



30-015-39053

CIMAREX ENERGY

Empire

Eddy County, NM

Pere Marquette 18 Federal #7H

VH - Job #32K0911905

Survey: Actual

SDI Standard Survey Report

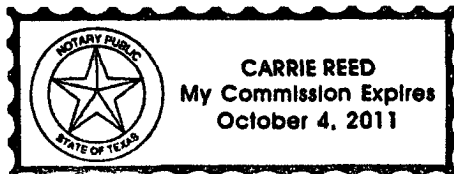
This survey is correct to the best of my knowledge and is supported by actual field data.

Richardson

Notarized this date 4th of October, 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 #7H
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 #7H	North Reference:	Grid
Wellbore:	VH - Job #32K0911905	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #32K0911905	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	Latitude:	32° 51' 4 550 N
From:	Lat/Long	Easting:	570,262 08 usft	Longitude:	104° 6' 16 340 W
Position Uncertainty:	0 0 usft	Slot Radius:	0"	Grid Convergence:	0 12 °

Well	Pere Marquette 18 Federal #7H, Directional (Great White)					
Well Position	+N/-S	0 0 usft	Northing:	669,378 00 usft	Latitude:	32° 50' 24 059 N
	+E/-W	0 0 usft	Easting:	566,851 91 usft	Longitude:	104° 6' 56 415 W
Position Uncertainty		0 0 usft	Wellhead Elevation:	usft	Ground Level:	0 0 usft

Wellbore	VH - Job #32K0911905				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	9/22/2011	7 85	60 66	48,925

Design		VH - Job #32K0911905			
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	95 73	

Survey Program	Date				
From	To	Survey (Wellbore)	Tool Name	Description	
(usft)	(usft)				
119 1	1,011 7	Actual (VH - Job #32K0911905)	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		
119 1	0 93	68 69	119 1	0 4	0 9	68 69	1 0		
271 3	1 01	101 69	271 3	0 5	3 4	81 08	3 4		
363 5	0 98	119 62	363 5	0 0	4 8	90 31	4 8		
455 7	1 44	104 31	455 6	-0 7	6 7	96 02	6 7		
547 9	2 16	96 64	547 8	-1 2	9 5	97 13	9 6		
640 0	2 13	96 91	639 8	-1 6	12 9	97 04	13 0		
732 2	2 17	95 16	732 0	-2 0	16 4	96 83	16 5		
824 4	2 23	95 89	824 1	-2 3	19 9	96 60	20 0		
916 6	2 00	91 74	916 2	-2 5	23 3	96 21	23 4		
1,011 7	1 62	92 35	1,011 3	-2 6	26 3	95 73	26 4		



Scientific Drilling
Directional Drilling Operations

Project: Empire
Eddy County, NM
Well: Pere Marquette 18 Federal #7H
Wellbore: VH - Job #32K0911905
Design: VH - Job #32K0911905

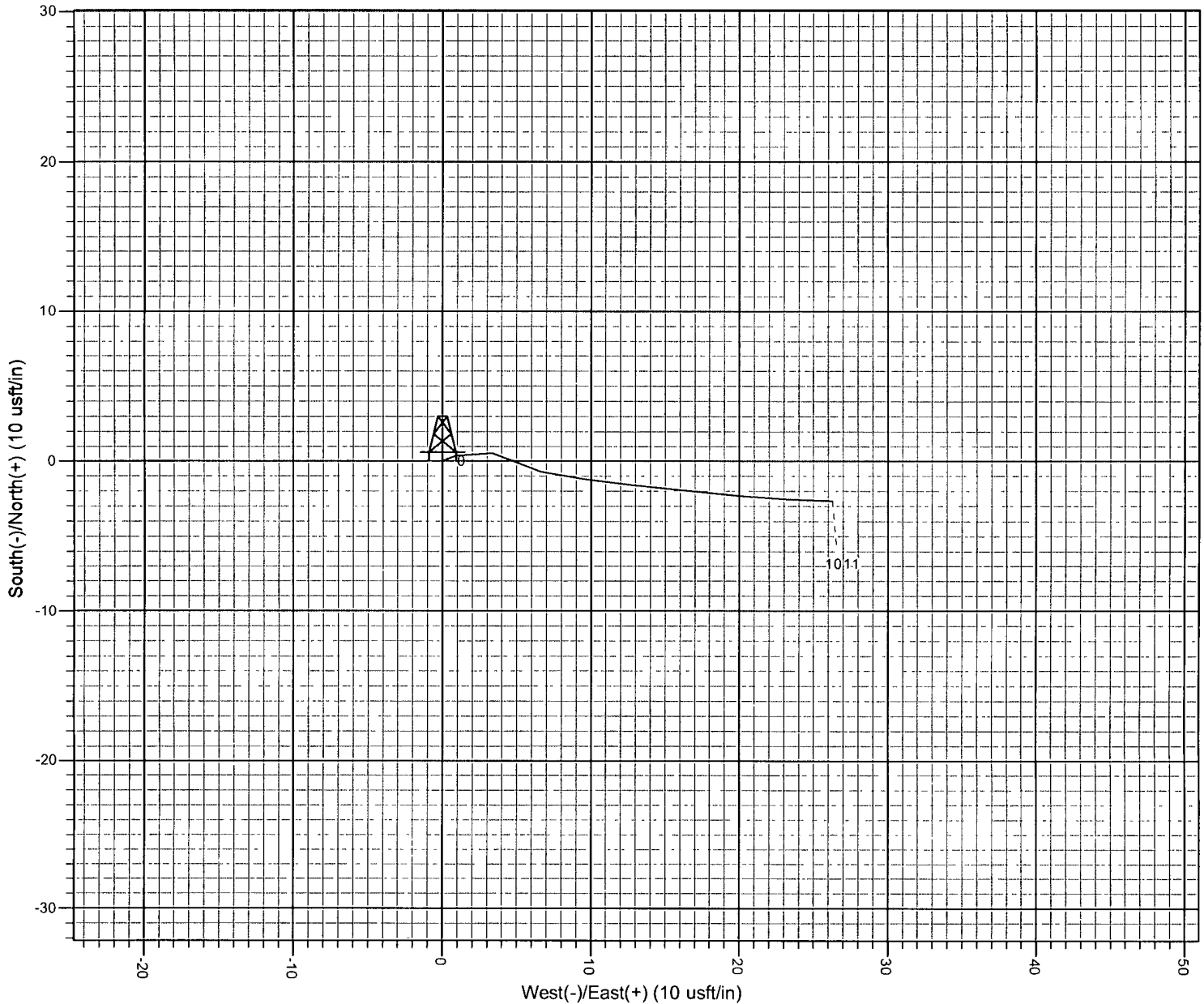


Azimuths to Grid North
True North: -0.12°
Magnetic North: 7.73°

Magnetic Field
Strength: 48925.3 nT
Dip Angle: 60.66°
Date: 9/22/2011
Model: IGRF2010

WELL DETAILS: Pere Marquette 18 Federal #7H
WELL @ 0.0usft (Original Well Elev)
Ground Level: 0.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	669378.00	566851.91	32° 50' 24.059 N	104° 6' 56.415 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 #7
Eddy Co, NM**

Proposal No: 03169-433-21

Presented By:

Terry Morgan
Regional Manager

Mirenda Morgan
Well Planner



CIMAREX

WELL DETAILS Pere Marquette 18 Fed #7

+N/-S 0 0	+E/-W 0 0	Northing 669399.90	Ground Level: Easting 608188.00	0.0 Latitude 32° 50' 24.059 N	Longitude 104° 6' 56.414 W	Slot
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Project: Eddy County (NM83E)
Site: Sec 18-T17S-R29E
Well: Pere Marquette 18 Fed #7
Wellbore: Wellbore #1
Design: Design #1

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
PM 18 #7 PBHL	4850.0	-330.0	78.2	669069.95	608266.16	32° 50' 20.793 N	104° 6' 55.506 W	Circle (Radius 25.0)

- plan hits target center



Azimuths to Grid North
True North -0.12°
Total Correction/Magnetic North 7.74°
Magnetic Field
Strength 48933.2 nT
Dip Angle 60.66°
Date 08/24/2011
Model IGRF2010

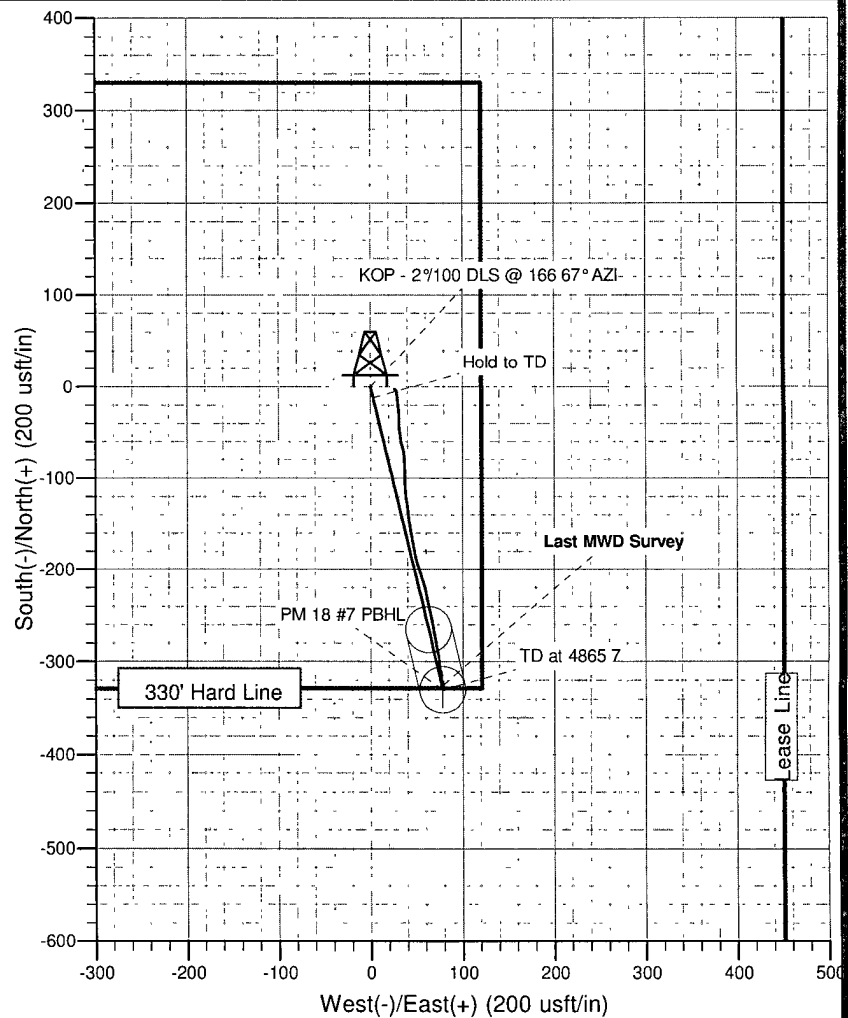
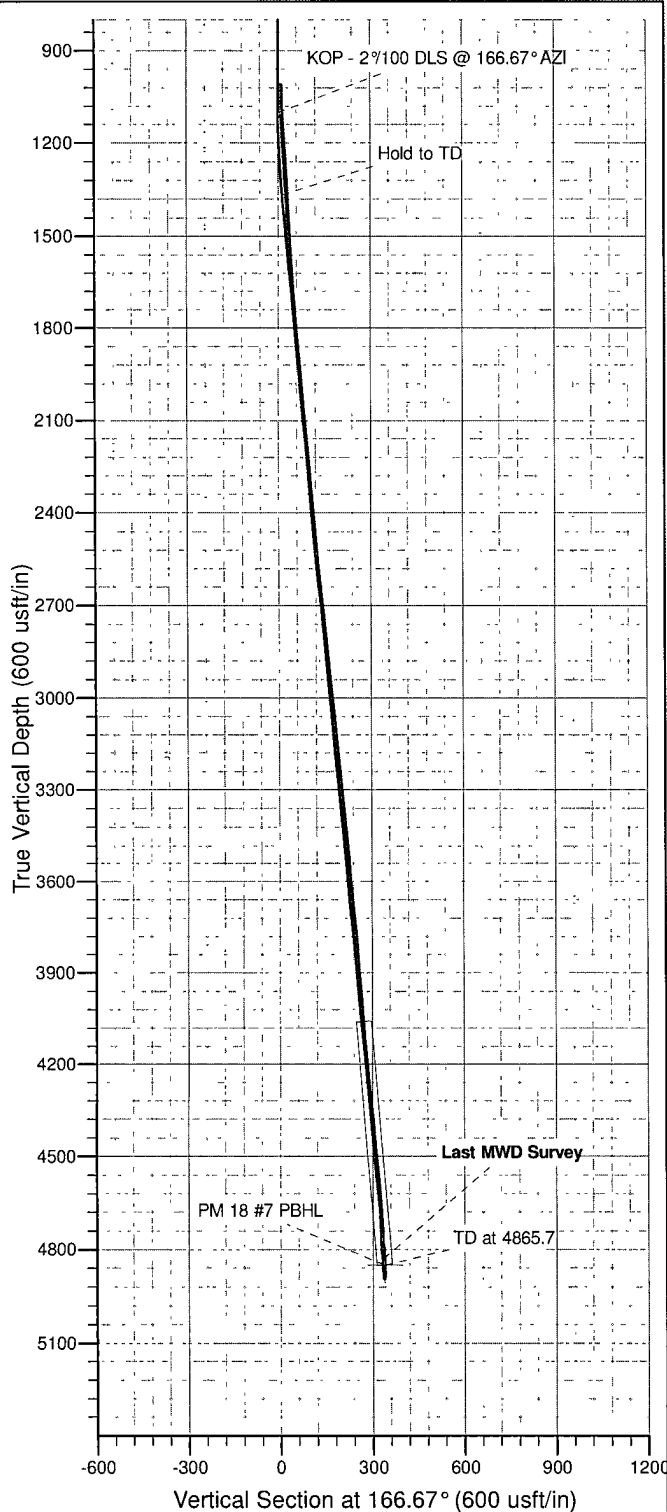
SECTION DETAILS

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	
1367.9	5.36	166.67	1367.5	-12.2	2.9	2.00	166.67	12.5	
4865.7	5.36	166.67	4850.0	-329.9	78.2	0.00	0.00	339.1	PM 18 #7 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 @ 166.67° AZI
1367.5	1367.9	5.36	166.67	-12.2	2.9	12.5	12.5	Hold to TD
4850.0	4865.7	5.36	166.67	-329.9	78.2	339.1	339.1	TD at 4865.7

25' Target Radius



Cimarex Energy Co. (Midland)

Eddy County (NM83E)

Sec 18-T17S-R29E

Pere Marquette 18 Fed #7

Wellbore #1

Survey: Survey #1

Standard Survey Report

30 September, 2011

Great White Directional Services

Survey Report

Company:	Cimarex Energy Co. (Midland)	Local Co-ordinate Reference:	Well-Pere Marquette 18 Fed #7
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 #7	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:		Northing:	669,464.80 usft	Latitude:	32° 50' 24.712 N
From:	Map	Easting:	607,648.10 usft	Longitude:	104° 7' 2 741 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.12 °

Well	Pere Marquette 18 Fed #7					
Well Position	+N/-S	0.0 usft	Northing:	669,399.90 usft	Latitude:	32° 50' 24.059 N
	+E/-W	0.0 usft	Easting:	608,188.00 usft	Longitude:	104° 6' 56.414 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	0.0 usft

Wellbore					
Wellbore #1					
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
			(°)	(°)	(nT)
	IGRF2010	08/24/11	7.86	60.66	48,933

Design:	Wellbore #1				
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	166.67	

Survey Program		Date	09/30/11		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
1,011.0	4,906.0	Survey #1 (Wellbore #1)	MWD	MWD - Standard	

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)
1,011.0	1.62	92.35	1,011.3	-2.6	26.3	8.6	0.00	0.00	0.00
1,152.0	3.60	173.70	1,152.2	-7.1	28.8	13.6	2.64	1.40	57.70
1,246.0	3.80	174.20	1,246.0	-13.1	29.4	19.6	0.22	0.21	0.53
1,341.0	3.60	175.70	1,340.8	-19.3	29.9	25.6	0.23	-0.21	1.58
1,435.0	3.20	173.50	1,434.7	-24.8	30.5	31.2	0.45	-0.43	-2.34
1,529.0	3.20	178.00	1,528.5	-30.0	30.8	36.3	0.27	0.00	4.79
1,623.0	3.90	181.20	1,622.3	-35.8	30.9	42.0	0.77	0.74	3.40
1,718.0	4.80	177.90	1,717.1	-43.1	30.9	49.0	0.98	0.95	-3.47
1,812.0	5.40	170.40	1,810.7	-51.3	31.8	57.3	0.95	0.64	-7.98
1,907.0	5.10	167.70	1,905.3	-59.9	33.5	66.0	0.41	-0.32	-2.84

Great White Directional Services

Survey Report

Company:	Cimarex Energy Co. (Midland)	Local Co-ordinate Reference:	Well Pere Marquette 18 Fed #7
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 #7	North Reference:	Gnd
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)	
2,002.0	5.20	164.60	1,999.9	-68.2	35.5	74.5	0.31	0.11	-3.26	
2,097.0	5.40	179.00	2,094.5	-76.8	36.7	83.2	1.41	0.21	15.16	
2,192.0	5.30	178.30	2,189.1	-85.6	36.9	91.8	0.13	-0.11	-0.74	
2,287.0	5.30	178.30	2,283.7	-94.4	37.2	100.4	0.00	0.00	0.00	
2,381.0	5.10	177.90	2,377.3	-102.9	37.5	108.8	0.22	-0.21	-0.43	
2,474.0	4.80	178.90	2,469.9	-110.9	37.7	116.6	0.34	-0.32	1.08	
2,570.0	6.20	173.20	2,565.5	-120.1	38.4	125.7	1.56	1.46	-5.94	
2,664.0	6.40	170.30	2,658.9	-130.3	39.9	136.0	0.40	0.21	-3.09	
2,759.0	6.20	173.10	2,753.4	-140.6	41.4	146.4	0.39	-0.21	2.95	
2,853.0	5.70	172.00	2,846.9	-150.3	42.7	156.1	0.55	-0.53	-1.17	
2,946.0	5.60	170.30	2,939.4	-159.3	44.1	165.2	0.21	-0.11	-1.83	
3,041.0	6.00	169.70	3,033.9	-168.8	45.7	174.8	0.43	0.42	-0.63	
3,136.0	5.80	169.20	3,128.4	-178.4	47.5	184.5	0.22	-0.21	-0.53	
3,230.0	5.90	166.90	3,221.9	-187.7	49.5	194.1	0.27	0.11	-2.45	
3,326.0	5.70	162.80	3,317.4	-197.1	52.0	203.8	0.48	-0.21	-4.27	
3,421.0	5.30	162.80	3,412.0	-205.8	54.7	212.9	0.42	-0.42	0.00	
3,516.0	5.40	161.40	3,506.6	-214.2	57.4	221.7	0.17	0.11	-1.47	
3,610.0	5.10	168.60	3,600.2	-222.5	59.7	230.3	0.77	-0.32	7.66	
3,706.0	5.30	168.80	3,695.8	-231.1	61.4	239.0	0.21	0.21	0.21	
3,800.0	4.90	167.70	3,789.4	-239.2	63.1	247.3	0.44	-0.43	-1.17	
3,895.0	4.50	169.10	3,884.1	-246.9	64.7	255.1	0.44	-0.42	1.47	
3,990.0	4.40	166.20	3,978.8	-254.1	66.2	262.5	0.26	-0.11	-3.05	
4,085.0	4.10	168.60	4,073.5	-260.9	67.8	269.5	0.37	-0.32	2.53	
4,180.0	5.60	171.00	4,168.2	-268.8	69.2	277.5	1.59	1.58	2.53	
4,274.0	6.20	169.90	4,261.7	-278.4	70.8	287.2	0.65	0.64	-1.17	
4,369.0	6.20	170.00	4,356.2	-288.5	72.6	297.4	0.01	0.00	0.11	
4,462.0	5.10	172.70	4,448.7	-297.5	74.0	306.5	1.22	-1.18	2.90	
4,557.0	4.90	172.50	4,543.3	-305.7	75.0	314.8	0.21	-0.21	-0.21	
4,652.0	4.10	170.50	4,638.0	-313.1	76.1	322.2	0.86	-0.84	-2.11	
4,746.0	3.50	170.10	4,731.8	-319.2	77.2	328.4	0.64	-0.64	-0.43	
4,790.0	3.50	168.60	4,775.8	-321.9	77.7	331.1	0.21	0.00	-3.41	
4,844.0	3.50	168.60	4,829.7	-325.1	78.3	334.4	0.00	0.00	0.00	
Last MWD Survey - PM 18 #7 PBHL										
4,906.0	3.50	168.60	4,891.5	-328.8	79.1	338.2	0.00	0.00	0.00	
Projection to Bit										

Survey Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
4,844.0	4,829.7	-325.1	78.3	Last MWD Survey	
4,906.0				Projection to Bit	

Great White Directional Services
Survey Report

Company:	Cimarex Energy Co. (Midland)	Local Co-ordinate Reference:	Well Pere Marquette 18 Fed #7
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 #7	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000:1 Single User Db

Checked By: _____	Approved By: _____	Date: _____
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