

AUG 31 2011

Results of Directional Survey

RECEIVED

API number:	30-025-39885		
OGRID:		Operator:	COG OPERATING LLC
		Property:	MACHO STATE # 2H

surface	ULSTR:	E	02	T 24S	R 33E
				2260 FNL	330 FWL

BH Loc	ULSTR:	H	02	T 24S	R 33E
14385 MD		9920.9	TVD	2044 FNL	4926 FWL

Top Perf/OH	ULSTR:	E	02	T 24S	R 33E
10300 MD		10020.4	TVD	2230 FNL	859 FWL

Bot Perf/OH	ULSTR:	H	02	T 24S	R 33E
14280 MD		9921.5	TVD	2049 FNL	4821 FWL

	MD	N/S	E/W	VD
	10298	28.98	527.54	10020.35
TOP PERFS/OH	10300	29.58	529.45	10020.41
	10330	38.54	558.06	10021.25
	14223	208.40	4434.55	9921.82
BOT PERFS/OH	14280	210.91	4491.49	9921.51
	14385	215.53	4596.39	9920.94

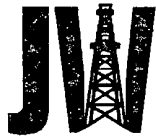
NEXT TO LAST	14223	208.40	4434.55	9921.82
LAST READING	14385	215.53	4596.39	9920.94
TD	14385	215.53	4596.39	9920.94

Surface Location	2260 FN	330 FW
Projected BHL	2044 FN	4926 FW
Location of		
Top Perfs/OH	2230 FN	859 FW
Bottom Perfs/OH	2049 FN	4821 FW

SUMMARY of Subsurface Locations

Surface Location	E-02-24S-33E	2260 FN	330 FW	Vert. Depth
Top Perfs/OH	E-02-24S-33E	2230 FN	859 FW	10020.41
Bottom Perfs/OH	H-02-24S-33E	2049 FN	4821 FW	9921.51
Projected TD	H-02-24S-33E	2044 FN	4926 FW	9920.94

AUG 31 2011



DRILLING INC. Oil Well Drilling Contractor

Post Office Box 160 Artesia, New Mexico 88211-0160 Office (575) 748-8704 Fax (575) 748-8719

HOBBS OCD

February 14, 2011

AUG 22 2011

RECEIVED

COG Operating, LLC
PO Box 1630
Artesia, New Mexico 88211-1630

Re: Macho State # 2H
Sec. 2, T-24-S, R-33-E
Lea County, New Mexico

Attn: Sheryl Baker

The following is a Deviation Survey on the referenced well in Lea County, New Mexico:

255' - 1°	2704' - 1.5°	8356' - 1.5°
516' - 2°	3099' - 1.5°	8825' - 1.75°
653' - 1.5°	3559' - 2°	9292' - 1.25°
789' - 3.5°	3883' - 1°	9667' - 2°
804' - 3.25°	4288' - 1.75°	10105' - 0.25°
867' - 5.25°	4726' - 2.75°	10544' - 1°
937' - 6°	5211' - 3.5°	10925' - 1°
1129' - 1.32°	5429' - 3°	11294' - 2°
1193' - 1.23°	5707' - 2.25°	
1232' - 1.33°	6117' - 0.75°	
1286' - 1.76°	6613' - 1°	
1429' - 1.75°	7017' - 0.5°	
1663' - 0.75°	7545' - 1°	
2132' - 1°	7919' - 1°	

SUR: E-02-24s-33e, 2260/N & 330/W
BHL: H-2-24s-33e, 2044/N & 4926/W
API # 30-025-39885

Sincerely,

Gary W. Chappell
Contracts Manager

STATE OF NEW MEXICO)
COUNTY OF EDDY)

The foregoing was acknowledged before me this 14th day of February, 2011 by Gary W. Chappell.

MY COMMISSION EXPIRES

10/28/2014

NOTARY PUBLIC

OFFICIAL SEAL
Crisha Morgan
NOTARY PUBLIC-STATE OF NEW MEXICO

My commission expires: 10/28/14

COG OPERATING

Bell Lake
Lea County, NM
Macho State #2H
VH - Job #32K0111093

HOBBS OCD

AUG 22 2011

RECEIVED

SUR: E-02-24s-33e, 2260/N & 330/W
BHL: H-2-24s-33e, 2044/N & 4926/W
API # 30-025-39885

Survey: Actual

SDI Standard Survey Report

20 February, 2011

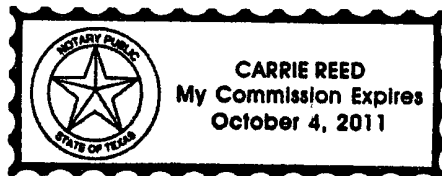
This survey is correct to the best of my knowledge and is supported by actual field data.

Hubert

Notarized this date 21st of February, 2011.

Carrie Reed

Notary Signature
County of Midland
State of Texas



Scientific Drilling
Directional Drilling Operations

Scientific Drilling International, Inc.
SDI Standard Survey Report



Company:	COG OPERATING	Local Co-ordinate Reference:	Well Macho State #2H
Project:	Bell Lake	TVD Reference:	WELL @ 0 0usft (Original Well Elev)
Site:	Lea County, NM	MD Reference:	WELL @ 0 0usft (Original Well Elev)
Well:	Macho State #2H	North Reference:	Grid
Wellbore:	VH - Job #32K0111093	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #32K0111093	Database:	EDM-Regulatory

Project	Bell Lake		
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	Lea County, NM		
Site Position:		Northing:	454,824.08 usft
From:	Lat/Long	Easting:	742,176.59 usft
Position Uncertainty:	0 0 usft	Slot Radius:	13-3/16"
		Latitude:	32° 14' 52.800 N
		Longitude:	103° 33' 0.000 W
		Grid Convergence:	0.42 °

Well	Macho State #2H, Directional (Pathfinder)		
Well Position	+N/-S	0 0 usft	Northing: 454,824.08 usft
	+E/-W	0 0 usft	Easting: 742,176.59 usft
Position Uncertainty	0 0 usft	Wellhead Elevation:	usft
		Latitude:	32° 14' 52.800 N
		Longitude:	103° 33' 0.000 W
		Ground Level:	0.0 usft

Wellbore	VH - Job #32K0111093				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	BGGM2010	1/30/2011	7.67	60.23	48,734

Design	VH - Job #32K0111093			
Audit Notes:				
Version:	1.0	Phase:	ACTUAL	Tie On Depth: 0 0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0 0	0 0	89.65

Survey Program	Date 2/20/2011			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100 0	10,500 0	Actual (VH - Job #32K0111093)	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	0.20	3.64	100.0	0.2	0.0	3.64	0.2
200.0	0.23	337.58	200.0	0.5	-0.1	354.18	0.5
300.0	0.57	264.00	300.0	0.7	-0.6	316.85	0.9
400.0	1.39	217.98	400.0	-0.3	-1.9	259.66	1.9
500.0	1.90	198.90	499.9	-2.9	-3.2	227.71	4.3
600.0	2.16	193.82	599.9	-6.3	-4.1	213.45	7.5
700.0	3.00	200.32	699.8	-10.5	-5.5	207.52	11.9
800.0	5.41	220.34	799.5	-16.6	-9.5	209.68	19.1
900.0	5.24	223.16	899.1	-23.5	-15.6	213.61	28.2
1,000.0	1.55	208.16	998.9	-28.0	-19.4	214.67	34.1
1,100.0	1.06	193.75	1,098.9	-30.1	-20.3	213.90	36.3

Scientific Drilling International, Inc.

SDI Standard Survey Report



Company:	COG OPERATING	Local Co-ordinate Reference:	Well Macho State #2H
Project:	Bell Lake	TVD Reference:	WELL @ 0.0usft (Original Well Elev)
Site:	Lea County, NM	MD Reference:	WELL @ 0.0usft (Original Well Elev)
Well:	Macho State #2H	North Reference:	Grid
Wellbore:	VH - Job #32K0111093	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #32K0111093	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	1.23	192.30	1,198.8	-32.1	-20.7	212.83	38.2
1,300.0	1.72	185.76	1,298.8	-34.6	-21.1	211.34	40.5
1,400.0	1.60	189.93	1,398.8	-37.5	-21.5	209.80	43.2
1,500.0	1.27	229.32	1,498.7	-39.6	-22.6	209.67	45.6
1,600.0	1.23	257.91	1,598.7	-40.5	-24.4	211.09	47.3
1,700.0	1.34	268.18	1,698.7	-40.8	-26.7	213.16	48.7
1,800.0	1.33	266.97	1,798.7	-40.9	-29.0	215.33	50.1
1,900.0	1.53	278.10	1,898.6	-40.8	-31.5	217.66	51.5
2,000.0	1.66	283.98	1,998.6	-40.2	-34.2	220.36	52.8
2,100.0	1.91	294.93	2,098.5	-39.2	-37.1	223.45	54.0
2,200.0	2.21	305.97	2,198.5	-37.3	-40.2	227.10	54.9
2,300.0	2.39	307.54	2,298.4	-34.9	-43.4	231.16	55.7
2,400.0	2.45	309.98	2,398.3	-32.3	-46.7	235.33	56.8
2,500.0	2.34	315.71	2,498.2	-29.5	-49.8	239.37	57.8
2,600.0	2.17	320.16	2,598.1	-26.5	-52.4	243.13	58.7
2,700.0	2.03	328.11	2,698.1	-23.6	-54.5	246.61	59.4
2,800.0	1.86	339.53	2,798.0	-20.6	-56.0	249.85	59.7
2,900.0	1.75	344.54	2,898.0	-17.6	-57.0	252.87	59.7
3,000.0	1.81	350.72	2,997.9	-14.5	-57.7	255.85	59.5
3,100.0	1.95	6.65	3,097.9	-11.3	-57.7	258.93	58.8
3,200.0	1.94	22.17	3,197.8	-8.0	-56.9	261.96	57.5
3,300.0	1.96	25.26	3,297.8	-4.9	-55.5	264.93	55.8
3,400.0	2.11	41.79	3,397.7	-2.0	-53.6	267.86	53.6
3,500.0	2.31	51.75	3,497.6	0.6	-50.8	270.69	50.8
3,600.0	2.59	58.39	3,597.5	3.0	-47.3	273.69	47.4
3,700.0	2.83	62.23	3,697.4	5.4	-43.2	277.11	43.5
3,800.0	2.91	63.91	3,797.3	7.6	-38.7	281.18	39.4
3,900.0	2.55	74.30	3,897.2	9.4	-34.3	285.29	35.5
4,000.0	1.60	111.97	3,997.1	9.4	-30.8	287.03	32.2
4,100.0	2.31	164.15	4,097.1	7.0	-29.0	283.55	29.8
4,200.0	2.43	175.11	4,197.0	2.9	-28.3	275.93	28.4
4,300.0	1.69	191.25	4,296.9	-0.6	-28.4	268.74	28.4
4,400.0	1.32	158.61	4,396.9	-3.1	-28.2	263.64	28.4
4,500.0	2.69	133.63	4,496.8	-5.8	-26.1	257.40	26.8
4,600.0	3.06	136.28	4,596.7	-9.4	-22.6	247.42	24.4
4,700.0	3.16	147.85	4,696.5	-13.6	-19.3	234.67	23.6
4,800.0	3.70	141.13	4,796.4	-18.5	-15.8	220.45	24.3
4,900.0	4.27	129.20	4,896.1	-23.4	-10.9	204.92	25.8
5,000.0	4.43	128.73	4,995.8	-28.1	-5.0	189.99	28.6
5,100.0	3.50	127.14	5,095.6	-32.4	0.5	179.13	32.4
5,200.0	3.12	131.97	5,195.4	-36.0	4.9	172.19	36.4
5,300.0	2.75	133.42	5,295.3	-39.5	8.7	167.57	40.5
5,400.0	2.60	136.90	5,395.2	-42.8	12.0	164.34	44.5
5,500.0	2.59	134.67	5,495.1	-46.1	15.2	161.78	48.5

Scientific Drilling International, Inc.
SDI Standard Survey Report



Company:	COG OPERATING	Local Co-ordinate Reference:	Well Macho State #2H
Project:	Bell Lake	TVD Reference:	WELL @ 0 0usft (Original Well Elev)
Site:	Lea County, NM	MD Reference:	WELL @ 0 0usft (Original Well Elev)
Well:	Macho State #2H	North Reference:	Gnd
Wellbore:	VH - Job #32K0111093	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #32K0111093	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	2.33	133.72	5,595.0	-49.1	18.2	159.61	52.3
5,700.0	2.00	131.69	5,694.9	-51.6	21.0	157.86	55.7
5,800.0	1.95	131.63	5,794.9	-53.9	23.6	156.38	58.9
5,900.0	1.91	133.82	5,894.8	-56.2	26.1	155.13	61.9
6,000.0	1.93	132.61	5,994.7	-58.5	28.5	154.02	65.1
6,100.0	1.71	132.49	6,094.7	-60.6	30.8	153.05	68.0
6,200.0	1.45	131.80	6,194.7	-62.5	32.9	152.25	70.6
6,300.0	1.24	134.96	6,294.6	-64.1	34.6	151.65	72.8
6,400.0	1.11	139.24	6,394.6	-65.6	36.0	151.25	74.8
6,500.0	1.07	141.69	6,494.6	-67.1	37.2	150.98	76.7
6,600.0	0.98	136.80	6,594.6	-68.4	38.4	150.72	78.4
6,700.0	0.99	137.11	6,694.6	-69.7	39.5	150.43	80.1
6,800.0	0.85	141.49	6,794.5	-70.9	40.6	150.21	81.7
6,900.0	0.77	141.51	6,894.5	-72.0	41.5	150.06	83.1
7,000.0	0.89	149.32	6,994.5	-73.2	42.3	149.99	84.5
7,100.0	0.96	147.36	7,094.5	-74.6	43.1	149.95	86.1
7,200.0	0.94	145.91	7,194.5	-76.0	44.0	149.89	87.8
7,300.0	0.96	146.26	7,294.5	-77.3	45.0	149.82	89.5
7,400.0	0.80	151.40	7,394.5	-78.6	45.8	149.80	91.0
7,500.0	0.65	151.79	7,494.5	-79.7	46.4	149.82	92.3
7,600.0	0.57	161.10	7,594.5	-80.7	46.8	149.90	93.3
7,700.0	0.55	189.65	7,694.5	-81.7	46.9	150.14	94.2
7,800.0	0.56	185.59	7,794.5	-82.6	46.8	150.50	94.9
7,900.0	0.53	184.00	7,894.4	-83.6	46.7	150.82	95.7
8,000.0	0.57	179.85	7,994.4	-84.5	46.6	151.11	96.5
8,100.0	0.99	199.06	8,094.4	-85.8	46.4	151.63	97.6
8,200.0	1.59	216.69	8,194.4	-87.8	45.2	152.73	98.7
8,300.0	1.64	215.55	8,294.4	-90.0	43.6	154.17	100.0
8,400.0	1.60	213.35	8,394.3	-92.4	42.0	155.56	101.5
8,500.0	1.65	208.58	8,494.3	-94.8	40.5	156.85	103.1
8,600.0	1.75	204.25	8,594.2	-97.5	39.2	158.08	105.1
8,700.0	1.57	201.26	8,694.2	-100.1	38.1	159.17	107.1
8,800.0	1.30	197.89	8,794.2	-102.5	37.2	160.03	109.1
8,900.0	1.10	188.96	8,894.2	-104.5	36.7	160.63	110.8
9,000.0	0.80	176.94	8,994.1	-106.2	36.6	160.96	112.3
9,100.0	0.94	158.80	9,094.1	-107.6	37.0	161.04	113.8
9,200.0	0.96	158.52	9,194.1	-109.2	37.6	161.01	115.5
9,300.0	1.00	162.60	9,294.1	-110.8	38.1	161.00	117.2
9,400.0	1.62	180.93	9,394.1	-113.0	38.4	161.24	119.4
9,500.0	1.59	179.72	9,494.0	-115.8	38.4	161.67	122.0
9,600.0	1.63	172.08	9,594.0	-118.6	38.6	161.99	124.7
9,700.0	1.46	167.13	9,694.0	-121.3	39.0	162.15	127.4
9,800.0	1.23	174.48	9,793.9	-123.6	39.4	162.30	129.7
9,900.0	0.81	193.79	9,893.9	-125.3	39.4	162.56	131.4

Scientific Drilling International, Inc.
SDI Standard Survey Report



Company:	COG OPERATING	Local Co-ordinate Reference:	Well Macho State #2H
Project:	Bell Lake	TVD Reference:	WELL @ 0 0usft (Original Well Elev)
Site:	Lea County, NM	MD Reference:	WELL @ 0 0usft (Original Well Elev)
Well:	Macho State #2H	North Reference:	Grid
Wellbore:	VH - Job #32K0111093	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #32K0111093	Database:	EDM-Regulatory

Survey							
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
10,000.0	0 81	173 10	9,993.9	-126 7	39.3	162.78	132.7
10,100.0	0 89	141 10	10,093.9	-128 0	39 9	162.71	134.1
10,200 0	0 62	119 88	10,193.9	-128 9	40.8	162.43	135.2
10,300.0	0.56	116 10	10,293.9	-129.4	41.7	162 13	136 0
10,400.0	0.55	116 35	10,393.9	-129 8	42.6	161 84	136.6
10,500 0	0 37	118.61	10,493.9	-130.2	43 3	161 60	137 2



Scientific Drilling
Directional Drilling Operations

Project: Bell Lake
Lea County, NM
Well: Macho State #2H
Wellbore: VH - Job #32K0111093
Design: VH - Job #32K0111093

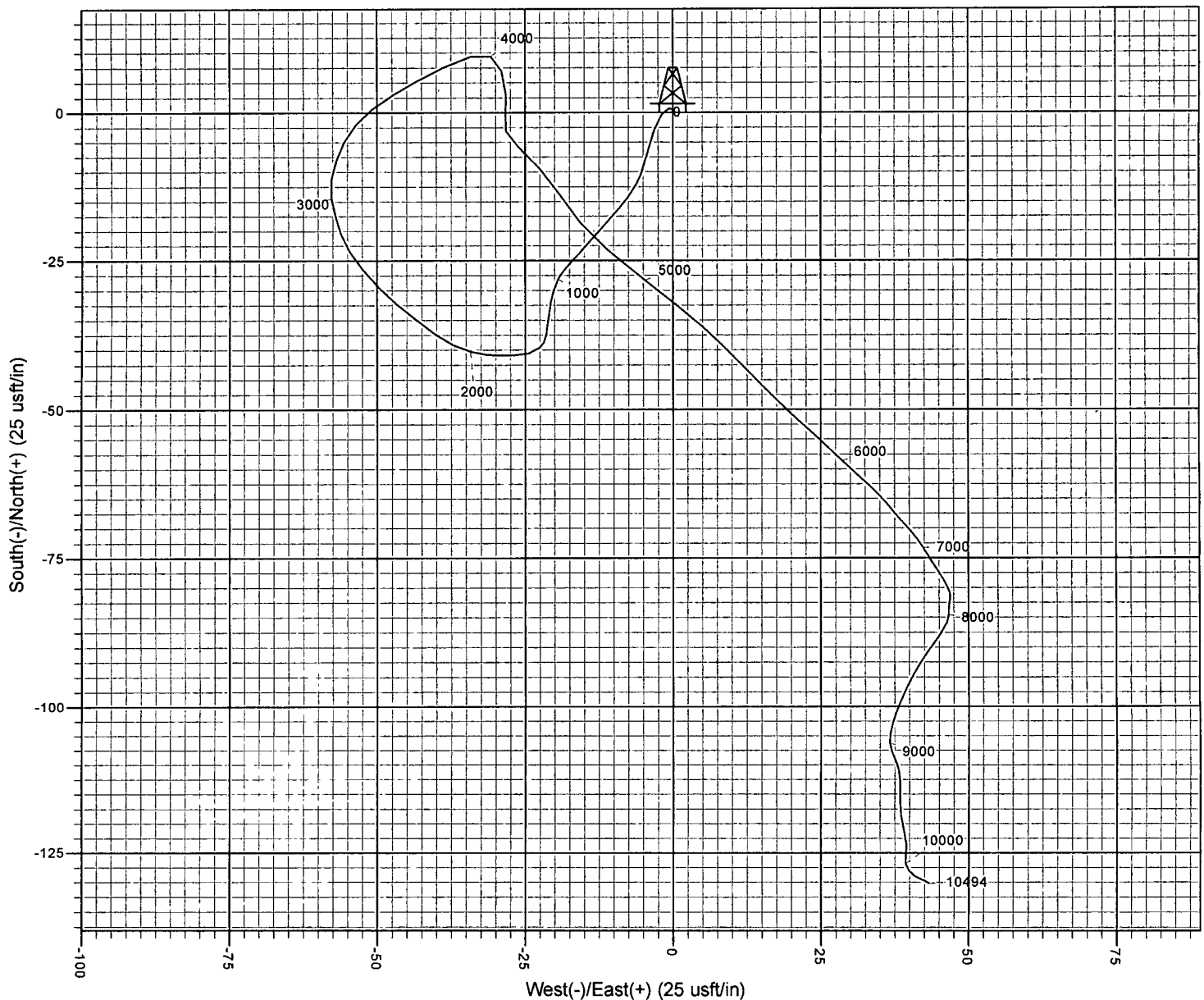


Azimuths to Grid North:
True North: -0 42°
Magnetic North: 7 25°

Magnetic Field
Strength: 48733 7snT
Dip Angle: 60 23°
Date: 1/30/2011
Model: BGGM2010

WELL DETAILS: Macho 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	454824.08	742176.59	32° 14' 52.800 N	103° 33' 0.000 W	



PROJECT DETAILS: Bell Lake
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: Lea County, NM
Site Centre Latitude: 32° 14' 52.800 N
Longitude: 103° 33' 0.000 W
Positional Uncertainty: 0.0
Convergence: 0.42
Local North: Grid



Cog Operating LLC- Eastern NM

Lea County

Macho State

#2H

OH

HOBBS OCD

AUG 22 2011

RECEIVED

Survey: MWD

Pathfinder X & Y Survey Report

27 February, 2011

PATHFINDER[®]

A Schlumberger Company

SUR: E-02-24s-33e, 2260/N & 330/W
BHL: H-2-24s-33e, 2044/N & 4926/W
API # 30-025-39885



Pathfinder
Pathfinder X & Y Survey Report



Company:	Cog Operating LLC- Eastern NM	Local Co-ordinate Reference:	Well #2H
Project:	Lea County	TVD Reference:	WELL @ 3646.00usft (Original Well Elev)
Site:	Macho State	MD Reference:	WELL @ 3646.00usft (Original Well Elev)
Well:	#2H	North Reference:	Gnd
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Single User Db

Project		Lea County, New Mexico	
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		Macho State				
Site Position:		Northing:	456,587.500	usft	Latitude:	32° 15' 10.253 N
From:	Map	Easting:	742,127.700	usft	Longitude:	103° 33' 0.419 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16	"	Grid Convergence:	0.42 °

Well		#2H				
Well Position	+N/-S	0.00 usft	Northing:	454,658.000 usft	Latitude:	32° 14' 51.159 N
	+E/-W	0.00 usft	Easting:	742,144.200 usft	Longitude:	103° 33' 0.391 W
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft	Ground Level:	3,627.00 usft	

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	01/24/11	7.61	60 24	48,705

Design	OH			
Audit Notes:				
Version:	1.0	Phase:	ACTUAL	Tie On Depth: 0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.00	0.00	0.00	89.65



Pathfinder
Pathfinder X & Y Survey Report

PATHFINDER
A Schlumberger Company

Company:	Cog Operating LLC- Eastern NM	Local Co-ordinate Reference:	Well #2H
Project:	Lea County	TVD Reference:	WELL @ 3646.00usft (Original Well Elev)
Site:	Macho State	MD Reference:	WELL @ 3646.00usft (Original Well Elev)
Well:	#2H	North Reference:	Gnd
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Single User Db

Survey Program		Date	02/27/11		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.00	9,400.00	GYRO (OH)	CB-GYRO-MS	Camera based gyro multishot	
9,502.00	14,385.00	MWD (OH)	MWD	MWD - Standard	

MD (usft)	Inc (°)	Azi (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
9,400.00	1.62	180.93	9,394.07	-5,748.07	-113.03	38.38	37.69	0.00	454,544.97	742,182.58
9,502.00	1.58	128.48	9,496.04	-5,850.04	-115.35	39.46	38.75	1.39	454,542.65	742,183.66
9,537.00	7.30	82.20	9,530.92	-5,884.92	-115.34	42.04	41.34	18.03	454,542.66	742,186.24
9,568.00	12.66	77.44	9,561.44	-5,915.44	-114.34	47.31	46.61	17.48	454,543.66	742,191.51
9,599.00	13.54	74.27	9,591.64	-5,945.64	-112.62	54.12	53.43	3.66	454,545.38	742,198.32
9,631.00	15.65	72.15	9,622.60	-5,976.60	-110.28	61.84	61.16	6.80	454,547.72	742,206.04
9,663.00	18.11	70.99	9,653.22	-6,007.22	-107.33	70.65	69.99	7.76	454,550.67	742,214.85
9,694.00	21.63	71.12	9,682.37	-6,036.37	-103.91	80.61	79.98	11.36	454,554.09	742,224.81
9,725.00	25.59	72.63	9,710.77	-6,064.77	-100.06	92.41	91.80	12.92	454,557.94	742,236.61
9,757.00	29.28	74.11	9,739.17	-6,093.17	-95.86	106.54	105.95	11.73	454,562.14	742,250.74
9,788.00	33.15	76.31	9,765.68	-6,119.68	-91.77	122.07	121.51	13.01	454,566.23	742,266.27
9,818.00	37.02	76.08	9,790.22	-6,144.22	-87.66	138.81	138.28	12.91	454,570.34	742,283.01
9,850.00	40.63	74.17	9,815.15	-6,169.15	-82.50	158.20	157.69	11.88	454,575.50	742,302.40
9,881.00	43.62	73.26	9,838.14	-6,192.14	-76.66	178.15	177.68	9.84	454,581.34	742,322.35
9,912.00	46.43	72.95	9,860.05	-6,214.05	-70.29	199.13	198.70	9.09	454,587.71	742,343.33
9,943.00	49.07	73.70	9,880.89	-6,234.89	-63.71	221.11	220.72	8.70	454,594.29	742,365.31
9,975.00	51.97	74.96	9,901.23	-6,255.23	-57.04	244.89	244.54	9.56	454,600.96	742,389.09
10,006.00	55.13	75.97	9,919.65	-6,273.65	-50.79	269.03	268.71	10.52	454,607.21	742,413.23
10,037.00	58.39	74.82	9,936.64	-6,290.64	-44.25	294.11	293.83	10.96	454,613.75	742,438.31
10,068.00	61.38	73.80	9,952.19	-6,306.19	-36.99	319.92	319.69	10.06	454,621.01	742,464.12
10,099.00	64.10	72.18	9,966.39	-6,320.39	-28.93	346.27	346.09	9.93	454,629.07	742,490.47



Pathfinder
Pathfinder X & Y Survey Report

PATHFINDER
A Schlumberger Company

Company: Cog Operating LLC- Eastern NM
Project: Lea County
Site: Macho State
Well: #2H
Wellbore: OH
Design: OH

Local Co-ordinate Reference: Well #2H
TVD Reference: WELL @ 3646.00usft (Original Well Elev)
MD Reference: WELL @ 3646.00usft (Original Well Elev)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Single User Db

Survey

MD (usft)	Inc (°)	Azi (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
10,131.00	66.97	71.64	9,979.64	-6,333.64	-19.88	373.95	373.82	9.10	454,638.12	742,518.15
10,162.00	70.00	71.88	9,991.01	-6,345.01	-10.86	401.34	401.27	9.80	454,647.14	742,545.54
10,177.00	71.75	71.96	9,995.92	-6,349.92	-6.46	414.81	414.77	11.68	454,651.54	742,559.01
10,193.00	73.25	72.47	10,000.73	-6,354.73	-1.80	429.34	429.32	9.86	454,656.20	742,573.54
10,225.00	76.33	72.57	10,009.13	-6,363.13	7.47	458.79	458.83	9.63	454,665.47	742,602.99
10,256.00	80.20	72.78	10,015.43	-6,369.43	16.51	487.76	487.85	12.50	454,674.51	742,631.96
10,298.00	86.35	72.40	10,020.35	-6,374.35	28.98	527.54	527.71	14.67	454,686.98	742,671.74
10,330.00	90.40	72.82	10,021.25	-6,375.25	38.54	558.06	558.29	12.72	454,696.54	742,702.26
10,423.00	90.31	74.15	10,020.68	-6,374.68	64.98	647.22	647.61	1.43	454,722.98	742,791.42
10,517.00	89.78	74.95	10,020.60	-6,374.60	90.02	737.82	738.36	1.02	454,748.02	742,882.02
10,610.00	89.52	78.75	10,021.17	-6,375.17	111.17	828.37	829.03	4.10	454,769.17	742,972.57
10,704.00	91.10	81.14	10,020.66	-6,374.66	127.58	920.91	921.67	3.05	454,785.58	743,065.11
10,797.00	91.19	81.45	10,018.81	-6,372.81	141.65	1,012.82	1,013.67	0.35	454,799.65	743,157.02
10,892.00	91.28	83.94	10,016.76	-6,370.76	153.73	1,107.02	1,107.94	2.62	454,811.73	743,251.22
10,954.00	91.71	84.76	10,015.14	-6,369.14	159.83	1,168.70	1,169.65	1.49	454,817.83	743,312.90
11,047.00	91.45	85.17	10,012.58	-6,366.58	167.99	1,261.30	1,262.31	0.52	454,825.99	743,405.50
11,140.00	91.71	87.90	10,010.01	-6,364.01	173.61	1,354.09	1,355.12	2.95	454,831.61	743,498.29
11,234.00	92.42	87.99	10,006.62	-6,360.62	176.98	1,447.97	1,449.02	0.76	454,834.98	743,592.17
11,328.00	91.28	88.57	10,003.59	-6,357.59	179.80	1,541.87	1,542.94	1.36	454,837.80	743,686.07
11,422.00	92.07	88.05	10,000.84	-6,354.84	182.57	1,635.79	1,636.88	1.01	454,840.57	743,779.99
11,515.00	92.33	89.66	9,997.27	-6,351.27	184.43	1,728.70	1,729.80	1.75	454,842.43	743,872.90
11,608.00	92.07	90.46	9,993.70	-6,347.70	184.33	1,821.63	1,822.72	0.90	454,842.33	743,965.83
11,702.00	91.19	89.98	9,991.03	-6,345.03	183.97	1,915.59	1,916.68	1.07	454,841.97	744,059.79
11,765.00	91.10	89.85	9,989.77	-6,343.77	184.06	1,978.58	1,979.67	0.25	454,842.06	744,122.78
11,890.00	90.48	90.82	9,988.04	-6,342.04	183.33	2,103.56	2,104.64	0.92	454,841.33	744,247.76
11,952.00	91.54	90.99	9,986.95	-6,340.95	182.35	2,165.54	2,166.62	1.73	454,840.35	744,309.74
12,045.00	91.80	90.71	9,984.24	-6,338.24	180.97	2,258.50	2,259.56	0.41	454,838.97	744,402.70



Pathfinder
Pathfinder X & Y Survey Report



Company:	Cog Operating LLC- Eastern NM	Local Co-ordinate Reference:	Well #2H
Project:	Lea County	TVD Reference:	WELL @ 3646.00usft (Original Well Elev)
Site:	Macho State	MD Reference:	WELL @ 3646.00usft (Original Well Elev)
Well:	#2H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Single User Db

Survey										
MD (usft)	Inc (°)	Azi (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
12,139.00	92.07	90.78	9,981.07	-6,335.07	179.75	2,352.43	2,353.49	0.30	454,837.75	744,496.63
12,233.00	92.59	91.19	9,977.25	-6,331.25	178.14	2,446.34	2,447.38	0.70	454,836.14	744,590.54
12,324.00	92.42	90.83	9,973.27	-6,327.27	176.53	2,537.24	2,538.27	0.44	454,834.53	744,681.44
12,419.00	93.47	91.72	9,968.39	-6,322.39	174.42	2,632.09	2,633.11	1.45	454,832.42	744,776.29
12,512.00	93.47	91.13	9,962.76	-6,316.76	172.11	2,724.89	2,725.89	0.63	454,830.11	744,869.09
12,605.00	93.91	89.61	9,956.77	-6,310.77	171.51	2,817.69	2,818.69	1.70	454,829.51	744,961.89
12,699.00	92.07	88.36	9,951.87	-6,305.87	173.18	2,911.54	2,912.55	2.37	454,831.18	745,055.74
12,793.00	92.33	89.13	9,948.26	-6,302.26	175.24	3,005.45	3,006.46	0.86	454,833.24	745,149.65
12,887.00	89.08	89.20	9,947.11	-6,301.11	176.61	3,099.42	3,100.44	3.46	454,834.61	745,243.62
12,980.00	90.75	89.13	9,947.24	-6,301.24	177.96	3,192.41	3,193.43	1.80	454,835.96	745,336.61
13,074.00	91.19	89.35	9,945.65	-6,299.65	179.21	3,286.39	3,287.42	0.52	454,837.21	745,430.59
13,166.00	91.19	89.50	9,943.74	-6,297.74	180.13	3,378.36	3,379.40	0.16	454,838.13	745,522.56
13,259.00	90.48	89.18	9,942.39	-6,296.39	181.20	3,471.34	3,472.39	0.84	454,839.20	745,615.54
13,352.00	90.84	89.27	9,941.31	-6,295.31	182.46	3,564.33	3,565.38	0.40	454,840.46	745,708.53
13,445.00	91.10	89.35	9,939.74	-6,293.74	183.58	3,657.31	3,658.36	0.29	454,841.58	745,801.51
13,539.00	91.54	88.91	9,937.57	-6,291.57	185.01	3,751.27	3,752.33	0.66	454,843.01	745,895.47
13,633.00	92.15	88.74	9,934.55	-6,288.55	186.93	3,845.20	3,846.27	0.67	454,844.93	745,989.40
13,727.00	92.95	88.31	9,930.37	-6,284.37	189.35	3,939.08	3,940.16	0.97	454,847.35	746,083.28
13,819.00	91.98	88.44	9,926.41	-6,280.41	191.96	4,030.96	4,032.05	1.06	454,849.96	746,175.16
13,912.00	91.10	88.55	9,923.91	-6,277.91	194.40	4,123.89	4,125.00	0.95	454,852.40	746,268.09
14,005.00	90.75	87.05	9,922.41	-6,276.41	197.97	4,216.81	4,217.94	1.66	454,855.97	746,361.01
14,099.00	89.96	87.24	9,921.83	-6,275.83	202.65	4,310.69	4,311.84	0.86	454,860.65	746,454.89
14,192.00	89.96	87.38	9,921.89	-6,275.89	207.01	4,403.58	4,404.77	0.15	454,865.01	746,547.78
14,223.00	90.31	87.48	9,921.82	-6,275.82	208.40	4,434.55	4,435.74	1.17	454,866.40	746,578.75
14,385.00	90.31	87.48	9,920.94	-6,274.94	215.53	4,596.39	4,597.62	0.00	454,873.53	746,740.59



Pathfinder
Pathfinder X & Y Survey Report



Company: Cog Operating LLC- Eastern NM
Project: Lea County
Site: Macho State
Well: #2H
Wellbore: OH
Design: OH

Local Co-ordinate Reference: Well #2H
TVD Reference: WELL @ 3646.00usft (Original Well Elev)
MD Reference: WELL @ 3646.00usft (Original Well Elev)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Single User Db

Checked By: _____ Approved By: _____ Date: _____



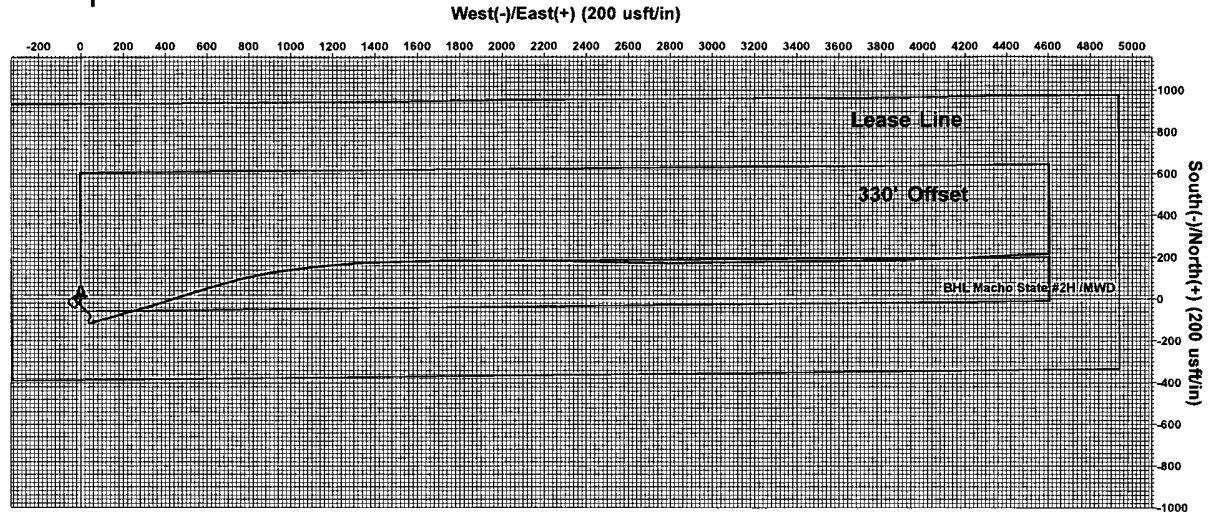
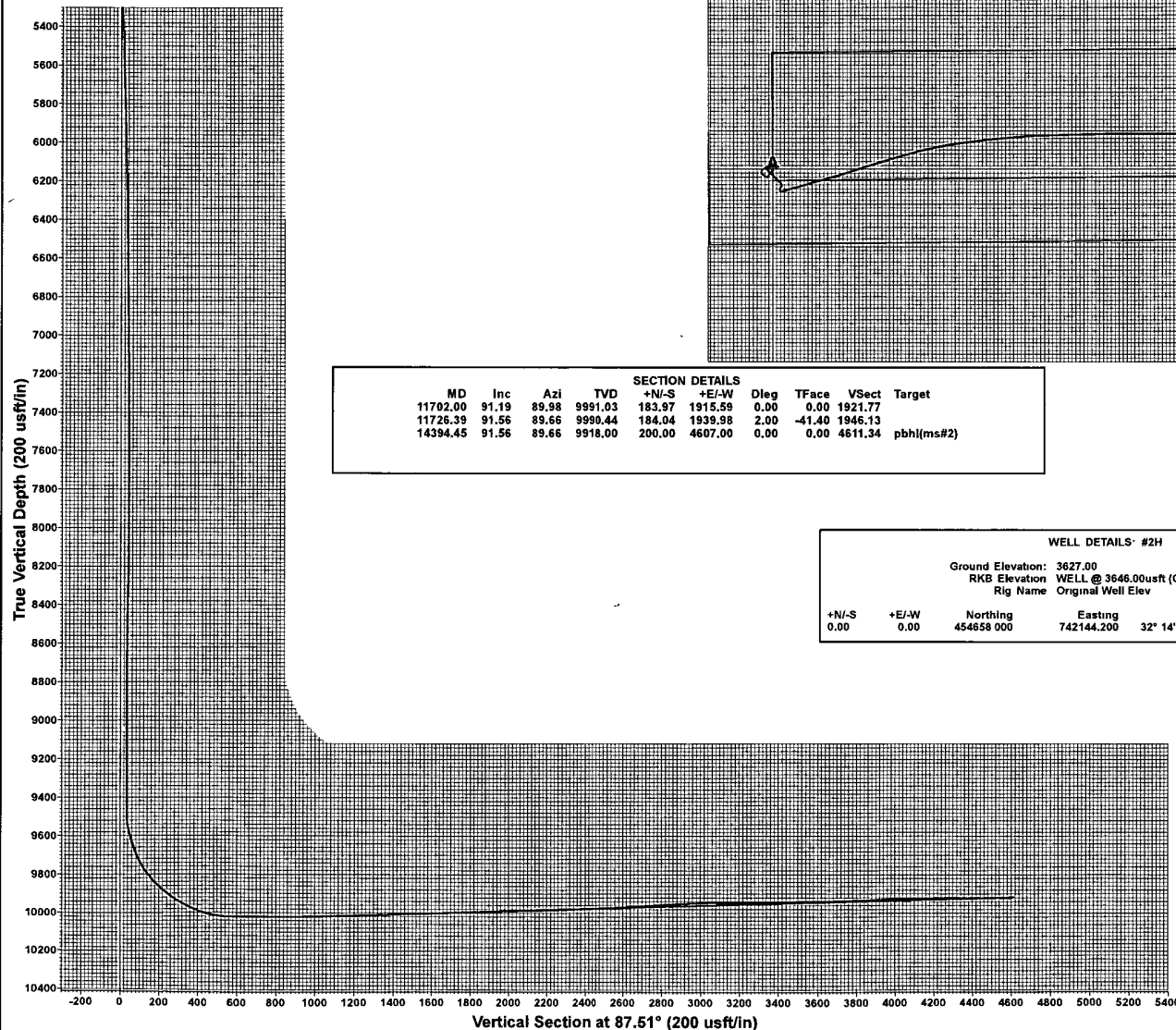
Project: Lea County
Site: Macho State
Well: #2H
Wellbore: OH
Plan: Plan #4 (#2H/OH)



Azimuths to Grid North
True North: -0.42°
Magnetic North: 7.20°

Magnetic Field
Strength: 48705.3snT
Dip Angle: 60.24°
Date: 01/24/2011
Model: IGRF200510

PATHFINDER
A Schlumberger Company



SECTION DETAILS									
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VFace	Target
11702.00	91.19	89.98	9981.03	183.87	1915.59	0.00	0.00	1921.77	
11726.39	91.56	89.66	9990.44	184.04	1939.98	2.00	-41.40	1946.13	
14394.45	91.56	89.66	9918.00	200.00	4607.00	0.00	0.00	4611.34	pbl(ms#2)

WELLBORE TARGET DETAILS (MAP CO-ORDINATES)						
Name	TVD	+N/-S	+E/-W	Northing	Easting	Shape
pbl(ms#2)	9918.00	200.00	4607.00	454858.000	746751.200	Point
TGT1(Macho#2H)	9995.00	151.12	1803.00	454809.120	743947.200	Point

WELL DETAILS - #2H						
Ground Elevation: 3627.00						
RKB Elevation: WELL @ 3646.00usft (Original Well Elev)						
Rig Name: Original Well Elev						
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.00	0.00	454658.000	742144.200	32° 14' 51.159 N	103° 33' 0.391 W	

PROJECT DETAILS: Lea County
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
Local North: Grid

Plan Plan #4 (#2H/OH)			
Created By: Nate Bingham	Date: 10 05, February 27 2011		
Checked: _____	Date: _____		