



surface
BHL

1100/N 885/W
1964/W 1549/W

Scientific Drilling

Survey Report

Final



Company: BP Date: 11/22/2005 Time: 16:26:58 Page: 1
Field: SAN JUAN, New Mexico Co-ordinate(NE) Reference: Well: Atlantic LS #4M, Grid North
Site: SEC 25-T31N-R10W Vertical (TVD) Reference: NEW SITE 6422.0
Well: Atlantic LS #4M Section (VS) Reference: Well (0.00N,0.00E,141.77Azi)
Wellpath: OH Survey Calculation Method: Minimum Curvature Db: Sybase

Field: SAN JUAN, New Mexico
SAN JUAN COUNTY, NEW MEXICO
USA
Map System: US State Plane Coordinate System 1983
Geo Datum: GRS 1980
Sys Datum: Mean Sea Level

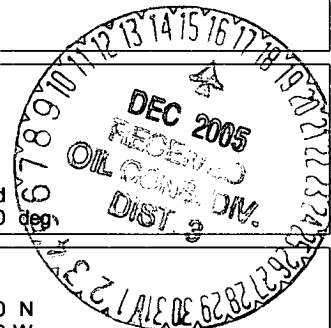
Map Zone: New Mexico, Western Zone
Coordinate System: Well Centre
Geomagnetic Model: bggm2005

Site: SEC 25-T31N-R10W

SAN JUAN NEW MEXICO

Site Position: Northing: ft
From: Lease Line Easting: ft
Position Uncertainty: 0.00 ft
Ground Level: 6408.00 ft

Latitude: deg
Longitude: deg
North Reference: Grid
Grid Convergence: 0.00 deg



Well: Atlantic LS #4M

Slot Name:

Well Position: +N/-S 314.78 ft Northing: 2137269.85 ft Latitude: 36 52 24.470 N
+E/-W -2997.65 ft Easting: 2721246.45 ft Longitude: 107 50 22.778 W
Position Uncertainty: 0.00 ft

Wellpath: OH

Current Datum: NEW SITE Height 6422.00 ft
Magnetic Data: 10/3/2005
Field Strength: 51439 nT
Vertical Section: Depth From (TVD) ft
0.00 0.00 0.00 141.77

Drilled From: Surface
Tie-on Depth: 0.00 ft
Above System Datum: Mean Sea Level
Declination: 10.67 deg
Mag Dip Angle: 63.73 deg
+E/-W ft
Direction deg

Survey: MWD Survey

Start Date: 11/22/2005

Company: Scientific Drilling
Tool: MWD ISCWSA;MWD - Standard

Engineer: Masoud Khodadad
Tied-to: From Surface

Survey: MWD Survey

MD ft	Incl deg	Azim deg	TVD ft	+N/-S ft	+E/-W ft	VS ft	DLS deg/100ft	Build deg/100ft	Turn deg/100ft	Tool/Comment
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MWD ISCWSA
200.00	0.40	286.79	200.00	0.20	-0.66	-0.57	0.20	0.20	0.00	9 5/8"
252.00	0.50	286.79	252.00	0.32	-1.05	-0.90	0.20	0.20	0.00	MWD ISCWSA
313.00	0.09	262.39	313.00	0.39	-1.35	-1.14	0.69	-0.67	-40.00	MWD ISCWSA
374.00	1.07	128.38	373.99	0.03	-0.96	-0.61	1.86	1.61	-219.69	MWD ISCWSA
436.00	1.71	140.47	435.97	-1.04	0.09	0.88	1.13	1.03	19.50	MWD ISCWSA
497.00	3.38	137.87	496.91	-3.08	1.87	3.58	2.74	2.74	-4.26	MWD ISCWSA
558.00	4.88	131.52	557.75	-6.13	5.02	7.93	2.57	2.46	-10.41	MWD ISCWSA
620.00	7.55	139.11	619.38	-10.96	9.66	14.59	4.50	4.31	12.24	MWD ISCWSA
680.00	9.53	139.98	678.71	-17.75	15.44	23.49	3.31	3.30	1.45	MWD ISCWSA
740.00	11.50	136.35	737.70	-25.88	22.76	34.41	3.46	3.28	-6.05	MWD ISCWSA
802.00	13.42	136.91	798.24	-35.61	31.94	47.74	3.10	3.10	0.90	MWD ISCWSA
862.00	14.40	138.73	856.48	-46.30	41.62	62.13	1.79	1.63	3.03	MWD ISCWSA
925.00	15.36	139.42	917.37	-58.52	52.22	78.29	1.55	1.52	1.10	MWD ISCWSA
988.00	16.46	140.45	977.95	-71.74	63.33	95.55	1.80	1.75	1.63	MWD ISCWSA
1052.00	17.54	140.04	1039.16	-86.13	75.30	114.25	1.70	1.69	-0.64	MWD ISCWSA
1115.00	18.51	141.35	1099.06	-101.21	87.64	133.74	1.67	1.54	2.08	MWD ISCWSA
1178.00	19.57	139.68	1158.62	-117.07	100.71	154.29	1.89	1.68	-2.65	MWD ISCWSA
1242.00	20.49	142.25	1218.75	-134.10	114.51	176.20	1.99	1.44	4.02	MWD ISCWSA
1306.00	21.63	141.16	1278.47	-152.14	128.76	199.20	1.88	1.78	-1.70	MWD ISCWSA
1369.00	22.80	142.16	1336.79	-170.83	143.53	223.01	1.95	1.86	1.59	MWD ISCWSA
1432.00	24.42	140.33	1394.52	-190.49	159.34	248.24	2.82	2.57	-2.90	MWD ISCWSA
1496.00	24.77	138.41	1452.71	-210.71	176.68	274.85	1.36	0.55	-3.00	MWD ISCWSA
1560.00	25.32	139.36	1510.70	-231.12	194.49	301.91	1.06	0.86	1.48	MWD ISCWSA



Scientific Drilling Survey Report



Company: BP	Date: 11/22/2005	Time: 16:26:58	Page: 2
Field: SAN JUAN, New Mexico	Co-ordinate(NE) Reference:	Well: Atlantic LS #4M, Grid North	
Site: SEC 25-T31N-R10W	Vertical (TVD) Reference:	NEW SITE 6422.0	
Well: Atlantic LS #4M	Section (VS) Reference:	Well (0.00N,0.00E,141.77Azi)	
Wellpath: OH	Survey Calculation Method:	Minimum Curvature	Db: Sybase

Survey: MWD Survey

MD ft	Incl deg	Azim deg	TVD ft	+N/-S ft	+E/-W ft	VS ft	DLS deg/100ft	Build deg/100ft	Turn deg/100ft	Tool/Comment
1623.00	25.40	137.89	1567.63	-251.36	212.33	328.85	1.01	0.13	-2.33	MWD ISCWSA
1687.00	24.46	138.96	1625.66	-271.54	230.23	355.78	1.63	-1.47	1.67	MWD ISCWSA
1751.00	24.12	139.43	1684.00	-291.47	247.44	382.08	0.61	-0.53	0.73	MWD ISCWSA
1815.00	23.93	136.66	1742.45	-310.84	264.85	408.07	1.79	-0.30	-4.33	MWD ISCWSA
1879.00	23.61	139.94	1801.03	-330.09	282.01	433.81	2.13	-0.50	5.12	MWD ISCWSA
1889.89	23.73	139.96	1811.00	-333.44	284.82	438.18	1.11	1.11	0.21	OJO ALAMO
1942.00	24.31	140.07	1858.60	-349.69	298.45	459.38	1.11	1.11	0.21	MWD ISCWSA
2008.18	23.93	140.24	1919.00	-370.46	315.78	486.42	0.58	-0.57	0.26	KIRTLAND
2038.00	23.76	140.32	1946.27	-379.73	323.48	498.47	0.58	-0.57	0.26	MWD ISCWSA
2101.00	22.96	140.59	2004.11	-398.99	339.39	523.44	1.28	-1.27	0.43	MWD ISCWSA
2165.00	23.04	140.92	2063.02	-418.36	355.21	548.45	0.24	0.12	0.52	MWD ISCWSA
2227.00	23.20	139.64	2120.04	-437.08	370.77	572.78	0.85	0.26	-2.06	MWD ISCWSA
2259.00	23.52	140.20	2149.42	-446.79	378.93	585.46	1.22	1.00	1.75	MWD ISCWSA
2322.00	23.92	141.32	2207.10	-466.42	394.96	610.80	0.96	0.63	1.78	MWD ISCWSA
2385.00	24.01	141.41	2264.67	-486.41	410.94	636.39	0.15	0.14	0.14	MWD ISCWSA
2446.00	23.69	141.65	2320.46	-505.72	426.28	661.05	0.55	-0.52	0.39	MWD ISCWSA
2509.00	23.73	139.38	2378.14	-525.27	442.39	686.38	1.45	0.06	-3.60	MWD ISCWSA
2572.00	23.62	140.08	2435.84	-544.57	458.74	711.66	0.48	-0.17	1.11	MWD ISCWSA
2634.00	22.57	142.03	2492.87	-563.48	474.03	735.97	2.10	-1.69	3.15	MWD ISCWSA
2698.00	21.70	141.59	2552.15	-582.43	488.94	760.09	1.38	-1.36	-0.69	MWD ISCWSA
2761.00	21.35	143.90	2610.76	-600.82	502.94	783.19	1.46	-0.56	3.67	MWD ISCWSA
2851.11	20.25	144.64	2695.00	-626.79	521.63	815.16	1.26	-1.22	0.82	FRUITLAND
2856.00	20.19	144.68	2699.59	-628.17	522.60	816.85	1.26	-1.22	0.86	MWD ISCWSA
2919.00	19.27	145.83	2758.89	-645.64	534.73	838.08	1.58	-1.46	1.83	MWD ISCWSA
2982.00	19.33	146.89	2818.35	-662.98	546.26	858.83	0.56	0.10	1.68	MWD ISCWSA
3046.00	19.06	148.47	2878.79	-680.76	557.51	879.76	0.91	-0.42	2.47	MWD ISCWSA
3109.00	18.42	150.91	2938.45	-698.22	567.73	899.80	1.61	-1.02	3.87	MWD ISCWSA
3110.63	18.39	150.93	2940.00	-698.68	567.98	900.31	1.68	-1.61	1.47	Fruitland coal-4M
3173.00	17.39	151.90	2999.35	-715.50	577.15	919.20	1.68	-1.61	1.55	MWD ISCWSA
3236.00	16.21	145.65	3059.66	-731.06	586.55	937.24	3.42	-1.87	-9.92	MWD ISCWSA
3300.00	16.22	144.69	3121.12	-745.73	596.76	955.08	0.42	0.02	-1.50	MWD ISCWSA
3364.00	14.31	145.80	3182.86	-759.57	606.37	971.90	3.02	-2.98	1.73	MWD ISCWSA
3374.47	14.36	145.99	3193.00	-761.72	607.82	974.49	0.64	0.45	1.84	PICTURED CLIFFS
3426.00	14.59	146.92	3242.90	-772.45	614.94	987.32	0.64	0.45	1.80	MWD ISCWSA
3458.00	14.46	148.50	3273.87	-779.24	619.23	995.30	1.30	-0.41	4.94	MWD ISCWSA
3522.00	13.47	149.05	3335.98	-792.44	627.23	1010.63	1.56	-1.55	0.86	MWD ISCWSA
3536.41	13.27	149.71	3350.00	-795.31	628.93	1013.94	1.72	-1.35	4.61	LEWIS
3585.00	12.63	152.10	3397.35	-804.82	634.23	1024.69	1.72	-1.33	4.91	MWD ISCWSA
3639.00	12.30	158.04	3450.08	-815.37	639.14	1036.02	2.45	-0.61	11.00	CSG PT.4M
3669.00	12.30	158.04	3479.39	-821.30	641.53	1042.15	0.00	0.00	0.00	7"
3679.00	12.30	158.04	3489.17	-823.28	642.33	1044.20	0.00	0.00	0.00	Assumed survey to TD
4089.00	0.00	0.00	3896.02	-863.94	658.73	1086.28	3.00	-3.00	0.00	MWD ISCWSA
4887.98	0.00	0.00	4695.00	-863.94	658.73	1086.28	0.00	0.00	0.00	CLIFF HOUSE
5213.98	0.00	0.00	5021.00	-863.94	658.73	1086.28	0.00	0.00	0.00	MENELEE
5624.98	0.00	0.00	5432.00	-863.94	658.73	1086.28	0.00	0.00	0.00	GREENHORN
5653.98	0.00	0.00	5461.00	-863.94	658.73	1086.28	0.00	0.00	0.00	POINT LOOKOUT
5676.98	0.00	0.00	5484.00	-863.94	658.73	1086.28	0.00	0.00	0.00	GRANEROS
5964.98	0.00	0.00	5772.00	-863.94	658.73	1086.28	0.00	0.00	0.00	MANCOS
7733.98	0.00	0.00	7541.00	-863.94	658.73	1086.28	0.00	0.00	0.00	TWO WELLS
7819.98	0.00	0.00	7627.00	-863.94	658.73	1086.28	0.00	0.00	0.00	PAGUATE
7860.98	0.00	0.00	7668.00	-863.94	658.73	1086.28	0.00	0.00	0.00	CUBERO
7891.98	0.00	0.00	7699.00	-863.94	658.73	1086.28	0.00	0.00	0.00	L. CUBERO
7930.98	0.00	0.00	7738.00	-863.94	658.73	1086.28	0.00	0.00	0.00	ENCINAL CYN

Company: BP Field: SAN JUAN, New Mexico Site: SEC 25-T31N-R10W Well: Atlantic LS #4M Wellpath: OH	Date: 11/22/2005 Co-ordinate(NE) Reference: Well: Atlantic LS #4M, Grid North Vertical (TVD) Reference: NEW SITE 6422.0 Section (VS) Reference: Well (0.00N,0.00E,141.77Azi) Survey Calculation Method: Minimum Curvature	Time: 16:26:58 Page: 3 Db: Sybase
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Survey: MWD Survey

MD ft	Incl deg	Azim deg	TVD ft	+N/-S ft	+E/-W ft	VS ft	DLS deg/100ft	Build deg/100ft	Turn deg/100ft	Tool/Comment
7988.00	0.00	0.00	7795.02	-863.94	658.73	1086.28	0.00	0.00	0.00	MWD ISCWSA

Targets

Name	Description Dip. Dir.	TVD ft	+N/-S ft	+E/-W ft	Map Northing ft	Map Easting ft	← Latitude → Deg Min Sec			← Longitude → Deg Min Sec		
Fruitland coal-4M		2940.00	-720.65	567.70	2136549.26	2721814.10	36	52	17.345 N	107	50	15.791 W
CSG PT.4M		3450.00	-844.88	665.57	2136425.04	2721911.97	36	52	16.117 N	107	50	14.586 W
PBHL-4M		7800.00	-904.20	712.40	2136365.72	2721958.80	36	52	15.530 N	107	50	14.010 W
-Circle (Radius: 100)												

Casing Points

MD ft	TVD ft	Diameter in	Hole Size in	Name
200.00	200.00	9.625	12.250	9 5/8"
3669.00	3479.39	7.000	8.500	7"

Formations

MD ft	TVD ft	Formations	Lithology	Dip Angle deg	Dip Direction deg
1889.89	1811.00	OJO ALAMO		0.00	0.00
2008.18	1919.00	KIRTLAND		0.00	0.00
2851.11	2695.00	FRUITLAND		0.00	0.00
3110.63	2940.00	FRUITLAND COAL		0.00	0.00
3374.47	3193.00	PICTURED CLIFFS		0.00	0.00
3536.41	3350.00	LEWIS		0.00	0.00
4887.98	4695.00	CLIFF HOUSE		0.00	0.00
5213.98	5021.00	MENEFEE		0.00	0.00
5653.98	5461.00	POINT LOOKOUT		0.00	0.00
5964.98	5772.00	MANCOS		0.00	0.00
5624.98	5432.00	GREENHORN		0.00	0.00
5676.98	5484.00	GRANEROS		0.00	0.00
7733.98	7541.00	TWO WELLS		0.00	0.00
7819.98	7627.00	PAGUATE		0.00	0.00
7860.98	7668.00	CUBERO		0.00	0.00
7891.98	7699.00	L. CUBERO		0.00	0.00
7930.98	7738.00	ENCINAL CYN		0.00	0.00

Annotation

MD ft	TVD ft	
3679.00	3489.17	Assumed survey to TD



SDI Job #: 32D1005780
COMPANY: BP AMERICA
LOCATION: SEC 25-T31N-10W
RIG NAME: AWS 184
STATE: NEW MEXICO
COUNTY: SAN JUAN CO
WELL NAME: ATLANTIC LS #4M

FIELD: SAN JUAN NORTH
Sec-Twn-Rng: SEC 25-T31N-R10W
AFE# & District: MIDLAND 32

COMMENT

BHA Summary Report for JOB

#	TIME IN - OUT		DEPTHS		Footage		ROP			RPM		FLOW		Incl.		Azimuth		Weight Ranges			
	Time IN	Time Out	Hrs.	IN	OUT	Rotary	Slide	Total	AVG.	Rotary	Slide	Rate	IN	OUT	IN	OUT	IN	OUT	SO	PU	RAB
1	04-Nov-05 @ 10:00	08-Nov-05 @ 16:00	97.00	.0	3679.0	2853.0	591.0	3444.0	46.9	49.4	37.6	0-330	.0	.0	.0	.0			0-52	0-72	0-63
				Hours>	57.73	15.70	73.43														

8 3/4 BIT 3x14
 O.D.=8 3/4
 Length=0.79



MUD MOTOR
 O.D.=6.5
 Length=20.03

W/FLOAT
 O.D.=6.5
 Length=2.4

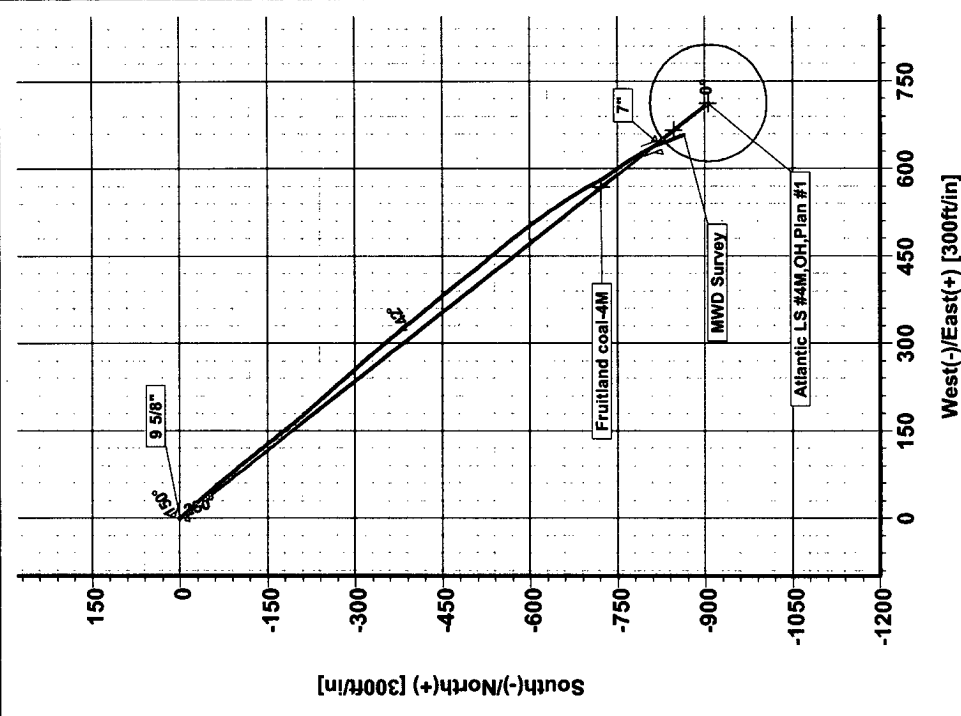
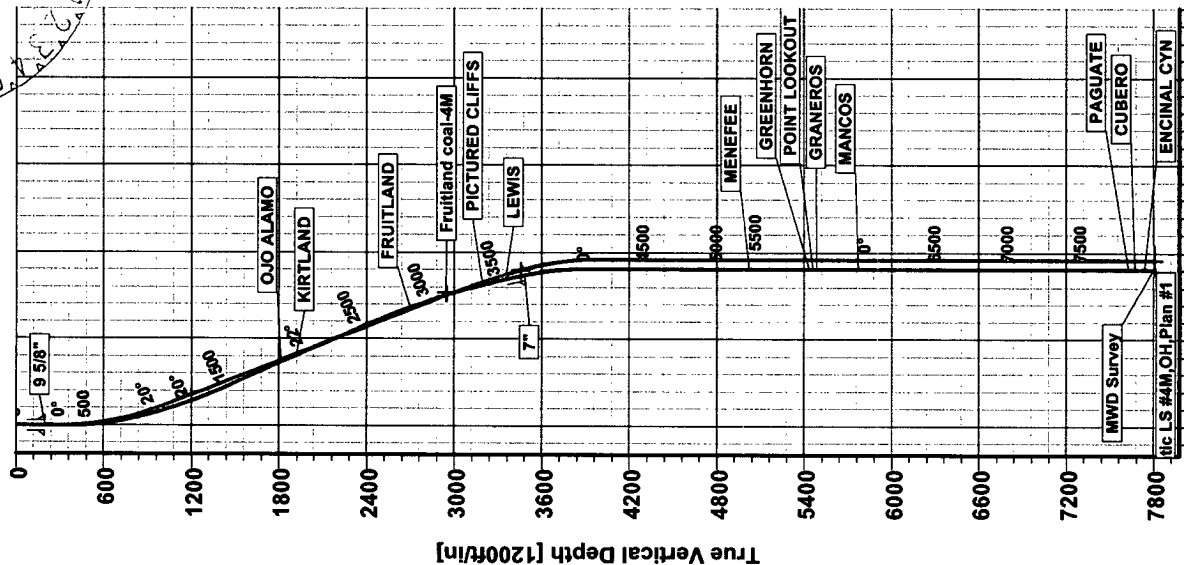


COMPARISON PLOT

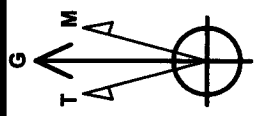
DEC 2005

PLANNED
ACTUAL

Field: SAN JUAN, New Mexico
Site: SEC 25-T31N-R10W
Well: Atlantic LS #4M
Wellpath: OH
Survey: MWD Survey



LEGEND
Atlantic LS #4M, OH, Plan #1
OH
MWD Survey



Azimuths to Grid North
True North: 0.00°
Magnetic North: 10.67°
Magnetic Field
Strength: 51439nT
Dip Angle: 63.73°
Date: 10/3/2005
Model: bggm2005

FORMATION TOP DETAILS

No.	TVDPath	MDPath	Formation
1	1811.00	1889.89	OJO ALAMO
2	1919.00	2008.18	KIRTLAND
3	2695.00	2851.11	FRUITLAND
4	2940.00	3110.63	FRUITLAND COAL
5	3193.00	3374.47	PICTURED CLIFFS
6	3350.00	3536.41	LEWIS
7	4695.00	4887.98	CLIFF HOUSE
8	5021.00	5213.98	MENEFE
9	5461.00	5653.98	POINT LOOKOUT
10	5772.00	5964.98	MANCOS
11	5432.00	5624.98	GREENHORN
12	5484.00	5676.98	GRANEROS
13	7541.00	7733.98	TWO WELLS
14	7627.00	7819.98	PAGUATE
15	7668.00	7860.98	CUBERO
16	7699.00	7891.98	L. CUBERO
17	7738.00	7930.98	ENCINAL CYN

SURVEY PROGRAM

Date : 6/15/2005 Validated : No Version : 0

Depth Fm Depth To Survey/Plan
0.00 7999.64 Planned: Plan #1 V28
Tool MWD ISWCSA

SITE DETAILS

SEC 25-T31N-R10W
SAN JUAN NEW MEXICO
Ground Level: 6408.00
Positional Uncertainty: 0.00
Convergence: 0.00

FIELD DETAILS

SAN JUAN, New Mexico
SAN JUAN COUNTY, NEW MEXICO
USA
Geodetic System: US State Plane Coordinate System 1983
Ellipsoid: GRS 1980
Zone: New Mexico, Western Zone
Magnetic Model: bggm2005

Vertical Section at 141.77° [1200ft/in]



Field: SAN JUAN, New Mexico
Site: SEC 25-T31N-R10W
Well: Atlantic LS #4M
Wellpath: OH
Survey: MWD Survey

