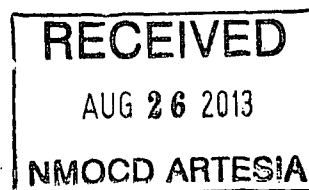




PHOENIX
TECHNOLOGY SERVICES

August 22, 2013

Oil Conservation Division
State of New Mexico
811 S. First St.
Artesia, New Mexico 88210



Dear District 2 - Artesia

Attention: Regulatory Department

Re: Apache Corporation
Crow Federal #16H
Eddy County, NM
API #30-015-40990
Job No. 1310959

Enclosed please find the Survey Data Certification, and the original Plat and one copy of the Survey Report performed on the above referenced Well by Phoenix Technology Services, Inc. (P-5 No. 664171). Other information required by your office is as follows:

Name & Title of Surveyor	Drainhole Number	Surveyed Depths		Dates Performed		Type of Survey
		From	To	Start	End	
Matt Dice	16H	531	9,572	08/10/13	08/20/13	MWD

A certified plat on which the bottom hole location is oriented both to the surface location and to the lease lines (or unit lines in case of pooling) is attached to the survey report. If any other information is required, please contact the undersigned at the letterhead address and phone number.

Best Regards,

Dolly Bush

Dolly Bush
Operations Administrator

Certified mail receipt number: 7011 1570 0001 4364 8615

Phoenix Technology Services SURVEY DATA CERTIFICATION



PHOENIX
TECHNOLOGY SERVICES

PHOENIX JOB NUMBER

1310959

OPERATOR

Apache Corporation

WELL NAME

Crow Federal 16H

COUNTY & STATE

Eddy County, NM

API WELL NUMBER

30-015-40990

PROPOSED DIRECTION

89:63

TIE-IN DATA						
MEASURED DEPTH	VERTICAL DEPTH	INCLIN	AZIMUTH	N-S COORD	E-W COORD	DATA SOURCE
472 ft	471.90 ft	1.81 ft	92.83 ft	0:53 S	7:68 ft	Surface

FIRST SURVEY DATE	FIRST SURVEY DEPTH	INCLIN	AZIMUTH
10-Aug-13	531 ft	2.1	97.6

SURVEY INSTRUMENT TYPE
Phoenix MWD

LAST SURVEY DATE	LAST SURVEY DEPTH	INCLIN	AZIMUTH
20-Aug-13	9,572 ft	88.7	88.6

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
20-Aug-13	9,626 ft	88.7	88.6

Matt Dice

PRINT YOUR NAME ABOVE

Matt Dice

SIGN YOUR NAME ABOVE

MAGNETIC DECLINATION OR TOTAL GRID

TOTAL CORRECTION USED	DECLINATION OR GRID
7.27	GRID

8/20/2013

TODAY'S DATE

MWD SUPERVISOR 1

Bernard Caldwell

DIRECTIONAL DRILLER 1

Ken Smith

MWD SUPERVISOR 2

Matt Dice

DIRECTIONAL DRILLER 2

Matt Boyt

1805 Brittmore Road

Houston, Texas 77043

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



Apache Corporation

Eddy County, NM (NAD27 NME)

Crow Federal

#16H

OH/Job #1310959

Survey: Phoenix MWD Surveys

Standard Survey Report

21 August, 2013





Phoenix Technology Services

Survey Report



Company:	Apache Corporation	Local Co-ordinate Reference:	Well #16H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3849.00usft (Capstar 114)
Site:	Crow Federal	MD Reference:	KB @ 3849.00usft (Capstar 114)
Well:	#16H	North Reference:	Grid
Wellbore:	OH/Job #1310959	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 114)	Database:	GCR-DB

Project	Eddy 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	Crow Federal		
Site Position:	Map	Northing:	671,130.90 usft
From:		Easting:	643,906.80 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 50' 38.92796 N
		Longitude:	103° 51' 53.16689 W
		Grid Convergence:	0.25 °

Well	#16H		
Well Position	+N/-S	0.00 usft	Northing:
	+E/-W	0.00 usft	Easting:
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft
		Latitude:	32° 50' 47.34188 N
		Longitude:	103° 52' 56.72576 W
		Ground Level:	3,838.00 usft

Wellbore	OH/Job #1310959		
Magnetics	Model Name	Sample Date	Declination
			(°)
	IGRF2010_14	07/30/13	7.52
			Dip Angle
			(°)
			Field Strength
			(nT)
			60.66
			48,741

Design	Surveys (Capstar 114)		
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
			(°)
			89.63

Survey Program	Date 08/21/13		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
100.00	472.00	Gyro (OH/Job #1310959)	CB-GYRO-MS
531.00	9,626.00	Phoenix MWD Surveys (OH/Job #1310959)	MWD
			Description
			Camera based gyro multishot
			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)
	472.00	1.81	92.83	471.90	-0.53	7.68	7.68	0.00	0.00	0.00
Tie-on to Gyro:	531.00	2.10	97.60	530.87	-0.72	9.69	9.68	0.56	0.49	8.08
First Phoenix MWD Survey	606.00	1.80	101.80	605.82	-1.14	12.20	12.19	0.44	-0.40	5.60
	691.00	0.80	135.30	690.80	-1.84	13.93	13.91	1.43	-1.18	39.41
	777.00	1.00	284.40	776.80	-2.08	13.62	13.61	2.02	0.23	173.37
	862.00	1.50	286.00	861.78	-1.59	11.83	11.82	0.59	0.59	1.88
	948.00	1.60	288.40	947.75	-0.90	9.61	9.61	0.14	0.12	2.79



Phoenix Technology Services Survey Report



Company:	Apache Corporation	Local Co-ordinate Reference:	Well #16H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3849.00usft (Capstar.114)
Site:	Crow Federal	MD Reference:	KB @ 3849.00usft (Capstar.114)
Well:	#16H	North Reference:	Gnd
Wellbore:	OH/Job #1310959	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar.114)	Database:	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)
1,033.00	1.50	292.90	1,032.71	-0.09	7.46	7.46	0.19	-0.12	5.29
1,119.00	1.20	300.70	1,118.69	0.81	5.65	5.66	0.41	-0.35	9.07
1,205.00	1.00	305.90	1,204.68	1.71	4.27	4.28	0.26	-0.23	6.05
1,290.00	0.80	313.60	1,289.66	2.55	3.24	3.25	0.27	-0.24	9.06
1,378.00	0.80	321.00	1,377.66	3.45	2.41	2.43	0.12	0.00	8.41
1,463.00	0.50	315.30	1,462.65	4.18	1.77	1.80	0.36	-0.35	-6.71
1,549.00	0.30	319.70	1,548.65	4.62	1.36	1.39	0.24	-0.23	5.12
1,634.00	0.30	321.50	1,633.65	4.96	1.08	1.11	0.01	0.00	2.12
1,723.00	0.30	312.30	1,722.65	5.30	0.76	0.80	0.05	0.00	-10.34
1,808.00	0.30	294.80	1,807.64	5.54	0.40	0.43	0.11	0.00	-20.59
1,893.00	0.40	298.30	1,892.64	5.78	-0.07	-0.03	0.12	0.12	4.12
1,978.00	0.40	307.10	1,977.64	6.10	-0.57	-0.53	0.07	0.00	10.35
2,064.00	0.40	303.40	2,063.64	6.44	-1.06	-1.01	0.03	0.00	-4.30
2,150.00	0.50	309.20	2,149.64	6.85	-1.60	-1.55	0.13	0.12	6.74
2,235.00	0.80	311.40	2,234.63	7.47	-2.33	-2.28	0.35	0.35	2.59
2,321.00	0.90	308.70	2,320.62	8.29	-3.31	-3.25	0.13	0.12	-3.14
2,406.00	0.20	248.30	2,405.62	8.65	-3.97	-3.91	0.96	-0.82	-71.06
2,492.00	0.40	203.30	2,491.62	8.32	-4.22	-4.17	0.34	0.23	-52.33
2,577.00	0.40	222.50	2,576.61	7.83	-4.54	-4.49	0.16	0.00	22.59
2,663.00	0.40	221.60	2,662.61	7.39	-4.94	-4.90	0.01	0.00	-1.05
2,749.00	0.70	234.60	2,748.61	6.86	-5.57	-5.53	0.38	0.35	15.12
2,834.00	0.40	244.20	2,833.60	6.43	-6.26	-6.22	0.37	-0.35	11.29
2,920.00	0.20	241.70	2,919.60	6.23	-6.66	-6.62	0.23	-0.23	-2.91
3,005.00	0.30	270.50	3,004.60	6.16	-7.02	-6.98	0.19	0.12	33.88
3,091.00	0.30	274.40	3,090.60	6.18	-7.47	-7.43	0.02	0.00	4.53
3,179.00	0.20	252.10	3,178.60	6.15	-7.84	-7.80	0.16	-0.11	-25.34
3,265.00	0.30	270.20	3,264.60	6.10	-8.21	-8.17	0.15	0.12	21.05
3,349.00	0.20	276.20	3,348.60	6.12	-8.58	-8.54	0.12	-0.12	7.14
3,434.00	0.50	282.30	3,433.60	6.21	-9.09	-9.05	0.36	0.35	7.18
3,558.00	0.30	289.50	3,557.59	6.44	-9.92	-9.88	0.17	-0.16	5.81
3,643.00	1.00	170.90	3,642.59	5.78	-10.01	-9.98	1.38	0.82	-139.53
3,732.00	1.10	195.60	3,731.58	4.19	-10.12	-10.09	0.52	0.11	27.75
3,817.00	1.80	140.00	3,816.55	2.38	-9.48	-9.47	1.75	0.82	-65.41
3,903.00	1.80	140.90	3,902.51	0.30	-7.76	-7.76	0.03	0.00	1.05
3,988.00	1.30	51.80	3,987.49	-0.14	-6.16	-6.16	2.59	-0.59	-104.82
4,074.00	1.50	43.20	4,073.46	1.28	-4.62	-4.62	0.34	0.23	-10.00
4,163.00	1.20	101.80	4,162.44	1.94	-2.91	-2.90	1.51	-0.34	65.84
4,252.00	1.00	104.50	4,251.42	1.56	-1.25	-1.24	0.23	-0.22	3.03
4,341.00	0.70	107.90	4,340.41	1.19	0.02	0.03	0.34	-0.34	3.82
4,426.00	0.90	100.20	4,425.41	0.92	1.17	1.18	0.27	0.24	-9.06
4,475.00	1.00	96.00	4,474.40	0.80	1.97	1.98	0.25	0.20	-8.57
4,519.00	1.00	89.10	4,518.39	0.77	2.74	2.74	0.27	0.00	-15.68
4,559.00	3.20	79.00	4,558.36	0.99	4.18	4.19	5.56	5.50	-25.25



Phoenix Technology Services Survey Report



Company:	Apache Corporation	Local Co-ordinate Reference:	Well #16H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3849.00usft (Capstar 114)
Site:	Crow Federal	MD Reference:	KB @ 3849.00usft (Capstar 114)
Well:	#16H	North Reference:	Grid
Wellbore:	OH/Job #1310959	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 114)	Database:	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)
4,604.00	7.50	74.00	4,603.16	2.04	8.24	8.26	9.60	9.56	-11.11
4,646.00	15.30	79.30	4,644.30	3.82	16.34	16.36	18.72	18.57	12.62
4,689.00	24.00	83.20	4,684.76	5.92	30.62	30.66	20.45	20.23	9.07
4,732.00	30.40	87.40	4,722.98	7.45	50.20	50.24	15.53	14.88	9.77
4,775.00	35.90	90.30	4,758.97	7.88	73.69	73.74	13.31	12.79	6.74
4,818.00	40.50	91.40	4,792.76	7.47	100.27	100.32	10.81	10.70	2.56
4,860.00	44.30	92.40	4,823.77	6.52	128.57	128.61	9.19	9.05	2.38
4,903.00	46.40	93.20	4,853.99	5.02	159.12	159.15	5.06	4.88	1.86
4,946.00	51.70	93.00	4,882.16	3.27	191.54	191.56	12.33	12.33	-0.47
4,987.00	56.80	91.70	4,906.10	1.92	224.77	224.78	12.70	12.44	-3.17
5,030.00	59.50	90.50	4,928.79	1.22	261.29	261.29	6.71	6.28	-2.79
5,072.00	65.20	88.90	4,948.28	1.43	298.47	298.48	13.98	13.57	-3.81
5,115.00	70.10	88.90	4,964.62	2.19	338.23	338.23	11.40	11.40	0.00
5,157.00	74.90	89.90	4,977.25	2.61	378.27	378.28	11.65	11.43	2.38
5,200.00	78.90	91.20	4,987.00	2.20	420.14	420.14	9.76	9.30	3.02
5,243.00	83.00	91.10	4,993.76	1.35	462.58	462.58	9.54	9.53	-0.23
5,286.00	87.20	91.70	4,997.43	0.30	505.40	505.40	9.87	9.77	1.40
5,374.00	87.30	90.80	5,001.65	-1.61	593.28	593.26	1.03	0.11	-1.02
5,463.00	86.90	90.20	5,006.15	-2.39	682.16	682.13	0.81	-0.45	-0.67
5,549.00	86.90	90.20	5,010.81	-2.69	768.04	768.00	0.00	0.00	0.00
5,634.00	86.90	89.60	5,015.40	-2.54	852.91	852.88	0.70	0.00	-0.71
5,719.00	86.80	89.30	5,020.07	-1.73	937.78	937.75	0.37	-0.12	-0.35
5,804.00	87.20	89.40	5,024.52	-0.76	1,022.66	1,022.63	0.49	0.47	0.12
5,892.00	88.80	89.60	5,027.59	0.00	1,110.60	1,110.57	1.83	1.82	0.23
5,977.00	89.30	89.50	5,029.00	0.67	1,195.58	1,195.56	0.60	0.59	-0.12
6,063.00	88.80	89.60	5,030.43	1.35	1,281.57	1,281.55	0.59	-0.58	0.12
6,148.00	88.80	88.80	5,032.21	2.53	1,366.54	1,366.53	0.94	0.00	-0.94
6,234.00	89.10	88.20	5,033.78	4.78	1,452.50	1,452.50	0.78	0.35	-0.70
6,320.00	87.70	89.20	5,036.18	6.73	1,538.44	1,538.45	2.00	-1.63	1.16
6,405.00	87.30	89.10	5,039.89	7.99	1,623.35	1,623.36	0.49	-0.47	-0.12
6,491.00	87.30	88.10	5,043.94	10.09	1,709.22	1,709.25	1.16	0.00	-1.16
6,576.00	87.20	87.80	5,048.02	13.13	1,794.07	1,794.12	0.37	-0.12	-0.35
6,662.00	87.50	87.30	5,052.00	16.80	1,879.90	1,879.97	0.68	0.35	-0.58
6,747.00	88.70	87.60	5,054.82	20.58	1,964.77	1,964.86	1.46	1.41	0.35
6,833.00	88.10	88.80	5,057.22	23.28	2,050.69	2,050.80	1.56	-0.70	1.40
6,917.00	87.70	89.80	5,060.30	24.31	2,134.63	2,134.74	1.28	-0.48	1.19
7,002.00	87.50	90.40	5,063.86	24.16	2,219.55	2,219.66	0.74	-0.24	0.71
7,087.00	87.10	89.80	5,067.86	24.01	2,304.46	2,304.56	0.85	-0.47	-0.71
7,172.00	87.20	90.80	5,072.09	23.57	2,389.35	2,389.45	1.18	0.12	1.18
7,257.00	86.60	90.70	5,076.68	22.46	2,474.22	2,474.31	0.72	-0.71	-0.12
7,345.00	88.40	91.30	5,080.52	20.92	2,562.12	2,562.20	2.16	2.05	0.68
7,431.00	87.50	90.60	5,083.60	19.50	2,648.05	2,648.12	1.33	-1.05	-0.81
7,516.00	87.20	89.70	5,087.53	19.27	2,732.96	2,733.02	1.12	-0.35	-1.06
7,601.00	86.80	88.90	5,091.98	20.31	2,817.83	2,817.90	1.05	-0.47	-0.94



Phoenix Technology Services

Survey Report



Company:	Apache Corporation	Local Co-ordinate Reference:	Well #16H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3849.00usft (Capstar 114)
Site:	Crow Federal	MD Reference:	KB @ 3849.00usft (Capstar 114)
Well:	#16H	North Reference:	Grid
Wellbore:	OH/Job #1310959	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 114)	Database:	GCR DB

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)
7,686.00	86.90	89.70	5,096.65	21.35	2,902.70	2,902.77	0.95	0.12	0.94
7,774.00	85.90	88.30	5,102.17	22.88	2,990.51	2,990.59	1.95	-1.14	-1.59
7,859.00	86.60	89.40	5,107.73	24.58	3,075.30	3,075.40	1.53	0.82	1.29
7,943.00	87.10	90.80	5,112.35	24.43	3,159.18	3,159.27	1.77	0.60	1.67
8,028.00	88.70	91.00	5,115.46	23.10	3,244.11	3,244.19	1.90	1.88	0.24
8,112.00	88.40	91.00	5,117.59	21.64	3,328.07	3,328.14	0.36	-0.36	0.00
8,197.00	88.10	90.60	5,120.18	20.45	3,413.02	3,413.08	0.59	-0.35	-0.47
8,283.00	87.90	90.30	5,123.19	19.77	3,498.96	3,499.02	0.42	-0.23	-0.35
8,368.00	87.90	90.00	5,126.30	19.55	3,583.90	3,583.96	0.35	0.00	-0.35
8,452.00	87.30	89.20	5,129.82	20.14	3,667.83	3,667.88	1.19	-0.71	-0.95
8,537.00	87.60	88.90	5,133.60	21.55	3,752.73	3,752.79	0.50	0.35	-0.35
8,622.00	87.70	89.10	5,137.08	23.03	3,837.65	3,837.72	0.26	0.12	0.24
8,707.00	88.50	91.40	5,139.90	22.66	3,922.59	3,922.66	2.86	0.94	2.71
8,791.00	88.30	91.40	5,142.25	20.60	4,006.54	4,006.58	0.24	-0.24	0.00
8,876.00	88.60	91.10	5,144.55	18.75	4,091.48	4,091.52	0.50	0.35	-0.35
8,960.00	88.80	90.50	5,146.45	17.58	4,175.45	4,175.48	0.75	0.24	-0.71
9,045.00	88.30	89.80	5,148.60	17.36	4,260.43	4,260.45	1.01	-0.59	-0.82
9,130.00	88.30	89.60	5,151.13	17.80	4,345.39	4,345.41	0.24	0.00	-0.24
9,214.00	88.20	89.30	5,153.69	18.61	4,429.34	4,429.37	0.38	-0.12	-0.36
9,298.00	88.00	89.00	5,156.48	19.85	4,513.29	4,513.32	0.43	-0.24	-0.36
9,383.00	88.00	88.80	5,159.44	21.48	4,598.22	4,598.26	0.24	0.00	-0.24
9,467.00	88.20	88.80	5,162.23	23.24	4,682.16	4,682.21	0.24	0.24	0.00
9,555.00	88.70	88.70	5,164.61	25.16	4,770.10	4,770.17	0.58	0.57	-0.11
9,572.00	88.70	88.60	5,164.99	25.56	4,787.09	4,787.16	0.59	0.00	-0.59
Last Phoenix MWD Survey									
9,626.00	88.70	88.60	5,166.22	26.88	4,841.06	4,841.14	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)	
472.00	471.90	-0.53	7.68	Tie-on to Gyro
531.00	530.87	-0.72	9.69	First Phoenix MWD Survey
9,572.00	5,164.99	25.56	4,787.09	Last Phoenix MWD Survey
9,626.00	5,166.22	26.88	4,841.06	Projection to TD

Checked By: _____	Approved By: _____	Date: _____
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