



PHOENIX
TECHNOLOGY SERVICES

May 29, 2015

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
Raven Federal #17H
Eddy County, NM
API #30-015-40914
Job No. 1411574

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	Drain Hole Number	Surveyed Depths		Dates Performed		Type of Survey
		From	To	Start	End	
Mike Miller	17H	4,855	8,702	05/19/15	05/22/15	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,
Alva Dunigan

Alva Dunigan
Operations Administrator

Certified mail receipt number: 7011 1570 0001 4365 0540

Company:	Apache Corporation	Local Co-ordinate Reference:	Well #17H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3757.00usft (Capstar 114)
Site:	Raven Federal	MD Reference:	KB @ 3757.00usft (Capstar 114)
Well:	#17H	North Reference:	Grid
Wellbore:	WB1 / Job #1411574	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 114)	Database:	Compass 5000 GCR

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	Raven Federal		
Site Position:		Northing:	673,239.70 usft
From:	Map	Easting:	633,303.50 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 51' 0.24298 N
		Longitude:	103° 53' 57.35087 W
		Grid Convergence:	0.24 °

Well	#17H		
Well Position	+N/-S	0.00 usft	Northing: 674,786.70 usft
	+E/-W	0.00 usft	Easting: 632,075.00 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft
		Latitude:	32° 51' 15.60043 N
		Longitude:	103° 54' 11.67775 W
		Ground Level:	3,746.00 usft

Wellbore	WB1 / Job #1411574		
Magnetics	Model Name	Sample Date	Declination
	HDGM	5/8/2015	7.68
			Dip Angle
			60.80
			Field Strength
			48,569

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
			(°)
			269.62

Survey Program	Date	5/24/2015		
From	To	Survey (Wellbore)	Tool Name	Description
(usft)	(usft)			
110.21	4,829.16	Phoenix Gyro Survey (WB1 / Job #141157)	PHX_SPT_GTD	PHX Continuous north-seeking gyro
4,855.00	8,772.00	Phoenix MWD Survey (WB1 / Job #14115)	PHX+MWD+HDGM	PHX+MWD+HDGM

Survey										
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Vertical	Dogleg	Build	Turn	
Depth	(°)	(°)	Depth	(usft)	(usft)	Section	Rate	Rate	Rate	
(usft)			(usft)			(usft)	(°/100usft)	(°/100usft)	(°/100usft)	
4,829.16	0.31	337.29	4,828.65	-26.69	-21.78	21.96	0.00	0.00	0.00	
Tie-on to Phoenix Gyro Survey										
4,855.00	1.00	280.30	4,854.49	-26.58	-22.03	22.21	3.37	2.67	-220.55	
First Phoenix MWD Survey										
4,897.00	5.30	271.00	4,896.42	-26.48	-24.33	24.51	10.28	10.24	-22.14	
4,940.00	11.30	270.80	4,938.95	-26.39	-30.54	30.71	13.95	13.95	-0.47	
4,982.00	17.80	270.00	4,979.58	-26.33	-41.08	41.28	15.48	15.48	-1.90	
5,025.00	24.90	270.60	5,019.60	-26.24	-56.73	56.90	16.52	16.51	1.40	
5,067.00	30.30	271.60	5,056.81	-25.85	-76.17	76.34	12.90	12.86	2.38	

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Well:	#17H	North Reference:	Grid
Wellbore:	WB1 / Job #1411574	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 114)	Database:	Compass 5000 GCR

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)
5,110.00	34.40	272.00	5,093.13	-25.12	-99.17	99.33	9.55	9.53	0.93
5,152.00	38.20	272.30	5,128.97	-24.18	-124.01	124.17	9.08	9.05	0.71
5,195.00	42.10	270.90	5,159.83	-23.42	-151.72	151.87	9.31	9.07	-3.26
5,237.00	46.30	271.00	5,189.94	-22.94	-180.99	181.14	10.00	10.00	0.24
5,280.00	50.30	271.60	5,218.54	-22.20	-213.08	213.22	9.36	9.30	1.40
5,322.00	54.10	272.10	5,244.27	-21.13	-246.24	246.38	9.10	9.05	1.19
5,365.00	58.40	272.40	5,268.16	-19.72	-281.96	282.08	10.02	10.00	0.70
5,407.00	61.90	273.20	5,289.06	-17.94	-318.34	318.45	8.50	8.33	1.90
5,450.00	64.40	273.50	5,308.48	-15.70	-356.63	356.73	5.85	5.81	0.70
5,492.00	67.90	273.10	5,325.46	-13.49	-394.98	395.06	8.38	8.33	-0.95
5,535.00	72.70	272.80	5,339.95	-11.41	-435.39	435.46	11.18	11.16	-0.70
5,578.00	78.90	273.00	5,350.49	-9.30	-477.01	477.06	14.43	14.42	0.47
5,620.00	82.50	272.10	5,357.28	-7.46	-518.41	518.44	8.83	8.57	-2.14
5,663.00	86.60	270.90	5,361.36	-6.34	-561.19	561.22	9.93	9.53	-2.79
5,704.00	89.10	270.10	5,362.90	-5.98	-602.15	602.18	6.40	6.10	-1.95
5,747.00	91.70	270.00	5,362.60	-5.94	-645.15	645.17	6.05	6.05	-0.23
5,790.00	92.10	270.10	5,361.17	-5.91	-688.12	688.15	0.96	0.93	0.23
5,917.00	91.20	268.80	5,357.52	-7.12	-815.06	815.09	1.24	-0.71	-1.02
6,045.00	88.50	268.10	5,357.85	-10.59	-943.00	943.05	2.18	-2.11	-0.55
6,172.00	89.80	268.70	5,359.74	-14.13	-1,069.93	1,070.01	1.13	1.02	0.47
6,300.00	90.90	268.20	5,358.95	-17.59	-1,197.88	1,197.97	0.94	0.86	-0.39
6,428.00	90.80	269.90	5,357.06	-19.72	-1,325.85	1,325.95	1.33	-0.08	1.33
6,556.00	92.60	269.50	5,353.26	-20.39	-1,453.78	1,453.89	1.44	1.41	-0.31
6,683.00	90.80	269.90	5,349.49	-21.05	-1,580.72	1,580.83	1.45	-1.42	0.31
6,811.00	88.50	269.50	5,350.27	-21.72	-1,708.71	1,708.81	1.82	-1.80	-0.31
6,938.00	87.80	271.60	5,354.37	-20.50	-1,835.63	1,835.72	1.74	-0.55	1.65
7,066.00	88.90	271.50	5,358.06	-17.04	-1,963.53	1,963.60	0.86	0.86	-0.08
7,194.00	90.10	271.30	5,359.18	-13.91	-2,091.48	2,091.53	0.95	0.94	-0.16
7,322.00	90.90	270.20	5,358.06	-12.24	-2,219.46	2,219.49	1.06	0.63	-0.86
7,449.00	91.00	268.50	5,355.95	-13.68	-2,346.43	2,346.47	1.34	0.08	-1.34
7,577.00	91.20	266.70	5,353.50	-19.04	-2,474.29	2,474.36	1.41	0.16	-1.41
7,705.00	91.70	269.30	5,350.26	-23.50	-2,602.16	2,602.26	2.07	0.39	2.03
7,832.00	92.50	268.80	5,345.60	-25.61	-2,729.06	2,729.16	0.74	0.63	-0.39
7,960.00	91.70	269.60	5,340.91	-27.39	-2,856.95	2,857.07	0.88	-0.63	0.63
8,088.00	91.80	269.50	5,337.00	-28.40	-2,984.89	2,985.01	0.11	0.08	-0.08
8,215.00	90.50	270.30	5,334.45	-28.62	-3,111.86	3,111.98	1.20	-1.02	0.63
8,343.00	89.40	271.00	5,334.57	-27.17	-3,239.85	3,239.96	1.02	-0.86	0.55
8,471.00	90.20	270.70	5,335.01	-25.27	-3,367.83	3,367.93	0.67	0.63	-0.23
8,598.00	91.50	270.90	5,333.13	-23.50	-3,494.81	3,494.88	1.04	1.02	0.16
8,702.00	92.80	270.60	5,329.23	-22.14	-3,598.72	3,598.79	1.28	1.25	-0.29
Final Phoenix MWD Survey									
8,772.00	92.80	270.80	5,325.81	-21.40	-3,668.63	3,668.69	0.00	0.00	0.00
Projection to TD									

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Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
4,829.16	4,828.65	-26.69	-21.78	Tie-on to Phoenix Gyro Survey
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Checked By: _____	Approved By: _____	Date: _____
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