

Results of Directional Survey

API number:	30-025-41042	DD	
OGRID:		Operator:	APACHE CORP
		Property:	NORTH MONUMENT G/SA UNIT # 389

surface	ULSTR:	C	30	T	19S	R	37E
				1180	FNL	2475	FWL

5230.5

BH Loc	ULSTR:	G	30	T	19S	R	37E
4067	MD	4056.2	TVD	1349	FNL	2603	FEL
						2627	FWL

Top Perf/OH	ULSTR:	F	30	T	19S	R	37E
3733	MD	3724.2	TVD	1320	FNL	2606	FWL

Bot Perf/OH	ULSTR:	F	30	T	19S	R	37E
3906	MD	3896.3	TVD	1334	FNL	2617	FWL

	MD	N/S	E/W	VD
	3681	-136.53	127.09	3672.44
TOP PERFS/OH	3733	-140.04	130.56	3724.20
	3809	-145.17	135.63	3799.86
	3809	-145.17	135.63	3799.86
BOT PERFS/OH	3906	-153.70	141.91	3896.28
	3937	-156.42	143.92	3927.09

NEXT TO LAST	4018	-164.40	149.10	4007.53
LAST READING	4067	-169.08	152.38	4056.20
TD	4067	-169.08	152.38	4056.20

Surface Location	1180	FN	2475	FW
Projected BHL	1349	FN	2627	FW
Location of				
Top Perfs/OH	1320	FN	2606	FW
Bottom Perfs/OH	1334	FN	2617	FW

SUMMARY of Subsurface Locations

Surface Location	C-30-19S-37E	1180	FN	2475	FW	Vert. Depth
Top Perfs/OH	F-30-19S-37E	1320	FN	2606	FW	3724.20
Bottom Perfs/OH	F-30-19S-37E	1334	FN	2617	FW	3896.28
Projected TD	G-30-19S-37E	1349	FN	2627	FW	4056.20

OCT 24 2013

Apache Corporation
303 Veterans Airpark Lane, #3000
Midland, TX 79705

API # 30-025-41042

North Monument G/SA Unit #389
Lea County, New Mexico

SL: 1180' FNL - 2475' FNL; C-30-195-37E
BNL: 1349' FNL - 2601' FNL; G-30-195-37E

237	2.37	0.40	0.70	1.66	1.66
468	2.31	0.40	0.70	1.62	3.28
705	2.37	0.50	0.88	2.07	5.35
988	2.83	0.30	0.53	1.49	6.84
1297	3.09	0.20	0.35	1.08	7.92

HOBBS OCD

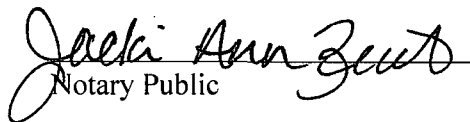
OCT 03 2013

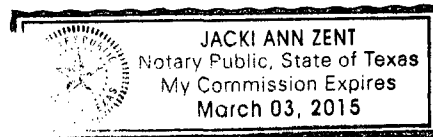
RECEIVED



Archie Brown - General Manager

The attached instrument was acknowledged before me on the 8th day of July, 2013 by
Archie Brown - General Manager, CapStar Drilling, Inc.


Notary Public



HOBBS:OCD

JUL 11 2013

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Apache Corporation

Lea County, NM (NAD83 NME)

NMGSAU

#389

OH/Job #1310455

Survey: Phoenix MWD Survey

Phoenix Final Survey Report

29 June, 2013





Phoenix Technology Services
Phoenix Final Survey Report



Company:	Apache Corporation	Local Co-ordinate Reference:	Well #389
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	KB @ 3658.00usft (Capstar 120)
Site:	NMGSAU	MD Reference:	KB @ 3658.00usft (Capstar 120)
Well:	#389	North Reference:	True
Wellbore:	OH/Job #1310455	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 120)	Database:	GCR DB

Project	Lea County, NM (NAD83 NME)		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		

Site	NMGSAU		
Site Position:		Northing:	582,973.08 usft
From:	Map	Easting:	870,597.88 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16"
		Latitude:	32° 35' 53.144390 N
		Longitude:	103° 15' 51.083479 W
		Grid Convergence:	0.58 °

Well	#389		
Well Position	+N-S	0.00 usft	Northing:
	+E-W	0.00 usft	Easting:
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft
		Latitude:	32° 38' 7.447806 N
		Longitude:	103° 17' 28.023103 W
		Ground Level:	3,647.00 usft

Wellbore	OH/Job #1310455		
Magnetics	Model Name	Sample Date	Declination
	IGRF2010_14	06/14/13	7.24
			Dip Angle
			60.56
			Field Strength
			48,692

Design	Surveys (Capstar 120)		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.00
Vertical Section:	Depth From (TVD)	+N-S	+E-W
	(usft)	(usft)	(usft)
	0.00	0.00	0.00
			Direction
			(°)
			140.40

Survey Program	Date: 06/29/13		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
100.00	1,225.00	SDI Gyro (OH/Job #1310455)	Keeper
1,225.00	4,067.00	Phoenix MWD Survey (OH/Job #1310455)	MWD
			Description
			Keeper Standard Rate Gyro
			MWD - Standard

Survey	MD	Inc	Azi (azimuth)	TVD	N/S	E/W	V. Sec	DLeg
	(usft)	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(°/100usft)
	1,225.00	0.21	197.94	1,224.98	2.05	-3.09	-3.55	0.00
Tie-on to SDI Gyro								
	1,378.00	0.30	214.70	1,377.98	1.46	-3.40	-3.29	0.08
First Phoenix MWD Survey								
	1,506.00	1.80	130.80	1,505.96	-0.13	-2.07	-1.22	1.40
	1,633.00	2.80	129.90	1,632.85	-3.42	1.82	3.80	0.79
	1,762.00	3.90	125.60	1,761.63	-8.00	7.80	11.14	0.87
	1,889.00	5.10	138.70	1,888.24	-14.75	15.04	20.95	1.24
	2,017.00	7.20	138.50	2,015.50	-25.04	24.11	34.66	1.64
	2,145.00	6.10	140.40	2,142.63	-36.29	33.76	49.48	0.88
	2,273.00	5.40	145.50	2,269.99	-46.49	41.51	62.28	0.68



Phoenix Technology Services
Phoenix Final Survey Report



Company: Apache Corporation
Project: Lea County, NM (NAD83 NME)
Site: NMGSAU
Well: #389
Wellbore: OH/Job #1310455
Design: Surveys (Capstar 120)

Local Co-ordinate Reference: Well #389
TVD Reference: KB @ 3658.00usft (Capstar 120)
MD Reference: KB @ 3658.00usft (Capstar 120)
North Reference: True
Survey Calculation Method: Minimum Curvature
Database: GCR DB

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
2,401.00	5.40	145.60	2,397.42	-56.42	48.32	74.28	0.01
2,529.00	4.80	124.10	2,524.93	-64.40	56.16	85.42	1.55
2,657.00	4.40	132.20	2,652.51	-70.70	64.23	95.42	0.60
2,785.00	5.10	139.40	2,780.07	-78.31	71.57	105.96	0.72
2,913.00	4.80	139.90	2,907.60	-86.73	78.72	117.01	0.24
3,041.00	4.90	135.20	3,035.14	-94.71	86.02	127.81	0.32
3,169.00	5.40	136.50	3,162.62	-102.95	94.02	139.26	0.40
3,297.00	4.80	132.00	3,290.12	-110.91	102.15	150.57	0.56
3,425.00	5.80	139.30	3,417.57	-119.39	110.35	162.33	0.94
3,553.00	5.30	134.90	3,544.97	-128.47	118.75	174.68	0.51
3,681.00	5.10	133.10	3,672.44	-136.53	127.09	186.21	0.20
3,809.00	5.80	137.30	3,799.86	-145.17	135.63	198.31	0.63
3,937.00	6.80	149.00	3,927.09	-156.42	143.92	212.26	1.27
4,018.00	6.70	145.00	4,007.53	-164.40	149.10	221.72	0.59
Last Phoenix MWD Survey							
4,067.00	6.70	145.00	4,056.20	-169.08	152.38	227.41	0.00
Projection to TD							

Survey Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,225.00	1,224.98	2.05	-3.08	Tie-on to SDI Gyro
1,378.00	1,377.98	1.46	-3.40	First Phoenix MWD Survey
4,018.00	4,007.53	-164.40	149.11	Last Phoenix MWD Survey
4,067.00	4,056.20	-169.08	152.39	Projection to TD

Checked By: _____

Approved By: _____

Date: _____

API # 30-025-41042

APACHE CORP

Eunice Monument
Lea County, NM
North Monument G/SA #389
VH - Job #320613-KW-663

HOBBS OCD

OCT 03 2013

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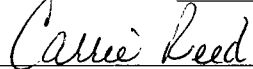
Survey: Gyro

SDI Survey Report

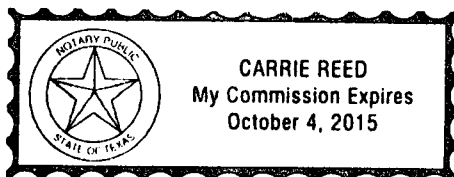
This survey is correct to the best of my knowledge and is supported by actual field data.



Notarized this date 10th of June, 2013.



Notary Signature
County of Midland
State of Texas



SDI
SDI Survey Report

Company:	APACHE CORP	Local Co-ordinate Reference:	Well North Monument G/SA #389
Project:	Eunice Monument	TVD Reference:	WELL @ 0.00usft (Original Well Elev)
Site:	Lea County, NM	MD Reference:	WELL @ 0.00usft (Original Well Elev)
Well:	North Monument G/SA #389	North Reference:	Grid
Wellbore:	VH - Job #320613-KW-663	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #320613-KW-663	Database:	EDM-Regulatory

Project	Eunice 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		
Site Position:		Northing:	590,447.31 usft
From:	Lat/Long	Easting:	817,856.60 usft
Position Uncertainty:	0.00 usft	Slot Radius:	0"
		Latitude:	32° 37' 8.400 N
		Longitude:	103° 18' 3.600 W
		Grid Convergence:	0.56 °

Well	North Monument G/SA #389, Vertical		
Well Position	+N/-S	0.00 usft	Northing: 596,443.63 usft
	+E/-W	0.00 usft	Easting: 820,841.31 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft
		Latitude:	32° 38' 7.440 N
		Longitude:	103° 17' 28.020 W
		Ground Level:	0.00 usft

Wellbore	VH - Job #320613-KW-663				
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
			(°)	(°)	(nT)
	IGRF2000	12/31/2004	8.46	60.88	49,734

Design	VH - Job #320613-KW-663			
Audit Notes:				
Version:	1.0	Phase:	ACTUAL	Tie On Depth: 0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction
	(usft)	(usft)	(usft)	(°)
	0.00	0.00	0.00	140.40

Survey Program	Date 6/30/2013				
From	To	Survey (Wellbore)	Tool Name	Description	
(usft)	(usft)				
100.00	1,225.00	Gyro (VH - Job #320613-KW-663)	Keeper	Keeper Gyro	

Survey								
MD	Inc	Azi (azimuth)	TVD	+FSL/-FNL	+FWL/-FEL	Closure Azimuth	Closure Distance	
(usft)	(°)	(°)	(usft)	(usft)	(usft)	(°)	(usft)	
0.00	0.00	0.00	0.00	5,996.32	2,984.71	0.00	0.00	
100.00	0.32	325.17	100.00	5,996.55	2,984.55	325.17	0.28	
200.00	0.40	331.91	200.00	5,997.09	2,984.22	327.76	0.91	
300.00	0.46	317.30	299.99	5,997.69	2,983.79	326.11	1.65	
400.00	0.51	305.71	399.99	5,998.24	2,983.15	321.08	2.47	
500.00	0.48	293.21	499.99	5,998.67	2,982.41	315.61	3.29	
600.00	0.49	280.37	599.98	5,998.91	2,981.60	309.84	4.04	
700.00	0.23	289.01	699.98	5,999.05	2,980.99	306.34	4.61	
800.00	0.14	42.79	799.98	5,999.21	2,980.88	307.08	4.79	
900.00	0.17	143.60	899.98	5,999.18	2,981.05	308.06	4.64	
1,000.00	0.22	142.26	999.98	5,998.91	2,981.26	306.90	4.31	
1,100.00	0.13	117.68	1,099.98	5,998.70	2,981.48	306.43	4.01	

SDI
SDI Survey Report

Company:	APACHE CORP	Local Co-ordinate Reference:	Well North Monument G/SA #389
Project:	Eunice Monument	TVD Reference:	WELL @ 0.00usft (Original Well Elev)
Site:	Lea County, NM	MD Reference:	WELL @ 0.00usft (Original Well Elev)
Well:	North Monument G/SA #389	North Reference:	Grid
Wellbore:	VH - Job #320613-KW-663	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #320613-KW-663	Database:	EDM-Regulatory

Survey							
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	+FSL/-FNL (usft)	+FWL/-FEL (usft)	Closure Azimuth (°)	Closure Distance (usft)
1,200.00	0.22	165.93	1,199.98	5,998.46	2,981.63	304.83	3.75
1,225.00	0.21	197.94	1,224.98	5,998.37	2,981.62	303.67	3.70

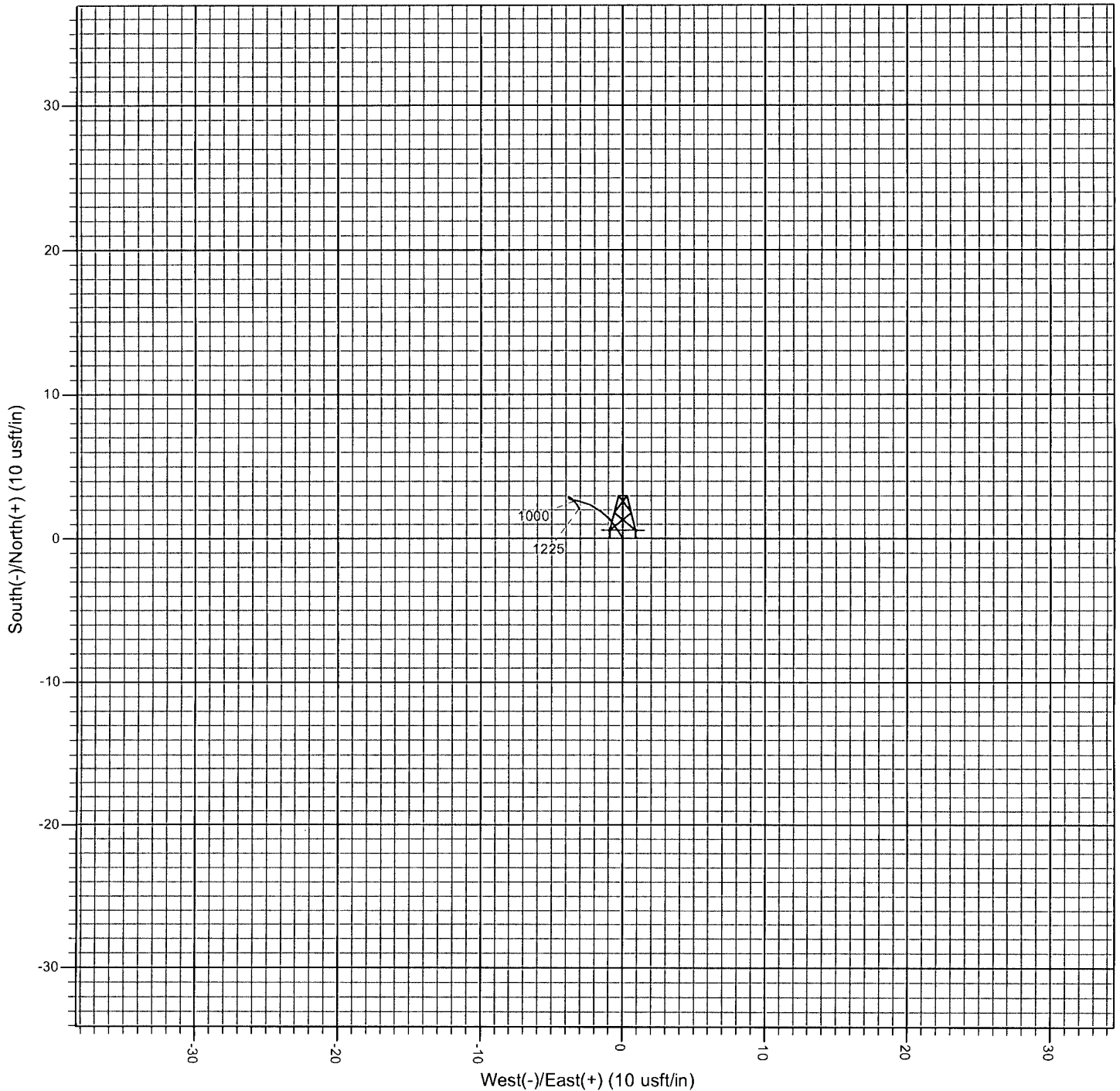


Scientific Drilling

Project: Eunice Monument
Lea County, NM
Well: North Monument G/SA #389
Wellbore: VH - Job #320613-KW-663
Design: VH - Job #320613-KW-663

WELL DETAILS: North Monument G/SA #389
WELL @ 0.00usft (Original Well Elev)
Ground Level: 0.00

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.00	0.00	596443.63	820841.31	32° 38' 7.440 N	103° 17' 28.020 W	



PROJECT DETAILS: Eunice Monument	SITE DETAILS: Lea County, NM
Geodetic System: US State Plane 1927 (Exact solution)	Site Centre Latitude: 32° 37' 8.400 N
Datum: NAD 1927 (NADCON CONUS)	Longitude: 103° 18' 3.600 W
Ellipsoid: Clarke 1866	Positional Uncertainty: 0.00
Zone: New Mexico East 3001	Convergence: 0.56
System Datum: Mean Sea Level	Local North: Grid



API# 30-025-41042

Apache Corporation

Lea County, NM (NAD83 NME)

NMGSAU

#389

OH/Job #1310455

Survey: Phoenix MWD Survey

Phoenix Final Survey Report

29 June, 2013



PHOENIX
TECHNOLOGY SERVICES



Phoenix Technology Services

Phoenix Final Survey Report



Company:	Apache Corporation	Local Co-ordinate Reference:	Well #389
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	KB @ 3658.00usft (Capstar 120)
Site:	NMGSAU	MD Reference:	KB @ 3658.00usft (Capstar 120)
Well:	#389	North Reference:	True
Wellbore:	OH/Job #1310455	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 120)	Database:	GCR DB

Project:	Lea County, NM (NAD83 NME)		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		

Site:	NMGSAU				
Site Position:		Northing:	582,973.08 usft	Latitude:	32° 35' 53.144390 N
From:	Map	Easting:	870,597.88 usft	Longitude:	103° 15' 51.083479 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16"	Grid Convergence:	0.58 °

Well:	#389					
Well Position	+N/-S	0.00 usft	Northing:	596,463.94 usft	Latitude:	32° 38' 7.447806 N
	+E/-W	0.00 usft	Easting:	862,171.57 usft	Longitude:	103° 17' 28.023103 W
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft	Ground Level:	3,647.00 usft	

Wellbore:	OH/Job #1310455				
Magnetics:	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010_14	06/14/13	7.24	60.56	48,692

Design:	Surveys (Capstar 120)				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction	
	(usft)	(usft)	(usft)	(°)	
	0.00	0.00	0.00	140.40	

Survey Program		Date: 06/29/13		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.00	1,225.00	SDI Gyro (OH/Job #1310455)	Keeper	Keeper Standard Rate Gyro
1,225.00	4,067.00	Phoenix MWD Survey (OH/Job #1310455)	MWD	MWD - Standard

Survey	MD	Inc	Azi (azimuth)	TVD	N/S	E/W	V. Sec	DLeg
	(usft)	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(°/100usft)
	1,225.00	0.21	197.94	1,224.98	2.05	-3.09	-3.55	0.00
Tie-on to SDI Gyro								
	1,378.00	0.30	214.70	1,377.98	1.46	-3.40	-3.29	0.08
First Phoenix MWD Survey								
	1,506.00	1.80	130.80	1,505.96	-0.13	-2.07	-1.22	1.40
	1,633.00	2.80	129.90	1,632.85	-3.42	1.82	3.80	0.79
	1,762.00	3.90	125.60	1,761.63	-8.00	7.80	11.14	0.87
	1,889.00	5.10	138.70	1,888.24	-14.75	15.04	20.95	1.24
	2,017.00	7.20	138.50	2,015.50	-25.04	24.11	34.66	1.64
	2,145.00	6.10	140.40	2,142.63	-36.29	33.76	49.48	0.88
	2,273.00	5.40	145.50	2,269.99	-46.49	41.51	62.28	0.68



Phoenix Technology Services
Phoenix Final Survey Report



Company:	Apache Corporation	Local Co-ordinate Reference:	Well #389
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	KB @ 3658.00usft (Capstar 120)
Site:	NMGSAU	MD Reference:	KB @ 3658.00usft (Capstar 120)
Well:	#389	North Reference:	True
Wellbore:	OH/Job #1310455	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 120)	Database:	GCR DB

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
2,401.00	5.40	145.60	2,397.42	-56.42	48.32	74.28	0.01
2,529.00	4.80	124.10	2,524.93	-64.40	56.16	85.42	1.55
2,657.00	4.40	132.20	2,652.51	-70.70	64.23	95.42	0.60
2,785.00	5.10	139.40	2,780.07	-78.31	71.57	105.96	0.72
2,913.00	4.80	139.90	2,907.60	-86.73	78.72	117.01	0.24
3,041.00	4.90	135.20	3,035.14	-94.71	86.02	127.81	0.32
3,169.00	5.40	136.50	3,162.62	-102.95	94.02	139.26	0.40
3,297.00	4.80	132.00	3,290.12	-110.91	102.15	150.57	0.56
3,425.00	5.80	139.30	3,417.57	-119.39	110.35	162.33	0.94
3,553.00	5.30	134.90	3,544.97	-128.47	118.75	174.68	0.51
3,681.00	5.10	133.10	3,672.44	-136.53	127.09	186.21	0.20
3,809.00	5.80	137.30	3,799.86	-145.17	135.63	198.31	0.63
3,937.00	6.80	149.00	3,927.09	-156.42	143.92	212.26	1.27
4,018.00	6.70	145.00	4,007.53	-164.40	149.10	221.72	0.59
Last Phoenix MWD Survey							
4,067.00	6.70	145.00	4,056.20	-169.08	152.38	227.41	0.00
Projection to TD							

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,225.00	1,224.98	2.05	-3.08	Tie-on to SDI Gyro
1,378.00	1,377.98	1.46	-3.40	First Phoenix MWD Survey
4,018.00	4,007.53	-164.40	149.11	Last Phoenix MWD Survey
4,067.00	4,056.20	-169.08	152.39	Projection to TD

Checked By: _____ Approved By: _____ Date: _____

Phoenix Technology Services SURVEY DATA CERTIFICATION



PHOENIX JOB NUMBER

1310455

OPERATOR

Apache

WELL NAME

NMGSAU #389

COUNTY & STATE

Lea, New Mexico

API WELL NUMBER

30-02541042

PROPOSED DIRECTION

140.4

TIE-IN DATA						
MEASURED DEPTH	VERTICAL DEPTH	INCLIN	AZIMUTH	N-S COORD	E-W COORD	DATA SOURCE
1,225 ft	1,224.98 ft	.2 ft	197.9 ft	2.05 ft	-3.09 ft	Gyro

FIRST SURVEY DATE	FIRST SURVEY DEPTH	INCLIN	AZIMUTH
27-Jun-13	1,378 ft	0.3	214.7

SURVEY INSTRUMENT TYPE
Phoenix MWD

LAST SURVEY DATE	LAST SURVEY DEPTH	INCLIN	AZIMUTH
27-Jun-13	4,018 ft	6.7	145

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
15-Jun-13	4,067 ft	6.7	145

Billy Simpson

PRINT YOUR NAME ABOVE

MAGNETIC DECLINATION OR TOTAL GRID

TOTAL CORRECTION USED	7.24
DECLINATION OR GRID	GRID

SIGN YOUR NAME ABOVE

6/28/2013

TODAY'S DATE

MWD SUPERVISOR 1

Billy Simpson

DIRECTIONAL DRILLER 1

Travis Gibson

MWD SUPERVISOR 2

0

DIRECTIONAL DRILLER 2

Chris Dunning

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