

15-39713

A Gyrodata Directional Survey

FINAL DEFINITIVE COPY

for

BOPCO LP

Lease: .ND 19 FED SWD #1 Well: #ND19, 5" DRILLPIPE
Location: LATSHAW DRILLING RIG #7, EDDY COUNTY, NEW MEXICO

Job Number: MD0212GVCW173

Run Date: 04 Feb 2012

Surveyor: Michael Robles, Curtis Baum

Calculation Method: MINIMUM CURVATURE

Survey surface coordinates obtained from: Well Plan/Plot

Survey Latitude: 32.208789 deg. N Longitude: 103.913969 deg. W

Azimuth Correction:

Gyro: -0.22000 deg to Grid North

Depth Reference: Rotary Table

Rotary Table Elevation: 26.00

Vertical Section Calculated from Well Head Location

Closure Calculated from Well Head Location

Horizontal Coordinates Calculated from Well Head Location

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MEASURED DEPTH feet	I N C L deg.	AZIMUTH deg.	BORE HOLE BEARING deg. min.	DOGLEG SEVERITY deg./ 100 ft.	VERTICAL DEPTH feet	CLOSURE DIST. feet	AZIMUTH deg.	HORIZONTAL COORDINATES feet
0.00	0.00	0.00	N 0 0 E	0.00	0.00	0.0	0.0	0.00 N 0.00 E
0 - 11228 FT RATE GYROSCOPIC MULTISHOT SURVEY RUN INSIDE 5" DRILLPIPE								
ALL MEASURED DEPTHS AND COORDINATES REFERENCED TO LATSHAW DRILLING RIG #7 R.K.B. 26FT								
100.00	0.86	9.20	N 9 12 E	0.86	100.00	0.8	9.2	0.74 N 0.12 E
199.90	0.74	10.76	N 10 46 E	0.12	199.89	2.1	9.7	2.11 N 0.36 E
300.90	0.73	6.88	N 6 53 E	0.05	300.88	3.4	9.4	3.39 N 0.56 E
400.80	0.66	349.16	N 10 50 W	0.23	400.77	4.6	6.6	4.59 N 0.53 E
500.80	0.64	340.69	N 19 19 W	0.10	500.76	5.7	2.4	5.68 N 0.23 E
600.90	0.62	341.11	N 18 53 W	0.02	600.86	6.7	358.9	6.72 N 0.13 W
700.80	0.35	333.57	N 26 26 W	0.28	700.75	7.5	356.7	7.51 N 0.44 W
801.30	0.37	331.72	N 28 17 W	0.02	801.25	8.1	354.9	8.07 N 0.73 W
899.70	0.36	329.99	N 30 1 W	0.02	899.65	8.7	353.2	8.62 N 1.03 W
1000.90	0.33	340.57	N 19 26 W	0.07	1000.85	9.3	352.0	9.17 N 1.29 W
1100.60	0.35	341.44	N 18 34 W	0.02	1100.55	9.8	351.3	9.73 N 1.48 W
1200.60	0.34	346.06	N 13 56 W	0.03	1200.55	10.4	350.9	10.30 N 1.65 W
1300.90	0.44	17.91	N 17 55 E	0.23	1300.84	11.1	351.7	10.96 N 1.60 W
1400.10	0.48	15.98	N 15 59 E	0.04	1400.04	11.8	353.3	11.72 N 1.37 W
1500.60	0.49	16.42	N 16 25 E	0.01	1500.54	12.6	354.8	12.54 N 1.13 W
1600.70	0.70	10.20	N 10 12 E	0.22	1600.63	13.6	356.2	13.55 N 0.90 W
1700.80	0.88	4.57	N 4 34 E	0.20	1700.72	14.9	357.2	14.92 N 0.74 W
1800.80	0.97	359.94	N 0 4 W	0.12	1800.71	16.5	357.7	16.53 N 0.67 W
1900.80	1.95	328.02	N 31 59 W	1.24	1900.68	18.9	355.2	18.82 N 1.58 W

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MEASURED DEPTH feet	I N C L deg.	A Z I M U T H deg.	B O R E H O L E B E A R I N G deg. min.	D O G L E G S E V E R I T Y deg./ 100 ft.	V E R T I C A L D E P T H feet	C L O S U R E D I S T. A Z I M U T H feet deg.	H O R I Z O N T A L C O O R D I N A T E S feet
2000.80	2.07	328.61	N 31 23 W	0.12	2000.61	22.1 351.1	21.80 N 3.42 W
2100.50	1.74	324.77	N 35 14 W	0.35	2100.26	25.1 348.0	24.58 N 5.23 W
2200.70	1.55	325.39	N 34 37 W	0.19	2200.42	27.8 345.7	26.94 N 6.88 W
2300.90	1.48	324.88	N 35 7 W	0.07	2300.58	30.3 343.9	29.11 N 8.39 W
2401.00	1.09	329.21	N 30 47 W	0.40	2400.66	32.4 342.7	30.99 N 9.62 W
2500.80	1.06	328.23	N 31 46 W	0.04	2500.44	34.3 342.0	32.59 N 10.59 W
2601.00	1.01	327.75	N 32 15 W	0.05	2600.62	36.0 341.3	34.12 N 11.55 W
2700.70	0.81	344.44	N 15 34 W	0.33	2700.31	37.6 341.0	35.54 N 12.21 W
2800.70	0.73	34.09	N 34 5 E	0.65	2800.30	38.7 341.9	36.75 N 12.04 W
2901.00	1.03	64.87	N 64 52 E	0.55	2900.59	39.2 343.9	37.66 N 10.87 W
2999.90	1.42	96.08	S 83 55 E	0.77	2999.47	38.9 346.9	37.91 N 8.85 W
3100.90	2.01	109.65	S 70 21 E	0.71	3100.42	37.7 350.9	37.18 N 5.93 W
3200.50	2.39	120.62	S 59 23 E	0.57	3199.95	35.6 356.0	35.54 N 2.50 W
3300.50	2.45	119.89	S 60 7 E	0.07	3299.86	33.4 2.0	33.41 N 1.15 E
3400.50	2.09	123.32	S 56 41 E	0.38	3399.78	31.7 8.2	31.34 N 4.52 E
3501.00	1.43	128.67	S 51 20 E	0.68	3500.24	30.4 13.4	29.55 N 7.03 E
3600.60	1.31	129.89	S 50 7 E	0.12	3599.81	29.4 17.6	28.05 N 8.88 E
3701.10	1.06	128.77	S 51 14 E	0.25	3700.29	28.7 21.4	26.73 N 10.48 E
3800.60	0.93	130.88	S 49 7 E	0.14	3799.77	28.2 24.7	25.62 N 11.81 E
3900.60	0.65	160.21	S 19 47 E	0.48	3899.76	27.6 27.2	24.56 N 12.62 E
4001.10	0.67	172.95	S 7 3 E	0.15	4000.26	26.7 28.8	23.44 N 12.88 E

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MEASURED DEPTH feet	I N C L deg.	A Z I M U T H deg.	B O R E H O L E B E A R I N G deg. min.	D O G L E G S E V E R I T Y deg./ 100 ft.	V E R T I C A L D E P T H feet	C L O S U R E D I S T. A Z I M U T H feet deg.	H O R I Z O N T A L C O O R D I N A T E S feet
4100.80	0.53	198.06	S 18 4 W	0.30	4099.95	25.8 29.7	22.42 N 12.81 E
4200.70	0.50	207.53	S 27 32 W	0.09	4199.85	24.9 30.0	21.60 N 12.47 E
4301.00	0.49	212.35	S 32 21 W	0.04	4300.14	24.1 30.0	20.85 N 12.03 E
4400.60	0.47	220.59	S 40 35 W	0.07	4399.74	23.2 29.8	20.18 N 11.54 E
4500.60	0.42	213.12	S 33 7 W	0.08	4499.74	22.5 29.5	19.56 N 11.07 E
4600.90	0.23	206.07	S 26 4 W	0.19	4600.03	21.9 29.5	19.07 N 10.78 E
4700.80	0.23	193.73	S 13 44 W	0.05	4699.93	21.5 29.7	18.69 N 10.65 E
4800.90	0.17	188.68	S 8 41 W	0.06	4800.03	21.2 30.0	18.35 N 10.58 E
4901.00	0.18	198.66	S 18 40 W	0.03	4900.13	20.9 30.2	18.06 N 10.51 E
5000.00	0.26	215.05	S 35 3 W	0.10	4999.13	20.5 30.2	17.72 N 10.33 E
5100.70	0.31	226.35	S 46 21 W	0.07	5099.83	20.0 30.0	17.35 N 10.00 E
5200.20	0.35	230.29	S 50 17 W	0.05	5199.33	19.5 29.4	16.97 N 9.57 E
5300.00	0.40	239.13	S 59 8 W	0.08	5299.13	18.9 28.6	16.60 N 9.04 E
5400.90	0.46	225.63	S 45 38 W	0.12	5400.02	18.2 27.6	16.13 N 8.44 E
5500.80	0.53	207.44	S 27 26 W	0.17	5499.92	17.4 27.2	15.44 N 7.95 E
5600.90	0.76	209.81	S 29 49 W	0.23	5600.01	16.2 27.1	14.45 N 7.40 E
5700.20	0.89	211.25	S 31 15 W	0.13	5699.30	14.8 26.8	13.22 N 6.67 E
5801.00	1.32	221.70	S 41 42 W	0.47	5800.08	12.9 25.2	11.69 N 5.50 E
5901.00	1.31	223.49	S 43 29 W	0.04	5900.06	10.7 21.5	10.00 N 3.94 E
6000.90	0.95	251.44	S 71 26 W	0.65	5999.94	9.2 14.9	8.91 N 2.37 E
6101.30	0.94	286.38	N 73 37 W	0.57	6100.33	8.9 5.1	8.87 N 0.79 E
6200.80	0.76	274.08	N 85 55 W	0.26	6199.82	9.2 355.9	9.15 N 0.65 W

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MEASURED DEPTH feet	I N C L deg.	A Z I M U T H deg.	B O R E H O L E B E A R I N G deg. min.	D O G L E G S E V E R I T Y deg./ 100 ft.	V E R T I C A L D E P T H feet	C L O S U R E D I S T. A Z I M U T H feet deg.	H O R I Z O N T A L C O O R D I N A T E S feet
6300.80	0.73	256.75	S 76 45 W	0.23	6299.81	9.3 348.0	9.05 N 1.93 W
6400.70	0.72	250.72	S 70 43 W	0.08	6399.70	9.2 340.1	8.70 N 3.14 W
6500.70	0.77	231.13	S 51 8 W	0.26	6499.69	9.1 332.2	8.07 N 4.26 W
6600.90	0.77	214.24	S 34 14 W	0.23	6599.88	8.8 323.9	7.09 N 5.16 W
6700.80	0.89	196.52	S 16 31 W	0.28	6699.77	8.2 315.2	5.79 N 5.76 W
6800.60	0.83	197.13	S 17 8 W	0.06	6799.56	7.6 305.1	4.36 N 6.19 W
6900.90	0.82	194.72	S 14 43 W	0.04	6899.85	7.2 294.3	2.97 N 6.59 W
7000.80	0.86	192.22	S 12 13 W	0.05	6999.74	7.1 282.6	1.55 N 6.93 W
7100.50	0.92	195.70	S 15 42 W	0.08	7099.43	7.3 270.3	0.04 N 7.30 W
7200.60	0.80	202.55	S 22 33 W	0.16	7199.52	7.9 260.0	1.38 S 7.79 W
7300.60	0.85	226.37	S 46 22 W	0.34	7299.51	9.0 253.6	2.53 S 8.59 W
7400.70	1.05	260.05	S 80 3 W	0.58	7399.59	10.5 252.3	3.20 S 10.04 W
7500.50	1.09	259.76	S 79 46 W	0.04	7499.38	12.4 253.4	3.53 S 11.87 W
7600.80	1.27	270.74	N 89 16 W	0.29	7599.65	14.4 255.2	3.69 S 13.92 W
7700.70	1.16	278.33	N 81 40 W	0.19	7699.53	16.4 257.6	3.52 S 16.03 W
7801.30	0.84	262.25	S 82 15 W	0.42	7800.12	18.1 258.9	3.48 S 17.77 W
7900.60	0.92	216.67	S 36 40 W	0.69	7899.41	19.4 257.5	4.21 S 18.96 W
8000.60	1.48	202.12	S 22 7 W	0.63	7999.38	20.8 253.1	6.05 S 19.93 W
8100.80	1.38	207.26	S 27 16 W	0.16	8099.55	22.6 248.3	8.33 S 20.97 W
8200.60	1.21	221.78	S 41 47 W	0.37	8199.33	24.4 245.4	10.18 S 22.22 W
8300.60	1.14	231.17	S 51 10 W	0.20	8299.31	26.4 243.9	11.59 S 23.70 W
8400.00	1.13	234.86	S 54 52 W	0.07	8398.69	28.3 243.2	12.77 S 25.27 W

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MEASURED DEPTH feet	I N C L deg.	A Z I M U T H deg.	B O R E H O L E B E A R I N G deg. min.	D O G L E G S E V E R I T Y deg./ 100 ft.	V E R T I C A L D E P T H feet	C L O S U R E D I S T. A Z I M U T H feet deg.	H O R I Z O N T A L C O O R D I N A T E S feet
8500.90	1.09	240.20	S 60 12 W	0.11	8499.57	30.3 242.8	13.82 S 26.92 W
8599.90	0.97	246.98	S 66 59 W	0.17	8598.55	32.0 242.8	14.62 S 28.51 W
8700.50	1.00	250.50	S 70 30 W	0.07	8699.14	33.8 243.2	15.25 S 30.12 W
8800.70	1.30	260.18	S 80 11 W	0.36	8799.32	35.7 243.9	15.73 S 32.06 W
8900.80	1.72	248.09	S 68 5 W	0.52	8899.38	38.3 244.5	16.49 S 34.57 W
9000.60	1.79	240.62	S 60 37 W	0.24	8999.14	41.4 244.5	17.81 S 37.32 W
9100.70	1.87	236.05	S 56 3 W	0.17	9099.18	44.5 244.0	19.49 S 40.04 W
9200.80	1.74	236.20	S 56 12 W	0.13	9199.23	47.7 243.5	21.25 S 42.66 W
9300.00	1.36	261.94	S 81 56 W	0.79	9298.40	50.3 243.7	22.25 S 45.07 W
9400.40	1.37	266.25	S 86 15 W	0.10	9398.77	52.5 244.6	22.49 S 47.45 W
9500.60	1.42	263.44	S 83 26 W	0.08	9498.94	54.8 245.5	22.71 S 49.88 W
9600.50	1.86	201.01	S 21 1 W	1.74	9598.81	57.1 244.8	24.37 S 51.69 W
9700.50	1.59	207.99	S 27 59 W	0.34	9698.76	59.5 242.9	27.11 S 52.92 W
9800.70	1.43	206.47	S 26 28 W	0.16	9798.93	61.6 241.4	29.46 S 54.13 W
9900.80	1.03	201.70	S 21 42 W	0.41	9899.00	63.4 240.3	31.41 S 55.02 W
10000.10	1.03	200.14	S 20 8 W	0.03	9998.29	64.7 239.3	33.08 S 55.66 W
10100.80	1.03	195.41	S 15 25 W	0.08	10098.97	66.1 238.2	34.80 S 56.21 W
10200.80	1.29	186.21	S 6 13 W	0.32	10198.95	67.5 237.0	36.79 S 56.57 W
10300.80	1.24	185.93	S 5 56 W	0.05	10298.93	68.9 235.5	38.98 S 56.81 W
10400.70	1.11	187.69	S 7 41 W	0.14	10398.81	70.3 234.3	41.01 S 57.05 W
10500.60	1.23	189.03	S 9 2 W	0.12	10498.68	71.7 233.1	43.03 S 57.35 W

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MEASURED DEPTH feet	I N C L deg.	AZIMUTH deg.	BORE HOLE BEARING deg. min.	DOGLEG SEVERITY deg./ 100 ft.	VERTICAL DEPTH feet	CLOSURE DIST. AZIMUTH feet deg.	HORIZONTAL COORDINATES feet
10601.00	1.39	193.69	S 13 41 W	0.19	10599.06	73.4 231.9	45.28 S 57.80 W
10700.00	1.21	196.43	S 16 26 W	0.19	10698.03	75.2 230.9	47.45 S 58.38 W
10801.10	1.03	223.44	S 43 26 W	0.55	10799.11	77.0 230.4	49.13 S 59.31 W
10900.90	1.27	234.48	S 54 29 W	0.33	10898.89	79.0 230.3	50.43 S 60.83 W
11000.70	1.66	234.70	S 54 42 W	0.39	10998.66	81.6 230.5	51.90 S 62.91 W
11101.00	1.88	228.51	S 48 31 W	0.29	11098.91	84.6 230.5	53.83 S 65.32 W
11200.90	1.97	223.30	S 43 18 W	0.20	11198.76	88.0 230.3	56.17 S 67.73 W
11229.10	2.03	227.49	S 47 29 W	0.56	11226.94	89.0 230.3	56.86 S 68.43 W

Final Station Closure: Distance: 88.97 ft Az: 230.28 deg.