



PHOENIX
TECHNOLOGY SERVICES

October 20, 2014

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 #20H
Eddy County, NM
API #30-015-40917
Job No. 1410582

NM OIL CONSERVATION
ARTESIA DISTRICT

OCT 24 2014

RECEIVED

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	
Brad Hill	20H	4,886	9,569	08/14/14	08/20/14	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,

Dana Robinson

Dana Robinson
Operations Administrator
Certified mail receipt number:

7011 1570 0001 4365 2490

Phoenix Technology Services SURVEY DATA CERTIFICATION



PHOENIX
TECHNOLOGY SERVICES

PHOENIX JOB NUMBER

1410582

OPERATOR

Apache

WELL NAME

Raven Federal #20H

COUNTY & STATE

Eddy, NM

API WELL NUMBER

30-015-40917

PROPOSED DIRECTION

269.62

TIE-IN DATA						
MEASURED DEPTH	VERTICAL DEPTH	INCLIN	AZIMUTH	N-S COORD	E-W COORD	DATA SOURCE
4,800 ft	4,799.70 ft	0.27	285.61	23.12 ft	-12.08 ft	Gyro

FIRST SURVEY DATE	FIRST SURVEY DEPTH	INCLIN	AZIMUTH
14-Aug-14	4,886 ft	1.0	285.3

SURVEY INSTRUMENT

TYPE

Phoenix MWD

LAST SURVEY DATE	LAST SURVEY DEPTH	INCLIN	AZIMUTH
20-Aug-14	9,569 ft	90.2	268.7

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-14	9,638 ft	90.2	268.7

Brad Hill

PRINT YOUR NAME ABOVE

Brad Hill

SIGN YOUR NAME ABOVE

8/20/2014

TODAY'S DATE

MAGNETIC DECLINATION OR TOTAL GRID

TOTAL CORRECTION USED	7.16
DECLINATION OR GRID	GRID

MWD SUPERVISOR 1

Brad Hill

DIRECTIONAL DRILLER 1

Jon Wingate

MWD SUPERVISOR 2

Shelby Johnson

DIRECTIONAL DRILLER 2

Aaron Kinney

1805 Brittmore Road

Houston, Texas 77043

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

NM OIL CONSERVATION
ARTESIA DISTRICT
 DISTRICT I
 1625 N. French Dr., Hobbs, NM 88240
 Phone: (575) 393-6161 Fax: (575) 393-9722
 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 87401
 Phone: (505) 334-6178 Fax: (505) 334-6179
 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 30-015-40917	Pool Code 96831	Pool Name Cedar Lake; Glorie-la-Yeso
Property Code 39330	Property Name RAVEN FEDERAL	Well Number 20H
OGRID No. 873	Operator Name APACHE CORPORATION	Elevation 3714'

Surface Location

UL or lot No.	Section	Township	Range	Lot/Idn	Feet from the	North/South line	Feet from the	East/West line	County
P	7	17-S	31-E		420	SOUTH	180	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
4	7	17-S	31-E		420	SOUTH	330	WEST	EDDY

Dedicated Acres	Joint or Juffill	Consolidation Code	Order No.
151.89			

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

1 31.57 AC. 2 31.68 AC. 3 31.78 AC. 4 31.89 AC.	GEODETIC COORDINATES NAD 27 NME SURFACE LOCATION Y=670594.0 N X=632919.1 E BOTTOM HOLE LOCATION Y=670564.3 N X=628416.2 E CORNER COORDINATES TABLE (A) - Y=671462.0 N, X=628083.4 E (B) - Y=671495.1 N, X=633093.9 E (C) - Y=670142.2 N, X=628087.6 E (D) - Y=670175.3 N, X=633101.5 E HORIZ. DIST. = 4504.2' GRID. AZ. = 269°37'14"	DETAIL 3707.7' 3714.8' 3716.2' 3722.6' SEE DETAIL	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. <u>Sorina L. Flores</u> 7/24/12 Signature Date <u>Sorina L. Flores</u> Printed Name <u>Sorina.Flores@apachecorp.com</u> E-mail Address 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 19, 2012 Date of Survey Signature & Seal of Professional Surveyor: <u>Ronald J. Eidson</u> 07/18/2012 Certificate Number Gary C. Eidson 12641 Ronald J. Eidson 3239 JWSC W.O. 12.11.1229
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Apache Corporation

Eddy County, NM (NAD27 NME)

Raven Federal

#20H

WB1/Job #1410582

Survey: Phoenix MWD Survey

Standard Survey Report

20 August, 2014



Company:	Apache Corporation	Local Co-ordinate Reference:	Well #20H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3725.00usft (Capstar 114)
Site:	Raven Federal	MD Reference:	KB @ 3725.00usft (Capstar 114)
Well:	#20H	North Reference:	Grid
Wellbore:	WB1/Job #1410582	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:	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:	#20H		
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' 34.07911 N
		Longitude:	103° 54' 1.98394 W
		Ground Level:	3,714.00 usft

Wellbore:	WB1/Job #1410582				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010_14	08/04/14	7.40	60.62	48,636

Design:	Surveys (Capstar 114)				
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	269.62	

Survey Program	Date 08/20/14				
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.00	4,800.00	Gyrodata Gyro Survey (WB1/Job #1410582)	NS-GYRO-MS	North sensing gyrocompassing m/s	
4,886.00	9,638.00	Phoenix MWD Survey (WB1/Job #1410582)	PHX+MWD+BGGM	PHX+MWD+BGGM v3: standard declination	

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)	
4,800.00	0.27	285.61	4,799.70	-23.12	-12.08	12.23	0.00	0.00	0.00	
Tie-on to Gyrodata Gyro Survey										
4,886.00	1.00	285.30	4,885.70	-22.87	-13.00	13.15	0.85	0.85	-0.36	
First Phoenix MWD Survey										
4,932.00	5.40	268.60	4,931.61	-22.81	-15.55	15.70	9.68	9.57	-36.30	
4,974.00	11.00	268.90	4,973.17	-22.94	-21.54	21.69	13.33	13.33	0.71	
5,017.00	16.90	270.30	5,014.88	-22.98	-31.90	32.05	13.74	13.72	3.26	
5,060.00	22.60	273.00	5,055.34	-22.52	-46.41	46.56	13.42	13.26	6.28	
5,103.00	28.20	274.70	5,094.16	-21.25	-64.80	64.94	13.13	13.02	3.95	

Company:	Apache Corporation	Local Co-ordinate Reference:	Well #20H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3725.00usft (Capstar 114)
Site:	Raven Federal	MD Reference:	KB @ 3725.00usft (Capstar 114)
Well:	#20H	North Reference:	Grid
Wellbore:	WB1/Job #1410582	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)
5,148.00	34.00	274.50	5,132.68	-19.39	-87.96	88.09	12.89	12.89	-0.44
5,191.00	39.60	272.20	5,167.10	-17.92	-113.66	113.78	13.41	13.02	-5.35
5,234.00	45.20	270.70	5,198.84	-17.21	-142.64	142.75	13.23	13.02	-3.49
5,277.00	51.50	269.60	5,227.40	-17.14	-174.75	174.86	14.77	14.65	-2.56
5,319.00	56.00	269.40	5,252.23	-17.44	-208.61	208.72	10.72	10.71	-0.48
5,365.00	59.60	269.60	5,276.74	-17.77	-247.53	247.64	7.83	7.83	0.43
5,408.00	62.70	269.70	5,297.49	-18.00	-285.19	285.30	7.21	7.21	0.23
5,451.00	65.90	270.00	5,316.13	-18.10	-323.93	324.04	7.47	7.44	0.70
5,495.00	68.90	270.70	5,333.04	-17.85	-364.54	364.65	6.97	6.82	1.59
5,538.00	74.30	271.50	5,346.61	-17.07	-405.32	405.43	12.68	12.56	1.86
5,580.00	80.20	272.50	5,355.87	-15.63	-446.24	446.34	14.24	14.05	2.38
5,640.00	87.60	273.50	5,362.24	-12.51	-505.78	505.85	12.44	12.33	1.67
5,726.00	87.60	273.10	5,365.85	-7.56	-591.56	591.60	0.46	0.00	-0.47
5,811.00	89.20	272.20	5,368.22	-3.64	-676.43	676.44	2.16	1.88	-1.06
5,897.00	91.70	271.20	5,367.54	-1.08	-762.38	762.37	3.13	2.91	-1.16
5,983.00	91.80	271.10	5,364.92	0.64	-848.33	848.30	0.16	0.12	-0.12
6,068.00	91.80	271.00	5,362.25	2.20	-933.27	933.24	0.12	0.00	-0.12
6,154.00	91.30	270.80	5,359.92	3.55	-1,019.23	1,019.18	0.63	-0.58	-0.23
6,239.00	91.30	268.00	5,357.99	2.66	-1,104.19	1,104.15	3.29	0.00	-3.29
6,368.00	90.50	267.80	5,355.97	-2.07	-1,233.09	1,233.08	0.64	-0.62	-0.16
6,496.00	91.60	267.40	5,353.62	-7.43	-1,360.95	1,360.97	0.91	0.86	-0.31
6,624.00	90.90	265.70	5,350.83	-15.13	-1,488.69	1,488.75	1.44	-0.55	-1.33
6,752.00	90.90	268.40	5,348.82	-21.71	-1,616.49	1,616.60	2.11	0.00	2.11
6,880.00	92.40	269.40	5,345.13	-24.17	-1,744.41	1,744.53	1.41	1.17	0.78
7,009.00	90.70	269.80	5,341.64	-25.07	-1,873.35	1,873.48	1.35	-1.32	0.31
7,137.00	90.40	270.60	5,340.41	-24.62	-2,001.34	2,001.46	0.67	-0.23	0.63
7,265.00	89.40	269.90	5,340.64	-24.06	-2,129.34	2,129.45	0.95	-0.78	-0.55
7,394.00	90.20	271.80	5,341.09	-22.15	-2,258.32	2,258.41	1.60	0.62	1.47
7,525.00	90.50	271.90	5,340.29	-17.92	-2,389.25	2,389.31	0.24	0.23	0.08
7,656.00	89.90	272.00	5,339.83	-13.46	-2,520.17	2,520.20	0.46	-0.46	0.08
7,784.00	90.30	269.70	5,339.61	-11.57	-2,648.15	2,648.16	1.82	0.31	-1.80
7,912.00	90.20	269.70	5,339.05	-12.24	-2,776.14	2,776.16	0.08	-0.08	0.00
8,041.00	90.50	271.00	5,338.26	-11.45	-2,905.14	2,905.15	1.03	0.23	1.01
8,169.00	91.10	270.40	5,336.47	-9.88	-3,033.11	3,033.11	0.66	0.47	-0.47
8,297.00	91.30	268.30	5,333.79	-11.34	-3,161.07	3,161.07	1.65	0.16	-1.64
8,425.00	90.40	267.10	5,331.89	-16.47	-3,288.95	3,288.98	1.17	-0.70	-0.94
8,553.00	89.90	267.10	5,331.56	-22.95	-3,416.78	3,416.86	0.39	-0.39	0.00
8,681.00	90.80	268.50	5,330.78	-27.86	-3,544.68	3,544.79	1.30	0.70	1.09
8,809.00	90.80	267.80	5,328.99	-31.99	-3,672.60	3,672.73	0.55	0.00	-0.55
8,937.00	90.60	268.70	5,327.42	-35.90	-3,800.53	3,800.69	0.72	-0.16	0.70
9,065.00	92.00	270.70	5,324.52	-36.57	-3,928.49	3,928.64	1.91	1.09	1.56
9,194.00	92.40	270.30	5,319.57	-35.45	-4,057.39	4,057.53	0.44	0.31	-0.31
9,322.00	92.30	269.90	5,314.32	-35.22	-4,185.28	4,185.42	0.32	-0.08	-0.31

Company:	Apache Corporation	Local Co-ordinate Reference:	Well #20H
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Well:	#20H	North Reference:	Grid
Wellbore:	WB1/Job #1410582	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)	
9,451.00	89.90	268.90	5,311.84	-36.58	-4,314.24	4,314.38	2.02	-1.86	-0.78	
9,569.00	90.20	268.70	5,311.74	-39.05	-4,432.21	4,432.37	0.31	0.25	-0.17	
Last Phoenix MWD Survey										
9,638.00	90.20	268.70	5,311.50	-40.61	-4,501.19	4,501.36	0.00	0.00	0.00	
Projection to TD										

Survey Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
4,800.00	4,799.70	-23.12	-12.08	Tie-on to Gyrodata Gyro Survey	
4,886.00	4,885.70	-22.87	-13.00	First Phoenix MWD Survey	
9,569.00	5,311.74	-39.05	-4,432.21	Last Phoenix MWD Survey	
9,638.00	5,311.50	-40.61	-4,501.19	Projection to TD	

Checked By: _____	Approved By: _____	Date: _____
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