



HOBBS OCD

SEP 02 2014

RECEIVED

Apache Corporation

Lea County, NM (NAD27 NME)

Bertha J Barber

#15D API#30-025-41281
SW: 590' FNL & 145' FEL UL: A 07-208-37E

WB1/Job #1311766

Survey: Phoenix MWD Survey

Standard Survey Report

10 January, 2014



SEP 05 2014

Company:	Apache Corporation	Local Co-ordinate Reference:	Well #15D
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB @ 3571.00usft (Capstar 120)
Site:	Bertha J Barber	MD Reference:	KB @ 3571.00usft (Capstar 120)
Well:	#15D	North Reference:	Grid
Wellbore:	WB1/Job #1311766	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 120)	Database:	Compass 5000 GCR DB

Project	Lea County, NM (NAD27 NME)		
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	Bertha J Barber		
Site Position:		Northing:	581,142.80 usft
From:	Map	Easting:	823,742.90 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 35' 35.76922 N
		Longitude:	103° 16' 55.86236 W
		Grid Convergence:	0.57 °

Well	#15D		
Well Position	+N/-S	0.00 usft	Northing: 581,142.80 usft
	+E/-W	0.00 usft	Easting: 823,742.90 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft
		Latitude:	32° 35' 35.76922 N
		Longitude:	103° 16' 55.86236 W
		Ground Level:	3,560.00 usft

Wellbore	WB1/Job #1311766				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010_14	01/02/14	7.16	60.51	48,613

Design	Surveys (Capstar 120)				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.00	0.00	0.00	47.13	

Survey Program	Date	01/10/14		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
99.74	980.00	SDI Gyro Survey (WB1/Job #1311766)	Scientific Gyro	Scientific Drilling Intl. Standard Wireline Keeper
1,083.00	3,960.00	Phoenix MWD Survey (WB1/Job #131176)	MWD	MWD - Standard

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)
980.00	0.31	193.79	979.99	-3.38	0.66	-1.82	0.00	0.00	0.00
1,083.00	0.50	215.80	1,082.99	-4.02	0.33	-2.49	0.24	0.18	21.37
First Phoenix MWD Survey									
1,210.00	0.80	204.50	1,209.98	-5.27	-0.36	-3.85	0.26	0.24	-8.90
1,338.00	1.00	189.30	1,337.96	-7.19	-0.91	-5.56	0.24	0.16	-11.88
1,466.00	1.00	196.80	1,465.94	-9.36	-1.42	-7.40	0.10	0.00	5.86
1,593.00	1.00	203.10	1,592.92	-11.44	-2.17	-9.37	0.09	0.00	4.96
1,721.00	1.00	170.50	1,720.91	-13.57	-2.42	-11.01	0.44	0.00	-25.47
1,807.00	1.00	138.90	1,806.89	-14.87	-1.81	-11.44	0.63	0.00	-36.74
1,893.00	1.50	95.50	1,892.87	-15.55	-0.19	-10.72	1.20	0.58	-50.47

Company: Apache Corporation
Project: Lea County, NM (NAD27 NME)
Site: Bertha J Barber
Well: #15D
Wellbore: WB1/Job #1311766
Design: Surveys (Capstar 120)

Local Co-ordinate Reference: Well #15D
TVD Reference: KB @ 3571.00usft (Capstar 120)
MD Reference: KB @ 3571.00usft (Capstar 120)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Compass 5000 GCR 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)
1,978.00	1.60	45.70	1,977.85	-14.82	1.76	-8.79	1.54	0.12	-58.59
2,063.00	2.00	45.20	2,062.80	-12.95	3.67	-6.12	0.47	0.47	-0.59
2,148.00	2.50	47.10	2,147.74	-10.64	6.08	-2.79	0.59	0.59	2.24
2,234.00	3.70	44.30	2,233.61	-7.38	9.39	1.86	1.41	1.40	-3.26
2,319.00	5.80	38.30	2,318.32	-2.05	13.97	8.84	2.54	2.47	-7.06
2,405.00	5.10	46.00	2,403.93	4.02	19.41	16.96	1.18	-0.81	8.95
2,490.00	5.40	46.90	2,488.57	9.38	25.05	24.74	0.37	0.35	1.06
2,576.00	6.00	36.30	2,574.15	15.76	30.66	33.20	1.41	0.70	-12.33
2,661.00	5.10	39.20	2,658.75	22.27	35.68	41.30	1.11	-1.06	3.41
2,746.00	4.90	45.30	2,743.43	27.75	40.65	48.67	0.67	-0.24	7.18
2,832.00	5.20	43.70	2,829.09	33.15	45.95	56.23	0.39	0.35	-1.86
2,917.00	5.60	44.90	2,913.71	38.88	51.54	64.22	0.49	0.47	1.41
3,002.00	6.70	43.60	2,998.22	45.41	57.89	73.32	1.30	1.29	-1.53
3,087.00	6.60	41.00	3,082.65	52.68	64.51	83.12	0.37	-0.12	-3.06
3,172.00	5.80	42.30	3,167.15	59.55	70.61	92.26	0.96	-0.94	1.53
3,258.00	5.40	40.60	3,252.74	65.83	76.17	100.61	0.50	-0.47	-1.98
3,343.00	7.30	47.90	3,337.22	72.49	82.78	109.98	2.42	2.24	8.59
3,429.00	6.90	50.00	3,422.56	79.47	90.79	120.61	0.55	-0.47	2.44
3,514.00	7.50	44.00	3,506.89	86.75	98.55	131.25	1.13	0.71	-7.06
3,599.00	7.40	42.90	3,591.17	94.75	106.13	142.24	0.20	-0.12	-1.29
3,685.00	7.40	47.00	3,676.46	102.58	113.95	153.31	0.61	0.00	4.77
3,770.00	7.00	50.80	3,760.79	109.59	121.97	163.95	0.73	-0.47	4.47
3,856.00	6.50	51.50	3,846.19	115.93	129.84	174.03	0.59	-0.58	0.81
3,910.00	5.60	53.40	3,899.89	119.40	134.35	179.70	1.71	-1.67	3.52
Last Phoenix MWD Survey									
3,960.00	5.60	53.40	3,949.65	122.31	138.26	184.55	0.00	0.00	0.00
Projection to TD									

Survey Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,083.00	1,082.99	-4.02	0.33	First Phoenix MWD Survey
3,910.00	3,899.89	119.40	134.35	Last Phoenix MWD Survey
3,960.00	3,949.65	122.31	138.26	Projection to TD

Checked By: _____ Approved By: _____ Date: _____

Phoenix Technology Services SURVEY DATA CERTIFICATION



PHOENIX JOB NUMBER

1311766

OPERATOR

Apache Corporation

WELL NAME

Bertha J Barber #15D

COUNTY & STATE

Lea County, New Mexico

API WELL NUMBER

30-025-41281

PROPOSED DIRECTION

47.13

TIE-IN DATA						
MEASURED DEPTH	VERTICAL DEPTH	INCLIN	AZIMUTH	N-S COORD	E-W COORD	DATA SOURCE
980 ft	979.99 ft	0.31 ft	193.79 ft	-3.38 ft	.66 ft	Gyro

FIRST SURVEY DATE	FIRST SURVEY DEPTH	INCLIN	AZIMUTH
8-Jan-14	1,083 ft	0.50	215.80

SURVEY INSTRUMENT TYPE
Phoenix MWD

LAST SURVEY DATE	LAST SURVEY DEPTH	INCLIN	AZIMUTH
10-Jan-14	3,910 ft	5.60	53.40

TO THE BEST OF MY KNOWLEDGE I
CERTIFY THIS SURVEY DATA TO BE
TRUE AND CORRECT.

PROJECTED TD SURVEY DATE	PROJECTED TD SURVEY DEPTH	INCLIN	AZIMUTH
10-Jan-14	3,960 ft	5.60	53.40

David Puente

PRINT YOUR NAME ABOVE

David Puente

SIGN YOUR NAME ABOVE

MAGNETIC DECLINATION OR TOTAL GRID

TOTAL CORRECTION USED	7.16
DECLINATION OR GRID	GRID

1/10/2014

TODAY'S DATE

MWD SUPERVISOR 1

David Puente

DIRECTIONAL DRILLER 1

Tim Owens

MWD SUPERVISOR 2

NA

DIRECTIONAL DRILLER 2

Jackson John

1805 Brittmore Road

Houston, Texas 77043

(713)3370609 (Voice), (713)337-0599 (Fax)

HOBBS OCD

SEP 02 2014

RECEIVED

APACHE CORP

Monument

Lea County, NM (Grid North)

Bertha J Barber #15D API#30-025-41281

VH - Job #320114-KW-019 SL: 590' FWL 4145' FEL
WL: A-07-20S-37E

Survey: Gyro

SDI Survey Report

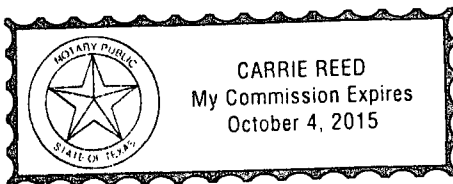
This survey is correct to the best of my knowledge and is supported by actual field data.

Richard

Notarized this date 31st of January, 2013.

Carrie Reed

Notary Signature
County of Midland
State of Texas



SDI

SDI Survey Report

Company:	APACHE CORP	Local Co-ordinate Reference:	Well Bertha J Barber #15D
Project:	Monument	TVD Reference:	Mean Sea Level (System)
Site:	Lea County, NM (Grid North)	MD Reference:	Mean Sea Level (System)
Well:	Bertha J Barber #15D	North Reference:	Grid
Wellbore:	VH - Job #320114-KW-019	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #320114-KW-019	Database:	EDM-Regulatory

Project:	Monument		
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:	Lea County, NM (Grid North)				
Site Position:		Northing:	581,142.72 usft	Latitude:	32° 35' 35.768 N
From:	Lat/Long	Easting:	823,742.90 usft	Longitude:	103° 16' 55.862 W
Position Uncertainty:	0.0 usft	Slot Radius:	0"	Grid Convergence:	0.57 °

Well	Bertha J Barber #15D, Directional					
Well Position	+N/-S	0.0 usft	Northing:	581,142.72 usft	Latitude:	32° 35' 35.768 N
	+E/-W	0.0 usft	Easting:	823,742.90 usft	Longitude:	103° 16' 55.862 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	0.0 usft

Wellbore: VH - Job #320114-KW-019					
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	1/7/2014	7.16	60.51	48,638

Design:		VH - Job #320114-KW-019			
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	(°)
				47.13	

Survey Program		Date: 1/19/2014		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
99.7	980.0	Gyro (VH - Job #320114-KW-019)	Keeper	Keeper Gyro

Survey	MD	Inc	Azi (azimuth)	TVD	N/S	E/W	Closure Azimuth	Closure Distance
	(usft)	(°)	(°)	(usft)	(usft)	(usft)	(°)	(usft)
	0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.0
	99.7	0.42	154.28	99.7	-0.3	0.2	154.28	0.4
	100.0	0.42	153.90	100.0	-0.3	0.2	154.28	0.4
	200.0	0.27	138.90	200.0	-0.8	0.5	150.42	1.0
	300.0	0.16	73.18	300.0	-1.0	0.8	141.91	1.2
	400.0	0.11	153.28	400.0	-1.0	0.9	137.31	1.4
	500.0	0.20	85.57	500.0	-1.1	1.2	133.33	1.6
	600.0	0.26	201.22	600.0	-1.3	1.3	135.91	1.8
	700.0	0.31	189.07	700.0	-1.8	1.1	147.54	2.1
	800.0	0.38	196.37	800.0	-2.4	1.0	157.21	2.6
	900.0	0.33	199.44	900.0	-2.9	0.8	164.80	3.1
	980.0	0.31	193.79	980.0	-3.4	0.7	168.73	3.4



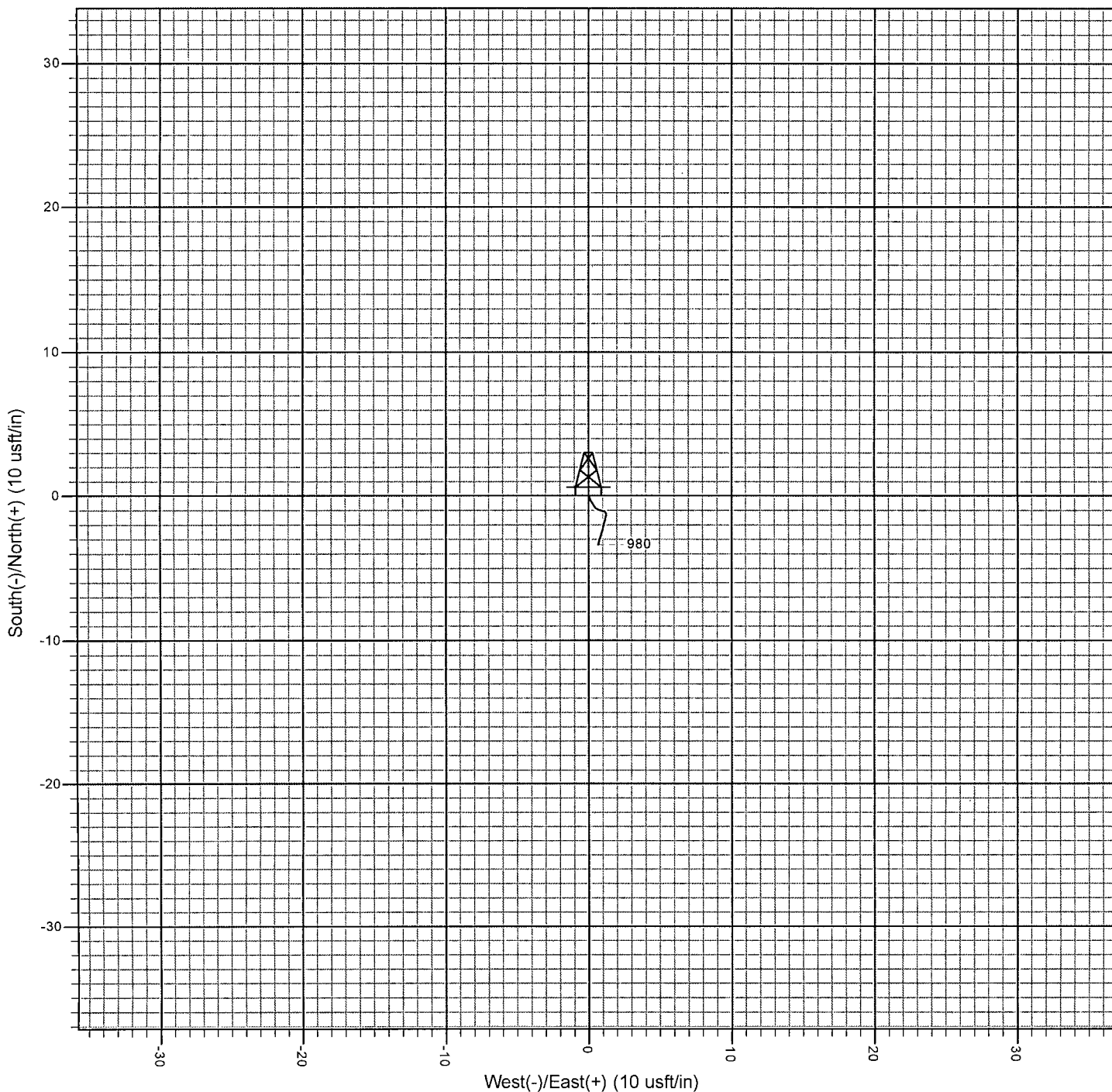
Project: Monument
Lea County, NM (Grid North)
Well: Bertha J Barber #15D
Wellbore: VH - Job #320114-KW-019
Design: VH - Job #320114-KW-019

WELL DETAILS: Bertha J Barber #15D

Mean Sea Level (System)

Ground Level: 0.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	581142.72	823742.90	32° 35' 35.768 N	103° 16' 55.862 W	



PROJECT DETAILS: Monument	SITE DETAILS: Lea County, NM (Grid North)
Geodetic System: US State Plane 1927 (Exact solution)	Site Centre Latitude: 32° 35' 35.768 N
Datum: NAD 1927 (NADCON CONUS)	Longitude: 103° 16' 55.862 W
Ellipsoid: Clarke 1866	Positional Uncertainty: 0.0
Zone: New Mexico East 3001	Convergence: 0.57
System Datum: Mean Sea Level	Local North: Grid