



30-015-40762

Bopco L P

Eddy County, NM (NAD 27)
PLU Ross Ranch 33-25-30 USA
#1H

Wellbore #1 / Job #1310023

Survey: Phoenix MWD

Standard Survey Report

10 February, 2013





Phoenix Technology Services

Survey Report



Company:	Bopco L P	Local Co-ordinate Reference:	Well #1H
Project:	Eddy County, NM (NAD 27)	TVD Reference:	WELL @ 3219.00usft (Latshaw 14)
Site:	PLU Ross Ranch 33-25-30 USA	MD Reference:	WELL @ 3219.00usft, (Latshaw 14)
Well:	#1H	North Reference:	Grid
Wellbore:	Wellbore #1 / Job #1310023	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Latshaw 14)	Database:	GCR DB v5000

Project:	Eddy County, NM (NAD 27)		
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		PLU Ross Ranch 33-25-30 USA				
Site Position:		Northing:	397,909.00 usft	Latitude:	32° 5' 35.5182 N	
From:	Map	Easting:	636,627.00 usft	Longitude:	103° 53' 31.7349 W	
Position Uncertainty:		0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.23 °

Well	#1H					
Well Position	+N/-S	0.00 usft	Northing:	397,909.00 usft	Latitude:	32° 5' 35.5182 N
	+E/-W	0.00 usft	Easting:	636,627.00 usft	Longitude:	103° 53' 31.7349 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	22.00 usft	Ground Level:	3,197.00 usft

Wellbore						Wellbore #1 / Job #1310023					
Magnetics		Model Name		Sample Date		Declination		Dip Angle		Field Strength	
						(°)		(°)		(nT)	
		IGRF2010_14		01/03/13		7.53		59.97		48,348	

Design		Surveys (Latshaw 14)			
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	180.20	

Survey Program		Date	02/10/13		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
111.90	1,134.00	Gyrodata (Wellbore #1 / Job #1310023)	NS-GYRO-MS	North sensing gyrocompassing m/s	
1,167.00	13,448.00	Phoenix MWD (Wellbore #1 / Job #131002)	MWD	MWD - Standard	

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
1,134.00	1.12	179.54	1,133.95	-2.40	-0.23	2.40	0.00	0.00	0.00
1,167.00	1.10	187.10	1,166.94	-3.03	-0.27	3.04	0.45	-0.06	22.91
First Phoenix MWD Survey									
1,357.00	1.50	182.50	1,356.89	-7.33	-0.60	7.33	0.22	0.21	-2.42
1,548.00	1.50	175.30	1,547.83	-12.32	-0.51	12.32	0.10	0.00	-3.77
1,738.00	1.80	173.60	1,737.75	-17.76	0.03	17.76	0.16	0.16	-0.89
1,928.00	0.10	23.80	1,927.72	-20.58	0.43	20.57	0.99	-0.89	-78.84
2,119.00	0.70	324.50	2,118.72	-19.47	-0.18	19.47	0.34	0.31	-31.05
2,309.00	1.10	328.70	2,308.69	-16.97	-1.80	16.98	0.21	0.21	2.21
2,498.00	1.10	331.70	2,497.66	-13.82	-3.60	13.84	0.03	0.00	1.59



Phoenix Technology Services
Survey Report



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Site:	PLU Ross Ranch 33-25-30 USA	MD Reference:	WELL @ 3219.00usft (Latshaw 14)
Well:	#1H	North Reference:	Grid
Wellbore:	Wellbore #1 / Job #1310023	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Latshaw 14)	Database:	GCR DB v5000

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
2,688.00	0.90	310.30	2,687.63	-11.25	-5.61	11.27	0.22	-0.11	-11.26
2,879.00	0.50	324.80	2,878.61	-9.60	-7.23	9.63	0.23	-0.21	7.59
3,069.00	0.20	83.20	3,068.61	-8.88	-7.38	8.91	0.33	-0.16	62.32
3,260.00	0.90	109.20	3,259.60	-9.34	-5.63	9.36	0.38	0.37	13.61
3,450.00	1.70	137.60	3,449.55	-11.91	-2.32	11.92	0.53	0.42	14.95
3,620.00	0.90	253.30	3,619.53	-14.16	-1.90	14.16	1.32	-0.47	68.06
3,832.00	1.10	260.20	3,831.49	-14.98	-5.50	15.00	0.11	0.09	3.25
4,022.00	1.00	265.50	4,021.46	-15.42	-8.95	15.45	0.07	-0.05	2.79
4,212.00	0.70	267.90	4,211.44	-15.59	-11.76	15.63	0.16	-0.16	1.26
4,403.00	0.80	269.30	4,402.43	-15.65	-14.26	15.70	0.05	0.05	0.73
4,593.00	0.80	268.10	4,592.41	-15.71	-16.92	15.77	0.01	0.00	-0.63
4,784.00	1.00	264.70	4,783.38	-15.91	-19.91	15.98	0.11	0.10	-1.78
4,974.00	0.80	265.30	4,973.36	-16.17	-22.88	16.25	0.11	-0.11	0.32
5,165.00	0.60	278.00	5,164.35	-16.14	-25.20	16.23	0.13	-0.10	6.65
5,355.00	0.50	259.00	5,354.34	-16.16	-27.00	16.26	0.11	-0.05	-10.00
5,545.00	0.40	234.00	5,544.33	-16.71	-28.35	16.81	0.11	-0.05	-13.16
5,735.00	0.40	229.00	5,734.33	-17.54	-29.39	17.64	0.02	0.00	-2.63
5,926.00	0.60	214.80	5,925.32	-18.79	-30.46	18.90	0.12	0.10	-7.43
6,115.00	0.60	209.30	6,114.31	-20.47	-31.51	20.58	0.03	0.00	-2.91
6,304.00	1.00	204.60	6,303.29	-22.83	-32.68	22.95	0.21	0.21	-2.49
6,494.00	0.70	190.40	6,493.27	-25.48	-33.58	25.60	0.19	-0.16	-7.47
6,684.00	0.70	164.80	6,683.26	-27.74	-33.48	27.86	0.16	0.00	-13.47
6,874.00	1.00	155.20	6,873.23	-30.37	-32.49	30.48	0.17	0.16	-5.05
7,064.00	1.40	166.90	7,063.19	-34.13	-31.26	34.24	0.25	0.21	6.16
7,254.00	1.10	168.10	7,253.15	-38.18	-30.36	38.28	0.16	-0.16	0.63
7,444.00	0.90	177.70	7,443.12	-41.45	-29.93	41.56	0.14	-0.11	5.05
7,634.00	1.10	184.60	7,633.09	-44.76	-30.01	44.87	0.12	0.11	3.63
7,825.00	1.90	190.20	7,824.02	-49.71	-30.72	49.81	0.43	0.42	2.93
8,015.00	1.30	181.50	8,013.95	-54.96	-31.33	55.07	0.34	-0.32	-4.58
8,204.00	1.40	223.50	8,202.90	-58.78	-32.98	58.89	0.51	0.05	22.22
8,312.00	2.00	232.00	8,310.85	-60.90	-35.37	61.02	0.60	0.56	7.87
8,344.00	2.00	242.60	8,342.83	-61.50	-36.31	61.62	1.15	0.00	33.13
8,375.00	2.10	222.50	8,373.81	-62.17	-37.17	62.30	2.33	0.32	-64.84
8,407.00	3.90	199.60	8,405.77	-63.62	-37.93	63.76	6.65	5.63	-71.56
8,439.00	8.30	185.70	8,437.58	-66.95	-38.53	67.08	14.41	13.75	-43.44
8,470.00	13.60	187.10	8,468.01	-72.80	-39.20	72.93	17.12	17.10	4.52
8,501.00	18.10	187.40	8,497.82	-81.19	-40.27	81.33	14.52	14.52	0.97
8,533.00	22.90	186.90	8,527.78	-92.31	-41.66	92.45	15.01	15.00	-1.56
8,564.00	26.50	187.70	8,555.94	-105.16	-43.31	105.31	11.66	11.61	2.58
8,596.00	30.00	185.50	8,584.13	-120.20	-45.04	120.35	11.41	10.94	-6.88
8,628.00	33.30	180.40	8,611.37	-136.95	-45.87	137.11	13.27	10.31	-15.94
8,660.00	37.40	177.10	8,637.47	-155.45	-45.44	155.61	14.13	12.81	-10.31
8,691.00	41.10	176.80	8,661.47	-175.04	-44.39	175.19	11.95	11.94	-0.97



Phoenix Technology Services

Survey Report



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Design:	Surveys (Latshaw 14)	Database:	GCR DB v5000

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
8,723.00	42.70	176.30	8,685.29	-196.37	-43.10	196.52	5.11	5.00	-1.56
8,755.00	45.80	174.90	8,708.21	-218.63	-41.38	218.77	10.16	9.69	-4.38
8,787.00	48.30	173.30	8,730.01	-241.92	-38.97	242.05	8.63	7.81	-5.00
8,818.00	50.60	172.00	8,750.16	-265.28	-35.95	265.40	8.07	7.42	-4.19
8,850.00	54.20	174.00	8,769.68	-290.44	-32.87	290.55	12.29	11.25	6.25
8,882.00	57.10	175.60	8,787.74	-316.74	-30.48	316.85	9.96	9.06	5.00
8,913.00	60.50	176.80	8,803.80	-343.20	-28.73	343.30	11.46	10.97	3.87
8,945.00	64.20	175.30	8,818.64	-371.47	-26.77	371.56	12.28	11.56	-4.69
8,977.00	67.30	173.60	8,831.79	-400.50	-23.95	400.58	10.83	9.69	-5.31
9,009.00	70.30	173.80	8,843.36	-430.15	-20.67	430.22	9.39	9.38	0.63
9,040.00	74.10	173.40	8,852.83	-459.48	-17.38	459.54	12.32	12.26	-1.29
9,072.00	77.90	172.10	8,860.57	-490.28	-13.46	490.32	12.51	11.88	-4.06
9,103.00	82.00	172.10	8,865.98	-520.50	-9.27	520.53	13.23	13.23	0.00
9,135.00	87.00	171.00	8,869.05	-552.00	-4.59	552.01	16.00	15.63	-3.44
9,166.00	91.80	170.40	8,869.37	-582.58	0.42	582.58	15.60	15.48	-1.94
9,262.00	93.30	173.10	8,865.10	-677.48	14.18	677.43	3.21	1.56	2.81
9,357.00	91.50	176.60	8,861.12	-772.00	22.70	771.91	4.14	-1.89	3.68
9,452.00	91.00	180.60	8,859.05	-866.93	25.02	866.83	4.24	-0.53	4.21
9,547.00	90.90	180.40	8,857.47	-961.91	24.19	961.82	0.24	-0.11	-0.21
9,642.00	91.20	180.70	8,855.73	-1,056.89	23.28	1,056.80	0.45	0.32	0.32
9,737.00	90.50	180.40	8,854.32	-1,151.87	22.36	1,151.79	0.80	-0.74	-0.32
9,832.00	90.90	180.80	8,853.16	-1,246.86	21.37	1,246.78	0.60	0.42	0.42
9,927.00	91.00	181.20	8,851.59	-1,341.83	19.71	1,341.76	0.43	0.11	0.42
10,022.00	91.10	181.40	8,849.85	-1,436.79	17.56	1,436.72	0.24	0.11	0.21
10,117.00	91.60	181.80	8,847.61	-1,531.73	14.91	1,531.67	0.67	0.53	0.42
10,213.00	91.10	181.70	8,845.35	-1,627.66	11.97	1,627.61	0.53	-0.52	-0.10
10,308.00	89.50	181.10	8,844.85	-1,722.62	9.65	1,722.58	1.80	-1.68	-0.63
10,402.00	89.50	180.40	8,845.67	-1,816.61	8.42	1,816.57	0.74	0.00	-0.74
10,498.00	89.80	180.20	8,846.25	-1,912.61	7.92	1,912.57	0.38	0.31	-0.21
10,593.00	88.50	179.70	8,847.66	-2,007.60	8.00	2,007.56	1.47	-1.37	-0.53
10,688.00	89.50	181.00	8,849.32	-2,102.58	7.42	2,102.54	1.73	1.05	1.37
10,783.00	88.40	180.60	8,851.06	-2,197.55	6.10	2,197.52	1.23	-1.16	-0.42
10,878.00	88.90	180.20	8,853.30	-2,292.52	5.43	2,292.49	0.67	0.53	-0.42
10,973.00	89.00	180.40	8,855.04	-2,387.50	4.94	2,387.47	0.24	0.11	0.21
11,069.00	88.30	180.20	8,857.30	-2,483.47	4.43	2,483.44	0.76	-0.73	-0.21
11,164.00	90.20	180.00	8,858.55	-2,578.46	4.27	2,578.43	2.01	2.00	-0.21
11,259.00	89.30	179.00	8,858.96	-2,673.46	5.10	2,673.42	1.42	-0.95	-1.05
11,354.00	90.30	180.20	8,859.29	-2,768.45	5.76	2,768.41	1.64	1.05	1.26
11,450.00	90.20	180.40	8,858.87	-2,864.45	5.26	2,864.41	0.23	-0.10	0.21
11,545.00	91.00	180.40	8,857.88	-2,959.44	4.59	2,959.40	0.84	0.84	0.00
11,640.00	91.60	179.80	8,855.72	-3,054.41	4.43	3,054.38	0.89	0.63	-0.63
11,734.00	92.00	179.90	8,852.77	-3,148.37	4.67	3,148.33	0.44	0.43	0.11
11,829.00	91.40	179.70	8,849.95	-3,243.32	5.01	3,243.29	0.67	-0.63	-0.21



Phoenix Technology Services

Survey Report



Company:	Bopco L P	Local Co-ordinate Reference:	Well #1H
Project:	Eddy County, NM (NAD 27)	TVD Reference:	WELL @ 3219.00usft (Latshaw 14)
Site:	PLU Ross Ranch 33-25-30 USA	MD Reference:	WELL @ 3219.00usft (Latshaw 14)
Well:	#1H	North Reference:	Grid
Wellbore:	Wellbore #1 / Job #1310023	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Latshaw 14)	Database:	GCR DB v5000

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
11,924.00	89.60	178.90	8,849.12	-3,338.31	6.17	3,338.27	2.07	-1.89	-0.84
12,019.00	91.20	179.20	8,848.46	-3,433.29	7.74	3,433.24	1.71	1.68	0.32
12,114.00	92.00	179.00	8,845.81	-3,528.24	9.23	3,528.19	0.87	0.84	-0.21
12,209.00	91.70	180.90	8,842.74	-3,623.19	9.32	3,623.13	2.02	-0.32	2.00
12,304.00	92.50	182.60	8,839.26	-3,718.07	6.42	3,718.03	1.98	0.84	1.79
12,399.00	90.90	182.30	8,836.44	-3,812.94	2.36	3,812.91	1.71	-1.68	-0.32
12,495.00	89.40	181.80	8,836.19	-3,908.88	-1.08	3,908.86	1.65	-1.56	-0.52
12,590.00	91.10	182.50	8,835.78	-4,003.81	-4.64	4,003.80	1.94	1.79	0.74
12,685.00	90.70	183.00	8,834.28	-4,098.68	-9.20	4,098.69	0.67	-0.42	0.53
12,780.00	87.40	180.80	8,835.86	-4,193.60	-12.35	4,193.62	4.17	-3.47	-2.32
12,876.00	86.90	180.50	8,840.63	-4,289.47	-13.43	4,289.49	0.61	-0.52	-0.31
12,971.00	86.90	181.20	8,845.77	-4,384.32	-14.84	4,384.35	0.74	0.00	0.74
13,065.00	86.20	181.00	8,851.43	-4,478.14	-16.64	4,478.17	0.77	-0.74	-0.21
13,160.00	87.50	181.20	8,856.65	-4,572.97	-18.46	4,573.01	1.38	1.37	0.21
13,255.00	88.00	182.30	8,860.38	-4,667.85	-21.36	4,667.90	1.27	0.53	1.16
13,350.00	88.30	182.20	8,863.44	-4,762.73	-25.09	4,762.79	0.33	0.32	-0.11
13,396.00	88.40	182.40	8,864.77	-4,808.67	-26.94	4,808.74	0.49	0.22	0.43
Last Phoenix MWD Survey									
13,448.00	88.40	182.40	8,866.22	-4,860.61	-29.11	4,860.68	0.00	0.00	0.00
Projection To TD									

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,167.00	1,166.94	-3.03	-0.27	First Phoenix MWD Survey
13,396.00	8,864.77	-4,808.67	-26.94	Last Phoenix MWD Survey
13,448.00	8,866.22	-4,860.61	-29.11	Projection To TD

Checked By: _____	Approved By: _____	Date: _____
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