

30-015-39030

CIMAREX ENERGY

Empire

Eddy County, NM

Pere Marquette 18 Federal #2H

VH - Job #32K0711721

Survey: Actual

SDI Standard Survey Report

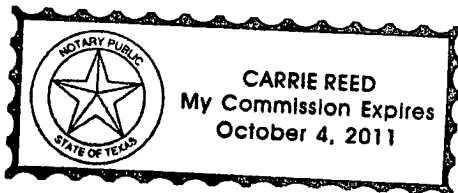
This survey is correct to the best of my knowledge and is supported by actual field data.

Flonanth

Notarized this date 2nd of September, 2011.

Carrie Reed

Notary Signature
County of Midland
State of Texas



Scientific Drilling International, Inc.
SDI Standard Survey Report



Company:	CIMAREX ENERGY	Local Co-ordinate Reference:	Well Pere Marquette 18 Federal #2H
Project:	Empire	TVD Reference:	WELL @ 0.0usft (Original Well Elev)
Site:	Eddy County, NM	MD Reference:	WELL @ 0.0usft (Original Well Elev)
Well:	Pere Marquette 18 Federal #2H	North Reference:	Grid
Wellbore:	VH - Job #32K0711721	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #32K0711721	Database:	EDM-Regulatory

Project	Empire		
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:	673,477 15 usft
From:	Lat/Long	Easting:	570,262 08 usft
Position Uncertainty:	0 0 usft	Slot Radius:	0"
		Latitude:	32° 51' 4 550 N
		Longitude:	104° 6' 16 340 W
		Grid Convergence:	0 12 °

Well	Pere Marquette 18 Federal #2H, Directional (Great White)		
Well Position	+N/-S	0 0 usft	Northing: 669,442 89 usft
	+E/-W	0 0 usft	Easting: 566,312 07 usft
Position Uncertainty	0 0 usft	Wellhead Elevation:	usft
		Latitude:	32° 50' 24 712 N
		Longitude:	104° 7' 2 741 W
		Ground Level:	0 0 usft

Wellbore	VH - Job #32K0711721				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	7/30/2011	7 87	60 66	48,940

Design	VH - Job #32K0711721			
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	0 16

Survey Program	Date	10/17/2011		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100 0	1,019 0	Actual (VH - Job #32K0711721)	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 53	75 08	100 0	0 1	0 4	75 08	0 5
200 0	0 35	275 55	200 0	0 3	0 6	65 59	0 6
300 0	1 02	251 84	300 0	0 0	-0 6	272 03	0 6
400 0	0 94	245 46	400 0	-0 6	-2 2	254 46	2 2
500 0	0 65	170 50	500 0	-1 5	-2 8	241 88	3 2
600 0	0 73	134 97	600 0	-2 5	-2 3	222 02	3 4
700 0	0 57	127 39	700 0	-3 3	-1 4	203 45	3 6
800 0	0 70	97 66	799 9	-3 6	-0 4	186 48	3 7
900 0	0 53	137 05	899 9	-4 1	0 5	172 89	4 1
1,000 0	0 58	132 59	999 9	-4 7	1 2	165 87	4 9
1,019 0	0 63	106 84	1,018 9	-4 8	1 4	164 25	5 0



Scientific Drilling
Directional Drilling Operations

Project: Empire
Eddy County, NM
Well: Pere Marquette 18 Federal #2H
Wellbore: VH - Job #32K0711721
Design: VH - Job #32K0711721



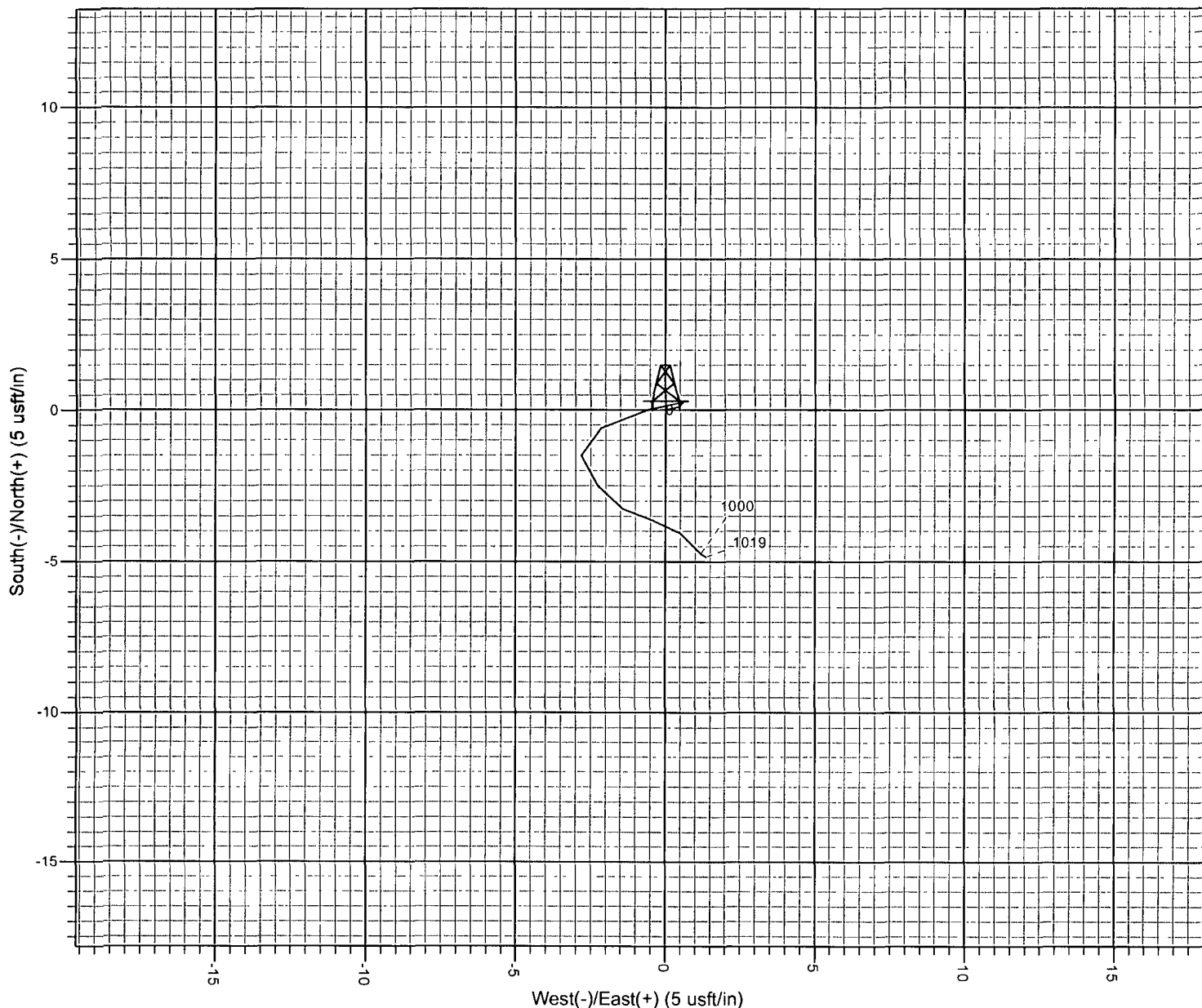
Azimuths to Grid North
True North: -0 12°
Magnetic North: 7 75°

Magnetic Field
Strength 48940 0snT
Dip Angle: 60 66°
Date 7/30/2011
Model IGRF2010

WELL DETAILS: Pere Marquette 18 Federal #2H
WELL @ 0.0usft (Original Well Elev)

Ground Level: 0 0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0 0	0.0	669442.89	566312.07	32° 50' 24 712 N	104° 7' 2.741 W	



PROJECT DETAILS: Empire
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° 51' 4.550 N
Longitude: 104° 6' 16.340 W
Positional Uncertainty: 0.0
Convergence: 0.12
Local North: Grid

End of Well Recap FOR

Cimarex Energy
Pere Marquette 18 Fed #2
Eddy Co., NM

Proposal No. 03079-433-21

Presented By:

Terry Morgan
Regional Manager

Mirenda Morgan
Well Planner





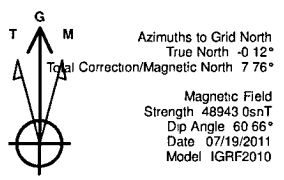
Overlay Well & Survey Report



WELL DETAILS: Pere Marquette 18 Fed #2						
+N/-S	+E/-W	Northing	Ground Level	0.0	Latitude	Longitude
0.0	0.0	669464.80	Easting	607648.10	32° 50' 24.712 N	104° 7' 2.741 W
						Slot



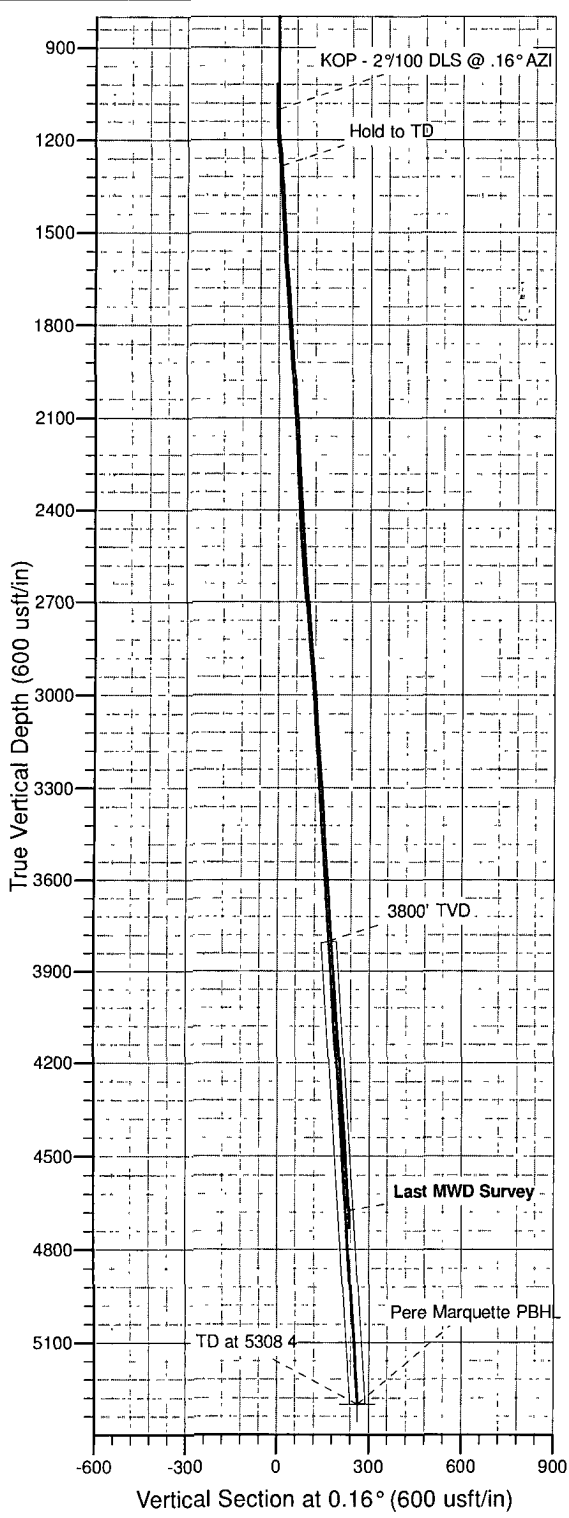
Project Eddy County (NM83E)
Site: Sec 18-T17S-R29E
Well: Pere Marquette 18 Fed #2
Wellbore: Wellbore #1
Design: Design #1



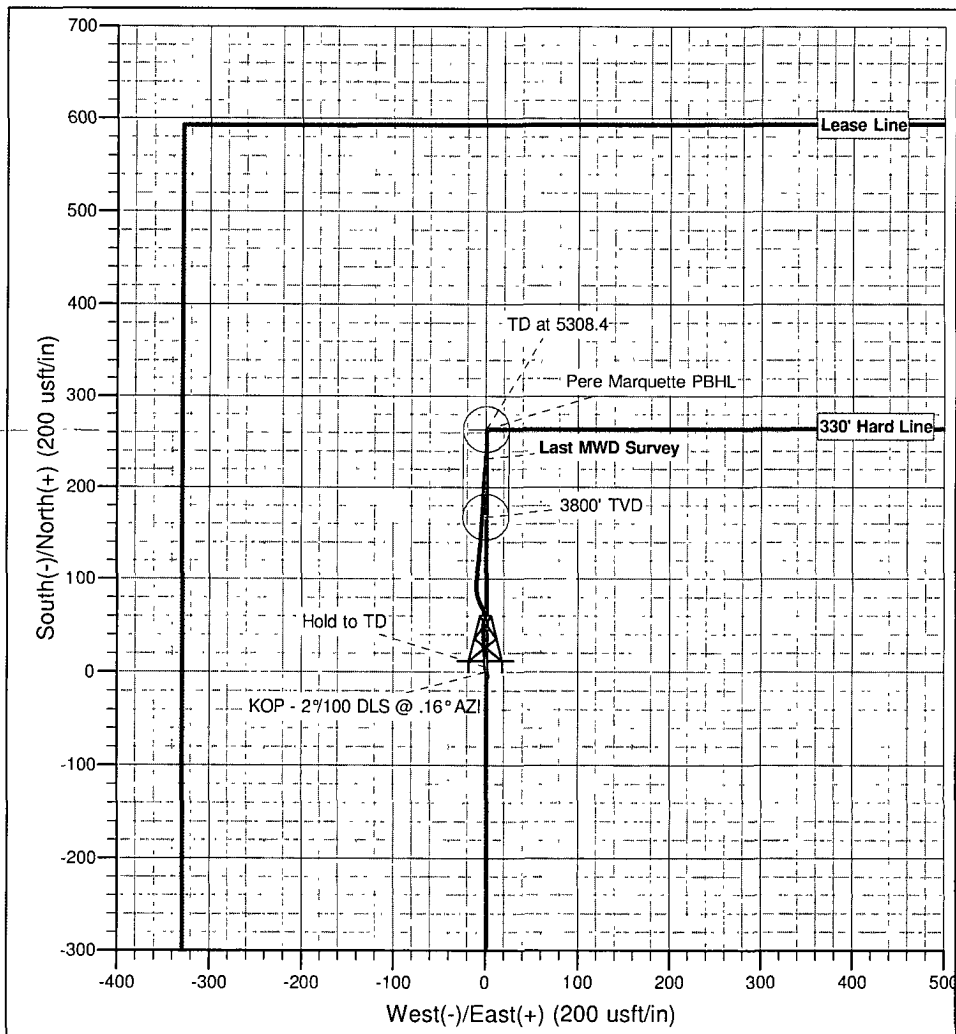
DESIGN TARGET DETAILS							
Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
Pere Marquette PBHL	5300.0	263.8	0.8	669728.56	607648.85	32° 50' 27.322 N	104° 7' 2.726 W
- plan hits target center		Shape Circle (Radius 0.0)					

SECTION DETAILS									
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
1100.0	0.00	0.00	1100.0	0.0	0.0	0.00	0.00	0.0	
1283.7	3.67	0.16	1283.6	5.9	0.0	2.00	0.16	5.9	
5308.4	3.67	0.16	5300.0	263.8	0.7	0.00	0.00	263.8	Pere Marquette PBHL

ANNOTATIONS									
TVD	MD	Inc	Azi	+N/-S	+E/-W	VSect	Departure	Annotation	
1100.0	1100.0	0.00	0.00	0.0	0.0	0.0	0.0	KOP - 2°/100 DLS @ .16° AZI	
1283.6	1283.7	3.67	0.16	5.9	0.0	5.9	5.9	Hold to TD	
3800.0	3805.3	3.67	0.16	167.5	0.5	167.5	167.5	3800' TVD	
5300.0	5308.4	3.67	0.16	263.8	0.7	263.8	263.8	TD at 5308.4	



25' Radius



Cimarex Energy Co. (Midland)

Eddy County (NM83E)

Sec 18-T17S-R29E

Pere Marquette 18 Fed #2

Wellbore #1

Survey: Survey #1

Standard Survey Report

08 August, 2011

Great White Directional Services

Survey Report

Company:	Cimarex Energy Co. (Midland)	Local Co-ordinate Reference:	Well: Pere Marquette 18 Fed #2
Project:	Eddy County (NM83E)	TVD Reference:	WELL @ 0.0usft (Original Well Elev)
Site:	Sec 18-T17S-R29E	MD Reference:	WELL @ 0.0usft (Original Well Elev)
Well:	Pere Marquette 18 Fed #2	North Reference:	Gnd
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Project	Eddy County (NM83E)		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		

Site	Sec 18-T17S-R29E		
Site Position:	Map	Northing:	669,464.80 usft
From:		Easting:	607,648.10 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 50' 24.712 N
		Longitude:	104° 7' 2.741 W
		Grid Convergence:	0.12 °

Well	Pere Marquette 18 Fed #2		
Well Position	+N/-S	0.0 usft	Northing:
	+E/-W	0.0 usft	Easting:
Position Uncertainty	0.0 usft	Wellhead Elevation:	usft
		Latitude:	32° 50' 24.712 N
		Longitude:	104° 7' 2.741 W
		Ground Level:	0.0 usft

Wellbore	Wellbore #1		
Magnetics	Model Name	Sample Date	Declination
			(°)
	IGRF2010	07/19/11	7.87
			Dip Angle
			(°)
			60.66
			Field Strength
			(nT)
			48,943

Design	Wellbore #1		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.0	0.0	0.0
			Direction
			(°)
			0.16

Survey Program	Date	08/08/11		
From	To	Survey (Wellbore)	Tool Name	Description
(usft)	(usft)			
1,019.0	4,734.0	Survey #1 (Wellbore #1)	MWD	MWD - Standard

Survey										
Measured Depth	Inclination	Azimuth	Vertical Depth	+N/-S	+E/-W	Vertical Section	Dogleg Rate	Build Rate	Turn Rate	
(usft)	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(°/100usft)	(°/100usft)	(°/100usft)	
1,019.0	0.63	106.84	1,018.9	-4.8	1.4	-4.8	0.00	0.00	0.00	
Target Box										
1,099.0	0.70	15.10	1,098.9	-4.5	1.9	-4.5	1.19	0.09	-114.68	
1,130.0	1.90	358.90	1,129.9	-3.8	2.0	-3.8	4.01	3.87	-52.26	
1,162.0	2.70	350.00	1,161.9	-2.5	1.8	-2.5	2.73	2.50	-27.81	
1,194.0	3.10	347.70	1,193.9	-0.9	1.5	-0.9	1.30	1.25	-7.19	
1,225.0	3.20	348.00	1,224.8	0.7	1.1	0.7	0.33	0.32	0.97	
1,257.0	3.50	348.50	1,256.8	2.6	0.8	2.6	0.94	0.94	1.56	
1,289.0	3.60	348.10	1,288.7	4.5	0.4	4.5	0.32	0.31	-1.25	
1,320.0	3.70	355.80	1,319.6	6.4	0.1	6.4	1.61	0.32	24.84	
1,351.0	3.80	354.40	1,350.6	8.5	-0.1	8.5	0.44	0.32	-4.52	

Great White Directional Services

Survey Report

Company:	Cimarex Energy Co. (Midland)	Local Co-ordinate Reference:	Well Pere Marquette 18 Fed #2
Project:	Eddy County (NM83E)	TVD Reference:	WELL @ 0.0usft (Original Well Elev)
Site:	Sec 18-T17S-R29E	MD Reference:	WELL @ 0.0usft (Original Well Elev)
Well:	Pere Marquette 18 Fed #2	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
1,383.0	3.80	355.40	1,382.5	10.6	-0.3	10.6	0.21	0.00	3.13
1,414.0	3.30	359.10	1,413.4	12.5	-0.4	12.5	1.77	-1.61	11.94
1,446.0	3.00	1.80	1,445.4	14.3	-0.4	14.3	1.05	-0.94	8.44
1,478.0	3.00	1.20	1,477.3	15.9	-0.3	15.9	0.10	0.00	-1.88
1,509.0	2.90	359.70	1,508.3	17.5	-0.3	17.5	0.41	-0.32	-4.84
1,541.0	3.60	352.10	1,540.3	19.3	-0.4	19.3	2.56	2.19	-23.75
1,604.0	4.90	349.10	1,603.1	23.9	-1.2	23.9	2.09	2.06	-4.76
1,636.0	4.80	350.40	1,635.0	26.6	-1.7	26.6	0.46	-0.31	4.06
1,699.0	4.20	356.10	1,697.8	31.5	-2.3	31.5	1.19	-0.95	9.05
1,762.0	3.70	4.90	1,760.6	35.8	-2.3	35.8	1.25	-0.79	13.97
1,866.0	3.30	354.80	1,864.4	42.1	-2.3	42.1	0.71	-0.38	-9.71
1,952.0	4.10	1.80	1,950.2	47.7	-2.4	47.7	1.07	0.93	8.14
2,047.0	4.10	2.60	2,045.0	54.5	-2.1	54.5	0.06	0.00	0.84
2,174.0	2.60	7.30	2,171.8	61.9	-1.6	61.9	1.20	-1.18	3.70
2,268.0	2.00	343.00	2,265.7	65.5	-1.8	65.5	1.20	-0.64	-25.85
2,362.0	3.70	325.70	2,359.6	69.6	-4.0	69.6	2.01	1.81	-18.40
2,456.0	3.80	340.10	2,453.4	75.1	-6.7	75.0	1.00	0.11	15.32
2,551.0	4.50	348.00	2,548.1	81.7	-8.6	81.6	0.95	0.74	8.32
2,645.0	4.60	350.00	2,641.8	89.0	-10.0	89.0	0.20	0.11	2.13
2,740.0	5.00	8.10	2,736.5	96.8	-10.1	96.8	1.64	0.42	19.05
2,836.0	4.90	7.80	2,832.2	105.0	-8.9	105.0	0.11	-0.10	-0.31
2,930.0	4.80	6.60	2,925.8	112.9	-7.9	112.9	0.15	-0.11	-1.28
3,025.0	4.00	8.80	3,020.5	120.1	-7.0	120.1	0.86	-0.84	2.32
3,119.0	3.90	1.20	3,114.3	126.6	-6.4	126.6	0.57	-0.11	-8.09
3,214.0	3.90	6.20	3,209.1	133.0	-6.0	133.0	0.36	0.00	5.26
3,309.0	4.00	4.60	3,303.9	139.5	-5.4	139.5	0.16	0.11	-1.68
3,404.0	3.90	4.50	3,398.7	146.1	-4.9	146.0	0.11	-0.11	-0.11
3,498.0	3.80	2.90	3,492.4	152.4	-4.4	152.3	0.16	-0.11	-1.70
3,593.0	3.70	1.50	3,587.2	158.6	-4.2	158.6	0.14	-0.11	-1.47
3,688.0	3.70	4.70	3,682.0	164.7	-3.9	164.7	0.22	0.00	3.37
3,790.0	3.90	4.70	3,783.8	171.4	-3.3	171.4	0.20	0.20	0.00
3,885.0	4.00	3.20	3,878.6	177.9	-2.9	177.9	0.15	0.11	-1.58
3,980.0	4.00	2.40	3,973.4	184.6	-2.5	184.6	0.06	0.00	-0.84
4,074.0	4.20	1.80	4,067.1	191.3	-2.3	191.3	0.22	0.21	-0.64
4,169.0	4.00	2.20	4,161.9	198.1	-2.1	198.1	0.21	-0.21	0.42
4,263.0	3.70	5.50	4,255.7	204.4	-1.6	204.4	0.40	-0.32	3.51
4,358.0	3.80	4.70	4,350.5	210.6	-1.1	210.6	0.12	0.11	-0.84
4,453.0	3.60	3.70	4,445.3	216.7	-0.6	216.7	0.22	-0.21	-1.05
4,547.0	3.60	5.60	4,539.1	222.5	-0.2	222.5	0.13	0.00	2.02
4,641.0	4.00	2.50	4,632.9	228.8	0.3	228.8	0.48	0.43	-3.30
4,683.0	3.80	1.80	4,674.8	231.6	0.4	231.6	0.49	-0.48	-1.67
Last MWD Survey									
4,734.0	3.80	1.80	4,725.7	235.0	0.5	235.0	0.00	0.00	0.00

Great White Directional Services

Survey Report

Company:	Cimarex Energy Co. (Midland)	Local Co-ordinate Reference:	Well: Pere Marquette 18 Fed #2
Project:	Eddy County (NM83E)	TVD Reference:	WELL @ 0.0usft (Original Well Elev)
Site:	Sec 18-T17S-R29E	MD Reference:	WELL @ 0.0usft (Original Well Elev)
Well:	Pere Marquette 18 Fed #2	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
Projection to TD - Target Cylinder - Pere Marquette PBHL									

Survey Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
4,683.0	4,674.8	231.6	0.4	Last MWD Survey	
4,734.0	4,725.7	235.0	0.5	Projection to TD	

Checked By: _____ Approved By: _____ Date: _____