





Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Sheley 3A-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 3A-4H	North Reference:	True
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	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 3A-4H					
Well Position	+N/-S	0.0 ft	Northing:	1,302,431.47 ft	Latitude:	40.162012
	+E/-W	0.0 ft	Easting:	3,167,295.47 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	9/11/2012	8.75	66.79	52,860

Design	FINAL				
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	92.00	

Survey Program	Date	10/15/2012			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
162.0	11,695.0	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		
162.0	0.30	107.30	162.0	-0.1	0.4	0.4	0.19	0.19		
255.0	0.40	20.00	255.0	0.1	0.7	0.7	0.53	0.11		
348.0	1.00	300.50	348.0	0.8	0.2	0.1	1.08	0.65		
441.0	2.00	293.50	441.0	1.9	-2.0	-2.1	1.09	1.08		
534.0	3.40	294.90	533.9	3.7	-6.0	-6.1	1.51	1.51		
627.0	4.30	287.70	626.6	5.9	-11.8	-12.0	1.10	0.97		
720.0	4.90	283.40	719.3	7.9	-19.0	-19.3	0.74	0.65		
782.0	5.80	278.80	781.1	9.0	-24.7	-25.0	1.61	1.45		
905.0	5.80	274.20	903.4	10.4	-37.0	-37.4	0.38	0.00		
998.0	7.10	280.80	995.9	11.8	-47.4	-47.8	1.61	1.40		
1,091.0	9.30	280.90	1,087.9	14.3	-60.4	-60.9	2.37	2.37		
1,184.0	10.70	278.00	1,179.5	16.9	-76.3	-76.9	1.60	1.51		

Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Sheley 3A-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 3A-4H	North Reference:	True
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	USA EDM 5000 Multi Users DB

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
1,277.0	11.50	275.80	1,270.7	19.1	-94.1	-94.7	0.97	0.86	
1,370.0	10.60	274.40	1,362.0	20.7	-111.9	-112.5	1.01	-0.97	
1,463.0	11.30	274.20	1,453.3	22.0	-129.5	-130.2	0.75	0.75	
1,558.0	11.00	278.90	1,546.5	24.1	-147.7	-148.5	1.01	-0.32	
1,653.0	11.60	279.80	1,639.7	27.1	-166.1	-166.9	0.66	0.63	
1,748.0	12.10	275.00	1,732.7	29.6	-185.4	-186.3	1.16	0.53	
1,843.0	12.40	271.80	1,825.5	30.8	-205.5	-206.5	0.78	0.32	
1,938.0	13.40	278.60	1,918.1	32.7	-226.6	-227.6	1.91	1.05	
2,033.0	11.70	277.10	2,010.8	35.6	-247.0	-248.1	1.82	-1.79	
2,128.0	13.00	275.70	2,103.6	37.8	-267.2	-268.4	1.40	1.37	
2,223.0	13.30	279.40	2,196.2	40.7	-288.6	-289.9	0.94	0.32	
2,318.0	12.00	277.70	2,288.8	43.8	-309.2	-310.6	1.42	-1.37	
2,413.0	12.80	277.20	2,381.6	46.4	-329.4	-330.9	0.85	0.84	
2,508.0	11.20	277.60	2,474.5	49.0	-349.0	-350.5	1.69	-1.68	
2,603.0	12.00	277.00	2,567.6	51.4	-368.0	-369.5	0.85	0.84	
2,698.0	13.00	281.50	2,660.4	54.7	-388.3	-389.9	1.47	1.05	
2,793.0	12.00	282.80	2,753.1	59.0	-408.4	-410.2	1.09	-1.05	
2,889.0	12.80	277.80	2,846.9	62.7	-428.6	-430.5	1.39	0.83	
2,984.0	11.20	278.30	2,939.8	65.5	-448.2	-450.2	1.69	-1.68	
3,079.0	12.40	282.40	3,032.8	69.0	-467.3	-469.4	1.54	1.26	
3,174.0	12.60	283.30	3,125.5	73.6	-487.3	-489.6	0.29	0.21	
3,269.0	10.50	281.90	3,218.6	77.7	-505.9	-508.3	2.23	-2.21	
3,364.0	10.80	276.90	3,312.0	80.6	-523.2	-525.7	1.02	0.32	
3,459.0	11.10	276.90	3,405.2	82.8	-541.1	-543.7	0.32	0.32	
3,554.0	12.70	275.90	3,498.2	84.9	-560.6	-563.2	1.70	1.68	
3,649.0	11.90	275.80	3,591.0	87.0	-580.7	-583.4	0.84	-0.84	
3,744.0	12.00	275.80	3,683.9	89.0	-600.3	-603.0	0.11	0.11	
3,839.0	12.30	276.00	3,776.8	91.0	-620.2	-623.0	0.32	0.32	
3,934.0	12.30	281.00	3,869.6	94.0	-640.1	-643.0	1.12	0.00	
4,030.0	14.70	280.00	3,963.0	98.1	-662.2	-665.2	2.51	2.50	
4,125.0	14.30	278.70	4,055.0	102.0	-685.7	-688.8	0.54	-0.42	
4,220.0	13.00	279.50	4,147.3	105.5	-707.8	-711.0	1.38	-1.37	
4,315.0	8.70	284.00	4,240.6	109.0	-725.3	-728.7	4.61	-4.53	
4,410.0	9.70	281.50	4,334.3	112.3	-740.1	-743.6	1.13	1.05	
4,505.0	9.20	282.50	4,428.0	115.6	-755.4	-759.0	0.55	-0.53	
4,600.0	8.80	282.50	4,521.9	118.8	-769.9	-773.6	0.42	-0.42	
4,695.0	7.10	282.60	4,616.0	121.6	-782.7	-786.5	1.79	-1.79	
4,790.0	5.30	271.30	4,710.4	123.0	-792.8	-796.6	2.28	-1.89	
4,885.0	4.90	273.70	4,805.0	123.4	-801.3	-805.1	0.48	-0.42	
4,981.0	4.60	273.70	4,900.7	123.9	-809.2	-813.0	0.31	-0.31	
5,076.0	4.40	277.60	4,995.4	124.6	-816.6	-820.5	0.38	-0.21	
5,171.0	2.70	287.40	5,090.2	125.8	-822.4	-826.3	1.89	-1.79	
5,266.0	2.50	289.20	5,185.1	127.1	-826.5	-830.4	0.23	-0.21	
5,361.0	0.90	310.10	5,280.1	128.3	-829.0	-833.0	1.78	-1.68	
5,456.0	0.90	308.50	5,375.1	129.2	-830.1	-834.1	0.03	0.00	
5,551.0	0.40	3.30	5,470.1	130.0	-830.7	-834.7	0.78	-0.53	
5,646.0	0.30	268.10	5,565.1	130.3	-830.9	-835.0	0.55	-0.11	
5,741.0	0.70	323.40	5,660.1	130.8	-831.5	-835.6	0.61	0.42	
5,836.0	0.50	289.90	5,755.0	131.4	-832.3	-836.3	0.42	-0.21	
5,932.0	0.70	289.70	5,851.0	131.8	-833.2	-837.3	0.21	0.21	
6,027.0	1.10	310.10	5,946.0	132.5	-834.5	-838.6	0.53	0.42	
6,122.0	0.20	65.80	6,041.0	133.2	-835.0	-839.1	1.26	-0.95	
6,217.0	0.40	107.80	6,136.0	133.2	-834.5	-838.7	0.30	0.21	

Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Sheley 3A-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 3A-4H	North Reference:	True
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	USA EDM 5000 Multi Users DB

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
6,312.0	0.40	16.60	6,231.0	133.4	-834.1	-838.3	0.60	0.00	
6,407.0	0.20	78.40	6,326.0	133.7	-833.9	-838.0	0.37	-0.21	
6,502.0	0.70	21.10	6,421.0	134.3	-833.5	-837.7	0.65	0.53	
6,565.0	1.40	108.10	6,484.0	134.4	-832.6	-836.8	2.43	1.11	
6,597.0	3.90	119.20	6,516.0	133.8	-831.3	-835.5	7.94	7.81	
6,629.0	6.00	116.40	6,547.9	132.5	-828.9	-833.0	6.60	6.56	
6,661.0	8.00	112.20	6,579.6	130.9	-825.3	-829.4	6.45	6.25	
6,692.0	10.60	106.50	6,610.2	129.3	-820.6	-824.6	8.89	8.39	
6,724.0	13.60	100.90	6,641.5	127.7	-814.0	-818.0	10.06	9.37	
6,756.0	16.10	99.40	6,672.4	126.3	-806.0	-809.9	7.90	7.81	
6,787.0	18.20	97.20	6,702.0	125.0	-796.9	-800.8	7.09	6.77	
6,819.0	21.30	94.90	6,732.2	123.9	-786.2	-790.0	9.99	9.69	
6,851.0	24.10	92.80	6,761.7	123.1	-773.9	-777.7	9.11	8.75	
6,882.0	27.60	90.80	6,789.6	122.6	-760.3	-764.2	11.63	11.29	
6,914.0	31.20	91.00	6,817.4	122.4	-744.6	-748.5	11.25	11.25	
6,946.0	34.10	92.40	6,844.4	121.9	-727.4	-731.2	9.36	9.06	
6,972.0	36.80	91.70	6,865.6	121.3	-712.3	-716.1	10.50	10.38	
7,009.0	39.10	91.50	6,894.7	120.7	-689.6	-693.4	6.23	6.22	
7,041.0	42.20	90.90	6,919.0	120.3	-668.7	-672.5	9.76	9.69	
7,072.0	44.80	91.40	6,941.5	119.8	-647.4	-651.2	8.46	8.39	
7,104.0	47.40	93.30	6,963.7	118.9	-624.4	-628.1	9.18	8.12	
7,136.0	48.80	94.00	6,985.1	117.4	-600.6	-604.3	4.67	4.37	
7,167.0	50.10	93.10	7,005.2	115.9	-577.1	-580.8	4.74	4.19	
7,199.0	52.30	93.70	7,025.3	114.4	-552.2	-555.9	7.03	6.87	
7,231.0	54.00	92.90	7,044.4	113.0	-526.6	-530.3	5.68	5.31	
7,262.0	55.50	92.90	7,062.3	111.7	-501.4	-504.9	4.84	4.84	
7,294.0	56.70	92.10	7,080.2	110.5	-474.8	-478.4	4.29	3.75	
7,325.0	58.10	92.30	7,096.9	109.5	-448.7	-452.3	4.55	4.52	
7,357.0	60.10	92.90	7,113.3	108.3	-421.3	-424.8	6.45	6.25	
7,389.0	62.30	92.10	7,128.7	107.0	-393.3	-396.8	7.22	6.87	
7,420.0	63.60	92.00	7,142.8	106.1	-365.7	-369.2	4.20	4.19	
7,452.0	65.10	92.30	7,156.7	105.0	-336.9	-340.3	4.76	4.69	
7,466.0	66.10	92.70	7,162.5	104.4	-324.1	-327.6	7.60	7.14	
7,538.0	73.90	94.60	7,187.1	100.1	-256.7	-260.0	11.11	10.83	
7,570.0	77.20	93.90	7,195.1	97.8	-225.8	-229.0	10.53	10.31	
7,601.0	80.20	92.70	7,201.1	96.0	-195.4	-198.7	10.40	9.68	
7,633.0	81.50	91.70	7,206.2	94.8	-163.9	-167.1	5.10	4.06	
7,665.0	81.00	91.60	7,211.1	93.9	-132.2	-135.4	1.59	-1.56	
7,696.0	81.40	91.80	7,215.8	93.0	-101.6	-104.8	1.44	1.29	
7,728.0	83.20	91.70	7,220.1	92.0	-69.9	-73.1	5.63	5.62	
7,760.0	85.60	92.40	7,223.2	90.9	-38.1	-41.2	7.81	7.50	
7,792.0	88.10	91.70	7,225.0	89.8	-6.2	-9.3	8.11	7.81	
7,823.0	88.30	91.10	7,226.0	89.0	24.8	21.7	2.04	0.65	
7,855.0	88.80	91.10	7,226.8	88.4	56.8	53.7	1.56	1.56	
7,887.0	89.00	90.80	7,227.4	87.9	88.8	85.7	1.13	0.62	
7,919.0	89.20	90.70	7,227.9	87.4	120.8	117.6	0.70	0.62	
7,950.0	89.20	90.70	7,228.3	87.1	151.8	148.6	0.00	0.00	
7,982.0	89.60	90.10	7,228.7	86.8	183.8	180.6	2.25	1.25	
8,045.0	89.50	90.40	7,229.2	86.6	246.8	243.6	0.50	-0.16	
8,090.0	89.90	90.40	7,229.4	86.3	291.8	288.6	0.89	0.89	
8,140.0	89.80	92.10	7,229.5	85.2	341.7	338.6	3.41	-0.20	
8,185.0	90.10	92.10	7,229.6	83.5	386.7	383.6	0.67	0.67	
8,235.0	89.30	91.90	7,229.8	81.8	436.7	433.6	1.65	-1.60	

Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Sheley 3A-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 3A-4H	North Reference:	True
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	USA EDM 5000 Multi Users DB

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
8,280.0	89.20	92.30	7,230.4	80.1	481.6	478.6	0.92	-0.22	
8,331.0	89.00	93.00	7,231.2	77.8	532.6	529.5	1.43	-0.39	
8,376.0	89.20	93.20	7,231.9	75.3	577.5	574.5	0.63	0.44	
8,426.0	87.90	92.50	7,233.2	72.8	627.4	624.5	2.95	-2.60	
8,521.0	87.50	92.00	7,237.0	69.1	722.3	719.4	0.67	-0.42	
8,616.0	88.80	92.30	7,240.1	65.6	817.2	814.4	1.40	1.37	
8,674.5	88.80	91.56	7,241.3	63.6	875.6	872.8	1.26	0.00	Sheley 3A-4H TGT #1
8,711.0	88.80	91.10	7,242.1	62.7	912.1	909.4	1.26	0.00	
8,806.0	89.70	91.20	7,243.3	60.8	1,007.1	1,004.3	0.95	0.95	
8,901.0	90.80	91.40	7,242.9	58.7	1,102.0	1,099.3	1.18	1.16	
8,996.0	91.50	90.90	7,241.0	56.8	1,197.0	1,194.3	0.91	0.74	
9,092.0	90.40	91.70	7,239.4	54.6	1,293.0	1,290.3	1.42	-1.15	
9,187.0	89.30	92.30	7,239.6	51.3	1,387.9	1,385.3	1.32	-1.16	
9,282.0	89.20	92.10	7,240.9	47.6	1,482.8	1,480.3	0.24	-0.11	
9,377.0	89.50	92.10	7,242.0	44.2	1,577.8	1,575.3	0.32	0.32	
9,472.0	88.10	91.90	7,244.0	40.8	1,672.7	1,670.2	1.49	-1.47	
9,567.0	88.40	91.50	7,246.9	38.0	1,767.6	1,765.2	0.53	0.32	
9,662.0	89.40	91.40	7,248.7	35.6	1,862.5	1,860.2	1.06	1.05	
9,757.0	90.10	91.30	7,249.1	33.4	1,957.5	1,955.2	0.74	0.74	
9,774.6	90.01	91.34	7,249.1	33.0	1,975.1	1,972.7	0.57	-0.53	Sheley 3A-4H TGT #2
9,852.0	89.60	91.50	7,249.3	31.1	2,052.5	2,050.2	0.57	-0.53	
9,947.0	88.20	90.50	7,251.2	29.4	2,147.5	2,145.1	1.81	-1.47	
10,037.0	90.30	92.00	7,252.3	27.4	2,237.4	2,235.1	2.87	2.33	
10,132.0	90.40	91.90	7,251.8	24.2	2,332.4	2,330.1	0.15	0.11	
10,227.0	89.90	92.30	7,251.5	20.7	2,427.3	2,425.1	0.67	-0.53	
10,322.0	89.10	92.20	7,252.3	17.0	2,522.2	2,520.1	0.85	-0.84	
10,418.0	89.00	92.30	7,253.9	13.2	2,618.1	2,616.1	0.15	-0.10	
10,513.0	88.20	92.80	7,256.3	9.0	2,713.0	2,711.0	0.99	-0.84	
10,608.0	88.20	92.30	7,259.2	4.8	2,807.9	2,806.0	0.53	0.00	
10,703.0	90.80	93.00	7,260.1	0.4	2,902.8	2,901.0	2.83	2.74	
10,798.0	89.50	92.40	7,259.8	-4.1	2,997.6	2,996.0	1.51	-1.37	
10,893.0	90.10	91.70	7,260.2	-7.5	3,092.6	3,091.0	0.97	0.63	
10,988.0	90.00	91.50	7,260.1	-10.1	3,187.5	3,186.0	0.24	-0.11	
11,083.0	89.90	91.70	7,260.2	-12.8	3,282.5	3,281.0	0.24	-0.11	
11,178.0	88.90	90.90	7,261.1	-15.0	3,377.5	3,375.9	1.35	-1.05	
11,273.0	89.60	91.90	7,262.4	-17.3	3,472.4	3,470.9	1.28	0.74	
11,368.0	88.80	92.80	7,263.7	-21.2	3,567.3	3,565.9	1.27	-0.84	
11,462.0	87.80	92.70	7,266.5	-25.7	3,661.2	3,659.9	1.07	-1.06	
11,557.0	89.00	92.60	7,269.2	-30.1	3,756.1	3,754.8	1.27	1.26	
11,640.0	88.60	92.30	7,270.9	-33.6	3,839.0	3,837.8	0.60	-0.48	Last Cathedral Survey @ 11,640' MD
11,695.0	88.60	92.30	7,272.2	-35.8	3,893.9	3,892.8	0.00	0.00	Projection to Bit @ 11,695' MD - Sheley 3A-4H P

Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Sheley 3A-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 3A-4H	North Reference:	True
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	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 3A-4H TGT #2	0.00	0.00	7,250.0	22.9	1,974.8	1,302,467.71	3,169,270.10	40.162075	-104.894374
- actual wellpath misses target center by 10.1ft at 9774.6ft MD (7249.1 TVD, 33.0 N, 1975.1 E)									
- Point									
Sheley 3A-4H TGT #1	0.00	0.00	7,242.0	61.3	875.5	1,302,498.67	3,168,170.53	40.162181	-104.898307
- actual wellpath misses target center by 2.4ft at 8674.5ft MD (7241.3 TVD, 63.6 N, 875.6 E)									
- Point									
Sheley 3A-4H PBHL (9.2	0.00	0.00	7,275.0	-44.3	3,898.8	1,302,413.51	3,171,194.51	40.161890	-104.887490
- actual wellpath misses target center by 10.2ft at 11695.0ft MD (7272.2 TVD, -35.8 N, 3893.9 E)									
- Point									

Design Annotations				
Measured Depth	Vertical Depth	Local Coordinates		Comment
(ft)	(ft)	+N/-S (ft)	+E/-W (ft)	
11,640.0	7,270.9	-33.6	3,839.0	Last Cathedral Survey @ 11,640' MD
11,695.0	7,272.2	-35.8	3,893.9	Projection to Bit @ 11,695' MD

Checked By: _____ Approved By: _____ Date: _____