

PETROLEUM DEVELOPMENT CORP Weld County CO

Well Name: **Thornton 11V-404**

Surface Location: Thornton 11C-HZ Pad Sec.11-T7N-R66W
 North American Datum 1983 , US State Plane 1983 , Colorado Northern Zone

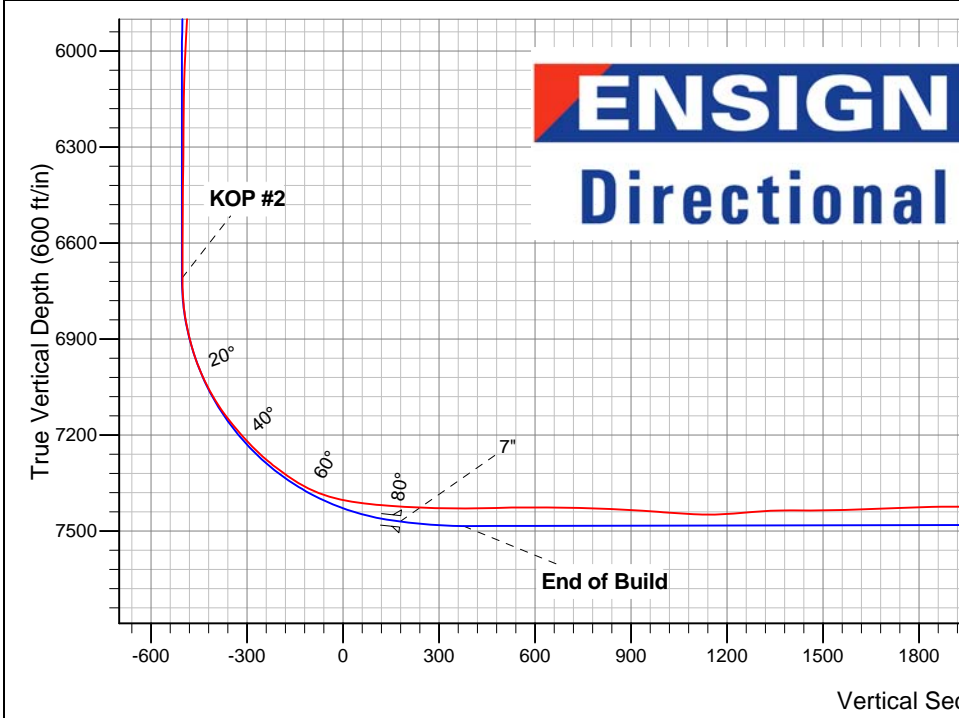
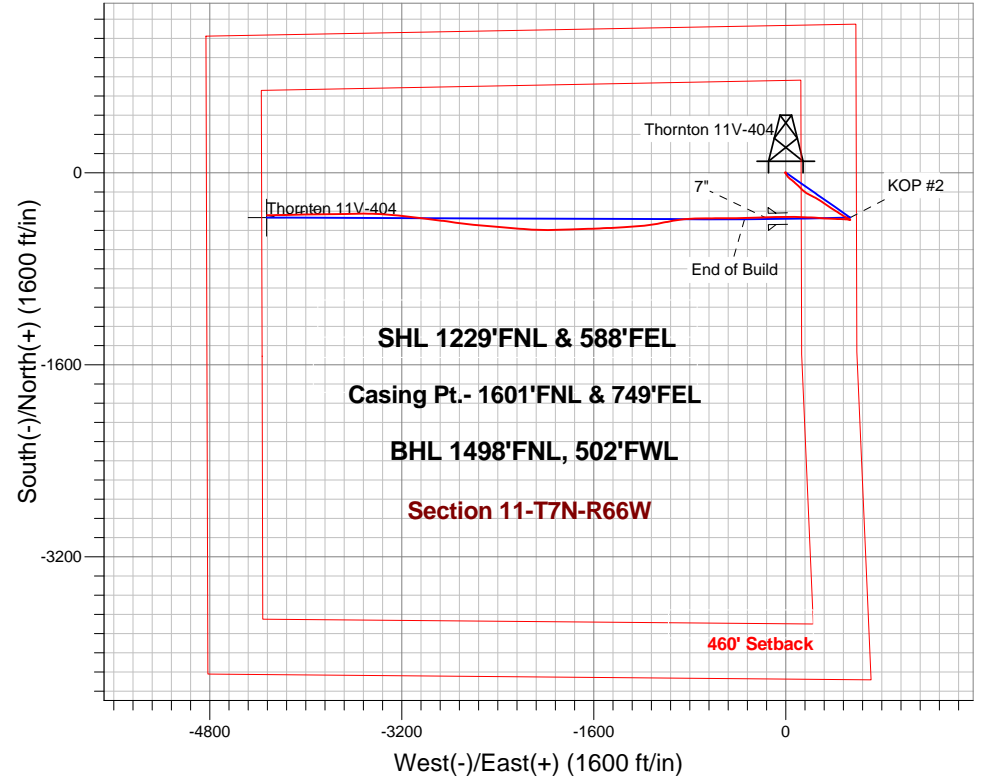
Ground Elevation: 4961.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	1460154.54	3211895.38	40.594020	-104.736990	

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

FINAL SURVEY

Projected Bottom Hole Location
 12060' MD 7471' TVD 354' S & 4325' W of SHL
 90.1 degree Incl @ 269.5 degree AZM

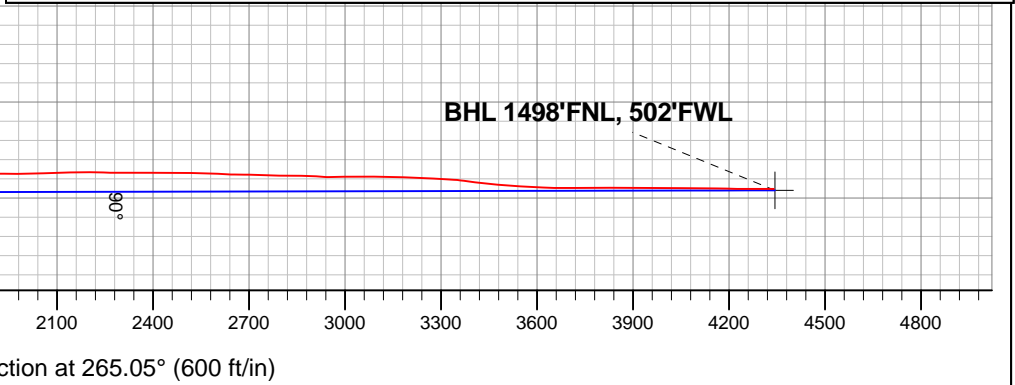


Thornton 11C-HZ Pad Sec.11-T7N-R66W
 Thornton 11V-404
 Wellbore #1
 7:14, August 30 2013

ANNOTATIONS
 No annotation data is available.

LEGEND

- Thornton 11V-404, Wellbore #1, Plan #2 (6-03-13) V0
- Wellbore #1





PETROLEUM DEVELOPMENT CORP Weld County CO

SEC.11-T7N-R66W

Thornton 11C-HZ Pad Sec.11-T7N-R66W

Thornton 11V-404

Wellbore #1

Design: Wellbore #1

Standard Survey Report

30 August, 2013

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Thornton 11V-404
Project:	SEC.11-T7N-R66W	TVD Reference:	WELL @ 4976.0ft (RKB - 15')
Site:	Thornton 11C-HZ Pad Sec.11-T7N-R66W	MD Reference:	WELL @ 4976.0ft (RKB - 15')
Well:	Thornton 11V-404	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Landmark

Project	SEC.11-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 11C-HZ Pad Sec.11-T7N-R66W				
Site Position:		Northing:	1,460,187.98 ft	Latitude:	40.594110
From:	Lat/Long	Easting:	3,211,970.08 ft	Longitude:	-104.736720
Position Uncertainty:	0.0 ft	Slot Radius:	"	Grid Convergence:	0.49 °

Well	Thornton 11V-404					
Well Position	+N/-S	0.0 ft	Northing:	1,460,154.54 ft	Latitude:	40.594020
	+E/-W	0.0 ft	Easting:	3,211,895.38 ft	Longitude:	-104.736990
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	4,961.0 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	8/8/2013	8.58	67.14	53,008

Design	Wellbore #1				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.0	0.0	0.0	265.05	

Survey Program	Date	8/26/2013			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
145.0	12,060.0	Survey #1 (Wellbore #1)	MWD	MWD - Standard	

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	0.00
145.0	0.20	69.60	145.0	0.1	0.2	-0.2	0.14	0.14	0.00	0.00
235.0	0.20	344.20	235.0	0.3	0.3	-0.4	0.30	0.00	-94.89	-94.89
327.0	0.10	7.70	327.0	0.5	0.3	-0.4	0.13	-0.11	25.54	25.54
418.0	0.10	85.20	418.0	0.6	0.4	-0.4	0.14	0.00	85.17	85.17
510.0	0.10	136.70	510.0	0.6	0.5	-0.6	0.09	0.00	55.98	55.98
601.0	0.20	330.10	601.0	0.6	0.5	-0.6	0.33	0.11	-183.08	-183.08
693.0	0.80	312.00	693.0	1.2	0.0	-0.1	0.67	0.65	-19.67	-19.67
784.0	0.80	305.90	784.0	2.0	-1.0	0.9	0.09	0.00	-6.70	-6.70
875.0	1.00	306.20	875.0	2.8	-2.2	1.9	0.22	0.22	0.33	0.33
972.0	1.30	255.00	972.0	3.1	-3.9	3.7	1.06	0.31	-52.78	-52.78
1,063.0	1.50	220.90	1,062.9	1.9	-5.7	5.5	0.93	0.22	-37.47	-37.47

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Site:	Thornton 11C-HZ Pad Sec.11-T7N-R66W	MD Reference:	WELL @ 4976.0ft (RKB - 15')
Well:	Thornton 11V-404	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	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)
1,155.0	1.10	188.90	1,154.9	0.1	-6.6	6.6	0.88	-0.43	-34.78
1,251.0	1.80	130.20	1,250.9	-1.8	-5.6	5.8	1.61	0.73	-61.15
1,347.0	1.60	134.20	1,346.8	-3.7	-3.5	3.8	0.24	-0.21	4.17
1,443.0	2.70	145.90	1,442.8	-6.5	-1.3	1.8	1.23	1.15	12.19
1,538.0	2.80	143.10	1,537.7	-10.2	1.4	-0.5	0.18	0.11	-2.95
1,634.0	3.00	147.70	1,633.5	-14.2	4.1	-2.9	0.32	0.21	4.79
1,729.0	4.30	149.80	1,728.3	-19.4	7.2	-5.5	1.38	1.37	2.21
1,824.0	5.00	145.30	1,823.0	-25.9	11.4	-9.1	0.83	0.74	-4.74
1,919.0	5.50	141.50	1,917.6	-32.8	16.6	-13.7	0.64	0.53	-4.00
2,014.0	5.80	135.90	2,012.2	-39.8	22.7	-19.2	0.66	0.32	-5.89
2,109.0	6.10	129.90	2,106.7	-46.5	30.0	-25.8	0.73	0.32	-6.32
2,203.0	6.60	131.40	2,200.1	-53.3	37.8	-33.1	0.56	0.53	1.60
2,298.0	6.50	127.20	2,294.5	-60.2	46.2	-40.9	0.52	-0.11	-4.42
2,393.0	6.80	124.60	2,388.8	-66.6	55.1	-49.2	0.45	0.32	-2.74
2,488.0	7.30	128.70	2,483.1	-73.6	64.5	-57.9	0.75	0.53	4.32
2,584.0	8.00	134.10	2,578.3	-82.0	74.0	-66.7	1.04	0.73	5.63
2,678.0	9.70	135.20	2,671.1	-92.2	84.3	-76.0	1.82	1.81	1.17
2,773.0	9.70	132.70	2,764.8	-103.3	95.8	-86.6	0.44	0.00	-2.63
2,868.0	9.80	134.20	2,858.4	-114.4	107.5	-97.2	0.29	0.11	1.58
2,964.0	10.70	136.50	2,952.9	-126.5	119.5	-108.1	1.03	0.94	2.40
3,059.0	11.60	132.30	3,046.1	-139.4	132.6	-120.1	1.28	0.95	-4.42
3,154.0	11.40	128.30	3,139.2	-151.6	147.1	-133.4	0.87	-0.21	-4.21
3,249.0	10.80	127.60	3,232.4	-162.9	161.5	-146.8	0.65	-0.63	-0.74
3,344.0	9.10	122.80	3,326.0	-172.4	174.9	-159.3	1.99	-1.79	-5.05
3,440.0	9.80	116.00	3,420.7	-180.0	188.6	-172.3	1.37	0.73	-7.08
3,536.0	9.60	115.10	3,515.3	-187.0	203.2	-186.3	0.26	-0.21	-0.94
3,631.0	9.60	118.50	3,609.0	-194.2	217.3	-199.7	0.60	0.00	3.58
3,726.0	9.70	117.50	3,702.6	-201.6	231.4	-213.1	0.21	0.11	-1.05
3,821.0	9.70	117.20	3,796.3	-209.0	245.6	-226.6	0.05	0.00	-0.32
3,916.0	10.00	118.60	3,889.9	-216.6	259.9	-240.3	0.40	0.32	1.47
4,010.0	11.00	123.80	3,982.3	-225.5	274.6	-254.1	1.46	1.06	5.53
4,105.0	11.10	124.40	4,075.5	-235.7	289.6	-268.2	0.16	0.11	0.63
4,201.0	11.60	123.60	4,169.6	-246.3	305.3	-282.9	0.55	0.52	-0.83
4,296.0	12.00	122.80	4,262.6	-256.9	321.6	-298.2	0.45	0.42	-0.84
4,392.0	11.50	123.80	4,356.6	-267.6	337.9	-313.5	0.56	-0.52	1.04
4,487.0	10.60	124.80	4,449.9	-277.9	352.9	-327.6	0.97	-0.95	1.05
4,582.0	10.60	124.60	4,543.2	-287.8	367.3	-341.1	0.04	0.00	-0.21
4,677.0	10.30	124.10	4,636.7	-297.6	381.5	-354.4	0.33	-0.32	-0.53
4,772.0	9.60	123.80	4,730.2	-306.7	395.2	-367.2	0.74	-0.74	-0.32
4,867.0	9.90	122.20	4,823.9	-315.5	408.6	-379.9	0.43	0.32	-1.68
4,962.0	9.20	121.10	4,917.5	-323.8	422.1	-392.5	0.76	-0.74	-1.16
5,057.0	8.10	119.90	5,011.5	-331.0	434.4	-404.2	1.17	-1.16	-1.26
5,152.0	7.40	122.50	5,105.6	-337.6	445.3	-414.5	0.82	-0.74	2.74
5,247.0	8.70	122.60	5,199.7	-344.8	456.5	-425.1	1.37	1.37	0.11
5,342.0	8.50	123.30	5,293.6	-352.5	468.5	-436.3	0.24	-0.21	0.74
5,438.0	7.60	121.70	5,388.6	-359.8	479.8	-447.0	0.97	-0.94	-1.67
5,533.0	6.80	121.40	5,482.9	-366.0	489.9	-456.5	0.84	-0.84	-0.32
5,628.0	5.90	120.60	5,577.3	-371.4	498.9	-465.0	0.95	-0.95	-0.84
5,724.0	5.30	117.30	5,672.9	-376.0	507.1	-472.8	0.71	-0.63	-3.44
5,819.0	4.90	117.20	5,767.5	-379.8	514.6	-479.9	0.42	-0.42	-0.11
5,913.0	3.80	118.50	5,861.2	-383.1	520.9	-485.9	1.17	-1.17	1.38
6,008.0	3.40	112.40	5,956.0	-385.7	526.3	-491.1	0.58	-0.42	-6.42
6,103.0	2.50	121.10	6,050.9	-387.9	530.7	-495.2	1.06	-0.95	9.16

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Site:	Thornton 11C-HZ Pad Sec.11-T7N-R66W	MD Reference:	WELL @ 4976.0ft (RKB - 15')
Well:	Thornton 11V-404	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	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)
6,198.0	1.00	134.00	6,145.8	-389.5	533.1	-497.5	1.62	-1.58	13.58
6,293.0	0.70	120.50	6,240.8	-390.4	534.2	-498.5	0.38	-0.32	-14.21
6,387.0	0.70	125.30	6,334.8	-391.0	535.1	-499.4	0.06	0.00	5.11
6,482.0	0.70	131.70	6,429.8	-391.7	536.0	-500.2	0.08	0.00	6.74
6,578.0	0.70	127.80	6,525.8	-392.5	536.9	-501.1	0.05	0.00	-4.06
6,672.0	0.50	149.00	6,619.8	-393.2	537.6	-501.7	0.31	-0.21	22.55
6,728.0	0.60	151.50	6,675.8	-393.6	537.9	-501.9	0.18	0.18	4.46
6,760.0	0.40	168.00	6,707.8	-393.9	538.0	-502.0	0.76	-0.63	51.56
6,792.0	1.50	275.90	6,739.8	-394.0	537.6	-501.6	5.21	3.44	337.19
6,824.0	4.00	281.10	6,771.8	-393.7	536.1	-500.1	7.84	7.81	16.25
6,855.0	6.80	279.90	6,802.6	-393.2	533.2	-497.3	9.04	9.03	-3.87
6,887.0	9.50	279.60	6,834.3	-392.4	528.7	-492.9	8.44	8.44	-0.94
6,919.0	11.80	278.30	6,865.7	-391.5	522.9	-487.1	7.23	7.19	-4.06
6,950.0	14.30	276.20	6,895.9	-390.6	515.9	-480.3	8.21	8.06	-6.77
6,982.0	16.70	275.90	6,926.8	-389.7	507.4	-471.9	7.50	7.50	-0.94
7,014.0	19.10	274.40	6,957.2	-388.9	497.6	-462.2	7.64	7.50	-4.69
7,045.0	21.80	273.30	6,986.3	-388.1	486.8	-451.5	8.80	8.71	-3.55
7,077.0	24.40	273.00	7,015.7	-387.4	474.3	-439.1	8.13	8.13	-0.94
7,109.0	26.90	272.50	7,044.5	-386.8	460.5	-425.4	7.84	7.81	-1.56
7,141.0	29.30	272.10	7,072.8	-386.2	445.4	-410.4	7.52	7.50	-1.25
7,172.0	32.50	271.60	7,099.4	-385.7	429.5	-394.6	10.36	10.32	-1.61
7,204.0	35.40	271.50	7,125.9	-385.2	411.6	-376.8	9.06	9.06	-0.31
7,236.0	38.20	271.50	7,151.5	-384.7	392.5	-357.8	8.75	8.75	0.00
7,268.0	40.30	272.20	7,176.3	-384.0	372.2	-337.7	6.71	6.56	2.19
7,299.0	41.90	273.20	7,199.7	-383.1	351.9	-317.5	5.58	5.16	3.23
7,331.0	43.50	274.20	7,223.2	-381.7	330.2	-296.1	5.43	5.00	3.13
7,362.0	45.90	274.50	7,245.2	-380.0	308.5	-274.5	7.77	7.74	0.97
7,394.0	48.70	273.90	7,266.9	-378.3	285.0	-251.3	8.86	8.75	-1.88
7,426.0	51.40	273.60	7,287.5	-376.7	260.6	-227.1	8.47	8.44	-0.94
7,457.0	53.50	272.90	7,306.4	-375.3	236.0	-202.7	7.01	6.77	-2.26
7,489.0	55.10	273.10	7,325.0	-373.9	210.1	-177.0	5.03	5.00	0.63
7,521.0	57.70	272.80	7,342.7	-372.6	183.5	-150.6	8.16	8.13	-0.94
7,553.0	61.40	272.40	7,358.9	-371.3	155.9	-123.3	11.61	11.56	-1.25
7,584.0	65.70	272.40	7,372.8	-370.2	128.2	-95.8	13.87	13.87	0.00
7,616.0	70.10	271.60	7,384.8	-369.1	98.6	-66.3	13.94	13.75	-2.50
7,648.0	74.60	271.10	7,394.5	-368.4	68.1	-36.0	14.14	14.06	-1.56
7,679.0	78.30	270.30	7,401.7	-368.0	37.9	-6.0	12.20	11.94	-2.58
7,711.0	81.10	270.20	7,407.5	-367.9	6.5	25.3	8.76	8.75	-0.31
7,743.0	82.00	269.50	7,412.2	-368.0	-25.2	56.9	3.55	2.81	-2.19
7,774.0	83.70	269.20	7,416.0	-368.3	-55.9	87.5	5.57	5.48	-0.97
7,806.0	85.40	268.60	7,419.1	-368.9	-87.8	119.3	5.63	5.31	-1.88
7,879.0	86.80	267.00	7,424.0	-371.7	-160.6	192.0	2.91	1.92	-2.19
7,909.0	87.10	267.30	7,425.6	-373.2	-190.5	222.0	1.41	1.00	1.00
7,940.0	87.80	268.30	7,427.0	-374.4	-221.4	252.9	3.93	2.26	3.23
7,971.0	88.40	268.70	7,428.0	-375.2	-252.4	283.8	2.33	1.94	1.29
8,001.0	88.80	268.30	7,428.8	-376.0	-282.4	313.8	1.89	1.33	-1.33
8,031.0	89.20	268.20	7,429.3	-376.9	-312.4	343.7	1.37	1.33	-0.33
8,062.0	90.00	268.30	7,429.5	-377.9	-343.3	374.7	2.60	2.58	0.32
8,092.0	91.30	269.30	7,429.2	-378.5	-373.3	404.6	5.47	4.33	3.33
8,123.0	91.90	269.70	7,428.3	-378.8	-404.3	435.5	2.33	1.94	1.29
8,153.0	91.60	269.10	7,427.4	-379.1	-434.3	465.4	2.24	-1.00	-2.00
8,184.0	91.00	269.50	7,426.7	-379.5	-465.3	496.3	2.33	-1.94	1.29
8,214.0	90.80	269.40	7,426.2	-379.8	-495.3	526.2	0.75	-0.67	-0.33
8,245.0	90.20	269.70	7,425.9	-380.0	-526.3	557.1	2.16	-1.94	0.97

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8,275.0	89.90	269.60	7,425.9	-380.2	-556.3	587.0	1.05	-1.00	-0.33
8,306.0	89.30	269.50	7,426.1	-380.4	-587.3	617.9	1.96	-1.94	-0.32
8,337.0	89.30	269.70	7,426.5	-380.6	-618.3	648.8	0.65	0.00	0.65
8,367.0	89.30	269.70	7,426.9	-380.8	-648.3	678.7	0.00	0.00	0.00
8,398.0	89.20	269.80	7,427.3	-380.9	-679.3	709.6	0.46	-0.32	0.32
8,428.0	89.50	269.60	7,427.6	-381.1	-709.3	739.5	1.20	1.00	-0.67
8,459.0	87.90	267.70	7,428.3	-381.8	-740.3	770.5	8.01	-5.16	-6.13
8,490.0	87.70	267.80	7,429.5	-383.0	-771.2	801.4	0.72	-0.65	0.32
8,520.0	87.40	266.90	7,430.8	-384.4	-801.2	831.3	3.16	-1.00	-3.00
8,550.0	87.30	265.70	7,432.2	-386.4	-831.1	861.3	4.01	-0.33	-4.00
8,581.0	86.60	263.80	7,433.8	-389.2	-861.9	892.3	6.52	-2.26	-6.13
8,611.0	86.20	261.40	7,435.7	-393.0	-891.6	922.2	8.09	-1.33	-8.00
8,643.0	86.30	260.40	7,437.8	-398.1	-923.1	954.0	3.13	0.31	-3.13
8,675.0	85.40	259.10	7,440.1	-403.8	-954.5	985.8	4.93	-2.81	-4.06
8,706.0	86.70	260.30	7,442.3	-409.3	-984.9	1,016.6	5.70	4.19	3.87
8,738.0	86.20	258.90	7,444.2	-415.1	-1,016.3	1,048.4	4.64	-1.56	-4.38
8,770.0	86.50	258.80	7,446.3	-421.2	-1,047.7	1,080.1	0.99	0.94	-0.31
8,802.0	87.70	259.80	7,447.9	-427.2	-1,079.1	1,111.9	4.88	3.75	3.13
8,833.0	89.60	260.80	7,448.6	-432.4	-1,109.6	1,142.8	6.93	6.13	3.23
8,865.0	92.60	262.50	7,448.0	-437.0	-1,141.3	1,174.7	10.77	9.38	5.31
8,897.0	94.70	263.60	7,446.0	-440.9	-1,173.0	1,206.7	7.40	6.56	3.44
8,928.0	94.70	264.20	7,443.4	-444.2	-1,203.7	1,237.5	1.93	0.00	1.94
8,960.0	94.40	265.90	7,440.9	-446.9	-1,235.5	1,269.4	5.38	-0.94	5.31
8,992.0	93.70	266.60	7,438.6	-449.0	-1,267.3	1,301.4	3.09	-2.19	2.19
9,023.0	92.90	266.50	7,436.9	-450.9	-1,298.2	1,332.3	2.60	-2.58	-0.32
9,055.0	91.30	266.10	7,435.7	-453.0	-1,330.1	1,364.3	5.15	-5.00	-1.25
9,087.0	91.10	265.60	7,435.0	-455.3	-1,362.0	1,396.2	1.68	-0.63	-1.56
9,119.0	89.30	266.50	7,434.9	-457.5	-1,394.0	1,428.2	6.29	-5.63	2.81
9,150.0	90.00	266.90	7,435.1	-459.3	-1,424.9	1,459.2	2.60	2.26	1.29
9,182.0	90.40	268.00	7,435.0	-460.7	-1,456.9	1,491.2	3.66	1.25	3.44
9,214.0	90.70	267.60	7,434.7	-461.9	-1,488.8	1,523.2	1.56	0.94	-1.25
9,245.0	90.90	267.60	7,434.2	-463.2	-1,519.8	1,554.1	0.65	0.65	0.00
9,277.0	91.40	268.00	7,433.6	-464.4	-1,551.8	1,586.1	2.00	1.56	1.25
9,309.0	91.90	267.50	7,432.7	-465.7	-1,583.8	1,618.0	2.21	1.56	-1.56
9,340.0	92.40	267.60	7,431.5	-467.0	-1,614.7	1,649.0	1.64	1.61	0.32
9,372.0	92.80	268.50	7,430.1	-468.1	-1,646.6	1,680.9	3.08	1.25	2.81
9,404.0	92.30	268.10	7,428.6	-469.1	-1,678.6	1,712.8	2.00	-1.56	-1.25
9,436.0	92.20	268.30	7,427.4	-470.1	-1,710.6	1,744.8	0.70	-0.31	0.63
9,467.0	92.30	268.70	7,426.2	-470.9	-1,741.5	1,775.7	1.33	0.32	1.29
9,499.0	91.60	268.30	7,425.1	-471.7	-1,773.5	1,807.6	2.52	-2.19	-1.25
9,531.0	91.40	267.70	7,424.2	-472.8	-1,805.5	1,839.5	1.98	-0.63	-1.88
9,562.0	90.90	267.40	7,423.6	-474.2	-1,836.4	1,870.5	1.88	-1.61	-0.97
9,594.0	89.70	268.10	7,423.5	-475.4	-1,868.4	1,902.5	4.34	-3.75	2.19
9,626.0	89.00	267.70	7,423.8	-476.6	-1,900.4	1,934.4	2.52	-2.19	-1.25
9,657.0	89.80	268.10	7,424.1	-477.7	-1,931.4	1,965.4	2.89	2.58	1.29
9,689.0	90.50	269.10	7,424.1	-478.5	-1,963.3	1,997.3	3.81	2.19	3.13
9,720.0	92.40	271.00	7,423.3	-478.5	-1,994.3	2,028.2	8.67	6.13	6.13
9,753.0	92.00	270.40	7,422.0	-478.1	-2,027.3	2,061.0	2.18	-1.21	-1.82
9,785.0	91.40	273.10	7,421.1	-477.1	-2,059.3	2,092.8	8.64	-1.88	8.44
9,816.0	91.30	273.10	7,420.3	-475.4	-2,090.2	2,123.5	0.32	-0.32	0.00
9,848.0	90.80	273.40	7,419.7	-473.6	-2,122.2	2,155.1	1.82	-1.56	0.94
9,880.0	90.20	273.90	7,419.5	-471.6	-2,154.1	2,186.8	2.44	-1.88	1.56
9,912.0	88.80	273.60	7,419.7	-469.5	-2,186.0	2,218.4	4.47	-4.38	-0.94

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Thornton 11V-404
Project:	SEC.11-T7N-R66W	TVD Reference:	WELL @ 4976.0ft (RKB - 15')
Site:	Thornton 11C-HZ Pad Sec.11-T7N-R66W	MD Reference:	WELL @ 4976.0ft (RKB - 15')
Well:	Thornton 11V-404	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	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)
9,944.0	88.70	273.90	7,420.4	-467.4	-2,218.0	2,250.0	0.99	-0.31	0.94
9,975.0	89.80	275.00	7,420.8	-465.0	-2,248.9	2,280.6	5.02	3.55	3.55
10,007.0	90.20	275.30	7,420.8	-462.1	-2,280.7	2,312.1	1.56	1.25	0.94
10,039.0	90.20	275.20	7,420.7	-459.2	-2,312.6	2,343.6	0.31	0.00	-0.31
10,071.0	90.60	275.00	7,420.5	-456.3	-2,344.5	2,375.1	1.40	1.25	-0.63
10,102.0	89.50	274.70	7,420.5	-453.7	-2,375.4	2,405.7	3.68	-3.55	-0.97
10,133.0	88.90	274.40	7,420.9	-451.3	-2,406.3	2,436.2	2.16	-1.94	-0.97
10,165.0	89.50	274.80	7,421.4	-448.7	-2,438.1	2,467.8	2.25	1.88	1.25
10,197.0	89.30	274.90	7,421.7	-446.0	-2,470.0	2,499.3	0.70	-0.63	0.31
10,229.0	89.40	274.50	7,422.1	-443.4	-2,501.9	2,530.9	1.29	0.31	-1.25
10,260.0	89.10	274.25	7,422.5	-440.7	-2,532.8	2,561.4	2.46	-0.97	2.26
10,291.0	87.70	275.10	7,423.3	-438.0	-2,563.7	2,591.9	4.53	-4.52	-0.32
10,323.0	86.60	274.80	7,424.9	-435.2	-2,595.5	2,623.4	3.56	-3.44	-0.94
10,354.0	88.70	276.50	7,426.2	-432.1	-2,626.3	2,653.8	8.71	6.77	5.48
10,386.0	89.60	277.50	7,426.7	-428.3	-2,658.1	2,685.1	4.20	2.81	3.13
10,417.0	88.60	277.20	7,427.2	-424.3	-2,688.8	2,715.4	3.37	-3.23	-0.97
10,449.0	87.00	276.70	7,428.4	-420.4	-2,720.6	2,746.7	5.24	-5.00	-1.56
10,481.0	89.20	277.50	7,429.4	-416.5	-2,752.3	2,778.0	7.31	6.88	2.50
10,513.0	90.50	278.40	7,429.5	-412.0	-2,784.0	2,809.2	4.94	4.06	2.81
10,545.0	89.80	279.20	7,429.4	-407.1	-2,815.6	2,840.3	3.32	-2.19	2.50
10,577.0	87.40	277.50	7,430.2	-402.5	-2,847.3	2,871.4	9.19	-7.50	-5.31
10,609.0	85.90	276.10	7,432.1	-398.7	-2,879.0	2,902.7	6.41	-4.69	-4.38
10,641.0	87.40	276.40	7,434.0	-395.2	-2,910.7	2,934.0	4.78	4.69	0.94
10,673.0	90.80	277.20	7,434.5	-391.4	-2,942.5	2,965.3	10.92	10.63	2.50
10,705.0	91.30	277.30	7,433.9	-387.4	-2,974.2	2,996.6	1.59	1.56	0.31
10,737.0	90.90	276.70	7,433.3	-383.5	-3,006.0	3,027.9	2.25	-1.25	-1.88
10,769.0	90.50	277.40	7,432.9	-379.6	-3,037.8	3,059.2	2.52	-1.25	2.19
10,801.0	89.30	277.30	7,432.9	-375.5	-3,069.5	3,090.4	3.76	-3.75	-0.31
10,833.0	89.00	276.80	7,433.4	-371.6	-3,101.2	3,121.7	1.82	-0.94	-1.56
10,865.0	88.20	276.50	7,434.2	-367.9	-3,133.0	3,153.1	2.67	-2.50	-0.94
10,896.0	88.20	276.00	7,435.2	-364.5	-3,163.8	3,183.5	1.61	0.00	-1.61
10,928.0	87.80	275.80	7,436.3	-361.2	-3,195.6	3,214.9	1.40	-1.25	-0.63
10,960.0	86.90	276.20	7,437.8	-357.9	-3,227.4	3,246.3	3.08	-2.81	1.25
10,992.0	87.30	276.00	7,439.4	-354.5	-3,259.2	3,277.6	1.40	1.25	-0.63
11,024.0	86.90	275.30	7,441.0	-351.3	-3,291.0	3,309.0	2.52	-1.25	-2.19
11,055.0	85.90	274.50	7,442.9	-348.7	-3,321.8	3,339.5	4.13	-3.23	-2.58
11,087.0	83.70	273.80	7,445.8	-346.4	-3,353.6	3,371.0	7.21	-6.88	-2.19
11,119.0	82.00	272.20	7,449.8	-344.7	-3,385.3	3,402.4	7.27	-5.31	-5.00
11,150.0	83.10	271.60	7,453.8	-343.7	-3,416.0	3,433.0	4.03	3.55	-1.94
11,183.0	84.70	271.00	7,457.4	-342.9	-3,448.8	3,465.6	5.17	4.85	-1.82
11,214.0	85.90	270.90	7,459.9	-342.4	-3,479.7	3,496.3	3.88	3.87	-0.32
11,245.0	86.30	270.90	7,462.0	-341.9	-3,510.7	3,527.1	1.29	1.29	0.00
11,277.0	86.50	270.30	7,464.0	-341.6	-3,542.6	3,558.9	1.97	0.63	-1.88
11,309.0	87.10	269.50	7,465.8	-341.7	-3,574.5	3,590.7	3.12	1.88	-2.50
11,340.0	88.00	269.30	7,467.1	-342.0	-3,605.5	3,621.6	2.97	2.90	-0.65
11,372.0	89.10	268.00	7,467.9	-342.7	-3,637.5	3,653.5	5.32	3.44	-4.06
11,404.0	90.00	268.50	7,468.2	-343.7	-3,669.5	3,685.4	3.22	2.81	1.56
11,436.0	89.70	268.60	7,468.3	-344.5	-3,701.5	3,717.4	0.99	-0.94	0.31
11,467.0	90.10	268.50	7,468.3	-345.3	-3,732.5	3,748.3	1.33	1.29	-0.32
11,499.0	90.30	269.10	7,468.2	-346.0	-3,764.4	3,780.3	1.98	0.63	1.88
11,531.0	90.40	269.40	7,468.0	-346.4	-3,796.4	3,812.2	0.99	0.31	0.94
11,562.0	90.30	269.50	7,467.8	-346.7	-3,827.4	3,843.1	0.46	-0.32	0.32
11,594.0	90.20	269.40	7,467.7	-347.0	-3,859.4	3,875.0	0.44	-0.31	-0.31

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Thornton 11V-404
Project:	SEC.11-T7N-R66W	TVD Reference:	WELL @ 4976.0ft (RKB - 15')
Site:	Thornton 11C-HZ Pad Sec.11-T7N-R66W	MD Reference:	WELL @ 4976.0ft (RKB - 15')
Well:	Thornton 11V-404	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	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)
11,626.0	89.40	269.00	7,467.8	-347.5	-3,891.4	3,906.9	2.80	-2.50	-1.25
11,658.0	90.20	269.60	7,467.9	-347.8	-3,923.4	3,938.8	3.12	2.50	1.88
11,690.0	90.10	269.50	7,467.8	-348.1	-3,955.4	3,970.7	0.44	-0.31	-0.31
11,722.0	89.10	269.40	7,468.0	-348.4	-3,987.4	4,002.6	3.14	-3.13	-0.31
11,754.0	88.60	269.40	7,468.7	-348.7	-4,019.4	4,034.5	1.56	-1.56	0.00
11,786.0	89.20	269.30	7,469.3	-349.1	-4,051.4	4,066.4	1.90	1.88	-0.31
11,818.0	89.50	268.70	7,469.7	-349.7	-4,083.4	4,098.3	2.10	0.94	-1.88
11,849.0	89.50	268.40	7,469.9	-350.4	-4,114.4	4,129.3	0.97	0.00	-0.97
11,881.0	89.70	268.90	7,470.2	-351.2	-4,146.4	4,161.2	1.68	0.63	1.56
11,913.0	89.20	268.80	7,470.5	-351.8	-4,178.4	4,193.2	1.59	-1.56	-0.31
11,945.0	89.50	268.80	7,470.8	-352.5	-4,210.4	4,225.1	0.94	0.94	0.00
11,977.0	90.00	269.30	7,471.0	-353.0	-4,242.4	4,257.0	2.21	1.56	1.56
12,008.0	90.10	269.50	7,470.9	-353.4	-4,273.4	4,287.9	0.72	0.32	0.65
12,060.0	90.10	269.50	7,470.9	-353.8	-4,325.4	4,339.8	0.00	0.00	0.00
BHL 1520'FNL, 500'FWL									

Checked By: _____	Approved By: _____	Date: _____
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