

30-015-39021

APACHE CORP

Empire
Eddy County, NM
Empire Abo Unit #411
DH - Job #32D11111140

Survey: MWD - Assumed vertical @ 5400'MD

SDI Standard Survey Report

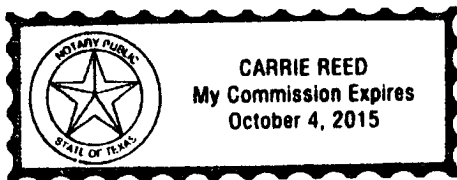
This survey is correct to the best of my knowledge and is supported by actual field data.

RL North

Notarized this date 31st of December, 2011.

Carrie Reed

Notary Signature
County of Midland
State of Texas



Scientific Drilling International, Inc.
SDI Standard Survey Report



Company:	APACHE CORP	Local Co-ordinate Reference:	Well Empire Abo Unit #411
Project:	Empire	TVD Reference:	WELL @ 0 0usft (Original Well Elev)
Site:	Eddy County, NM	MD Reference:	WELL @ 0 0usft (Original Well Elev)
Well:	Empire Abo Unit #411	North Reference:	Grid
Wellbore:	DH - Job #32D11111140	Survey Calculation Method:	Minimum Curvature
Design:	DH - Job #32D11111140	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:	648,599 85 usft	Latitude:	32° 46' 58 955 N
From:	Lat/Long	Easting:	534,055 50 usft	Longitude:	104° 13' 21 083 W
Position Uncertainty:	0 0 usft	Slot Radius:	13-3/16"	Grid Convergence:	0 06 °

Well	Empire Abo Unit #411, Vertical w/Sidetrack					
Well Position	+N/-S	0 0 usft	Northing:	648,599 85 usft	Latitude:	32° 46' 58 955 N
	+E/-W	0 0 usft	Easting:	534,055 50 usft	Longitude:	104° 13' 21 083 W
Position Uncertainty		0 0 usft	Wellhead Elevation:	usft	Ground Level:	0.0 usft

Wellbore	DH - Job #32D11111140				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	11/22/2011	7 88	60 58	48,862

Design		DH - Job #32D11111140		
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	159 76

Survey Program		Date	1/22/2012		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
5,448 0	6,225 0	MWD - Assumed vertical @ 5400'MD (DH	MWD	MWD	

Survey							
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
5,400 0	0 00	0 00	5,400 0	0 0	0 0	0 00	0 0
5,448.0	1 78	326.61	5,448 0	0.6	-0.4	326 61	0 7
5,489 0	1 75	326 66	5,489 0	1 7	-1 1	326 63	2 0
5,533 0	1.13	150 79	5,533 0	1 9	-1 3	325 83	2 2
5,576 0	2 02	149 18	5,576 0	0 8	-0 7	321 50	1 1
5,618 0	2 12	145 18	5,617 9	-0.4	0 2	160 29	0 5
5,661 0	2 16	145 30	5,660 9	-1 8	1 1	148 58	2 1
5,703 0	2 02	147 50	5,702 9	-3 0	1 9	147 64	3 6
5,746 0	1 35	154 58	5,745 8	-4 1	2 5	148 34	4 8
5,789 0	1 00	154 75	5,788 8	-4 9	2 9	149 31	5 7
5,831 0	0 74	178 74	5,830 8	-5 5	3 1	150 83	6 3
5,874 0	1 25	166 76	5,873 8	-6 3	3 2	152 94	7 0

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Company:	APACHE CORP	Local Co-ordinate Reference:	Well Empire Abo Unit #411
Project:	Empire	TVD Reference:	WELL @ 0 0usft (Original Well Elev)
Site:	Eddy County, NM	MD Reference:	WELL @ 0 0usft (Original Well Elev)
Well:	Empire Abo Unit #411	North Reference:	Grid
Wellbore:	DH - Job #32D11111140	Survey Calculation Method:	Minimum Curvature
Design:	DH - Job #32D11111140	Database:	EDM-Regulatory

Survey								
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)	
5,916 0	1 74	157 19	5,915 8	-7 3	3 5	154 05	8 1	
5,959 0	1 91	156 02	5,958 8	-8 5	4 1	154 41	9 5	
6,001 0	1 76	162 59	6,000 8	-9 8	4 6	155 00	10 8	
6,044 0	0 95	172 94	6,043 8	-10 8	4 8	155 96	11 8	
6,087 0	0 45	171 85	6,086 8	-11 3	4 9	156 66	12 3	
6,129 0	0 52	307 50	6,128 8	-11 4	4 8	157 29	12 3	
6,172 0	0 50	298 78	6,171 8	-11 1	4 4	158 31	12 0	
6,225 0	0 50	298 78	6,224 7	-10 9	4 0	159 76	11 6	
Projection to Bit								

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
6,225 0	6,223 9	59 1	-42 1	Projection to Bit



Project: Empire
Eddy County, NM
Well: Empire Abo Unit #4 11
Wellbore: DH - Jo b #32D11111140
Design DH - Jo b #32D11111140

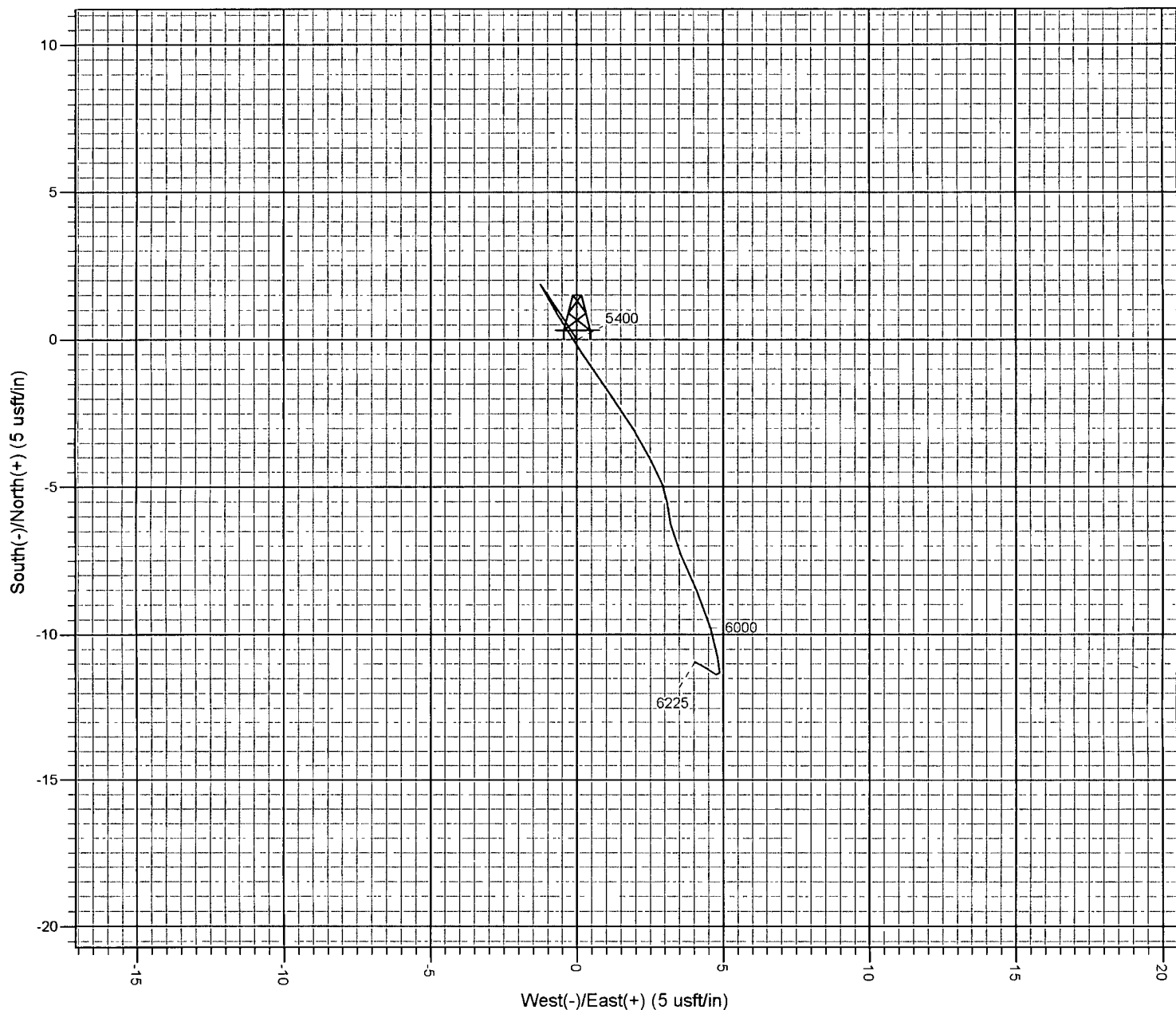


Azimuths to Gnd North
True North -0 06°
Magnetic North 7 82°

Magnetic Field
Strength 48862.0snT
Dip Angle 60 58°
Date 1 1/22/2011
Model IGRF2010

WELL DETAILS: Empire Abo Unit #4 11
WELL @ 0.0usft (Original Well Elev)
Ground Level: 0.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0 0	648599.85	534055 50	32° 46' 58 955 N	104° 13' 21 083 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° 46' 58 955 N
Longitude: 104° 13' 21.083 W
Positional Uncertainty: 0 0
Convergence: 0 06
Local North: Grid