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Form 3160-3
(June 2015)

FORM APPROVED
OMB No. 1004-0137
Expires: January 31, 2018

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

APPLICATION FOR PERMIT TO DRILL OR REENTER

5. Lease Serial No.
NMNM060393

6. If Indian, Allotee or Tribe Name

1a. Type of work: ☑ DRILL ☐ REENTER

1b. Type of Well: ☑ Oil Well ☐ Gas Well ☐ Other

1c. Type of Completion: ☐ Hydraulic Fracturing ☑ Single Zone ☐ Multiple Zone

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

8. Lease Name and Well No.
BLACK & TAN 27 FEDERAL COM
405H (319564)

2. Name of Operator
APACHE CORPORATION (873)

9. API Well No.
30-025-46124

3a. Address
303 Veterans Airpark Lane #1000 Midland TX 79705

3b. Phone No. *(include area code)*
(432)818-1000

10. Field and Pool, or Exploratory
BONE SPRING / LEA, BONE SPRING, S (77580)

4. Location of Well *(Report location clearly and in accordance with any State requirements.*)*

At surface SWSE / 215 FSL / 2072 FEL / LAT 32.5374367 / LONG -103.5462208

At proposed prod. zone NWNE / 50 FNL / 1344 FEL / LAT 32.5512292 / LONG -103.5438653

11. Sec., T. R. M. or Blk. and Survey or Area
SEC 27 / T20S / R34E / NMP

14. Distance in miles and direction from nearest town or post office*
25 miles

12. County or Parish
LEA

13. State
NM

15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drig. unit line, if any)
100 feet

16. No of acres in lease
80

17. Spacing Unit dedicated to this well
320

18. Distance from proposed location* to nearest well, drilling, completed, applied for, on this lease, ft.
40 feet

19. Proposed Depth
11418 feet / 16484 feet

20. BLM/BIA Bond No. in file
FED: NMB000736

21. Elevations (Show whether DF, KDB, RT, GL, etc.)
3715 feet

22. Approximate date work will start*
08/30/2019

23. Estimated duration
15 days

24. Attachments

The following, completed in accordance with the requirements of Onshore Oil and Gas Order No. 1, and the Hydraulic Fracturing rule per 43 CFR 3162.3-3 (as applicable)

1. Well plat certified by a registered surveyor.
2. A Drilling Plan.
3. A Surface Use Plan (if the location is on National Forest System Lands, the SUPO must be filed with the appropriate Forest Service Office).
4. Bond to cover the operations unless covered by an existing bond on file (see Item 20 above).
5. Operator certification.
6. Such other site specific information and/or plans as may be requested by the BLM.

25. Signature	Name *(Printed/Typed)*	Date
(Electronic Submission)	Sorina Flores / Ph: (432)818-1167	12/10/2018

Title
Supv of Drilling Services

Approved by *(Signature)*	Name *(Printed/Typed)*	Date
(Electronic Submission)	Cody Layton / Ph: (575)234-5959	05/24/2019

Title	Office
Assistant Field Manager Lands & Minerals	CARLSBAD

Application approval 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.
Conditions of approval, if any, are attached.

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.

OLP Rec 05/31/19

APPROVED WITH CONDITIONS

Approval Date: 05/24/2019

LH 06/13/19
REQUIRES NSL

(Continued on page 2)

*(Instructions on page 2)

INSTRUCTIONS

GENERAL: This form is designed for submitting proposals to perform certain well operations, as indicated on Federal and Indian lands and leases for action by appropriate Federal agencies, pursuant to applicable Federal laws and regulations. Any necessary special instructions concerning the use of this form and the number of copies to be submitted, particularly with regard to local, area, or regional procedures and practices, either are shown below or will be issued by, or may be obtained from local Federal offices.

ITEM I: If the proposal is to redrill to the same reservoir at a different subsurface location or to a new reservoir, use this form with appropriate notations. Consult applicable Federal regulations concerning subsequent work proposals or reports on the well.

ITEM 4: Locations on Federal or Indian land should be described in accordance with Federal requirements. Consult local Federal offices for specific instructions.

ITEM 14: Needed only when location of well cannot readily be found by road from the land or lease description. A plat, or plats, separate or on the reverse side, showing the roads to, and the surveyed location of, the wen, and any other required information, should be furnished when required by Federal agency offices.

ITEMS 15 AND 18: If well is to be, or has been directionany drilled, give distances for subsurface location of hole in any present or objective productive zone.

ITEM 22: Consult applicable Federal regulations, or appropriate officials, concerning approval of the proposal before operations are started.

ITEM 24: If the proposal will involve hydraulic fracturing operations, you must comply with 43 CFR 3162.3-3, including providing information about the protection of usable water. Operators should provide the best available information about all formations containing water and their depths. This information could include data and interpretation of resistivity logs run on nearby wells. Information may also be obtained from state or tribal regulatory agencies and from local BLM offices.

NOTICES

The Privacy Act of 1974 and regulation in 43 CFR 2.48(d) provide that you be furnished the following information in connection with information required by this application.
AUTHORITY: 30 U.S.C. 181 et seq., 25 U.S.C. 396; 43 CFR 3160
PRINCIPAL PURPOSES: The information will be used to: (1) process and evaluate your application for a permit to drill a new oil, gas, or service wen or to reenter a plugged and abandoned well; and (2) document, for administrative use, information for the management, disposal and use of National Resource Lands and resources including (a) analyzing your proposal to discover and extract the Federal or Indian resources encountered; (b) reviewing procedures and equipment and the projected impact on the land involved; and (c) evaluating the effects of the proposed operation on the surface and subsurface water and other environmental impacts.
ROUTINE USE: Information from the record and/or the record win be transferred to appropriate Federal, State, and local or foreign agencies, when relevant to civil, criminal or regulatory investigations or prosecution, in connection with congressional inquiries and for regulatory responsibilities.
EFFECT OF NOT PROVIDING INFORMATION: Filing of this application and disclosure of the information is mandatory only if you elect to initiate a drilling or reentry operation on an oil and gas lease.

The Paperwork Reduction Act of 1995 requires us to inform you that:
The BLM conects this information to anow evaluation of the technical, safety, and environmental factors involved with drilling for oil and/or gas on Federal and Indian oil and gas leases. This information will be used to analyze and approve applications. Response to this request is mandatory only if the operator elects to initiate drilling or reentry operations on an oil and gas lease. The BLM would like you to know that you do not have to respond to this or any other Federal agency-sponsored information collection unless it displays a currently valid OMB control number.

BURDEN HOURS STATEMENT: Public reporting burden for this form is estimated to average 8 hours per response, including the time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Direct comments regarding the burden estimate or any other aspect of this form to U.S. Department of the Interior, Bureau of Land Management (1004-0137), Bureau Information Conection Clearance Officer (WO-630), 1849 C Street, N.W., Mail Stop 401 LS, Washington, D.C. 20240.

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Approval Date: 05/24/2019

Review and Appeal Rights

A person contesting a decision shall request a State Director review. This request must be filed within 20 working days of receipt of the Notice with the appropriate State Director (see 43 CFR 3165.3). The State Director review decision may be appealed to the Interior Board of Land Appeals, 801 North Quincy Street, Suite 300, Arlington, VA 22203 (see 43 CFR 3165.4). Contact the above listed Bureau of Land Management office for further information.

PECOS DISTRICT
DRILLING CONDITIONS OF APPROVAL

OPERATOR'S NAME:	Apache Corporation
LEASE NO.:	NMNM060393
WELL NAME & NO.:	Black & Tan 27 Federal Com 405H
SURFACE HOLE FOOTAGE:	215'/S & 2072'/E
BOTTOM HOLE FOOTAGE	50'/N & 1344'/E
LOCATION:	Section 27, T.20 S., R.34 E., NMPM
COUNTY:	Lea County, New Mexico

COA

H2S	(•) Yes	( ) No	
Potash	( ) None	( ) Secretary	(•) R-111-P
Cave/Karst Potential	(•) Low	( ) Medium	( ) High
Variance	( ) None	(•) Flex Hose	( ) Other
Wellhead	(•) Conventional	( ) Multibowl	( ) Both
Other	[ ] 4 String Area	[x] Capitan Reef	[ ] WIPP
Other	[x] Fluid Filled	[ ] Cement Squeeze	[ ] Pilot Hole
Special Requirements	[ ] Water Disposal	[x] COM	[ ] Unit

A. HYDROGEN SULFIDE

A Hydrogen Sulfide (H2S) Drilling Plan shall be activated 500 feet prior to drilling into the **Base of Salt and Yates-7 Rivers** 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.

B. CASING

1. The **13-3/8** inch surface casing shall be set at approximately **1650 feet** (a minimum of 25 feet (Lea County) into the Rustler Anhydrite and above the salt) and cemented to the surface.

    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 will be a minimum of **24 hours in the Potash Area** or 500 pounds compressive strength, whichever

is greater. (This is to include the lead cement)

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.

Intermediate casing must be kept fluid filled to meet BLM minimum collapse requirement.

2. The minimum required fill of cement behind the **9-5/8** inch intermediate casing shall be set at approximately **5644 feet** is:

Option 1 (Single Stage):

- Cement to surface. If cement does not circulate see B.1.a, c-d above.
  Wait on cement (WOC) time for a primary cement job is to include the lead cement slurry due to cave/karst or potash.
  Cement excess is less than 25%, more cement might be required.

Option 2:

Operator has proposed a DV tool, the depth may be adjusted as long as the cement is changed proportionally. The DV tool may be cancelled if cement circulates to surface on the first stage.

a. First stage to DV tool: Cement to circulate. If cement does not circulate off the DV tool, contact the appropriate BLM office before proceeding with second stage cement job.

b. Second stage above DV tool:

- Cement to surface. If cement does not circulate, contact the appropriate BLM office.
  Wait on cement (WOC) time for a primary cement job is to include the lead cement slurry due to cave/karst or potash.
  Cement excess is less than 25%, more cement might be required.

❖ **Special Capitan Reef requirements.** If lost circulation (50% or greater) occurs below the Base of the Salt, the operator shall do the following:

- Switch to fresh water mud to protect the Capitan Reef and use fresh water mud until setting the intermediate casing. The appropriate BLM office is to be notified for a PET to witness the switch to fresh water.

- Daily drilling reports from the Base of the Salt to the setting of the intermediate casing are to be submitted to the BLM CFO engineering staff via e-mail by 0800 hours each morning. Any lost circulation encountered is to be recorded on these drilling reports. The daily drilling report should show mud volume per shift/tour. Failure to submit these reports will result in an Incidence of Non-Compliance being issued for failure to comply with the Conditions of Approval. If not already planned, the operator shall run a caliper survey for the intermediate well bore and submit to the appropriate BLM office.

Liner casing must be kept fluid filled to meet BLM minimum collapse requirement.

3. The minimum required fill of cement behind the **7-5/8** inch liner is:

    - Cement should tie-back **100 feet** into the previous casing. Operator shall provide method of verification.
      Cement excess is less than 25%, more cement might be required.

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

    - Cement to surface. If cement does not circulate, contact the appropriate BLM office.

C. PRESSURE CONTROL

1. Variance approved to use flex line from BOP to choke manifold. Manufacturer's specification to be readily available. No external damage to flex line. Flex line to be installed as straight as possible (no hard bends).'

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.

3. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the **9-5/8** inch intermediate casing shoe shall be **5000 (5M)** psi.

D. SPECIAL REQUIREMENT (S)

Communitization Agreement

- The operator will submit a Communitization Agreement to the Carlsbad Field Office, 620 E Greene St. Carlsbad, New Mexico 88220, at least 90 days before the anticipated date of first production from a well subject to a spacing order issued by the New Mexico Oil Conservation Division. The Communitization Agreement will include the signatures of all working interest owners in all Federal and Indian leases subject to the Communitization Agreement (i.e., operating rights owners and lessees of record), or certification that the operator has obtained the written signatures of all

such owners and will make those signatures available to the BLM immediately upon request.

- If the operator does not comply with this condition of approval, the BLM may take enforcement actions that include, but are not limited to, those specified in 43 CFR 3163.1.
- In addition, the well sign shall include the surface and bottom hole lease numbers. When the Communitization Agreement number is known, it shall also be on the sign.

GENERAL 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)

☒ Chaves and Roosevelt Counties
Call the Roswell Field Office, 2909 West Second St., Roswell NM 88201.
During office hours call (575) 627-0272.
After office hours call (575)

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

☒ Lea County
Call the Hobbs Field Station, 414 West Taylor, Hobbs NM 88240, (575) 393-3612

1. 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.

   a. In the event the operator has proposed to drill multiple wells utilizing a skid/walking rig. Operator shall secure the wellbore on the current well, after installing and testing the wellhead, by installing a blind flange of like pressure rating to the wellhead and a pressure gauge that can be monitored while drilling is performed on the other well(s).
   b. When the operator proposes to set surface casing with Spudder Rig
      - Notify the BLM when moving in and removing the Spudder Rig.
      - Notify the BLM when moving in the 2nd Rig. Rig to be moved in within 90 days of notification that Spudder Rig has left the location.
      - BOP/BOPE test to be conducted per Onshore Oil and Gas Order No. 2 as soon as 2nd Rig is rigged up on well.

2. Floor controls are required for 3M or Greater systems. These controls will be on the rig floor, unobstructed, readily accessible to the driller and will be operational at all times during drilling and/or completion activities. Rig floor is defined as the area immediately around the rotary table; the area immediately above the substructure on which the draw works are located, this does not include the dog house or stairway area.

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.

A. CASING

1. 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.

2. Wait on cement (WOC) for Potash Areas: After cementing but before commencing any tests, the casing string shall stand cemented under pressure until both of the following conditions have been met: 1) cement reaches a minimum compressive strength of 500 psi for all cement blends, 2) until cement has been in place at least 24 hours. WOC time will be recorded in the driller's log.

3. Wait on cement (WOC) for Water Basin: After cementing but before commencing any tests, the casing string shall stand cemented under pressure until both of the following conditions have been met: 1) cement reaches a minimum compressive strength of 500 psi at the shoe, 2) until cement has been in place at least 8 hours. WOC time will be recorded in the driller's log. See individual casing strings for details regarding lead cement slurry requirements.

4. Provide compressive strengths including hours to reach required 500 pounds compressive strength prior to cementing each casing string. Have well specific cement details onsite prior to pumping the cement for each casing string.

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

6. On that portion of any well approved for a 5M BOPE system or greater, a pressure integrity test of each casing shoe shall be performed. Formation at the shoe shall be tested to a minimum of the mud weight equivalent anticipated to control the formation pressure to the next casing depth or at total depth of the well. This test shall be performed before drilling more than 20 feet of new hole.

7. 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.

8. Whenever a casing string is cemented in the R-111-P potash area, the NMOCD requirements shall be followed.

B. 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. If a variance is approved for a flexible hose to be installed from the BOP to the choke manifold, the following requirements apply: Check condition of flexible line from BOP to choke manifold, replace if exterior is damaged or if line fails test. Line to be as straight as possible with no hard bends and is to be anchored according to Manufacturer's requirements. The flexible hose can be exchanged with a hose of equal size and equal or greater pressure rating. Anchor requirements, specification sheet and hydrostatic pressure test certification matching the hose in service, to be onsite for review. These documents shall be posted in the company man's trailer and on the rig floor.

3. 5M or higher system requires an HCR valve, remote kill line and annular to match. The remote kill line is to be installed prior to testing the system and tested to stack pressure.

4. If the operator has proposed a multi-bowl wellhead assembly in the APD. The following requirements must be met:

    a. Wellhead shall be installed by manufacturer's representatives, submit documentation with subsequent sundry.
    b. If the welding is performed by a third party, the manufacturer's representative shall monitor the temperature to verify that it does not exceed the maximum temperature of the seal.
    c. Manufacturer representative shall install the test plug for the initial BOP test.
    d. Whenever any seal subject to test pressure is broken, all the tests in OOGO2.III.A.2.i must be followed.
    e. If the cement does not circulate and one inch operations would have been possible with a standard wellhead, the well head shall be cut off, cementing operations performed and another wellhead installed.

5. 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. In potash areas, 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. For all casing strings, casing cut-off and BOP installation can be initiated at twelve hours after bumping the plug. However, **no tests** shall commence until the cement has had a minimum of 24 hours setup time.

c. The tests shall be done by an independent service company utilizing a test plug not a cup or J-packer. The operator also has the option of utilizing an independent tester to test without a plug (i.e. against the casing) pursuant to Onshore Order 2 with the pressure not to exceed 70% of the burst rating for the casing. Any test against the casing must meet the WOC time for water basin (8 hours) or potash (24 hours) or 500 pounds compressive strength, whichever is greater, prior to initiating the test (see casing segment as lead cement may be critical item).

d. 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.

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

f. 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.

g. 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.

h. BOP/BOPE must be tested by an independent service company within 500 feet of the top of the Wolfcamp formation if the time between the setting of the intermediate casing and reaching this depth exceeds 20 days. This test does not exclude the test prior to drilling out the casing shoe as per Onshore Order No. 2.

C. DRILLING MUD

Mud system monitoring equipment, with derrick floor indicators and visual and audio alarms, shall be operating before drilling into the Wolfcamp formation, and shall be used until production casing is run and cemented.

D. 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.

PECOS DISTRICT
SURFACE USE
CONDITIONS OF APPROVAL

OPERATOR'S NAME:	Apache Corporation
WELL NAME & NO.:	Black & Tan 27 Federal Com 405H
SURFACE HOLE FOOTAGE:	215'/S & 2072'/E
BOTTOM HOLE FOOTAGE	50'/N & 1344'/E
LOCATION:	Section 27, T.20 S., R.34 E., NMPM
COUNTY:	Lea County, New Mexico

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Standard Conditions of Approval (COA) apply to this APD. If any deviations to these standards exist or special COAs are required, the section with the deviation or requirement will be checked below.

I. GENERAL PROVISIONS

The approval of the Application For Permit To Drill (APD) is in compliance with all applicable laws and regulations: 43 Code of Federal Regulations 3160, the lease terms, Onshore Oil and Gas Orders, Notices To Lessees, New Mexico Oil Conservation Division (NMOCD) Rules, National Historical Preservation Act As Amended, and instructions and orders of the Authorized Officer. Any request for a variance shall be submitted to the Authorized Officer on Form 3160-5, Sundry Notices and Report on Wells.

II. PERMIT EXPIRATION

If the permit terminates prior to drilling and drilling cannot be commenced within 60 days after expiration, an operator is required to submit Form 3160-5, Sundry Notices and Reports on Wells, requesting surface reclamation requirements for any surface disturbance. However, if the operator will be able to initiate drilling within 60 days after the expiration of the permit, the operator must have set the conductor pipe in order to allow for an extension of 60 days beyond the expiration date of the APD. (Filing of a Sundry Notice is required for this 60 day extension.)

III. ARCHAEOLOGICAL, PALEONTOLOGY & HISTORICAL SITES

Any cultural and/or paleontological resource discovered by the operator or by any person working on the operator's behalf shall immediately report such findings to the Authorized Officer. The operator is fully accountable for the actions of their contractors and subcontractors. The operator shall suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the Authorized Officer. An evaluation of the discovery shall be made by the Authorized Officer to determine the appropriate actions that shall be required to prevent the loss of significant cultural or scientific values of the discovery. The operator shall be held responsible for the cost of the proper mitigation measures that the Authorized Officer assesses after consultation with the operator on the evaluation and decisions of the discovery. Any unauthorized collection or disturbance of cultural or paleontological resources may result in a shutdown order by the Authorized Officer.

IV. NOXIOUS WEEDS

The operator shall be held responsible if noxious weeds become established within the areas of operations. Weed control shall be required on the disturbed land where noxious weeds exist, which includes the roads, pads, associated pipeline corridor, and adjacent land affected by the establishment of weeds due to this action. The operator shall consult with the Authorized Officer for acceptable weed control methods, which include following EPA and BLM requirements and policies.

V. SPECIAL REQUIREMENT(S)

Timing Limitation Stipulation / Condition of Approval for lesser prairie-chicken: Oil and gas activities including 3-D geophysical exploration, and drilling will not be allowed in lesser prairie-chicken habitat during the period from March 1st through June 15th annually. During that period, other activities that produce noise or involve human activity, such as the maintenance of oil and gas facilities, pipeline, road, and well pad construction, will be allowed except between 3:00 am and 9:00 am. The 3:00 am to 9:00 am restriction will not apply to normal, around-the-clock operations, such as venting, flaring, or pumping, which do not require a human presence during this period. Additionally, no new drilling will be allowed within up to 200 meters of leks known at the time of permitting. Normal vehicle use on existing roads will not be restricted. Exhaust noise from pump jack engines must be muffled or otherwise controlled so as not to exceed 75 db measured at 30 feet from the source of the noise.

Ground-level Abandoned Well Marker to avoid raptor perching: Upon the plugging and subsequent abandonment of the well, the well marker will be installed at ground level on a plate containing the pertinent information for the plugged well. For more installation details, contact the Carlsbad Field Office at 575-234-5972.

Timing Limitation Exceptions:
The Carlsbad Field Office will publish an annual map of where the LPC timing and noise stipulations and conditions of approval (Limitations) will apply for the identified year (between March 1 and June 15) based on the latest survey information. The LPC Timing Area map will identify areas which are Habitat Areas (HA), Isolated Population Area (IPA), and Primary Population Area (PPA). The LPC Timing Area map will also have an area in red crosshatch. The red crosshatch area is the only area where an operator is required to submit a request for exception to the LPC Limitations. If an operator is operating outside the red crosshatch area, the LPC Limitations do not apply for that year and an exception to LPC Limitations is not required.

Hydrology:
The entire well pad will be bermed to prevent oil, salt, and other chemical contaminants from leaving the well pad. The compacted berm shall be constructed at a minimum of 12 inches with impermeable mineral material (e.g. caliche). Topsoil shall not be used to construct the berm. No water flow from the uphill side(s) of the pad shall be allowed to enter the well pad. The integrity of the berm shall be maintained around the surfaced pad throughout the life of the well and around the downsized pad after interim reclamation has been completed. Any water erosion that may occur due to the construction of the well pad during the life of the well will be quickly corrected and proper measures will be taken to prevent future erosion. Stockpiling of topsoil is required. The top soil shall be stockpiled in an appropriate location to prevent loss of soil due to water or wind erosion and not used for berming or erosion control. If fluid collects within the bermed area, the fluid must be vacuumed into a safe container and disposed of properly at a state approved facility.

Tank battery locations will be lined and bermed. A 20 mil permanent liner will be installed with a 4 oz. felt backing to prevent tears or punctures. Tank battery berms must be large enough to contain 1 ½ times the content of the largest tank or 24 hour production, whichever is greater. Automatic shut off, check valves, or similar systems will be installed for tanks to minimize the effects of catastrophic line failures used in production or drilling.

A leak detection plan will be submitted to the BLM Carlsbad Field Office for approval prior to pipeline installation. The method could incorporate gauges to detect pressure drops, situating valves and lines so they can be visually inspected periodically or installing electronic sensors to alarm when a leak is present. The leak detection plan will incorporate an automatic shut off system that will be installed for proposed pipelines to minimize the effects of an undesirable event.

VI. CONSTRUCTION

A. NOTIFICATION

The BLM shall administer compliance and monitor construction of the access road and well pad. Notify the Carlsbad Field Office at (575) 234-5909 at least 3 working days prior to commencing construction of the access road and/or well pad.

When construction operations are being conducted on this well, the operator shall have the approved APD and Conditions of Approval (COA) on the well site and they shall be made available upon request by the Authorized Officer.

B. TOPSOIL

The operator shall strip the top portion of the soil (root zone) from the entire well pad area and stockpile the topsoil along the edge of the well pad as depicted in the APD. The root zone is typically six (6) inches in depth. All the stockpiled topsoil will be redistributed over the interim reclamation areas. Topsoil shall not be used for berming the pad or facilities. For final reclamation, the topsoil shall be spread over the entire pad area for seeding preparation.

Other subsoil (below six inches) stockpiles must be completely segregated from the topsoil stockpile. Large rocks or subsoil clods (not evident in the surrounding terrain) must be buried within the approved area for interim and final reclamation.

C. CLOSED LOOP SYSTEM

Tanks are required for drilling operations: No Pits.

The operator shall properly dispose of drilling contents at an authorized disposal site.

D. FEDERAL MINERAL MATERIALS PIT

Payment shall be made to the BLM prior to removal of any federal mineral materials. Call the Carlsbad Field Office at (575) 234-5972.

E. WELL PAD SURFACING

Surfacing of the well pad is not required.

If the operator elects to surface the well pad, the surfacing material may be required to be removed at the time of reclamation. The well pad shall be constructed in a manner which creates the smallest possible surface disturbance, consistent with safety and operational needs.

F. EXCLOSURE FENCING (CELLARS & PITS)

Exclosure Fencing
The operator will install and maintain exclosure fencing for all open well cellars to prevent access to public, livestock, and large forms of wildlife before and after drilling operations until the pit is free of fluids and the operator initiates backfilling. (For examples of exclosure fencing design, refer to BLM's Oil and Gas Gold Book, Exclosure Fence Illustrations, Figure 1, Page 18.)

G. ON LEASE ACCESS ROADS

Road Width
The access road shall have a driving surface that creates the smallest possible surface disturbance and does not exceed fourteen (14) feet in width. The maximum width of surface disturbance, when constructing the access road, shall not exceed twenty-five (25) feet.

Surfacing
Surfacing material is not required on the new access road driving surface. If the operator elects to surface the new access road or pad, the surfacing material may be required to be removed at the time of reclamation.

Where possible, no improvements should be made on the unsurfaced access road other than to remove vegetation as necessary, road irregularities, safety issues, or to fill low areas that may sustain standing water.

The Authorized Officer reserves the right to require surfacing of any portion of the access road at any time deemed necessary. Surfacing may be required in the event the road deteriorates, erodes, road traffic increases, or it is determined to be beneficial for future field development. The surfacing depth and type of material will be determined at the time of notification.

Crowning
Crowning shall be done on the access road driving surface. The road crown shall have a grade of approximately 2% (i.e., a 1" crown on a 14' wide road). The road shall conform to Figure 1; cross section and plans for typical road construction.

Ditching
Ditching shall be required on both sides of the road.

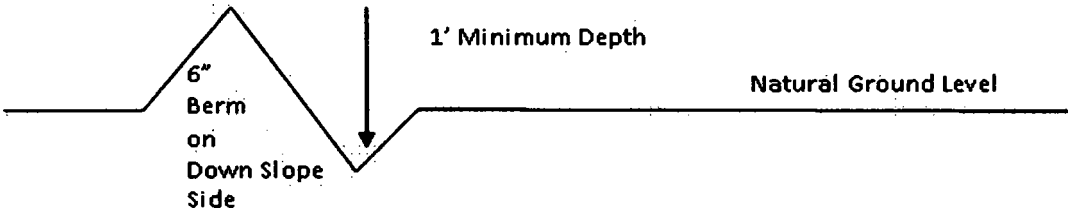
Turnouts
Vehicle turnouts shall be constructed on the road. Turnouts shall be intervisible with interval spacing distance less than 1000 feet. Turnouts shall conform to Figure 1; cross section and plans for typical road construction.

Drainage

Drainage control systems shall be constructed on the entire length of road (e.g. ditches, sidehill outsloping and insloping, lead-off ditches, culvert installation, and low water crossings).

A typical lead-off ditch has a minimum depth of 1 foot below and a berm of 6 inches above natural ground level. The berm shall be on the down-slope side of the lead-off ditch.

Cross Section of a Typical Lead-off Ditch



All lead-off ditches shall be graded to drain water with a 1 percent minimum to 3 percent maximum ditch slope. The spacing interval are variable for lead-off ditches and shall be determined according to the formula for spacing intervals of lead-off ditches, but may be amended depending upon existing soil types and centerline road slope (in %);

Formula for Spacing Interval of Lead-off Ditches

Example - On a 4% road slope that is 400 feet long, the water flow shall drain water into a lead-off ditch. Spacing interval shall be determined by the following formula:

400 foot road with 4% road slope: $\frac{400'}{4\%} + 100' = 200'$ lead-off ditch interval

Cattle guards

An appropriately sized cattle guard sufficient to carry out the project shall be installed and maintained at fence/road crossings. Any existing cattle guards on the access road route shall be repaired or replaced if they are damaged or have deteriorated beyond practical use. The operator shall be responsible for the condition of the existing cattle guards that are in place and are utilized during lease operations.

Fence Requirement

Where entry is granted across a fence line, the fence shall be braced and tied off on both sides of the passageway prior to cutting. The operator shall notify the private surface landowner or the grazing allotment holder prior to crossing any fences.

Public Access

Public access on this road shall not be restricted by the operator without specific written approval granted by the Authorized Officer.

Construction Steps

1. Salvage topsoil
2. Construct road
3. Redistribute topsoil
4. Revegetate slopes

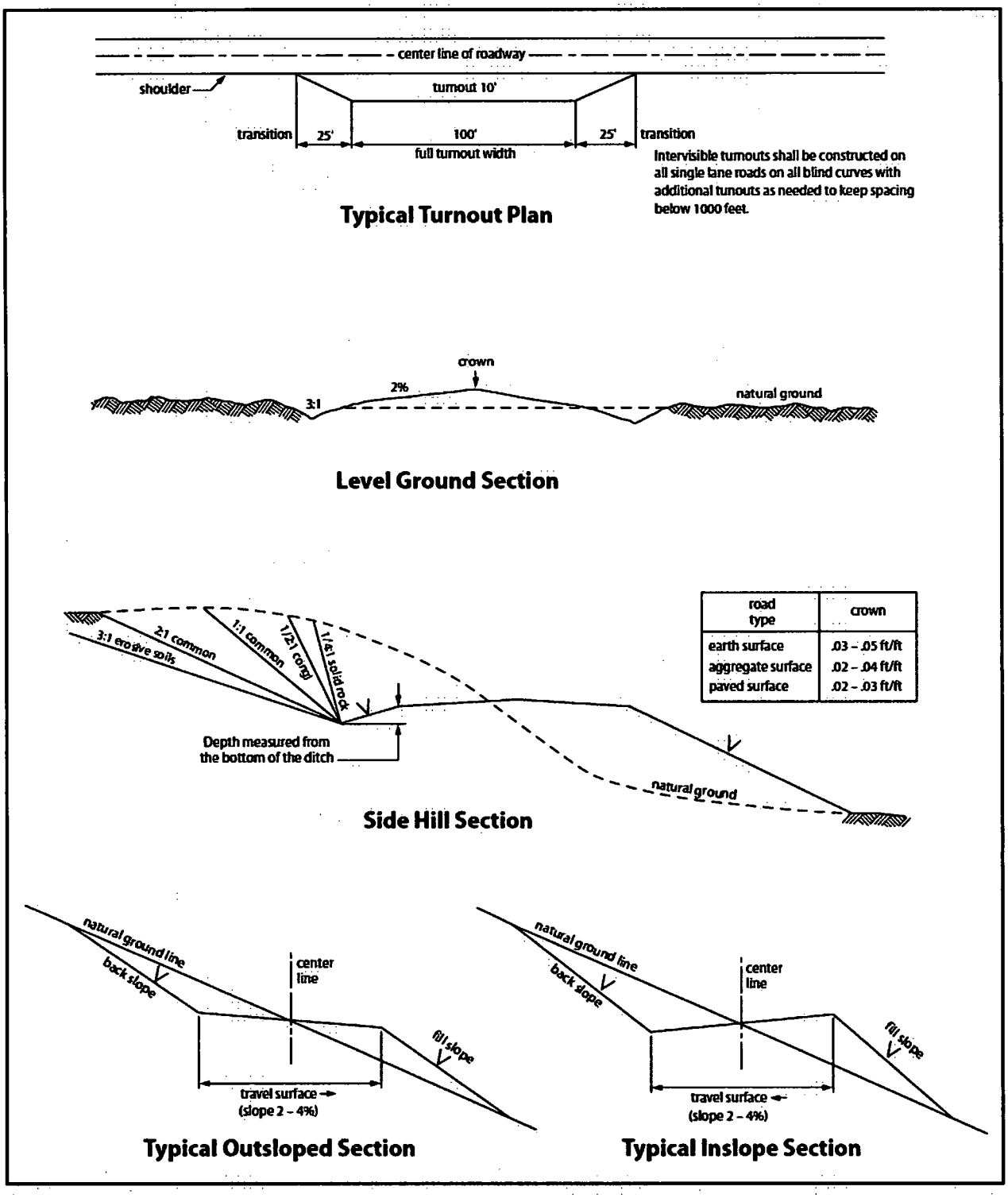


Figure 1. Cross-sections and plans for typical road sections representative of BLM resource or FS local and higher-class roads.

VII. PRODUCTION (POST DRILLING)

A. WELL STRUCTURES & FACILITIES

Placement of Production Facilities
Production facilities should be placed on the well pad to allow for maximum interim recontouring and revegetation of the well location.

Exclosure Netting (Open-top Tanks)
Immediately following active drilling or completion operations, the operator will take actions necessary to prevent wildlife and livestock access, including avian wildlife, to all open-topped tanks that contain or have the potential to contain salinity sufficient to cause harm to wildlife or livestock, hydrocarbons, or Resource Conservation and Recovery Act of 1976-exempt hazardous substances. At a minimum, the operator will net, screen, or cover open-topped tanks to exclude wildlife and livestock and prevent mortality. If the operator uses netting, the operator will cover and secure the open portion of the tank to prevent wildlife entry. The operator will net, screen, or cover the tanks until the operator removes the tanks from the location or the tanks no longer contain substances that could be harmful to wildlife or livestock. Use a maximum netting mesh size of 1 ½ inches. The netting must not be in contact with fluids and must not have holes or gaps.

Chemical and Fuel Secondary Containment and Exclosure Screening
The operator will prevent all hazardous, poisonous, flammable, and toxic substances from coming into contact with soil and water. At a minimum, the operator will install and maintain an impervious secondary containment system for any tank or barrel containing hazardous, poisonous, flammable, or toxic substances sufficient to contain the contents of the tank or barrel and any drips, leaks, and anticipated precipitation. The operator will dispose of fluids within the containment system that do not meet applicable state or U. S. Environmental Protection Agency livestock water standards in accordance with state law; the operator must not drain the fluids to the soil or ground. The operator will design, construct, and maintain all secondary containment systems to prevent wildlife and livestock exposure to harmful substances. At a minimum, the operator will install effective wildlife and livestock exclosure systems such as fencing, netting, expanded metal mesh, lids, and grate covers. Use a maximum netting mesh size of 1 ½ inches.

Open-Vent Exhaust Stack Exclosures
The operator will construct, modify, equip, and maintain all open-vent exhaust stacks on production equipment to prevent birds and bats from entering, and to discourage perching, roosting, and nesting. (*Recommended exclosure structures on open-vent exhaust stacks are in the shape of a cone.*) Production equipment includes, but may not be limited to, tanks, heater-treaters, separators, dehydrators, flare stacks, in-line units, and compressor mufflers.

Containment Structures

Proposed production facilities such as storage tanks and other vessels will have a secondary containment structure that is constructed to hold the capacity of 1.5 times the largest tank, plus freeboard to account for precipitation, unless more stringent protective requirements are deemed necessary.

Painting Requirement
All above-ground structures including meter housing that are not subject to safety requirements shall be painted a flat non-reflective paint color, **Shale Green** from the BLM Standard Environmental Color Chart (CC-001: June 2008).

VIII. INTERIM RECLAMATION

During the life of the development, all disturbed areas not needed for active support of production operations should undergo interim reclamation in order to minimize the environmental impacts of development on other resources and uses.

Within six (6) months of well completion, operators should work with BLM surface management specialists (Jim Amos: 575-234-5909) to devise the best strategies to reduce the size of the location. Interim reclamation should allow for remedial well operations, as well as safe and efficient removal of oil and gas.

During reclamation, the removal of caliche is important to increasing the success of revegetating the site. Removed caliche that is free of contaminants may be used for road repairs, fire walls or for building other roads and locations. In order to operate the well or complete workover operations, it may be necessary to drive, park and operate on restored interim vegetation within the previously disturbed area. Disturbing revegetated areas for production or workover operations will be allowed. If there is significant disturbance and loss of vegetation, the area will need to be revegetated. Communicate with the appropriate BLM office for any exceptions/exemptions if needed.

All disturbed areas after they have been satisfactorily prepared need to be reseeded with the seed mixture provided below.

Upon completion of interim reclamation, the operator shall submit a Sundry Notices and Reports on Wells, Subsequent Report of Reclamation (Form 3160-5).

IX. FINAL ABANDONMENT & RECLAMATION

At final abandonment, well locations, production facilities, and access roads must undergo "final" reclamation so that the character and productivity of the land are restored.

Earthwork for final reclamation must be completed within six (6) months of well plugging. All pads, pits, facility locations and roads must be reclaimed to a satisfactory revegetated, safe, and stable condition, unless an agreement is made with the landowner or BLM to keep the road and/or pad intact.

After all disturbed areas have been satisfactorily prepared, these areas need to be revegetated with the seed mixture provided below. Seeding should be accomplished by drilling on the contour whenever practical or by other approved methods. Seeding may need to be repeated until revegetation is successful, as determined by the BLM.

Operators shall contact a BLM surface protection specialist prior to surface abandonment operations for site specific objectives (Jim Amos: 575-234-5909).

Ground-level Abandoned Well Marker to avoid raptor perching: Upon the plugging and subsequent abandonment of the well, the well marker will be installed at ground level on a plate containing the pertinent information for the plugged well.

Seed Mixture for LPC Sand/Shinnery Sites

Holder shall seed all disturbed areas with the seed mixture listed below. The seed mixture shall be planted in the amounts specified in pounds of pure live seed (PLS)* per acre. There shall be no primary or secondary noxious weeds in the seed mixture. Seed will be tested and the viability testing of seed shall be done in accordance with State law(s) and within nine (9) months prior to purchase. Commercial seed shall be either certified or registered seed. The seed container shall be tagged in accordance with State law(s) and available for inspection by the Authorized Officer.

Seed will be planted using a drill equipped with a depth regulator to ensure proper depth of planting where drilling is possible. The seed mixture will be evenly and uniformly planted over the disturbed area (smaller/heavier seeds have a tendency to drop the bottom of the drill and are planted first). Holder shall take appropriate measures to ensure this does not occur. Where drilling is not possible, seed will be broadcast and the area shall be raked or chained to cover the seed. When broadcasting the seed, the pounds per acre are to be doubled. Seeding shall be repeated until a satisfactory stand is established as determined by the Authorized Officer. Evaluation of growth may not be made before completion of at least one full growing season after seeding.

Species to be planted in pounds of pure live seed* per acre:

Species	lb/acre
Plains Bristlegrass	5lbs/A
Sand Bluestem	5lbs/A
Little Bluestem	3lbs/A
Big Bluestem	6lbs/A
Plains Coreopsis	2lbs/A
Sand Dropseed	1lbs/A

*Pounds of pure live seed:

Pounds of seed x percent purity x percent germination = pounds pure live seed

AFMSS

U.S. Department of the Interior
BUREAU OF LAND MANAGEMENT

Operator Certification Data Report

05/28/2019

Operator Certification

I hereby certify that I, or someone under my direct supervision, have inspected the drill site and access route proposed herein; that I am familiar with the conditions which currently exist; that I have full knowledge of state and Federal laws applicable to this operation; that the statements made in this APD package are, to the best of my knowledge, true and correct; and that the work associated with the operations proposed herein will be performed in conformity with this APD package and the terms and conditions under which it is approved. I also certify that I, or the company I represent, am responsible for the operations conducted under this application. These statements are subject to the provisions of 18 U.S.C. 1001 for the filing of false statements.

NAME: Sorina Flores **Signed on:** 11/29/2018

Title: Supv of Drilling Services

Street Address: 303 Veterans Airpark Ln #1000

City: Midland **State:** TX **Zip:** 79705

Phone: (432)818-1167

Email address: sorina.flores@apachecorp.com

Field Representative

Representative Name:

Street Address:

City: **State:** **Zip:**

Phone:

Email address:

AFMSS

U.S. Department of the Interior
BUREAU OF LAND MANAGEMENT

Application Data Report

05/28/2019

APD ID: 10400036812 **Submission Date:** 12/10/2018

Operator Name: APACHE CORPORATION

Well Name: BLACK & TAN 27 FEDERAL COM **Well Number:** 405H

[redacted]

Show Final Text

Well Type: OIL WELL **Well Work Type:** Drill

Section 1 - General

APD ID: 10400036812 **Tie to previous NOS?** **Submission Date:** 12/10/2018

BLM Office: CARLSBAD **User:** Sorina Flores **Title:** Supv of Drilling Services

Federal/Indian APD: FED **Is the first lease penetrated for production Federal or Indian?** FED

Lease number: NMNM060393 **Lease Acres:** 80

Surface access agreement in place? **Allotted?** **Reservation:**

Agreement in place? NO **Federal or Indian agreement:**

Agreement number:

Agreement name:

Keep application confidential? YES

Permitting Agent? NO **APD Operator:** APACHE CORPORATION

Operator letter of designation:

Operator Info

Operator Organization Name: APACHE CORPORATION

Operator Address: 303 Veterans Airpark Lane #1000 **Zip:** 79705

Operator PO Box:

Operator City: Midland **State:** TX

Operator Phone: (432)818-1000

Operator Internet Address:

Section 2 - Well Information

Well in Master Development Plan? NO **Master Development Plan name:**

Well in Master SUPO? NO **Master SUPO name:**

Well in Master Drilling Plan? NO **Master Drilling Plan name:**

Well Name: BLACK & TAN 27 FEDERAL COM **Well Number:** 405H **Well API Number:**

Field/Pool or Exploratory? Field and Pool **Field Name:** BONE SPRING **Pool Name:** LEA, BONE SPRING, S

Is the proposed well in an area containing other mineral resources? POTASH

Operator Name: APACHE CORPORATION

Well Name: BLACK & TAN 27 FEDERAL COM **Well Number:** 405H

Describe other minerals:

Is the proposed well in a Helium production area? N **Use Existing Well Pad?** NO **New surface disturbance?**

Type of Well Pad: MULTIPLE WELL **Multiple Well Pad Name:** BLACK & TAN 27 FED COM **Number:** PAD 3 EAST

Well Class: HORIZONTAL **Number of Legs:**

Well Work Type: Drill

Well Type: OIL WELL

Describe Well Type:

Well sub-Type: OTHER

Describe sub-type: DEVELOPMENT

Distance to town: 25 Miles **Distance to nearest well:** 40 FT **Distance to lease line:** 100 FT

Reservoir well spacing assigned acres Measurement: 320 Acres

Well plat: BlkTan27FedCom405H_Plat_signed_20181210143616.pdf

Well work start Date: 08/30/2019 **Duration:** 15 DAYS

Section 3 - Well Location Table

Survey Type: RECTANGULAR

Describe Survey Type:

Datum: NAD83 **Vertical Datum:** NAVD88

Survey number:

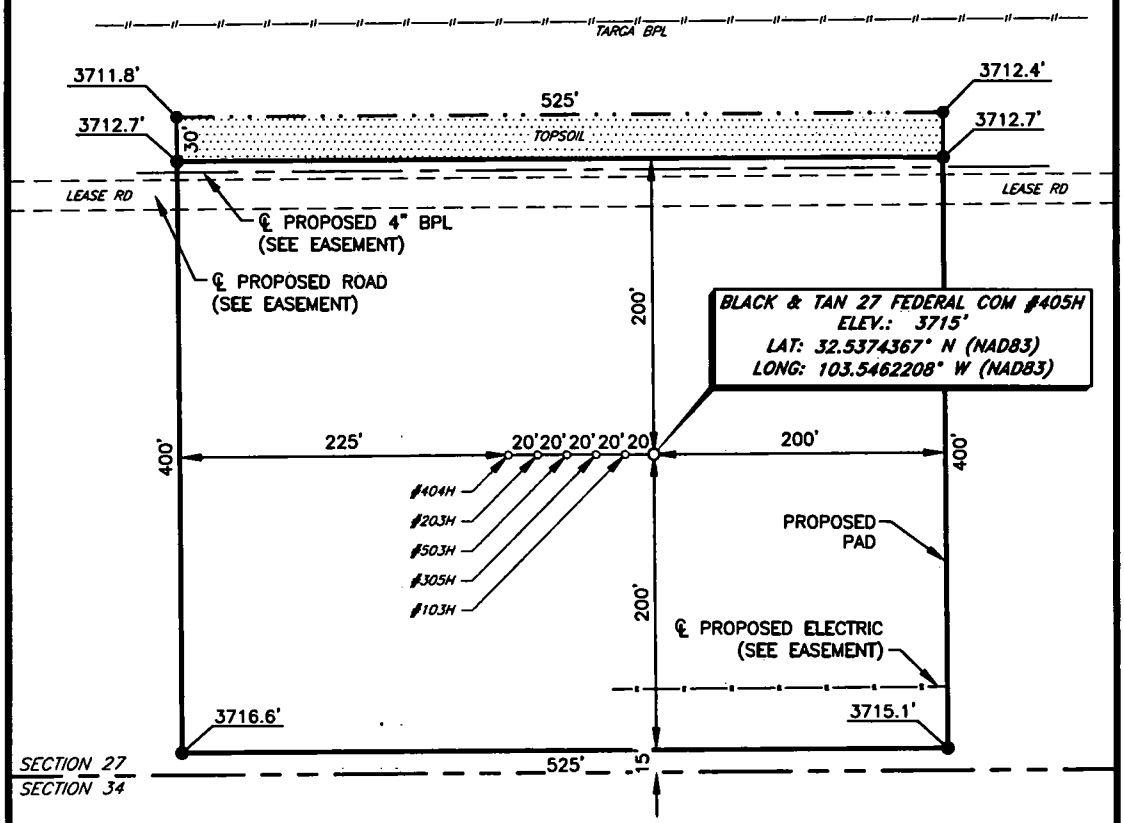
	NS-Foot	NS Indicator	EW-Foot	EW Indicator	Twsp	Range	Section	Aliquot/Lot/Tract	Latitude	Longitude	County	State	Meridian	Lease Type	Lease Number	Elevation	MD	TVD
SHL Leg #1	215	FSL	2072	FEL	20S	34E	27	Aliquot SWSE	32.5374367	-103.5462208	LEA	NEW MEXICO	NEW MEXICO	F	NMNM 060393	3715	0	0
KOP Leg #1	50	FSL	1345	FEL	20S	34E	27	Aliquot SWSE	32.5369821	-103.5438624	LEA	NEW MEXICO	NEW MEXICO	F	NMNM 060393	-7267	11028	10982
PPP Leg #1	241	FSL	1345	FEL	20S	34E	27	Aliquot SWSE	32.5375009	-103.5438625	LEA	NEW MEXICO	NEW MEXICO	F	NMNM 060393	-7650	11472	11365

Operator Name: APACHE CORPORATION

Well Name: BLACK & TAN 27 FEDERAL COM **Well Number:** 405H

	NS-Foot	NS Indicator	EW-Foot	EW Indicator	Twsp	Range	Section	Aliquot/Lot/Tract	Latitude	Longitude	County	State	Meridian	Lease Type	Lease Number	Elevation	MD	TVD
EXIT Leg #1	50	FNL	1344	FEL	20S	34E	27	Aliquot NWNE	32.5512292	-103.5438653	LEA	NEW MEXICO	NEW MEXICO	F	NMNM 0000082	-7703	16484	11418
BHL Leg #1	50	FNL	1344	FEL	20S	34E	27	Aliquot NWNE	32.5512292	-103.5438653	LEA	NEW MEXICO	NEW MEXICO	F	NMNM 0000082	-7703	16484	11418

APACHE CORPORATION
BLACK & TAN 27 FEDERAL COM #405H
(215' FSL & 2072' FEL)
SECTION 27, T20S, R34E
N. M. P. M., LEA COUNTY, NEW MEXICO



SCALE: 1" = 100'
0 50' 100'

BEARINGS ARE GRID NAD 83 NM EAST
DISTANCES ARE HORIZ. GROUND.

DIRECTIONS TO LOCATION

From the intersection of Hwy 176 and CR-27 (Skeen Rd.),
Go Northwest on CR-27 approx. 1.4 miles to a lease road on the right;
Turn right and go East approx. 0.3 miles to proposed location on the right.

THIS IS NOT A BOUNDARY SURVEY, APPARENT PROPERTY CORNERS AND PROPERTY LINES ARE SHOWN FOR INFORMATION ONLY, BOUNDARY DATA IS SHOWN FROM A PREVIOUS SURVEY REFERENCED HEREON.

I, Jeffrey L. Fansler, a N. M. Professional Surveyor, hereby certify that I prepared this plat from an actual survey made on the ground under my direct supervision, said survey and plat meet the Min. Stds. for Land Surveying in the State of N. M. and are true and correct to the best of my knowledge and belief.

Jeffrey L. Fansler NM PS 10034

JEFFREY L. FANSLER NEW MEXICO 10034 7/9/18 PROFESSIONAL SURVEYOR

NO.	REVISION	DATE

JOB NO.: LS1806829
DWG. NO.: 1806829PAD

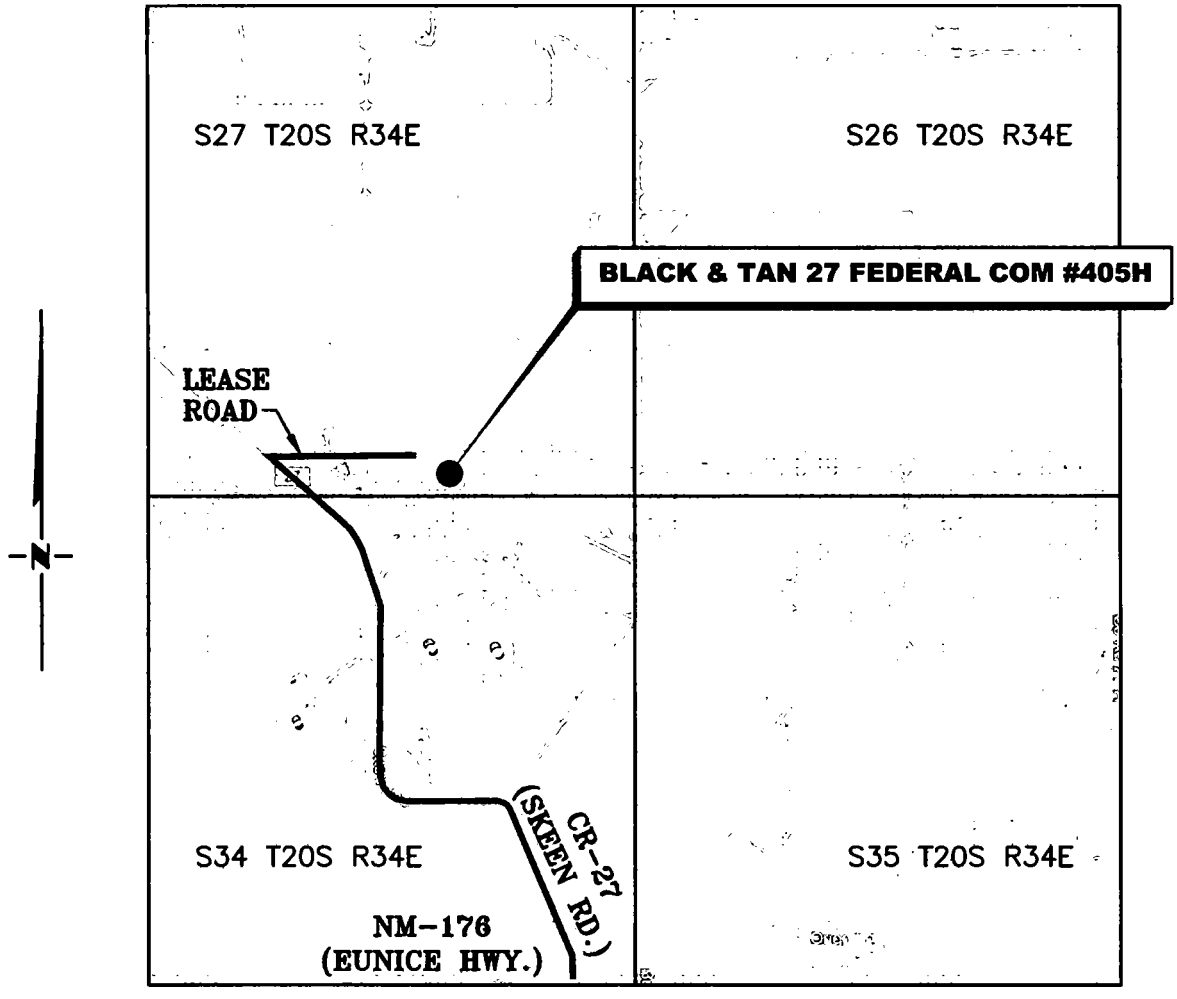
RRC

405 308 W. BROADWAY ST., HOBBS, NM 88240 (575) 964-8200

SCALE: 1" = 100'
DATE: 07-02-2017
SURVEYED BY: AB/RU
DRAWN BY: CAR
APPROVED BY: JLF
SHEET : 1 OF 1

VICINITY MAP

NOT TO SCALE



SECTION 27, TWP. 20 SOUTH, RGE. 34 EAST, N. M. P. M., LEA COUNTY, NEW MEXICO

OPERATOR: Apache Corporation
LEASE: Black & Tan 27 Federal Com
WELL NO.: 405H

LOCATION: 215' FSL & 2,072' FEL
ELEVATION: 3715'

NO.	REVISION	DATE

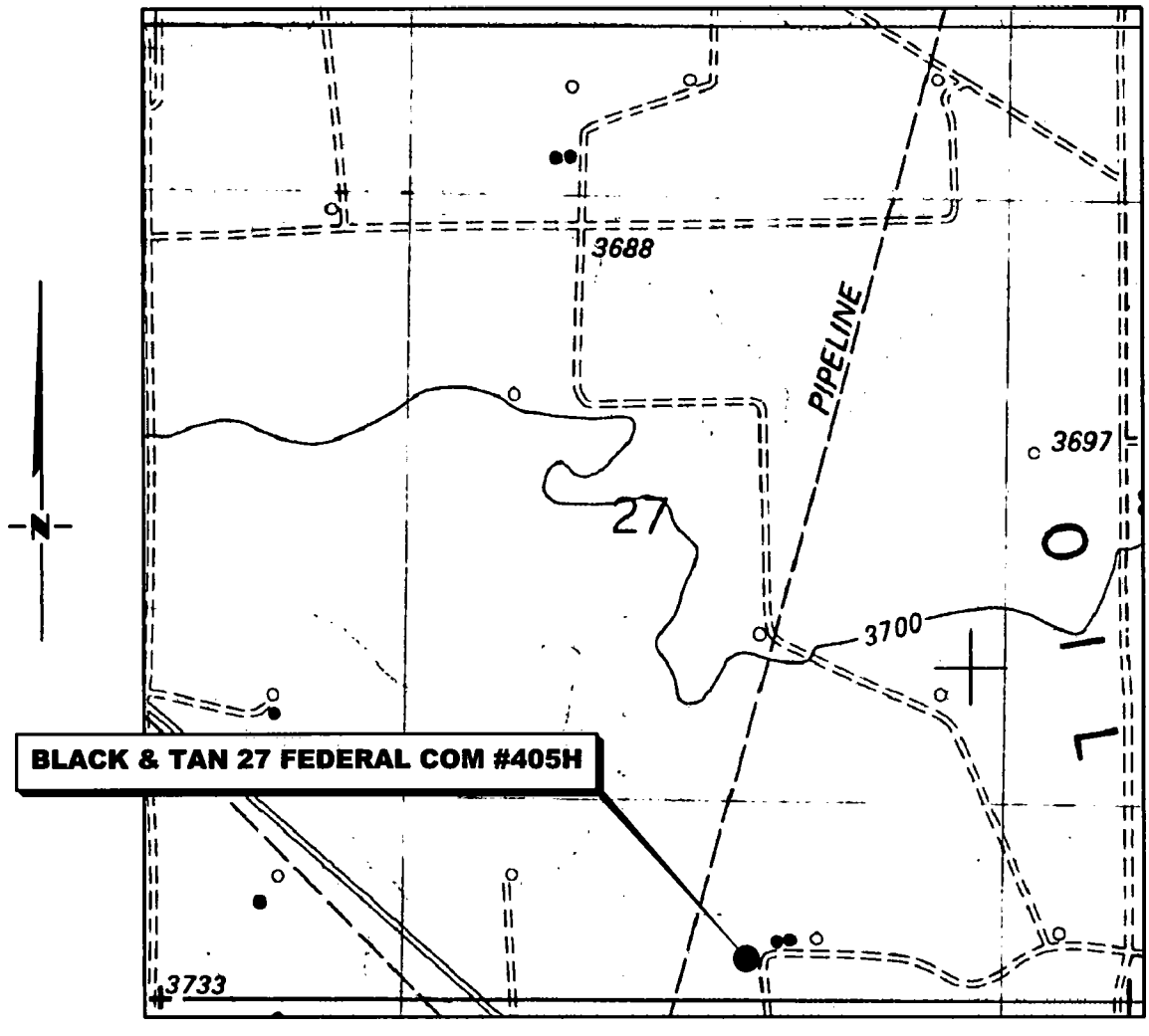
JOB NO.: LS1806829
DWG. NO.: 1806829VM

RRC

405 308 W. BROADWAY ST., HOBBS, NM 88240 (575) 964-8200

SCALE: N / A
DATE: 07-02-2018
SURVEYED BY: AB/RU
DRAWN BY: CAR
APPROVED BY: JLF
SHEET: 1 OF 1

LOCATION VERIFICATION MAP



SECTION 27, TWP. 20 SOUTH, RGE. 34 EAST,
N. M. P. M., LEA COUNTY, NEW MEXICO

OPERATOR: Apache Corporation
LEASE: Black & Tan 27 Federal Com
WELL NO.: 405H
ELEVATION: 3715'

LOCATION: 215' FSL & 2,072' FEL
CONTOUR INTERVAL: 10'
USGS TOPO. SOURCE MAP:
Lea, NM (P. E. 1984)

NO.	REVISION	DATE

JOB NO.: LS1806829
DWG. NO.: 1806829LVM

RRC

405 308 W. BROADWAY ST., HOBBS, NM 88240 (575) 964-8200

SCALE: 1" = 1000'
DATE: 07-02-2018
SURVEYED BY: AB/RU
DRAWN BY: CAR
APPROVED BY: JLF
SHEET: 1 OF 1

APD ID: 10400036812 **Submission Date:** 12/10/2018

Operator Name: APACHE CORPORATION

Well Name: BLACK & TAN 27 FEDERAL COM **Well Number:** 405H

Well Type: OIL WELL **Well Work Type:** Drill

[redacted]

Show Final Text

Section 1 - Geologic Formations

Formation ID	Formation Name	Elevation	True Vertical Depth	Measured Depth	Lithologies	Mineral Resources	Producing Formation
1	RUSTLER	3715	1625	1625		POTASH	No
2	SALADO	1759	1955	1955		POTASH	No
3	TANSILL	349	3365	3365		OIL	No
4	YATES	194	3520	3520		NATURAL GAS,OIL	No
5	CAPITAN REEF	-207	3921	3921		NATURAL GAS,OIL	No
6	DELAWARE	-1951	5665	5665		OIL	No
7	BONE SPRING	-4876	8590	8590		OIL	Yes

Section 2 - Blowout Prevention

Pressure Rating (PSI): 5M **Rating Depth:** 12200

Equipment: Rotating Head, Mud Gas Separator, Blow Down Pit, Flare Line

Requesting Variance? YES

Variance request: Apache request a variance to use a flexible hose between BOP and Choke manifold. Flex hose may vary pending availability. A quality control inspection and test certificate will be available for review.
Testing Procedure: BOP/BOPE will be tested by independent service company to 250psi low and high pressure indicated above per Onshore Order 2 requirements. System may be upgraded to higher pressure but sill tested to WP listed . If system is upgraded, all components installed will be functional and tested. Pipe rams will be operationally checked each 24 hr period. Blind rams will be operationally checked on each TOOH. These checks will be noted on daily tour sheets. Other accessories to BOP equipment will include Kelly cock and floor safety valve (inside BOP), choke lines and choke manifold. (see attached schematic)

Choke Diagram Attachment:

BlkTan27FedCom_12.25Hole_BOP_ChokeManifold_Schem_20190411150056.pdf

BOP Diagram Attachment:

BlkTan27FedCom_8.75_6.75_Hole_BOP_3M_ChokeManifold_Schem_REV_5.7.19_20190508085744.pdf

Operator Name: APACHE CORPORATION

Well Name: BLACK & TAN 27 FEDERAL COM **Well Number:** 405H

Section 3 - Casing

Casing ID	String Type	Hole Size	Csg Size	Condition	Standard	Tapered String	Top Set MD	Bottom Set MD	Top Set TVD	Bottom Set TVD	Top Set MSL	Bottom Set MSL	Calculated casing length MD	Grade	Weight	Joint Type	Collapse SF	Burst SF	Joint SF Type	Joint SF	Body SF Type	Body SF
1	INTERMEDIATE	12.25	9.625	NEW	API	N	0	800	0	800	-8196	-13076	800	J-55	40	BUTT	5.1	1.16	BUOY	2.27	BUOY	1.99
2	SURFACE	17.5	13.375	NEW	API	N	0	1650	0	1650	-7296	-8996	1650	J-55	54.5	BUTT	2.92	1.67	BUOY	4.1	BUOY	3.84
3	PRODUCTION	6.75	5.5	NEW	API	Y	0	5400	0	5376			5400	P-110	20	OTHER - GB-CD	3.24	1.44	BUOY	2.27	BUOY	2.17
4	INTERMEDIATE	12.25	9.625	NEW	API	N	800	5660	800	5633	-7296	-8196	4860	J-55	40	LTC	1.71	1.16	BUOY	1.8	BUOY	2.16
5	LINER	8.75	7.625	NEW	API	N	5560	10870	5534	10824			5310	L-80	26.4	OTHER - TMK UP SF	1.34	1.89	BUOY	2.23	BUOY	2.48
6	PRODUCTION	6.75	5.5	NEW	API	Y	5400	16354	5376	11420			10954	P-110	20	OTHER - TMK UP SF	1.52	1.39	BUOY	2.02	BUOY	2.2
7	PRODUCTION	6.75	4.5	NEW	API	Y	16354	16484	11420	11419			130	P-110	13.5	BUTT	1.47	1.69	BUOY	3.36	BUOY	3.16

Casing Attachments

Casing ID: 1 **String Type:** INTERMEDIATE

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

BlkTan27FedCom_IntermCsgDesignAssumpt_20181121104400.pdf

Operator Name: APACHE CORPORATION

Well Name: BLACK & TAN 27 FEDERAL COM **Well Number:** 405H

Casing Attachments

Casing ID: 2 **String Type:** SURFACE

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

BlkTan27FedCom_SurfCsgDesignAssumpt_20181121104411.pdf

Casing ID: 3 **String Type:** PRODUCTION

Inspection Document:

Spec Document:

Tapered String Spec:

Black_and_Tan_27_Federal_COM_405H_ProdCsgTaperedSpecsREVISED_20190411151342.pdf

Casing Design Assumptions and Worksheet(s):

BlkTan27FedCom_ProdCsgDesignAssumpt_20190411151851.pdf

BlkTan27FedCom_TechDataSheet_PPS_5500od_2000ppf_P110_GB_CD_Butt_6.300_Rev_1_20190429125012.pdf

Casing ID: 4 **String Type:** INTERMEDIATE

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

BlkTan27FedCom_IntermCsgDesignAssumpt_20181121104424.pdf

Operator Name: APACHE CORPORATION

Well Name: BLACK & TAN 27 FEDERAL COM **Well Number:** 405H

Casing Attachments

Casing ID: 5 **String Type:** LINER

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

BlkTan27FedCom_IntermDrlgLiner_Casing_Design_Assumptions_20190411151425.pdf

BlkTan27FedCom_TechDataSheet_TMK_UP_SF_7.625_x_26.4_L80_20190429125026.pdf

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Casing ID: 6 **String Type:** PRODUCTION

Inspection Document:

Spec Document:

Tapered String Spec:

Black_and_Tan_27_Federal_COM_405H_ProdCsgTaperedSpecsREVISED_20190411151540.pdf

Casing Design Assumptions and Worksheet(s):

BlkTan27FedCom_ProdCsgDesignAssumpt_20190411151600.pdf

BlkTan27FedCom_TechDataSheet_TMK_UP_SF_5.5_x_20_P110_20190429125038.pdf

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Casing ID: 7 **String Type:** PRODUCTION

Inspection Document:

Spec Document:

Tapered String Spec:

Black_and_Tan_27_Federal_COM_405H_ProdCsgTaperedSpecsREVISED_20190411151724.pdf

Casing Design Assumptions and Worksheet(s):

BlkTan27FedCom_ProdCsgDesignAssumpt_20190411151807.pdf

Operator Name: APACHE CORPORATION

Well Name: BLACK & TAN 27 FEDERAL COM **Well Number:** 405H

Section 4 - Cement

String Type	Lead/Tail	Stage Tool Depth	Top MD	Bottom MD	Quantity(sx)	Yield	Density	Cu Ft	Excess%	Cement type	Additives
SURFACE	Lead		0	1320	676	1.72	13.5	1162.72	25	Cl C	4% Bentonite + 1% CaCl2
SURFACE	Tail		1320	1650	245	1.34	14.8	328.3	25	Cl C	1% CaCl2
INTERMEDIATE	Lead	3460	0	2780	450	2.32	12.7	1044	25	Cl C	10% NaCl + 6% Benontite + 1% MgOx-M + 0.7% Retarder
INTERMEDIATE	Tail		2780	3460	200	1.33	14.8	266	25	Cl C	0.3% retarder
INTERMEDIATE	Lead		3460	4660	250	2.32	12.7	580	25	Cl C	10% NaCl + 6% Benontite + 1% MgOx-M + 0.7% Retarder
INTERMEDIATE	Tail		4660	5660	300	1.33	14.8	399	25	Cl C	0.3% retarder
INTERMEDIATE	Lead		0	4660	770	2.32	12.7	1786.4	25	Cl C	10% NaCl + 6% Benontite + 1% MgOx-M + 0.7% Retarder
INTERMEDIATE	Tail		4660	5660	300	1.33	14.8	399	25	Cl C	0.2% Retarder
LINER	Lead		5560	9870	170	2.87	10.5	487.9	10	Nine Lite	5% Light Weight Beads + 0.3% Fluid Loss + 0.2% Dispersant + 0.2% GXT + 0.2% Suspension Aid + 0.25% Retarder + 0.25% Citric Acid
LINER	Tail		9870	10870	100	1.22	14.5	122	10	h	2% Bentonite Gel + 3% MgOx-M + 0.6% Fluid Loss + 0.3% Dispersant + 0.45% Retarder
PRODUCTION	Lead		0	11028	690	2.9	11	2001	20	Nine lite	10% Bentonite Gel + 8% Plexcrete SFA + 0.7% Fluid Loss + 0.4% Defoamer + 0.6% Retarder
PRODUCTION	Tail		11028	16484	380	1.46	13.2	554.8	20	Nine Lite	1.3% Salt + 5% Expanding Agent + 0.5% Fluid Loss + 0.35% Retarder + 0.1% Anti Settling + 0.2% Dispersant + 0.4 #/sk Defoamer
PRODUCTION	Lead		0	11028	690	2.9	11	2001	20	Nine Lite	10% Bentonite Gel + 8% Plexcrete SFA +

Operator Name: APACHE CORPORATION

Well Name: BLACK & TAN 27 FEDERAL COM **Well Number:** 405H

String Type	Lead/Tail	Stage Tool Depth	Top MD	Bottom MD	Quantity(sx)	Yield	Density	Cu Ft	Excess%	Cement type	Additives
											0.7% Fluid Loss + 0.4% Defoamer + 0.6% Retarder
PRODUCTION	Tail		11028	16484	380	1.46	13.2	554.8	20	Nine lite	1.3% Salt + 5% Expanding Agent + 0.5% Fluid Loss + 0.35% Retarder + 0.1% Anti Settling + 0.2% Dispersant + 0.4 #/sk Defoamer
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Section 5 - Circulating Medium

Mud System Type: Closed

Will an air or gas system be Used? NO

Description of the equipment for the circulating system in accordance with Onshore Order #2:

Diagram of the equipment for the circulating system in accordance with Onshore Order #2:

Describe what will be on location to control well or mitigate other conditions: Sufficient mud materials to maintain mud properties and meet minimum lost circulation and weight increase requirements will be kept on location at all times

Describe the mud monitoring system utilized: PVT/Pason/Visual Monitoring

Circulating Medium Table

Operator Name: APACHE CORPORATION

Well Name: BLACK & TAN 27 FEDERAL COM **Well Number:** 405H

Top Depth	Bottom Depth	Mud Type	Min Weight (lbs/gal)	Max Weight (lbs/gal)	Density (lbs/cu ft)	Gel Strength (lbs/100 sqft)	PH	Viscosity (CP)	Salinity (ppm)	Filtration (cc)	Additional Characteristics
0	1650	SPUD MUD	8.3	9							
1650	5660	SALT SATURATED	9.8	10.5							
5660	10870	OTHER : CUT BRINE	8.6	10.2							
10870	16484	OIL-BASED MUD	9	12							

Section 6 - Test, Logging, Coring

List of production tests including testing procedures, equipment and safety measures:

Onshore Order 2.111.D shall be followed. Will run GR/CNL from TD to surf (horizontal well - vertical portion of hole). Stated logs run will be in the completion report & submitted to BLM.

List of open and cased hole logs run in the well:

CNL/FDC,DS,GR,MWD,MUDLOG

Coring operation description for the well:

None planned

Section 7 - Pressure

Anticipated Bottom Hole Pressure: 6500 **Anticipated Surface Pressure:** 3988.04

Anticipated Bottom Hole Temperature(F): 166

Anticipated abnormal pressures, temperatures, or potential geologic hazards? YES

Describe:

Capitan reef poses lost circulation potential

Contingency Plans geoharzards description:

For Capitan Reef, Apache will switch over to FW system if lost circ is encountered. A 2-stage cmt job will be proposed to get cmt to surf.

Contingency Plans geohazards attachment:

Hydrogen Sulfide drilling operations plan required? YES

Hydrogen sulfide drilling operations plan:

BlkTan27FedCom_H2SOpsContPlan_20181121112018.pdf

Operator Name: APACHE CORPORATION

Well Name: BLACK & TAN 27 FEDERAL COM **Well Number:** 405H

Section 8 - Other Information

Proposed horizontal/directional/multi-lateral plan submission:

BlkTan27FedCom405H_WallPlot_20181129082546.pdf

BlkTan27FedCom405H_DirSurvey_20181129082545.pdf

Other proposed operations facets description:

**Cement contingency plan attached if loss circulation is encountered. Prod cmt had to be duplicated due to system irregularities with csg. Complete csg & cmt plan attached.
**Apache request variance to use flexible hose between BOP & Choke Manifold, see attachment for additional information
*Estimated Completion Date: 9/2019
*Estimated First Production Date: 10/2019

Other proposed operations facets attachment:

BlkTan27FedCom_401H_402H_403H_404H_405H_406H_GasCapturePlan_20181127145156.pdf

BlkTan27FedCom405H_CsgDetail_REVISED_20190411153319.pdf

BlkTan27FedCom405H_CmtDetail_REVISED_20190411153318.pdf

Other Variance attachment:

BlkTan27FedCom_Flexline_20181121112354.pdf

APACHE BOP AND CHOKE MANIFOLD SCHEMATIC (BlkTan27FedCom 401H, 402H, 403H, 404H, 405H, 406H)

[redacted]

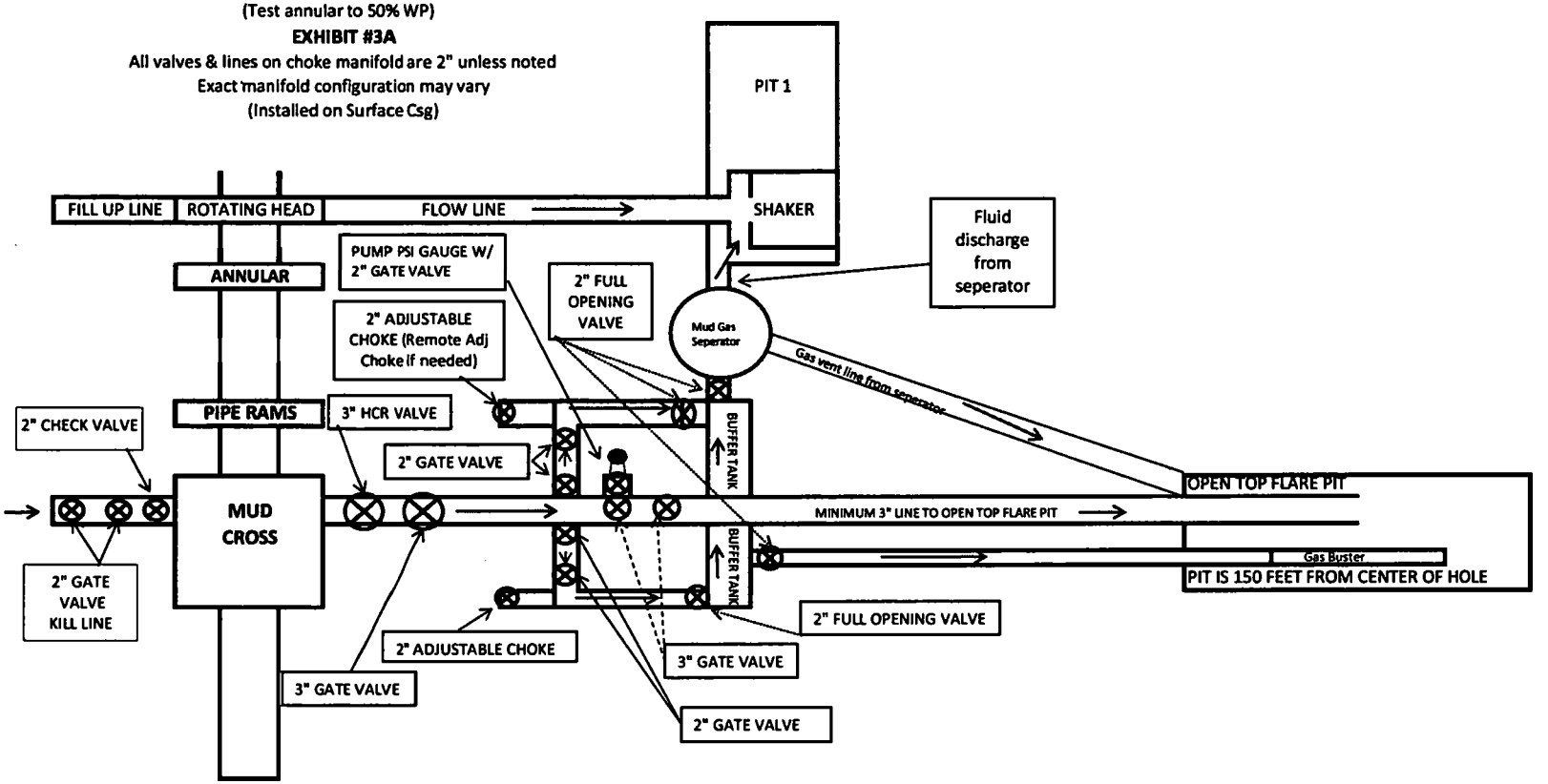
(Test annular to 50% WP)

EXHIBIT #3A

All valves & lines on choke manifold are 2" unless noted

Exact manifold configuration may vary

(Installed on Surface Csg)



***** If H2S is encountered in quantities greater than 100ppm, Apache will shut in well & install a remote operated choke *****

APACHE BOP AND CHOKE MANIFOLD SCHEMATIC (BlkTan27FedCom 401H, 402H, 403H, 404H, 405H, 406H)

(Test annular to 50% WP)

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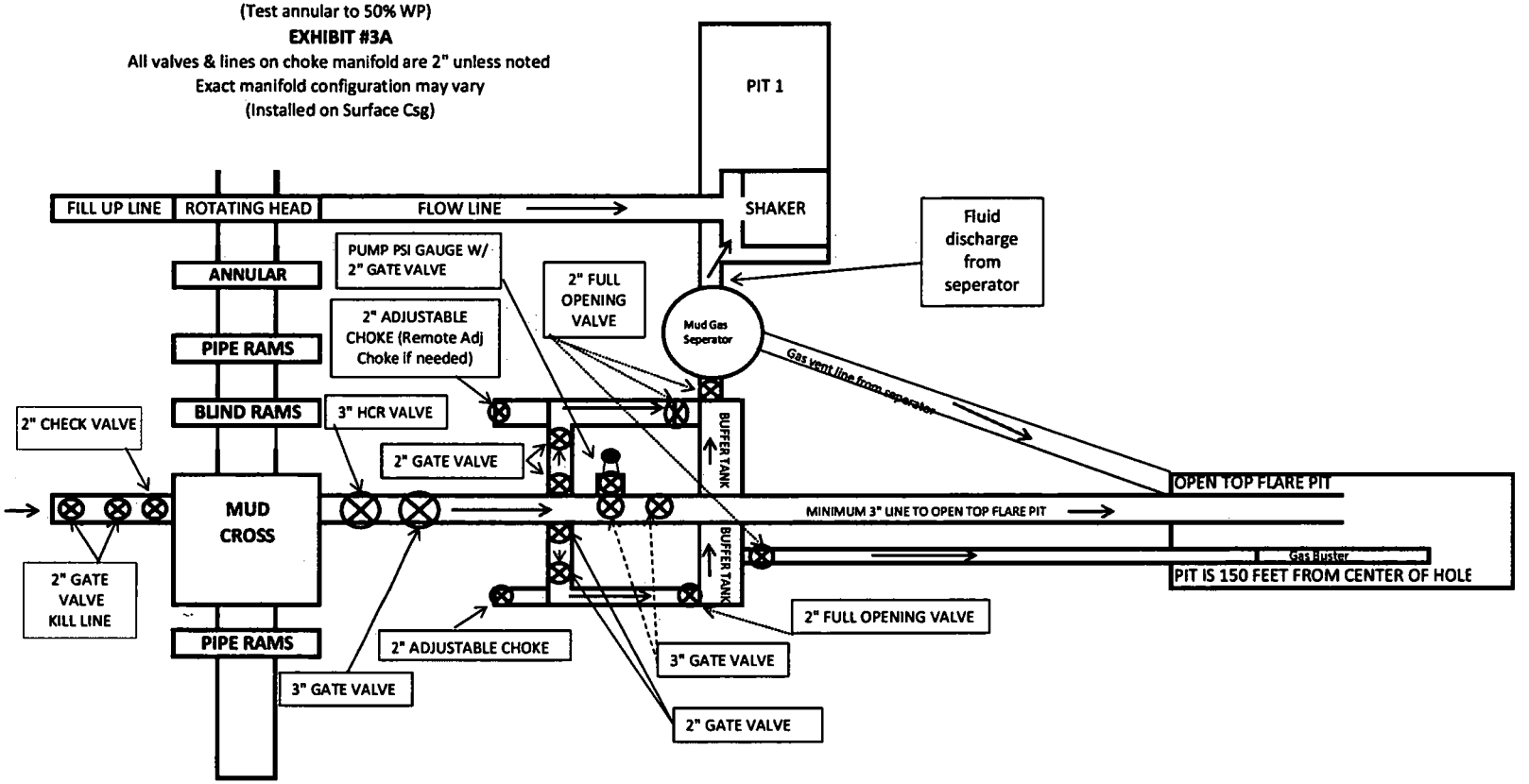

*** If H2S is encountered in quantities greater than 100ppm, Apache will shut in well & install a remote operated choke ***

Black & Tan 27 Federal COM 405H Production Casing Tapered String Specs

All casing design assumptions were ran in StressCheck to determine safety factors which meet or exceed both Apache Corp and BLM minimum requirements. All casing strings will be filled while running in hole in order to not exceed collapse rating of the casing.

String	OD/Weight/Grade	Connection	MD Interval (ft)	Minimum Safety Factor (Abs)		
				Burst	Collapse	Axial
Production Casing	5 ½", 20 ppf, P-110	GBCD, P-110	0-5400'	1.44	3.24	2.17
	5 ½", 20 ppf, P-110	TMK UP SF, P-110	5400'-16354'	1.39	1.52	2.02
	4 ½", 13.5 ppf, P-110	BTC, P-110	16354'-16484'	1.69	1.47	3.16

Production Casing Burst Design		
Load Case	**External Pressure**	**Internal Pressure**
Pressure Test	Mud base fluid density to TOC, cement mix-water gradient to outer shoe and pore pressure to TD	Fluid in hole (water or produced water) + test psi
Tubing Leak	Mud base fluid density to TOC, cement mix-water gradient to outer shoe and pore pressure to TD	Packer @ KOP, leak below surface 8.6 ppg packer fluid
Stimulation	Mud base fluid density to TOC, cement mix-water gradient to outer shoe and pore pressure to TD	Max frac pressure with heaviest frac fluid
Green Cement Pressure Test	Mud base fluid density to TOC, cement mix-water gradient to outer shoe and pore pressure to TD	Max pressure used to bump the plug during cement job

Production Casing Collapse Design		
Load Case	**External Pressure**	**Internal Pressure**
Full Evacuation	Mud weight string was set in	None
Cementing	Wet cement weight	Water (8.33 ppg)

Production Casing Axial Design	
Load Case	**Assumptions**
Overpull	100 kips
Running in hole	2 ft/s
Green Cement Pressure Test	Max pressure when bumping plug
Service Loads	N/A

Black & Tan 27 Federal COM 405H Production Casing Tapered String Specs

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Green Cement Pressure Test	Mud base fluid density to TOC, cement mix-water gradient to outer shoe and pore pressure to TD	Max pressure used to bump the plug during cement job

Production Casing Collapse Design		
Load Case	**External Pressure**	**Internal Pressure**
Full Evacuation	Mud weight string was set in	None
Cementing	Wet cement weight	Water (8.33 ppg)

Production Casing Axial Design	
Load Case	**Assumptions**
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Running in hole	2 ft/s
Green Cement Pressure Test	Max pressure when bumping plug
Service Loads	N/A

Black & Tan 27 Federal COM 405H Production Casing Tapered String Specs

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Production Casing Burst Design		
Load Case	**External Pressure**	**Internal Pressure**
Pressure Test	Mud base fluid density to TOC, cement mix-water gradient to outer shoe and pore pressure to TD	Fluid in hole (water or produced water) + test psi
Tubing Leak	Mud base fluid density to TOC, cement mix-water gradient to outer shoe and pore pressure to TD	Packer @ KOP, leak below surface 8.6 ppg packer fluid
Stimulation	Mud base fluid density to TOC, cement mix-water gradient to outer shoe and pore pressure to TD	Max frac pressure with heaviest frac fluid
Green Cement Pressure Test	Mud base fluid density to TOC, cement mix-water gradient to outer shoe and pore pressure to TD	Max pressure used to bump the plug during cement job

Production Casing Collapse Design		
Load Case	**External Pressure**	**Internal Pressure**
Full Evacuation	Mud weight string was set in	None
Cementing	Wet cement weight	Water (8.33 ppg)

Production Casing Axial Design	
Load Case	**Assumptions**
Overpull	100 kips
Running in hole	2 ft/s
Green Cement Pressure Test	Max pressure when bumping plug
Service Loads	N/A

Casing Design Assumptions and Load Cases

Intermediate

All casing design assumptions were ran in StressCheck to determine safety factors which meet or exceed both Apache Corp and BLM minimum requirements. All casing strings will be filled while running in hole in order to not exceed collapse rating of the casing.

Intermediate Casing Burst Design		
Load Case	**External Pressure**	**Internal Pressure**
Pressure Test	Mud and Cement Mix Water	Test psi with Mud Weight of displacement fluid
Fracture @ shoe w/ Gas Gradient Above	Mud and Cement Mix Water	Fracture psi at shoe and 0.7 gas gravity above shoe
Green Cement Pressure Test	Mud and Cement Mix Water	Max pressure used to bump the plug during cement job
Lost Returns with Water	Mud and Cement Mix Water	Pressure to fracture shoe with water hydrostatic

Intermediate Casing Collapse Design		
Load Case	**External Pressure**	**Internal Pressure**
Full/Partial Evacuation	Mud weight string was set in	50% casing evacuation with intermediate mud inside casing
Lost Returns with Mud Drop	Mud weight string was set in	Lost returns at TD casing shoe with 8.33 ppg mud
Cementing	Wet cement weight	Water (8.33 ppg)

Intermediate Casing Axial Design	
Load Case	**Assumptions**
Overpull	100 kips
Running in hole	2 ft/s
Green Cement Pressure Test	Max pressure when bumping plug
Service Loads	N/A

Casing Design Assumptions and Load Cases

Surface

All casing design assumptions were ran in StressCheck to determine safety factors which meet or exceed both Apache Corp and BLM minimum requirements. All casing strings will be filled while running in hole in order to not exceed collapse rating of the casing.

Surface Casing Burst Design		
Load Case	**External Pressure**	**Internal Pressure**
Pressure Test	Mud and Cement Mix Water	Test psi with Mud Weight of displacement fluid
Fracture @ shoe w/ Gas Gradient Above	Mud and Cement Mix Water	Fracture psi at shoe and 0.7 gas gravity above shoe
Green Cement Pressure Test	Mud and Cement Mix Water	Max pressure used to bump the plug during cement job
Lost Returns with Water	Mud and Cement Mix Water	Pressure to fracture shoe with water hydrostatic

Surface Casing Collapse Design		
Load Case	**External Pressure**	**Internal Pressure**
Full/Partial Evacuation	Mud weight string was set in	50% casing evacuation with surface mud inside casing
Lost Returns with Mud Drop	Mud weight string was set in	Lost returns at intermediate casing point with brine
Cementing	Wet cement weight	Water (8.33 ppg)

Surface Casing Axial Design	
Load Case	**Assumptions**
Overpull	100 kips
Running in hole	2 ft/s
Green Cement Pressure Test	Max pressure when bumping plug
Service Loads	N/A

Casing Design Assumptions and Load Cases

Intermediate

All casing design assumptions were ran in StressCheck to determine safety factors which meet or exceed both Apache Corp and BLM minimum requirements. All casing strings will be filled while running in hole in order to not exceed collapse rating of the casing.

Intermediate Casing Burst Design		
Load Case	**External Pressure**	**Internal Pressure**
Pressure Test	Mud and Cement Mix Water	Test psi with Mud Weight of displacement fluid
Fracture @ shoe w/ Gas Gradient Above	Mud and Cement Mix Water	Fracture psi at shoe and 0.7 gas gravity above shoe
Green Cement Pressure Test	Mud and Cement Mix Water	Max pressure used to bump the plug during cement job
Lost Returns with Water	Mud and Cement Mix Water	Pressure to fracture shoe with water hydrostatic

Intermediate Casing Collapse Design		
Load Case	**External Pressure**	**Internal Pressure**
Full/Partial Evacuation	Mud weight string was set in	50% casing evacuation with intermediate mud inside casing
Lost Returns with Mud Drop	Mud weight string was set in	Lost returns at TD casing shoe with 8.33 ppg mud
Cementing	Wet cement weight	Water (8.33 ppg)

Intermediate Casing Axial Design	
Load Case	**Assumptions**
Overpull	100 kips
Running in hole	2 ft/s
Green Cement Pressure Test	Max pressure when bumping plug
Service Loads	N/A

Casing Design Assumptions and Load Cases

Intermediate Drilling Liner

All casing design assumptions were ran in StressCheck to determine safety factors which meet or exceed both Apache Corp and BLM minimum requirements. All casing strings will be filled while running in hole in order to not exceed collapse rating of the casing.

Intermediate Drilling Liner Casing Burst Design		
Load Case	**External Pressure**	**Internal Pressure**
Pressure Test	Mud and Cement Mix Water	Test psi with Mud Weight of displacement fluid
Gas Kick	Mud and Cement Mix Water	Pressure seen while circulating out a 30 bbl 0.5 ppg kick intensity influx from well TD to surface while using current mud weight.
Green Cement Pressure Test	Mud and Cement Mix Water	Max pressure used to bump the plug during cement job
Lost Returns with Water	Mud and Cement Mix Water	Pressure to fracture shoe with water hydrostatic

Intermediate Drilling Liner Casing Collapse Design		
Load Case	**External Pressure**	**Internal Pressure**
Full/Partial Evacuation	Mud weight string was set in	50% casing evacuation with intermediate mud inside casing
Lost Returns with Mud Drop	Mud weight string was set in	Lost returns at TD with 12 ppg mud
Cementing	Wet cement weight	Water (8.33 ppg)

Intermediate Drilling Liner Casing Axial Design	
Load Case	**Assumptions**
Overpull	100 kips
Running in hole	2 ft/s
Green Cement Pressure Test	Max pressure when bumping plug
Service Loads	N/A

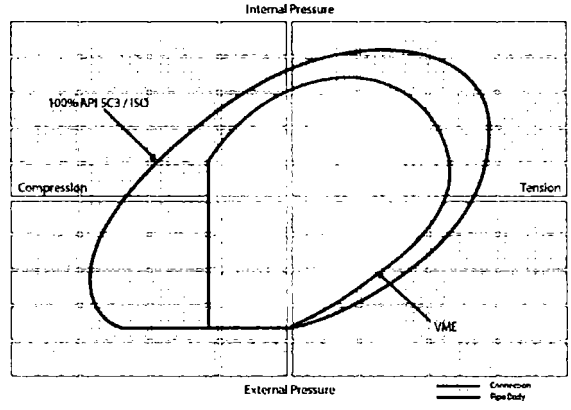
TECHNICAL DATA SHEET TMK UP SF 7.625 X 26.4 L80

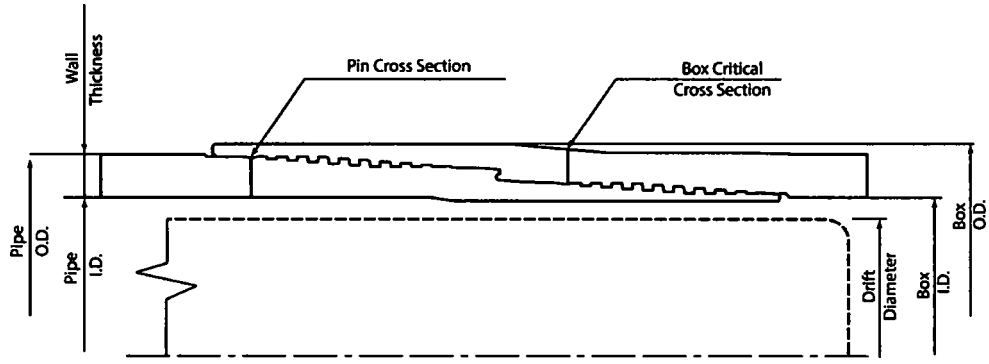
TUBULAR PARAMETERS	
Nominal OD, (inch)	7.625
Wall Thickness, (inch)	0.328
Pipe Grade	L80
Drift	Standard

CONNECTION PARAMETERS	
Connection OD (inch)	7.792
Connection ID, (inch)	6.938
Make-Up Loss, (inch)	6.029
Connection Critical Area, (sq inch)	6.666
Yield Strength in Tension, (klbs)	533
Yeld Strength in Compression, (klbs)	533
Tension Efficiency	89%
Compression Efficiency	89%
Min. Internal Yield Pressure, (psi)	6 020
Collapse Pressure, (psi)	3 400
Uniaxial Bending (deg/100ft)	43.0

MAKE-UP TORQUES	
Minimum Make-Up Torque, (ft-lb)	15 000
Optimum Make-Up Torque, (ft-lb)	16 500
Maximum Make-Up Torque, (ft-lb)	18 200
Operating Torque, (ft-lb)	19 210
Yield Torque, (ft-lb)	22 600

PIPE BODY PROPERTIES	
PE Weight, (lbs/ft)	25.56
Nominal Weight, (lbs/ft)	26.40
Nominal ID, (inch)	6.969
Drift Diameter, (inch)	6.844
Nominal Pipe Body Area, (sq inch)	7.519
Yield Strength in Tension, (klbs)	601
Min. Internal Yield Pressure, (psi)	6 020
Collapse Pressure, (psi)	3 400
Minimum Yield Strength, (psi)	80 000
Minimum Tensile Strength, (psi)	95 000





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Casing Design Assumptions and Load Cases

Production

All casing design assumptions were ran in StressCheck to determine safety factors which meet or exceed both Apache Corp and BLM minimum requirements. All casing strings will be filled while running in hole in order to not exceed collapse rating of the casing.

Production Casing Burst Design		
Load Case	**External Pressure**	**Internal Pressure**
Pressure Test	Mud base fluid density to TOC, cement mix-water gradient to outer shoe and pore pressure to TD	Fluid in hole (water or produced water) + test psi
Tubing Leak	Mud base fluid density to TOC, cement mix-water gradient to outer shoe and pore pressure to TD	Packer @ KOP, leak below surface 8.6 ppg packer fluid
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Green Cement Pressure Test	Mud base fluid density to TOC, cement mix-water gradient to outer shoe and pore pressure to TD	Max pressure used to bump the plug during cement job

Production Casing Collapse Design		
Load Case	**External Pressure**	**Internal Pressure**
Full Evacuation	Mud weight string was set in	None
Cementing	Wet cement weight	Water (8.33 ppg)

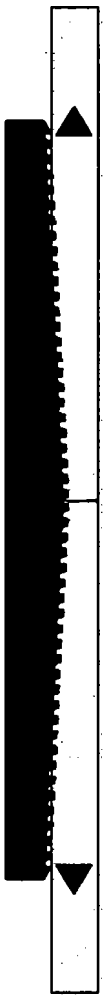
Production Casing Axial Design	
Load Case	**Assumptions**
Overpull	100 kips
Running in hole	2 ft/s
Green Cement Pressure Test	Max pressure when bumping plug
Service Loads	N/A

GB connections
Engineering the Right Connections

GB Connection Performance Properties Sheet

Rev. 1 (08/25/2015)

ENGINEERING THE RIGHT CONNECTIONS™



Casing: 5.5 OD, 20 ppf
Casing Grade: P-110

Connection: GB CD Butt 6.300
Coupling Grade: API P-110

PIPE BODY GEOMETRY					
Nominal OD (in.)	5 1/2	Wall Thickness (in.)	0.361	Drift Diameter (in.)	4.653
Nominal Weight (ppf)	20.00	Nominal ID (in.)	4.778	API Alternate Drift Dia. (in.)	N/A
Plain End Weight (ppf)	19.83	Plain End Area (in.^{2})	5.828		

PIPE BODY PERFORMANCE					
Material Specification	P-110	Min. Yield Str. (psi)	110,000	Min. Ultimate Str. (psi)	125,000
Collapse		**Tension**		**Pressure**	
API (psi)	11,100	Pl. End Yield Str. (kips)	641	Min. Int. Yield Press. (psi)	12,640
High Collapse (psi)	N/A	**Torque**		**Bending**	
		Yield Torque (ft-lbs)	74,420	Build Rate to Yield (°/100 ft)	91.7

GB CD Butt 6.300 COUPLING GEOMETRY			
Coupling OD (in.)	6.300	Makeup Loss (in.)	4.2500
Coupling Length (in.)	8.500	Critical Cross-Sect. (in.^{2})	8.527

GB CD Butt 6.300 CONNECTION PERFORMANCE RATINGS/EFFICIENCIES					
Material Specification	API P-110	Min. Yield Str. (psi)	110,000	Min. Ultimate Str. (psi)	125,000
Tension		**Efficiency**		**Bending**	
Thread Str. (kips)	667	Internal Pressure (%)	100%	Build Rate to Yield (°/100 ft)	80.0
Min. Tension Yield (kips)	891	External Pressure (%)	100%	**Yield Torque**	
Min. Tension Ult. (kips)	1,013	Tension (%)	100%	Yield Torque (ft-lbs)	31,180
Joint Str. (kips)	667	Compression (%)	100%		
		Ratio of Areas (Cplg/Pipe)	1.46		

MAKEUP TORQUE					
Min. MU Tq. (ft-lbs)	10,000	Max. MU Tq. (ft-lbs)	20,000	Running Tq. (ft-lbs)	See GBT RP
				Max. Operating Tq. (ft-lbs)*	29,620

Units: US Customary (lbm, in., °F, lbf)
1 kip = 1,000 lbs
* See Running Procedure for description and limitations.
See attached: Notes for GB Connection Performance Properties.
GBT Running Procedure (GBT RP): www.gbconnections.com/pdf/RP-GB-DWC-Connections.pdf
Blanking Dimensions: www.gbconnections.com/pdf/GB-DWC-Blanking-Dimensions.pdf
Connection yield torque rating based on physical testing or extrapolation therefrom

GB connections

Engineering the Right Connections

Notes for GB Connections Performance Properties

Rev. 1 (May, 2018)

ENGINEERING THE RIGHT CONNECTIONS™

1. All dimensions shown are nominal. Plain end weight is calculated in accordance with API TR 5C3. Performance properties are empirical, based on nominal dimensions, minimum material yield and ultimate strengths, and calculated in general accordance with industry standard formula(s) assuming uniaxial loading. All properties are calculated on the basis of materials at room temperature. NOTE: Material properties change with temperature.
2. Joint strength is the lesser of pipe thread strength and minimum coupling tension as calculated in accordance with API TR 5C3. Tensile efficiency is calculated using coupling strength based on ultimate material strength per API TR 5C3 divided by plain end yield strength of the casing. Minimum Coupling Tension based on material *yield* strength is provided *for information only.* Performance values presented for tension do not account for failure by pull-out (which can occur with heavy wall casing), effects of internal and external pressure, thermally induced axial loads, casing curvature (bending), and/or other static and dynamic loads that may occur singularly or in combination during downhole deployment and with subsequent well operations.
3. Drift diameters are based on Standard and Alternate drift sizes per API 5CT. Drift diameters are not specified for API 5L pipe. Drift diameters shown on GB Connection Performance Property Sheets represent the diameter of the drift mandrel used for end-drifting after coupling buck on. When shown, the alternate drift diameter is used for end drifting. Drift testing is performed in accordance with currently applicable API Specifications.
4. Minimum Internal Yield Pressure Performance values for Casing (API 5CT), Line Pipe (API 5L), and mill casing proprietary grades are based on API TR 5C3 formulas and assume 87.5% minimum wall thicknesses. Minimum Internal Yield Pressure efficiency for GB Connections is the lesser of the Minimum Internal Yield Pressure of the coupling and Leak Resistance divided by pipe body Minimum Internal Yield Pressure (all based on API TR 5C3 formulas). GB Connections typically demonstrate pressure resistance exceeding the mating pipe body unless otherwise noted with a pressure efficiency < 100%. Pressure efficiency can only be achieved when connections are properly assembled in strict accordance with GB Connections' Running Procedures (www.gbconnections.com/pdf/RP-GB-DWC-Connections.pdf.
5. Compression efficiency of the Casing/Connection combinations does not consider the axial load that causes pipe body buckling. The compressive load that causes buckling is usually less than the pipe body compressive yield strength and is dependent on a number of factors including, but not limited to, string length (or slenderness ratio; L/D), thermally induced axial loads, and annular clearance that may (or may not) lend side support to the casing string.
6. Bending values assume a constant radius of curvature where the casing is in uniformly intimate contact with the wall of the wellbore (i.e. when the upset at the coupling OD is small compared with wellbore wall irregularities). When the radius of curvature is not constant due to large wellbore wall irregularities, varying trajectory, micro doglegs, wash-outs, rock ledges, and other downhole conditions, unpredictable excessive bending stresses can occur that may be detrimental to casing and connection performance.
7. Fatigue failures are a function of material properties, stress range, and number of stress reversal cycles. API 5CT, API 5L, and mill proprietary casing/coupling materials have a finite fatigue life. Higher stress ranges yield lower fatigue life. So as a general rule of thumb, casing should never be rotated at higher RPMs than needed for task accomplishment. For the same stress range, casing rotated at 25 RPMs will generally last 4 times longer (more rotating hours) than casing rotated at 100 RPMs. However with fatigue, there are opportunities for unexpected higher stress reversal levels associated with vibration, thermally induced axial loads, and bending (see above) in addition to all other stress reversals imparted during running, rotating, reciprocating, pressure testing, pumping, etc. The extent and quality of the cement job is also a factor. Under aggressive, high-volume, multi-stage hydraulic fracturing operations, the casing string (including the connections) is severely taxed such that local stress range(s) and actual number of applied cycles cannot be precisely determined without full string instrumentation.
8. External pressure efficiency (expressed in percent) is the ratio of the lesser of Minimum Internal Yield Pressure and Leak Resistance for coupling (calculated per API TR 5C3) divided by the API collapse rating of the casing. External pressure efficiency has not been verified by testing and does not consider other applied loads. External pressure efficiency does not account for any high collapse rating that may be shown on GB Connection Performance Property Sheets.
9. Maximum Makeup Torque is provided for guidance only. This value is not the same as the Connection Yield Torque shown. Connection Yield Torque is the lesser of yield torque rating for the critical cross-section of pipe body, connector body, and pin nose and the threadform load flank bearing area. Connection Yield Torque does not consider radial buckling of the pipe or connection due to excessive jaw pressure during torque application. Torque in connections can increase or decrease over that applied at makeup (connection tightening/loosening) with rotating and stimulation operations due to slip-stick, shock loads, bending, tight spots, vibration(s), temperature, and other downhole factors that may occur individually or in combination. Due to circumstances beyond the control of GB Connections, User accepts all risks associated with casing and connection related issues that occur during and after rotating operations.
10. **Every** GB Connection requires the proper amount and distribution of thread compound to all pin and coupling threads and careful field make up in strict accordance with GB Connections' Running Procedures to provide expected levels of performance in service.
11. Reactions among water, drilling muds and other fluids, and chemicals introduced by User with downhole formation fluids may result in an environment detrimental to casing and connection performance. User should carefully consider all aspects of the string design including material compatibility with respect to possible corrosion, sour conditions, and other factors that may result in unexpected casing and/or connection failure at or below published ratings.
12. Performance Properties are subject to change without notice. User is advised to obtain the current GB Connection Performance Property Sheet for each application. Please visit **www.gbconnections.com** to download.

Limitations

Data presented in GB Performance Property Sheets and Running Procedures ("GB Information") is provided for informational purposes only and intended to be supplemented by the professional judgment of qualified personnel during design, field handling, deployment, and all subsequent well operations. The use of GB Information is at the User's sole risk.

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OVERVIEW

This field running procedure applies to makeup of **GB *Drilling with Casing*** (GB DwC) Connections which include GB CD, GB CDE, GB RDB, AND GB RDB WS Connections with GB Butt (Buttress), GB 4P, and GB 3P thread forms. All of these connections are suitable for ***Running*** (standard casing applications), ***Rotating*** (to aid string advancement), ***Drilling*** (Drilling with Casing/Drilling with Liners) and ***Driving***. This procedure also applies to the legacy GB Connections known as GB Butt and GB 3P.

Numerous factors impact the makeup torque of Buttress (GB Butt) and Modified Buttress Threads (such as GB 4P and GB 3P). Some of these factors include but are not limited to: allowable threading tolerances, joint characteristics (OD, straightness, hooked ends, and weight), vertical alignment (derrick, top drive, and elevator alignment relative to rotary table), thread compound (amount and distribution), snub line (location and orientation), distance between tongs and backups, temperature/weather, equipment type, efficiencies (electrical, hydraulic and mechanical), grips/dies (type, condition, orientation, location, contact area, and grip distribution), measurement equipment, gauge calibration, personnel, etc. The nature of these types of connections makes it impossible to provide makeup torque values that will yield proper power tight makeup on every rig under all circumstances with the wide variety of existing connection makeup equipment.

This procedure has been designed to determine the ***Running Torque*** required for proper power tight makeup of GB Connections under the circumstances and with the actual equipment, set up conditions, weather, etc. that exist at the time of running. With proper execution of this procedure, GB Connections will be properly and consistently assembled.

LIMITATIONS

This GB Running Procedure provides the basic recommended practices and is intended to be supplemented by the professional judgment of qualified personnel based on observation of actual makeups throughout the casing run. GB DwC Connections require the proper amount and distribution of thread compound to all pin and coupling threads and careful field makeup in strict accordance with GB Connections' Running Procedures to provide expected levels of performance in service.

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DEFINITIONS

1. Minimum Makeup (MU) Torque: Connections must have at least this amount of torque applied.
2. Shoulder Torque: MU torque required to achieve shoulder engagement.
3. Running Torque: Developed at start of casing run per GB Running Procedure and once established, used for the rest of the joints in the string. Using date established with progression of the casing run. The ***Running Torque*** may be adjusted as needed to stay within parameters defined here. The ***Running Torque*** will likely vary with each job due to the factors listed in the Overview section.
4. Delta Torque: Difference between ***Shoulder Torque*** and final makeup torque.
5. Maximum Makeup (MU) Torque: Assembly torque shall not exceed the ***Maximum MU Torque*** shown on size, weight, and grade-specific GB Performance Property Sheets at the beginning of a casing run when

establishing the ***Running Torque***. In the unlikely event that ***Running Torque*** determined by the procedure meets or exceeds the ***Maximum MU Torque***, call GB Connections for assistance.

6. Yield Torque: Torque that causes yielding in the connection (usually yielding of the pin nose). ***Yield Torque*** rating does **NOT** consider the torque that may radially buckle the pipe body at the grip points. ***Yield Torque*** values for the pipe body and connection which are based on nominal dimensions and minimum material yield strength.
7. Maximum Operating Torque: The ***Maximum Operating Torque*** shown on the GB Connections Performance Property Sheets includes a 5% safety factor on ***Yield Torque***. As such, it represents the limiting torque ***spike*** that can be applied to the connection during rotating operations. The ***Maximum Operating Torque*** is **NOT** the ***Maximum MU Torque*** and is **NOT** a sustainable rotating torque. Operating at the ***Maximum Operating Torque*** for any length of time may damage connections due to likely random, unexpected torque spikes that occur during rotating operations. USER should carefully consider this value to determine if a higher Safety Factor on ***Yield Torque*** is more suitable for the project-specific application.

KEY INFORMATION

Thread Compound: Best-O-Life 2000, Best-O-Life 2000 Arctic Grade (AG), API Modified, API Modified Hi-Pressure, or any industry recognized equivalent to these products. Thread compound may also be referred to as "dope". User should avoid products that include Metal Free (MF) in the product name. Tool joint compounds are expressly forbidden for makeup of GB DwC Connections. Apply thread compound to all pin and box threads as described here is required per this procedure.

Torque Values: ***Minimum and Maximum MU Torque*** values are provided on individual GB Connections Performance Property Sheets available at the following link: http://www.gbconnections.com

Continuous Makeup: Makeup of GB Connections **SHALL START AND CONTINUE WITHOUT STOPPING** until full power tight makeup is achieved.

Makeup Speed: Use of high gear at no more than 20 RPMs is permissible once proper starting thread engagement has occurred. **THE FINAL TWO (2) TURNS, AT A MINIMUM, SHALL BE COMPLETED IN LOW GEAR AT LESS THAN 6 RPMS**.

Pin Nose Engagement: Pin nose engagement is indicated by a spike on an analog torque gauge or a sharp vertical spike on a torque vs. turn plot. As a secondary check, proper power tight makeup is achieved when the coupling covers approximately half of the API Triangle Stamp on the pin. The triangle will be stamped on the pin member as indicated by a white locator stripe.

Acceptance Criteria: All GB Connections must exhibit shoulder engagement (achieve pin-to-pin or pin-to-shoulder engagement) with a: (1) ***Delta Torque*** ranging between 10% and 50% of majority of the ***Shoulder Torque*** and (2) final torque not exceeding the ***Running Torque*** as established in this procedure. Outlier joints that require additional attention would be an exception to ***Maximum MU Torque*** limit as discussed under Comments, Troubleshooting.

It is imperative that the following procedure be executed carefully at the beginning of every casing run to determine the ***Running Torque*** (torque to be used for the rest of the string). Torque values established on an individual casing run are never transferrable to other runs. The procedure should be fully executed for each and every casing run.

The ***Running Torque*** is determined while running the first 10 joints after joints assembled with threadlocking compounds are made up. Sometimes more than the first 10 joints will be needed to establish the ***Running Torque*** due to erratic results and/or other run-specific conditions. The ***Running Torque*** may have to be re-established or adjusted during the casing run under certain conditions[1] and observations. Use the size-specific GB Connections Performance Property Sheets (http://www.gbconnections.com) for physical properties for the ***Minimum*** and ***Maximum MU Torque*** values.

Connections shall be made up until shoulder engagement with ***Delta Torque*** ≥ 10% of the ***Shoulder Torque*** (not to exceed the ***Maximum MU Torque***, see procedure below) using the ***Running Torque*** value established in this procedure. The ***Maximum MU Torque*** at the beginning of the casing run for establishing the ***Running Torque*** shall be limited to the value shown on the applicable GB Connections Performance Property Sheet. The ***Running Torque*** shall be used thereafter and throughout the run as the limiting makeup torque value. The ***Maximum MU Torque*** on the GBC Performance Property Sheet value is given as a practical limit for avoidance of thread galling, connection damage, and possible tube damage due to excessive jaw pressure that can occur with application of extreme makeup torque. Contact GB Connections if more than the ***Maximum MU Torque*** value is required for shoulder engagement and/or final makeup, or if torque exceeding the ***Maximum Operating Torque*** value is required for the intended service.

PROCEDURE FOR ESTABLISHING *RUNNING TORQUE*

1. Remove coupling thread protectors only after casing is set in V-Door.
2. ***Always apply fresh thread compound to coupling threads and internal shoulder (where applicable).*** See Comment No. 1 (below) for discussion on proper amount of thread compound.
3. Remove pin thread protectors only after joint is raised in the derrick. Visually inspect pin threads for sufficient thread compound as described in Comment No. 1; ***add fresh compound to pin threads and pin nose.***
4. Fresh thread compound should **NEVER** be added on top of dope contaminated with dust, dirt, and/or debris. Threads observed to have contaminated thread compound shall be thoroughly cleaned and dried before applying fresh thread compound.
5. Stab the pin carefully into the coupling of the joint hanging in the rotary table. A stabbing guide is recommended to protect the pin nose and leading thread from physical damage that may contribute to thread galling. Make up each connection until shoulder engagement plus ***Delta Torque*** between 10% and 50% of the ***Shoulder Torque*** without exceeding the ***Maximum MU Torque*** . Record the ***Shoulder Torque*** observed for the first 10 joints (excluding threadlocked accessory joints). The ***Running Torque*** is (a) the ***Minimum MU Torque*** shown on the GB Connections Performance Property Sheets ***or*** (b) the Maximum ***Shoulder Torque*** recorded from the first 10 makeups + 10%, ***whichever is higher*** (rounded to the next highest 500 ft.-lbs.) When making up the initial joints for establishing the ***Running Torque*** carefully watch the torque gauge for the ***Shoulder Torque*** and try to manually shut down the tongs before reaching ***Maximum MU Torque*** shown on the GB Connections Performance Property Sheets. Alternately, the dump valve should be set to the ***Maximum MU Torque*** during this initial process.

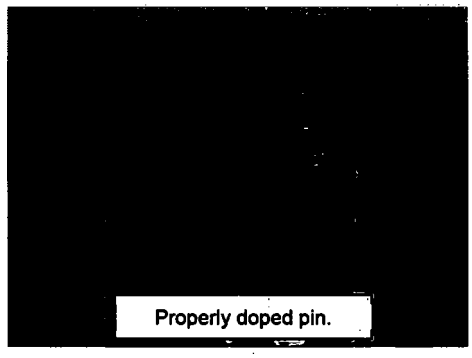
6. After the first 10 makeups (more if necessary due to conditions at the time of the run), use the ***"Running Torque"*** established in Step 5 for the remainder of the string. A dump valve is strongly recommended to stop makeup once the established ***Running Torque*** is achieved.

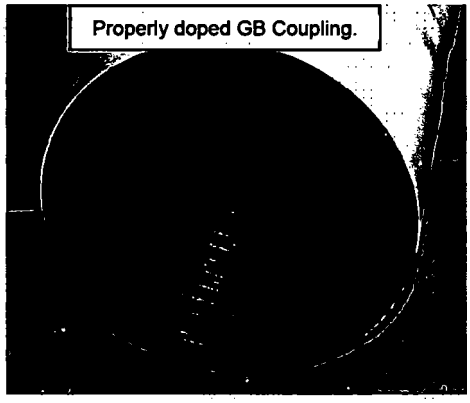
[1] Examples include but are not limited to more than an occasional low or high ***Delta Torque***, string of mixed mills, equipment change, large temperature change, and wobbling or noticeable vibration when joint is turning.

7. All connections made up with the established ***Running Torque*** should achieve shoulder engagement with the minimum amount of ***Delta Torque***. Carefully watch for the spike on the torque gauge during each make up to verify shoulder engagement. As a ***secondary*** verification, randomly check the makeup position relative to the API Triangle Stamp during the run. Proper power tight makeup position is achieved when the coupling covers approximately half of the API Triangle Stamp on the pin (see accompanying photo).
8. All connections should achieve shoulder engagement with at least 10% ***Delta Torque*** before the ***Maximum MU Torque*** is achieved.

COMMENTS, TROUBLESHOOTING

1. GB Connections are thread compound friendly. Thread compounds shall be handled, mixed, and applied in strict accordance with the manufacturer's instructions. **THREAD COMPOUND SHALL BE APPLIED TO BOTH PIN AND COUPLING THREADS AND OPPOSING PIN NOSE OR SHOULDER AREA OF EVERY CONNECTION**. Sufficient thread compound has been applied when all threads (pin and coupling), pin nose, and coupling ID surfaces are completely covered **WITH NO GAPS OR BARE SPOTS**. The thread form should be discernible beneath the compound; i.e. when the thread valleys appear half full. Be generous with the thread compound; but avoid over-doping to the point where ***excessive*** amounts are squeezed out during assembly. Use of a mustache brush is the preferred method for applying and distributing thread compounds to GB Connections.


Properly doped pin.


Properly doped GB Coupling.

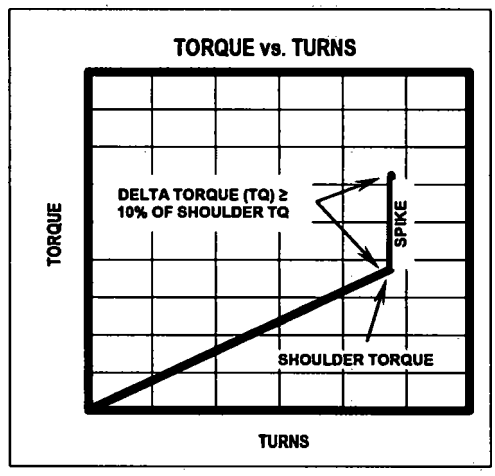
2. If threads are cleaned on racks, new dope shall be applied in a light, even coat to both pin and coupling threads. See Comment No. 1 above for description of sufficient thread compound. Clean thread protectors shall be re-applied to freshly doped pin and coupling threads unless the casing run is imminent (no more than a few hours) to avoid contaminating exposed thread compound.
3. All connections should achieve shoulder engagement before reaching the "***Running Torque***" value determined by this procedure. Any connection that does not achieve shoulder engagement at the established "***Running Torque***" value shall be visually inspected for position relative to the API Triangle Stamp.
   a) If the coupling is shy of the API Triangle Stamp Base, the connection shall be broken out, cleaned and inspected visually for thread damage, re-doped, and made-up again (or laid down if threads are damaged). Connections that have not achieved shoulder engagement **SHALL NEVER** be backed up a couple of turns and remade. They shall be completely broken out, cleaned and inspected as described above.
   b) If the coupling covers the API Triangle base but does not cover approximately half of the Triangle Stamp, add additional torque to achieve shouldering and finish the makeup. It is common to see high torque (possibly exceeding the ***Maximum MU Torque***) to initiate connection turning. This is acceptable as long as the torque drops off once movement starts and then spikes with shoulder engagement. If acceptable makeup doesn't occur with one additional torque application, the connection shall be broken out (as described in 3a above). With an additional attempt, it is OK for the final torque to exceed the **Running Torque** but it should not exceed the ***Maximum MU Torque*** (except to initiate additional turning).
   c) Any connection not properly assembled (i.e. not meeting the acceptance criteria) in two (2) attempts (provided threads pass a visual inspection each time) is reject and shall be laid down.

4. At the established ***Running Torque***, the connections will generally shoulder with ***Delta Torque*** between 10% and 50%. High interference connections will tend to have a higher ***Shoulder Torque*** and less ***Delta Torque*** (at least 10% of the ***Shoulder Torque*** is required). Low interference connections will tend to have lower ***Shoulder Torque*** and more ***Delta Torque***. In general, the GB Connections makeup consistently but will vary due to any of the factors enumerated in the second paragraph of the Overview section of this procedure. However, wide variability on more than a few joints should be investigated for a root cause and, if necessary, a new ***Running Torque*** should be adjusted as described below.

   If a connection appears to have shouldered but doesn't have at least 10% ***Delta Torque***, the position relative to the API Triangle Stamp should be checked. In just about every instance, the position will have covered the triangle base, so additional torque can be added to complete the makeup as discussed in 3.b) above. Expect an instantaneous spike with showing more than 30% ***Delta Torque*** with application of additional torque. Under this condition, this makeup is acceptable.

   Similarly, random connections here and there with more than 30% ***Delta Torque*** is generally not cause for concern. However, if overshooting the 30% maximum ***Delta Torque*** target occurs frequently, then the established ***Running Torque*** value should be walked down in 500 ft-lbs. to 1,000 ft-lbs. increments until connection makeup routinely falls in line with the stated acceptance criteria.

5. ***Torque vs. Turn monitoring systems are recommended for field makeup of GB Connections.*** While Torque vs. Turn plots provide good information about makeup, they **SHALL NOT BE SUBSTITUTED FOR DIRECT VISUAL OBSERVATION OF THE CONNECTION DURING ASSEMBLY**. There is no second chance to watch field assembly of a connection. Torque vs. Turn plots can always be viewed for verification purposes once a makeup is finished. When available, torque vs. turn plots shall finish with a clearly defined spike as shown in the graphic to the right. The general character of torque vs. turn plots for good makeups will become evident after the first ten (10) makeups (again, more may be necessary due to rig- and/or equipment-specific conditions). Any makeup that results in a plot that is "out-of-character"[2] when compared with the majority of plots from previous good makeups should be checked carefully.



   When using Torque vs. Turn monitoring equipment, GB recommends setting a reference torque value of 500 ft.-lbs. or 10% of the minimum makeup torque (whichever is lower) to normalize the resulting plots. Plot scales should be set so data spans at least 2/3 of the turns scale on each plot (15 turns will usually be sufficient at the start and can be reduced based on data from the first few joints). **UNDER NO CIRCUMSTANCE SHOULD MAKEUP BE STARTED UNTIL THE MONITORING SYSTEM IS READY TO RECORD DATA**.

6. Occasionally the mill side of a GB Connection may turn during field makeup. When observed, the makeup should continue without stopping per this procedure. It may be helpful to scribe a vertical line across the coupling-pipe interface to aid estimation of mill side turning if it is observed with some frequency. The amount of mill side turn should be carefully observed and estimated. If the mill side turns less than ½ turn and all other aspects of the makeup are good, the connection is acceptable. If the mill side turns more than ½ turn trouble- shooting should be initiated paying particular attention to amount and distribution of thread compound, vertical alignment, weight of joint, hooked end on pipe, and other possible factors that may contribute to possible high torque during field makeup. Counting turns can help to estimate if coupling will need to be stopped to avoid over rotation. It should

[2] An "out-of-character" plot may initiate with a high torque, show significantly steeper slope from the start of makeup, wide torque undulations as makeup progresses, no clearly defined spike, insufficient/inconsistent turns, etc.

be noted that mill side turning during field makeup occurs occasionally and should not be concerning. Frequent or persistent mill side turning is a symptom that needs troubleshooting and appropriate corrective action.

7. A double wrap of the pick-up sling should be used when raising casing into the derrick when lifting subs, single joint, side-door, or slip elevators are not being used.
8. Higher torque may be required to achieve shoulder engagement when threadlock compounds are applied. User is advised to carefully follow the manufacturer's instructions with respect to mixing, application, temperature, and time. Torque ranges with threadlock compounds cannot be estimated due to many variables including but not limited to temperature, time, connection tolerances, and surface finish. In these cases, carefully monitor makeup to be sure shouldering occurs. The only exception to the shouldering requirement is with float equipment (float shoe and float collar) that will be assembled with a threadlocking compound. In this case, makeup to a position that covers the base of API Triangle Stamp is considered satisfactory.
9. Manual and automated dump valves can miss the established ***Running Torque*** due to several factors. Slightly overshooting the ***Running Torque*** is not cause for concern as long as the final "dump" torque is not excessive, and the equipment used is generally consistent joint-to-joint. Overshooting the ***Running Torque*** with a final makeup speed greater than 10 RPMs is risky and potentially harmful to the connection as discussed below.
10. Attached is a "Worksheet for determining GB Connections ***Running Torque*** at the beginning of a Casing Run" for use at the start of any casing run using GB Connections. GB recommends that this worksheet be filled out and maintained with the casing run records.

MAKEUP SPEED

To reiterate: Use of high gear at no more than 20 RPMs is permissible once proper starting thread engagement has occurred. **THE FINAL TWO (2) TURNS, AT A MINIMUM, SHALL BE COMPLETED IN LOW GEAR AT LESS THAN 6 RPMS**.

Making up connections at RPM exceeding those listed above may result in unsatisfactory connection performance downhole. Risks associated with excessive makeup RPMs are common for any connection with internal pin nose engagement. High speed makeup can:

1. Impart an unnecessary impulse load at nose contact. Certain materials are more susceptible to cracking under sudden or instantaneously applied loads.
2. Inhibit efficient movement of and trap thread compound under high pressure causing additional and unquantifiable high hoop stresses in the connection.
3. Result in significant overshoot of established dump torque value due to equipment latency between signal and equipment shut down resulting in higher but unknown actual final torque value. Excessive overshoot can result in pin nose yielding.

PROCEDURE SUMMARY

1. Remove coupling protectors after casing is set in V-Door and apply fresh thread compound to coupling threads.
2. Raise joint in derrick, remove pin protectors, and apply fresh thread compound to pin threads and pin nose.
3. Carefully stab pin into coupling and makeup to pin nose engagement. Try to stop makeup without exceeding the ***Maximum MU Torque*** (shown on GB Connections Performance Property Sheets). Carefully watch for and note the ***Shoulder Torque***.
4. Record ***Shoulder Torque*** and Final Torque values, and position relative to API Triangle Stamp for first ten (10) connections, more if necessary due to run/rig-specific conditions.

5. The ***Running Torque*** is (a) the ***Maximum MU Torque*** shown on the GB Connections Performance Property Sheet or (b) the maximum torque required for shoulder engagement + 10% ***Delta Torque*** determined from the first 10 makeups, ***whichever is higher.*** Use the attached Worksheet to record this data and determine the ***Running Torque***.
6. Make up the rest of the string at the ***Running Torque*** determined in the previous step verifying each connection has shouldered with between 10% and 30% ***Delta Torque.***

DO's and DONT's

1. **DO** check vertical alignment.
2. **DO** apply thread compound to all pin and coupling threads, pin nose and coupling shoulder area.
3. **DO** establish the ***Running Torque*** in accordance with GB Procedures.
4. **DO** make adjustments to ***Running Torque*** if indicated by inconsistent makeups during the casing run.
5. **DO** check every makeup for a clear indication of shouldering with a minimum ***Delta Torque*** ≥ 10% of the ***Shoulder Torque***.
6. **DO** reject any coupling that is not properly made up after two (2) attempts.
7. **DO** carefully stab pins into coupling (use a stabbing guide for casing smaller than 9 5/8" OD).
8. **DO** finish the makeup with at least two (2) full turns in low gear at 6 RPMs or less.
9. **DO** make up every connection continuously to pin nose engagement without stopping.
10. **DO** make note of anything that occurs with any connection makeup such as backup grips slipped, connection inspected and remade, etc.
11. **Do** check out every connection that appears out of character relative to the population. An example would be a connection that is completed in significant fewer turns than most others. Check the triangle stamp and record position and take corrective action if needed.
12. **DO** add torque to any connection that appears to achieve pin nose engagement but not 10% delta torque.
13. **DO** adjust the ***Running Torque*** up or down in increments to achieve consistent ***Delta Torque*** between 10% and 30%.
14. **Do** make note of any anomaly during any connection makeup, such as backups slipped, mill side turned, etc.
15. **DO NOT** over dope.
16. **DO NOT** exceed the ***Maximum MU Torque*** as shown on the GB Connections Performance Property Sheets during assembly.

17. **DO NOT** make up any misaligned connection.
18. **DO NOT** exceed 20 RPMs in high gear and 6 RPMs in low gear for the final two (2) full turns.
19. **DO NOT** remove pin thread protectors until pipe is hanging in the derrick.
20. **DO NOT** ever back a connection up a couple of turns and remake. Any connection requiring this type of attention **SHALL** be broken out completely, cleaned, visually inspected, and if OK, re-doped and remade.
21. **DO NOT** hesitate to contact GB Connections with questions before and during any casing run.

RECOMMENDED EQUIPMENT

- Stabbing Guide
- Mustache Brush
- Torque vs. Turn Monitoring Equipment or Dump Valve

Worksheet for determining GB Connection Running Torque at the beginning of a Casing Run

Ignore joints that are assembled with threadlock compounds. See "Addendum Procedure for GB Connections Assembled with Threadlocking Compounds" available at www.gbconnections.com.

Pertinent Excerpt from GB Running Procedure

5. Stab the pin carefully into the coupling of the joint hanging in the rotary table. A stabbing guide is recommended to protect the pin nose and leading thread from physical damage that may contribute to thread galling. Make up each connection until shoulder engagement plus delta torque ≥ 10% of the shoulder torque without exceeding the Maximum Makeup Torque. Record the shoulder torque observed for the first 10 joints (excluding threadlocked accessory joints). The Running Torque is (a) the Minimum Makeup Torque shown on the GB Connection Performance Property Sheets or (b) the Maximum Shoulder Torque recorded from the first 10 makeups + 10%, whichever is higher (rounded to the next highest 500 ft.-lbs.) When making up the initial joints for establishing the Running Torque carefully watch the torque gauge for the shoulder torque and try to manually shut down the tongs before reaching Maximum Makeup Torque shown on the GB Connection Performance Property Sheets. Alternately, the dump valve should be set to the Maximum Makeup Torque during this initial process.

6. After the first 10 makeups (more if necessary due to conditions at the time of the run), use the "Running Torque" established in Step 5 for the remainder of the string. A dump valve is strongly recommended to stop makeup once the established Running Torque is achieved.

Casing Data		Comment
OD (in)		See GBC Performance Property Sheet
Weight (ppf)		See GBC Performance Property Sheet
Grade		See GBC Performance Property Sheet
Min MU Torque (ft-lbs)		See GBC Performance Property Sheet
Max MU Torque (ft-lbs)		See GBC Performance Property Sheet
Max Operating Torque (ft-lbs)		The Maximum Operating Torque is **NOT** the Maximum Makeup Torque and is **NOT** a sustainable rotating torque. Operating at the Maximum Operating Torque for any length of time will likely damage the connection.

Notes	Joint No.	Shoulder Torque (ft-lbs)	Final Torque (ft-lbs)	Triangle Stamp Position Sketch (△)
Required	1			
Required	2			
Required	3			
Required	4			
Required	5			
Required	6			
Required	7			
Required	8			
Required	9			
Required	10			
Optional	11			
Optional	12			
Optional	13			
Optional	14			
Optional	15			
Max. Shoulder Torque				
A Max. Shoulder Torque + 10%				
B Min. Makeup Torque (from GB Conn. Data Sheet)				
Running Torque (ft-lbs)		-	**A** or **B**, whichever is greater.	

Optional joints should be added if there is wide variability in shoulder torques recorded during the initial 10 joints. Judgement should be used to determine if more than 10 joints are needed for the purpose of establishing the Running Torque and, if so, how many more should be added.

Wide variations in Shoulder Torque during the first ten (10) joints suggest other issues requiring attention such as poor alignment, improper amount and distribution of thread compound, etc. Refer to 2nd paragraph of GB Running Procedure for possible contributing factors to aid troubleshooting.

GB Connections
950 Threadneedle, Suite 130
Houston TX 77079
Toll Free: 1-888-245-3848
Main: 713-465-3585
Fax: 713-984-1529

For Techincal Information, contact:

Gene Mannella
gmannella@gbconnections.com

Qing Lu
qlu@gbconnections.com

Jordan Kles
jkles@gbconnections.com

Rev. 13 (05/16/2018)

Casing Design Assumptions and Load Cases

Production

All casing design assumptions were ran in StressCheck to determine safety factors which meet or exceed both Apache Corp and BLM minimum requirements. All casing strings will be filled while running in hole in order to not exceed collapse rating of the casing.

Production Casing Burst Design		
Load Case	**External Pressure**	**Internal Pressure**
Pressure Test	Mud base fluid density to TOC, cement mix-water gradient to outer shoe and pore pressure to TD	Fluid in hole (water or produced water) + test psi
Tubing Leak	Mud base fluid density to TOC, cement mix-water gradient to outer shoe and pore pressure to TD	Packer @ KOP, leak below surface 8.6 ppg packer fluid
Stimulation	Mud base fluid density to TOC, cement mix-water gradient to outer shoe and pore pressure to TD	Max frac pressure with heaviest frac fluid
Green Cement Pressure Test	Mud base fluid density to TOC, cement mix-water gradient to outer shoe and pore pressure to TD	Max pressure used to bump the plug during cement job

Production Casing Collapse Design		
Load Case	**External Pressure**	**Internal Pressure**
Full Evacuation	Mud weight string was set in	None
Cementing	Wet cement weight	Water (8.33 ppg)

Production Casing Axial Design	
Load Case	**Assumptions**
Overpull	100 kips
Running in hole	2 ft/s
Green Cement Pressure Test	Max pressure when bumping plug
Service Loads	N/A

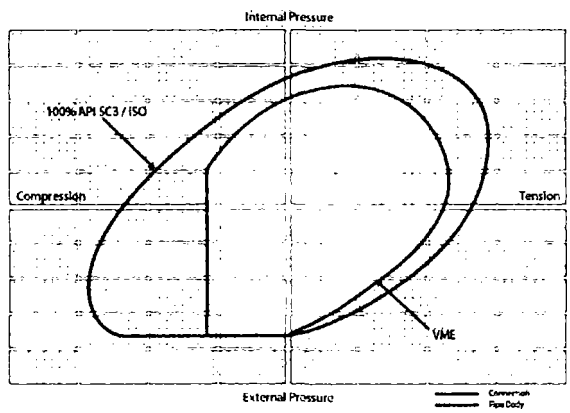
TECHNICAL DATA SHEET TMK UP SF 5.5 X 20 P110

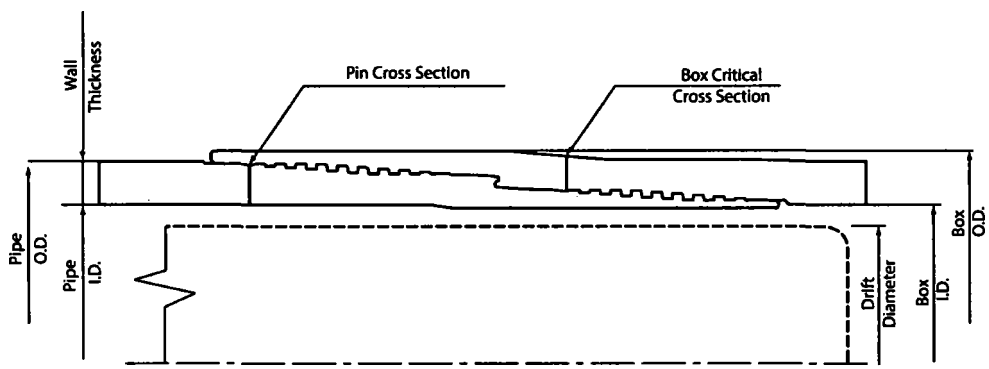
TUBULAR PARAMETERS	
Nominal OD, (inch)	5.500
Wall Thickness, (inch)	0.361
Pipe Grade	P110
Drift	Standard

CONNECTION PARAMETERS	
Connection OD (inch)	5.646
Connection ID, (inch)	4.734
Make-Up Loss, (inch)	5.526
Connection Critical Area, (sq inch)	5.275
Yield Strength in Tension, (klbs)	580
Yeld Strength in Compression, (klbs)	580
Tension Efficiency	91%
Compression Efficiency	91%
Min. Internal Yield Pressure, (psi)	12 640
Collapse Pressure, (psi)	11 110
Uniaxial Bending (deg/100ft)	83.0

MAKE-UP TORQUES	
Minimum Make-Up Torque, (ft-lb)	10 200
Optimum Make-Up Torque, (ft-lb)	11 200
Maximum Make-Up Torque, (ft-lb)	12 300
Operating Torque, (ft-lb)	13 090
Yield Torque, (ft-lb)	15 400

PIPE BODY PROPERTIES	
PE Weight, (lbs/ft)	19.81
Nominal Weight, (lbs/ft)	20.00
Nominal ID, (inch)	4.778
Drift Diameter, (inch)	4.653
Nominal Pipe Body Area, (sq inch)	5.828
Yield Strength in Tension, (klbs)	641
Min. Internal Yield Pressure, (psi)	12 640
Collapse Pressure, (psi)	11 110
Minimum Yield Strength, (psi)	110 000
Minimum Tensile Strength, (psi)	125 000





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Casing Design Assumptions and Load Cases

Production

All casing design assumptions were ran in StressCheck to determine safety factors which meet or exceed both Apache Corp and BLM minimum requirements. All casing strings will be filled while running in hole in order to not exceed collapse rating of the casing.

Production Casing Burst Design		
Load Case	**External Pressure**	**Internal Pressure**
Pressure Test	Mud base fluid density to TOC, cement mix-water gradient to outer shoe and pore pressure to TD	Fluid in hole (water or produced water) + test psi
Tubing Leak	Mud base fluid density to TOC, cement mix-water gradient to outer shoe and pore pressure to TD	Packer @ KOP, leak below surface 8.6 ppg packer fluid
Stimulation	Mud base fluid density to TOC, cement mix-water gradient to outer shoe and pore pressure to TD	Max frac pressure with heaviest frac fluid
Green Cement Pressure Test	Mud base fluid density to TOC, cement mix-water gradient to outer shoe and pore pressure to TD	Max pressure used to bump the plug during cement job

Production Casing Collapse Design		
Load Case	**External Pressure**	**Internal Pressure**
Full Evacuation	Mud weight string was set in	None
Cementing	Wet cement weight	Water (8.33 ppg)

Production Casing Axial Design	
Load Case	**Assumptions**
Overpull	100 kips
Running in hole	2 ft/s
Green Cement Pressure Test	Max pressure when bumping plug
Service Loads	N/A

HYDROGEN SULFIDE (H_2S) DRILLING OPERATIONS PLAN

Hydrogen Sulfide Training:

All regularly assigned personnel, contracted or employed by Apache Corporation will receive training from qualified instructor(s) in the following areas prior to commencing drilling possible hydrogen sulfide bearing formations in this well:

- The hazards and characteristics of hydrogen sulfide (H_2S)
- The proper use and maintenance of personal protective equipment and life support systems.
- The proper use of H_2S detectors, alarms, warning systems, briefing area, evacuation procedures & prevailing winds.
- The proper techniques for first aid and rescue procedures.

Supervisory personnel will be trained in the following areas:

- The effects of H_2S on metal components. If high tensile tubulars are to be utilized, personnel will be trained in their special maintenance requirements.
- Corrective action & shut-in procedures when drilling or reworking a well & blowout prevention / well control procedures.
- The contents and requirements of the H_2S Drilling Operations Plan

There will be an initial training session just prior to encountering a known or probable H_2S zone (within 3 days or 500') and weekly H_2S and well control drills for all personnel in each crew. The initial training session shall include a review of the site specific H_2S Drilling Operations Plan and the Public Protection Plan. This plan shall be available at the well site. All personnel will be required to carry documentation that they have received proper training.

H_2S SAFETY EQUIPMENT AND SYSTEMS:

Well Control Equipment that will be available & installed if H_2S is encountered:

- Flare Line with electronic igniter or continuous pilot.
- Choke manifold with a minimum of one remote choke.
- Blind rams & pipe rams to accommodate all pipe sizes with properly sized closing unit.
- Auxiliary equipment to include: annular preventer, mud-gas separator, rotating head & flare gun with flares

Protective Equipment for Essential Personnel:

- SCBA units located in dog house & at briefing areas, as indicated on wellsite diagram.

H2S Dection and Monitoring Equipment:

- Two portable H_2S monitors positioned on location for best coverage & response. These units have warning lights & audible sirens when H_2S levels of 10 ppm are reached.
- One portable H_2S monitor positioned near flare line.

H2S Visual Warning Systems:

- Wind direction indicators are shown on wellsite diagram.
- Caution / Danger signs shall be posted on roads providing direct access to location. Signs will be painted a high visibility yellow with black lettering of sufficient size to be readable at a reasonable distance from the immediate location. Bilingual signs will be used when appropriate.

Mud Program:

- The Mud Program has been designed to minimize the volume of H_2S circulated to the surface. Proper mud weights, safe drilling practices & the use of H_2S scavengers will minimize hazards when penetrating H_2S bearing zones.
- A mud-gas separator and H_2S gas buster will be utilized as needed.

Metallurgy:

- All drill strings, casing, tubing, wellhead, blowout preventers, drilling spool, kill lines, choke manifold & lines, & valves will be suitable for H_2S service.
- All elastomers used for packing & seals shall be H_2S trim.

Communication:

- Cellular telephone and 2-way radio communications in company vehicles, rig floor and mud logging trailer.

HYDROGEN SULFIDE (H_2S) CONTINGENCY PLAN

Assumed 100 ppm ROE = 3000'

100 ppm H_2S concentration shall trigger activation of this plan.

Emergency Procedures

In the event of a release of gas containing H_2S, the first responder(s) must

- Isolate the area and prevent entry by other persons into the 100 ppm ROE.
- Evacuate any public places encompassed by the 100 ppm ROE.
- Be equipped with H_2S monitors and air packs in order to control the release.
- Use the "buddy system" to ensure no injuries occur during the response
- Take precautions to avoid personal injury during this operation.
- Contact operators and/or local officials to aid in operation. See list of phone numbers attached.
- Have received training in the :
  - Detection of H_2S, and
  - Measures for protection against the gas,
  - Equipment used for protection and emergency response.

Ignition of Gas source

Should control of the well be considered lost and ignition considered, take care to protect against exposure to Sulfur Dioxide (SO_2). Intentional ignition must be coordinated with the NMOCD and local officials. Additionally the NM State Police may become involved. NM State Police shall be the Incident Command on scene of any major release. Take care to protect downwind whenever this is an ignition of the gas.

Characteristics of H_2S and SO_2

Common Name	Chemical Formula	Specific Gravity	Threshold Limit	Hazardous Limit	Lethal Concentration
Hydrogen Sulfide	H_2S	1.189 Air = 1	10 ppm	100 ppm/hr	600 ppm
Sulfur Dioxide	SO_2	2.21 Air = 1	2 ppm	N/A	1000 ppm

Contacting Authorities

Apache Corporation personnel must liaison with local and state agencies to ensure a proper response to a major release. Additionally, the OCD must be notified of the release as soon as possible but no later than 4 hours. Agencies will ask for information such as type and volume of release, wind direction, location of release, etc. Be prepared with all information available including directions to site. The following call list of essential and potential responders has been prepared for use during a release. Apache's response must be in coordination with the State of New Mexico's *"Hazardous Materials Emergency Response Plan" (HMER).*

WELL CONTROL EMERGENCY RESPONSE PLAN

I. GENERAL PHILOSOPHY

Our objective is to ensure that during an emergency, a predetermined procedure is followed so that prompt decisions can be made based on accurate information.

The best way to handle and emergency is with an experienced organization set up for the sole purpose of solving the problem. The *Well Control Emergency Response Team* was organized to handle dangerous & expensive well control problems. The *Team* is structured such that each individual can contribute the most from his area of expertise. Key decision-makers are determined prior to an emergency to avoid confusion about who is in charge.

If the well is flowing uncontrolled at the surface or subsurface, *The Emergency Response Team* will be mobilized. The *Team* is customized for the people currently on the Apache staff. Staff changes may require a change in the plan.

II. EMERGENCY PROCEDURE ON DRILLING OR COMPLETION OPERATIONS

A. In the event of an emergency the *Drilling Foreman or Tool-Pusher* will immediately contact only one of the following starting with the first name listed:

Name	Office	Mobile	Home
Larry VanGilder – Drlg Superintendent	432-818-1965	432-557-1097	
John Vacek – Drilling Engineer	432-818-1882	281-222-1812	
Bobby Smith – Drilling Manager	432-818-1020	432-556-7701	
Ted Ward – EH&S Coordinator		432-234-0600	
Erick Wood – EH&S Coordinator		432-250-5904	

***This one phone call will free the Drilling Foreman to devote his full time to securing the safety of personnel & equipment. This call will initiate the process to mobilize the Well Control Emergency Response Team. Apache maintains an Emergency Telephone Conference Room in the Houston office. This room is available for us by the Permian Region. The room has 50 separate telephone lines.*

B. The Apache employee contacted by the Drilling Foreman will begin contacting the rest of the *Team*. If **LARRY VAN GILDER** is out of contact, **JOHN VACEK** will be notified.

C. If a member of the *Emergency Response Team* is away from the job, he must be available for call back. Telephone numbers should be left with secretaries or a key decision-maker.

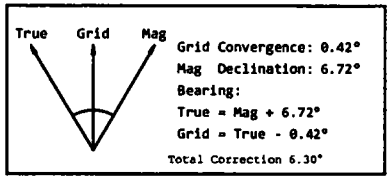
D. Apache's reporting procedure for spills or releases of oil or hazardous materials will be implemented when spills or releases have occurred or are probable.

EMERGENCY RESPONSE NUMBERS:

SHERIFF DEPARTMENT	
Eddy County	575-887-7551
Lea County	575-396-3611
FIRE DEPARTMENT	**911**
Artesia	575-746-5050
Carlsbad	575-885-2111
Eunice	575-394-2111
Hobbs	575-397-9308
Jal	575-395-2221
Lovington	575-396-2359
HOSPITALS	**911**
Artesia Medical Emergency	575-746-5050
Carlsbad Medical Emergency	575-885-2111
Eunice Medical Emergency	575-394-2112
Hobbs Medical Emergency	575-397-9308
Jal Medical Emergency	575-395-2221
Lovington Medical Emergency	575-396-2359
AGENT NOTIFICATIONS	
Bureau of Land Management	575-393-3612
New Mexico Oil Conservation Division	575-393-6161

Apache

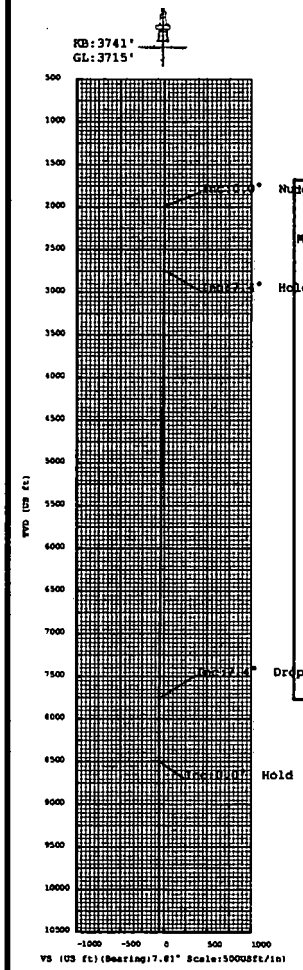
Apache Corporation
Black & Tan 27 Fed Com 405H
Lea Co, New Mexico



Plan Data for Black & Tan 27 Fed Com 405H

Plan Point Information:
DogLeg Severity Unit: °/100.00ft Position offsets from Slot centre

MD (USft)	Inc (°)	Az (°)	TVD (USft)	+N/-S (USft)	+E/-W (USft)	Northing (USft)	Easting (USft)	VSec (USft)	DLS (DLSU)	Comments
0.00	0.00	0.00	-0.00	-0.00	0.00	560146.30	783902.30	0.00	0.00	
2000.00	0.00	0.00	2000.00	-0.00	0.00	560146.30	783902.30	0.00	0.00	Nudge
2737.11	7.37	102.40	2735.07	-10.16	46.24	560136.14	783948.54	-3.79	1.00	Hold
7808.85	7.37	102.40	7764.91	-149.84	681.76	559996.46	784584.06	-55.80	0.00	Drop
8545.96	0.00	0.00	8499.98	-160.00	728.00	559986.30	784630.30	-59.59	1.00	Hold
11028.46	0.00	0.00	10982.48	-160.00	728.00	559986.30	784630.30	-59.59	0.00	KOP
11782.62	90.50	359.57	11459.93	321.62	724.35	560467.92	784626.65	417.07	12.00	Landing Pt
16484.62	90.50	359.57	11418.89	5023.30	688.70	565169.60	784591.00	5070.29	0.00	B&T27FC405H PBHL



Plan Data for Black & Tan 27 Fed Com 405H

Field: Apache NM (Nad 83 NMEZ)
Map Unit: USFt Vertical Reference Datum (VRD): Mean Sea Level
Projected Coordinate System: NAD83 / New Mexico East (ftUS)

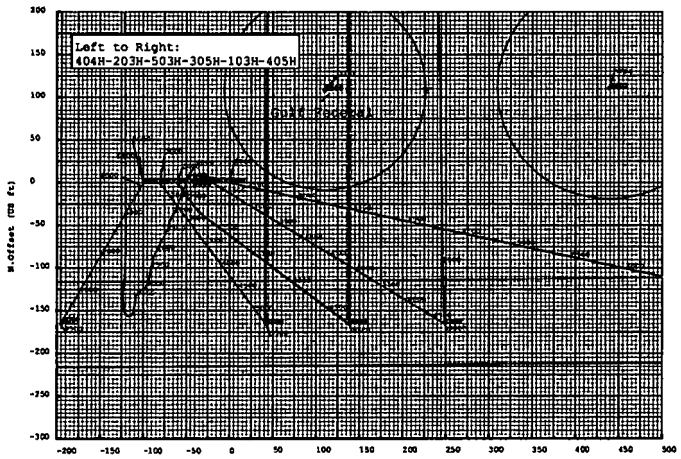
Site: Black & Tan 27 Fed Com Pad 3
Unit: USFeet TVD Reference:
Company Name: Apache Corporation
Position: Northing: 560146.00USft Latitude: 32.537437°
Easting: 783862.20USft Longitude: -103.546351°
North Reference: Grid Grid Convergence: 0.42°
Elevation Above VRD: 3714.00USft
Comment: Lea Co., NM

Slot: Black & Tan 27 Fed Com 405H
Position:
Offset is from Site centre
+N/-S: 0.30USft Northing: 560146.30USft Latitude: 32.537437°
+E/-W: 40.10USft Easting: 783902.30USft Longitude: -103.546221°
Elevation Above VRD: 3715.00USft

Well: Black & Tan 27 Fed Com 405H
Type: Main-Well
File Number:
Plan Folder: P1 Plan: P1:V1
Vertical Section: Position offset of origin from Slot centre:
+N/-S: -0.00USft Azimuth: 7.81°
+E/-W: 0.00USft
Magnetic Parameters:

Model:	Field Strength:	Declination:	Dip:	Date:
HDGM2016v6.0	47966(nT)	6.72°	59.93°	2018-12-13

Comment: H&P 482



Plan Data for Black & Tan 27 Fed Com 405H

Formation Point Information:

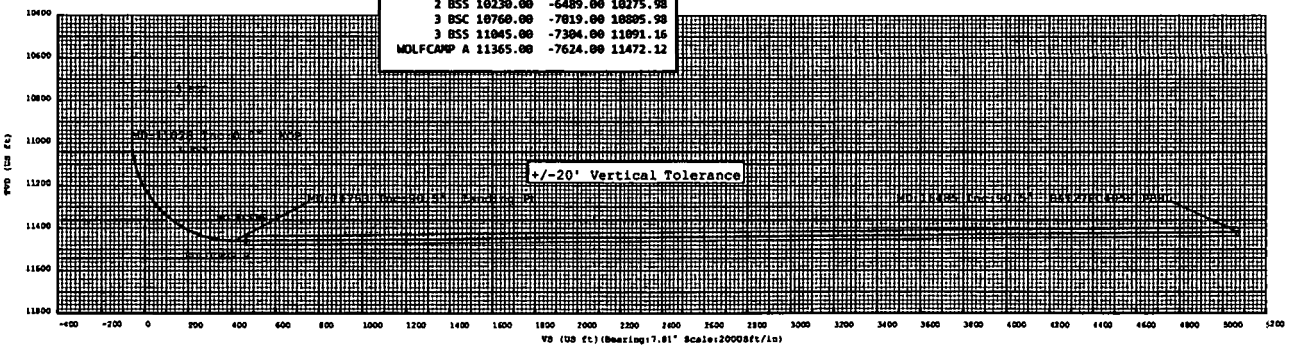
Name	TVD (USft)	Elevation (USft)	MD (USft)
WOLFCAMP B	11545.00	-7804.00	-1.00
RUSTLER	1625.00	2116.00	1625.00
SALADO	1955.00	1786.00	1955.00
TANSILL	3365.00	376.00	3372.28
YATES	3520.00	221.00	3528.57
SEVEN RIVERS	3921.00	-180.00	3932.91
DELAWARE	5665.00	-1924.00	5691.45
AVALON	8590.00	-4849.00	8635.98
1 BSC	9290.00	-5549.00	9335.98
1 BSS	9690.00	-5949.00	9735.98
2 BSC	9955.00	-6214.00	10000.98
2 BSS	10230.00	-6489.00	10275.98
3 BSC	10760.00	-7019.00	10805.98
3 BSS	11045.00	-7304.00	11091.16
WOLFCAMP A	11365.00	-7624.00	11472.12

Plan Data for Black & Tan 27 Fed Com 405H

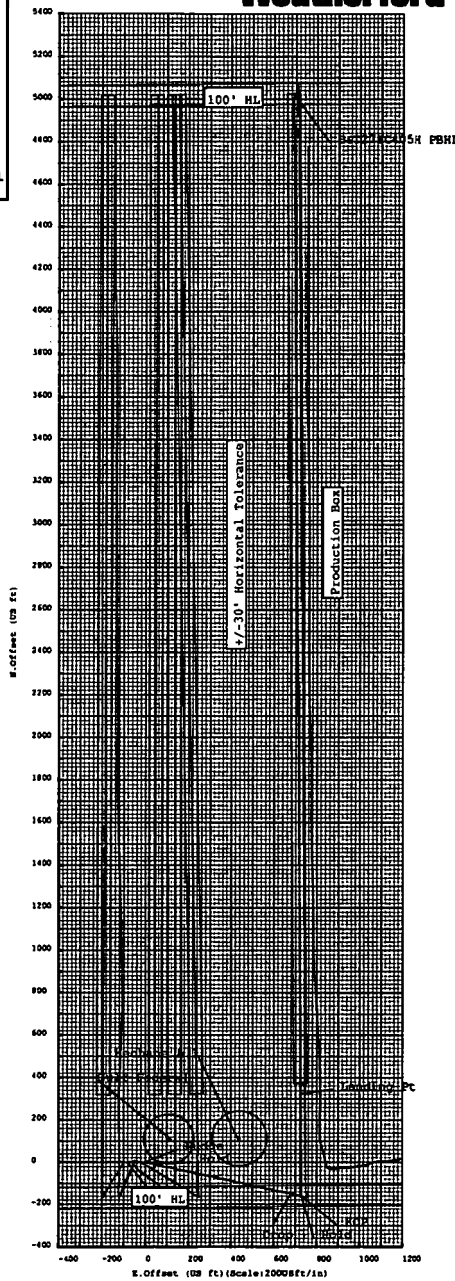
Target Set Information:
Name: B&T27FC405H
Position offsets from Slot centre

Name	TVD (USft)	Elevation (USft)	+N/-S (USft)	+E/-W (USft)	Northing (USft)	Easting (USft)
LTP	0.00	3741.00	4973.30	689.10	565119.60	784591.40
PBHL	11418.89	-7677.89	5023.30	688.70	565169.60	784591.00

- Black & Tan 27 Fed Com 405H
- Black & Tan 27 Fed Com 203H
- Black & Tan 27 Fed Com 503H
- Black & Tan 27 Fed Com 305H
- Black & Tan 27 Fed Com 103H
- Gulf Federal
- Keohane A 1
- Black & Tan 27 Fed Com 404H
- Black & Tan 27 Fed Com 307H



Weatherford



Drawing By: Ty Hardin Date: 22 August 2018
Office Name: Drilling Services - Houston
Address: 12101 Cutten Road
Houston, TX 77066
Phone: Office: +1.832.955.0032 | Cell: +1.713.882.8256

5D Plan Report

Apache Corporation

Field Name: *Apache NM (Nad 83 NMEZ)*
Site Name: *Black & Tan 27 Fed Com Pad 3*
Well Name: *Black & Tan 27 Fed Com 405H*
Plan: *P1:V1*

23 August 2018

5D Plan Report

Black & Tan 27 Fed Com 405H

Field Name: Apache NM (Nad 83 NMEZ)	**Map Units:** US ft	**Company Name:** Apache Corporation
	Vertical Reference Datum (VRD): Mean Sea Level	
	Projected Coordinate System: NAD83 / New Mexico East (ftUS)	
	Comment:	

Site: Black & Tan 27 Fed Com Pad 3	**Units:** US ft	**North Reference:** Grid	**Convergence Angle:** 0.42
	Position:	**Northing:** 560146.00 US ft	**Latitude:** 32.537436611
		Easting: 783862.20 US ft	**Longitude:** -103.546350856
	Elevation above MSL: 3714.00 US ft		
	Comment: Lea Co., NM		

Slot: Black & Tan 27 Fed Com 405H	**Position (Relative to Site Centre)**		
	+N/-S: 0.30 US ft	**Northing:** 560146.30 US ft	**Latitude:** 32.537436621
	+E/-W: 40.10 US ft	**Easting:** 783902.30 US ft	**Longitude:** -103.546220736
	Elevation above MSL: 3715.00 US ft		
	Comment:		

Well: Black & Tan 27 Fed Com 405H	**Type:** Main well		**UWI:**	**Plan:** P1:V1
	File Number:	**Comment:** H&P 482		
	Closure Distance: 5070.29US ft		**Closure Azimuth:** 7.81°	
	Vertical Section: Position of Origin (Relative to Slot centre)			
		+N/-S: -0.00 US ft	**+E/-W:** 0.00 US ft	**Az:** 7.81°
	Magnetic Parameters:			
	Model: HDGM2016v6.0	**Field Strength:** 47966.9nT	**Declination:** 6.72°	**Dip:** 59.93° **Date:** 13/Dec/2018

Drill floor: Plan: P1:V1

Rig Height (Well TVD Reference): 26.00US ft **Elevation above MSL:** 3741.00US ft **Inclination:** 0.00° **Azimuth:** 0.00°

Target set: B&T27FC405H Comment:

Target Name:	Shape:	TVD (US ft)	N.Offset (US ft)	E.Offset (US ft)	Northing (USFt)	Easting (USFt)	C.Pt.Distance (US ft)	Comment
LTP	Point	0.00	4973.30	689.10	565119.60	784591.40	5020.81	
PBHL	Cuboid	11418.89	5023.30	688.70	565169.60	784591.00	0.00	

Wellpath created using minimum curvature.

5D Plan Report

Tie Point:

MD: 0.00USFt **Inclination:** 0.00° **Azimuth:** 0.00° **TVD:** - 0.00USFt **North Offset:** - 0.00USFt **East Offset:** 0.00USFt

Salient Points: (Relative to Slot centre)(TVD relative to Well TVD Reference)

MD (US ft)	Inc (°)	Az (°)	TVD (US ft)	VS (US ft)	N.Offset (US ft)	E.Offset (US ft)	Northing (US ft)	Easting (US ft)	DLS (°/100US ft)	Comment
0.00	0.00	0.00	-0.00	0.00	-0.00	0.00	560146.30	783902.30	0.00	
2000.00	0.00	0.00	2000.00	0.00	-0.00	0.00	560146.30	783902.30	0.00	Nudge
2737.11	7.37	102.40	2735.07	-3.79	-10.16	46.24	560136.14	783948.54	1.00	Hold
7808.85	7.37	102.40	7764.91	-55.80	-149.84	681.76	559996.46	784584.06	0.00	Drop
8545.96	0.00	0.00	8499.98	-59.59	-160.00	728.00	559986.30	784630.30	1.00	Hold
11028.46	0.00	0.00	10982.48	-59.59	-160.00	728.00	559986.30	784630.30	0.00	KOP
11782.62	90.50	359.57	11459.93	417.07	321.62	724.35	560467.92	784626.65	12.00	Landing Pt
16484.62	90.50	359.57	11418.89	5070.29	5023.30	688.70	565169.60	784591.00	0.00	B&T27FC405 H PBHL

Interpolated Points: (Relative to Slot centre)(TVD relative to Well TVD Reference)

MD (US ft)	Inc (°)	Az (°)	TVD (US ft)	VS (US ft)	N.Offset (US ft)	E.Offset (US ft)	Northing (US ft)	Easting (US ft)	DLS (°/100US ft)	Comment
0.00	0.00	0.00	-0.00	0.00	-0.00	0.00	560146.30	783902.30	0.00	
100.00	0.00	0.00	100.00	0.00	-0.00	0.00	560146.30	783902.30	0.00	
200.00	0.00	0.00	200.00	0.00	-0.00	0.00	560146.30	783902.30	0.00	
300.00	0.00	0.00	300.00	0.00	-0.00	0.00	560146.30	783902.30	0.00	
400.00	0.00	0.00	400.00	0.00	-0.00	0.00	560146.30	783902.30	0.00	
500.00	0.00	0.00	500.00	0.00	-0.00	0.00	560146.30	783902.30	0.00	
600.00	0.00	0.00	600.00	0.00	-0.00	0.00	560146.30	783902.30	0.00	
700.00	0.00	0.00	700.00	0.00	-0.00	0.00	560146.30	783902.30	0.00	
800.00	0.00	0.00	800.00	0.00	-0.00	0.00	560146.30	783902.30	0.00	
900.00	0.00	0.00	900.00	0.00	-0.00	0.00	560146.30	783902.30	0.00	
1000.00	0.00	0.00	1000.00	0.00	-0.00	0.00	560146.30	783902.30	0.00	
1100.00	0.00	0.00	1100.00	0.00	-0.00	0.00	560146.30	783902.30	0.00	
1200.00	0.00	0.00	1200.00	0.00	-0.00	0.00	560146.30	783902.30	0.00	
1300.00	0.00	0.00	1300.00	0.00	-0.00	0.00	560146.30	783902.30	0.00	
1400.00	0.00	0.00	1400.00	0.00	-0.00	0.00	560146.30	783902.30	0.00	
1500.00	0.00	0.00	1500.00	0.00	-0.00	0.00	560146.30	783902.30	0.00	
1600.00	0.00	0.00	1600.00	0.00	-0.00	0.00	560146.30	783902.30	0.00	
1625.00	0.00	0.00	1625.00	0.00	-0.00	0.00	560146.30	783902.30	0.00	RUSTLER :
1700.00	0.00	0.00	1700.00	0.00	-0.00	0.00	560146.30	783902.30	0.00	
1800.00	0.00	0.00	1800.00	0.00	-0.00	0.00	560146.30	783902.30	0.00	
1900.00	0.00	0.00	1900.00	0.00	-0.00	0.00	560146.30	783902.30	0.00	
1955.00	0.00	0.00	1955.00	0.00	-0.00	0.00	560146.30	783902.30	0.00	SALADO :
2000.00	0.00	0.00	2000.00	0.00	-0.00	0.00	560146.30	783902.30	0.00	Nudge
2100.00	1.00	102.40	2099.99	-0.07	-0.19	0.85	560146.11	783903.15	1.00	
2200.00	2.00	102.40	2199.96	-0.28	-0.75	3.41	560145.55	783905.71	1.00	
2300.00	3.00	102.40	2299.86	-0.63	-1.69	7.67	560144.61	783909.97	1.00	
2400.00	4.00	102.40	2399.68	-1.12	-3.00	13.63	560143.30	783915.93	1.00	
2500.00	5.00	102.40	2499.37	-1.74	-4.68	21.29	560141.62	783923.59	1.00	
2600.00	6.00	102.40	2598.90	-2.51	-6.74	30.66	560139.56	783932.96	1.00	
2700.00	7.00	102.40	2698.26	-3.41	-9.17	41.71	560137.13	783944.01	1.00	
2737.11	7.37	102.40	2735.07	-3.79	-10.16	46.24	560136.14	783948.54	1.00	Hold
2800.00	7.37	102.40	2797.45	-4.43	-11.90	54.13	560134.40	783956.43	0.00	
2900.00	7.37	102.40	2896.62	-5.46	-14.65	66.66	560131.65	783968.96	0.00	
3000.00	7.37	102.40	2995.80	-6.48	-17.40	79.19	560128.90	783981.49	0.00	
3100.00	7.37	102.40	3094.97	-7.51	-20.16	91.72	560126.14	783994.02	0.00	
3200.00	7.37	102.40	3194.14	-8.53	-22.91	104.25	560123.39	784006.55	0.00	
3300.00	7.37	102.40	3293.32	-9.56	-25.67	116.78	560120.63	784019.08	0.00	
3372.28	7.37	102.40	3365.00	-10.30	-27.66	125.83	560118.64	784028.13	0.00	TANSILL :
3400.00	7.37	102.40	3392.49	-10.58	-28.42	129.31	560117.88	784031.61	0.00	
3500.00	7.37	102.40	3491.66	-11.61	-31.17	141.84	560115.13	784044.14	0.00	
3528.57	7.37	102.40	3520.00	-11.90	-31.96	145.42	560114.34	784047.72	0.00	YATES :
3600.00	7.37	102.40	3590.84	-12.64	-33.93	154.37	560112.37	784056.67	0.00	
3700.00	7.37	102.40	3690.01	-13.66	-36.68	166.90	560109.62	784069.20	0.00	

5D Plan Report

Interpolated Points: (Relative to Slot centre)(TVD relative to Well TVD Reference)										
MD (US ft)	Inc (°)	Az (°)	TVD (US ft)	VS (US ft)	N.Offset (US ft)	E.Offset (US ft)	Northing (US ft)	Easting (US ft)	DLS (°/100US ft)	Comment
3800.00	7.37	102.40	3789.18	-14.69	-39.44	179.43	560106.86	784081.73	0.00	
3900.00	7.37	102.40	3888.36	-15.71	-42.19	191.96	560104.11	784094.26	0.00	
3932.91	7.37	102.40	3921.00	-16.05	-43.10	196.08	560103.20	784098.38	0.00	SEVEN RIVERS :
4000.00	7.37	102.40	3987.53	-16.74	-44.94	204.49	560101.36	784106.79	0.00	
4100.00	7.37	102.40	4086.71	-17.76	-47.70	217.02	560098.60	784119.32	0.00	
4200.00	7.37	102.40	4185.88	-18.79	-50.45	229.55	560095.85	784131.85	0.00	
4300.00	7.37	102.40	4285.05	-19.82	-53.20	242.08	560093.10	784144.38	0.00	
4400.00	7.37	102.40	4384.23	-20.84	-55.96	254.61	560090.34	784156.91	0.00	
4500.00	7.37	102.40	4483.40	-21.87	-58.71	267.14	560087.59	784169.44	0.00	
4600.00	7.37	102.40	4582.57	-22.89	-61.47	279.67	560084.83	784181.97	0.00	
4700.00	7.37	102.40	4681.75	-23.92	-64.22	292.20	560082.08	784194.50	0.00	
4800.00	7.37	102.40	4780.92	-24.94	-66.97	304.73	560079.33	784207.03	0.00	
4900.00	7.37	102.40	4880.09	-25.97	-69.73	317.26	560076.57	784219.56	0.00	
5000.00	7.37	102.40	4979.27	-26.99	-72.48	329.79	560073.82	784232.09	0.00	
5100.00	7.37	102.40	5078.44	-28.02	-75.24	342.33	560071.06	784244.63	0.00	
5200.00	7.37	102.40	5177.62	-29.05	-77.99	354.86	560068.31	784257.16	0.00	
5300.00	7.37	102.40	5276.79	-30.07	-80.74	367.39	560065.56	784269.69	0.00	
5400.00	7.37	102.40	5375.96	-31.10	-83.50	379.92	560062.80	784282.22	0.00	
5500.00	7.37	102.40	5475.14	-32.12	-86.25	392.45	560060.05	784294.75	0.00	
5600.00	7.37	102.40	5574.31	-33.15	-89.01	404.98	560057.29	784307.28	0.00	
5691.45	7.37	102.40	5665.00	-34.09	-91.52	416.44	560054.78	784318.74	0.00	DELAWARE :
5700.00	7.37	102.40	5673.48	-34.17	-91.76	417.51	560054.54	784319.81	0.00	
5800.00	7.37	102.40	5772.66	-35.20	-94.51	430.04	560051.79	784332.34	0.00	
5900.00	7.37	102.40	5871.83	-36.23	-97.27	442.57	560049.03	784344.87	0.00	
6000.00	7.37	102.40	5971.00	-37.25	-100.02	455.10	560046.28	784357.40	0.00	
6100.00	7.37	102.40	6070.18	-38.28	-102.78	467.63	560043.52	784369.93	0.00	
6200.00	7.37	102.40	6169.35	-39.30	-105.53	480.16	560040.77	784382.46	0.00	
6300.00	7.37	102.40	6268.52	-40.33	-108.28	492.69	560038.02	784394.99	0.00	
6400.00	7.37	102.40	6367.70	-41.35	-111.04	505.22	560035.26	784407.52	0.00	
6500.00	7.37	102.40	6466.87	-42.38	-113.79	517.75	560032.51	784420.05	0.00	
6600.00	7.37	102.40	6566.05	-43.41	-116.55	530.28	560029.75	784432.58	0.00	
6700.00	7.37	102.40	6665.22	-44.43	-119.30	542.81	560027.00	784445.11	0.00	
6800.00	7.37	102.40	6764.39	-45.46	-122.05	555.34	560024.25	784457.64	0.00	
6900.00	7.37	102.40	6863.57	-46.48	-124.81	567.87	560021.49	784470.17	0.00	
7000.00	7.37	102.40	6962.74	-47.51	-127.56	580.40	560018.74	784482.70	0.00	
7100.00	7.37	102.40	7061.91	-48.53	-130.32	592.93	560015.98	784495.23	0.00	
7200.00	7.37	102.40	7161.09	-49.56	-133.07	605.46	560013.23	784507.76	0.00	
7300.00	7.37	102.40	7260.26	-50.58	-135.82	617.99	560010.48	784520.29	0.00	
7400.00	7.37	102.40	7359.43	-51.61	-138.58	630.52	560007.72	784532.82	0.00	
7500.00	7.37	102.40	7458.61	-52.64	-141.33	643.05	560004.97	784545.35	0.00	
7600.00	7.37	102.40	7557.78	-53.66	-144.08	655.59	560002.22	784557.89	0.00	
7700.00	7.37	102.40	7656.96	-54.69	-146.84	668.12	559999.46	784570.42	0.00	
7800.00	7.37	102.40	7756.13	-55.71	-149.59	680.65	559996.71	784582.95	0.00	
7808.85	7.37	102.40	7764.91	-55.80	-149.84	681.76	559996.46	784584.06	0.00	Drop
7900.00	6.46	102.40	7855.39	-56.68	-152.19	692.47	559994.11	784594.77	1.00	
8000.00	5.46	102.40	7954.85	-57.51	-154.42	702.61	559991.88	784604.91	1.00	
8100.00	4.46	102.40	8054.47	-58.20	-156.28	711.06	559990.02	784613.36	1.00	
8200.00	3.46	102.40	8154.23	-58.75	-157.76	717.80	559988.54	784620.10	1.00	
8300.00	2.46	102.40	8254.10	-59.17	-158.87	722.84	559987.43	784625.14	1.00	
8400.00	1.46	102.40	8354.04	-59.44	-159.60	726.18	559986.70	784628.48	1.00	
8500.00	0.46	102.40	8454.02	-59.57	-159.96	727.82	559986.34	784630.12	1.00	
8545.96	0.00	0.00	8499.98	-59.59	-160.00	728.00	559986.30	784630.30	1.00	Hold
8600.00	0.00	0.00	8554.02	-59.59	-160.00	728.00	559986.30	784630.30	0.00	
8635.98	0.00	0.00	8590.00	-59.59	-160.00	728.00	559986.30	784630.30	0.00	AVALON :
8700.00	0.00	0.00	8654.02	-59.59	-160.00	728.00	559986.30	784630.30	0.00	
8800.00	0.00	0.00	8754.02	-59.59	-160.00	728.00	559986.30	784630.30	0.00	
8900.00	0.00	0.00	8854.02	-59.59	-160.00	728.00	559986.30	784630.30	0.00	
9000.00	0.00	0.00	8954.02	-59.59	-160.00	728.00	559986.30	784630.30	0.00	

5D Plan Report

Interpolated Points: (Relative to Slot centre)(TVD relative to Well TVD Reference)										
MD (US ft)	Inc (°)	Az (°)	TVD (US ft)	VS (US ft)	N.Offset (US ft)	E.Offset (US ft)	Northing (US ft)	Easting (US ft)	DLS (°/100US ft)	Comment
9100.00	0.00	0.00	9054.02	-59.59	-160.00	728.00	559986.30	784630.30	0.00	
9200.00	0.00	0.00	9154.02	-59.59	-160.00	728.00	559986.30	784630.30	0.00	
9300.00	0.00	0.00	9254.02	-59.59	-160.00	728.00	559986.30	784630.30	0.00	
9335.98	0.00	0.00	9290.00	-59.59	-160.00	728.00	559986.30	784630.30	0.00	1 BSC :
9400.00	0.00	0.00	9354.02	-59.59	-160.00	728.00	559986.30	784630.30	0.00	
9500.00	0.00	0.00	9454.02	-59.59	-160.00	728.00	559986.30	784630.30	0.00	
9600.00	0.00	0.00	9554.02	-59.59	-160.00	728.00	559986.30	784630.30	0.00	
9700.00	0.00	0.00	9654.02	-59.59	-160.00	728.00	559986.30	784630.30	0.00	
9735.98	0.00	0.00	9690.00	-59.59	-160.00	728.00	559986.30	784630.30	0.00	1 BSS :
9800.00	0.00	0.00	9754.02	-59.59	-160.00	728.00	559986.30	784630.30	0.00	
9900.00	0.00	0.00	9854.02	-59.59	-160.00	728.00	559986.30	784630.30	0.00	
10000.00	0.00	0.00	9954.02	-59.59	-160.00	728.00	559986.30	784630.30	0.00	
10000.98	0.00	0.00	9955.00	-59.59	-160.00	728.00	559986.30	784630.30	0.00	2 BSC :
10100.00	0.00	0.00	10054.02	-59.59	-160.00	728.00	559986.30	784630.30	0.00	
10200.00	0.00	0.00	10154.02	-59.59	-160.00	728.00	559986.30	784630.30	0.00	
10275.98	0.00	0.00	10230.00	-59.59	-160.00	728.00	559986.30	784630.30	0.00	2 BSS :
10300.00	0.00	0.00	10254.02	-59.59	-160.00	728.00	559986.30	784630.30	0.00	
10400.00	0.00	0.00	10354.02	-59.59	-160.00	728.00	559986.30	784630.30	0.00	
10500.00	0.00	0.00	10454.02	-59.59	-160.00	728.00	559986.30	784630.30	0.00	
10600.00	0.00	0.00	10554.02	-59.59	-160.00	728.00	559986.30	784630.30	0.00	
10700.00	0.00	0.00	10654.02	-59.59	-160.00	728.00	559986.30	784630.30	0.00	
10800.00	0.00	0.00	10754.02	-59.59	-160.00	728.00	559986.30	784630.30	0.00	
10805.98	0.00	0.00	10760.00	-59.59	-160.00	728.00	559986.30	784630.30	0.00	3 BSC :
10900.00	0.00	0.00	10854.02	-59.59	-160.00	728.00	559986.30	784630.30	0.00	
11000.00	0.00	0.00	10954.02	-59.59	-160.00	728.00	559986.30	784630.30	0.00	
11028.46	0.00	0.00	10982.48	-59.59	-160.00	728.00	559986.30	784630.30	0.00	KOP
11091.16	7.52	359.57	11045.00	-55.52	-155.89	727.97	559990.41	784630.27	12.00	3 BSS :
11100.00	8.59	359.57	11053.76	-54.29	-154.65	727.96	559991.65	784630.26	12.00	
11200.00	20.59	359.57	11150.36	-29.42	-129.51	727.77	560016.79	784630.07	12.00	
11300.00	32.59	359.57	11239.62	14.79	-84.84	727.43	560061.46	784629.73	12.00	
11400.00	44.59	359.57	11317.65	76.40	-22.59	726.96	560123.71	784629.26	12.00	
11472.12	53.24	359.57	11365.00	130.15	31.71	726.55	560178.01	784628.85	12.00	WOLFCAMP A :
11500.00	56.59	359.57	11381.02	152.72	54.52	726.37	560200.82	784628.67	12.00	
11600.00	68.59	359.57	11426.98	240.41	143.13	725.70	560289.43	784628.00	12.00	
11700.00	80.59	359.57	11453.51	335.65	239.35	724.97	560385.65	784627.27	12.00	
11782.62	90.50	359.57	11459.93	417.07	321.62	724.35	560467.92	784626.65	12.00	Landing Pt
11800.00	90.50	359.57	11459.77	434.26	338.99	724.22	560485.29	784626.52	0.00	
11900.00	90.50	359.57	11458.90	533.23	438.99	723.46	560585.29	784625.76	0.00	
12000.00	90.50	359.57	11458.03	632.19	538.98	722.70	560685.28	784625.00	0.00	
12100.00	90.50	359.57	11457.16	731.15	638.97	721.94	560785.27	784624.24	0.00	
12200.00	90.50	359.57	11456.28	830.11	738.97	721.18	560885.27	784623.48	0.00	
12300.00	90.50	359.57	11455.41	929.08	838.96	720.43	560985.26	784622.73	0.00	
12400.00	90.50	359.57	11454.54	1028.04	938.95	719.67	561085.25	784621.97	0.00	
12500.00	90.50	359.57	11453.67	1127.00	1038.95	718.91	561185.25	784621.21	0.00	
12600.00	90.50	359.57	11452.79	1225.96	1138.94	718.15	561285.24	784620.45	0.00	
12700.00	90.50	359.57	11451.92	1324.93	1238.93	717.39	561385.23	784619.69	0.00	
12800.00	90.50	359.57	11451.05	1423.89	1338.93	716.64	561485.23	784618.94	0.00	
12900.00	90.50	359.57	11450.17	1522.85	1438.92	715.88	561585.22	784618.18	0.00	
13000.00	90.50	359.57	11449.30	1621.82	1538.91	715.12	561685.21	784617.42	0.00	
13100.00	90.50	359.57	11448.43	1720.78	1638.91	714.36	561785.21	784616.66	0.00	
13200.00	90.50	359.57	11447.56	1819.74	1738.90	713.60	561885.20	784615.90	0.00	
13300.00	90.50	359.57	11446.68	1918.70	1838.89	712.84	561985.19	784615.14	0.00	
13400.00	90.50	359.57	11445.81	2017.67	1938.89	712.09	562085.19	784614.39	0.00	
13500.00	90.50	359.57	11444.94	2116.63	2038.88	711.33	562185.18	784613.63	0.00	
13600.00	90.50	359.57	11444.07	2215.59	2138.87	710.57	562285.17	784612.87	0.00	
13700.00	90.50	359.57	11443.19	2314.56	2238.87	709.81	562385.17	784612.11	0.00	
13800.00	90.50	359.57	11442.32	2413.52	2338.86	709.05	562485.16	784611.35	0.00	
13900.00	90.50	359.57	11441.45	2512.48	2438.85	708.30	562585.15	784610.60	0.00	

5D Plan Report

Interpolated Points: (Relative to Slot centre)(TVD relative to Well TVD Reference)										
MD (US ft)	Inc (°)	Az (°)	TVD (US ft)	VS (US ft)	N.Offset (US ft)	E.Offset (US ft)	Northing (US ft)	Easting (US ft)	DLS (°/100US ft)	Comment
14000.00	90.50	359.57	11440.57	2611.44	2538.85	707.54	562685.15	784609.84	0.00	
14100.00	90.50	359.57	11439.70	2710.41	2638.84	706.78	562785.14	784609.08	0.00	
14200.00	90.50	359.57	11438.83	2809.37	2738.83	706.02	562885.13	784608.32	0.00	
14300.00	90.50	359.57	11437.96	2908.33	2838.83	705.26	562985.13	784607.56	0.00	
14400.00	90.50	359.57	11437.08	3007.29	2938.82	704.50	563085.12	784606.80	0.00	
14500.00	90.50	359.57	11436.21	3106.26	3038.81	703.75	563185.11	784606.05	0.00	
14600.00	90.50	359.57	11435.34	3205.22	3138.81	702.99	563285.11	784605.29	0.00	
14700.00	90.50	359.57	11434.47	3304.18	3238.80	702.23	563385.10	784604.53	0.00	
14800.00	90.50	359.57	11433.59	3403.15	3338.79	701.47	563485.09	784603.77	0.00	
14900.00	90.50	359.57	11432.72	3502.11	3438.79	700.71	563585.09	784603.01	0.00	
15000.00	90.50	359.57	11431.85	3601.07	3538.78	699.96	563685.08	784602.26	0.00	
15100.00	90.50	359.57	11430.97	3700.03	3638.77	699.20	563785.07	784601.50	0.00	
15200.00	90.50	359.57	11430.10	3799.00	3738.77	698.44	563885.07	784600.74	0.00	
15300.00	90.50	359.57	11429.23	3897.96	3838.76	697.68	563985.06	784599.98	0.00	
15400.00	90.50	359.57	11428.36	3996.92	3938.75	696.92	564085.05	784599.22	0.00	
15500.00	90.50	359.57	11427.48	4095.88	4038.75	696.16	564185.05	784598.46	0.00	
15600.00	90.50	359.57	11426.61	4194.85	4138.74	695.41	564285.04	784597.71	0.00	
15700.00	90.50	359.57	11425.74	4293.81	4238.73	694.65	564385.03	784596.95	0.00	
15800.00	90.50	359.57	11424.87	4392.77	4338.73	693.89	564485.03	784596.19	0.00	
15900.00	90.50	359.57	11423.99	4491.74	4438.72	693.13	564585.02	784595.43	0.00	
16000.00	90.50	359.57	11423.12	4590.70	4538.71	692.37	564685.01	784594.67	0.00	
16100.00	90.50	359.57	11422.25	4689.66	4638.71	691.62	564785.01	784593.92	0.00	
16200.00	90.50	359.57	11421.37	4788.62	4738.70	690.86	564885.00	784593.16	0.00	
16300.00	90.50	359.57	11420.50	4887.59	4838.69	690.10	564984.99	784592.40	0.00	
16400.00	90.50	359.57	11419.63	4986.55	4938.69	689.34	565084.99	784591.64	0.00	
16484.62	90.50	359.57	11418.89	5070.29	5023.30	688.70	565169.60	784591.00	0.00	B&T27FC405 H PBHL

BLACK & TAN 27 FEDERAL COM 405H - CSG DETAIL - REVISED

String: **SURFACE**

Hole Size: 17.5

Top Setting Depth (MD):	0	Top Setting Depth (TVD):	0	Btm setting depth (MD):	1650	Btm setting depth (TVD):	1650
Size:	13-3/8"	Grade:	J-55	Weight (lbs/ft):	54.5	Joint (Butt,FJ, LTC,STC, SLH, N/A, Other):	Buttress

Condition (New/Used): New Standard (API/Non-API): API

Tapered String (Y/N)?: N
If yes, need spec attachment

Safety Factors

Collapse Design Safety Factor: 2.92 Burst Design Safety Factor: 1.67

Body Tensile Design Safety Factor type?: Dry/Buoyant Buoyant
Body Tensile Design Safety Factor: 3.84

Joint Tensile Design Safety Factor type?: Dry/Buoyant Buoyant
Joint Tensile Design Safety Factor: 4.1

String: **INTERMEDIATE**

Hole Size: 12.25

Top Setting Depth (MD):	0	Top Setting Depth (TVD):	0	Btm setting depth (MD):	800	Btm setting depth (TVD):	800
Size:	9-5/8"	Grade:	J-55	Weight (lbs/ft):	40	Joint (Butt,FJ, LTC,STC, SLH, N/A, Other):	Buttress

Condition (New/Used): New Standard (API/Non-API): API

Tapered String (Y/N)?: N
If yes, need spec attachment

Safety Factors

Collapse Design Safety Factor: 5.1 Burst Design Safety Factor: 1.16

Body Tensile Design Safety Factor type?: Dry/Buoyant Buoyant
Body Tensile Design Safety Factor: 1.99

Joint Tensile Design Safety Factor type?: Dry/Buoyant Buoyant
Joint Tensile Design Safety Factor: 2.27

Top Setting Depth (MD):	800	Top Setting Depth (TVD):	800	Btm setting depth (MD):	5660	Btm setting depth (TVD):	5633
Size:	9-5/8"	Grade:	J-55	Weight (lbs/ft):	40	Joint (Butt,FJ, LTC,STC, SLH, N/A, Other):	LTC

Condition (New/Used): New Standard (API/Non-API): API

Tapered String (Y/N)?: N
If yes, need spec attachment

Safety Factors

Collapse Design Safety Factor: 1.71 Burst Design Safety Factor: 1.16

Body Tensile Design Safety Factor type?: Dry/Buoyant Buoyant
Body Tensile Design Safety Factor: 2.16

Joint Tensile Design Safety Factor type?: Dry/Buoyant Buoyant
Joint Tensile Design Safety Factor: 1.8

String: **DRILLING LINER**

Hole Size: 8.75

Top Setting Depth (MD):	5560	Top Setting Depth (TVD):	5534	Btm setting depth (MD):	10870	Btm setting depth (TVD):	10824
Size:	7-5/8"	Grade:	L-80	Weight (lbs/ft):	26.4	Joint (Butt,FJ, LTC,STC, SLH, N/A, Other):	TMK UP SF

Condition (New/Used): New Standard (API/Non-API): Non-API

Tapered String (Y/N)?: N
If yes, need spec attachment

Safety Factors

Collapse Design Safety Factor: 1.34 Burst Design Safety Factor: 1.89

Body Tensile Design Safety Factor type?: Dry/Buoyant Buoyant
Body Tensile Design Safety Factor: 2.48

Joint Tensile Design Safety Factor type?: Dry/Buoyant Buoyant
Joint Tensile Design Safety Factor: 2.23

String: **PRODUCTION**

Hole Size: 6.75

Top Setting Depth (MD):	0	Top Setting Depth (TVD):	0	Btm setting depth (MD):	5400	Btm setting depth (TVD):	5376
Size:	5-1/2"	Grade:	P-110	Weight (lbs/ft):	20	Joint (Butt,FJ, LTC,STC, SLH, N/A, Other):	GB-CD

Condition (New/Used): New Standard (API/Non-API): Non-API

Safety Factors

Collapse Design Safety Factor: 3.24 Burst Design Safety Factor: 1.44

Body Tensile Design Safety Factor type?: Dry/Buoyant Buoyant
Body Tensile Design Safety Factor: 2.17

Joint Tensile Design Safety Factor type?: Dry/Buoyant Buoyant
Joint Tensile Design Safety Factor: 2.27

Tapered String (Y/N)?: Y
If yes, need spec attachment

Hole Size: 6.75

Top Setting Depth (MD):	5400	Top Setting Depth (TVD):	5376	Btm setting depth (MD):	16354	Btm setting depth (TVD):	11420
Size:	5-1/2"	Grade:	P-110	Weight (lbs/ft):	20	Joint (Butt,FJ, LTC,STC, SLH, N/A, Other):	TMK UP SF

Condition (New/Used): New Standard (API/Non-API): Non-API

Safety Factors

Collapse Design Safety Factor: 1.52 Burst Design Safety Factor: 1.39

Body Tensile Design Safety Factor type?: Dry/Buoyant Buoyant
Body Tensile Design Safety Factor: 2.2

Joint Tensile Design Safety Factor type?: Dry/Buoyant Buoyant
Joint Tensile Design Safety Factor: 2.02

Tapered String (Y/N)?: Y
If yes, need spec attachment

Hole Size: 6.75

Top Setting Depth (MD):	16354	Top Setting Depth (TVD):	11420	Btm setting depth (MD):	16484	Btm setting depth (TVD):	11419

Size:	4-1/2"	Grade:	P-110	Weight (lbs/ft):	13.5	Joint (Butt,FJ, LTC,STC, SLH, N/A, Other):	Buttress

Condition (New/Used): New Standard (API/Non-API): API

Safety Factors

Collapse Design Safety Factor: 1.47 Burst Design Safety Factor: 1.69

Body Tensile Design Safety Factor type?: Dry/Buoyant Buoyant
Body Tensile Design Safety Factor: 3.16

Joint Tensile Design Safety Factor type?: Dry/Buoyant Buoyant
Joint Tensile Design Safety Factor: 3.36

Tapered String (Y/N)?: Y
If yes, need spec attachment

BLACK & TAN 27 FEDERAL COM 405H - CMT DETAIL -REVISED

CEMENT: SURFACE

Stage Tool Depth: N/A

Lead:

Top MD of Segment:	0	Btm MD of Segment:	1320
Cmt Type:	C	Cmt Additives:	4% Bentonite + 1% CaCl2
Quantity (sks):	676		
Yield (cu/ft/sk):	1.72	Volume (cu/ft):	1162.72
Density (lbs/gal):	13.5	Percent OH Excess:	25%

Tail:

Top MD of Segment:	1320	Btm MD of Segment:	1650
Cmt Type:	C	Cmt Additives:	1% CaCl2
Quantity (sks):	245		
Yield (cu/ft/sk):	1.34	Volume (cu/ft):	328.3
Density (lbs/gal):	14.8	Percent OH Excess:	25%

CEMENT: INTERMEDIATE

Single Stage

Lead:

Top MD of Segment:	0	Btm MD of Segment:	4660
Cmt Type:	C	Cmt Additives:	10% NaCl + 6% Benontite + 1% MgOx-M + 0.7% Retarder
Quantity (sks):	770		
Yield (cu/ft/sk):	2.32	Volume (cu/ft):	1786.4
Density (lbs/gal):	12.7	Percent OH Excess:	25%

Tail:

Top MD of Segment:	4660	Btm MD of Segment:	5660
Cmt Type:	C	Cmt Additives:	0.2% Retarder

Quantity (sks):	300			
Yield (cu/ft/sk):	1.33	Volume (cu/ft):	399	
Density (lbs/gal):	14.8	Percent OH Excess:	25%	

2 Stage Cement Job

* DV tool depth(s) will be adjusted based on hole conditions and cement volumes will be adjusted proportionally. DV tool will be set a minimum of 50 feet below previous casing and a minimum of 200 feet above current shoe. Lab reports with the 500 psi compressive strength time for the cement will be onsite for review.

*If lost circulation is encountered, Apache may 2-stage Interm csg. A DVT may be used in the 9-5/8" csg & ECP may be placed below DVT.

1st Stage

Lead:

Top MD of Segment:	3460	Btm MD of Segment:	4660
Cmt Type: C		Cmt Additives:	10% NaCl + 6% Benontite + 1% MgOx-M + 0.7% Retarder

Quantity (sks):	250		
Yield (cu/ft/sk):	2.32	Volume (cu/ft):	580
Density (lbs/gal):	12.7	Percent OH Excess:	25%

Tail:

Top MD of Segment:	4660	Btm MD of Segment:	5660
Cmt Type: C		Cmt Additives:	0.3% Retarder

Quantity (sks):	300		
Yield (cu/ft/sk):	1.33	Volume (cu/ft):	399
Density (lbs/gal):	14.8	Percent OH Excess:	25%

Stage Tool / ECP Depth: ± 3460'

2nd Stage

Lead:

Top MD of Segment:	0	Btm MD of Segment:	2780

Cmt Type: C

Cmt Additives: 10% NaCl + 6% Benontite + 1% MgOx-M + 0.7% Retarder

Quantity (sks): 450
Yield (cu/ft/sk): 2.32 Volume (cu/ft): 1044
Density (lbs/gal): 12.7 Percent OH Excess: 25%

Tail:

Top MD of Segment: 2780

Btm MD of Segment: 3460

Cmt Type: C

Cmt Additives: 0.3% Retarder

Quantity (sks): 200
Yield (cu/ft/sk): 1.33 Volume (cu/ft): 266
Density (lbs/gal): 14.8 Percent OH Excess: 25%

CEMENT: DRILLING LINER

Stage Tool Depth: N/A

Lead:

Top MD of Segment: 5560

Btm MD of Segment: 9870

Cmt Type: Nine Lite

Cmt Additives: 5% Light Weight Beads + 0.3% Fluid Loss + 0.2% Dispersant + 0.2% GXT + 0.2% Suspension Aid + 0.25% Retarder + 0.25% Citric Acid

Quantity (sks): 170
Yield (cu/ft/sk): 2.87 Volume (cu/ft): 487.9
Density (lbs/gal): 10.5 Percent OH Excess: 10%

Tail:

Top MD of Segment: 9870

Btm MD of Segment: 10870

Cmt Type: H

Cmt Additives: 2% Bentonite Gel + 3% MgOx-M + 0.6% Fluid Loss + 0.3% Dispersant + 0.45% Retarder

Quantity (sks):	100		
Yield (cu/ft/sk):	1.22	Volume (cu/ft):	122
Density (lbs/gal):	14.5	Percent OH Excess:	10%

CEMENT: PRODUCTION

Single Stage

Lead:

Top MD of Segment:	0	Btm MD of Segment:	11028
Cmt Type:	Nine Lite	Cmt Additives:	10% Bentonite Gel + 8% Plexcrete SFA + 0.7% Fluid Loss + 0.4% Defoamer + 0.6% Retarder
Quantity (sks):	690		
Yield (cu/ft/sk):	2.9	Volume (cu/ft):	2001
Density (lbs/gal):	11	Percent OH Excess:	20%

Tail:

Top MD of Segment:	11028	Btm MD of Segment:	16484
Cmt Type:	Nine Lite	Cmt Additives:	1.3% Salt + 5% Expanding Agent + 0.5% Fluid Loss + 0.35% Retarder + 0.1% Anti Settling + 0.2% Dispersant + 0.4 #/sk Defoamer
Quantity (sks):	380		
Yield (cu/ft/sk):	1.46	Volume (cu/ft):	554.8
Density (lbs/gal):	13.2	Percent OH Excess:	20%

QUALITY CONTROL INSPECTION AND TEST CERTIFICATE				CERT. N°: 373	
PURCHASER: ContiTech Oil & Marine Corp.				P.O. N°: 4500398355	
CONTITECH RUBBER order N°: 538079		HOSE TYPE: 3" ID		Choke and Kill Hose	
HOSE SERIAL N°: 67090		NOMINAL / ACTUAL LENGTH:		10,67 m / 10,73 m	
W.P. 68,9 MPa 10000 psi		T.P. 103,4 MPa 15000 psi		Duration: 60 min.	

Pressure test with water at ambient temperature

See attachment. (1 page)

↑ 10 mm = 10 Min.

→ 10 mm = 25 MPa

COUPLINGS Type	Serial N°	Quality	Heat N°
3" coupling with	1252 8901	AISI 4130	A0709N A1126U
4 1/16" 10K API b.w. Flange end		AISI 4130	035285

NOT DESIGNED FOR WELL TESTING **API Spec 16 C**

Temperature rate:"B"

All metal parts are flawless

WE CERTIFY THAT THE ABOVE HOSE HAS BEEN MANUFACTURED IN ACCORDANCE WITH THE TERMS OF THE ORDER INSPECTED AND PRESSURE TESTED AS ABOVE WITH SATISFACTORY RESULT.

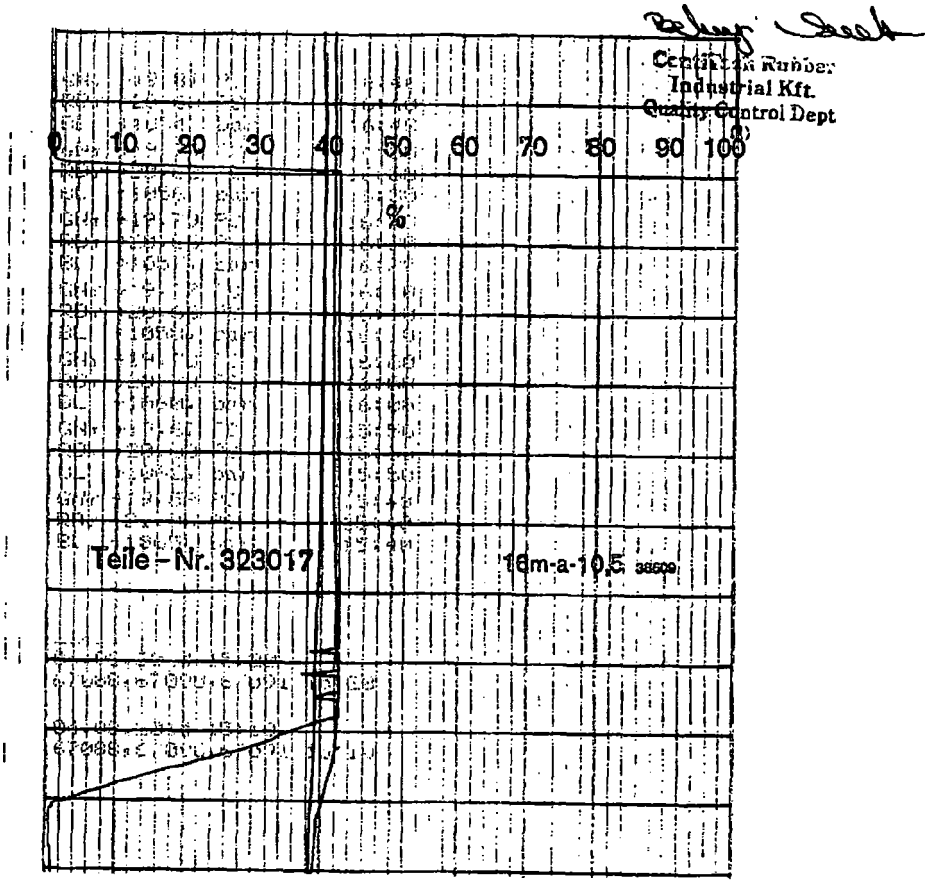
STATEMENT OF CONFORMITY: We hereby certify that the above items/equipment supplied by us are in conformity with the terms, conditions and specifications of the above Purchaser Order and that these items/equipment were fabricated inspected and tested in accordance with the referenced standards, codes and specifications and meet the relevant acceptance criteria and design requirements.

COUNTRY OF ORIGIN HUNGARY/EU

Date:	Inspector	Quality Control
05. March 2014.		ContiTech Rubber Industrial Kft. Quality Control Dept.

ATTACHMENT OF QUALITY CONTROL INSPECTION AND TEST CERTIFICATE *No: 371, 373, 374*

Page: 1 / 1



Continental
CONTITECH

Hose Data Sheet

CRI Order No.	538079
Customer	ContiTech Oil & Marine Corp.
Customer Order No	4500398355
Item No.	1
Hose Type	Flexible Hose
Standard	**API SPEC 16 C**
Inside dia in inches	3
Length	35 ft
Type of coupling one end	FLANGE 4.1/16" 10K API SPEC 6A TYPE 6BX FLANGE C/W BX155 R.GR.SOUR
Type of coupling other end	FLANGE 4.1/16" 10K API SPEC 6A TYPE 6BX FLANGE C/W BX155 R.GR.SOUR
H2S service NACE MR0175	Yes
Working Pressure	10 000 psi
Design Pressure	10 000 psi
Test Pressure	15 000 psi
Safety Factor	2,25
Marking	USUAL PHOENIX
Cover	NOT FIRE RESISTANT
Outside protection	St.steel outer wrap
Internal stripwound tube	No
Lining	OIL + GAS RESISTANT SOUR
Safety clamp	No
Lifting collar	No
Element C	No
Safety chain	No
Safety wire rope	No
Max.design temperature [°C]	100
Min.design temperature [°C]	-20
Min. Bend Radius operating [m]	0,90
Min. Bend Radius storage [m]	0,90
Electrical continuity	The Hose is electrically continuous
Type of packing	WOODEN CRATE ISPM-15

APD ID: 10400036812 **Submission Date:** 12/10/2018

Operator Name: APACHE CORPORATION

Well Name: BLACK & TAN 27 FEDERAL COM **Well Number:** 405H

Well Type: OIL WELL **Well Work Type:** Drill

Show Final Text

Section 1 - Existing Roads

Will existing roads be used? YES

Existing Road Map:

BlkTan27FedCom405H_ExistingRoads_20181129082659.pdf

Existing Road Purpose: ACCESS **Row(s) Exist?** NO

ROW ID(s)

ID:

Do the existing roads need to be improved? NO

Existing Road Improvement Description:

Existing Road Improvement Attachment:

Section 2 - New or Reconstructed Access Roads

Will new roads be needed? NO

Section 3 - Location of Existing Wells

Existing Wells Map? YES

Attach Well map:

BlkTan27FedCom405H_1MiRadius_20181129082717.pdf

Operator Name: APACHE CORPORATION

Well Name: BLACK & TAN 27 FEDERAL COM **Well Number:** 405H

Existing Wells description:

Section 4 - Location of Existing and/or Proposed Production Facilities

Submit or defer a Proposed Production Facilities plan? DEFER

Estimated Production Facilities description: Pipeline, battery and electric line has been approved on APD for the Black & Tan 27 Federal Com 305H (API# 30-025-43940).

Section 5 - Location and Types of Water Supply

Water Source Table

Water source use type: INTERMEDIATE/PRODUCTION CASING **Water source type:** OTHER

Describe type: BRINE

Source latitude: 32.48407 **Source longitude:** -103.15848

Source datum: NAD83

Water source permit type: PRIVATE CONTRACT

Source land ownership: FEDERAL

Water source transport method: TRUCKING

Source transportation land ownership: FEDERAL

Water source volume (barrels): 4000 **Source volume (acre-feet):** 0.51557237

Source volume (gal): 168000

Water source use type: INTERMEDIATE/PRODUCTION CASING, SURFACE CASING **Water source type:** GW WELL

Describe type:

Source latitude: 32.62567 **Source longitude:** -103.51543

Source datum: NAD83

Water source permit type: PRIVATE CONTRACT

Source land ownership: FEDERAL

Water source transport method: TRUCKING

Source transportation land ownership: FEDERAL

Water source volume (barrels): 3000 **Source volume (acre-feet):** 0.3866793

Source volume (gal): 126000

Operator Name: APACHE CORPORATION

Well Name: BLACK & TAN 27 FEDERAL COM **Well Number:** 405H

Water source and transportation map:

BlkTan27FedCom_BrineWaterSources_20181121113228.pdf

BlkTan27FedCom_FreshWaterSources_20181121113229.pdf

Water source comments:

New water well? NO

New Water Well Info

Well latitude: **Well Longitude:** **Well datum:**

Well target aquifer:

Est. depth to top of aquifer(ft): **Est thickness of aquifer:**

Aquifer comments:

Aquifer documentation:

Well depth (ft): **Well casing type:**

Well casing outside diameter (in.): **Well casing inside diameter (in.):**

New water well casing? **Used casing source:**

Drilling method: **Drill material:**

Grout material: **Grout depth:**

Casing length (ft.): **Casing top depth (ft.):**

Well Production type: **Completion Method:**

Water well additional information:

State appropriation permit:

Additional information attachment:

Section 6 - Construction Materials

Construction Materials description: Caliche provided by lessor pursuant surface use agmt, Danny Berry, Caliche pit - Sec 35, T20S, R34E

Construction Materials source location attachment:

Section 7 - Methods for Handling Waste

Waste type: DRILLING

Waste content description: Drilling fluids, produced oil and water while drilling and completion operations

Amount of waste: 2500 barrels

Waste disposal frequency : One Time Only

Safe containment description: All drilling and completion waste will be stored safely and disposed of properly

Safe containmant attachment:

Operator Name: APACHE CORPORATION

Well Name: BLACK & TAN 27 FEDERAL COM **Well Number:** 405H

Waste disposal type: RECYCLE **Disposal location ownership:** OTHER

Disposal type description:

Disposal location description: Trucked to an approved disposal facility.

Waste type: GARBAGE

Waste content description: Garbage and trash produced during drilling and completion operations

Amount of waste: 1500 pounds

Waste disposal frequency : Weekly

Safe containment description: Garbage and trash produced during drilling and completion ops will be collected in portable trash trailers and disposed of properly at a state approved disposal facility.

Safe containmant attachment:

Waste disposal type: OTHER **Disposal location ownership:** STATE

Disposal type description: land fill

Disposal location description: Lea County Landfill

Waste type: SEWAGE

Waste content description: Human waste and grey water

Amount of waste: 2000 gallons

Waste disposal frequency : Weekly

Safe containment description: Waste will be properly contained and disposed of properly at a state approved disposal facility

Safe containmant attachment:

Waste disposal type: OTHER **Disposal location ownership:** STATE

Disposal type description: Municipal waste facility

Disposal location description: Hobbs Municipal Waste Facility

Reserve Pit

Reserve Pit being used? NO

Temporary disposal of produced water into reserve pit?

Reserve pit length (ft.) **Reserve pit width (ft.)**

Reserve pit depth (ft.) **Reserve pit volume (cu. yd.)**

Is at least 50% of the reserve pit in cut?

Reserve pit liner

Reserve pit liner specifications and installation description

Operator Name: APACHE CORPORATION

Well Name: BLACK & TAN 27 FEDERAL COM **Well Number:** 405H

Cuttings Area

Cuttings Area being used? NO

Are you storing cuttings on location? YES

Description of cuttings location Cuttings will be stored in steel haul off bins and taken to an NMOCD approved disposal facility

Cuttings area length (ft.)

Cuttings area width (ft.)

Cuttings area depth (ft.)

Cuttings area volume (cu. yd.)

Is at least 50% of the cuttings area in cut?

WCuttings area liner

Cuttings area liner specifications and installation description

Section 8 - Ancillary Facilities

Are you requesting any Ancillary Facilities?: NO

Ancillary Facilities attachment:

Comments:

Section 9 - Well Site Layout

Well Site Layout Diagram:

BlkTan27FedCom405H_RigWellsiteLayout_20190411153519.pdf

BlkTan27FedCom405H_WellPadLayout_20190411153520.pdf

Comments:

Section 10 - Plans for Surface Reclamation

Type of disturbance: No New Surface Disturbance

Multiple Well Pad Name: BLACK & TAN 27 FED COM

Multiple Well Pad Number: PAD 3 EAST

Recontouring attachment:

Drainage/Erosion control construction: During construction, proper erosion control methods will be used to control erosion, runoff and siltation of surrounding area

Drainage/Erosion control reclamation: Proper erosion control methods will be used to control erosion, runoff and siltation of surrounding area

Operator Name: APACHE CORPORATION

Well Name: BLACK & TAN 27 FEDERAL COM **Well Number:** 405H

Well pad proposed disturbance (acres): 0	**Well pad interim reclamation (acres):**	**Well pad long term disturbance (acres):**
Road proposed disturbance (acres): 0	**Road interim reclamation (acres):**	**Road long term disturbance (acres):**
Powerline proposed disturbance (acres): 0	**Powerline interim reclamation (acres):** 0	**Powerline long term disturbance (acres):** 0
Pipeline proposed disturbance (acres): 0	**Pipeline interim reclamation (acres):**	**Pipeline long term disturbance (acres):**
Other proposed disturbance (acres): 0	**Other interim reclamation (acres):**	**Other long term disturbance (acres):**
Total proposed disturbance: 0	**Total interim reclamation:**	**Total long term disturbance:**

Disturbance Comments:

Reconstruction method: No reclamation planned for this pad. If reclamation is needed, are qill then be recontoured to the original contour if feasible, or if not feasible, to an interim contour that blends with surrounding topography as much as possible. Where applicable, any fill material of well pad will be backfilled into the cut to bring area back to original contour.
Topsoil redistribution: Topsoil will be evenly distributed and aggressively revegitated over the entire disturbed area not needed for all-weather operations.
Soil treatment: After all disturbed areas have been properly prepared, areas will need to be seeded with recommended seed mixture, free of noxious weeds. Final seedbed prep will consist of contour cultivating to a depth of 4-6 inches within 24 hrs prior to seeding, dozer tracking or other imprinting in order to break soil crust to create seed germination micro-sites.
Existing Vegetation at the well pad:

Existing Vegetation at the well pad attachment:

Existing Vegetation Community at the road:

Existing Vegetation Community at the road attachment:

Existing Vegetation Community at the pipeline:

Existing Vegetation Community at the pipeline attachment:

Existing Vegetation Community at other disturbances:

Existing Vegetation Community at other disturbances attachment:

Non native seed used? NO

Non native seed description:

Seedling transplant description:

Will seedlings be transplanted for this project? NO

Seedling transplant description attachment:

Will seed be harvested for use in site reclamation? NO

Seed harvest description:

Seed harvest description attachment:

Operator Name: APACHE CORPORATION

Well Name: BLACK & TAN 27 FEDERAL COM **Well Number:** 405H

Seed Management

Seed Table

Seed type:

Seed source:

Seed name:

Source name:

Source address:

Source phone:

Seed cultivar:

Seed use location:

PLS pounds per acre:

Proposed seeding season:

Seed Summary

Seed Type	Pounds/Acre

Total pounds/Acre:

Seed reclamation attachment:

Operator Contact/Responsible Official Contact Info

First Name:

Last Name:

Phone:

Email:

Seedbed prep:

Seed BMP:

Seed method:

Existing invasive species? NO

Existing invasive species treatment description:

Existing invasive species treatment attachment:

Weed treatment plan description: No invasive species present. Standard regular maintenance to maintain to maintain a clear location and road.

Weed treatment plan attachment:

Monitoring plan description: Identify area supporting weeds prior to construction, prevent introduction and spread of weeds from construction equipment during construction and contain weed seeds and propagules by preventing segregated topsoil from being spread to adjacent areas. No invasive species present. Standard regular maintenance to maintain a clear location and road.

Monitoring plan attachment:

Success standards: Maintain all disturbed areas as per Gold Book standards

Pit closure description: N/A

Pit closure attachment:

Operator Name: APACHE CORPORATION

Well Name: BLACK & TAN 27 FEDERAL COM **Well Number:** 405H

Section 11 - Surface Ownership

Disturbance type: WELL PAD

Describe:

Surface Owner: PRIVATE OWNERSHIP

Other surface owner description:

BIA Local Office:

BOR Local Office:

COE Local Office:

DOD Local Office:

NPS Local Office:

State Local Office:

Military Local Office:

USFWS Local Office:

Other Local Office:

USFS Region:

USFS Forest/Grassland: **USFS Ranger District:**

Fee Owner: T over V Ranch C/O Dan Berry **Fee Owner Address:** PO Box 160, Eunice, NM 88231

Phone: (575)369-5266 **Email:**

Surface use plan certification: YES

Surface use plan certification document:

BlkTan27FedCom_401H_402H_403H_404H_405H_406H_SurfUseAgmt_20181127125545.pdf

Surface access agreement or bond: Agreement

Surface Access Agreement Need description: Surface access agmt has been negotiated with private land owner. No bond necessary

Surface Access Bond BLM or Forest Service:

BLM Surface Access Bond number:

USFS Surface access bond number:

Operator Name: APACHE CORPORATION

Well Name: BLACK & TAN 27 FEDERAL COM **Well Number:** 405H

Section 12 - Other Information

Right of Way needed? NO **Use APD as ROW?**

ROW Type(s):

ROW Applications

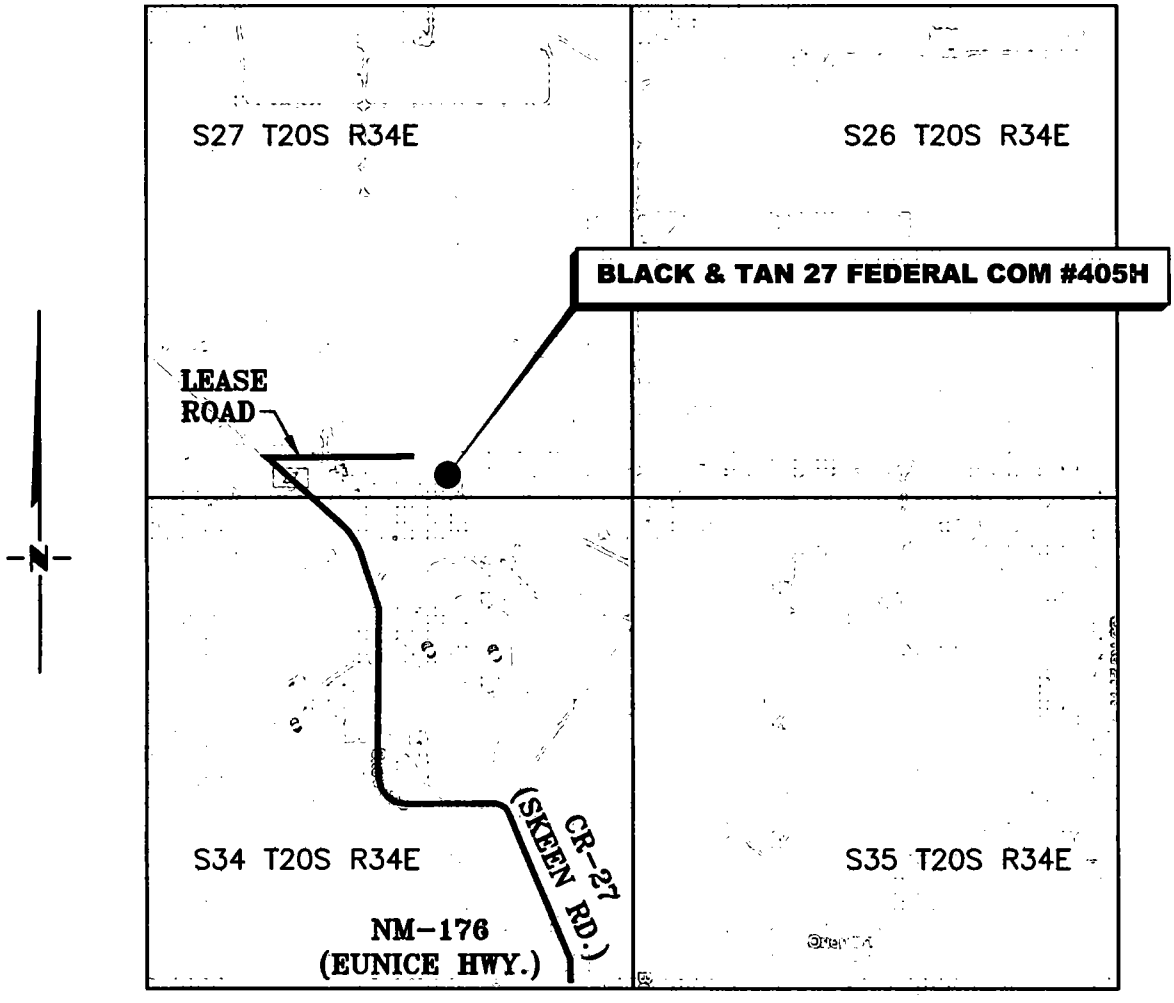
SUPO Additional Information: Onsite completed by Jeffery Robertson on 1/13/2016. Arch survey has been completed by Boone Arch Services. Operator Rep: Larry VanGilder, Drlg Supt, 432-818-1965 or 432-557-1097; Operator Production Rep: Lou Phillips, 575-393-2144. Pipeline, battery and electrical line has been applied for and approved on APD for Black & Tan 27 Fed Com 305H - API # 30-025-43940
Use a previously conducted onsite? YES

Previous Onsite information: Onsite completed by Jeffery Robertson on 1/13/2016.

Other SUPO Attachment

VICINITY MAP

NOT TO SCALE



SECTION 27, TWP. 20 SOUTH, RGE. 34 EAST, N. M. P. M., LEA COUNTY, NEW MEXICO

OPERATOR: Apache Corporation
LEASE: Black & Tan 27 Federal Com
WELL NO.: 405H

LOCATION: 215' FSL & 2,072' FEL
ELEVATION: 3715'

NO.	REVISION	DATE

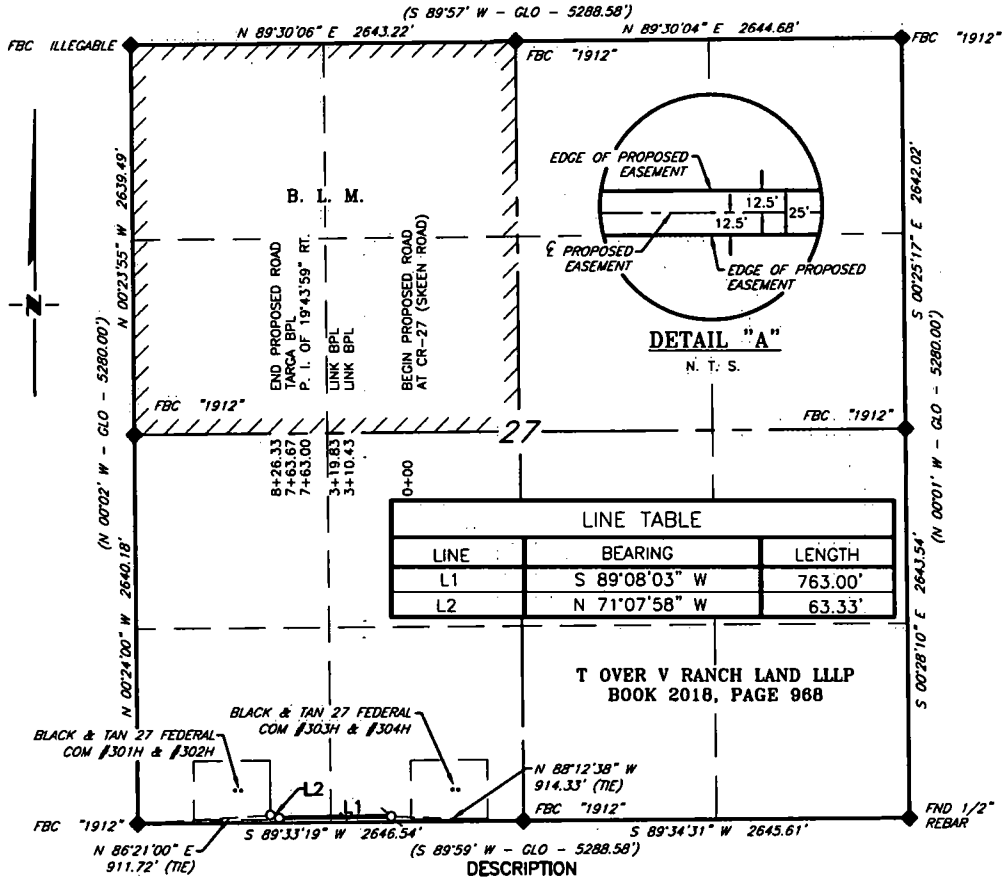
JOB NO.: LS1806829
DWG. NO.: 1806829VM

RRC

405 308 W. BROADWAY ST., HOBBS, NM 88240 (575) 964-8200

SCALE: N / A
DATE: 07-02-2018
SURVEYED BY: AB/RU
DRAWN BY: CAR
APPROVED BY: JLF
SHEET: 1 OF 1

APACHE CORPORATION
PROPOSED ACCESS ROAD
FOR THE BLACK & TAN FEDERAL COM #301H & #302H
SECTION 27, T20S, R34E
N. M. P. M., LEA CO., NEW MEXICO



DESCRIPTION

A strip of land 25 feet wide, being 826.33 feet or 50.080 rods in length, lying in Section 27, Township 20 South, Range 34 East, N. M. P. M., Lea County, New Mexico, being 12.5 feet left and 12.5 feet right of the following described survey of a centerline across the lands of T over V Ranch Land LLLP, according to a deed filed for record in Book 2018, Page 968, of the deed records of Lea County, New Mexico:

BEGINNING at Engr. Sta. 0+00, a point in the Southwest quarter of Section 27, which bears, N 88°12'38" W, 914.33 feet, from a brass cap, stamped "1912", found for the South quarter corner of Section 27;

Thence S 89°08'03" W, 763.00 feet, to Engr. Sta. 7+63.00, a P. I. of 19°43'59" right;

Thence N 71°07'58" W, 63.33 feet, to Engr. Sta. 8+26.33, the End of Survey, a point in the Southwest quarter of Section 27, which bears, N 86°21'00" E, 911.72 feet from a brass cap, stamped "1912", found for the Southwest corner of Section 27.

Said strip of land contains 0.474 acres acres, more or less, and is allocated by forties as follows:

SE 1/4 SW 1/4	24.830 Rods	0.235 Acres
SW 1/4 SW 1/4	25.250 Rods	0.239 Acres

SCALE: 1" = 1000'
0 500' 1000'

BEARINGS ARE GRID NAD 27 NM EAST
DISTANCES ARE HORIZ. GROUND.

LEGEND
( ) RECORD DATA - GLO
◆ FOUND MONUMENT AS NOTED
PROPOSED ACCESS ROAD

I, R. M. Howett, a N. M. Professional Surveyor, hereby certify that I prepared this plat from an actual survey made on the ground under my direct supervision, said survey and plat meet the Min. Stds. for Land Surveying in the State of N. M. and are true and correct to the best of my knowledge and belief.

Robert M. Howett
Robert M. Howett NM PS 19680

ROBERT M. HOWETT NEW MEXICO 19680 3/02/17 PROFESSIONAL SURVEYOR

Firm No.: TX 10193838 NM 4655451

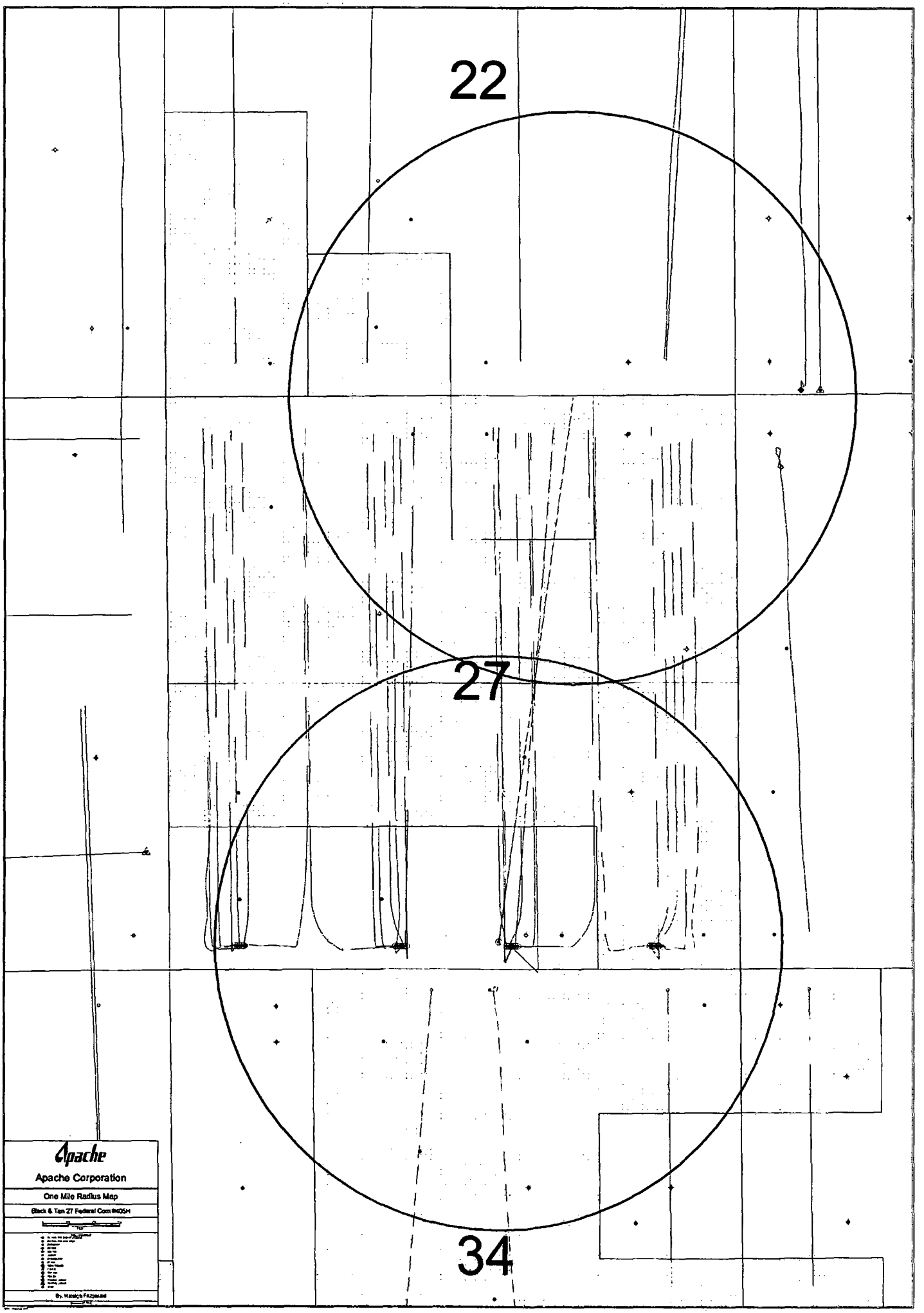
NO.	REVISION	DATE
1	NAME CHANGE	1/20/17

JOB NO.: LS1702121
DWG. NO.: 1702121RD1

RRC

308 W. BROADWAY ST., HOBBS, NM 88240 (575) 964-8200

SCALE: 1" = 1000'
DATE: 2-21-2017
SURVEYED BY: JM/HD
DRAWN BY: LPS
APPROVED BY: RMH
SHEET: 1 OF 1

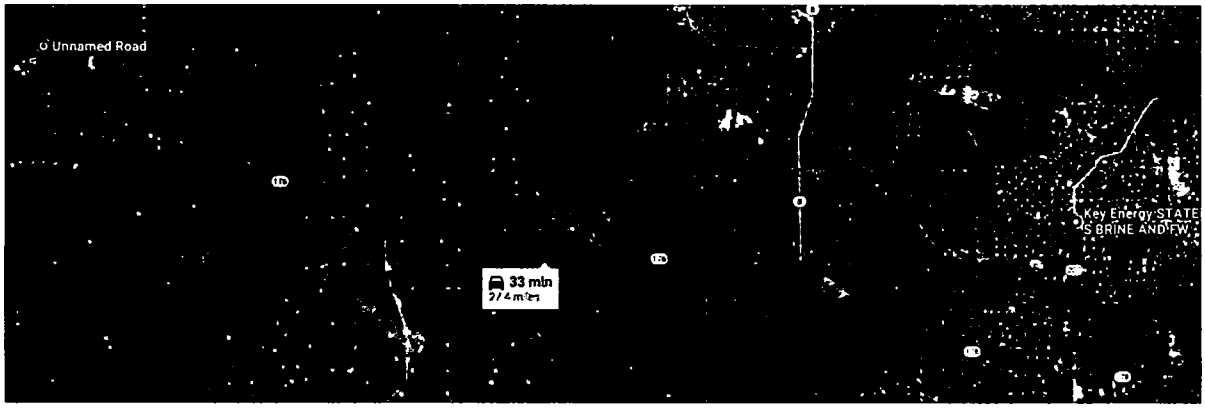

22
27
34
Apache
Apache Corporation
One Mile Radius Map
Black & Tan 27 Federal Com #405H

Black and Tan 27 Federal COM Brine Water Sources

Source:

32.484070, -103.158475

Key Energy State S Brine & FW Station



Key Energy STATE S BRINE AND FW

[illegible]

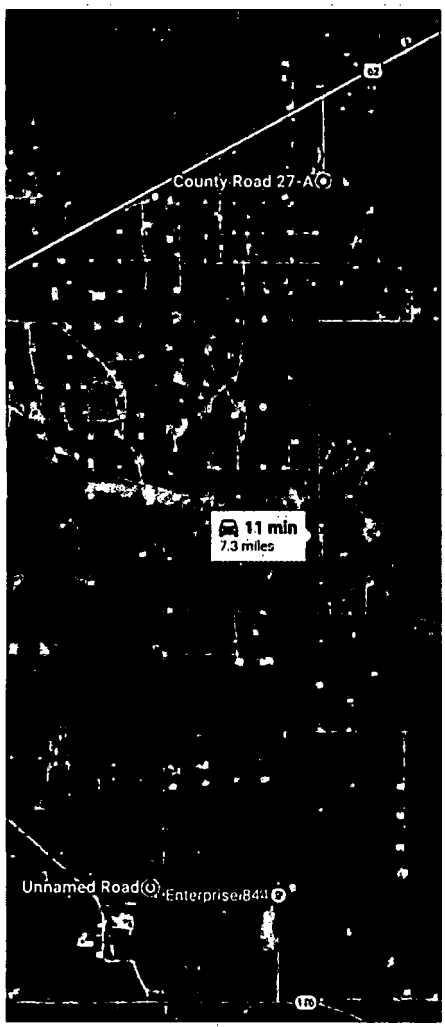
- Head south on NM-207 S toward Hill Rd
  [illegible]
- Turn right onto NM-176 W/Ave O
  Continue to follow NM-176 W
  [illegible]
- Turn left to stay on NM-176 W
  [illegible]
- Turn right
  [illegible]
- Turn left
  [illegible]
- Slight left
  Destination will be on the left
  [illegible]

Destination: Black and Tan 27 Federal COM

Black and Tan 27 Federal COM Fresh Water Sources

Source:

Marathon Road Water Station 32.625672, -103.515428



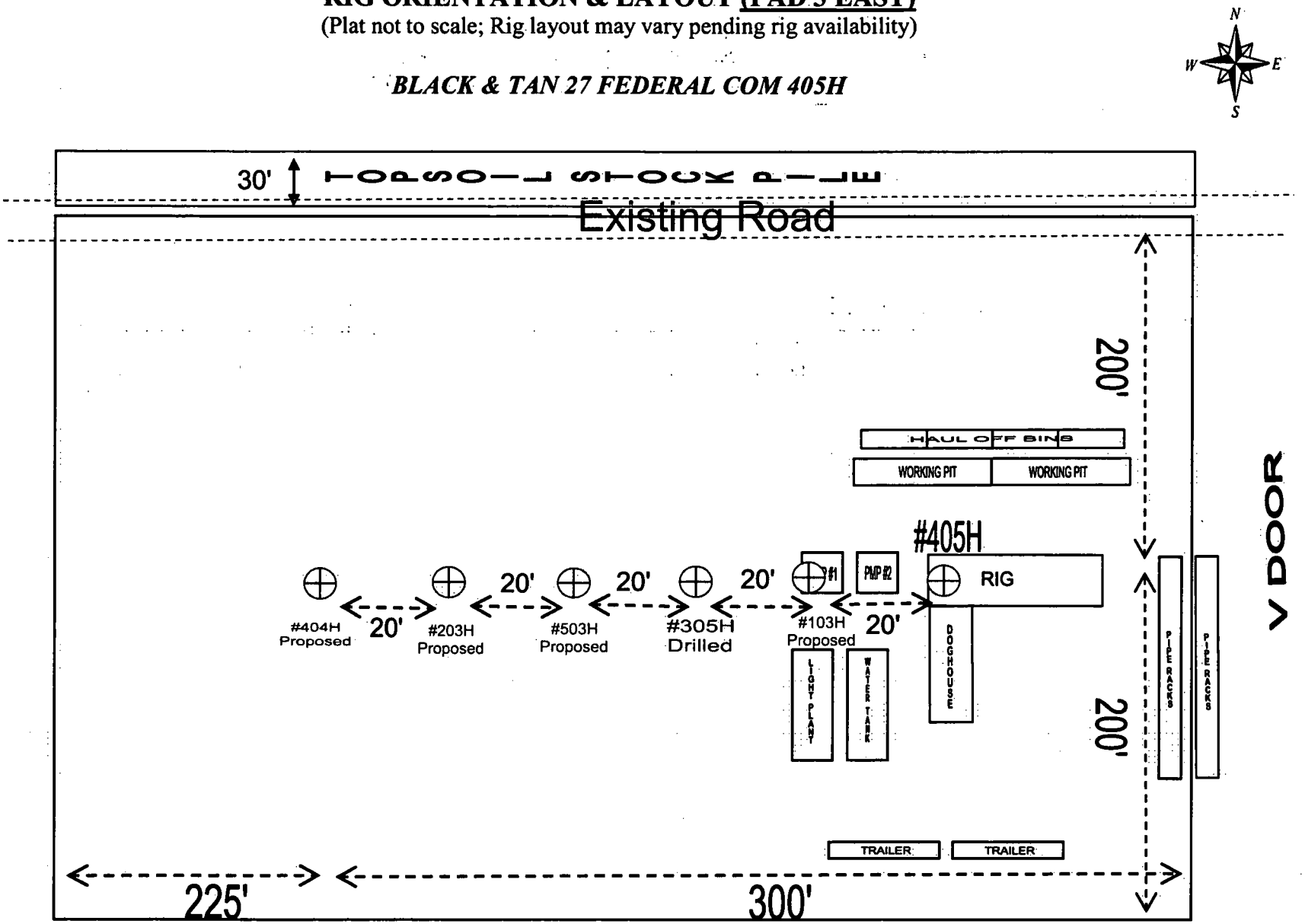
- Head south on County Rd 27-A
  6.2 mi
- Turn right
  1.1 mi
- Slight left
  Destination will be on the left
  259 ft

Destination: Black and Tan 27 Federal COM

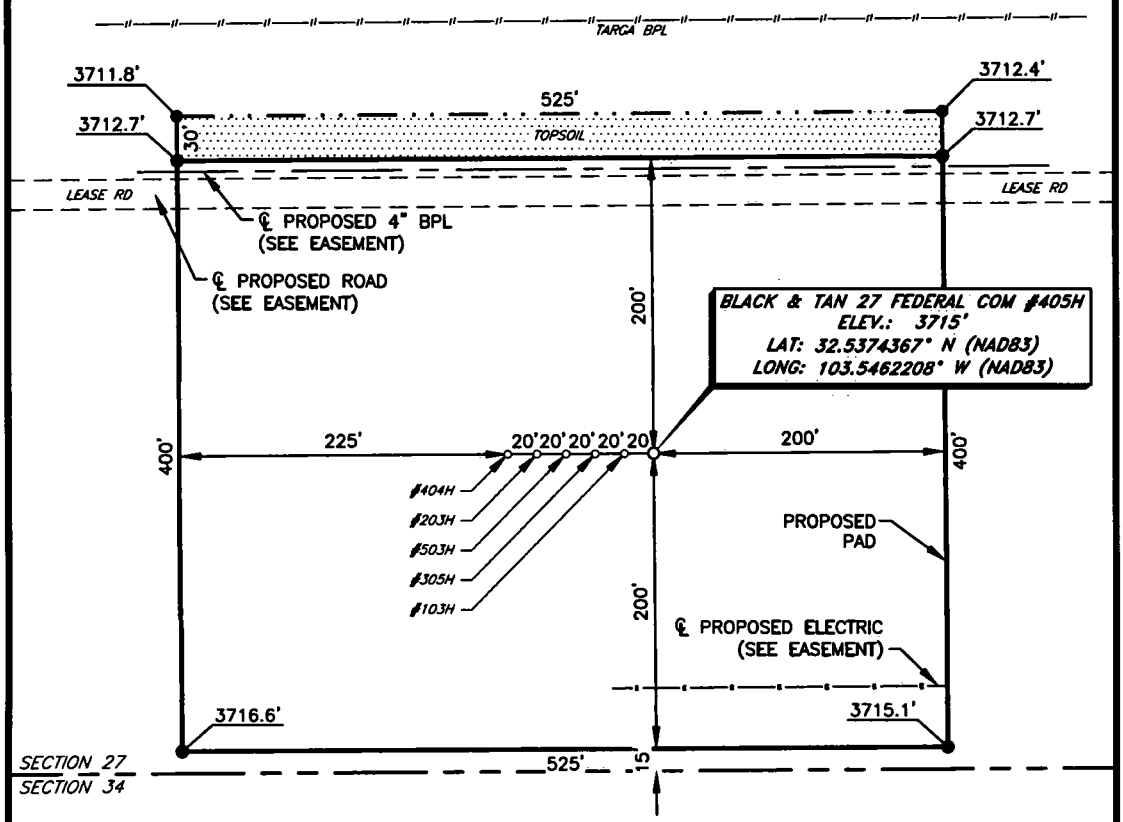
RIG ORIENTATION & LAYOUT (PAD 3 EAST)

(Plat not to scale; Rig layout may vary pending rig availability)

BLACK & TAN 27 FEDERAL COM 405H



APACHE CORPORATION
BLACK & TAN 27 FEDERAL COM #405H
(215' FSL & 2072' FEL)
SECTION 27, T20S, R34E
N. M. P. M., LEA COUNTY, NEW MEXICO



SCALE: 1" = 100'
0 50' 100'

BEARINGS ARE GRID NAD 83 NM EAST
DISTANCES ARE HORIZ. GROUND.

DIRECTIONS TO LOCATION

From the intersection of Hwy 176 and CR-27 (Skeen Rd.),
Go Northwest on CR-27 approx. 1.4 miles to a lease road on the right;
Turn right and go East approx. 0.3 miles to proposed location on the right.

THIS IS NOT A BOUNDARY SURVEY, APPARENT PROPERTY CORNERS AND PROPERTY LINES ARE SHOWN FOR INFORMATION ONLY, BOUNDARY DATA IS SHOWN FROM A PREVIOUS SURVEY REFERENCED HEREON.

I, Jeffrey L. Fansler, a N. M. Professional Surveyor, hereby certify that I prepared this plat from an actual survey made on the ground under my direct supervision, said survey and plat meet the Min. Stds. for Land Surveying in the State of N. M. and are true and correct to the best of my knowledge and belief.

Jeffrey L. Fansler NM PS 10034

JEFFREY L. FANSLER NEW MEXICO 10034 7/9/18 PROFESSIONAL SURVEYOR

NO.	REVISION	DATE

JOB NO.: LS1806829
DWG. NO.: 1806829PAD

RRC

405 308 W. BROADWAY ST., HOBBS, NM 88240 (575) 964-8200

SCALE: 1" = 100'
DATE: 07-02-2017
SURVEYED BY: AB/RU
DRAWN BY: CAR
APPROVED BY: JLF
SHEET : 1 OF 1

PRIVATE SURFACE OWNER AGREEMENT

OPERATOR: APACHE CORPORATION

WELL NAME: BLACK AND TAN 27 FEDERAL COM
SECTION: 27 TOWNSHIP: 20S RANGE: 34 COUNTY: LEA STATE: NM

LOCATION: #401H : SHL: 224' FSL & 610' FWL
#402H : SHL: 215' FSL & 2100' FWL
#403H : SHL: 215' FSL * 2200' FWL
#404H : SHL: 215' FSL & 2172' FEL
#405H : SHL: 215' FSL & 2072' FEL
#406H : SHL: 215' FSL & 762' FEL

LEASE NUMBER: SHL: NMLC-60393 BHL: NMLC-029519B

STATEMENT OF SURFACE USE

The surface to the subject land is owned by T over V Ranch
c/o DANNY BERRY
PO BOX 160
EUNICE, NM 88231 575-369-5266

The surface owner has been contacted regarding the drilling of the subject well, and an agreement for surface use has been negotiated.

CERTIFICATION: I hereby certify that the statements made in this statement are to the best of my knowledge, true and correct.

NAME: DEAN JARRETT

SIGNATURE: Dean Jarrett

DATE: 11-26-18

TITLE: STAFF SURFACE LANDMAN

To expedite your Application to Drill please fax the completed form to the
Bureau of Land Management (575) 234-5927 or (575) 885-9264
Attn: Legal Instruments Examiner
620 E. Green Street
Carlsbad, NM 88220

The original document with signature should be mailed as soon as possible.

Section 1 - General

Would you like to address long-term produced water disposal? NO

Section 2 - Lined Pits

Would you like to utilize Lined Pit PWD options? NO

Produced Water Disposal (PWD) Location:

PWD surface owner:

PWD disturbance (acres):

Lined pit PWD on or off channel:

Lined pit PWD discharge volume (bbl/day):

Lined pit specifications:

Pit liner description:

Pit liner manufacturers information:

Precipitated solids disposal:

Decribe precipitated solids disposal:

Precipitated solids disposal permit:

Lined pit precipitated solids disposal schedule:

Lined pit precipitated solids disposal schedule attachment:

Lined pit reclamation description:

Lined pit reclamation attachment:

Leak detection system description:

Leak detection system attachment:

Lined pit Monitor description:

Lined pit Monitor attachment:

Lined pit: do you have a reclamation bond for the pit?

Is the reclamation bond a rider under the BLM bond?

Lined pit bond number:

Lined pit bond amount:

Additional bond information attachment:

Section 3 - Unlined Pits

Would you like to utilize Unlined Pit PWD options? NO

Produced Water Disposal (PWD) Location:

PWD surface owner: **PWD disturbance (acres):**

Unlined pit PWD on or off channel:

Unlined pit PWD discharge volume (bbl/day):

Unlined pit specifications:

Precipitated solids disposal:

Decribe precipitated solids disposal:

Precipitated solids disposal permit:

Unlined pit precipitated solids disposal schedule:

Unlined pit precipitated solids disposal schedule attachment:

Unlined pit reclamation description:

Unlined pit reclamation attachment:

Unlined pit Monitor description:

Unlined pit Monitor attachment:

Do you propose to put the produced water to beneficial use?

Beneficial use user confirmation:

Estimated depth of the shallowest aquifer (feet):

Does the produced water have an annual average Total Dissolved Solids (TDS) concentration equal to or less than that of the existing water to be protected?

TDS lab results:

Geologic and hydrologic evidence:

State authorization:

Unlined Produced Water Pit Estimated percolation:

Unlined pit: do you have a reclamation bond for the pit?

Is the reclamation bond a rider under the BLM bond?

Unlined pit bond number:

Unlined pit bond amount:

Additional bond information attachment:

Section 4 - Injection

Would you like to utilize Injection PWD options? NO

Produced Water Disposal (PWD) Location:

PWD surface owner: **PWD disturbance (acres):**

Injection PWD discharge volume (bbl/day):

Injection well mineral owner:

Injection well type:

Injection well number: **Injection well name:**

Assigned injection well API number? **Injection well API number:**

Injection well new surface disturbance (acres):

Minerals protection information:

Mineral protection attachment:

Underground Injection Control (UIC) Permit?

UIC Permit attachment:

Section 5 - Surface Discharge

Would you like to utilize Surface Discharge PWD options? NO

Produced Water Disposal (PWD) Location:

PWD surface owner: **PWD disturbance (acres):**

Surface discharge PWD discharge volume (bbl/day):

Surface Discharge NPDES Permit?

Surface Discharge NPDES Permit attachment:

Surface Discharge site facilities information:

Surface discharge site facilities map:

Section 6 - Other

Would you like to utilize Other PWD options? NO

Produced Water Disposal (PWD) Location:

PWD surface owner: **PWD disturbance (acres):**

Other PWD discharge volume (bbl/day):

Other PWD type description:

Other PWD type attachment:

Have other regulatory requirements been met?

Other regulatory requirements attachment:

AFMSS

U.S. Department of the Interior
BUREAU OF LAND MANAGEMENT

Bond Info Data Report

05/28/2019

Bond Information

Federal/Indian APD: FED

BLM Bond number: NMB000736

BIA Bond number:

Do you have a reclamation bond? NO

Is the reclamation bond a rider under the BLM bond?

Is the reclamation bond BLM or Forest Service?

BLM reclamation bond number:

Forest Service reclamation bond number:

Forest Service reclamation bond attachment:

Reclamation bond number:

Reclamation bond amount:

Reclamation bond rider amount:

Additional reclamation bond information attachment: