

REPORT OF
SUB-SURFACE
DIRECTIONAL
SURVEY

API #

PETROLEUM DEVELOPMENT CORPORATION

MOUNTAIN FEDERAL NO. 5

ROOSEVELT COUNTY, NEW MEXICO

C. 30-7-32

JOB NUMBER

430-1652

430-1652

TYPE OF SURVEY

Gyroscopic Survey

Steering Tool

DATE

November 1, 1993

November 10, 1993

SURVEY BY TIM STEPHENS/RON COLLINS

OFFICE: MIDLAND, TX

BAC Per PK. 339/N 9 1653/W

PETROLEUM DEVELOPMENT CORPORATION

Structure : MOUNTAIN FEDERAL #5

Well : #5

Field : TOM TOM

Location : CHAVES COUNTY, NEW MEXICO

WELL PROFILE DATA

Point	MD	Inc	Dir	TVD	North	East
Top of Well	0	0.00	318.15	0	0	0
KOP	4034	0.00	318.15	4034	0	0
End of Build	4181	90.82	318.15	4114	80	-54
Target	5275	90.82	318.15	4098	890	-787



MAGNETIC DECLINATION
9 DEGREES EAST



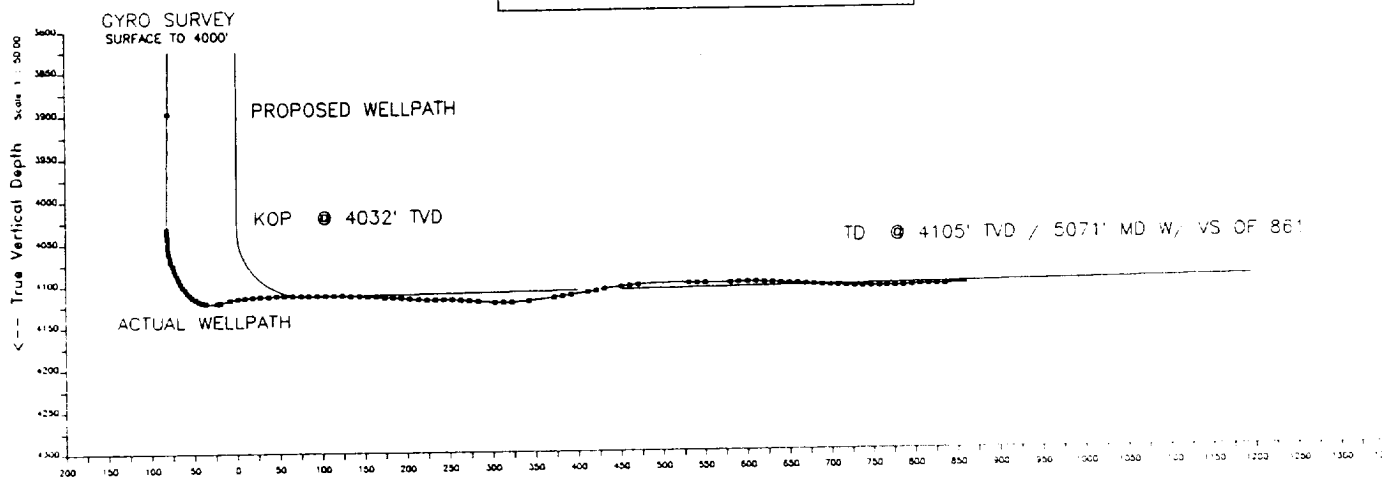
BOTTOM HOLE LOCATION
N. 651' W. 564'

PROPOSED WELLPATH

ACTUAL WELLPATH

SURFACE LOCATION

HORIZONTAL LENGTH - 1037'
VERTICAL SECTION - 861'
CLOSURE - 861'



PETROLEUM DEVELOPMENT CORPORATION
MOUNTAIN FEDERAL #5

#5
slot #1
TOM TOM
CHAVES COUNTY, NEW MEXICO

S U R V E Y L I S T I N G

by
Baker Hughes INTEQ

Your ref : STEERING TOOL SURVEY
Our ref : svy231
License :

Date printed : 16-Nov-93
Date created : 3-Nov-93
Last revised : 16-Nov-93

Field is centred on 0.000,0.000,0.00000,+
Structure is centred on 0.000,0.000,0.00000,N

Slot location is n0 0 0.000,w4 29 18.843
Slot Grid coordinates are N 0.000, E 0.000
Slot local coordinates are 0.00 N 0.00 E
Reference North is Grid North

PETROLEUM DEVELOPMENT CORPORATION
MOUNTAIN FEDERAL #5,#5
TOM TOM, CHAVES COUNTY, NEW MEXICO

SURVEY LISTING Page 1
Your ref : STEERING TOOL SURVEY
Last revised : 16-Nov-93

Measured Depth	Inclin. Degrees	Azimuth Degrees	True Vert. Depth	R E C T A N G U L A R C O O R D I N A T E S		Dogleg Deg/100Ft	Vert Sect
0.00	0.00	0.00	0.00	0.00 N	0.00 E	0.00	0.00
100.00	0.38	126.45	100.00	0.20 S	0.27 E	0.38	-0.32
200.00	0.12	70.31	200.00	0.36 S	0.63 E	0.33	-0.69
300.00	0.28	257.65	300.00	0.38 S	0.49 E	0.40	-0.61
400.00	0.24	334.46	400.00	0.24 S	0.16 E	0.32	-0.29
500.00	0.49	316.74	500.00	0.26 N	0.22 W	0.27	0.34
600.00	0.20	300.07	599.99	0.66 N	0.66 W	0.30	0.94
700.00	0.60	69.44	699.99	0.93 N	0.32 W	0.74	0.91
800.00	0.80	58.28	799.98	1.48 N	0.76 E	0.24	0.60
900.00	0.83	55.81	899.97	2.26 N	1.95 E	0.05	0.38
1000.00	0.76	85.14	999.96	2.72 N	3.21 E	0.41	-0.12
1100.00	1.71	92.35	1099.94	2.71 N	5.36 E	0.96	-1.56
1200.00	2.58	102.51	1199.87	2.16 N	9.05 E	0.95	-4.42
1300.00	2.62	111.21	1299.77	0.85 N	13.38 E	0.40	-8.29
1400.00	2.57	107.80	1399.66	0.66 S	17.64 E	0.16	-12.26
1500.00	2.59	119.00	1499.56	2.44 S	21.76 E	0.50	-16.33
1600.00	2.67	111.80	1599.46	4.40 S	25.89 E	0.34	-20.56
1700.00	2.28	120.46	1699.36	6.28 S	29.77 E	0.54	-24.54
1800.00	2.68	117.73	1799.27	8.37 S	33.56 E	0.42	-28.62
1900.00	2.55	117.47	1899.17	10.48 S	37.60 E	0.13	-32.90
2000.00	2.27	113.53	1999.08	12.30 S	41.39 E	0.32	-36.78
2100.00	1.13	107.75	2099.03	13.39 S	44.14 E	1.15	-39.43
2200.00	1.18	95.33	2199.01	13.79 S	46.11 E	0.25	-41.03
2300.00	1.04	80.14	2299.00	13.73 S	48.03 E	0.32	-42.27
2400.00	1.41	88.42	2398.97	13.54 S	50.15 E	0.41	-43.55
2500.00	1.63	78.49	2498.94	13.22 S	52.77 E	0.34	-45.06
2600.00	1.96	77.68	2598.89	12.57 S	55.84 E	0.33	-46.62
2700.00	2.60	78.13	2698.81	11.74 S	59.73 E	0.64	-48.60
2800.00	2.94	86.26	2798.69	11.11 S	64.51 E	0.52	-51.31
2900.00	3.14	92.38	2898.55	11.06 S	69.80 E	0.38	-54.81
3000.00	2.94	96.30	2998.41	11.45 S	75.09 E	0.29	-58.63
3100.00	2.88	96.36	3098.28	12.01 S	80.13 E	0.06	-62.41
3200.00	2.28	91.19	3198.18	12.33 S	84.62 E	0.64	-65.64
3300.00	2.17	99.33	3298.10	12.68 S	88.48 E	0.33	-68.47
3400.00	1.92	91.78	3398.04	13.04 S	92.02 E	0.37	-71.10
3500.00	1.45	93.31	3498.00	13.16 S	94.96 E	0.47	-73.16
3600.00	1.49	104.21	3597.96	13.55 S	97.48 E	0.28	-75.13
3700.00	1.43	102.56	3697.93	14.14 S	99.96 E	0.07	-77.23
3800.00	1.13	92.04	3797.91	14.45 S	102.16 E	0.38	-78.92
3900.00	1.04	113.20	3897.89	14.84 S	103.98 E	0.41	-80.43
4000.00	1.04	85.55	3997.87	15.13 S	105.72 E	0.50	-81.81 GYRO F/ SURFACE
4034.00	1.53	238.91	4031.87	15.34 S	105.64 E	7.36	-81.91 KOP W/ 40' SRAB MOTOR
4035.00	1.60	239.40	4032.87	15.36 S	105.62 E	7.36	-81.90
4040.00	6.10	266.30	4037.86	15.41 S	105.29 E	94.57	-81.73
4042.00	7.51	258.04	4039.84	15.44 S	105.06 E	85.54	-81.60 GIH W/ 64' SRAB MOTOR
4045.00	9.80	250.30	4042.81	15.57 S	104.62 E	85.54	-81.40
4050.00	13.30	221.50	4047.71	16.14 S	103.84 E	132.81	-81.31
4055.00	15.20	246.60	4052.56	16.84 S	102.86 E	128.14	-81.17
4060.00	17.10	261.40	4057.37	17.20 S	101.53 E	90.36	-80.56
4065.00	19.00	270.10	4062.12	17.31 S	99.99 E	65.86	-79.61

All data is in feet unless otherwise stated
Coordinates from structure and TVD from wellhead.
Vertical section is from wellhead on azimuth 318.15 degrees.
Declination is 0.00 degrees, Convergence is 0.00 degrees.
Calculation uses the minimum curvature method.
Presented by Baker Hughes INTEQ

PETROLEUM DEVELOPMENT CORPORATION
MOUNTAIN FEDERAL #5, #5
TOM TOM, CHAVES COUNTY, NEW MEXICO

SURVEY LISTING Page 2
Your ref : STEERING TOOL SURVEY
Last revised : 16-Nov-93

Measured Depth	Inclin. Degrees	Azimuth Degrees	True Vert. Depth	R E C T A N G U L A R C O O R D I N A T E S		Dogleg Deg/100Ft	Vert Sect	
4070.00	20.70	275.20	4066.82	17.23	S	98.29 E	48.50	-78.42
4075.00	23.00	275.70	4071.46	17.06	S	96.44 E	46.15	-77.05
4080.00	25.70	276.40	4076.02	16.84	S	94.39 E	54.31	-75.52
4085.00	28.40	276.60	4080.47	16.58	S	92.13 E	54.03	-73.82
4090.00	31.00	276.40	4084.81	16.30	S	89.67 E	52.04	-71.97
4095.00	32.90	274.90	4089.06	16.04	S	87.04 E	41.18	-70.02
4100.00	34.60	275.10	4093.21	15.80	S	84.27 E	34.07	-67.99
4105.00	36.30	276.80	4097.29	15.50	S	81.39 E	39.30	-65.84
4107.00	37.42	277.38	4098.89	15.35	S	80.20 E	58.56	-64.94
4110.00	39.10	278.20	4101.24	15.10	S	78.36 E	58.56	-63.52
4115.00	43.50	277.80	4105.00	14.64	S	75.09 E	88.16	-61.00
4120.00	46.30	278.40	4108.54	14.14	S	71.60 E	56.64	-58.30
4125.00	53.40	279.50	4111.76	13.54	S	67.82 E	142.99	-55.34
4130.00	57.70	281.30	4114.59	12.80	S	63.77 E	90.97	-52.08
4135.00	63.30	285.00	4117.05	11.80	S	59.54 E	129.17	-48.52
4140.00	69.50	285.00	4119.05	10.62	S	55.11 E	124.00	-44.68
4145.00	75.40	286.10	4120.56	9.34	S	50.52 E	119.85	-40.67
4150.00	80.10	286.50	4121.62	7.97	S	45.83 E	94.32	-36.52
4165.00	99.80	288.20	4121.63	3.52	S	31.59 E	131.82	-23.70
4166.00	100.21	284.38	4121.46	3.24	S	30.64 E	378.73	-22.86
4170.00	101.40	269.00	4120.70	2.79	S	26.75 E	378.73	-19.92
4185.00	100.40	291.40	4117.83	0.19	S	12.36 E	146.75	-8.39
4195.00	98.00	292.20	4116.23	3.47	N	3.19 E	25.26	0.46
4205.00	96.00	293.00	4115.02	7.29	N	5.97 W	21.52	9.41
4215.00	93.70	293.80	4114.17	11.25	N	15.11 W	24.34	18.46
4225.00	92.20	294.60	4113.66	15.34	N	24.22 W	16.99	27.59
4235.00	91.00	296.20	4113.38	19.63	N	33.25 W	19.99	36.81
4245.00	90.70	298.60	4113.23	24.23	N	42.13 W	24.18	46.16
4255.00	90.50	300.20	4113.12	29.14	N	50.84 W	16.12	55.62
4265.00	89.70	301.80	4113.11	34.29	N	59.41 W	17.89	65.18
4275.00	90.00	302.60	4113.13	39.62	N	67.87 W	8.54	74.79
4285.00	90.60	304.20	4113.08	45.12	N	76.22 W	17.09	84.46
4295.00	90.10	305.80	4113.02	50.86	N	84.41 W	16.76	94.20
4305.00	89.50	307.40	4113.05	56.82	N	92.44 W	17.09	104.00
4315.00	89.20	309.00	4113.17	63.00	N	100.30 W	16.28	113.85
4325.00	88.90	310.60	4113.33	69.40	N	107.98 W	16.28	123.74
4335.00	88.60	315.20	4113.55	76.20	N	115.30 W	46.09	133.69
4345.00	88.20	313.80	4113.83	83.21	N	122.43 W	14.55	143.67
4355.00	87.10	316.20	4114.24	90.28	N	129.50 W	26.38	153.64
4365.00	85.90	317.80	4114.85	97.58	N	136.30 W	19.98	163.62
4375.00	85.10	320.20	4115.64	105.10	N	142.84 W	25.23	173.59
4385.00	85.80	321.80	4116.43	112.84	N	149.12 W	17.42	183.54
4395.00	85.80	321.00	4117.16	120.64	N	155.34 W	7.98	193.50
4405.00	86.30	320.20	4117.85	128.35	N	161.67 W	9.42	203.47
4415.00	87.00	317.00	4118.44	135.84	N	168.27 W	32.70	213.45
4425.00	88.30	317.00	4118.84	143.14	N	175.08 W	13.00	223.44
4435.00	89.90	316.20	4119.00	150.41	N	181.95 W	17.89	233.43
4445.00	89.30	315.40	4119.07	157.58	N	188.93 W	10.00	243.42
4455.00	87.70	314.60	4119.33	164.64	N	195.99 W	17.89	253.41
4465.00	85.90	313.80	4119.89	171.60	N	203.15 W	19.69	263.37

All data is in feet unless otherwise stated
Coordinates from structure and TVD from wellhead.
Vertical section is from wellhead on azimuth 318.15 degrees.
Declination is 0.00 degrees, Convergence is 0.00 degrees.
Calculation uses the minimum curvature method.
Presented by Baker Hughes INTEQ

PETROLEUM DEVELOPMENT CORPORATION
MOUNTAIN FEDERAL #5, #5
TOM TOM, CHAVES COUNTY, NEW MEXICO

SURVEY LISTING Page 3
Your ref : STEERING TOOL SURVEY
Last revised : 16-Nov-93

Measured Depth	Inclin. Degrees	Azimuth Degrees	True Vert. Depth	R E C T A N G U L A R C O O R D I N A T E S		Dogleg Deg/100Ft	Vert Sect	
4475.00	85.10	313.00	4120.68	178.45 N	210.40 W	11.30	273.30	
4485.00	85.50	312.20	4121.50	185.20 N	217.73 W	8.92	283.22	
4495.00	86.80	312.20	4122.17	191.90 N	225.12 W	13.00	293.14	60r
4505.00	88.30	313.00	4122.59	198.66 N	232.48 W	17.00	303.09	
4515.00	90.30	312.20	4122.72	205.43 N	239.84 W	21.54	313.04	
4525.00	92.30	312.20	4122.49	212.15 N	247.24 W	20.00	322.98	
4535.00	94.00	312.20	4121.94	218.85 N	254.64 W	17.00	332.91	90r
4545.00	95.10	313.00	4121.15	225.60 N	261.98 W	13.59	342.84	
4555.00	96.40	312.20	4120.14	232.34 N	269.30 W	15.24	352.74	120r
4565.00	97.30	313.00	4118.95	239.06 N	276.61 W	12.00	362.62	160r
4575.00	98.10	313.00	4117.61	245.81 N	283.86 W	8.00	372.49	
4585.00	98.90	313.80	4116.13	252.61 N	291.04 W	11.25	382.35	
4595.00	99.10	314.60	4114.57	259.50 N	298.12 W	8.15	392.20	
4605.00	99.50	315.40	4112.95	266.47 N	305.10 W	8.85	402.05	170r
4615.00	99.60	317.00	4111.30	273.59 N	311.93 W	15.81	411.91	
4625.00	99.30	317.80	4109.65	280.85 N	318.60 W	8.44	421.77	
4635.00	99.20	318.60	4108.04	288.21 N	325.18 W	7.96	431.64	
4645.00	98.40	320.20	4106.52	295.71 N	331.61 W	17.72	441.52	150L
4655.00	97.30	321.80	4105.15	303.41 N	337.85 W	19.29	451.41	
4665.00	96.50	323.40	4103.95	311.30 N	343.88 W	17.78	461.31	
4675.00	95.60	325.00	4102.89	319.36 N	349.69 W	18.28	471.20	
4683.00	94.08	326.28	4102.22	325.94 N	354.19 W	24.80	479.10	LOST PART. CIRC. MIX LCM.
4685.00	93.70	326.60	4102.08	327.61 N	355.29 W	24.80	481.08	90L
4695.00	91.80	326.60	4101.60	335.94 N	360.79 W	19.00	490.96	45L
4705.00	91.20	326.60	4101.34	344.29 N	366.29 W	6.00	500.84	0
4715.00	90.70	325.80	4101.18	352.60 N	371.86 W	9.43	510.74	45R
4725.00	89.70	324.20	4101.14	360.79 N	377.59 W	18.87	520.67	60R
4735.00	89.10	323.40	4101.25	368.86 N	383.50 W	10.00	530.62	
4745.00	88.80	323.40	4101.43	376.88 N	389.46 W	3.00	540.58	
4755.00	89.50	323.40	4101.58	384.91 N	395.42 W	7.00	550.54	
4765.00	90.20	324.20	4101.60	392.98 N	401.33 W	10.63	560.49	60R
4775.00	90.70	324.20	4101.52	401.09 N	407.18 W	5.00	570.43	75R
4785.00	91.00	325.00	4101.38	409.24 N	412.97 W	8.54	580.37	
4795.00	91.10	325.00	4101.19	417.43 N	418.70 W	1.00	590.30	
4805.00	90.00	326.60	4101.10	425.70 N	424.32 W	19.42	600.20	
4815.00	88.70	326.60	4101.21	434.05 N	429.83 W	13.00	610.10	
4825.00	88.40	327.40	4101.46	442.44 N	435.27 W	8.54	619.97	
4835.00	88.30	328.20	4101.75	450.89 N	440.60 W	8.06	629.83	
4845.00	87.10	329.00	4102.15	459.42 N	445.80 W	14.42	639.65	
4855.00	86.00	328.20	4102.76	467.94 N	451.00 W	13.59	649.47	
4865.00	86.40	326.60	4103.42	476.35 N	456.38 W	16.46	659.32	
4875.00	86.60	326.60	4104.03	484.68 N	461.88 W	2.00	669.19	
4885.00	86.60	327.40	4104.62	493.05 N	467.31 W	7.98	679.05	
4895.00	86.00	327.40	4105.27	501.46 N	472.69 W	6.00	688.90	
4905.00	86.90	328.20	4105.89	509.90 N	478.01 W	12.03	698.74	
4915.00	86.30	328.20	4106.48	518.39 N	483.27 W	6.00	708.57	
4925.00	87.20	329.00	4107.05	526.91 N	488.47 W	12.03	718.39	
4935.00	87.70	330.60	4107.49	535.54 N	493.49 W	16.75	728.17	
4945.00	88.80	332.20	4107.80	544.32 N	498.28 W	19.41	737.90	
4955.00	91.00	334.60	4107.81	553.26 N	502.76 W	32.56	747.55	

All data is in feet unless otherwise stated
Coordinates from structure and TVD from wellhead.
Vertical section is from wellhead on azimuth 318.15 degrees.
Declination is 0.00 degrees, Convergence is 0.00 degrees.
Calculation uses the minimum curvature method.
Presented by Baker Hughes INTEQ

PETROLEUM DEVELOPMENT CORPORATION
MOUNTAIN FEDERAL #5,#5
TOM TOM, CHAVES COUNTY, NEW MEXICO

SURVEY LISTING Page 4
Your ref : STEERING TOOL SURVEY
Last revised : 16-Nov-93

Measured Depth	Inclin. Degrees	Azimuth Degrees	True Vert. Depth	R E C T A N G U L A R C O O R D I N A T E S		Dogleg Deg/100Ft	Vert Sect
4965.00	91.20	334.60	4107.62	562.29 N	507.04 W	2.00	757.14
4975.00	90.20	333.00	4107.50	571.26 N	511.46 W	18.87	766.77
4985.00	90.10	331.40	4107.47	580.11 N	516.12 W	16.03	776.47
4995.00	91.40	330.60	4107.34	588.85 N	520.97 W	15.26	786.22
5005.00	92.80	329.80	4106.98	597.52 N	525.94 W	16.12	795.99
5015.00	92.00	328.20	4106.56	606.09 N	531.08 W	17.88	805.80
5025.00	91.10	326.60	4106.29	614.51 N	536.47 W	18.35	815.67
5035.00	90.90	324.20	4106.11	622.74 N	542.14 W	24.08	825.58
5045.00	91.30	323.40	4105.92	630.81 N	548.05 W	8.94	835.53
5071.00	90.69	319.24	4105.47	651.10 N	564.29 W	16.17	861.48

TD. PROJECTED F/ PREVIOUS SURVEY.

All data is in feet unless otherwise stated
Coordinates from structure and IVD from wellhead.
Vertical section is from wellhead on azimuth 318.15 degrees.
Declination is 0.00 degrees, Convergence is 0.00 degrees.
Calculation uses the minimum curvature method.
Presented by Baker Hughes INTEQ

PETROLEUM DEVELOPMENT CORPORATION
MOUNTAIN FEDERAL #5, #5
TOM TOM, CHAVES COUNTY, NEW MEXICO

SURVEY LISTING Page 5
Your ref : STEERING TOOL SURVEY
Last revised : 16-Nov-93

				Comments in wellpath
				=====
MD	TVD	Rectangular Coords.		Comment

4000.00	3997.87	15.13 S	105.72 E	GYRO F/ SURFACE
4034.00	4031.87	15.34 S	105.64 E	KOP W/ 40' SRAB MOTOR
4042.00	4039.84	15.44 S	105.06 E	GIH W/ 64' SRAB MOTOR
4107.00	4098.89	15.35 S	80.20 E	GIH W/ 40' SRAB MOTOR
4166.00	4121.46	3.24 S	30.64 E	GIH W/ SRAH MOTOR
4495.00	4122.17	191.90 N	225.12 W	60r
4535.00	4121.94	218.85 N	254.64 W	90r
4555.00	4120.14	232.34 N	269.30 W	120r
4565.00	4118.95	239.06 N	276.61 W	160r
4605.00	4112.95	266.47 N	305.10 W	170r
4645.00	4106.52	295.71 N	331.61 W	150L
4683.00	4102.22	325.94 N	354.19 W	LOST PART. CIRC. MIX LCM.
4685.00	4102.08	327.61 N	355.29 W	90L
4695.00	4101.60	335.94 N	360.79 W	45L
4705.00	4101.34	344.29 N	366.29 W	0
4715.00	4101.18	352.60 N	371.86 W	45R
4725.00	4101.14	360.79 N	377.59 W	60R
4765.00	4101.60	392.98 N	401.33 W	60R
4775.00	4101.52	401.09 N	407.18 W	75R
5071.00	4105.47	651.10 N	564.29 W	TD. PROJECTED F/ PREVIOUS SURVEY.

All data is in feet unless otherwise stated
Coordinates from structure and TVD from wellhead.
Bottom hole distance is 861.60 on azimuth 319.08 degrees from wellhead.
Vertical section is from wellhead on azimuth 318.15 degrees.
Declination is 0.00 degrees, Convergence is 0.00 degrees.
Calculation uses the minimum curvature method.
Presented by Baker Hughes INTEQ



2105 Market Street Midland, Texas 79703
915-694-9517 Fax 915-694-5648

SURVEY CERTIFICATION SHEET

STATE OF TEXAS
COUNTY OF MIDLAND

I, Tim Stephens, in the employ of Baker Hughes INTEQ did on the days of November 1, 1993 thru November 1, 1993 conduct or supervise the taking of a Gyroscopic survey by the method of magnetic orientation from a depth of 0 feet to 4000 feet, with recordings of inclination and direction being obtained at approximate intervals of 100 feet.

This survey was conducted at the request of Petroleum Development Corporation for their Mountain Federal No. 5, Roosevelt County, State of New Mexico.

The data for this survey and the calculation were obtained and performed by me according to standards and procedures as set forth by Baker Hughes INTEQ and is true and correct to the best of my knowledge.

Tim Stephens
Directional Supervisor/Surveyor



2105 Market Street Midland, Texas 79703
915-694-9517 Fax 915-694-5648

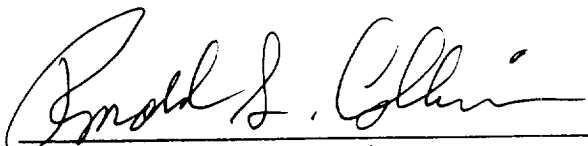
SURVEY CERTIFICATION SHEET

STATE OF TEXAS
COUNTY OF MIDLAND

I, Ron Collins, in the employ of Baker Hughes INTEQ did on the days of November 1, 1993 thru November 10, 1993 conduct or supervise the taking of a Steering Tool survey by the method of magnetic orientation from a depth of 4035 feet to 5071 feet, with recordings of inclination and direction being obtained at approximate intervals of 5 feet.

This survey was conducted at the request of Petroleum Development Corporation for their Mountain Federal No. 5, Roosevelt County, State of New Mexico.

The data for this survey and the calculation were obtained and performed by me according to standards and procedures as set forth by Baker Hughes INTEQ and is true and correct to the best of my knowledge.



Directional Supervisor/Surveyor