



Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Sheley 3B-4H
Project:	DJ Wattenberg	TVD Reference:	KBE @ 4925.0ft (Ensign 124)
Site:	SWSW S4-T2N-R67W (Sheley)	MD Reference:	KBE @ 4925.0ft (Ensign 124)
Well:	Sheley 3B-4H	North Reference:	True
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	HZ	Database:	USA EDM 5000 Multi Users DB

Project	DJ Wattenberg		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Northern Zone		

Site		SWSW S4-T2N-R67W (Sheley)			
Site Position:		Northing:	1,302,419.89 ft	Latitude:	40.161980
From:	Lat/Long	Easting:	3,167,329.04 ft	Longitude:	-104.901320
Position Uncertainty:	0.0 ft	Slot Radius:	13.200 in	Grid Convergence:	0.39 °

Well	Sheley 3B-4H					
Well Position	+N/-S	0.0 ft	Northing:	1,302,441.51 ft	Latitude:	40.162040
	+E/-W	0.0 ft	Easting:	3,167,295.36 ft	Longitude:	-104.901440
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	4,912.0 ft

Wellbore	HZ				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	10/8/2012	8.74	66.79	52,852

Design	HZ				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction	
	(ft)	(ft)	(ft)	(°)	
	0.0	0.0	0.0	97.00	

Survey Program	Date	11/2/2012			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
140.0	11,767.0	Survey #1 (HZ)	MWD	Geolink MWD	

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Formations / Comments
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	
140.0	0.40	189.50	140.0	-0.5	-0.1	0.0	0.29	0.29	
203.0	0.60	221.90	203.0	-0.9	-0.3	-0.2	0.54	0.32	
265.0	0.60	222.50	265.0	-1.4	-0.8	-0.6	0.01	0.00	
324.0	0.50	228.60	324.0	-1.8	-1.2	-0.9	0.20	-0.17	
388.0	0.70	246.70	388.0	-2.2	-1.7	-1.5	0.43	0.31	
450.0	0.30	234.70	450.0	-2.4	-2.2	-1.9	0.66	-0.65	
512.0	0.30	48.30	512.0	-2.4	-2.2	-1.9	0.97	0.00	
574.0	0.70	59.60	574.0	-2.1	-1.8	-1.5	0.66	0.65	
636.0	0.70	48.70	636.0	-1.7	-1.2	-1.0	0.21	0.00	
698.0	0.70	42.10	698.0	-1.1	-0.6	-0.5	0.13	0.00	
760.0	0.70	36.20	760.0	-0.5	-0.2	-0.1	0.12	0.00	
863.0	0.60	38.90	863.0	0.4	0.6	0.5	0.10	-0.10	

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925.0	1.90	23.80	924.9	1.6	1.2	1.0	2.15	2.10	
987.0	5.10	0.40	986.8	5.3	1.6	0.9	5.55	5.16	
1,049.0	8.50	356.20	1,048.4	12.6	1.3	-0.2	5.54	5.48	
1,111.0	11.80	352.70	1,109.4	23.5	0.2	-2.7	5.41	5.32	
1,204.0	16.20	339.30	1,199.6	45.1	-5.6	-11.0	5.85	4.73	
1,297.0	18.40	325.50	1,288.5	69.3	-18.5	-26.8	4.99	2.37	
1,390.0	16.90	316.10	1,377.1	91.1	-36.2	-47.0	3.46	-1.61	
1,483.0	16.10	314.60	1,466.3	109.9	-54.7	-67.7	0.97	-0.86	
1,568.0	15.50	316.00	1,548.1	126.4	-71.0	-85.9	0.84	-0.71	
1,663.0	15.20	314.20	1,639.7	144.2	-88.8	-105.7	0.59	-0.32	
1,758.0	12.90	313.50	1,731.8	160.2	-105.4	-124.1	2.43	-2.42	
1,854.0	12.60	311.40	1,825.5	174.5	-121.0	-141.4	0.58	-0.31	
1,949.0	12.40	320.00	1,918.2	189.2	-135.4	-157.4	1.97	-0.21	
2,044.0	12.10	319.10	2,011.1	204.5	-148.4	-172.2	0.37	-0.32	
2,139.0	13.10	329.20	2,103.8	221.3	-160.5	-186.2	2.54	1.05	
2,234.0	13.10	328.30	2,196.3	239.7	-171.6	-199.6	0.21	0.00	
2,329.0	14.50	330.50	2,288.6	259.2	-183.1	-213.4	1.57	1.47	
2,424.0	13.80	328.90	2,380.7	279.2	-194.9	-227.4	0.84	-0.74	
2,519.0	15.00	329.60	2,472.7	299.5	-206.9	-241.9	1.28	1.26	
2,614.0	14.70	326.40	2,564.5	320.2	-219.8	-257.2	0.92	-0.32	
2,709.0	16.00	328.70	2,656.1	341.4	-233.3	-273.2	1.51	1.37	
2,804.0	16.50	327.30	2,747.3	364.0	-247.4	-289.9	0.67	0.53	
2,899.0	16.00	322.30	2,838.5	385.7	-262.7	-307.7	1.56	-0.53	
2,994.0	14.30	324.70	2,930.2	405.6	-277.5	-324.8	1.91	-1.79	
3,089.0	14.70	324.00	3,022.2	424.9	-291.3	-340.9	0.46	0.42	
3,184.0	14.80	322.80	3,114.1	444.4	-305.8	-357.6	0.34	0.11	
3,279.0	14.20	321.40	3,206.1	463.1	-320.4	-374.4	0.73	-0.63	
3,375.0	13.40	324.00	3,299.3	481.3	-334.2	-390.4	1.05	-0.83	
3,470.0	14.50	324.40	3,391.5	499.9	-347.6	-406.0	1.16	1.16	
3,565.0	13.80	321.50	3,483.6	518.4	-361.6	-422.1	1.05	-0.74	
3,660.0	13.80	323.30	3,575.9	536.4	-375.4	-438.0	0.45	0.00	
3,754.0	13.70	327.40	3,667.2	554.8	-388.1	-452.9	1.04	-0.11	
3,849.0	15.20	329.90	3,759.2	575.0	-400.4	-467.5	1.71	1.58	
3,945.0	16.30	329.50	3,851.6	597.5	-413.6	-483.3	1.15	1.15	
4,040.0	16.10	327.90	3,942.8	620.2	-427.4	-499.8	0.51	-0.21	
4,135.0	16.00	326.30	4,034.1	642.2	-441.6	-516.6	0.48	-0.11	
4,230.0	15.30	323.80	4,125.6	663.2	-456.3	-533.7	1.02	-0.74	
4,325.0	13.00	320.80	4,217.7	681.6	-470.4	-550.0	2.54	-2.42	
4,420.0	13.90	331.80	4,310.1	700.0	-482.6	-564.3	2.85	0.95	
4,515.0	15.80	331.80	4,401.9	721.4	-494.1	-578.3	2.00	2.00	
4,610.0	17.30	332.10	4,493.0	745.3	-506.8	-593.9	1.58	1.58	
4,705.0	17.90	325.20	4,583.5	769.8	-521.8	-611.7	2.28	0.63	
4,800.0	17.10	319.10	4,674.1	792.3	-539.2	-631.8	2.11	-0.84	
4,895.0	16.00	318.60	4,765.2	812.7	-557.0	-651.9	1.17	-1.16	
4,990.0	14.70	317.90	4,856.8	831.5	-573.8	-670.8	1.38	-1.37	
5,085.0	15.60	324.60	4,948.5	850.8	-589.3	-688.6	2.07	0.95	
5,180.0	14.50	326.40	5,040.3	871.1	-603.3	-704.9	1.26	-1.16	
5,275.0	14.50	319.20	5,132.2	890.0	-617.6	-721.5	1.90	0.00	
5,370.0	14.90	318.80	5,224.1	908.2	-633.4	-739.4	0.43	0.42	
5,465.0	15.00	325.00	5,315.9	927.5	-648.5	-756.7	1.69	0.11	
5,560.0	15.60	327.60	5,407.5	948.4	-662.4	-773.1	0.96	0.63	
5,655.0	15.30	320.80	5,499.1	968.9	-677.2	-790.2	1.93	-0.32	
5,751.0	14.10	318.90	5,592.0	987.5	-692.9	-808.1	1.35	-1.25	

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Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Formations / Comments
5,846.0	14.20	322.10	5,684.1	1,005.4	-707.6	-824.9	0.83	0.11	
5,941.0	13.80	322.60	5,776.3	1,023.6	-721.7	-841.0	0.44	-0.42	
6,036.0	12.60	322.70	5,868.8	1,040.8	-734.8	-856.2	1.26	-1.26	
6,181.0	13.80	322.90	6,009.9	1,067.2	-754.9	-879.3	0.83	0.83	
6,226.0	13.00	321.90	6,053.7	1,075.5	-761.2	-886.6	1.85	-1.78	
6,321.0	13.20	323.60	6,146.2	1,092.6	-774.2	-901.6	0.46	0.21	
6,416.0	11.20	322.40	6,239.1	1,108.7	-786.3	-915.6	2.12	-2.11	
6,448.0	10.40	322.00	6,270.5	1,113.4	-790.0	-919.8	2.51	-2.50	
6,479.0	9.80	321.70	6,301.0	1,117.7	-793.3	-923.6	1.94	-1.94	
6,511.0	9.90	327.50	6,332.6	1,122.1	-796.5	-927.3	3.12	0.31	
6,543.0	10.00	344.20	6,364.1	1,127.1	-798.7	-930.2	8.99	0.31	
6,575.0	10.50	5.10	6,395.6	1,132.7	-799.2	-931.3	11.66	1.56	
6,606.0	11.50	23.20	6,426.0	1,138.4	-797.8	-930.6	11.54	3.23	
6,638.0	13.40	37.70	6,457.3	1,144.2	-794.3	-927.8	11.39	5.94	
6,670.0	14.90	48.10	6,488.3	1,149.9	-788.9	-923.2	9.21	4.69	
6,701.0	15.70	55.50	6,518.2	1,154.9	-782.5	-917.4	6.80	2.58	
6,733.0	16.10	62.00	6,549.0	1,159.5	-775.0	-910.5	5.70	1.25	
6,765.0	17.10	68.10	6,579.7	1,163.3	-766.7	-902.8	6.27	3.12	
6,796.0	18.40	70.10	6,609.2	1,166.7	-757.9	-894.4	4.63	4.19	
6,828.0	20.10	70.80	6,639.4	1,170.2	-748.0	-885.0	5.36	5.31	
6,860.0	21.70	72.50	6,669.3	1,173.8	-737.1	-874.7	5.35	5.00	
6,891.0	23.10	77.50	6,698.0	1,176.8	-725.7	-863.7	7.62	4.52	
6,923.0	24.40	82.30	6,727.2	1,179.1	-713.0	-851.4	7.28	4.06	
6,954.0	25.80	84.70	6,755.3	1,180.6	-700.0	-838.6	5.58	4.52	
6,986.0	26.60	84.10	6,784.0	1,181.9	-685.9	-824.8	2.63	2.50	
7,018.0	28.70	84.20	6,812.4	1,183.5	-671.1	-810.4	6.56	6.56	
7,049.0	30.90	84.90	6,839.3	1,184.9	-655.8	-795.3	7.18	7.10	
7,081.0	34.00	85.70	6,866.3	1,186.3	-638.7	-778.5	9.78	9.69	
7,113.0	36.40	87.80	6,892.4	1,187.4	-620.3	-760.4	8.40	7.50	
7,144.0	38.50	89.50	6,917.0	1,187.8	-601.4	-741.7	7.55	6.77	
7,176.0	40.80	90.20	6,941.7	1,187.8	-581.0	-721.5	7.32	7.19	
7,207.0	43.00	90.70	6,964.7	1,187.7	-560.3	-700.9	7.18	7.10	
7,239.0	45.70	91.90	6,987.6	1,187.2	-538.0	-678.6	8.84	8.44	
7,271.0	48.70	91.50	7,009.4	1,186.5	-514.5	-655.3	9.42	9.37	
7,302.0	50.40	90.10	7,029.5	1,186.1	-490.9	-631.8	6.47	5.48	
7,334.0	51.60	90.50	7,049.6	1,186.0	-466.0	-607.1	3.87	3.75	
7,366.0	53.20	90.00	7,069.1	1,185.9	-440.7	-581.9	5.15	5.00	
7,397.0	55.80	89.90	7,087.1	1,185.9	-415.5	-556.9	8.39	8.39	
7,429.0	58.50	89.90	7,104.5	1,186.0	-388.6	-530.2	8.44	8.44	
7,460.0	61.10	90.20	7,120.1	1,186.0	-361.8	-503.6	8.43	8.39	
7,492.0	62.90	90.50	7,135.1	1,185.8	-333.5	-475.6	5.69	5.62	
7,524.0	63.80	90.00	7,149.5	1,185.7	-304.9	-447.2	3.14	2.81	
7,555.0	66.20	90.40	7,162.6	1,185.6	-276.8	-419.3	7.83	7.74	
7,611.0	72.10	92.00	7,182.5	1,184.4	-224.5	-367.2	10.87	10.54	
7,642.0	73.60	92.40	7,191.6	1,183.3	-194.9	-337.7	4.99	4.84	
7,674.0	75.30	92.80	7,200.2	1,181.9	-164.1	-307.0	5.45	5.31	
7,706.0	76.40	93.30	7,208.0	1,180.3	-133.2	-276.0	3.76	3.44	
7,737.0	78.40	93.00	7,214.8	1,178.6	-103.0	-245.8	6.52	6.45	
7,769.0	83.00	92.60	7,220.0	1,177.1	-71.4	-214.3	14.43	14.37	
7,801.0	85.80	92.20	7,223.1	1,175.7	-39.6	-182.6	8.84	8.75	
7,832.0	86.20	92.40	7,225.2	1,174.5	-8.7	-151.8	1.44	1.29	
7,864.0	87.90	93.10	7,226.9	1,172.9	23.2	-119.9	5.74	5.31	
7,896.0	90.50	92.90	7,227.3	1,171.3	55.2	-88.0	8.15	8.12	

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7,928.0	91.40	92.70	7,226.8	1,169.7	87.1	-56.1	2.88	2.81	
7,991.0	91.90	92.60	7,225.0	1,166.8	150.0	6.7	0.81	0.79	
8,054.0	90.80	91.30	7,223.5	1,164.7	213.0	69.4	2.70	-1.75	
8,118.0	89.00	91.10	7,223.6	1,163.3	277.0	133.1	2.83	-2.81	
8,181.0	89.30	90.80	7,224.6	1,162.3	339.9	195.8	0.67	0.48	
8,244.0	87.90	91.40	7,226.1	1,161.1	402.9	258.4	2.42	-2.22	
8,307.0	88.10	93.60	7,228.3	1,158.3	465.8	321.2	3.50	0.32	
8,371.0	89.10	95.80	7,229.9	1,153.1	529.6	385.1	3.77	1.56	
8,434.0	89.00	96.30	7,230.9	1,146.4	592.2	448.1	0.81	-0.16	
8,497.0	89.40	95.30	7,231.8	1,140.1	654.9	511.1	1.71	0.63	
8,561.0	89.80	94.50	7,232.2	1,134.6	718.6	575.0	1.40	0.62	
8,624.0	88.60	93.20	7,233.1	1,130.4	781.5	637.9	2.81	-1.90	
8,688.0	87.40	94.50	7,235.3	1,126.1	845.3	701.8	2.76	-1.87	
8,783.0	86.80	98.20	7,240.2	1,115.6	939.6	796.6	3.94	-0.63	
8,878.0	87.20	97.40	7,245.1	1,102.7	1,033.6	891.5	0.94	0.42	
8,973.0	88.50	99.60	7,248.7	1,088.7	1,127.5	986.4	2.69	1.37	
9,068.0	90.80	99.80	7,249.3	1,072.7	1,221.1	1,081.3	2.43	2.42	
9,163.0	91.80	99.00	7,247.1	1,057.2	1,314.8	1,176.2	1.35	1.05	
9,258.0	90.20	98.80	7,245.5	1,042.5	1,408.6	1,271.1	1.70	-1.68	
9,353.0	90.10	98.10	7,245.2	1,028.5	1,502.6	1,366.1	0.74	-0.11	
9,448.0	92.30	98.70	7,243.2	1,014.6	1,596.5	1,461.0	2.40	2.32	
9,512.0	92.70	98.40	7,240.4	1,005.1	1,659.8	1,524.9	0.78	0.62	
9,575.0	92.00	97.60	7,237.8	996.4	1,722.1	1,587.8	1.69	-1.11	
9,638.0	89.20	97.20	7,237.2	988.3	1,784.6	1,650.8	4.49	-4.44	
9,701.0	89.20	97.00	7,238.1	980.5	1,847.1	1,713.8	0.32	0.00	
9,765.0	89.80	96.40	7,238.6	973.0	1,910.6	1,777.8	1.33	0.94	
9,828.0	90.40	95.50	7,238.5	966.5	1,973.3	1,840.8	1.72	0.95	
9,923.0	90.20	95.80	7,238.0	957.1	2,067.8	1,935.8	0.38	-0.21	
10,018.0	90.10	97.00	7,237.8	946.5	2,162.2	2,030.8	1.27	-0.11	
10,113.0	88.90	97.20	7,238.6	934.8	2,256.5	2,125.8	1.28	-1.26	
10,208.0	89.50	96.50	7,239.9	923.5	2,350.8	2,220.8	0.97	0.63	
10,303.0	89.40	97.70	7,240.8	911.7	2,445.1	2,315.8	1.27	-0.11	
10,399.0	89.10	96.40	7,242.1	899.9	2,540.4	2,411.8	1.39	-0.31	
10,494.0	89.20	95.30	7,243.5	890.3	2,634.9	2,506.7	1.16	0.11	
10,589.0	89.20	95.30	7,244.8	881.5	2,729.5	2,601.7	0.00	0.00	
10,683.0	88.70	95.90	7,246.5	872.3	2,823.0	2,695.6	0.83	-0.53	
10,779.0	88.50	95.00	7,248.9	863.2	2,918.5	2,791.6	0.96	-0.21	
10,878.0	88.70	97.50	7,251.3	852.4	3,016.9	2,890.5	2.53	0.20	
10,973.0	87.20	97.50	7,254.7	840.0	3,111.0	2,985.4	1.58	-1.58	
11,069.0	87.00	97.20	7,259.6	827.8	3,206.1	3,081.3	0.38	-0.21	
11,164.0	88.70	97.80	7,263.1	815.4	3,300.2	3,176.2	1.90	1.79	
11,259.0	89.40	96.40	7,264.7	803.6	3,394.5	3,271.2	1.65	0.74	
11,354.0	89.30	95.80	7,265.8	793.5	3,488.9	3,366.2	0.64	-0.11	
11,449.0	87.90	96.80	7,268.1	783.1	3,583.3	3,461.2	1.81	-1.47	
11,544.0	88.10	95.40	7,271.4	773.0	3,677.7	3,556.1	1.49	0.21	
11,638.0	87.60	96.50	7,274.9	763.3	3,771.1	3,650.0	1.28	-0.53	
11,717.0	87.10	95.80	7,278.6	754.8	3,849.6	3,728.9	1.09	-0.63	
11,767.0	87.10	95.80	7,281.1	749.8	3,899.3	3,778.8	0.00	0.00	

Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Sheley 3B-4H
Project:	DJ Wattenberg	TVD Reference:	KBE @ 4925.0ft (Ensign 124)
Site:	SWSW S4-T2N-R67W (Sheley)	MD Reference:	KBE @ 4925.0ft (Ensign 124)
Well:	Sheley 3B-4H	North Reference:	True
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	HZ	Database:	USA EDM 5000 Multi Users DB

Targets									
Target Name	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- hit/miss target	(°)	(°)	(ft)	(ft)	(ft)	(ft)	(ft)		
- Shape									
Sheley 3B-4H PBHL	0.00	0.00	7,266.1	732.5	3,904.3	1,303,200.38	3,171,194.66	40.164050	-104.887470
- survey misses target center by 23.4ft at 11767.0ft MD (7281.1 TVD, 749.8 N, 3899.3 E)									
- Point									
Sheley 3B-4H TGT #2	0.00	0.00	7,242.6	942.3	2,195.7	1,303,398.63	3,169,484.68	40.164626	-104.893583
- survey misses target center by 4.8ft at 10051.8ft MD (7237.8 TVD, 942.4 N, 2195.8 E)									
- Point									
Sheley 3B-4H LP	0.00	0.00	7,225.0	1,234.7	-185.4	1,303,674.90	3,167,101.66	40.165429	-104.902103
- survey misses target center by 59.8ft at 7657.9ft MD (7196.0 TVD, 1182.6 N, -179.7 E)									
- Point									
Sheley 3B-4H TGT #1	0.00	0.00	7,242.0	1,088.6	1,004.7	1,303,536.83	3,168,292.67	40.165028	-104.897845
- survey misses target center by 17.9ft at 8851.2ft MD (7243.8 TVD, 1106.2 N, 1007.0 E)									
- Point									

Survey Annotations					
Measured Depth	Vertical Depth	Local Coordinates			
(ft)	(ft)	+N/-S	+E/-W		
(ft)	(ft)	(ft)	(ft)	Comment	
11,717.0	7,278.6	754.8	3,849.6	Last Cathedral Survey @ 11717' MD	
11,767.0	7,281.1	749.8	3,899.3	Projection to Bit @ 11767' MD	

Checked By: _____ Approved By: _____ Date: _____