



PHOENIX
TECHNOLOGY SERVICES

April 15, 2016

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 #24H
Eddy County, NM
API #30-015-43363
Job No. 1514707

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	
Bernard Caldwell	24H	4,234	9,192	12/05/15	12/09/15	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,

Claudia Carreon

Claudia Carreon
Operations Administrator

Certified mail receipt number: 7015 0640 0000 9907 5456

Phoenix Technology Services
SURVEY DATA CERTIFICATION



PHOENIX JOB NUMBER 1514707

ENERGY COMPANY Apache Corp

WELL NAME Raven Federal #24 H

COUNTY & STATE

Eddy County, NM

API WELL NUMBER 30-015-43363

PROPOSED DIRECTION 88.76°

TIE-IN DATA						
MEASURED DEPTH	VERTICAL DEPTH	INCLIN	AZIMUTH	N-S COORD	E-W COORD	DATA SOURCE
4,200.00 ft	4,199.34 ft	0.38	56.23	-28.15 ft	-9.41 ft	Phoenix Gyro

FIRST SURVEY DATE	FIRST SURVEY DEPTH	INCLIN	AZIMUTH
5-Dec-15	4,234.00 ft	0.20	173.90

SURVEY INSTRUMENT TYPE
Phoenix MWD

LAST SURVEY DATE	LAST SURVEY DEPTH	INCLIN	AZIMUTH
9-Dec-15	9,192.00 ft	88.2°	90.0°

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
9-Dec-15	9,264.00 ft	88.2°	90.0°

Bernard Caldwell

PRINT YOUR NAME ABOVE

Bernard Caldwell

SIGN YOUR NAME ABOVE

MAGNETIC DECLINATION OR TOTAL GRID

TOTAL CORRECTION USED	7.41
DECLINATION OR GRID	GRID

12/09/15

TODAY'S DATE

MWD SUPERVISOR 1

Bernard Caldwell

DIRECTIONAL DRILLER 1

David Eddins

MWD SUPERVISOR 2

Steven Poer

DIRECTIONAL DRILLER 2

Brad Jones

12329 Cutten Rd., Houston, Texas 777066

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



NM OIL CONSERVATION
ARTESIA DISTRICT
MAY 09 2016

RECEIVED

Apache Corporation

Eddy County, NM (NAD27 NME)

Raven Federal

#24H

OH / Job #1514707

Survey: Phoenix MWD Surveys

Standard Survey Report

10 December, 2015



Company:	Apache Corporation	Local Co-ordinate Reference:	Well #24H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3735.00usft (Capstar 114)
Site:	Raven Federal	MD Reference:	KB @ 3735.00usft (Capstar 114)
Well:	#24H	North Reference:	Grid
Wellbore:	OH / Job #1514707	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:	Map	Northing:	673,239.70 usft
From:		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	#24H		
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' 52.02357 N
		Longitude:	103° 54' 52.69693 W
		Ground Level:	3,724.00 usft

Wellbore	OH / Job #1514707		
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Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	12/1/2015	7.63	60.77	48,533

Design	Surveys (Capstar 114)		
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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	88.76

Survey Program		Date	12/10/2015		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.00	4,200.00	Phoenix Gyro Surveys (OH / Job #151470)	PHX_SPT_GTD	PHX Continuous north-seeking gyro	
4,234.00	9,264.00	Phoenix MWD Surveys (OH / Job #151470)	PHX+MWD+HDGM	PHX+OWSG MWD + HDGM	

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)
	4,200.00	0.38	56.23	4,199.34	-28.15	-9.41	-10.01	0.00	0.00	0.00
Tie In to Phoenix Gyros										
	4,234.00	0.20	173.90	4,233.34	-28.14	-9.31	-9.91	1.49	-0.53	346.09
First Phoenix MWD Surveys										
	4,334.00	0.20	131.00	4,333.34	-28.43	-9.16	-9.77	0.15	0.00	-42.90
	4,434.00	0.30	130.30	4,433.34	-28.72	-8.82	-9.44	0.10	0.10	-0.70
	4,534.00	0.30	174.50	4,533.34	-29.15	-8.60	-9.23	0.23	0.00	44.20
	4,634.00	0.60	237.90	4,633.33	-29.69	-9.02	-9.66	0.54	0.30	63.40
	4,734.00	0.70	242.00	4,733.33	-30.25	-10.00	-10.65	0.11	0.10	4.10

Company:	Apache Corporation	Local Co-ordinate Reference:	Well #24H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3735.00usft (Capstar 114)
Site:	Raven Federal	MD Reference:	KB @ 3735.00usft (Capstar 114)
Well:	#24H	North Reference:	Grid
Wellbore:	OH / Job #1514707	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)
4,819.00	1.50	69.30	4,818.32	-30.10	-9.42	-10.07	2.58	0.94	-203.18
4,861.00	6.10	72.70	4,860.22	-29.24	-6.77	-7.40	10.96	10.95	8.10
4,904.00	11.10	77.30	4,902.72	-27.65	-0.55	-1.15	11.73	11.63	10.70
4,946.00	16.50	80.00	4,943.49	-25.73	9.28	8.72	12.94	12.86	6.43
4,989.00	22.20	81.60	4,984.05	-23.48	23.34	22.82	13.31	13.26	3.72
5,031.00	27.60	80.50	5,022.13	-20.71	40.80	40.34	12.90	12.86	-2.62
5,074.00	33.20	78.30	5,059.20	-16.68	62.17	61.79	13.28	13.02	-5.12
5,117.00	38.80	78.40	5,093.98	-11.58	86.91	86.64	13.02	13.02	0.23
5,160.00	44.70	79.40	5,126.04	-6.08	115.00	114.84	13.81	13.72	2.33
5,202.00	50.90	80.20	5,154.24	-0.58	145.61	145.56	14.83	14.76	1.90
5,245.00	57.00	81.70	5,179.54	4.87	179.92	179.99	14.46	14.19	3.49
5,288.00	61.70	81.80	5,201.45	10.17	216.52	216.69	10.93	10.93	0.23
5,331.00	65.50	81.20	5,220.57	15.87	254.61	254.89	8.93	8.84	-1.40
5,373.00	69.40	80.40	5,236.67	22.07	292.89	293.30	9.45	9.29	-1.90
5,416.00	73.70	80.70	5,250.28	28.76	333.12	333.66	10.02	10.00	0.70
5,459.00	77.70	81.30	5,260.90	35.28	374.26	374.94	9.40	9.30	1.40
5,501.00	81.70	81.70	5,268.40	41.39	415.12	415.92	9.57	9.52	0.95
5,544.00	85.70	81.20	5,273.12	47.74	457.38	458.31	9.37	9.30	-1.16
5,672.00	88.40	80.40	5,279.71	68.18	583.55	584.89	2.20	2.11	-0.63
5,800.00	90.80	84.10	5,280.60	85.43	710.35	712.03	3.45	1.88	2.89
5,928.00	90.00	89.00	5,279.71	93.13	838.08	839.89	3.88	-0.63	3.83
6,056.00	88.00	90.70	5,281.94	93.47	966.04	967.84	2.05	-1.56	1.33
6,184.00	87.40	91.40	5,287.08	91.12	1,093.92	1,095.63	0.72	-0.47	0.55
6,312.00	86.80	91.90	5,293.56	87.44	1,221.70	1,223.31	0.61	-0.47	0.39
6,440.00	86.80	90.40	5,300.70	84.88	1,349.47	1,350.99	1.17	0.00	-1.17
6,568.00	87.80	89.70	5,306.73	84.77	1,477.33	1,478.82	0.95	0.78	-0.55
6,696.00	89.20	89.80	5,310.08	85.33	1,605.28	1,606.75	1.10	1.09	0.08
6,824.00	88.00	89.80	5,313.21	85.77	1,733.24	1,734.69	0.94	-0.94	0.00
6,952.00	87.30	89.70	5,318.46	86.33	1,861.13	1,862.56	0.55	-0.55	-0.08
7,080.00	88.50	90.10	5,323.15	86.55	1,989.04	1,990.45	0.99	0.94	0.31
7,208.00	88.30	89.40	5,326.72	87.11	2,116.99	2,118.38	0.57	-0.16	-0.55
7,336.00	90.00	89.70	5,328.62	88.12	2,244.96	2,246.34	1.35	1.33	0.23
7,464.00	89.80	90.80	5,328.84	87.56	2,372.96	2,374.30	0.87	-0.16	0.86
7,592.00	89.00	90.80	5,330.18	85.77	2,500.94	2,502.21	0.63	-0.63	0.00
7,720.00	89.00	90.60	5,332.42	84.21	2,628.91	2,630.12	0.16	0.00	-0.16
7,848.00	88.50	90.20	5,335.21	83.31	2,756.88	2,758.03	0.50	-0.39	-0.31
7,976.00	88.90	90.20	5,338.11	82.87	2,884.84	2,885.96	0.31	0.31	0.00
8,104.00	88.60	90.30	5,340.91	82.31	3,012.81	3,013.89	0.25	-0.23	0.08
8,232.00	88.90	89.20	5,343.70	82.87	3,140.78	3,141.83	0.89	0.23	-0.86
8,360.00	89.10	88.10	5,345.93	85.88	3,268.72	3,269.81	0.87	0.16	-0.86
8,487.00	89.60	89.20	5,347.37	88.87	3,395.67	3,396.80	0.95	0.39	0.87
8,616.00	89.50	89.20	5,348.39	90.68	3,524.66	3,525.79	0.08	-0.08	0.00
8,744.00	90.00	89.50	5,348.95	92.13	3,652.65	3,653.79	0.46	0.39	0.23

Company:	Apache Corporation	Local Co-ordinate Reference:	Well #24H
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Well:	#24H	North Reference:	Grid
Wellbore:	OH / Job #1514707	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)
8,872.00	89.30	89.80	5,349.73	92.91	3,780.64	3,781.77	0.59	-0.55	0.23
9,000.00	89.50	90.00	5,351.07	93.13	3,908.63	3,909.73	0.22	0.16	0.16
9,128.00	88.60	89.90	5,353.19	93.24	4,036.62	4,037.69	0.71	-0.70	-0.08
9,192.00	88.20	90.00	5,354.98	93.30	4,100.59	4,101.65	0.64	-0.63	0.16
Final Phoenix MWD Survey									
9,264.00	88.20	90.00	5,357.24	93.30	4,172.55	4,173.60	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)	
4,200.00	4,199.34	-28.15	-9.41	Tie In to Phoenix Gyros
4,234.00	4,233.34	-28.14	-9.31	First Phoenix MWD Surveys
9,192.00	5,354.98	93.30	4,100.59	Final Phoenix MWD Survey
9,264.00	5,357.24	93.30	4,172.55	Projection to TD

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
1000 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

NM OIL CONSERVATION Form C-102
ARTESIA DISTRICT Revised August 1, 2011
FEB 29 2016 Submit one copy to appropriate District Office
RECEIVED ☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

API Number 30-015-43363	Pool Code 96831	Pool Name Cedar Lake, G. Lorietta-Yeso
Property Code 315935	Property Name RAVEN FEDERAL	Well Number 24H
OGRID No. 873	Operator Name APACHE CORPORATION	Elevation 3724'

UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
3	7	17-S	31-E		2245	SOUTH	505	WEST	EDDY

As-Drilled Bottom Hole & Last Take Point 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
I	7	17-S	31-E		2310.7	SOUTH	331.4	EAST	EDDY
Dedicated Acres	Joint or Infill	Consolidation Code	Order No.	We'll not completed yet					

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

GEODETIC COORDINATES NAD 83 NME SURFACE LOCATION Y= 672453.9 N X= 669764.1 E LAT.=32.847901° N LONG.=103.915145° W LAT.=32°50'52" N LONG.=103°54'55" W GEODETIC COORDINATES NAD 27 NME SURFACE LOCATION Y= 672390.0 N X= 628585.4 E LAT.=32.847784° N LONG.=103.914638° W LAT.=32°50'52" N LONG.=103°54'53" W	FIRST TAKE POINT NAD 83 NME Y= 672447.9 N X= 669879.4 E LAT.=32.847883° N LONG.=103.914770° W LAT.=32°50'52" N LONG.=103°54'53" W FIRST TAKE POINT NAD 27 NME Y= 672384.0 N X= 628700.7 E LAT.=32.847766° N LONG.=103.914263° W LAT.=32°50'52" N LONG.=103°54'51" W	AS-DRILLED BOTTOM HOLE & LAST TAKE POINT LOCATION NAD 83 NME Y= 672547.2 N X= 673935.6 E LAT.=32.848111° N LONG.=103.901561° W LAT.=32°50'53" N LONG.=103°54'06" W AS-DRILLED BOTTOM HOLE & LAST TAKE POINT LOCATION NAD 27 NME Y= 672483.2 N X= 632757.0 E LAT.=32.847994° N LONG.=103.901054° W LAT.=32°50'53" N LONG.=103°54'04" W	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 released 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. Signature _____ Date _____ Printed Name _____ E-mail Address _____
AS-DRILLED PATH AS-DRILLED B.H. & L.T.P. CORNER COORDINATES TABLE NAD 83 NME A - Y=672845.7 N, X=669257.9 E B - Y=672878.9 N, X=674265.0 E C - Y=671525.9 N, X=669262.1 E D - Y=671559.1 N, X=674272.6 E CORNER COORDINATES TABLE NAD 27 NME A - Y=672781.8 N, X=628079.2 E B - Y=672814.9 N, X=633086.4 E C - Y=671462.0 N, X=628083.4 E D - Y=671495.1 N, X=633093.9 E NOTE: AS-DRILLED PATH & BOTTOM HOLE LOCATION PLOTTED FROM PHOENIX TECHNOLOGY SERVICES STANDARD SURVEY REPORT: DECEMBER 10, 2015			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 direct supervision and the same is true and correct to the best of my belief. Date of Survey _____ Signature _____ Seal of _____ REGISTERED PROFESSIONAL SURVEYOR Ronald J. Eidson 12/21/2015 Certificate Number Gary G. Eidson 12641 Ronald J. Eidson 3239 ACK REV. 12/2/15 REL. W.O. 15 13 0250 JWSC W.O. 15 13 1110