





Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well DV08B-23 H23 4101
Project:	North Piceance	TVD Reference:	WELL @ 6776.0ft (Patterson 326)
Site:	H23 4101	MD Reference:	WELL @ 6776.0ft (Patterson 326)
Well:	DV08B-23 H23 4101	North Reference:	True
Wellbore:	VH	Survey Calculation Method:	Minimum Curvature
Design:	VH	Database:	USA EDM 5000 Multi Users DB

Project	North Piceance		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Central Zone		

Site	H23 4101			
Site Position:		Northing:	1,691,517.95 ft	Latitude: 39.68868
From:	Lat/Long	Easting:	2,101,712.46 ft	Longitude: -108.69256
Position Uncertainty:	0.0 ft	Slot Radius:	13.200 in	Grid Convergence: -2.01 °

Well	DV08B-23 H23 4101			
Well Position	+N/-S	0.0 ft	Northing:	1,691,549.82 ft
	+E/-W	0.0 ft	Easting:	2,101,726.88 ft
Position Uncertainty	0.0 ft	Wellhead Elevation:	ft	Ground Level: 6,754.0 ft

Wellbore	VH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	5/28/2012	10.56	65.74	52,161

Design	VH			
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	200.69

Survey Program	Date	6/27/2012		
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
204.0	6,090.0	Survey #1 (VH)	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	
204.0	1.30	211.30	204.0	-2.0	-1.2	2.3	0.64	0.64	
297.0	1.40	219.60	297.0	-3.8	-2.5	4.4	0.24	0.11	
389.0	0.80	201.40	388.9	-5.2	-3.4	6.1	0.75	-0.65	
481.0	0.60	193.60	480.9	-6.3	-3.8	7.2	0.24	-0.22	
576.0	0.40	160.10	575.9	-7.1	-3.8	8.0	0.36	-0.21	
670.0	0.30	108.10	669.9	-7.5	-3.4	8.2	0.34	-0.11	
775.0	0.40	75.10	774.9	-7.5	-2.8	8.0	0.21	0.10	
898.0	0.70	24.60	897.9	-6.7	-2.1	7.0	0.44	0.24	
993.0	1.40	49.90	992.9	-5.4	-1.0	5.4	0.87	0.74	
1,087.0	1.10	17.90	1,086.9	-3.8	0.2	3.5	0.79	-0.32	
1,182.0	1.40	73.90	1,181.9	-2.6	1.6	1.9	1.27	0.32	
1,277.0	1.10	72.20	1,276.8	-2.0	3.6	0.6	0.32	-0.32	

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Wellbore:	VH	Survey Calculation Method:	Minimum Curvature
Design:	VH	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
1,371.0	1.20	72.50	1,370.8	-1.4	5.4	-0.6	0.11	0.11	
1,466.0	1.10	84.70	1,465.8	-1.0	7.2	-1.6	0.28	-0.11	
1,561.0	1.30	90.60	1,560.8	-1.0	9.2	-2.3	0.25	0.21	
1,655.0	0.70	332.50	1,654.8	-0.5	10.0	-3.1	1.85	-0.64	
1,750.0	0.70	194.10	1,749.8	-0.5	9.6	-2.9	1.38	0.00	
1,845.0	1.90	177.90	1,844.7	-2.7	9.5	-0.9	1.31	1.26	
1,940.0	2.50	175.10	1,939.7	-6.3	9.8	2.4	0.64	0.63	
2,035.0	3.10	158.00	2,034.6	-10.7	10.9	6.2	1.08	0.63	
2,130.0	4.40	154.90	2,129.4	-16.4	13.4	10.6	1.38	1.37	
2,224.0	4.80	163.50	2,223.1	-23.5	16.1	16.3	0.85	0.43	
2,319.0	5.20	172.90	2,317.7	-31.5	17.7	23.2	0.96	0.42	
2,414.0	6.30	169.50	2,412.2	-40.9	19.2	31.5	1.21	1.16	
2,509.0	7.80	180.30	2,506.5	-52.5	20.1	42.0	2.10	1.58	
2,603.0	8.50	186.10	2,599.6	-65.8	19.3	54.7	1.15	0.74	
2,698.0	9.60	188.30	2,693.4	-80.6	17.5	69.3	1.21	1.16	
2,793.0	9.00	190.00	2,787.1	-95.8	15.0	84.3	0.69	-0.63	
2,887.0	9.00	193.20	2,880.0	-110.2	12.1	98.8	0.53	0.00	
2,982.0	8.90	206.40	2,973.8	-124.0	7.1	113.5	2.16	-0.11	
3,077.0	8.40	227.60	3,067.8	-135.3	-1.3	127.0	3.38	-0.53	
3,171.0	8.70	235.40	3,160.7	-143.9	-12.2	139.0	1.27	0.32	
3,266.0	8.20	232.40	3,254.7	-152.1	-23.5	150.6	0.70	-0.53	
3,361.0	8.50	235.10	3,348.7	-160.3	-34.6	162.2	0.52	0.32	
3,455.0	8.00	231.80	3,441.7	-168.3	-45.5	173.5	0.73	-0.53	
3,550.0	7.60	223.70	3,535.8	-176.9	-55.0	185.0	1.23	-0.42	
3,645.0	5.50	231.20	3,630.2	-184.3	-62.9	194.7	2.38	-2.21	
3,740.0	6.50	225.50	3,724.7	-191.0	-70.3	203.5	1.22	1.05	
3,835.0	6.10	213.10	3,819.1	-199.0	-76.9	213.3	1.49	-0.42	
3,929.0	4.20	222.70	3,912.7	-205.7	-81.9	221.4	2.21	-2.02	
4,024.0	5.20	217.90	4,007.4	-211.6	-86.9	228.7	1.13	1.05	
4,119.0	4.30	225.20	4,102.1	-217.5	-92.1	236.0	1.14	-0.95	
4,214.0	3.60	229.90	4,196.9	-222.0	-96.9	241.9	0.81	-0.74	
4,308.0	2.90	205.40	4,290.7	-226.0	-100.2	246.8	1.64	-0.74	
4,403.0	2.50	222.00	4,385.6	-229.7	-102.6	251.2	0.92	-0.42	
4,498.0	1.00	241.60	4,480.6	-231.7	-104.7	253.7	1.68	-1.58	
4,592.0	1.50	260.60	4,574.5	-232.2	-106.7	255.0	0.68	0.53	
4,687.0	0.30	249.60	4,669.5	-232.5	-108.1	255.7	1.27	-1.26	
4,782.0	1.20	254.70	4,764.5	-232.9	-109.3	256.5	0.95	0.95	
4,878.0	0.40	280.60	4,860.5	-233.1	-110.6	257.1	0.89	-0.83	
4,972.0	0.90	275.60	4,954.5	-233.0	-111.7	257.4	0.53	0.53	
5,067.0	0.90	286.50	5,049.5	-232.7	-113.1	257.6	0.18	0.00	
5,162.0	0.70	8.90	5,144.5	-231.9	-113.8	257.1	1.12	-0.21	
5,257.0	1.80	15.90	5,239.5	-229.9	-113.3	255.1	1.17	1.16	
5,351.0	1.50	39.10	5,333.4	-227.5	-112.1	252.4	0.77	-0.32	
5,446.0	0.90	35.30	5,428.4	-225.9	-110.9	250.5	0.64	-0.63	
5,541.0	1.30	58.10	5,523.4	-224.8	-109.5	248.9	0.62	0.42	
5,635.0	1.60	82.30	5,617.4	-224.0	-107.3	247.5	0.72	0.32	
5,730.0	1.30	110.50	5,712.3	-224.2	-105.0	246.8	0.80	-0.32	
5,825.0	0.60	216.90	5,807.3	-225.0	-104.3	247.3	1.66	-0.74	
5,919.0	1.00	240.70	5,901.3	-225.8	-105.3	248.4	0.54	0.43	
6,030.0	1.60	266.20	6,012.3	-226.4	-107.7	249.8	0.74	0.54	Last Cathedral Survey @ 6,030' MD
6,090.0	1.60	266.20	6,072.3	-226.5	-109.3	250.5	0.00	0.00	Projection to Bit @ 6,090' MD - DV08B-23 H23 4

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Design:	VH	Database:	USA EDM 5000 Multi Users DB

Targets									
Target Name									
- hit/miss target	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- Shape	(°)	(°)	(ft)	(ft)	(ft)	(ft)	(ft)		
DV08B-23 H23 4101 PB	0.00	0.00	6,150.0	-1,128.2	-203.3	1,690,429.46	2,101,484.07	39.68567	-108.69324
- actual wellpath misses target center by 909.9ft at 6090.0ft MD (6072.3 TVD, -226.5 N, -109.3 E)									
- Point									
DV08B-23 H23 4101 PB	0.00	0.00	6,150.0	-231.7	-108.7	1,691,322.09	2,101,610.15	39.68813	-108.69290
- actual wellpath misses target center by 77.9ft at 6090.0ft MD (6072.3 TVD, -226.5 N, -109.3 E)									
- Point									

Design Annotations				
Measured Depth	Vertical Depth	Local Coordinates		Comment
(ft)	(ft)	+N/-S (ft)	+E/-W (ft)	
6,030.0	6,012.3	-226.4	-107.7	Last Cathedral Survey @ 6,030' MD
6,090.0	6,072.3	-226.5	-109.3	Projection to Bit @ 6,090' MD

Checked By: _____ Approved By: _____ Date: _____