

COG OPERATING

Palmillo
Eddy County, NM
Phantom 18 State #2H
VH - Job #32K0111022

30-015-38258

Survey: Actual

SDI Standard Survey Report

16 January, 2011



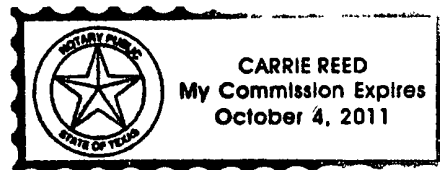
This survey is correct to the best of my knowledge and is supported by actual field data.

Richard

Notarized this date 16th of January, 2011.

Carrie Reed

Notary Signature
County of Midland
State of Texas



Scientific Drilling International, Inc.
SDI Standard Survey Report

Company:	COG OPERATING	Local Co-ordinate Reference:	Well Phantom 18 State #2H
Project:	Palmillo	TVD Reference:	WELL @ 0.0usft (Original Well Elev)
Site:	Eddy County, NM	MD Reference:	WELL @ 0.0usft (Original Well Elev)
Well:	Phantom 18 State #2H	North Reference:	Grid
Wellbore:	VH - Job #32K0111022	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #32K0111022	Database:	EDM-Regulatory

Project	Palmillo		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site: Eddy County, NM					
Site Position:		Northing:	601,707.40 usft	Latitude:	32° 39' 14.400 N
From:	Lat/Long	Easting:	568,120.77 usft	Longitude:	104° 6' 43.200 W
Position Uncertainty:	0 0 usft	Slot Radius:	13-3/16"	Grid Convergence:	0 12 °

Well	Phantom 18 State #2H, Directional (Pathfinder)					
Well Position	+N/-S	0 0 usft	Northing:	601,707.40 usft	Latitude:	32° 39' 14.400 N
	+E/-W	0.0 usft	Easting:	568,120.77 usft	Longitude:	104° 6' 43.200 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	0 0 usft

Wellbore	VH - Job #32K0111022				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	BGGM2010	1/10/2011	7.98	60.51	48,916

Design					VH - Job #32K0111022							
Audit Notes:												
Version:		1.0		Phase:		ACTUAL		Tie On Depth:		0.0		
Vertical Section:		Depth From (TVD)			+N/-S			+E/-W			Direction	
		(usft)			(usft)			(usft)			(°)	
		0.0			0.0			0.0			0.11	

Survey Program	Date 1/16/2011				
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.0	9,034.0	Actual (VH - Job #32K0111022)	Keeper	Keeper Gyro	

Survey							
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.0
100.0	0.21	268.26	100.0	0.0	-0.2	268.26	0.2
200.0	0.42	147.07	200.0	-0.3	-0.2	207.67	0.4
300.0	0.47	314.70	300.0	-0.3	-0.3	217.51	0.4
400.0	0.45	347.21	400.0	0.3	-0.6	297.61	0.7
500.0	0.46	17.72	500.0	1.1	-0.6	331.26	1.3
600.0	0.64	43.15	600.0	1.9	-0.1	357.02	1.9
700.0	1.30	68.39	700.0	2.7	1.3	26.25	3.0
800.0	1.22	68.56	799.9	3.5	3.4	43.86	4.9
900.0	1.19	67.01	899.9	4.3	5.3	51.01	6.9
1,000.0	1.02	55.92	999.9	5.2	7.0	53.38	8.8
1,100.0	0.75	29.52	1,099.9	6.3	8.1	52.12	10.2

Scientific Drilling International, Inc.
SDI Standard Survey Report

Company:	COG OPERATING	Local Co-ordinate Reference:	Well Phantom 18 State #2H
Project:	Palmillo	TVD Reference:	WELL @ 0.0usft (Original Well Elev)
Site:	Eddy County, NM	MD Reference:	WELL @ 0.0usft (Original Well Elev)
Well:	Phantom 18 State #2H	North Reference:	Grid
Wellbore:	VH - Job #32K0111022	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #32K0111022	Database:	EDM-Regulatory

Survey							
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
1,200.0	0.62	345.85	1,199.9	7.4	8.3	48.26	11.1
1,300.0	0.61	331.12	1,299.9	8.4	7.9	43.28	11.5
1,400.0	0.69	331.08	1,399.9	9.4	7.3	38.07	11.9
1,500.0	0.31	342.29	1,499.9	10.2	7.0	34.45	12.3
1,600.0	0.37	341.94	1,599.9	10.7	6.8	32.32	12.7
1,700.0	0.41	351.78	1,699.9	11.4	6.6	30.23	13.2
1,800.0	0.50	353.18	1,799.9	12.2	6.5	28.21	13.8
1,900.0	0.52	356.83	1,899.9	13.1	6.4	26.30	14.6
2,000.0	0.49	358.05	1,999.9	13.9	6.4	24.71	15.3
2,100.0	0.41	357.11	2,099.9	14.7	6.4	23.43	16.0
2,200.0	0.34	353.27	2,199.9	15.4	6.3	22.37	16.6
2,300.0	0.42	340.77	2,299.9	16.0	6.2	21.07	17.2
2,400.0	0.45	359.60	2,399.8	16.7	6.0	19.85	17.8
2,500.0	0.54	2.83	2,499.8	17.6	6.1	19.01	18.6
2,600.0	0.47	5.79	2,599.8	18.5	6.1	18.34	19.5
2,700.0	0.58	9.84	2,699.8	19.4	6.3	17.88	20.4
2,800.0	0.50	20.31	2,799.8	20.3	6.5	17.74	21.3
2,900.0	0.60	19.53	2,899.8	21.2	6.8	17.83	22.3
3,000.0	0.65	17.76	2,999.8	22.2	7.2	17.87	23.4
3,100.0	0.58	23.36	3,099.8	23.2	7.5	17.98	24.4
3,200.0	0.59	28.92	3,199.8	24.2	8.0	18.31	25.4
3,300.0	0.82	30.62	3,299.8	25.2	8.6	18.84	26.7
3,400.0	1.03	35.22	3,399.8	26.6	9.5	19.65	28.2
3,500.0	1.23	39.77	3,499.8	28.1	10.7	20.81	30.1
3,600.0	1.70	44.96	3,599.7	30.0	12.4	22.50	32.5
3,700.0	2.01	49.86	3,699.7	32.2	14.8	24.72	35.4
3,800.0	2.52	42.75	3,799.6	34.9	17.7	26.81	39.1
3,900.0	2.46	35.22	3,899.5	38.3	20.4	28.02	43.4
4,000.0	1.96	25.20	3,999.4	41.6	22.3	28.24	47.2
4,100.0	1.47	357.66	4,099.4	44.4	23.0	27.39	50.0
4,200.0	1.45	327.70	4,199.4	46.8	22.3	25.48	51.8
4,300.0	1.58	309.79	4,299.3	48.7	20.6	22.87	52.9
4,400.0	1.71	303.30	4,399.3	50.4	18.3	19.89	53.6
4,500.0	1.82	303.44	4,499.2	52.1	15.7	16.74	54.4
4,600.0	2.08	298.80	4,599.2	53.9	12.8	13.33	55.4
4,700.0	2.16	298.32	4,699.1	55.6	9.5	9.70	56.5
4,800.0	2.18	295.98	4,799.0	57.4	6.1	6.12	57.7
4,900.0	2.16	294.74	4,899.0	59.0	2.7	2.65	59.1
5,000.0	2.32	294.49	4,998.9	60.6	-0.8	359.22	60.6
5,100.0	2.35	296.82	5,098.8	62.4	-4.5	355.88	62.6
5,200.0	2.69	299.72	5,198.7	64.5	-8.4	352.61	65.0
5,300.0	2.84	298.96	5,298.6	66.8	-12.6	349.35	68.0
5,400.0	2.92	298.12	5,398.5	69.2	-17.0	346.22	71.3
5,500.0	3.16	303.08	5,498.3	71.9	-21.5	343.33	75.1

Scientific Drilling International, Inc.
SDI Standard Survey Report

Company:	COG OPERATING	Local Co-ordinate Reference:	Well Phantom 18 State #2H
Project:	Palmillo	TVD Reference:	WELL @ 0.0usft (Original Well Elev)
Site:	Eddy County, NM	MD Reference:	WELL @ 0.0usft (Original Well Elev)
Well:	Phantom 18 State #2H	North Reference:	Grid
Wellbore:	VH - Job #32K0111022	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #32K0111022	Database:	EDM-Regulatory

Survey							
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
5,600.0	3.60	297.11	5,598.2	74.9	-26.6	340.41	79.5
5,700.0	3.63	289.81	5,698.0	77.4	-32.4	337.27	83.9
5,800.0	3.33	289.26	5,797.8	79.4	-38.1	334.35	88.1
5,900.0	2.83	287.82	5,897.6	81.1	-43.2	331.95	91.9
6,000.0	2.60	287.77	5,997.5	82.6	-47.7	329.97	95.4
6,100.0	2.31	287.32	6,097.4	83.9	-51.8	328.29	98.6
6,200.0	2.02	284.07	6,197.4	84.9	-55.5	326.85	101.4
6,300.0	1.66	276.57	6,297.3	85.5	-58.6	325.57	103.7
6,400.0	1.78	279.53	6,397.3	85.9	-61.6	324.37	105.7
6,500.0	2.17	277.36	6,497.2	86.4	-65.0	323.06	108.1
6,600.0	4.16	270.95	6,597.0	86.7	-70.5	320.89	111.8
6,700.0	2.14	257.78	6,696.9	86.4	-75.9	318.68	115.0
6,800.0	1.41	152.19	6,796.9	84.9	-77.2	317.72	114.7
6,900.0	1.60	145.48	6,896.8	82.7	-75.8	317.47	112.2
7,000.0	1.53	148.25	6,996.8	80.4	-74.3	317.23	109.5
7,100.0	1.53	146.55	7,096.7	78.1	-72.9	316.98	106.9
7,200.0	1.53	151.86	7,196.7	75.8	-71.5	316.67	104.2
7,300.0	1.46	157.64	7,296.7	73.5	-70.4	316.22	101.8
7,400.0	1.67	161.94	7,396.6	70.9	-69.5	315.58	99.3
7,500.0	1.08	181.41	7,496.6	68.6	-69.1	314.81	97.3
7,600.0	1.13	183.23	7,596.6	66.7	-69.1	313.96	96.0
7,700.0	1.44	190.49	7,696.6	64.4	-69.4	312.87	94.7
7,800.0	1.76	194.91	7,796.5	61.7	-70.0	311.39	93.4
7,900.0	1.45	218.22	7,896.5	59.2	-71.2	309.76	92.6
8,000.0	1.46	240.49	7,996.5	57.6	-73.1	308.24	93.1
8,100.0	1.30	271.04	8,096.4	57.0	-75.4	307.11	94.5
8,200.0	0.46	53.77	8,196.4	57.3	-76.2	306.94	95.3
8,300.0	0.90	75.81	8,296.4	57.7	-75.1	307.54	94.7
8,400.0	1.05	89.17	8,396.4	57.9	-73.4	308.27	93.5
8,500.0	1.30	115.99	8,496.4	57.4	-71.5	308.78	91.7
8,600.0	1.53	126.67	8,596.4	56.1	-69.4	308.98	89.2
8,700.0	1.25	123.48	8,696.3	54.7	-67.4	309.08	86.8
8,800.0	1.16	135.39	8,796.3	53.4	-65.8	309.08	84.7
8,900.0	1.05	135.47	8,896.3	52.0	-64.4	308.93	82.8
9,000.0	1.04	160.59	8,996.3	50.5	-63.5	308.52	81.1
9,034.0	0.61	175.95	9,030.3	50.1	-63.4	308.31	80.7



Scientific Drilling
Directional Drilling Operations

Project: Palmillo
Eddy County, NM
Well: Phantom 18 State #2H
Wellbore: VH - Job #32K0111022
Design: VH - Job #32K0111022



Azimuths to Grid North
True North: -0.12°
Magnetic North: 7.86°

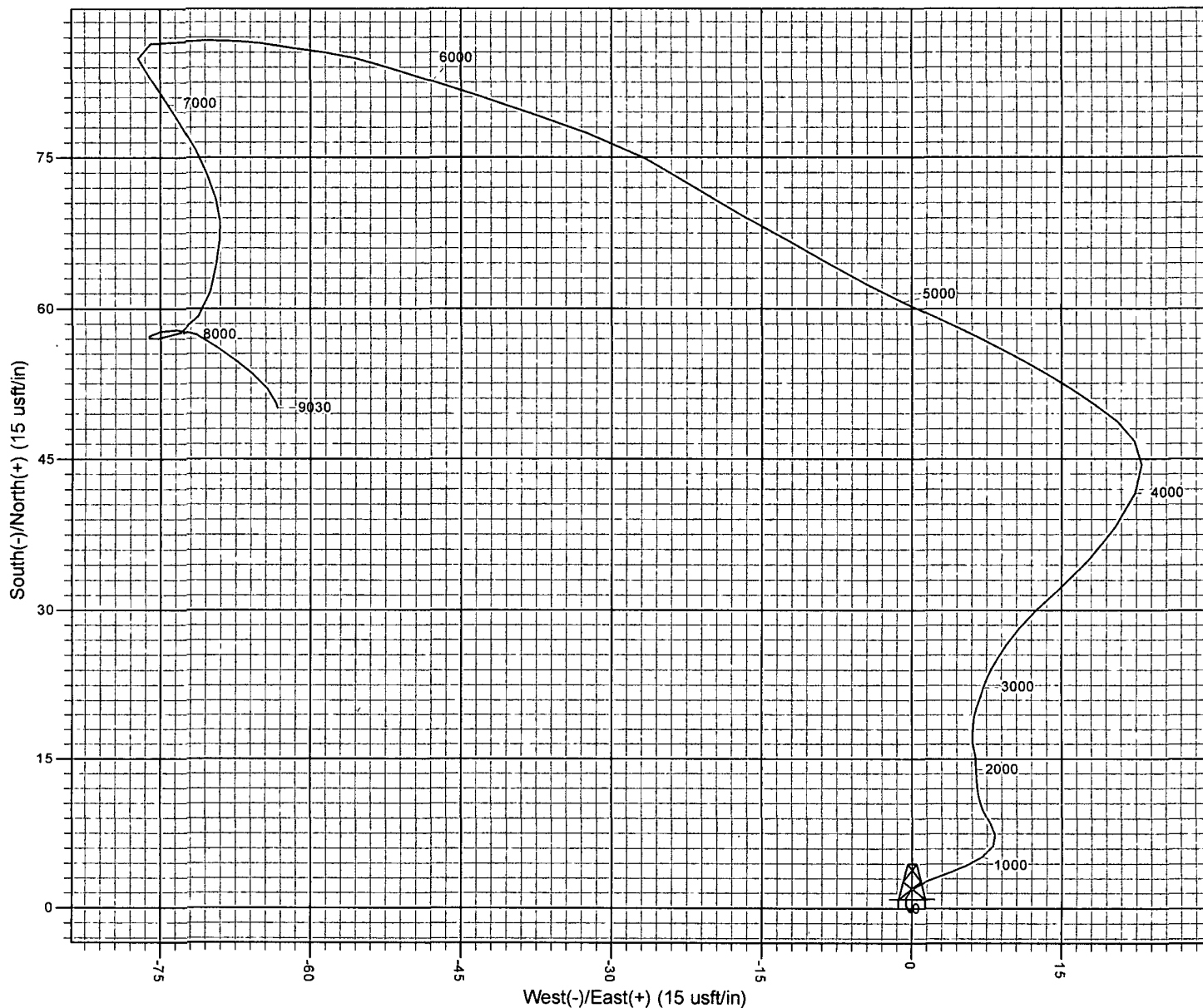
Magnetic Field
Strength: 48915.8nT
Dip Angle: 60.51°
Date: 1/10/2011
Model: BGGM2010

WELL DETAILS: Phantom 18 State #2H

WELL @ 0.0usft (Original Well Elev)

Ground Level: 0.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	601707.40	568120.77	$32^\circ 39' 14.400\text{ N}$	$104^\circ 6' 43.200\text{ W}$	



PROJECT DETAILS: Palmillo

Geodetic System: US State Plane 1927 (Exact solution)

Datum: NAD 1927 (NADCON CONUS)

Ellipsoid: Clarke 1866

Zone: New Mexico East 3001

System Datum: Mean Sea Level

SITE DETAILS: Eddy County, NM

Site Centre Latitude: $32^\circ 39' 14.400\text{ N}$

Longitude: $104^\circ 6' 43.200\text{ W}$

Positional Uncertainty: 0.0

Convergence: 0.12

Local North: Grid