
7,059.0	34.90	267.10	7,021.5	-23.5	39.6	-38.8	7.20	7.19	0.63
7,091.0	37.10	268.10	7,047.4	-24.3	20.8	-20.0	7.12	6.88	3.13
7,122.0	39.30	269.20	7,071.8	-24.7	1.6	-0.9	7.43	7.10	3.55
7,153.0	41.40	269.00	7,095.4	-25.0	-18.4	19.2	6.79	6.77	-0.65
7,184.0	43.30	269.40	7,118.3	-25.3	-39.3	40.1	6.19	6.13	1.29
7,215.0	44.50	271.10	7,140.7	-25.2	-60.8	61.6	5.43	3.87	5.48
7,246.0	44.00	270.50	7,162.9	-24.9	-82.4	83.2	2.10	-1.61	-1.94
7,277.0	44.70	270.70	7,185.0	-24.7	-104.1	104.8	2.30	2.26	0.65
7,308.0	45.90	270.40	7,206.8	-24.5	-126.1	126.8	3.93	3.87	-0.97
7,340.0	48.20	270.80	7,228.6	-24.2	-149.6	150.2	7.25	7.19	1.25
7,371.0	50.60	270.80	7,248.8	-23.9	-173.1	173.7	7.74	7.74	0.00
7,402.0	52.70	270.50	7,268.0	-23.6	-197.4	198.0	6.82	6.77	-0.97
7,433.0	54.10	270.30	7,286.5	-23.4	-222.3	222.9	4.55	4.52	-0.65
7,464.0	56.20	269.50	7,304.2	-23.5	-247.7	248.3	7.10	6.77	-2.58
7,495.0	59.30	268.80	7,320.8	-23.9	-273.9	274.5	10.18	10.00	-2.26
7,525.0	61.90	269.70	7,335.5	-24.2	-300.1	300.7	9.05	8.67	3.00
7,557.0	64.40	269.30	7,350.0	-24.5	-328.6	329.2	7.89	7.81	-1.25
7,588.0	66.90	268.60	7,362.7	-25.0	-356.8	357.5	8.32	8.06	-2.26
7,619.0	69.10	268.60	7,374.4	-25.7	-385.6	386.2	7.10	7.10	0.00
7,650.0	71.60	267.70	7,384.8	-26.6	-414.8	415.4	8.52	8.06	-2.90
7,681.0	74.80	266.10	7,393.7	-28.2	-444.4	445.0	11.44	10.32	-5.16
7,712.0	77.60	265.80	7,401.1	-30.4	-474.4	475.1	9.08	9.03	-0.97
7,743.0	79.60	265.50	7,407.3	-32.7	-504.7	505.5	6.52	6.45	-0.97
7,774.0	81.00	265.90	7,412.5	-35.0	-535.2	536.0	4.69	4.52	1.29
7,805.0	83.50	264.30	7,416.7	-37.6	-565.8	566.7	9.55	8.06	-5.16
7,836.0	86.40	263.80	7,419.4	-40.8	-596.5	597.5	9.49	9.35	-1.61
7,887.0	87.20	263.90	7,422.2	-46.2	-647.1	648.2	1.58	1.57	0.20
7,919.0	86.30	263.30	7,424.1	-49.8	-678.9	680.1	3.38	-2.81	-1.88
7,951.0	86.20	262.30	7,426.1	-53.8	-710.5	711.9	3.13	-0.31	-3.13
7,983.0	86.20	262.80	7,428.3	-58.0	-742.2	743.7	1.56	0.00	1.56
8,015.0	86.40	263.30	7,430.3	-61.8	-773.9	775.5	1.68	0.63	1.56
8,047.0	86.50	263.20	7,432.3	-65.6	-805.6	807.3	0.44	0.31	-0.31
8,079.0	86.50	262.90	7,434.3	-69.4	-837.3	839.1	0.94	0.00	-0.94

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<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Wellbore #1	<b>Database:</b>	Landmark

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)
8,111.0	87.30	263.40	7,436.0	-73.2	-869.1	870.9	2.95	2.50	1.56
8,142.0	87.40	263.80	7,437.4	-76.7	-899.8	901.8	1.33	0.32	1.29
8,174.0	87.20	264.30	7,438.9	-80.0	-931.6	933.7	1.68	-0.63	1.56
8,206.0	88.00	264.70	7,440.3	-83.1	-963.4	965.6	2.79	2.50	1.25
8,238.0	88.30	264.40	7,441.3	-86.1	-995.3	997.5	1.33	0.94	-0.94
8,270.0	87.60	264.60	7,442.5	-89.2	-1,027.1	1,029.4	2.27	-2.19	0.63
8,302.0	86.80	263.30	7,444.0	-92.5	-1,058.9	1,061.3	4.77	-2.50	-4.06
8,334.0	88.50	265.60	7,445.3	-95.6	-1,090.7	1,093.2	8.93	5.31	7.19
8,366.0	92.20	268.90	7,445.1	-97.2	-1,122.7	1,125.1	15.49	11.56	10.31
8,398.0	91.60	269.40	7,444.1	-97.6	-1,154.6	1,157.1	2.44	-1.88	1.56
8,430.0	91.20	269.00	7,443.3	-98.1	-1,186.6	1,189.1	1.77	-1.25	-1.25
8,461.0	89.10	268.10	7,443.2	-98.9	-1,217.6	1,220.1	7.37	-6.77	-2.90
8,492.0	88.30	267.30	7,443.9	-100.1	-1,248.6	1,251.1	3.65	-2.58	-2.58
8,524.0	87.80	266.70	7,445.0	-101.8	-1,280.5	1,283.1	2.44	-1.56	-1.88
8,556.0	87.60	266.00	7,446.3	-103.8	-1,312.4	1,315.0	2.27	-0.63	-2.19
8,588.0	90.30	268.80	7,446.9	-105.3	-1,344.4	1,347.0	12.15	8.44	8.75
8,620.0	91.50	270.40	7,446.4	-105.5	-1,376.4	1,379.0	6.25	3.75	5.00
8,651.0	91.70	269.90	7,445.5	-105.4	-1,407.4	1,410.0	1.74	0.65	-1.61
8,683.0	91.60	270.80	7,444.6	-105.2	-1,439.4	1,441.9	2.83	-0.31	2.81
8,715.0	91.40	271.10	7,443.7	-104.7	-1,471.3	1,473.9	1.13	-0.63	0.94
8,747.0	91.00	271.00	7,443.1	-104.1	-1,503.3	1,505.8	1.29	-1.25	-0.31
8,779.0	91.20	270.40	7,442.5	-103.7	-1,535.3	1,537.8	1.98	0.63	-1.88
8,811.0	89.80	270.20	7,442.2	-103.6	-1,567.3	1,569.8	4.42	-4.38	-0.63
8,843.0	87.60	269.40	7,442.9	-103.7	-1,599.3	1,601.8	7.32	-6.88	-2.50
8,875.0	87.50	269.60	7,444.3	-103.9	-1,631.3	1,633.7	0.70	-0.31	0.63
8,906.0	88.20	270.10	7,445.4	-104.0	-1,662.3	1,664.7	2.77	2.26	1.61
8,939.0	88.40	269.70	7,446.4	-104.1	-1,695.2	1,697.7	1.35	0.61	-1.21
8,971.0	88.30	270.40	7,447.3	-104.1	-1,727.2	1,729.6	2.21	-0.31	2.19
9,003.0	88.40	270.00	7,448.3	-103.9	-1,759.2	1,761.6	1.29	0.31	-1.25
9,034.0	89.30	271.20	7,448.9	-103.6	-1,790.2	1,792.6	4.84	2.90	3.87
9,066.0	89.60	270.80	7,449.2	-103.1	-1,822.2	1,824.5	1.56	0.94	-1.25
9,098.0	90.40	271.30	7,449.2	-102.5	-1,854.2	1,856.5	2.95	2.50	1.56
9,130.0	90.80	271.70	7,448.9	-101.6	-1,886.2	1,888.4	1.77	1.25	1.25
9,162.0	92.40	270.80	7,448.0	-100.9	-1,918.2	1,920.4	5.74	5.00	-2.81
9,193.0	92.70	271.60	7,446.6	-100.3	-1,949.1	1,951.3	2.75	0.97	2.58
9,225.0	92.70	271.10	7,445.1	-99.5	-1,981.1	1,983.2	1.56	0.00	-1.56
9,257.0	92.60	272.20	7,443.6	-98.6	-2,013.0	2,015.1	3.45	-0.31	3.44
9,289.0	92.50	271.70	7,442.2	-97.5	-2,045.0	2,047.0	1.59	-0.31	-1.56
9,321.0	92.40	271.90	7,440.8	-96.5	-2,076.9	2,078.9	0.70	-0.31	0.63
9,353.0	92.40	272.00	7,439.5	-95.4	-2,108.9	2,110.8	0.31	0.00	0.31
9,385.0	92.30	272.10	7,438.2	-94.3	-2,140.8	2,142.7	0.44	-0.31	0.31
9,417.0	91.90	272.30	7,437.0	-93.1	-2,172.8	2,174.6	1.40	-1.25	0.63
9,449.0	91.30	271.40	7,436.1	-92.0	-2,204.8	2,206.6	3.38	-1.88	-2.81
9,481.0	91.40	272.40	7,435.3	-91.0	-2,236.7	2,238.5	3.14	0.31	3.13
9,513.0	91.60	272.50	7,434.5	-89.6	-2,268.7	2,270.4	0.70	0.63	0.31
9,544.0	91.60	272.60	7,433.6	-88.2	-2,299.7	2,301.3	0.32	0.00	0.32
9,576.0	91.70	271.80	7,432.7	-87.0	-2,331.6	2,333.2	2.52	0.31	-2.50
9,608.0	91.80	272.50	7,431.7	-85.8	-2,363.6	2,365.1	2.21	0.31	2.19
9,640.0	92.10	272.20	7,430.6	-84.5	-2,395.5	2,397.0	1.33	0.94	-0.94
9,672.0	91.50	271.60	7,429.6	-83.4	-2,427.5	2,428.9	2.65	-1.88	-1.88
9,704.0	91.60	272.30	7,428.8	-82.3	-2,459.5	2,460.8	2.21	0.31	2.19
9,736.0	91.30	272.80	7,428.0	-80.9	-2,491.4	2,492.7	1.82	-0.94	1.56
9,768.0	91.40	273.10	7,427.2	-79.3	-2,523.4	2,524.6	0.99	0.31	0.94
9,799.0	91.00	271.80	7,426.6	-77.9	-2,554.3	2,555.5	4.39	-1.29	-4.19

<b>Company:</b>	PETROLEUM DEVELOPMENT CORP Weld County CO	<b>Local Co-ordinate Reference:</b>	Well Thornton 19X-404
<b>Project:</b>	SEC.19-T7N-R66W	<b>TVD Reference:</b>	WELL @ 4976.0ft (RKB Ensign 32 - 15')
<b>Site:</b>	Thornton 19X-404 Pad Sec.19-T7N-R66W	<b>MD Reference:</b>	WELL @ 4976.0ft (RKB Ensign 32 - 15')
<b>Well:</b>	Thornton 19X-404	<b>North Reference:</b>	True
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Wellbore #1	<b>Database:</b>	Landmark

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)	
9,831.0	90.90	272.30	7,426.0	-76.8	-2,586.3	2,587.5	1.59	-0.31	1.56	
9,862.0	91.30	272.40	7,425.4	-75.5	-2,617.3	2,618.4	1.33	1.29	0.32	
9,894.0	91.30	272.30	7,424.7	-74.2	-2,649.3	2,650.3	0.31	0.00	-0.31	
9,926.0	92.00	272.20	7,423.8	-73.0	-2,681.2	2,682.2	2.21	2.19	-0.31	
9,958.0	91.60	272.40	7,422.8	-71.7	-2,713.2	2,714.1	1.40	-1.25	0.63	
9,990.0	90.70	272.50	7,422.1	-70.3	-2,745.1	2,746.0	2.83	-2.81	0.31	
10,022.0	90.30	271.60	7,421.9	-69.2	-2,777.1	2,777.9	3.08	-1.25	-2.81	
10,054.0	90.40	269.90	7,421.7	-68.7	-2,809.1	2,809.9	5.32	0.31	-5.31	
10,086.0	90.30	269.00	7,421.5	-69.1	-2,841.1	2,841.9	2.83	-0.31	-2.81	
10,118.0	90.70	269.00	7,421.2	-69.6	-2,873.1	2,873.9	1.25	1.25	0.00	
10,150.0	91.20	269.60	7,420.7	-70.0	-2,905.1	2,905.9	2.44	1.56	1.88	
10,182.0	90.00	268.10	7,420.3	-70.6	-2,937.1	2,937.9	6.00	-3.75	-4.69	
10,213.0	89.00	267.10	7,420.6	-71.9	-2,968.1	2,968.9	4.56	-3.23	-3.23	
10,245.0	89.60	266.60	7,421.0	-73.7	-3,000.0	3,000.8	2.44	1.88	-1.56	
10,277.0	89.80	266.50	7,421.2	-75.6	-3,031.9	3,032.8	0.70	0.63	-0.31	
10,309.0	89.70	267.20	7,421.3	-77.4	-3,063.9	3,064.8	2.21	-0.31	2.19	
10,341.0	89.70	266.50	7,421.5	-79.1	-3,095.8	3,096.8	2.19	0.00	-2.19	
10,373.0	89.80	266.80	7,421.6	-81.0	-3,127.8	3,128.8	0.99	0.31	0.94	
10,405.0	90.80	266.90	7,421.4	-82.8	-3,159.7	3,160.8	3.14	3.13	0.31	
10,437.0	91.20	268.70	7,420.9	-84.0	-3,191.7	3,192.8	5.76	1.25	5.63	
10,469.0	91.30	268.30	7,420.2	-84.8	-3,223.7	3,224.8	1.29	0.31	-1.25	
10,500.0	91.40	268.60	7,419.4	-85.7	-3,254.7	3,255.8	1.02	0.32	0.97	
10,532.0	91.60	268.50	7,418.6	-86.5	-3,286.7	3,287.8	0.70	0.63	-0.31	
10,564.0	91.80	268.80	7,417.7	-87.2	-3,318.6	3,319.7	1.13	0.63	0.94	
10,595.0	90.50	268.70	7,417.0	-87.9	-3,349.6	3,350.7	4.21	-4.19	-0.32	
10,628.0	90.30	268.80	7,416.8	-88.6	-3,382.6	3,383.7	0.68	-0.61	0.30	
10,660.0	90.40	270.00	7,416.6	-89.0	-3,414.6	3,415.7	3.76	0.31	3.75	
10,691.0	90.50	269.10	7,416.4	-89.2	-3,445.6	3,446.7	2.92	0.32	-2.90	
10,723.0	90.20	269.90	7,416.2	-89.5	-3,477.6	3,478.7	2.67	-0.94	2.50	
10,756.0	90.00	269.40	7,416.1	-89.7	-3,510.6	3,511.7	1.63	-0.61	-1.52	
10,787.0	89.90	270.00	7,416.1	-89.9	-3,541.6	3,542.7	1.96	-0.32	1.94	
10,807.0	90.20	270.00	7,416.1	-89.9	-3,561.6	3,562.7	1.50	1.50	0.00	
10,839.0	90.60	270.80	7,415.9	-89.6	-3,593.6	3,594.6	2.80	1.25	2.50	
10,870.0	90.20	272.40	7,415.7	-88.8	-3,624.6	3,625.6	5.32	-1.29	5.16	
10,902.0	89.90	271.20	7,415.7	-87.8	-3,656.6	3,657.5	3.87	-0.94	-3.75	
10,934.0	90.80	273.00	7,415.5	-86.6	-3,688.5	3,689.5	6.29	2.81	5.63	
10,966.0	91.90	272.50	7,414.7	-85.1	-3,720.5	3,721.3	3.78	3.44	-1.56	
10,998.0	92.10	271.70	7,413.6	-83.9	-3,752.5	3,753.2	2.58	0.63	-2.50	
11,030.0	92.20	272.40	7,412.4	-82.7	-3,784.4	3,785.2	2.21	0.31	2.19	
11,061.0	92.10	272.30	7,411.2	-81.5	-3,815.4	3,816.1	0.46	-0.32	-0.32	
11,094.0	92.00	271.70	7,410.0	-80.3	-3,848.3	3,849.0	1.84	-0.30	-1.82	
11,126.0	91.60	271.10	7,409.0	-79.5	-3,880.3	3,880.9	2.25	-1.25	-1.88	
11,157.0	92.20	271.00	7,408.0	-79.0	-3,911.3	3,911.8	1.96	1.94	-0.32	
11,189.0	93.10	270.90	7,406.5	-78.4	-3,943.2	3,943.8	2.83	2.81	-0.31	
11,222.0	93.10	270.30	7,404.7	-78.1	-3,976.2	3,976.7	1.82	0.00	-1.82	
11,254.0	92.80	269.90	7,403.1	-78.0	-4,008.1	4,008.6	1.56	-0.94	-1.25	
11,286.0	92.90	269.40	7,401.5	-78.2	-4,040.1	4,040.6	1.59	0.31	-1.56	
11,317.0	93.60	270.80	7,399.8	-78.2	-4,071.1	4,071.5	5.04	2.26	4.52	
11,349.0	93.20	271.20	7,397.9	-77.6	-4,103.0	4,103.4	1.77	-1.25	1.25	
11,381.0	93.20	271.60	7,396.1	-76.8	-4,134.9	4,135.3	1.25	0.00	1.25	
11,413.0	93.20	271.20	7,394.3	-76.1	-4,166.9	4,167.2	1.25	0.00	-1.25	
11,445.0	92.90	271.60	7,392.6	-75.3	-4,198.8	4,199.1	1.56	-0.94	1.25	
11,477.0	92.50	271.60	7,391.1	-74.4	-4,230.8	4,231.0	1.25	-1.25	0.00	



<b>Company:</b>	PETROLEUM DEVELOPMENT CORP Weld County CO	<b>Local Co-ordinate Reference:</b>	Well Thornton 19X-404
<b>Project:</b>	SEC.19-T7N-R66W	<b>TVD Reference:</b>	WELL @ 4976.0ft (RKB Ensign 32 - 15')
<b>Site:</b>	Thornton 19X-404 Pad Sec.19-T7N-R66W	<b>MD Reference:</b>	WELL @ 4976.0ft (RKB Ensign 32 - 15')
<b>Well:</b>	Thornton 19X-404	<b>North Reference:</b>	True
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Wellbore #1	<b>Database:</b>	Landmark

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)
11,509.0	92.20	271.10	7,389.8	-73.6	-4,262.7	4,263.0	1.82	-0.94	-1.56
11,541.0	92.80	269.50	7,388.4	-73.5	-4,294.7	4,294.9	5.34	1.88	-5.00
11,573.0	94.10	269.20	7,386.4	-73.8	-4,326.6	4,326.8	4.17	4.06	-0.94
11,605.0	94.30	269.40	7,384.1	-74.2	-4,358.6	4,358.8	0.88	0.63	0.63
11,637.0	94.20	269.90	7,381.7	-74.4	-4,390.5	4,390.7	1.59	-0.31	1.56
11,668.0	94.10	269.30	7,379.5	-74.6	-4,421.4	4,421.6	1.96	-0.32	-1.94
11,700.0	94.00	269.40	7,377.2	-75.0	-4,453.3	4,453.5	0.44	-0.31	0.31
11,732.0	93.90	269.70	7,375.0	-75.2	-4,485.2	4,485.4	0.99	-0.31	0.94
11,763.0	93.70	269.20	7,373.0	-75.5	-4,516.2	4,516.3	1.73	-0.65	-1.61
11,795.0	93.50	268.90	7,371.0	-76.1	-4,548.1	4,548.3	1.13	-0.63	-0.94
11,828.0	93.30	269.40	7,369.0	-76.6	-4,581.0	4,581.2	1.63	-0.61	1.52
11,860.0	93.30	269.50	7,367.2	-76.9	-4,613.0	4,613.1	0.31	0.00	0.31
11,892.0	93.40	269.50	7,365.3	-77.1	-4,644.9	4,645.1	0.31	0.31	0.00
11,925.0	93.30	269.40	7,363.4	-77.5	-4,677.9	4,678.0	0.43	-0.30	-0.30
11,957.0	92.80	269.20	7,361.7	-77.8	-4,709.8	4,709.9	1.68	-1.56	-0.63
11,983.0	93.20	268.20	7,360.3	-78.4	-4,735.8	4,735.9	4.14	1.54	-3.85
12,034.0	93.20	268.20	7,357.4	-80.0	-4,786.7	4,786.8	0.00	0.00	0.00
BHL 1320'FSL & 500'FWL									

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_