

BHL
1980' FWL - 660' FSL
Tolerances = 197' N, 203' S
175' E and 225' W of BHL

CASING DETAILS

No casing data is available

FORMATION TOP DETAILS

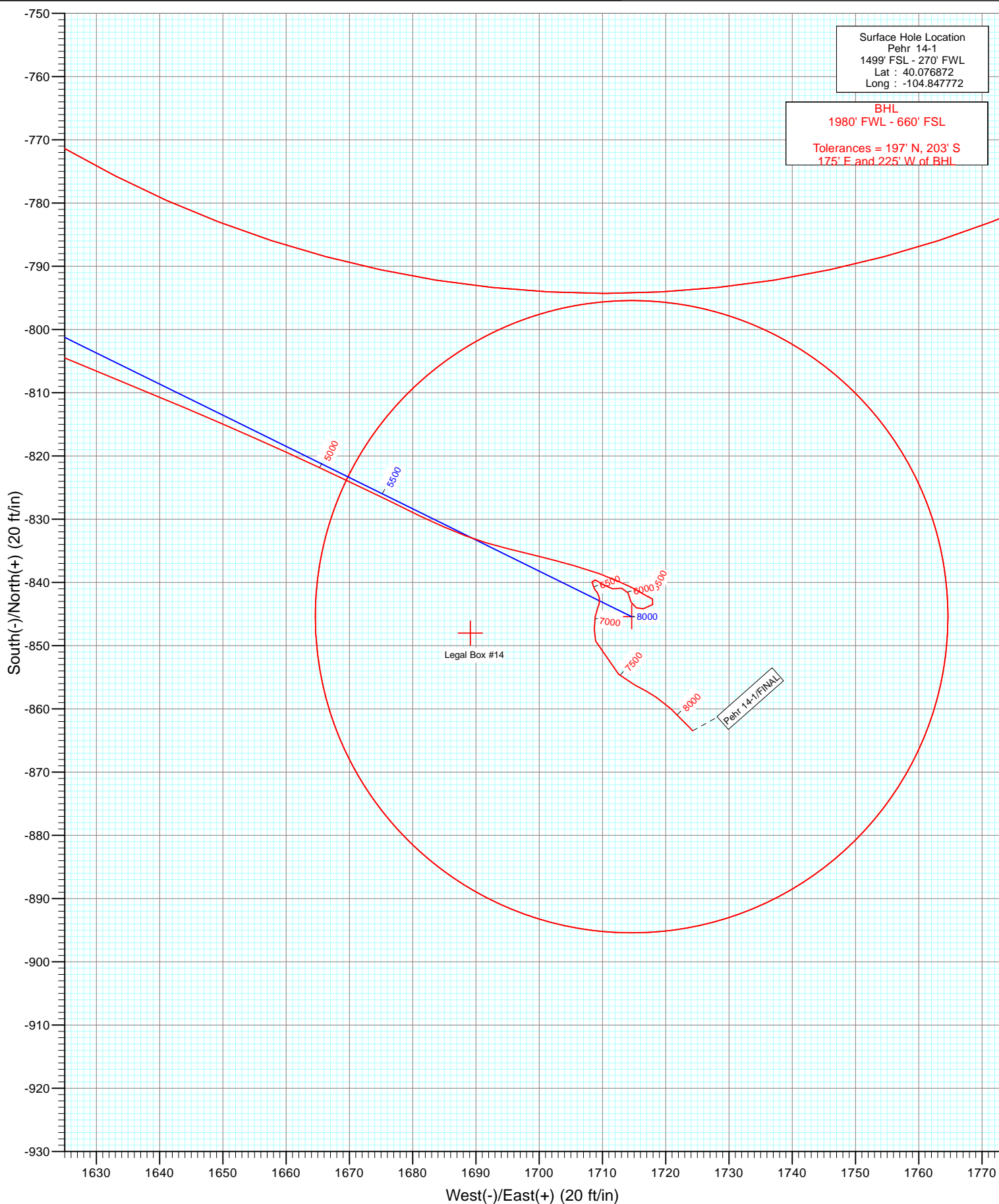
No formation data is available



Azimuths to True North
Magnetic North: 8.78°

Magnetic Field
Strength: 52869.1snT
Dip Angle: 66.75°
Date: 3/26/2012
Model: IGRF2010

FINAL Pehr 14-1 12x12 LR KB=15 @ 4959.0ft (Xtreme 15) GL @ 4944.0 North American Datum 1983 Well Pehr 14-1, True North							
Type	Target	Azimuth	Origin Type	N/S	E/W	From TVD	
Target	Pehr 14-1 PBHL	116.25	Slot	0.0	0.0	0.0	
Legal Box #14		TVD	+N/-S	+E/-W	Latitude	Longitude	
		-5000.0	-848.0	1689.1	40.074544	-104.841736	
		8447.0	845.1	1711.6	40.074551	-104.841645	



Cathedral Energy Services

Survey Report

Company:	Anadarko Petroleum Corporation	Local Co-ordinate Reference:	Well Pehr 14-1
Project:	DJ Wattenberg	TVD Reference:	KB=15' @ 4959.0ft (Xtreme 15)
Site:	NWSW Sec1-T1N-R67W (Pehr 33-1)	MD Reference:	KB=15' @ 4959.0ft (Xtreme 15)
Well:	Pehr 14-1	North Reference:	True
Wellbore:	DD	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		NWSW Sec1-T1N-R67W (Pehr 33-1)			
Site Position:		Northing:	1,271,518.81 ft	Latitude:	40.076861
From:	Lat/Long	Easting:	3,182,472.99 ft	Longitude:	-104.847950
Position Uncertainty:	0.0 ft	Slot Radius:	13.200 in	Grid Convergence:	0.42 °

Well	Pehr 14-1					
Well Position	+N/-S	0.0 ft	Northing:	1,271,523.17 ft	Latitude:	40.076872
	+E/-W	0.0 ft	Easting:	3,182,522.77 ft	Longitude:	-104.847772
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	4,944.0 ft

Wellbore	DD				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	3/26/2012	8.78	66.75	52,869

Design	FINAL				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.0	0.0	0.0	116.25	

Survey Program	Date	9/12/2012			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
77.0	8,525.0	Survey #1 (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	Legal Box #14	
77.0	0.60	147.30	77.0	-0.3	0.2	0.3	0.78	0.78		
165.0	1.80	109.60	165.0	-1.2	1.8	2.1	1.56	1.36		
253.0	3.70	106.10	252.9	-2.4	5.8	6.3	2.17	2.16		
341.0	5.40	105.40	340.6	-4.3	12.5	13.1	1.93	1.93		
417.0	6.50	110.10	416.2	-6.8	20.0	20.9	1.58	1.45		
508.0	7.30	121.10	506.5	-11.5	29.8	31.8	1.69	0.88		
599.0	8.80	125.00	596.6	-18.5	40.4	44.5	1.75	1.65		
690.0	10.20	126.30	686.4	-27.3	52.6	59.3	1.56	1.54		
780.0	11.20	115.50	774.8	-35.7	67.0	75.9	2.48	1.11		
870.0	12.90	114.50	862.8	-43.7	84.0	94.6	1.90	1.89		
1,021.0	12.80	115.90	1,010.1	-58.0	114.4	128.2	0.22	-0.07		
1,112.0	13.60	115.30	1,098.6	-66.9	133.1	149.0	0.89	0.88		

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Site:	NWSW Sec1-T1N-R67W (Pehr 33-1)	MD Reference:	KB=15' @ 4959.0ft (Xtreme 15)
Well:	Pehr 14-1	North Reference:	True
Wellbore:	DD	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
1,203.0	14.00	115.80	1,187.0	-76.3	152.7	170.7	0.46	0.44	
1,294.0	15.60	116.30	1,275.0	-86.5	173.6	193.9	1.76	1.76	
1,384.0	17.70	118.70	1,361.2	-98.4	196.4	219.7	2.45	2.33	
1,475.0	20.80	119.20	1,447.1	-113.0	222.7	249.7	3.41	3.41	
1,566.0	22.60	118.20	1,531.7	-129.1	252.2	283.3	2.02	1.98	
1,656.0	24.60	116.80	1,614.1	-145.7	284.2	319.3	2.31	2.22	
1,747.0	25.80	115.20	1,696.5	-162.7	319.0	358.1	1.52	1.32	
1,838.0	27.40	117.00	1,777.8	-180.7	355.6	398.8	1.97	1.76	
1,929.0	27.50	112.30	1,858.6	-198.1	393.7	440.7	2.38	0.11	
2,019.0	27.00	112.10	1,938.6	-213.7	431.8	481.8	0.56	-0.56	
2,111.0	27.80	114.10	2,020.3	-230.3	470.7	524.1	1.33	0.87	
2,201.0	27.20	116.10	2,100.1	-247.9	508.4	565.6	1.22	-0.67	
2,292.0	26.30	114.30	2,181.4	-265.4	545.4	606.6	1.33	-0.99	
2,383.0	26.10	116.60	2,263.0	-282.7	581.7	646.7	1.14	-0.22	
2,474.0	25.70	121.00	2,344.9	-301.8	616.5	686.4	2.16	-0.44	
2,564.0	25.40	120.00	2,426.1	-321.5	650.0	725.1	0.58	-0.33	
2,655.0	25.40	117.70	2,508.3	-340.3	684.1	764.1	1.08	0.00	
2,746.0	24.60	118.60	2,590.8	-358.5	718.1	802.5	0.97	-0.88	
2,837.0	25.00	118.60	2,673.4	-376.7	751.6	840.7	0.44	0.44	
2,927.0	24.70	119.60	2,755.1	-395.1	784.6	878.5	0.57	-0.33	
3,018.0	24.70	117.50	2,837.7	-413.3	818.0	916.4	0.96	0.00	
3,109.0	25.60	115.20	2,920.1	-430.4	852.7	955.1	1.46	0.99	
3,199.0	26.20	115.40	3,001.1	-447.2	888.2	994.4	0.67	0.67	
3,290.0	26.10	114.80	3,082.8	-464.2	924.5	1,034.5	0.31	-0.11	
3,381.0	24.80	114.50	3,164.9	-480.6	960.1	1,073.6	1.44	-1.43	
3,472.0	25.20	117.10	3,247.4	-497.3	994.7	1,112.1	1.28	0.44	
3,562.0	23.90	115.00	3,329.3	-513.7	1,028.3	1,149.4	1.74	-1.44	
3,653.0	22.20	112.50	3,413.0	-528.1	1,060.9	1,185.0	2.16	-1.87	
3,744.0	21.50	115.90	3,497.5	-542.0	1,091.7	1,218.9	1.59	-0.77	
3,834.0	21.60	120.40	3,581.2	-557.6	1,120.9	1,251.9	1.84	0.11	
3,925.0	24.20	117.20	3,665.0	-574.6	1,151.9	1,287.2	3.17	2.86	
4,016.0	26.50	121.20	3,747.2	-593.6	1,185.9	1,326.1	3.15	2.53	
4,107.0	25.10	119.80	3,829.2	-613.7	1,220.0	1,365.6	1.68	-1.54	
4,198.0	26.70	115.00	3,911.0	-632.0	1,255.3	1,405.3	2.90	1.76	
4,288.0	26.90	113.00	3,991.4	-648.5	1,292.3	1,445.9	1.03	0.22	
4,379.0	26.00	115.90	4,072.9	-665.2	1,329.2	1,486.4	1.73	-0.99	
4,470.0	26.20	116.10	4,154.6	-682.8	1,365.2	1,526.4	0.24	0.22	
4,561.0	25.80	118.00	4,236.4	-700.9	1,400.7	1,566.3	1.02	-0.44	
4,651.0	25.30	115.20	4,317.6	-718.3	1,435.4	1,605.1	1.45	-0.56	
4,742.0	23.30	114.70	4,400.5	-734.1	1,469.4	1,642.5	2.21	-2.20	
4,833.0	22.70	114.60	4,484.3	-748.9	1,501.7	1,678.1	0.66	-0.66	
4,924.0	23.10	115.60	4,568.1	-763.9	1,533.8	1,713.5	0.61	0.44	
5,014.0	21.10	114.30	4,651.5	-778.2	1,564.5	1,747.3	2.29	-2.22	
5,105.0	19.30	113.80	4,736.9	-791.0	1,593.1	1,778.7	1.99	-1.98	
5,195.0	18.10	112.10	4,822.1	-802.3	1,619.7	1,807.5	1.46	-1.33	
5,286.0	15.90	113.00	4,909.1	-812.5	1,644.3	1,834.1	2.43	-2.42	
5,377.0	12.60	115.20	4,997.3	-821.6	1,664.7	1,856.4	3.67	-3.63	
5,468.0	10.50	116.20	5,086.5	-829.5	1,681.2	1,874.7	2.32	-2.31	
5,559.0	8.20	103.30	5,176.3	-834.6	1,694.9	1,889.3	3.40	-2.53	
5,650.0	5.70	106.00	5,266.6	-837.4	1,705.6	1,900.1	2.77	-2.75	
5,740.0	3.90	114.60	5,356.3	-839.9	1,712.7	1,907.5	2.15	-2.00	
5,831.0	1.20	126.00	5,447.2	-841.7	1,716.3	1,911.5	3.00	-2.97	
5,922.0	1.20	109.90	5,538.2	-842.6	1,717.9	1,913.4	0.37	0.00	

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Survey Report

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Well:	Pehr 14-1	North Reference:	True
Wellbore:	DD	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
6,012.0	1.30	236.70	5,628.2	-843.5	1,718.0	1,913.9	2.48	0.11	
6,103.0	0.80	259.60	5,719.1	-844.2	1,716.5	1,912.8	0.71	-0.55	
6,194.0	0.70	300.70	5,810.1	-844.0	1,715.4	1,911.8	0.59	-0.11	
6,285.0	0.90	329.60	5,901.1	-843.1	1,714.5	1,910.6	0.49	0.22	
6,375.0	1.10	352.30	5,991.1	-841.6	1,714.0	1,909.5	0.49	0.22	
6,466.0	1.10	260.00	6,082.1	-840.9	1,713.1	1,908.3	1.74	0.00	
6,557.0	0.80	278.70	6,173.1	-841.0	1,711.6	1,907.0	0.47	-0.33	
6,647.0	1.00	303.30	6,263.1	-840.5	1,710.3	1,905.7	0.48	0.22	
6,738.0	1.10	298.50	6,354.1	-839.6	1,708.9	1,904.0	0.15	0.11	
6,829.0	1.00	161.60	6,445.1	-839.9	1,708.4	1,903.7	2.15	-0.11	
6,919.0	0.50	155.30	6,535.1	-841.0	1,708.8	1,904.5	0.56	-0.56	
7,010.0	0.50	132.30	6,626.0	-841.7	1,709.2	1,905.2	0.22	0.00	
7,100.0	0.70	178.20	6,716.0	-842.5	1,709.5	1,905.9	0.56	0.22	
7,191.0	0.50	190.40	6,807.0	-843.4	1,709.5	1,906.2	0.26	-0.22	
7,282.0	0.50	210.50	6,898.0	-844.2	1,709.2	1,906.3	0.19	0.00	
7,372.0	1.20	188.90	6,988.0	-845.4	1,708.9	1,906.6	0.84	0.78	
7,463.0	1.30	180.90	7,079.0	-847.4	1,708.7	1,907.3	0.22	0.11	
7,554.0	1.10	163.30	7,170.0	-849.3	1,708.9	1,908.3	0.46	-0.22	
7,871.0	1.30	130.00	7,486.9	-854.5	1,712.6	1,913.9	0.23	0.06	
8,006.0	1.30	117.60	7,621.9	-856.2	1,715.1	1,916.9	0.21	0.00	
8,098.0	1.20	118.70	7,713.9	-857.1	1,716.9	1,918.9	0.11	-0.11	
8,189.0	1.20	124.60	7,804.8	-858.1	1,718.5	1,920.8	0.14	0.00	
8,320.0	1.30	130.80	7,935.8	-859.9	1,720.7	1,923.6	0.13	0.08	
8,500.8	1.50	138.50	8,116.5	-863.0	1,723.9	1,927.8	0.15	0.11	Pehr 14-1 PBHL
8,525.0	1.50	138.50	8,140.7	-863.5	1,724.3	1,928.4	0.00	0.00	Last Cathedral Survey @ 8,525' MD

Targets									
Target Name	- hit/miss target	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude Longitude
Legal Box #14		0.00	0.00	-5,000.0	-848.0	1,689.1	1,270,687.60	3,184,218.10	40.074544 -104.841736
- actual wellpath misses target center by 5345.3ft at 0.0ft MD (0.0 TVD, 0.0 N, 0.0 E)									
- Rectangle (sides W400.0 H400.0 D0.0)									
Pehr 14-1 PBHL		0.00	0.00	8,117.0	-845.4	1,714.6	1,270,690.39	3,184,243.57	40.074551 -104.841645
- actual wellpath misses target center by 19.9ft at 8500.8ft MD (8116.5 TVD, -863.0 N, 1723.9 E)									
- Circle (radius 50.0)									

Design Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates			
		+N/-S (ft)	+E/-W (ft)	Comment	
8,525.0	8,140.7	-863.5	1,724.3	Last Cathedral Survey @ 8,525' MD	

Checked By: _____ Approved By: _____ Date: _____