NM OIL CONSERVATION
ARTESIA DISTRICT

Form 3160-5
(August 2007)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

AUG 28 2014
RECEIVED

FORM 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.

5. Lease Serial No.
NMLC029435B

6. If Indian, Allottee or Tribe Name

7. If Unit or CA/Agreement, Name and/or No.

1. Type of Well
☒ Oil Well ☐ Gas Well ☐ Other

8. Well Name and No.
RAVEN FEDERAL 19H

2. Name of Operator
APACHE CORPORATION
Contact: SORINA FLORES
E-Mail: sorina.flores@apachecorp.com

9. API Well No.
30-015-40916-00-X1

3a. Address
303 VETERANS AIRPARK LANE SUITE 3000
MIDLAND, TX 79705

3b. Phone No. (include area code)
Ph: 432-818-1167

10. Field and Pool, or Exploratory
CEDAR LAKE

4. Location of Well (*Footage, Sec., T., R., M., or Survey Description*)
Sec 7 T17S R31E SESE 485FSL 180FEL
32.842978 N Lat, 103.900551 W Lon

Non-Standard Location

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 to Original A PD
	☐ Change Plans	☐ Plug and Abandon	☐ Temporarily Abandon	
	☐ 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 recomplete 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.)

BLM-CO-1463 NATIONWIDE / NMB000736

Accepted for record
NMOCD
9-3-2014

Apache proposes to change the csg/cmt for the Raven Federal #19H as follows:

CSG PROGRAM:
HOLE DEPTH OD CSG WT GRADE COLLAR DESIGN COLLAPSE BURST TENSION
MW Rating/SF Rating/SF Rating/SF
17-1/2" 0-450' 13-3/8" 48# H40 STC 8.8ppg 770psi 1730psi 322000lbs
3.592 5.49 17.22
12-1/4" 0-3500' 9-5/8" 36# J55 STC 9.8ppg 2020psi 3520psi 394000lbs
1.134 1.45 3.68
8-3/4" 0-4362' 7" 29# L80 LTC 9.3ppg 7020psi 8160psi 587000lbs

APPROVED
AUG 27 2014
BUREAU OF LAND MANAGEMENT
CARLSBAD FIELD OFFICE

14. I hereby certify that the foregoing is true and correct.
Electronic Submission #251798 verified by the BLM Well Information System
For APACHE CORPORATION, sent to the Carlsbad
Committed to AFMSS for processing by ED FERNANDEZ on 07/17/2014 (14EF0075SE)

Name (*Printed/Typed*) SORINA FLORES
Title SUBMITTING CONTACT

Signature (Electronic Submission)
Date 07/07/2014

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved By EDWARD FERNANDEZ
Title PETROLEUM ENGINEER
Date 08/27/2014

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 Carlsbad

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 ****

SEE ATTACHED FOR CONDITIONS OF APPROVAL

Non-Standard Location

SUBJECT TO LIKE APPROVAL BY STATE

Additional data for EC transaction #251798 that would not fit on the form

32. Additional remarks, continued

(vert) 3.3 3.87 4.64
8-3/4" 4362-5200' 5-1/2" 20# L80 LTC 9.3ppg 8269psi 9190psi 416000lbs
(curve) (4838 TVD) 3.53 9.93 4.30
7-7/8" 5200-9351' 5-1/2" 20# L80 LTC 9.3ppg 8739psi 9190psi 416000lbs
(lat.) (4770' TVD) 3.79 3.99 2.22

*Calculated Safety Factors based on:
Burst: Full evacuation of annulus & csg filled with mud
Collapse: Mud in annulus & full evacuation of csg
Tension: Annulus & csg filled with mud

Production csg will be a tapered string w/7" csg f/surf to KOP(cmtd through a stage tool f/ KOP to 2500'), uncemented 5-1/2" csg f/ KOP to LP, & uncemented 5-1/2" csg with packers & sleeves f/ LP to TD to isolate San Andres & Glorieta formations, two hydraulic-set open hole packers will be placed in 5-1/2" csg & set 50' above & 50' below the top of Glorieta formation.

CMT PROGRAM:
Surf (TOC-Surf) 100% excess cmt; cmt with:
Single Slurry: 520sx CL c w/2% CaCL2(14.8wt, 1.34yld, 6.31 gal wtr/sk)
Comp Strengths: 12hr - 1270psi 24hr - 2029psi
*If lost circ is encountered while drlg 17-1/2" hole, operator may pmp 200sx Cl C Thixotropic cmt(14.4wt, 1.55yld, 6.65 gal wtr/sk) ahead of cmt slurry shown above. If cmt does not circ to surf, appropriate BLM office shall be notified. The TOC shall be determined by a method approved by BLM. Operator will propose a remediation method & request BLM approval

Interm (TOC-surf) 50% excess cmt; cmt with:
Lead: 700sx 35/65 Poz C w/6% gel+5% Salt (12.9wt, 1.92yld, 9.92 gal wtr/sk)
Comp Strengths: 12hr - 820psi 24hr - 1189psi
Tail: 290sx Cl C(14.8wt, 1.33yld, 6.31 gal wtr/sk)
Comp Strengths: 12hr - 1120psi 24hr - 2106psi
*If water flow is encountered, operator may use a DVT in 9-5/8" Interm csg & operator may place an ECP below DVT. Operator may also set csg slips before cmtg. Assuming DVT is set at 1800', the following cmt would be used:
1st stage: 630sx Cl C(14.8wt, 1.33yld, 6.31 gal wtr/sK) 50% excess cmt
2nd stage: 670sx Cl C (14.8wt, 1.33yld, 6.31 gal wtr/sk) 50% excess cmt. If a DVT is set at a different depth, cmt volumes will be adjusted accordingly.

Prod (TOC: ~2500' f/surf) 35% excess cmt; cmt with:
Lead:110sx 35/65 Poz C W/6% Gel+5% Salt (12.6wt, 2.06yld, 10.95 gal wtr/sk)
Comp Strengths: 12hr - 317psi 24hr - 500psi
Tail:130sx TXI Lighweight w/1.3% Salt+0.3% Retarder(13.0wt,1.48yld,7.58 gal wtr/sk) Comp Strengths: 12hr - 1100psi 24hr - 1755psi
*If operator chooses to run fluid caliper, above cmt volumes may be revised based on fluid caliper measurement.

**** PLEASE SEE ATTACHMENT FOR ADDITIONAL SUNDRY INFORMATION; ADDITIONAL INFORMATION DID NOT FIT ONLINE*****

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

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

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

API Number	Pool Code	Pool Name

Property Code	Property Name	Well Number
	RAVEN FEDERAL	19H
OGRID No.	**Operator Name**	**Elevation**
	APACHE CORPORATION	3713'

Surface Location

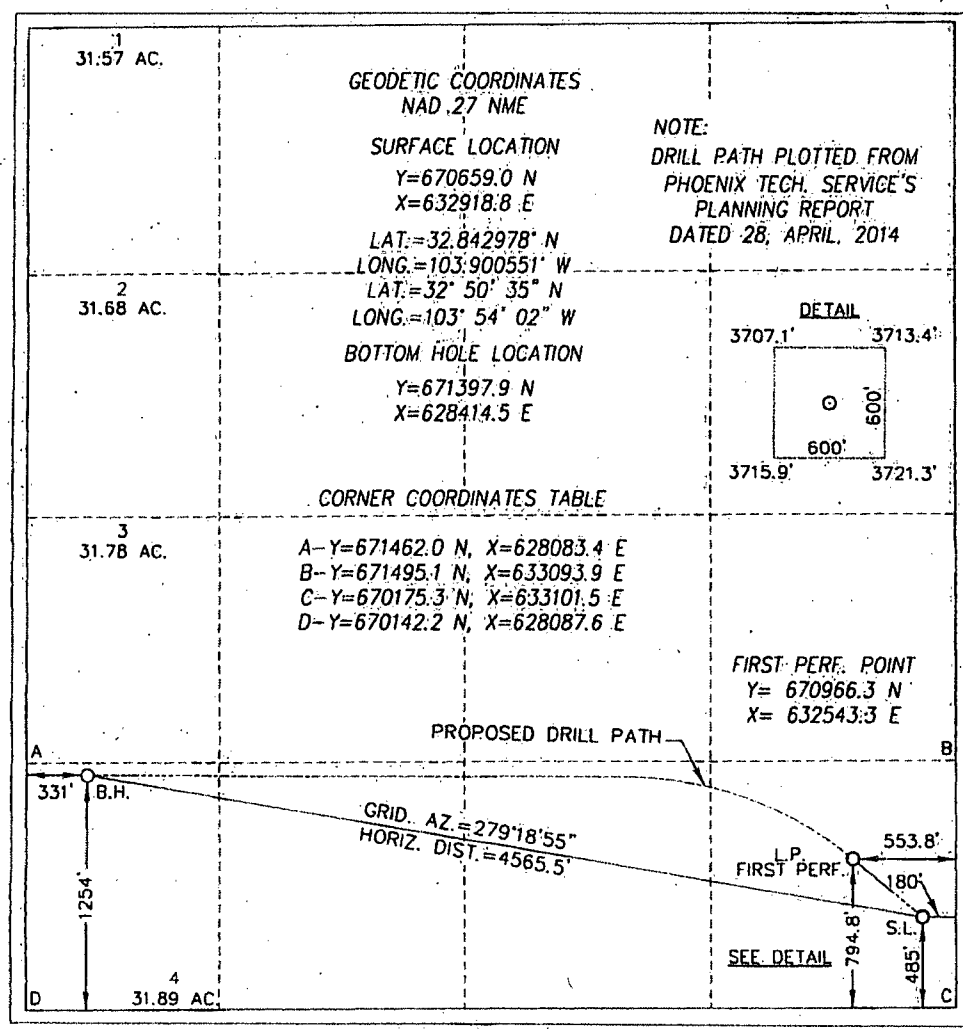
UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
P	7	17-S	31-E		485	SOUTH	180	EAST	EDDY

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		1254	SOUTH	331	WEST	EDDY

Dedicated Acres	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



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 Date

Printed Name

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:

RONALD J. EIDSON
NEW MEXICO
3239
PROFESSIONAL SURVEYOR

08/07/2014

Certificate Number Gary O. Eidson 12641
Ronald J. Eidson 3239

LSL Rel. W.O.: 14.13.0839 JWSC W.O.: 14.13.0839

DRILLING PLAN: BLM COMPLIANCE
(Supplement to BLM 3160-3)

APACHE CORPORATION (OGRID: 873) RAVEN FEDERAL #19H

Lease #: NMLC-029435A Projected TVD: ~4770' MD: ~9351' GL: 3724'
SL: 485' FSL & 180' FEL UL: P SEC: 7 BHL: 1254' FSL & 330' FWL UL: 4 SEC: 7
T17S R31E EDDY COUNTY, NEW MEXICO

1. GEOLOGIC NAME OF SURFACE FORMATION: Eolian/Piedmond Alluvial Deposits

2. ESTIMATED TOPS OF GEOLOGICAL MARKERS & DEPTHS OF ANTICIPATED FRESH WATER, OIL OR GAS:

Quaternary Aeolian	Surf	Queen	2403'
Rustler	262'	Grayburg	2792'
Top of Salt	497'	San Andres	3102'
Base of Salt	1329'	Glorieta	4595'
Yates	1507'	Yeso (Paddock)	4653' (Oil)
Seven Rivers	1786'	TD	TVD: 4770' MD: 9351'

Avg Depth to Ground Water: ~80'

All FW & prospectively valuable minerals, as described by BLM, encountered during drlg, will be recorded by depth & adequately protected. All oil & gas shows within zones of correlative rights will be tested to determine commercial potential. The surf FW sands will be protected by setting 13-3/8" surf csg at 450' & circ cmt to surf. All intervals will be isolated by setting a 7" & 5-1/2" tapered production csg string at TD and cmtg as shown below.

3. CASING PROGRAM: All casing is new & API approved

HOLE SIZE	DEPTH	OD CASING	WEIGHT	GRADE	COLLAR	DESIGN MW	COLLAPSE Rating/SF*	BURST Rating/SF*	TENSION Rating/SF*
17-1/2"	0' – 450'	13-3/8"	48#	H-40	STC	8.8 ppg	770 psi 3.592	1730 psi 5.49	322000 lbs 17.22
12-1/4"	0' - 3500'	9-5/8"	36#	J-55	STC	9.8 ppg	2020 psi 1.134	3520 psi 1.45	394000 lbs 3.68
8-3/4" (vertical)	0' – 4362' (4362' TVD)	7"	29#	L-80	LTC	9.3 ppg	7020 psi 3.33	8160 psi 3.87	587000 lbs 4.64
8-3/4" (curve)	4362' - 5200' (4838' TVD)	5-1/2"	20#	L-80	LTC	9.3 ppg	8269 psi 3.53	9190 psi 3.93	416000 lbs 4.30
7-7/8" (lateral)	5200' - 9351' (4770' TVD)	5-1/2"	20#	L-80	LTC	9.3 ppg	8739 psi 3.79	9190 psi 3.99	416000 lbs 2.22

*Calculated Safety Factors based on:
Burst: Full evacuation of annulus and casing filled with mud
Collapse: Mud in annulus and full evacuation of casing
Tension: Annulus and casing filled with mud

Production csg will be a tapered string w/ 7" csg from surf to KOP (cmtd through a stage tool f/ KOP to 2500'), uncemented 5-1/2" csg f/ KOP to LP, & uncemented 5-1/2" csg with packers & sleeves f/ LP to TD to isolate San Andres & Glorieta formations, two hydraulic-set open hole packers will be placed in 5-1/2" csg & set 50' above & 50' below the top of Glorieta formation.

4. CEMENT PROGRAM:

A. Surface (TOC – Surface) **100% excess cmt Cmt with:**

Single Slurry: 520 sx Class C w/2% CaCl2 *(14.8 wt, 1.34 yld, 6.31 gal wtr/sk)*
*Compressive Strengths : **12 hr** – 1270 psi **24 hr** – 2029 psi*

If lost circ is encountered while drlg the 17-1/2" hole, operator may pmp 200sx Cl C thixotropic cmt *(14.4 wt, 1.55 yld, 6.65 gal wtr/sk)* ahead of the cement slurry shown above. If cmt does not circ to surf, the appropriate BLM office shall be notified. The TOC shall be determined by a method approved by BLM. Operator will propose a remediation method and request BLM approval.

B. Intermediate (TOC – Surface) **50% excess cmt **. Cmt with:

Lead: 700 sx 35/65 Poz C w/6% Gel + 5% Salt (12.9 wt, 1.92 yld, 9.92 gal wtr/sk)
Compressive Strengths: 12 hr – 820 psi 24 hr – 1189 psi

Tail: 290 sx Class C (14.8 wt, 1.33 yld, 6.31 gal wtr/sk)
Compressive Strengths: 12 hr – 1120 psi 24 hr – 2106 psi

If a water flow is encountered, operator may use a DVT in the 9-5/8" intermediate csg & operator may place an ECP below the DVT. Operator may also set csg slips before cmtg. Assuming a DVT is set at 1800', the following cmt would be used: 1st Stage 630sx Cl C (14.8 wt, 1.33 yld, 6.31 gal wtr/sk) 50% excess cmt 2nd Stage 670sx Cl C (14.8 wt, 1.33 yld, 6.31 gal wtr/sk) 50% excess cmt If a DVT is set at a different depth, cmt volumes will be adjusted accordingly.

C. Production (TOC: ~2500' from Surface) **35% excess cmt Cmt with:**

Lead: 110 sx 35-65 Poz C w/6% Gel + 5% Salt (12.6 wt, 2.06 yld, 10.95 gal wtr/sk)

Compressive Strengths: 12 hr – 317 psi 24 hr – 500 psi

Tail: 130 sx TXI Lightweight w/1.3% Salt + 0.3% Retarder (13.0 wt, 1.48 yld , 7.58 gal wtr/sk)

Compressive Strengths: 12 hr – 1100 psi 24 psi – 1755 psi

If operator chooses to run a fluid caliper, the above cmt volumes may be revised based on fluid caliper measurement.

5. PROPOSED CONTROL EQUIPMENT

"EXHIBIT 3" shows a 13-5/8" 3M psi WP BOP consisting of an annular bag type preventer. This BOP will be nippled up on the 13-3/8" surface csg head & tested to 2000psi using a test plug. After 9-5/8" intermediate csg is set & cmtd, an 11" 3M BOP consisting of an annular bag type preventer, middle pipe rams & bottom blind rams will be installed & utilized continuously until TD is reached (*"EXHIBIT 3A"*). That BOP will be tested at 2000 psi; max surface pressure is not expected to exceed 2000 psi. BHP is calculated to be approximately 2306 psi at TD & 2340 psi at the deepest point in the lateral. All BOPs & associated equipment will be tested per BLM *Drilling Operations Order #2*. The BOPs will be operated & checked each 24 hour period & blind rams will be operated and checked when the drill pipe is out of the hole. Function tests will be documented on the daily driller's log. *"EXHIBIT 3 & 3A"* also show a 3M psi choke manifold with a 3" blow down line. Full opening stabbing valve & kelly cock will be on the derrick floor in case of need. No abnormal pressures or temperatures are expected in this well. No nearby wells have encountered any well control problems.

6. AUXILIARY WELL CONTROL EQUIPMENT / MONITORING EQUIPMENT:

13-5/8" 3000 psi annular preventer (3M BOP/BOPE to be used as a 2M system)
11" 3000 psi double BOP (blind & pipe rams) and annular preventer (3M BOP/BOPE to be used as a 2M system)
4-1/2" x 3000 psi kelly valve
13-5/8" or 11" x 3000 psi mud cross – H2S detector on production hole
Gate-type safety valve – 3" choke line from BOP to manifold
2" adjustable chokes – 3" blow down line
Fill up line per BLM *Onshore Order #2*

7. PROPOSED MUD CIRCULATION SYSTEM: (CLOSED LOOP SYSTEM)

INTERVAL	MUD WEIGHT (ppg)	VISCOSITY (sec/qt)	FLUID LOSS (cc)	MUD TYPE
0' – 450'	8.3 – 8.8	28 – 36	NC	FW
450' - 3500'	9.6 – 9.8	28 – 29	NC	Brine
3500' – 4362'	9.0 – 9.8	28 – 29	NC	Brine/Cut Brine
4362' – 9351'	9.0 – 9.3	28 – 29	NC	Cut Brine

** Visual mud monitoring equipment shall be in place to detect volume changes. A mud test shall be performed every 24 hours after mudding up to determine density, viscosity, gel strength, filtration, and pH. The necessary mud products for weight addition and fluid loss control will be on location at all times.

8. LOGGING, CORING & TESTING PROGRAM:

A. No cores, DSTs, or open hole logs are planned at this time.
B. Mudloggers from 4200' to TD.
C. Additional testing will be initiated subsequent to setting the 7" and 5-1/2" tapered production casing string. Specific intervals will be targeted based on geological sample shows.

9. POTENTIAL HAZARDS:

No abnormal pressures or temperatures are anticipated. In the event abnormal pressures are encountered, the proposed mud program will be modified to increase the mud-weight. There is known presence of H2S in this area. If H2S is encountered the operator will comply with the provisions of BLM *Onshore Oil & Gas Order #6*. All personnel will be familiar with all aspects of safe operation of equipment being used to drill this well. Estimated maximum BHP: 2340 psi and estimated BHT: 115° F.

10. ANTICIPATED STARTING DATE AND DURATION OF OPERATIONS:

Road and location construction will begin after BLM has approved APD. Anticipated spud date will be after BLM approval and as soon as an appropriate rig is available. Move in operations and drilling is expected to take approximately 20 days. If production casing is run, an additional 90 days will be needed to complete the well and construct surface facilities and/or lay flow lines in order to place the well on production.

Apache
EXPLORING WHAT'S POSSIBLE

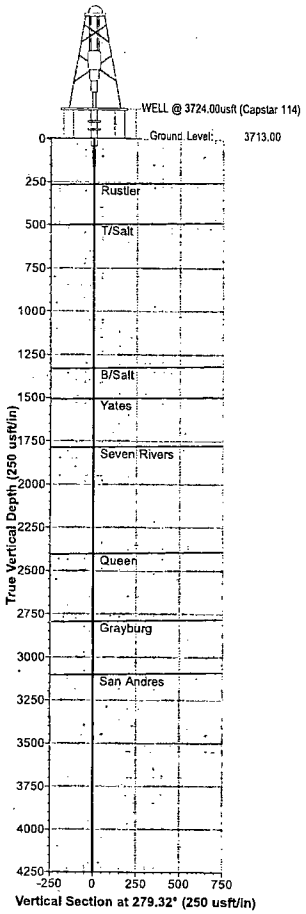
Project: Eddy County, NM (NAD27 NME)
Site: Raven Federal
Well: #19H
Wellbore: WB1
Design: Plan #2 04-28-14
Rig: Capstar 114

PHOENIX TECHNOLOGY SERVICES

T G M

Azimuths to Grid North
True North: -0.23°
Magnetic North: 7.41°

Magnetic Field
Strength: 48839.3snT
Dip Angle: 60.67°
Date: 07/25/2012
Model: IGRF2010_14



WELL DETAILS

Ground Level: 3713.00

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.00	0.00	670659.00	632918.80	32° 50' 34.72230 N	103° 54' 1.98434 W

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Target	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
2	4362.60	0.00	0.00	4362.60	0.00	0.00	0.00	0.00	0.00		KOP: Start Build 12.00°/100'
3	5120.40	90.94	309.30	4840.00	307.36	-375.52	12.00	309.30	420.32		LP at 90.94° Inc, Start Turn 3.00°/100'
4	6430.33	90.94	270.00	4817.72	739.17	-1584.95	3.00	-89.67	1683.70		EOT: Hold 270° Azm
5	9351.07	90.94	270.00	4770.00	739.00	-4505.30	0.00	0.00	4565.51	BHL v2 Raven Fed 19H	TD at 9351.07

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
BHL v2 Raven Fed 19H	4770.00	739.00	-4505.30	671398.00	628413.50	32° 50' 42.21434 N	103° 54' 54.75796 W	Point

- plan hits target center

Map System: US State Plane 1927 (Exact solution)
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1866
Zone Name: New Mexico East 3001

Local Origin: Well #19H, Grid North

Latitude: 32° 50' 34.72230 N
Longitude: 103° 54' 1.98434 W

Grid East: 632918.80
Grid North: 670659.00
Scale Factor: 1.000

Geomagnetic Model: IGRF2010_14
Sample Date: 25-Jul-12
Magnetic Declination: 7.65°
Dip Angle from Horizontal: 60.67°
Magnetic Field Strength: 48839

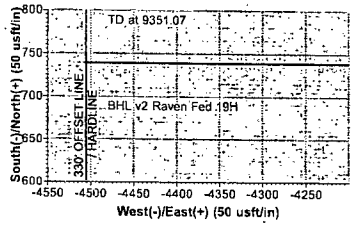
To convert a Magnetic Direction to a Grid Direction, Add 7.41°
To convert a Magnetic Direction to a True Direction, Add 7.65° East
To convert a True Direction to a Grid Direction, Subtract 0.23°

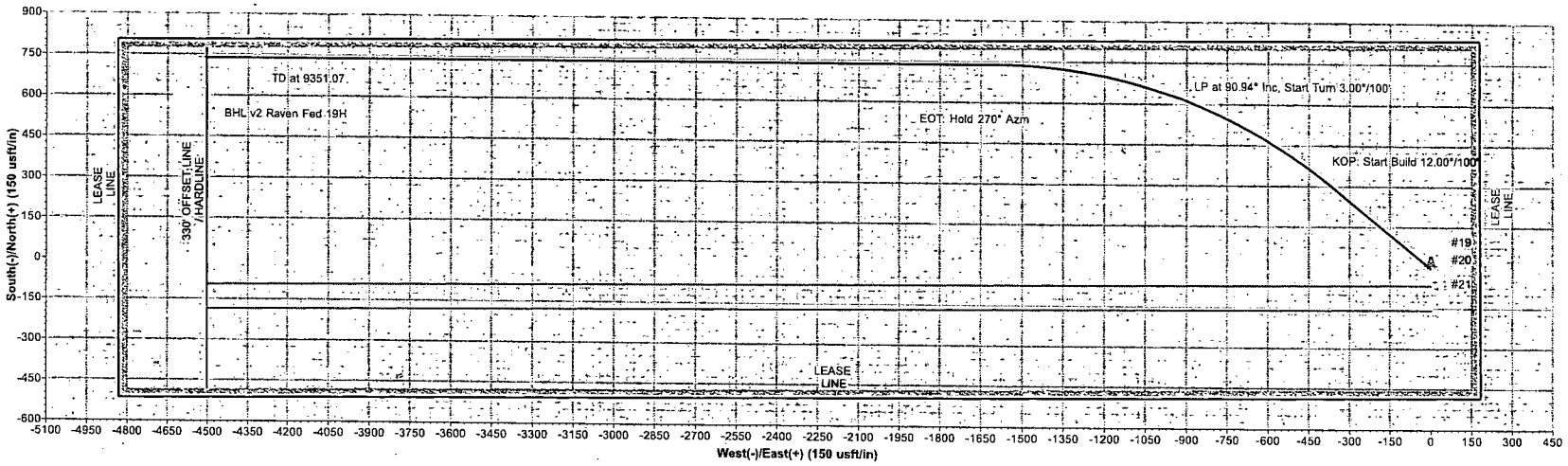
LEGEND

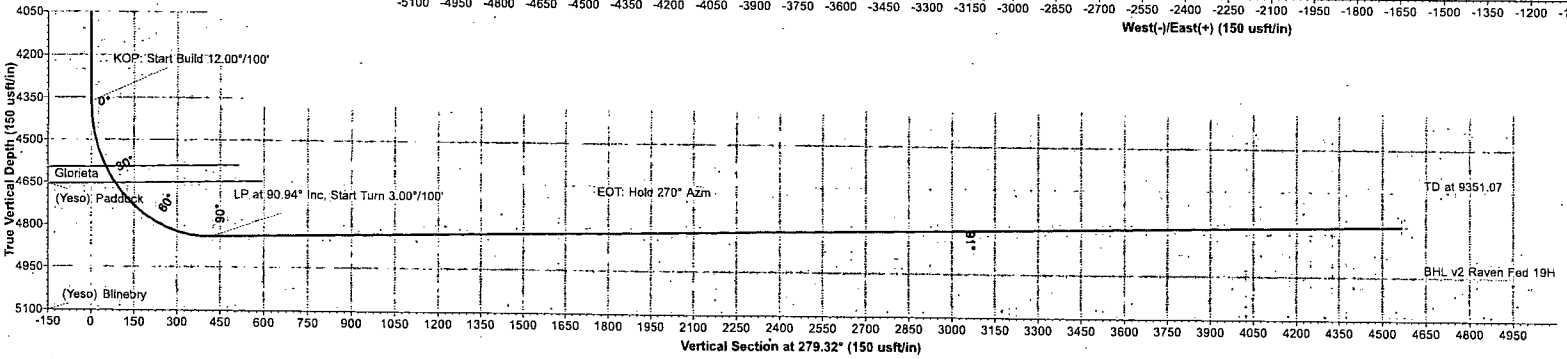
- #20H, WB1/Job #1410582, Plan #2 04-03-14 V0
- #21H, WB1/Job #1410583, Plan #2 04-03-14 V0
- Plan #2 04-28-14

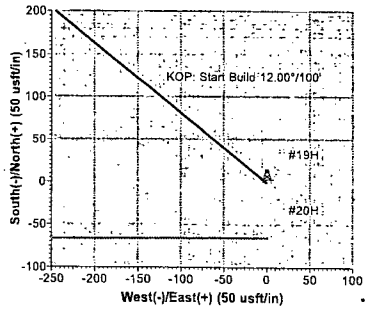
FORMATION TOP DETAILS

TVDPath	MDPath	Formation	DipAngle	DipDir
262.00	262.00	Rustler	-0.94	279.32
497.00	497.00	T/Salt	-0.94	279.32
1329.00	1329.00	B/Salt	-0.94	279.32
1507.00	1507.00	Yates	-0.94	279.32
1786.00	1786.00	Seven Rivers	-0.94	279.32
2403.00	2403.00	Queen	-0.94	279.32
2792.00	2792.00	Grayburg	-0.94	279.32
3102.00	3102.00	San Andres	-0.94	279.32
4594.15	4604.35	Glorieta	-0.94	279.32
4651.62	4673.03	(Yeso) Paddock	-0.94	279.32









Created By: Julio Piña Date: 15:44, April 28 2014

Apache
EXPLORING WHAT'S POSSIBLE

Apache Corporation

Eddy County, NM (NAD27 NME)
Raven Federal
#19H
WB1

Plan: Plan #2 04-28-14

Planning Report

28 April, 2014

PHOENIX
TECHNOLOGY SERVICES

Phoenix Technology Services

Planning Report

Company:	Apache Corporation	Local Co-ordinate Reference:	Well #19H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	WELL @ 3724.00usft (Capstar 114)
Site:	Raven Federal	MD Reference:	WELL @ 3724.00usft (Capstar 114)
Well:	#19H	North Reference:	Grid
Wellbore:	WB1	Survey Calculation Method:	Minimum Curvature
Design:	Plan #2 04-28-14	Database:	Compass 5000 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	Latitude:	32° 51' 0.24298 N
From:	Map	Easting:	633,303.50 usft	Longitude:	103° 53' 57.35087 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.24 °

Well: #19H

Well Position	+N/-S	0.00 usft	Northing:	670,659.00 usft	Latitude:	32° 50' 34.72230 N
	+E/-W	0.00 usft	Easting:	632,918.80 usft	Longitude:	103° 54' 1.98434 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	3,713.00 usft

Wellbore: WB1

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010_14	07/25/12	7.65	60.67	48,839

Design: Plan #2 04-28-14

Audit Notes:

Version:		Phase:	PLAN	Tie On Depth:	0.00

Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.00	0.00	0.00	279.32

Survey Tool Program: Date 04/28/14

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.00	9,351.07	Plan #2 04-28-14 (WB1)	MWD	MWD - Standard

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0.00	0.00	0.00	-3,724.00	0.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
100.00	0.00	0.00	-3,624.00	100.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
200.00	0.00	0.00	-3,524.00	200.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
262.00	0.00	0.00	-3,462.00	262.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
Rustler										
300.00	0.00	0.00	-3,424.00	300.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
400.00	0.00	0.00	-3,324.00	400.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
497.00	0.00	0.00	-3,227.00	497.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
T/Salt										
500.00	0.00	0.00	-3,224.00	500.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
600.00	0.00	0.00	-3,124.00	600.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
700.00	0.00	0.00	-3,024.00	700.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
800.00	0.00	0.00	-2,924.00	800.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
900.00	0.00	0.00	-2,824.00	900.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
1,000.00	0.00	0.00	-2,724.00	1,000.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
1,100.00	0.00	0.00	-2,624.00	1,100.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
1,200.00	0.00	0.00	-2,524.00	1,200.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
1,300.00	0.00	0.00	-2,424.00	1,300.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
1,329.00	0.00	0.00	-2,395.00	1,329.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
B/Salt										
1,400.00	0.00	0.00	-2,324.00	1,400.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
1,500.00	0.00	0.00	-2,224.00	1,500.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
1,507.00	0.00	0.00	-2,217.00	1,507.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
Yates										
1,600.00	0.00	0.00	-2,124.00	1,600.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
1,700.00	0.00	0.00	-2,024.00	1,700.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
1,786.00	0.00	0.00	-1,938.00	1,786.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
Seven Rivers										

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1,800.00	0.00	0.00	-1,924.00	1,800.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
1,900.00	0.00	0.00	-1,824.00	1,900.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
2,000.00	0.00	0.00	-1,724.00	2,000.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
2,100.00	0.00	0.00	-1,624.00	2,100.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
2,200.00	0.00	0.00	-1,524.00	2,200.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
2,300.00	0.00	0.00	-1,424.00	2,300.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
2,400.00	0.00	0.00	-1,324.00	2,400.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
2,403.00	0.00	0.00	-1,321.00	2,403.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
Queen										
2,500.00	0.00	0.00	-1,224.00	2,500.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
2,600.00	0.00	0.00	-1,124.00	2,600.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
2,700.00	0.00	0.00	-1,024.00	2,700.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
2,792.00	0.00	0.00	-932.00	2,792.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
Grayburg										
2,800.00	0.00	0.00	-924.00	2,800.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
2,900.00	0.00	0.00	-824.00	2,900.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
3,000.00	0.00	0.00	-724.00	3,000.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
3,100.00	0.00	0.00	-624.00	3,100.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
3,102.00	0.00	0.00	-622.00	3,102.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
San Andres										
3,200.00	0.00	0.00	-524.00	3,200.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
3,300.00	0.00	0.00	-424.00	3,300.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
3,400.00	0.00	0.00	-324.00	3,400.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
3,500.00	0.00	0.00	-224.00	3,500.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
3,600.00	0.00	0.00	-124.00	3,600.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
3,700.00	0.00	0.00	-24.00	3,700.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
3,800.00	0.00	0.00	76.00	3,800.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00

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Planned Survey

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3,900.00	0.00	0.00	176.00	3,900.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
4,000.00	0.00	0.00	276.00	4,000.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
4,100.00	0.00	0.00	376.00	4,100.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
4,200.00	0.00	0.00	476.00	4,200.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
4,300.00	0.00	0.00	576.00	4,300.00	0.00	0.00	670,659.00	632,918.80	0.00	0.00
4,362.60	0.00	0.00	638.60	4,362.60	0.00	0.00	670,659.00	632,918.80	0.00	0.00
KOP: Start Build 12.00°/100'										
4,375.00	1.49	309.30	651.00	4,375.00	0.10	-0.12	670,659.10	632,918.68	0.14	12.00
4,400.00	4.49	309.30	675.96	4,399.96	0.93	-1.13	670,659.93	632,917.67	1.27	12.00
4,425.00	7.49	309.30	700.82	4,424.82	2.58	-3.15	670,661.58	632,915.65	3.53	12.00
4,450.00	10.49	309.30	725.51	4,449.51	5.05	-6.17	670,664.05	632,912.63	6.91	12.00
4,475.00	13.49	309.30	749.96	4,473.96	8.34	-10.19	670,667.34	632,908.61	11.41	12.00
4,500.00	16.49	309.30	774.11	4,498.11	12.44	-15.19	670,671.44	632,903.61	17.01	12.00
4,525.00	19.49	309.30	797.89	4,521.89	17.33	-21.17	670,676.33	632,897.63	23.69	12.00
4,550.00	22.49	309.30	821.23	4,545.23	23.00	-28.10	670,682.00	632,890.70	31.45	12.00
4,575.00	25.49	309.30	844.06	4,568.06	29.43	-35.96	670,688.43	632,882.84	40.25	12.00
4,600.00	28.49	309.30	866.34	4,590.34	36.62	-44.74	670,695.62	632,874.06	50.08	12.00
4,604.35	29.01	309.30	870.15	4,594.15	37.94	-46.36	670,696.94	632,872.44	51.89	12.00
Glorieta										
4,625.00	31.49	309.30	887.99	4,611.99	44.53	-54.41	670,703.53	632,864.39	60.90	12.00
4,650.00	34.49	309.30	908.96	4,632.96	53.15	-64.94	670,712.15	632,853.86	72.69	12.00
4,673.03	37.25	309.30	927.62	4,651.62	61.70	-75.38	670,720.70	632,843.42	84.37	12.00
(Yeso) Paddock										
4,675.00	37.49	309.30	929.18	4,653.18	62.45	-76.31	670,721.45	632,842.49	85.41	12.00
4,700.00	40.49	309.30	948.61	4,672.61	72.42	-88.48	670,731.42	632,830.32	99.03	12.00
4,725.00	43.49	309.30	967.19	4,691.19	83.01	-101.42	670,742.01	632,817.38	113.51	12.00
4,750.00	46.49	309.30	984.87	4,708.87	94.20	-115.09	670,753.20	632,803.71	128.82	12.00

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4,775.00	49.49	309.30	1,001.60	4,725.60	105.96	-129.46	670,764.96	632,789.34	144.91	12.00
4,800.00	52.49	309.30	1,017.34	4,741.34	118.27	-144.49	670,777.27	632,774.31	161.73	12.00
4,825.00	55.49	309.30	1,032.03	4,756.03	131.07	-160.14	670,790.07	632,758.66	179.25	12.00
4,850.00	58.49	309.30	1,045.65	4,769.65	144.35	-176.36	670,803.35	632,742.44	197.40	12.00
4,875.00	61.49	309.30	1,058.16	4,782.16	158.06	-193.11	670,817.06	632,725.69	216.15	12.00
4,900.00	64.49	309.30	1,069.51	4,793.51	172.17	-210.35	670,831.17	632,708.45	235.44	12.00
4,925.00	67.49	309.30	1,079.68	4,803.68	186.63	-228.02	670,845.63	632,690.78	255.22	12.00
4,950.00	70.49	309.30	1,088.64	4,812.64	201.41	-246.07	670,860.41	632,672.73	275.43	12.00
4,975.00	73.49	309.30	1,096.37	4,820.37	216.47	-264.47	670,875.47	632,654.33	296.02	12.00
5,000.00	76.49	309.30	1,102.85	4,826.85	231.76	-283.15	670,890.76	632,635.65	316.93	12.00
5,025.00	79.49	309.30	1,108.05	4,832.05	247.24	-302.07	670,906.24	632,616.73	338.11	12.00
5,050.00	82.49	309.30	1,111.97	4,835.97	262.88	-321.18	670,921.88	632,597.62	359.49	12.00
5,075.00	85.49	309.30	1,114.59	4,838.59	278.63	-340.42	670,937.63	632,578.38	381.03	12.00
5,100.00	88.49	309.30	1,115.90	4,839.90	294.44	-359.73	670,953.44	632,559.07	402.65	12.00
5,120.40	90.94	309.30	1,116.00	4,840.00	307.36	-375.52	670,966.36	632,543.28	420.32	12.00
LP at 90.94° Inc, Start Turn 3.00°/100'										
5,200.00	90.95	306.91	1,114.69	4,838.69	356.47	-438.14	671,015.47	632,480.66	490.06	3.00
5,300.00	90.96	303.91	1,113.02	4,837.02	414.40	-519.62	671,073.40	632,399.18	579.84	3.00
5,400.00	90.97	300.91	1,111.33	4,835.33	467.98	-604.02	671,126.98	632,314.78	671.81	3.00
5,500.00	90.98	297.91	1,109.62	4,833.62	517.08	-691.11	671,176.08	632,227.69	765.69	3.00
5,600.00	90.99	294.91	1,107.90	4,831.90	561.55	-780.65	671,220.55	632,138.15	861.25	3.00
5,700.00	90.99	291.91	1,106.17	4,830.17	601.27	-872.39	671,260.27	632,046.41	958.21	3.00
5,800.00	90.99	288.91	1,104.43	4,828.43	636.13	-966.09	671,295.13	631,952.71	1,056.32	3.00
5,900.00	90.99	285.91	1,102.70	4,826.70	666.04	-1,061.49	671,325.04	631,857.31	1,155.30	3.00
6,000.00	90.99	282.91	1,100.97	4,824.97	690.92	-1,158.31	671,349.92	631,760.49	1,254.88	3.00
6,100.00	90.98	279.91	1,099.26	4,823.26	710.69	-1,256.31	671,369.69	631,662.49	1,354.78	3.00
6,200.00	90.97	276.91	1,097.56	4,821.56	725.31	-1,355.21	671,384.31	631,563.59	1,454.74	3.00

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6,300.00	90.96	273.91	1,095.87	4,819.87	734.73	-1,454.74	671,393.73	631,464.06	1,554.49	3.00
6,400.00	90.94	270.91	1,094.22	4,818.22	738.93	-1,554.63	671,397.93	631,364.17	1,653.74	3.00
6,430.33	90.94	270.00	1,093.72	4,817.72	739.17	-1,584.95	671,398.17	631,333.85	1,683.70	3.00
EOT: Hold 270° Azm										
6,500.00	90.94	270.00	1,092.58	4,816.58	739.16	-1,654.61	671,398.16	631,264.19	1,752.44	0.00
6,600.00	90.94	270.00	1,090.95	4,814.95	739.16	-1,754.60	671,398.16	631,164.20	1,851.11	0.00
6,700.00	90.94	270.00	1,089.31	4,813.31	739.15	-1,854.59	671,398.15	631,064.21	1,949.77	0.00
6,800.00	90.94	270.00	1,087.68	4,811.68	739.15	-1,954.57	671,398.15	630,964.23	2,048.44	0.00
6,900.00	90.94	270.00	1,086.05	4,810.05	739.14	-2,054.56	671,398.14	630,864.24	2,147.11	0.00
7,000.00	90.94	270.00	1,084.41	4,808.41	739.14	-2,154.55	671,398.14	630,764.25	2,245.78	0.00
7,100.00	90.94	270.00	1,082.78	4,806.78	739.13	-2,254.53	671,398.13	630,664.27	2,344.44	0.00
7,200.00	90.94	270.00	1,081.15	4,805.15	739.12	-2,354.52	671,398.12	630,564.28	2,443.11	0.00
7,300.00	90.94	270.00	1,079.51	4,803.51	739.12	-2,454.51	671,398.12	630,464.29	2,541.78	0.00
7,400.00	90.94	270.00	1,077.88	4,801.88	739.11	-2,554.49	671,398.11	630,364.31	2,640.45	0.00
7,500.00	90.94	270.00	1,076.24	4,800.24	739.11	-2,654.48	671,398.11	630,264.32	2,739.11	0.00
7,600.00	90.94	270.00	1,074.61	4,798.61	739.10	-2,754.47	671,398.10	630,164.33	2,837.78	0.00
7,700.00	90.94	270.00	1,072.98	4,796.98	739.09	-2,854.45	671,398.09	630,064.35	2,936.45	0.00
7,800.00	90.94	270.00	1,071.34	4,795.34	739.09	-2,954.44	671,398.09	629,964.36	3,035.11	0.00
7,900.00	90.94	270.00	1,069.71	4,793.71	739.08	-3,054.43	671,398.08	629,864.37	3,133.78	0.00
8,000.00	90.94	270.00	1,068.07	4,792.07	739.08	-3,154.41	671,398.08	629,764.39	3,232.45	0.00
8,100.00	90.94	270.00	1,066.44	4,790.44	739.07	-3,254.40	671,398.07	629,664.40	3,331.12	0.00
8,200.00	90.94	270.00	1,064.81	4,788.81	739.07	-3,354.39	671,398.07	629,564.41	3,429.78	0.00
8,300.00	90.94	270.00	1,063.17	4,787.17	739.06	-3,454.37	671,398.06	629,464.43	3,528.45	0.00
8,400.00	90.94	270.00	1,061.54	4,785.54	739.05	-3,554.36	671,398.05	629,364.44	3,627.12	0.00
8,500.00	90.94	270.00	1,059.91	4,783.91	739.05	-3,654.35	671,398.05	629,264.45	3,725.78	0.00
8,600.00	90.94	270.00	1,058.27	4,782.27	739.04	-3,754.33	671,398.04	629,164.47	3,824.45	0.00
8,700.00	90.94	270.00	1,056.64	4,780.64	739.04	-3,854.32	671,398.04	629,064.48	3,923.12	0.00

Company:	Apache Corporation	Local Co-ordinate Reference:	Well #19H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	WELL @ 3724.00usft (Capstar 114)
Site:	Raven Federal	MD Reference:	WELL @ 3724.00usft (Capstar 114)
Well:	#19H	North Reference:	Grid
Wellbore:	WB1	Survey Calculation Method:	Minimum Curvature
Design:	Plan #2 04-28-14	Database:	Compass 5000 GCR DB

Planned Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVDSS (usft)	TVD (usft)	N/S (usft)	E/W (usft)	Northing (usft)	Easting (usft)	V Sec (usft)	DLeg (°/100usft)
8,800.00	90.94	270.00	1,055.00	4,779.00	739.03	-3,954.31	671,398.03	628,964.49	4,021.79	0.00
8,900.00	90.94	270.00	1,053.37	4,777.37	739.03	-4,054.29	671,398.03	628,864.51	4,120.45	0.00
9,000.00	90.94	270.00	1,051.74	4,775.74	739.02	-4,154.28	671,398.02	628,764.52	4,219.12	0.00
9,100.00	90.94	270.00	1,050.10	4,774.10	739.01	-4,254.27	671,398.01	628,664.53	4,317.79	0.00
9,200.00	90.94	270.00	1,048.47	4,772.47	739.01	-4,354.25	671,398.01	628,564.55	4,416.45	0.00
9,300.00	90.94	270.00	1,046.83	4,770.83	739.00	-4,454.24	671,398.00	628,464.56	4,515.12	0.00
9,351.07	90.94	270.00	1,046.00	4,770.00	739.00	-4,505.30	671,398.00	628,413.50	4,565.51	0.00

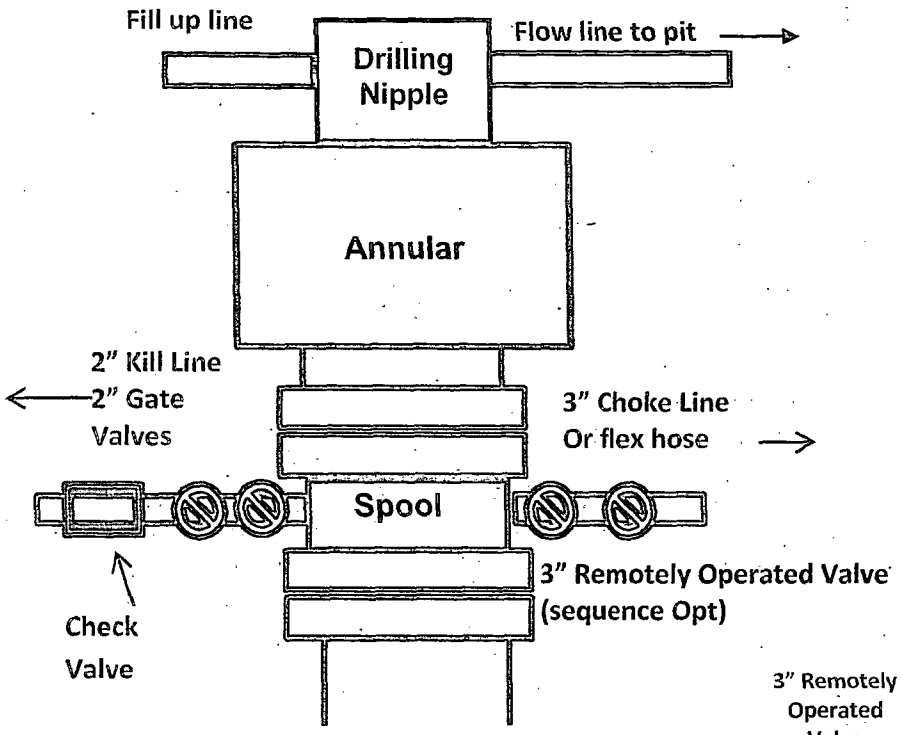
TD at 9351.07

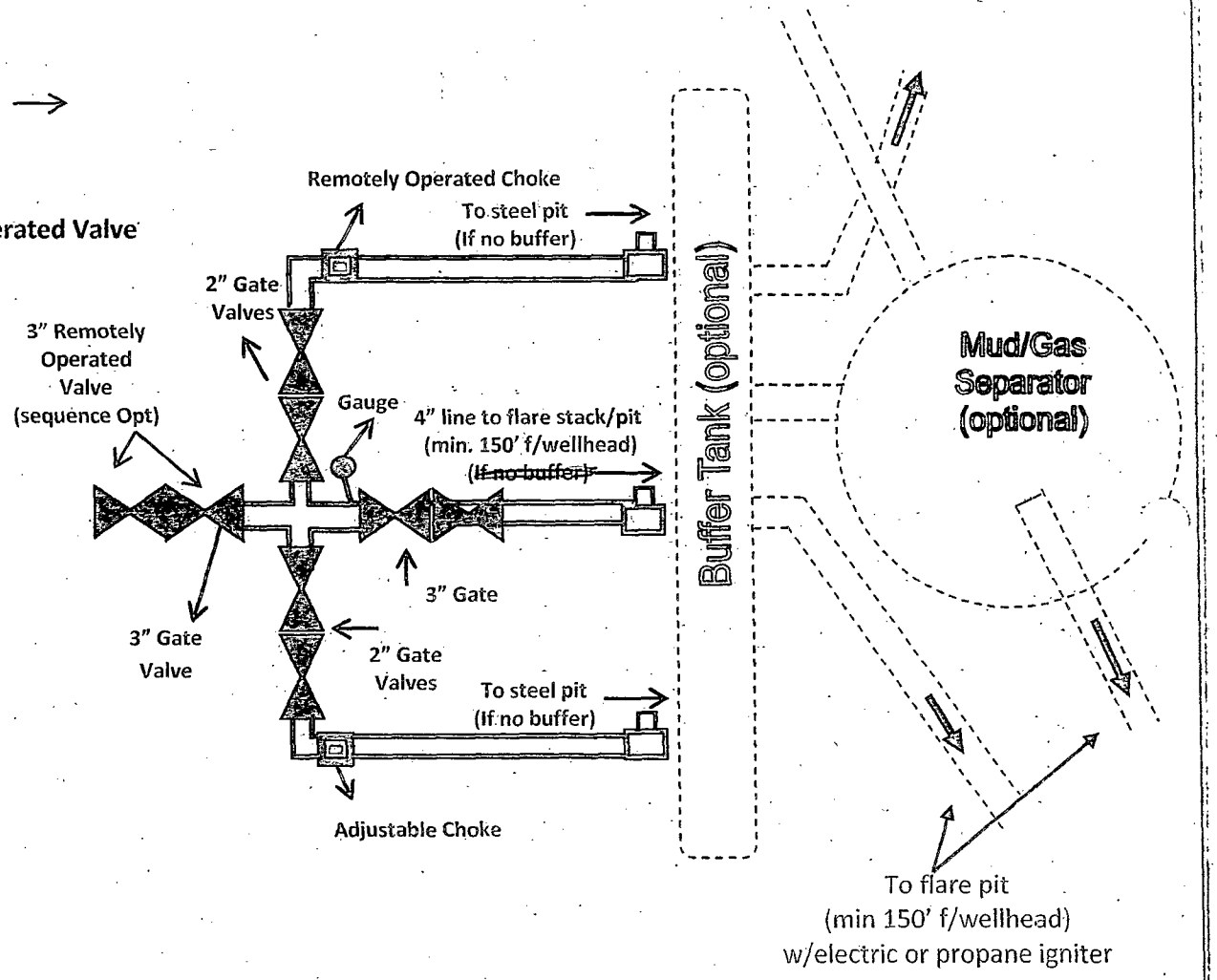
Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	+E/-W (usft)	Comment
4,362.60	4,362.60	0.00	0.00	KOP: Start Build 12.00°/100'
5,120.40	4,840.00	307.36	-375.52	LP at 90.94° Inc, Start Turn 3.00°/100'
6,430.33	4,817.72	739.17	-1,584.95	EOT: Hold 270° Azm
9,351.07	4,770.00	739.00	-4,505.30	TD at 9351.07

13-5/8" 3M psi
BOPE & Choke Manifold
EXHIBIT 3

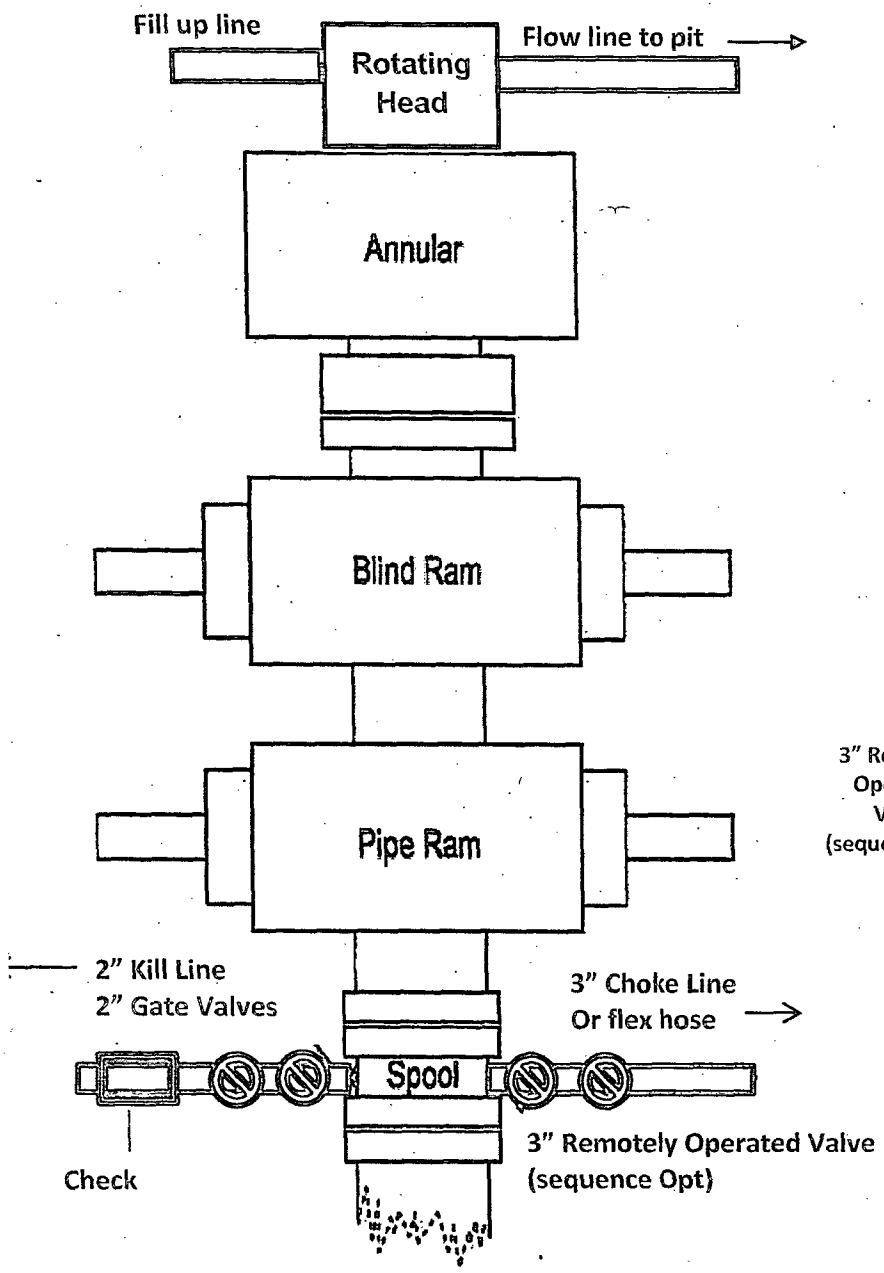
All valve & lines on choke manifold are 2" unless noted.
Exact manifold configuration may vary

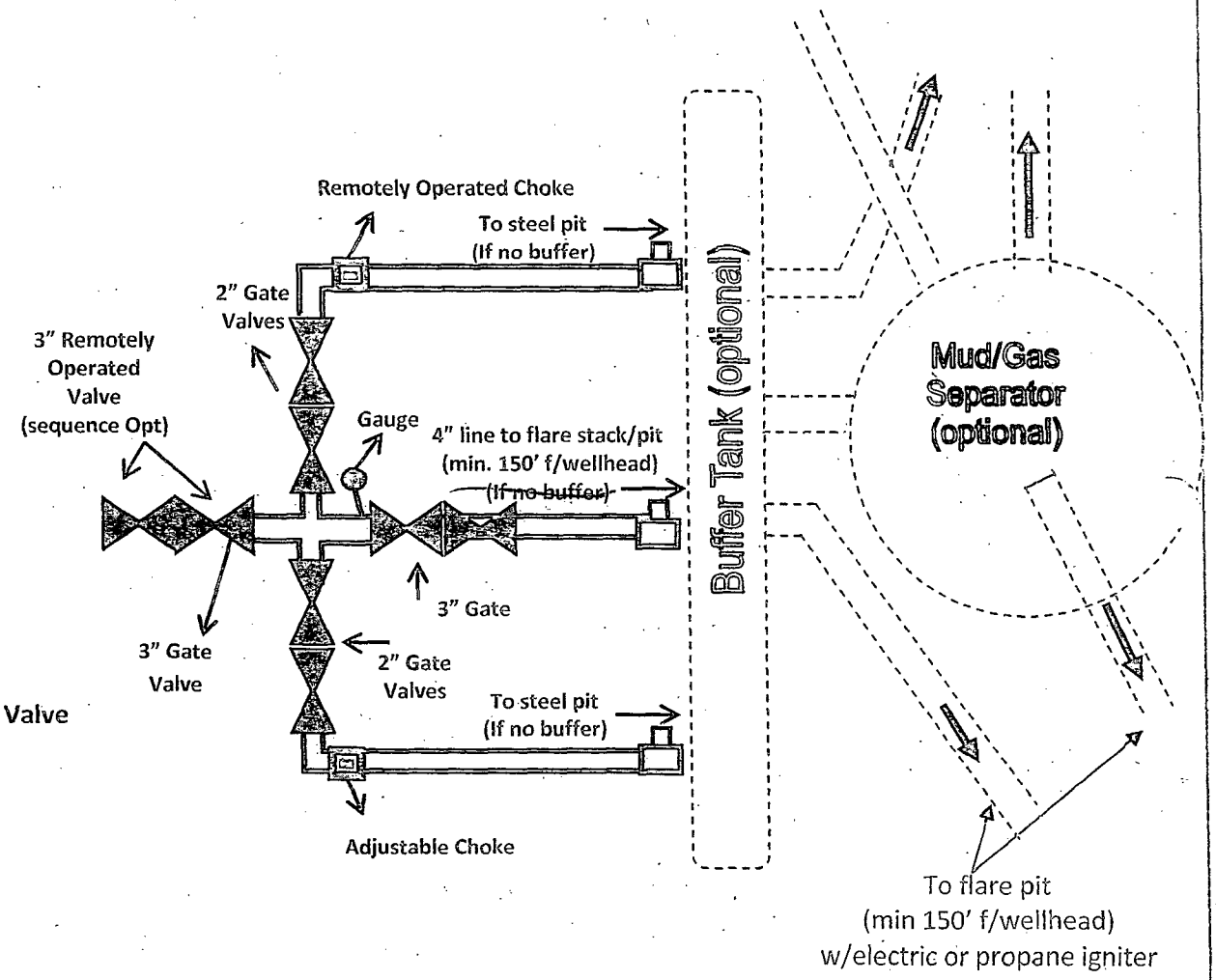




11" or 13-5/8" 5M psi BOPE & Choke Manifold EXHIBIT 3A

All valve & lines on choke manifold are 2" unless noted.
Exact manifold configuration may vary





CONDITIONS OF APPROVAL

Sundry dated 07/07/2014

OPERATOR'S NAME:	Apache Corporation
LEASE NO.:	LC029435A
WELL NAME & NO.:	19H Raven Federal – 30-015-40916
SURFACE HOLE FOOTAGE:	485' FSL & 180' FEL
BOTTOM HOLE FOOTAGE	1254' FSL & 331' FWL
LOCATION:	Section 7, T.17 S., R.31 E., NMPM
COUNTY:	Eddy County, New Mexico

I. DRILLING

A. DRILLING OPERATIONS REQUIREMENTS

The BLM is to be notified in advance for a representative to witness:

a. Spudding well (minimum of 24 hours)
b. Setting and/or Cementing of all casing strings (minimum of 4 hours)
c. BOPE tests (minimum of 4 hours)

☒ **Eddy County**
Call the Carlsbad Field Office, 620 East Greene St., Carlsbad, NM 88220, (575) 361-2822

1. A Hydrogen Sulfide (H2S) Drilling Plan shall be activated 500 feet prior to drilling into the **Grayburg** formation. **As a result, the Hydrogen Sulfide area must meet Onshore Order 6 requirements, which includes equipment and personnel/public protection items. If Hydrogen Sulfide is encountered, please provide measured values and formations to the BLM.**

2. Unless the production casing has been run and cemented or the well has been properly plugged, the drilling rig shall not be removed from over the hole without prior approval. **If the drilling rig is removed without approval – an Incident of Non-Compliance will be written and will be a "Major" violation.**

3. **The record of the drilling rate along with the GR/N well log run from TD to surface (horizontal well – vertical portion of hole) shall be submitted to the BLM office as well as all other logs run on the borehole 30 days from completion. If available, a digital copy of the logs is to be submitted in addition to the paper copies. The Rustler top and top and bottom of Salt are to be recorded on the Completion Report.**

B. CASING

Changes to the approved APD casing program need prior approval if the items substituted are of lesser grade or different casing size or are Non-API. The Operator can exchange the components of the proposal with that of superior strength (i.e. changing from J-55 to N-80, or from 36# to 40#). Changes to the approved cement program need prior approval if the altered cement plan has less volume or strength or if the changes are substantial (i.e. Multistage tool, ECP, etc.). The initial wellhead installed on the well will remain on the well with spools used as needed.

Centralizers required on surface casing per Onshore Order 2.III.B.1.f.

Wait on cement (WOC) time prior to drilling out for a primary cement job will be a minimum 18 hours for a water basin, 24 hours in the potash area, or 500 pounds compressive strength, whichever is greater for all casing strings. DURING THIS WOC TIME, NO DRILL PIPE, ETC. SHALL BE RUN IN THE HOLE. Provide compressive strengths including hours to reach required 500 pounds compressive strength prior to cementing each casing string. IF OPERATOR DOES NOT HAVE THE WELL SPECIFIC CEMENT DETAILS ONSITE PRIOR TO PUMPING THE CEMENT FOR EACH CASING STRING, THE WOC WILL BE 30 HOURS. See individual casing strings for details regarding lead cement slurry requirements.

No pea gravel permitted for remedial or fall back remedial without prior authorization from the BLM engineer.

Possibility for water flows in the top of salt.
Possibility of lost circulation in the Rustler, Tansill, Yates, Seven Rivers, and San Andres.

1. The **13-3/8** inch surface casing shall be set at approximately **450** feet (**in a competent bed <u>below the Magenta Dolomite</u>, which is a <u>Member of the Rustler</u>, and if salt is encountered, set casing at least 25 feet above the salt**) and cemented to the surface. **<u>Fresh water mud to be used to setting depth.</u>**

    a. If cement does not circulate to the surface, the appropriate BLM office shall be notified and a temperature survey utilizing an electronic type temperature survey with surface log readout will be used or a cement bond log shall be run to verify the top of the cement. Temperature survey will be run a minimum of six hours after pumping cement and ideally between 8-10 hours after completing the cement job.

    b. Wait on cement (WOC) time for a primary cement job is to include the lead cement slurry.

c. Wait on cement (WOC) time for a remedial job will be a minimum of 4 hours after bringing cement to surface or 500 pounds compressive strength, whichever is greater.

d. If cement falls back, remedial cementing will be done prior to drilling out that string.

2. The minimum required fill of cement behind the **9-5/8** inch intermediate casing is:

☒ Cement to surface. If cement does not circulate see B.1.a, c-d above.

Operator proposes a contingency two stage cement job if lost circulation is encountered, DV tool will be set at approximately 1800'. If no lost circulation is encountered the casing will be cemented to surface in a single stage.

a. First stage to DV tool:

☒ Cement to circulate. If cement does not circulate, contact the appropriate BLM office before proceeding with second stage cement job. Operator should have plans as to how they will achieve approved top of cement on the next stage.

b. Second stage above DV tool:

☒ Cement to surface. If cement does not circulate see B.1.a, c-d above.

3. The minimum required fill of cement behind the **7 x 5-1/2** inch production casing is:

☒ Cement as proposed by operator. Operator shall provide method of verification. (Cement from KO point to 2500' from surface)

4. If hardband drill pipe is rotated inside casing, returns will be monitored for metal. If metal is found in samples, drill pipe will be pulled and rubber protectors which have a larger diameter than the tool joints of the drill pipe will be installed prior to continuing drilling operations.

C. PRESSURE CONTROL

1. All blowout preventer (BOP) and related equipment (BOPE) shall comply with well control requirements as described in Onshore Oil and Gas Order No. 2 and API RP 53 Sec. 17.

2. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the surface casing shoe shall be **2000 (2M)** psi **(Installing 3M annular, testing to 2,000 psi)**.

3. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the **8-5/8** intermediate casing shoe shall be **2000 (2M)** psi (**Installing a 3M, testing to 2,000 psi**).

4. The appropriate BLM office shall be notified a minimum of 4 hours in advance for a representative to witness the tests.

    a. In a water basin, for all casing strings utilizing slips, these are to be set as soon as the crew and rig are ready and any fallback cement remediation has been done. The casing cut-off and BOP installation can be initiated four hours after installing the slips, which will be approximately six hours after bumping the plug. For those casing strings not using slips, the minimum wait time before cut-off is eight hours after bumping the plug. BOP/BOPE testing can begin after cut-off or once cement reaches 500 psi compressive strength (including lead when specified), whichever is greater. However, if the float does not hold, cut-off cannot be initiated until cement reaches 500 psi compressive strength (including lead when specified).

    b. The tests shall be done by an independent service company utilizing a test plug **not a cup or J-packer**.

    c. The test shall be run on a 5000 psi chart for a 2-3M BOP/BOP, on a 10000 psi chart for a 5M BOP/BOPE and on a 15000 psi chart for a 10M BOP/BOPE. If a linear chart is used, it shall be a one hour chart. A circular chart shall have a maximum 2 hour clock. If a twelve hour or twenty-four hour chart is used, tester shall make a notation that it is run with a two hour clock.

    d. The results of the test shall be reported to the appropriate BLM office.

    e. All tests are required to be recorded on a calibrated test chart. **A copy of the BOP/BOPE test chart and a copy of independent service company test will be submitted to the appropriate BLM office.**

    f. The BOP/BOPE test shall include a low pressure test from 250 to 300 psi. The test will be held for a minimum of 10 minutes if test is done with a test plug and 30 minutes without a test plug. This test shall be performed prior to the test at full stack pressure.

D. DRILL STEM TEST

If drill stem tests are performed, Onshore Order 2.III.D shall be followed.

E. WASTE MATERIAL AND FLUIDS

All waste (i.e. drilling fluids, trash, salts, chemicals, sewage, gray water, etc.) created as a result of drilling operations and completion operations shall be safely contained and disposed of properly at a waste disposal facility. No waste material or fluid shall be disposed of on the well location or surrounding area.

Porto-johns and trash containers will be on-location during fracturing operations or any other crew-intensive operations.

EGF 082714