

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENTNMOCD
ArtesiaFORM APPROVED
OMB NO. 1004-0135
Expires: July 31, 2010**SUNDRY NOTICES AND REPORTS ON WELLS**
*Do not use this form for proposals to drill or to re-enter an abandoned well. Use form 3160-3 (APD) for such proposals.***SUBMIT IN TRIPLICATE - Other instructions on reverse side.**

1. Type of Well ☒ Oil Well ☐ Gas Well ☐ Other		5. Lease Serial No. NMLC029435A
2. Name of Operator APACHE CORPORATION		6. If Indian, Allottee or Tribe Name
Contact: EMILY FOLLIS E-Mail: Emily.Follis@apachecorp.com		7. If Unit or CA/Agreement, Name and/or No.
3a. Address 303 VETERANS AIRPARK LANE SUITE 3000 MIDLAND, TX 79705	3b. Phone No. (include area code) Ph: 432-818-1801	8. Well Name and No. CEDAR LAKE FEDERAL CA 722H
4. Location of Well (Footage, Sec., T., R., M., or Survey Description) Sec 7 T17S R31E Lot 3 2115FSL 505FWL		9. API Well No. 30-015-43361-00-X1
		10. Field and Pool, or Exploratory CEDAR LAKE
		11. County or Parish, and State EDDY COUNTY, NM

12. CHECK APPROPRIATE BOX(ES) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION			
☐ Notice of Intent	☐ Acidize	☐ Deepen	☐ Production (Start/Resume)	☐ Water Shut-Off
☒ Subsequent Report	☐ Alter Casing	☐ Fracture Treat	☐ Reclamation	☐ Well Integrity
☐ Final Abandonment Notice	☐ Casing Repair	☐ New Construction	☐ Recomplete	☒ Other
	☐ Change Plans	☐ Plug and Abandon	☐ Temporarily Abandon	Production Start-up
	☐ Convert to Injection	☐ Plug Back	☐ Water Disposal	

13. Describe Proposed or Completed Operation (clearly state all pertinent details, including estimated starting date of any proposed work and approximate duration thereof. If the proposal is to deepen directionally or recompleat horizontally, give subsurface locations and measured and true vertical depths of all pertinent markers and zones. Attach the Bond under which the work will be performed or provide the Bond No. on file with BLM/BIA. Required subsequent reports shall be filed within 30 days following completion of the involved operations. If the operation results in a multiple completion or recompletion in a new interval, a Form 3160-4 shall be filed once testing has been completed. Final Abandonment Notices shall be filed only after all requirements, including reclamation, have been completed, and the operator has determined that the site is ready for final inspection.)

Apache completed the well as follows: RR 11/14/2015 KOP @ 4774'

12/18/15 SET ANCHORS, FINAL CUT, GR-CNL-CBL-LOG TOC @ 167'

12/22/15TAG DV TOOL @ 4760'

12/23/15 RIH W/4.6" MILL COMPLETE CLEAN OUT & RDMO WO UNIT

12/24/15 POOH RDMO

01/06/16 FRAC PREP, CLEAN SNOW OFF PAD - HAVE MEETING AS TO WHERE TO SPOT TANKS

05/02/16MIRU FRAC & ALL PARTIES FOR PACKER PLUS

05/03/16 COMPLETE MIRU,HSM WITH ALL PERSONEL, C & J TO FRAC BLINRBRY (UPPER (14 STAGE FRAC)RU TO

BACKSIDE PRESURE UP TO 200 PSI, BRING PRODUCTION CASING TO 2500 PSI HOLD 15 MINUTES

05/03-04/16 STAGE 1-14(5653-9323)AFTER STAGE 14 RDMO

NM OIL CONSERVATION

ARTESIA DISTRICT

AUG 29 2016

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14. I hereby certify that the foregoing is true and correct. Electronic Submission #346899 verified by the BLM Well Information System For APACHE CORPORATION, sent to the Carlsbad Committed to AFMSS for processing by PRISCILLA PEREZ on 08/04/2016 (16PP1902SE)	
Name (Printed/Typed) EMILY FOLLIS	Title REGULATORY ANALYST
Signature (Electronic Submission)	Date 08/04/2016
THIS SPACE FOR FEDERAL OR STATE OFFICE USE	
Approved By _____	Title _____
Conditions of approval, if any, are attached. Approval of this notice does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.	
Office _____	

Title 18 U.S.C. Section 1001 and Title 43 U.S.C. Section 1212, make it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

**** BLM REVISED ** BLM REVISED ** BLM REVISED ** BLM REVISED ** BLM REVISED ****

Additional data for EC transaction #346899 that would not fit on the form

32. Additional remarks, continued

TOTAL ACID 2411 BBL
TOTAL SAND 2,653,540#

05/09/16 MIRU SU & ALL PARTIES FOUND WELL ON VAC ND FV NU BOP, TALLEY TBG, PU RIH W/4.60 MILL 156
JTS 2-7/8" P110-6 TBG LEAVE SWINGING @ 4600' SI SDFN
05/10-11/16 DRILL OUT, POOH W/ TBG & BHA RDMO ALL PARTIES RUN ESP AT LATER DATE
07/14/16 MIRU,RIH W/GE ESP,RDMO
07/26/16 SET SURFACE, RUN ELECTRICAL, PLUMB INTO BATTERY, FINAL REPORT

Apache Corporation
303 Veterans Airpark Lane, #3000
Midland, TX 79705

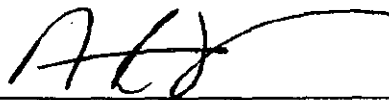
Raven Federal Com #022H
Eddy County, New Mexico

API # 30-015-43361
Sec. 7-T175 R31E

250	2.50	0.75	1.31	3.28	3.28
400	1.50	2.00	3.50	5.25	8.53
562	1.62	1.00	1.75	2.84	11.37
762	2.00	0.80	1.40	2.80	14.17
980	2.18	1.20	2.10	4.58	18.74
1236	2.56	1.50	2.63	6.72	25.46
1492	2.56	1.20	2.10	5.38	30.84
1706	2.14	0.90	1.58	3.37	34.21
2000	2.94	0.90	1.58	4.63	38.84
2255	2.55	0.30	0.53	1.34	40.18
2474	2.19	0.70	1.23	2.68	42.86
2730	2.56	0.60	1.05	2.69	45.55
2984	2.54	0.40	0.70	1.78	47.33
3240	2.56	0.10	0.18	0.45	47.78
3466	2.26	0.50	0.88	1.98	49.75
3705	2.39	1.00	1.75	4.18	53.94
3962	2.57	0.70	1.23	3.15	57.09
4217	2.55	0.80	1.40	3.57	60.66
4431	2.14	0.60	1.05	2.25	62.90
4734	3.03	0.20	0.35	1.06	63.96

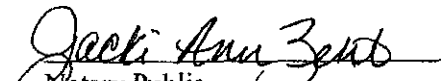
New Name

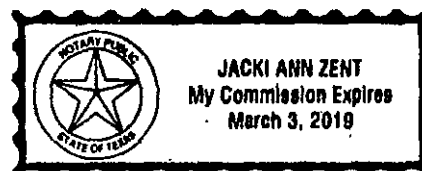
Cedar Lake Federal CA 722H



Archie Brown - General Manager

The attached instrument was acknowledged before me on the 18th day of November, 2015
by Archie Brown - General Manager, CapStar Drilling, Inc.


Notary Public



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: (505) 748-1283 Fax: (505) 748-9720

DISTRICT III
1000 Rio Hondo 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
ARTESIA DISTRICT Form C-102
Revised August 1, 2011
Submit one copy to appropriate District Office

AUG 29 2016

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DAMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

API Number 30-015-43361	Pool Code 96831	Pool Name Cedar Lake; G/Orieta-Yeso
Property Code 315935	Permittee Name Cedar Lake Federal CA	Well Number 722 H
CGRID No. 873	Operator Name APACHE CORPORATION	Elevation 3723'

Surface Location

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		2115	SOUTH	505	WEST	EDDY

AS-Drilled 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		1374.1	SOUTH	333.7	EAST	EDDY

Dedicated Acres 151.18	Joint or Infill	Consolidation Code	Order No.
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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= 672323.9 N
X= 669764.5 E
LAT.=32.847755" N
LONG.=103.915146" W
LAT.=32°50'51" N
LONG.=103°54'55" W

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

AS-DRILLED BOTTOM HOLE LOCATION
NAD 83 NME
Y= 671610.8 N
X= 673938.7 E
LAT.=32.845538" N
LONG.=103.901564" W
LAT.=32°50'44" N
LONG.=103°54'06" W

GEODETIC COORDINATES
NAD 27 NME
SURFACE LOCATION
Y= 672260.0 N
X= 628585.8 E
LAT.=32.847427" N
LONG.=103.914638" W
LAT.=32°50'51" N
LONG.=103°54'53" W

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

AS-DRILLED BOTTOM HOLE LOCATION
NAD 27 NME
Y= 671546.8 N
X= 632760.0 E
LAT.=32.845420" N
LONG.=103.901056" W
LAT.=32°50'44" N
LONG.=103°54'04" W

NOTE: AS-DRILLED PATH AND B.H. PLOTTED FROM PHOENIX TECHNOLOGY SERVICES MWD REPORT DATE NOVEMBER 12, 2015

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.

Signature: *Emily Follis* Date: *5/13/16*
Printed Name: *Emily Follis*
E-mail Address: *emily.follis@apachecorp.com*

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.

NOVEMBER 13, 2014

Date of Survey: *NOV 13 2014*
Signature & Seal of Professional Surveyor: *Ronald J. Eidson*
Certificate Number: *3239*
Gary G. Eidson 12641
Ronald J. Eidson 3239

LSL REL W.O.: 15.13.0248 JWSC W.O.: 15.13.1070

District I
1625 N. French Dr., Hobbs, NM 88240
District II
811 S. First St., Artesia, NM 88210
District III
1000 Rio Hondo Rd., Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals & Natural Resources

Form C-104
Revised August 1, 2011

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Submit one copy to appropriate District Office

☐ AMENDED REPORT

I. REQUEST FOR ALLOWABLE AND AUTHORIZATION TO TRANSPORT

¹ Operator name and Address Apache Corporation 303 Veterans Alpark Lane Suite 1000 Midland TX 79705		² OGRID Number 873
		³ Reason for Filing Code/ Effective Date NW /07/26/2016
⁴ API Number 30-015-43361	⁵ Pool Name CEDAR LAKE; GLORIETA-YESO	⁶ Pool Code [96831]
⁷ Property Code 315935	⁸ Property Name CEDAR LAKE FEDERAL CA	⁹ Well Number 722H

II. ¹⁰ Surface Location

U/L or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South Line	Feet from the	East/West line	County
L	7	17S	31E	3	2115	SOUTH	505	WEST	EDDY

¹¹ Bottom Hole Location

U/L or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
I	7	17S	31E		1374	SOUTH	333.7	EAST	EDDY

¹² Use Code F	¹³ Producing Method Code P	¹⁴ Gas Connection Date 07/26/2016	¹⁵ C-129 Permit Number	¹⁶ C-129 Effective Date	¹⁷ C-129 Expiration Date
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III. Oil and Gas Transporters

¹⁸ Transporter OGRID	¹⁹ Transporter Name and Address	²⁰ O/G/W
252293	Holly Energy Pipeline 311 W Quay / PO Box 1360 Artesia NM 88210	O
221115	Frontier Field Services LLC 4200 East Skelly Drive Suite 700 Tulsa OK 74135	G

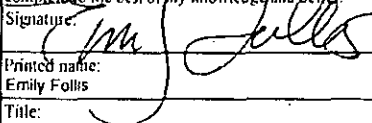
IV. Well Completion Data

²¹ Spud Date 10/31/2015	²² Ready Date 07/26/2016	²³ TD 9349'	²⁴ PBDT 9349'	²⁵ Perforations 5653-9323	²⁶ DHC, MC
²⁷ Hole Size	²⁸ Casing & Tubing Size	²⁹ Depth Set	³⁰ Sacks Cement		
17.5'	13.375 48#	426	1100 sx Class C		
12.25	9.625 40#	3506'	1400 sx Class C		
8.5	7 29#L80/5.5 20#L80	4760/9333	600 sx Class C		
Tubing	2-7/8	5024			

V. Well Test Data

³¹ Date New Oil 07/26/2016	³² Gas Delivery Date 07/26/2016	³³ Test Date 08/02/16	³⁴ Test Length 24 hrs	³⁵ Tbg. Pressure	³⁶ C'sg. Pressure
³⁷ Choke Size	³⁸ Oil 448	³⁹ Water 946	⁴⁰ Gas 768		⁴¹ Test Method P

⁴² I hereby certify that the rules of the Oil Conservation Division have been complied with and that the information given above is true and complete to the best of my knowledge and belief.

Signature: 
Printed name:
Emily Follis
Title:
Reg Analyst
E-mail Address:
emily.follis@apachecorp.com
Date:
08/04/2016

Phone:
432-818-1801

OIL CONSERVATION DIVISION

Approved by:

Title:

Approval Date:



NM OIL CONSERVATION
ARTESIA DISTRICT

AUG 29 2016

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Cedar Lake Federal CA 722H

Apache Corporation

Eddy County, NM (NAD27 NME)

Raven Federal

#22H

OH / Job #1514540

Design: Surveys (Capstar 114)

Standard Survey Report

12 November, 2015

*final survey
mud & gyro
tie on*





Phoenix Technology Services LP

Survey Report



Company:	Apache Corporation	Local Co-ordinate Reference:	Well #22H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3734.00usft (Capstar 114)
Site:	Raven Federal	MD Reference:	KB @ 3734.00usft (Capstar 114)
Well:	#22H	North Reference:	Grid
Wellbore:	OH / Job #1514540	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:	#22H		
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' 50.73718 N
		Longitude:	103° 54' 52.69829 W
		Ground Level:	3,723.00 usft

Wellbore:	OH / Job #1514540		
Magnetics	Model Name	Sample Date	Declination
	HDGM	10/23/2015	7.65
			Dip Angle
			60.77
			Field Strength
			48,545

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	Direction
	(usft)	(usft)	(usft)	(°)
	0.00	0.00	0.00	99.55

Survey Program	Date: 11/12/2015		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name
100.00	4,662.00	Phoenix Gyro Surveys (OH / Job #151454)	PHX_SPT_GTD
4,819.00	9,349.00	Phoenix MWD Surveys (OH / Job #151454)	PHX+MWD+HDGM
			Description
			PHX Continuous north-seeking gyro
			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)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.43	161.38	100.00	-0.36	0.12	0.18	0.43	0.43	0.00
200.00	0.57	288.73	200.00	-0.55	-0.23	-0.14	0.90	0.14	127.35
300.00	0.94	242.65	299.99	-0.77	-1.43	-1.28	0.68	0.37	-46.08
400.00	1.06	132.38	399.98	-1.77	-1.48	-1.16	1.64	0.12	-110.27
500.00	1.05	128.12	499.96	-2.96	-0.07	0.42	0.08	-0.01	-4.26
600.00	1.02	120.74	599.95	-3.98	1.41	2.05	0.14	-0.03	-7.38
700.00	0.99	116.98	699.93	-4.83	2.95	3.71	0.07	-0.03	-3.76
800.00	0.96	110.35	799.92	-5.51	4.50	5.36	0.12	-0.03	-6.63
900.00	0.84	346.77	899.91	-5.09	5.12	5.89	1.59	-0.12	-123.58



Phoenix Technology Services LP

Survey Report



Company:	Apache Corporation	Local Co-ordinate Reference:	Well #22H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3734.00usft (Capstar 114)
Site:	Raven Federal	MD Reference:	KB @ 3734.00usft (Capstar 114)
Well:	#22H	North Reference:	Grid
Wellbore:	OH / Job #1514540	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 114)	Database:	Compass 5000 GCR

Measured			Vertical			Vertical	Dogleg	Build	Turn
Depth	Inclination	Azimuth	Depth	+N/-S	+E/-W	Section	Rate	Rate	Rate
(usft)	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(°/100usft)	(°/100usft)	(°/100usft)
1,000.00	1.13	77.14	999.90	-4.15	5.92	6.52	1.41	0.29	90.37
1,100.00	1.20	81.91	1,099.88	-3.79	7.91	8.43	0.12	0.07	4.77
1,200.00	1.27	81.91	1,199.86	-3.48	10.05	10.49	0.07	0.07	0.00
1,300.00	1.41	95.37	1,299.83	-3.44	12.37	12.77	0.34	0.14	13.46
1,400.00	1.37	105.80	1,399.80	-3.88	14.74	15.18	0.26	-0.04	10.43
1,500.00	1.31	113.55	1,499.77	-4.67	16.94	17.48	0.19	-0.06	7.75
1,600.00	1.20	114.80	1,599.75	-5.56	18.94	19.60	0.11	-0.11	1.25
1,700.00	1.14	117.83	1,699.73	-6.46	20.77	21.56	0.09	-0.06	3.03
1,800.00	1.04	120.32	1,799.71	-7.39	22.43	23.35	0.11	-0.10	2.49
1,900.00	0.88	134.04	1,899.70	-8.38	23.77	24.83	0.28	-0.16	13.72
2,000.00	0.75	124.26	1,999.69	-9.28	24.86	26.06	0.19	-0.13	-9.78
2,100.00	0.69	96.97	2,099.68	-9.72	26.00	27.25	0.34	-0.06	-27.29
2,200.00	0.66	257.50	2,199.68	-9.02	26.04	27.32	1.33	-0.03	160.53
2,300.00	0.62	114.40	2,299.67	-10.27	25.97	27.31	1.21	-0.04	-143.10
2,400.00	0.62	99.55	2,399.67	-10.58	26.99	28.37	0.16	0.00	-14.85
2,500.00	0.59	88.41	2,499.66	-10.66	28.04	29.42	0.12	-0.03	-11.14
2,600.00	0.60	236.26	2,599.66	-10.93	28.12	29.55	1.14	0.01	147.85
2,700.00	0.46	220.84	2,699.66	-11.53	27.42	28.96	0.20	-0.14	-15.42
2,800.00	0.45	133.21	2,799.65	-12.10	27.45	29.07	0.63	-0.01	-87.63
2,900.00	0.36	135.15	2,899.65	-12.59	27.95	29.66	0.09	-0.09	1.94
3,000.00	0.39	34.28	2,999.65	-12.53	28.37	30.05	0.58	0.03	-100.87
3,100.00	0.26	290.31	3,099.65	-12.17	28.35	29.97	0.52	-0.13	-103.97
3,200.00	0.12	347.00	3,199.65	-11.99	28.11	29.71	0.22	-0.14	56.69
3,300.00	0.36	334.10	3,299.65	-11.51	27.95	29.49	0.24	0.24	-12.90
3,400.00	0.55	51.68	3,399.65	-11.03	28.19	29.63	0.59	0.19	77.58
3,500.00	0.64	358.82	3,499.64	-10.17	28.55	29.85	0.54	0.09	-52.86
3,600.00	0.59	141.63	3,599.64	-10.02	28.86	30.12	1.17	-0.05	142.81
3,700.00	0.73	26.17	3,699.64	-9.85	29.46	30.69	1.12	0.14	-115.46
3,800.00	0.89	323.50	3,799.63	-8.65	29.28	30.31	0.85	0.16	-62.67
3,900.00	0.86	28.17	3,899.62	-7.37	29.17	29.99	0.94	-0.03	64.67
4,000.00	0.91	30.16	3,999.61	-6.02	29.93	30.51	0.06	0.05	1.99
4,100.00	0.93	35.20	4,099.59	-4.67	30.79	31.14	0.08	0.02	5.04
4,200.00	0.47	45.16	4,199.59	-3.72	31.55	31.73	0.47	-0.46	9.96
4,300.00	0.66	136.82	4,299.58	-3.85	32.24	32.43	0.82	0.19	91.66
4,400.00	0.81	53.74	4,399.58	-3.85	33.20	33.38	0.98	0.15	-83.08
4,500.00	0.50	153.50	4,499.57	-3.82	33.97	34.13	1.02	-0.31	99.76
4,600.00	0.48	186.55	4,599.57	-4.63	34.11	34.41	0.28	-0.02	33.05
4,662.00	0.42	98.08	4,661.57	-4.92	34.31	34.65	1.02	-0.10	-142.69
Tie-In to Phoenix Gyros									
4,819.00	6.70	117.60	4,818.19	-9.25	43.00	43.94	4.02	4.00	12.43
First Phoenix MWD Survey									
4,861.00	13.80	118.50	4,859.49	-12.78	49.59	51.02	16.91	16.90	2.14
4,904.00	21.20	120.40	4,900.47	-19.17	60.81	63.15	17.26	17.21	4.42

Company:	Apache Corporation	Local Co-ordinate Reference:	Well #2211
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KN @ 3734.00usft (Capstar 114)
Site:	Raven Federal	MD Reference:	KB @ 3734.00usft (Capstar 114)
Well:	#2211	North Reference:	Grid
Wellbore:	OH / Job #1514540	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)	Buid Rate (°/100usft)	Turn Rate (°/100usft)	
4,947.00	28.80	122.90	4,939.42	-28.74	76.24	79.95	17.84	17.67	5.81	
4,989.00	34.20	125.10	4,975.21	-41.03	94.40	99.90	13.14	12.86	5.24	
5,032.00	37.80	126.40	5,010.00	-55.81	114.91	122.57	8.56	8.37	3.02	
5,074.00	42.00	127.70	5,042.21	-72.05	136.39	146.46	10.19	10.00	3.10	
5,117.00	46.90	129.30	5,072.90	-90.80	159.94	172.79	11.60	11.40	3.72	
5,160.00	50.80	129.10	5,101.19	-111.26	185.03	200.92	9.08	9.07	-0.47	
5,203.00	53.50	128.70	5,127.57	-132.58	211.45	230.52	6.32	6.28	-0.93	
5,245.00	55.80	127.10	5,151.87	-153.61	238.48	260.66	6.30	5.48	-3.81	
5,288.00	57.60	126.30	5,175.48	-175.09	267.30	292.64	4.47	4.19	-1.86	
5,331.00	61.20	126.90	5,197.36	-197.15	297.00	325.60	8.46	8.37	1.40	
5,374.00	64.60	126.90	5,216.95	-220.13	327.61	359.59	7.91	7.91	0.00	
5,417.00	68.20	127.30	5,234.16	-243.90	359.03	394.52	8.42	8.37	0.93	
5,459.00	72.80	127.60	5,248.18	-267.97	390.45	429.50	10.97	10.95	0.71	
5,501.00	78.90	126.90	5,258.44	-292.61	422.86	465.54	14.61	14.52	-1.67	
5,544.00	85.30	126.00	5,264.35	-317.89	457.10	503.51	15.03	14.88	-2.09	
5,587.00	89.20	126.00	5,266.41	-343.14	491.84	541.96	8.07	9.07	0.00	
5,715.00	86.50	121.30	5,271.21	-413.99	698.28	658.67	4.23	-2.11	-3.67	
5,842.00	87.10	117.00	5,278.31	-475.74	708.99	778.10	3.41	0.47	-3.39	
5,970.00	89.30	113.20	5,282.33	-529.99	824.82	901.32	3.43	1.72	-2.97	
6,099.00	87.10	108.10	5,286.38	-575.45	945.43	1,027.79	4.30	-1.71	-3.95	
6,226.00	87.10	107.70	5,292.81	-614.43	1,066.12	1,153.29	0.31	0.00	-0.31	
6,354.00	87.30	105.80	5,299.06	-651.28	1,188.54	1,280.12	1.49	0.16	-1.48	
6,482.00	88.40	102.70	5,303.86	-682.76	1,312.50	1,407.58	2.57	0.86	-2.42	
6,610.00	89.30	98.70	5,306.43	-706.51	1,438.22	1,535.50	3.20	0.70	-3.13	
6,738.00	88.40	93.40	5,309.01	-720.00	1,565.43	1,663.19	4.20	-0.70	-4.14	
6,866.00	87.10	90.30	5,314.03	-724.13	1,693.25	1,789.92	2.62	-1.02	-2.42	
6,994.00	88.10	89.90	5,319.39	-724.35	1,821.14	1,916.07	0.84	0.78	-0.31	
7,122.00	88.40	89.80	5,323.30	-724.01	1,949.08	2,042.18	0.25	0.23	-0.08	
7,250.00	89.20	89.80	5,325.98	-723.57	2,077.05	2,168.31	0.63	0.63	0.00	
7,378.00	89.30	90.70	5,327.66	-724.13	2,205.03	2,294.61	0.71	0.08	0.70	
7,506.00	87.60	88.90	5,331.12	-723.68	2,332.98	2,420.71	1.93	-1.33	-1.41	
7,634.00	88.50	88.40	5,335.47	-720.67	2,460.86	2,546.32	0.80	0.70	-0.39	
7,762.00	88.50	88.10	5,338.83	-716.76	2,588.76	2,671.80	0.23	0.00	-0.23	
7,890.00	88.60	89.10	5,342.06	-713.63	2,716.68	2,797.43	0.78	0.08	0.78	
8,018.00	89.70	90.20	5,343.96	-712.85	2,844.66	2,923.50	1.22	0.86	0.86	
8,146.00	90.00	91.40	5,344.30	-714.64	2,972.64	3,050.01	0.97	0.23	0.94	
8,274.00	88.90	90.40	5,345.53	-716.65	3,100.62	3,176.55	1.16	-0.86	-0.78	
8,402.00	88.60	90.70	5,348.32	-717.88	3,228.58	3,302.94	0.33	-0.23	0.23	
8,530.00	87.90	90.90	5,352.23	-719.66	3,356.51	3,429.39	0.57	-0.55	0.16	
8,658.00	87.90	89.60	5,356.92	-720.22	3,484.42	3,555.62	1.01	0.00	-1.02	
8,786.00	88.40	89.60	5,361.05	-719.33	3,612.35	3,681.63	0.39	0.39	0.00	
8,914.00	87.80	89.50	5,365.30	-718.32	3,740.27	3,807.61	0.48	-0.47	-0.08	
9,042.00	89.00	89.70	5,368.87	-717.43	3,868.22	3,933.64	0.95	0.94	0.16	
9,170.00	90.00	88.90	5,369.99	-715.87	3,996.20	4,059.59	1.00	0.78	-0.63	



Phoenix Technology Services LP Survey Report



Company:	Apache Corporation	Local Co-ordinate Reference:	Well #22H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3734.00usft (Capstar 114)
Site:	Raven Federal	MD Reference:	KB @ 3734.00usft (Capstar 114)
Well:	#22H	North Reference:	Grid
Wellbore:	OII / Job #1514540	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 114)	Database:	Compass 5000 GCR

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)
9,277.00	89.70	89.30	5,370.27	-714.19	4,103.19	4,164.81	0.47	-0.28	0.37
Final Phoenix MWD Survey									
9,349.00	89.70	89.30	5,370.64	-713.31	4,175.18	4,235.66	0.00	0.00	0.00
Projection to TD									

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
4,662.00	4,661.57	-4.92	34.31	Tie-In to Phoenix Gyros
4,819.00	4,818.19	-9.25	43.00	First Phoenix MWD Survey
9,277.00	5,370.27	-714.19	4,103.19	Final Phoenix MWD Survey
9,349.00	5,370.64	-713.31	4,175.18	Projection to TD

Checked By: _____ Approved By: _____ Date: _____

Phoenix Technology Services
Design Report 12-Nov-2015 07:21:12

Apache Corporation

Raven Federal #22H
Eddy County, NM (NAD27 NME)
OH / Job #1514540
Surveys (Capstar 114)

Surface Loc.:
Northing: (Y) 672260.00
Easting: (X) 628585.80
KB Elev: 3734.00'
GL Elev: 3723.00'

Survey Type Information:

H 100.00 - 4662.00 PHOENIX GYRO SURVEYS : PHX_SPT_GTD
H 4819.00 - 9349.00 PHOENIX MWD SURVEYS : PHX+MWD+HDGM

Measured Depth (ft)	Incl.	Azim.	Sub-Sea Depth (ft)	Vertical Depth (ft)	Local Coor (+N/-S) (ft)	UTM Coor (+E/-W) (ft)	Northings (ft)	Eastings (ft)
0	0	0	-3734	0	0	0	672260	628585.8
100	0.43	161.38	-3634	100	-0.36	0.12	672259.6	628585.9
200	0.57	288.73	-3534	200	-0.55	-0.23	672259.5	628585.6
300	0.94	242.65	-3434.01	299.99	-0.77	-1.43	672259.2	628584.4
400	1.06	132.38	-3334.02	399.98	-1.77	-1.48	672258.2	628584.3
500	1.05	128.12	-3234.04	499.96	-2.96	-0.07	672257	628585.7
600	1.02	120.74	-3134.05	599.95	-3.98	1.41	672256	628587.2
700	0.99	116.98	-3034.07	699.93	-4.83	2.95	672255.2	628588.8
800	0.96	110.35	-2934.08	799.92	-5.51	4.5	672254.5	628590.3
900	0.84	346.77	-2834.09	899.91	-5.09	5.12	672254.9	628590.9
1000	1.13	77.14	-2734.1	999.9	-4.15	5.92	672255.9	628591.7
1100	1.2	81.91	-2634.12	1099.88	-3.79	7.91	672256.2	628593.7
1200	1.27	81.91	-2534.14	1199.86	-3.48	10.05	672256.5	628595.9
1300	1.41	95.37	-2434.17	1299.83	-3.44	12.37	672256.6	628598.2
1400	1.37	105.8	-2334.2	1399.8	-3.88	14.74	672256.1	628600.5
1500	1.31	113.55	-2234.23	1499.77	-4.67	16.94	672255.3	628602.7
1600	1.2	114.8	-2134.25	1599.75	-5.56	18.94	672254.4	628604.7
1700	1.14	117.83	-2034.27	1699.73	-6.46	20.77	672253.5	628606.6
1800	1.04	120.32	-1934.29	1799.71	-7.39	22.43	672252.6	628608.2
1900	0.88	134.04	-1834.3	1899.7	-8.38	23.77	672251.6	628609.6
2000	0.75	124.26	-1734.31	1999.69	-9.28	24.86	672250.7	628610.7
2100	0.69	96.97	-1634.32	2099.68	-9.72	26	672250.3	628611.8

2200	0.66	257.5	-1534.32	2199.68	-9.92	26.04	672250.1	628611.8
2300	0.62	114.4	-1434.33	2299.67	-10.27	25.97	672249.7	628611.8
2400	0.62	99.55	-1334.33	2399.67	-10.58	26.99	672249.4	628612.8
2500	0.59	88.41	-1234.34	2499.66	-10.66	28.04	672249.3	628613.8
2600	0.6	236.26	-1134.34	2599.66	-10.93	28.12	672249.1	628613.9
2700	0.46	220.84	-1034.34	2699.66	-11.53	27.42	672248.5	628613.2
2800	0.45	133.21	-934.35	2799.65	-12.1	27.45	672247.9	628613.3
2900	0.36	135.15	-834.35	2899.65	-12.59	27.95	672247.4	628613.8
3000	0.39	34.28	-734.35	2999.65	-12.53	28.37	672247.5	628614.2
3100	0.26	290.31	-634.35	3099.65	-12.17	28.35	672247.8	628614.2
3200	0.12	347	-534.35	3199.65	-11.99	28.11	672248	628613.9
3300	0.36	334.1	-434.35	3299.65	-11.61	27.95	672248.4	628613.8
3400	0.55	51.68	-334.35	3399.65	-11.03	28.19	672249	628614
3500	0.64	358.82	-234.36	3499.64	-10.17	28.55	672249.8	628614.4
3600	0.59	141.63	-134.36	3599.64	-10.02	28.86	672250	628614.7
3700	0.73	26.17	-34.36	3699.64	-9.85	29.46	672250.2	628615.3
3800	0.89	323.5	65.63	3799.63	-8.65	29.28	672251.4	628615.1
3900	0.86	28.17	165.62	3899.62	-7.37	29.17	672252.6	628615
4000	0.91	30.16	265.61	3999.61	-6.02	29.93	672254	628615.7
4100	0.93	35.2	365.59	4099.59	-4.67	30.79	672255.3	628616.6
4200	0.47	45.16	465.59	4199.59	-3.72	31.55	672256.3	628617.4
4300	0.66	136.82	565.58	4299.58	-3.85	32.24	672256.2	628618
4400	0.81	53.74	665.58	4399.58	-3.85	33.2	672256.2	628619
4500	0.5	153.5	765.57	4499.57	-3.82	33.97	672256.2	628619.8
4600	0.48	186.55	865.57	4599.57	-4.63	34.11	672255.4	628619.9
4662	0.42	98.08	927.57	4661.57	-4.92	34.31	672255.1	628620.1
4819	6.7	117.6	1084.19	4818.19	-9.25	43	672250.8	628628.8
4861	13.8	118.5	1125.49	4859.49	-12.78	49.59	672247.2	628635.4
4904	21.2	120.4	1166.47	4900.47	-19.17	60.81	672240.8	628646.6
4947	28.8	122.9	1205.42	4939.42	-28.74	76.24	672231.3	628662
4989	34.2	125.1	1241.21	4975.21	-41.03	94.4	672219	628680.2
5032	37.8	126.4	1276	5010	-55.81	114.91	672204.2	628700.7
5074	42	127.7	1308.21	5042.21	-72.05	136.39	672188	628722.2
5117	46.9	129.3	1338.9	5072.9	-90.8	159.94	672169.2	628745.7
5160	50.8	129.1	1367.19	5101.19	-111.26	185.03	672148.7	628770.8
5203	53.5	128.7	1393.57	5127.57	-132.58	211.45	672127.4	628797.3
5245	55.8	127.1	1417.87	5151.87	-153.61	238.48	672106.4	628824.3
5288	57.6	126.3	1441.48	5175.48	-175.09	267.3	672084.9	628853.1
5331	61.2	126.9	1463.36	5197.36	-197.15	297	672062.9	628882.8
5374	64.6	126.9	1482.95	5216.95	-220.13	327.61	672039.9	628913.4
5417	68.2	127.3	1500.16	5234.16	-243.9	359.03	672016.1	628944.8
5459	72.8	127.6	1514.18	5248.18	-267.97	390.45	671992	628976.3
5501	78.9	126.9	1524.44	5258.44	-292.61	422.86	671967.4	629008.7
5544	85.3	126	1530.35	5264.35	-317.89	457.1	671942.1	629042.9
5587	89.2	126	1532.41	5266.41	-343.14	491.84	671916.9	629077.6
5715	86.5	121.3	1537.21	5271.21	-413.99	598.28	671846	629184.1
5842	87.1	117	1544.31	5278.31	-475.74	708.99	671784.3	629294.8

5970	89.3	113.2	1548.33	5282.33	-529.99	824.82	671730	629410.6
6099	87.1	108.1	1552.38	5286.38	-575.45	945.43	671684.6	629531.2
6226	87.1	107.7	1558.81	5292.81	-614.43	1066.12	671645.6	629651.9
6354	87.3	105.8	1565.06	5299.06	-651.28	1188.54	671608.7	629774.3
6482	88.4	102.7	1569.86	5303.86	-682.76	1312.5	671577.2	629898.3
6610	89.3	98.7	1572.43	5306.43	-706.51	1438.22	671553.5	630024
6738	88.4	93.4	1575.01	5309.01	-720	1565.43	671540	630151.2
6866	87.1	90.3	1580.03	5314.03	-724.13	1693.25	671535.9	630279.1
6994	88.1	89.9	1585.39	5319.39	-724.35	1821.14	671535.7	630406.9
7122	88.4	89.8	1589.3	5323.3	-724.01	1949.08	671536	630534.9
7250	89.2	89.8	1591.98	5325.98	-723.57	2077.05	671536.4	630662.9
7378	89.3	90.7	1593.66	5327.66	-724.13	2205.03	671535.9	630790.8
7506	87.6	88.9	1597.12	5331.12	-723.68	2332.98	671536.3	630918.8
7634	88.5	88.4	1601.47	5335.47	-720.67	2460.86	671539.3	631046.7
7762	88.5	88.1	1604.83	5338.83	-716.76	2588.76	671543.2	631174.6
7890	88.6	89.1	1608.06	5342.06	-713.63	2716.68	671546.4	631302.5
8018	89.7	90.2	1609.96	5343.96	-712.85	2844.66	671547.2	631430.5
8146	90	91.4	1610.3	5344.3	-714.64	2972.64	671545.4	631558.4
8274	88.9	90.4	1611.53	5345.53	-716.65	3100.62	671543.4	631686.4
8402	88.6	90.7	1614.32	5348.32	-717.88	3228.58	671542.1	631814.4
8530	87.9	90.9	1618.23	5352.23	-719.66	3356.51	671540.3	631942.3
8658	87.9	89.6	1622.92	5356.92	-720.22	3484.42	671539.8	632070.2
8786	88.4	89.6	1627.05	5361.05	-719.33	3612.35	671540.7	632198.2
8914	87.8	89.5	1631.3	5365.3	-718.32	3740.27	671541.7	632326.1
9042	89	89.7	1634.87	5368.87	-717.43	3868.22	671542.6	632454
9170	90	88.9	1635.99	5369.99	-715.87	3996.2	671544.1	632582
9277	89.7	89.3	1636.27	5370.27	-714.19	4103.19	671545.8	632689
9349	89.7	89.3	1636.64	5370.64	-713.31	4175.18	671546.7	632761

All data are in feet unless otherwise stated. Directions and coordinates are relative to Grid North.
Vertical depths are relative to KB. Northings and Eastings are relative to Well.

The Dogleg Severity is in Degrees per 100 feet.

Vertical Section is from Slot and calculated along an Azimuth of 99.550° (Grid).

Coordinate System is NAD 1927 (NADCON CONUS) US State Plane 1927 (Exact solution), New Mexico East
Grid Convergence at Surface is 0.227°.

Based upon Minimum Curvature type calculations, at a Measured Depth of 9349.00ft.,
the Bottom Hole Displacement is 4235.67ft., in the Direction of 99.550° (Grid).

Vertical Section (ft)	Dogleg Rate (°/100ft)	Annotation
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0	0	
0.18	0.43	
-0.14	0.9	
-1.28	0.68	
-1.16	1.64	
0.42	0.08	
2.05	0.14	
3.71	0.07	
5.36	0.12	
5.89	1.59	
6.52	1.41	
8.43	0.12	
10.49	0.07	
12.77	0.34	
15.18	0.26	
17.48	0.19	
19.6	0.11	
21.56	0.09	
23.35	0.11	
24.83	0.28	
26.06	0.19	
27.25	0.34	

27.32	1.33
27.31	1.21
28.37	0.16
29.42	0.12
29.55	1.14
28.96	0.2
29.07	0.63
29.66	0.09
30.05	0.58
29.97	0.52
29.71	0.22
29.49	0.24
29.63	0.59
29.85	0.54
30.12	1.17
30.69	1.12
30.31	0.85
29.99	0.94
30.51	0.06
31.14	0.08
31.73	0.47
32.43	0.82
33.38	0.98
34.13	1.02
34.41	0.28
34.65	1.02 Tie-in to Phoenix Gyros
43.94	4.02 First Phoenix MWD Survey
51.02	16.91
63.15	17.26
79.95	17.84
99.9	13.14
122.57	8.56
146.46	10.19
172.79	11.69
200.92	9.08
230.52	6.32
260.66	6.3
292.64	4.47
325.6	8.46
359.59	7.91
394.52	8.42
429.5	10.97
465.54	14.61
503.51	15.03
541.96	9.07
658.67	4.23
778.1	3.41

901.32	3.43
1027.79	4.3
1153.29	0.31
1280.12	1.49
1407.58	2.57
1535.5	3.2
1663.19	4.2
1789.92	2.62
1916.07	0.84
2042.18	0.25
2168.31	0.62
2294.61	0.71
2420.71	1.93
2546.32	0.8
2671.8	0.23
2797.43	0.78
2923.5	1.22
3050.01	0.97
3176.55	1.16
3302.94	0.33
3429.39	0.57
3555.62	1.01
3681.63	0.39
3807.61	0.48
3933.64	0.95
4059.59	1
4164.81	0.47 Final Phoenix MWD Survey
4235.66	0 Projection to TD

ast 3001.

SURVEY CERTIFICATION FORM

3610 Elkins Road Midland, TX 79705 t:432-684-0057 f: 432-686-7964



PHOENIX
TECHNOLOGY SERVICES

Company: Apache

Well Name: Raven Federal Com # 22H

Survey Instrument Type: North Seek Rate Gyro

Job #: 01514598

County/State: Eddy Co., New Mexico

API # 30-015-43361

TIE-IN DATA

Measure Depth (ft)	Vertical Depth (ft)	Inclination (°)	Azimuth (°)	N-S Coordinates	E-W Coordinates	Data Source
0	0	0	0	0	0	Surface

First Survey

Date	Depth (ft)	Inclination (°)	Azimuth (°)
2015-11-07	0	0	0

Last Survey

Date	Depth (ft)	Inclination (°)	Azimuth (°)
2015-11-07	4662	0.42	98.08

Projected TD Survey

Date	Depth (ft)	Inclination (°)	Azimuth (°)
0	0	0	0

Grid Correction
-0.23

Gyro Operator: Phoenix Technology Services USA Ltd

Gyro Supervisor: Jaime Stephenson

To the best of my knowledge I certify this survey data to be correct and true

Date:

11-07-15

Print Name: Noe Garza

Signature:

Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	5/3/2016
State:	New Mexico
County:	Eddy
API Number:	30-015-43361
Operator Name:	Apache
Well Name and Number:	Raven Federal Com 22H
Longitude:	-103.914638
Latitude:	32.847427
Long/Lat Projection:	NAD27
Production Type:	Oil
True Vertical Depth (TVD):	5,328
Total Water Volume (gal):	2,416,470

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
FR-15	C&J	Friction Reducer	Distillates (petroleum), Hydro-treated lig	64742-47-8	60.00%	0.02430%	
			Polyacrylamide Copolymer	Proprietary	40.00%	0.01620%	
			Surfactant Blend	Proprietary	6.00%	0.00243%	
CL-2	C&J	Corrosion Inhibitor	Methanol	67-56-1	80.00%	0.01867%	
			Fatty Acids	Proprietary	10.00%	0.00233%	
ICA-1	C&J	Iron Control Agent	Trisodium Nitrotriacetate	5064-31-3	50.00%	0.00897%	
AP-Scale-2	SNF Inc.	Paraffin and Scale Additive	Calcium Chloride	10043-52-4	25.00%	0.00076%	
CL-3	C&J	Corrosion Inhibitor	Ethylene Glycol	107-21-1	40.00%	0.00000%	
			Dimethylformamide	68-12-2	20.00%	0.00000%	
			2-butoxyethanol	111-76-2	15.00%	0.00000%	
			Cinnamaldehyde	104-55-2	15.00%	0.00000%	
			Tar Bases, Quinoline Dervis., Benzyl C	72480-70-7	15.00%	0.00000%	
			1-decanol	112-30-1	5.00%	0.00000%	
			4-nonylphenol, Branched, Ethoxylated	127087-87-0	5.00%	0.00000%	
			1-octanol	111-87-5	2.50%	0.00000%	
			Isopropanol	67-63-0	2.50%	0.00000%	
			Triethyl Phosphate	78-40-0	2.50%	0.00000%	
CS-1	C&J	Clay Stabilizer	Choline Chloride	67-48-1	80.00%	0.00968%	
Aquar 742	DOW Chemical	Biocidal Product	Glutaraldehyde	111-30-8	42.00%	0.00394%	
			Water	7732-18-5	48.60%	0.00456%	
			Quaternary ammonium compounds, be	68424-85-1	7.50%	0.00070%	
			Ethanol	64-17-5	1.00%	0.00009%	
Ap-Surf-2A	Blentech Corp	Surfactant	Isopropyl Alcohol	67-63-0	45.00%	0.01493%	
HC-15	C&J	Acidizing	Hydrochloric Acid	7647-01-0	15.00%	0.63%	
100 Mesh	C&J	Proppant	Silica - Crystalline, Quartz	14080-60-7	99.90%	5.78%	
			Aluminum Oxide	1344-28-1	1.10%	0.06%	
			Iron Oxide	1309-37-1	0.10%	0.00579%	
			Titanium Dioxide	13463-67-7	0.10%	0.00579%	

Hydraulic Fracturing Fluid Composition:

[illegible]

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

**** Information is based on the maximum potential for concentration and thus the total may be over 100%**

All component information listed was obtained from the supplier's Material Safety Data Sheets (MSDS). As such, the Operator is not responsible for inaccurate and/or incomplete information. Any questions regarding the content of the MSDS should be directed to the supplier who provided it. The Occupational Safety and Health Administration's (OSHA) regulations govern the criteria for the disclosure of this information. Please note that Federal Law protects "proprietary", "trade secret", and "confidential business information" and the criteria for how this information is reported on an MSDS is subject to 29 CFR 1910.1200(i) and Appendix D.

WELL NAME: RAVEN FEDERAL COM 22H
 API: 30-015-43361
 SPUD DATE: 10/31/2015
 PRODUCING FORMATION: YESO UPPER BLINEBRY
 FIELD: CEDAR LAKE (BP)
 COUNTY: EDDY
 STATE: NEW MEXICO
 WORKING INTEREST: 50.00%

SURFACE LOC: 2115' FSL & 505' FWL

SECTION: 7

TOWNSHIP: 17-S

RANGE: 31-E

SURVEY: RONALD J. EIDSON

BOTTOM HOLE LOC: 1374.1' FSL & 333.7' FEL

SECTION: 7

TOWNSHIP: 17-S

RANGE: 31-E

SURVEY: RONALD J. EIDSON

DRILL RIG: CAPSTAR 114

RIG RELEASE: 11/14/2015

KB (ft): 3,734.00

GL (ft): 3,723.00

KB/GL DIFF (ft): 11.00

TMD (ft): 9,349.00

TD OF PILOT HOLE (ft): N/A

FC DEPTH (ft): 9,323.00

PBMD (ft): 9,349.00

RDV DEPTH (ft): N/A

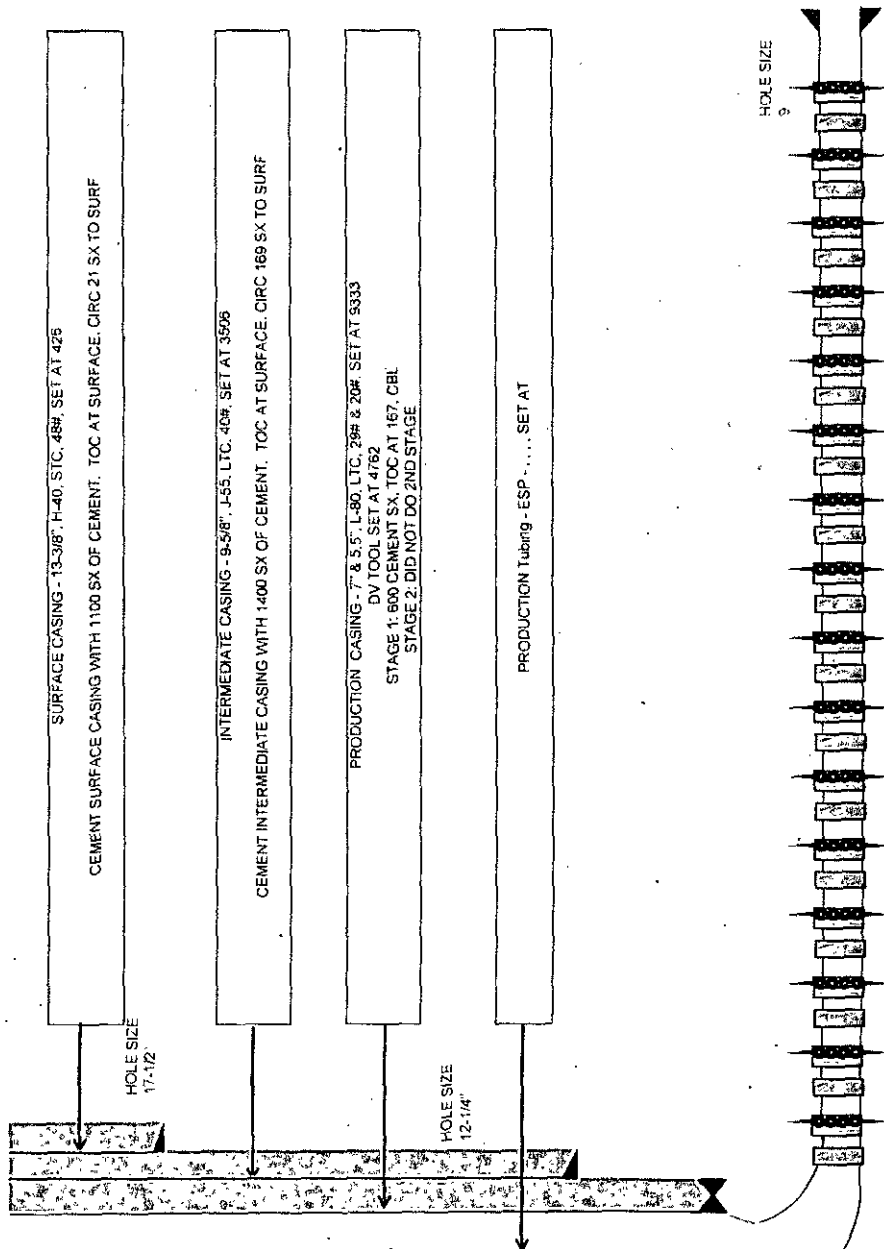
ORIO VALVE (ft): N/A

DEEPEST TVD (ft): 5,370.00

TAPERED CASING STRING:

7" 20# L-80 TO X-OVER @ 4,762'
 TAPERING TO 5" 20# L-80 SET @ 9,333'

KOP (ft):
 LATERAL LENGTH (ft):
 TO OF PILOT HOLE (ft): N/A



PACKERS & SLEEVES
 TOP PERF (MD): 5,653
 BOTTOM PERF (MD): 9,323

4,774

3,686

TMD (ft): 9,349
 FC DEPTH (ft): 9,323
 PBMD (ft): 9,349
 RDV DEPTH (ft): N/A
 ORIO VALVE (ft): N/A

COMPLETION:

STIMULATION:

STATUS:

COMMENTS:

PACKERS & SLEEVES - 14 STAGES

TOTAL ACID (bb)	2,411	TOTAL LTR (bb)	57,707	TOTAL PROPPANT (lbs)	2,653,840	MAX WH RATE (bpm)	93.00	MAX WH PRESSURE (psi)	5,988
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PRODUCTION METHOD	Pumping	LIFT TYPE	ESP	SETTING DEPTH	0
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CROSSOVER SUB @ 4,762'

LAST UPDATED BY: HILLARI GOULD
 LAST UPDATED: 4/27/2016