

PATRIOT DRILLING, LLC

OPERATOR: COG Operating, LLC
WELL/LEASE: Crossman 25 State # 1-H
COUNTY: Eddy Co., New Mexico
Sec. 25, T25S, R27E

30-215-38948

**STATE OF NEW MEXICO
DEVIATION REPORT**

<u>Depth</u>	<u>Deviation</u>	<u>Depth</u>	<u>Deviation</u>
203	1 1/4	1,965	3 1/4
359	1 1/2	2,060	4
469	1	2,140	3 1/4
761	1/4	2,188	2 1/2
1,050	3/4	2,558	1
1,364	1/2	3,128	1/2
1,527	1	3,633	3/4
1,684	1 1/2	5,122	2
1,872	3 1/2	5,630	1 1/4

RECEIVED

NOV - 8 2011

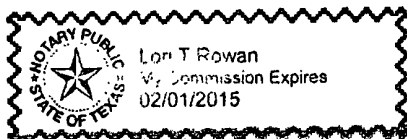
NMOCD ARTESIA

Patriot Drilling, LLC

M. Leroy Peterson, Executive Vice-
President

The foregoing instrument was acknowledged before me on this 12th day of
September, 2011 by M. Leroy Peterson, Executive Vice-President of Patriot Drilling,

My Commission Expires: 02/01/2015



Lori T. Rowan
Notary Public for Ector Co., Texas

30-015-38948

COG OPERATING

Hay Hollow
Eddy County, NM
Crossman 25 State #1H
VH - Job #32K0811834

Survey: Actual

SDI Standard Survey Report

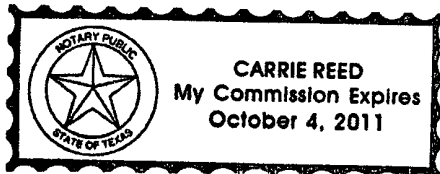
This survey is correct to the best of my knowledge and is supported by actual field data.

[Signature]

Notarized this date 27th of September, 2011.

[Signature]

Notary Signature
County of Midland
State of Texas



Scientific Drilling International, Inc.
SDI Standard Survey Report



Company:	COG OPERATING	Local Co-ordinate Reference:	Well Crossman 25 State #1H
Project:	Hay Hollow	TVD Reference:	WELL @ 0 0usft (Original Well Elev)
Site:	Eddy County, NM	MD Reference:	WELL @ 0 0usft (Original Well Elev)
Well:	Crossman 25 State #1H	North Reference:	Grid
Wellbore:	VH - Job #32K0811834	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #32K0811834	Database:	EDM-Regulatory

Project	Hay Hollow		
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:	386,239 33 usft
From:	Lat/Long	Easting:	572,312 98 usft
Position Uncertainty:	0 0 usft	Slot Radius:	13-3/16"
		Latitude:	32° 3' 42 020 N
		Longitude:	104° 5' 59 660 W
		Grid Convergence:	0 12 °

Well	Crossman 25 State #1H, Directional (Pathfinder)		
Well Position	+N/-S	0 0 usft	Northing: 402,705 55 usft
	+E/-W	0 0 usft	Easting: 561,101 19 usft
Position Uncertainty	0 0 usft	Wellhead Elevation:	usft
		Latitude:	32° 6' 25 200 N
		Longitude:	104° 8' 9 600 W
		Ground Level:	0 0 usft

Wellbore	VH - Job #32K0811834				
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
			(°)	(°)	(nT)
	IGRF2010	8/31/2011	7 81	59 97	48,487

Design	VH - Job #32K0811834			
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	180 21

Survey Program	Date	10/12/2011		
From	To	Survey (Wellbore)	Tool Name	Description
(usft)	(usft)			
100 0	6,313 0	Actual (VH - Job #32K0811834)	Keeper	Keeper Gyro

Survey								
Measured Depth	Inclination	Azimuth	True Vertical	North/South	East/West	Closure Azimuth	Closure Distance	
(usft)	(°)	(°)	Depth	(usft)	(usft)	(°)	(usft)	
0 0	0 00	0 00	0 0	0 0	0 0	0 00	0 0	
100 0	1 05	289 00	100 0	0 3	-0 9	289 00	0 9	
200 0	1 13	294 97	200 0	1 0	-2 6	291 09	2 8	
300 0	1 57	275 57	299 9	1 6	-4 9	287 74	5 1	
400 0	0 61	321 73	399 9	2 1	-6 6	287 81	6 9	
500 0	0 61	317 44	499 9	2 9	-7 3	291 91	7 8	
600 0	0 35	294 81	599 9	3 4	-7 9	293 54	8 6	
700 0	0 28	287 82	699 9	3 6	-8 4	293 43	9 2	
800 0	0 41	244 69	799 9	3 6	-9 0	291 69	9 7	
900 0	0 38	251 32	899 9	3 3	-9 6	289 00	10 2	
1,000 0	0 40	233 66	999 9	3 0	-10 2	286 36	10 6	
1,100 0	0 34	245 68	1,099 9	2 7	-10 8	283 93	11 1	

Scientific Drilling International, Inc.

SDI Standard Survey Report



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Site:	Eddy County, NM	MD Reference:	WELL @ 0 0usft (Original Well Elev)
Well:	Crossman 25 State #1H	North Reference:	Grid
Wellbore:	VH - Job #32K0811834	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #32K0811834	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 22	263 13	1,199 9	2 5	-11 2	282 67	11 5
1,300 0	0 22	3 71	1,299 9	2 7	-11 4	283 29	11 7
1,400 0	0 31	338 39	1,399 9	3 1	-11 5	285 27	11 9
1,500 0	0 97	54 24	1,499 9	3 9	-10 9	289 60	11 6
1,600 0	1 38	75 63	1,599 9	4 7	-9 0	297 33	10 2
1,700 0	1 52	74 03	1,699 9	5 3	-6 6	308 96	8 5
1,800 0	3 06	70 28	1,799 8	6 6	-2 8	336 94	7 2
1,900 0	3 64	75 37	1,899 6	8 3	2 8	18 47	8 8
2,000 0	3 76	82 79	1,999 4	9 5	9 1	43 71	13 2
2,100 0	3 18	92 38	2,099 2	9 8	15 1	57 02	18 0
2,200 0	1 99	94 30	2,199 1	9 6	19 6	64 01	21 8
2,300 0	1 66	95 20	2,299 1	9 3	22 8	67 79	24 6
2,400 0	1 44	95 20	2,399 0	9 1	25 5	70 43	27 1
2,500 0	1 18	92 25	2,499 0	8 9	27 8	72 22	29 2
2,600 0	1 07	98 46	2,599 0	8 7	29 7	73 63	31 0
2,700 0	1 08	101 79	2,699 0	8 4	31 6	75 10	32 7
2,800 0	0 99	99 42	2,798 9	8 1	33 3	76 40	34 3
2,900 0	0 69	98 95	2,898 9	7 8	34 8	77 31	35 7
3,000 0	0 37	114 63	2,998 9	7 6	35 7	77 97	36 5
3,100 0	0 09	309 21	3,098 9	7 5	35 9	78 18	36 7
3,200 0	0 18	282 59	3,198 9	7 6	35 7	77 98	36 5
3,300 0	0 26	316 20	3,298 9	7 8	35 4	77 57	36 2
3,400 0	0 43	307 81	3,398 9	8 2	34 9	76 80	35 9
3,500 0	0 56	317 18	3,498 9	8 8	34 3	75 64	35 4
3,600 0	0 67	309 04	3,598 9	9 5	33 5	74 16	34 8
3,700 0	0 72	302 19	3,698 9	10 2	32 5	72 57	34 1
3,800 0	0 80	282 13	3,798 9	10 7	31 3	71 15	33 1
3,900 0	0 85	269 47	3,898 9	10 8	29 9	70 08	31 8
4,000 0	0 83	268 39	3,998 9	10 8	28 4	69 19	30 4
4,100 0	0 87	269 47	4,098 9	10 8	26 9	68 20	29 0
4,200 0	1 02	267 74	4,198 8	10 7	25 3	67 00	27 5
4,300 0	0 87	265 24	4,298 8	10 6	23 7	65 78	25 9
4,400 0	1 04	245 56	4,398 8	10 2	22 1	65 20	24 3
4,500 0	1 15	241 12	4,498 8	9 3	20 4	65 36	22 4
4,600 0	1 30	229 65	4,598 8	8 1	18 6	66 44	20 3
4,700 0	1 32	233 06	4,698 8	6 7	16 8	68 32	18 1
4,800 0	1 12	233 59	4,798 7	5 4	15 1	70 29	16 1
4,900 0	1 06	224 65	4,898 7	4 2	13 7	73 01	14 3
5,000 0	0 77	236 74	4,998 7	3 2	12 5	75 81	12 9
5,100 0	0 79	218 26	5,098 7	2 2	11 5	78 94	11 7
5,200 0	0 89	219 28	5,198 7	1 1	10 6	84 04	10 6
5,300 0	0 96	213 00	5,298 7	-0 2	9 6	91 18	9 6
5,400 0	1 02	206 59	5,398 7	-1 7	8 8	100 95	8 9
5,500 0	1 17	202 77	5,498 6	-3 4	8 0	113 29	8 7

Scientific Drilling International, Inc.

SDI Standard Survey Report



Company:	COG OPERATING	Local Co-ordinate Reference:	Well Crossman 25 State #1H
Project:	Hay Hollow	TVD Reference:	WELL @ 0 0usft (Original Well Elev)
Site:	Eddy County, NM	MD Reference:	WELL @ 0 0usft (Original Well Elev)
Well:	Crossman 25 State #1H	North Reference:	Grid
Wellbore:	VH - Job #32K0811834	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #32K0811834	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	1 16	199 50	5,598 6	-5 3	7 2	126 34	9 0
5,700 0	1 12	205 81	5,698 6	-7 2	6 5	137 86	9 7
5,800 0	1 11	198 45	5,798 6	-9 0	5 7	147 32	10 6
5,900 0	1 82	202 84	5,898 5	-11 3	4 8	156 95	12 3
6,000 0	2 09	192 49	5,998 5	-14 6	3 8	165 34	15 1
6,100 0	1 95	199 05	6,098 4	-18 0	2 9	170 94	18 2
6,200 0	1 56	204 77	6,198 4	-20 8	1 7	175 22	20 9
6,300 0	1 36	235 77	6,298 3	-22 7	0 2	179 52	22 7
6,313 0	1 30	232 18	6,311 3	-22 9	-0 1	180 14	22 9



Project: Hay Hollow
Eddy County, NM
Well: Crossman 25 State #1H
Wellbore: VH - Job #32K0811834
Design: VH - Job #32K0811834

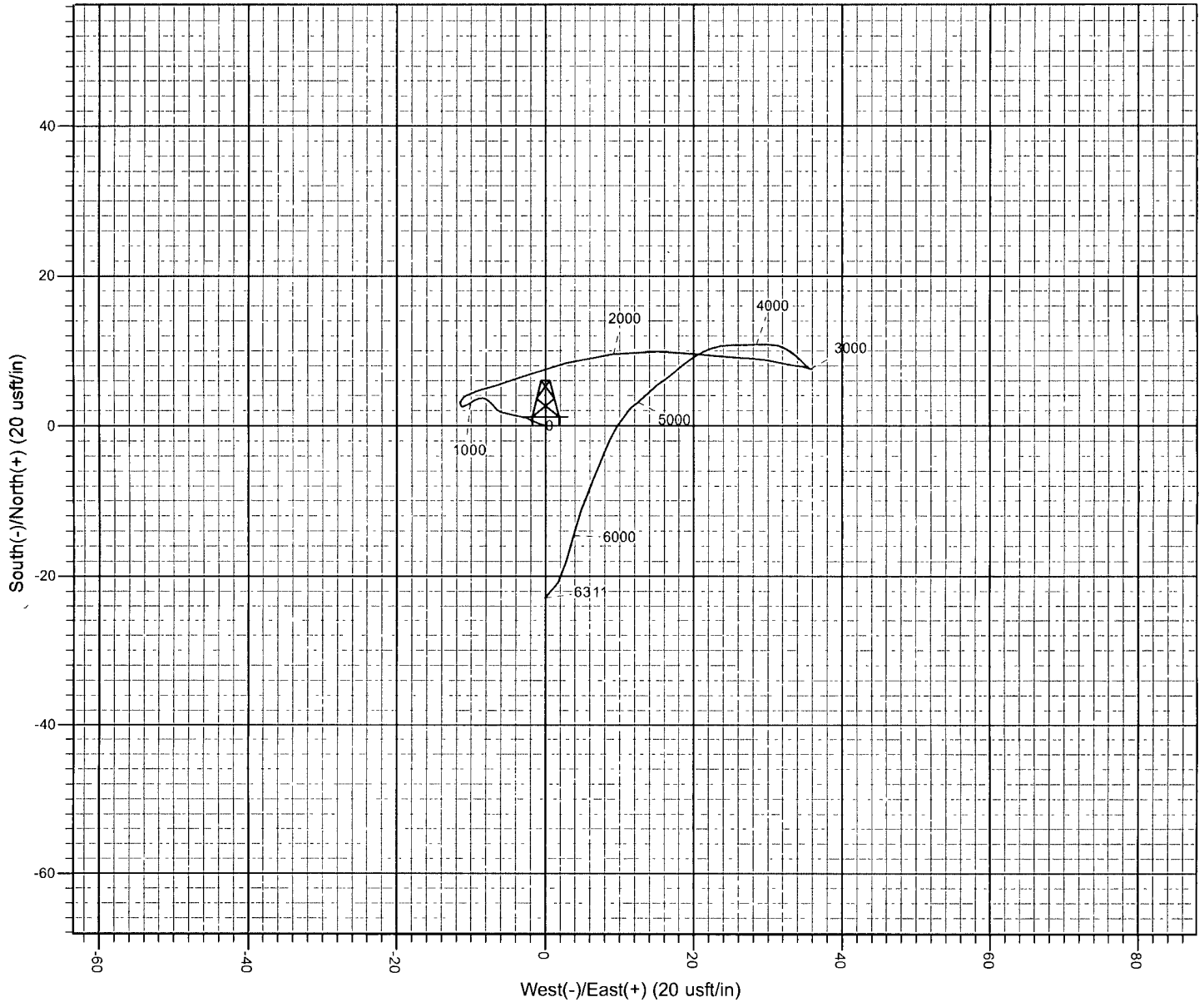


Azimuths to Grid North
True North -0 10°
Magnetic North 7 70°

Magnetic Field
Strength 48486 6snT
Dip Angle 59 97°
Date 8/31/2011
Model IGRF2010

WELL DETAILS: Crossman 25 State #1H
WELL @ 0 0usft (Original Well Elev)
Ground Level: 0.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	402705 55	561101.19	32° 6' 25.200 N	104° 8' 9.600 W	



PROJECT DETAILS: Hay Hollow
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° 3' 42.020 N
Longitude: 104° 5' 59.660 W
Positional Uncertainty: 0.0
Convergence: 0.12
Local North: Grid



COG Operating LLC

Eddy County (NAD83)

Crossman 25 State

No.1H

OH

Survey: Survey #2

PathFinder X & Y

12 September, 2011

PATHFINDER[®]

A Schlumberger Company

30.015-38948



Project: Eddy County (NAD83)
Site: Crossman 25 State
Well: No.1H
Wellbore: OH
Plan: Plan No.6 (No.1H/OH)

PROJECT DETAILS Eddy County (NAD83)
Geodetic System US State Plane 1983
Datum: North American Datum 1983
Ellipsoid GRS 1980
Zone New Mexico Eastern Zone
System Datum Mean Sea Level
Local North Grid



Azimuths to Grid North
True North -0.10°
Magnetic North 7.70°
Magnetic Field
Strength 48505.35nT
Dip Angle 60.00°
Date 8/23/2011
Model IGRF200510

PATHFINDER[®]

A Schlumberger Company

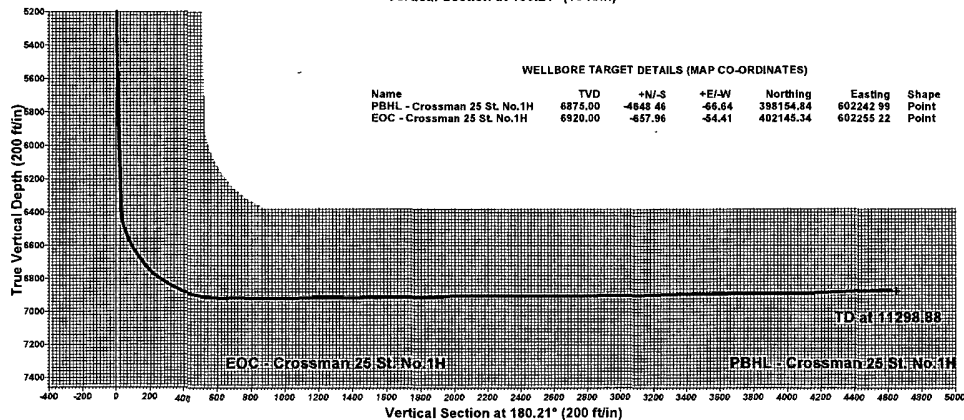
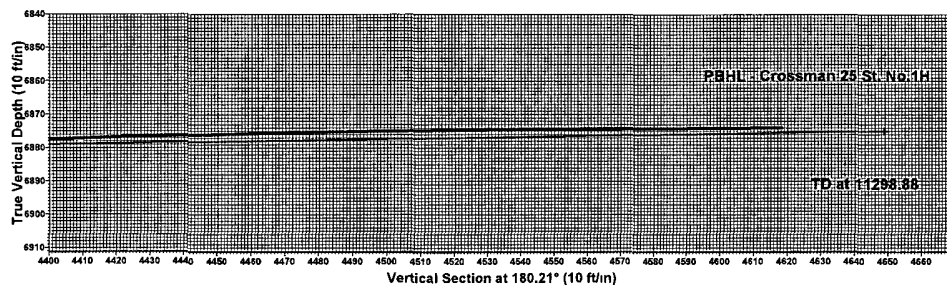
SECTION DETAILS

MD	Inc	Azi	TVD	+N/-S	+E/-W	DLeg	TFace	VSec	Target
9653.00	89.96	178.96	6899.83	-3002.97	-45.59	0.00	0.00	3003.11	
9804.00	90.90	179.80	6898.69	-3153.95	-43.70	0.75	34.25	3154.09	
9891.87	90.91	180.32	6897.31	-3241.61	-44.09	1.50	85.62	3241.95	
11291.98	90.91	180.32	6875.00	-4648.46	-46.64	0.00	0.00	4648.57	PBHL - Crossman 25 St. No.1H

WELL DETAILS No.1H

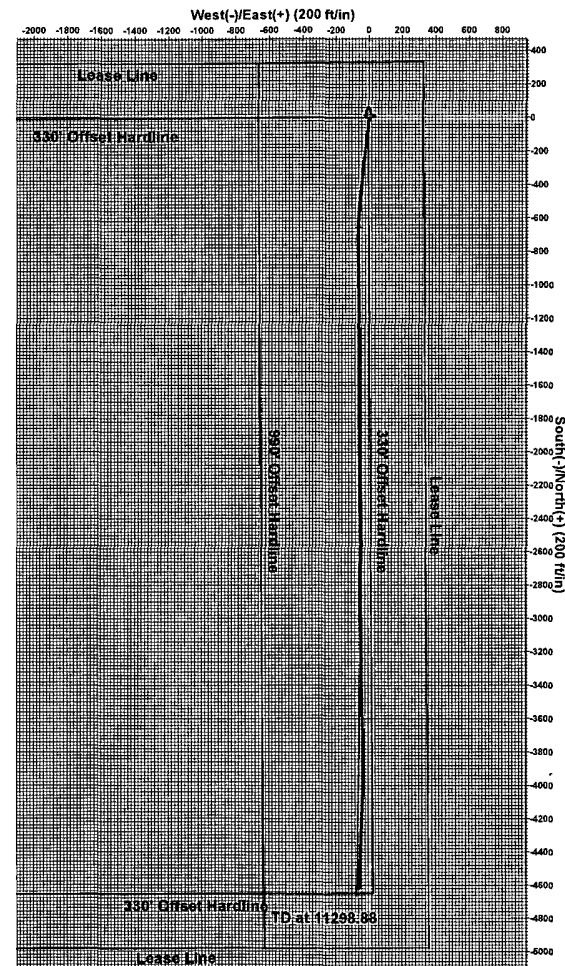
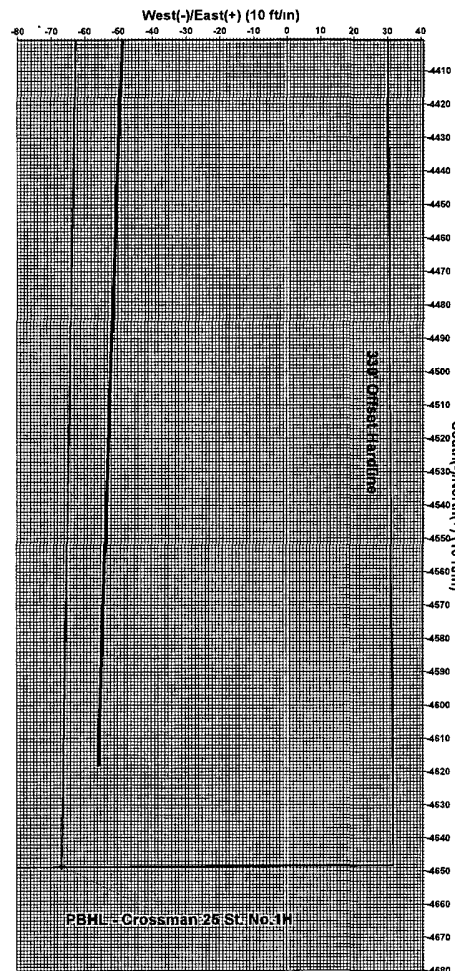
Ground Elevation: 2997.00
RKB Elevation: RKB - 17' GL - 2997' @ 3014.00ft (Original Well Elev)
Rig Name: Original Well Elev

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.00	0.00	402803.30	602309.63	32° 6' 26.036872 N	104° 8' 11 083604 W



WELLBORE TARGET DETAILS (MAP CO-ORDINATES)

Name	TVD	+N/-S	+E/-W	Northing	Easting	Shape
PBHL - Crossman 25 St. No.1H	6875.00	-4848.46	-46.64	398154.84	602242.99	Point
EOC - Crossman 25 St. No.1H	6920.00	-4875.96	-44.41	402145.34	602255.22	Point



Plan, Plan No 6 (No.1H/OH)

Created By James Anderson Date 9 23, September 12 2011



PathFinder A Schlumberger Company
PathFinder X & Y



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well No.1H
Project:	Eddy County (NAD83)	TVD Reference:	RKB - 17' GL - 2997' @ 3014.00ft (Original Well E
Site:	Crossman 25 State	MD Reference:	RKB - 17' GL - 2997' @ 3014.00ft (Original Well E
Well:	No.1H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	1 Smith DB

Project	Eddy County (NAD83)		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		

Site	Crossman 25 State		
Site Position:		Northing:	402,803.30 ft
From:	Map	Easting:	602,309.63 ft
Position Uncertainty:	0.00 ft	Slot Radius:	"
		Latitude:	32° 6' 26.0368872 N
		Longitude:	104° 8' 11.0836004 W
		Grid Convergence:	0.10 °

Well		No.1H				
Well Position	+N-S	0.00 ft	Northing:	402,803.30 ft	Latitude:	32° 6' 26.0368872 N
	+E-W	0.00 ft	Easting:	602,309.63 ft	Longitude:	104° 8' 11.0836004 W
Position Uncertainty		0.00 ft	Wellhead Elevation:	ft	Ground Level:	2,997.00 ft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	8/23/2011	7.80	60.00	48,505

Design	OH			
Audit Notes:				
Version:	1.0	Phase:	ACTUAL	Tie On Depth: 0.00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.00	0.00	0.00	180.21



PathFinder A Schlumberger Company
PathFinder X & Y



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well No.1H
Project:	Eddy County (NAD83)	TVD Reference:	RKB - 17' GL - 2997' @ 3014.00ft (Original Well E
Site:	Crossman 25 State	MD Reference:	RKB - 17' GL - 2997' @ 3014.00ft (Original Well E
Well:	No.1H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	1 Smith DB

Survey Program		Date	9/12/2011		
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
100.00	6,313.00	Survey #1 (OH)	NS-GYRO-MS	North sensing gyrocompassing m/s	
6,371.00	11,269.00	Survey #2 (OH)	MWD	MWD - Standard	

Survey	MD (ft)	Inc (°)	Azi (°)	TVD (ft)	TVDSS (ft)	N/S (ft)	E/W (ft)	V. Sec (ft)	DLeg (°/100ft)	Northing (ft)	Easting (ft)
	6,313.00	1.30	232.18	6,311.34	3,297.34	-22.90	-0.05	22.90	0.00	402,780.40	602,309.58
	6,371.00	1.14	190.39	6,369.33	3,355.33	-23.87	-0.68	23.88	1.52	402,779.43	602,308.95
	6,402.00	3.25	179.16	6,400.30	3,386.30	-25.06	-0.72	25.06	6.91	402,778.24	602,308.91
	6,434.00	8.18	178.68	6,432.13	3,418.13	-28.24	-0.66	28.24	15.41	402,775.06	602,308.97
	6,465.00	13.54	179.48	6,462.57	3,448.57	-34.08	-0.57	34.08	17.30	402,769.22	602,309.06
	6,497.00	18.47	182.93	6,493.32	3,479.32	-42.89	-0.80	42.89	15.68	402,760.41	602,308.83
	6,527.00	21.19	184.61	6,521.54	3,507.54	-53.04	-1.48	53.05	9.26	402,750.26	602,308.15
	6,558.00	23.30	184.91	6,550.23	3,536.23	-64.74	-2.45	64.75	6.82	402,738.56	602,307.18
	6,590.00	25.94	184.47	6,579.32	3,565.32	-78.02	-3.54	78.04	8.27	402,725.28	602,306.09
	6,622.00	28.75	184.47	6,607.74	3,593.74	-92.68	-4.68	92.69	8.78	402,710.62	602,304.95
	6,653.00	31.74	185.23	6,634.51	3,620.51	-108.23	-6.01	108.25	9.72	402,695.07	602,303.62
	6,685.00	33.50	186.26	6,661.47	3,647.47	-125.40	-7.74	125.42	5.77	402,677.90	602,301.89
	6,716.00	35.26	187.22	6,687.05	3,673.05	-142.78	-9.80	142.81	5.94	402,660.52	602,299.83
	6,748.00	38.78	187.88	6,712.60	3,698.60	-161.87	-12.33	161.92	11.07	402,641.43	602,297.30
	6,779.00	42.74	188.24	6,736.07	3,722.07	-181.91	-15.17	181.96	12.80	402,621.39	602,294.46
	6,811.00	46.69	188.89	6,758.81	3,744.81	-204.17	-18.53	204.23	12.43	402,599.13	602,291.10
	6,842.00	50.39	188.81	6,779.33	3,765.33	-227.12	-22.10	227.20	11.94	402,576.18	602,287.53
	6,873.00	53.20	188.03	6,798.50	3,784.50	-251.21	-25.67	251.31	9.28	402,552.09	602,283.96
	6,905.00	55.93	186.63	6,817.05	3,803.05	-277.07	-28.99	277.17	9.25	402,526.23	602,280.64
	6,937.00	59.18	185.25	6,834.22	3,820.22	-303.93	-31.77	304.04	10.79	402,499.37	602,277.86
	6,969.00	62.34	184.69	6,849.85	3,835.85	-331.74	-34.19	331.86	9.99	402,471.56	602,275.44



PathFinder A Schlumberger Company
PathFinder X & Y

PATHFINDER
A Schlumberger Company

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well No.1H
Project:	Eddy County (NAD83)	TVD Reference:	RKB - 17' GL - 2997' @ 3014.00ft (Original Well E
Site:	Crossman 25 State	MD Reference:	RKB - 17' GL - 2997' @ 3014.00ft (Original Well E
Well:	No.1H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	1 Smith DB

Survey										
MD (ft)	Inc (°)	Azi (°)	TVD (ft)	TVDSS (ft)	N/S (ft)	E/W (ft)	V. Sec (ft)	DLeg (°/100ft)	Northing (ft)	Easting (ft)
7,000.00	65.16	184.72	6,863.56	3,849.56	-359.45	-36.47	359.58	9.10	402,443.85	602,273.16
7,031.00	67.88	185.41	6,875.91	3,861.91	-387.77	-38.98	387.91	9.01	402,415.53	602,270.65
7,063.00	71.40	185.80	6,887.04	3,873.04	-417.62	-41.91	417.77	11.06	402,385.68	602,267.72
7,094.00	74.83	186.29	6,896.04	3,882.04	-447.11	-45.04	447.27	11.17	402,356.19	602,264.59
7,126.00	78.00	186.26	6,903.56	3,889.56	-478.03	-48.44	478.20	9.91	402,325.27	602,261.19
7,157.00	80.81	185.79	6,909.26	3,895.26	-508.33	-51.63	508.51	9.19	402,294.97	602,258.00
7,190.00	83.10	184.91	6,913.87	3,899.87	-540.86	-54.68	541.05	7.42	402,262.44	602,254.95
7,222.00	85.74	184.15	6,916.98	3,902.98	-572.60	-57.20	572.81	8.58	402,230.70	602,252.43
7,253.00	89.34	183.28	6,918.31	3,904.31	-603.50	-59.20	603.72	11.95	402,199.80	602,250.43
7,285.00	90.84	183.11	6,918.26	3,904.26	-635.45	-60.98	635.67	4.72	402,167.85	602,248.65
7,307.12	90.84	182.81	6,917.94	3,903.94	-657.54	-62.13	657.76	1.34	402,145.76	602,247.50
EOC - Crossman 25 St. No.1H										
7,317.00	90.84	182.68	6,917.80	3,903.80	-667.41	-62.60	667.63	1.34	402,135.89	602,247.03
7,348.00	89.78	180.69	6,917.63	3,903.63	-698.39	-63.51	698.62	7.27	402,104.91	602,246.12
7,379.00	89.60	179.34	6,917.80	3,903.80	-729.39	-63.52	729.62	4.39	402,073.91	602,246.11
7,411.00	89.52	179.04	6,918.04	3,904.04	-761.39	-63.07	761.61	0.97	402,041.91	602,246.56
7,442.00	89.60	178.72	6,918.28	3,904.28	-792.38	-62.46	792.61	1.06	402,010.92	602,247.17
7,506.00	89.52	179.47	6,918.77	3,904.77	-856.37	-61.45	856.59	1.18	401,946.93	602,248.18
7,569.00	89.78	179.71	6,919.16	3,905.16	-919.37	-61.00	919.59	0.56	401,883.93	602,248.63
7,633.00	90.48	179.40	6,919.01	3,905.01	-983.37	-60.50	983.58	1.20	401,819.93	602,249.13
7,696.00	90.84	179.11	6,918.28	3,904.28	-1,046.36	-59.68	1,046.57	0.73	401,756.94	602,249.95
7,760.00	91.54	179.29	6,916.96	3,902.96	-1,110.34	-58.79	1,110.54	1.13	401,692.96	602,250.84
7,824.00	90.92	179.19	6,915.58	3,901.58	-1,174.31	-57.94	1,174.52	0.98	401,628.99	602,251.69
7,887.00	89.60	179.18	6,915.30	3,901.30	-1,237.31	-57.05	1,237.51	2.10	401,565.99	602,252.58
7,950.00	89.08	179.10	6,916.02	3,902.02	-1,300.30	-56.10	1,300.49	0.84	401,503.00	602,253.53
8,013.00	89.25	179.66	6,916.94	3,902.94	-1,363.28	-55.42	1,363.48	0.93	401,440.02	602,254.21
8,076.00	90.92	180.49	6,916.85	3,902.85	-1,426.28	-55.50	1,426.48	2.96	401,377.02	602,254.13



PathFinder A Schlumberger Company
PathFinder X & Y

PATHFINDER
A Schlumberger Company

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well No.1H
Project:	Eddy County (NAD83)	TVD Reference:	RKB - 17' GL - 2997' @ 3014.00ft (Original Well E
Site:	Crossman 25 State	MD Reference:	RKB - 17' GL - 2997' @ 3014.00ft (Original Well E
Well:	No.1H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	1 Smith DB

Survey										
MD (ft)	Inc (°)	Azi (°)	TVD (ft)	TVDSS (ft)	N/S (ft)	E/W (ft)	V. Sec (ft)	DLeg (°/100ft)	Northing (ft)	Easting (ft)
8,139.00	90.31	180.26	6,916.17	3,902.17	-1,489.28	-55.91	1,489.47	1.03	401,314.02	602,253.72
8,203.00	91.89	180.22	6,914.94	3,900.94	-1,553.26	-56.18	1,553.46	2.47	401,250.04	602,253.45
8,265.00	90.57	179.59	6,913.61	3,899.61	-1,615.25	-56.08	1,615.44	2.36	401,188.05	602,253.55
8,329.00	90.13	179.61	6,913.22	3,899.22	-1,679.24	-55.63	1,679.44	0.69	401,124.06	602,254.00
8,391.00	91.10	179.49	6,912.55	3,898.55	-1,741.24	-55.15	1,741.43	1.58	401,062.06	602,254.48
8,454.00	92.15	179.44	6,910.77	3,896.77	-1,804.21	-54.56	1,804.40	1.67	400,999.09	602,255.07
8,517.00	92.59	179.55	6,908.16	3,894.16	-1,867.15	-54.00	1,867.34	0.72	400,936.15	602,255.63
8,580.00	91.45	179.59	6,905.94	3,891.94	-1,930.11	-53.53	1,930.29	1.81	400,873.19	602,256.10
8,612.00	91.28	179.53	6,905.18	3,891.18	-1,962.10	-53.28	1,962.28	0.56	400,841.20	602,256.35
8,644.00	91.45	179.65	6,904.42	3,890.42	-1,994.09	-53.06	1,994.27	0.65	400,809.21	602,256.57
8,707.00	90.66	179.47	6,903.26	3,889.26	-2,057.08	-52.57	2,057.26	1.29	400,746.22	602,257.06
8,770.00	90.13	179.24	6,902.82	3,888.82	-2,120.07	-51.86	2,120.25	0.92	400,683.23	602,257.77
8,833.00	89.87	179.03	6,902.82	3,888.82	-2,183.06	-50.91	2,183.24	0.53	400,620.24	602,258.72
8,896.00	89.87	178.82	6,902.97	3,888.97	-2,246.05	-49.73	2,246.22	0.33	400,557.25	602,259.90
8,990.00	89.78	179.41	6,903.25	3,889.25	-2,340.04	-48.28	2,340.20	0.63	400,463.26	602,261.35
9,085.00	89.87	179.04	6,903.54	3,889.54	-2,435.03	-46.99	2,435.19	0.40	400,368.27	602,262.64
9,179.00	89.96	178.92	6,903.68	3,889.68	-2,529.02	-45.32	2,529.16	0.16	400,274.28	602,264.31
9,274.00	89.69	180.21	6,903.97	3,889.97	-2,624.01	-44.60	2,624.16	1.39	400,179.29	602,265.03
9,369.00	90.92	180.66	6,903.47	3,889.47	-2,719.00	-45.32	2,719.15	1.38	400,084.30	602,264.31
9,464.00	90.92	180.44	6,901.94	3,887.94	-2,813.99	-46.23	2,814.14	0.23	399,989.31	602,263.40
9,559.00	90.84	179.91	6,900.48	3,886.48	-2,908.98	-46.52	2,909.13	0.56	399,894.32	602,263.11
9,653.00	89.96	178.96	6,899.83	3,885.83	-3,002.97	-45.59	3,003.11	1.38	399,800.33	602,264.04
9,748.00	90.22	179.41	6,899.68	3,885.68	-3,097.96	-44.24	3,098.10	0.55	399,705.34	602,265.39
9,842.00	91.19	179.68	6,898.52	3,884.52	-3,191.95	-43.50	3,192.08	1.07	399,611.35	602,266.13
9,937.00	91.01	179.45	6,896.70	3,882.70	-3,286.92	-42.78	3,287.06	0.31	399,516.38	602,266.85
10,032.00	90.84	179.41	6,895.16	3,881.16	-3,381.91	-41.83	3,382.04	0.18	399,421.39	602,267.80
10,127.00	90.40	178.80	6,894.14	3,880.14	-3,476.89	-40.35	3,477.01	0.79	399,326.41	602,269.28



PathFinder A Schlumberger Company
PathFinder X & Y



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well No.1H
Project:	Eddy County (NAD83)	TVD Reference:	RKB - 17' GL - 2997' @ 3014.00ft (Original Well E
Site:	Crossman 25 State	MD Reference:	RKB - 17' GL - 2997' @ 3014.00ft (Original Well E
Well:	No.1H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	1 Smith DB

Survey

MD (ft)	Inc (°)	Azi (°)	TVD (ft)	TVDSS (ft)	N/S (ft)	E/W (ft)	V. Sec (ft)	DLeg (°/100ft)	Northing (ft)	Easting (ft)
10,221.00	89.69	177.99	6,894.06	3,880.06	-3,570.85	-37.71	3,570.97	1.15	399,232.45	602,271.92
10,315.00	90.92	179.73	6,893.56	3,879.56	-3,664.83	-35.84	3,664.93	2.27	399,138.47	602,273.79
10,410.00	90.31	178.86	6,892.54	3,878.54	-3,759.81	-34.67	3,759.91	1.12	399,043.49	602,274.96
10,503.00	90.40	180.31	6,891.97	3,877.97	-3,852.81	-34.00	3,852.90	1.56	398,950.49	602,275.63
10,598.00	90.57	179.84	6,891.16	3,877.16	-3,947.80	-34.13	3,947.90	0.53	398,855.50	602,275.50
10,692.00	90.92	180.22	6,889.94	3,875.94	-4,041.79	-34.17	4,041.89	0.55	398,761.51	602,275.46
10,788.00	92.15	183.93	6,887.37	3,873.37	-4,137.68	-37.65	4,137.79	4.07	398,665.62	602,271.98
10,882.00	92.15	182.23	6,883.84	3,869.84	-4,231.47	-42.69	4,231.60	1.81	398,571.83	602,266.94
10,975.00	92.33	182.03	6,880.20	3,866.20	-4,324.34	-46.15	4,324.48	0.29	398,478.96	602,263.48
11,070.00	91.80	181.98	6,876.78	3,862.78	-4,419.22	-49.47	4,419.37	0.56	398,384.08	602,260.16
11,166.00	90.66	181.78	6,874.72	3,860.72	-4,515.14	-52.62	4,515.30	1.21	398,288.16	602,257.01
11,213.00	90.31	181.72	6,874.32	3,860.32	-4,562.12	-54.05	4,562.28	0.76	398,241.18	602,255.58
11,269.00	90.31	181.72	6,874.02	3,860.02	-4,618.09	-55.74	4,618.26	0.00	398,185.21	602,253.89

PBHL - Crossman 25 St. No.1H

Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
EOC - Crossman 25 St - survey misses target center by 8.00ft at 7307.14ft MD (6917.94 TVD, -657.56 N, -62.13 E) - Point	0.00	0.00	6,920.00	-657.96	-54.41	402,145.34	602,255.22	32° 6' 19.5265726 N	4° 8' 11.7301779 W
PBHL - Crossman 25 - survey misses target center by 32.28ft at 11269.00ft MD (6874.02 TVD, -4618.09 N, -55.74 E) - Point	0.00	0.00	6,875.00	-4,648.46	-66.64	398,154.84	602,242.99	32° 5' 40.0360037 N	4° 8' 11.9570036 W

Checked By: _____ Approved By: _____ Date: _____