REPORT OF

SUB-SURFACE DIRECTIONAL SURVEY

API

PETROLEUM DEVELOPMENT CORPORATION

WATTAM FEDERAL NO. 1

CHAVES COUNTY, NEW MEXICO

JOB NUMBER	TYPE OF SURVEY	DATE
430-1662	GYROSCOPIC	DECEMBER 10, 1993
430-1662	STEERING TOOL	DECEMBER 14, 1993

SURVEY BY TIM STEPHENS/RON COLLINS

OFFICE: MIDLAND, TX

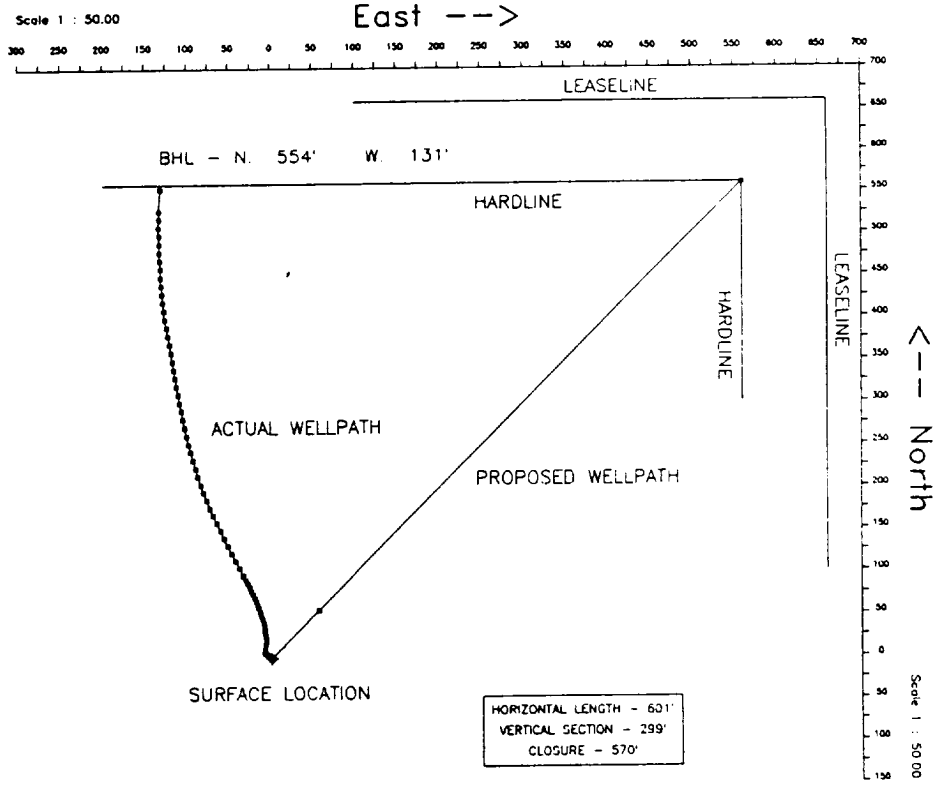
PETROLEUM DEVELOPEMENT CORPORATION

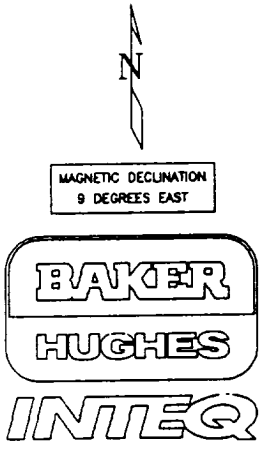
Structure : WATTAM FEDERAL #1

Field : TOM TOM **Location : CHAVES COUNTY, NEW MEXICO**

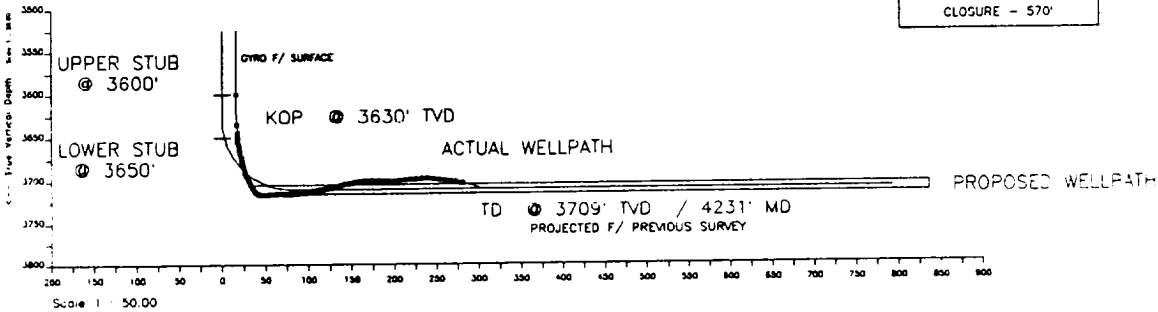
---- WELL PROFILE DATA ----

--- Point ---	MD	Inc	Dir	TVD	North	East
Tie on	0	0.00	45.00	0	0	0
KOP	3630	0.00	45.00	3630	0	0
End of Build	3758	90.00	45.00	3710	56	56
Target	4468	90.00	45.00	3710	560	560





HORIZONTAL LENGTH - 601'
VERTICAL SECTION - 299'
CLOSURE - 570'



vertical Section on 45.00 azimuth with reference 0.00 N, 0.00 E from structure

PETROLEUM DEVELOPEMENT CORPORATION
WATTAM FEDERAL #1

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 :
Our ref : svy242
License :

Date printed : 28-Dec-93
Date created : 3-Dec-93
Last revised : 28-Dec-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 DEVELOPEMENT CORPORATION — SURVEY LISTING — Page 1
WATTAM FEDERAL #1,slot #1 — Your ref :
TOM TOM,CHAVES COUNTY, NEW MEXICO — Last revised : 28-Dec-93

Measured Depth	Inclin. Degrees	Azimuth Degrees	True Vert. Depth	RECTANGULAR COORDINATES		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	0.47	154.65	100.00	0.37 S	0.18 E	0.47	-0.14	
200.00	0.31	168.19	200.00	1.01 S	0.41 E	0.18	-0.42	
300.00	0.15	177.27	300.00	1.40 S	0.47 E	0.16	-0.66	
400.00	0.17	298.88	400.00	1.46 S	0.34 E	0.28	-0.79	
500.00	0.50	312.39	499.99	1.09 S	0.11 W	0.34	-0.85	
600.00	0.44	309.60	599.99	0.56 S	0.72 W	0.06	-0.91	
700.00	0.54	327.08	699.99	0.08 N	1.28 W	0.18	-0.84	
800.00	0.56	312.71	799.98	0.81 N	1.89 W	0.14	-0.76	
900.00	0.38	308.91	899.98	1.35 N	2.51 W	0.18	-0.82	
1000.00	0.42	324.24	999.98	1.86 N	2.98 W	0.11	-0.80	
1100.00	0.44	329.21	1099.97	2.48 N	3.39 W	0.04	-0.64	
1200.00	0.28	338.03	1199.97	3.04 N	3.68 W	0.17	-0.45	
1300.00	0.42	318.29	1299.97	3.54 N	4.02 W	0.18	-0.34	
1400.00	0.39	312.52	1399.97	4.04 N	4.51 W	0.05	-0.33	
1500.00	0.43	298.72	1499.96	4.45 N	5.09 W	0.11	-0.45	
1600.00	0.41	316.55	1599.96	4.89 N	5.67 W	0.13	-0.54	
1700.00	0.55	306.34	1699.96	5.44 N	6.30 W	0.16	-0.61	
1800.00	0.54	306.10	1799.95	6.00 N	7.07 W	0.01	-0.75	
1900.00	0.56	304.73	1899.95	6.56 N	7.85 W	0.02	-0.91	
2000.00	0.82	349.32	1999.94	7.54 N	8.38 W	0.58	-0.60	
2100.00	0.95	4.09	2099.93	9.07 N	8.46 W	0.26	0.43	
2200.00	1.11	11.76	2199.91	10.84 N	8.20 W	0.21	1.87	
2300.00	1.14	7.28	2299.90	12.78 N	7.88 W	0.09	3.47	
2400.00	1.06	12.20	2399.88	14.67 N	7.55 W	0.12	5.03	
2500.00	1.03	5.84	2499.86	16.47 N	7.27 W	0.12	6.50	
2600.00	0.93	10.42	2599.84	18.16 N	7.03 W	0.13	7.87	
2700.00	1.10	6.11	2699.83	19.91 N	6.78 W	0.19	9.28	
2800.00	0.93	0.38	2799.81	21.68 N	6.67 W	0.20	10.61	
2900.00	1.07	355.40	2899.80	23.42 N	6.74 W	0.16	11.79	
3000.00	0.82	343.23	2999.78	25.04 N	7.02 W	0.32	12.74	
3100.00	0.71	354.05	3099.78	26.34 N	7.29 W	0.18	13.46	
3200.00	0.65	349.18	3199.77	27.51 N	7.46 W	0.08	14.17	
3300.00	0.60	357.31	3299.76	28.59 N	7.60 W	0.10	14.84	
3400.00	0.53	347.37	3399.76	29.56 N	7.72 W	0.12	15.45	
3500.00	0.38	311.02	3499.76	30.23 N	8.07 W	0.32	15.67	
3600.00	0.52	313.76	3599.75	30.77 N	8.65 W	0.14	15.64	GYRO F/ SURFACE
3630.00	3.55	10.68	3629.73	31.77 N	8.58 W	11.00	16.40	SHORT RADIUS KOP
3635.00	4.10	11.70	3634.72	32.10 N	8.51 W	11.00	16.68	
3645.00	7.70	13.50	3644.66	33.10 N	8.28 W	36.04	17.55	
3650.00	10.70	181.80	3649.64	32.96 N	8.22 W	366.12	17.50	
3655.00	14.30	6.90	3654.60	33.12 N	8.16 W	499.51	17.65	
3660.00	16.10	359.40	3659.42	34.42 N	8.09 W	53.25	18.62	
3665.00	18.20	353.00	3664.20	35.89 N	8.19 W	56.41	19.58	
3670.00	20.90	349.70	3668.91	37.54 N	8.45 W	58.32	20.57	
3675.00	24.10	344.60	3673.53	39.41 N	8.88 W	74.91	21.58	
3680.00	27.70	340.30	3678.03	41.48 N	9.54 W	81.17	22.59	
3685.00	30.70	339.70	3682.40	43.78 N	10.38 W	60.28	23.62	
3690.00	34.20	341.40	3686.61	46.31 N	11.27 W	72.33	24.78	
3695.00	38.10	342.10	3690.65	49.11 N	12.19 W	78.43	26.10	

All data is in feet unless otherwise stated
Coordinates from structure and TVD from wellhead.
Vertical section is from N 0.00 E 0.00 on azimuth 45.00 degrees.
Declination is 0.00 degrees, Convergence is 0.00 degrees.
Calculation uses the minimum curvature method.
Presented by Baker Hughes INTEQ

PETROLEUM DEVELOPEMENT CORPORATION
WATTAM FEDERAL #1,slot #1
TOM TOM,CHAVES COUNTY, NEW MEXICO

SURVEY LISTING Page 2
Your ref :
Last revised : 28-Dec-93

Measured Depth	Inclin. Degrees	Azimuth Degrees	True Vert. Depth	RECTANGULAR COORDINATES		Dogleg Deg/100Ft	Vert Sect	
3700.00	43.40	342.50	3694.44	52.22 N	13.18 W	106.13	27.60	
3705.00	47.00	341.80	3697.96	55.59 N	14.27 W	72.68	29.22	
3710.00	50.90	340.80	3701.24	59.16 N	15.48 W	79.44	30.89	
3715.00	54.60	338.60	3704.27	62.89 N	16.86 W	81.86	32.55	
3720.00	58.80	336.60	3707.01	66.76 N	18.46 W	90.40	34.15	
3725.00	63.70	335.10	3709.42	70.75 N	20.25 W	101.46	35.71	
3730.00	68.10	334.40	3711.46	74.88 N	22.20 W	88.92	37.25	
3735.00	72.40	333.80	3713.15	79.11 N	24.25 W	86.74	38.79	
3740.00	76.20	333.20	3714.50	83.42 N	26.40 W	76.87	40.32	
3745.00	80.90	331.90	3715.49	87.77 N	28.66 W	97.39	41.80	
3750.00	85.40	331.50	3716.09	92.14 N	31.01 W	90.35	43.22	
3755.00	90.40	331.90	3716.27	96.53 N	33.38 W	100.32	44.66	
3756.00	90.50	331.91	3716.26	97.42 N	33.85 W	10.05	44.95	GIH W/ ANGLE HOLD MOTOR
3765.00	91.40	332.00	3716.12	105.36 N	38.08 W	10.05	47.57	
3775.00	91.60	332.60	3715.85	114.21 N	42.73 W	6.32	50.54	
3785.00	91.30	333.10	3715.60	123.10 N	47.29 W	5.83	53.61	
3795.00	91.70	333.70	3715.34	132.04 N	51.76 W	7.21	56.76	
3805.00	91.30	333.90	3715.08	141.01 N	56.18 W	4.47	59.99	
3815.00	91.10	334.80	3714.87	150.02 N	60.51 W	9.22	63.30	
3825.00	89.80	334.80	3714.79	159.07 N	64.76 W	13.00	66.68	
3835.00	88.70	334.40	3714.92	168.10 N	69.05 W	11.70	70.04	
3845.00	89.10	335.80	3715.11	177.17 N	73.26 W	14.56	73.48	
3855.00	91.40	337.70	3715.07	186.36 N	77.21 W	29.83	77.18	
3865.00	92.20	340.20	3714.75	195.69 N	80.80 W	26.24	81.24	
3875.00	91.70	341.30	3714.41	205.12 N	84.09 W	12.08	85.58	
3885.00	92.30	342.70	3714.06	214.63 N	87.18 W	15.22	90.12	
3895.00	94.40	343.00	3713.48	224.17 N	90.13 W	21.21	94.78	
3905.00	94.50	344.20	3712.70	233.73 N	92.94 W	12.00	99.55	
3915.00	94.60	345.00	3711.91	243.34 N	95.59 W	8.04	104.48	
3925.00	94.80	344.50	3711.09	252.96 N	98.21 W	5.37	109.42	
3935.00	94.60	346.80	3710.27	262.61 N	100.68 W	23.01	114.50	
3945.00	95.50	348.10	3709.39	272.33 N	102.84 W	15.77	119.85	
3955.00	97.30	348.40	3708.28	282.06 N	104.87 W	18.24	125.30	
3965.00	98.50	348.90	3706.90	291.77 N	106.82 W	12.98	130.78	
3975.00	97.60	348.90	3705.50	301.49 N	108.72 W	9.00	136.31	
3985.00	97.40	349.20	3704.20	311.22 N	110.61 W	3.58	141.86	
3995.00	97.20	350.50	3702.93	320.99 N	112.35 W	13.05	147.52	
4005.00	96.00	351.80	3701.78	330.80 N	113.88 W	17.63	153.38	
4015.00	95.10	352.00	3700.81	340.66 N	115.28 W	9.22	159.36	
4025.00	92.80	350.80	3700.12	350.52 N	116.78 W	25.93	165.28	
4035.00	89.20	349.60	3699.95	360.37 N	118.48 W	37.95	171.04	
4045.00	88.50	348.80	3700.15	370.19 N	120.35 W	10.63	176.66	
4055.00	87.70	349.00	3700.48	380.00 N	122.28 W	8.24	182.24	
4065.00	87.00	349.50	3700.94	389.81 N	124.14 W	8.60	187.86	
4075.00	89.40	350.30	3701.26	399.65 N	125.89 W	25.30	193.58	
4085.00	93.10	353.20	3701.04	409.54 N	127.33 W	47.00	199.56	
4095.00	94.60	354.90	3700.37	419.46 N	128.36 W	22.64	205.84	
4105.00	94.50	355.90	3699.57	429.40 N	129.16 W	10.02	212.30	
4115.00	93.10	356.60	3698.91	439.36 N	129.81 W	15.64	218.88	
4125.00	93.10	355.50	3698.37	449.32 N	130.50 W	10.98	225.44	

All data is in feet unless otherwise stated
Coordinates from structure and TVD from wellhead.
Vertical section is from N 0.00 E 0.00 on azimuth 45.00 degrees.
Declination is 0.00 degrees, Convergence is 0.00 degrees.
Calculation uses the minimum curvature method.
Presented by Baker Hughes INTEQ

PETROLEUM DEVELOPEMENT CORPORATION SURVEY LISTING Page 3
WATTAM FEDERAL #1,slot #1 Your ref :
TOM TOM,CHAVES COUNTY, NEW MEXICO Last revised : 28-Dec-93

Measured Depth	Inclin. Degrees	Azimuth Degrees	True Vert. Depth	RECTANGULAR COORDINATES		Dogleg Deg/100Ft	Vert Sect	
4135.00	90.50	356.80	3698.06	459.29 N	131.17 W	29.06	232.02	
4145.00	88.40	356.40	3698.15	469.27 N	131.76 W	21.38	238.65	
4155.00	86.40	358.70	3698.60	479.25 N	132.19 W	30.46	245.41	
4165.00	85.70	359.00	3699.29	489.23 N	132.39 W	7.61	252.32	
4175.00	85.70	359.00	3700.04	499.20 N	132.57 W	0.00	259.25	
4185.00	84.60	359.60	3700.89	509.16 N	132.69 W	12.52	266.21	
4195.00	83.00	1.10	3701.97	519.10 N	132.63 W	21.87	273.28	
4205.00	81.00	1.90	3703.36	529.00 N	132.37 W	21.51	280.46	
4231.00	75.80	3.96	3708.59	554.42 N	131.07 W	21.45	299.36	TD. PROJECTED F/ PREVIOUS SURVEY

All data is in feet unless otherwise stated
Coordinates from structure and TVD from wellhead.
Vertical section is from N 0.00 E 0.00 on azimuth 45.00 degrees.
Declination is 0.00 degrees, Convergence is 0.00 degrees.
Calculation uses the minimum curvature method.
Presented by Baker Hughes INTEQ

Comments in wellpath

MD	TVD	Rectangular Coords.		Comment
3600.00	3599.75	30.77 N	8.65 W	GYRO F/ SURFACE
3630.00	3629.73	31.77 N	8.58 W	SHORT RADIUS KOP
3756.00	3716.26	97.42 N	33.85 W	GIH W/ ANGLE HOLD MOTOR
4231.00	3708.59	554.42 N	131.07 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 569.71 on azimuth 346.70 degrees from wellhead.
Vertical section is from N 0.00 E 0.00 on azimuth 45.00 degrees.
Declination is 0.00 degrees, Convergence is 0.00 degrees.
Calculation uses the minimum curvature method.
Presented by Baker Hughes INTEQ

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 December 10, 19 93 thru December 10, 19 93 conduct or supervise the taking of a Gyroscopic survey by the method of magnetic orientation from a depth of 0 feet to 3600 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 Wattam Federal No. 1, Chaves 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

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, Ron Collins, in the employ of Baker Hughes *INTEQ* did on the days of December 10, 19 93 thru December 14, 19 93 conduct or supervise the taking of a Steering Tool survey by the method of magnetic orientation from a depth of 3635 feet to 4055 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 Wattam Federal No. 1, Chaves 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.

Ronald S. Collins

Directional Supervisor/Surveyor