

PETROLEUM DEVELOPMENT CORP Weld County CO

Well Name: **Richter 34R-223**

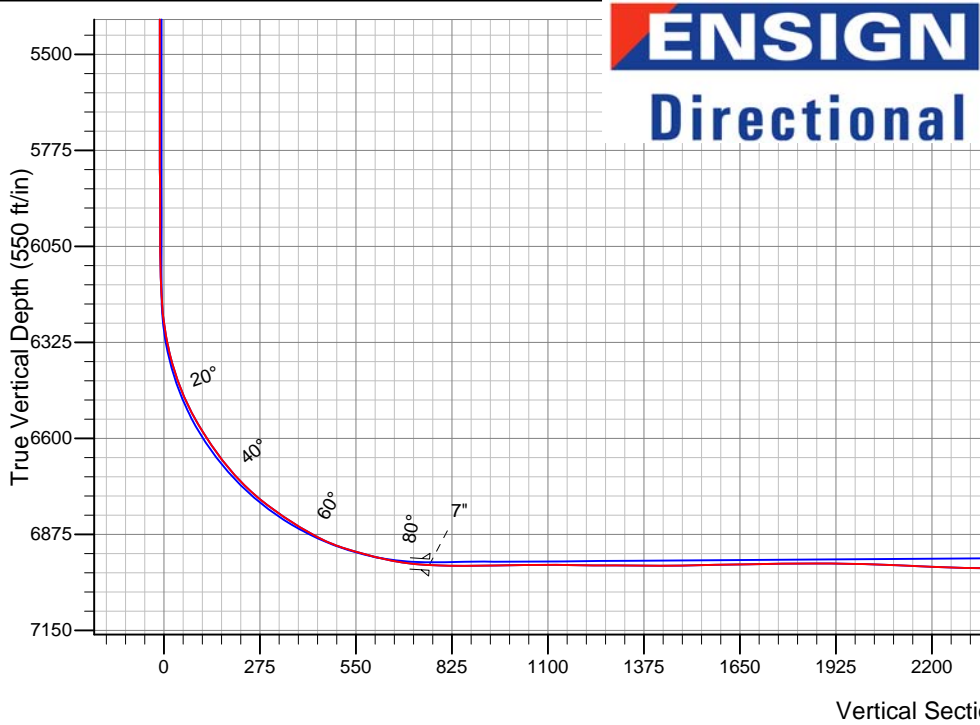
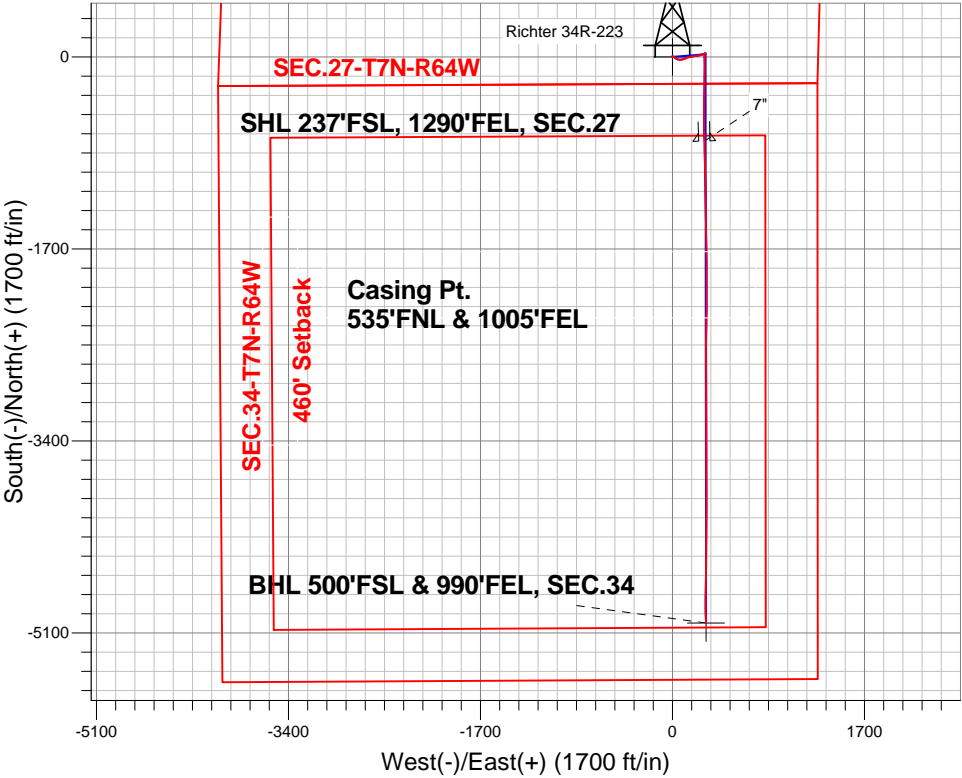
Surface Location: Richter 27T-HZ Pad Sec.27-T7N-R64W
North American Datum 1983 , US State Plane 1983 , Colorado Northern Zone

Ground Elevation: 4870.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	1440180.70	3269220.33	40.537660	-104.531370	
Ensign 121 RKB - 13.5' WELL @ 4883.5ft (Ensign 121 RKB - 13.5')						

FINAL SURVEY

Projected Bottom Hole Location
11679'MD 6949'TVD 5013'S & 297'E of SHL
92.0 degree Incl @ 178.8 degree AZM



Richter 27T-HZ Pad Sec.27-T7N-R64W Richter 34R-223 Wellbore #1 9:46, December 18 2013	ANNOTATIONS
	No annotation data is available.
LEGEND	
✕ Richter 34R-223, Wellbore #1, Plan #2 (11-27-13)R V0	
□ Wellbore #1	
○ Survey #1	

BHL 500'FSL & 990'FEL, SEC.34



PETROLEUM DEVELOPMENT CORP Weld County CO

SEC.27-T7N-R64W

Richter 27T-HZ Pad Sec.27-T7N-R64W

Richter 34R-223

Wellbore #1

Survey: Survey #1

Standard Survey Report

18 December, 2013

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Richter 34R-223
Project:	SEC.27-T7N-R64W	TVD Reference:	WELL @ 4883.5ft (Ensign 121 RKB - 13.5')
Site:	Richter 27T-HZ Pad Sec.27-T7N-R64W	MD Reference:	WELL @ 4883.5ft (Ensign 121 RKB - 13.5')
Well:	Richter 34R-223	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Landmark

Project	SEC.27-T7N-R64W, Weld County, CO		
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	Richter 27T-HZ Pad Sec.27-T7N-R64W				
Site Position:		Northing:	1,440,175.74 ft	Latitude:	40.537650
From:	Lat/Long	Easting:	3,269,098.08 ft	Longitude:	-104.531810
Position Uncertainty:	0.0 ft	Slot Radius:	"	Grid Convergence:	0.63 °

Well	Richter 34R-223					
Well Position	+N-S	0.0 ft	Northing:	1,440,180.70 ft	Latitude:	40.537660
	+E-W	0.0 ft	Easting:	3,269,220.33 ft	Longitude:	-104.531370
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	4,870.0 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	11/27/2013	8.42	67.11	52,969

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	176.60	

Survey Program	Date	12/18/2013			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
162.0	11,679.0	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	
1.0	0.00	5.60	1.0	0.0	0.0	0.0	0.00	0.00	0.00	
SHL 237'FSL, 1290'FEL, SEC.27										
162.0	0.20	5.60	162.0	0.3	0.0	-0.3	0.12	0.12	0.00	
253.0	0.40	0.90	253.0	0.8	0.0	-0.8	0.22	0.22	-5.16	
344.0	0.40	333.80	344.0	1.4	-0.1	-1.4	0.21	0.00	-29.78	
435.0	0.20	321.70	435.0	1.8	-0.3	-1.8	0.23	-0.22	-13.30	
527.0	0.10	294.10	527.0	1.9	-0.5	-2.0	0.13	-0.11	-30.00	
618.0	0.30	310.40	618.0	2.1	-0.8	-2.2	0.23	0.22	17.91	
709.0	0.10	24.80	709.0	2.3	-0.9	-2.4	0.32	-0.22	81.76	
800.0	0.20	314.50	800.0	2.5	-1.0	-2.6	0.21	0.11	-77.25	
875.0	0.40	323.10	875.0	2.8	-1.2	-2.9	0.27	0.27	11.47	

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Richter 34R-223
Project:	SEC.27-T7N-R64W	TVD Reference:	WELL @ 4883.5ft (Ensign 121 RKB - 13.5')
Site:	Richter 27T-HZ Pad Sec.27-T7N-R64W	MD Reference:	WELL @ 4883.5ft (Ensign 121 RKB - 13.5')
Well:	Richter 34R-223	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)
995.0	1.00	23.00	995.0	4.1	-1.1	-4.2	0.73	0.50	49.92
1,090.0	1.40	111.10	1,090.0	4.5	0.3	-4.4	1.78	0.42	92.74
1,186.0	2.40	110.70	1,185.9	3.3	3.3	-3.1	1.04	1.04	-0.42
1,279.0	3.50	102.10	1,278.8	2.1	7.9	-1.6	1.27	1.18	-9.25
1,376.0	4.00	116.70	1,375.6	-0.1	13.8	0.9	1.11	0.52	15.05
1,471.0	5.00	137.10	1,470.3	-4.6	19.6	5.8	1.97	1.05	21.47
1,567.0	7.50	128.10	1,565.7	-11.5	27.4	13.1	2.79	2.60	-9.38
1,662.0	9.00	117.60	1,659.7	-18.8	38.8	21.1	2.23	1.58	-11.05
1,757.0	10.60	101.60	1,753.4	-24.0	54.0	27.2	3.31	1.68	-16.84
1,853.0	10.20	84.00	1,847.8	-24.9	71.1	29.1	3.32	-0.42	-18.33
1,948.0	10.20	79.60	1,941.3	-22.5	87.7	27.7	0.82	0.00	-4.63
2,043.0	9.80	69.80	2,034.9	-18.2	103.6	24.3	1.84	-0.42	-10.32
2,139.0	9.50	67.70	2,129.5	-12.4	118.6	19.4	0.48	-0.31	-2.19
2,234.0	9.10	67.80	2,223.3	-6.5	132.8	14.4	0.42	-0.42	0.11
2,329.0	8.20	72.20	2,317.2	-1.6	146.2	10.3	1.18	-0.95	4.63
2,424.0	7.60	81.50	2,411.3	1.4	158.9	8.1	1.48	-0.63	9.79
2,520.0	7.00	87.00	2,506.5	2.6	171.0	7.5	0.96	-0.63	5.73
2,615.0	6.60	80.80	2,600.8	3.8	182.2	7.0	0.88	-0.42	-6.53
2,710.0	6.90	83.10	2,695.2	5.3	193.2	6.1	0.43	0.32	2.42
2,805.0	7.40	81.40	2,789.5	6.9	204.9	5.2	0.57	0.53	-1.79
2,900.0	7.90	81.40	2,883.6	8.8	217.4	4.1	0.53	0.53	0.00
2,996.0	8.00	72.80	2,978.7	11.8	230.3	1.9	1.24	0.10	-8.96
3,091.0	8.00	70.50	3,072.8	16.0	242.9	-1.5	0.34	0.00	-2.42
3,186.0	6.80	70.30	3,167.0	20.1	254.4	-5.0	1.26	-1.26	-0.21
3,281.0	5.50	78.60	3,261.4	22.9	264.2	-7.2	1.65	-1.37	8.74
3,377.0	4.90	84.90	3,357.0	24.1	272.8	-7.9	0.86	-0.63	6.56
3,472.0	3.30	78.60	3,451.8	25.0	279.5	-8.4	1.75	-1.68	-6.63
3,567.0	2.40	89.80	3,546.7	25.6	284.2	-8.7	1.11	-0.95	11.79
3,662.0	1.60	72.40	3,641.6	26.0	287.4	-8.9	1.05	-0.84	-18.32
3,757.0	0.70	58.30	3,736.6	26.7	289.2	-9.5	0.99	-0.95	-14.84
3,853.0	0.50	36.40	3,832.6	27.3	289.9	-10.1	0.31	-0.21	-22.81
3,947.0	0.30	15.30	3,926.6	27.9	290.2	-10.7	0.26	-0.21	-22.45
4,043.0	0.80	86.80	4,022.6	28.2	291.0	-10.9	0.79	0.52	74.48
4,138.0	0.90	95.10	4,117.6	28.2	292.4	-10.8	0.17	0.11	8.74
4,233.0	0.80	89.30	4,212.6	28.1	293.8	-10.6	0.14	-0.11	-6.11
4,328.0	0.70	86.50	4,307.5	28.1	295.0	-10.6	0.11	-0.11	-2.95
4,423.0	0.30	56.10	4,402.5	28.3	295.8	-10.7	0.49	-0.42	-32.00
4,519.0	0.30	96.50	4,498.5	28.4	296.3	-10.8	0.22	0.00	42.08
4,614.0	0.30	20.20	4,593.5	28.6	296.6	-11.0	0.39	0.00	-80.32
4,709.0	0.10	25.30	4,688.5	28.9	296.7	-11.3	0.21	-0.21	5.37
4,804.0	0.40	342.90	4,783.5	29.3	296.7	-11.7	0.35	0.32	-44.63
4,898.0	0.80	280.50	4,877.5	29.8	295.9	-12.2	0.75	0.43	-66.38
4,993.0	1.00	267.70	4,972.5	29.9	294.4	-12.4	0.30	0.21	-13.47
5,088.0	1.10	267.00	5,067.5	29.8	292.7	-12.4	0.11	0.11	-0.74
5,183.0	0.80	255.20	5,162.5	29.6	291.1	-12.3	0.38	-0.32	-12.42
5,277.0	0.90	253.80	5,256.5	29.2	289.8	-12.0	0.11	0.11	-1.49
5,373.0	0.70	255.20	5,352.5	28.8	288.5	-11.7	0.21	-0.21	1.46
5,468.0	0.80	270.90	5,447.5	28.7	287.3	-11.6	0.24	0.11	16.53
5,563.0	1.10	259.80	5,542.5	28.5	285.7	-11.6	0.37	0.32	-11.68
5,659.0	0.70	280.00	5,638.4	28.5	284.2	-11.6	0.53	-0.42	21.04
5,754.0	0.80	263.10	5,733.4	28.5	283.0	-11.7	0.25	0.11	-17.79
5,849.0	0.70	113.50	5,828.4	28.2	282.9	-11.4	1.52	-0.11	-157.47
5,944.0	0.20	165.70	5,923.4	27.8	283.5	-10.9	0.63	-0.53	54.95
6,040.0	0.60	138.70	6,019.4	27.2	283.8	-10.4	0.45	0.42	-28.13

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Richter 34R-223
Project:	SEC.27-T7N-R64W	TVD Reference:	WELL @ 4883.5ft (Ensign 121 RKB - 13.5')
Site:	Richter 27T-HZ Pad Sec.27-T7N-R64W	MD Reference:	WELL @ 4883.5ft (Ensign 121 RKB - 13.5')
Well:	Richter 34R-223	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)
6,135.0	0.60	146.90	6,114.4	26.5	284.4	-9.6	0.09	0.00	8.63
6,230.0	4.00	180.90	6,209.3	22.7	284.7	-5.8	3.70	3.58	35.79
6,277.0	6.80	181.90	6,256.1	18.3	284.5	-1.4	5.96	5.96	2.13
6,325.0	9.90	181.00	6,303.6	11.3	284.4	5.5	6.46	6.46	-1.88
6,372.0	13.20	180.50	6,349.6	1.9	284.3	14.9	7.02	7.02	-1.06
6,420.0	16.40	179.60	6,396.0	-10.3	284.3	27.2	6.68	6.67	-1.88
6,467.0	20.00	180.30	6,440.7	-25.0	284.3	41.8	7.67	7.66	1.49
6,516.0	24.30	180.90	6,486.1	-43.5	284.1	60.2	8.79	8.78	1.22
6,563.0	27.90	179.60	6,528.3	-64.1	284.0	80.9	7.76	7.66	-2.77
6,611.0	30.90	179.60	6,570.1	-87.7	284.1	104.4	6.25	6.25	0.00
6,658.0	33.70	180.30	6,609.8	-112.8	284.2	129.5	6.01	5.96	1.49
6,706.0	36.60	179.10	6,649.0	-140.5	284.3	157.0	6.21	6.04	-2.50
6,753.0	40.10	177.50	6,685.9	-169.6	285.2	186.2	7.74	7.45	-3.40
6,802.0	44.10	178.60	6,722.2	-202.4	286.3	219.0	8.30	8.16	2.24
6,849.0	47.70	180.30	6,754.9	-236.2	286.6	252.7	8.09	7.66	3.62
6,897.0	52.20	180.20	6,785.8	-272.9	286.4	289.4	9.38	9.38	-0.21
6,944.0	55.70	182.30	6,813.5	-310.9	285.6	327.2	8.28	7.45	4.47
6,992.0	57.40	184.00	6,839.9	-350.9	283.4	367.0	4.61	3.54	3.54
7,039.0	59.60	182.60	6,864.5	-390.9	281.1	406.8	5.33	4.68	-2.98
7,087.0	63.80	181.20	6,887.3	-433.1	279.7	448.9	9.12	8.75	-2.92
7,134.0	69.20	180.30	6,906.0	-476.2	279.1	491.9	11.62	11.49	-1.91
7,182.0	73.90	179.30	6,921.2	-521.7	279.3	537.3	9.99	9.79	-2.08
7,229.0	75.30	178.90	6,933.7	-567.0	280.0	582.6	3.09	2.98	-0.85
7,278.0	76.60	178.60	6,945.5	-614.5	281.1	630.1	2.72	2.65	-0.61
7,325.0	81.50	178.40	6,954.5	-660.6	282.3	676.2	10.43	10.43	-0.43
7,373.0	85.40	178.20	6,959.9	-708.3	283.7	723.9	8.14	8.13	-0.42
7,410.0	86.56	178.43	6,962.5	-745.2	284.8	760.7	3.19	3.12	0.63
7"									
7,437.0	87.40	178.60	6,964.0	-772.1	285.5	787.7	3.19	3.13	0.62
7,481.0	89.70	180.00	6,965.1	-816.1	286.0	831.6	6.12	5.23	3.18
7,572.0	90.90	179.60	6,964.6	-907.1	286.3	922.5	1.39	1.32	-0.44
7,665.0	90.60	179.50	6,963.4	-1,000.1	287.1	1,015.3	0.34	-0.32	-0.11
7,757.0	90.50	178.60	6,962.5	-1,092.1	288.6	1,107.3	0.98	-0.11	-0.98
7,849.0	88.40	177.50	6,963.4	-1,184.0	291.7	1,199.2	2.58	-2.28	-1.20
7,944.0	90.70	178.80	6,964.1	-1,279.0	294.8	1,294.2	2.78	2.42	1.37
8,039.0	88.90	178.00	6,964.5	-1,373.9	297.4	1,389.1	2.07	-1.89	-0.84
8,134.0	91.20	180.30	6,964.4	-1,468.9	298.8	1,484.0	3.42	2.42	2.42
8,230.0	91.30	178.80	6,962.3	-1,564.9	299.6	1,579.9	1.57	0.10	-1.56
8,325.0	90.90	179.10	6,960.5	-1,659.8	301.3	1,674.8	0.53	-0.42	0.32
8,420.0	90.60	180.50	6,959.2	-1,754.8	301.7	1,769.6	1.51	-0.32	1.47
8,515.0	90.20	179.80	6,958.6	-1,849.8	301.4	1,864.4	0.85	-0.42	-0.74
8,611.0	88.80	179.80	6,959.4	-1,945.8	301.7	1,960.3	1.46	-1.46	0.00
8,706.0	88.40	179.10	6,961.7	-2,040.8	302.7	2,055.1	0.85	-0.42	-0.74
8,801.0	87.00	179.80	6,965.5	-2,135.7	303.6	2,149.9	1.65	-1.47	0.74
8,896.0	88.10	181.00	6,969.6	-2,230.6	302.9	2,244.6	1.71	1.16	1.26
8,992.0	89.50	181.00	6,971.6	-2,326.6	301.2	2,340.3	1.46	1.46	0.00
9,087.0	90.10	181.00	6,971.9	-2,421.5	299.6	2,435.0	0.63	0.63	0.00
9,182.0	90.40	180.30	6,971.5	-2,516.5	298.5	2,529.8	0.80	0.32	-0.74
9,277.0	90.10	180.30	6,971.1	-2,611.5	298.0	2,624.6	0.32	-0.32	0.00
9,372.0	90.00	179.80	6,971.0	-2,706.5	297.9	2,719.4	0.54	-0.11	-0.53
9,468.0	90.00	179.60	6,971.0	-2,802.5	298.4	2,815.3	0.21	0.00	-0.21
9,563.0	89.70	179.10	6,971.3	-2,897.5	299.5	2,910.2	0.61	-0.32	-0.53
9,658.0	90.90	180.20	6,970.8	-2,992.5	300.1	3,005.0	1.71	1.26	1.16

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Richter 34R-223
Project:	SEC.27-T7N-R64W	TVD Reference:	WELL @ 4883.5ft (Ensign 121 RKB - 13.5')
Site:	Richter 27T-HZ Pad Sec.27-T7N-R64W	MD Reference:	WELL @ 4883.5ft (Ensign 121 RKB - 13.5')
Well:	Richter 34R-223	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)
9,753.0	90.10	180.00	6,969.9	-3,087.5	299.9	3,099.9	0.87	-0.84	-0.21
9,849.0	89.30	179.60	6,970.4	-3,183.5	300.2	3,195.7	0.93	-0.83	-0.42
9,944.0	90.60	180.00	6,970.5	-3,278.5	300.6	3,290.6	1.43	1.37	0.42
10,039.0	90.70	180.20	6,969.4	-3,373.5	300.4	3,385.4	0.24	0.11	0.21
10,135.0	91.40	180.20	6,967.7	-3,469.5	300.1	3,481.2	0.73	0.73	0.00
10,230.0	91.30	179.60	6,965.5	-3,564.5	300.2	3,576.0	0.64	-0.11	-0.63
10,325.0	91.10	179.60	6,963.5	-3,659.4	300.9	3,670.8	0.21	-0.21	0.00
10,420.0	90.60	179.10	6,962.1	-3,754.4	302.0	3,765.7	0.74	-0.53	-0.53
10,515.0	88.80	180.30	6,962.6	-3,849.4	302.5	3,860.6	2.28	-1.89	1.26
10,610.0	90.20	180.70	6,963.4	-3,944.4	301.7	3,955.3	1.53	1.47	0.42
10,706.0	89.80	180.30	6,963.4	-4,040.4	300.8	4,051.1	0.59	-0.42	-0.42
10,801.0	89.60	179.80	6,963.9	-4,135.4	300.7	4,145.9	0.57	-0.21	-0.53
10,896.0	89.30	179.80	6,964.8	-4,230.4	301.1	4,240.8	0.32	-0.32	0.00
10,991.0	89.70	180.90	6,965.6	-4,325.4	300.5	4,335.6	1.23	0.42	1.16
11,087.0	90.00	181.00	6,965.9	-4,421.4	298.9	4,431.3	0.33	0.31	0.10
11,182.0	90.80	181.20	6,965.2	-4,516.3	297.1	4,526.0	0.87	0.84	0.21
11,277.0	90.60	180.30	6,964.0	-4,611.3	295.8	4,620.8	0.97	-0.21	-0.95
11,372.0	92.40	180.70	6,961.6	-4,706.3	295.0	4,715.5	1.94	1.89	0.42
11,467.0	93.00	180.00	6,957.1	-4,801.2	294.4	4,810.2	0.97	0.63	-0.74
11,563.0	92.20	179.30	6,952.7	-4,897.1	295.0	4,906.0	1.11	-0.83	-0.73
11,621.0	92.00	178.80	6,950.6	-4,955.0	296.0	4,963.9	0.93	-0.34	-0.86
11,679.0	92.00	178.80	6,948.6	-5,013.0	297.2	5,021.8	0.00	0.00	0.00
BHL 500'FSL & 990'FEL, SEC.34									

Casing Points				
Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
7,410.0	6,962.5	7"	7	7-1/2

Checked By: _____	Approved By: _____	Date: _____
-------------------	--------------------	-------------