

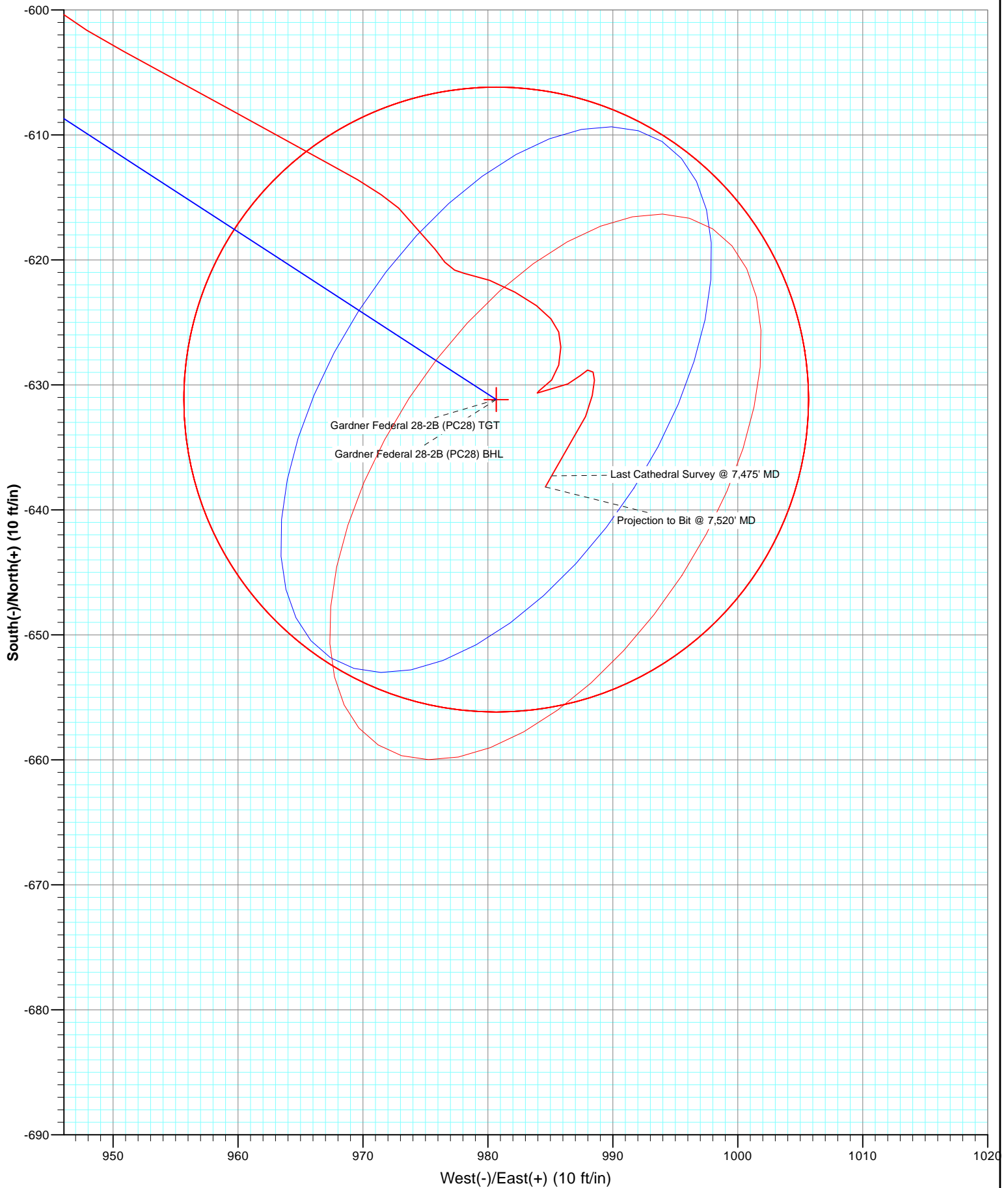
FORMATION TOP DETAILS

No formation data is available



Azimuths to True North
 Magnetic North: 10.21°

Magnetic Field
 Strength: 52092.9nT
 Dip Angle: 65.64°
 Date: 7/13/2012
 Model: IGRF2010



Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Gardner Federal 28-2B (PC28)
Project:	S. Piceance (Parachute)	TVD Reference:	KBE @ 6442.0ft (Nabors M13)
Site:	NENW Sec28-T7S-R95W (PC-28)	MD Reference:	KBE @ 6442.0ft (Nabors M13)
Well:	Gardner Federal 28-2B (PC28)	North Reference:	True
Wellbore:	DD	Survey Calculation Method:	Minimum Curvature
Design:	DD	Database:	USA EDM 5000 Multi Users DB

Project	S. Piceance (Parachute), Garfield County, CO		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Central Zone		

Site	NENW Sec28-T7S-R95W (PC-28)			
Site Position:		Northing:	1,585,994.78 ft	Latitude: 39.415560
From:	Lat/Long	Easting:	2,292,840.18 ft	Longitude: -108.003350
Position Uncertainty:	0.0 ft	Slot Radius:	13.200 in	Grid Convergence: -1.58 °

Well	Gardner Federal 28-2B (PC28)			
Well Position	+N/-S	0.0 ft	Northing:	1,585,991.91 ft
	+E/-W	0.0 ft	Easting:	2,292,825.12 ft
Position Uncertainty	0.0 ft	Wellhead Elevation:	ft	Ground Level: 6,420.0 ft

Wellbore	DD				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	7/13/2012	10.21	65.64	52,093

Design	DD			
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	122.77

Survey Program	Date	8/6/2012		
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
140.0	1,155.0	Survey #1 (DD)	MWD	Geolink MWD
1,257.0	7,520.0	Survey #2 (DD)	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	1.60	122.10	140.0	-1.0	1.7	2.0	1.14	1.14	
170.0	2.90	143.40	170.0	-1.9	2.5	3.1	5.08	4.33	
201.0	4.00	148.30	200.9	-3.4	3.5	4.8	3.67	3.55	
232.0	4.50	143.90	231.8	-5.3	4.8	6.9	1.92	1.61	
263.0	4.50	142.40	262.7	-7.3	6.2	9.2	0.38	0.00	
293.0	4.80	130.30	292.6	-9.0	7.9	11.5	3.41	1.00	
324.0	4.90	126.40	323.5	-10.6	10.0	14.1	1.11	0.32	
417.0	6.40	118.10	416.1	-15.4	17.7	23.3	1.83	1.61	
510.0	8.50	120.20	508.3	-21.3	28.3	35.3	2.28	2.26	
602.0	11.20	122.70	598.9	-29.6	41.7	51.0	2.97	2.93	
694.0	14.10	125.10	688.7	-40.9	58.3	71.2	3.20	3.15	

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Well:	Gardner Federal 28-2B (PC28)	North Reference:	True
Wellbore:	DD	Survey Calculation Method:	Minimum Curvature
Design:	DD	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
787.0	14.50	125.70	778.8	-54.2	77.1	94.1	0.46	0.43	
878.0	14.20	117.90	867.0	-66.0	96.2	116.6	2.15	-0.33	
968.0	14.10	119.60	954.2	-76.6	115.5	138.6	0.47	-0.11	
1,064.0	14.00	119.50	1,047.3	-88.1	135.7	161.8	0.11	-0.10	
1,155.0	14.30	117.40	1,135.6	-98.7	155.3	184.0	0.65	0.33	
1,257.0	13.80	120.20	1,234.5	-110.6	177.0	208.7	0.83	-0.49	
1,352.0	13.10	119.40	1,326.9	-121.6	196.2	230.8	0.76	-0.74	
1,447.0	14.10	122.30	1,419.3	-133.1	215.3	253.1	1.27	1.05	
1,542.0	15.10	123.70	1,511.2	-146.1	235.4	277.0	1.12	1.05	
1,637.0	14.20	122.60	1,603.1	-159.3	255.5	301.1	0.99	-0.95	
1,732.0	16.00	122.20	1,694.8	-172.5	276.4	325.8	1.90	1.89	
1,827.0	14.80	122.40	1,786.4	-186.0	297.7	351.0	1.26	-1.26	
1,921.0	14.80	119.30	1,877.3	-198.3	318.4	375.0	0.84	0.00	
2,016.0	14.90	123.70	1,969.1	-211.0	339.1	399.4	1.19	0.11	
2,110.0	13.70	124.70	2,060.2	-224.1	358.3	422.6	1.30	-1.28	
2,206.0	16.70	123.80	2,152.8	-238.2	379.1	447.7	3.13	3.12	
2,301.0	15.50	123.10	2,244.1	-252.7	401.1	474.1	1.28	-1.26	
2,396.0	14.40	124.00	2,335.9	-266.3	421.5	498.6	1.18	-1.16	
2,491.0	14.60	125.20	2,427.9	-279.8	441.1	522.3	0.38	0.21	
2,586.0	16.20	119.80	2,519.5	-293.3	462.4	547.5	2.26	1.68	
2,681.0	15.20	118.80	2,610.9	-305.9	484.8	573.2	1.09	-1.05	
2,776.0	16.30	123.50	2,702.4	-319.2	506.8	599.0	1.77	1.16	
2,870.0	16.30	123.50	2,792.6	-333.8	528.8	625.3	0.00	0.00	
2,965.0	15.40	123.10	2,884.0	-348.0	550.5	651.3	0.95	-0.95	
3,060.0	14.50	116.70	2,975.8	-360.3	571.7	675.7	1.98	-0.95	
3,155.0	15.30	119.80	3,067.6	-371.8	593.2	700.1	1.19	0.84	
3,250.0	14.80	119.50	3,159.3	-384.0	614.6	724.7	0.53	-0.53	
3,345.0	14.30	117.20	3,251.3	-395.4	635.6	748.5	0.80	-0.53	
3,440.0	14.90	122.60	3,343.2	-407.3	656.4	772.4	1.57	0.63	
3,535.0	14.50	120.90	3,435.1	-420.0	676.9	796.5	0.62	-0.42	
3,630.0	15.40	125.90	3,526.9	-433.5	697.3	821.0	1.65	0.95	
3,725.0	14.90	123.50	3,618.6	-447.7	717.7	845.8	0.84	-0.53	
3,819.0	14.30	123.60	3,709.5	-460.7	737.4	869.5	0.64	-0.64	
3,914.0	15.30	124.80	3,801.4	-474.4	757.5	893.7	1.10	1.05	
4,009.0	15.20	123.70	3,893.0	-488.5	778.2	918.7	0.32	-0.11	
4,104.0	14.80	124.10	3,984.8	-502.2	798.6	943.3	0.43	-0.42	
4,199.0	14.30	123.60	4,076.7	-515.5	818.4	967.1	0.54	-0.53	
4,294.0	13.90	122.70	4,168.9	-528.1	837.8	990.3	0.48	-0.42	
4,388.0	13.10	123.00	4,260.3	-540.0	856.2	1,012.2	0.85	-0.85	
4,483.0	12.80	124.60	4,352.9	-551.9	873.9	1,033.5	0.49	-0.32	
4,578.0	10.90	120.30	4,445.8	-562.4	890.3	1,053.0	2.20	-2.00	
4,673.0	10.60	122.00	4,539.2	-571.5	905.5	1,070.7	0.46	-0.32	
4,767.0	9.30	123.90	4,631.8	-580.4	919.1	1,087.0	1.43	-1.38	
4,862.0	8.60	127.00	4,725.6	-588.9	931.2	1,101.7	0.89	-0.74	
4,957.0	7.60	129.10	4,819.7	-597.1	941.7	1,115.0	1.10	-1.05	
5,051.0	5.90	117.50	4,913.0	-603.3	950.8	1,126.0	2.31	-1.81	
5,146.0	5.70	119.70	5,007.5	-607.9	959.2	1,135.6	0.31	-0.21	
5,241.0	5.30	117.90	5,102.1	-612.3	967.2	1,144.7	0.46	-0.42	
5,336.0	2.80	130.50	5,196.8	-615.8	972.9	1,151.4	2.78	-2.63	
5,431.0	2.60	147.40	5,291.7	-619.2	975.8	1,155.6	0.86	-0.21	
5,443.6	2.37	143.82	5,304.3	-619.6	976.1	1,156.1	2.19	-1.81	Gardner Federal 28-2B (PC28) TGT
5,526.0	1.40	94.60	5,386.7	-621.1	978.1	1,158.6	2.19	-1.18	
5,621.0	1.20	118.20	5,481.7	-621.6	980.1	1,160.6	0.60	-0.21	

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Well:	Gardner Federal 28-2B (PC28)	North Reference:	True
Wellbore:	DD	Survey Calculation Method:	Minimum Curvature
Design:	DD	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
5,716.0	1.50	112.60	5,576.6	-622.6	982.2	1,162.8	0.34	0.32	
5,811.0	1.00	136.00	5,671.6	-623.7	983.9	1,164.9	0.74	-0.53	
5,906.0	0.90	128.40	5,766.6	-624.7	985.0	1,166.4	0.17	-0.11	
6,001.0	0.70	176.80	5,861.6	-625.8	985.7	1,167.5	0.72	-0.21	
6,096.0	0.80	168.10	5,956.6	-627.0	985.8	1,168.3	0.16	0.11	
6,191.0	1.00	201.30	6,051.6	-628.4	985.7	1,168.9	0.58	0.21	
6,286.0	0.60	211.20	6,146.6	-629.6	985.1	1,169.1	0.44	-0.42	
6,381.0	1.10	239.70	6,241.6	-630.5	984.1	1,168.7	0.67	0.53	
6,476.0	0.90	65.70	6,336.5	-630.6	984.0	1,168.7	2.10	-0.21	
6,571.0	0.70	83.50	6,431.5	-630.3	985.2	1,169.6	0.33	-0.21	
6,666.0	0.80	65.00	6,526.5	-629.9	986.4	1,170.4	0.27	0.11	
6,760.0	0.70	46.10	6,620.5	-629.3	987.4	1,170.8	0.28	-0.11	
6,855.0	0.20	77.70	6,715.5	-628.8	988.0	1,171.1	0.57	-0.53	
6,950.0	0.40	125.70	6,810.5	-629.0	988.4	1,171.5	0.32	0.21	
7,045.0	0.60	198.70	6,905.5	-629.6	988.5	1,172.0	0.65	0.21	
7,139.0	0.90	180.40	6,999.5	-630.8	988.4	1,172.5	0.40	0.32	
7,234.0	1.30	209.70	7,094.5	-632.5	987.8	1,173.0	0.71	0.42	
7,466.5	1.30	209.70	7,326.9	-637.1	985.2	1,173.3	0.00	0.00	Gardner Federal 28-2B (PC28) BHL
7,475.0	1.30	209.70	7,335.4	-637.3	985.1	1,173.3	0.00	0.00	Last Cathedral Survey @ 7,475' MD
7,520.0	1.30	209.70	7,380.4	-638.2	984.6	1,173.3	0.00	0.00	Projection to Bit @ 7,520' MD

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									
Gardner Federal 28-2B (0.00	358.42	5,304.0	-631.2	980.7	1,585,333.95	2,293,788.02	39.413818	-107.999932
- actual wellpath misses target center by 12.4ft at 5443.6ft MD (5304.3 TVD, -619.6 N, 976.1 E)									
- Circle (radius 25.0)									
Gardner Federal 28-2B (0.00	358.42	7,327.0	-631.2	980.7	1,585,333.95	2,293,788.02	39.413818	-107.999932
- actual wellpath misses target center by 7.5ft at 7466.5ft MD (7326.9 TVD, -637.1 N, 985.2 E)									
- Circle (radius 25.0)									

Design Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates			
		+N/-S (ft)	+E/-W (ft)	Comment	
7,475.0	7,335.4	-637.3	985.1	Last Cathedral Survey @ 7,475' MD	
7,520.0	7,380.4	-638.2	984.6	Projection to Bit @ 7,520' MD	

Checked By: _____ Approved By: _____ Date: _____