

COG OPERATING

Watkins
Eddy County, NM
Blue Thunder 5 Federal #4H
VH - Job #32K0311196

Survey: Actual

30-015-38477

SDI Standard Survey Report

14 March, 2011

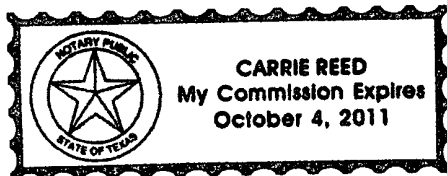
This survey is correct to the best of my knowledge and is supported by actual field data.

Stewart

Notarized this date 14 of April, 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 Blue Thunder 5 Federal #4H
Project:	Watkins	TVD Reference:	WELL @ 0.0usft (Original Well Elev)
Site:	Eddy County, NM	MD Reference:	WELL @ 0.0usft (Original Well Elev)
Well:	Blue Thunder 5 Federal #4H	North Reference:	Grid
Wellbore:	VH - Job #32K0311196	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #32K0311196	Database:	EDM-Regulatory

Project	Watkins		
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:	622,376.46 usft	Latitude:	32° 42' 36.000 N
From:	Lat/Long	Easting:	654,817.23 usft	Longitude:	103° 49' 48.000 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16"	Grid Convergence:	0.27 °

Well	Blue Thunder 5 Federal #4H, Directional (Pathfinder)					
Well Position	+N/-S	0.0 usft	Northing:	612,664.37 usft	Latitude:	32° 41' 0.640 N
	+E/-W	0.0 usft	Easting:	638,065.48 usft	Longitude:	103° 53' 4.540 W
Position Uncertainty	0.0 usft	Wellhead Elevation:	usft	Ground Level:	0.0 usft	

Wellbore	VH - Job #32K0311196				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	BGGM2010	3/4/2011	7 86	60 57	48,947

Design		VH - Job #32K0311196		
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	269 67

Survey Program		Date: 3/14/2011		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100 0	8,235 0	Actual (VH - Job #32K0311196)	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 28	182.21	100 0	-0 2	0 0	182 21	0 2
200 0	0 26	184 44	200 0	-0 7	0 0	182.92	0 7
300 0	0 24	170 23	300 0	-1.1	0 0	180 92	1 1
400 0	0 24	227 80	400 0	-1 5	-0 1	185 28	1 5
500 0	0 43	190 65	500 0	-2 0	-0 4	190.26	2 0
600 0	0 63	165 57	600 0	-2 9	-0 3	185 80	2 9
700 0	0 77	155 26	700 0	-4 0	0 1	178 26	4 0
800 0	0 75	147 66	800 0	-5 2	0 8	171 76	5 3
900 0	0 62	129 69	900 0	-6 1	1 5	166 02	6 3
1,000 0	0 36	108.03	1,000 0	-6 6	2 2	161 16	6 9
1,100 0	0 36	93 31	1,100 0	-6 7	2 8	156 87	7 3

Scientific Drilling International, Inc.

SDI Standard Survey Report



Company:	COG OPERATING	Local Co-ordinate Reference:	Well Blue Thunder 5 Federal #4H
Project:	Watkins	TVD Reference:	WELL @ 0 0usft (Original Well Elev)
Site:	Eddy County, NM	MD Reference:	WELL @ 0 0usft (Original Well Elev)
Well:	Blue Thunder 5 Federal #4H	North Reference:	Grid
Wellbore:	VH - Job #32K0311196	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #32K0311196	Database:	EDM-Regulatory

Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
1,200 0	0 24	57 46	1,200 0	-6 6	3 3	153 07	7 4
1,300 0	0 24	46 56	1,300 0	-6 3	3 7	149 86	7 3
1,400 0	0 31	54 30	1,400 0	-6 0	4 0	146 12	7 2
1,500 0	0 41	44 63	1,500 0	-5 6	4 5	141 16	7 2
1,600 0	0 40	39 16	1,600 0	-5 1	5 0	135 54	7 1
1,700 0	0 46	46 39	1,700 0	-4 5	5 5	129 51	7 1
1,800 0	0 55	42 93	1,799 9	-3 9	6 1	122 55	7 2
1,900 0	0 65	46 72	1,899 9	-3 2	6 9	114 77	7 5
2,000 0	0 92	58 23	1,999 9	-2 3	7 9	106 47	8 3
2,100 0	0 95	62 51	2,099 9	-1 5	9 4	99 36	9 5
2,200 0	0 94	61 25	2,199 9	-0 8	10 8	94 05	10 8
2,300 0	0 71	52 09	2,299 9	0 0	12 0	89 96	12 0
2,400 0	0 60	27 07	2,399 9	0 9	12 8	86 16	12 8
2,500 0	0 98	2 22	2,499 9	2 2	13 0	80 51	13 2
2,600 0	0 75	352 77	2,599 9	3 7	13 0	74 16	13 5
2,700 0	0 35	354 92	2,699 9	4 6	12 9	70 19	13 7
2,800 0	0 35	352 78	2,799 9	5 2	12 8	67 73	13 8
2,900 0	0 27	336 57	2,899 9	5 8	12 7	65 55	13 9
3,000 0	0 51	277 65	2,999 9	6 0	12 1	63 55	13 6
3,100 0	0 50	282 41	3,099 9	6 2	11 3	61 22	12 9
3,200 0	0 60	287 66	3,199 8	6 4	10 3	58 08	12 2
3,300 0	0 71	292 26	3,299 8	6 8	9 3	53 60	11 5
3,400 0	0 76	296 29	3,399 8	7 4	8 1	47 73	10 9
3,500 0	0 78	299 59	3,499 8	8 0	6 9	40 86	10 6
3,600 0	0 76	298 30	3,599 8	8 6	5 7	33 58	10 4
3,700 0	0 79	297 80	3,699 8	9 3	4 5	26 10	10 3
3,800 0	0 84	300 06	3,799 8	10 0	3 3	18 32	10 5
3,900 0	0 86	298 47	3,899 8	10 7	2 0	10 63	10 9
4,000 0	0 63	300 66	3,999 8	11 3	0 9	4 41	11 4
4,100 0	0 52	297 02	4,099 8	11 8	0 0	359 99	11 8
4,200 0	0 49	300 87	4,199 8	12 2	-0 8	356 38	12 3
4,300 0	0 53	290 44	4,299 8	12 6	-1 6	352 89	12 7
4,400 0	0 78	276 69	4,399 8	12 9	-2 7	348 22	13 1
4,500 0	0 83	275 30	4,499 7	13 0	-4 1	342 58	13 6
4,600 0	0 97	260 88	4,599 7	12 9	-5 6	336 46	14 1
4,700 0	1 13	256 79	4,699 7	12 6	-7 4	329 43	14 6
4,800 0	1 51	257 68	4,799 7	12 1	-9 7	321 29	15 5
4,900 0	1 60	255 02	4,899 7	11 4	-12 3	312 88	16 8
5,000 0	1 89	250 47	4,999 6	10 5	-15 2	304 66	18 5
5,100 0	2 02	251 23	5,099 6	9 4	-18 4	297 02	20 7
5,200 0	2 11	256 10	5,199 5	8 4	-21 9	290 98	23 5
5,300 0	1 99	256 64	5,299 4	7 6	-25 4	286 58	26 5
5,400 0	1 71	258 58	5,399 4	6 9	-28 5	283 51	29 3
5,500 0	1 71	256 44	5,499 3	6 2	-31 4	281 18	32 0

Scientific Drilling International, Inc.

SDI Standard Survey Report



Company:	COG OPERATING	Local Co-ordinate Reference:	Well Blue Thunder 5 Federal #4H
Project:	Watkins	TVD Reference:	WELL @ 0 0usft (Original Well Elev)
Site:	Eddy County, NM	MD Reference:	WELL @ 0 0usft (Original Well Elev)
Well:	Blue Thunder 5 Federal #4H	North Reference:	Grid
Wellbore:	VH - Job #32K0311196	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #32K0311196	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 70	260 75	5,599 3	5 6	-34 4	279 30	34 8	
5,700 0	1 72	264 21	5,699 2	5 2	-37 3	277 98	37 7	
5,800 0	1 55	270 29	5,799 2	5 1	-40 2	277 22	40 5	
5,900 0	1 42	272 98	5,899 2	5 2	-42 7	276 88	43 1	
6,000 0	1 34	276 71	5,999 1	5 4	-45 1	276 77	45 5	
6,100 0	1 49	279 17	6,099 1	5 7	-47 6	276 84	47 9	
6,200 0	1 18	282 58	6,199 1	6 1	-49 9	277 01	50 3	
6,300 0	1 20	286 01	6,299 1	6 6	-51 9	277 30	52 3	
6,400 0	1 36	289 57	6,399 0	7 3	-54 0	277 73	54 5	
6,500 0	1 50	305 94	6,499 0	8 5	-56 2	278 60	56 8	
6,600 0	1 89	304 44	6,599 0	10 2	-58 6	279 87	59 5	
6,700 0	2 57	300 31	6,698 9	12 3	-61 9	281 21	63 1	
6,800 0	2 75	303 40	6,798 8	14 7	-65 8	282 60	67 5	
6,900 0	2 50	297 65	6,898 7	17 1	-69 8	283 73	71 8	
7,000 0	2 48	297 29	6,998 6	19 1	-73 6	284 51	76 1	
7,100 0	2 00	298 03	7,098 5	20 9	-77 1	285 14	79 9	
7,200 0	1 23	296 90	7,198 5	22 2	-79 6	285 57	82 6	
7,300 0	0 98	283 78	7,298 4	22 9	-81 4	285 69	84 5	
7,400 0	1 07	288 90	7,398 4	23 4	-83 1	285 71	86 3	
7,500 0	0 90	307 15	7,498 4	24 1	-84 6	285 93	88 0	
7,600 0	0 95	323 95	7,598 4	25 3	-85 7	286 44	89 4	
7,700 0	1 00	320 13	7,698 4	26 6	-86 8	287 06	90 8	
7,800 0	1 19	292 14	7,798 4	27 7	-88 3	287 41	92 5	
7,900 0	1 20	298 51	7,898 3	28 6	-90 2	287 59	94 6	
8,000 0	1 29	285 15	7,998 3	29 4	-92 2	287 68	96 7	
8,100 0	1 22	272 52	8,098 3	29 7	-94 3	287 49	98 9	
8,200 0	0 77	262 87	8,198 3	29 7	-96 1	287 17	100 5	
8,235 0	0 88	278 17	8,233 3	29 7	-96 6	287 09	101 0	



Project: Watkins
 Eddy County, NM
 Well: Blue Thunder 5 Federal #4H
 Wellbore: VH - Job #32K0311196
 Design: VH - Job #32K0311196

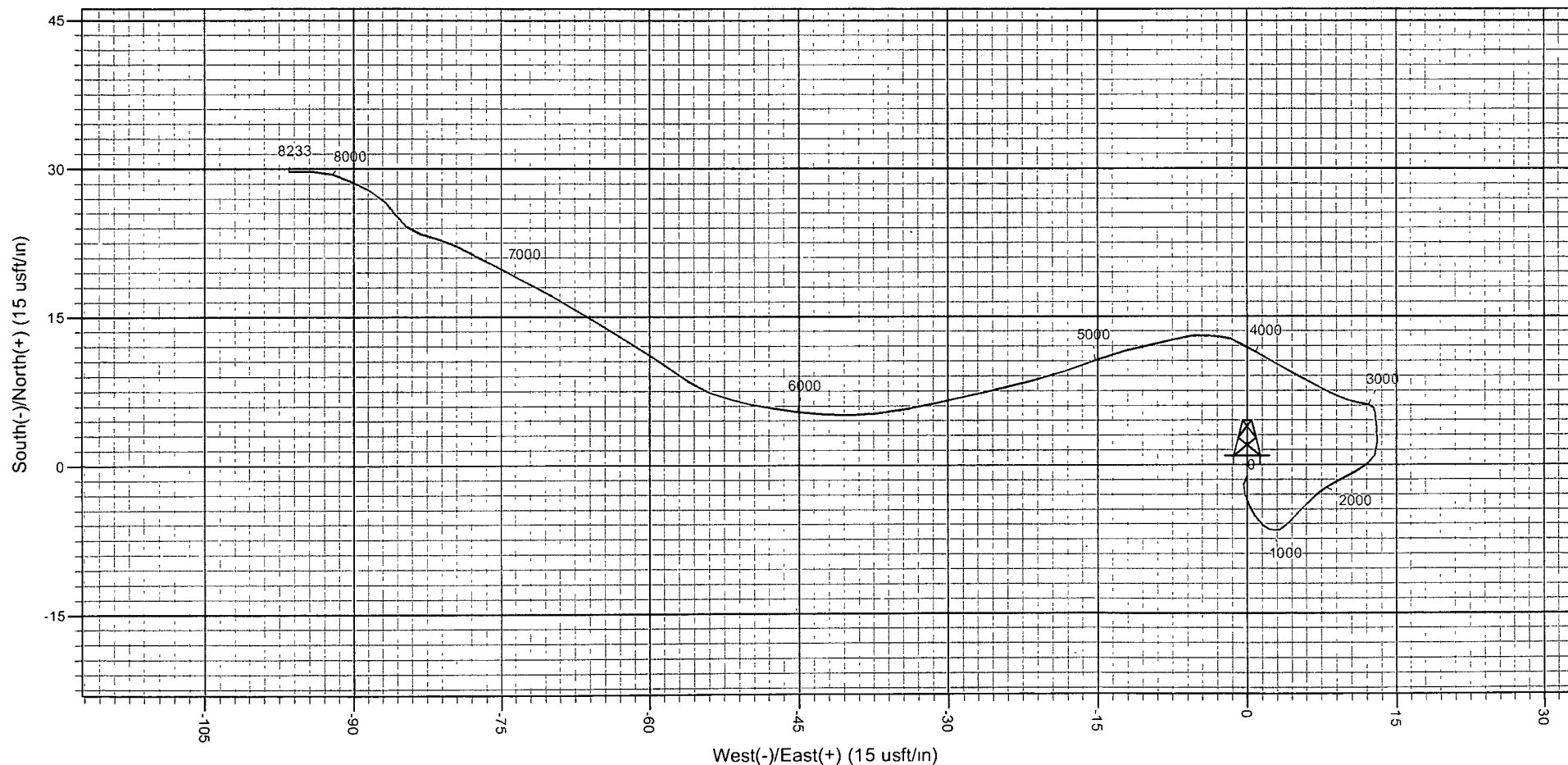


Azimuths to Grid North
 True North -0.24°
 Magnetic North 7.62°

Magnetic Field
 Strength 48946.9 nT
 Dip Angle 60.57°
 Date 3/4/2011
 Model BGGM2010

WELL DETAILS: Blue Thunder 5 Federal #4H
 WELL @ 0.0usft (Original Well Elev)
 Ground Level: 0.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	612664.37	638065.48	32° 41' 0.640 N	103° 53' 4.540 W	



PROJECT DETAILS: Watkins
 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° 42' 36.000 N
 Longitude: 103° 49' 48.000 W
 Positional Uncertainty: 0.0
 Convergence: 0.27
 Local North: Grid