30-025-44692

PECOS DISTRICT
SURFACE USE
CONDITIONS OF APPROVAL

OPERATOR'S NAME:	Centennial Resource Production Inc.
LEASE NO.:	NMNM131588
WELL NAME & NO.:	Cheddar 3BS Federal Com 1H
SURFACE HOLE FOOTAGE:	330'/S & 330'/N
BOTTOM HOLE FOOTAGE	330'/N & 330'/W
LOCATION:	SECTION 5, TT22S, R32E, NMPM
COUNTY:	LEA

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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.

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Approval Date: 04/13/2018

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.

Watershed:
The entire well pad will be bermed to prevent oil, salt, and other chemical contaminants from leaving the well pad. Topsoil shall not be used to construct the berm. No water flow from the uphill side(s) of the pad shall be allowed to enter the well pad. The berm shall be maintained through the life of the well and after interim reclamation has been completed. Any water erosion that may occur due to the construction of the well pad during the life of the well will be quickly corrected and proper measures will be taken to prevent future erosion. Tank battery locations will be lined and bermed. A 20 mil permanent liner will be installed with a 4 oz. felt backing to prevent tears or punctures. Tank battery berms must be large enough to contain 1 ½ times the content of the largest tank or 24 hour production, whichever is greater. Automatic shut off, check valves, or similar systems will be installed for tanks to minimize the effects of catastrophic line failures used in production or drilling.

Potash Minerals:

Lessees must comply with the 2012 Secretarial Potash Order. The Order is designed to manage the efficient development of oil, gas, and potash resources. Section 6 of the Order provides general provisions which must be followed to minimize conflict between the industries and ensure the safety of operations. Three exceptions to this policy will be permitted if the drilling will occur under the following conditions from:

(a) A Drilling Island associated with a Development Area established under this Order or a Drilling Island established under a prior Order;

(b) A Barren Area and the Authorized Officer determines that such operations will not adversely affect active or planned potash mining operations in the immediate vicinity of the proposed drill-site; or

(c) A Drilling Island, not covered by (a) above or single well site established under this Order by the approval and in the sole discretion of the Authorized Officer, provided that such site was jointly recommended to the Authorized Officer by the oil and gas lessee(s) and the nearest potash lessee(s).

When the Authorized Officer determines that unitization is necessary for orderly oil and gas development and proper protection of potash deposits, no well shall be drilled for oil or gas except pursuant to a unit plan approved by the authorized officer.

The drilling or the abandonment of any well on said lease shall be done in accordance with applicable oil and gas operating regulations including such requirements as the Authorized Officer may prescribe as necessary to prevent the infiltration of oil, gas or water into formations containing potash deposits or into mines or working being utilized in the extraction of such deposits.

To minimize impacts to potash resources, the proposed well is confined within the boundaries of the established Cheddar Drill Island (See Potash Memo and Map in attached file for Drill Island description).

VI. CONSTRUCTION

A. NOTIFICATION

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

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

B. TOPSOIL

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

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

C. CLOSED LOOP SYSTEM

Tanks are required for drilling operations: No Pits.

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

D. FEDERAL MINERAL MATERIALS PIT

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

E. WELL PAD SURFACING

Surfacing of the well pad is not required.

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

F. EXCLOSURE FENCING (CELLARS & PITS)

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

G. ON LEASE ACCESS ROADS

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

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

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

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

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

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

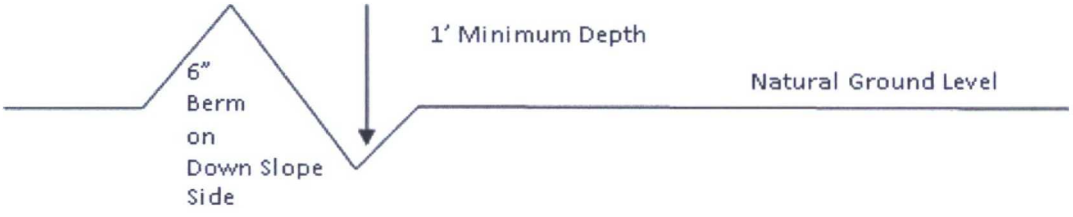
Turnouts
Vehicle turnouts shall be constructed on the road. Turnouts shall be intervisible with interval spacing distance less than 1000 feet. Turnouts shall conform to Figure 1; cross section and plans for typical road construction.

Drainage

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

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

Cross Section of a Typical Lead-off Ditch



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

Formula for Spacing Interval of Lead-off Ditches

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

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

Cattle guards

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

Fence Requirement

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

Public Access

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

Construction Steps

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

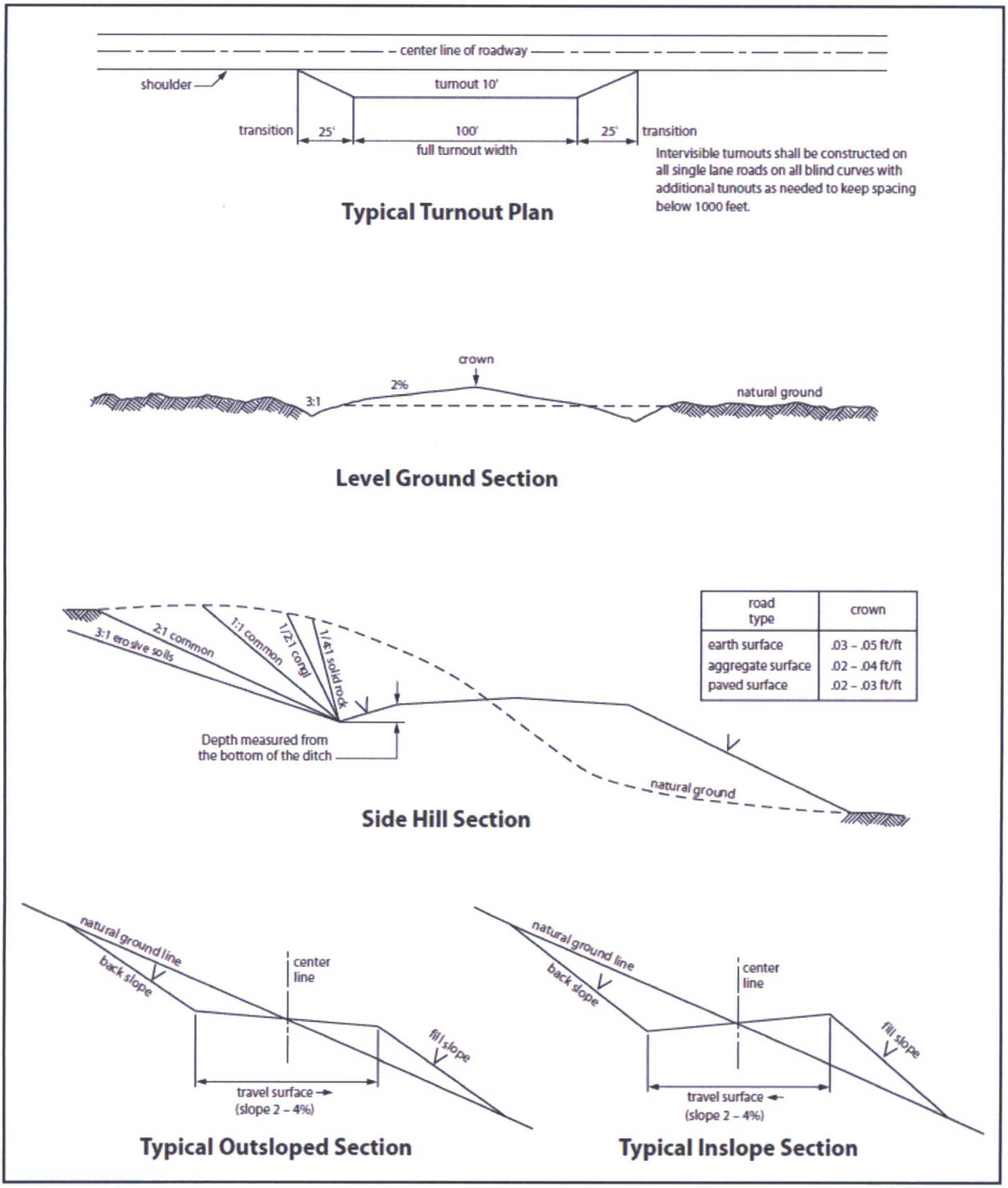


Figure 1. Cross-sections and plans for typical road sections representative of BLM resource or FS local and higher-class roads.

VII. PRODUCTION (POST DRILLING)

A. WELL STRUCTURES & FACILITIES

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

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

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

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

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

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

VIII. INTERIM RECLAMATION

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

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

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

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

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

IX. FINAL ABANDONMENT & RECLAMATION

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

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

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

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

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

30-025-44692

PECOS DISTRICT
DRILLING OPERATIONS
CONDITIONS OF APPROVAL

OPERATOR'S NAME:	**Centennial Resources Production, LLC**
LEASE NO.:	**NMNM-131588**
WELL NAME & NO.:	**Cheddar 3BS Federal Com 1H**
SURFACE HOLE FOOTAGE:	**0244' FSL & 0370' FWL**
BOTTOM HOLE FOOTAGE	**0330' FNL & 0330' FWL Sec. 32, T. 21 S., R 32 E.**
LOCATION:	**Section 05, T. 22 S., R 32 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.

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

A. **Hydrogen Sulfide**

Approval Date: 04/13/2018

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

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

3. 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.**

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

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.

Secretary's Potash
Possibility of water flows in the Salado and Castile.
Possibility of lost circulation in the Rustler, Red Beds, and Delaware.

1. The **13-3/8** inch surface casing shall be set at approximately **700** 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.**

    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.

Formation below the 13-3/8" shoe to be tested according to Onshore Order 2.III.B.1.i. Test to be done as a mud equivalency test using the mud weight necessary for the pore pressure of the formation below the shoe and the mud weight for the bottom of the hole. Report results to BLM office.

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 is:

    ☐ 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 potash. Excess calculates to negative 25% - Additional cement will be required.**

Formation below the 9-5/8" shoe to be tested according to Onshore Order 2.III.B.1.i. Test to be done as a mud equivalency test using the mud weight necessary for the pore pressure of the formation below the shoe (not the mud weight required to prevent dissolving the salt formation) and the mud weight for the bottom of the hole. Report results to 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:

   ☐ Top of cement to reach at least 500 feet above the top of the uppermost hydrocarbon productive interval. **Excess calculates to 21% - 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.

B. PRESSURE CONTROL

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

2. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the surface casing shoe shall be 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.

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

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

   a. In potash areas, for all casing strings utilizing slips, these are to be set as soon as the crew and rig are ready and any fallback cement remediation has been done. For all casing strings, casing cut-off and BOP installation can be initiated at twelve hours after bumping the plug. However, **no tests** shall commence until the cement has had a minimum of 24 hours setup time.

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

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

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

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

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

C. DRILL STEM TEST

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

D. WASTE MATERIAL AND FLUIDS

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

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

JAM 040918

30-025-44692

GMT Exploration Company LLC

GMT Exploration

Lea County, NM (NAD 83)
Cheddar Federal Com pad.
Cheddar 3BS Federal Com 1H

Cheddar 3BS Federal Com 1H

Plan: Design #3

Standard Planning Report

15 June, 2017

NEWSCO

Database:	EDM 5000.1 Single User Db	**Local Co-ordinate Reference:**	Well Cheddar 3BS Federal Com 1H
Company:	GMT Exploration	**TVD Reference:**	WELL @ 3716.00ft (Original Well Elev)
Project:	Lea County, NM (NAD 83)	**MD Reference:**	WELL @ 3716.00ft (Original Well Elev)
Site:	Cheddar Federal Com pad.	**North Reference:**	Grid
Well:	Cheddar 3BS Federal Com 1H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Cheddar 3BS Federal Com 1H		
Design:	Design #3		

Project Lea County, NM (NAD 83)

Map System:	US State Plane 1983	**System Datum:**	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		

Site Cheddar Federal Com pad.

Site Position:		**Northing:**	515,157.17 usft	**Latitude:**	32° 24' 52.790 N
From:	Lat/Long	**Easting:**	735,445.93 usft	**Longitude:**	103° 42' 15.520 W
Position Uncertainty:	0.00 ft	**Slot Radius:**	13-3/16"	**Grid Convergence:**	0.34 °

Well Cheddar 3BS Federal Com 1H

Well Position	**+N/-S**	-149.88 ft	**Northing:**	515,007.29 usft	**Latitude:**	32° 24' 51.307 N
	+E/-W	1.19 ft	**Easting:**	735,447.12 usft	**Longitude:**	103° 42' 15.516 W
Position Uncertainty		0.00 ft	**Wellhead Elevation:**	0.00 ft	**Ground Level:**	3,696.00 ft

Wellbore Cheddar 3BS Federal Com 1H

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	04/24/17	7.05	60.22	48,050

Design Design #3

Audit Notes:

Version:		**Phase:**	PLAN	**Tie On Depth:**	0.00

Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.00	0.00	0.00	359.61

Plan Sections

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
3,100.00	0.00	0.00	3,100.00	0.00	0.00	0.00	0.00	0.00	0.00	
3,392.79	5.86	179.53	3,392.28	-14.95	0.12	2.00	2.00	0.00	179.53	
8,736.11	5.86	179.53	8,707.72	-560.08	4.62	0.00	0.00	0.00	0.00	
9,028.90	0.00	0.00	9,000.00	-575.03	4.74	2.00	-2.00	0.00	180.00	VP Cheddar 3BS Fed
11,188.94	0.00	0.00	11,160.04	-575.03	4.74	0.00	0.00	0.00	0.00	
12,091.03	90.21	359.60	11,733.00	0.00	0.76	10.00	10.00	-0.04	359.60	
21,989.46	90.21	359.60	11,697.00	9,898.13	-67.82	0.00	0.00	0.00	0.00	PBHL Cheddar 3BS F

Database:	EDM 5000.1 Single User Db	**Local Co-ordinate Reference:**	Well Cheddar 3BS Federal Com 1H
Company:	GMT Exploration	**TVD Reference:**	WELL @ 3716.00ft (Original Well Elev)
Project:	Lea County, NM (NAD 83)	**MD Reference:**	WELL @ 3716.00ft (Original Well Elev)
Site:	Cheddar Federal Com pad.	**North Reference:**	Grid
Well:	Cheddar 3BS Federal Com 1H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Cheddar 3BS Federal Com 1H		
Design:	Design #3		

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00
Rustler									
670.00	0.00	0.00	670.00	0.00	0.00	0.00	0.00	0.00	0.00
700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	0.00	0.00
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00	0.00
900.00	0.00	0.00	900.00	0.00	0.00	0.00	0.00	0.00	0.00
Salt Top									
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00
1,100.00	0.00	0.00	1,100.00	0.00	0.00	0.00	0.00	0.00	0.00
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00
1,300.00	0.00	0.00	1,300.00	0.00	0.00	0.00	0.00	0.00	0.00
1,400.00	0.00	0.00	1,400.00	0.00	0.00	0.00	0.00	0.00	0.00
1,500.00	0.00	0.00	1,500.00	0.00	0.00	0.00	0.00	0.00	0.00
1,600.00	0.00	0.00	1,600.00	0.00	0.00	0.00	0.00	0.00	0.00
1,700.00	0.00	0.00	1,700.00	0.00	0.00	0.00	0.00	0.00	0.00
1,800.00	0.00	0.00	1,800.00	0.00	0.00	0.00	0.00	0.00	0.00
1,900.00	0.00	0.00	1,900.00	0.00	0.00	0.00	0.00	0.00	0.00
2,000.00	0.00	0.00	2,000.00	0.00	0.00	0.00	0.00	0.00	0.00
2,100.00	0.00	0.00	2,100.00	0.00	0.00	0.00	0.00	0.00	0.00
2,200.00	0.00	0.00	2,200.00	0.00	0.00	0.00	0.00	0.00	0.00
2,300.00	0.00	0.00	2,300.00	0.00	0.00	0.00	0.00	0.00	0.00
2,400.00	0.00	0.00	2,400.00	0.00	0.00	0.00	0.00	0.00	0.00
2,500.00	0.00	0.00	2,500.00	0.00	0.00	0.00	0.00	0.00	0.00
2,600.00	0.00	0.00	2,600.00	0.00	0.00	0.00	0.00	0.00	0.00
2,700.00	0.00	0.00	2,700.00	0.00	0.00	0.00	0.00	0.00	0.00
2,800.00	0.00	0.00	2,800.00	0.00	0.00	0.00	0.00	0.00	0.00
2,900.00	0.00	0.00	2,900.00	0.00	0.00	0.00	0.00	0.00	0.00
3,000.00	0.00	0.00	3,000.00	0.00	0.00	0.00	0.00	0.00	0.00
Start Build 2.00									
3,100.00	0.00	0.00	3,100.00	0.00	0.00	0.00	0.00	0.00	0.00
3,200.00	2.00	179.53	3,199.98	-1.75	0.01	-1.75	2.00	2.00	0.00
3,300.00	4.00	179.53	3,299.84	-6.98	0.06	-6.98	2.00	2.00	0.00
Start 5343.32 hold at 3392.79 MD									
3,392.79	5.86	179.53	3,392.28	-14.95	0.12	-14.95	2.00	2.00	0.00
3,400.00	5.86	179.53	3,399.45	-15.68	0.13	-15.68	0.00	0.00	0.00
3,500.00	5.86	179.53	3,498.93	-25.89	0.21	-25.89	0.00	0.00	0.00
3,600.00	5.86	179.53	3,598.41	-36.09	0.30	-36.09	0.00	0.00	0.00
3,700.00	5.86	179.53	3,697.89	-46.29	0.38	-46.29	0.00	0.00	0.00
3,800.00	5.86	179.53	3,797.37	-56.49	0.47	-56.49	0.00	0.00	0.00
3,900.00	5.86	179.53	3,896.84	-66.69	0.55	-66.70	0.00	0.00	0.00
4,000.00	5.86	179.53	3,996.32	-76.90	0.63	-76.90	0.00	0.00	0.00
4,100.00	5.86	179.53	4,095.80	-87.10	0.72	-87.10	0.00	0.00	0.00
4,200.00	5.86	179.53	4,195.28	-97.30	0.80	-97.30	0.00	0.00	0.00
4,300.00	5.86	179.53	4,294.76	-107.50	0.89	-107.51	0.00	0.00	0.00
4,400.00	5.86	179.53	4,394.23	-117.71	0.97	-117.71	0.00	0.00	0.00
4,500.00	5.86	179.53	4,493.71	-127.91	1.05	-127.91	0.00	0.00	0.00
4,600.00	5.86	179.53	4,593.19	-138.11	1.14	-138.11	0.00	0.00	0.00
Delaware Mountain Group									

Database:	EDM 5000.1 Single User Db	**Local Co-ordinate Reference:**	Well Cheddar 3BS Federal Com 1H
Company:	GMT Exploration	**TVD Reference:**	WELL @ 3716.00ft (Original Well Elev)
Project:	Lea County, NM (NAD 83)	**MD Reference:**	WELL @ 3716.00ft (Original Well Elev)
Site:	Cheddar Federal Com pad.	**North Reference:**	Grid
Well:	Cheddar 3BS Federal Com 1H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Cheddar 3BS Federal Com 1H		
Design:	Design #3		

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
4,636.55	5.86	179.53	4,629.55	-141.84	1.17	-141.84	0.00	0.00	0.00
4,700.00	5.86	179.53	4,692.67	-148.31	1.22	-148.32	0.00	0.00	0.00
Delaware Bell Canyon									
4,742.07	5.86	179.53	4,734.52	-152.60	1.26	-152.61	0.00	0.00	0.00
4,800.00	5.86	179.53	4,792.15	-158.51	1.31	-158.52	0.00	0.00	0.00
4,900.00	5.86	179.53	4,891.63	-168.72	1.39	-168.72	0.00	0.00	0.00
5,000.00	5.86	179.53	4,991.10	-178.92	1.47	-178.92	0.00	0.00	0.00
5,100.00	5.86	179.53	5,090.58	-189.12	1.56	-189.13	0.00	0.00	0.00
5,200.00	5.86	179.53	5,190.06	-199.32	1.64	-199.33	0.00	0.00	0.00
5,300.00	5.86	179.53	5,289.54	-209.52	1.73	-209.53	0.00	0.00	0.00
5,400.00	5.86	179.53	5,389.02	-219.73	1.81	-219.73	0.00	0.00	0.00
5,500.00	5.86	179.53	5,488.49	-229.93	1.90	-229.94	0.00	0.00	0.00
Cherry Canyon									
5,571.13	5.86	179.53	5,559.25	-237.19	1.96	-237.19	0.00	0.00	0.00
5,600.00	5.86	179.53	5,587.97	-240.13	1.98	-240.14	0.00	0.00	0.00
5,700.00	5.86	179.53	5,687.45	-250.33	2.06	-250.34	0.00	0.00	0.00
5,800.00	5.86	179.53	5,786.93	-260.54	2.15	-260.54	0.00	0.00	0.00
5,900.00	5.86	179.53	5,886.41	-270.74	2.23	-270.75	0.00	0.00	0.00
6,000.00	5.86	179.53	5,985.89	-280.94	2.32	-280.95	0.00	0.00	0.00
6,100.00	5.86	179.53	6,085.36	-291.14	2.40	-291.15	0.00	0.00	0.00
6,200.00	5.86	179.53	6,184.84	-301.34	2.48	-301.35	0.00	0.00	0.00
6,300.00	5.86	179.53	6,284.32	-311.55	2.57	-311.56	0.00	0.00	0.00
6,400.00	5.86	179.53	6,383.80	-321.75	2.65	-321.76	0.00	0.00	0.00
6,500.00	5.86	179.53	6,483.28	-331.95	2.74	-331.96	0.00	0.00	0.00
6,600.00	5.86	179.53	6,582.75	-342.15	2.82	-342.16	0.00	0.00	0.00
6,700.00	5.86	179.53	6,682.23	-352.35	2.90	-352.37	0.00	0.00	0.00
6,800.00	5.86	179.53	6,781.71	-362.56	2.99	-362.57	0.00	0.00	0.00
6,900.00	5.86	179.53	6,881.19	-372.76	3.07	-372.77	0.00	0.00	0.00
7,000.00	5.86	179.53	6,980.67	-382.96	3.16	-382.97	0.00	0.00	0.00
7,100.00	5.86	179.53	7,080.15	-393.16	3.24	-393.18	0.00	0.00	0.00
Brushy Canyon									
7,179.01	5.86	179.53	7,158.74	-401.22	3.31	-401.24	0.00	0.00	0.00
7,200.00	5.86	179.53	7,179.62	-403.37	3.32	-403.38	0.00	0.00	0.00
7,300.00	5.86	179.53	7,279.10	-413.57	3.41	-413.58	0.00	0.00	0.00
7,400.00	5.86	179.53	7,378.58	-423.77	3.49	-423.78	0.00	0.00	0.00
7,500.00	5.86	179.53	7,478.06	-433.97	3.58	-433.99	0.00	0.00	0.00
7,600.00	5.86	179.53	7,577.54	-444.17	3.66	-444.19	0.00	0.00	0.00
7,700.00	5.86	179.53	7,677.01	-454.38	3.75	-454.39	0.00	0.00	0.00
7,800.00	5.86	179.53	7,776.49	-464.58	3.83	-464.59	0.00	0.00	0.00
7,900.00	5.86	179.53	7,875.97	-474.78	3.91	-474.80	0.00	0.00	0.00
8,000.00	5.86	179.53	7,975.45	-484.98	4.00	-485.00	0.00	0.00	0.00
8,100.00	5.86	179.53	8,074.93	-495.18	4.08	-495.20	0.00	0.00	0.00
8,200.00	5.86	179.53	8,174.41	-505.39	4.17	-505.40	0.00	0.00	0.00
8,300.00	5.86	179.53	8,273.88	-515.59	4.25	-515.61	0.00	0.00	0.00
Lower Brushy Canyon Marker									
8,364.81	5.86	179.53	8,338.36	-522.20	4.30	-522.22	0.00	0.00	0.00
8,400.00	5.86	179.53	8,373.36	-525.79	4.33	-525.81	0.00	0.00	0.00
8,500.00	5.86	179.53	8,472.84	-535.99	4.42	-536.01	0.00	0.00	0.00
8,600.00	5.86	179.53	8,572.32	-546.20	4.50	-546.21	0.00	0.00	0.00
Bone Spring									
8,631.12	5.86	179.53	8,603.27	-549.37	4.53	-549.39	0.00	0.00	0.00
8,700.00	5.86	179.53	8,671.80	-556.40	4.59	-556.42	0.00	0.00	0.00
Start Drop -2.00									

Database:	EDM 5000.1 Single User Db	**Local Co-ordinate Reference:**	Well Cheddar 3BS Federal Com 1H
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Project:	Lea County, NM (NAD 83)	**MD Reference:**	WELL @ 3716.00ft (Original Well Elev)
Site:	Cheddar Federal Com pad.	**North Reference:**	Grid
Well:	Cheddar 3BS Federal Com 1H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Cheddar 3BS Federal Com 1H		
Design:	Design #3		

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
8,736.11	5.86	179.53	8,707.72	-560.08	4.62	-560.10	0.00	0.00	0.00
8,800.00	4.58	179.53	8,771.34	-565.89	4.66	-565.91	2.00	-2.00	0.00
Avalon Shale Top									
8,826.95	4.04	179.53	8,798.22	-567.91	4.68	-567.93	2.00	-2.00	0.00
8,900.00	2.58	179.53	8,871.14	-572.13	4.72	-572.15	2.00	-2.00	0.00
9,000.00	0.58	179.53	8,971.10	-574.88	4.74	-574.90	2.00	-2.00	0.00
Start 2160.04 hold at 9028.90 MD									
9,028.90	0.00	0.00	9,000.00	-575.03	4.74	-575.05	2.00	-2.00	0.00
9,100.00	0.00	0.00	9,071.10	-575.03	4.74	-575.05	0.00	0.00	0.00
9,200.00	0.00	0.00	9,171.10	-575.03	4.74	-575.05	0.00	0.00	0.00
9,300.00	0.00	0.00	9,271.10	-575.03	4.74	-575.05	0.00	0.00	0.00
9,400.00	0.00	0.00	9,371.10	-575.03	4.74	-575.05	0.00	0.00	0.00
9,500.00	0.00	0.00	9,471.10	-575.03	4.74	-575.05	0.00	0.00	0.00
9,600.00	0.00	0.00	9,571.10	-575.03	4.74	-575.05	0.00	0.00	0.00
1st Bone Spring Sand									
9,667.09	0.00	0.00	9,638.19	-575.03	4.74	-575.05	0.00	0.00	0.00
9,700.00	0.00	0.00	9,671.10	-575.03	4.74	-575.05	0.00	0.00	0.00
9,800.00	0.00	0.00	9,771.10	-575.03	4.74	-575.05	0.00	0.00	0.00
9,900.00	0.00	0.00	9,871.10	-575.03	4.74	-575.05	0.00	0.00	0.00
10,000.00	0.00	0.00	9,971.10	-575.03	4.74	-575.05	0.00	0.00	0.00
10,100.00	0.00	0.00	10,071.10	-575.03	4.74	-575.05	0.00	0.00	0.00
Carbonate									
10,152.09	0.00	0.00	10,123.19	-575.03	4.74	-575.05	0.00	0.00	0.00
10,200.00	0.00	0.00	10,171.10	-575.03	4.74	-575.05	0.00	0.00	0.00
10,300.00	0.00	0.00	10,271.10	-575.03	4.74	-575.05	0.00	0.00	0.00
2nd Bone Spring Sand									
10,342.09	0.00	0.00	10,313.19	-575.03	4.74	-575.05	0.00	0.00	0.00
10,400.00	0.00	0.00	10,371.10	-575.03	4.74	-575.05	0.00	0.00	0.00
10,500.00	0.00	0.00	10,471.10	-575.03	4.74	-575.05	0.00	0.00	0.00
10,600.00	0.00	0.00	10,571.10	-575.03	4.74	-575.05	0.00	0.00	0.00
10,700.00	0.00	0.00	10,671.10	-575.03	4.74	-575.05	0.00	0.00	0.00
Carbonate									
10,727.09	0.00	0.00	10,698.19	-575.03	4.74	-575.05	0.00	0.00	0.00
10,800.00	0.00	0.00	10,771.10	-575.03	4.74	-575.05	0.00	0.00	0.00
10,900.00	0.00	0.00	10,871.10	-575.03	4.74	-575.05	0.00	0.00	0.00
11,000.00	0.00	0.00	10,971.10	-575.03	4.74	-575.05	0.00	0.00	0.00
11,100.00	0.00	0.00	11,071.10	-575.03	4.74	-575.05	0.00	0.00	0.00
Start DLS 10.00 TFO 359.60									
11,188.94	0.00	0.00	11,160.04	-575.03	4.74	-575.05	0.00	0.00	0.00
11,200.00	1.11	359.60	11,171.10	-574.92	4.74	-574.94	10.00	10.00	0.00
11,300.00	11.11	359.60	11,270.40	-564.30	4.67	-564.32	10.00	10.00	0.00
11,400.00	21.11	359.60	11,366.36	-536.60	4.47	-536.61	10.00	10.00	0.00
3rd Bone Spring Sand									
11,473.92	28.50	359.60	11,433.41	-505.61	4.26	-505.63	10.00	10.00	0.00
11,500.00	31.11	359.60	11,456.04	-492.65	4.17	-492.67	10.00	10.00	0.00
11,600.00	41.11	359.60	11,536.73	-433.80	3.76	-433.81	10.00	10.00	0.00
11,700.00	51.11	359.60	11,605.98	-361.83	3.26	-361.84	10.00	10.00	0.00
11,800.00	61.11	359.60	11,661.67	-278.93	2.69	-278.94	10.00	10.00	0.00
Possible Horizontal Target Top									
11,877.27	68.83	359.60	11,694.34	-208.97	2.20	-208.98	10.00	10.00	0.00
11,900.00	71.11	359.60	11,702.13	-187.62	2.06	-187.63	10.00	10.00	0.00
12,000.00	81.11	359.60	11,726.11	-90.67	1.38	-90.68	10.00	10.00	0.00
Start 9898.43 hold at 12091.03 MD									

Database:	EDM 5000.1 Single User Db	**Local Co-ordinate Reference:**	Well Cheddar 3BS Federal Com 1H
Company:	GMT Exploration	**TVD Reference:**	WELL @ 3716.00ft (Original Well Elev)
Project:	Lea County, NM (NAD 83)	**MD Reference:**	WELL @ 3716.00ft (Original Well Elev)
Site:	Cheddar Federal Com pad.	**North Reference:**	Grid
Well:	Cheddar 3BS Federal Com 1H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Cheddar 3BS Federal Com 1H		
Design:	Design #3		

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
12,091.03	90.21	359.60	11,733.00	0.00	0.76	-0.01	10.00	10.00	0.00
12,100.00	90.21	359.60	11,732.96	8.97	0.69	8.96	0.00	0.00	0.00
12,200.00	90.21	359.60	11,732.60	108.97	0.00	108.96	0.00	0.00	0.00
12,300.00	90.21	359.60	11,732.24	208.96	-0.69	208.96	0.00	0.00	0.00
12,400.00	90.21	359.60	11,731.87	308.96	-1.38	308.96	0.00	0.00	0.00
12,500.00	90.21	359.60	11,731.51	408.96	-2.08	408.96	0.00	0.00	0.00
12,600.00	90.21	359.60	11,731.15	508.95	-2.77	508.96	0.00	0.00	0.00
12,700.00	90.21	359.60	11,730.78	608.95	-3.46	608.96	0.00	0.00	0.00
12,800.00	90.21	359.60	11,730.42	708.95	-4.16	708.96	0.00	0.00	0.00
12,900.00	90.21	359.60	11,730.06	808.95	-4.85	808.96	0.00	0.00	0.00
13,000.00	90.21	359.60	11,729.69	908.94	-5.54	908.96	0.00	0.00	0.00
13,100.00	90.21	359.60	11,729.33	1,008.94	-6.23	1,008.96	0.00	0.00	0.00
13,200.00	90.21	359.60	11,728.96	1,108.94	-6.93	1,108.96	0.00	0.00	0.00
13,300.00	90.21	359.60	11,728.60	1,208.93	-7.62	1,208.96	0.00	0.00	0.00
13,400.00	90.21	359.60	11,728.24	1,308.93	-8.31	1,308.96	0.00	0.00	0.00
13,500.00	90.21	359.60	11,727.87	1,408.93	-9.01	1,408.96	0.00	0.00	0.00
13,600.00	90.21	359.60	11,727.51	1,508.92	-9.70	1,508.95	0.00	0.00	0.00
13,700.00	90.21	359.60	11,727.15	1,608.92	-10.39	1,608.95	0.00	0.00	0.00
13,800.00	90.21	359.60	11,726.78	1,708.92	-11.08	1,708.95	0.00	0.00	0.00
13,900.00	90.21	359.60	11,726.42	1,808.91	-11.78	1,808.95	0.00	0.00	0.00
14,000.00	90.21	359.60	11,726.06	1,908.91	-12.47	1,908.95	0.00	0.00	0.00
14,100.00	90.21	359.60	11,725.69	2,008.91	-13.16	2,008.95	0.00	0.00	0.00
14,200.00	90.21	359.60	11,725.33	2,108.91	-13.86	2,108.95	0.00	0.00	0.00
14,300.00	90.21	359.60	11,724.96	2,208.90	-14.55	2,208.95	0.00	0.00	0.00
14,400.00	90.21	359.60	11,724.60	2,308.90	-15.24	2,308.95	0.00	0.00	0.00
14,500.00	90.21	359.60	11,724.24	2,408.90	-15.93	2,408.95	0.00	0.00	0.00
14,600.00	90.21	359.60	11,723.87	2,508.89	-16.63	2,508.95	0.00	0.00	0.00
14,700.00	90.21	359.60	11,723.51	2,608.89	-17.32	2,608.95	0.00	0.00	0.00
14,800.00	90.21	359.60	11,723.15	2,708.89	-18.01	2,708.95	0.00	0.00	0.00
14,900.00	90.21	359.60	11,722.78	2,808.88	-18.70	2,808.95	0.00	0.00	0.00
15,000.00	90.21	359.60	11,722.42	2,908.88	-19.40	2,908.95	0.00	0.00	0.00
15,100.00	90.21	359.60	11,722.05	3,008.88	-20.09	3,008.94	0.00	0.00	0.00
15,200.00	90.21	359.60	11,721.69	3,108.87	-20.78	3,108.94	0.00	0.00	0.00
15,300.00	90.21	359.60	11,721.33	3,208.87	-21.48	3,208.94	0.00	0.00	0.00
15,400.00	90.21	359.60	11,720.96	3,308.87	-22.17	3,308.94	0.00	0.00	0.00
15,500.00	90.21	359.60	11,720.60	3,408.87	-22.86	3,408.94	0.00	0.00	0.00
15,600.00	90.21	359.60	11,720.24	3,508.86	-23.55	3,508.94	0.00	0.00	0.00
15,700.00	90.21	359.60	11,719.87	3,608.86	-24.25	3,608.94	0.00	0.00	0.00
15,800.00	90.21	359.60	11,719.51	3,708.86	-24.94	3,708.94	0.00	0.00	0.00
15,900.00	90.21	359.60	11,719.15	3,808.85	-25.63	3,808.94	0.00	0.00	0.00
16,000.00	90.21	359.60	11,718.78	3,908.85	-26.33	3,908.94	0.00	0.00	0.00
16,100.00	90.21	359.60	11,718.42	4,008.85	-27.02	4,008.94	0.00	0.00	0.00
16,200.00	90.21	359.60	11,718.05	4,108.84	-27.71	4,108.94	0.00	0.00	0.00
16,300.00	90.21	359.60	11,717.69	4,208.84	-28.40	4,208.94	0.00	0.00	0.00
16,400.00	90.21	359.60	11,717.33	4,308.84	-29.10	4,308.94	0.00	0.00	0.00
16,500.00	90.21	359.60	11,716.96	4,408.84	-29.79	4,408.94	0.00	0.00	0.00
16,600.00	90.21	359.60	11,716.60	4,508.83	-30.48	4,508.94	0.00	0.00	0.00
16,700.00	90.21	359.60	11,716.24	4,608.83	-31.18	4,608.93	0.00	0.00	0.00
16,800.00	90.21	359.60	11,715.87	4,708.83	-31.87	4,708.93	0.00	0.00	0.00
16,900.00	90.21	359.60	11,715.51	4,808.82	-32.56	4,808.93	0.00	0.00	0.00
17,000.00	90.21	359.60	11,715.15	4,908.82	-33.25	4,908.93	0.00	0.00	0.00
17,100.00	90.21	359.60	11,714.78	5,008.82	-33.95	5,008.93	0.00	0.00	0.00
17,200.00	90.21	359.60	11,714.42	5,108.81	-34.64	5,108.93	0.00	0.00	0.00
17,300.00	90.21	359.60	11,714.05	5,208.81	-35.33	5,208.93	0.00	0.00	0.00

Database:	EDM 5000.1 Single User Db	**Local Co-ordinate Reference:**	Well Cheddar 3BS Federal Com 1H
Company:	GMT Exploration	**TVD Reference:**	WELL @ 3716.00ft (Original Well Elev)
Project:	Lea County, NM (NAD 83)	**MD Reference:**	WELL @ 3716.00ft (Original Well Elev)
Site:	Cheddar Federal Com pad.	**North Reference:**	Grid
Well:	Cheddar 3BS Federal Com 1H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Cheddar 3BS Federal Com 1H		
Design:	Design #3		

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
17,400.00	90.21	359.60	11,713.69	5,308.81	-36.03	5,308.93	0.00	0.00	0.00
17,500.00	90.21	359.60	11,713.33	5,408.80	-36.72	5,408.93	0.00	0.00	0.00
17,600.00	90.21	359.60	11,712.96	5,508.80	-37.41	5,508.93	0.00	0.00	0.00
17,700.00	90.21	359.60	11,712.60	5,608.80	-38.10	5,608.93	0.00	0.00	0.00
17,800.00	90.21	359.60	11,712.24	5,708.80	-38.80	5,708.93	0.00	0.00	0.00
17,900.00	90.21	359.60	11,711.87	5,808.79	-39.49	5,808.93	0.00	0.00	0.00
18,000.00	90.21	359.60	11,711.51	5,908.79	-40.18	5,908.93	0.00	0.00	0.00
18,100.00	90.21	359.60	11,711.14	6,008.79	-40.87	6,008.93	0.00	0.00	0.00
18,200.00	90.21	359.60	11,710.78	6,108.78	-41.57	6,108.92	0.00	0.00	0.00
18,300.00	90.21	359.60	11,710.42	6,208.78	-42.26	6,208.92	0.00	0.00	0.00
18,400.00	90.21	359.60	11,710.05	6,308.78	-42.95	6,308.92	0.00	0.00	0.00
18,500.00	90.21	359.60	11,709.69	6,408.77	-43.65	6,408.92	0.00	0.00	0.00
18,600.00	90.21	359.60	11,709.33	6,508.77	-44.34	6,508.92	0.00	0.00	0.00
18,700.00	90.21	359.60	11,708.96	6,608.77	-45.03	6,608.92	0.00	0.00	0.00
18,800.00	90.21	359.60	11,708.60	6,708.76	-45.72	6,708.92	0.00	0.00	0.00
18,900.00	90.21	359.60	11,708.24	6,808.76	-46.42	6,808.92	0.00	0.00	0.00
19,000.00	90.21	359.60	11,707.87	6,908.76	-47.11	6,908.92	0.00	0.00	0.00
19,100.00	90.21	359.60	11,707.51	7,008.76	-47.80	7,008.92	0.00	0.00	0.00
19,200.00	90.21	359.60	11,707.14	7,108.75	-48.50	7,108.92	0.00	0.00	0.00
19,300.00	90.21	359.60	11,706.78	7,208.75	-49.19	7,208.92	0.00	0.00	0.00
19,400.00	90.21	359.60	11,706.42	7,308.75	-49.88	7,308.92	0.00	0.00	0.00
19,500.00	90.21	359.60	11,706.05	7,408.74	-50.57	7,408.92	0.00	0.00	0.00
19,600.00	90.21	359.60	11,705.69	7,508.74	-51.27	7,508.92	0.00	0.00	0.00
19,700.00	90.21	359.60	11,705.33	7,608.74	-51.96	7,608.91	0.00	0.00	0.00
19,800.00	90.21	359.60	11,704.96	7,708.73	-52.65	7,708.91	0.00	0.00	0.00
19,900.00	90.21	359.60	11,704.60	7,808.73	-53.35	7,808.91	0.00	0.00	0.00
20,000.00	90.21	359.60	11,704.24	7,908.73	-54.04	7,908.91	0.00	0.00	0.00
20,100.00	90.21	359.60	11,703.87	8,008.72	-54.73	8,008.91	0.00	0.00	0.00
20,200.00	90.21	359.60	11,703.51	8,108.72	-55.42	8,108.91	0.00	0.00	0.00
20,300.00	90.21	359.60	11,703.14	8,208.72	-56.12	8,208.91	0.00	0.00	0.00
20,400.00	90.21	359.60	11,702.78	8,308.72	-56.81	8,308.91	0.00	0.00	0.00
20,500.00	90.21	359.60	11,702.42	8,408.71	-57.50	8,408.91	0.00	0.00	0.00
20,600.00	90.21	359.60	11,702.05	8,508.71	-58.20	8,508.91	0.00	0.00	0.00
20,700.00	90.21	359.60	11,701.69	8,608.71	-58.89	8,608.91	0.00	0.00	0.00
20,800.00	90.21	359.60	11,701.33	8,708.70	-59.58	8,708.91	0.00	0.00	0.00
20,900.00	90.21	359.60	11,700.96	8,808.70	-60.27	8,808.91	0.00	0.00	0.00
21,000.00	90.21	359.60	11,700.60	8,908.70	-60.97	8,908.91	0.00	0.00	0.00
21,100.00	90.21	359.60	11,700.23	9,008.69	-61.66	9,008.91	0.00	0.00	0.00
21,200.00	90.21	359.60	11,699.87	9,108.69	-62.35	9,108.90	0.00	0.00	0.00
21,300.00	90.21	359.60	11,699.51	9,208.69	-63.04	9,208.90	0.00	0.00	0.00
21,400.00	90.21	359.60	11,699.14	9,308.69	-63.74	9,308.90	0.00	0.00	0.00
21,500.00	90.21	359.60	11,698.78	9,408.68	-64.43	9,408.90	0.00	0.00	0.00
21,600.00	90.21	359.60	11,698.42	9,508.68	-65.12	9,508.90	0.00	0.00	0.00
21,700.00	90.21	359.60	11,698.05	9,608.68	-65.82	9,608.90	0.00	0.00	0.00
21,800.00	90.21	359.60	11,697.69	9,708.67	-66.51	9,708.90	0.00	0.00	0.00
21,900.00	90.21	359.60	11,697.33	9,808.67	-67.20	9,808.90	0.00	0.00	0.00
TD at 21989.46									
21,989.46	90.21	359.60	11,697.00	9,898.13	-67.82	9,898.36	0.00	0.00	0.00

Database:	EDM 5000.1 Single User Db	**Local Co-ordinate Reference:**	Well Cheddar 3BS Federal Com 1H
Company:	GMT Exploration	**TVD Reference:**	WELL @ 3716.00ft (Original Well Elev)
Project:	Lea County, NM (NAD 83)	**MD Reference:**	WELL @ 3716.00ft (Original Well Elev)
Site:	Cheddar Federal Com pad.	**North Reference:**	Grid
Well:	Cheddar 3BS Federal Com 1H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Cheddar 3BS Federal Com 1H		
Design:	Design #3		

Design Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (usft)	Easting (usft)	Latitude	Longitude
VP Cheddar 3BS Federa - plan hits target center - Point	0.00	0.00	9,000.00	-575.03	4.74	514,432.26	735,451.86	32° 24' 45.617 N	103° 42' 15.500 W
PBHL Cheddar 3BS Fed - plan hits target center - Point	0.00	0.00	11,697.00	9,898.13	-67.82	524,905.40	735,379.30	32° 26' 29.254 N	103° 42' 15.627 W
FTP Cheddar 3BS Fede - plan misses target center by 0.01ft at 12091.04ft MD (11733.00 TVD, 0.01 N, 0.76 E) - Point	0.00	0.00	11,733.00	0.01	0.76	515,007.30	735,447.89	32° 24' 51.307 N	103° 42' 15.507 W

Formations

Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
670.00	670.00	Rustler		0.18	359.60
1,000.00	1,000.00	Salt Top		0.18	359.60
4,636.55	4,630.00	Delaware Mountain Group		0.18	359.60
4,742.07	4,735.00	Delaware Bell Canyon		0.18	359.60
5,571.13	5,560.00	Cherry Canyon		0.18	359.60
7,179.01	7,160.00	Brushy Canyon		0.18	359.60
8,364.81	8,340.00	Lower Brushy Canyon Marker		0.18	359.60
8,631.12	8,605.00	Bone Spring		0.18	359.60
8,826.95	8,800.00	Avalon Shale Top		0.18	359.60
9,667.09	9,640.00	1st Bone Spring Sand		0.18	359.60
10,152.09	10,125.00	Carbonate		0.18	359.60
10,342.09	10,315.00	2nd Bone Spring Sand		0.18	359.60
10,727.09	10,700.00	Carbonate		0.18	359.60
11,473.92	11,435.00	3rd Bone Spring Sand		0.18	359.60
11,877.27	11,695.00	Possible Horizontal Target Top		0.18	359.60

Plan Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates +N/-S (ft)	Local Coordinates +E/-W (ft)	Comment
3,100.00	3,100.00	0.00	0.00	Start Build 2.00
3,392.79	3,392.28	-14.95	0.12	Start 5343.32 hold at 3392.79 MD
8,736.11	8,707.72	-560.08	4.62	Start Drop -2.00
9,028.90	9,000.00	-575.03	4.74	Start 2160.04 hold at 9028.90 MD
11,188.94	11,160.04	-575.03	4.74	Start DLS 10.00 TFO 359.60
12,091.03	11,733.00	0.00	0.76	Start 9898.43 hold at 12091.03 MD
21,989.46	11,697.00	9,898.13	-67.82	TD at 21989.46

GMT Exploration Company LLC

Project:	Lea County, NM (NAD 83)
Site:	Cheddar Federal Com pad.
Well:	Cheddar 3BS Federal Com 1H
Wellbore:	Cheddar 3BS Federal Com 1H
Design:	Design #3
Latitude:	32° 24' 51.307 N
Longitude:	103° 42' 15.516 W
GL:	3696.00
KB:	WELL @ 3716.00ft (Original Well Elev)

NEWSCO

WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
VP Cheddar 3BS Federal Com 1H P3	9000.00	-575.03	4.74	514432.26	735451.86	32° 24' 45.617 N	103° 42' 15.500 W
PBHL Cheddar 3BS Federal Com 1H P3	11697.00	9898.13	-67.82	524905.40	735379.30	32° 26' 29.254 N	103° 42' 15.627 W
FTP Cheddar 3BS Federal Com 1H P3	11733.00	0.01	0.76	515007.30	735447.89	32° 24' 51.307 N	103° 42' 15.507 W

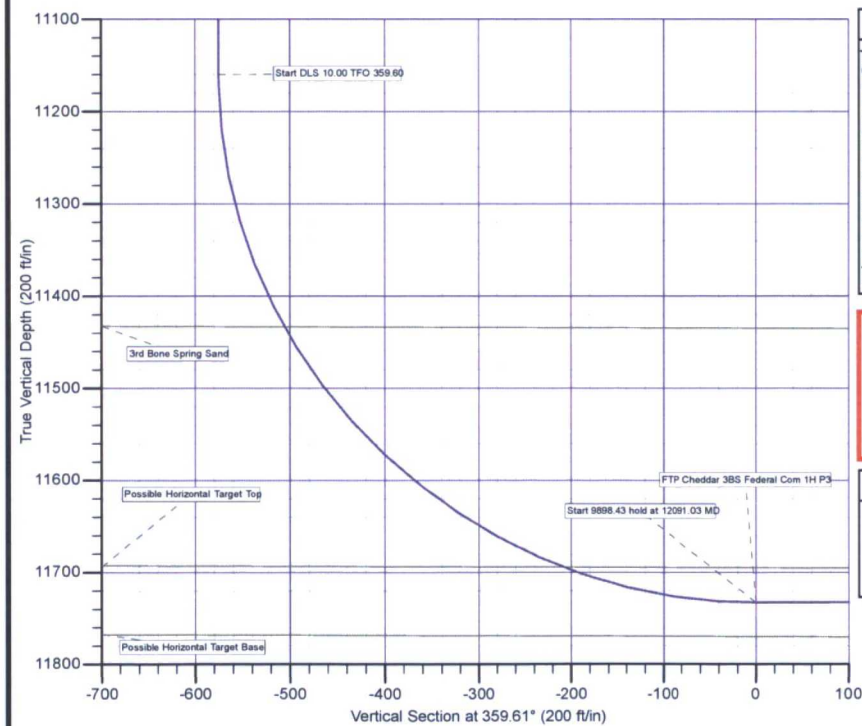
WELL DETAILS: Cheddar 3BS Federal Com 1H

Ground Level: 3696.00

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.00	0.00	515007.29	735447.12	32° 24' 51.307 N	103° 42' 15.516 W	

SECTION DETAILS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Annotation
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
3100.00	0.00	0.00	3100.00	0.00	0.00	0.00	0.00	0.00	Start Build 2.00
3392.79	5.86	179.53	3392.28	-14.95	0.12	2.00	179.53	-14.95	Start 5343.32 hold at 3392.79 MD
8736.11	5.86	179.53	8707.72	-560.08	4.62	0.00	0.00	-560.10	Start Drop -2.00
9028.90	0.00	0.00	9000.00	-575.03	4.74	2.00	180.00	-575.05	Start 2160.04 hold at 9028.90 MD
11188.94	0.00	0.00	11160.04	-575.03	4.74	0.00	0.00	-575.05	Start DLS 10.00 TFO 359.60
12091.03	90.21	359.60	11733.00	0.00	0.76	10.00	359.60	-0.01	Start 9898.43 hold at 12091.03 MD
21989.46	90.21	359.60	11697.00	9898.13	-67.82	0.00	0.00	9898.36	TD at 21989.46



FORMATION TOP DETAILS

TVDPath	MDPath	Formation
670.00	670.00	Rustler
1000.00	1000.00	Salt Top
4629.55	4636.55	Delaware Mountain Group
4734.52	4742.07	Delaware Bell Canyon
5559.25	5571.13	Cherry Canyon
7158.74	7179.01	Brushy Canyon
8338.36	8364.81	Lower Brushy Canyon Marker
8603.27	8631.12	Bone Spring
8798.22	8826.95	Avalon Shale Top
9638.19	9667.09	1st Bone Spring Sand
10123.19	10152.09	Carbonate
10313.19	10342.09	2nd Bone Spring Sand
10698.19	10727.09	Carbonate
11433.41	11473.92	3rd Bone Spring Sand
11694.34	11877.27	Possible Horizontal Target Top

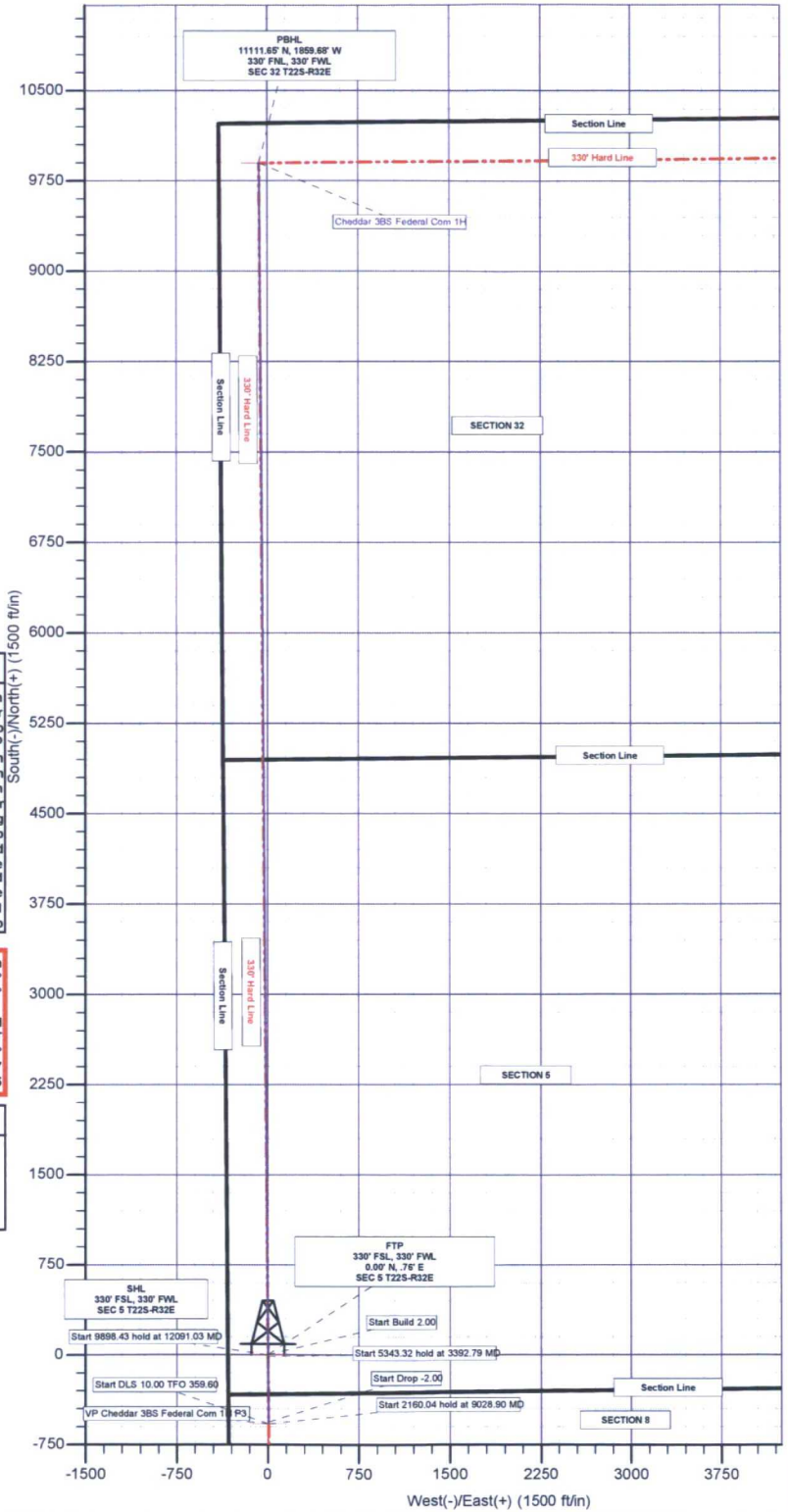
T G M

Azimuths to Grid North
True North: -0.34°
Magnetic North: 6.71°

Magnetic Field
Strength: 48050.4snT
Dip Angle: 60.22°
Date: 04/24/2017
Model: IGRF2015

PROJECT DETAILS: Lea County, NM (NAD 83)

Geodetic System: US State Plane 1983
Datum: North American Datum 1983
Ellipsoid: GRS 1980
Zone: New Mexico Eastern Zone
System Datum: Mean Sea Level



Plan: Design #3 (Cheddar 3BS Federal Com 1H/Cheddar 3BS Federal Com 1H)

Created By: TRACY WILLIAMS Date: 14:38, June 15 2017

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I. INTRODUCTION

This plan specifies precautionary measures, safety equipment, emergency procedures, responsibilities, duties, and the compliance status pertaining to the production operations of Hydrogen Sulfide producing wells on:

Cheddar 3BS Federal Com 1H

This plan will be in full effect prior to and continuing with all production operations for all wells producing potential Hydrogen Sulfide.

This plan was developed in response to the potential hazards involved when producing formations that may contain Hydrogen Sulfide (H_2S). It has been written in compliance with current rules and regulations.

This plan shall require the full cooperation and efforts of all individuals participating in the production of potential H_2S wells. Each individual is required to know their assigned responsibilities and duties in regard to normal production operations and emergency procedures. Each person should thoroughly understand and be able to use all safety related equipment on the production facility. Each person should become familiar with the location of all safety equipment and become involved in ensuring that all equipment is properly stored, easily accessible, and routinely maintained. An ongoing training program will remain in effect with regular drills, equipment inspections, and annual certifications for all personnel.

Centennial Resource Development
Here after referred to as
"Centennial"
Shall make every reasonable effort to provide all possible safeguards to protect all personnel, both on this location and in the immediate vicinity, from the harmful effects of H_2S exposure, if a release to the atmosphere should occur.

II. SAFETY EQUIPMENT

A summary of the procedures and equipment that will be operational prior to producing wells follows:

- The location production equipment, piping, vent/flare system, and all associated sensing and connecting lines, and process containment have been designed and evaluated with materials chosen considering corrosion from exposure to H2s and SO2. Process control Instrumentation media supply has been established as "Compressed "AIR ONLY" with no interface or alternate use of produced gas as a working supply source.
- All associated Simultaneous operations, SIMOPS, other special operations, wireline, slick line, well testing, bleed down or off of vessels, casings or instrumentation, valves etc. for testing, service, or inspection, will not be done until a JSA have been established directing all personnel onsite to observe all

established safety measures, and all dangers have been identified, anticipated, and prepared for with personnel safety equipment required to be employed.

- The Flare is equipped with two redundant SO2 sensors located within the vent scrubber entry line to the flare boom and are set at 5ppm minimum which will shut-in the location immediately and alarm locally, and must be manually reset.
- Atmospheric sensors strategically located as illustrated will be set to detect a minimum of 2 PPM SO2, and will effect a total shut-in. These sensors are located in the following locations:

  A.

  B.

  C.

Handheld portable SO2 detectors are for full variable specific sensor surveys and for redundant backup of the fixed sensor net.

- At any time that personnel detect an H2S or SO2 suspect odor or experience nasal irritation, sensor readings will be taken at the fixed sensor locations and in all areas of the location on an hourly basis. These readings will be documented and continued until the Centennial PIC and or the Safety Supervisor judge by the readings history that all is clear.

A. SAFE BRIEFING AREAS

Two areas will be designated as "SAFE BRIEFING AREAS".
The Primary Safe Briefing Area

If the Primary Safe Briefing Area cannot be used due to wind conditions; the designated secondary safe briefing area will be used.

These two areas are so designated for accessibility reasons related to self contained safe breathing air device locations, evacuation muster point utility, and for ease of overall communication, organizational support, as well as the all important prevailing wind directions. Drawings of the facility denoting these locations are included in Appendix D.
If H_2S is detected in concentrations equal to or in excess of 20 PPM, all personnel not assigned emergency duties are to assemble in the appropriate "SAFE BRIEFING AREA" for instructions.

B. WIND DIRECTION INDICATOR

Windsocks (2)

Allowing the wind direction to be observed from anywhere on the location.

C. Warning-DANGER SIGNS (For approaching traffic)

All signs shall also be illuminated under conditions of poor visibility.

DANGER **POISONOUS GAS** **HYDROGEN SULFIDE** **DO NOT APPROACH IF RED FLAGS ARE DISPLAYED**

Additionally, an audible alarm will sound when H_2S exceeds 10 ppm, and a red strobe light system will be activated for H_2S concentrations of 20 PPM or greater. This condition will exist until the all clear is given.

D. SAFE BRIEFING AREA

High visibility Red background signs with white lettering indicating the designated safe briefing areas will be prominently posted designating the established Safe Briefing Area locations.

1. **(Primary Safe Briefing Area) @_____**

2. **(Secondary Safe Briefing Area) @_____**

E. H2s HAZARD CONDTION SIGNS

High visibility signs with lettering indicating the H2s Hazard Condition I or II signals and personnel response directions, as designated in Appendix B-1, will be posted in the following locations:

1. **Primary Safe Briefing Area**
2. **Secondary Safe Briefing Area,**
3.
4.

F. H_2S DETECTORS AND ALARMS

Continuous monitoring type H_2S sensor-detectors, capable of sensing a minimum of 10 PPM, Atmospheric H_2S sensors will be located at each of the following points:
(Note: see facility plot / Safety Equip Layout in Appendix D)

1.
2.
3.
4.

G. (2) Hand Held H2S / Gas Detectors

Two handheld H2S/gas detectors will be always available for specific monitoring requirements and periodic air quality testing checks.

H. Spot-check "Mini-Check type"

Personnel carried H2S Personal detectors will be available for general usage as is needed for **JSA** reviewed required work projects, or emergencies, to add an additional layer of detection, along with handheld detectors and the location fixed detector network.

I. Automatic detection response condition alarms

Automatic H_2S alarms (visual and audible alarms will be located at the following points:

1.
2.
3.
4.
5.
6.
7.

Additionally, other automatic visual alarms, red flashing strobe lights and automatic sirens will be activated as per the facility SAFE chart. A Pinpoint H_2S alarms display will be located in the _____.

J. FLARE LINE PIPING

Prior to opening wells for production, and at all times thereafter, the flare boom **shall** be fully operational so that gas can be flared (burned) if H_2S gas has to be bled (vented) from any process vessel. A remote ignition device with a secondary ignition system will be fully available and in-service at all times.

In the event that the flare goes out the location and all wells will automatically be shut-in until such time as the flare can be reignited. Electronic sensors are installed to monitor after-burn at the flare boom for S02 detection. If 2 ppm SO_2 detection is sensed, the location–wells will automatically be shut-in.

K. H_2S CORROSION CONTROL

A chemical injection pump system has been established to protect piping and production process vessels form H2S related corrosion.

L. BREATHING AIR

1. There will be self-contained breathing apparatus (SCBA) labeled **("Safe Breathing Air")** located at the following areas:

- These devices will be designed, selected, used, and maintained to conform to the ANSI Z88.2 AMERICAN NATIONAL STANDARD FOR RESPORITORY PROTECTION

a. Primary "SAFE BRIEFING AREA"

b. Secondary "SAFE BRIEFING AREA"

c.

d.

e.

f.

g.

h

TOTAL: 00 SCBA BREATHING AIR-PACK DEVICES

2. There will be a cascade rack of high pressure breathing air labeled "Safe Breathing Air" located at each of the following areas:

a. **Primary Safe Briefing Area**

b. **SECONDARY SAFE BRIEFING AREA**

Additionally, at each cascade station there will be two (2) each 50' extension hoses for emergency extended reach efforts.

M. LIST OF SAFETY EQUIPMENT

The description and quantity of all safety equipment (including but not limited to breathing air equipment, resuscitators, H_2S and SO_2 detectors, explosion meters, flare gun, etc.) is listed in Appendix C.

N. ADDITIONAL H_2S HARDWARE

1. **Flare boom with automatic remote lighting system.**
2. **Portable H2S / gas detection meters.**
3. **Mini-Check personal H2S detectors**
4. **H2S / SO2 / Gas detector calibrator kit**

O. FANS

Two (2) portable electric fans (48" or larger with explosion proof motor), with 50' of flexible cord shall be located [redacted]. The fan frame-structure shall be of the tilt to roll type.

P. SULFATREAT SYSTEM

The SulfaTreat System will be used to reduce the average H_2S concentration from well stream flow of approximately, **500 PPM high / 39PPM low,** to an approximate maximum of 4 PPM. They will be installed and will be monitored daily to determine when the material is spent. In the event the H_2S concentration exceeds 8 PPM the location will be shut in. Additional information concerning these units may be found in Appendix E.

III. NORMAL OPERATING PROCEDURES

A. PRIOR TO PRODUCING WELLS

This H_2S Contingency Plan will be operational prior to producing wells at Cheddar 2BS Federal Com 1H.

1. Lists of emergency phone numbers will be maintained on the location and shall be posted at the following places:

   a. CENTENNIAL Facility Production Office
   b. CENTENNIAL Facility Production Person in charge Office
   c. CENTENNIAL muster area

2. All safety equipment and H_2S related hardware shall be set up as outlined under Section II "SAFETY EQUIPMENT" All safety equipment shall be inspected routinely, paying particular attention to resuscitators and breathing air equipment, with documentation of all inspections and service kept on file.

3. All personnel on site shall be assigned breathing air equipment and, as needed, personal H_2S detection devices. CENTENNIAL and Contract personnel required to work in the following areas will be provided with SCBA's.

   a.
   b.
   c.
   d.

4. Prior to producing wells, and continuing, all CENTENNIAL personnel, contract personnel, and all essential service company personnel shall be thoroughly trained in the hazardous nature of H2s within the production operations, and receive accredited certification from a certified, qualified technician instructor, in the use of breathing air equipment, emergency procedures, responsibilities, and first aid for H_2S victims.
   The Location Person in Charge will also be the primary certified, qualified Safety Supervisor, and will have the authority to delegate H2S safety supervision responsibilities to a designated certified – qualified person in the interest of comprehensive, efficient, and thorough control and oversight of all activities related to H2s operations. This designated Safety Supervisor will ensure that the integrity of this plan is fully adhered to, at all

times, and that all personnel and activities remain within full compliance.

The Safety Supervisor or Centennial Person in Charge shall keep a file listing all personnel that have completed the special training programs both off of, and onsite the platform. Copies of all H2s training certification of all personnel, service contractors, and visitors onsite shall also be kept on file with the;

Centennial Regulatory/Compliance supervisor

All personnel shall be given a copy of

SAFE PRACTICES DURING THE PRODUCTION OF HYDROGEN SULFIDE

As listed in Section B-1 of the Appendix. This document summarizes the steps to be taken during the three (3) conditions classifications, operational status, and personnel required responses.

This document lists general information about toxic gases, explains the physiological effects of H_2S, classifies operating conditions, and informs each reader of their general responsibilities concerning safety equipment and emergency procedures. The Safety Supervisor or Centennial Person in Charge shall keep a file listing of all persons that have copies of the document, with their signatures, verifying that they have read and understand it thoroughly.

B. DURING PRODUCTION / FLOWING OF SOUR GAS WELLS

1. During normal production operations, flowing of sour gas wells, the H_2S fixed detection system will be calibrated every fourteen **(14)** days under normal conditions by personnel trained to calibrate the installed specific systems sensor equipment by exposing the sensors to a known concentration in the range of 10 ppm to 30 ppm. In the event that H_2S is detected under normal working conditions, the units will be tested at least once every twenty-four (24) hours until an all clear can be determined. The time and results of each test will be logged by the Safety Supervisor or Centennial Person in Charge and reported each day to the CENTENNIAL PRODUCTION SUPERVISOR, until an all clear has been determined. All other associated H2S safety equipment shall be inspected during the required weekly drills.

- A third party Certified Technician will inspect and calibrate all H2s and SO2 sensors every 90 days by exposing the sensors to a known concentration of 10ppm to 30ppm.He will also follow-up, inspect and

verify all safety system functions of the detection system as stated in the SAFE chart; and inspect all breathing air equipment, and systems, as well as all other H2S related devices as inventoried on the H2S safety equipment inspection forms, including signs, flags, lights, strobes, alarms, storage containers, etc. that are weekly inspected by the location operations personnel.

The CENTENNIAL Person in Charge shall insure that the H_2S detection equipment calibrations and tests are recorded on the specific Daily Production Report forms and compliance files inspection records.

Note: In the event that any one H_2S detector does not test successfully, a temporary manned handheld certified sensor-detector will be employed until such time as the faulty sensor can be repaired-replaced. If more than one sensor fails to test, production operations will cease until all failed detectors are:

a. **Repaired, or Replaced and tested**
b. **Approval to proceed using temporary manned handheld detectors is received from the appropriate Regulatory authority.**

Criteria for continuing operation:

a. **No more than any one sensor may be out of service at one time.**
b. **A portable H_2S monitoring device must be temporarily substituted for fixed area monitor substitution.**
c. **A competent qualified person must monitor the portable H_2S device until the sensor is repaired.**

2. When entering the location, all personnel, without exception, shall proceed directly to, or as directed, to the location office for log in, location briefing and orientation. They will then be assigned breathing air equipment. An instructional H2S orientation briefing will also be held, unless personnel names and social security numbers are registered and current with the Safety Supervisor and/or Centennial Person in charge. If so then a walk through briefing will be held with the attendance documented. The Safety Supervisor and/or Centennial Person in Charge will be responsible for assigning all equipment to these individuals and instructing them in its use. JSA's will also record this process prior to commencing any project work on the facility.

3. All equipment brought on location by contract Service Company employees must be logged onsite, including the type, model number, and quantity of all H_2S related safety equipment.

4. Upon boarding the platform, each person shall be issued a copy of **"SAFE PRACTICES DURING THE PRODUCTION OF HYDROGEN SULFIDE"** from the Safety Supervisor or Centennial Person in Charge. They shall verify that it has been read by signing in the provided for acknowledgement space. If they have not previously done so, a copy of the signed page should be forwarded to the **CENTENNIAL AREA SUPERVISOR and the REGULATORY/COMPLIANCE SUPERVISOR.**

5. Hydrogen Sulfide drills will be regularly held as often as necessary to acquaint the crews and contract service company personnel with their responsibilities when a release has occurred from the well(s). After the CENTENNIAL Person in Charge is satisfied that all crews are trained, drills shall be conducted weekly.

6. Each person aboard the location shall be instructed on the proper use of breathing air equipment until supervisory personnel are satisfied that each person has demonstrated competency in using that equipment. This training must include all personnel that are allowed aboard the location during normal production operations.

7. After familiarization, each **on-duty** crew shall perform a weekly drill with breathing equipment. The drill should include removing equipment from stowage, inspecting the breathing air equipment, putting it on, and working for a short period. A record should be kept of the personnel drilled and the date. A complete "BREATHING AIR EQUIPMENT DRILL" procedure is given in Section B-5 of the Appendix, drill should be documented on daily morning production report.

8. Along with normal weekly fire drills and safety meetings, weekly breathing air equipment drills and H_2S training sessions shall also be held for all **off-duty** personnel and a record of attendance shall be kept.

9. All production personnel and contract service company personnel must be aware of the location of all SCBA's, cascade breathing air systems, resuscitation equipment, portable fire extinguishers, and H_2S detectors. Knowledge of the location of H_2S detection monitors is vital to understanding the "emergency conditions". In addition, key personnel shall be trained in the use of resuscitation equipment and the H_2S detection system equipment.

10. H_2S detection equipment shall be available for use by all working personnel. After any device has initially detected H_2S, periodic inspections of all areas of poor ventilation shall be made with a portable H_2S detector instrument.

11. All personnel on the location should become "wind-conscious" included in training drills, and be aware at all times of the direction of the prevailing winds. They should remember that H_2S is **heavier than air and will collect in low places in still air**.

12. There shall be no welding if H_2S is detected at the surface area, until the surrounding air is thoroughly tested with a handheld H2s detector, and an explosion meter, and the work area has been determined to be safe to proceed.

13. After production operations commence on H_2S wells, increased monitoring of the working area should be provided anytime the well is flowing. **If the H_2S concentration reaches 20 PPM in the air, all working personnel shall wear breathing air equipment,** and all personnel not assigned emergency duties must go to the appropriate "SAFE BRIEFING AREA".

IV. OPERATING CONDTIONS – CLASSIFICATIONS

Note: CENTENNIAL has elected to use the audible intermittent horn and amber strobe alarm for Condition I and the red strobe light with continuous horn in addition to the other warning signs for Condition II.

A. POSSIBLE HAZARDOUS CONDITIONS (H_2S NOT PRESENT)

NORMAL OPERATIONS

1. Warning Signs
(For notification of general public and operations):

"DANGER--POISONOUS GAS--HYDROGEN SULFIDE"
"Poisonous Gas Do Not Approach If Red Flags are displayed"

(See Section II).

These signs SHALL be illuminated at night and SHALL be continuously illuminated during times of reduced visibility.

2. **Production Process Upset Alarm**
(For notification of production and contract personnel):

3. **Characterized by:** Production operations under control: Routine production operations in production zones that may contain Hydrogen Sulfide. This condition will be in effect as "Normal OPS" continuously when producing wells, until it is necessary to go to a Condition I or II.

4. **General Action:**

   a. Be alert for condition change. There will be **NO SMOKING** except in approved designated areas as

permitted by the Person in charge or the Safety Supervisor.

b. Keep all safety equipment available and all monitors functioning properly.

c. Perform all required drills for familiarization and proficiency.

B. CONDITION I – POTENTIAL DANGER TO LIFE – H_2S PRESENT AT 10 TO LESS THAN 20 PPM

1. Warning Signs

(For notification of general public and operations):

"DANGER--POISONOUS GAS--HYDROGEN SULFIDE"
"Poisonous Gas Do Not Approach If Red Flags are displayed"

These signs SHALL be illuminated at night and SHALL be continuously illuminated during times of reduced visibility.

2. Alarm

A pinpoint alarm will activate showing the concentration and location of the detected H_2S gas. A Master system control card is located in the _____ Building that shows the area location and PPM of H_2S at the alarming sensor head. The pinpoint alarm is depicted on the facility drawing / safety equipment layout.

Work Areas:

Continuous Siren Alarm – Alarm signals will continue for as long as the H_2S concentration is present at or greater than 10 ppm and less then 20 ppm or until deactivated by the CENTENNIAL Person in Charge. When H_2S concentration is present at or greater than 10 and less than 20 ppm remote alarm can only be reset manually.

Note: Any alarm that is not answered in five (5) minutes will activate an automatic shut-in of the facility.

3. Living Areas

A continuous siren alarm will be activated automatically and continue for as long as the H2S concentration is present at greater than 10 PPM and less than 20 PPM, or until deactivated Centennial Person in Charge.

4. **Characterized By:**

Production operations under control:

Sour gas may be present in concentrations at threshold levels and may or may not be detectable by odor (See 'TOXICITY OF VARIOUS GASES" Section B-2 in the Appendix). This condition will be in effect continuously from the time H_2S concentration reaches 10 PPM unless it is necessary to go to Condition II. Action to be taken under Condition I is contained under Section V "H_2S EMERGENCY PROCEDURES".

5. **General Action**

a. Don SCBA and proceed immediately to the upwind "SAFE BRIEFING AREA" if not specifically assigned duties to correct or control the situation.

b. Be alert for a condition change. There will be **NO SMOKING** at this time.

c. **Check safety equipment for proper functioning. Keep it available. No welding or open fires without permission from the CENTENNIAL Person in Charge.**

d. Follow the instructions of the Centennial Supervisors.

e. Contact _____ and inform of H_2S release detection.

C. CONDITION II – MODERATE DANGER TO LIFE – H_2S PRESENT AT 20 PPM OR ABOVE

1. Warning Signs

(For notification of general public and operations):

"DANGER--POISONOUS GAS--HYDROGEN SULFIDE"

"Poisonous Gas Do Not Approach If Red Flags are displayed"

These signs SHALL be illuminated at night and SHALL be continuously illuminated during times of reduced visibility.

2. Alarm:

Work Areas, Living quarters and Pinpoint Alarms:

Continuous sounding of the H_2S siren and red strobe lights in [redacted] with red flags outdoors. All audible alarms and red lights will sound as long as the H_2S concentration is present at 20 ppm or greater or until deactivated by the CENTENNIAL Person in Charge. Exterior red flags will remain displayed until alarm condition clears and is manually reset at the Control Panel. System can only be reset when H_2S concentration levels fall below 20 ppm. **Location production will be terminated at 20 PPM atmospheric upset**.

3. Characterized By:

Critical well operations or well control problems. Poisonous gases are present above the threshold levels (as defined under 'TOXICITY OF VARIOUS GASES" Section B-1 in the Appendix). This condition shall be in effect when the H_2S concentration is present at 20 PPM or higher.

4. General Action

a. Go to Safe Briefing area and immediately don a Self Contained Breathing Apparatus if not specifically assigned duties to correct or control the situation.

b. Follow the instructions of the CENTENNIAL Person in Charge.

c. CENTENNIAL Person in Charge shall initiate emergency action as provided in this plan.

d. All persons working in the hazard area shall wear self-contained breathing apparatus.

e. Production will automatically be shut-in.

f. Contact _____ and inform of H_2S release detection.

V. H_2S EMERGENCY PROCEDURES
(According to the operating condition declared)

A. EMERGENCY PROCEDURES FOR CONDITION I

If at anytime greater than 10 ppm of H_2S detected the following steps will taken:

1. The person detecting the H_2S shall immediately notify the CENTENNIAL Person in Charge.

2. The CENTENNIAL Person in charge shall don self-contained breathing apparatus, take hand held detectors to the pinpoint location and verify the presence and source of H_2S.

3. When notified of a Condition I or II situation, the following personnel will immediately put on their breathing air units:

   a. All personnel in the immediate release area.
   b. All personnel in the operational area.
   c. All personnel downwind of the source of H_2S.

4. The on-duty CENTENNIAL Person in Charge will alert all personnel in work areas that a Condition I exists. He shall be prepared to shut off the air circulation system and to close all doorways downwind of and below the source of H_2S.

5. The CENTENNIAL Person in Charge will test air quality using a portable gas detector.

6. A concerted effort must be made by supervisory personnel to determine the source of the H_2S and to suppress the H_2S as quickly as possible. **Normal operations must not proceed until the source of the H_2S is determined** and conditions are stabilized. All personnel will keep breathing air equipment on while source of release is being identified and until the CENTENNIAL Person in Charge gives the all clear.

7. The CENTENNIAL Person in Charge will make sure all non-essential personnel are out of the potential danger area (i.e. well bay, plus ten). All personnel who remain in the potential danger areas must utilize the "Buddy System".

8. The CENTENNIAL Person in Charge will order all personnel to check their safety equipment to see that it is working properly and is in the proper location.

9. The CENTENNIAL Person in Charge shall notify the CENTENNIAL Production Supervisor of current conditions and actions taken.

10. The CENTENNIAL Person in Charge will see that all monitoring devices are functioning properly and reading accurately and will increase gas-monitoring activities with portable units.

11. Once breathing air equipment is on, the CENTENNIAL Person in Charge should:
Be ready to close master well control valve(s) if automatic functions fail.

B. EMERGENCY PROCEDURES FOR CONDITION II

If the H_2S concentration reaches 20 PPM the wells and production system will automatically be shut-in. In addition to items listed above under Condition I:

1. The person detecting the H_2S must immediately notify the CENTENNIAL Person in Charge.

2. The following personnel will immediately put on their breathing air units:

   a. CENTENNIAL Person in Charge
   b. All Production Personnel
   c. All Contract Personnel

3. Once breathing air equipment is on, the CENTENNIAL Person in Charge should:

   a. Be ready to close master well control valve if automatic functions fails.

4. The CENTENNIAL Person in Charge will alert all personnel in work areas that a Condition II exists. He shall be prepared to shut off any air circulation system.

5. All personnel on the location must don assigned self-breathing apparatus and report to the "SAFE BRIEFING AREA" for further instructions. If your assigned self-contained breathing apparatus and the "SAFE BRIEFING AREA" are upwind of the well, or source of the leakage, the self-contained breathing apparatus

may be carried to the briefing area. However, if there is any doubt, don and activate the unit immediately. If it becomes necessary to go through the production area to get to the "SAFE BRIEFING AREA", the breathing air equipment should be put on as soon as the equipment is reached. If you are located on the downwind end of the location when the Condition II alarm is sounded, hold your breath and proceed to the upwind "SAFE BRIEFING AREA", donning the nearest breathing air equipment available.

6. Always put on breathing air equipment before assisting someone affected by H_2S gas, and utilize the "Buddy System". If the affected person is stricken in a high concentration area turn respirator by-pass to full positive pressure and obtain stand-by assistance before entering the area. Always use the "Buddy System" when entering possibly contaminated areas.

7. The CENTENNIAL Person in Charge will assess the situation and assign duties to each person needed to bring the situation under control. When the severity of the situation has been determined, all persons will be advised. The CENTENNIAL Person in Charge will:

   a. Direct corrective action
   b. Notify the CENTENNIAL Production Supervisor

8. The CENTENNIAL Production Supervisor will be responsible for notifying the appropriate regulatory agencies (See Appendix B-7).

9. If an H_2S concentration exceeding 50 PPM in the air is recorded at the outer perimeter of the location, notify all appropriate regulatory agencies and alert by radio communication all known aircraft in the immediate vicinity of the production location.

VI. SPECIAL OPERATIONS

A. EQUIPMENT BLOW-DOWN / LINE PRESSURE RELEASES

1. All produced gases released from any production vessel or line must be vented and burned through a flare system equipped with continuous pilot and automatic igniter.

B. FACILITY START-UP PROTOCOL (AFTER EVACUATION)

1. After the facility has been evacuated and prior to re-starting generators, the system must be reset to bring H_2S systems back in service. The H_2S System must be checked and tested prior to performing any operations.

VII. PARTIAL EVACUATION PROCEDURE

Key personnel to remain onsite during a partial evacuation are:

a. Production Location Crew On-Duty
b. Centennial Person in Charge
c. Any other designated CENTENNIAL Supervisory Personnel.

VIII. RE-IGNITING THE FLARE

A. RESPONSIBILITY FOR DECISION

In the event of severe well control problems and failure of the flare and back-up systems, the final decision to re-ignite the flare is the responsibility of the CENTENNIAL Person in Charge. This decision should be made based upon conditions at the time. Two possible scenarios that might prevent re-ignition are:

1) **Human life is endangered or, 2) There is no hope of controlling the well under the prevailing conditions at the site.**

The Person in Charge should make such a decision only after consulting with the ranking CENTENNIAL Representative onsite at the location and only if time and circumstances permit. He must not delay his decision, however, if human life or safety of the location is threatened.

In all cases, an attempt should be made to notify the CENTENNIAL Production Supervisor as soon as possible prior to igniting the well.

If the well is ignited, the burning H_2S will be converted to sulfur dioxide (SO_2), which is also highly toxic and heavier than air. Hence, do not assume the area is safe after the well is ignited.

B. METHODS OF RE-LIGHTING THE FLARE

1. The primary method of re- igniting the flare will be the electronic ignition device built into the flare boom.
   The secondary method of re-igniting the flare will be a 25mm hand held flare gun, which has a range of approximately 500'. Always ignite the flare from upwind and do not approach the flare any closer than is necessary.

   Note: Before firing the flare gun or igniting flammable material, check the atmosphere at your location for combustible gases with an explosion meter.

2. Only after the primary method of ignition fails will the flare gun backup ignition method be used. Use good sound judgment as to which method is the proper one to employ based upon the actual specific circumstances at that time.

   Note: If both primary and secondary flare ignition systems fail, the location shall be immediately shut-in.

IX. RESPONSIBILITIES AND DUTIES

A. ALL PERSONNEL

1. It is the responsibility of all personnel on the location, as well as, any other personnel assisting in the production operations of the well to familiarize themselves with the procedures outlined in the "H_2S Contingency Plan".

2. Each individual is responsible for seeing that their assigned safety equipment is properly stored, easily accessible and routinely maintained.

3. Each person must familiarize themselves with the location of all safety equipment at the location, and be able to use all safety equipment at a moment's notice. The location and quantity of all safety equipment is given in the Appendix, Section C-1.

4. All personnel must read and understand the "SAFE PROCEDURES DURING THE PRODUCTION OF HYDROGEN SULFIDE'.

5. Report any indications of H_2S to those in the area and to the CENTENNIAL Person in Charge.

B. CENTENNIAL PERSON IN CHARGE

1. The CENTENNIAL Person in Charge is responsible for thoroughly understands and enforcing all aspects of the "H_2S Contingency Plan".

2. The CENTENNIAL Person in Charge is responsible for seeing that all safety and emergency procedures outlined the "**H_2S Contingency Plan**" are observed by all personnel participating in the production and testing of the H_2S well.

3. The CENTENNIAL Person in Charge is responsible for advising the CENTENNIAL Production Supervisor whenever the procedures as specified herein cannot be complied with.

4. The CENTENNIAL Person in Charge is responsible for setting up the location for production operations of Hydrogen Sulfide as described under Section II "Safety Equipment".

5. The CENTENNIAL Person in Charge in conjunction with CENTENNIAL Production Engineer is responsible for seeing that all hardware and replacement parts, manifold lines, and all other piping which may be required to carry H_2S contaminated fluids under high pressure, are suitable for H_2S.

6. The CENTENNIAL Person in Charge in conjunction with the Safety Supervisor shall be responsible for scheduling personnel training.

7. If the presence of H_2S is reported and confirmed, the CENTENNIAL Person in Charge is responsible for immediately advising the CENTENNIAL Production Supervisor

8. The CENTENNIAL Person in Charge in consultation with the Production Supervisor shall restrict the number of personnel on the location to a minimum during expected hazardous operations.

C. SAFETY SUPERVISORS OR CENTENNIAL PERSON IN CHARGE

1. The Safety Supervisors and Centennial Person in Charge are responsible for thoroughly understanding the contents of the "H_2S Contingency Plan".

2. It is the responsibility of the Safety Supervisors and the CENTENNIAL Person in Charge to see that all safety and emergency procedures outlined in the "H_2S Contingency Plan" are observed by all personnel aboard the platform.

3. The Safety Supervisors share the responsibility of the CENTENNIAL Person in Charge in scheduling training for personnel aboard the platform.

4. The on-duty Safety Supervisor or Centennial Person in Charge shares the responsibility for closing all doorways and hatches in the event that H_2S is detected in the atmosphere at any time.

5. The Safety Supervisor in conjunction with the CENTENNIAL Person in Charge will be responsible for inspecting the location to make sure that all passageways remain unobstructed.

6. The Safety Supervisor or Centennial Person in Charge is responsible for alerting all, on and off duty personnel during a "Condition I or II" alert and for confirming that warning alarms, signal lights, and red flags are operating properly as outline under Section IV "OPERATING CONDITIONS – CLASSIFICATION".

7. The Safety Supervisor or Centennial Person in Charge is responsible for notifying all personnel in the area of the location of a change in conditions.

8. The Safety Supervisor or Centennial Person in Charge is responsible for performing a weekly documented inventory inspection to assure that all safety equipment is being properly stored and maintained.

9. The Safety Supervisor or Centennial Person in Charge is responsible for logging the arrival and departure of all personnel on the location, per CENTENNIAL policy - compliance requirements.

10. The Safety Supervisor or Centennial Person in Charge is responsible for H_2S training, which includes the use, maintenance and storage of the safety equipment.

11. The Safety Supervisor or Centennial Person in Charge is responsible for issuing H_2S safety equipment to arriving

personnel on the location and for collection of same from departing personnel.

12. The Safety Supervisor or Centennial Person in Charge is responsible for assuring that a **competent person** performs all maintenance and completes repair of safety equipment.

13. The Safety Supervisor or Centennial Person in Charge is responsible for assuring that required inspection and sanitizing of the H_2S safety equipment is performed.

14. The Safety Supervisor or Centennial Person in Charge is responsible for the maintenance of the H_2S Safety Training Class Attendance Records, and other record keeping requirements. He shall furnish the Centennial Regulatory / Compliance Supervisor a copy of all class attendance records.

15. The Safety Supervisor or Centennial Person in Charge will observe and assist during **weekly** Hydrogen Sulfide drills.

16. The Safety Supervisor or Centennial Person in Charge will observe testing of the Hydrogen Sulfide monitors **every 14 days** for response. A copy of the test results will be given to the Centennial Production Supervisor.

17. The Safety Supervisor or Centennial Person in Charge will calibrate and maintain records of personal H_2S monitoring equipment.

X. PROCEDURE FOR INFORMING PERSONNEL OF THE H_2S CONTINGENCY PLAN

A. There will be several copies of the complete "**H_2S Contingency Plan**" available in the CENTENNIAL location operations office.

B. **All personnel** arriving at the location will report immediately to the Safety Supervisor or Centennial Person in Charge for familiarization with the "Safe Practices during the Production of Hydrogen Sulfide". Each person will be required to sign a log indicating that they have and do understand the "SAFE PRACTICES" syllabus. (See appendix C-4)

- All personnel entering the location during normal production operations will be required to have H2s safety certification. Specialist and or other temporary visitors not certified will receive

orientation and participate in a JSA as required for their specific task, and will work under the direct supervision of the designated Task specific safety supervisor.

C. The Safety Supervisor or Centennial Person in Charge will verify and document H2s training of all crews, personnel and familiarize them with the "Safe Practices during the Production of Hydrogen Sulfide". Written records will be maintained.

XI. APPENDICES

APPENDIX A

WELL CONTROL

A. All efforts should be made to maintain control of the H2S well(s), in the event the release exceeds 20 PPM, the well(s) will be automatically shut-in.

B. When the primary and secondary ignition system on the flare fails the well(s) shall be shut-in.

C. When a Hydrogen Sulfide Condition I or II occurs audible and visual alarms will be activated. When a Hydrogen Sulfide Condition II occurs the location will automatically shut-in. If any facility alarm is not answered in five (5) minutes, location will automatically shut-in.

D. CENTENNIAL will have the capability to shut-in all well(s) by manual remote control on the facility without accessing the well area. All system upsets due to H2S detection will be reported to the CENTENNIAL AREA PRODUCTION SUPERVISOR.

APPENDIX B-1

HAZARDOUS CONDITIONS

SAFETY PROCEDURES DURING THE PRODUCTION OF HYDROGEN SULFIDE

This memorandum is intended to familiarize you with the conditions that can exist when producing a well from formations that may contain H_2S and the precautions CENTENNIAL and the Safety Supervisor or Centennial Person in Charge have taken in designing the production program and the safety program to provide maximum safety.

You should become familiar with all safety equipment on the location, its use and availability. The windsock is provided to show which direction the wind is blowing so that "SAFE BRIEFING AREA" can be easily defined. You should become "wind conscious" and frequently observe these wind direction indicators. All persons aboard the location will receive instructions on the use of safety equipment and what to do during an H_2S emergency. The well(s) will be monitored with H_2S continuous monitoring-type detectors.

Production operations will be performed under four (4) possible conditions.

A. POTENTIAL HAZARDOUS CONDITIONS (H_2S NOT PRESENT)

1. **Warning Signs**
(For notification of general public and operations):

High visibility operational danger signs will be displayed in a manner visible to personnel approaching the location.

(See Section II).

These signs SHALL be illuminated at night and SHALL be continuously illuminated during times of reduced visibility.

2. **Alarm** (for notification of location crew): None

3. **Characterized by:**
Production operations under control. Routine production operations in zones that may contain hydrogen sulfide. This condition will be in effect continuously when well is flowing.

4. **General Action:**

   a. Be alert for condition change.

   b. Keep all safety equipment available and monitors functioning properly.

   c. Perform all drills for familiarization and proficiency.

B. CONDITION I – POTENTIAL DANGER TO LIFE – H_2S PRESENT GREATER THAT 10 BUT LESS THAN 20 PPM

1. **Warning Signs**
(For notification of general public and operations):

"DANGER--POISONOUS GAS--HYDROGEN SULFIDE":
"Poisonous Gas Do Not Approach If Red Flags are displayed"
(See Section II).

These signs SHALL be illuminated at night and SHALL be continuously illuminated during times of reduced visibility.

2. **Alarm**

A pinpoint alarm will activate showing the concentration and location of the H_2S gas.
The fixed area alarm H2S atmosphere control panel will be located in the _____ Building.

Work Areas

Audible intermittent alarm signals will continue for as long as the H_2S concentration is present at 10 ppm or greater until deactivated by the CENTENNIAL Person in Charge / Contract Person in Charge. A remote signal will be sent to main facility and inform CENTENNIAL Person in Charge that an upset has occurred when a concentration is present at 10 to 20 PPM.

Living Areas

The audible alarms will be activated automatically and will continue for as long as the condition exists. A remote alarm will be sent to inform the CENTENNIAL Production Supervisor that an upset has occurred.

3. **Characterized By:**

Production operations under control. Production operations in producing zones that may contain Hydrogen Sulfide.

Poisonous gases may be present in concentrations at threshold levels and may or may not be detectable by odor (See 'TOXICITY OF VARIOUS GASES" Section B-2 in the Appendix). This condition will be in effect continuously from the time H_2S concentration reaches 10 PPM unless it is necessary to go to Condition II. **Action to be taken under** Condition I is contained under Section V "H_2S EMERGENCY PROCEDURES".

4. **General Action**

a. Don SCBA and proceed immediately to the "SAFE BRIEFING AREA" if not specifically assigned duties to correct or control the situation.

b. Be alert for a condition change. There will be **NO SMOKING** at this time.

c. Check safety equipment for proper functioning. Keep it available. No welding or open fires without permission from the CENTENNIAL Person in Charge.

d. Follow instruction of the CENTENNIAL Person in Charge / Safety Supervisor.

C. CONDITION II – MODERATE DANGER TO LIFE – H_2S PRESENT AT 20 PPM OR ABOVE

1. Warning Signs

(For notification of general public and operations):

"DANGER--POISONOUS GAS--HYDROGEN SULFIDE"
"Poisonous Gas Do Not Approach If Red Flags are displayed"
(See Section II).

These signs SHALL be illuminated at night and SHALL be continuously illuminated during times of reduced visibility.

2. Alarm

Work Areas and Living Quarters:

Continuous sounding of the H_2S siren and red strobe lights and red flags outdoors. All audible alarms and red lights on interior of buildings will continue for as long as the H_2S concentration is present at 10 ppm atmosphere and less than 20 PPM or until deactivated by the Safety Supervisor or CENTENNIAL Person in Charge. A remote alarm will be sent. Exterior red flags will remain displayed until alarm condition clears and is manually reset. System can only be reset when H_2S concentration levels fall below 20 PPM. Location production will be terminated at a 20 PPM atmospheric upset.

3. Characterized By

Critical well operations or well control problems. Poisonous gases are present above the threshold levels (as defined under 'TOXICITY OF VARIOUS GASES" Section B-2 in the Appendix). This condition shall be in effect when the H_2S concentration is present at 20 ppm or higher.

4. General Action

a. Don SCBA and proceed immediately to the "SAFE BRIEFING AREA" with self-contained breathing apparatus if not specifically assigned duties to correct or control the situation.

b. Follow the instructions of the Safety Supervisor or the CENTENNIAL Person in Charge.

c. The Safety Supervisor or the CENTENNIAL Person in Charge shall initiate emergency action as provided in this plan.

d. All persons working in the hazard area will wear self-contained breathing apparatus. All personnel will restrict their movements as directed by the Safety Supervisor or the CENTENNIAL Person in Charge.

e. If the well is ignited, the burning Hydrogen Sulfide will be converted to Sulfur Dioxide that is also poisonous.

Therefore, **DO NOT ASSUME THAT THE AREA IS SAFE AFTER THE GAS IS IGNITED, CONTINUE TO OBSERVE EMERGENCY PROCEDURES AND FOLLOW THE INSTRUCTIONS OF SUPERVISORS.**

f. **Production will automatically be shut-in.**

During an emergency, persons will utilize the "Buddy System" preventing anyone from entering a gas area alone – whether he is using breathing equipment or not.

If you are wearing breathing air equipment, do not remove it until you are directed that it is safe to do so by the Centennial Person in Charge or the Safety Supervisor.

If a sudden gas release occurs without warning, you should:

1. Hold your breath and rapidly evacuate the area containing the H_2S and move upwind, if possible.

2. Put on breathing air equipment.

3. Help anyone who may be affected by the gas. **NOTE: PUT ON YOUR BREATHING AIR EQUIPMENT BEFORE HELPING ANYONE OVERCOME BY H_2S.**

4. Evacuate quickly to the "SAFE BRIEFING AREA" to receive instructions from the Safety Supervisor or the CENTENNIAL Person in Charge.

5. **DO NOT PANIC.**

CENTENNIAL Persons in Charge will make every effort to prevent any release of Hydrogen Sulfide gas. However, should an accidental release occur, this plan has been provided so that any such release may be handled with a minimum of trouble. If you are on the location during any operating condition, it is essential that you follow the instructions of the CENTENNIAL Person in Charge and or the Safety Supervisor.

Several copies of the "H_2S Contingency Plan" are available in the CENTENNIAL Person in Charge's office. This plan sets out precautionary measures, safety equipment, emergency procedures, responsibilities, and duties, pertaining to the production and testing of Hydrogen Sulfide. All personnel should become familiar with the contents of the "H_2S Contingency Plan" and afterward should sign the log indicating that they have received, read and understand the 'SAFE PROCEDURES DURING THE PRODUCTION OF HYDROGEN SULFIDE".

The table on the next page lists various poisonous gases and the concentrations at which they become dangerous.

APPENDIX B-2

TOXICITY OF VARIOUS GASES

TOXICITY OF GASES (Taken from API RP-49 September 1974 – Re-issued August 1978)					
Common Name	**Chemical Formula**	**Gravity (Air=1)**	**Threshold 1 Limit**	**Hazardous 2 Limit**	**Lethal 3 Limit**
Hydrogen Sulfide	H_2S	1.18	10 ppm	250 ppm/1hr	600 ppm
Sulfur Dioxide	SO_2	2.21	20 ppm	------	1000 ppm
Carbon Monoxide	CO	0.97	50 ppm	400 ppm/1hr	1000 ppm
Carbon Dioxide	CO_2	1.52	5000 ppm	5%	10%
Methane	CH_4	.55	90000 ppm	Combustible Above 5% in Air	

1. Threshold concentration at which it is believed that all workers may repeatedly be exposed day after day, without adverse effect.	2. Hazardous Concentration that may cause death.	3. Lethal Concentration that will cause death with short-term exposure.

Properties of Gases

The produced gas will probably be a mixture of Carbon Dioxide, Hydrogen Sulfide, and Methanes.

A. Carbon Dioxide

1. Carbon Dioxide (CO_2) is usually considered inert and is commonly used to extinguish fires. It is heavier than air (1.52 times) and it will concentrate in low areas of still air. Humans cannot breathe air containing more than 10% CO_2 without losing consciousness. Air containing 5% CO_2 will cause disorientation in a few minutes. Continued exposures to CO_2 after being affected will cause convulsions, coma, and respiratory failure.

2. The threshold limit of CO_2 is 5000 ppm. Short-term exposure to 50,000 PPM (5%) is reasonable. This gas is colorless and odorless and can be tolerated in relatively high concentrations.

B. Hydrogen Sulfide

1. Hydrogen Sulfide (H_2S) itself is a colorless, transparent gas and is flammable. It is heavier than air and, hence, may accumulate in low places.

2. Although the slightest presence of H_2S in the air is normally detectable by its characteristic "rotten egg" odor, it is dangerous to rely on the odor as a means of detecting excessive concentrations because the sense of smell is rapidly lost, allowing lethal concentrations to be accumulated without warning. The following table indicates the poisonous nature of Hydrogen Sulfide.

HYDROGEN SULFIDE TOXICITY			
Concentration			Effects
$\%H_2S$	PPM	GR/100 SCF 1	
0.001	10	.65	Safe for 8 hours without respirator. Obvious and unpleasant odor.
0.002	20	1.30	Burning in eyes and irritation of respiratory tract after one hour.
0.01	100	6.48	Kills smell in 3 to 15 minutes; may sting eyes and throat.
0.02	200	12.96	Kills smell shortly; stings eyes and throat.
0.05	500	32.96	Dizziness; breathing ceases in a few minutes; need prompt artificial respiration.
0.07	700	45.92	Unconscious quickly; death will result if not rescued promptly.
0.10	1000	64.80	Unconscious at once; followed by death within minutes.
Note: 1 Grain per 100 Cubic Feet			

C. **Sulfur Dioxide**

1. Sulfur Dioxide is a colorless, transparent gas and is non-flammable.

2. Sulfur Dioxide (SO_2) is produced during the burning of H_2S. Although SO_2 is heavier than air, it will be picked up by a breeze and carried downwind at elevated temperatures. Since Sulfur Dioxide is extremely irritating to the eyes and mucous membranes of the upper respiratory tract, it has exceptionally good warning powers in this respect. The following table indicates the toxic nature of the gas.

SULFUR DIOXIDE TOXICITY		
Concentration		Effects
% SO_2	PPM	
.0005	3 to 5	Pungent odor-normally a person can detect SO_2 in this range.
.0012	12	Throat irritation, coughing, and constriction of the chest tearing and smarting of eyes.
0.15	150	So irritating that it can only be endured for a few minutes.
.05	500	Causes a sense of suffocation, even with first breath.

APPENDIX B-3

FIRST AID TREATMENT PROCEDURES FOR HYDROGEN SULFIDE POISONING

A. Remove the victim to fresh air. If breathing has ceased or is labored, begin resuscitation immediately.

B. Apply resuscitator to help purge H_2S from the blood stream.

C. Keep victim at rest and prevent chilling.

D. Get victim under physician's care as soon as possible.

APPENDIX B-4

ACKNOWLEDGMENT STATEMENT

FOR SAFE PRCEDURES DURING THE PRODUCTION OF HYDROGEN SULFIDE

CENTENNIAL

Cheddar 2BS Federal Com 1H
Production Facility

Date: _____

I, _____ an

employee of _____, have

reviewed a copy of 'SAFE PROCEDURES DURING THE PRODUCTION OF

HYDROGEN SULFIDE", and thoroughly understand it.

_____
(Signature)

NOTE: This signed form will be kept on the facility.

APPENDIX B-5

BREATHING AIR EQUIPMENT DRILLS FOR ON-DUTY PERSONNEL

On-duty personnel include the location Production Crew, Safety Supervisor and the CENTENNIAL Person in Charge.

An H_2S drill and training session must be given once a week to all on-duty personnel in coincidence with off-duty personnel off-duty personnel will reverse roles on alternate drills.

The purpose of the drill is to instruct the crew in the operation and use of breathing air and H_2S related emergency equipment and to allow them to become acquainted with using the equipment under working conditions. The crews should be trained to put on their breathing air equipment within one (1) minute after an H_2S emergency has been alerted.

The following procedure should be used for weekly drills. The CENTENNIAL Person in Charge and Safety Supervisor must be satisfied that the crews are proficient with the equipment. **Note**: It is to be outlined under "EMERGENCY PROCEDURES FOR CONDITION I AND CONDTION II, Section V, and Subsection B.

1. All onsite personnel should be informed that a drill will be held.

2. The Safety Supervisor -Centennial Person in Charge should initiate the drill by signaling as he would if he detected H_2S.

3. The Safety Supervisor or Centennial Person in Charge and all CENTENNIAL personnel should don their breathing air equipment.

4. The Person in Charge should proceed as if a release of H_2S was present and simulate preparation to shutting the well in.

5. The Safety Supervisor or Centennial Person in Charge should perform a grab air quality check as pinpointed from the fixed H_2S monitors to confirm any readings. CENTENNIAL wants to make it standard practice that an air sample test is performed every time anything unusual happens. **(Note: Even if conditions return to normal.)** In a drill it may not be necessary to perform a grab air sample test.

6. During the drill the CENTENNIAL Person in Charge- Safety Supervisor will make sure that everyone is using their equipment properly and the site contingency plan is implemented.

7. Resume normal operations.

8. The CENTENNIAL Person in Charge- Safety Supervisor will hold a review to discuss results of the drill with those participating.

    1. Condition I and II alerts and steps to be taken by all personnel.

    2. The importance of wind direction when dealing with H_2S.

    3. Proper use and storage of all types of breathing equipment.

    4. Proper use and storage of oxygen resuscitators.

    5. Proper use and storage of H_2S detectors

    6. The "Buddy System" and the procedure for rescuing a person overcome by H_2S.

    7. Responsibilities and duties.

    8. Location of H_2S safety equipment.

    9. Other parts of the **"H_2S Contingency Plan"** that should be reviewed.

Note: A record of attendance must be kept for weekly drills and training sessions. These drills and training sessions must also be documented on the CENTENNIAL Daily Report.

APPENDIX B-6

EMERGENCY CONTACT NUMBERS

Initial detection, but less than 10 ppm – Initiate verification and notification actions

Latitude: 32.414252 Longitude: 103.704310

Driving Directions

911 is Available

Lea County

Hobbs Police Dept.	**575-397-0330**
Lea County Sheriff Dept.	**432-458-4025**
Hobbs Fire Dept.	**505-397-9308**
Lee Regional Hospital	**575-492-5251**

Eddy County

Carlsbad City Police	**575-885-2111**
Eddy County Sheriff's Dept.	**575-885-4835**
Carlsbad Fire Dept.	**575-885-3125**
Carlsbad Medical Center	**575-887-4100**

Centennial Contacts

Centennial:

Superintendent – Rickie Mills/John Helm-(432) 967-9520

HSE- Reggie Phillips (432) 638-3380

Regulatory Agency

Bureau of Land Mgmt.	**Carlsbad Field Office 575-234-5972**

Tiger Safety - H_2S Services

Bob Luke	**(888) 365-5220**
Craig McGeHee	**(888) 365-5220 or Cell: (432) 248-2416**
Joel Wirtz	**(888) 365-5220 or Cell: (432) 231-5872**

APPENDIX B-7

EVACUATION PLAN

The following general plan has been developed in the event that any public evacuation becomes necessary:
CENTENNIAL has requested and been assured the support of various public safety entities in the area.

1. The Sheriff's Department will conduct any evacuations of local residents.
2. Assistance from other public safety entities may be requested if required.
3. The included maps detail the area of the well site, including the inventory of public homes within the radius of exposure of the well.
4. In the event that there is any suspected problem on the well, the well site supervisor will notify the Sheriff's Office for alert status.
5. Alert status will require that available public support personnel will proceed to the Sheriff's Office and stand by for instructions.
6. If isolation and evacuation are necessary, then units will be dispatched to points marked on the map with instructions to maintain roadblocks.
7. Evacuation teams will then proceed to sectors to be evacuated. Evacuation procedures will follow appropriate consideration for wind conditions.
8. Personnel from the prime contractor on the site will establish safe perimeters using H2S detectors.
9. The Texas Railroad Commission and other authorities will be notified as soon as possible.
10. Other supplemental contractors will be contacted and called as needed.

    Company guidelines state that where hydrogen sulfide concentrations could exceed 10 ppm, contractors shall follow minimum requirements for protecting personnel. Company's action level is in agreement with the NIOSH Recommended Exposure Limit. Company shall notify contractors of locations where hydrogen sulfide concentrations could exceed 10 ppm and a plan to address site design and emergency response will be addressed in the contingency plan where hydrogen sulfide is known or suspected.

Resident Emergency List

Determining Exposure Radius for Onshore Drilling & Workover

Potentially hazardous volume means a volume of gas of such H2S concentration and flow rate that it may result in radius of exposure-calculated ambient concentrations of 100 ppm H2S at any occupied residence, school, church, park, school bus stop, place of business or other area where the public could reasonably be expected to frequent, or 500 ppm H2S at any Federal, State, County or municipal road or highway.

Radius of exposure means the calculation resulting from using the Pasquill -Gifford derived equation, or by such other method(s) that may be approved by the authorized officer.

Residents within the 100 ppm ROE:

Name: **Address:** **Phone #**

Residents within the 500 ppm ROE:

Name: **Address:** **Phone #**

APPENDIX B-8

KEY PERSONNEL TO REMAIN DURING PARTIAL EVACUATION

1. Production Crew On-Duty
2. Other designated Personnel
3. Safety Supervisor or Centennial Person in Charge
4.

Note: Once the emergency is better defined, consider transferring any of the above personnel to the stand-by boat if reasonably sure they will not be needed.

If the emergency requires considerable time, consideration should be given to evacuating some of the personnel to rest when they are not needed.

APPENDIX C

H_2S EQUIPMENT LIST

	RESPIRATORY SAFETY SYSTEMS	
	Qty.	Description

	DETECTION AND ALARM SYSTEM	
	Qty.	Description
	ADDITIONAL SAFETY RELATED ITEMS	
	Qty.	Description

APPENDIX D

FACILITY DIAGRAMS / AS ATTACHED

DRAWINGS		
Number	**Revision**	**Description**
	O	Safety Equipment Layout
	O	Equipment Layout Plan
	O	Area Classification
	O	Flow Schematic
	O	SAFE Chart

APPENDIX E

SULFATREAT INFORMATION

Please see the attached manufacturer's information.

APPENDIX F

DEPARTURES AND APPROVALS

REGULATORY REQUIREMENT	DATE	COMMENTS	MMS CONTACT

APPENDIX G

PLAN REVISION / ADDITION RECORD

REVISION	DATE	DESCRIPTION OF REVISION / ADDITION

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