

PETROLEUM DEVELOPMENT CORP Weld County CO

Well Name: **Magnuson 23L-421**

Surface Location: Magnuson Pad Sec.23-T7N-R66W

North American Datum 1983 , US State Plane 1983 , Colorado Northern Zone

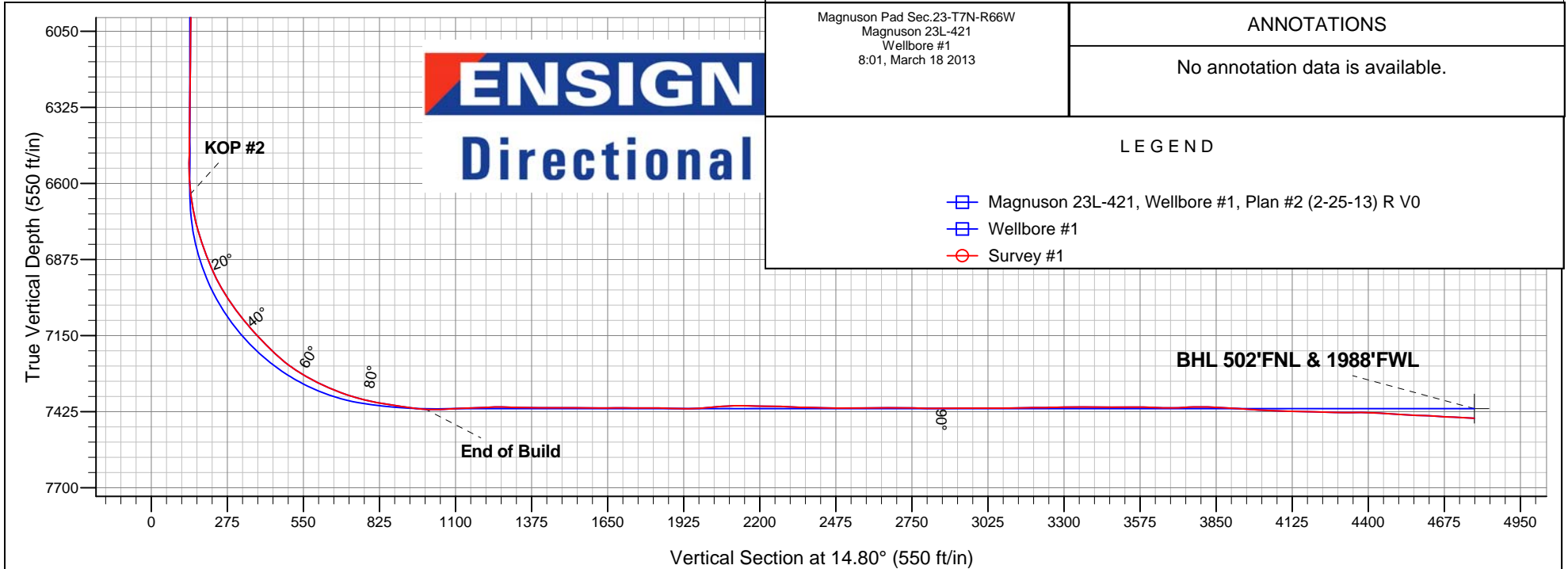
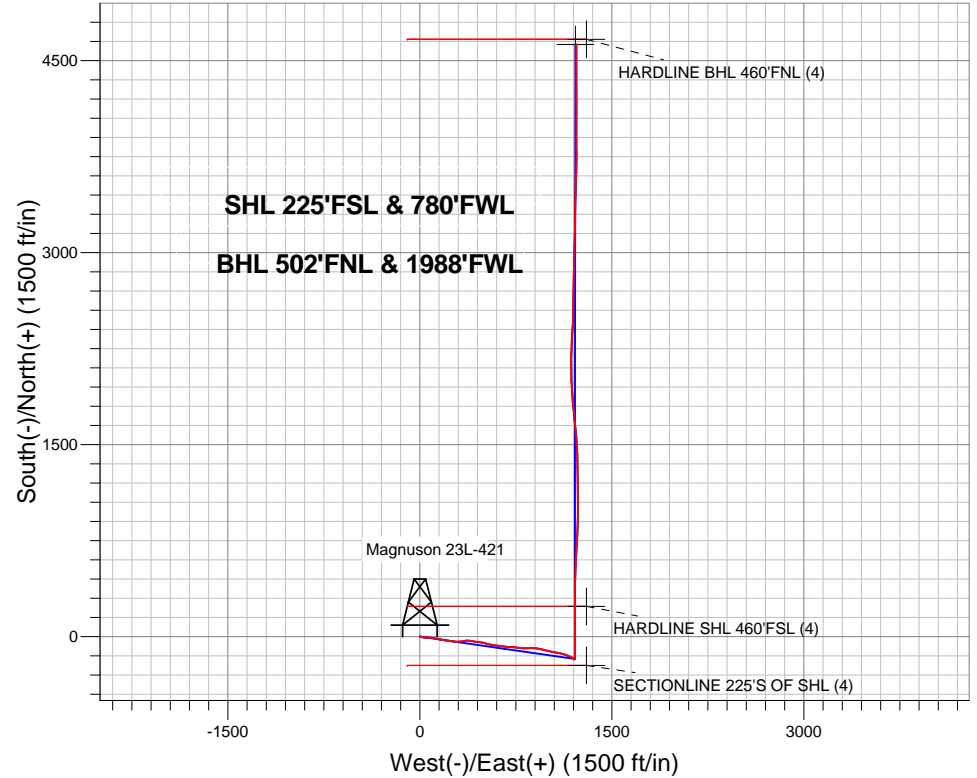
Ground Elevation: 4899.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	1445544.64	3207997.28	40.554010	-104.751470	

RKB Ensign 32 - 15' WELL @ 4914.0ft (RKB Ensign 32 - 15')

FINAL SURVEY

Projected Bottom Hole Location
12000' MD 7449' TVD 4625' N & 1222' E of SHL
86.8 degree Incl @ 359.2 degree AZM



Magnuson Pad Sec.23-T7N-R66W
Magnuson 23L-421
Wellbore #1
8:01, March 18 2013

ANNOTATIONS

No annotation data is available.

LEGEND

- Magnuson 23L-421, Wellbore #1, Plan #2 (2-25-13) R V0
- Wellbore #1
- Survey #1



PETROLEUM DEVELOPMENT CORP Weld County CO

SEC.23-T7N-R66W

Magnuson Pad Sec.23-T7N-R66W

Magnuson 23L-421

Wellbore #1

Survey: Survey #1

Standard Survey Report

18 March, 2013

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Magnuson 23L-421
Project:	SEC.23-T7N-R66W	TVD Reference:	WELL @ 4914.0ft (RKB Ensign 32 - 15')
Site:	Magnuson Pad Sec.23-T7N-R66W	MD Reference:	WELL @ 4914.0ft (RKB Ensign 32 - 15')
Well:	Magnuson 23L-421	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)
590.0	9.00	97.40	588.5	-6.2	30.4	1.8	2.99	2.60	-11.04
685.0	10.00	92.00	682.2	-7.4	46.1	4.6	1.41	1.05	-5.68
780.0	10.40	93.00	775.7	-8.2	62.9	8.2	0.46	0.42	1.05
865.0	10.40	94.10	859.3	-9.1	78.2	11.2	0.23	0.00	1.29
1,033.0	9.80	98.00	1,024.7	-12.2	107.5	15.7	0.54	-0.36	2.32
1,128.0	12.00	102.00	1,117.9	-15.4	125.1	17.1	2.45	2.32	4.21
1,222.0	13.60	98.30	1,209.6	-19.0	145.6	18.8	1.91	1.70	-3.94
1,315.0	14.90	103.20	1,299.8	-23.3	168.1	20.4	1.91	1.40	5.27
1,407.0	16.40	98.50	1,388.3	-27.9	192.5	22.2	2.13	1.63	-5.11
1,529.0	17.60	97.30	1,505.0	-32.8	227.8	26.4	1.02	0.98	-0.98
1,651.0	19.60	98.10	1,620.6	-38.0	266.3	31.2	1.65	1.64	0.66
1,774.0	16.60	86.50	1,737.6	-39.9	304.3	39.2	3.80	-2.44	-9.43
1,865.0	16.60	80.40	1,824.8	-36.9	330.1	48.6	1.91	0.00	-6.70
1,962.0	15.80	81.30	1,917.9	-32.6	356.8	59.6	0.86	-0.82	0.93
2,058.0	13.10	94.40	2,010.9	-31.5	380.6	66.8	4.40	-2.81	13.65
2,152.0	13.60	104.10	2,102.4	-35.0	401.9	68.8	2.44	0.53	10.32
2,247.0	14.20	97.30	2,194.6	-39.2	424.3	70.5	1.83	0.63	-7.16
2,343.0	15.70	94.40	2,287.4	-41.7	449.0	74.4	1.75	1.56	-3.02
2,438.0	15.90	97.60	2,378.8	-44.4	474.7	78.3	0.94	0.21	3.37
2,533.0	14.50	104.80	2,470.5	-49.1	499.1	80.0	2.47	-1.47	7.58
2,629.0	14.80	108.00	2,563.3	-56.0	522.4	79.3	0.90	0.31	3.33
2,724.0	15.10	97.30	2,655.1	-61.3	546.2	80.2	2.92	0.32	-11.26
2,819.0	15.10	99.90	2,746.9	-65.0	570.7	82.9	0.71	0.00	2.74
2,947.0	15.40	100.20	2,870.3	-70.9	603.8	85.7	0.24	0.23	0.23
3,073.0	17.00	96.90	2,991.3	-76.1	638.6	89.6	1.46	1.27	-2.62
3,199.0	15.70	93.40	3,112.2	-79.3	673.9	95.5	1.29	-1.03	-2.78
3,326.0	16.00	91.80	3,234.4	-80.9	708.5	102.8	0.42	0.24	-1.26
3,453.0	16.10	98.30	3,356.5	-84.0	743.4	108.7	1.42	0.08	5.12
3,580.0	15.90	95.70	3,478.6	-88.2	778.2	113.5	0.59	-0.16	-2.05
3,706.0	15.50	93.60	3,599.9	-91.0	812.1	119.5	0.55	-0.32	-1.67
3,833.0	13.80	87.10	3,722.7	-91.3	844.2	127.4	1.86	-1.34	-5.12
3,865.0	13.50	84.80	3,753.8	-90.8	851.7	129.8	1.94	-0.94	-7.19
3,992.0	14.40	90.70	3,877.1	-89.6	882.3	138.7	1.32	0.71	4.65
4,119.0	14.80	98.80	4,000.0	-92.3	914.1	144.3	1.64	0.31	6.38
4,246.0	16.90	104.60	4,122.2	-99.4	948.0	146.0	2.07	1.65	4.57
4,373.0	16.50	102.70	4,243.8	-108.0	983.5	146.7	0.53	-0.31	-1.50
4,500.0	14.60	101.60	4,366.2	-115.2	1,016.8	148.3	1.51	-1.50	-0.87
4,627.0	14.20	100.10	4,489.2	-121.2	1,047.8	150.5	0.43	-0.31	-1.18
4,753.0	14.80	101.30	4,611.2	-127.0	1,078.8	152.7	0.53	0.48	0.95
4,880.0	14.10	104.80	4,734.1	-134.2	1,109.6	153.7	0.88	-0.55	2.76
5,007.0	14.10	107.30	4,857.3	-142.7	1,139.4	153.0	0.48	0.00	1.97
5,101.0	12.00	114.50	4,948.9	-150.2	1,159.2	150.9	2.82	-2.23	7.66
5,195.0	9.50	117.50	5,041.2	-157.8	1,175.0	147.5	2.72	-2.66	3.19
5,291.0	7.50	112.50	5,136.2	-163.9	1,187.8	144.9	2.22	-2.08	-5.21
5,386.0	5.50	119.40	5,230.6	-168.5	1,197.5	143.0	2.26	-2.11	7.26
5,481.0	3.00	110.60	5,325.3	-171.6	1,203.8	141.6	2.71	-2.63	-9.26
5,577.0	1.00	91.80	5,421.2	-172.5	1,207.0	141.5	2.17	-2.08	-19.58
5,703.0	0.50	71.10	5,547.2	-172.4	1,208.6	142.1	0.45	-0.40	-16.43
5,830.0	0.40	311.90	5,674.2	-171.9	1,208.8	142.6	0.61	-0.08	-93.86
5,957.0	0.30	317.00	5,801.2	-171.3	1,208.2	142.9	0.08	-0.08	4.02
6,083.0	0.20	148.90	5,927.2	-171.3	1,208.1	143.0	0.39	-0.08	-133.41
6,211.0	0.40	184.60	6,055.2	-171.9	1,208.2	142.4	0.21	0.16	27.89
6,337.0	0.60	193.90	6,181.2	-173.0	1,208.0	141.3	0.17	0.16	7.38

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Site:	Magnuson Pad Sec.23-T7N-R66W	MD Reference:	WELL @ 4914.0ft (RKB Ensign 32 - 15')
Well:	Magnuson 23L-421	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)
6,464.0	0.90	160.70	6,308.2	-174.6	1,208.2	139.8	0.41	0.24	-26.14
6,592.0	0.70	179.00	6,436.2	-176.3	1,208.5	138.2	0.25	-0.16	14.30
6,654.0	1.00	208.00	6,498.2	-177.2	1,208.3	137.3	0.83	0.48	46.77
6,686.0	0.70	231.60	6,530.2	-177.6	1,208.0	136.9	1.42	-0.94	73.75
6,718.0	1.50	348.10	6,562.2	-177.3	1,207.7	137.1	5.99	2.50	364.06
6,750.0	4.00	359.00	6,594.1	-175.7	1,207.6	138.5	7.95	7.81	34.06
6,782.0	6.60	1.30	6,626.0	-172.8	1,207.7	141.4	8.15	8.13	7.19
6,813.0	8.30	9.00	6,656.7	-168.8	1,208.0	145.4	6.35	5.48	24.84
6,845.0	10.10	9.40	6,688.3	-163.7	1,208.9	150.5	5.63	5.63	1.25
6,877.0	12.50	7.60	6,719.7	-157.5	1,209.8	156.7	7.58	7.50	-5.63
6,908.0	14.40	1.80	6,749.8	-150.4	1,210.3	163.8	7.51	6.13	-18.71
6,940.0	17.00	0.40	6,780.7	-141.7	1,210.5	172.2	8.21	8.13	-4.38
6,972.0	18.90	1.50	6,811.1	-131.8	1,210.7	181.8	6.03	5.94	3.44
7,004.0	21.00	2.70	6,841.2	-120.9	1,211.1	192.4	6.69	6.56	3.75
7,035.0	21.60	0.60	6,870.1	-109.7	1,211.4	203.4	3.13	1.94	-6.77
7,067.0	23.30	0.20	6,899.6	-97.5	1,211.5	215.2	5.33	5.31	-1.25
7,099.0	25.70	1.30	6,928.7	-84.2	1,211.7	228.1	7.63	7.50	3.44
7,131.0	28.80	1.80	6,957.2	-69.5	1,212.1	242.3	9.71	9.69	1.56
7,163.0	31.70	0.40	6,984.8	-53.4	1,212.4	258.0	9.33	9.06	-4.38
7,195.0	33.80	359.50	7,011.7	-36.1	1,212.3	274.7	6.74	6.56	-2.81
7,226.0	35.60	359.20	7,037.2	-18.5	1,212.1	291.7	5.83	5.81	-0.97
7,258.0	37.50	359.50	7,062.9	0.6	1,211.9	310.1	5.96	5.94	0.94
7,289.0	39.90	359.50	7,087.1	20.0	1,211.8	328.8	7.74	7.74	0.00
7,321.0	41.50	359.30	7,111.4	40.8	1,211.5	348.9	5.02	5.00	-0.63
7,353.0	42.60	0.00	7,135.1	62.3	1,211.4	369.6	3.74	3.44	2.19
7,385.0	44.40	1.30	7,158.4	84.3	1,211.7	391.0	6.28	5.63	4.06
7,417.0	45.40	0.90	7,181.0	106.9	1,212.1	412.9	3.25	3.13	-1.25
7,448.0	47.00	0.00	7,202.5	129.2	1,212.3	434.6	5.57	5.16	-2.90
7,480.0	48.90	359.70	7,223.9	153.0	1,212.2	457.5	5.98	5.94	-0.94
7,512.0	52.30	358.80	7,244.2	177.7	1,211.9	481.4	10.84	10.63	-2.81
7,544.0	55.50	358.60	7,263.1	203.6	1,211.3	506.2	10.01	10.00	-0.63
7,575.0	58.60	358.60	7,279.9	229.6	1,210.7	531.2	10.00	10.00	0.00
7,607.0	61.40	358.60	7,295.9	257.3	1,210.0	557.8	8.75	8.75	0.00
7,639.0	62.80	0.00	7,310.9	285.5	1,209.6	585.0	5.84	4.38	4.38
7,670.0	64.50	0.60	7,324.7	313.3	1,209.8	611.9	5.75	5.48	1.94
7,702.0	67.10	0.40	7,337.8	342.5	1,210.0	640.2	8.14	8.13	-0.63
7,734.0	69.40	0.40	7,349.6	372.2	1,210.2	669.0	7.19	7.19	0.00
7,765.0	71.10	1.30	7,360.1	401.4	1,210.7	697.3	6.13	5.48	2.90
7,797.0	73.30	2.00	7,369.9	431.8	1,211.6	727.0	7.18	6.88	2.19
7,829.0	75.40	2.20	7,378.5	462.6	1,212.7	757.0	6.59	6.56	0.63
7,871.0	78.00	2.30	7,388.2	503.5	1,214.3	796.9	6.19	6.19	0.24
7,922.0	81.60	3.60	7,397.2	553.6	1,216.9	846.1	7.49	7.06	2.55
7,953.0	81.70	3.20	7,401.7	584.2	1,218.7	876.1	1.32	0.32	-1.29
7,983.0	81.80	3.00	7,406.0	613.9	1,220.3	905.2	0.74	0.33	-0.67
8,014.0	82.10	2.50	7,410.4	644.5	1,221.8	935.2	1.87	0.97	-1.61
8,044.0	83.70	2.50	7,414.1	674.3	1,223.1	964.3	5.33	5.33	0.00
8,075.0	87.00	2.70	7,416.6	705.1	1,224.5	994.5	10.66	10.65	0.65
8,105.0	90.30	2.50	7,417.3	735.1	1,225.8	1,023.8	11.02	11.00	-0.67
8,135.0	92.60	2.50	7,416.5	765.0	1,227.1	1,053.1	7.67	7.67	0.00
8,165.0	92.80	3.20	7,415.1	795.0	1,228.6	1,082.4	2.42	0.67	2.33
8,196.0	93.40	3.20	7,413.4	825.9	1,230.4	1,112.7	1.94	1.94	0.00
8,226.0	92.50	2.70	7,411.9	855.8	1,231.9	1,142.1	3.43	-3.00	-1.67
8,257.0	91.80	1.60	7,410.7	886.7	1,233.1	1,172.3	4.20	-2.26	-3.55

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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
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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)
8,287.0	92.20	1.30	7,409.7	916.7	1,233.8	1,201.5	1.67	1.33	-1.00
8,318.0	92.70	1.80	7,408.4	947.7	1,234.7	1,231.6	2.28	1.61	1.61
8,349.0	90.50	359.90	7,407.5	978.7	1,235.1	1,261.7	9.38	-7.10	-6.13
8,379.0	87.70	358.30	7,408.0	1,008.7	1,234.6	1,290.6	10.75	-9.33	-5.33
8,409.0	87.90	358.30	7,409.1	1,038.6	1,233.8	1,319.3	0.67	0.67	0.00
8,439.0	88.50	358.80	7,410.1	1,068.6	1,233.0	1,348.1	2.60	2.00	1.67
8,470.0	89.20	359.70	7,410.7	1,099.6	1,232.6	1,377.9	3.68	2.26	2.90
8,501.0	90.20	0.20	7,410.8	1,130.6	1,232.6	1,407.9	3.61	3.23	1.61
8,531.0	90.60	0.60	7,410.6	1,160.6	1,232.8	1,437.0	1.89	1.33	1.33
8,561.0	90.00	0.20	7,410.5	1,190.6	1,233.0	1,466.0	2.40	-2.00	-1.33
8,592.0	89.70	0.00	7,410.6	1,221.6	1,233.0	1,496.0	1.16	-0.97	-0.65
8,622.0	89.70	359.50	7,410.7	1,251.6	1,232.9	1,525.0	1.67	0.00	-1.67
8,654.0	89.40	359.20	7,411.0	1,283.6	1,232.5	1,555.8	1.33	-0.94	-0.94
8,686.0	89.30	358.60	7,411.3	1,315.6	1,231.9	1,586.6	1.90	-0.31	-1.88
8,718.0	90.00	358.60	7,411.5	1,347.6	1,231.1	1,617.3	2.19	2.19	0.00
8,749.0	90.60	358.30	7,411.4	1,378.5	1,230.3	1,647.1	2.16	1.94	-0.97
8,781.0	90.00	357.60	7,411.2	1,410.5	1,229.2	1,677.7	2.88	-1.88	-2.19
8,813.0	89.80	357.60	7,411.3	1,442.5	1,227.8	1,708.3	0.63	-0.63	0.00
8,845.0	89.50	356.90	7,411.5	1,474.5	1,226.3	1,738.8	2.38	-0.94	-2.19
8,877.0	89.70	357.20	7,411.7	1,506.4	1,224.6	1,769.2	1.13	0.63	0.94
8,908.0	89.80	356.70	7,411.8	1,537.4	1,223.0	1,798.8	1.64	0.32	-1.61
8,940.0	90.60	356.40	7,411.7	1,569.3	1,221.1	1,829.1	2.67	2.50	-0.94
8,972.0	87.70	353.50	7,412.2	1,601.2	1,218.3	1,859.2	12.81	-9.06	-9.06
9,003.0	88.00	353.00	7,413.3	1,631.9	1,214.6	1,888.0	1.88	0.97	-1.61
9,035.0	89.30	353.50	7,414.1	1,663.7	1,210.9	1,917.8	4.35	4.06	1.56
9,067.0	91.20	354.60	7,414.0	1,695.5	1,207.5	1,947.7	6.86	5.94	3.44
9,098.0	93.10	354.40	7,412.8	1,726.4	1,204.6	1,976.8	6.16	6.13	-0.65
9,130.0	95.10	355.50	7,410.5	1,758.2	1,201.8	2,006.8	7.13	6.25	3.44
9,162.0	94.50	354.90	7,407.8	1,789.9	1,199.1	2,036.8	2.65	-1.88	-1.88
9,193.0	93.40	355.10	7,405.7	1,820.7	1,196.4	2,065.9	3.61	-3.55	0.65
9,225.0	92.20	355.50	7,404.1	1,852.6	1,193.8	2,096.1	3.95	-3.75	1.25
9,257.0	90.10	355.10	7,403.5	1,884.5	1,191.2	2,126.2	6.68	-6.56	-1.25
9,289.0	89.30	355.10	7,403.6	1,916.4	1,188.4	2,156.3	2.50	-2.50	0.00
9,320.0	88.70	356.00	7,404.2	1,947.3	1,186.0	2,185.6	3.49	-1.94	2.90
9,352.0	88.80	356.90	7,404.9	1,979.2	1,184.0	2,216.0	2.83	0.31	2.81
9,384.0	89.30	357.80	7,405.4	2,011.2	1,182.6	2,246.5	3.22	1.56	2.81
9,416.0	88.30	358.80	7,406.1	2,043.1	1,181.6	2,277.2	4.42	-3.13	3.13
9,447.0	87.10	0.00	7,407.3	2,074.1	1,181.3	2,307.0	5.47	-3.87	3.87
9,479.0	87.80	0.60	7,408.8	2,106.1	1,181.4	2,338.0	2.88	2.19	1.88
9,511.0	89.30	1.10	7,409.6	2,138.1	1,181.9	2,369.0	4.94	4.69	1.56
9,543.0	88.80	0.70	7,410.1	2,170.1	1,182.4	2,400.1	2.00	-1.56	-1.25
9,574.0	88.50	0.60	7,410.8	2,201.0	1,182.8	2,430.1	1.02	-0.97	-0.32
9,606.0	89.20	1.60	7,411.5	2,233.0	1,183.4	2,461.2	3.81	2.19	3.13
9,637.0	89.30	2.50	7,411.9	2,264.0	1,184.5	2,491.5	2.92	0.32	2.90
9,669.0	89.70	3.40	7,412.2	2,296.0	1,186.1	2,522.8	3.08	1.25	2.81
9,701.0	91.00	3.20	7,412.0	2,327.9	1,188.0	2,554.1	4.11	4.06	-0.63
9,731.0	91.50	3.20	7,411.3	2,357.9	1,189.7	2,583.5	1.67	1.67	0.00
9,764.0	90.80	3.00	7,410.6	2,390.8	1,191.4	2,615.8	2.21	-2.12	-0.61
9,796.0	89.70	3.00	7,410.5	2,422.8	1,193.1	2,647.1	3.44	-3.44	0.00
9,828.0	89.30	2.50	7,410.8	2,454.7	1,194.7	2,678.4	2.00	-1.25	-1.56
9,860.0	89.60	2.20	7,411.1	2,486.7	1,196.0	2,709.7	1.33	0.94	-0.94
9,891.0	89.60	1.80	7,411.3	2,517.7	1,197.0	2,739.9	1.29	0.00	-1.29
9,923.0	88.60	0.90	7,411.8	2,549.7	1,197.8	2,771.0	4.20	-3.13	-2.81
9,955.0	88.60	0.70	7,412.6	2,581.6	1,198.3	2,802.1	0.62	0.00	-0.63

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Magnuson 23L-421
Project:	SEC.23-T7N-R66W	TVD Reference:	WELL @ 4914.0ft (RKB Ensign 32 - 15')
Site:	Magnuson Pad Sec.23-T7N-R66W	MD Reference:	WELL @ 4914.0ft (RKB Ensign 32 - 15')
Well:	Magnuson 23L-421	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)
9,987.0	90.40	1.10	7,412.9	2,613.6	1,198.8	2,833.1	5.76	5.63	1.25
10,018.0	90.70	0.90	7,412.6	2,644.6	1,199.3	2,863.2	1.16	0.97	-0.65
10,050.0	90.20	1.10	7,412.3	2,676.6	1,199.9	2,894.3	1.68	-1.56	0.63
10,082.0	89.90	0.90	7,412.3	2,708.6	1,200.4	2,925.4	1.13	-0.94	-0.63
10,114.0	90.00	0.90	7,412.3	2,740.6	1,200.9	2,956.4	0.31	0.31	0.00
10,146.0	90.00	0.40	7,412.3	2,772.6	1,201.3	2,987.5	1.56	0.00	-1.56
10,178.0	89.40	359.90	7,412.5	2,804.6	1,201.4	3,018.4	2.44	-1.88	-1.56
10,209.0	90.80	1.10	7,412.4	2,835.6	1,201.6	3,048.5	5.95	4.52	3.87
10,241.0	91.80	1.80	7,411.7	2,867.6	1,202.4	3,079.6	3.81	3.13	2.19
10,273.0	90.10	1.60	7,411.2	2,899.6	1,203.4	3,110.8	5.35	-5.31	-0.63
10,305.0	90.20	1.80	7,411.1	2,931.6	1,204.3	3,141.9	0.70	0.31	0.63
10,337.0	92.00	2.30	7,410.5	2,963.5	1,205.5	3,173.1	5.84	5.63	1.56
10,368.0	89.90	2.20	7,410.0	2,994.5	1,206.7	3,203.4	6.78	-6.77	-0.32
10,400.0	90.60	1.80	7,409.8	3,026.5	1,207.8	3,234.6	2.52	2.19	-1.25
10,432.0	91.90	2.30	7,409.1	3,058.4	1,209.0	3,265.8	4.35	4.06	1.56
10,463.0	90.50	1.30	7,408.5	3,089.4	1,209.9	3,296.0	5.55	-4.52	-3.23
10,495.0	89.60	0.70	7,408.5	3,121.4	1,210.5	3,327.1	3.38	-2.81	-1.88
10,526.0	90.70	0.90	7,408.4	3,152.4	1,210.9	3,357.1	3.61	3.55	0.65
10,557.0	91.20	0.70	7,407.9	3,183.4	1,211.4	3,387.2	1.74	1.61	-0.65
10,588.0	89.80	0.40	7,407.6	3,214.4	1,211.7	3,417.3	4.62	-4.52	-0.97
10,620.0	88.50	359.70	7,408.1	3,246.4	1,211.7	3,448.2	4.61	-4.06	-2.19
10,652.0	89.10	0.60	7,408.7	3,278.4	1,211.8	3,479.2	3.38	1.88	2.81
10,684.0	90.70	2.30	7,408.8	3,310.4	1,212.6	3,510.3	7.30	5.00	5.31
10,716.0	91.00	2.20	7,408.3	3,342.4	1,213.8	3,541.5	0.99	0.94	-0.31
10,748.0	89.80	1.60	7,408.1	3,374.3	1,214.9	3,572.7	4.19	-3.75	-1.88
10,779.0	88.30	1.30	7,408.6	3,405.3	1,215.7	3,602.9	4.93	-4.84	-0.97
10,811.0	87.80	0.20	7,409.7	3,437.3	1,216.1	3,633.9	3.77	-1.56	-3.44
10,843.0	87.90	0.40	7,410.9	3,469.3	1,216.3	3,664.9	0.70	0.31	0.63
10,875.0	91.10	1.80	7,411.2	3,501.3	1,216.9	3,695.9	10.91	10.00	4.38
10,906.0	93.60	2.90	7,409.9	3,532.2	1,218.1	3,726.2	8.81	8.06	3.55
10,938.0	92.30	2.70	7,408.3	3,564.1	1,219.7	3,757.4	4.11	-4.06	-0.63
10,970.0	90.40	2.00	7,407.5	3,596.1	1,221.0	3,788.7	6.33	-5.94	-2.19
11,002.0	87.90	1.30	7,408.0	3,628.1	1,221.9	3,819.8	8.11	-7.81	-2.19
11,033.0	87.50	1.60	7,409.2	3,659.0	1,222.7	3,850.0	1.61	-1.29	0.97
11,065.0	87.10	0.60	7,410.7	3,691.0	1,223.3	3,881.0	3.36	-1.25	-3.13
11,097.0	86.30	0.60	7,412.6	3,722.9	1,223.7	3,912.0	2.50	-2.50	0.00
11,129.0	86.40	359.70	7,414.6	3,754.9	1,223.8	3,942.9	2.82	0.31	-2.81
11,160.0	86.00	359.00	7,416.7	3,785.8	1,223.4	3,972.7	2.60	-1.29	-2.26
11,192.0	86.50	359.30	7,418.8	3,817.7	1,222.9	4,003.5	1.82	1.56	0.94
11,224.0	87.30	359.30	7,420.5	3,849.7	1,222.5	4,034.2	2.50	2.50	0.00
11,255.0	88.20	0.00	7,421.7	3,880.7	1,222.4	4,064.1	3.68	2.90	2.26
11,287.0	88.50	359.90	7,422.6	3,912.6	1,222.3	4,095.1	0.99	0.94	-0.31
11,319.0	88.70	0.00	7,423.4	3,944.6	1,222.3	4,126.0	0.70	0.63	0.31
11,351.0	89.00	0.60	7,424.0	3,976.6	1,222.5	4,157.0	2.10	0.94	1.88
11,382.0	88.20	359.30	7,424.8	4,007.6	1,222.4	4,186.9	4.92	-2.58	-4.19
11,414.0	88.30	359.90	7,425.8	4,039.6	1,222.2	4,217.8	1.90	0.31	1.88
11,446.0	88.50	0.00	7,426.7	4,071.6	1,222.2	4,248.7	0.70	0.63	0.31
11,478.0	88.90	0.00	7,427.4	4,103.6	1,222.2	4,279.6	1.25	1.25	0.00
11,509.0	89.10	0.20	7,427.9	4,134.6	1,222.2	4,309.6	0.91	0.65	0.65
11,541.0	89.80	0.70	7,428.2	4,166.6	1,222.5	4,340.6	2.69	2.19	1.56
11,573.0	90.50	0.60	7,428.2	4,198.6	1,222.9	4,371.6	2.21	2.19	-0.31
11,605.0	87.90	0.60	7,428.6	4,230.6	1,223.2	4,402.7	8.13	-8.13	0.00
11,636.0	87.70	0.00	7,429.8	4,261.5	1,223.4	4,432.6	2.04	-0.65	-1.94

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Magnuson 23L-421
Project:	SEC.23-T7N-R66W	TVD Reference:	WELL @ 4914.0ft (RKB Ensign 32 - 15')
Site:	Magnuson Pad Sec.23-T7N-R66W	MD Reference:	WELL @ 4914.0ft (RKB Ensign 32 - 15')
Well:	Magnuson 23L-421	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)	
11,668.0	86.60	359.90	7,431.4	4,293.5	1,223.3	4,463.5	3.45	-3.44	-0.31	
11,700.0	85.80	359.30	7,433.5	4,325.4	1,223.1	4,494.4	3.12	-2.50	-1.88	
11,732.0	86.50	0.20	7,435.7	4,357.3	1,223.0	4,525.2	3.56	2.19	2.81	
11,764.0	87.60	359.90	7,437.3	4,389.3	1,223.0	4,556.1	3.56	3.44	-0.94	
11,795.0	88.90	359.90	7,438.3	4,420.3	1,222.9	4,586.0	4.19	4.19	0.00	
11,827.0	86.40	359.90	7,439.6	4,452.3	1,222.9	4,616.9	7.81	-7.81	0.00	
11,859.0	86.50	359.50	7,441.5	4,484.2	1,222.7	4,647.8	1.29	0.31	-1.25	
11,890.0	87.30	359.70	7,443.2	4,515.2	1,222.5	4,677.6	2.66	2.58	0.65	
11,922.0	87.40	0.00	7,444.7	4,547.1	1,222.4	4,708.5	0.99	0.31	0.94	
12,000.0	86.80	359.20	7,448.6	4,625.0	1,221.9	4,783.7	1.28	-0.77	-1.03	
BHL 500'FNL & 1980'FWL										

Design Targets										
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude	
- hit/miss target										
- Shape										
HARDLINE BHL 460'f	0.00	0.00	1.0	4,666.9	1,300.0	1,450,222.21	3,209,257.80	40.566820	-104.746791	
- survey misses target center by 4844.6ft at 6.6ft MD (6.6 TVD, 0.0 N, 0.0 E)										
- Polygon										
Point 1			1.0	0.0	0.0	1,450,222.21	3,209,257.80			
Point 2			1.0	0.0	-1,400.0	1,450,210.39	3,207,857.89			
HARDLINE SHL 460'f	0.00	0.00	1.0	235.0	1,300.0	1,445,790.61	3,209,295.21	40.554655	-104.746792	
- survey misses target center by 1321.1ft at 1.1ft MD (1.1 TVD, 0.0 N, 0.0 E)										
- Polygon										
Point 1			1.0	0.0	0.0	1,445,790.61	3,209,295.21			
Point 2			1.0	0.0	-1,400.0	1,445,778.79	3,207,895.30			
SECTIONLINE 225'S	0.00	0.00	1.0	-225.0	1,300.0	1,445,330.64	3,209,299.09	40.553392	-104.746792	
- survey misses target center by 1319.3ft at 1.0ft MD (1.0 TVD, 0.0 N, 0.0 E)										
- Polygon										
Point 1			1.0	0.0	0.0	1,445,330.64	3,209,299.09			
Point 2			1.0	0.0	-1,400.0	1,445,318.82	3,207,899.18			
BHL 500'FNL & 1980'	0.00	0.00	7,414.0	4,626.9	1,214.1	1,450,181.52	3,209,172.28	40.566710	-104.747100	
- survey misses target center by 35.6ft at 12000.0ft MD (7448.6 TVD, 4625.0 N, 1221.9 E)										
- Point										

Checked By: _____	Approved By: _____	Date: _____
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