PECOS DISTRICT
CONDITIONS OF APPROVAL

OPERATOR'S NAME:	**Apache Corporation**
LEASE NO.:	**NMNM-0381970**
WELL NAME & NO.:	**Onion Knight Federal 201H**
SURFACE HOLE FOOTAGE:	**0150' FSL & 1025' FWL**
BOTTOM HOLE FOOTAGE	**0280' FNL & 1025' FWL**
LOCATION:	**Section 04, T. 22 S., R 34 E., NMPM**
COUNTY:	**County, New Mexico**

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.

Operator to submit sundry to add "COM" to the well name.

DRILLING

A. DRILLING OPERATIONS REQUIREMENTS

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

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

☐ **Lea County**

Call the Hobbs Field Station, 414 West Taylor, Hobbs NM 88240, (575) 3933612

1. **Hydrogen Sulfide has been reported as a hazard in formations deeper than the proposed depth. Hydrogen Sulfide (H2S) monitors shall be installed prior to drilling out the surface shoe. If H2S is detected in concentrations greater than 100 ppm, the Hydrogen Sulfide area shall meet Onshore Order 6 requirements, which includes equipment and personnel/public protection items. If Hydrogen Sulfide is encountered, provide measured values and formations to the BLM.**

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

3. 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 is located, this does not include the dog house or stairway area.

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

B. **CASING**

Changes to the approved APD casing program need prior approval if the items substituted are of lesser grade or different casing size or are Non-API. The

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

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

Wait on cement (WOC) 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.

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.

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

Capitan Reef
Possible water flows in the Artesia Group, Salado, and Capitan Reef.
Possible lost circulation in the Red Beds, Rustler, Capitan Reef, and Delaware.

1. The **13-3/8** inch surface casing shall be set at approximately **1825** feet (a minimum of 25 feet into the Rustler Anhydrite and above the salt) and cemented to the surface. **If salt is encountered, set casing at least 25 feet above the salt. Excess calculates to 19% - Additional cement may be required.**

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

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

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

Intermediate casing shall be kept fluid filled while running into hole to meet BLM minimum collapse requirements.

2. The minimum required fill of cement behind the **9-5/8** inch intermediate casing, which shall be set at approximately **5440** 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 Capitan Reef. Excess calculates to 10% - Additional cement may be required.**

Option #1: DV tool

DV tool shall be set a minimum of 50' below previous shoe and a minimum of 200' above current shoe. Operator shall submit sundry if DV tool depth cannot be set in this range. If an ECP is used, it is to be set a minimum of 50' below the shoe to provide cement across the shoe. If it cannot be set below the shoe, a CBL shall be run to verify cement coverage.

a. First stage to DV tool:___

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

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 Capitan Reef. Excess calculates to 12% - Additional cement may 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.**

Centralizers required on horizontal leg, must be type for horizontal service and a minimum of one every other joint.

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

   ☐ Cement should tie-back at least **50 feet above the Capitan Reef** (Top of Capitan Reef estimated at 4220'). Operator shall provide method of verification. **Excess calculates to 9% - Additional cement may be required.**

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

C. PRESSURE CONTROL

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

2. Variance approved to use flex line from BOP to choke manifold. 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.** If the BLM inspector questions the straightness of the hose, a BLM engineer will be contacted and will review in the field or via picture supplied by inspector to determine if changes are required (operator shall expect delays if this occurs).

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

    a. **For surface casing only:** If the BOP/BOPE is to be tested against casing, the wait on cement (WOC) time for that casing is to be met (see WOC statement at start of casing section). Independent service company required.

4. The appropriate BLM office shall be notified a minimum of 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).

    a. 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).

    b. 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.

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

d. 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.**

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

D. DRILL STEM TEST

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

E. WASTE MATERIAL AND FLUIDS

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

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

JAM 102417

PECOS DISTRICT
SURFACE USE
CONDITIONS OF APPROVAL

OPERATOR'S NAME:	Apache Corp
LEASE NO.:	NM0381970
WELL NAME & NO.:	Onion Knight Federal – 201H
SURFACE HOLE FOOTAGE:	150'/S & 1025'/W
BOTTOM HOLE FOOTAGE	280'/N & 1025'/W
LOCATION:	Section 4, T. 22 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.

This authorization is subject to your Certificate of Participation and/or Certificate of Inclusion under the New Mexico Candidate Conservation Agreement. Because it involves surface disturbing activities covered under your Certificate, your Habitat Conservation Fund Account with the Center of Excellence for Hazardous Materials Management (CEHMM) will be debited according to Exhibit B Part 2 of the Certificate of Participation.

Buried Pipeline Stipulations

Escape Ramps - The operator will construct and maintain pipeline/utility trenches that are not otherwise fenced, screened, or netted to prevent livestock, wildlife, and humans from becoming entrapped. At a minimum, the operator will construct and maintain escape ramps, ladders, or other methods of avian and terrestrial wildlife escape in the trenches according to the following criteria:

a. Any trench left open for eight (8) hours or less is not required to have escape ramps; however, before the trench is backfilled, the contractor/operator shall inspect the trench for wildlife, remove all trapped wildlife, and release them at least 100 yards from the trench.
b. For trenches left open for eight (8) hours or more, earthen escape ramps (built at no more than a 30 degree slope and spaced no more than 500 feet apart) shall be placed in the trench.

Watershed/Water Quality:

For all proposed actions; the entire perimeter of the well pad and CTB sites 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 high with impermeable mineral material (e.g. caliche).
- No water flow from the uphill side(s) of the pad shall be allowed to enter the well pad.
- The topsoil stockpile shall be located outside the bermed well pad.
- Topsoil, either from the well pad or surrounding area, shall not be used to construct the berm.
- No storm drains, tubing or openings shall be placed in the berm.
- 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.
- 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 access road entering the well pad shall be constructed so that the integrity of the berm height surrounding the well pad is not compromised. (Any access road crossing the berm cannot be lower than the berm height.)

Leak Detection:

- 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 values 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. Regular monitoring is required to quickly identify leaks for their immediate and proper treatment.

Tank Battery:

- 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.
- 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.

VI. CONSTRUCTION

A. NOTIFICATION

The BLM shall administer compliance and monitor construction of the access road and well pad. Notify the 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 .

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.

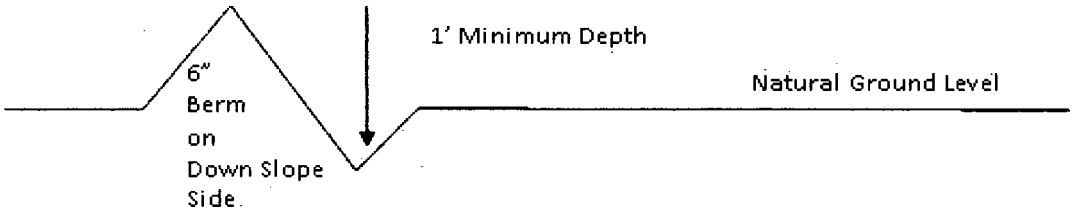
Ditching
Ditching shall be required on both sides of the road.

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, leadoff 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.



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 %);

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

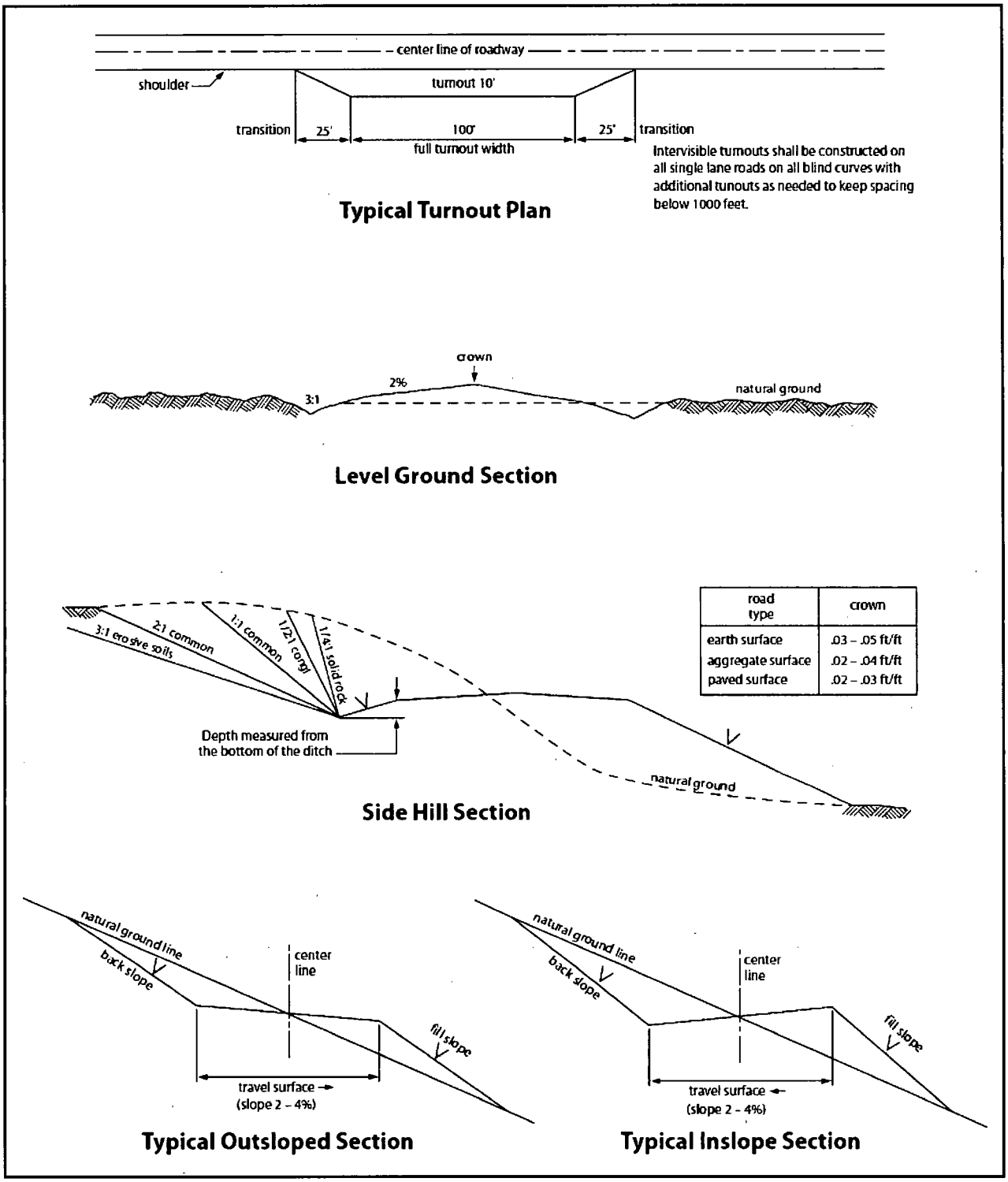


Figure 1. Cross-sections and plans for typical road sections representative of BLM resource or FS local and higher-class roads.

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).

B. PIPELINES

BURIED PIPELINE STIPULATIONS

A copy of the application (Grant, APD, or Sundry Notice) and attachments, including conditions of approval, survey plat and/or map, will be on location during construction. BLM personnel may request to you a copy of your permit during construction to ensure compliance with all stipulations.

Holder agrees to comply with the following stipulations to the satisfaction of the Authorized Officer:

1. The Holder shall indemnify the United States against any liability for damage to life or property arising from the occupancy or use of public lands under this grant.

2. The Holder shall comply with all applicable Federal laws and regulations existing or hereafter enacted or promulgated. In any event, the holder shall comply with the Toxic Substances Control Act of 1976 as amended, 15 USC 2601 et seq. (1982) with regards to any toxic substances that are used, generated by or stored on the right-of-way or on facilities authorized under this right-of-way grant. (See 40 CFR Part 702-799 and especially, provisions on polychlorinated biphenyls, 40 CFR 761.1-761.193.) Additionally, any release of toxic substances (leaks, spills, etc.) in excess of the reportable quantity established by 40 CFR Part 117 shall be reported as required by the Comprehensive Environmental Response, Compensation, and Liability Act, section 102b. A copy of any report required or requested by any Federal agency or State government as a result of a reportable release or spill of any toxic substances shall be furnished to the authorized officer concurrent with the filing of the reports to the involved Federal agency or State government.

3. The holder agrees to indemnify the United States against any liability arising from the release of any hazardous substance or hazardous waste (as these terms are defined in the Comprehensive Environmental Response, Compensation and Liability Act of 1980, 42 U.S.C. 9601, et seq. or the Resource Conservation and Recovery Act, 42 U.S.C.6901, et seq.) on the Right-of-Way (unless the release or threatened release is wholly unrelated to the Right-of-Way holder's activity on the Right-of-Way), or resulting from the activity of the Right-of-Way holder on the Right-of-Way. This agreement applies without regard to whether a release is caused by the holder, its agent, or unrelated third parties.

4. If, during any phase of the construction, operation, maintenance, or termination of the pipeline, any oil or other pollutant should be discharged from the pipeline system, impacting

Federal lands, the control and total removal, disposal, and cleaning up of such oil or other pollutant, wherever found, shall be the responsibility of holder, regardless of fault. Upon failure of holder to control, dispose of, or clean up such discharge on or affecting Federal lands, or to repair all damages resulting therefrom, on the Federal lands, the Authorized Officer may take such measures as he deems necessary to control and clean up the discharge and restore the area, including where appropriate, the aquatic environment and fish and wildlife habitats, at the full expense of the holder. Such action by the Authorized Officer shall not relieve holder of any responsibility as provided herein.

5. All construction and maintenance activity will be confined to the authorized right-of-way.

6. The pipeline will be buried with a minimum cover of 36 inches between the top of the pipe and ground level.

7. The maximum allowable disturbance for construction in this right-of-way will be **30** feet:

- Blading of vegetation within the right-of-way will be allowed: maximum width of blading operations will not exceed **20** feet. The trench is included in this area. (*Blading is defined as the complete removal of brush and ground vegetation.*)

- Clearing of brush species within the right-of-way will be allowed: maximum width of clearing operations will not exceed **30** feet. The trench and bladed area are included in this area. (*Clearing is defined as the removal of brush while leaving ground vegetation (grasses, weeds, etc.) intact. Clearing is best accomplished by holding the blade 4 to 6 inches above the ground surface.*)

- The remaining area of the right-of-way (if any) shall only be disturbed by compressing the vegetation. (*Compressing can be caused by vehicle tires, placement of equipment, etc.*)

8. The holder shall stockpile an adequate amount of topsoil where blading is allowed. The topsoil to be stripped is approximately 6 inches in depth. The topsoil will be segregated from other spoil piles from trench construction. The topsoil will be evenly distributed over the bladed area for the preparation of seeding.

9. The holder shall minimize disturbance to existing fences and other improvements on public lands. The holder is required to promptly repair improvements to at least their former state. Functional use of these improvements will be maintained at all times. The holder will contact the owner of any improvements prior to disturbing them. When necessary to pass through a fence line, the fence shall be braced on both sides of the passageway prior to cutting of the fence. No permanent gates will be allowed unless approved by the Authorized Officer.

10. Vegetation, soil, and rocks left as a result of construction or maintenance activity will be randomly scattered on this right-of-way and will not be left in rows, piles, or berms, unless otherwise approved by the Authorized Officer. The entire right-of-way shall be recontoured to match the surrounding landscape. The backfilled soil shall be compacted and a 6 inch berm will be left over the ditch line to allow for settling back to grade.

11. In those areas where erosion control structures are required to stabilize soil conditions, the holder will install such structures as are suitable for the specific soil conditions being encountered and which are in accordance with sound resource management practices.

12. The holder will reseed all disturbed areas. Seeding will be done according to the attached seeding requirements, using the following seed mix.

( ) seed mixture 1	( ) seed mixture 3
(X) seed mixture 2	( ) seed mixture 4
( ) seed mixture 2/LPC	( ) Aplomado Falcon Mixture

13. All above-ground structures not subject to safety requirements shall be painted by the holder to blend with the natural color of the landscape. The paint used shall be color which simulates "Standard Environmental Colors" – **Shale Green**, Munsell Soil Color No. 5Y 4/2.

14. The pipeline will be identified by signs at the point of origin and completion of the right-of-way and at all road crossings. At a minimum, signs will state the holder's name, BLM serial number, and the product being transported. All signs and information thereon will be posted in a permanent, conspicuous manner, and will be maintained in a legible condition for the life of the pipeline.

15. The holder shall not use the pipeline route as a road for purposes other than routine maintenance as determined necessary by the Authorized Officer in consultation with the holder before maintenance begins. The holder will take whatever steps are necessary to ensure that the pipeline route is not used as a roadway. As determined necessary during the life of the pipeline, the Authorized Officer may ask the holder to construct temporary deterrence structures.

16. Any cultural and/or paleontological resources (historic or prehistoric site or object) discovered by the holder, or any person working on his behalf, on public or Federal land shall be immediately reported to the Authorized Officer. Holder 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 will be made by the Authorized Officer to determine appropriate actions to prevent the loss of significant cultural or scientific values. The holder will be responsible for the cost of evaluation and any decision as to proper mitigation measures will be made by the Authorized Officer after consulting with the holder.

17. 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 associated roads, 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.

18. Escape Ramps - The operator will construct and maintain pipeline/utility trenches [that are not otherwise fenced, screened, or netted] to prevent livestock, wildlife, and humans from becoming entrapped. At a minimum, the operator will construct and maintain escape ramps,

ladders, or other methods of avian and terrestrial wildlife escape in the trenches according to the following criteria:

c. Any trench left open for eight (8) hours or less is not required to have escape ramps; however, before the trench is backfilled, the contractor/operator shall inspect the trench for wildlife, remove all trapped wildlife, and release them at least 100 yards from the trench.
d. For trenches left open for eight (8) hours or more, earthen escape ramps (built at no more than a 30 degree slope and spaced no more than 500 feet apart) shall be placed in the trench.

19. Special Stipulations:

Lesser Prairie-Chicken

Oil and gas activities 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, geophysical exploration other than 3-D operations, and 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. 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 ft. from the source of the noise.

C. ELECTRIC LINES

STANDARD STIPULATIONS FOR OVERHEAD ELECTRIC DISTRIBUTION LINES

A copy of the grant and attachments, including stipulations, survey plat and/or map, will be on location during construction. BLM personnel may request to you a copy of your permit during construction to ensure compliance with all stipulations.

Holder agrees to comply with the following stipulations to the satisfaction of the Authorized Officer:

1. The holder shall indemnify the United States against any liability for damage to life or property arising from the occupancy or use of public lands under this grant.

2. The holder shall comply with all applicable Federal laws and regulations existing or hereafter enacted or promulgated. In any event, the holder shall comply with the Toxic Substances Control Act of 1976 as amended, 15 USC 2601 et seq. (1982) with regards to any toxic substances that are used, generated by or stored on the right-of-way or on facilities authorized under this right-of-way grant. (See 40 CFR, Part 702-799 and

especially, provisions on polychlorinated biphenyls, 40 CFR 761.1-761.193.) Additionally, any release of toxic substances (leaks, spills, etc.) in excess of the reportable quantity established by 40 CFR, Part 117 shall be reported as required by the Comprehensive Environmental Response, Compensation, and Liability Act, section 102b. A copy of any report required or requested by any Federal agency or State government as a result of a reportable release or spill of any toxic substances shall be furnished to the authorized officer concurrent with the filing of the reports to the involved Federal agency or State government.

3. The holder agrees to indemnify the United States against any liability arising from the release of any hazardous substance or hazardous waste (as these terms are defined in the Comprehensive Environmental Response, Compensation and Liability Act of 1980, 42 U.S.C. 9601, et seq. or the Resource Conservation and Recovery Act, 42 U.S.C. 6901, et seq.) on the Right-of-Way (unless the release or threatened release is wholly unrelated to the Right-of-Way holder's activity on the Right-of-Way), or resulting from the activity of the Right-of-Way holder on the Right-of-Way. This agreement applies without regard to whether a release is caused by the holder, its agent, or unrelated third parties.

4. There will be no clearing or blading of the right-of-way unless otherwise agreed to in writing by the Authorized Officer.

5. Power lines shall be constructed and designed in accordance to standards outlined in "Suggested Practices for Avian Protection on Power lines: The State of the Art in 2006" Edison Electric Institute, APLIC, and the California Energy Commission 2006 . The holder shall assume the burden and expense of proving that pole designs not shown in the above publication deter raptor perching, roosting, and nesting. Such proof shall be provided by a raptor expert approved by the Authorized Officer. The BLM reserves the right to require modification or additions to all powerline structures placed on this right-of-way, should they be necessary to ensure the safety of large perching birds. Such modifications and/or additions shall be made by the holder without liability or expense to the United States.

Raptor deterrence will consist of but not limited to the following: triangle perch discouragers shall be placed on each side of the cross arms and a nonconductive perching deterrence shall be placed on all vertical poles that extend past the cross arms.

6. The holder shall minimize disturbance to existing fences and other improvements on public lands. The holder is required to promptly repair improvements to at least their former state. Functional use of these improvements will be maintained at all times. The holder will contact the owner of any improvements prior to disturbing them. When necessary to pass through a fence line, the fence shall be braced on both sides of the passageway prior to cutting the fence. No permanent gates will be allowed unless approved by the Authorized Officer.

7. The BLM serial number assigned to this authorization shall be posted in a permanent, conspicuous manner where the power line crosses roads and at all serviced facilities.

Numbers will be at least two inches high and will be affixed to the pole nearest the road crossing and at the facilities served.

8. Upon cancellation, relinquishment, or expiration of this grant, the holder shall comply with those abandonment procedures as prescribed by the Authorized Officer.

9. All surface structures (poles, lines, transformers, etc.) shall be removed within 180 days of abandonment, relinquishment, or termination of use of the serviced facility or facilities or within 180 days of abandonment, relinquishment, cancellation, or expiration of this grant, whichever comes first. This will not apply where the power line extends service to an active, adjoining facility or facilities.

10. Any cultural and/or paleontological resource (historic or prehistoric site or object) discovered by the holder, or any person working on his behalf, on public or Federal land shall be immediately reported to the Authorized Officer. Holder 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 will be made by the Authorized Officer to determine appropriate actions to prevent the loss of significant cultural or scientific values. The holder will be responsible for the cost of evaluation and any decision as to proper mitigation measures will be made by the Authorized Officer after consulting with the holder.

11. Special Stipulations:
- For reclamation remove poles, lines, transformer, etc. and dispose of properly.
- Fill in any holes from the poles removed.

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, geophysical exploration other than 3-D operations, and 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 ft. from the source of the noise.

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

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 = I	10 ppm	100 ppm/hr	600 ppm
Sulfur Dioxide	SO_2	2.21 Air = I	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

5D Plan Report

[redacted]

Apache Corporation

Field Name: *Apache Lea Co, NM (Nad 83 NME)*
Site Name: *Onion Knight Federal 201H*
Well Name: *Onion Knight Federal 201H*
Plan: *P1:V1*

[redacted]

24 April 2017

5D Plan Report

Onion Knight Federal 201H

Field Name: Apache Lea Co, NM (Nad 83 NME)	**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: Onion Knight Federal 201H	**Units:** US ft	**North Reference:** Grid	**Convergence Angle:** 0.46
	Position:	**Northing:** 515353.70 US ft	**Latitude:** 32° 24' 49.99"
		Easting: 804617.30 US ft	**Longitude:** -103° 28' 48.61"
	Elevation above MSL: 3609.00 US ft		
	Comment:		

Slot: Onion Knight Federal 201H	**Position (Relative to Site Centre)**		
	+N/-S: 0.00 US ft	**Northing:** 515353.70 US ft	**Latitude:** 32°24'49.99"
	+E/-W: 0.00 US ft	**Easting:** 804617.30 US ft	**Longitude:** -103°28'48.61"
	Elevation above MSL: 3609.00 US ft		
	Comment:		

Well: Onion Knight Federal 201H	**Type:** Main well	**UWI:**	**Plan:** P1:V1	
	File Number:	**Comment:**		
	Closure Distance: 4887.63US ft	**Closure Azimuth:** 359.81°		
	Vertical Section: Position of Origin (Relative to Slot centre)			
	+N/-S: 0.00 US ft	**+E/-W:** 0.00 US ft	**Az:** 359.81°	
	Magnetic Parameters:			
	Model: bggm2016	**Field Strength:** 48154.9nT	**Declination:** 6.95°	**Dip:** 60.27° **Date:** 01/Aug/2017

Drill floor: Plan: P1:V1

Rig Height (Drill Floor):	**Elevation above MSL:**	**Inclination:**	**Azimuth:**
26.00US ft	3635.00US ft	0.00°	0.00°

Target set: Onion Knight Federal 201H Comment:

Target Name:	Shape:	TVD (US ft)	N.Offset (US ft)	E.Offset (US ft)	Northing (USFt)	Easting (USFt)	Comment
PBHL 201H	Cuboid	10490.00	4887.60	-16.60	520241.30	804600.70	

Wellpath created using minimum curvature.

5D Plan Report

Tie Point:

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

Salient Points: (Relative to Slot centre)(TVD relative to Drill Floor)

MD (US ft)	Inc (°)	Az (°)	TVD (US ft)	N.Offset (US ft)	E.Offset (US ft)	VS (US ft)	DLS (°/100US ft)	B.Rate (°/100US ft)	T.Rate (°/100US ft)	T.Face (°)	Comment
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
10012.54	0.00	0.00	10012.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	KOP
10441.50	51.48	359.81	10386.08	180.07	-0.61	180.07	12.00	12.00	0.00	359.81	HL Cross Heel
10762.54	90.00	359.81	10490.00	477.46	-1.62	477.47	12.00	12.00	-0.00	0.00	LP
15122.50	90.00	359.81	10490.00	4837.40	-16.43	4837.42	0.00	0.00	0.00	0.00	HL Cross Toe
15172.70	90.00	359.81	10490.00	4887.60	-16.60	4887.63	0.00	0.00	0.00	0.00	PBHL 201H

Interpolated Points: (Relative to Slot centre)(TVD relative to Drill Floor)

MD (US ft)	Inc (°)	Az (°)	TVD (US ft)	N.Offset (US ft)	E.Offset (US ft)	VS (US ft)	DLS (°/100US ft)	Northing (US ft)	Easting (US ft)	B.Rate (°/100US ft)	T.Rate (°/100US ft)	T.Face (°)	Comment
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
900.00	0.00	0.00	900.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
1000.00	0.00	0.00	1000.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
1100.00	0.00	0.00	1100.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
1200.00	0.00	0.00	1200.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
1300.00	0.00	0.00	1300.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
1400.00	0.00	0.00	1400.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
1500.00	0.00	0.00	1500.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
1600.00	0.00	0.00	1600.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
1700.00	0.00	0.00	1700.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
1800.00	0.00	0.00	1800.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
1900.00	0.00	0.00	1900.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
2000.00	0.00	0.00	2000.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
2100.00	0.00	0.00	2100.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
2200.00	0.00	0.00	2200.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
2300.00	0.00	0.00	2300.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
2400.00	0.00	0.00	2400.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
2500.00	0.00	0.00	2500.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	

5D Plan Report

Interpolated Points: (Relative to Slot centre)(TVD relative to Drill Floor)													
MD (US ft)	Inc (°)	Az (°)	TVD (US ft)	N.Offset (US ft)	E.Offset (US ft)	VS (US ft)	DLS (°/100US ft)	Northing (US ft)	Easting (US ft)	B.Rate (°/100US ft)	T.Rate (°/100US ft)	T.Face (°)	Comment
2600.00	0.00	0.00	2600.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
2700.00	0.00	0.00	2700.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
2800.00	0.00	0.00	2800.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
2900.00	0.00	0.00	2900.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
3000.00	0.00	0.00	3000.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
3100.00	0.00	0.00	3100.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
3200.00	0.00	0.00	3200.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
3300.00	0.00	0.00	3300.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
3400.00	0.00	0.00	3400.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
3500.00	0.00	0.00	3500.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
3600.00	0.00	0.00	3600.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
3700.00	0.00	0.00	3700.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
3800.00	0.00	0.00	3800.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
3900.00	0.00	0.00	3900.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
4000.00	0.00	0.00	4000.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
4100.00	0.00	0.00	4100.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
4200.00	0.00	0.00	4200.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
4300.00	0.00	0.00	4300.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
4400.00	0.00	0.00	4400.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
4500.00	0.00	0.00	4500.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
4600.00	0.00	0.00	4600.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
4700.00	0.00	0.00	4700.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
4800.00	0.00	0.00	4800.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
4900.00	0.00	0.00	4900.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
5000.00	0.00	0.00	5000.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
5100.00	0.00	0.00	5100.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
5200.00	0.00	0.00	5200.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
5300.00	0.00	0.00	5300.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
5400.00	0.00	0.00	5400.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
5500.00	0.00	0.00	5500.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
5600.00	0.00	0.00	5600.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
5700.00	0.00	0.00	5700.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
5800.00	0.00	0.00	5800.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
5900.00	0.00	0.00	5900.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
6000.00	0.00	0.00	6000.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	

5D Plan Report

Interpolated Points: (Relative to Slot centre)(TVD relative to Drill Floor)													
MD (US ft)	Inc (°)	Az (°)	TVD (US ft)	N.Offset (US ft)	E.Offset (US ft)	VS (US ft)	DLS (°/100US ft)	Northing (US ft)	Easting (US ft)	B.Rate (°/100US ft)	T.Rate (°/100US ft)	T.Face (°)	Comment
6100.00	0.00	0.00	6100.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
6200.00	0.00	0.00	6200.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
6300.00	0.00	0.00	6300.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
6400.00	0.00	0.00	6400.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
6500.00	0.00	0.00	6500.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
6600.00	0.00	0.00	6600.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
6700.00	0.00	0.00	6700.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
6800.00	0.00	0.00	6800.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
6900.00	0.00	0.00	6900.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
7000.00	0.00	0.00	7000.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
7100.00	0.00	0.00	7100.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
7200.00	0.00	0.00	7200.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
7300.00	0.00	0.00	7300.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
7400.00	0.00	0.00	7400.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
7500.00	0.00	0.00	7500.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
7600.00	0.00	0.00	7600.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
7700.00	0.00	0.00	7700.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
7800.00	0.00	0.00	7800.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
7900.00	0.00	0.00	7900.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
8000.00	0.00	0.00	8000.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
8100.00	0.00	0.00	8100.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
8200.00	0.00	0.00	8200.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
8300.00	0.00	0.00	8300.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
8400.00	0.00	0.00	8400.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
8500.00	0.00	0.00	8500.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
8600.00	0.00	0.00	8600.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
8700.00	0.00	0.00	8700.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
8800.00	0.00	0.00	8800.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
8900.00	0.00	0.00	8900.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
9000.00	0.00	0.00	9000.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
9100.00	0.00	0.00	9100.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
9200.00	0.00	0.00	9200.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
9300.00	0.00	0.00	9300.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
9400.00	0.00	0.00	9400.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
9500.00	0.00	0.00	9500.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	

5D Plan Report

Interpolated Points: (Relative to Slot centre)(TVD relative to Drill Floor)													
MD (US ft)	Inc (°)	Az (°)	TVD (US ft)	N.Offset (US ft)	E.Offset (US ft)	VS (US ft)	DLS (°/100US ft)	Northing (US ft)	Easting (US ft)	B.Rate (°/100US ft)	T.Rate (°/100US ft)	T.Face (°)	Comment
9600.00	0.00	0.00	9600.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
9700.00	0.00	0.00	9700.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
9800.00	0.00	0.00	9800.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
9900.00	0.00	0.00	9900.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
10000.00	0.00	0.00	10000.00	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	
10012.54	0.00	0.00	10012.54	0.00	0.00	0.00	0.00	515353.70	804617.30	0.00	0.00	0.00	KOP
10100.00	10.50	359.81	10099.51	7.99	-0.03	7.99	12.00	515361.69	804617.27	12.00	0.00	359.81	
10200.00	22.50	359.81	10195.22	36.33	-0.12	36.33	12.00	515390.03	804617.18	12.00	0.00	0.00	
10300.00	34.50	359.81	10282.95	83.95	-0.29	83.95	12.00	515437.65	804617.01	12.00	0.00	0.00	
10400.00	46.50	359.81	10358.85	148.77	-0.51	148.77	12.00	515502.47	804616.79	12.00	-0.00	0.00	
10441.50	51.48	359.81	10386.08	180.07	-0.61	180.07	12.00	515533.77	804616.69	12.00	-0.00	0.00	HL Cross Heel
10500.00	58.50	359.81	10419.62	227.95	-0.77	227.96	12.00	515581.65	804616.53	12.00	0.00	0.00	
10600.00	70.50	359.81	10462.60	318.04	-1.08	318.05	12.00	515671.74	804616.22	12.00	-0.00	0.00	
10700.00	82.50	359.81	10485.91	415.10	-1.41	415.10	12.00	515768.80	804615.89	12.00	-0.00	0.00	
10762.54	90.00	359.81	10490.00	477.46	-1.62	477.47	12.00	515831.16	804615.68	12.00	0.00	0.00	LP
10800.00	90.00	359.81	10490.00	514.92	-1.75	514.92	0.00	515868.62	804615.55	0.00	0.00	0.00	
10900.00	90.00	359.81	10490.00	614.92	-2.09	614.92	0.00	515968.62	804615.21	0.00	0.00	0.00	
11000.00	90.00	359.81	10490.00	714.92	-2.43	714.92	0.00	516068.62	804614.87	0.00	0.00	0.00	
11100.00	90.00	359.81	10490.00	814.92	-2.77	814.92	0.00	516168.62	804614.53	0.00	0.00	0.00	
11200.00	90.00	359.81	10490.00	914.92	-3.11	914.92	0.00	516268.62	804614.19	0.00	0.00	0.00	
11300.00	90.00	359.81	10490.00	1014.92	-3.45	1014.92	0.00	516368.62	804613.85	0.00	0.00	0.00	
11400.00	90.00	359.81	10490.00	1114.92	-3.79	1114.92	0.00	516468.62	804613.51	0.00	0.00	0.00	
11500.00	90.00	359.81	10490.00	1214.92	-4.13	1214.92	0.00	516568.62	804613.17	0.00	0.00	0.00	
11600.00	90.00	359.81	10490.00	1314.92	-4.47	1314.92	0.00	516668.62	804612.83	0.00	0.00	0.00	
11700.00	90.00	359.81	10490.00	1414.92	-4.81	1414.92	0.00	516768.62	804612.49	0.00	0.00	0.00	
11800.00	90.00	359.81	10490.00	1514.92	-5.15	1514.92	0.00	516868.62	804612.15	0.00	0.00	0.00	
11900.00	90.00	359.81	10490.00	1614.92	-5.48	1614.92	0.00	516968.62	804611.82	0.00	0.00	0.00	
12000.00	90.00	359.81	10490.00	1714.91	-5.82	1714.92	0.00	517068.61	804611.48	0.00	0.00	0.00	
12100.00	90.00	359.81	10490.00	1814.91	-6.16	1814.92	0.00	517168.61	804611.14	0.00	0.00	0.00	
12200.00	90.00	359.81	10490.00	1914.91	-6.50	1914.92	0.00	517268.61	804610.80	0.00	0.00	0.00	
12300.00	90.00	359.81	10490.00	2014.91	-6.84	2014.92	0.00	517368.61	804610.46	0.00	0.00	0.00	
12400.00	90.00	359.81	10490.00	2114.91	-7.18	2114.92	0.00	517468.61	804610.12	0.00	0.00	0.00	
12500.00	90.00	359.81	10490.00	2214.91	-7.52	2214.92	0.00	517568.61	804609.78	0.00	0.00	0.00	
12600.00	90.00	359.81	10490.00	2314.91	-7.86	2314.92	0.00	517668.61	804609.44	0.00	0.00	0.00	
12700.00	90.00	359.81	10490.00	2414.91	-8.20	2414.92	0.00	517768.61	804609.10	0.00	0.00	0.00	

5D Plan Report

Interpolated Points: (Relative to Slot centre)(TVD relative to Drill Floor)

MD (US ft)	Inc (°)	Az (°)	TVD (US ft)	N.Offset (US ft)	E.Offset (US ft)	VS (US ft)	DLS (°/100US ft)	Northing (US ft)	Easting (US ft)	B.Rate (°/100US ft)	T.Rate (°/100US ft)	T.Face (°)	Comment
12800.00	90.00	359.81	10490.00	2514.91	-8.54	2514.92	0.00	517868.61	804608.76	0.00	0.00	0.00	
12900.00	90.00	359.81	10490.00	2614.91	-8.88	2614.92	0.00	517968.61	804608.42	0.00	0.00	0.00	
13000.00	90.00	359.81	10490.00	2714.91	-9.22	2714.92	0.00	518068.61	804608.08	0.00	0.00	0.00	
13100.00	90.00	359.81	10490.00	2814.91	-9.56	2814.92	0.00	518168.61	804607.74	0.00	0.00	0.00	
13200.00	90.00	359.81	10490.00	2914.91	-9.90	2914.92	0.00	518268.61	804607.40	0.00	0.00	0.00	
13300.00	90.00	359.81	10490.00	3014.91	-10.24	3014.92	0.00	518368.61	804607.06	0.00	0.00	0.00	
13400.00	90.00	359.81	10490.00	3114.91	-10.58	3114.92	0.00	518468.61	804606.72	0.00	0.00	0.00	
13500.00	90.00	359.81	10490.00	3214.91	-10.92	3214.92	0.00	518568.61	804606.38	0.00	0.00	0.00	
13600.00	90.00	359.81	10490.00	3314.91	-11.26	3314.92	0.00	518668.61	804606.04	0.00	0.00	0.00	
13700.00	90.00	359.81	10490.00	3414.91	-11.60	3414.92	0.00	518768.61	804605.70	0.00	0.00	0.00	
13800.00	90.00	359.81	10490.00	3514.90	-11.94	3514.92	0.00	518868.60	804605.36	0.00	0.00	0.00	
13900.00	90.00	359.81	10490.00	3614.90	-12.28	3614.92	0.00	518968.60	804605.02	0.00	0.00	0.00	
14000.00	90.00	359.81	10490.00	3714.90	-12.62	3714.92	0.00	519068.60	804604.68	0.00	0.00	0.00	
14100.00	90.00	359.81	10490.00	3814.90	-12.96	3814.92	0.00	519168.60	804604.34	0.00	0.00	0.00	
14200.00	90.00	359.81	10490.00	3914.90	-13.30	3914.92	0.00	519268.60	804604.00	0.00	0.00	0.00	
14300.00	90.00	359.81	10490.00	4014.90	-13.64	4014.92	0.00	519368.60	804603.66	0.00	0.00	0.00	
14400.00	90.00	359.81	10490.00	4114.90	-13.98	4114.92	0.00	519468.60	804603.32	0.00	0.00	0.00	
14500.00	90.00	359.81	10490.00	4214.90	-14.32	4214.92	0.00	519568.60	804602.98	0.00	0.00	0.00	
14600.00	90.00	359.81	10490.00	4314.90	-14.65	4314.92	0.00	519668.60	804602.65	0.00	0.00	0.00	
14700.00	90.00	359.81	10490.00	4414.90	-14.99	4414.92	0.00	519768.60	804602.31	0.00	0.00	0.00	
14800.00	90.00	359.81	10490.00	4514.90	-15.33	4514.92	0.00	519868.60	804601.97	0.00	0.00	0.00	
14900.00	90.00	359.81	10490.00	4614.90	-15.67	4614.92	0.00	519968.60	804601.63	0.00	0.00	0.00	
15000.00	90.00	359.81	10490.00	4714.90	-16.01	4714.92	0.00	520068.60	804601.29	0.00	0.00	0.00	
15100.00	90.00	359.81	10490.00	4814.90	-16.35	4814.92	0.00	520168.60	804600.95	0.00	0.00	0.00	
15122.50	90.00	359.81	10490.00	4837.40	-16.43	4837.42	0.00	520191.10	804600.87	0.00	0.00	0.00	HL Cross Toe
15172.70	90.00	359.81	10490.00	4887.60	-16.60	4887.63	0.00	520241.30	804600.70	0.00	0.00	0.00	PBHL 201H

Formation Points: (Relative to Slot centre)(TVD relative to Drill Floor)

Name	MD (US ft)	Inc (°)	Az (°)	TVD (US ft)	N.Offset (US ft)	E.Offset (US ft)	Northing (US ft)	Easting (US ft)	Comment
2nd BS Sand	10188.99	21.17	359.81	10185.00	32.23	-0.11	515385.93	804617.19	

Weatherford

Weatherford Drilling Services

GeoDec4 v2.5.0.0

Report Date:	April 24, 2017
Job Number:	
Customer:	Apache Corporation
Well Name:	Onion Knight Federal 201H
API Number:	
Rig Name:	HP 482
Location:	Lea County, NM Nad 83 NMEZ
Block:	
Engineer:	RWJ

NAD83 / New Mexico East (ftUS)	NAD83 (1986)
Projected Coordinate System	Geodetic Coordinate System
Datum: North American Datum 1983 (1986)	Datum: North American Datum 1983 (1986)
Ellipsoid: GRS 1980	Ellipsoid: GRS 1980
EPSG: 2257	EPSG: 4269
North: 515353.70 US Survey Foot	Latitude: 32.413886 Degree
East: 804617.30 US Survey Foot	Longitude: -103.48017 Degree
Convergence: 0.46°	
Declination: 6.95°	
Total Correction: 6.49°	
Datum Transformation: none	

Geodetic Location WGS84

MSL Elevation	=	0 usft
Latitude	=	32° 24' 49.99" N
Longitude	=	103° 28' 48.61" W

Magnetic Declination	=	6.95 deg	[True North Offset]		
Local Gravity	=	.9988 g	CheckSum	=	6662
Local Field Strength	=	48155 nT	Magnetic Vector X	=	23708 nT
Magnetic Dip	=	60.27 deg	Magnetic Vector Y	=	2892 nT
Magnetic Model	=	bggm2016.bgs	Magnetic Vector Z	=	41814 nT
Run Date	=	August 01, 2017	Magnetic Vector H	=	23884 nT

Signed:_____ Date:_____

Apache
Onion Knight Federal 201H
Lea Co, NM

Weatherford

Plan Data for Onion Knight Federal 201H

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	515353.70	804617.30	0.00	0.00	
10012.54	0.00	0.00	10012.54	0.00	0.00	515353.70	804617.30	0.00	0.00	KOP
10762.54	90.00	359.81	10490.00	477.46	-1.62	515831.16	804615.68	477.47	12.00	LP
15172.70	90.00	359.81	10490.00	4887.60	-16.60	520241.30	804600.70	4887.63	0.00	PBHL 201H

True Grid Mag

Grid Convergence: 0.46°
Mag Declination: 6.95°
Bearing:
True = Mag + 6.95°
Grid = True - 0.46°
Total Correction 6.49°

Onion Knight Federal 201H

Plan Data for Onion Knight Federal 201H

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

Site: Onion Knight Federal 201H
Unit: USFeet TVD Reference:
Company Name: Apache Corporation
Position: Northing: 515353.70USft Latitude: 32.413886°
Easting: 804617.30USft Longitude: -103.480170°
North Reference: Grid Grid Convergence: 0.46°
Elevation Above VRD: 3609.00USft

Slot: Onion Knight Federal 201H
Position:
Offset is from Site centre
+N/-S: 0.00USft Northing: 515353.70USft Latitude: 32.413886°
+E/-W: 0.00USft Easting: 804617.30USft Longitude: -103.480170°
Elevation Above VRD: 3609.00USft

Well: Onion Knight Federal 201H
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: 359.81°
+E/-W: 0.00USft
Magnetic Parameters:

Model	Field Strength	Declination	Dip	Date
bggm2016	48154(nT)	6.95°	60.27°	2017-08-01

Plan Data for Onion Knight Federal 201H

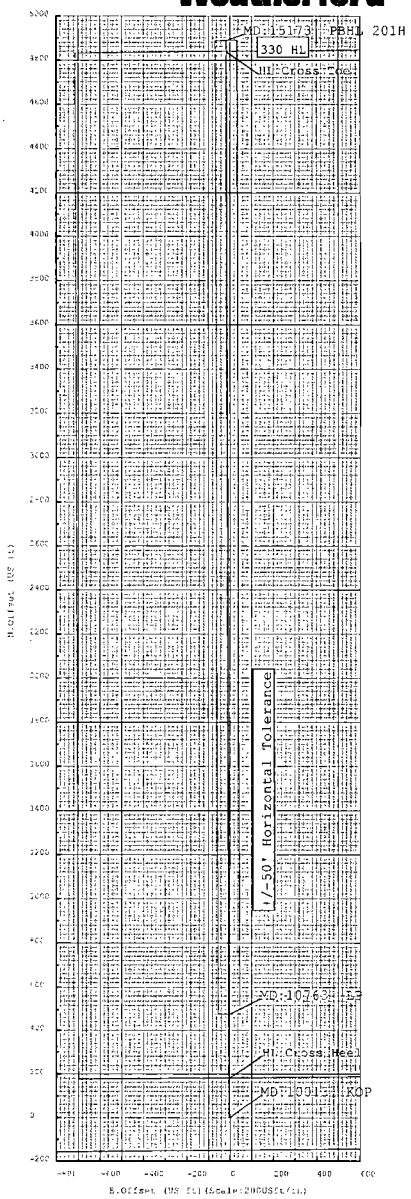
Target Set Information:
Name: Onion Knight Federal 201H
Position offsets from Slot centre

Name	TVD (USft)	TVD SS (USft)	+N/-S (USft)	+E/-W (USft)	Northing (USft)	Easting (USft)
PBHL 201H	10490.00	-6855.00	4887.60	-16.60	520241.30	804600.70

Plan Data for Onion Knight Federal 201H

Formation Point Information:

Name	TVD (USft)	TVD SS (USft)	MD (USft)
2nd BS Sand	10185.00	-6550.00	10188.99

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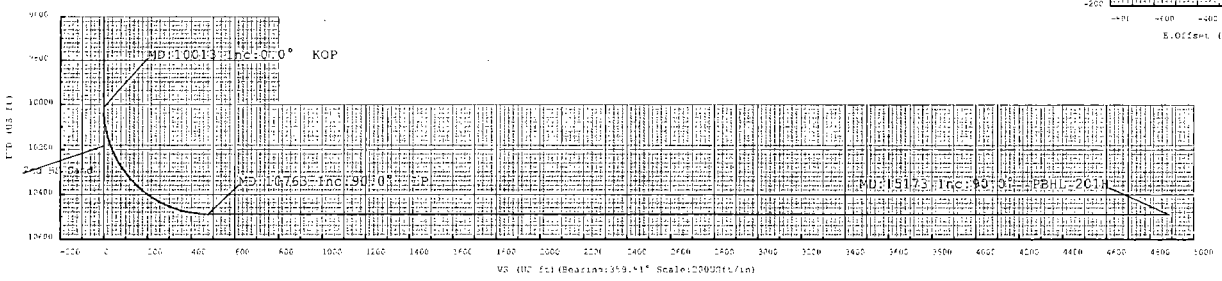

Drawing By: RWJ Date: 04-24-2017
Weatherford Drilling Services
10,000 Pilot Ave.
Midland,TX 79711
+1.432.561.8892 Main
+1.432.561.8895 Fax

Onion Knight Federal 201H

CEMENT: SURFACE

Stage Tool Depth: N/A

Lead:

Top MD of Segment:	0	Btm MD of Segment:	1412
Cmt Type:	C	Cmt Additives:	4% Bentonite + 1% CaCl2
Quantity (sks):	709		
Yield (cu/ft/sk):	1.73	Volume (cu/ft):	1226.6
Density (lbs/gal):	13.5	Percent OH Excess:	25%

Tail:

Top MD of Segment:	1412	Btm MD of Segment:	1765
Cmt Type:	C	Cmt Additives:	1% CaCl2
Quantity (sks):	260		
Yield (cu/ft/sk):	1.33	Volume (cu/ft):	345.8
Density (lbs/gal):	14.8	Percent OH Excess:	25%

CEMENT: INTERMEDIATE

Single Stage

Lead:

Top MD of Segment:	0	Btm MD of Segment:	4160
Cmt Type:	C	Cmt Additives:	5% NaCl + 4% Bentonite + Retarder
Quantity (sks):	825		
Yield (cu/ft/sk):	1.93	Volume (cu/ft):	1592.25
Density (lbs/gal):	12.6	Percent OH Excess:	25%

Tail:

Top MD of Segment:	4160	Btm MD of Segment:	5160
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 belwo DVT.

1st Stage

Lead:

Top MD of Segment:	3800	Btm MD of Segment:	4160
Cmt Type:	C	Cmt Additives:	5% NaCl + 4% Bentonite + Retarder
Quantity (sks):	138		
Yield (cu/ft/sk):	1.93	Volume (cu/ft):	266.34
Density (lbs/gal):	12.6	Percent OH Excess:	25%

Tail:

Top MD of Segment:	4160	Btm MD of Segment:	5160
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%

Stage Tool / ECP Depth: ± 3800'

2nd Stage

Lead:

Top MD of Segment: 0

Btm MD of Segment: 3120.55

Cmt Type: C

Cmt Additives: 5% NaCl + 4% Bentonite

Quantity (sks): 607
Yield (cu/ft/sk): 1.93 Volume (cu/ft): 1171.51
Density (lbs/gal): 12.6 Percent OH Excess: 25%

Tail:

Top MD of Segment: 3120.55

Btm MD of Segment: 3800

Cmt Type: C

Cmt Additives: 0.2% Retarder

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

CEMENT: PRODUCTION

Single Stage

Lead:

Top MD of Segment: 4660

Btm MD of Segment: 10012.54

Cmt Type: TXI Lite

Cmt Additives: 10% Bentonite + 10 lb/sk Compressive Strength Enhancer + 5 lb/sk Silica Fume + 0.5% Fluid Loss Additive + 0.5% Defoamer + 1% SMS + 0.7% Retarder + 0.2% Organic Retarder

Quantity (sks): 467
Yield (cu/ft/sk): 3.43 Volume (cu/ft): 1601.81

Density (lbs/gal): 10.8 Percent OH Excess: 20%

Tail:

Top MD of Segment: 10012.54

Btm MD of Segment: 15172.7

Cmt Type: TXI Lite

Cmt Additives: 0.4% Fluid Loss + 0.3% Retarder

Quantity (sks): 1090

Yield (cu/ft/sk): 1.33 Volume (cu/ft): 1449.7

Density (lbs/gal): 13.2 Percent OH Excess: 20%

Collapse Design Safety Factor:	1.47	Burst Design Safety Factor:	1.28
Body Tensile Design Safety Factor type?:	Dry/Buoyant		Buoyant
Body Tensile Design Safety Factor:	2.1		
Joint Tensile Design Safety Factor type?:	Dry/Buoyant		Buoyant
Joint Tensile Design Safety Factor:	2.19		

Onion Knight Federal 201H

String: **SURFACE**

Hole Size:	17.5						
Top Setting Depth (MD):	0	Top Setting Depth (TVD):	0	Btm setting depth (MD):	1765	Btm setting depth (TVD):	1765
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: 2.08 Burst Design Safety Factor: 1.82

Body Tensile Design Safety Factor type?: Dry/Buoyant Buoyant
Body Tensile Design Safety Factor: 3.74

Joint Tensile Design Safety Factor type?: Dry/Buoyant Buoyant
Joint Tensile Design Safety Factor: 3.99

String: **INTERMEDIATE**

Hole Size:	12.25						
Top Setting Depth (MD):	0	Top Setting Depth (TVD):	0	Btm setting depth (MD):	310	Btm setting depth (TVD):	310
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: 15.52 Burst Design Safety Factor: 1.96

Body Tensile Design Safety Factor type?: Dry/Buoyant Buoyant
Body Tensile Design Safety Factor: 2.09

Joint Tensile Design Safety Factor type?: Dry/Buoyant Buoyant
Joint Tensile Design Safety Factor: 2.39

Hole Size: 12.25

Top Setting Depth (MD):	310	Top Setting Depth (TVD):	310	Btm setting depth (MD):	5160	Btm setting depth (TVD):	5160
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: 1.73 Burst Design Safety Factor: 2.02

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: PRODUCTION

Hole Size:	8.75						
Top Setting Depth (MD):	0	Top Setting Depth (TVD):	0	Btm setting depth (MD):	10762	Btm setting depth (TVD):	10490
Size:	5-1/2"	Grade:	P-110	Weight (lbs/ft):	17	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:	1.47	Burst Design Safety Factor:	1.28
Body Tensile Design Safety Factor type?: Dry/Buoyant		Buoyant	
Body Tensile Design Safety Factor:	2.1		
Joint Tensile Design Safety Factor type?: Dry/Buoyant		Buoyant	
Joint Tensile Design Safety Factor:	2.19		

Hole Size:	8.5						
Top Setting Depth (MD):	10762	Top Setting Depth (TVD):	10490	Btm setting depth (MD):	15172.7	Btm setting depth (TVD):	10490
Size:	5-1/2"	Grade:	P-110	Weight (lbs/ft):	17	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

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.

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.

Surface 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

Surface 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)

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

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.

Surface 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

Surface 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)

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.

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
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

Surface 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 Brushy Canyon with Cut Brine (9.2 ppg)
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