Form 3160-3
(June 2015)

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

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

APPLICATION FOR PERMIT TO DRILL OR REENTER

5. Lease Serial No.
NMNM0106040A

6. If Indian, Allotee or Tribe Name

1a. Type of work: [✓] DRILL [ ] REENTER

1b. Type of Well: [ ] Oil Well [✓] Gas Well [ ] Other

1c. Type of Completion: [ ] Hydraulic Fracturing [✓] Single Zone [ ] Multiple Zone

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

8. Lease Name and Well No.
RED HILLS 32-5 FEDERAL COM
156H (326032)

2. Name of Operator
CIMAREX ENERGY COMPANY OF COLORADO (162683)

9. API Well No.
30-025-46295

3a. Address
600 N. Marienfeld St., Suite 600 Midland TX 79701

3b. Phone No. *(include area code)*
(432)620-1936

10. Field and Pool, or Exploratory (98148)
1ST BONESPRING SAND / WOLFCAMP

4. Location of Well *(Report location clearly and in accordance with any State requirements.*)*
At surface NENW / 390 FNL / 2365 FWL / LAT 32.093245 / LONG -103.59522
At proposed prod. zone SESW / 100 FSL / 2010 FWL / LAT 32.065569 / LONG -103.596363

11. Sec., T. R. M. or Blk. and Survey or Area
SEC 32 / T25S / R33E / NMP

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

12. County or Parish
LEA

13. State
NM

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

16. No of acres in lease
240

17. Spacing Unit dedicated to this well
320

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

19. Proposed Depth
12375 feet / 22285 feet

20. BLM/BIA Bond No. in file
FED: NMB001187

21. Elevations (Show whether DF, KDB, RT, GL, etc.)
3410 feet

22. Approximate date work will start*
03/01/2019

23. Estimated duration
30 days

24. Attachments

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

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

25. Signature	Name *(Printed/Typed)*	Date
(Electronic Submission)	Aricka Easterling / Ph: (918)560-7060	10/16/2018

Title
Regulatory Analyst

Approved by *(Signature)*	Name *(Printed/Typed)*	Date
(Electronic Submission)	Cody Layton / Ph: (575)234-5959	08/16/2019

Title	Office
Assistant Field Manager Lands & Minerals	CARLSBAD

Application approval does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.
Conditions of approval, if any, are attached.

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

GCP Rec 08/19/19

APPROVED WITH CONDITIONS

KR 08/19/19

(Continued on page 2)

*(Instructions on page 2)

Approval Date: 08/16/2019

INSTRUCTIONS

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

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

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

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

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

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

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

NOTICES

The Privacy Act of 1974 and regulation in 43 CFR 2.48(d) provide that you be furnished the following information in connection with information required by this application.

AUTHORITY: 30 U.S.C. 181 et seq., 25 U.S.C. 396; 43 CFR 3160

PRINCIPAL PURPOSES: The information will be used to: (1) process and evaluate your application for a permit to drill a new oil, gas, or service wen or to reenter a plugged and abandoned well; and (2) document, for administrative use, information for the management, disposal and use of National Resource Lands and resources including (a) analyzing your proposal to discover and extract the Federal or Indian resources encountered; (b) reviewing procedures and equipment and the projected impact on the land involved; and (c) evaluating the effects of the proposed operation on the surface and subsurface water and other environmental impacts.

ROUTINE USE: Information from the record and/or the record win be transferred to appropriate Federal, State, and local or foreign agencies, when relevant to civil, criminal or regulatory investigations or prosecution, in connection with congressional inquiries and for regulatory responsibilities.

EFFECT OF NOT PROVIDING INFORMATION: Filing of this application and disclosure of the information is mandatory only if you elect to initiate a drilling or reentry operation on an oil and gas lease.

The Paperwork Reduction Act of 1995 requires us to inform you that:

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

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

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Additional Operator Remarks

Location of Well

1. SHL: NENW / 390 FNL / 2365 FWL / TWSP: 25S / RANGE: 33E / SECTION: 32 / LAT: 32.093245 / LONG: -103.59522 (TVD: 0 feet, MD: 0 feet)
   PPP: SENW / 1320 FNL / 2010 FWL / TWSP: 26S / RANGE: 33E / SECTION: 5 / LAT: 32.0759722 / LONG: -103.5962806 (TVD: 12375 feet, MD: 18500 feet)
   PPP: NENW / 0 FNL / 2010 FWL / TWSP: 26S / RANGE: 33E / SECTION: 5 / LAT: 32.0798889 / LONG: -103.5948917 (TVD: 12375 feet, MD: 17100 feet)
   BHL: SESW / 100 FSL / 2010 FWL / TWSP: 26S / RANGE: 33E / SECTION: 5 / LAT: 32.065569 / LONG: -103.596363 (TVD: 12375 feet, MD: 22285 feet)

BLM Point of Contact

Name: Linda (Cathleen) Queen
Title: Project Manager-Carlsbad Field Office
Phone: 5752345962
Email: cqueen@blm.gov

Review and Appeal Rights

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

AFMSS

U.S. Department of the Interior
Bureau of Land Management

Application for Permit to Drill

APD Package Report

Date Printed: 08/18/2019 02:54 PM

APD ID: 10400034904	Well Status: AAPD
APD Received Date: 10/16/2018 01:22 PM	Well Name: RED HILLS 32-5 FEDERAL C
Operator: CIMAREX ENERGY COMPANY OF	Well Number: 156H

APD Package Report Contents

- Form 3160-3

- Operator Certification Report

- Application Report
- Application Attachments
  -- Well Plat: 1 file(s)

- Drilling Plan Report
- Drilling Plan Attachments
  -- Blowout Prevention Choke Diagram Attachment: 2 file(s)
  -- Blowout Prevention BOP Diagram Attachment: 2 file(s)
  -- Casing Design Assumptions and Worksheet(s): 4 file(s)
  -- Hydrogen sulfide drilling operations plan: 1 file(s)
  -- Proposed horizontal/directional/multi-lateral plan submission: 2 file(s)
  -- Other Facets: 3 file(s)
  -- Other Variances: 3 file(s)

- SUPO Report
- SUPO Attachments
  -- New Road Map: 1 file(s)
  -- Attach Well map: 1 file(s)
  -- Production Facilities map: 4 file(s)
  -- Water source and transportation map: 1 file(s)
  -- Well Site Layout Diagram: 1 file(s)
  -- Recontouring attachment: 1 file(s)
  -- Surface use plan certification document: 1 file(s)
  -- Other SUPO Attachment: 11 file(s)

- PWD Report
- PWD Attachments
  -- None

- Bond Report
- Bond Attachments
  -- None

PECOS DISTRICT
DRILLING CONDITIONS OF APPROVAL

OPERATOR'S NAME:	**Cimarex Energy Company Of Colorado**
LEASE NO.:	**NMNM0106040A**
WELL NAME & NO.:	**Red Hills 32-5 Federal Com 156H**
SURFACE HOLE FOOTAGE:	**390'/N & 2365'/W**
BOTTOM HOLE FOOTAGE	**100'/S & 2010'/E**
LOCATION:	**Section 32, T.25 S., R.33 E., NMPM**
COUNTY:	**Lea County, New Mexico**

COA

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

A. HYDROGEN SULFIDE

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

B. CASING

1. The **10-3/4** inch surface casing shall be set at approximately **1050** feet (a minimum of **25 feet (Lea County)** into the Rustler Anhydrite and above the salt) and cemented to the surface.

    a. If cement does not circulate to the surface, the appropriate BLM office shall be notified and a temperature survey utilizing an electronic type temperature survey with surface log readout will be used or a cement bond log shall be run to verify the top of the cement. Temperature survey will be run a minimum of six hours after pumping cement and ideally between 8-10 hours after completing the cement job.
    b. Wait on cement (WOC) time for a primary cement job will be a minimum of **8 hours** or 500 pounds compressive strength, whichever is greater. (This is to

include the lead cement)

c. Wait on cement (WOC) time for a remedial job will be a minimum of 4 hours after bringing cement to surface or 500 pounds compressive strength, whichever is greater.
d. If cement falls back, remedial cementing will be done prior to drilling out that string.

Operator shall filled 1/3rd casing with fluid while running intermediate casing to maintain collapse safety factor.

2. The minimum required fill of cement behind the **7-5/8** inch intermediate casing is: Operator has proposed a DV tool, the depth may be adjusted as long as the cement is changed proportionally. The DV tool may be cancelled if cement circulates to surface on the first stage.

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

b. Second stage above DV tool:Cement to surface. If cement does not circulate, contact the appropriate BLM office.

Wait on cement (WOC) time for a primary cement job is to include the lead cement slurry due to cave/karst or potash.

Variance is approved for annular spacing between 7 5/8" x 5 ½" casing.

3. The minimum required fill of cement behind the **5-1/2 x 5** inch production casing is:
   - Cement should tie-back at least **200 feet** into previous casing string. Operator shall provide method of verification. **Additional cement maybe required. Excess calculates to 14%.**

C. PRESSURE CONTROL

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

2. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the surface casing shoe shall be **5000 (5M)** psi.

3. Operator has proposed a multi-bowl wellhead assembly. This assembly will only be tested when installed on the surface casing. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the intermediate casing shoe shall be **10,000 (10M)** psi. **Variance is approved to use a 5000 (5M) Annular which shall be tested to 5000 (5M) psi.**

a. Wellhead shall be installed by manufacturer's representatives, submit documentation with subsequent sundry.

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

D. SPECIAL REQUIREMENT (S)

Communitization Agreement

- The operator will submit a Communitization Agreement to the Carlsbad Field Office, 620 E Greene St. Carlsbad, New Mexico 88220, at least 90 days before the anticipated date of first production from a well subject to a spacing order issued by the New Mexico Oil Conservation Division. The Communitization Agreement will include the signatures of all working interest owners in all Federal and Indian leases subject to the Communitization Agreement (i.e., operating rights owners and lessees of record), or certification that the operator has obtained the written signatures of all such owners and will make those signatures available to the BLM immediately upon request.
- If the operator does not comply with this condition of approval, the BLM may take enforcement actions that include, but are not limited to, those specified in 43 CFR 3163.1.
- In addition, the well sign shall include the surface and bottom hole lease numbers. When the Communitization Agreement number is known, it shall also be on the sign.

JJP08162019

GENERAL REQUIREMENTS

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

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

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

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

1. Unless the production casing has been run and cemented or the well has been properly plugged, the drilling rig shall not be removed from over the hole without prior approval.

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

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

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

A. CASING

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

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

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

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

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

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

7. If hardband drill pipe is rotated inside casing, returns will be monitored for metal. If metal is found in samples, drill pipe will be pulled and rubber protectors which have a larger diameter than the tool joints of the drill pipe will be installed prior to continuing drilling operations.
8. Whenever a casing string is cemented in the R-111-P potash area, the NMOCD requirements shall be followed.

B. PRESSURE CONTROL

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

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

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

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

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

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

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

lead when specified), whichever is greater. However, if the float does not hold, cut-off cannot be initiated until cement reaches 500 psi compressive strength (including lead when specified).

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

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

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

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

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

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

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

C. DRILLING MUD

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

D. WASTE MATERIAL AND FLUIDS

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

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

PECOS DISTRICT
SURFACE USE
CONDITIONS OF APPROVAL

OPERATOR'S NAME:	Cimarex Energy Company Of Colorado
WELL NAME & NO.:	Red Hills 32-5 Federal Com 155H
SURFACE HOLE FOOTAGE:	390'/N & 2385'/W
BOTTOM HOLE FOOTAGE	100'/S & 2430'/E
LOCATION:	Section 32, T.25 S., R.33 E., NMPM
COUNTY:	Lea County, New Mexico

TABLE OF CONTENTS

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.

☐ **Interim Reclamation**

☐ **Final Abandonment & Reclamation**

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.

Hydrology:

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

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

When crossing ephemeral drainages the pipeline(s) will be buried to a minimum depth of 48 inches from the top of pipe to ground level. Erosion control methods such as gabions and/or rock aprons should be placed on both up and downstream sides of the pipeline crossing. In addition, curled (weed free) wood/straw fiber wattles/logs and/or silt fences should be placed on the downstream side for sediment control during construction and maintained until soils and vegetation have stabilized. Water bars should be placed within the ROW to divert and dissipate surface runoff. A pipeline access road is not permitted to cross these ephemeral drainages. Traffic should be diverted to a preexisting route. Additional seeding may be required in floodplains and drainages to restore energy dissipating vegetation.

Prior to pipeline installation/construction a leak detection plan will be developed. The method(s) could incorporate gauges to detect pressure drops, situating valves and lines so they can be visually inspected periodically or installing electronic sensors to alarm when a leak is present. The leak detection plan will incorporate an automatic shut off system that will be installed for proposed pipelines to minimize the effects of an undesirable event.

Any water erosion that may occur due to the construction of overhead electric line and during the life of the power line will be quickly corrected and proper measures will be taken to prevent future erosion. A power pole should not be placed in drainages, playas, wetlands, riparian areas, or floodplains and must span across the features at a distance away that would not promote further erosion.

VI. CONSTRUCTION

A. NOTIFICATION

The BLM shall administer compliance and monitor construction of the access road and well pad. Notify the at least 3 working days prior to commencing construction of the access road and/or well pad.

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

B. TOPSOIL

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

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

C. CLOSED LOOP SYSTEM

Tanks are required for drilling operations: No Pits.

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

D. FEDERAL MINERAL MATERIALS PIT

Payment shall be made to the BLM prior to removal of any federal mineral materials. Call the .

E. WELL PAD SURFACING

Surfacing of the well pad is not required.

If the operator elects to surface the well pad, the surfacing material may be required to be removed at the time of reclamation. The well pad shall be constructed in a manner which

creates the smallest possible surface disturbance, consistent with safety and operational needs.

F. EXCLOSURE FENCING (CELLARS & PITS)

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

G. ON LEASE ACCESS ROADS

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

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

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

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

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

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

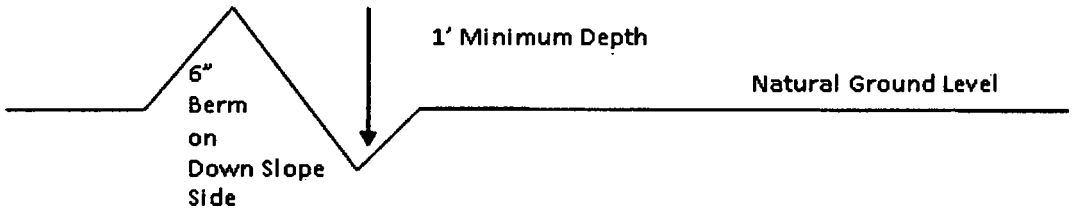
Turnouts

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

Drainage

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

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



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

Cattle guards

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

Fence Requirement

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

Public Access

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

Construction Steps

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

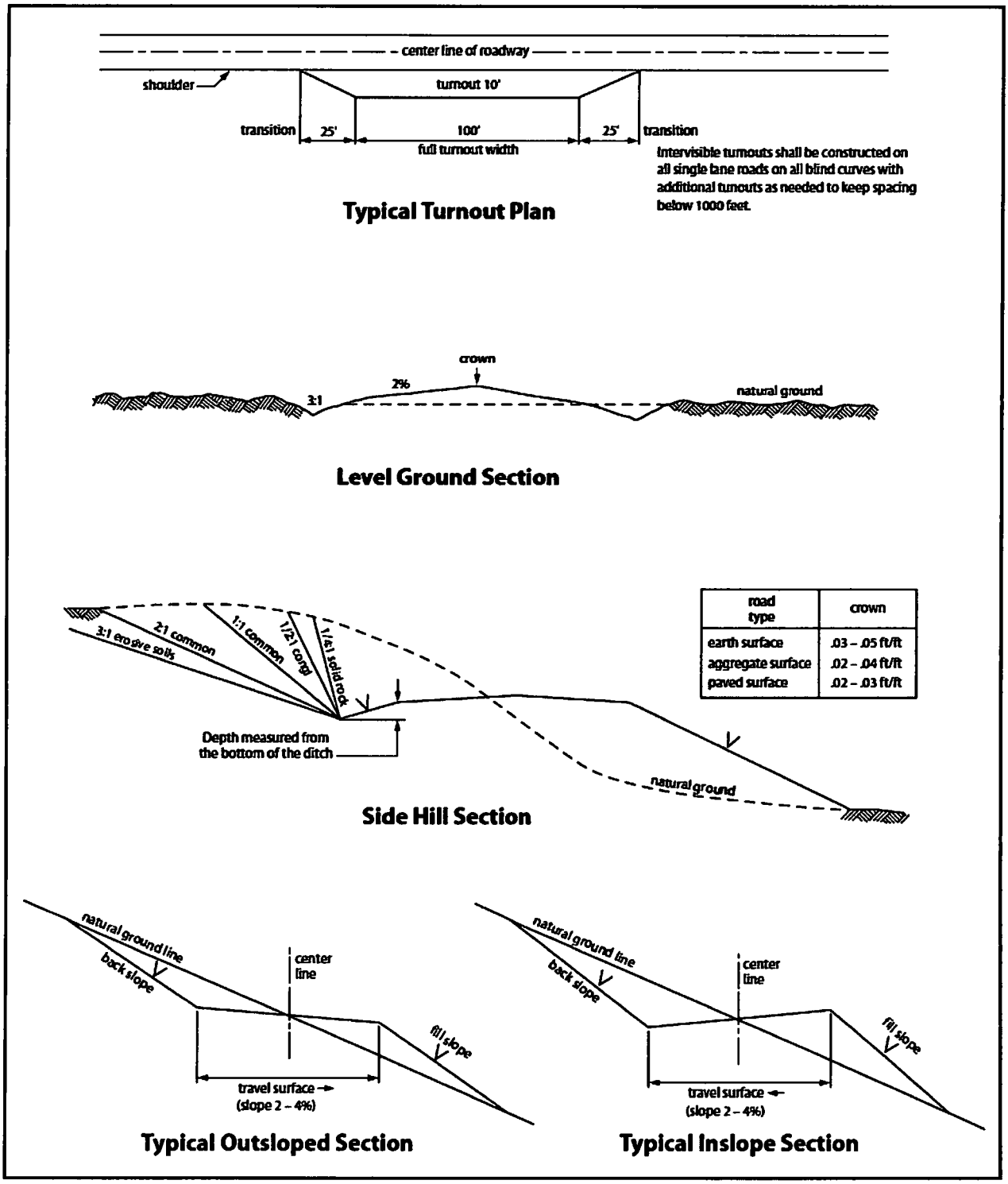


Figure 1. Cross-sections and plans for typical road sections representative of BLM resource or FS local and higher-class roads.

VII. PRODUCTION (POST DRILLING)

A. WELL STRUCTURES & FACILITIES

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

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

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

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

Containment Structures

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

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

VRM Facility Requirement
Low-profile tanks not greater than eight-feet-high shall be used.

B. **PIPELINES**

C. **ELECTRIC LINES**

VIII. INTERIM RECLAMATION

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

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

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

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

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

IX. FINAL ABANDONMENT & RECLAMATION

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

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

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

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

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

(Insert Seed Mixture Here)

Approval Date: 08/16/2019

AFMSS

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

Operator Certification Data Report

08/18/2019

Operator Certification

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

NAME: Amithy Crawford **Signed on:** 10/16/2018

Title: Regulatory Analyst

Street Address: 600 N. Marienfeld, Ste 600

City: Midland **State:** TX **Zip:** 79701

Phone: (432)620-1909

Email address: acrawford@cimarex.com

Field Representative

Representative Name:

Street Address:

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

Phone:

Email address:

AFMSS

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

Application Data Report

08/18/2019

APD ID: 10400034904 **Submission Date:** 10/16/2018

Operator Name: CIMAREX ENERGY COMPANY OF COLORADO

Well Name: RED HILLS 32-5 FEDERAL COM **Well Number:** 156H

Well Type: CONVENTIONAL GAS WELL **Well Work Type:** Drill

[redacted]

Show Final Text

Section 1 - General

APD ID: 10400034904 **Tie to previous NOS?** Y **Submission Date:** 10/16/2018

BLM Office: CARLSBAD **User:** Amithy Crawford **Title:** Regulatory Analyst

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

Lease number: NMNM0106040A **Lease Acres:** 240

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

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

Agreement number:

Agreement name:

Keep application confidential? YES

Permitting Agent? NO **APD Operator:** CIMAREX ENERGY COMPANY OF COLORADO

Operator letter of designation:

Operator Info

Operator Organization Name: CIMAREX ENERGY COMPANY OF COLORADO

Operator Address: 600 N. Marienfeld St., Suite 600 **Zip:** 79701

Operator PO Box:

Operator City: Midland **State:** TX

Operator Phone: (432)620-1936

Operator Internet Address: tstathem@cimarex.com

Section 2 - Well Information

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

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

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

Well Name: RED HILLS 32-5 FEDERAL COM **Well Number:** 156H **Well API Number:**

Field/Pool or Exploratory? Field and Pool **Field Name:** 1ST BONESPRING SAND **Pool Name:** WOLFCAMP

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

Operator Name: CIMAREX ENERGY COMPANY OF COLORADO

Well Name: RED HILLS 32-5 FEDERAL COM **Well Number:** 156H

Describe other minerals:

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

Type of Well Pad: MULTIPLE WELL **Multiple Well Pad Name:** RED HILLS 32-5 FED COM **Number:** E2W2 PAD 3

Well Class: HORIZONTAL **Number of Legs:** 1

Well Work Type: Drill

Well Type: CONVENTIONAL GAS WELL

Describe Well Type:

Well sub-Type: EXPLORATORY (WILDCAT)

Describe sub-type:

Distance to town: 24 Miles **Distance to nearest well:** 20 FT **Distance to lease line:** 390 FT

Reservoir well spacing assigned acres Measurement: 320 Acres

Well plat: Red_Hills_32_5_Fed_Com_156H_C102_Plat_20181005102100.pdf

Well work start Date: 03/01/2019 **Duration:** 30 DAYS

Section 3 - Well Location Table

Survey Type: RECTANGULAR

Describe Survey Type:

Datum: NAD83 **Vertical Datum:** NAVD88

Survey number: **Reference Datum:**

	NS-Foot	NS Indicator	EW-Foot	EW Indicator	Twsp	Range	Section	Aliquot/Lot/Tract	Latitude	Longitude	County	State	Meridian	Lease Type	Lease Number	Elevation	MD	TVD
SHL Leg #1	390	FNL	2365	FWL	25S	33E	32	Aliquot NENW	32.093245	-103.59522	LEA	NEW MEXICO	NEW MEXICO	S	STATE	3410	0	0
KOP Leg #1	330	FNL	2100	FWL	25S	33E	32	Aliquot NENW	32.0934139	-103.5961389	LEA	NEW MEXICO	NEW MEXICO	S	STATE	-8455	11878	11865
PPP Leg #1	0	FNL	2010	FWL	26S	33E	5	Aliquot NENW	32.0798889	-103.5948917	LEA	NEW MEXICO	NEW MEXICO	F	FEE	-8965	17100	12375

Operator Name: CIMAREX ENERGY COMPANY OF COLORADO

Well Name: RED HILLS 32-5 FEDERAL COM **Well Number:** 156H

	NS-Foot	NS Indicator	EW-Foot	EW Indicator	Twsp	Range	Section	Aliquot/Lot/Tract	Latitude	Longitude	County	State	Meridian	Lease Type	Lease Number	Elevation	MD	TVD
PPP Leg #1	1320	FNL	2010	FWL	26S	33E	5	Aliquot SENW	32.0759722	-103.5962806	LEA	NEW MEXICO	NEW MEXICO	F	NMNM 010604 0A	-8965	18500	12375
EXIT Leg #1	2640	FNL	2010	FWL	26S	33E	5	Aliquot SENW	32.0724	-103.5963083	LEA	NEW MEXICO	NEW MEXICO	F	NMNM 010604 0A	-8965	19800	12375
BHL Leg #1	100	FSL	2010	FWL	26S	33E	5	Aliquot SESW	32.065569	-103.596363	LEA	NEW MEXICO	NEW MEXICO	F	NMNM 016097 3	-8965	22285	12375

APD ID: 10400034904 **Submission Date:** 10/16/2018

Operator Name: CIMAREX ENERGY COMPANY OF COLORADO

Well Name: RED HILLS 32-5 FEDERAL COM **Well Number:** 156H

Well Type: CONVENTIONAL GAS WELL **Well Work Type:** Drill

[redacted]

Show Final Text

Section 1 - Geologic Formations

Formation ID	Formation Name	Elevation	True Vertical Depth	Measured Depth	Lithologies	Mineral Resources	Producing Formation
1	[redacted]						
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Section 2 - Blowout Prevention

Pressure Rating (PSI): 10M **Rating Depth:** 22285

Equipment: A BOP consisting of three rams, including one blind ram and two pipe rams and one annular preventer. An accumulator that meets the requirements in Onshore Order #2 for the pressure rating of the BOP stack. A rotating head may be installed as needed. A Kelly clock will be installed and maintained in operable condition and a drill string safety valve in the open position will be available on the rig floor.
Requesting Variance? YES

Variance request: Co-flex line between the BOP and choke manifold. Certification for proposed co-flex hose is attached. The hose is not required by the manufacturer to be anchored. In the event the specific hose is not available, one of equal or higher rating will be used. Variance to include Hammer Union connections on lines downstream of the buffer tank only.

Operator Name: CIMAREX ENERGY COMPANY OF COLORADO

Well Name: RED HILLS 32-5 FEDERAL COM **Well Number:** 156H

Cimarex requests a 5M annular variance for the 10M BOP system. See attached procedure.

Testing Procedure: A multi-bowl wellhead system will be utilized. After running the 10-3/4" surface casing, a 13 5/8" BOP/BOPE system with a minimum working pressure of 10000 psi will be installed on the wellhead system and will be pressure tested to 250 psi low followed by a 10000 psi test. Annular will be tested to 50% of working pressure. The pressure test will be repeated at least every 30 days, as per Onshore Order No. 2. The multi-bowl wellhead will be installed by vendor's representative. A copy of the installation instructions has been sent to the BLM field office. The wellhead will be installed by a third-party welder while being monitored by the wellhead vendor representative. All BOP equipment will be tested utilizing a conventional test plug. Not a cup or J-packer type. A solid steel body pack-off will be utilized after running and cementing the intermediate casing. After installation the pack-off and lower flange will be pressure tested to 10000 psi. The surface casing string will be tested as per Onshore Order No. 2 to at least 0.22 psi/ft or 1500 psi, whichever is greater. The casing string utilizing steel body pack-off will be tested to 70% of casing burst. If well conditions dictate conventional slips will be set and BOPE will be tested to appropriate pressures based on permitted pressure requirements.

Choke Diagram Attachment:

Red_Hills_32_5_Fed_Com_156H_Choke_10M_20181016123518.pdf

BOP Diagram Attachment:

Red_Hills_32_5_Fed_Com_156H_BOP_10M_20181016123528.pdf

Pressure Rating (PSI): 5M **Rating Depth:** 12504

Equipment: A BOP consisting of three rams, including one blind ram and two pipe rams and one annular preventer. An accumulator that meets the requirements in Onshore Order #2 for the pressure rating of the BOP stack. A rotating head may be installed as needed. A Kelly clock will be installed and maintained in operable condition and a drill string safety valve in the open position will be available on the rig floor.

Requesting Variance? YES

Variance request: Co-flex line between the BOP and choke manifold. Certification for proposed co-flex hose is attached. The hose is not required by the manufacturer to be anchored. In the event the specific hose is not available, one of equal or higher rating will be used. Variance to include Hammer Union connections on lines downstream of the buffer tank only.

Testing Procedure: A multi-bowl wellhead system will be utilized. After running the 10-3/4" surface casing, a 13 5/8" BOP/BOPE system with a minimum working pressure of 10000 psi will be installed on the wellhead system and will be pressure tested to 250 psi low followed by a 10000 psi test. Annular will be tested to 50% of working pressure. The pressure test will be repeated at least every 30 days, as per Onshore Order No. 2. The multi-bowl wellhead will be installed by vendor's representative. A copy of the installation instructions has been sent to the BLM field office. The wellhead will be installed by a third-party welder while being monitored by the wellhead vendor representative. All BOP equipment will be tested utilizing a conventional test plug. Not a cup or J-packer type. A solid steel body pack-off will be utilized after running and cementing the intermediate casing. After installation the pack-off and lower flange will be pressure tested to 10000 psi. The surface casing string will be tested as per Onshore Order No. 2 to at least 0.22 psi/ft or 1500 psi, whichever is greater. The casing string utilizing steel body pack-off will be tested to 70% of casing burst. If well conditions dictate conventional slips will be set and BOPE will be tested to appropriate pressures based on permitted pressure requirements.

Choke Diagram Attachment:

Red_Hills_32_5_Fed_Com_156H_Choke_5M_20181016123559.pdf

BOP Diagram Attachment:

Red_Hills_32_5_Fed_Com_156H_BOP_5M_20181016123612.pdf

Operator Name: CIMAREX ENERGY COMPANY OF COLORADO

Well Name: RED HILLS 32-5 FEDERAL COM **Well Number:** 156H

Section 3 - Casing

Casing ID	String Type	Hole Size	Csg Size	Condition	Standard	Tapered String	Top Set MD	Bottom Set MD	Top Set TVD	Bottom Set TVD	Top Set MSL	Bottom Set MSL	Calculated casing length MD	Grade	Weight	Joint Type	Collapse SF	Burst SF	Joint SF Type	Joint SF	Body SF Type	Body SF
1	SURFACE	14.75	10.75	NEW	API	N	0	1050	0	1050	0	1050	1050	J-55	40.5	BUTT	3.29	6.51	BUOY	14.79	BUOY	14.79
2	PRODUCTION	6.75	5.5	NEW	API	N	0	11879	0	11879	0		11879	L-80	20	LT&C	1.14	1.19	BUOY	1.87	BUOY	1.87
3	INTERMEDIATE	9.875	7.625	NEW	API	N	0	12504	0	12326	0		12504	L-80	29.7	BUTT	2.48	1.19	BUOY	1.81	BUOY	1.81
4	PRODUCTION	6.75	5.0	NEW	API	N	11879	22285	11879	12375	11879	22285	10406	P-110	18	BUTT	1.67	1.69	BUOY	64.96	BUOY	64.96

Casing Attachments

Casing ID: 1 **String Type:** SURFACE

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

Red_Hills_32_5_Fed_Com_156H_Casing_Assumptions_20181016130117.pdf

Operator Name: CIMAREX ENERGY COMPANY OF COLORADO

Well Name: RED HILLS 32-5 FEDERAL COM **Well Number:** 156H

Casing Attachments

Casing ID: 2 **String Type:** PRODUCTION

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

Red_Hills_32_5_Fed_Com_156H_Casing_Assumptions_20181016130109.pdf

Casing ID: 3 **String Type:** INTERMEDIATE

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

Red_Hills_32_5_Fed_Com_156H_Casing_Assumptions_20181016130059.pdf

Casing ID: 4 **String Type:** PRODUCTION

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

Red_Hills_32_5_Fed_Com_156H_Casing_Assumptions_20181016130043.pdf

Section 4 - Cement

Operator Name: CIMAREX ENERGY COMPANY OF COLORADO

Well Name: RED HILLS 32-5 FEDERAL COM **Well Number:** 156H

String Type	Lead/Tail	Stage Tool Depth	Top MD	Bottom MD	Quantity(sx)	Yield	Density	Cu Ft	Excess%	Cement type	Additives
SURFACE	Lead					1.72					
SURFACE	Tail										
PRODUCTION	Lead					1.3					
INTERMEDIATE	Lead					3.64					
INTERMEDIATE	Tail										
INTERMEDIATE	Lead					1.88					
PRODUCTION	Lead					1.3					

Section 5 - Circulating Medium

Mud System Type: Closed

Will an air or gas system be Used? NO

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

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

Describe what will be on location to control well or mitigate other conditions: Sufficient mud materials will be kept on location at all times in order to combat lost circulation or unexpected kicks. In order to run DSTs, open hole logs, and casing, the viscosity and water loss may have to be adjusted in order to meet these needs.
Describe the mud monitoring system utilized: PVT/Pason/Visual Monitoring

Circulating Medium Table

Operator Name: CIMAREX ENERGY COMPANY OF COLORADO

Well Name: RED HILLS 32-5 FEDERAL COM **Well Number:** 156H

Top Depth	Bottom Depth	Mud Type	Min Weight (lbs/gal)	Max Weight (lbs/gal)	Density (lbs/cu ft)	Gel Strength (lbs/100 sqft)	PH	Viscosity (CP)	Salinity (ppm)	Filtration (cc)	Additional Characteristics
0	1050	SPUD MUD	8.3	8.8							
1050	12504	OTHER : Brine Diesel Emulsion	8.5	9							
12504	22285	OIL-BASED MUD	12	12.5							

Section 6 - Test, Logging, Coring

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

No DST Planned

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

CNL,DS,GR

Coring operation description for the well:

n/a

Section 7 - Pressure

Anticipated Bottom Hole Pressure: 8043 **Anticipated Surface Pressure:** 5320.5

Anticipated Bottom Hole Temperature(F): 191

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

Describe:

Lost circulation may be encountered in the Delaware mountain group. Abnormal pressure as well as hole stability issues may be encountered in the Wolfcamp.

Contingency Plans geoharzards description:

Lost circulation material will be available, as well as additional drilling fluid along with the fluid volume in the drilling rig pit system. Drilling fluid can be mixed on location or mixed in vendor mud plant and trucked to location if needed. Sufficient barite will be available to maintain appropriate mud weight for the Wolfcamp interval.

Contingency Plans geohazards attachment:

Hydrogen Sulfide drilling operations plan required? YES

Hydrogen sulfide drilling operations plan:

Red_Hills_32_5_Fed_Com_156H_H2S_Plan_20181016131410.pdf

Operator Name: CIMAREX ENERGY COMPANY OF COLORADO

Well Name: RED HILLS 32-5 FEDERAL COM **Well Number:** 156H

Section 8 - Other Information

Proposed horizontal/directional/multi-lateral plan submission:

Red_Hills_32_5_Fed_Com_156H_AC_Report_20181016131424.pdf

Red_Hills_32_5_Fed_Com_156H_Directional_Plan_20181016131425.pdf

Other proposed operations facets description:

Other proposed operations facets attachment:

Red_Hills_32_5_Fed_Com_156H_Flex_Hose_20181016131445.pdf

Red_Hills_32_5_Fed_Com_156H_Gas_Capture_Plan_20181016131447.pdf

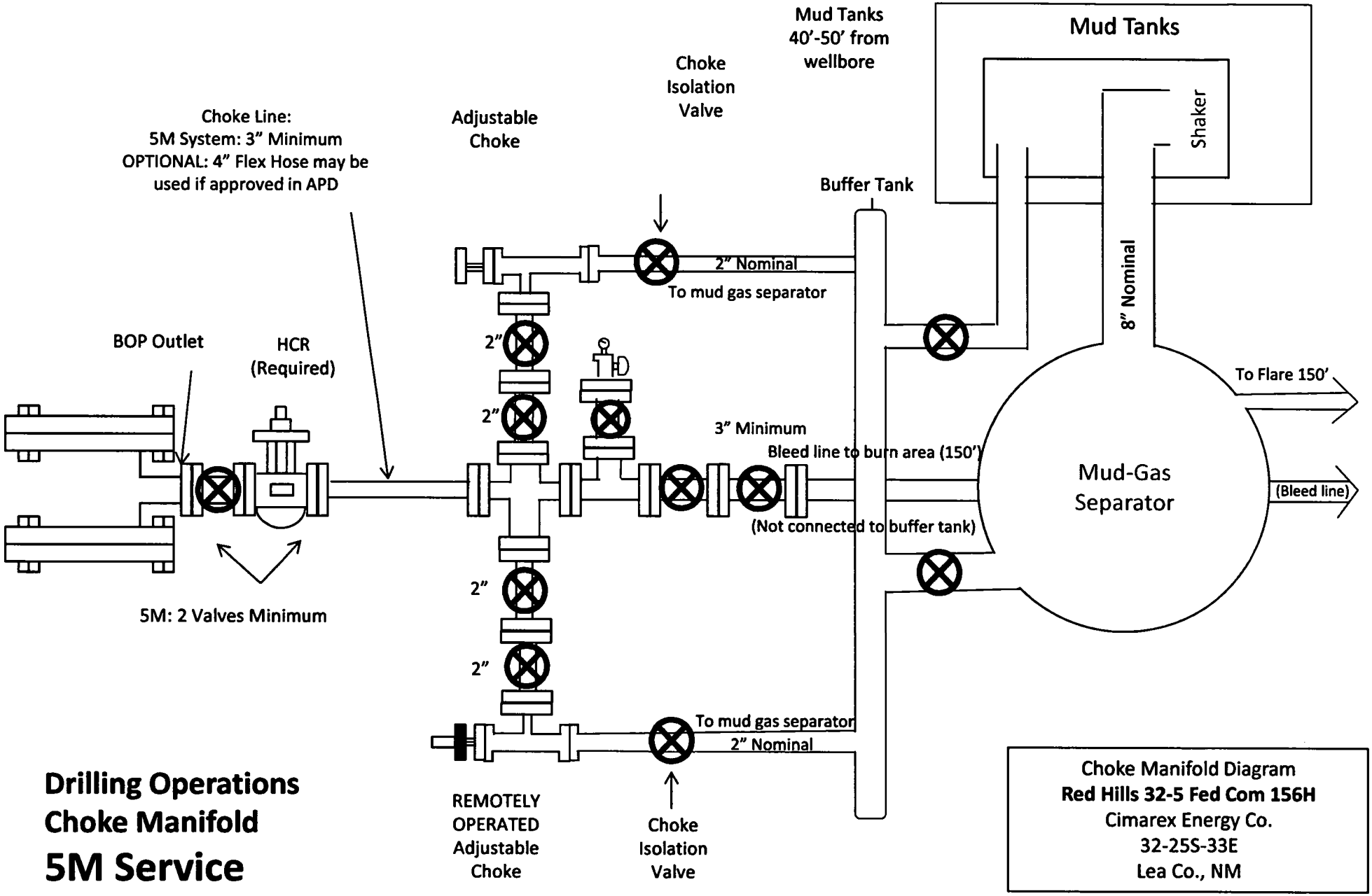
Red_Hills_32_5_Fed_Com_156H_Drilling_Plan_20190814111330.pdf

Other Variance attachment:

Red_Hills_32_5_Fed_Com_156H_Annular_Variance_Well_Control_Plan_20181016131500.pdf

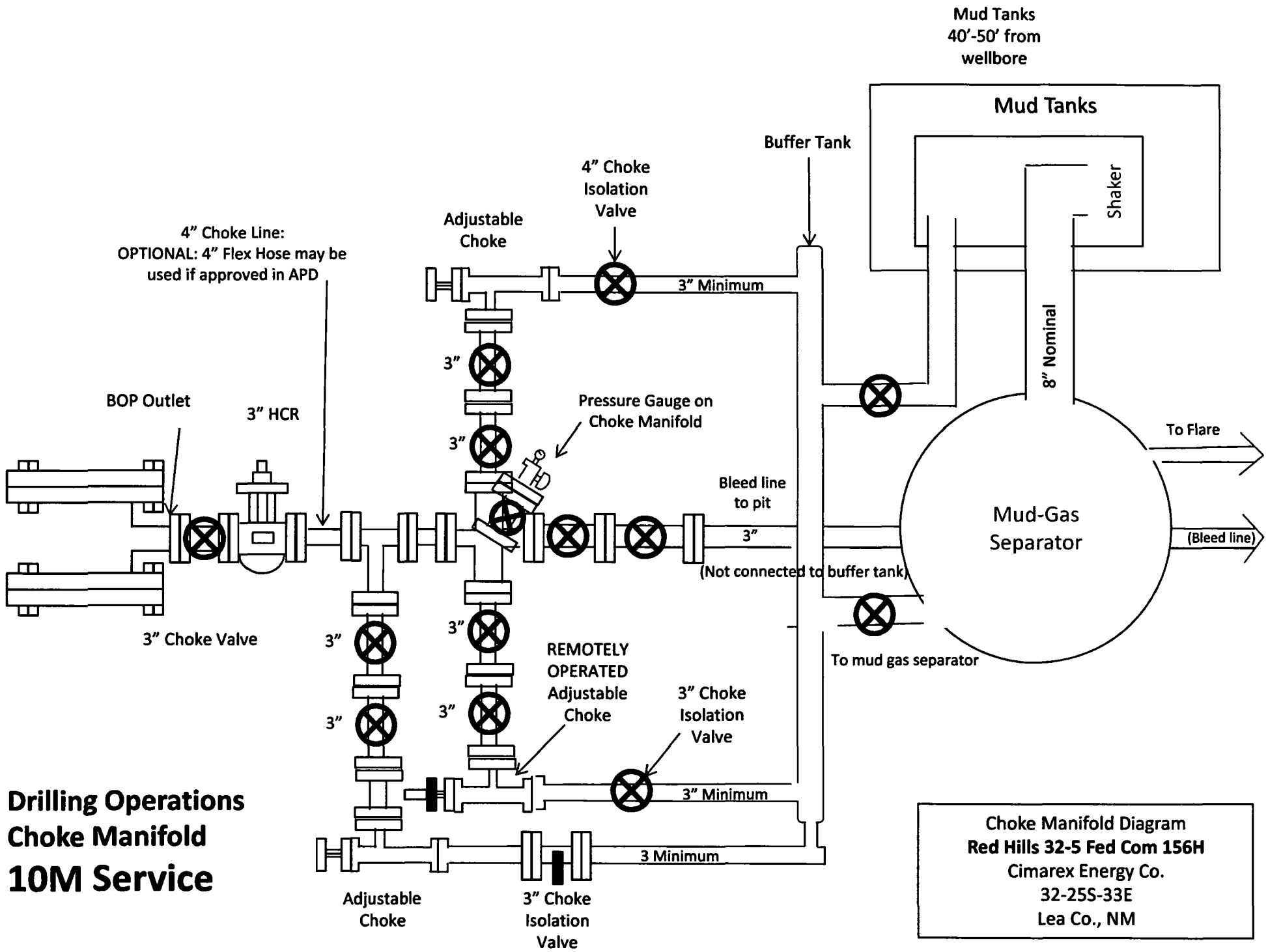
Red_Hills_32_5_Fed_Com_156H_Multibowl_Procedure_20181016131502.pdf

Red_Hills_32_5_Fed_Com_156H_Multibowl_Wellhead_20181016131503.pdf



Drilling Operations
Choke Manifold
5M Service

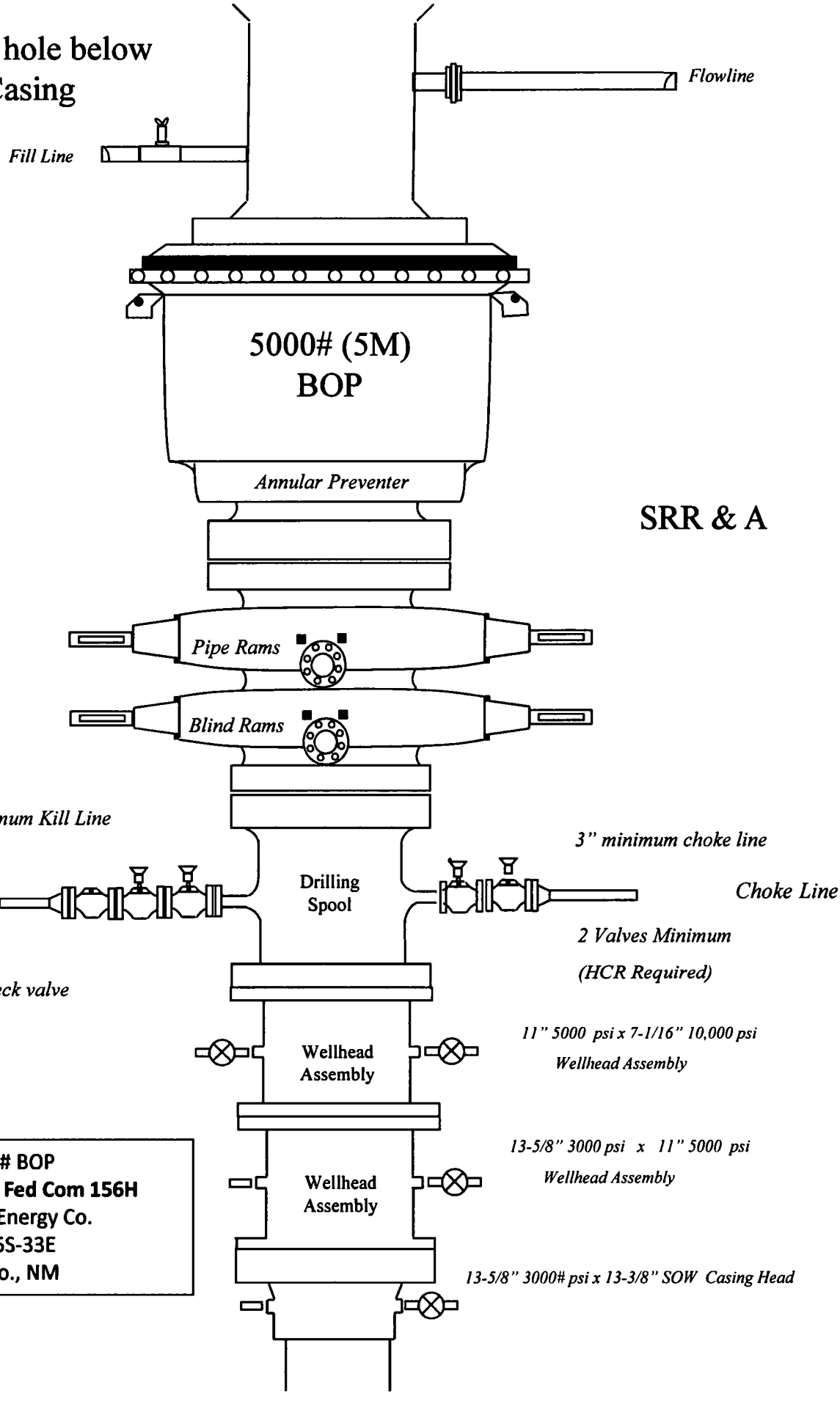
Choke Manifold Diagram
Red Hills 32-5 Fed Com 156H
Cimarex Energy Co.
32-25S-33E
Lea Co., NM



Drilling Operations
Choke Manifold
10M Service

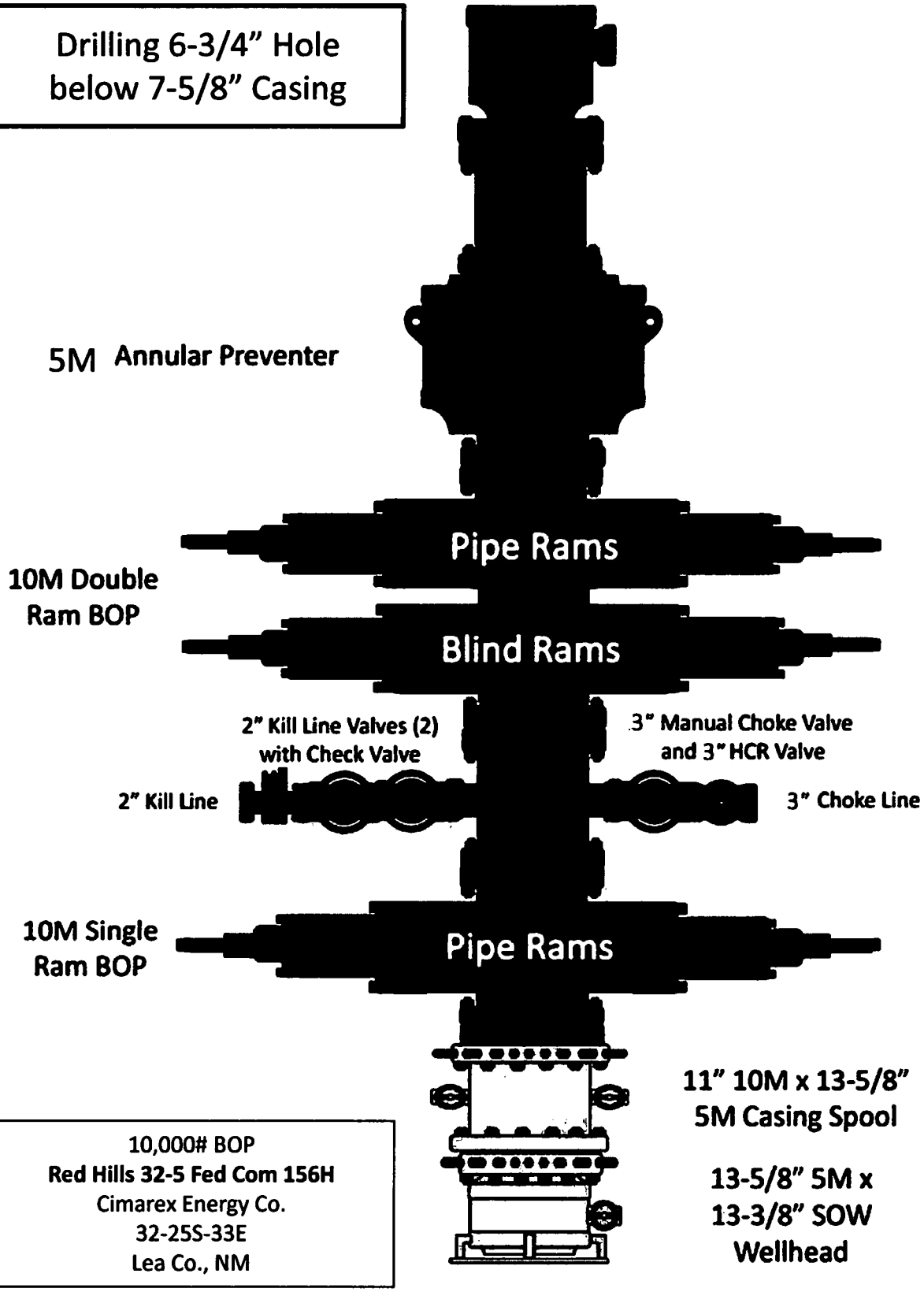
Choke Manifold Diagram
Red Hills 32-5 Fed Com 156H
Cimarex Energy Co.
32-25S-33E
Lea Co., NM

Drilling 9-7/8" hole below 10-3/4" Casing



5000# BOP
Red Hills 32-5 Fed Com 156H
Cimarex Energy Co.
32-25S-33E
Lea Co., NM

Drilling 6-3/4" Hole
below 7-5/8" Casing



10,000# BOP
Red Hills 32-5 Fed Com 156H
Cimarex Energy Co.
32-25S-33E
Lea Co., NM

Red Hills 32-5 Federal Com 156H

Casing Assumptions

Casing Program

Hole Size	Casing Depth From	Casing Depth To	Setting Depth TVD	Casing Size	Weight (lb/ft)	Grade	Conn.	SF Collapse	SF Burst	SF Tension
14 3/4	0	1050	1050	10-3/4"	40.50	J-55	BT&C	3.29	6.51	14.79
9 7/8	0	12504	12326	7-5/8"	29.70	L-80	BT&C	2.48	1.19	1.81
6 3/4	0	11879	11879	5-1/2"	20.00	L-80	LT&C	1.14	1.19	1.87
6 3/4	11879	22285	12375	5"	18.00	P-110	BT&C	1.67	1.69	64.96
					BLM Minimum Safety Factor			1.125	1	1.6 Dry 1.8 Wet

TVD was used on all calculations.
All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 IILB.1.h

Red Hills 32-5 Federal Com 156H

Casing Assumptions

Casing Program

Hole Size	Casing Depth From	Casing Depth To	Setting Depth TVD	Casing Size	Weight (lb/ft)	Grade	Conn.	SF Collapse	SF Burst	SF Tension
14 3/4	0	1050	1050	10-3/4"	40.50	J-55	BT&C	3.29	6.51	14.79
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TVD was used on all calculations.
All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h

Red Hills 32-5 Federal Com 156H

Casing Assumptions

Casing Program

Hole Size	Casing Depth From	Casing Depth To	Setting Depth TVD	Casing Size	Weight (lb/ft)	Grade	Conn.	SF Collapse	SF Burst	SF Tension
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Red Hills 32-5 Federal Com 156H

Casing Assumptions

Casing Program

Hole Size	Casing Depth From	Casing Depth To	Setting Depth TVD	Casing Size	Weight (lb/ft)	Grade	Conn.	SF Collapse	SF Burst	SF Tension
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6 3/4	0	11879	11879	5-1/2"	20.00	L-80	LT&C	1.14	1.19	1.87
6 3/4	11879	22285	12375	5"	18.00	P-110	BT&C	1.67	1.69	64.96
					BLM Minimum Safety Factor			1.125	1	1.6 Dry 1.8 Wet

TVD was used on all calculations.
All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 IILB.1.h

Hydrogen Sulfide Drilling Operations Plan
Red Hills 32-5 Federal Com 156H
Cimarex Energy Co. of Colorado
UL: C, Sec. 32, 25S, 33E
Lea Co., NM

1 All Company and Contract personnel admitted on location must be trained by a qualified H2S safety instructor to the following:

A. Characteristics of H_2S
B. Physical effects and hazards
C. Principal and operation of H2S detectors, warning system and briefing areas.
D. Evacuation procedure, routes and first aid.
E. Proper use of safety equipment & life support systems
F. Essential personnel meeting Medical Evaluation criteria will receive additional training on the proper use of 30 minute pressure demand air packs.

H_2S Detection and Alarm Systems:

A. H2S sensors/detectors to be located on the drilling rig floor, in the base of the sub structure/cellar area, on the mud pits in the shale shaker area. Additional H2S detectors may play placed as deemed necessary.

B. An audio alarm system will be installed on the derrick floor and in the top doghouse.

3 Windsock and/or wind streamers:

A. Windsock at mudpit area should be high enough to be visible.

B. Windsock on the rig floor and / or top doghouse should be high enough to be visible.

4 Condition Flags and Signs

A. Warning sign on access road to location.
B. Flags to be displayed on sign at entrance to location. Green flag indicates normal safe condition. Yellow flag indicates potential pressure and danger. Red flag indicates danger (H_2S present in dangerous concentration). Only H2S trained and certified personnel admitted to location.

5 Well control equipment:

A. See exhibit "E-1"

6 Communication:

A. While working under masks chalkboards will be used for communication.
B. Hand signals will be used where chalk board is inappropriate.
C. Two way radio will be used to communicate off location in case of emergency help is required. In most cases cellular telephones will be available at most drilling foreman's trailer or living quarters.

7 Drillstem Testing:
No DSTs r cores are planned at this time.

8 Drilling contractor supervisor will be required to be familiar with the effects H_2S has on tubular goods and other mechanical equipment.

9 If H2S is encountered, mud system will be altered if necessary to maintain control of formation. A mud gas separator will be brought into service along with H2S scavengers if necessary.

H_2S Contingency Plan
Red Hills 32-5 Federal Com 156H
Cimarex Energy Co. of Colorado
UL: C, Sec. 32, 25S, 33E
Lea Co., NM

Emergency Procedures

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

« Isolate the area and prevent entry by other persons into the 100 ppm ROE.
« Evacuate any public places encompassed by the 100 ppm ROE.
« Be equipped with H_2S monitors and air packs in order to control the release.
« Use the "buddy system" to ensure no injuries occur during the 432-620-1975
« Take precautions to avoid personal injury during this operation.
« Contact operator and/or local officials to aid in operation. See list of phone numbers attached.
« Have received training in the:
  - Detection of H_2S, and
  - Measures for protection against the gas,
  - Equipment used for protection and emergency response.

Ignition of Gas Source

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

Characteristics of H_2S and SO_2

Please see attached International Chemical Safety Cards.

Contacting Authorities

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

H_2S Contingency Plan Emergency Contacts
Red Hills 32-5 Federal Com 156H
Cimarex Energy Co. of Colorado
UL: C, Sec. 32, 25S, 33E
Lea Co., NM

Company Office			
Cimarex Energy Co. of Colorado		800-969-4789	
Co. Office and After-Hours Menu			
Key Personnel			
Name	**Title**	**Office**	**Mobile**
Larry Seigrist	Drilling Manager	432-620-1934	580-243-8485
Charlie Pritchard	Drilling Superintendent	432-620-1975	432-238-7084
Roy Shirley	Construction Superintendent		432-634-2136

Artesia		
Ambulance	911	
State Police	575-746-2703	
City Police	575-746-2703	
Sheriff's Office	575-746-9888	
Fire Department	**575-746-2701**	
Local Emergency Planning Committee	575-746-2122	
New Mexico Oil Conservation Division	575-748-1283	
Carlsbad		
Ambulance	911	
State Police	575-885-3137	
City Police	575-885-2111	
Sheriff's Office	575-887-7551	
Fire Department	**575-887-3798**	
Local Emergency Planning Committee	575-887-6544	
US Bureau of Land Management	575-887-6544	
Santa Fe		
New Mexico Emergency Response Commission (Santa Fe)	505-476-9600	
New Mexico Emergency Response Commission (Santa Fe) 24 Hrs	505-827-9126	
New Mexico State Emergency Operations Center	505-476-9635	
National		
National Emergency Response Center (Washington, D.C.)	800-424-8802	
Medical		
Flight for Life - 4000 24th St.; Lubbock, TX	806-743-9911	
Aerocare - R3, Box 49F; Lubbock, TX	806-747-8923	
Med Flight Air Amb - 2301 Yale Blvd S.E., #D3; Albuquerque, NM	505-842-4433	
SB Air Med Service - 2505 Clark Carr Loop S.E.; Albuquerque, NM	505-842-4949	
Other		
Boots & Coots IWC	800-256-9688	or 281-931-8884
Cudd Pressure Control	432-699-0139	or 432-563-3356
Halliburton	575-746-2757	
B.J. Services	575-746-3569	

Schlumberger

CIMAREX

Cimarex Red Hills 32-5 Federal Com 156H Rev0 RM 03Oct18 Anti-Collision Summary Report

Analysis Date-24hr Time:	October 03, 2018 - 13:54	**Analysis Method:**	3D Least Distance
Client:	Cimarex Energy	**Reference Trajectory:**	Cimarex Red Hills 32-5 Federal Com 156H Rev0 RM 03Oct18 (Non-Def Plan)
Field:	NM Lea County (NAD 83)	**Depth Interval:**	Every 10.00 Measured Depth (ft)
Structure:	Cimarex Red Hills 32-5 Federal Com 156H	**Rule Set:**	NAL Procedure: D&M AntiCollision Standard S002
Slot:	New Slot	**Min Pts:**	All local minima indicated.
Well:	Red Hills 32-5 Federal Com 156H	**Version / Patch:**	2.10.740.0
Borehole:	Red Hills 32-5 Federal Com 156H	**Database \ Project:**	US1153APP452.dir.slb.com\drilling-NM Lea County 2.10
Scan MD Range:	0.00ft ~ 22284.59ft		

Trajectory Error Model: ISCWSA0 3-D 95.000% Confidence 2.7955 sigma, for subject well. For offset wells, error model version is specified with each well respectively.

Offset Trajectories Summary

Offset Selection Criteria

Wellhead distance scan: Not performed!

Selection filters: Definitive Surveys - Definitive Plans - Definitive surveys exclude definitive plans
- All Non-Def Surveys when no Def-Survey is set in a borehole - All Non-Def Plans when no Def-Plan is set in a borehole

Offset Trajectory	Separation			Allow	Sep.	Controlling	Reference Trajectory		Risk Level			Alert	Status
	Ct-Ct (ft)	MAS (ft)	EOU (ft)	Dev. (ft)	Fact.	Rule	MD (ft)	TVD (ft)	Alert	Minor	Major		
Cimarex Red Hills 32-5 Federal Com 155H Rev0 RM 03Oct18 (Non-Def Plan)												Warning Alert	
	19.99	16.49	17.49	3.50	N/A	MAS = 5.03 (m)	0.00	0.00	CtCt<=15m<15.00			Enter Alert	
	19.99	16.49	17.49	3.50	78723.70	MAS = 5.03 (m)	26.00	26.00				WRP	
	19.99	16.49	8.46	3.50	1.94	MAS = 5.03 (m)	1500.00	1500.00				MinPts	
	20.01	16.49	8.43	3.52	1.93	MAS = 5.03 (m)	1510.00	1510.00				MINPT-O-EOU	
	20.14	16.49	8.46	3.65	1.92	MAS = 5.03 (m)	1530.00	1530.00				MinPt-O-SF	
	59.49	19.80	45.46	39.69	4.94	OSF1.50	2050.00	2048.29	OSF>5.00			Exit Alert	
	311.21	95.18	246.92	216.03	5.00	OSF1.50	10950.00	10936.29	OSF<5.00			Enter Alert	
	311.21	103.31	241.50	207.89	4.59	OSF1.50	11840.00	11826.29				MinPts	
	311.27	103.35	241.54	207.93	4.59	OSF1.50	11850.00	11838.29				MinPt-O-SF	
	327.51	100.51	259.67	227.00	4.97	OSF1.50	12050.00	12032.64	OSF>5.00			Exit Alert	
	419.93	96.62	354.68	323.31	6.65	OSF1.50	12960.00	12375.00				MinPt-CtCt	
	419.93	127.81	333.89	292.11	5.00	OSF1.50	15710.00	12375.00	OSF<5.00			Enter Alert	
	419.94	313.03	210.42	106.91	2.02	OSF1.50	22284.59	12375.00				MinPts	
Cimarex Red Hills 32-5 Federal Com 157H Rev0 RM 03Oct18 (Non-Def Plan)												Warning Alert	
	20.00	16.50	17.50	3.50	N/A	MAS = 5.03 (m)	0.00	0.00	CtCt<=15m<15.00			Enter Alert	
	20.00	16.50	17.50	3.50	78768.43	MAS = 5.03 (m)	26.00	26.00				WRP	
	20.00	16.50	8.55	3.50	1.95	MAS = 5.03 (m)	1490.00	1490.00				MinPts	
	20.06	16.61	8.15	3.45	1.87	OSF1.50	1630.00	1629.96				MINPT-O-EOU	
	20.10	16.65	8.16	3.44	1.86	OSF1.50	1660.00	1659.92				MinPt-O-ADP	

Results highlighted: Sep-Factor separation <= 1.50 ft

Offset Trajectory	Separation			Allow	Sep.	Controlling	Reference Trajectory		Risk Level			Alert	Status
	Ct-Ct (ft)	MAS (ft)	EOU (ft)	Dev. (ft)	Fact.	Rule	MD (ft)	TVD (ft)	Alert	Minor	Major		
	20.11	16.67	8.17	3.44	1.86	OSF1.50	1670.00	1669.90				MinPt-O-SF	
	20.19	16.73	8.21	3.46	1.87	OSF1.50	1710.00	1709.81				MinPt-O-SF	
	118.48	37.36	92.74	81.12	4.99	OSF1.50	4900.00	4888.29	OSF>5.00			Exit Alert	
	424.19	86.34	365.80	337.85	7.54	OSF1.50	11900.00	11888.28				MinPts	
	420.33	82.33	364.62	338.01	7.85	OSF1.50	12510.00	12327.81				MinPt-O-ADP	
	420.25	82.23	364.60	338.02	7.86	OSF1.50	12530.00	12332.76				MINPT-O-EOU	
	419.83	127.75	333.93	292.18	5.00	OSF1.50	15860.00	12375.00	OSF<5.00			Enter Alert	
	419.93	318.08	207.05	101.86	1.98	OSF1.50	22284.59	12375.00				MinPts	

Schlumberger

Cimarex Red Hills 32-5 Federal Com 156H Rev0 RM 03Oct18 Proposal
Geodetic Report
(Non-Def Plan)

CIMAREX

Report Date:	October 03, 2018 - 01:54 PM	**Survey / DLS Computation:**	Minimum Curvature / Lubinski
Client:	Cimarex Energy	**Vertical Section Azimuth:**	180.000 ° (Grid North)
Field:	NM Lea County (NAD 83)	**Vertical Section Origin:**	0.000 ft, 0.000 ft
Structure / Slot:	Cimarex Red Hills 32-5 Federal Com 156H / New Slot	**TVD Reference Datum:**	RKB
Well:	Red Hills 32-5 Federal Com 156H	**TVD Reference Elevation:**	3435.700 ft above MSL
Borehole:	Red Hills 32-5 Federal Com 156H	**Seabed / Ground Elevation:**	3409.700 ft above MSL
UWI / API#:	Unknown / Unknown	**Magnetic Declination:**	6.724 °
Survey Name:	Cimarex Red Hills 32-5 Federal Com 156H Rev0 RM 03Oct18	**Total Gravity Field Strength:**	998.4285mgn (9.80665 Based)
Survey Date:	October 03, 2018	**Gravity Model:**	GARM
Tort / AHD / DDI / ERD Ratio:	101.107 ° / 10422.143 ft / 6.278 / 0.842	**Total Magnetic Field Strength:**	47821.984 nT
Coordinate Reference System:	NAD83 New Mexico State Plane, Eastern Zone, US Feet	**Magnetic Dip Angle:**	59.736 °
Location Lat / Long:	N 32° 5' 35.68065", W 103° 35' 42.79071"	**Declination Date:**	October 03, 2018
Location Grid N/E Y/X:	N 398441.470 ftUS, E 769914.850 ftUS	**Magnetic Declination Model:**	HDGM 2018
CRS Grid Convergence Angle:	0.3922 °	**North Reference:**	Grid North
Grid Scale Factor:	0.99996893	**Grid Convergence Used:**	0.3922 °
Version / Patch:	2.10.740.0	**Total Corr Mag North->Grid North:**	6.3323 °
		Local Coord Referenced To:	Well Head

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")
SHL [390' FNL, 2365' FWL]	0.00	0.00	181.62	0.00	0.00	0.00	0.00	N/A	398441.47	769914.85	N 32 5 35.68	W 103 35 42.79
	100.00	0.00	281.85	100.00	0.00	0.00	0.00	0.00	398441.47	769914.85	N 32 5 35.68	W 103 35 42.79
	200.00	0.00	281.85	200.00	0.00	0.00	0.00	0.00	398441.47	769914.85	N 32 5 35.68	W 103 35 42.79
	300.00	0.00	281.85	300.00	0.00	0.00	0.00	0.00	398441.47	769914.85	N 32 5 35.68	W 103 35 42.79
	400.00	0.00	281.85	400.00	0.00	0.00	0.00	0.00	398441.47	769914.85	N 32 5 35.68	W 103 35 42.79
	500.00	0.00	281.85	500.00	0.00	0.00	0.00	0.00	398441.47	769914.85	N 32 5 35.68	W 103 35 42.79
	600.00	0.00	281.85	600.00	0.00	0.00	0.00	0.00	398441.47	769914.85	N 32 5 35.68	W 103 35 42.79
	700.00	0.00	281.85	700.00	0.00	0.00	0.00	0.00	398441.47	769914.85	N 32 5 35.68	W 103 35 42.79
	800.00	0.00	281.85	800.00	0.00	0.00	0.00	0.00	398441.47	769914.85	N 32 5 35.68	W 103 35 42.79
	900.00	0.00	281.85	900.00	0.00	0.00	0.00	0.00	398441.47	769914.85	N 32 5 35.68	W 103 35 42.79
Rustler	1000.00	0.00	281.85	1000.00	0.00	0.00	0.00	0.00	398441.47	769914.85	N 32 5 35.68	W 103 35 42.79
	1100.00	0.00	281.85	1100.00	0.00	0.00	0.00	0.00	398441.47	769914.85	N 32 5 35.68	W 103 35 42.79
	1200.00	0.00	281.85	1200.00	0.00	0.00	0.00	0.00	398441.47	769914.85	N 32 5 35.68	W 103 35 42.79
	1300.00	0.00	281.85	1300.00	0.00	0.00	0.00	0.00	398441.47	769914.85	N 32 5 35.68	W 103 35 42.79
Top of Salt	*1340.00*	*0.00*	*281.85*	*1340.00*	*0.00*	*0.00*	*0.00*	*0.00*	*398441.47*	*769914.85*	*N 32 5 35.68*	*W 103 35 42.79*
	1400.00	0.00	281.85	1400.00	0.00	0.00	0.00	0.00	398441.47	769914.85	N 32 5 35.68	W 103 35 42.79
Nudge 2°/100' DLS	1500.00	0.00	281.85	1500.00	0.00	0.00	0.00	0.00	398441.47	769914.85	N 32 5 35.68	W 103 35 42.79
	1600.00	2.00	281.85	1599.98	-0.36	0.36	-1.71	2.00	398441.83	769913.14	N 32 5 35.68	W 103 35 42.81
	1700.00	4.00	281.85	1699.84	-1.43	1.43	-6.83	2.00	398442.90	769908.02	N 32 5 35.70	W 103 35 42.87
Hold Nudge	1777.69	5.55	281.85	1777.25	-2.76	2.76	-13.16	2.00	398444.23	769901.69	N 32 5 35.71	W 103 35 42.94
	1800.00	5.55	281.85	1799.46	-3.20	3.20	-15.27	0.00	398444.67	769899.58	N 32 5 35.71	W 103 35 42.97
	1900.00	5.55	281.85	1898.99	-5.19	5.19	-24.75	0.00	398446.66	769890.10	N 32 5 35.73	W 103 35 43.08
	2000.00	5.55	281.85	1998.52	-7.18	7.18	-34.22	0.00	398448.65	769880.63	N 32 5 35.75	W 103 35 43.19
	2100.00	5.55	281.85	2098.05	-9.17	9.17	-43.69	0.00	398450.64	769871.16	N 32 5 35.77	W 103 35 43.30
	2200.00	5.55	281.85	2197.58	-11.15	11.15	-53.16	0.00	398452.62	769861.69	N 32 5 35.79	W 103 35 43.41
	2300.00	5.55	281.85	2297.11	-13.14	13.14	-62.63	0.00	398454.61	769852.22	N 32 5 35.81	W 103 35 43.52
	2400.00	5.55	281.85	2396.64	-15.13	15.13	-72.10	0.00	398456.60	769842.75	N 32 5 35.84	W 103 35 43.63

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")
	2500.00	5.55	281.85	2496.17	-17.12	17.12	-81.58	0.00	398458.59	769833.28	N 32 5 35.86	W 103 35 43.74
	2600.00	5.55	281.85	2595.71	-19.10	19.10	-91.05	0.00	398460.57	769823.81	N 32 5 35.88	W 103 35 43.85
	2700.00	5.55	281.85	2695.24	-21.09	21.09	-100.52	0.00	398462.56	769814.33	N 32 5 35.90	W 103 35 43.96
	2800.00	5.55	281.85	2794.77	-23.08	23.08	-109.99	0.00	398464.55	769804.86	N 32 5 35.92	W 103 35 44.07
	2900.00	5.55	281.85	2894.30	-25.07	25.07	-119.46	0.00	398466.53	769795.39	N 32 5 35.94	W 103 35 44.18
	3000.00	5.55	281.85	2993.83	-27.05	27.05	-128.93	0.00	398468.52	769785.92	N 32 5 35.96	W 103 35 44.29
	3100.00	5.55	281.85	3093.36	-29.04	29.04	-138.41	0.00	398470.51	769776.45	N 32 5 35.98	W 103 35 44.40
	3200.00	5.55	281.85	3192.89	-31.03	31.03	-147.88	0.00	398472.50	769766.98	N 32 5 36.00	W 103 35 44.51
	3300.00	5.55	281.85	3292.42	-33.02	33.02	-157.35	0.00	398474.48	769757.51	N 32 5 36.02	W 103 35 44.62
	3400.00	5.55	281.85	3391.95	-35.00	35.00	-166.82	0.00	398476.47	769748.04	N 32 5 36.04	W 103 35 44.73
	3500.00	5.55	281.85	3491.48	-36.99	36.99	-176.29	0.00	398478.46	769738.56	N 32 5 36.06	W 103 35 44.84
	3600.00	5.55	281.85	3591.01	-38.98	38.98	-185.76	0.00	398480.45	769729.09	N 32 5 36.08	W 103 35 44.95
	3700.00	5.55	281.85	3690.54	-40.96	40.96	-195.24	0.00	398482.43	769719.62	N 32 5 36.10	W 103 35 45.06
	3800.00	5.55	281.85	3790.07	-42.95	42.95	-204.71	0.00	398484.42	769710.15	N 32 5 36.12	W 103 35 45.17
	3900.00	5.55	281.85	3889.60	-44.94	44.94	-214.18	0.00	398486.41	769700.68	N 32 5 36.14	W 103 35 45.28
	4000.00	5.55	281.85	3989.13	-46.93	46.93	-223.65	0.00	398488.40	769691.21	N 32 5 36.16	W 103 35 45.39
	4100.00	5.55	281.85	4088.66	-48.91	48.91	-233.12	0.00	398490.38	769681.74	N 32 5 36.18	W 103 35 45.50
	4200.00	5.55	281.85	4188.19	-50.90	50.90	-242.59	0.00	398492.37	769672.26	N 32 5 36.20	W 103 35 45.61
	4300.00	5.55	281.85	4287.73	-52.89	52.89	-252.06	0.00	398494.36	769662.79	N 32 5 36.22	W 103 35 45.72
	4400.00	5.55	281.85	4387.26	-54.88	54.88	-261.54	0.00	398496.34	769653.32	N 32 5 36.24	W 103 35 45.83
	4500.00	5.55	281.85	4486.79	-56.86	56.86	-271.01	0.00	398498.33	769643.85	N 32 5 36.26	W 103 35 45.94
Drop to Vertical 2°/100' DLS	4513.28	5.55	281.85	4500.00	-57.13	57.13	-272.27	0.00	398498.60	769642.59	N 32 5 36.26	W 103 35 45.95
	4600.00	3.82	281.85	4586.43	-58.58	58.58	-279.20	2.00	398500.05	769635.66	N 32 5 36.28	W 103 35 46.03
Base of Salt	*4643.65*	*2.95*	*281.85*	*4630.00*	*-59.11*	*59.11*	*-281.72*	*2.00*	*398500.58*	*769633.14*	*N 32 5 36.28*	*W 103 35 46.06*
	4700.00	1.82	281.85	4686.30	-59.59	59.59	-284.01	2.00	398501.06	769630.85	N 32 5 36.29	W 103 35 46.09
Hold Vertical	4790.96	0.00	281.85	4777.25	-59.89	59.89	-285.43	2.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	4800.00	0.00	281.85	4786.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	4900.00	0.00	281.85	4886.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
Delaware Sands	*4908.71*	*0.00*	*281.85*	*4895.00*	*-59.89*	*59.89*	*-285.43*	*0.00*	*398501.36*	*769629.43*	*N 32 5 36.29*	*W 103 35 46.10*
	5000.00	0.00	281.85	4986.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	5100.00	0.00	281.85	5086.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	5200.00	0.00	281.85	5186.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	5300.00	0.00	281.85	5286.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	5400.00	0.00	281.85	5386.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	5500.00	0.00	281.85	5486.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	5600.00	0.00	281.85	5586.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	5700.00	0.00	281.85	5686.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	5800.00	0.00	281.85	5786.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	5900.00	0.00	281.85	5886.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	6000.00	0.00	281.85	5986.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	6100.00	0.00	281.85	6086.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	6200.00	0.00	281.85	6186.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	6300.00	0.00	281.85	6286.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	6400.00	0.00	281.85	6386.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	6500.00	0.00	281.85	6486.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	6600.00	0.00	281.85	6586.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	6700.00	0.00	281.85	6686.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	6800.00	0.00	281.85	6786.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	6900.00	0.00	281.85	6886.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	7000.00	0.00	281.85	6986.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	7100.00	0.00	281.85	7086.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	7200.00	0.00	281.85	7186.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	7300.00	0.00	281.85	7286.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	7400.00	0.00	281.85	7386.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	7500.00	0.00	281.85	7486.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	7600.00	0.00	281.85	7586.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	7700.00	0.00	281.85	7686.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")
	7800.00	0.00	281.85	7786.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	7900.00	0.00	281.85	7886.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	8000.00	0.00	281.85	7986.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	8100.00	0.00	281.85	8086.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	8200.00	0.00	281.85	8186.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	8300.00	0.00	281.85	8286.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	8400.00	0.00	281.85	8386.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	8500.00	0.00	281.85	8486.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	8600.00	0.00	281.85	8586.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	8700.00	0.00	281.85	8686.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	8800.00	0.00	281.85	8786.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	8900.00	0.00	281.85	8886.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	9000.00	0.00	281.85	8986.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
Bone Spring	*9038.71*	*0.00*	*281.85*	*9025.00*	*-59.89*	*59.89*	*-285.43*	*0.00*	*398501.36*	*769629.43*	*N 32 5 36.29*	*W 103 35 46.10*
	9100.00	0.00	281.85	9086.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	9200.00	0.00	281.85	9186.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	9300.00	0.00	281.85	9286.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	9400.00	0.00	281.85	9386.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	9500.00	0.00	281.85	9486.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	9600.00	0.00	281.85	9586.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	9700.00	0.00	281.85	9686.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	9800.00	0.00	281.85	9786.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	9900.00	0.00	281.85	9886.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	10000.00	0.00	281.85	9986.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
1st Bone Spring Sand	*10023.71*	*0.00*	*281.85*	*10010.00*	*-59.89*	*59.89*	*-285.43*	*0.00*	*398501.36*	*769629.43*	*N 32 5 36.29*	*W 103 35 46.10*
	10100.00	0.00	281.85	10086.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	10200.00	0.00	281.85	10186.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
2nd Bone Spring Carb	*10223.71*	*0.00*	*281.85*	*10210.00*	*-59.89*	*59.89*	*-285.43*	*0.00*	*398501.36*	*769629.43*	*N 32 5 36.29*	*W 103 35 46.10*
	10300.00	0.00	281.85	10286.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	10400.00	0.00	281.85	10386.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	10500.00	0.00	281.85	10486.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
2nd Bone Spring Sand	*10578.71*	*0.00*	*281.85*	*10565.00*	*-59.89*	*59.89*	*-285.43*	*0.00*	*398501.36*	*769629.43*	*N 32 5 36.29*	*W 103 35 46.10*
	10600.00	0.00	281.85	10586.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	10700.00	0.00	281.85	10686.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	10800.00	0.00	281.85	10786.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	10900.00	0.00	281.85	10886.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	11000.00	0.00	281.85	10986.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
3rd Bone Spring Carb	*11048.71*	*0.00*	*281.85*	*11035.00*	*-59.89*	*59.89*	*-285.43*	*0.00*	*398501.36*	*769629.43*	*N 32 5 36.29*	*W 103 35 46.10*
	11100.00	0.00	281.85	11086.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	11200.00	0.00	281.85	11186.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	11300.00	0.00	281.85	11286.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	11400.00	0.00	281.85	11386.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	11500.00	0.00	281.85	11486.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	11600.00	0.00	281.85	11586.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	11700.00	0.00	281.85	11686.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
3rd Bone Spring Sand	*11703.71*	*0.00*	*281.85*	*11690.00*	*-59.89*	*59.89*	*-285.43*	*0.00*	*398501.36*	*769629.43*	*N 32 5 36.29*	*W 103 35 46.10*
	11800.00	0.00	281.85	11786.29	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
KOP - Build 12°/100' DLS	11878.71	0.00	281.85	11865.00	-59.89	59.89	-285.43	0.00	398501.36	769629.43	N 32 5 36.29	W 103 35 46.10
	11900.00	2.56	180.00	11886.28	-59.41	59.41	-285.43	12.00	398500.88	769629.43	N 32 5 36.29	W 103 35 46.10
	12000.00	14.56	180.00	11984.99	-44.57	44.57	-285.43	12.00	398486.03	769629.43	N 32 5 36.14	W 103 35 46.10
	12100.00	26.56	180.00	12078.45	-9.52	9.52	-285.43	12.00	398450.99	769629.43	N 32 5 35.79	W 103 35 46.11
Wolfcamp	*12177.91*	*35.90*	*180.00*	*12145.00*	*30.83*	*-30.83*	*-285.43*	*12.00*	*398410.64*	*769629.43*	*N 32 5 35.39*	*W 103 35 46.11*
	12200.00	38.56	180.00	12162.59	44.19	-44.19	-285.43	12.00	398397.28	769629.43	N 32 5 35.26	W 103 35 46.11

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")
	12300.00	50.56	180.00	12233.71	114.23	-114.23	-285.43	12.00	398327.25	769629.43	N 32 5 34.57	W 103 35 46.12
	12400.00	62.56	180.00	12288.73	197.52	-197.52	-285.43	12.00	398243.96	769629.43	N 32 5 33.75	W 103 35 46.12
Wolfcamp A1	*12438.31*	*67.15*	*180.00*	*12305.00*	*232.19*	*-232.19*	*-285.43*	*12.00*	*398209.29*	*769629.43*	*N 32 5 33.40*	*W 103 35 46.13*
	12500.00	74.56	180.00	12325.22	290.42	-290.42	-285.43	12.00	398151.06	769629.43	N 32 5 32.83	W 103 35 46.13
Build 4°/100' DLS	12503.71	75.00	180.00	12326.19	294.00	-294.00	-285.43	12.00	398147.48	769629.43	N 32 5 32.79	W 103 35 46.13
	12600.00	78.85	180.00	12347.97	387.78	-387.78	-285.43	4.00	398053.70	769629.43	N 32 5 31.86	W 103 35 46.14
	12700.00	82.85	180.00	12363.87	486.49	-486.49	-285.43	4.00	397955.00	769629.43	N 32 5 30.89	W 103 35 46.15
	12800.00	86.85	180.00	12372.84	586.06	-586.06	-285.43	4.00	397855.43	769629.43	N 32 5 29.90	W 103 35 46.16
Landing Point	12878.71	90.00	180.00	12375.00	664.73	-664.73	-285.43	4.00	397776.76	769629.43	N 32 5 29.12	W 103 35 46.16
	12900.00	90.00	180.00	12375.00	686.02	-686.02	-285.43	0.00	397755.47	769629.43	N 32 5 28.91	W 103 35 46.16
	13000.00	90.00	180.00	12375.00	786.02	-786.02	-285.43	0.00	397655.47	769629.43	N 32 5 27.92	W 103 35 46.17
	13100.00	90.00	180.00	12375.00	886.02	-886.02	-285.43	0.00	397555.48	769629.43	N 32 5 26.93	W 103 35 46.18
	13200.00	90.00	180.00	12375.00	986.02	-986.02	-285.43	0.00	397455.48	769629.43	N 32 5 25.94	W 103 35 46.19
	13300.00	90.00	180.00	12375.00	1086.02	-1086.02	-285.43	0.00	397355.48	769629.43	N 32 5 24.95	W 103 35 46.19
	13400.00	90.00	180.00	12375.00	1186.02	-1186.02	-285.43	0.00	397255.49	769629.43	N 32 5 23.96	W 103 35 46.20
	13500.00	90.00	180.00	12375.00	1286.02	-1286.02	-285.43	0.00	397155.49	769629.43	N 32 5 22.97	W 103 35 46.21
	13600.00	90.00	180.00	12375.00	1386.02	-1386.02	-285.43	0.00	397055.49	769629.43	N 32 5 21.99	W 103 35 46.22
	13700.00	90.00	180.00	12375.00	1486.02	-1486.02	-285.43	0.00	396955.50	769629.43	N 32 5 21.00	W 103 35 46.23
	13800.00	90.00	180.00	12375.00	1586.02	-1586.02	-285.43	0.00	396855.50	769629.43	N 32 5 20.01	W 103 35 46.23
	13900.00	90.00	180.00	12375.00	1686.02	-1686.02	-285.43	0.00	396755.50	769629.43	N 32 5 19.02	W 103 35 46.24
	14000.00	90.00	180.00	12375.00	1786.02	-1786.02	-285.43	0.00	396655.51	769629.43	N 32 5 18.03	W 103 35 46.25
	14100.00	90.00	180.00	12375.00	1886.02	-1886.02	-285.43	0.00	396555.51	769629.43	N 32 5 17.04	W 103 35 46.26
	14200.00	90.00	180.00	12375.00	1986.02	-1986.02	-285.43	0.00	396455.51	769629.43	N 32 5 16.05	W 103 35 46.27
	14300.00	90.00	180.00	12375.00	2086.02	-2086.02	-285.43	0.00	396355.52	769629.43	N 32 5 15.06	W 103 35 46.27
	14400.00	90.00	180.00	12375.00	2186.02	-2186.02	-285.43	0.00	396255.52	769629.43	N 32 5 14.07	W 103 35 46.28
	14500.00	90.00	180.00	12375.00	2286.02	-2286.02	-285.43	0.00	396155.52	769629.43	N 32 5 13.08	W 103 35 46.29
	14600.00	90.00	180.00	12375.00	2386.02	-2386.02	-285.43	0.00	396055.53	769629.43	N 32 5 12.09	W 103 35 46.30
	14700.00	90.00	180.00	12375.00	2486.02	-2486.02	-285.43	0.00	395955.53	769629.43	N 32 5 11.10	W 103 35 46.31
	14800.00	90.00	180.00	12375.00	2586.02	-2586.02	-285.43	0.00	395855.53	769629.43	N 32 5 10.11	W 103 35 46.31
	14900.00	90.00	180.00	12375.00	2686.02	-2686.02	-285.43	0.00	395755.54	769629.43	N 32 5 9.12	W 103 35 46.32
	15000.00	90.00	180.00	12375.00	2786.02	-2786.02	-285.43	0.00	395655.54	769629.43	N 32 5 8.13	W 103 35 46.33
	15100.00	90.00	180.00	12375.00	2886.02	-2886.02	-285.43	0.00	395555.54	769629.43	N 32 5 7.14	W 103 35 46.34
	15200.00	90.00	180.00	12375.00	2986.02	-2986.02	-285.43	0.00	395455.55	769629.43	N 32 5 6.15	W 103 35 46.35
	15300.00	90.00	180.00	12375.00	3086.02	-3086.02	-285.43	0.00	395355.55	769629.43	N 32 5 5.16	W 103 35 46.35
	15400.00	90.00	180.00	12375.00	3186.02	-3186.02	-285.43	0.00	395255.55	769629.43	N 32 5 4.17	W 103 35 46.36
	15500.00	90.00	180.00	12375.00	3286.02	-3286.02	-285.43	0.00	395155.56	769629.43	N 32 5 3.18	W 103 35 46.37
	15600.00	90.00	180.00	12375.00	3386.02	-3386.02	-285.43	0.00	395055.56	769629.43	N 32 5 2.19	W 103 35 46.38
	15700.00	90.00	180.00	12375.00	3486.02	-3486.02	-285.43	0.00	394955.56	769629.43	N 32 5 1.21	W 103 35 46.39
	15800.00	90.00	180.00	12375.00	3586.02	-3586.02	-285.43	0.00	394855.57	769629.43	N 32 5 0.22	W 103 35 46.39
	15900.00	90.00	180.00	12375.00	3686.02	-3686.02	-285.43	0.00	394755.57	769629.43	N 32 4 59.23	W 103 35 46.40
	16000.00	90.00	180.00	12375.00	3786.02	-3786.02	-285.43	0.00	394655.57	769629.43	N 32 4 58.24	W 103 35 46.41
	16100.00	90.00	180.00	12375.00	3886.02	-3886.02	-285.43	0.00	394555.58	769629.43	N 32 4 57.25	W 103 35 46.42
	16200.00	90.00	180.00	12375.00	3986.02	-3986.02	-285.43	0.00	394455.58	769629.43	N 32 4 56.26	W 103 35 46.43
	16300.00	90.00	180.00	12375.00	4086.02	-4086.02	-285.43	0.00	394355.58	769629.43	N 32 4 55.27	W 103 35 46.43
	16400.00	90.00	180.00	12375.00	4186.02	-4186.02	-285.43	0.00	394255.59	769629.43	N 32 4 54.28	W 103 35 46.44
	16500.00	90.00	180.00	12375.00	4286.02	-4286.02	-285.43	0.00	394155.59	769629.43	N 32 4 53.29	W 103 35 46.45
	16600.00	90.00	180.00	12375.00	4386.02	-4386.02	-285.43	0.00	394055.59	769629.43	N 32 4 52.30	W 103 35 46.46
	16700.00	90.00	180.00	12375.00	4486.02	-4486.02	-285.43	0.00	393955.60	769629.43	N 32 4 51.31	W 103 35 46.46
	16800.00	90.00	180.00	12375.00	4586.02	-4586.02	-285.43	0.00	393855.60	769629.43	N 32 4 50.32	W 103 35 46.47
	16900.00	90.00	180.00	12375.00	4686.02	-4686.02	-285.43	0.00	393755.60	769629.43	N 32 4 49.33	W 103 35 46.48
	17000.00	90.00	180.00	12375.00	4786.02	-4786.02	-285.43	0.00	393655.61	769629.43	N 32 4 48.34	W 103 35 46.49
	17100.00	90.00	180.00	12375.00	4886.02	-4886.02	-285.43	0.00	393555.61	769629.43	N 32 4 47.35	W 103 35 46.50
	17200.00	90.00	180.00	12375.00	4986.02	-4986.02	-285.43	0.00	393455.61	769629.43	N 32 4 46.36	W 103 35 46.50
	17300.00	90.00	180.00	12375.00	5086.02	-5086.02	-285.43	0.00	393355.62	769629.43	N 32 4 45.37	W 103 35 46.51
	17400.00	90.00	180.00	12375.00	5186.02	-5186.02	-285.43	0.00	393255.62	769629.43	N 32 4 44.38	W 103 35 46.52
	17500.00	90.00	180.00	12375.00	5286.02	-5286.02	-285.43	0.00	393155.62	769629.43	N 32 4 43.39	W 103 35 46.53
	17600.00	90.00	180.00	12375.00	5386.02	-5386.02	-285.43	0.00	393055.62	769629.43	N 32 4 42.40	W 103 35 46.54
	17700.00	90.00	180.00	12375.00	5486.02	-5486.02	-285.43	0.00	392955.63	769629.43	N 32 4 41.42	W 103 35 46.54

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")
	17800.00	90.00	180.00	12375.00	5586.02	-5586.02	-285.43	0.00	392855.63	769629.43	N 32 4 40.43	W 103 35 46.55
	17900.00	90.00	180.00	12375.00	5686.02	-5686.02	-285.43	0.00	392755.63	769629.43	N 32 4 39.44	W 103 35 46.56
	18000.00	90.00	180.00	12375.00	5786.02	-5786.02	-285.43	0.00	392655.64	769629.43	N 32 4 38.45	W 103 35 46.57
	18100.00	90.00	180.00	12375.00	5886.02	-5886.02	-285.43	0.00	392555.64	769629.43	N 32 4 37.46	W 103 35 46.58
	18200.00	90.00	180.00	12375.00	5986.02	-5986.02	-285.43	0.00	392455.64	769629.43	N 32 4 36.47	W 103 35 46.58
	18300.00	90.00	180.00	12375.00	6086.02	-6086.02	-285.43	0.00	392355.65	769629.43	N 32 4 35.48	W 103 35 46.59
	18400.00	90.00	180.00	12375.00	6186.02	-6186.02	-285.43	0.00	392255.65	769629.43	N 32 4 34.49	W 103 35 46.60
	18500.00	90.00	180.00	12375.00	6286.02	-6286.02	-285.43	0.00	392155.65	769629.43	N 32 4 33.50	W 103 35 46.61
	18600.00	90.00	180.00	12375.00	6386.02	-6386.02	-285.43	0.00	392055.66	769629.43	N 32 4 32.51	W 103 35 46.62
	18700.00	90.00	180.00	12375.00	6486.02	-6486.02	-285.43	0.00	391955.66	769629.43	N 32 4 31.52	W 103 35 46.62
	18800.00	90.00	180.00	12375.00	6586.02	-6586.02	-285.43	0.00	391855.66	769629.43	N 32 4 30.53	W 103 35 46.63
	18900.00	90.00	180.00	12375.00	6686.02	-6686.02	-285.43	0.00	391755.67	769629.43	N 32 4 29.54	W 103 35 46.64
	19000.00	90.00	180.00	12375.00	6786.02	-6786.02	-285.43	0.00	391655.67	769629.43	N 32 4 28.55	W 103 35 46.65
	19100.00	90.00	180.00	12375.00	6886.02	-6886.02	-285.43	0.00	391555.67	769629.43	N 32 4 27.56	W 103 35 46.66
	19200.00	90.00	180.00	12375.00	6986.02	-6986.02	-285.43	0.00	391455.68	769629.43	N 32 4 26.57	W 103 35 46.66
	19300.00	90.00	180.00	12375.00	7086.02	-7086.02	-285.43	0.00	391355.68	769629.43	N 32 4 25.58	W 103 35 46.67
	19400.00	90.00	180.00	12375.00	7186.02	-7186.02	-285.43	0.00	391255.68	769629.43	N 32 4 24.59	W 103 35 46.68
	19500.00	90.00	180.00	12375.00	7286.02	-7286.02	-285.43	0.00	391155.69	769629.43	N 32 4 23.60	W 103 35 46.69
	19600.00	90.00	180.00	12375.00	7386.02	-7386.02	-285.43	0.00	391055.69	769629.43	N 32 4 22.61	W 103 35 46.70
	19700.00	90.00	180.00	12375.00	7486.02	-7486.02	-285.43	0.00	390955.69	769629.43	N 32 4 21.62	W 103 35 46.70
	19800.00	90.00	180.00	12375.00	7586.02	-7586.02	-285.43	0.00	390855.70	769629.43	N 32 4 20.64	W 103 35 46.71
	19900.00	90.00	180.00	12375.00	7686.02	-7686.02	-285.43	0.00	390755.70	769629.43	N 32 4 19.65	W 103 35 46.72
	20000.00	90.00	180.00	12375.00	7786.02	-7786.02	-285.43	0.00	390655.70	769629.43	N 32 4 18.66	W 103 35 46.73
	20100.00	90.00	180.00	12375.00	7886.02	-7886.02	-285.43	0.00	390555.71	769629.43	N 32 4 17.67	W 103 35 46.73
	20200.00	90.00	180.00	12375.00	7986.02	-7986.02	-285.43	0.00	390455.71	769629.43	N 32 4 16.68	W 103 35 46.74
	20300.00	90.00	180.00	12375.00	8086.02	-8086.02	-285.43	0.00	390355.71	769629.43	N 32 4 15.69	W 103 35 46.75
	20400.00	90.00	180.00	12375.00	8186.02	-8186.02	-285.43	0.00	390255.72	769629.43	N 32 4 14.70	W 103 35 46.76
	20500.00	90.00	180.00	12375.00	8286.02	-8286.02	-285.43	0.00	390155.72	769629.43	N 32 4 13.71	W 103 35 46.77
	20600.00	90.00	180.00	12375.00	8386.02	-8386.02	-285.43	0.00	390055.72	769629.43	N 32 4 12.72	W 103 35 46.77
	20700.00	90.00	180.00	12375.00	8486.02	-8486.02	-285.43	0.00	389955.73	769629.43	N 32 4 11.73	W 103 35 46.78
	20800.00	90.00	180.00	12375.00	8586.02	-8586.02	-285.43	0.00	389855.73	769629.43	N 32 4 10.74	W 103 35 46.79
	20900.00	90.00	180.00	12375.00	8686.02	-8686.02	-285.43	0.00	389755.73	769629.43	N 32 4 9.75	W 103 35 46.80
	21000.00	90.00	180.00	12375.00	8786.02	-8786.02	-285.43	0.00	389655.74	769629.43	N 32 4 8.76	W 103 35 46.81
	21100.00	90.00	180.00	12375.00	8886.02	-8886.02	-285.43	0.00	389555.74	769629.43	N 32 4 7.77	W 103 35 46.81
	21200.00	90.00	180.00	12375.00	8986.02	-8986.02	-285.43	0.00	389455.74	769629.43	N 32 4 6.78	W 103 35 46.82
	21300.00	90.00	180.00	12375.00	9086.02	-9086.02	-285.43	0.00	389355.75	769629.43	N 32 4 5.79	W 103 35 46.83
	21400.00	90.00	180.00	12375.00	9186.02	-9186.02	-285.43	0.00	389255.75	769629.43	N 32 4 4.80	W 103 35 46.84
	21500.00	90.00	180.00	12375.00	9286.02	-9286.02	-285.43	0.00	389155.75	769629.43	N 32 4 3.81	W 103 35 46.85
	21600.00	90.00	180.00	12375.00	9386.02	-9386.02	-285.43	0.00	389055.76	769629.43	N 32 4 2.82	W 103 35 46.85
	21700.00	90.00	180.00	12375.00	9486.02	-9486.02	-285.43	0.00	388955.76	769629.43	N 32 4 1.83	W 103 35 46.86
	21800.00	90.00	180.00	12375.00	9586.02	-9586.02	-285.43	0.00	388855.76	769629.43	N 32 4 0.84	W 103 35 46.87
	21900.00	90.00	180.00	12375.00	9686.02	-9686.02	-285.43	0.00	388755.77	769629.43	N 32 3 59.86	W 103 35 46.88
	22000.00	90.00	180.00	12375.00	9786.02	-9786.02	-285.43	0.00	388655.77	769629.43	N 32 3 58.87	W 103 35 46.89
	22100.00	90.00	180.00	12375.00	9886.02	-9886.02	-285.43	0.00	388555.77	769629.43	N 32 3 57.88	W 103 35 46.89
	22200.00	90.00	180.00	12375.00	9986.02	-9986.02	-285.43	0.00	388455.78	769629.43	N 32 3 56.89	W 103 35 46.90
Cimarex Red Hills 32-5 Federal Com 156H - PBHL [100' FSL, 2010' FWL]	22284.59	90.00	180.00	12375.00	10070.61	-10070.61	-285.43	0.00	388371.19	769629.43	N 32 3 56.05	W 103 35 46.91

Survey Type: Non-Def Plan

Survey Error Model: ISCWSA Rev 0 *** 3-D 95.000% Confidence 2.7955 sigma

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")

Survey Program:

Description	Part	MD From (ft)	MD To (ft)	EOU Freq (ft)	Hole Size (in)	Casing Diameter (in)	Expected Max Inclination (deg)	Survey Tool Type	Borehole / Survey
	1	0.000	26.000	1/100.000	30.000	30.000		NAL_MWD_IFR1+MS-Depth Only	Red Hills 32-5 Federal Com 156H / Cimarex Red Hills 32-5 Federal Com 156H Rev0 RM
	1	26.000	22284.590	1/100.000	30.000	30.000		NAL_MWD_IFR1+MS	Red Hills 32-5 Federal Com 156H / Cimarex Red Hills 32-5

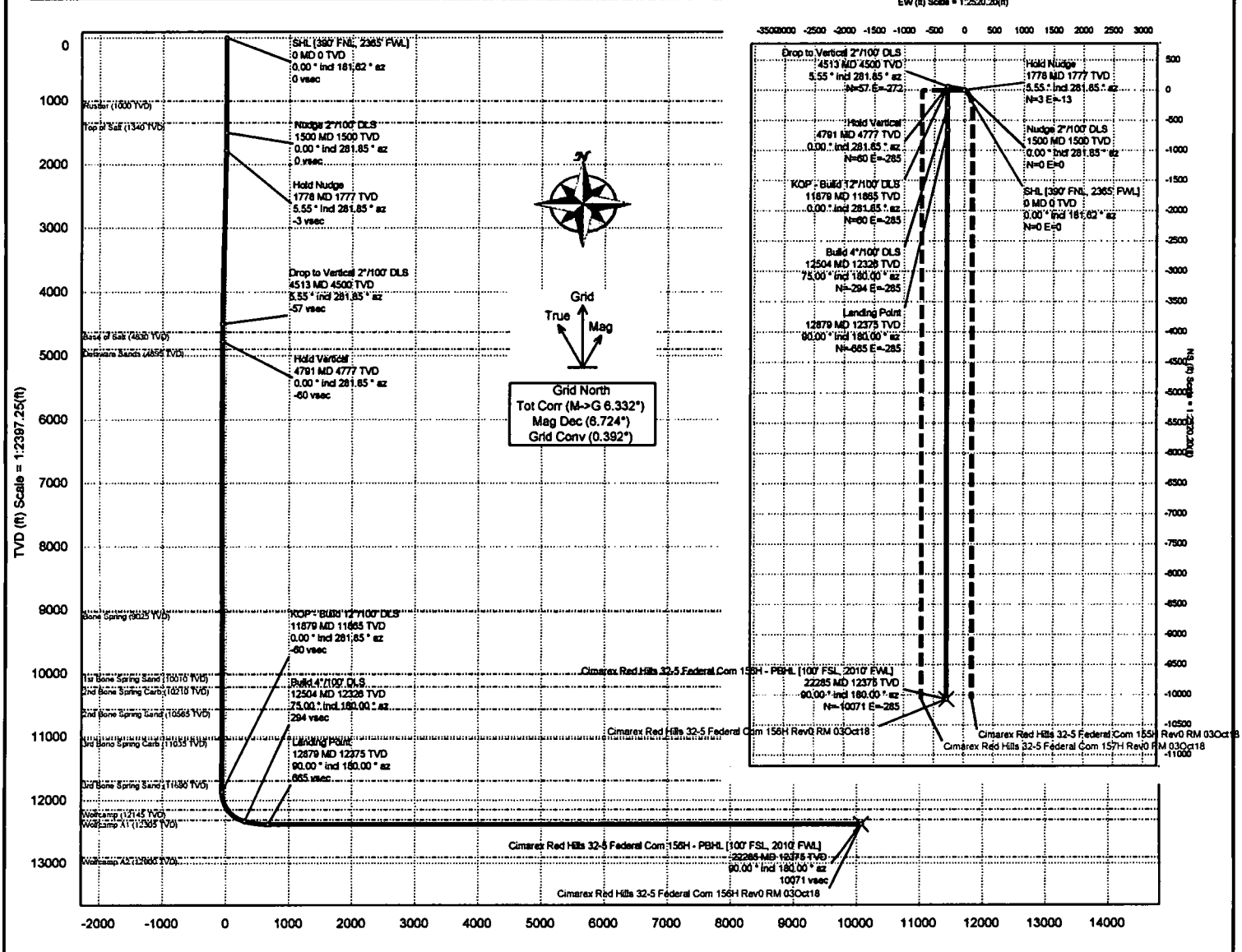
Schlumberger

Cimarex Energy Rev 0

CIMAREX

Borehole:	Well:	Field:	Structure:
Red Hills 32-5 Federal Com 156H	Red Hills 32-5 Federal Com 156H	NM Lea County (NAD 83)	Cimarex Red Hills 32-5 Federal Com 156H

Gravity & Magnetic Parameters				Surface Location	NAD83 New Mexico State Plane, Eastern Zone, US Feet				Miscellaneous			
Model:	HDGM 2018	Dip: 59.738°	Date: 03-Oct-2018	Lat:	N 32 8 38.69	Northing:	388441.47ftUS	Grid Conv:	0.3922°	Slot: New Slot	TVD Ref:	RKB(3436.7ft above MSL)
MagDec:	6.724°	FS: 47821.884nT	Gravity FS: 998.423mgn (9.80665 Based)	Lon:	W 103 35 42.79	Easting:	783914.88ftUS	Scale Fact:	0.99996383	Plan:	Cimarex Red Hills 32-5 Federal Com 156H Rev0 RM 03Oct18	



Vertical Section (ft) Azim = 180.00° Scale = 1:2397.25(ft) Origin = 0N/-S, 0E/-W

Critical Points

Critical Point	MD	INCL	AZIM	TVD	VSEC	N(+)/S(-)	E(+)/W(-)	DLS
SHL [390' FNL, 2365' FWL]	0.00	0.00	181.62	0.00	0.00	0.00	0.00	
Rustler	1000.00	0.00	281.85	1000.00	0.00	0.00	0.00	0.00
Top of Salt	1340.00	0.00	281.85	1340.00	0.00	0.00	0.00	0.00
Nudge 2°/100' DLS	1500.00	0.00	281.85	1500.00	0.00	0.00	0.00	0.00
Hold Nudge	1777.69	5.55	281.85	1777.25	-2.76	2.76	-13.16	2.00
Drop to Vertical 2°/100' DLS	4513.28	5.55	281.85	4500.00	-57.13	57.13	-272.27	0.00
Base of Salt	4643.65	2.95	281.85	4630.00	-59.11	59.11	-281.72	2.00
Hold Vertical	4790.96	0.00	281.85	4777.25	-59.89	59.89	-285.43	2.00
Delaware Sands	4908.71	0.00	281.85	4895.00	-59.89	59.89	-285.43	0.00
Bone Spring	9038.71	0.00	281.85	9025.00	-59.89	59.89	-285.43	0.00
1st Bone Spring Sand	10023.71	0.00	281.85	10010.00	-59.89	59.89	-285.43	0.00
2nd Bone Spring Carb	10223.71	0.00	281.85	10210.00	-59.89	59.89	-285.43	0.00
2nd Bone Spring Sand	10578.71	0.00	281.85	10565.00	-59.89	59.89	-285.43	0.00
3rd Bone Spring Carb	11048.71	0.00	281.85	11035.00	-59.89	59.89	-285.43	0.00
3rd Bone Spring Sand	11703.71	0.00	281.85	11690.00	-59.89	59.89	-285.43	0.00
KOP - Build 12°/100' DLS	11878.71	0.00	281.85	11865.00	-59.89	59.89	-285.43	0.00
Wolfcamp	12177.91	35.90	180.00	12145.00	30.63	-30.63	-285.43	12.00
Wolfcamp A1	12438.31	67.15	180.00	12305.00	232.19	-232.19	-285.43	12.00
Build 4°/100' DLS	12503.71	75.00	180.00	12328.19	294.00	-294.00	-285.43	12.00
Landing Point	12878.71	90.00	180.00	12375.00	664.73	-664.73	-285.43	4.00
Cimarex Red Hills 32-5 Federal Com 156H - PBHL [100' FSL, 2010' FWL]	22284.59	90.00	180.00	12375.00	10070.61	-10070.61	-285.43	0.00
Wolfcamp A2	NaN			12900.00				

1. Geological Formations

TVD of target 12,375
MD at TD 22,285

Pilot Hole TD N/A
Deepest expected fresh water

Formation	Depth (TVD) from KB	Water/Mineral Bearing/Target Zone	Hazards
Rustler	1000	N/A	
Top of Salt	1340	N/A	
Base of Salt	4644	N/A	
Lamar	4892	N/A	
Bell Canyon	4908	N/A	
Cherry Canyon	5980	N/A	
Brushy Canyon	7516	Hydrocarbons	
Bone Spring	9039	Hydrocarbons	
1st Bone Spring Sand	10024	Hydrocarbons	
2nd Bone Spring Carb	10224	Hydrocarbons	
2nd Bone Spring Sand	10579	Hydrocarbons	
3rd Bone Spring Carb	11049	Hydrocarbons	
3rd Bone Spring Sand	11704	Hydrocarbons	
Wolfcamp	12178	Hydrocarbons	

2. Casing Program

Hole Size	Casing Depth From	Casing Depth To	Setting Depth TVD	Casing Size	Weight (lb/ft)	Grade	Conn.	SF Collapse	SF Burst	SF Tension
14 3/4	0	1050	1050	10-3/4"	40.50	J-55	BT&C	3.29	6.51	14.79
9 7/8	0	12504	12326	7-5/8"	29.70	L-80	BT&C	2.48	1.19	1.81
6 3/4	0	11879	11879	5-1/2"	20.00	L-80	LT&C	1.14	1.19	1.87
6 3/4	11879	22285	12375	5"	18.00	P-110	BT&C	1.67	1.69	64.96
					BLM Minimum Safety Factor			1.125	1	1.6 Dry 1.8 Wet

TVD was used on all calculations.
All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h

Request Variance for 5-1/2" x 7-5/8" annular clearance. The portion that does not meet clearance will not be cemented

	Y or N
Is casing new? If used, attach certification as required in Onshore Order #1	Y
Does casing meet API specifications? If no, attach casing specification sheet.	Y
Is premium or uncommon casing planned? If yes attach casing specification sheet.	N
Does the above casing design meet or exceed BLM's minimum standards? If not provide justification (loading assumptions, casing design criteria).	Y
Will the intermediate pipe be kept at a minimum 1/3 fluid filled to avoid approaching the collapse pressure rating of the casing?	Y
Is well located within Capitan Reef?	N
If yes, does production casing cement tie back a minimum of 50' above the Reef?	N
Is well within the designated 4 string boundary.	N
Is well located in SOPA but not in R-111-P?	N
If yes, are the first 2 strings cemented to surface and 3rd string cement tied back 500' into previous casing?	N
Is well located in R-111-P and SOPA?	N
If yes, are the first three strings cemented to surface?	N
Is 2nd string set 100' to 600' below the base of salt?	N
Is well located in high Cave/Karst?	N
If yes, are there two strings cemented to surface?	N
(For 2 string wells) If yes, is there a contingency casing if lost circulation occurs?	N
Is well located in critical Cave/Karst?	N
If yes, are there three strings cemented to surface?	N
Is AC Report included?	N

3. Cementing Program

Casing	# Sks	Wt. lb/gal	Yld ft3/sack	H2O gal/sk	500# Comp. Strength (hours)	Slurry Description
Surface	408	13.50	1.72	9.15	15.5	Lead: Class C + Bentonite
	109	14.80	1.34	6.32	9.5	Tail: Class C + LCM
Intermediate Stage 1	603	10.30	3.64	22.18		Lead: Tuned Light + LCM
	207	14.20	1.30	5.86	14:30	Tail: 50:50 (Poz:H) + Salt + Bentonite + Fluid Loss + Dispersant + SMS
Intermediate Stage 2	757	12.90	1.88	9.65	12	Lead: 35:65 (Poz:C) + Salt + Bentonite
Production	736	14.20	1.30	5.86	14:30	Tail: 50:50 (Poz:H) + Salt + Bentonite + Fluid Loss + Dispersant + SMS

DV tool with possible annular casing packer as needed is proposed at a depth of +/- 4,700'.

Casing String	TOC	% Excess
Surface	0	45
Intermediate Stage 1	4700	47
Intermediate Stage 2	0	39
Production	12304	9

4. Pressure Control Equipment

	A variance is requested for the use of a diverter on the surface casing. See attached for schematic.

BOP installed and tested before drilling which hole?	Size	Min Required WP	Type		Tested To
9 7/8	13 5/8	5M	Annular	X	50% of working pressure
			Blind Ram		5M
			Pipe Ram	X	
			Double Ram	X	
			Other		
6 3/4	13 5/8	10M	Annular	X	50% of working pressure
			Blind Ram		10M
			Pipe Ram	X	
			Double Ram	X	
			Other		

BOP/BOPE will be tested by an independent service company to 250 psi low and the high pressure indicated above per Onshore Order 2 requirements. The System may be upgraded to a higher pressure but still tested to the working pressure listed in the table above. If the system is upgraded all the components installed will be functional and tested.

Pipe rams will be operationally checked each 24 hour period. Blind rams will be operationally checked on each trip out of the hole. These checks will be noted on the daily tour sheets. Other accessories to the BOP equipment will include a Kelly cock and floor safety valve (inside BOP) and choke lines and choke manifold. See attached schematics.

X	Formation integrity test will be performed per Onshore Order #2. On Exploratory wells or on that portion of any well approved for a 5M BOPE system or greater, a pressure integrity test of each casing shoe shall be performed. Will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.i.	
X	A variance is requested for the use of a flexible choke line from the BOP to Choke Manifold. See attached for specs and hydrostatic test chart.	
	N	Are anchors required by manufacturer?

5. Mud Program

Depth	Type	Weight (ppg)	Viscosity	Water Loss
0' to 1050'	FW Spud Mud	8.30 - 8.80	30-32	N/C
1050' to 12504'	Brine Diesel Emulsion	8.50 - 9.00	30-35	N/C
12504' to 22285'	Oil Based Mud	12.00 - 12.50	50-70	N/C

Sufficient mud materials to maintain mud properties and meet minimum lost circulation and weight increase requirements will be kept on location at all times.

The Brine Emulsion is completely saturated brine fluid that ties diesel into itself to lower the weight of the fluid. The drilling fluid is completely salt saturated.

What will be used to monitor the loss or gain of fluid?	PVT/Pason/Visual Monitoring

6. Logging and Testing Procedures

Logging, Coring and Testing	
X	Will run GR/CNL fromTD to surface (horizontal well – vertical portion of hole). Stated logs run will be in the Completion Report and submitted to the BLM.
	No logs are planned based on well control or offset log information.
	Drill stem test?
	Coring?

Additional Logs Planned	Interval

7. Drilling Conditions

Condition	
BH Pressure at deepest TVD	8043 psi
Abnormal Temperature	No

Hydrogen Sulfide (H2S) monitors will be installed prior to drilling out the surface shoe. If H2S is detected in concentrations greater than 100 ppm, the operator will comply with the provisions of Onshore Oil and Gas Order #6. If Hydrogen Sulfide is encountered, measured values and formations will be provided to the BLM.	
X	H2S is present
X	H2S plan is attached

8. Other Facets of Operation

9. Wellhead

A multi-bowl wellhead system will be utilized.

After running the 10-3/4" surface casing, a 13 5/8" BOP/BOPE system with a minimum working pressure of 10000 psi will be installed on the wellhead system and will be pressure tested to 250 psi low followed by a 10000 psi test. Annular will be tested to 50% of working pressure. The pressure test will be repeated at least every 30 days, as per Onshore Order No. 2.

The multi-bowl wellhead will be installed by vendor's representative. A copy of the installation instructions has been sent to the BLM field office.

The wellhead will be installed by a third-party welder while being monitored by the wellhead vendor representative.

All BOP equipment will be tested utilizing a conventional test plug. Not a cup or J-packer type.

A solid steel body pack-off will be utilized after running and cementing the intermediate casing. After installation the pack-off and lower flange will be pressure tested to 10000 psi.

The surface casing string will be tested as per Onshore Order No. 2 to at least 0.22 psi/ft or 1500 psi, whichever is greater.

The casing string utilizing steel body pack-off will be tested to 70% of casing burst.

If well conditions dictate conventional slips will be set and BOPE will be tested to appropriate pressures based on permitted pressure requirements.

Cimarex 10M Well Control Plan

Version 1.0

BOPE Preventer Utilization

The table below displays all BHA components, drill pipe, casing, or open hole that could be present during a required shut in and the associated preventer component that would provide a barrier to flow. It is specific to the hole section that requires a 10M system. The mud system being utilized in the hole will always assumed to be the first barrier to flow. The below table, combined with the mud program, documents that two barriers to flow can be maintained at all times, independent of the rating of the annular preventer.

Drill String Element	OD	Preventer	RWP
4" Drillpipe	4"	Lower Ram 3 1/2" - 5 ½" VBR* Upper Ram 3 1/2" - 5 ½" VBR*	10M
4.5" Drillpipe	4.5"	Lower Ram 3 1/2" - 5 ½" VBR* Upper Ram 3 1/2" - 5 ½" VBR*	10M
4" HWDP Drillpipe	4"	Lower Ram 3 1/2" - 5 ½" VBR* Upper Ram 3 1/2" - 5 ½" VBR*	10M
4.5" HWDP Drillpipe	4.5"	Lower Ram 3 1/2" - 5 ½" VBR* Upper Ram 3 1/2" - 5 ½" VBR*	10M
Drill Collars (including non-magnetic)	4.75-5.25"	Lower Ram 3 1/2" - 5 ½" VBR* Upper Ram 3 1/2" - 5 ½" VBR*	10M
Production Casing	5.5"	Lower Ram 3 1/2" - 5 ½" VBR* Upper Ram 3 1/2" - 5 ½" VBR*	10M
Production Casing	5"	Lower Ram 3 1/2" - 5 ½" VBR* Upper Ram 3 1/2" - 5 ½" VBR*	10M
Production Casing	4.5"	Lower Ram 3 1/2" - 5 ½" VBR* Upper Ram 3 1/2" - 5 ½" VBR*	10M
ALL	0-13 5/8"	Annular	5M
Open Hole		*Blind Rams*	10M

*VBR – Variable Bore Ram

Well Control Procedures

Proper well control response is highly specific to current well conditions and must be adapted based on environment as needed. The procedures below are given in "common" operating conditions to cover the basic and most necessary operations required during the wellbore construction. These include drilling ahead, tripping pipe, tripping BHA, running casing, and pipe out of the hole/open hole. In some of the procedures below, there will be a switch of control from the lesser RWP annular to the appropriate 10M RWP ram. The pressure at which this is done is variable based on overall well conditions that must be evaluated situationally. The pressure that control is switched may be equal to or less than the RWP but at no time will the pressure on the annular preventer exceed the RWP of the annular. The annular will be tested to 5,000 psi. This will be the RWP of the annular preventer.

Shutting In While Drilling

1. Sound alarm to alert crew
2. Space out drill string
3. Shut down pumps
4. Shut in uppermost BOPE preventer (typically the annular preventer) and open HCR.
5. Verify well is shut-in and flow has stopped
6. Notify supervisory personnel
7. Record data (SIDP, SICP, Pit Gain, and Time)
8. Hold pre-job safety meeting and discuss kill procedure

9. If pressure is anticipated to climb to the RWP of the annular preventer during kill procedure, swap control of the well to the upper pipe ram

Shutting In While Tripping

1. Sound alarm and alert crew
2. Install open, full open safety valve and close valve
3. Shut in uppermost BOPE preventer (typically the annular preventer) and open HCR.
4. Verify well is shut-in and flow has stopped
5. Notify supervisory personnel
6. Record data (SIDP, SICP, Pit Gain, and Time)
7. Hold pre-job safety meeting and discuss kill procedure
8. If pressure is anticipated to climb to the RWP of the annular preventer during kill procedure, swap control of the well to the upper pipe ram

Shutting In While Running Casing

1. Sound alarm and alert crew
2. Install circulating swedge. Close high pressure, low torque valves.
3. Shut in uppermost BOPE preventer (typically the annular preventer) and open HCR.
4. Verify well is shut-in and flow has stopped
5. Notify supervisory personnel
6. Record data (SIDP, SICP, Pit Gain, and Time)
7. Hold Pre-job safety meeting and discuss kill procedure
8. If pressure is anticipated to climb to the RWP of the annular preventer during kill procedure, swap control of the well to the upper pipe ram

Shutting in while out of hole

1. Sound alarm
2. Shut-in well: close blind rams
3. Verify well is shut-in and monitor pressures
4. Notify supervisory personnel
5. Record data (SIDP, SICP, Pit Gain, and Time)
6. Hold Pre-job safety meeting and discuss kill procedure

Shutting in prior to pulling BHA through stack

1. Prior to pulling last joint of drill pipe thru the stack space out and check flow. If flowing see steps below.
2. Sound alarm and alert crew
3. Install open, full open safety valve and close valve
4. Shut in upper pipe ram and open HCR.

5. Verify well is shut-in and flow has stopped
6. Notify supervisory personnel
7. Record data (SIDP, SICP, Pit Gain, and Time)
8. Hold pre-job safety meeting and discuss kill procedure

Shutting in while BHA is in the stack and ram preventer and combo immediately available

1. Sound alarm and alert crew
2. Stab Crossover and install open, full open safety valve and close valve
3. Space out drill string with upset just beneath the compatible pipe ram.
4. Shut in upper compatible pipe ram and open HCR.
5. Verify well is shut-in and flow has stopped
6. Notify supervisory personnel
7. Record data (SIDP, SICP, Pit Gain, and Time)
8. Hold pre-job safety meeting and discuss kill procedure

Shutting in while BHA is in the stack and no ram preventer or combo immediately available

1. Sound alarm and alert crew
2. If possible pick up high enough, to pull string clear and follow "Open Hole" scenario
3. If not possible to pick up high enough:
    1. Stab Crossover, make up one joint/stand of drill pipe, and install open, full open safety valve and close valve
4. Space out drill string with upset just beneath the compatible pipe ram.
5. Shut in upper compatible pipe ram and open HCR.
6. Verify well is shut-in and flow has stopped
7. Notify supervisory personnel
8. Record data (SIDP, SICP, Pit Gain, and Time)
9. Hold pre-job safety meeting and discuss kill procedure

Cactus Wellhead

Installation Procedure Prepared For:

Cimarex

13-3/8" x 9-5/8" x 5-1/2" x 2-3/8"MBU-3T Wellhead Assy.
With 13-5/8" 5M x 13-3/8" SOW MBU-3T Housing
13-5/8" 5M x 7-1/16" 10M CTH-DBLHPS Tubing Head
And 7-1/16" x 2-3/8" CTH-EN Tubing Hanger

Publication # IP0552

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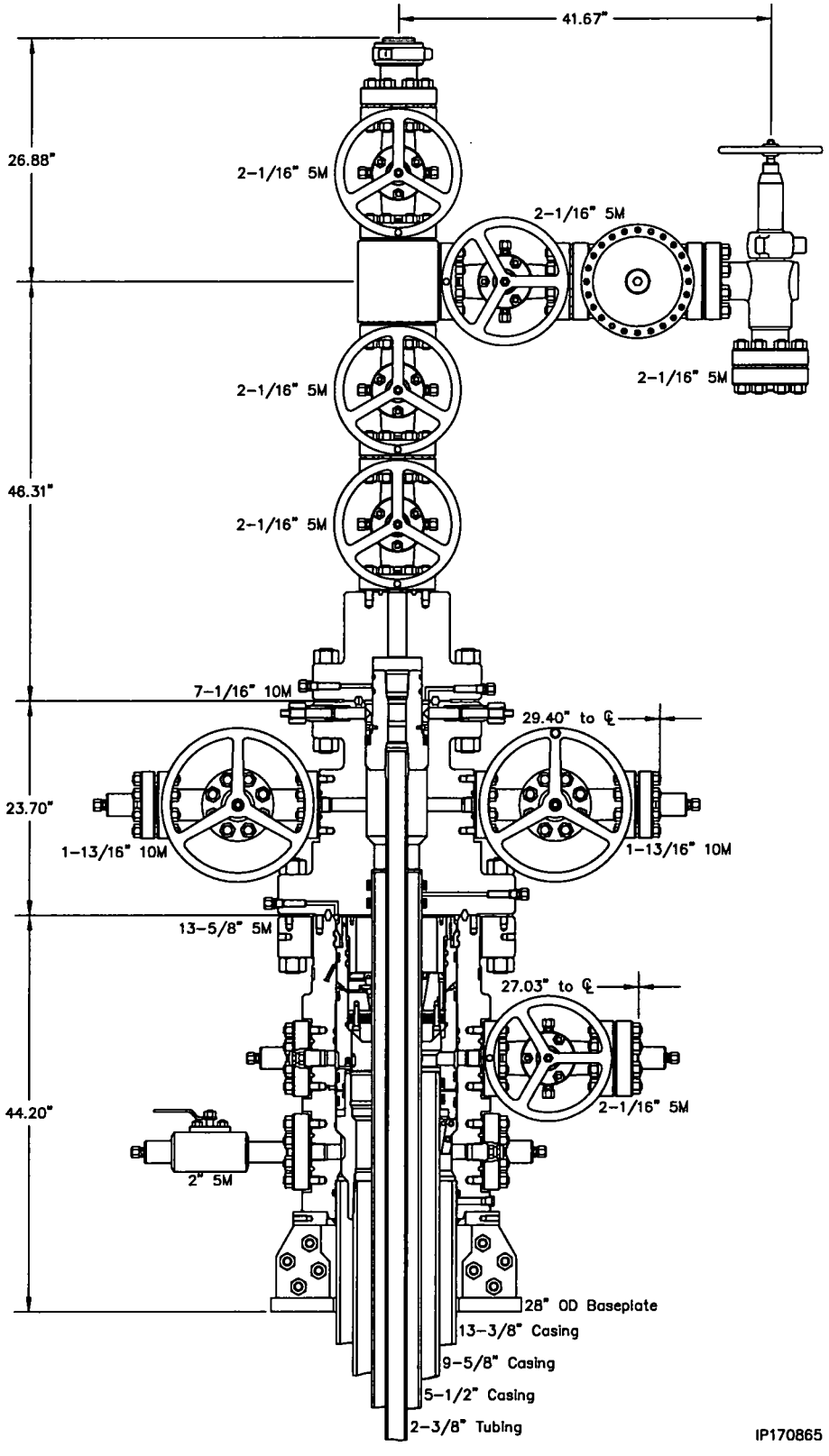
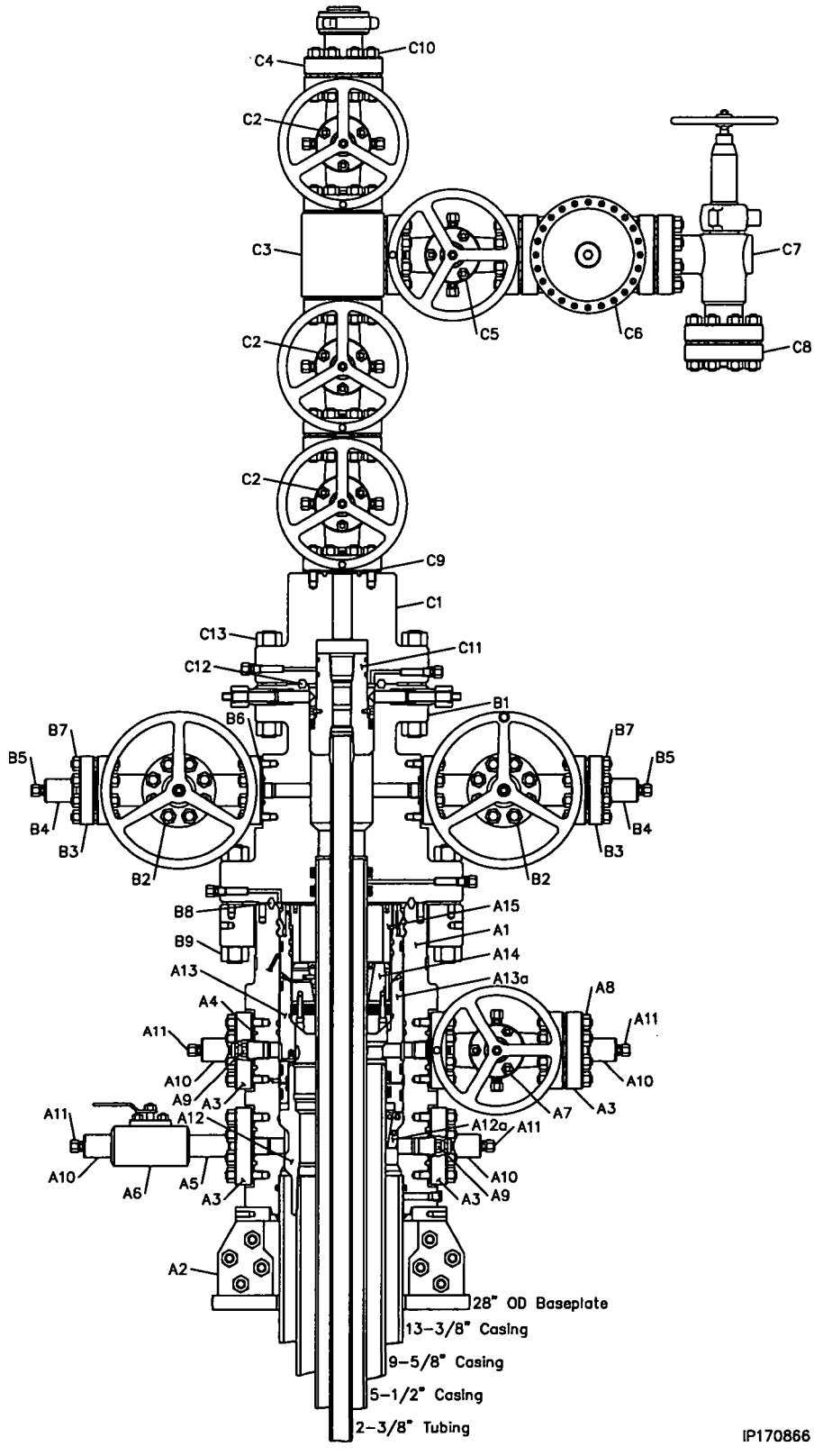
System Drawing



Bill of Materials



IP170866

Cimarex
13-3/8" x 9-5/8" x 5-1/2" MBU-3T Wellhead System
With 13-5/8" 5M x 13-3/8" SOW MBU-3T Housing And
13-5/8" 5M x 7-1/16" 10M CTH-DBLHPS Tubing Head

Cactus Wellhead

MBU-3T HOUSING ASSEMBLY

Item	Qty	Description
A1	1	Housing, CW, MBU-3T, 13-5/8" 5M x 13-3/8" SOW, With Two 2-1/16" 5M Studded Upper And Lower Outlets, 6A-PU-AA-1-2 Part # 117620
A2	1	Baseplate Kit, Split Weldless, 28" OD x 14" ID x 11" Long, For 13-3/8" SOW & 15" Nose, With Two 4" x 4" Gout Slots And Four 5/8" Lift Threads On Top Ring, Arranged For 20" Conductor Part # 104718
A3	4	Companion Flange, 2-1/16" 5M x 2" Line Pipe, 6A-KU-EE-NL-1 Part # 200002
A4	5	Ring Gasket, R-24, 2-1/16" 3/5M Part # R24
A5	1	Nipple, 2" Line Pipe, 5000 PSI MAX WP, 4130/4140, 75K
A6	1	Ball Valve, TSI, 2 RP 5M 2" Line Pipe x 2" Line Pipe, Cast Body And End Piece, CR/NI Plated Ball, CS Stem, Delrin Seats, Buna N Seals, With Locking Device, Non-Nace Part # 103887
A7	1	Gate Valve, CW1, 2-1/16" 3/5M Flanged End, Handwheel Operated, AA/DD-NL Trim (6A-LU-AA/DD-NL-1-2) Part # 610003
A8	8	Stud, All-Thread, With Two Nuts, Black, 7/8" x 6-1/2" B7/2H, No Plating Part # 780067
A9	2	Valve Removal Plug, 1-1/2" Sharp Vee x 1-1/4" Hex, 6A-DD-NL Part # VR2

MBU-3T HOUSING ASSEMBLY

Item	Qty	Description
A10	4	Bull Plug, CW, 2" Line Pipe x 1/2" Line Pipe, 6A-DD-NL Part # BP2T
A11	4	Fitting, Grease, Vented Cap, 1/2" NPT Alloy Non-Nace Part # FTG1
A12	1	Casing Hanger, CW, MBU-LR, Fluted, 13-5/8" 10M x 9-5/8" LC Box Bottom x 10.250" 4 Stub Acme 2G LH Box Top, 6A-U-AA-1-1 Part # 104173
A13	1	Packoff, CW, MBU-3T, Mandrel, 13-5/8" Nested x 11" With 11.250" 4 Stub Acme 2G LH Box Top, 6A-U-AA-1-1 Part # 117152
A14	1	Casing Hanger, CW, C2, 11" x 5-1/2" 6A-P-AA-3-1 Part # 108067
A15	1	Hold Down Ring, For C2 Casing Hanger, 11" Thru 4-1/2" Arranged For MBU-3T Packoff, 13-5/8" With 11.250" 4 Stub Acme 2G LH Pin x 9.06 ID x 6.25" Long With 2.25" Thread Length, 4140 110K Part # 117418

EMERGENCY EQUIPMENT

Item	Qty	Description
A12a	1	Casing Hanger, CW, MBU-3T-LWR, Emergency, 13-5/8" x 9-5/8" 6A-PU-DD-3-1 Part # 116998
A13a	1	Packoff, CW, MBU-3T, Emergency, 13-5/8" nested x 11" x 9-5/8" With 11.250" 4 Stub Acme 2G LH box top, 6A-U-AA-1-1 Part # 117184

TUBING HEAD ASSEMBLY

Item	Qty	Description
B1	1	Tubing Head, CW, CTH-DBLHPS, 5-1/2", 13-5/8" 5M x 7-1/16" 10M, With Two 1-13/16" 10M Studded Outlets, 17-4PH Lock Down Screws, 6A-PU-EE-0,5-2-1 Part # 100147
B2	2	Gate Valve, AOZE, FC, 1-13/16" 10M, Flanged End, Handwheel Operated, EE-0,5 Trim, 6A-LU-EE-0,5-3-1 Part # 103188
B3	2	Companion Flange, 1-13/16" 10M x 2" Line Pipe, 5000 PSI Max WP, 4130 60K 6A-KU-EE-NL-1 Part # 200010
B4	2	Bull Plug, CW, 2" Line Pipe x 1/2" Line Pipe, 6A-DD-NL Part # BP2T
B5	2	Fitting, Grease, Vented Cap, 1/2" NPT Alloy Non-Nace Part # FTG1
B6	4	Ring Gasket, BX151, 1-13/16" 10M Part # BX-151
B7	16	Stud, All-Thread With Two Nuts, Black, 3/4" x 5-1/2" Long, B7/2H Part # 780080
B8	1	Ring Gasket, BX-160, 13-5/8" 5M Part # BX-160
B9	16	Stud, All-Thread With Two Nuts, Black, 1-5/8" x 12-3/4" Long, B7/2H Part # 780087

PRODUCTION TREE ASSEMBLY

Item	Qty	Description
C1	1	Adapter, Tubing Head, CW, EN, 5-1/2", 7-1/16" 10M Flanged x 2-1/16" 5M Studded x 12.0" Long, 6A-PU-EE-NL-1-1 Part # 101940
C2	3	Gate Valve, CW1, 2-1/16" 3/5M Flanged End, Handwheel Operated, AA/DD-NL Trim (6A-LU-AA/DD-NL-1-2) Part # 610003
C3	1	Tee, CW, Studded, 2-1/16" 5M x 2-1/16" 5M, 6A-PU-EE-NL-1 Part # 100177
C4	1	Tree Cap, CW, BHTA, B15A, 2-1/16" 5M x 2-3/8" EU Tubing ILT x 4.625" 4 Acme 2G External Threads, 6A-PU-EE-NL-1-1 Part # 100231
C5	1	Gate Valve, CW1, 2-1/16" 3/5M Flanged End, Handwheel Operated, BB/EE-0,5 Trim (6A-LU-BB/EE-0,5-1-2) Part # 610004
C6	1	Actuator Valve, OMNI, CS-R, 2-1/16" 5M Flanged End, Complete With Model DX-10 Diaphragm Pneumatic Actuator, Cast Bosy, Reverse Acting Slab Gate, Floating Seats, EE-0,5 Trim (6A-V-PU-EE-0,5-1-2), Actuator P-BB-1, Includes Manual Override, WKM M Type Part # 106676

PRODUCTION TREE ASSEMBLY

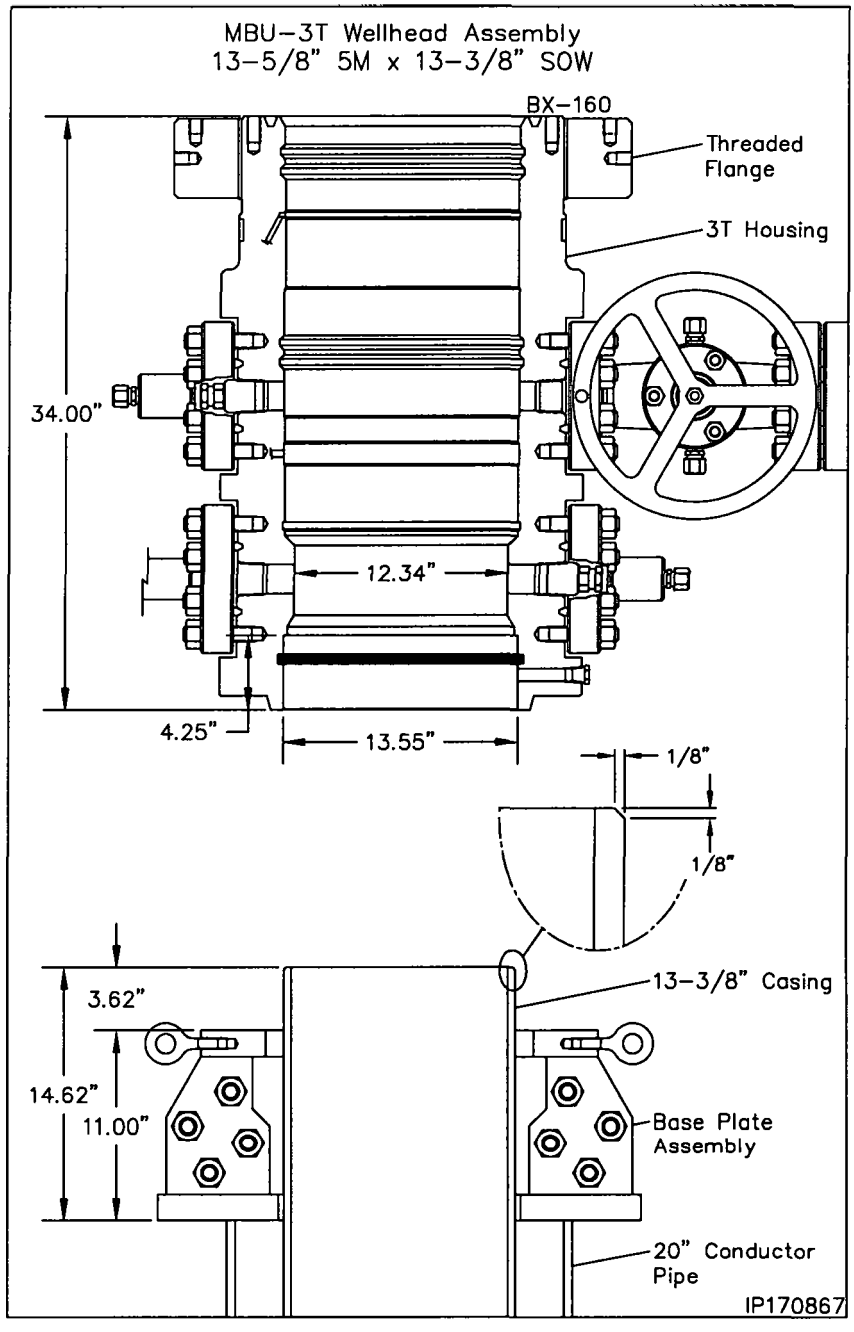
Item	Qty	Description
C7	1	Choke, Adjustable, Techseal, N62, 2-1/16" 5M Flanged, Alloy, With 1" Max Orifice, 1" HS Stem And Seat, AA Trim Part # 103137
C8	1	Companion Flange, 2-1/16" 5M x 2" Line Pipe, 6A-KU-EE-NL-1 Part # 200002
C9	9	Ring Gasket, R-24, 2-1/16" 3/5M Part # R24
C10	40	Stud, All-Thread, With Two Nuts, Black, 7/8" x 6-1/2" B7/2H, No Plating Part # 780067
C11	1	Tubing Hanger, CW, CTH-EN, 5-1/2", 7-1/16" x 2-3/8" EU API Modified Box Bottom x 2-3/8" EU Bot Top, With 2" HBPV Thread, 6A-U-AA-1-1 Part # 105154
C12	1	Ring Gasket, BX-156, 7-1/16" 10M Part # BX156
C13	12	Stud, All-Thread, With Two Nuts, Black, 1-1/2" x 11-3/4" B7/2H, No Plating Part # 780082

RECOMMENDED SERVICE TOOLS

Item	Qty	Description
ST1	1	Test Plug/Retrieving Tool, CW, MBU-3T, 13-5/8" x 4-1/2" IF (NC50) Box Top and Bottom, 1-1/4" LP Bypass and Spring Loaded Lift Dogs Part # 104467
ST2	1	Wear Bushing, CW, MBU-3T-LWR, 13-5/8" x 12.31" ID x 26.5" Long Part # 116974
ST3	1	Casing Hanger Running Tool, CW, MBU-LR, 13-5/8" x 9-5/8" LC Top x 10.250" 4 Stub Acme 2G LH Pin Bottom Part # 100943
ST4	1	Torque Collar, CW, Casing Hanger, For Use With 10.75" OD Tool Neck And 3.25" To 5.50" Long Box Hanger Neck Part # 103374
ST5	1	Wash Tool, CW, MBU-3T-LR, MBS2, Fluted, 13-5/8" x 4-1/2" IF Box Top Threads, With Brushes Part # 106277
ST6	1	Packoff Running Tool, CW, MBU-3T UPR, 13-5/8" Nested, With 11.250" 4 Stub Acme 2G LH Pin Bottom x 4-1/2" IF (NC-50) Box Top With Seal Sleeve Part # 117310
ST7	1	Test Plug, CW, MBU-2LR Inner, 11" x 4-1/2" IF, 1-1/4" LP Bypass Part # 108848
ST8	1	Wear Bushing, MBU-3T-UPR, 13-5/8" x 9.00" I.D. x 14.5" Long, With O-Ring Grooves And Anti-Rotation, Arranged For 13-5/8" Retrieval Tool Part # 117158
ST9	1	Test Plug/Retrieving Tool, CW, CTH, 7-1/16" x 3-1/2" IF, 1-1/4" LP bypass and spring loaded lift dogs Part # 100140

Stage 1 — Install the MBU-3T Wellhead Housing

1. Run the 20" conductor and 13-3/8" surface casing to the required depth and cement as required.
2. Determine the correct elevation for the MBU-3T Wellhead Assembly.
3. Cut the 20" casing at a predetermined elevation below ground level to facilitate the installation of the balance of the wellhead equipment. Grind stub level with the horizon.
4. Cut the 13-3/8" casing 14.62" above the top of the 20" casing stub and place an 1/8" x 1/8" bevel on the OD of the stub.
5. Remove all loose rust and scale from the top 6" of the stub.
6. Examine the ***28" OD Split Weldless Baseplate Assembly (Item A2)***. Verify the following:
   - baseplate assembly is clean and in good condition
   - all gussets are properly welded
   - baseplate halves are bolted together and bolts are tightened securely
   - lift eyes are in place and tightened securely
7. Attach a suitable lifting device to the baseplate assembly and carefully lower it over the 13-3/8" casing stub and land it on the 20" conductor pipe.
8. Verify that 3.62" of 13-3/8" casing is exposed above the baseplate upper support plate and the baseplate is level with the horizon.
9. Remove the baseplate assembly and set aside.
10. Examine the ***13-5/8" 5M x 13-3/8" SOW MBU-3T Wellhead Assembly (Item A1)***. Verify the following:
    - all seal areas are clean and undamaged
    - weld socket is clean and free of grease and debris and o-ring is in place and in good condition
    - valves are intact and in good condition



Stage 1 — Install the MBU-3T Wellhead Housing

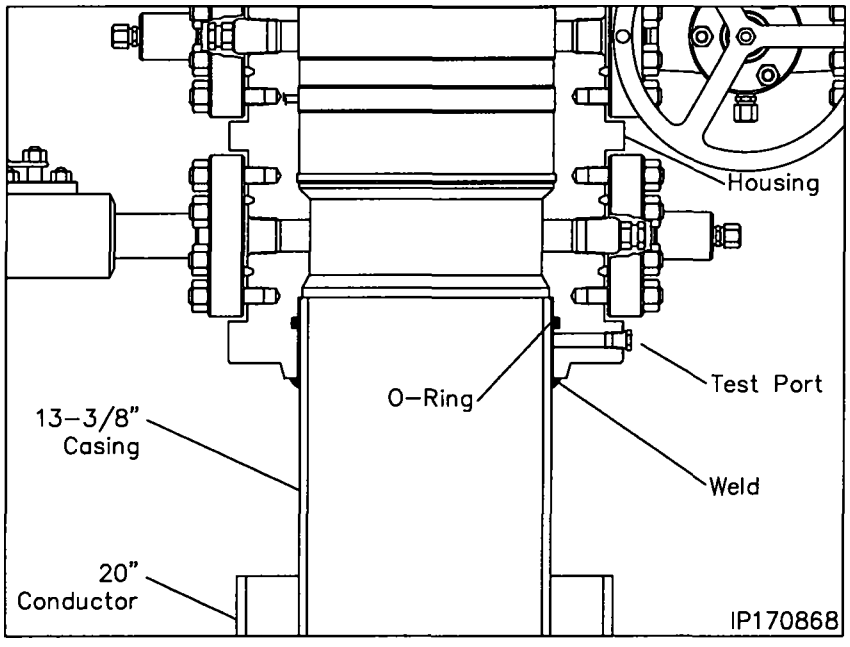
11. Align and level the Wellhead Assembly over the casing stub, orienting the outlets so they will be compatible with the drilling equipment.

12. Remove the pipe plug from the port on the bottom of the Head.

13. Slowly and carefully lower the assembly over the casing stub and externally weld the MBU-3T housing to the surface casing.

Note: The weld should be a fillet-type weld with legs no less than the wall thickness of the casing. Legs of 1/2" to 5/8" are adequate for most jobs.

Refer to the back of this publication for the **Recommended Procedure for Field Welding Pipe to Wellhead Parts for Pressure Seal** and for field testing of the weld connection.



14. After a satisfactory test is achieved, replace the pipe plug in the port on the bottom of the housing.

15. Remove the baseplate bolting and separate the assembly in two halves.

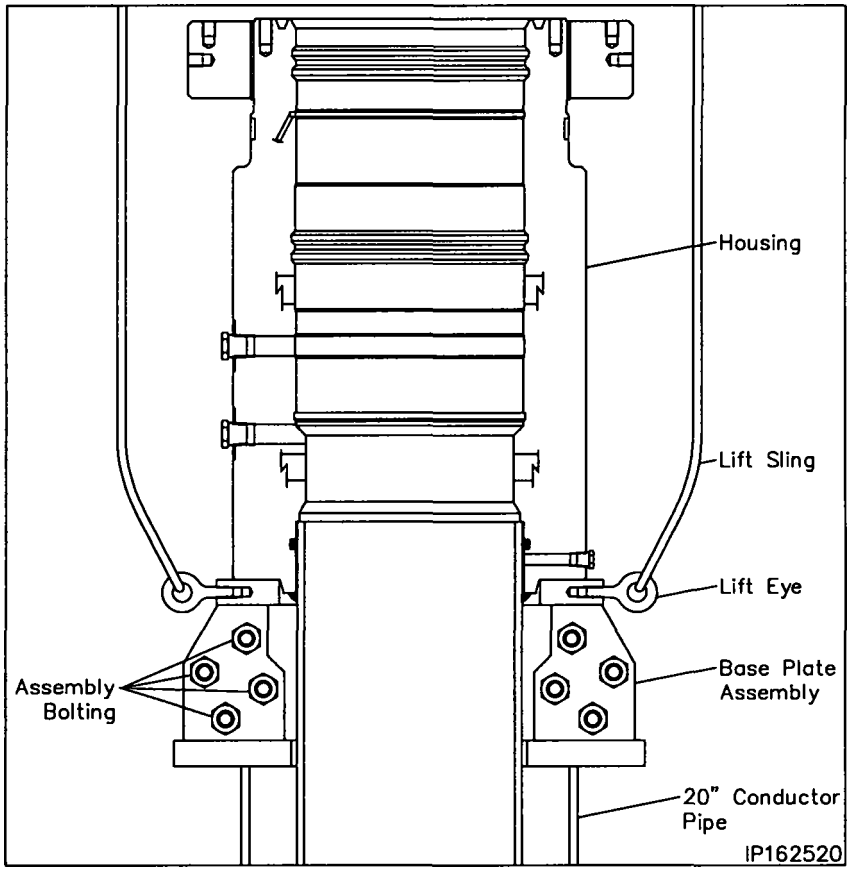
16. Attach a suitable lifting sling to the two lift eyes on the upper plate of one half of the assembly and carefully lower it into the cellar and on top of the 20" conductor. Push the baseplate half up against the 13-3/8" casing.

17. Pick up the remaining half of the baseplate assembly and position it on top of the 20" conductor adjacent the first half.

18. Push the two halves together and install the (8) 1" Studs with Two Nuts and tighten the bolting securely.

19. Final torque the bolts to approximately 200 ft lbs.

20. Ensure the thread flange is positioned approximately 1/8" below the top of the housing and is in proper two hole position.



21. Install BOP stack as required.

Stage 2 — Test the BOP Stack

Immediately after making up the BOP stack and periodically during the drilling of the well for the next casing string the BOP stack (connections and rams) must be tested.

1. Examine the ***13-5/8" Nominal x 4-1/2" IF (NC-50) CW Test Plug/ Retrieving Tool (Item ST1)***. Verify the following:
   - 1-1/2" VR plug and weep hole plug are in place and tightened securely
   - elastomer seal is in place and in good condition
   - retractable lift lugs are in place, clean, and free to move
   - drill pipe threads are clean and in good condition

2. Position the test plug with the elastomer seal down and the lift lugs up and make up the tool to a joint of drill pipe.

WARNING: Ensure that the lift lugs are up and the elastomer seal is down

3. Remove the 1/2" NPT pipe plug from the weep hole if pressure is to be supplied through the drill pipe.

4. Open the housing lower side outlet valve.

5. Lightly lubricate the test plug seal with oil or light grease.

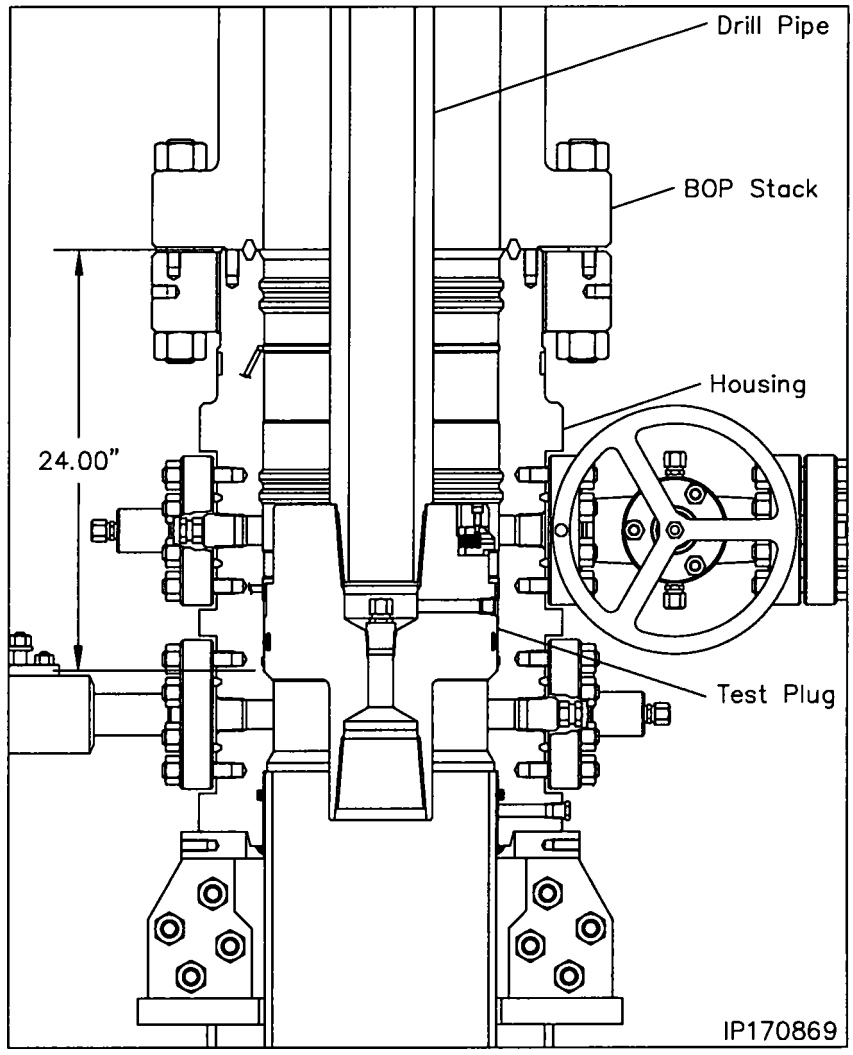
6. Carefully lower the test plug through the BOP and land it on the load shoulder in the housing, 24.00" below the top of the housing.

7. Close the BOP rams on the pipe and test the BOP to 5,000.

Note: Any leakage past the test plug will be clearly visible at the open side outlet valve.

8. After a satisfactory test is achieved, release the pressure and open the rams.

9. Remove as much fluid as possible from the BOP stack and the retrieve the test plug with a straight vertical lift.



Note: When performing the BOP blind ram test it is highly recommended to suspend a stand of drill pipe below the test plug to ensure the plug stays in place while disconnecting it from the drill pipe.

10. Repeat this procedure as required during the drilling of the hole section.

Stage 3 — Run the Lower Wear Bushing

Note: Always use a Wear Bushing while drilling to protect the load shoulders from damage by the drill bit or rotating drill pipe. The Wear Bushing **must be retrieved** prior to running the casing.

1. Examine the ***13-5/8" Nominal MBU-3T-LWR Wear Bushing (Item ST2).*** Verify the following
   - internal bore is clean and in good condition
   - upper trash o-ring is in place and in good condition
   - shear o-ring cord is in place and in good condition
   - paint anti-rotation lugs white and allow paint to dry

Run the Wear Bushing Before Drilling

2. Orient the ***13-5/8" Nominal x 4-1/2" IF (NC-50) CW Test Plug/Retrieving Tool (Item ST1)***. with lift lugs down and drill pipe connection up.

3. Make up the Retrieving Tool to a joint of drill pipe.

4. Align the retractable lift lugs of the tool with the retrieval holes of the bushing and carefully lower the tool into the Wear Bushing until the lugs snap into place.

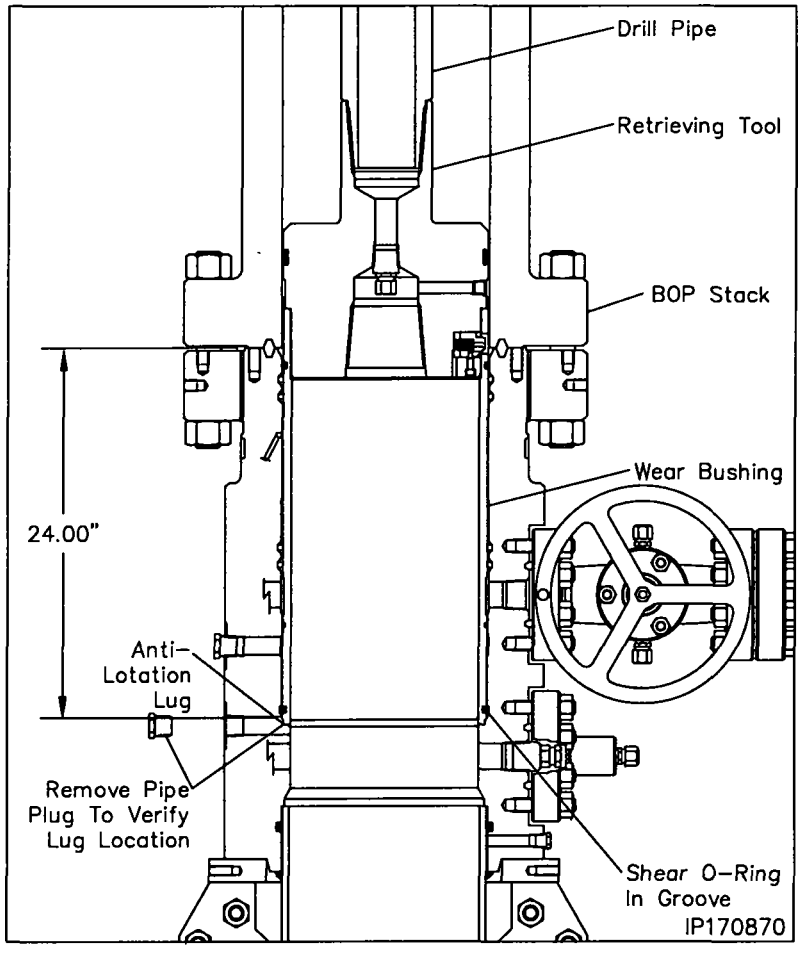
Note: If the lugs did not align with the holes, rotate the tool in either direction until they snap into place.

5. **Apply a heavy coat of grease, not dope, to the OD of the bushing.**

6. Slowly lower the Tool/Bushing Assembly through the BOP stack and land it on the load shoulder in the housing, 24.00" below the top of the housing.

7. Remove one of the 1" sight port pipe plugs from the OD of the housing and look through the hole to verify the lug has engaged the slot. The painted lug will be clearly visible through the port. Reinstall the pipe plug and tighten securely.

8. Rotate the drill pipe clockwise (right) to locate the stop lugs in their mating notches in the head. When properly aligned the bushing will drop an additional 1/2".



Note: The Shear O-Ring on bottom of the bushing will locate in a groove above the load shoulder in the head to act as a retaining device for the bushing.

9. Remove the tool from the Wear Bushing by rotating the drill pipe counter clockwise (left) 1/4 turn and lifting straight up.

10. Drill as required.

Note: It is highly recommended to retrieve, clean, inspect, grease, and reset the wear bushing each time the hole is tripped during the drilling of the hole section.

Retrieve the Wear Bushing After Drilling

11. Make up the Retrieving Tool to the drill pipe .

12. Slowly lower the tool into the Wear Bushing.

13. Pick up and balance the riser weight and rotate the Retrieving Tool clockwise until a positive stop is felt. This indicates the lugs have snapped into the holes in the bushing.

14. Retrieve the Wear Bushing, and remove it and the Retrieving Tool from the drill string.

Stage 4 — Hang Off the 9-5/8" Casing

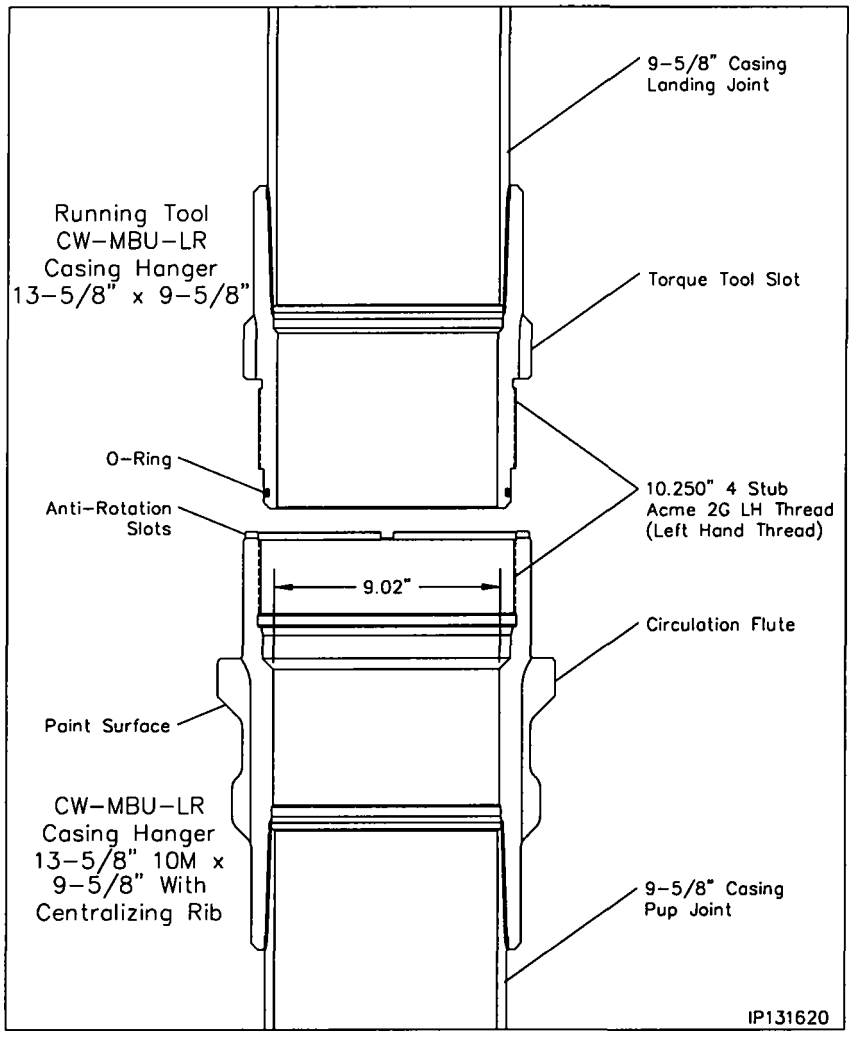
Normally the 9-5/8" MBU-LR casing hanger and running tool will be pre assembled and torque collar installed prior to being shipped to location. If this is not the case, continue to step 2.

Note: If the 9-5/8" casing becomes stuck and the mandrel casing hanger can not be landed, Refer to **Stage 4A** for the emergency procedure.

1. Examine the ***13-5/8" x 9-5/8" CW-MBU-LR Fluted Mandrel Casing Hanger (Item A12).*** Verify the following:
   - internal bore and threads are clean and in good condition
   - neck seal area is clean and undamaged
   - pup joint is properly installed and pin threads are clean and in good condition

2. Examine the ***13-5/8" x 9-5/8" CW-MBU-3T-LR Casing Hanger Running Tool (Item ST3).*** Verify the following:
   - internal bore and threads are clean and in good condition
   - o-ring is clean and in good condition

3. Make up a 9-5/8" landing joint in the top of the running tool and torque *connection to thread manufacturer's* maximum make up torque.



Stage 4 — Hang Off the 9-5/8" Casing

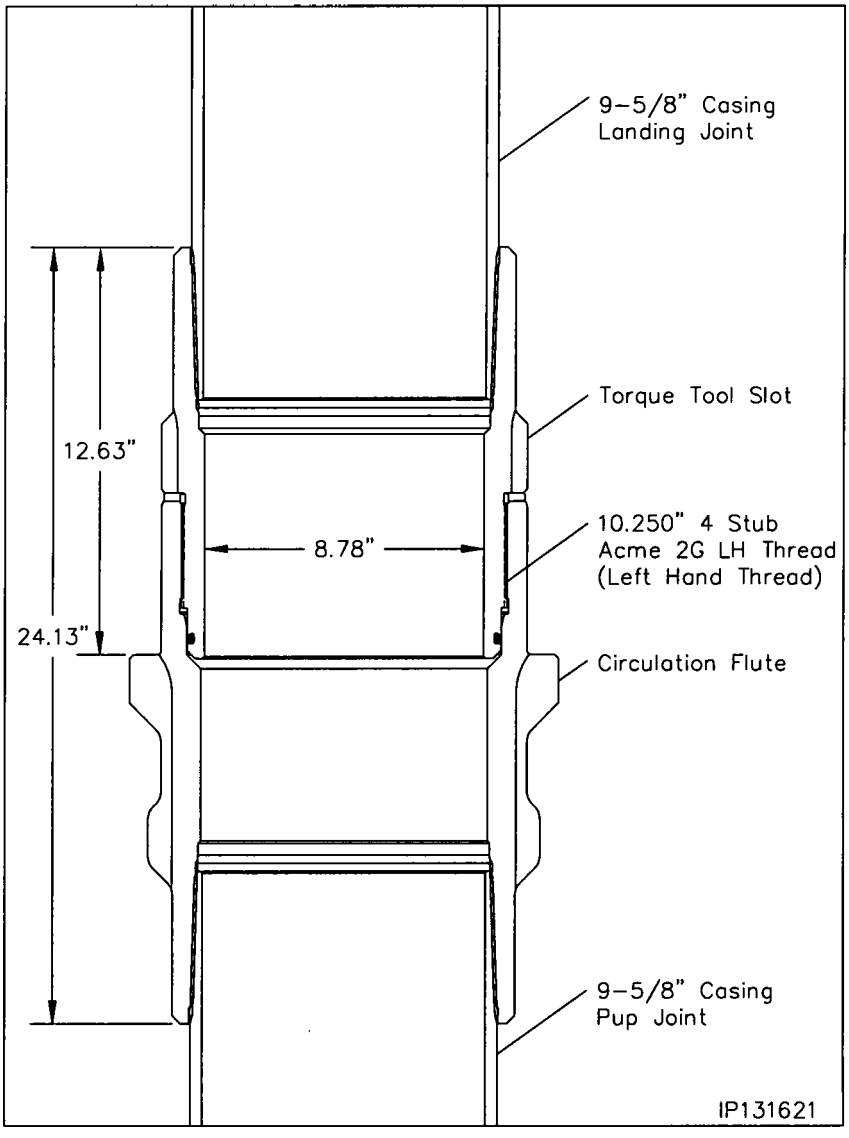
4. On the pipe rack, thoroughly clean and lightly lubricate mating threads, seal areas and o-ring of the casing hanger and running tool with oil or a light grease.

5. ***Using chain tongs only,*** thread the Running Tool into the Hanger with left hand rotation until it shoulders out on the hanger body.

WARNING: Do Not apply torque to the Hanger/Tool connection.

6. Paint the bottom of the landing shoulder of the hanger flutes white as indicated in IP DRW 131620

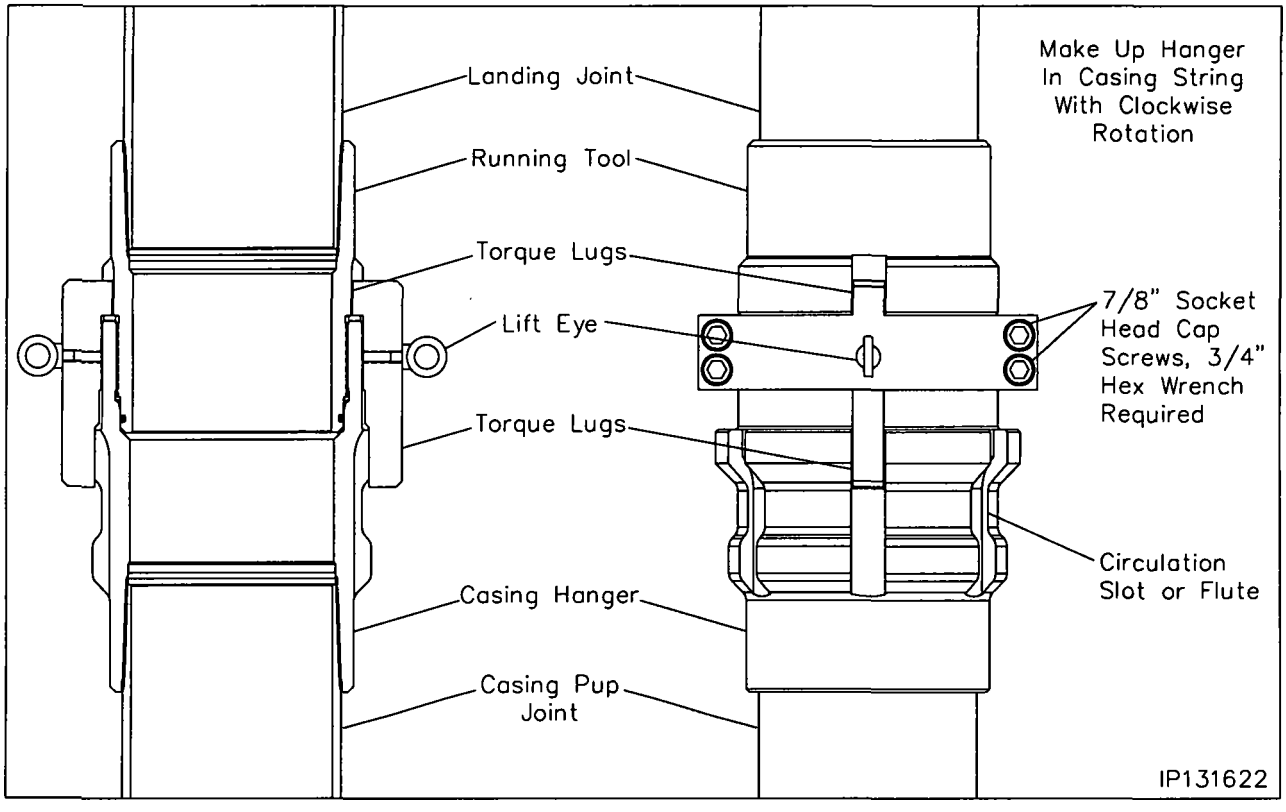
7. Using only chain tongs, rotate the running tool clockwise (right) to align the anti-rotation torque slots in the running tool with the circulation slots or flutes in the casing hanger.



Stage 4 — Hang Off the 9-5/8" Casing

8. Examine the ***13-5/8" Nominal 9-5/8" MBU-LR Casing Hanger Torque Collar (Item ST4).*** Verify the following:
   - cap screws are in place and in good condition
9. Remove the 7/8" cap screws and separate the tool in half.
10. Place one half of the tool around the hanger/running tool assembly engaging the torque lugs of the tool in the mating slots in the hanger and running tool.
11. Place the second half adjacent the first half and secure the tool halves with the 7/8" cap screws. Torque screws to approximately 100 ft lbs.
12. Run the 9-5/8" casing to the required depth and space out for the mandrel hanger.
13. *Pick up the 9-5/8" casing hanger/* running tool assembly and make it up in the casing string using the top drive casing handling tool. Torque connection to thread manufacturer's optimum make up torque.
14. Attach a suitable lifting device with wire slings to the lift eyes of the torque collar.
15. Using a 3/4" hex wrench, remove the 7/8" cap screws and separate the collar in two halves. Remove the tool and set assembly aside.
16. *Using only chain tongs, back off the* running tool one full turn and then counter clockwise to a positive stop.

WARNING: Do not torque connection.



Stage 4 — Hang Off the 9-5/8" Casing

17. Calculate the total landing dimension by adding the previously determined RKB dimension and 24.00", the depth of the wellhead.

18. Starting at the top of the 45° angle load shoulder of the casing hanger measure up the landing joint the calculated dimension and place a white paint band around the landing joint at that dimension. Write LANDED on the joint.

19. Carefully lower the hanger through the BOP stack and land it on the load shoulder in the housing, 24.00" below the top of the housing.

20. Slack off all weight on the casing and verify that the landing dimension paint band has aligned with the rig floor.

21. Locate the 1" sight port pipe plug and remove the plug.

22. Look through the port to verify that the hanger is properly landed. The white paint band on the hanger will be clearly visible in the center of the open port.

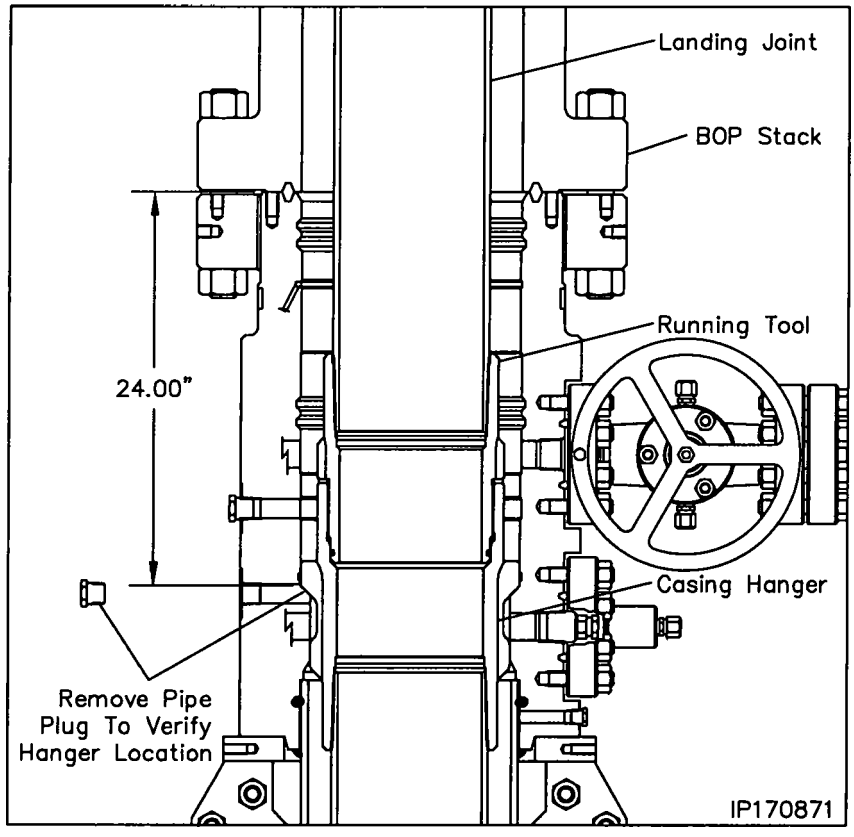
23. Reinstall the pipe plug and tighten securely.

24. Place a vertical paint mark on the landing joint to verify if the casing string rotates during the cementing process.

25. Cement the casing as required.

Note: Returns may be taken through the circulation slots and out the BOP or out the side outlets on the lower housing.

Note: If the casing is to be reciprocated during cementing, it is advisable to pick up the casing hanger a minimum of 4 to 6 feet above the landing point. Place a mark on the landing joint level with the rig floor and then reciprocate above that point. If at any time resistance is felt, re-land the casing hanger immediately.



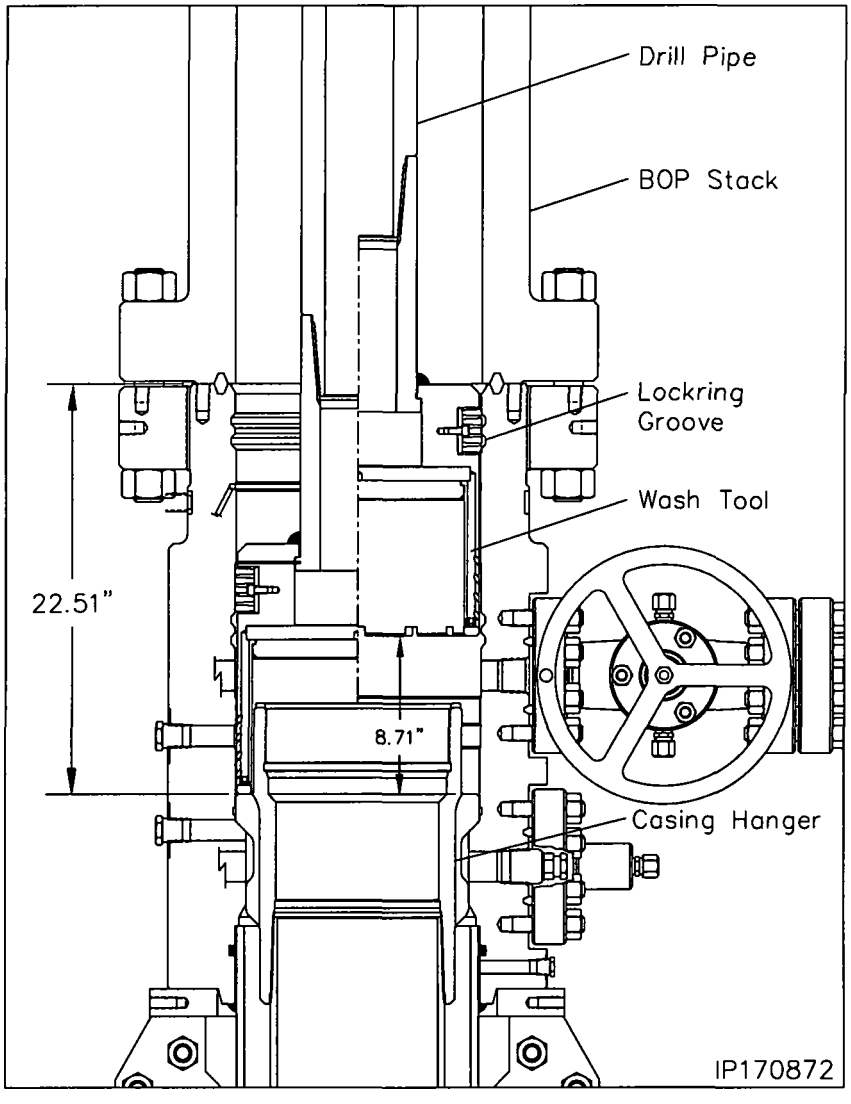
26. ***Using Chain Tongs Only located 180° apart,*** retrieve the Running Tool and landing joint by rotating the landing joint clockwise (right) approximately 16 turns.

WARNING: The rig floor tong may be used to break the connection but **under no circumstances is the top drive to be used to rotate or remove the casing hanger running tool.**

Stage 4 — Hang Off the 9-5/8" Casing

Running the 13-5/8" Wash Tool

1. Examine the ***13-5/8" x 4-1/2" IF Wash Tool (Item ST5).*** Verify the following:
   - drill pipe threads and bore are clean and in good condition
   - all ports are open and free of debris
   - brushes are securely attached and in good condition
2. Orient the Wash Tool with drill pipe box up. Make up a joint of drill pipe to the tool.
3. Carefully lower the Wash Tool through the BOP and land it on top of the 9-5/8" casing hanger, 22.51" below the top of the housing.
4. Place a paint mark on the drill pipe level with the rig floor.
5. Using chain tongs, rotate the tool clockwise (right) approximately 6 turns to loosen any debris that may be on top of the hanger flutes.
6. Open the lower side outlet valve and drain the BOP stack.
7. Pick up on the tool approximately 1" and attach a high pressure water line or the top drive to the end of the drill pipe and pump water at approximately 25 SPM through the tool and up the BOP stack.
8. Pick up the tool an additional 7.71" and rotate the tool back and forth to brush the upper lockring groove free of debris.
9. While flushing, raise and lower the tool the full length of the wellhead and BOP stack. The drill pipe should be slowly rotated (approximately 20 RPM) while raising and lowering to wash the inside of the housing and BOP stack to remove all caked on debris.
10. Once washing is complete, land the wash tool on the hanger flutes.



11. Shut down pumps and observe the returns at the open lower outlet for debris.
12. Reengage the pump and fully wash the inside of the wellhead and the entire BOP one additional cycle ensuring the stopping point is with the wash tool resting on top of the hanger flutes.

Note: Observe the returns at the open outlet valve. If returns are not clean, continue flushing until they are.

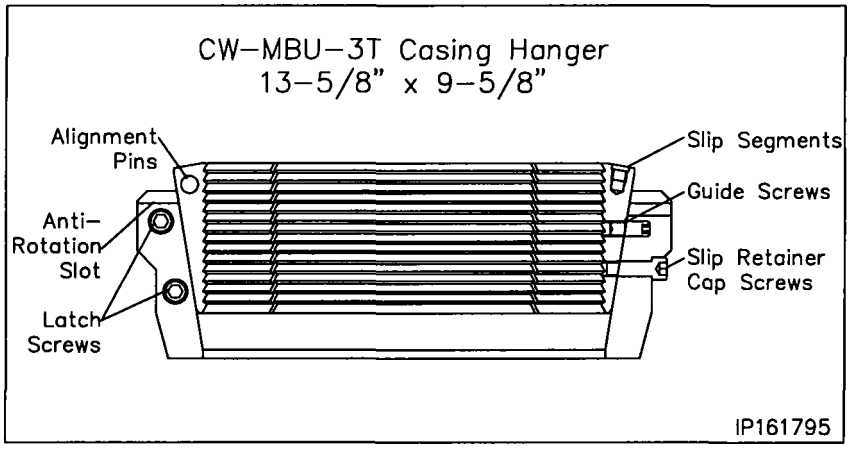
13. Once the returns are clean and free of debris, retrieve the tool to the rig floor.
14. Using a bright light, sight through the bore of the BOP stack and observe the top of the hanger neck and flutes. Ensure that there are no dark areas on top of the hanger flutes.

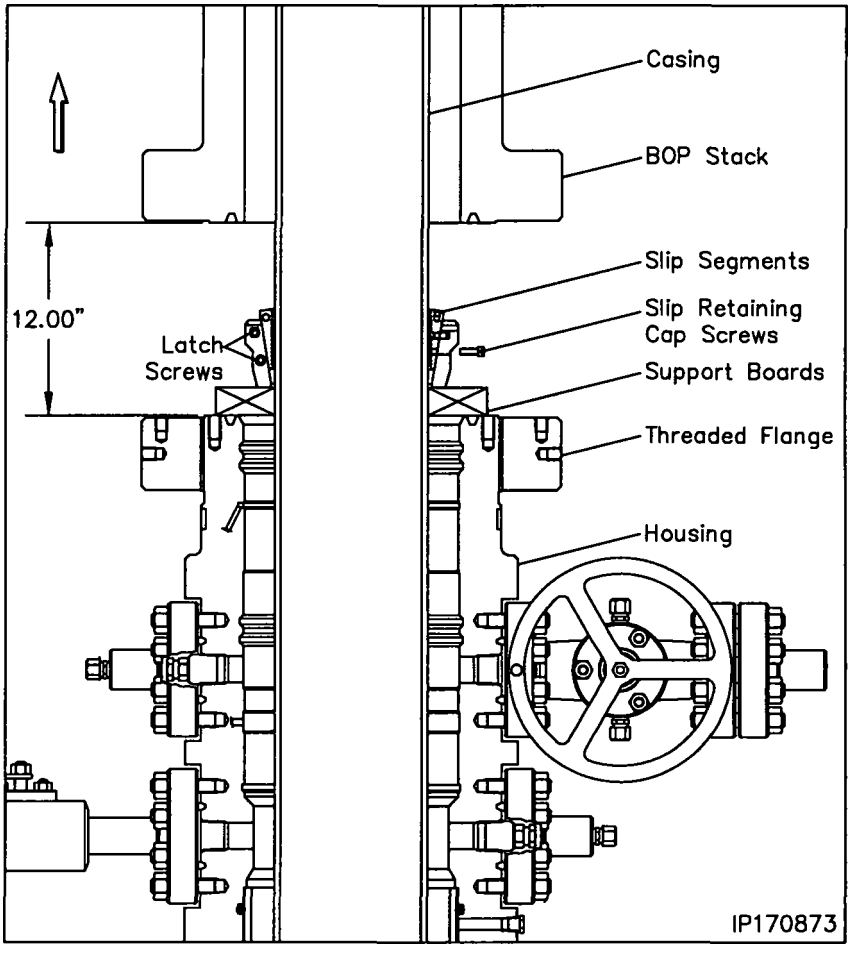
WARNING: Continue washing until all debris is removed.

Stage 4A — Hang Off the 9-5/8" Casing (Emergency)

Note: The following procedure should be followed **ONLY** if the 9-5/8" casing should become stuck in the hole. If the casing did not get stuck and is hung off with the Mandrel Casing Hanger, skip this stage.

1. Cement the hole as required.
2. Drain the BOP stack through the housing lower side outlet valve.
3. Break the connection between the BOP stack and the MBU-3T housing.
4. Pick up on the BOP stack a minimum of 12" above the housing flange and secure with safety slings.
5. Washout as required.
6. Examine the ***13-5/8" x 9-5/8" MBU-3T Slip Casing Hanger (Item A12a).*** Verify the following:
   - slips and internal bore are clean and in good condition
   - all screws are in place
7. There are two latch screws located in the top of the casing hanger. Using a 5/16" Allen wrench, remove the two latch screws located 180° apart and separate the hanger into two halves.
8. Place two boards on the lower adapter against the casing to support the Hanger.
9. Pick up one half of the hanger and place it around the casing and on top of the boards.
10. Pick up the second hanger half and place it around the casing adjacent the first half.
11. Slide the two hanger halves together ensuring the slip alignment pins properly engage the opposing hanger half.
12. Reinstall the latch screws and tighten securely.
13. Prepare to lower the hanger into the housing bowl.





Stage 4A — Hang Off the 9-5/8" Casing (Emergency)

WARNING: Do Not Drop the Casing Hanger!

14. Grease the Casing Hanger's body and remove the slip retaining screws.

15. Remove the boards and allow the hanger to slide into the housing bowl. When properly positioned the top of the hanger will be approximately 22.56" below the top of the housing.

16. Pull tension on the casing to the desired hanging weight and then slack off.

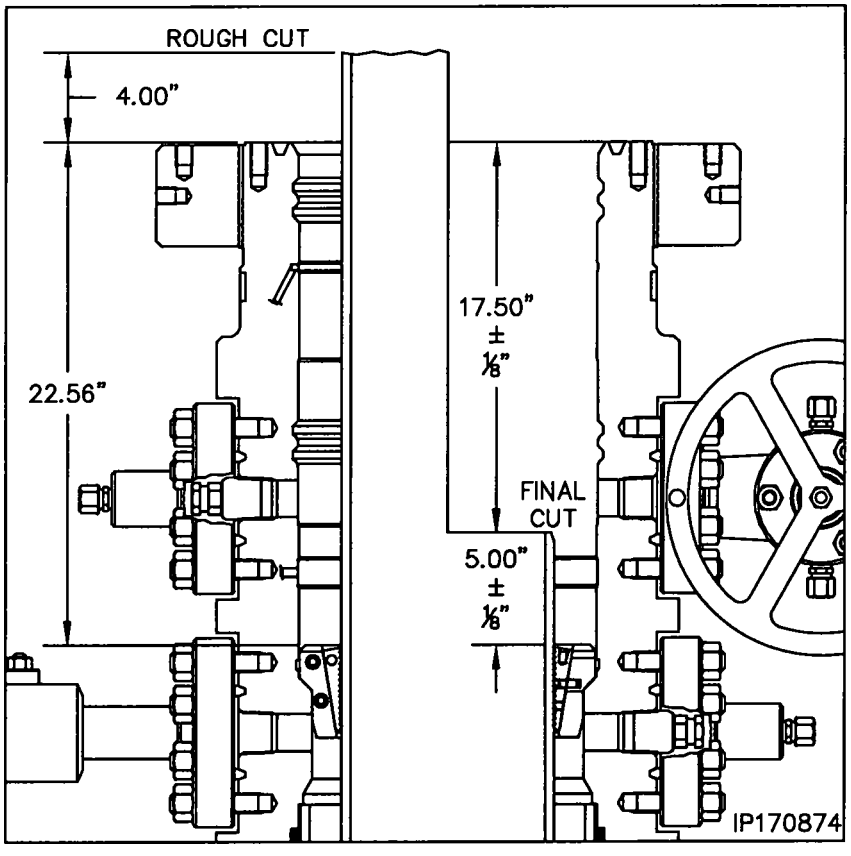
Note: A sharp decrease on the weight indicator will signify that the hanger has taken weight and at what point, If this does not occur, pull tension again and slack off once more.

WARNING: Because of the potential fire hazard and the risk of loss of life and property, It is highly recommended to check the casing annulus and pipe bore for gas with an approved sensing device prior to cutting off the casing. If gas is present, do not use an open flame torch to cut the casing. It will be necessary to use a air driven mechanical cutter which is spark free.

17. Rough cut the casing approximately 4" above the top of the housing and move the excess casing out of the way.

18. Using the Wach's internal casing cutter, final cut the casing at 17.50" ± 1/8" below the top of the lower adapter or 5.00" ± 1/8" above the hanger body.

19. Remove the internal casing cutter assembly and reconfigure the assembly to bevel the casing. Reinstall the cutter assembly and then place a 3/16" x 3/8" bevel on the O.D. and a I.D. chamfer to match the minimum bore of the packoff to be installed.



Note: There must not be any rough edges on the casing or the seals of the Packoff will be damaged.

20. Thoroughly clean the housing bowl, removing all cement and cutting debris.

21. Locate the two anti-rotation notches in the top of the slip bowl.

22. Place a straight edge on top of the slip bowl and in line with the center of one of the notches.

23. Ensure the straight edge is vertical and then place a paint mark on top of the housing in line with the notch in the slip bowl.

Stage 5 — Install the MBU-3T Mandrel Hanger Packoff

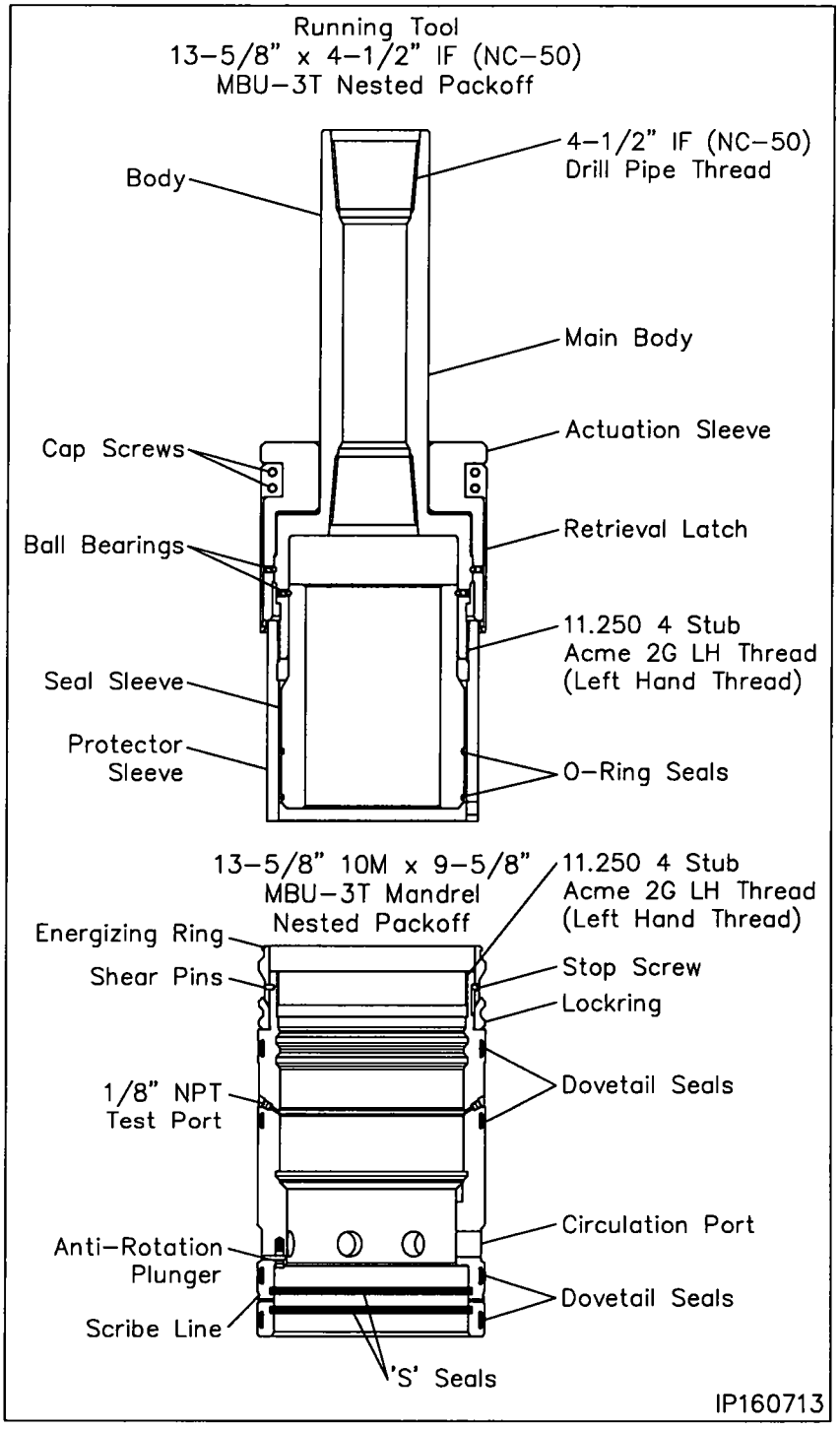
The following steps detail the installation of the MBU-3T Nested Packoff Assembly for the mandrel hanger. If the casing was landed using the emergency slip hanger, skip this step and proceed with Stage 5A for installing the emergency MBU-3T Nested packoff.

1. Examine the ***13-5/8" x 11.250" 4 Stub Acme 2G LH box top MBU-3T Mandrel Hanger Nested Packoff Assembly (Item A13).*** Verify the following:
   - all elastomer seals are in place and undamaged
   - internal bore, and ports, are clean and in good condition
   - lockring is fully retracted
   - energizer ring is in its upper most position and retained with shear pins and stop screws are loose
   - anti-rotation plungers are in place, free to move

2. Locate the 5/16" scribe mark between the lower dovetail seals of the packoff and paint only the scribe mark white. Allow the paint to dry.

3. Inspect the ID and OD seals for any damage and replace as necessary.

4. Examine the ***13-5/8" Nominal x 11.250" 4 Stub Acme 2G LH, MBU-3T Nested Packoff Running Tool (Item ST6).*** Verify the following:
   - Acme threads are clean and in good condition
   - retrieval latch is in position and retained with cap screws
   - Remove seal sleeve protector sleeve
   - seal sleeve is in position and rotates freely
   - seal sleeve o-rings are in place and in good condition
   - reinstall seal sleeve protector

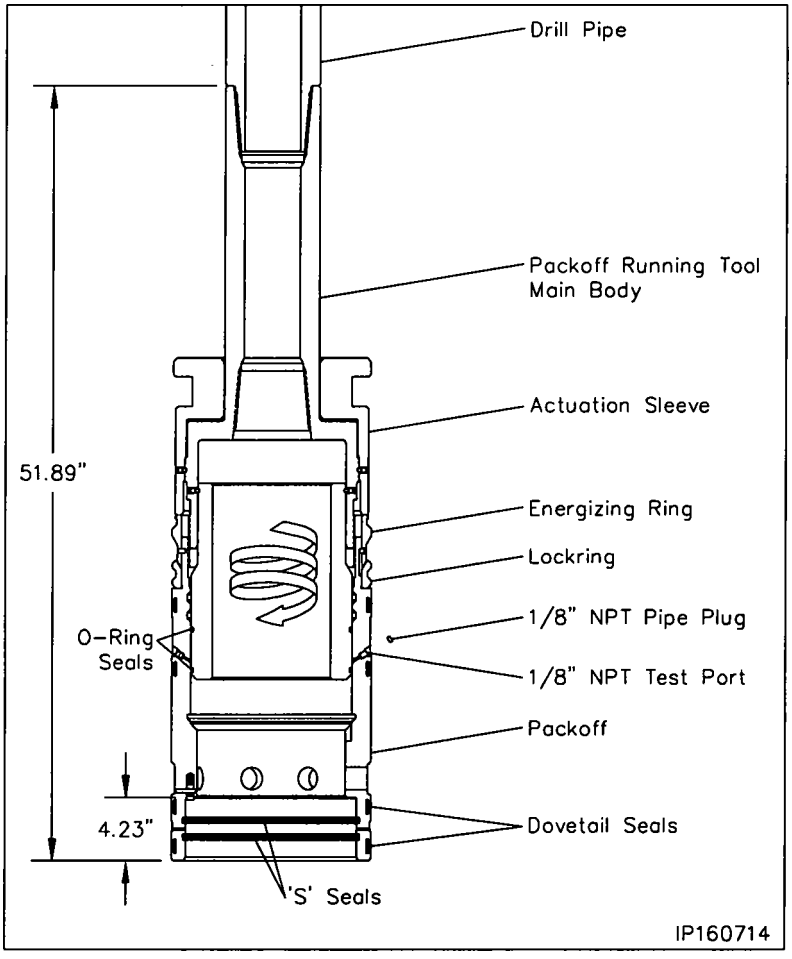


Stage 5 — Install the MBU-3T Mandrel Hanger Packoff

5. Remove the retrieval latch and set aside.
6. Make up the running tool to 4-1/2" NC-50 drill pipe and torque the connection to optimum make up torque.
7. Pick up the Running Tool with landing joint and suspend it above the packoff.
8. Remove the tool protector sleeve with counter clockwise rotation and set the sleeve aside.
9. Thoroughly clean and lightly lubricate the mating Acme threads of the running tool and packoff with oil or light grease.
10. Lightly lubricate the seal sleeve o-rings with oil or a light grease.
11. Carefully lower the tool into the packoff and thread them together by first rotating the tool clockwise (RIGHT) to locate the thread start and then counter clockwise (LEFT) until the tool upper body makes contact with the packoff Energizing Ring. Approximately 4 turns.
12. Install (1) 1/8" NPT pipe plug in the OD test port of the packoff and tighten securely.
13. Attach a test pump to the remaining open port and inject test fluid between the seal sleeve o-rings until a stable test pressure of 5,000 psi is achieved.
14. If the test fails, remove the tool and replace the leaking o-rings.
15. After a satisfactory test is achieved remove the test pump and the 1/8" pipe plug from the opposite test port.

WARNING: All 1/8" pipe plugs must be removed prior to installing the packoff

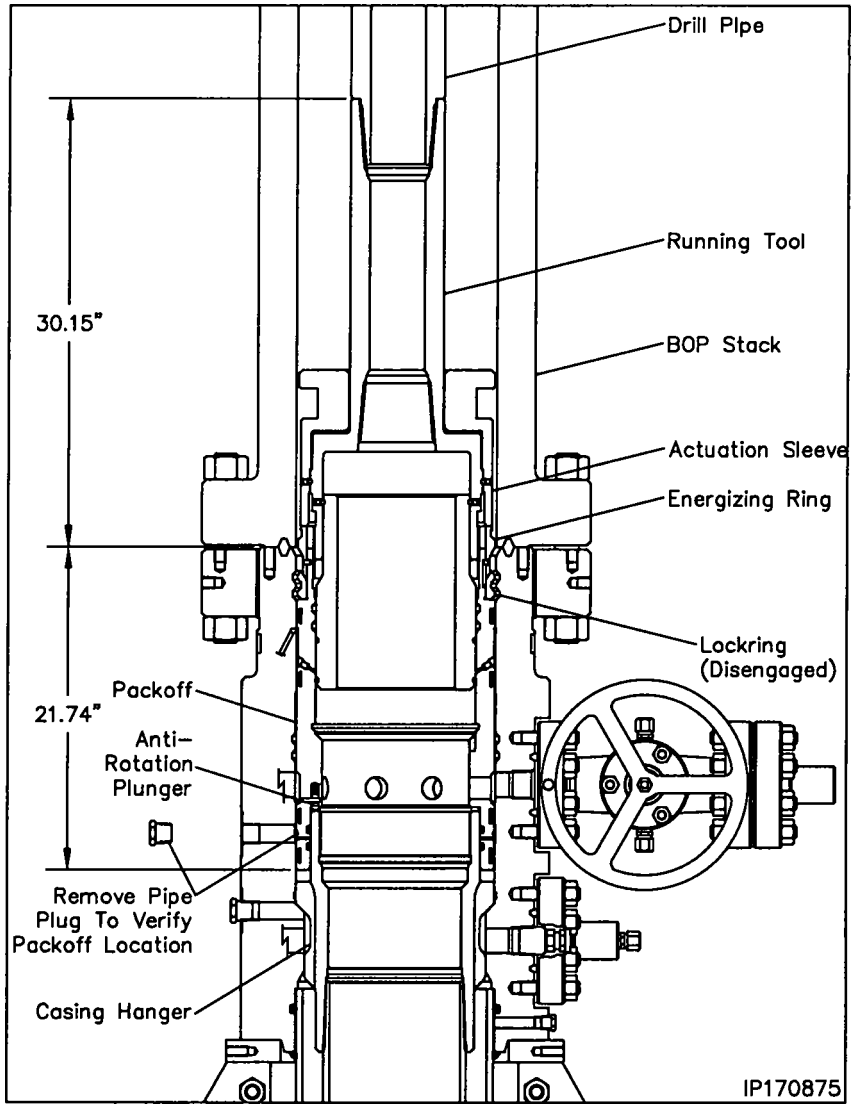
16. Pick up the assembly and thoroughly clean and lightly lubricate the packoff ID 'S' seals and the OD dovetail seals with oil or light grease.



Stage 5 — Install the MBU-3T Mandrel Hanger Packoff

Landing the Packoff

17. Remove the hole cover.
18. Measure up 5 foot from the bottom of the packoff and place a paint mark on the drill pipe.
19. Pick up the packoff/running tool assembly and carefully lower the assembly through the BOP marking the landing joint every five feet until the calculated dimension is reached.
20. Place a paint mark on the landing joint at that dimension and mark land off. Place an additional mark 1-1/2" above the first one and mark engaged.
21. Continue lowering the packoff until it passes over the neck of the hanger and lands on the casing hanger neck, 21.74" below the top of the MBU-3T housing.
22. Locate the upper 1" sight port pipe plug and remove the plug
23. Look through the port to verify that the packoff is properly landed. The white paint scribe line will be clearly visible in the center of the open port.
24. Reinstall the pipe plug and tighten securely.



Stage 5 — Install the MBU-3T Mandrel Hanger Packoff

Seal Test

25. Locate the upper and lower seal test fittings on the O.D. of the housing and remove the dust cap from the fittings.

26. Attach a test pump to the open lower fitting and pump clean test fluid between the seals until a stable test pressure of 5,000 psi is achieved.

27. Hold test pressure for 5 minutes.

28. If a leak develops, bleed off test pressure, remove the packoff from the wellhead and replace the leaking seals.

29. Repeat steps 25 through 27 for the remaining port and test seals to 5,000 psi

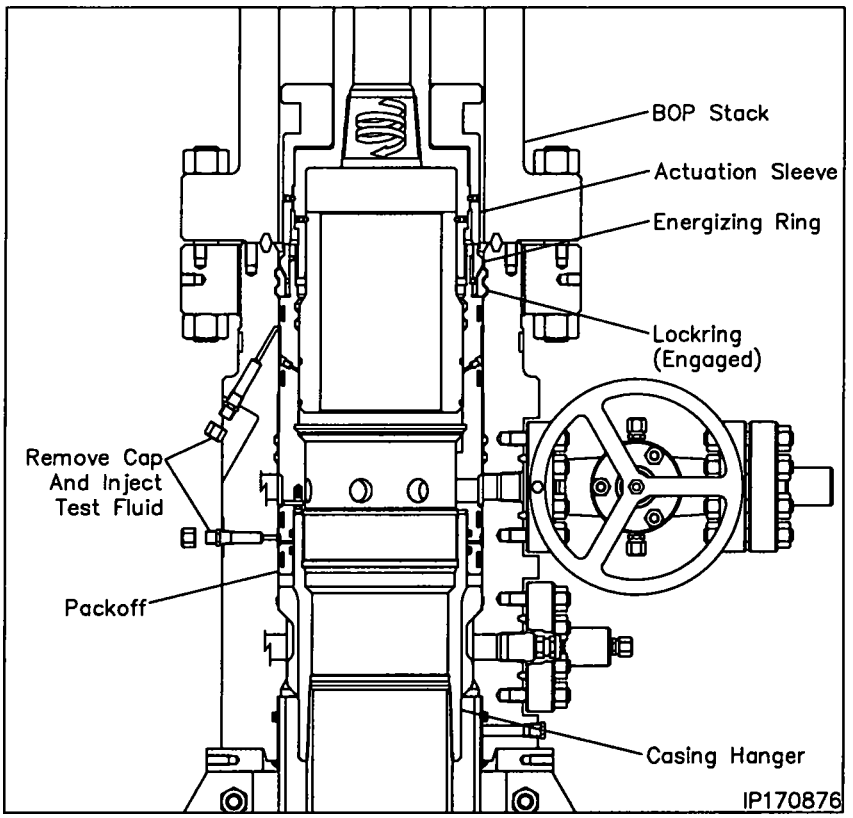
30. After satisfactory tests are achieved, bleed off the test pressure but leave the test manifolds in place.

Engaging the Lockring

31. Using chain tongs only located 180° apart, slowly rotate the drill pipe counter clockwise until the anti-rotation plungers align with the slots in the top of the hanger. Expect torque of approximately 400 ft lbs. to rotate the packoff.

32. Using only chain tongs, rotate the landing joint approximately 6 to 6-1/2 turns counter clockwise to engage the packoff lockring in its mating groove in the bore of the MBU-LR housing.

Note: Approximately 800 to 900 ft. lbs. of torque will be required to break over the shear pins in the packoff. The torque will drop off and then increase slightly when the energizing ring pushes the lockring out. A positive stop will be encountered when the lockring is fully engaged.



Note: When properly engaged the second paint mark on the landing joint will align with the rig floor. VERIFY PAINT MARKS.

WARNING: It is imperative that the landing joint remain concentric with the well bore when rotating to engage the lockring. This can be accomplished with the use of the air hoist.

WARNING: If the required turns to engage the lockring are not achieved or excessive torque is encountered, remove the packoff and first call local branch and then Houston Engineering.

33. Back off the landing joint/running tool approximately three turns. Using the top drive, exert a 40,000 lbs. pull on the landing joint.

34. Reattach the test pump to the open test manifolds and retest the packoff seals as previously outlined. This will also verify that the packoff is in place.

35. After satisfactory test is achieved, bleed off all test pressure, remove test pump and reinstall the dust cap on the open fittings.

36. Using only chain tongs, rotate the landing joint clockwise until the tool comes free of the packoff (approximately 9 to 9-1/2 turns) and then retrieve the tool with a straight vertical lift.

Stage 5 — Install the MBU-3T Mandrel Hanger Packoff

In the event the packoff is required to be removed after the lockring is engaged the following procedure is to be followed.

Retrieving the Packoff

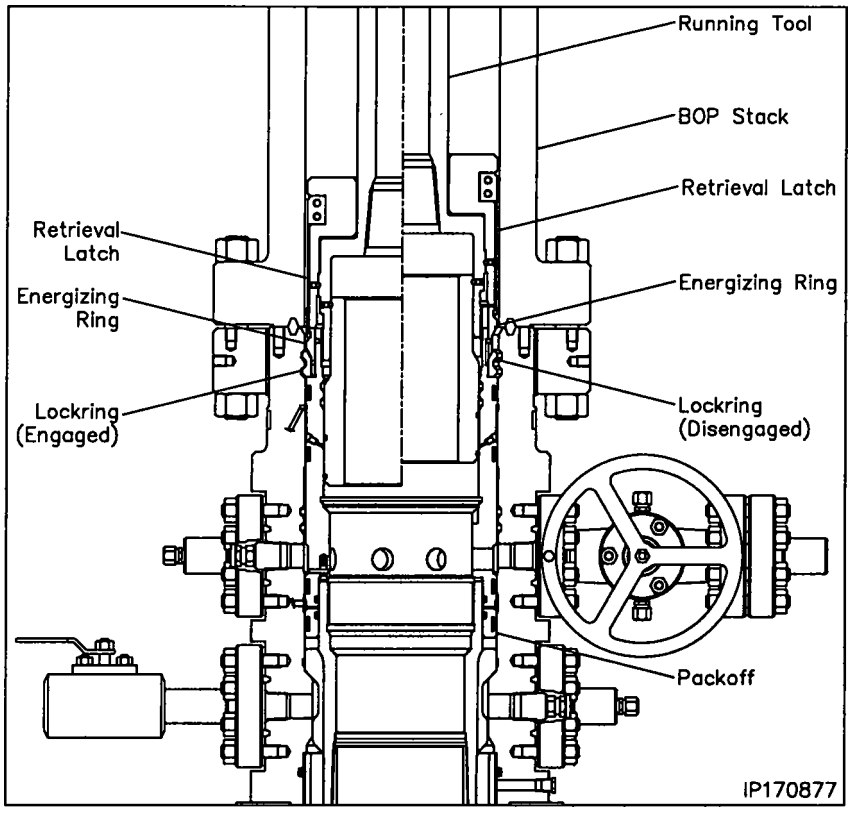
1. Position the retrieval latch so the latch finger extend from the bottom of the running tool body.
2. Reinstall the cap screws and tighten them securely.
3. Ensure the retrieval latch freely rotates on the running tool body.
4. Carefully lower the running tool through the BOP stack and into the packoff.
5. Rotate the drill pipe clockwise (Right) to locate the thread start and then counter clockwise (Left) (approximately 9 to 9-1/2 turns) to a positive stop.

Note: At this point the retrieval latches will have passed over the energizing ring and snapped into place.

6. Rotate the drill pipe clockwise (right) approximately 6 turns to a positive stop. The drill pipe should rise approximately 1-1/2".

Warning: Do not exceed the 6 turns or the packoff may be seriously damaged.

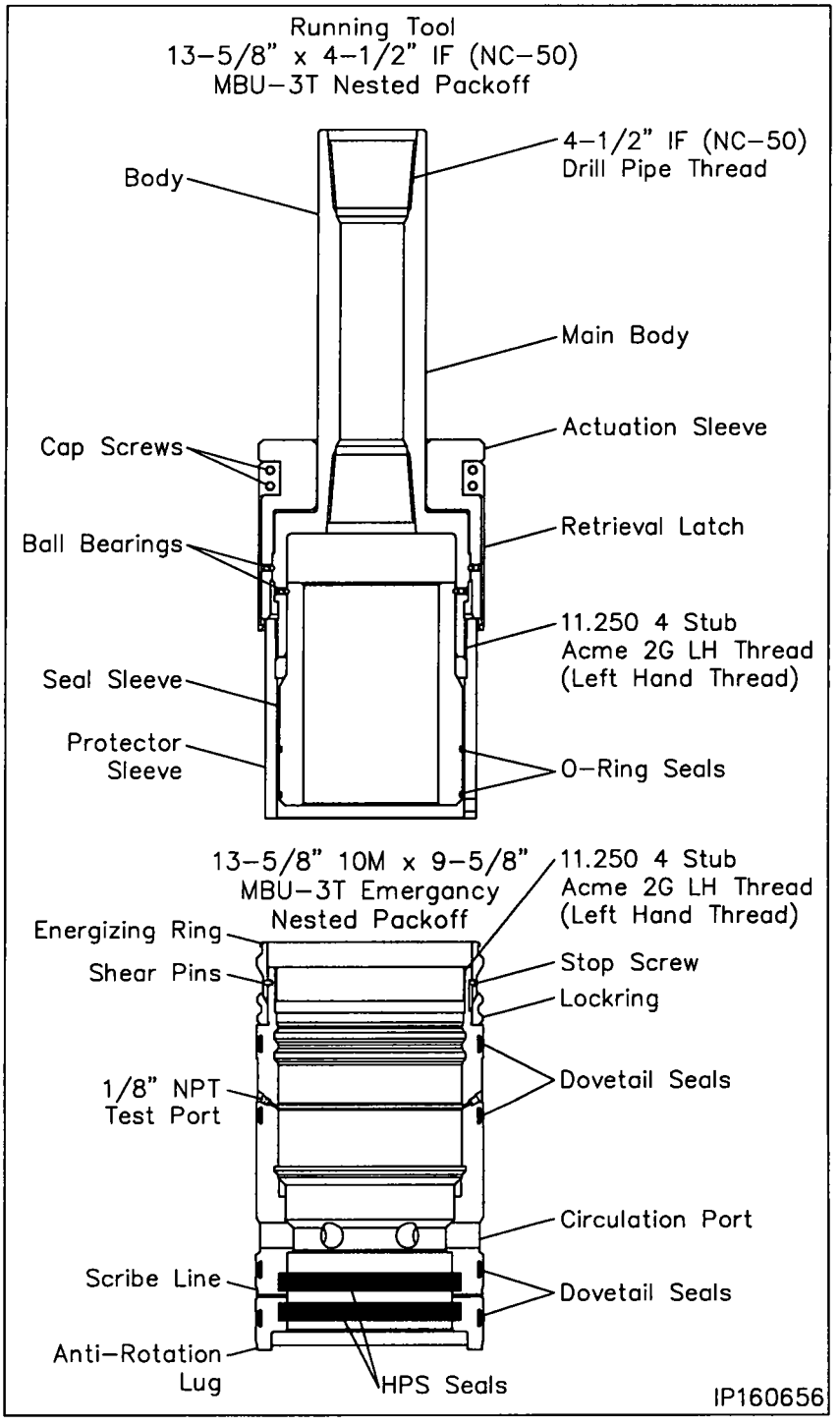
7. Carefully pick up on the drill pipe and remove the packoff from the MBU-3T wellhead with a straight vertical lift.
8. Rotate the packoff 1 turn clockwise to relax the retrieval latch.
9. Remove the (4) 1/2" cap screws and remove the latch assembly.
10. Redress the Packoff and reset as previously outlined.
11. Once the packoff is properly set, reinstall the retrieval latch on the tool.



Stage 5A — Install the MBU-3T Emergency Packoff

Note: The following procedure should be followed **ONLY** if the 9-5/8" casing should become stuck in the hole and the emergency casing hanger has been installed. If the casing did not get stuck and is hung off with the Mandrel Casing Hanger and Packoff, skip this stage.

1. Examine the ***13-5/8" 10M x 9-5/8" x 11.250" 4 Stub Acme 2G LH box top MBU-3T Emergency Nested Packoff Assembly (Item A13a).*** Verify the following:
   - all elastomer seals are in place and undamaged
   - internal bore, and ports, are clean and in good condition
   - lockring is fully retracted
   - energizer ring is in its upper most position and retained with shear pins
2. Inspect the ID and OD seals for any damage and replace as necessary.
3. Examine the ***13-5/8" Nominal x 11.250" 4 Stub Acme 2G LH, MBU-3T Nested Packoff Running Tool (Item ST6).*** Verify the following:
   - Acme threads are clean and in good condition
   - retrieval latch is in position and retained with cap screws
   - seal sleeve is in position and rotates freely
   - seal sleeve o-rings are in place and in good condition
   - reinstall seal sleeve protector
4. Make up a joint 4-1/2" IF (NC-50) drill pipe to the top of the Running Tool and tighten connection to thread manufacturer's maximum make up torque.
5. Run in the hole with two stands of drill pipe and set in floor slips.

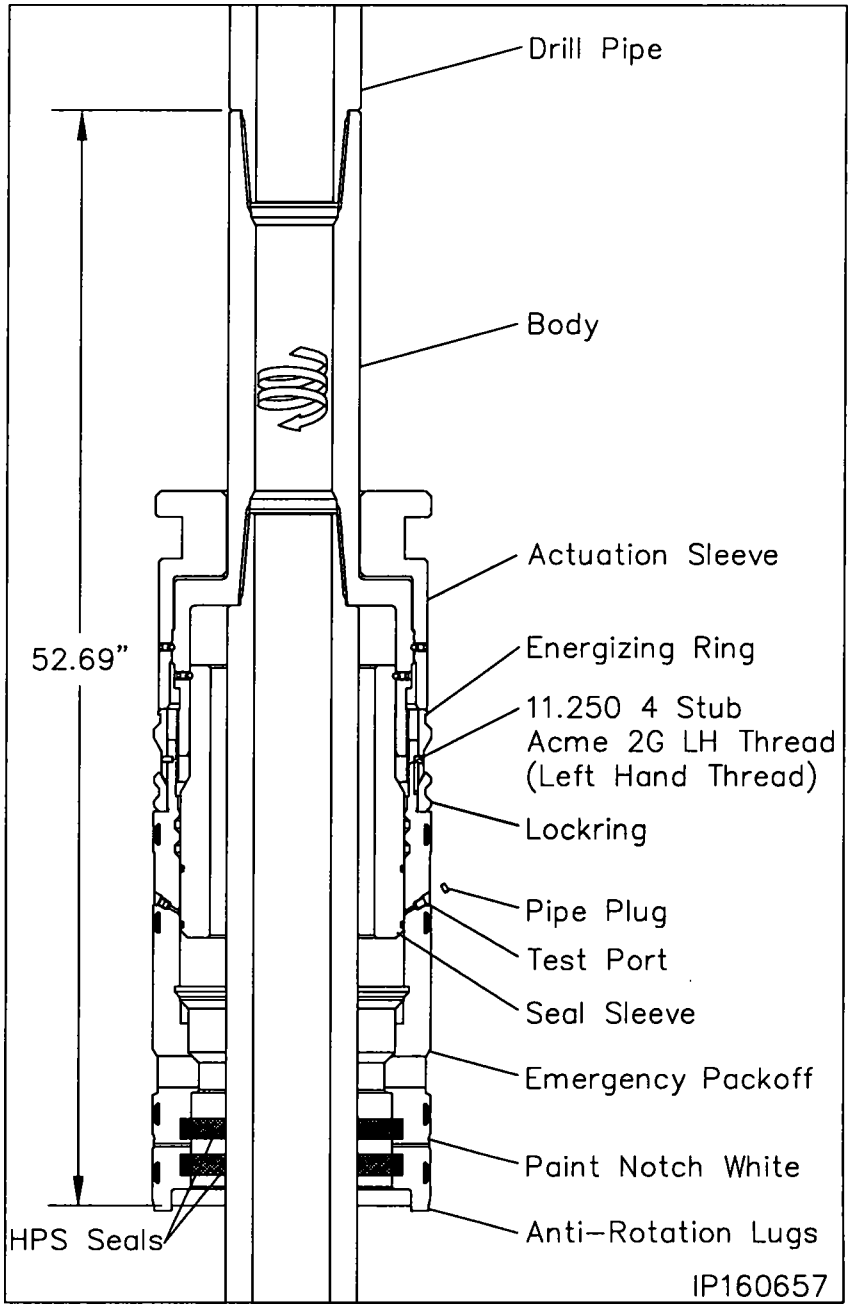


Stage 5A — Install the MBU-3T Emergency Packoff

6. Pick up the packoff and carefully pass it over the drill pipe and set it on top of the floor slips.
7. Pick up the running tool with landing joint and remove the tool protector sleeve with counter clockwise rotation and set the sleeve aside.
8. Thoroughly clean and lightly lubricate the mating acme threads of the running tool and packoff with oil or light grease.
9. Lightly lubricate the seal sleeve o-rings with oil or a light grease.
10. Make up the running tool to the drill pipe in the floor slips using the appropriate length pip x pin sub.
11. Pick up the packoff and thread it onto the running tool with clockwise (Right) rotation until the Energizing Ring makes contact with the lower body of the tool. (Approximately 4 turns).
12. Install (1) 1/8" NPT pipe plug in the OD test port of the packoff and tighten securely
13. Attach a test pump to the remaining open port and inject test fluid between the seal sleeve o-rings until a stable test pressure of 5,000 psi is achieved.
14. If the test fails, remove the tool and replace the leaking o-rings.
15. After a satisfactory test is achieved remove the test pump and the 1/8" pipe plug from the opposite test port.

WARNING: All 1/8" pipe plugs must be removed prior to installing the packoff

16. Thoroughly clean and lightly lubricate the packoff ID 'HPS' seals and the OD dovetail seals with oil or light grease.



17. Using a straight edge positioned vertically and centered on the anti-rotation lug on the bottom of the packoff, place a white paint mark up the side of the packoff in line with the lug.

Note: The line will be used to guide the packoff anti-rotation lug into its mating notch in the slip bowl.

Stage 5A — Install the MBU-3T Emergency Packoff

Landing the Packoff

18. Pick up the drill string and remove the floor slips.

19. Carefully lower the packoff through the rig floor and position it just above the housing.

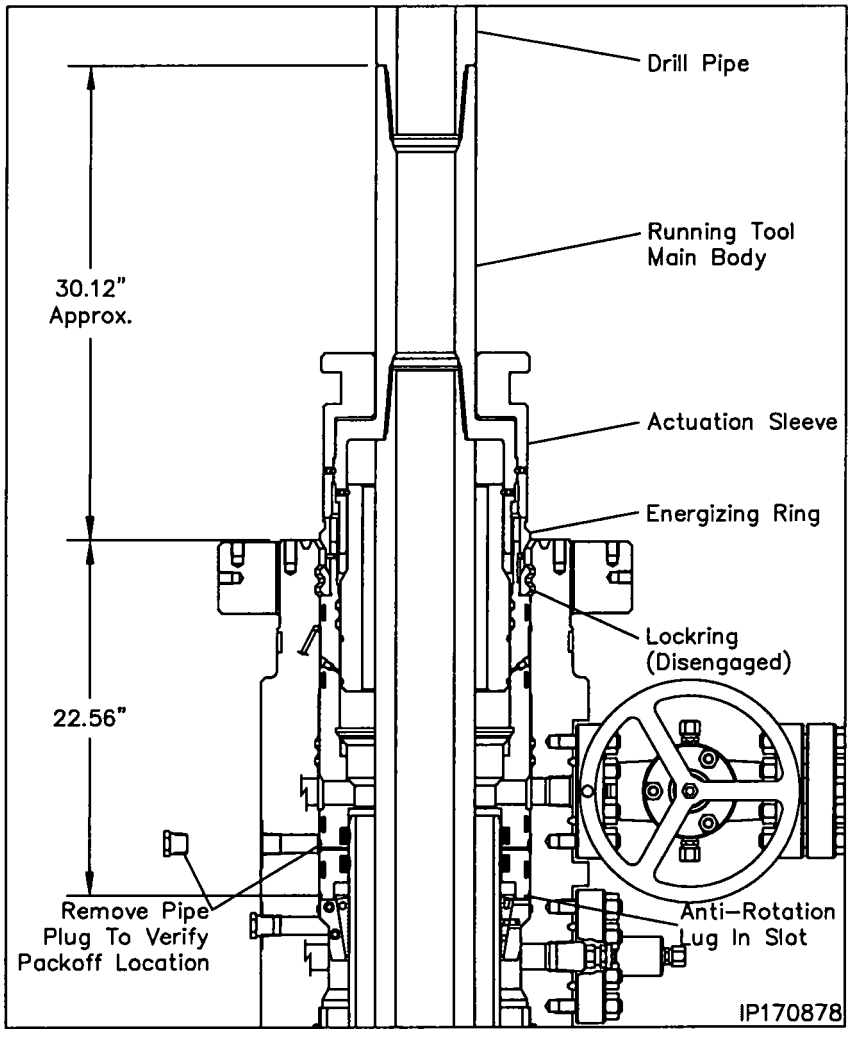
20. Align the white paint line with the existing paint mark on top of the housing.

21. While holding the packoff to maintain alignment, carefully lower the packoff into the housing until it lands on top of the slip hanger.

Note: When properly positioned the top of the running tool will be approximately 30.12" above the top of the MBU-3T Housing.

22. Remove the upper 1" LP pipe plug from the sight port to verify the packoff is properly landed. The 5/16" scribe line should be clearly visible in the center of the port.

23. With landing verified, reinstall the pipe plug and tighten securely.



Stage 5A — Install the MBU-3T Emergency Packoff

Seal Test

24. Locate the upper and lower seal test fittings on the O.D. of the housing and remove the dust cap from the fittings.

25. Attach a test pump to the open lower fitting and pump clean test fluid between the seals until a stable test pressure of 5,000 psi or 80% of casing collapse - Whichever is less is achieved.

26. Hold test pressure for 15 minutes.

27. If a leak develops, bleed off test pressure, remove the packoff from the wellhead and replace the leaking seals.

28. After satisfactory test is achieved, bleed off the test pressure but leave the test manifold in place.

29. Repeat steps 25 through 27 for the remaining port and test seals to 5,000 psi.

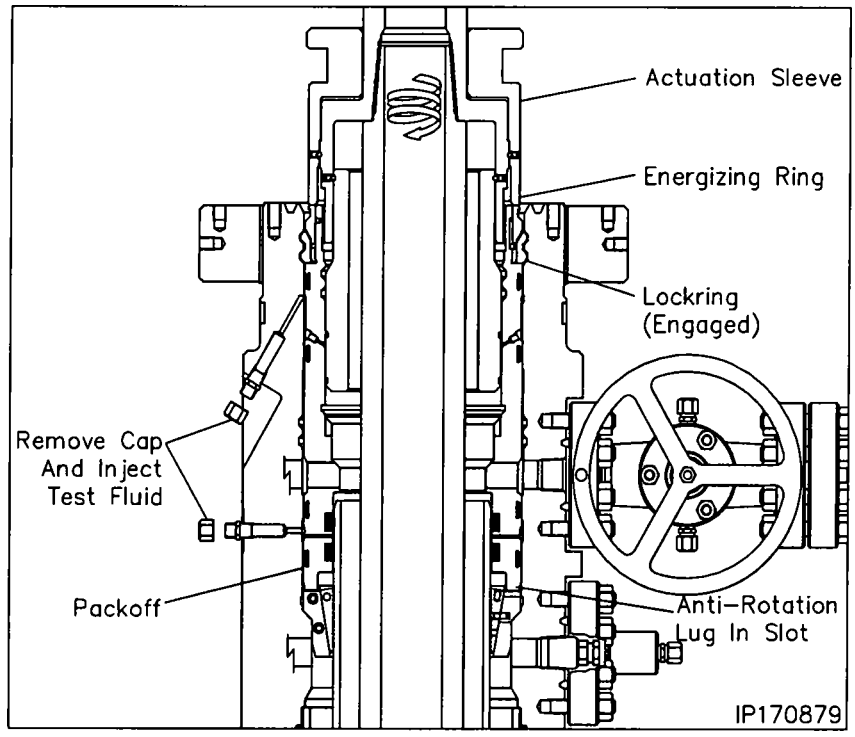
Engaging the Lockring

30. Using only chain tongs, rotate the landing joint approximately 6 to 6-1/2 turns counter clockwise (Left) to engage the packoff lockring in its mating groove in the bore of the MBU-3T housing.

Note: Approximately 800 to 900 ft. lbs. of torque will be required to break over the shear pins in the packoff. The torque will drop off and then increase slightly when the energizing ring pushes the lockring out. A positive stop will be encountered when the lockring is fully engaged.

WARNING: It is imperative that the drill pipe landing joint remain concentric with the well bore when rotating to engage the lockring. This can be accomplished with the use of the air hoist.

WARNING: If the required turns to engage the lockring are not achieved or excessive torque is encountered, remove the packoff and first call local branch and then Houston Engineering.



31. Back off the landing joint/running tool approximately three turns. Using the top drive, exert a 40,000 lbs. pull on the landing joint.

32. Reattach the test pump to the open test manifolds and retest the packoff seals as previously outlined. This will also verify that the packoff is in place.

33. After satisfactory test is achieved, bleed off all test pressure, remove test pump and reinstall the dust cap on the open fittings.

34. Using only chain tongs, rotate the landing joint clockwise until the tool comes free of the packoff (approximately 9 to 9-1/2 turns) and then retrieve the tool with a straight vertical lift.

35. Reinstall and nipple up the BOP stack.

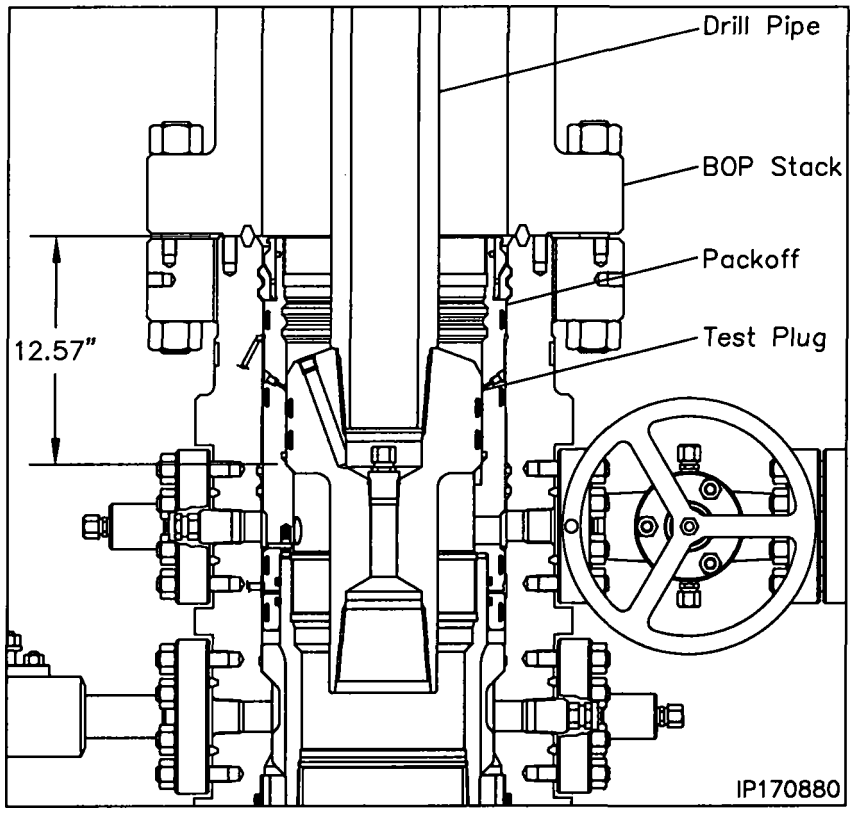
Stage 6 — Test the BOP Stack

Immediately after making up the BOP stack and periodically during the drilling of the well for the next casing string the BOP stack (connections and rams) must be tested.

1. Examine the ***11" Nominal x 4-1/2" IF CW Test Plug. (Item ST7).*** Verify the following:
   - 1-1/4" VR plug and weep hole plug are in place and tightened securely
   - elastomer seals are in place and in good condition
   - drill pipe threads are clean and in good condition
2. Position the test plug with the tong neck down and the elastomer seals up and make up the tool to a joint of drill pipe.
3. Remove the 1/2" NPT pipe plug from the weep hole if pressure is to be supplied through the drill pipe.
4. Open the housing upper side outlet valve.
5. Lightly lubricate the test plug seal with oil or light grease.
6. Carefully lower the test plug through the BOP and land it on the load shoulder in the packoff, 12.57" below the top of the housing.
7. Close the BOP rams on the pipe and test the BOP to 5,000 psi.

Note: Any leakage past the test plug will be clearly visible at the open side outlet valve.

8. After a satisfactory test is achieved, release the pressure and open the rams.



9. Remove as much fluid as possible from the BOP stack and the retrieve the test plug with a straight vertical lift.

Note: When performing the BOP blind ram test it is highly recommended to suspend a stand of drill pipe below the test plug to ensure the plug stays in place while disconnecting from it with the drill pipe.

10. Repeat this procedure as required during the drilling of the hole section.

Stage 7 — Run the Upper Wear Bushing

Note: Always use a Wear Bushing while drilling to protect the load shoulders from damage by the drill bit or rotating drill pipe. The Wear Bushing **must be retrieved** prior to running the casing.

1. Examine the ***13-5/8" x 11" x 9.00" ID MBU-3T-UPR Wear Bushing (Item ST8).*** Verify the following
   - internal bore is clean and in good condition
   - o-ring is in place and in good condition
   - shear o-ring cord is in place and in good condition
   - paint anti-rotation lugs white and allow paint to dry

Run the Wear Bushing Before Drilling

2. Orient the ***13-5/8" Nominal x 4-1/2" IF (NC-50) CW Test Plug/Retrieving Tool (Item ST1)*** with drill pipe connection up.

3. Attach the Retrieving Tool to a joint of drill pipe.

WARNING: Ensure that the lift lugs are down and the elastomer seal is up

4. Align the retractable lift lugs of the tool with the retrieval holes of the bushing and carefully lower the tool into the Wear Bushing until the lugs snap into place.

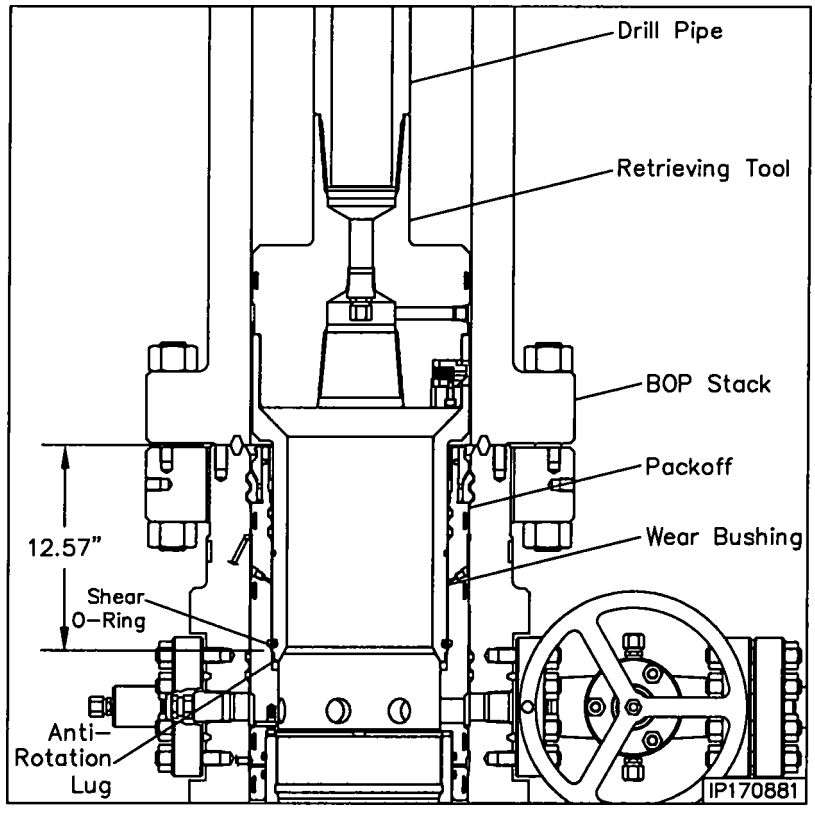
Note: If the lugs did not align with the holes, rotate the tool in either direction until they snap into place.

5. **Apply a heavy coat of grease, not dope, to the OD of the bushing.**

6. Ensure the BOP stack is drained and free of any debris fro previous test.

7. Slowly lower the Tool/Bushing Assembly through the BOP stack and land it on the load shoulder in the housing, 12.57" below the top of the housing.

8. Rotate the drill pipe clockwise (right) to locate the stop lugs in their mating notches in the head. When properly aligned the bushing will drop an additional 1/2".



Note: The Shear O-Ring on bottom of the bushing will locate in a groove above the load shoulder in the head to act as a retaining device for the bushing.

9. Remove the tool from the Wear Bushing by rotating the drill pipe counter clockwise (left) 1/4 turn and lifting straight up.

10. Drill as required.

Note: It is highly recommended to retrieve, clean, inspect, grease, and reset the wear bushing each time the hole is tripped during the drilling of the hole section.

Retrieve the Wear Bushing After Drilling

11. Make up the Retrieving Tool to the drill pipe.

12. Slowly lower the tool into the Wear Bushing.

13. Rotate the Retrieving Tool clockwise until a positive stop is felt. This indicates the lugs have snapped into the holes in the bushing.

14. Using the top drive, slowly pick up on the landing joint in 1000 lbs increments until the bushing starts to rise. This action should take a minimum of 3000 lbs pull. Do Not Exceed 60,000 lbs.

15. Retrieve the Wear Bushing, and remove it and the Retrieving Tool from the drill string.

Stage 8 — Hang Off the 5-1/2" Casing

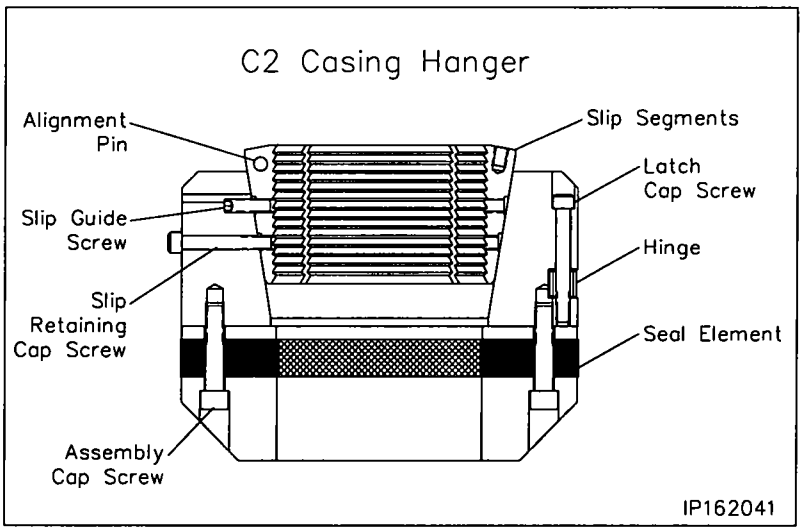
1. Run the 5-1/2" casing through the BOP to the required depth and cement the hole as required.
2. Drain the BOP stack through the housing side outlet valve.
3. Locate the actuation screw on the OD of the drilling adapter.
4. Using a hex drive, fully retract the actuation screws until they are slightly over flush with the glandnuts.
5. Pick up on the BOP stack a minimum of 16" above the housing hub and secure with safety slings.
6. Washout as required using a fresh water hose.

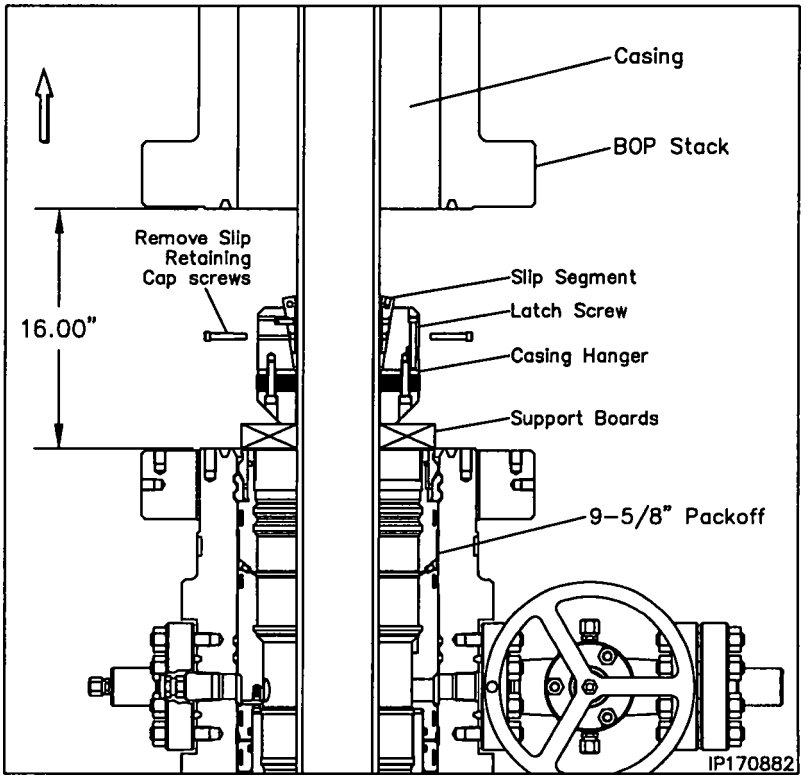
Note: Side outlet valve to remain open while setting the casing hanger.

7. Examine the ***11" x 5-1/2" C2 Slip Casing Hanger (Item A14).*** Verify the following:
   - slips and internal bore are clean and in good condition
   - all screws are in place
   - packoff rubber is in good condition

Note: Ensure that the packoff rubber does not protrude beyond the O.D. of the casing hanger body. If it does, loosen the cap screws in the bottom of the hanger.

8. There are two latch screws located in the top of the casing hanger. Using a 5/16" Allen wrench, remove the two latch screws located 180° apart and separate the hanger into two halves.
9. Place two boards on the housing flange against the casing to support the Hanger.
10. Pick up one half of the hanger and place it around the casing and on top of the support boards
11. Pick up the second hanger half and place it around the casing adjacent the first half.
12. Slide the who hanger halves together ensuring the slip guide pins properly engage the opposing hanger.
13. Reinstall the latch screws and tighten securely.





Stage 8 — Hang Off the 5-1/2" Casing

14. Using a 5/16" allen wrench, remove the slip retainer cap screws and discard them.

15. Prepare to lower the Hanger into the housing bowl.

WARNING: Do Not Drop the Casing Hanger!

16. Lubricate the O.D. of the casing hanger liberally with a light grease or oil.

17. Remove the boards and allow the Hanger to slide into the housing bowl. When properly positioned the top of the hanger will be approximately 6.38" below the top of the housing.

18. Pull tension on the casing to the desired hanging weight and then slack off.

Note: A sharp decrease on the weight indicator will signify that the Hanger has taken weight and at what point, If this does not occur, pull tension again and slack off once more.

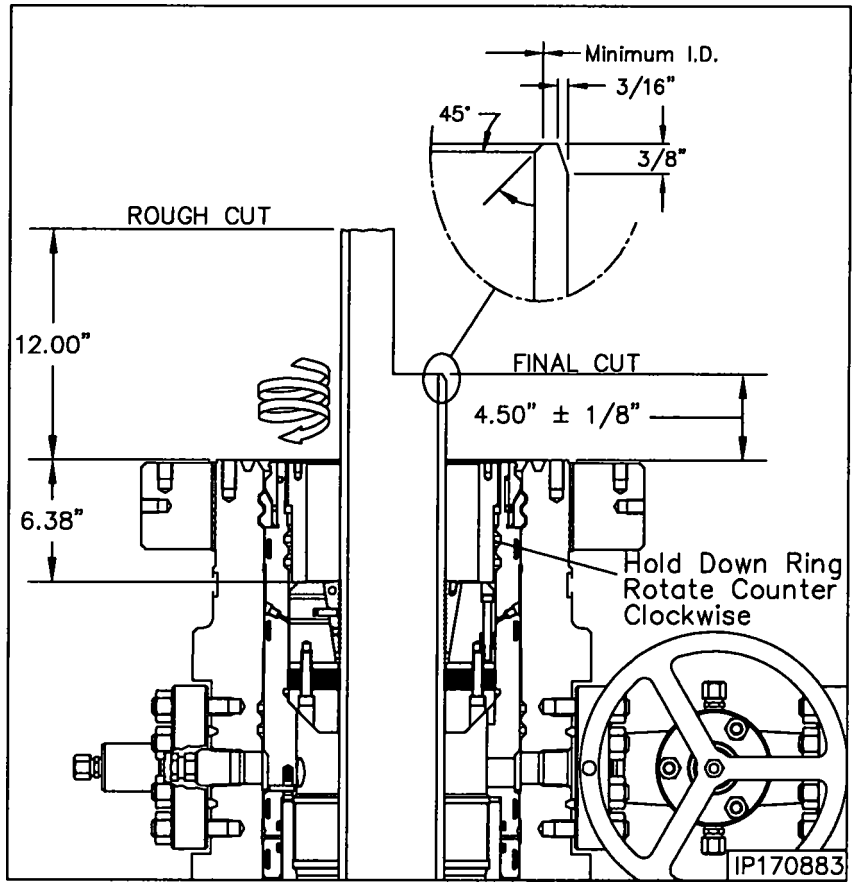
WARNING: Because of the potential fire hazard and the risk of loss of life and property, It is highly recommended to check the casing annulus and pipe bore for gas with an approved sensing device prior to cutting off the casing. If gas is present, do not use an open flame torch to cut the casing. It will be necessary to use a air driven mechanical cutter which is spark free.

19. Rough cut the casing approximately 12" above the top flange and move the excess casing out of the way.

20. Final cut the casing at 4.50" ± 1/8" above the top of the housing.

21. Grind the casing stub level and then place a 3/16" x 3/8" bevel on the O.D. and a I.D. chamfer to match the minimum bore of the Tubing Head to be installed.

Note: There must not be any rough edges on the casing or the seals of the tubing head will be damaged.



22. Using a high pressure water hose, thoroughly clean the top of the casing head, casing hanger, and casing stub and blow dry with compressed air. Ensure all cutting debris are removed.

23. Thoroughly clean and lightly lubricate the mating acme threads of the MBU-3T packoff and the slip the ***Hold Down Ring (Item A15).***

24. Thread the ring into the packoff with counter clockwise rotation to a positive stop on top of the slip hanger.

25. Fill the void above the hanger with clean test fluid to the top of the flange.

WARNING: Do Not over fill the void with test fluid - trapped fluid under the ring gasket may prevent a good seal from forming.

Stage 9 — Install the Tubing Head

Note: The tubing head may be shipped to location with the lower frac valve pre installed and tested.

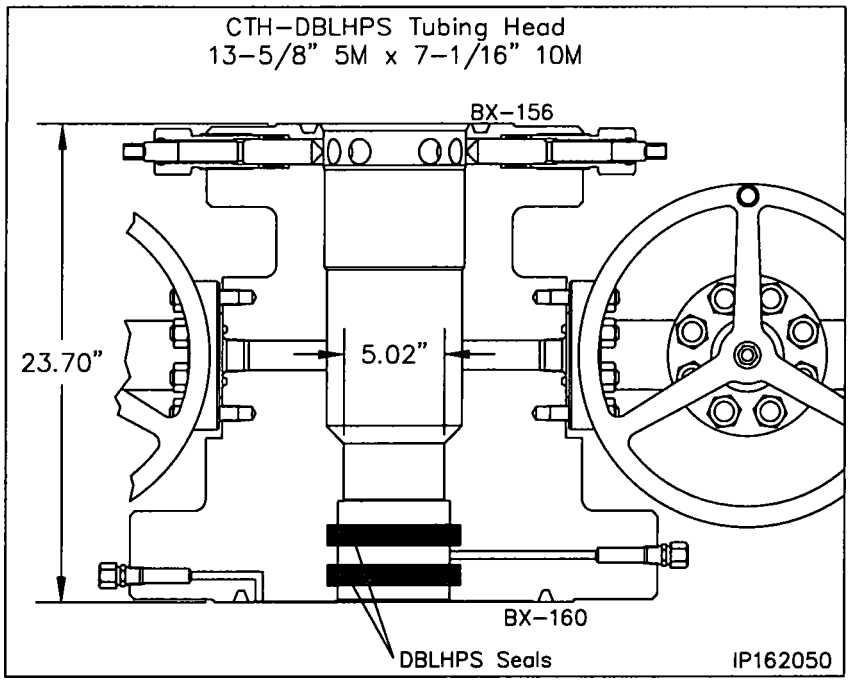
1. Examine the ***13-5/8" 5M x 7-1/16" 10M CW, CTH-DBLHPS Tubing Head With 5-1/2" DBLHPS Bottom (Item B1)*** Verify the following:
   - seal area and bore are clean and in good condition
   - ***HPS Seals*** are in place and in good condition
   - all peripheral equipment is intact and undamaged
2. Clean the mating ring grooves of the MBU-3T Housing and tubing head.
3. Lightly lubricate the I.D. of the tubing head 'HPS' seals and the casing stub with a light oil or grease.

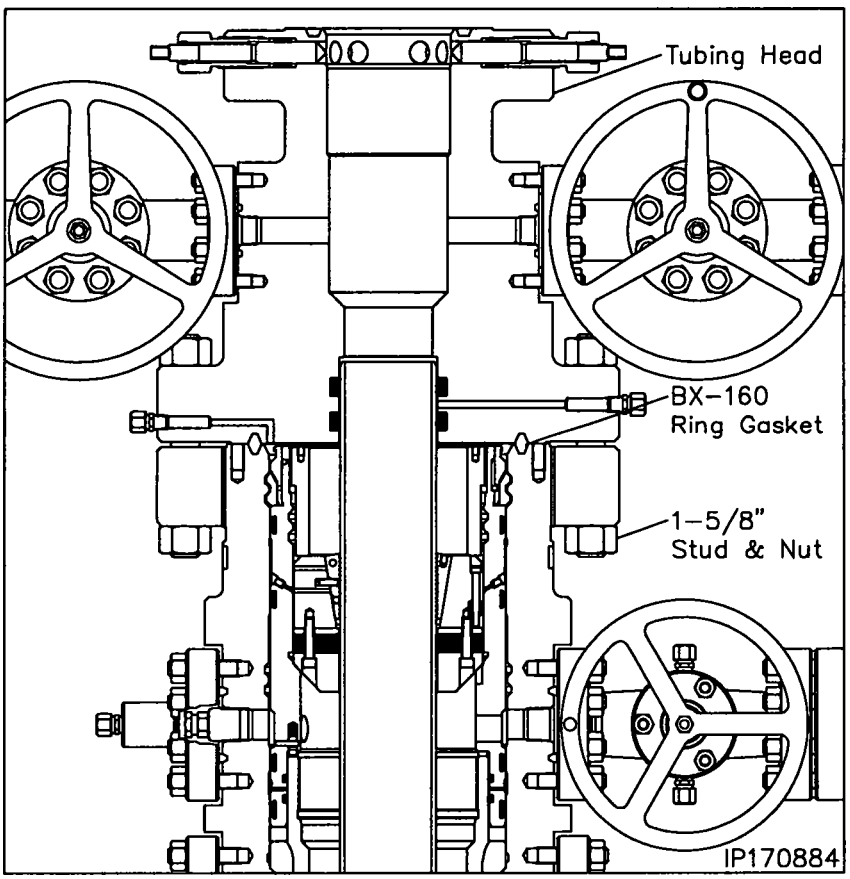
Note: Excessive oil or grease may prevent a good seal from forming!

4. Install a new ***BX-160 Ring Gasket (Item B6)*** in the ring groove of the housing.
5. Pick up the tubing head and suspend it above the housing.
6. Orient the head so that the outlets properly align with the housing upper outlets and then carefully lower the head over the casing stub and then land it on the ring gasket.

Warning: Do Not damage the 'HPS' seals or their sealing ability will be impaired!

7. Make up the flange connection using the ***1-5/8" x 12-3/4" studs and nuts (Item B7)***, tightening them in an alternating cross pattern.

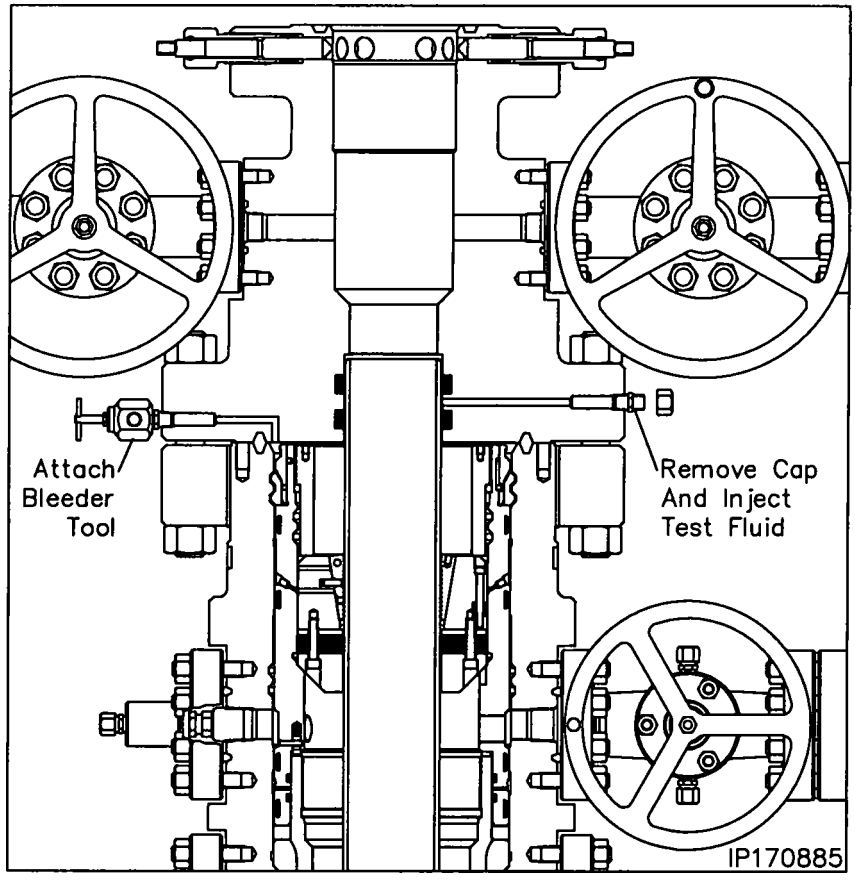




Stage 9 — Install the Tubing Head

Seal Test

1. Locate the seal test fitting and one flange test fitting on the Tubing Head lower flange and remove the dust cap from both fittings.
2. Attach a Bleeder Tool to one of the open flange test fittings and open the Tool.
3. Attach a test pump to the seal test fitting and pump clean test fluid between the HPS Seals until a test pressure of ***10,000 psi.***
4. Hold test pressure for 15 minutes.
5. If pressure drops, a leak has developed. Bleed off test pressure and take the appropriate action in the adjacent table.
6. After a satisfactory test is achieved, remove the Test Pump, drain test fluid and reinstall the dust cap on the open seal test fitting.

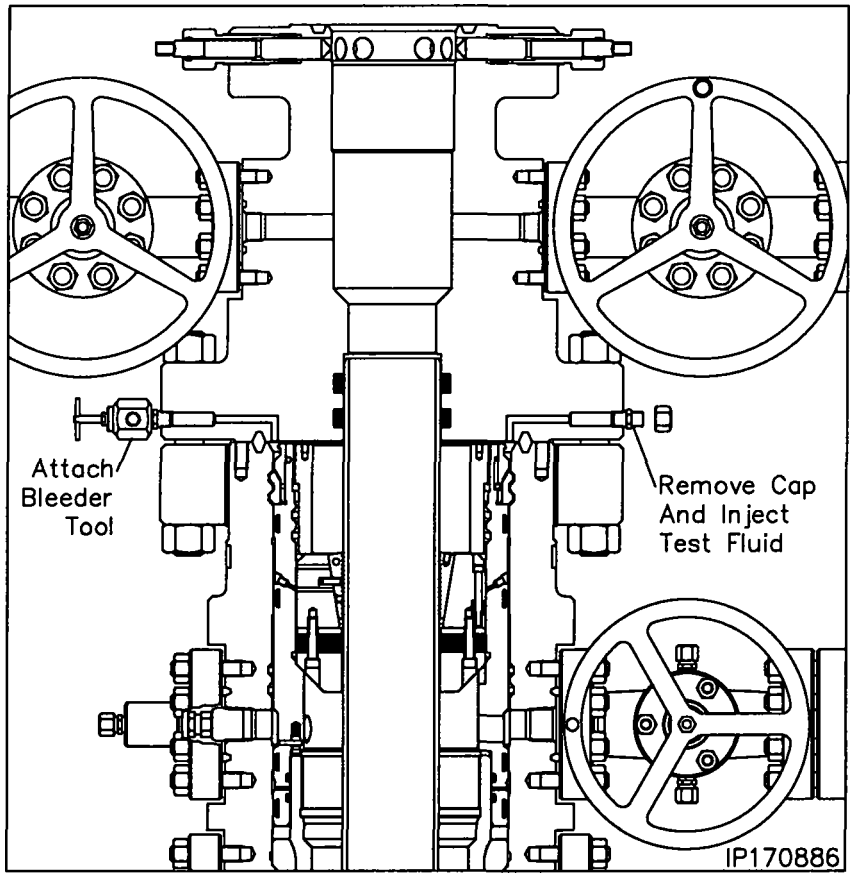


Seal Test	
Leak Location	**Appropriate Action**
Open bleeder tool - Lower HPS seal is leaking	Remove Tubing Head and replace leaking seals. Re land and retest seals
Into the tubing head bore - Upper HPS seal is leaking	

Stage 9 — Install the Tubing Head

Flange Test

1. Locate the remaining flange test *fitting on the Tubing Head lower* flange and remove the dust cap from the fitting.
2. Attach a test pump to the open flange test fitting and inject test fluid into the flange connection until a continuous stream flows from the opposite flange test bleeder tool.
3. Close the bleeder tool and continue to pumping test fluid to ***5,000 psi.***
4. Hold test pressure for 15 minutes.
5. If pressure drops a leak has developed. Take the appropriate action from the adjacent chart.
6. Repeat this procedure until a satisfactory test is achieved.
7. Once a satisfactory test is achieved, remove the test pump and bleeder tool, drain all test fluid, and reinstall the dust caps.



Flange Test	
Leak Location	**Appropriate Action**
Between flanges - Ring gasket is leaking	Verify flange bolt torque. If correct, remove tubing head to clean, inspect and possibly replace damaged ring gasket.
Into Casing Annulus - Slip Hanger Seal Element Is Leaking	Remove Tubing Head, spear casing and reset the casing hanger. Redress casing, reinstall Tubing Head and retest.

Stage 10 — Test the BOP Stack

Immediately after making up the BOP stack and periodically during the completion of the well the BOP stack (connections and rams) must be tested.

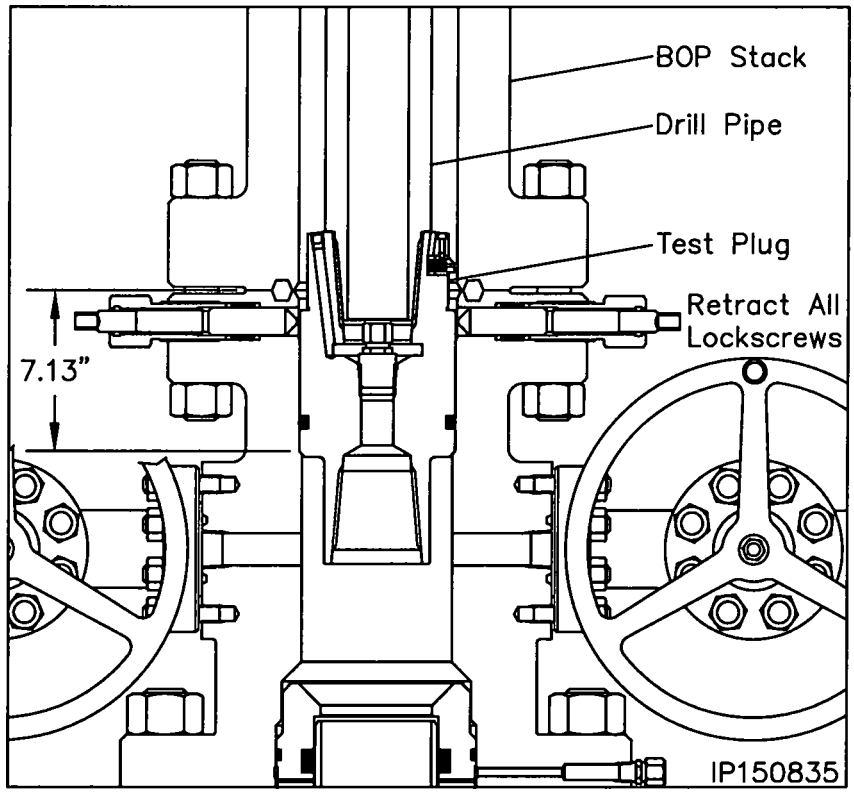
1. Examine the ***7-1/16" Nominal x 3-1/2" IF CW Test Plug/ Retrieving Tool (Item ST9)***. Verify the following:
   - 1-1/4" VR plug and weep hole plug are in place and tightened securely
   - elastomer seal is in place and in good condition
   - retractable lift lugs are in place, clean, and free to move
   - drill pipe threads are clean and in good condition

Note: Prior to installing the BOP it is recommended to attain an accurate RKB dimension for future use for accurately landing test plugs and tubing hangers. This dimension is attained by dropping a tape measure from the rig floor to the top of the wellhead flange. Pull tape taut and record the dimension from the wellhead to the top of the rig floor or kelly bushings. Ensure this dimension is placed on the BOP board in the dog house and on the drillers daily report sheet.

2. Position the test plug with the elastomer seal down and the lift lugs up and make up the tool to a joint of drill pipe.

WARNING: Ensure that the lift lugs are up and the elastomer seal is down

3. Remove the 1/2" NPT pipe plug from the weep hole if pressure is to be supplied through the drill pipe.
4. Open the tubing head side outlet valve and fully retract all lockscrews.
5. Lightly lubricate the test plug seal with oil or light grease.



6. Carefully lower the test plug through the BOP and land it on the load shoulder in the tubing head, 7.13" below the top of the head.
7. Close the BOP rams on the pipe and test the BOP to 10,000 psi.

Note: Any leakage past the test plug will be clearly visible at the open side outlet valve.

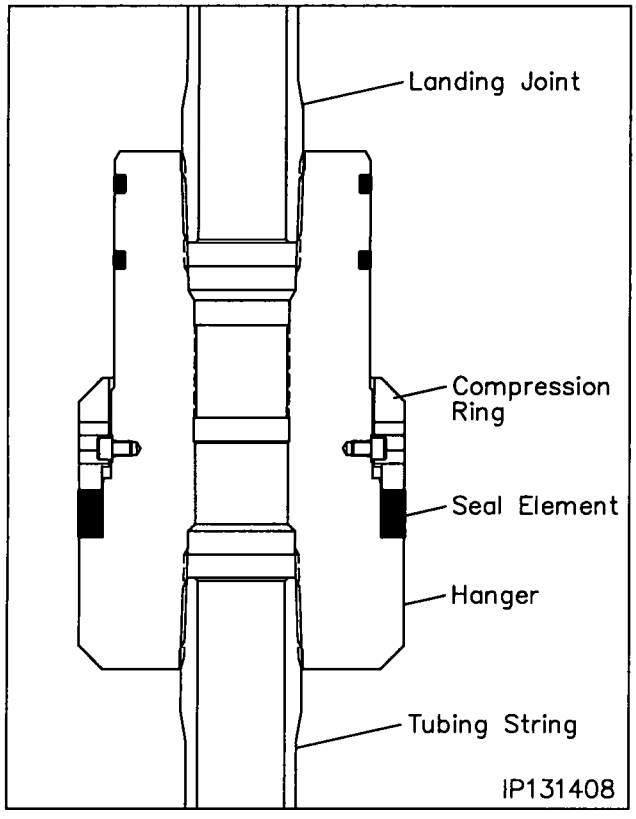
8. After a satisfactory test is achieved, release the pressure and open the rams.
9. Remove as much fluid as possible from the BOP stack and the retrieve the test plug with a straight vertical lift.

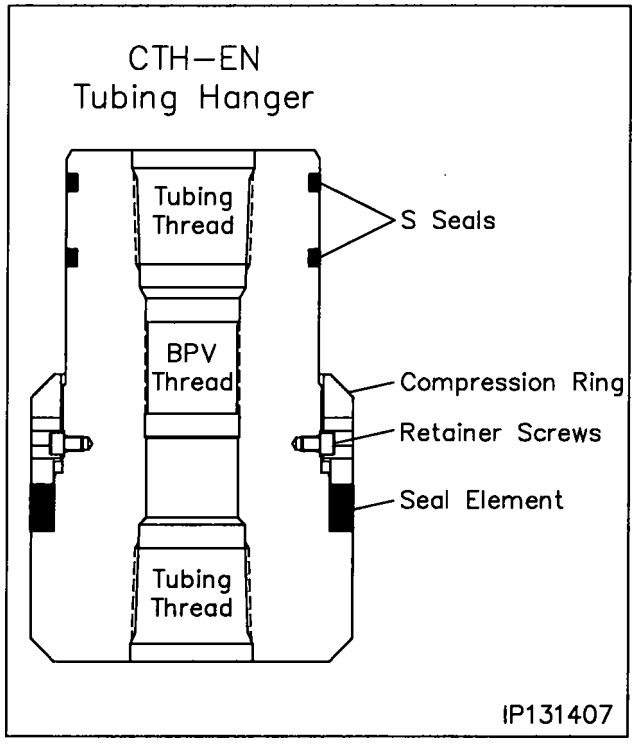
Note: When performing the BOP blind ram test it is highly recommended to suspend a stand of drill pipe below the test plug to ensure the plug stays in place while disconnecting from it with the drill pipe.

10. Repeat this procedure as required during the completion of the well.

Stage 10 — Hang Off the Tubing String

1. Run the 2-3/8" production tubing string to the required depth and space out appropriately.
2. Examine the ***7-1/16" x 2-3/8" EU CTH-EN Tubing Hanger (Item C11).*** Verify the following:
   - seal element is intact and undamaged
   - bore and internal threads are clean and undamaged
   - extended neck and neck seals are clean and undamaged
   - make up a short handling joint in the top of the hanger and tighten securely





3. At a predetermined position in the tubing string, set the tubing in the floor slips. Pick up the Tubing Hanger and make it up in the tubing string. Torque the tubing hanger to the thread manufacturer's optimum make up torque.
4. Pick up the tubing string so that the bottom of the hanger is approximately 5 feet above the rig floor and reset the floor slips.
5. Remove the handling joint and install the appropriate size landing joint in the top of the hanger and torque the landing joint to the thread manufacturer's minimum make up torque.

Stage 10 — Hang Off the Tubing String

6. Calculate the distance from the top of the tubing head to the top of the rig floor and add 7.13" the depth of the tubing bowl. Record this dimension.

Landing the Tubing Hanger

7. Drain the BOP and riser through the tubing head side outlet valve. Retract all lockscrews, and then flush the tubing head bowl with clean fresh water to remove any debris that may keep the hanger from properly landing.

Note: Side outlet valve to remain open while landing the tubing hanger.

8. Thoroughly clean and lightly lubricate the hanger packoff rubber with oil or a light grease.

9. Pick up the tubing string and remove the floor slips.

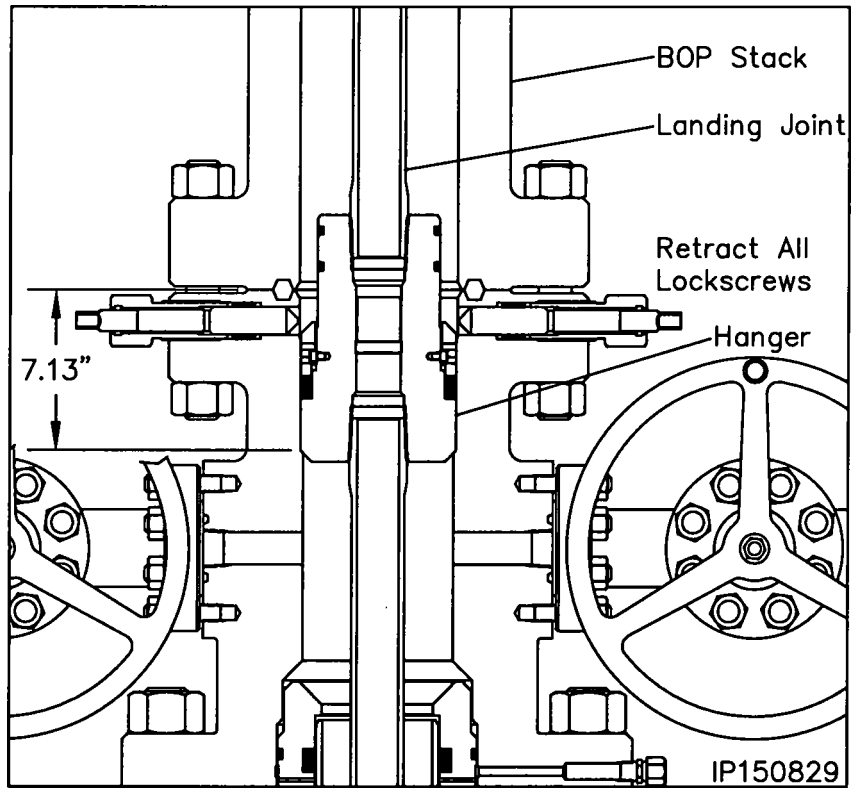
10. Carefully lower the tubing hanger into the well, tallying the tubing every five feet to the recorded dimension. Place a paint mark on the landing joint at the proper elevation of the recorded dimension.

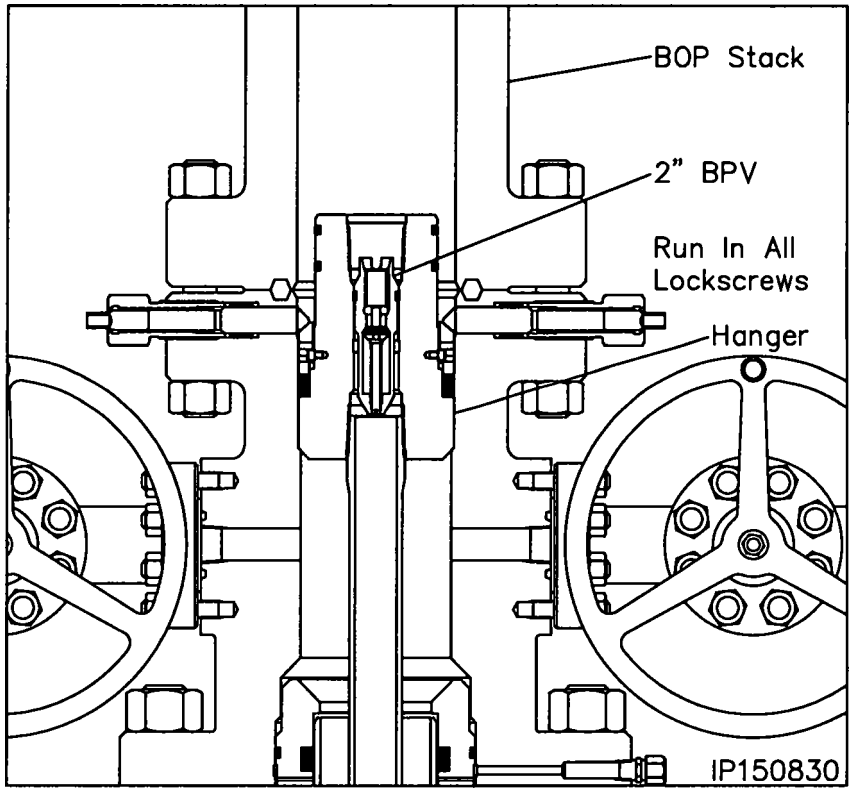
11. Continue lowering the tubing into the well and land the hanger in the tubing head and slack off all weight.

12. Run in all the tubing head lockscrews in an alternating cross pattern to refusal.

13. Retrieve the landing joint by rotating it to the left until it comes free of the hanger and then retrieve it with a straight lift.

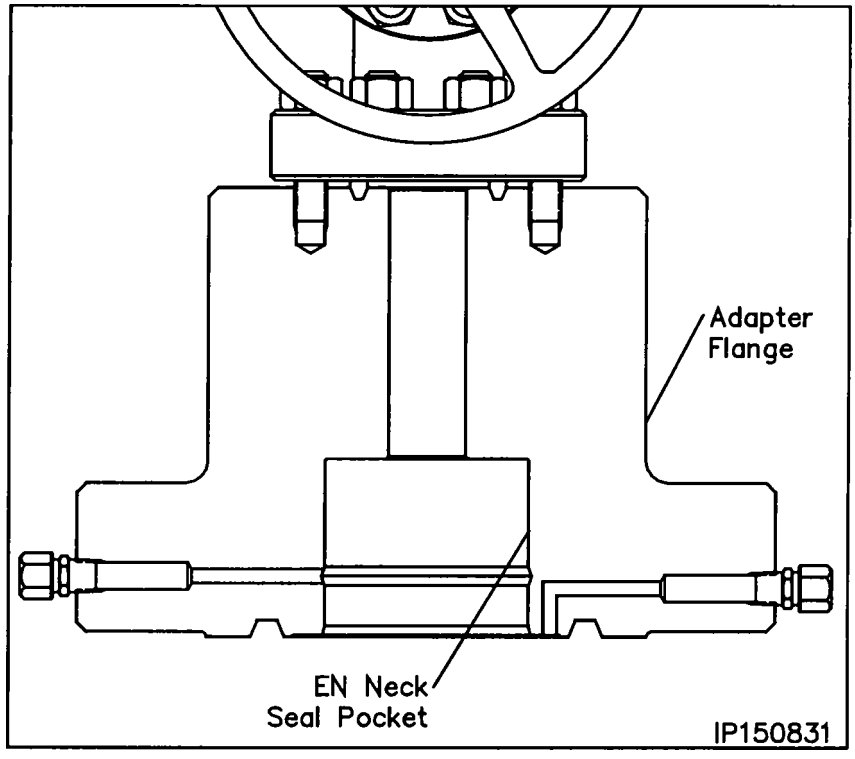
14. Using a dry rod, install the appropriate size One-Way Back Pressure Valve in the tubing hanger bore and nipple down the BOP.

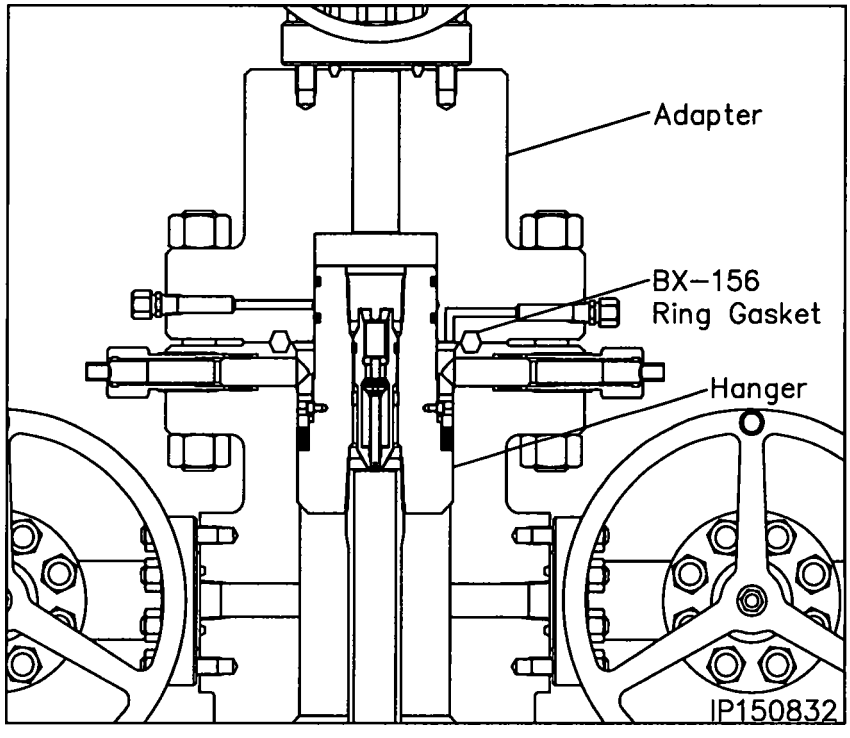




Stage 11 — Install the Production Tree

1. Using a high pressure water hose, thoroughly clean the top of the tubing head and the tubing hanger and blow dry with compressed air.
2. Carefully inspect the neck of the hanger for any damage and repair as necessary.
3. Carefully inspect the hanger neck 'S' Seals for any damage and replace as necessary.
4. Lightly lubricate the ring groove of the tubing head and the hanger 'S' Seals with oil or a light grease.
5. Place a new ***BX-156 Ring Gasket (Item C12)***, in the ring groove of the tubing head and fill the void above the hanger with clean test fluid.
6. Examine the ***2-1/16" 5M Single Tree with 7-1/16" 10M x 2-1/16" 5M EN Adapter Flange (Item C1).*** Verify the following:
   - internal bore and seal pocket are clean and in good condition
   - all valves, handwheels and fittings are in place and in good condition
7. Lightly lubricate the adapter seal pocket and ring groove with oil or a light grease.
8. Align and level the adapter with tree over the tubing head and then carefully lower the assembly over the tubing hanger neck and land the assembly on the ring gasket.
9. Make up the flange connection using the appropriate size ***Studs and Nuts (Item C13)***, tightening them in an alternating cross pattern.
10. Retighten all lockscrews and gland nuts to refusal.

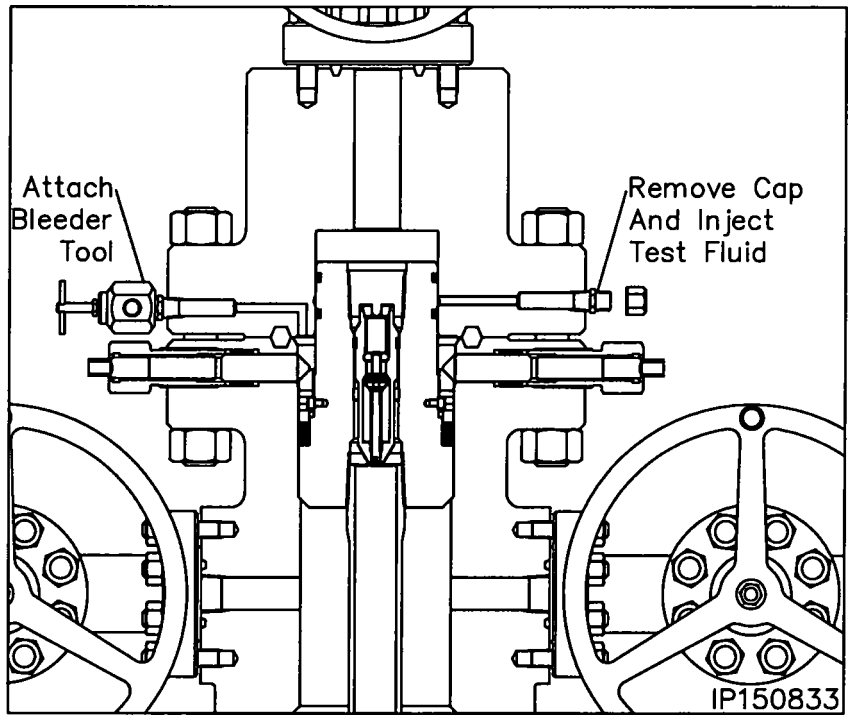




Stage 11 — Install the Production Tree

Seal Test

1. Locate the seal test fitting and one flange test fitting on the adapter flange and remove the dust cap from both fittings.
2. Attach a Bleeder Tool to one of the open flange test fittings and open the Tool.
3. Attach a test pump to the seal test fitting and pump clean test fluid between the S Seals until a stable test pressure of ***10,000 psi*** is attained.
4. Hold the test pressure for fifteen (15) minutes or as required by the drilling supervisor.
5. If pressure drops, a leak has developed. Bleed off test pressure and take the appropriate action in the adjacent table.
6. After a satisfactory test is achieved, remove the Test Pump, drain test fluid and reinstall the dust cap on the open seal test fitting.

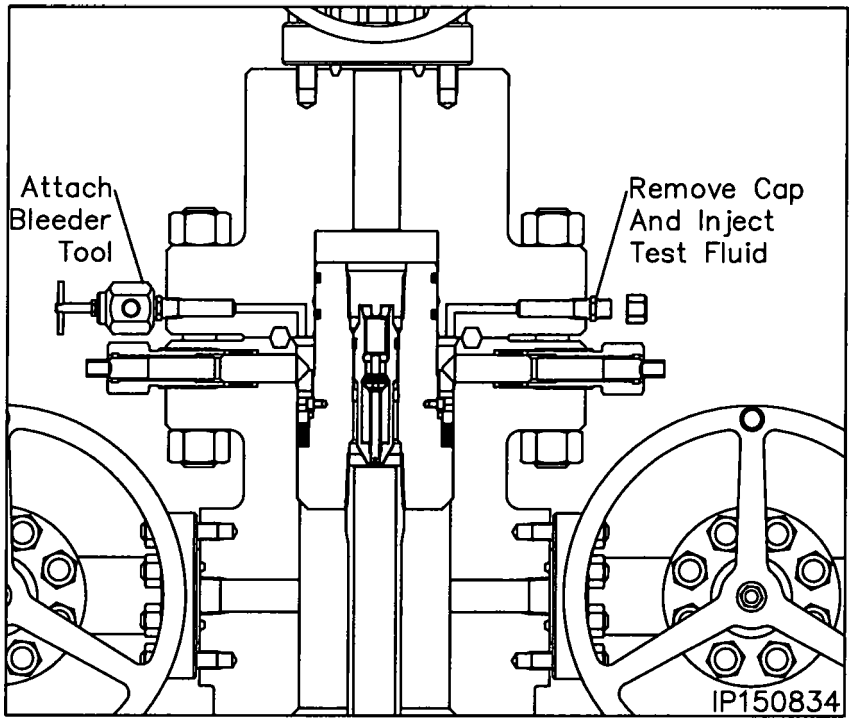


Leak Location	Appropriate Action
Into tree bore - Upper S seal is leaking	Remove the tree, replace leaking S seals, reinstall the tree and retest the connection
Open Flange Test bleeder tool - Lower S seal is leaking	Remove the tree, replace leaking S seals, reinstall the tree and retest the connection

Stage 11 — Install the Production Tree

Flange Test

1. Locate the remaining flange test fitting on the adapter flange and remove the dust cap from the fitting.
2. Attach a test pump to the open flange test fitting and inject test fluid into the flange connection until a continuous stream flows from the opposite flange test bleeder tool.
3. Close the bleeder tool and continue to pumping test fluid until a stable test pressure of ***10,000 psi*** is attained.
4. Hold the test pressure for fifteen (15) minutes or as required by the drilling supervisor.
5. If pressure drops a leak has developed at the ring gasket. Further tighten the flange connection.
6. Repeat this procedure until a satisfactory test is achieved.
7. Once a satisfactory test is achieved, remove the test pump and bleeder tool, drain all test fluid, and reinstall the dust caps.



Leak Location	Appropriate Action
Between flanges - Ring gasket is leaking	Further tighten the flange connection
Around lockscrews - Lockscrew packing is leaking	Further tighten lockscrews
Into tubing annulus - Hanger seal element is leaking	Further tighten lockscrew gland nuts
Open Seal Test bleeder tool - Lower S seal is leaking	Remove the tree, replace leaking S seals, reinstall the tree and retest the connection

Recommended Procedure for Field Welding Pipe to Wellhead Parts for Pressure Seal

1. **Introduction and Scope.** The following recommended procedure has been prepared with particular regard to attaining pressure-tight weld when attaching casing heads, flanges, etc., to casing. Although most of the high strength casing used (such as N-80) is not normally considered field weldable, some success may be obtained by using the following or similar procedures.

Caution: In some wellheads, the seal weld is also a structural weld and can be subjected to high tensile stresses. Consideration must therefore be given by competent authority to the mechanical properties of the weld and its heat affected zone.

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   a. The steels used in wellhead parts and in casing are high strength steels that are susceptible to cracking when welded. It is imperative that the finished weld and adjacent metal be free from cracks. The heat from welding also affects the mechanical properties. This is especially serious if the weld is subjected to service tension stresses.

   b. This procedure is offered only as a recommendation. The responsibility for welding lies with the user and results are largely governed by the welder's skill. Weldability of the several makes and grades of casing varies widely, thus placing added responsibility on the welder. Transporting a qualified welder to the job, rather than using a less-skilled man who may be at hand, will, in most cases, prove economical. The responsible operating representative should ascertain the welder's qualifications and, if necessary, assure himself by instruction or demonstration, that the welder is able to perform the work satisfactorily.

2. **Welding Conditions.** Unfavorable welding conditions must be avoided or minimized in every way possible, as even the most skilled welder cannot successfully weld steels that are susceptible to cracking under adverse working conditions, or when the work is rushed. Work above the welder on the drilling floor should be avoided. The weld should be protected from dripping mud, water, and oil and from wind, rain, or other adverse weather conditions. The drilling mud, water, or other fluids must be lowered in the casing and kept at a low level until the weld has properly cooled. It is the responsibility of the user to provide supervision that will assure favorable working conditions, adequate time, and the necessary cooperation of the rig personnel.

3. **Welding.** The welding should be done by the shielded metal-arc or other approved process.

4. **Filler Metal.** Filler Metals. For root pass, it's recommended to use E6010, E6011 (AC), E6019 or equivalent electrodes. The E7018 or E7018-A1 electrodes may also be used for root pass operations but has the tendency to trap slag in tight grooves. The E6010, E6011 and E6019 offer good penetration and weld deposit ductility with relatively high intrinsic hydrogen content. Since the E7018 and E7018-A1 are less susceptible to hydrogen induced cracking, it is recommended for use as the filler metal for completion of the weld groove after the root pass is completed. The E6010, E6011 (AC), E6019, E7018 and E7018-A1 are classified under one of the following codes AWS A5.1 (latest edition): Mild Steel covered electrodes or the AWS A5.5 (latest edition): Low Alloy Steel Covered Arc-Welding Electrodes. The low hydrogen electrodes, E7018 and E7018-A1, should not be exposed to the atmosphere until ready for use. It's recommended that hydrogen electrodes remain in their sealed containers. When a job arises, the container shall be opened and all unused remaining electrodes to be stored in heat electrode storage ovens. Low hydrogen electrodes exposed to the atmosphere, except water, for more than two hours should be dried 1 to 2 hours at 600°F to 700 °F (316°C to 371 °C) just before use. It's recommended for any low hydrogen electrode containing water on the surface should be scrapped.

5. **Preparation of Base Metal.** The area to be welded should be dry and free of any paint, grease/oil and dirt. All rust and heat-treat surface scale shall be ground to bright metal before welding.

Recommended Procedure for Field Welding Pipe to Wellhead Parts for Pressure Seal

6. **Preheating.** Prior to any heating, the wellhead member shall be inspected for the presence of any o-rings or other polymeric seals. If any o-rings or seals are identified then preheating requires close monitoring as noted in paragraph 6a. Before applying preheat, the fluid should be bailed out of the casing to a point several inches (>6" or 150 mm) below the weld joint/location. Preheat both the casing and wellhead member for a minimum distance of three (3) inches on each side of the weld joint using a suitable preheating torch in accordance with the temperatures shown below in a and b. The preheat temperature should be checked by the use of heat sensitive crayons. Special attention must be given to preheating the thick sections of wellhead parts to be welded, to insure uniform heating and expansion with respect to the relatively thin casing.

    a. Wellhead members containing o-rings and other polymeric seals have tight limits on the preheat and interpass temperatures. Those temperatures must be controlled at 200°F to 325°F or 93 °C to 160°C and closely monitored to prevent damage to the o-ring or seals.
    b. Wellhead members not containing o-rings and other polymeric seals should be maintained at a preheat and interpass temperature of 400°F to 600°F or 200°C to 300°C.

7. **Welding Technique.** Use a 1/8 or 5/32-inch (3.2 or 4.0 mm) E6010 or E7018 electrode and step weld the first bead (root pass); that, weld approximately 2 to 4 inches (50 to 100 mm) and then move diametrically opposite this point and weld 2 to 4 inches (50 to 100 mm) halfway between the first two welds, move diametrically opposite this weld, and so on until the first pass is completed. This second pass should be made with a 5/32-inch (4.0 mm) low hydrogen electrode of the proper strength and may be continuous. The balance of the welding groove may then be filled with continuous passes without back stepping or lacing, using a 3/16-inch (4.8 mm) low hydrogen electrode. All beads should be stringer beads with good penetration. There should be no undercutting and weld shall be workmanlike in appearance.

    a. Test ports should be open when welding is performed to prevent pressure buildup within the test cavity.
    b. During welding the temperature of the base metal on either side of the weld should be maintained at 200 to 300°F (93 to 149°C).
    c. Care should be taken to insure that the welding cable is properly grounded to the casing, but ground wire should not be welded to the casing or the wellhead. Ground wire should be firmly clamped to the casing, the wellhead, or fixed in position between pipe slips. Bad contact may cause sparking, with resultant hard spots beneath which incipient cracks may develop. The welding cable should not be grounded to the steel derrick, nor to the rotary-table base.

8. **Cleaning.** All slag or flux remaining on any welding bead should be removed before laying the next bead. This also applies to the completed weld.

9. **Defects.** Any cracks or blow holes that appear on any bead should be removed to sound metal by chipping or grinding before depositing the next bead.

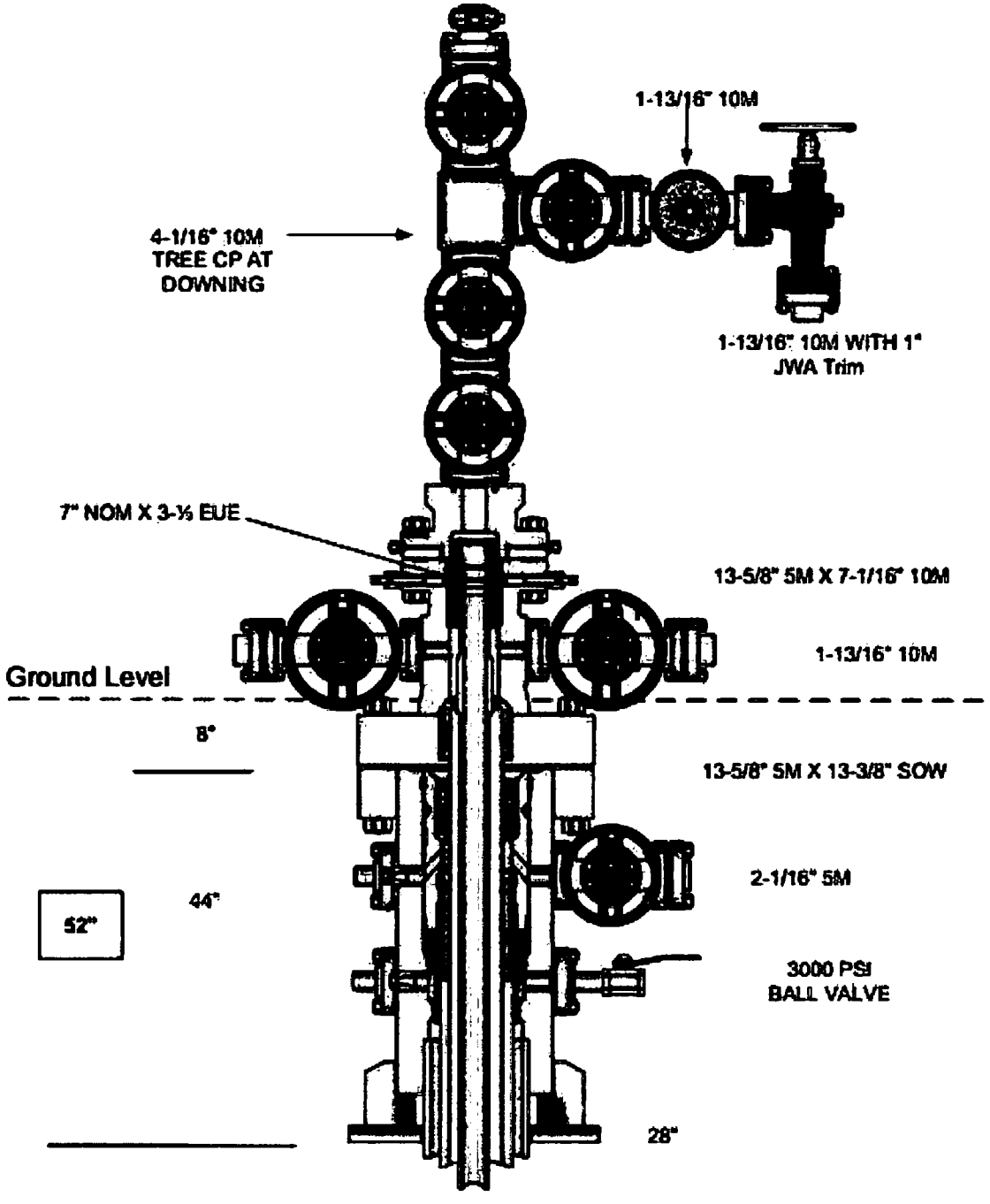
10. **Postheating.** Post-heating should be performed at the temperatures shown below and held at that temperature for no less than one hour followed by a slow cooling. The post-heating temperature should be in accordance with the following paragraphs.

    a. Wellhead members containing o-rings and other polymeric seals have tight limits on the post-heating temperatures. Those temperatures must be controlled at 250°F to 300°F or 120 °C to 150°C and closely monitored to prevent damage to the o-ring or seals.
    b. Wellhead members not containing o-rings and other polymeric seals should be post-heated at a temperature of 400°F to 600°F or 200°C to 300°C.

11. **Cooling.** ***Rapid cooling must be avoided.*** To assure slow cooling, welds should be protected from extreme weather conditions (cold, rain, high winds, etc.) by the use of suitable insulating material. (Specially designed insulating blankets are available at many welding supply stores.) Particular attention should be given to maintaining uniform cooling of the thick sections of the wellhead parts and the relatively thin casing, as the relatively thin casing will pull away from the head or hanger if allowed to cool more rapidly. The welds should cool in air to less than 200°F (93°C) (measured with a heat sensitive crayon) prior to permitting the mud to rise in the casing.

12. **Test the Weld.** After cooling, test the weld. The weld must be cool otherwise the test media will crack the weld. The test pressure should be no more than 80% of the casing collapse pressure.

Multi-bowl Wellhead Diagram



Multi-bowl Wellhead Diagram
Red Hills 32-5 Fed Com 156H
Cimarex Energy Co.
32-25S-33E
Lea Co., NM

APD ID: 10400034904 Submission Date: 10/16/2018

Operator Name: CIMAREX ENERGY COMPANY OF COLORADO

Well Name: RED HILLS 32-5 FEDERAL COM Well Number: 156H

Well Type: CONVENTIONAL GAS WELL Well Work Type: Drill

[redacted]

Show Final Text

Section 1 - Existing Roads

Will existing roads be used? NO

Section 2 - New or Reconstructed Access Roads

Will new roads be needed? YES

New Road Map:

Red_Hills_Unit_32_5_Road_Route_20181005104340.pdf

[redacted]

ACOE Permit Number(s):

[redacted]

New road access plan attachment:

[redacted]

Access road engineering design attachment:

[redacted]

Operator Name: CIMAREX ENERGY COMPANY OF COLORADO

Well Name: RED HILLS 32-5 FEDERAL COM **Well Number:** 156H

[redacted]

Access surfacing type description:

[redacted]

Offsite topsoil source description:

[redacted]

Access other construction information:

Access miscellaneous information:

Number of access turnouts: **Access turnout map:**

Drainage Control

[redacted]

Road Drainage Control Structures (DCS) attachment:

Access Additional Attachments

Additional Attachment(s):

Section 2 - New or Reconstructed Access Roads

Will new roads be needed? YES

New Road Map:

Red_Hills_Unit_32_5_Road_Route_20181005104340.pdf

[redacted]

ACOE Permit Number(s):

[redacted]

Operator Name: CIMAREX ENERGY COMPANY OF COLORADO

Well Name: RED HILLS 32-5 FEDERAL COM **Well Number:** 156H

[redacted]

New road access plan attachment:

[redacted]

Access road engineering design attachment:

[redacted]

Access surfacing type description:

[redacted]

Offsite topsoil source description:

[redacted]

Access other construction information:

Access miscellaneous information:

Number of access turnouts: **Access turnout map:**

Drainage Control

[redacted]

Road Drainage Control Structures (DCS) attachment:

Access Additional Attachments

Additional Attachment(s):

Section 2 - New or Reconstructed Access Roads

Will new roads be needed? YES

New Road Map:

Red_Hills_Unit_32_5_Road_Route_20181005104340.pdf

[redacted]

ACOE Permit Number(s):

Operator Name: CIMAREX ENERGY COMPANY OF COLORADO

Well Name: RED HILLS 32-5 FEDERAL COM **Well Number:** 156H

[redacted]

New road access plan attachment:

[redacted]

Access road engineering design attachment:

[redacted]

Access surfacing type description:

[redacted]

Offsite topsoil source description:

[redacted]

Access other construction information:

Access miscellaneous information:

Number of access turnouts: **Access turnout map:**

Drainage Control

[redacted]

Road Drainage Control Structures (DCS) attachment:

Access Additional Attachments

Additional Attachment(s):

Section 3 - Location of Existing Wells

Existing Wells Map? YES

Attach Well map:

Red_Hills_32_5_Fed_Com_E2W2_Pad_3_Mile_Radius_Existing_Wells_20181005104358.pdf

Existing Wells description:

Operator Name: CIMAREX ENERGY COMPANY OF COLORADO

Well Name: RED HILLS 32-5 FEDERAL COM **Well Number:** 156H

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

Submit or defer a Proposed Production Facilities plan? SUBMIT

Production Facilities description: Production facilities will be the same in the Red Hills Unit 127H, 130H, 131H and Red Hills 32-5 Fed Com 155H, 156H & 157H.
Production Facilities map:

Red_Hills_Unit_32_East_BS_3_CTB_Battery_Layout_20181016131547.pdf

Red_Hills_Unit_32_East_WC_4_CTB_Battery_Layout_20181016131551.pdf

Red_Hills_Unit_32_West_BS_1_CTB_Battery_Layout_20181016131555.pdf

Red_Hills_Unit_32_West_WC_2_CTB_Battery_Layout_20181016131559.pdf

Section 5 - Location and Types of Water Supply

Water Source Table

Water source use type: INTERMEDIATE/PRODUCTION CASING, SURFACE CASING **Water source type:** MUNICIPAL
Describe type:

Source latitude: **Source longitude:**

Source datum:

Water source permit type: WATER RIGHT,WATER RIGHT

Permit Number:

Source land ownership: STATE

Water source transport method: PIPELINE,PIPELINE,TRUCKING,TRUCKING
Source transportation land ownership: STATE

Water source volume (barrels): 5000 **Source volume (acre-feet):** 0.6444655

Source volume (gal): 210000

Water source and transportation map:

Red_Hills_32_5_Fed_Com_E2W2_Pad_3_Drilling_Water_Routes_20181005104516.pdf

Water source comments:

New water well? NO

New Water Well Info

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

Well target aquifer:

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

Aquifer comments:

Operator Name: CIMAREX ENERGY COMPANY OF COLORADO

Well Name: RED HILLS 32-5 FEDERAL COM **Well Number:** 156H

Aquifer documentation:

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

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

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

Drilling method: **Drill material:**

Grout material: **Grout depth:**

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

Well Production type: **Completion Method:**

Water well additional information:

State appropriation permit:

Additional information attachment:

Section 6 - Construction Materials

Using any construction materials: YES

Construction Materials description: The drilling and testing operations will be conducted on a watered and compacted native soil grade. Soft spots will be covered with scoria, free of large rocks (3" diameter). Upon completion as a commercial producer the location will be covered with scoria, free of large rocks (3" dia.) from an existing privately owned gravel pit.
Construction Materials source location attachment:

Section 7 - Methods for Handling Waste

Waste type: DRILLING

Waste content description: Drilling Fluids, drill cuttings, water and other waste produced from the well during drilling operations.
Amount of waste: 15000 barrels

Waste disposal frequency : Weekly

Safe containment description: n/a

Safe containmant attachment:

Waste disposal type: HAUL TO COMMERCIAL FACILITY **Disposal location ownership:** COMMERCIAL
Disposal type description:

Disposal location description: Haul to R360 commercial Disposal

Waste type: GARBAGE

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

Amount of waste: 32500 pounds

Waste disposal frequency : Weekly

Safe containment description: n/a

Safe containmant attachment:

Operator Name: CIMAREX ENERGY COMPANY OF COLORADO

Well Name: RED HILLS 32-5 FEDERAL COM **Well Number:** 156H

Waste disposal type: HAUL TO COMMERCIAL FACILITY **Disposal location ownership:** COMMERCIAL

Disposal type description:

Disposal location description: Windmill Spraying Service hauls trash to Lea County Landfill

Reserve Pit

Reserve Pit being used? NO

Temporary disposal of produced water into reserve pit?

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

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

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

Reserve pit liner

Reserve pit liner specifications and installation description

Cuttings Area

Cuttings Area being used? NO

Are you storing cuttings on location? NO

Description of cuttings location

Cuttings area length (ft.) **Cuttings area width (ft.)**

Cuttings area depth (ft.) **Cuttings area volume (cu. yd.)**

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

WCuttings area liner

Cuttings area liner specifications and installation description

Section 8 - Ancillary Facilities

Are you requesting any Ancillary Facilities?: NO

Ancillary Facilities attachment:

Comments:

Operator Name: CIMAREX ENERGY COMPANY OF COLORADO

Well Name: RED HILLS 32-5 FEDERAL COM **Well Number:** 156H

Section 9 - Well Site Layout

Well Site Layout Diagram:

Red_Hills_32_5_Fed_Com_156H_Wellsite_Layout_20181005104537.pdf

Comments:

Section 10 - Plans for Surface Reclamation

Type of disturbance: New Surface Disturbance

Multiple Well Pad Name: RED HILLS 32-5 FED COM

Multiple Well Pad Number: E2W2 PAD 3

Recontouring attachment:

Red_Hills_32_5_Fed_Com_E2W2_Pad_3_Interim_Reclaim_20181005104551.pdf

Drainage/Erosion control construction: To control and prevent potentially contaminated precipitation from leaving the pad site, a perimeter berm and settlement pond will be installed. Contaminated water will be removed from pond, stored in waste tanks, and disposed of at a state approved facility. Standing water or puddles will not be allowed. Drainage ditches would be established and maintained on the pad and along access roads to divert water away from operations. Natural drainage areas disturbed during construction would be re-contoured to near original condition prior to construction. Erosion Control Best Management Practices would be used where necessary and consist of seeding, fiber rolls, water bars, silt fences, and temporary diversion dikes. Areas disturbed during construction that are no longer needed for operations would be obliterated, re-contoured to near original condition prior to construction. Erosion Control Best Management Practices would be used where necessary and consist of seeding, fiber rolls, water bars, silt fences, and temporary diversion dikes. Areas disturbed during construction that are no longer needed for operations would be obliterated, re-contoured, and reclaimed to near original condition to re-establish natural drainage.

Drainage/Erosion control reclamation: All disturbed and re-contoured areas would be reseeded according to specifications. Approved seed mixtures would be certified weed free and consist of grasses, forbs, or shrubs similar to the surrounding area. Compacted soil areas may need to be obliterated and reclaimed to near natural conditions by re-contouring all slopes to facilitate and re-establish natural drainage.

Wellpad long term disturbance (acres): 3.36

Wellpad short term disturbance (acres): 3.631

Access road long term disturbance (acres): 6.227

Access road short term disturbance (acres): 0

Pipeline long term disturbance (acres): 22.355

Pipeline short term disturbance (acres): 0

Other long term disturbance (acres): 25.143

Other short term disturbance (acres): 0

Total long term disturbance: 65.318

Total short term disturbance: 3.631

Disturbance Comments: Flowline: 6009', Gas lift: 6009', Power: 11952', SWD: 11421', Sales: 7555', Oil: 9114', Road: 9041' Temp fresh water line: 17007'

Reconstruction method: After well plugging, all disturbed areas would be returned to the original contour or a contour that blends with the surrounding landform including roads unless the surface owner requests that they be left intact. In consultation with the surface owners it will be determined if any gravel or similar materials used to reinforce an area are to be removed, buried, or left in place during final reclamation. Salvaged topsoil, if any, would be re-spread evenly over the surfaces to be re-vegetated. As necessary, the soil surface would be prepared to provide a seedbed for re-establishment of desirable vegetation. Site preparation may include gouging, scarifying, dozer track-walking, mulching, or fertilizing. Reclamation, Re-vegetation, and Drainage: All disturbed and re-contoured areas would be reseeded using techniques outlined under Phase I and II of this plan or as specified by the land owner. Approved seed mixtures would be certified weed free and consist of grasses, forbs, or shrubs similar to the surrounding area. Compacted soil areas may need to be obliterated and reclaimed to near natural conditions by re-contouring all slopes to facilitate and re-establish natural drainage.

Topsoil redistribution: Salvaged topsoil, if any, would be re-spread evenly over the surfaces to be re-vegetated.

Soil treatment: As necessary, the soil surface would be prepared to provide a seedbed for re-establishment of desirable vegetation. Site preparation may include gouging, scarifying, dozer track-walking, mulching or fertilizing.
Existing Vegetation at the well pad:

Existing Vegetation at the well pad attachment:

Existing Vegetation Community at the road:

Existing Vegetation Community at the road attachment:

Existing Vegetation Community at the pipeline:

Existing Vegetation Community at the pipeline attachment:

Existing Vegetation Community at other disturbances:

Existing Vegetation Community at other disturbances attachment:

Non native seed used?

Non native seed description:

Seedling transplant description:

Will seedlings be transplanted for this project?

Seedling transplant description attachment:

Will seed be harvested for use in site reclamation?

Seed harvest description:

Seed harvest description attachment:

Seed Management

Seed Table

Seed type:

Seed source:

Seed name:

Source name:

Source address:

Source phone:

Seed cultivar:

Seed use location:

PLS pounds per acre:

Proposed seeding season:

Seed Summary

Total pounds/Acre:

Operator Name: CIMAREX ENERGY COMPANY OF COLORADO

Well Name: RED HILLS 32-5 FEDERAL COM **Well Number:** 156H

Seed Type	Pounds/Acre

Seed reclamation attachment:

Operator Contact/Responsible Official Contact Info

First Name: **Last Name:**

Phone: **Email:**

Seedbed prep:

Seed BMP:

Seed method:

Existing invasive species? NO

Existing invasive species treatment description:

Existing invasive species treatment attachment:

Weed treatment plan description: N/A

Weed treatment plan attachment:

Monitoring plan description: N/A

Monitoring plan attachment:

Success standards: N/A

Pit closure description: N/A

Pit closure attachment:

Section 11 - Surface Ownership

Disturbance type: WELL PAD

Describe:

Surface Owner: PRIVATE OWNERSHIP

Other surface owner description:

BIA Local Office:

BOR Local Office:

COE Local Office:

DOD Local Office:

NPS Local Office:

State Local Office:

Military Local Office:

Operator Name: CIMAREX ENERGY COMPANY OF COLORADO

Well Name: RED HILLS 32-5 FEDERAL COM **Well Number:** 156H

USFWS Local Office:

Other Local Office:

USFS Region:

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

Fee Owner: Tommy Dinwiddle (Dinwiddie Cattle Co) **Fee Owner Address:**

Phone: (575)355-7610 **Email:**

Surface use plan certification: YES

Surface use plan certification document:

Red_Hills_32_5_Fed_Com_156H_Operator_Land_Owner_Agmt_20181005104646.pdf

Surface access agreement or bond: Agreement

Surface Access Agreement Need description: See Attached Operator_Land Owner Agreement

Surface Access Bond BLM or Forest Service:

BLM Surface Access Bond number:

USFS Surface access bond number:

Section 12 - Other Information

Right of Way needed? YES **Use APD as ROW?** YES

ROW Type(s): 281001 ROW - ROADS,285003 ROW – POWER TRANS,288100 ROW – O&G Pipeline,288101 ROW – O&G Facility Sites,288103 ROW – Salt Water Disposal Pipeline/Facility,288104 ROW – Salt Water Disposal Apln/Fac-FLPMA,289001 ROW- O&G Well Pad,FLPMA (Powerline),Other

ROW Applications

SUPO Additional Information: The surface disturbance for the SWD, Road, Sales, Oil & Power routes are the same for Red Hills Wells in Sec 32-25S-33R.
Use a previously conducted onsite? YES

Previous Onsite Information: Onsite April 17, 2018 with BLM (Jeff Robertson) and Cimarex (Barry Hunt)

Other SUPO Attachment

Red_Hills_32_5_Fed_Com_E2W2_Pad_3_Road_Description_20181005104717.pdf
Red_Hills_32_5_Fed_Com_E2W2_Pad_3_Public_Access_20181005104716.pdf
Red_Hills_32_5_Fed_Com_E2W2_Pad_3_Temp_Water_Route_20181005104717.pdf

Operator Name: CIMAREX ENERGY COMPANY OF COLORADO

Well Name: RED HILLS 32-5 FEDERAL COM **Well Number:** 156H

Red_Hills_Unit_32_5_Flow_Gas_lift_Route_20181005104720.pdf
Red_Hills_Unit_32_5_Oil_Pipeline_Route_20181005104725.pdf
Red_Hills_Unit_32_5_Power_Route_20181005104728.pdf
Red_Hills_Unit_32_5_Sales_Route_20181005104730.pdf
Red_Hills_Unit_32_5_SWD_Route_20181005104734.pdf
Red_Hills_32_5_Fed_Com_156H_pkt_for_Jeff_1_20181005105055.pdf
Red_Hills_32_5_Fed_Com_156H_SUPO_20181005105116.pdf
Red_Hills_32_5_Fed_Com_156H_pkt_for_Jeff_2_20181005105115.pdf

AFMSS

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

PWD Data Report

08/18/2019

APD ID: 10400034904 **Submission Date:** 10/16/2018

Operator Name: CIMAREX ENERGY COMPANY OF COLORADO

Well Name: RED HILLS 32-5 FEDERAL COM **Well Number:** 156H

Well Type: CONVENTIONAL GAS WELL **Well Work Type:** Drill

Section 1 - General

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

Section 2 - Lined Pits

Would you like to utilize Lined Pit PWD options? NO

Produced Water Disposal (PWD) Location:

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

Lined pit PWD on or off channel:

Lined pit PWD discharge volume (bbl/day):

Lined pit specifications:

Pit liner description:

Pit liner manufacturers information:

Precipitated solids disposal:

Decribe precipitated solids disposal:

Precipitated solids disposal permit:

Lined pit precipitated solids disposal schedule:

Lined pit precipitated solids disposal schedule attachment:

Lined pit reclamation description:

Lined pit reclamation attachment:

Leak detection system description:

Leak detection system attachment:

Operator Name: CIMAREX ENERGY COMPANY OF COLORADO

Well Name: RED HILLS 32-5 FEDERAL COM **Well Number:** 156H

Lined pit Monitor description:

Lined pit Monitor attachment:

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

Is the reclamation bond a rider under the BLM bond?

Lined pit bond number:

Lined pit bond amount:

Additional bond information attachment:

Section 3 - Unlined Pits

Would you like to utilize Unlined Pit PWD options? NO

Produced Water Disposal (PWD) Location:

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

Unlined pit PWD on or off channel:

Unlined pit PWD discharge volume (bbl/day):

Unlined pit specifications:

Precipitated solids disposal:

Decribe precipitated solids disposal:

Precipitated solids disposal permit:

Unlined pit precipitated solids disposal schedule:

Unlined pit precipitated solids disposal schedule attachment:

Unlined pit reclamation description:

Unlined pit reclamation attachment:

Unlined pit Monitor description:

Unlined pit Monitor attachment:

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

Beneficial use user confirmation:

Estimated depth of the shallowest aquifer (feet):

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

TDS lab results:

Geologic and hydrologic evidence:

State authorization:

Unlined Produced Water Pit Estimated percolation:

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

Operator Name: CIMAREX ENERGY COMPANY OF COLORADO

Well Name: RED HILLS 32-5 FEDERAL COM **Well Number:** 156H

Is the reclamation bond a rider under the BLM bond?

Unlined pit bond number:

Unlined pit bond amount:

Additional bond information attachment:

Section 4 - Injection

Would you like to utilize Injection PWD options? NO

Produced Water Disposal (PWD) Location:

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

Injection PWD discharge volume (bbl/day):

Injection well mineral owner:

Injection well type:

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

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

Injection well new surface disturbance (acres):

Minerals protection information:

Mineral protection attachment:

Underground Injection Control (UIC) Permit?

UIC Permit attachment:

Section 5 - Surface Discharge

Would you like to utilize Surface Discharge PWD options? NO

Produced Water Disposal (PWD) Location:

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

Surface discharge PWD discharge volume (bbl/day):

Surface Discharge NPDES Permit?

Surface Discharge NPDES Permit attachment:

Surface Discharge site facilities information:

Surface discharge site facilities map:

Section 6 - Other

Would you like to utilize Other PWD options? NO

Produced Water Disposal (PWD) Location:

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

Other PWD discharge volume (bbl/day):

Operator Name: CIMAREX ENERGY COMPANY OF COLORADO

Well Name: RED HILLS 32-5 FEDERAL COM **Well Number:** 156H

Other PWD type description:

Other PWD type attachment:

Have other regulatory requirements been met?

Other regulatory requirements attachment:

AFMSS

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

Bond Info Data Report

08/18/2019

APD ID: 10400034904 **Submission Date:** 10/16/2018

Operator Name: CIMAREX ENERGY COMPANY OF COLORADO

Well Name: RED HILLS 32-5 FEDERAL COM **Well Number:** 156H

Well Type: CONVENTIONAL GAS WELL **Well Work Type:** Drill

[redacted]

Show Final Text

Bond Information

Federal/Indian APD: FED

BLM Bond number: NMB001187

BIA Bond number:

Do you have a reclamation bond? NO

Is the reclamation bond a rider under the BLM bond?

Is the reclamation bond BLM or Forest Service?

BLM reclamation bond number:

Forest Service reclamation bond number:

Forest Service reclamation bond attachment:

Reclamation bond number:

Reclamation bond amount:

Reclamation bond rider amount:

Additional reclamation bond information attachment: