

Scientific Drilling

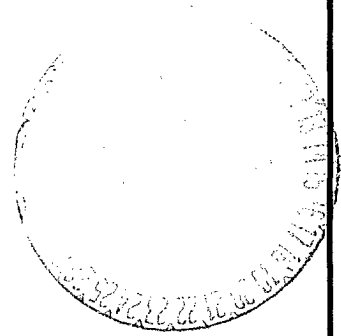
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BHL 926/N 1446/W

DIRECTIONAL SURVEY REPORT

Prepared For

**PHILLIPS PETROLEUM
San Juan 32-8 #23M
Rio Arriba County, NM**

**Prepared By:
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Scientific Drilling International
Rocky Mountain District**



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Scientific Drilling SURVEY REPORT

Company: PHILLIPS PETROLEUM COMPANY Date: 6/3/2002 Time: 17:58:19 Page: 1
Field: San Juan 32-8 #23M Co-ordinate(NE) Reference: Site: Rio Arriba County, Grid North
Site: Rio Arriba County Vertical (TVD) Reference: SITE 0.0
Well: San Juan 32-8 #23M Section (VS) Reference: Well (0.00N,0.00E,45.80Azi)
Wellpath: Original Hole Survey Calculation Method: Minimum Curvature Db: Sybase

Survey: Survey #1

Start Date: 5/13/2002

Company: ATA

Engineer: Scott Watson

Tool:

Tied-to: From Surface

Survey

Meas Depth ft	Incl deg	Azim deg	TVD ft	VS ft	N/S ft	E/W ft	DLS deg/100ft	CLen ft	CLSD ft	CLSA deg
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
150.00	0.33	193.39	150.00	-0.36	-0.42	-0.10	0.22	150.00	0.43	193.39
200.00	0.25	217.86	200.00	-0.59	-0.65	-0.20	0.29	50.00	0.68	197.22
250.00	0.34	201.93	250.00	-0.84	-0.87	-0.32	0.24	50.00	0.93	200.35
300.00	0.16	244.78	300.00	-1.04	-1.04	-0.44	0.50	50.00	1.13	203.04
350.00	0.16	213.86	350.00	-1.17	-1.13	-0.54	0.17	50.00	1.25	205.77
400.00	0.12	344.65	400.00	-1.22	-1.13	-0.60	0.51	50.00	1.28	207.75
450.00	0.19	303.78	450.00	-1.21	-1.04	-0.68	0.25	50.00	1.24	213.23
500.00	0.30	328.94	500.00	-1.20	-0.88	-0.82	0.30	50.00	1.20	222.88
550.00	0.40	330.49	550.00	-1.12	-0.61	-0.97	0.20	50.00	1.15	237.64
600.00	0.34	334.84	599.99	-1.03	-0.33	-1.12	0.13	50.00	1.16	253.66
650.00	0.60	327.65	649.99	-0.93	0.03	-1.32	0.53	50.00	1.32	271.20
700.00	0.59	345.79	699.99	-0.75	0.50	-1.52	0.38	50.00	1.60	288.11
750.00	0.65	339.79	749.99	-0.50	1.01	-1.69	0.18	50.00	1.97	301.04
800.00	0.71	356.48	799.98	-0.18	1.59	-1.80	0.41	50.00	2.40	311.41
850.00	0.72	10.31	849.98	0.27	2.21	-1.77	0.34	50.00	2.83	321.36
900.00	0.61	10.87	899.98	0.75	2.78	-1.66	0.22	50.00	3.24	329.16
950.00	0.64	6.77	949.97	1.18	3.32	-1.58	0.11	50.00	3.67	334.59
1000.00	0.78	7.33	999.97	1.67	3.93	-1.50	0.28	50.00	4.21	339.13
1050.00	0.71	17.50	1049.97	2.21	4.56	-1.36	0.30	50.00	4.76	343.38
1100.00	0.64	14.19	1099.96	2.72	5.13	-1.20	0.16	50.00	5.27	346.82
1150.00	0.79	8.45	1149.96	3.23	5.74	-1.08	0.33	50.00	5.84	349.33
1200.00	0.67	3.10	1199.95	3.72	6.38	-1.02	0.28	50.00	6.46	350.95
1250.00	0.74	17.34	1249.95	4.21	6.98	-0.90	0.38	50.00	7.03	352.62
1300.00	0.63	12.42	1299.95	4.73	7.55	-0.75	0.25	50.00	7.59	354.34
1350.00	0.71	4.71	1349.94	5.19	8.13	-0.66	0.24	50.00	8.16	355.33
1400.00	0.52	355.07	1399.94	5.57	8.66	-0.66	0.43	50.00	8.69	355.66
1450.00	0.59	1.05	1449.94	5.89	9.15	-0.67	0.18	50.00	9.17	355.80
1500.00	0.51	15.89	1499.94	6.27	9.62	-0.61	0.33	50.00	9.64	356.39
1550.00	0.38	3.31	1549.93	6.59	10.00	-0.54	0.32	50.00	10.01	356.93
1600.00	0.35	8.60	1599.93	6.83	10.32	-0.50	0.09	50.00	10.33	357.20
1650.00	0.47	1.42	1649.93	7.10	10.67	-0.48	0.26	50.00	10.68	357.45
1700.00	0.38	356.35	1699.93	7.35	11.04	-0.48	0.19	50.00	11.05	357.50
1750.00	0.28	357.05	1749.93	7.54	11.33	-0.50	0.20	50.00	11.34	357.48
1800.00	0.00	203.69	1799.93	7.62	11.45	-0.50	0.56	50.00	11.46	357.48
1850.00	0.06	204.97	1849.93	7.60	11.43	-0.52	0.12	50.00	11.44	357.42
1900.00	0.31	210.68	1899.93	7.44	11.29	-0.60	0.50	50.00	11.30	356.98
1950.00	0.14	180.79	1949.93	7.27	11.11	-0.67	0.40	50.00	11.13	356.57
2000.00	0.15	220.05	1999.93	7.16	11.00	-0.71	0.20	50.00	11.02	356.31
2050.00	0.19	201.93	2049.93	7.02	10.87	-0.78	0.13	50.00	10.90	355.89
2100.00	0.28	163.20	2099.93	6.89	10.68	-0.78	0.35	50.00	10.71	355.84
2150.00	0.36	218.99	2149.93	6.67	10.44	-0.84	0.62	50.00	10.47	355.40
2200.00	0.40	206.59	2199.93	6.35	10.16	-1.02	0.18	50.00	10.21	354.28
2250.00	0.22	243.30	2249.93	6.10	9.96	-1.18	0.52	50.00	10.03	353.24
2300.00	0.32	226.98	2299.93	5.87	9.82	-1.37	0.25	50.00	9.92	352.06
2350.00	0.21	246.44	2349.92	5.64	9.69	-1.56	0.28	50.00	9.82	350.88
2400.00	0.24	264.33	2399.92	5.47	9.64	-1.74	0.15	50.00	9.80	349.75
2450.00	0.29	271.95	2449.92	5.30	9.64	-1.97	0.12	50.00	9.84	348.42
2500.00	0.24	264.13	2499.92	5.13	9.63	-2.21	0.12	50.00	9.88	347.11



Scientific Drilling SURVEY REPORT

Company: PHILLIPS PETROLEUM COMPANY
Field: San Juan 32-8 #23M
Site: Rio Arriba County
Well: San Juan 32-8 #23M
Wellpath: Original Hole

Date: 6/3/2002 Time: 17:58:19 Page: 2
Co-ordinate(NE) Reference: Site: Rio Arriba County, Grid North
Vertical (TVD) Reference: SITE 0.0
Section (VS) Reference: Well (0.00N,0.00E,45.80Azi)
Survey Calculation Method: Minimum Curvature Db: Sybase

Survey

Meas Depth ft	Incl deg	Azim deg	TVD ft	VS ft	N/S ft	E/W ft	DLS deg/100ft	CLen ft	CLSD ft	CLSA deg
2550.00	0.09	264.91	2549.92	5.02	9.62	-2.35	0.30	50.00	9.90	346.28
2600.00	0.08	348.14	2599.92	5.01	9.65	-2.39	0.23	50.00	9.94	346.06
2650.00	0.25	325.59	2649.92	5.05	9.77	-2.46	0.36	50.00	10.08	345.85
2700.00	0.26	324.63	2699.92	5.08	9.95	-2.59	0.02	50.00	10.29	345.41
2750.00	0.17	352.24	2749.92	5.14	10.12	-2.67	0.27	50.00	10.47	345.24
2800.00	0.11	357.71	2799.92	5.22	10.24	-2.68	0.12	50.00	10.59	345.35
2850.00	0.06	9.52	2849.92	5.27	10.32	-2.68	0.11	50.00	10.66	345.46
2900.00	0.05	38.55	2899.92	5.32	10.36	-2.66	0.06	50.00	10.69	345.61
2950.00	0.08	88.51	2949.92	5.36	10.38	-2.61	0.12	50.00	10.70	345.88
3000.00	0.17	70.00	2999.92	5.46	10.40	-2.50	0.20	50.00	10.70	346.46
3050.00	0.14	50.22	3049.92	5.58	10.47	-2.39	0.12	50.00	10.74	347.15
3100.00	0.12	39.20	3099.92	5.70	10.55	-2.31	0.06	50.00	10.80	347.66
3150.00	0.10	54.71	3149.92	5.79	10.61	-2.24	0.07	50.00	10.85	348.08
3200.00	0.15	82.14	3199.92	5.89	10.65	-2.14	0.15	50.00	10.86	348.64
3250.00	0.30	124.71	3249.92	5.97	10.58	-1.97	0.43	50.00	10.76	349.47
3300.00	0.28	125.65	3299.92	6.01	10.44	-1.76	0.04	50.00	10.58	350.43
3350.00	0.40	125.85	3349.92	6.07	10.26	-1.52	0.24	50.00	10.37	351.58
3400.00	0.76	159.73	3399.92	5.96	9.85	-1.26	0.97	50.00	9.93	352.69
3450.00	1.02	161.40	3449.91	5.63	9.12	-1.01	0.52	50.00	9.17	353.70
3500.00	1.12	171.03	3499.90	5.16	8.21	-0.79	0.41	50.00	8.25	354.52
3550.00	1.17	171.65	3549.89	4.58	7.22	-0.64	0.10	50.00	7.25	354.96
3600.00	1.19	161.80	3599.88	4.05	6.23	-0.40	0.41	50.00	6.24	356.31
3650.00	0.98	173.15	3649.87	3.57	5.31	-0.19	0.60	50.00	5.31	357.97
3700.00	1.10	171.97	3699.86	3.02	4.41	-0.07	0.24	50.00	4.41	359.09
3750.00	0.84	173.85	3749.86	2.51	3.57	0.04	0.52	50.00	3.57	0.58
3800.00	0.68	190.38	3799.85	2.05	2.91	0.02	0.54	50.00	2.91	0.44
3850.00	0.54	201.75	3849.85	1.59	2.40	-0.12	0.37	50.00	2.40	357.17
3900.00	0.46	191.01	3899.85	1.21	1.99	-0.24	0.25	50.00	2.00	352.99
3950.00	0.30	200.85	3949.85	0.93	1.67	-0.33	0.34	50.00	1.70	348.83
4000.00	0.17	180.74	3999.85	0.75	1.47	-0.38	0.30	50.00	1.52	345.63
4050.00	0.16	67.36	4049.85	0.77	1.42	-0.31	0.55	50.00	1.46	347.59
4100.00	0.58	21.48	4099.85	1.06	1.69	-0.16	0.96	50.00	1.69	354.71
4150.00	1.23	18.20	4149.84	1.77	2.43	0.10	1.30	50.00	2.43	2.46
4200.00	2.07	20.81	4199.82	3.06	3.78	0.59	1.69	50.00	3.83	8.90
4250.00	2.93	17.49	4249.77	5.01	5.85	1.30	1.74	50.00	5.99	12.51
4300.00	4.06	18.11	4299.68	7.70	8.75	2.23	2.26	50.00	9.03	14.31
4350.00	5.11	18.86	4349.51	11.25	12.54	3.50	2.10	50.00	13.02	15.60
4400.00	5.78	18.93	4399.29	15.48	17.03	5.04	1.34	50.00	17.76	16.48
4450.00	6.62	19.59	4449.00	20.31	22.12	6.82	1.69	50.00	23.15	17.14
4500.00	7.22	22.22	4498.63	25.78	27.75	8.98	1.36	50.00	29.16	17.93
4550.00	7.22	24.60	4548.24	31.59	33.51	11.47	0.60	50.00	35.42	18.90
4600.00	7.14	26.95	4597.84	37.46	39.14	14.19	0.61	50.00	41.63	19.93
4650.00	7.87	28.64	4647.41	43.67	44.91	17.24	1.53	50.00	48.11	21.00
4700.00	8.27	30.88	4696.92	50.41	51.01	20.72	1.02	50.00	55.05	22.11
4750.00	8.28	32.52	4746.40	57.39	57.13	24.51	0.47	50.00	62.16	23.22
4800.00	8.05	35.34	4795.89	64.34	63.02	28.47	0.92	50.00	69.15	24.31
4850.00	8.31	37.16	4845.38	71.35	68.75	32.67	0.73	50.00	76.12	25.42
4900.00	8.17	39.00	4894.87	78.45	74.39	37.09	0.60	50.00	83.13	26.50
4950.00	7.85	39.65	4944.38	85.38	79.78	41.51	0.67	50.00	89.94	27.48
5000.00	7.67	40.27	4993.92	92.09	84.96	45.84	0.40	50.00	96.54	28.35
5050.00	7.43	40.86	5043.49	98.64	89.95	50.11	0.50	50.00	102.97	29.12
5100.00	7.20	41.69	5093.08	104.98	94.74	54.31	0.51	50.00	109.20	29.83



Scientific
Drilling

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Field: San Juan 32-8 #23M
Site: Rio Arriba County
Well: San Juan 32-8 #23M
Wellpath: Original Hole

Date: 6/3/2002 Time: 17:58:19 Page: 3
Co-ordinate(NE) Reference: Site: Rio Arriba County, Grid North
Vertical (TVD) Reference: SITE 0.0
Section (VS) Reference: Well (0.00N,0.00E,45.80Azi)
Survey Calculation Method: Minimum Curvature Db: Sybase

Survey

Meas Depth ft	Incl deg	Azim deg	TVD ft	VS ft	N/S ft	E/W ft	DLS deg/100ft	CLen ft	CLSD ft	CLSA deg
5150.00	7.08	41.25	5142.69	111.18	99.39	58.43	0.26	50.00	115.29	30.45
5200.00	6.79	41.98	5192.33	117.20	103.91	62.44	0.61	50.00	121.22	31.00
5250.00	6.56	41.73	5241.99	123.00	108.23	66.32	0.46	50.00	126.93	31.50
5300.00	6.38	42.70	5291.67	128.62	112.41	70.10	0.42	50.00	132.47	31.95
5350.00	6.28	44.15	5341.37	134.13	116.41	73.89	0.38	50.00	137.88	32.40
5400.00	6.12	43.42	5391.07	139.52	120.31	77.63	0.36	50.00	143.18	32.83
5450.00	5.93	44.50	5440.80	144.77	124.09	81.27	0.44	50.00	148.33	33.22
5500.00	5.98	44.57	5490.53	149.96	127.79	84.91	0.10	50.00	153.42	33.60
5550.00	5.94	46.35	5540.26	155.15	131.43	88.61	0.38	50.00	158.51	33.99
5600.00	5.86	46.16	5589.99	160.29	134.98	92.32	0.16	50.00	163.53	34.37
5650.00	5.85	46.44	5639.73	165.39	138.50	96.01	0.06	50.00	168.53	34.73
5700.00	6.01	46.66	5689.46	170.55	142.06	99.76	0.32	50.00	173.58	35.08
5750.00	5.91	46.61	5739.19	175.74	145.62	103.53	0.20	50.00	178.67	35.41
5800.00	5.99	46.76	5788.92	180.92	149.18	107.30	0.16	50.00	183.76	35.73
5850.00	5.95	46.85	5838.65	186.12	152.74	111.09	0.08	50.00	188.87	36.03
5900.00	5.72	46.51	5888.39	191.21	156.22	114.79	0.47	50.00	193.86	36.31
5950.00	5.49	47.29	5938.15	196.09	159.56	118.36	0.48	50.00	198.67	36.57
6000.00	5.52	48.48	5987.92	200.88	162.78	121.91	0.24	50.00	203.37	36.83
6050.00	5.53	49.49	6037.69	205.69	165.94	125.55	0.20	50.00	208.08	37.11
6100.00	5.71	50.23	6087.45	210.57	169.09	129.29	0.39	50.00	212.86	37.40
6150.00	5.58	50.67	6137.21	215.48	172.22	133.08	0.27	50.00	217.65	37.69
6200.00	5.49	51.49	6186.98	220.28	175.25	136.83	0.24	50.00	222.35	37.98
6250.00	5.44	51.50	6236.75	225.02	178.22	140.56	0.10	50.00	226.98	38.26
6300.00	5.60	52.19	6286.52	229.80	181.19	144.34	0.35	50.00	231.66	38.54
6350.00	5.72	52.54	6336.27	234.70	184.20	148.25	0.25	50.00	236.45	38.83
6400.00	5.87	52.01	6386.02	239.71	187.29	152.24	0.32	50.00	241.36	39.11
6450.00	5.94	52.29	6435.75	244.83	190.45	156.30	0.15	50.00	246.38	39.38
6500.00	5.98	52.04	6485.48	249.99	193.63	160.40	0.10	50.00	251.44	39.64
6550.00	6.03	52.00	6535.21	255.19	196.85	164.53	0.10	50.00	256.55	39.89
6600.00	5.95	52.13	6584.93	260.37	200.06	168.64	0.16	50.00	261.65	40.13
6650.00	5.85	52.22	6634.67	265.48	203.21	172.70	0.20	50.00	266.68	40.36
6700.00	5.73	51.88	6684.41	270.49	206.31	176.68	0.25	50.00	271.62	40.58
6750.00	5.29	51.72	6734.18	275.27	209.28	180.45	0.88	50.00	276.34	40.77
6800.00	5.06	51.75	6783.98	279.76	212.07	183.99	0.46	50.00	280.76	40.94
6850.00	4.67	51.03	6833.80	283.98	214.72	187.31	0.79	50.00	284.94	41.10
6900.00	4.59	49.50	6883.64	288.00	217.30	190.41	0.29	50.00	288.92	41.23
6950.00	4.48	48.72	6933.48	291.95	219.89	193.40	0.25	50.00	292.84	41.33
7000.00	4.51	49.53	6983.33	295.86	222.45	196.36	0.14	50.00	296.72	41.44
7050.00	4.41	50.29	7033.17	299.74	224.95	199.34	0.23	50.00	300.57	41.54
7100.00	4.08	51.37	7083.04	303.42	227.29	202.21	0.68	50.00	304.22	41.66
7150.00	3.89	53.67	7132.92	306.87	229.41	204.96	0.50	50.00	307.63	41.78
7200.00	3.86	53.20	7182.80	310.22	231.42	207.68	0.09	50.00	310.94	41.90
7250.00	3.73	54.48	7232.69	313.50	233.37	210.35	0.31	50.00	314.18	42.03
7300.00	3.48	55.99	7282.59	316.60	235.17	212.93	0.53	50.00	317.24	42.16
7350.00	3.33	56.05	7332.51	319.52	236.83	215.39	0.30	50.00	320.13	42.29
7400.00	3.11	57.44	7382.43	322.28	238.37	217.74	0.47	50.00	322.85	42.41
7450.00	2.99	58.69	7432.36	324.88	239.78	220.00	0.27	50.00	325.41	42.54
7500.00	2.96	61.83	7482.29	327.39	241.06	222.25	0.33	50.00	327.88	42.67
7550.00	3.06	61.32	7532.22	329.92	242.31	224.56	0.21	50.00	330.37	42.82
7600.00	3.01	63.09	7582.15	332.46	243.55	226.90	0.21	50.00	332.86	42.97
7650.00	3.08	62.03	7632.08	335.00	244.77	229.26	0.18	50.00	335.37	43.13
7700.00	3.39	62.19	7682.00	337.71	246.09	231.75	0.62	50.00	338.04	43.28
7750.00	3.46	61.89	7731.91	340.58	247.49	234.39	0.14	50.00	340.87	43.44



Scientific Drilling SURVEY REPORT

Company: PHILLIPS PETROLEUM COMPANY
Field: San Juan 32-8 #23M
Site: Rio Arriba County
Well: San Juan 32-8 #23M
Wellpath: Original Hole

Date: 6/3/2002 **Time:** 17:58:19 **Page:** 4
Co-ordinate(NE) Reference: Site: Rio Arriba County, Grid North
Vertical (TVD) Reference: SITE 0.0
Section (VS) Reference: Well (0.00N,0.00E,45.80Azi)
Survey Calculation Method: Minimum Curvature **Db:** Sybase

Survey

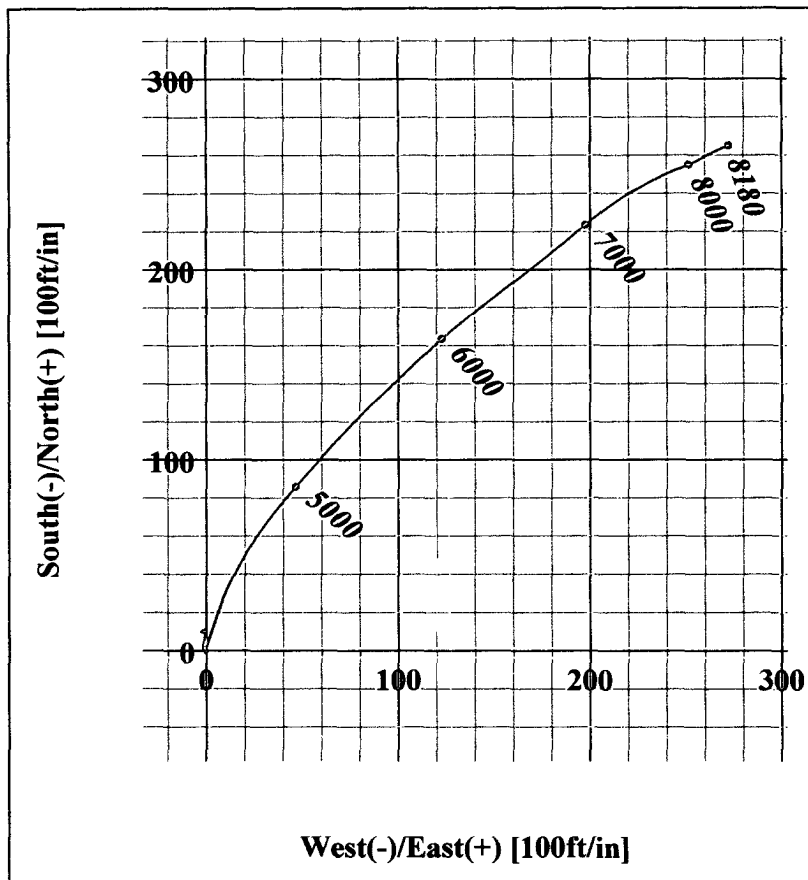
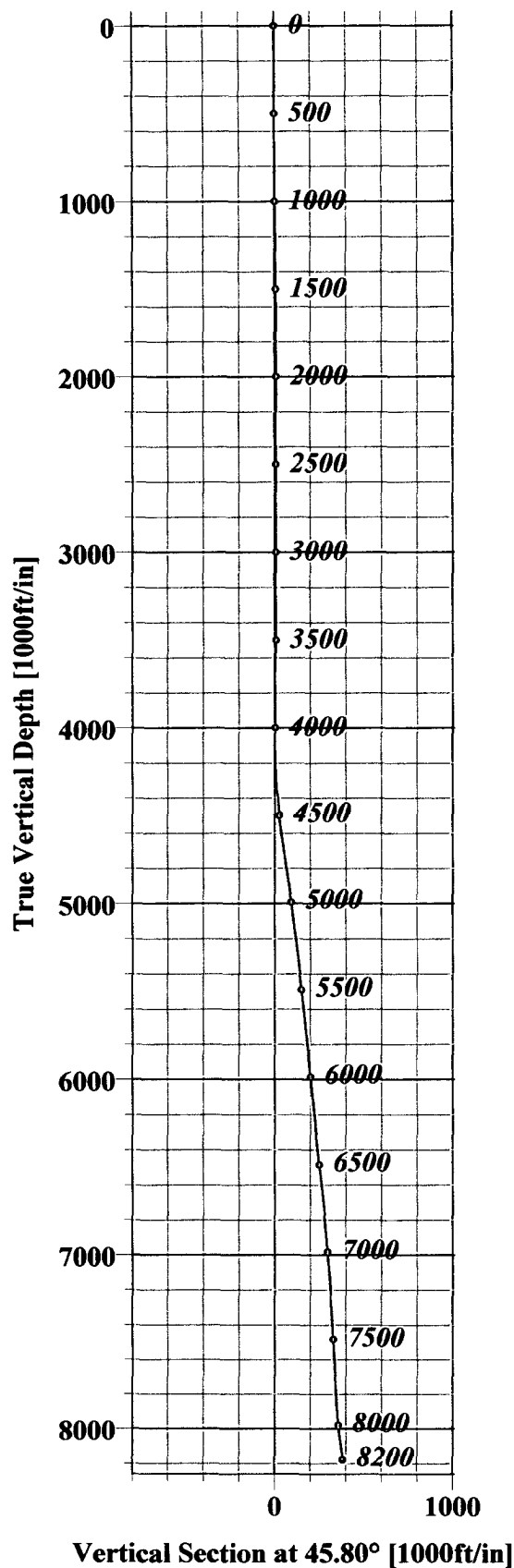
Meas Depth ft	Incl deg	Azim deg	TVD ft	VS ft	N/S ft	E/W ft	DLS deg/100ft	CLen ft	ClsD ft	ClsA deg
7800.00	3.41	63.75	7781.82	343.44	248.86	237.05	0.24	50.00	343.69	43.61
7850.00	3.45	66.55	7831.73	346.26	250.12	239.77	0.34	50.00	346.48	43.79
7900.00	3.70	66.92	7881.63	349.17	251.35	242.63	0.50	50.00	349.35	43.99
7950.00	4.50	69.38	7931.50	352.48	252.67	245.95	1.64	50.00	352.61	44.23
8000.00	5.31	67.24	7981.32	356.43	254.26	249.92	1.66	50.00	356.52	44.51
8050.00	6.64	63.11	8031.05	361.34	256.46	254.63	2.79	50.00	361.40	44.80
8100.00	8.09	61.59	8080.63	367.49	259.44	260.30	2.93	50.00	367.52	45.10
8150.00	7.62	64.76	8130.17	374.01	262.53	266.40	1.28	50.00	374.02	45.42
8200.00	7.41	72.26	8179.74	380.03	264.92	272.47	2.00	50.00	380.03	45.80



Scientific
Drilling

PHILLIPS PETROLEUM COMPANY

Field: San Juan 32-8 #23M
Site: Rio Arriba County
Well: San Juan 32-8 #23M
Wellpath: Original Hole
Survey: Survey #1



BOTTOM HOLE CLOSURE

380.03 ft. 45.8° Azimuth

FINAL STATION

8200.0' MD 8179.74' TVD
7.41° Angle 72.26° Azimuth
North 264.92 ft. East 272.47 ft.
380.03' Vert. Sec.

Survey: Survey #1 (San Juan 32-8 #23M/Original Hole)

Created By: Judi Moore

Date: 6/3/2002