



PHOENIX
TECHNOLOGY SERVICES

April 28, 2015

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

NM OIL CONSERVATION
ARTESIA DISTRICT

FEB 29 2016

Dear District 2 - Artesia

RECEIVED

Attention: Regulatory Department

Re: Apache Corporation
Raven Federal #16H
Eddy County, NM
API #30-015-40913 ←
Job No. 1411573

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	16H	4,415	8,254	04/19/15	04/22/15	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,

AD 3/1/16
Accepted for record
N41000

Alva J. Dunigan

Alva J. Dunigan
Operations Administrator

Certified mail receipt number: 7011 1570 0001 4365 0502

Phoenix Technology Services
SURVEY DATA CERTIFICATION



PHOENIX JOB NUMBER

1411573

OPERATOR

Apache

WELL NAME

Raven Federal #16H

COUNTY & STATE

Eddy County, NM

API WELL NUMBER

30-015-40913

PROPOSED DIRECTION

269.62

TIE-IN DATA						
MEASURED DEPTH	VERTICAL DEPTH	INCLIN	AZIMUTH	N-S COORD	E-W COORD	DATA SOURCE
4,370.69 ft	4,369.63 ft	0.50	293.83	-54.94 ft	-39.18 ft	Gyro

FIRST SURVEY DATE	FIRST SURVEY DEPTH	INCLIN	AZIMUTH
19-Apr-15	4,415.00 ft	1.20	280.50

SURVEY INSTRUMENT
TYPE

Phoenix MWD

LAST SURVEY DATE	LAST SURVEY DEPTH	INCLIN	AZIMUTH
22-Apr-15	8,254.00 ft	94.20	267.80

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
22-Apr-15	8,322.00 ft	94.20	267.80

Mike Miller

PRINT YOUR NAME ABOVE

SIGN YOUR NAME ABOVE

MAGNETIC DECLINATION OR TOTAL GRID

TOTAL CORRECTION USED	7.45
DECLINATION OR GRID	GRID

4.22.15

TODAY'S DATE

MWD SUPERVISOR 1

Mike Miller

DIRECTIONAL DRILLER 1

Steven Hawkins

MWD SUPERVISOR 2

Jimmy Confer

DIRECTIONAL DRILLER 2

Brant Duplechain

12329 Cutten Rd., Houston, Texas 777066

(713)337-0600 (Voice), (713)337-0599 (Fax)



NM OIL CONSERVATION
ARTESIA DISTRICT
FEB 29 2016

RECEIVED

Apache Corporation

Eddy County, NM (NAD27 NME)
Raven Federal
#16H

WB1 / Job #1411573

Survey: Phoenix MWD Survey

Standard Survey Report

23 April, 2015



Company:	Apache Corporation	Local Co-ordinate Reference:	Well #16H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3756.00usft (Capstar 119)
Site:	Raven Federal	MD Reference:	KB @ 3756.00usft (Capstar 119)
Well:	#16H	North Reference:	Grid
Wellbore:	WB1 / Job #1411573	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 119)	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:	From: Map	Northing:	673,239.70 usft
		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	#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° 51' 14.95823 N
		Longitude:	103° 54' 11.67616 W
		Ground Level:	3,745.00 usft

Wellbore	WB1 / Job #1411573		
Magnetics	Model Name	Sample Date	Declination
			(°)
	HDGM	4/6/2015	7.68
			Dip Angle
			(°)
			Field Strength
			(nT)
			48,579

Design	Surveys (Capstar 119)		
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 4/23/2015		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
153.31	4,370.69	Phoenix Gyro Survey (WB1 / Job #141157)	NS-GYRO-MS
4,415.00	8,322.00	Phoenix MWD Survey (WB1 / Job #14115)	PHX+MWD+HDGM
			Description
			North sensing gyrocompassing m/s
			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)
4,370.69	0.50	293.83	4,369.63	-54.94	-39.18	39.54	0.00	0.00	0.00
Tie-on to Phoenix Gyro Survey									
4,415.00	1.20	280.50	4,413.94	-54.78	-39.81	40.17	1.63	1.58	-30.08
First Phoenix MWD Survey									
4,457.00	6.20	273.30	4,455.84	-54.57	-42.51	42.87	11.93	11.90	-17.14
4,500.00	12.90	274.80	4,498.22	-54.04	-49.62	49.98	15.59	15.58	3.49
4,543.00	19.50	275.70	4,539.49	-52.92	-61.56	61.90	15.36	15.35	2.09
4,585.00	25.50	275.70	4,578.27	-51.32	-77.54	77.88	14.29	14.29	0.00
4,628.00	29.10	276.90	4,616.48	-49.15	-97.14	97.46	8.47	8.37	2.79

Company:	Apache Corporation	Local Co-ordinate Reference:	Well #16H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3756.00usft (Capstar 119)
Site:	Raven Federal	MD Reference:	KB @ 3756.00usft (Capstar 119)
Well:	#16H	North Reference:	Grid
Wellbore:	WB1 / Job #1411573	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 119)	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)
4,670.00	32.10	276.50	4,652.63	-46.66	-118.37	118.68	7.16	7.14	-0.95
4,713.00	35.10	274.90	4,688.44	-44.31	-142.05	142.34	7.27	6.98	-3.72
4,755.00	39.80	272.50	4,721.77	-42.69	-167.52	167.80	11.72	11.19	-5.71
4,798.00	44.60	271.70	4,753.62	-41.64	-196.38	196.65	11.23	11.16	-1.86
4,841.00	48.80	273.10	4,783.10	-40.32	-227.63	227.90	10.05	9.77	3.26
4,883.00	52.60	275.30	4,809.70	-37.92	-260.04	260.28	9.91	9.05	5.24
4,926.00	56.90	276.30	4,834.51	-34.36	-294.96	295.19	10.18	10.00	2.33
4,968.00	60.60	275.80	4,856.30	-30.58	-330.66	330.86	8.87	8.81	-1.19
5,011.00	65.60	275.30	4,875.75	-26.88	-368.82	368.99	11.67	11.63	-1.16
5,053.00	70.20	274.40	4,891.54	-23.59	-407.58	407.73	11.13	10.95	-2.14
5,096.00	76.00	275.70	4,904.04	-19.97	-448.55	448.67	13.79	13.49	3.02
5,139.00	80.30	275.10	4,912.87	-16.01	-490.44	490.53	10.09	10.00	-1.40
5,167.00	82.20	274.70	4,917.13	-13.65	-518.01	518.09	6.93	6.79	-1.43
5,210.00	89.00	274.10	4,920.42	-10.36	-560.73	560.79	15.87	15.81	-1.40
5,252.00	90.40	272.50	4,920.64	-7.94	-602.66	602.70	5.06	3.33	-3.81
5,295.00	88.50	269.90	4,921.06	-7.04	-645.64	645.67	7.49	-4.42	-6.05
5,337.00	88.60	269.20	4,922.12	-7.37	-687.62	687.66	1.68	0.24	-1.67
5,423.00	92.30	268.70	4,921.44	-8.95	-773.59	773.63	4.34	4.30	-0.58
5,550.00	92.40	269.70	4,916.24	-10.72	-900.47	900.52	0.79	0.08	0.79
5,678.00	91.60	271.30	4,911.77	-9.60	-1,028.38	1,028.42	1.40	-0.63	1.25
5,805.00	92.20	270.00	4,907.56	-8.16	-1,155.30	1,155.33	1.13	0.47	-1.02
5,933.00	92.90	269.00	4,901.86	-9.28	-1,283.17	1,283.20	0.95	0.55	-0.78
6,061.00	91.30	269.10	4,897.17	-11.40	-1,411.06	1,411.10	1.25	-1.25	0.08
6,188.00	92.50	268.40	4,892.96	-14.17	-1,537.96	1,538.02	1.09	0.94	-0.55
6,316.00	90.30	269.60	4,889.84	-16.40	-1,665.89	1,665.96	1.96	-1.72	0.94
6,444.00	89.50	270.40	4,890.06	-16.40	-1,793.89	1,793.96	0.88	-0.63	0.63
6,572.00	90.50	270.20	4,890.06	-15.73	-1,921.88	1,921.95	0.80	0.78	-0.16
6,699.00	91.70	270.00	4,887.62	-15.51	-2,048.86	2,048.92	0.96	0.94	-0.16
6,827.00	93.10	269.50	4,882.26	-16.07	-2,176.74	2,176.80	1.16	1.09	-0.39
6,955.00	91.10	269.70	4,877.57	-16.96	-2,304.64	2,304.71	1.57	-1.56	0.16
7,083.00	92.30	269.40	4,873.77	-17.96	-2,432.58	2,432.65	0.97	0.94	-0.23
7,210.00	91.30	270.70	4,869.78	-17.85	-2,559.51	2,559.58	1.29	-0.79	1.02
7,338.00	90.40	271.90	4,867.89	-14.95	-2,687.46	2,687.50	1.17	-0.70	0.94
7,466.00	91.70	271.50	4,865.54	-11.15	-2,815.38	2,815.40	1.06	1.02	-0.31
7,593.00	90.90	271.00	4,862.66	-8.38	-2,942.32	2,942.31	0.74	-0.63	-0.39
7,721.00	91.30	271.00	4,860.20	-6.15	-3,070.28	3,070.25	0.31	0.31	0.00
7,849.00	90.30	269.40	4,858.41	-5.70	-3,198.26	3,198.22	1.47	-0.78	-1.25
7,977.00	91.60	268.60	4,856.29	-7.94	-3,326.22	3,326.20	1.19	1.02	-0.63
8,105.00	92.80	268.00	4,851.38	-11.73	-3,454.06	3,454.06	1.05	0.94	-0.47
8,232.00	94.00	267.70	4,843.85	-16.49	-3,580.75	3,580.78	0.97	0.94	-0.24
8,254.00	94.20	267.80	4,842.27	-17.35	-3,602.67	3,602.71	1.02	0.91	0.45
Last Phoenix MWD Survey									
8,322.00	94.20	267.80	4,837.29	-19.95	-3,670.44	3,670.49	0.00	0.00	0.00
Projection to TD									

Company:	Apache Corporation	Local Co-ordinate Reference:	Well #16H
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Site:	Raven Federal	MD Reference:	KB @ 3756.00usft (Capstar 119)
Well:	#16H	North Reference:	Grid
Wellbore:	WB1 / Job #1411573	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 119)	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)

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
4,370.69	4,369.63	-54.94	-39.18	Tie-on to Phoenix Gyro Survey
4,415.00	4,413.94	-54.78	-39.81	First Phoenix MWD Survey
8,254.00	4,842.27	-17.35	-3,602.67	Last Phoenix MWD Survey
8,322.00	4,837.29	-19.95	-3,670.44	Projection to TD

Checked By: _____	Approved By: _____	Date: _____
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DISTRICT I
1625 N. French Dr., Hobbs, NM 88240
Phone: (575) 393-6161 Fax: (575) 393-0720

DISTRICT II
811 S. First St., Artesia, NM 88210
Phone: (575) 748-1283 Fax: (575) 748-9720

DISTRICT III
1060 Rio Brazos Road, Aztec, NM 87410
Phone: (505) 334-6178 Fax: (505) 334-6170

DISTRICT IV
1220 S. St. Francis Dr., Santa Fe, NM 87505
Phone: (505) 476-3460 Fax: (505) 476-3462

State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, New Mexico 87505

Form C-102
Revised August 1, 2011
Submit one copy to appropriate
District Office

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

API Number 30-015-40913	Pool Code 96831	Pool Name Cedar Lake; Gborieta-Yeso
Property Code 39330	Property Name RAVEN FEDERAL	Well Number 16H
OGRID No. 873	Operator Name APACHE CORPORATION	Elevation 3745'

Surface Location

UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
A	7	17-S	31-E		727	NORTH	1000	EAST	EDDY

Bottom Hole Location If Different From Surface

UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
1	7	17-S	31-E		727	NORTH	330	WEST	EDDY
Dedicated Acres 151.57	Joint or Infill	Consolidation Code	Order No.						

NO ALLOWABLE WILL BE ASSIGNED TO THIS COMPLETION UNTIL ALL INTERESTS HAVE BEEN CONSOLIDATED OR A NON-STANDARD UNIT HAS BEEN APPROVED BY THE DIVISION

GRID AZ.=269°37'06" HORIZ. DIST.=3673.0' DETAIL 3752.0' 3749.6' 3743.0' 3746.3' 31.57 AC. 31.68 AC. 31.78 AC. 31.89 AC.	OPERATOR CERTIFICATION I hereby certify that the information herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division. <i>Sorina L. Flores</i> 7/17/12 Signature Date <i>Sorina L. Flores</i> Printed Name <i>sorina.flores@apachecorp.com</i> E-mail Address
GEODETIC COORDINATES NAD 27 NME SURFACE LOCATION Y=674721.8 N X=632075.4 E BOTTOM HOLE LOCATION Y=674697.3 N X=628403.4 E CORNER COORDINATES TABLE ④ - Y=675422.0 N, X=628071.3 E ⑤ - Y=675455.2 N, X=633070.9 E ⑥ - Y=674101.9 N, X=628075.2 E ⑦ - Y=674135.1 N, X=633078.6 E	SURVEYOR CERTIFICATION I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief. APRIL 26, 2012 Date of Survey Signature <i>Ronald J. Eidson</i> Professional Surveyor <i>Ronald J. Eidson</i> 05/16/2012 Certificate Number 3239 AP JWSC W.O.: 12.11.0465