



38-015-40710

Bopco L P

Eddy County, NM (NAD27 NME)

Poker Lake Unit #423H

Wellbore #1 / Job #1310122

*Provide tie in
survey to 6729'*



Survey: Phoenix MWD Surveys

Phoenix Final Survey Report

27 February, 2013



PHOENIX
TECHNOLOGY SERVICES



Phoenix Technology Services

Phoenix Final Survey Report



Company:	Bopco L P	Local Co-ordinate Reference:	Well #423H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3195.00usft (McVay 5)
Site:	Poker Lake Unit	MD Reference:	KB @ 3195.00usft (McVay 5)
Well:	#423H	North Reference:	Grid
Wellbore:	Wellbore #1 / Job #1310122	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (McVay 5)	Database:	GCR DB

Project	Eddy County, NM (NAD27 NME)		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site	Poker Lake Unit		
Site Position:		Northing:	435,896.68 usft
From:	Map	Easting:	646,110.12 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 11' 51.0535 N
		Longitude:	103° 51' 39.5614 W
		Grid Convergence:	0.25 °

Well	#423H			
Well Position	+N/-S	0.00 usft	Northing:	405,055.21 usft
	+E/-W	0.00 usft	Easting:	629,701.96 usft
Position Uncertainty	0.00 usft		Wellhead Elevation:	usft
			Latitude:	32° 6' 46.5126 N
			Longitude:	103° 54' 51.9126 W
			Ground Level:	3,178.00 usft

Wellbore	Wellbore #1 / Job #1310122				
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
			(°)	(°)	(nT)
	IGRF2010_14	01/23/13	7.54	59.99	48,353

Design	Surveys (McVay 5)				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction	
	(usft)	(usft)	(usft)	(°)	
	0.00	0.00	0.00	134.72	

Survey Program	Date 02/27/13			
From	To	Survey (Wellbore)	Tool Name	Description
(usft)	(usft)			
6,779.00	14,769.00	Phoenix MWD Surveys (Wellbore #1 / Job	MWD	MWD - Standard



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Survey											
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVDSS (usft)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)	
6,729.00	1.08	213.27	-3,532.82	6,727.82	-57.05	11.25	48.14	0.00	404,998.16	629,713.21	
Tie-on to VES Gyro											
6,779.00	1.40	202.30	-3,582.81	6,777.81	-58.01	10.76	48.46	0.79	404,997.20	629,712.72	
Phoenix First MWD Survey											
6,811.00	1.30	146.90	-3,614.80	6,809.80	-58.67	10.81	48.97	3.93	404,996.54	629,712.77	
6,841.00	1.90	107.50	-3,644.79	6,839.79	-59.11	11.47	49.74	4.06	404,996.10	629,713.43	
6,872.00	4.00	101.20	-3,675.75	6,870.75	-59.47	13.02	51.10	6.84	404,995.74	629,714.98	
6,903.00	7.60	103.30	-3,706.58	6,901.58	-60.16	16.08	53.75	11.63	404,995.05	629,718.04	
6,935.00	12.10	105.10	-3,738.10	6,933.10	-61.52	21.38	58.48	14.09	404,993.69	629,723.34	
6,967.00	16.80	105.20	-3,769.08	6,964.08	-63.60	29.08	65.42	14.69	404,991.61	629,731.04	
6,999.00	21.80	103.70	-3,799.27	6,994.27	-66.23	39.32	74.54	15.70	404,988.98	629,741.28	
7,031.00	26.30	104.30	-3,828.49	7,023.49	-69.39	51.97	85.75	14.08	404,985.82	629,753.93	
7,062.00	30.10	101.50	-3,855.81	7,050.81	-72.63	66.25	98.18	12.98	404,982.58	629,768.21	
7,094.00	32.40	96.90	-3,883.17	7,078.17	-75.26	82.63	111.67	10.35	404,979.95	629,784.59	
7,126.00	36.30	100.00	-3,909.58	7,104.58	-77.94	100.48	126.24	13.35	404,977.27	629,802.44	
7,157.00	40.70	102.90	-3,933.84	7,128.84	-81.79	119.38	142.38	15.34	404,973.42	629,821.34	
7,188.00	45.20	105.10	-3,956.52	7,151.52	-86.92	139.86	160.54	15.30	404,968.29	629,841.82	
7,219.00	49.50	108.30	-3,977.53	7,172.53	-93.49	161.68	180.67	15.81	404,961.72	629,863.64	
7,250.00	53.00	111.90	-3,996.93	7,191.93	-101.81	184.37	202.64	14.47	404,953.40	629,886.33	
7,282.00	55.30	116.50	-4,015.68	7,210.68	-112.45	208.01	226.93	13.69	404,942.76	629,909.97	
7,312.00	56.60	121.50	-4,032.48	7,227.48	-124.50	229.73	250.84	14.47	404,930.71	629,931.69	
7,344.00	57.80	126.90	-4,049.82	7,244.82	-139.62	251.96	277.27	14.67	404,915.59	629,953.92	
7,375.00	60.00	131.50	-4,065.84	7,260.84	-156.40	272.52	303.68	14.55	404,898.81	629,974.48	
7,407.00	64.10	135.30	-4,080.84	7,275.84	-175.82	293.03	331.93	16.56	404,879.39	629,994.99	
7,421.00	66.10	135.80	-4,086.74	7,281.74	-184.89	301.92	344.63	14.65	404,870.32	630,003.88	
7,509.00	70.80	137.40	-4,119.05	7,314.05	-244.35	358.13	426.41	5.60	404,810.86	630,060.09	
7,539.00	74.60	138.40	-4,127.97	7,322.97	-265.60	377.33	455.00	13.06	404,789.61	630,079.29	



Phoenix Technology Services

Phoenix Final Survey Report



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Site:	Poker Lake Unit	MD Reference:	KB @ 3195.00usft (McVay 5)
Well:	#423H	North Reference:	Grid
Wellbore:	Wellbore #1 / Job #1310122	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (McVay 5)	Database:	GCR DB

Survey											
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVDSS (usft)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)	
7,571.00	77.10	139.10	-4,135.79	7,330.79	-288.93	397.78	485.95	8.10	404,766.28	630,099.74	
7,602.00	79.90	139.90	-4,141.97	7,336.97	-312.02	417.51	516.22	9.38	404,743.19	630,119.47	
7,633.00	81.40	140.50	-4,147.01	7,342.01	-335.52	437.09	546.66	5.20	404,719.69	630,139.05	
7,664.00	84.20	141.30	-4,150.90	7,345.90	-359.39	456.48	577.24	9.39	404,695.82	630,158.44	
7,695.00	87.00	140.20	-4,153.27	7,348.27	-383.32	476.04	607.97	9.70	404,671.89	630,178.00	
7,789.00	88.80	140.40	-4,156.72	7,351.72	-455.59	536.04	701.46	1.93	404,599.62	630,238.00	
7,882.00	90.20	140.90	-4,157.53	7,352.53	-527.51	595.00	793.96	1.60	404,527.70	630,296.96	
7,975.00	90.90	142.20	-4,156.64	7,351.64	-600.33	652.83	886.29	1.59	404,454.88	630,354.79	
8,069.00	90.20	138.40	-4,155.73	7,350.73	-672.64	712.86	979.82	4.11	404,382.57	630,414.82	
8,163.00	89.70	136.10	-4,155.82	7,350.82	-741.66	776.66	1,073.72	2.50	404,313.55	630,478.62	
8,256.00	90.30	136.50	-4,155.82	7,350.82	-808.90	840.91	1,166.69	0.78	404,246.31	630,542.87	
8,350.00	89.30	134.80	-4,156.14	7,351.14	-876.11	906.62	1,260.67	2.10	404,179.10	630,608.58	
8,443.00	87.80	134.30	-4,158.50	7,353.50	-941.33	972.87	1,353.64	1.70	404,113.88	630,674.83	
8,537.00	87.80	133.80	-4,162.11	7,357.11	-1,006.64	1,040.38	1,447.56	0.53	404,048.57	630,742.34	
8,630.00	89.60	134.10	-4,164.22	7,359.22	-1,071.16	1,107.32	1,540.52	1.96	403,984.05	630,809.28	
8,723.00	89.60	134.50	-4,164.87	7,359.87	-1,136.11	1,173.87	1,633.52	0.43	403,919.10	630,875.83	
8,817.00	89.10	135.30	-4,165.93	7,360.93	-1,202.46	1,240.45	1,727.51	1.00	403,852.75	630,942.41	
8,910.00	88.00	134.70	-4,168.28	7,363.28	-1,268.20	1,306.19	1,820.48	1.35	403,787.01	631,008.15	
9,003.00	89.40	134.90	-4,170.39	7,365.39	-1,333.71	1,372.16	1,913.45	1.52	403,721.50	631,074.12	
9,096.00	89.20	134.70	-4,171.53	7,366.53	-1,399.24	1,438.15	2,006.45	0.30	403,655.97	631,140.11	
9,189.00	91.80	134.70	-4,170.72	7,365.72	-1,464.65	1,504.24	2,099.43	2.80	403,590.56	631,206.20	
9,282.00	92.30	134.20	-4,167.39	7,362.39	-1,529.73	1,570.59	2,192.37	0.76	403,525.48	631,272.55	
9,376.00	90.50	135.80	-4,165.10	7,360.10	-1,596.17	1,637.03	2,286.34	2.56	403,459.04	631,338.99	
9,470.00	90.60	136.30	-4,164.19	7,359.19	-1,663.85	1,702.27	2,380.31	0.54	403,391.36	631,404.23	
9,562.00	90.40	135.60	-4,163.39	7,358.39	-1,729.97	1,766.23	2,472.28	0.79	403,325.24	631,468.19	
9,655.00	90.50	134.80	-4,162.66	7,357.66	-1,795.95	1,831.76	2,565.27	0.87	403,259.26	631,533.72	
9,748.00	90.00	135.20	-4,162.25	7,357.25	-1,861.71	1,897.52	2,658.27	0.69	403,193.50	631,599.48	



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9,841.00	90.00	135.00	-4,162.25	7,357.25	-1,927.59	1,963.17	2,751.27	0.22	403,127.62	631,665.13	
9,933.00	88.30	136.00	-4,163.62	7,358.62	-1,993.20	2,027.64	2,843.25	2.14	403,062.01	631,729.60	
10,026.00	88.00	135.70	-4,166.62	7,361.62	-2,059.89	2,092.38	2,936.18	0.46	402,995.32	631,794.34	
10,119.00	90.20	136.10	-4,168.08	7,363.08	-2,126.67	2,157.09	3,029.14	2.40	402,928.54	631,859.05	
10,212.00	90.40	134.60	-4,167.60	7,362.60	-2,192.82	2,222.45	3,122.13	1.63	402,862.39	631,924.41	
10,306.00	90.50	134.70	-4,166.86	7,361.86	-2,258.88	2,289.32	3,216.13	0.15	402,796.33	631,991.28	
10,399.00	90.20	134.30	-4,166.29	7,361.29	-2,324.07	2,355.65	3,309.13	0.54	402,731.14	632,057.61	
10,492.00	91.40	134.90	-4,164.99	7,359.99	-2,389.36	2,421.86	3,402.12	1.44	402,665.85	632,123.82	
10,585.00	89.70	134.90	-4,164.10	7,359.10	-2,455.00	2,487.73	3,495.11	1.83	402,600.21	632,189.69	
10,671.00	90.00	134.90	-4,164.32	7,359.32	-2,515.70	2,548.65	3,581.11	0.35	402,539.51	632,250.61	
10,749.00	89.40	133.60	-4,164.73	7,359.73	-2,570.13	2,604.51	3,659.10	1.84	402,485.08	632,306.47	
10,811.00	89.60	133.80	-4,165.27	7,360.27	-2,612.96	2,649.34	3,721.09	0.46	402,442.25	632,351.30	
10,905.00	91.00	133.50	-4,164.78	7,359.78	-2,677.84	2,717.35	3,815.07	1.52	402,377.37	632,419.31	
10,998.00	90.40	133.70	-4,163.64	7,358.64	-2,741.97	2,784.69	3,908.04	0.68	402,313.24	632,486.65	
11,091.00	89.10	134.50	-4,164.05	7,359.05	-2,806.69	2,851.48	4,001.03	1.64	402,248.52	632,553.44	
11,184.00	90.10	134.70	-4,164.70	7,359.70	-2,871.99	2,917.69	4,094.03	1.10	402,183.22	632,619.65	
11,279.00	89.00	135.60	-4,165.45	7,360.45	-2,939.34	2,984.69	4,189.02	1.50	402,115.87	632,686.65	
11,372.00	88.00	135.90	-4,167.88	7,362.88	-3,005.93	3,049.56	4,281.97	1.12	402,049.28	632,751.52	
11,466.00	88.40	136.60	-4,170.83	7,365.83	-3,073.80	3,114.53	4,375.89	0.86	401,981.41	632,816.49	
11,561.00	88.80	135.60	-4,173.15	7,368.15	-3,142.23	3,180.38	4,470.84	1.13	401,912.98	632,882.34	
11,655.00	93.20	136.70	-4,171.51	7,366.51	-3,209.99	3,245.47	4,564.77	4.82	401,845.22	632,947.43	
11,749.00	91.90	136.50	-4,167.33	7,362.33	-3,278.22	3,310.00	4,658.62	1.40	401,776.99	633,011.96	
11,843.00	89.50	136.60	-4,166.18	7,361.18	-3,346.45	3,374.63	4,752.56	2.56	401,708.76	633,076.59	
11,938.00	88.90	136.80	-4,167.51	7,362.51	-3,415.58	3,439.78	4,847.49	0.67	401,639.63	633,141.74	
12,032.00	86.00	135.80	-4,171.69	7,366.69	-3,483.46	3,504.65	4,941.35	3.26	401,571.75	633,206.61	
12,127.00	86.00	134.70	-4,178.32	7,373.32	-3,550.76	3,571.37	5,036.12	1.16	401,504.45	633,273.33	
12,221.00	86.20	132.90	-4,184.71	7,379.71	-3,615.67	3,639.05	5,129.88	1.92	401,439.54	633,341.01	



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12,315.00	85.30	132.20	-4,191.68	7,386.68	-3,679.06	3,708.11	5,223.56	1.21	401,376.15	633,410.07	
12,409.00	88.50	131.70	-4,196.76	7,391.76	-3,741.80	3,777.91	5,317.30	3.45	401,313.41	633,479.87	
12,503.00	91.00	130.60	-4,197.17	7,392.17	-3,803.65	3,848.68	5,411.10	2.91	401,251.56	633,550.64	
12,597.00	91.60	131.90	-4,195.04	7,390.04	-3,865.61	3,919.33	5,504.91	1.52	401,189.60	633,621.29	
12,692.00	93.00	132.20	-4,191.23	7,386.23	-3,929.18	3,989.82	5,599.72	1.51	401,126.03	633,691.78	
12,786.00	94.70	132.30	-4,184.91	7,379.91	-3,992.24	4,059.24	5,693.42	1.81	401,062.97	633,761.20	
12,880.00	95.10	133.10	-4,176.89	7,371.89	-4,055.76	4,128.07	5,787.02	0.95	400,999.45	633,830.03	
12,973.00	92.20	133.70	-4,170.97	7,365.97	-4,119.52	4,195.49	5,879.79	3.18	400,935.69	633,897.45	
13,066.00	91.30	133.60	-4,168.13	7,363.13	-4,183.68	4,262.75	5,972.73	0.97	400,871.53	633,964.71	
13,160.00	90.60	134.90	-4,166.57	7,361.57	-4,249.26	4,330.08	6,066.72	1.57	400,805.95	634,032.04	
13,255.00	88.40	134.10	-4,167.40	7,362.40	-4,315.84	4,397.83	6,161.70	2.46	400,739.37	634,099.79	
13,349.00	89.90	135.50	-4,168.79	7,363.79	-4,382.07	4,464.52	6,255.69	2.18	400,673.14	634,166.48	
13,443.00	89.50	136.90	-4,169.28	7,364.28	-4,449.91	4,529.57	6,349.65	1.55	400,605.30	634,231.53	
13,537.00	88.80	135.90	-4,170.68	7,365.68	-4,517.97	4,594.39	6,443.60	1.30	400,537.24	634,296.35	
13,632.00	89.80	136.10	-4,171.84	7,366.84	-4,586.30	4,660.38	6,538.57	1.07	400,468.91	634,362.34	
13,725.00	91.00	136.00	-4,171.19	7,366.19	-4,653.26	4,724.92	6,631.54	1.29	400,401.95	634,426.88	
13,819.00	90.20	137.20	-4,170.20	7,365.20	-4,721.55	4,789.50	6,725.48	1.53	400,333.66	634,491.46	
13,914.00	89.80	137.80	-4,170.20	7,365.20	-4,791.59	4,853.68	6,820.37	0.76	400,263.62	634,555.64	
14,005.00	90.30	137.80	-4,170.12	7,365.12	-4,859.00	4,914.81	6,911.24	0.55	400,196.21	634,616.77	
14,101.00	90.10	139.50	-4,169.79	7,364.79	-4,931.07	4,978.23	7,007.01	1.78	400,124.14	634,680.19	
14,195.00	87.80	138.40	-4,171.51	7,366.51	-5,001.94	5,039.94	7,100.73	2.71	400,053.27	634,741.90	
14,290.00	87.70	137.60	-4,175.24	7,370.24	-5,072.48	5,103.46	7,195.50	0.85	399,982.73	634,805.42	
14,383.00	89.40	138.30	-4,177.60	7,372.60	-5,141.51	5,165.73	7,288.32	1.98	399,913.70	634,867.69	
14,478.00	87.50	135.40	-4,180.17	7,375.17	-5,210.79	5,230.66	7,383.20	3.65	399,844.42	634,932.62	
14,572.00	89.30	136.30	-4,182.79	7,377.79	-5,278.21	5,296.11	7,477.14	2.14	399,777.00	634,998.07	
14,666.00	88.00	136.30	-4,185.00	7,380.00	-5,346.14	5,361.03	7,571.08	1.38	399,709.07	635,062.99	



Phoenix Technology Services

Phoenix Final Survey Report



Company:	Bopco L P	Local Co-ordinate Reference:	Well #423H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3195.00usft (McVay 5)
Site:	Poker Lake Unit	MD Reference:	KB @ 3195.00usft (McVay 5)
Well:	#423H	North Reference:	Grid
Wellbore:	Wellbore #1 / Job #1310122	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (McVay 5)	Database:	GCR DB

Survey											
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVDSS (usft)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)	
14,707.00	87.80	135.80	-4,186.51	7,381.51	-5,375.64	5,389.47	7,612.04	1.31	399,679.57	635,091.43	
Phoenix Last MWD Survey											
14,769.00	87.80	135.80	-4,188.89	7,383.89	-5,420.06	5,432.66	7,673.98	0.00	399,635.15	635,134.62	
Projection to Bit											

Survey Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
6,729.00	6,727.82	-57.05	11.25	Tie-on to VES Gyro	
6,779.00	6,777.81	-58.01	10.76	Phoenix First MWD Survey	
14,707.00	7,381.51	-5,375.64	5,389.47	Phoenix Last MWD Survey	
14,769.00	7,383.89	-5,420.06	5,432.66	Projection to Bit	

Checked By: _____	Approved By: _____	Date: _____
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