

# Carlsbad Field Office OCD Artesia

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT

## APPLICATION FOR PERMIT TO DRILL OR REENTER

FORM APPROVED  
OMB No. 1004-0137  
Expires October 31, 2014

1a. Type of work: <input checked="" type="checkbox"/> DRILL <input type="checkbox"/> REENTER		5. Lease Serial No. NMNM120353
1b. Type of Well: <input type="checkbox"/> Oil Well <input checked="" type="checkbox"/> Gas Well <input type="checkbox"/> Other <input checked="" type="checkbox"/> Single Zone <input type="checkbox"/> Multiple Zone		6. If Indian, Allottee or Tribe Name
2. Name of Operator MEWBOURNE OIL COMPANY		7. If Unit or CA Agreement, Name and No.  321618
3a. Address PO Box 5270 Hobbs NM 88240		8. Lease Name and Well No. PRINCE 31 W2DA FED COM 2H
3b. Phone No. (include area code) (575)393-5905		9. API Well No. 30-015-45069
4. Location of Well (Report location clearly and in accordance with any State requirements.) At surface LOT 1 / 850 FNL / 330 FWL / LAT 32.1788098 / LONG -104.0311715 At proposed prod. zone NENE / 440 FNL / 330 FEL / LAT 32.1799359 / LONG -104.0161993		10. Field and Pool, or Exploratory PURPLE-SAGE WOLFCAMP GAS / WO
11. Sec., T. R. M. or Blk. and Survey or Area SEC 31 / T24S / R29E / NMP		12. County or Parish EDDY
13. State NM		
14. Distance in miles and direction from nearest town or post office* 25 miles		
15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drig. unit line, if any) 330 feet	16. No. of acres in lease 80	17. Spacing Unit dedicated to this well 318.76
18. Distance from proposed location* to nearest well, drilling, completed, 35 feet applied for, on this lease, ft.	19. Proposed Depth 10918 feet / 15548 feet	20. BLM/BIA Bond No. on file FED: NM1693
21. Elevations (Show whether DF, KDB, RT, GL, etc.) 2939 feet	22. Approximate date work will start* 02/13/2018	23. Estimated duration 60 days

### 24. Attachments

The following, completed in accordance with the requirements of Onshore Oil and Gas Order No.1, must be attached to this form:

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

25. Signature (Electronic Submission)	Name (Printed/Typed) Bradley Bishop / Ph: (575)393-5905	Date 12/15/2017
Title Regulatory		
Approved by (Signature) (Electronic Submission)	Name (Printed/Typed) Cody Layton / Ph: (575)234-5959	Date 06/22/2018
Title Supervisor Multiple Resources		

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.

(Continued on page 2)

\*(Instructions on page 2)

**APPROVED WITH CONDITIONS**  
Approval Date: 06/22/2018

**NM OIL CONSERVATION  
ARTESIA DISTRICT**

**JUN 27 2018**

**RECEIVED**

RWP 6-29-18

## 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 1:** 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 well, 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 directionally 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.

## 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 well 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 will 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 collects this information to allow 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 Collection Clearance Officer (WO-630), 1849 C Street, N.W., Mail Stop 401 LS, Washington, D.C. 20240.

District I  
1625 N. French Dr., Hobbs, NM 88240  
Phone: (575) 393-6161 Fax: (575) 393-0720  
District II  
811 S. First St., Artesia, NM 88210  
Phone: (575) 748-1283 Fax: (575) 748-9720  
District III  
1000 Rio Brazos Road, Aztec, NM 87410  
Phone: (505) 334-6178 Fax: (505) 334-6170  
District IV  
1220 S. St. Francis Dr., Santa Fe, NM 87505  
Phone: (505) 476-3460 Fax: (505) 476-3462

**NM OIL CONSERVATION** State of New Mexico  
ARTESIA DISTRICT  
Energy, Minerals & Natural Resources Department  
JUN 27 2013 OIL CONSERVATION DIVISION  
1220 South St. Francis Dr.  
Santa Fe, NM 87505

RECEIVED

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

☐ AMENDED REPORT

**WELL LOCATION AND ACREAGE DEDICATION PLAT**

<sup>1</sup> API Number <b>30-015-45069</b>		<sup>2</sup> Pool Code <b>98220</b>	<sup>3</sup> Pool Name <b>PURPLE SAGE WOLFCAMP GAS</b>
<sup>4</sup> Property Code <b>321618</b>	<sup>5</sup> Property Name <b>PRINCE 31 W2DA FEDERAL COM</b>		<sup>6</sup> Well Number <b>2H</b>
<sup>7</sup> OGRID NO. <b>14744</b>	<sup>8</sup> Operator Name <b>MEWBOURNE OIL COMPANY</b>		<sup>9</sup> Elevation <b>2912'</b>

<sup>10</sup> Surface Location

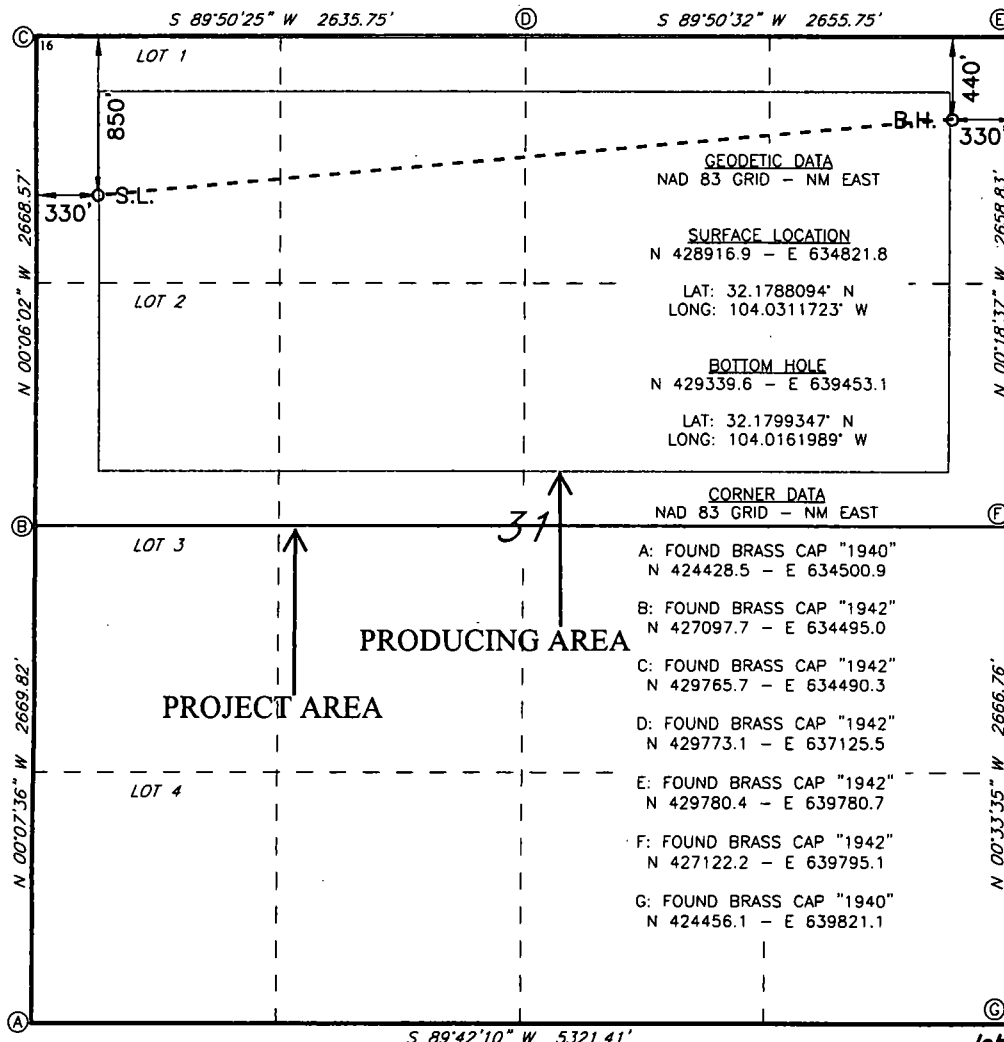
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet From the	East/West line	County
<b>1</b>	<b>31</b>	<b>24S</b>	<b>29E</b>		<b>850</b>	<b>NORTH</b>	<b>330</b>	<b>WEST</b>	<b>EDDY</b>

<sup>11</sup> Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
<b>A</b>	<b>31</b>	<b>24S</b>	<b>29E</b>		<b>440</b>	<b>NORTH</b>	<b>330</b>	<b>EAST</b>	<b>EDDY</b>

<sup>12</sup> Dedicated Acres <b>318.76</b>	<sup>13</sup> Joint or Infill	<sup>14</sup> Consolidation Code	<sup>15</sup> Order No.
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No allowable will be assigned to this completion until all interest have been consolidated or a non-standard unit has been approved by the division.



**17 OPERATOR CERTIFICATION**

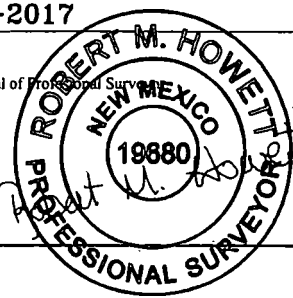
I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.

Signature **BRADLEY BISHOP** Date **12-15-17**  
Printed Name  
E-mail Address **BBISHOP@MEWBOURNE.COM**

**18 SURVEYOR CERTIFICATION**

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

Date of Survey **11-10-2017**  
Signature and Seal of Professional Surveyor  
**19680**  
Certificate Number



RWP 6-29-18

**United States Department of the Interior  
Bureau of Land Management  
Carlsbad Field Office  
620 E Greene Street  
Carlsbad, New Mexico 88201-1287**

**Statement Accepting Responsibility for Operations**

Operator Name: Mewbourne Oil Company  
Street or Box: P.O. Box 5270  
City, State: Hobbs, New Mexico  
Zip Code: 88241

The undersigned accepts all applicable terms, conditions, stipulations, and restrictions concerning operations conducted of the leased land or portion thereof, as described below.

Lease Number: NMNM-120353, Fee

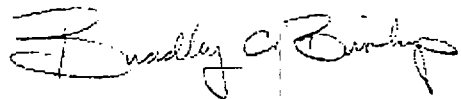
Legal Description of Land: Section 31, T-24S, R-29E Eddu County, New Mexico.  
Location @ 850' FNL & 330' FWL

Formation (if applicable): Wolfcamp

Bond Coverage: \$150,000

BLM Bond File: NM1693 nationwide, NMB000919

Authorized Signature: \_\_\_\_\_



Name: Bradley Bishop  
Title: Regulatory Manager  
Date: 12-15-17

## Additional Operator Remarks

### Location of Well

1. SHL: LOT 1 / 850 FNL / 330 FWL / TWSP: 24S / RANGE: 29E / SECTION: 31 / LAT: 32.1788098 / LONG: -104.0311715 ( TVD: 0 feet, MD: 0 feet )  
PPP: LOT 1 / 440 FNL / 1317 FWL / TWSP: 24S / RANGE: 29E / SECTION: 31 / LAT: 32.1799366 / LONG: -104.0279776 ( TVD: 10836 feet, MD: 11903 feet )  
PPP: LOT 1 / 440 FNL / 330 FWL / TWSP: 24S / RANGE: 29E / SECTION: 31 / LAT: 32.1799365 / LONG: -104.0311678 ( TVD: 10761 feet, MD: 10907 feet )  
BHL: NENE / 440 FNL / 330 FEL / TWSP: 24S / RANGE: 29E / SECTION: 31 / LAT: 32.1799359 / LONG: -104.0161993 ( TVD: 10918 feet, MD: 15548 feet )

## BLM Point of Contact

Name: Priscilla Perez

Title: Legal Instruments Examiner

Phone: 5752345934

Email: pperez@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.

JUN 27 2018

PECOS DISTRICT  
DRILLING CONDITIONS OF APPROVAL

RECEIVED

OPERATOR'S NAME:	MEWBOURNE OIL COMPANY
LEASE NO.:	NMNM120353
WELL NAME & NO.:	2H -PRINCE 31 W2DA FED COM
SURFACE HOLE FOOTAGE:	850'/N & 330'/W
BOTTOM HOLE FOOTAGE:	440'/N & 330'/E
LOCATION:	Section 31.,T24S., R.29E., NMP
COUNTY:	EDDY County, New Mexico

COA

H2S	<input type="radio"/> Yes	<input checked="" type="radio"/> No	
Potash	<input checked="" type="radio"/> None	<input type="radio"/> Secretary	<input type="radio"/> R-111-P
Cave/Karst Potential	<input type="radio"/> Low	<input type="radio"/> Medium	<input checked="" type="radio"/> High
Variance	<input type="radio"/> None	<input checked="" type="radio"/> Flex Hose	<input type="radio"/> Other
Wellhead	<input type="radio"/> Conventional	<input checked="" type="radio"/> Multibowl	<input type="radio"/> Both
Other	<input type="checkbox"/> 4 String Area	<input type="checkbox"/> Capitan Reef	<input type="checkbox"/> WIPP

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 13-3/8 inch surface casing shall be set at approximately 380 feet (a minimum of 25 feet 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.
2. The minimum required fill of cement behind the 9-5/8 inch intermediate casing is:
  - Cement to surface. If cement does not circulate see B.1.a, c-d above. **Additional cement maybe required. Excess calculates to 23%.**

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

- ❖ In High Cave/Karst Areas if cement does not circulate to surface on the first two casing strings, the cement on the 3rd casing string must come to surface.

3. The minimum required fill of cement behind the 7 inch production 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 should tie-back at least 200 feet into previous casing string. Operator shall provide method of verification.
4. The minimum required fill of cement behind the 4-1/2 inch production liner is:
  - Cement should tie-back 100' into the previous casing. Operator shall provide method of verification.

### **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**.

## GENERAL REQUIREMENTS

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

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

☒ Chaves and Roosevelt Counties

Call the Roswell Field Office, 2909 West Second St., Roswell NM 88201.

During office hours call (575) 627-0272.

After office hours call (575)

☒ Eddy County

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

☒ Lea County

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

1. Unless the production casing has been run and cemented or the well has been properly plugged, the drilling rig shall not be removed from over the hole without prior approval.
  - a. In the event the operator has proposed to drill multiple wells utilizing a skid/walking rig. Operator shall secure the wellbore on the current well, after installing and testing the wellhead, by installing a blind flange of like pressure rating to the wellhead and a pressure gauge that can be monitored while drilling is performed on the other well(s).
  - b. When the operator proposes to set surface casing with Spudder Rig
    - Notify the BLM when moving in and removing the Spudder Rig.
    - Notify the BLM when moving in the 2<sup>nd</sup> 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. The casing integrity test can be done (prior to the cement setting up) immediately after bumping the plug.
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. The casing integrity test can be done (prior to the cement setting up) immediately after bumping the plug.
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: The flex line must meet the requirements of API 16C. 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. **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.**
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, except the casing pressure test can be initiated immediately after bumping the plug (only applies to single stage cement jobs).
- c. The tests shall be done by an independent service company utilizing a test plug. The results of the test shall be reported to the appropriate BLM office.
- 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. All tests are required to be recorded on a calibrated test chart. A copy of the BOP/BOPE test chart and a copy of independent service company test will be submitted to the appropriate BLM office.
- f. The BOP/BOPE test shall include a low pressure test from 250 to 300 psi. The test will be held for a minimum of 10 minutes. This test shall be performed prior to the test at full stack pressure.
- g. 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.

#### **Waste Minimization Plan (WMP)**

In the interest of resource development, submission of additional well gas capture development plan information is deferred but may be required by the BLM Authorized Officer at a later date.

**ZS 040318**

**NM OIL CONSERVATION**  
ARTESIA DISTRICT  
JUN 27 2018

RECEIVED

**PECOS DISTRICT  
SURFACE USE  
CONDITIONS OF APPROVAL**

OPERATOR'S NAME:	MEWBOURNE OIL COMPANY
LEASE NO.:	NMNM120353
WELL NAME & NO.:	2H -PRINCE 31 W2DA FED COM
SURFACE HOLE FOOTAGE:	850'/N & 330'/W
BOTTOM HOLE FOOTAGE:	440'/N & 330'/E
LOCATION:	Section 31., T24S., R.29E., NMP
COUNTY:	EDDY 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.

- ☐ **General Provisions**
- ☐ **Permit Expiration**
- ☐ **Archaeology, Paleontology, and Historical Sites**
- ☐ **Noxious Weeds**
- ☒ **Special Requirements**
  - Cave/Karst
  - Watershed
  - Cultural
- ☐ **Construction**
  - Notification
  - Topsoil
  - Closed Loop System
  - Federal Mineral Material Pits
  - Well Pads
  - Roads
- ☐ **Road Section Diagram**
- ☒ **Production (Post Drilling)**
  - Well Structures & Facilities
  - Pipelines
- ☐ **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)**

### **Cave and Karst**

**\*\*** Depending on location, additional Drilling, Casing, and Cementing procedures may be required by engineering to protect critical karst groundwater recharge areas.

#### **Cave/Karst Surface Mitigation**

The following stipulations will be applied to minimize impacts during construction, drilling and production.

##### **Construction:**

In the advent that any underground voids are opened up during construction activities, construction activities will be halted and the BLM will be notified immediately.

##### **No Blasting:**

No blasting will be utilized for pad construction. The pad will be constructed and leveled by adding the necessary fill and caliche.

##### **Pad Berming:**

- The entire perimeter of the well pad will be bermed to prevent oil, salt, and other chemical contaminants from leaving the well pad.
- The compacted berm shall be constructed at a minimum of 12 inches high with impermeable mineral material (e.g. caliche).
- No water flow from the uphill side(s) of the pad shall be allowed to enter the well pad.
- The topsoil stockpile shall be located outside the bermed well pad.
- Topsoil, either from the well pad or surrounding area, shall not be used to construct the berm.
- No storm drains, tubing or openings shall be placed in the berm.
- If fluid collects within the bermed area, the fluid must be vacuumed into a safe container and disposed of properly at a state approved facility.
- The integrity of the berm shall be maintained around the surfaced pad throughout the life of the well and around the downsized pad after interim reclamation has been completed.
- Any access road entering the well pad shall be constructed so that the integrity of the berm height surrounding the well pad is not compromised. (Any access road crossing the berm cannot be lower than the berm height.)

##### **Tank Battery Liners and Berms:**

Tank battery locations and all facilities 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.

**Leak Detection System:**

A method of detecting leaks is required. The method could incorporate gauges to measure loss, siting valves and lines so they can be visually inspected, or installing electronic sensors to alarm when a leak is present. Leak detection plan will be submitted to BLM for approval.

**Automatic Shut-off Systems:**

Automatic shut off, check valves, or similar systems will be installed for pipelines and tanks to minimize the effects of catastrophic line failures used in production or drilling.

**Cave/Karst Subsurface Mitigation**

The following stipulations will be applied to protect cave/karst and ground water concerns:

**Rotary Drilling with Fresh Water:**

Fresh water will be used as a circulating medium in zones where caves or karst features are expected. SEE ALSO: Drilling COAs for this well.

**Directional Drilling:**

Kick off for directional drilling will occur at least 100 feet below the bottom of the cave occurrence zone. SEE ALSO: Drilling COAs for this well.

**Lost Circulation:**

ALL lost circulation zones from the surface to the base of the cave occurrence zone will be logged and reported in the drilling report.

Regardless of the type of drilling machinery used, if a void of four feet or more and circulation losses greater than 70 percent occur simultaneously while drilling in any cave-bearing zone, the BLM will be notified immediately by the operator. The BLM will assess the situation and work with the operator on corrective actions to resolve the problem.

**Abandonment Cementing:**

Upon well abandonment in high cave karst areas additional plugging conditions of approval may be required. The BLM will assess the situation and work with the operator to ensure proper plugging of the wellbore.

**Pressure Testing:**

Annual pressure monitoring will be performed by the operator on all casing annuli and reported in a sundry notice. If the test results indicated a casing failure has

occurred, remedial action will be undertaken to correct the problem to the BLM's approval.

### **Watershed**

- The entire perimeter of the well pad will be bermed to prevent oil, salt, and other chemical contaminants from leaving the well pad.
- Any water erosion that may occur due to the construction of the well pad during the life of the well will be quickly corrected and proper measures will be taken to prevent future erosion.
- Tank battery locations will be lined and bermed. A 20 mil permanent liner will be installed with a 4 oz. felt backing to prevent tears or punctures. Tank battery berms must be large enough to contain 1 ½ times the content of the largest tank or 24 hour production, whichever is greater.
- Automatic shut off, check valves, or similar systems will be installed for tanks to minimize the effects of catastrophic line failures used in production or drilling.
- The compacted berm shall be constructed at a minimum of 24 inches high with impermeable mineral material (e.g. caliche).
- No water flow from the uphill side(s) of the pad shall be allowed to enter the well pad.
- The topsoil stockpile shall be located outside the bermed well pad.
- Topsoil, either from the well pad or surrounding area, shall not be used to construct the berm.
- No storm drains, tubing or openings shall be placed in the berm.
- If fluid collects within the bermed area, the fluid must be vacuumed into a safe container and disposed of properly at a state approved facility.
- The integrity of the berm shall be maintained around the surfaced pad throughout the life of the well and around the downsized pad after interim reclamation has been completed.
- Any access road entering the well pad shall be constructed so that the integrity of the berm height surrounding the well pad is not compromised. (Any access road crossing the berm cannot be lower than the berm height.)
- A leak detection plan will be submitted to the BLM Carlsbad Field Office for approval prior to pipeline installation. The method could incorporate gauges to detect pressure drops, siting valves and lines so they can be visually inspected periodically or installing electronic sensors to alarm when a leak is present. The leak detection plan will incorporate an automatic shut off system that will be installed for proposed pipelines to minimize the effects of an undesirable event.

## **VI. CONSTRUCTION**

### **A. NOTIFICATION**

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

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

### **B. TOPSOIL**

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

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

### **C. CLOSED LOOP SYSTEM**

Tanks are required for drilling operations: No Pits.

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

### **D. FEDERAL MINERAL MATERIALS PIT**

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

### **E. WELL PAD SURFACING**

Surfacing of the well pad is not required.

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

## **F. EXCLOSURE FENCING (CELLARS & PITS)**

### **Exclosure Fencing**

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

## **G. ON LEASE ACCESS ROADS**

### **Road Width**

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

### **Surfacing**

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

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

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

### **Crowning**

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

### **Ditching**

Ditching shall be required on both sides of the road.

### **Turnouts**

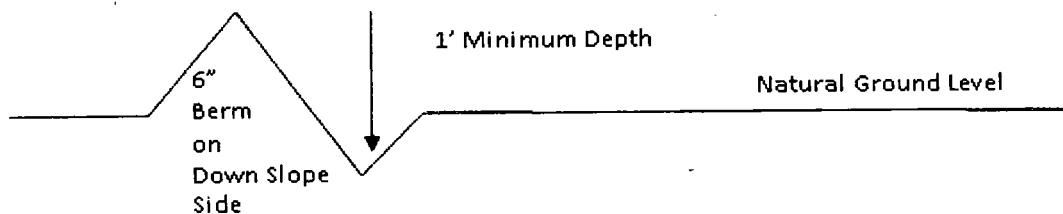
Vehicle turnouts shall be constructed on the road. Turnouts shall be intervisible with interval spacing distance less than 1000 feet. Turnouts shall conform to Figure 1; cross section and plans for typical road construction.

## Drainage

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

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

### Cross Section of a Typical Lead-off Ditch



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

### Formula for Spacing Interval of Lead-off Ditches

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

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

## Cattle guards

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

## Fence Requirement

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

**Public Access**

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

### Construction Steps

1. Salvage topsoil
2. Construct road

3. Redistribute topsoil
4. Revegetate slopes

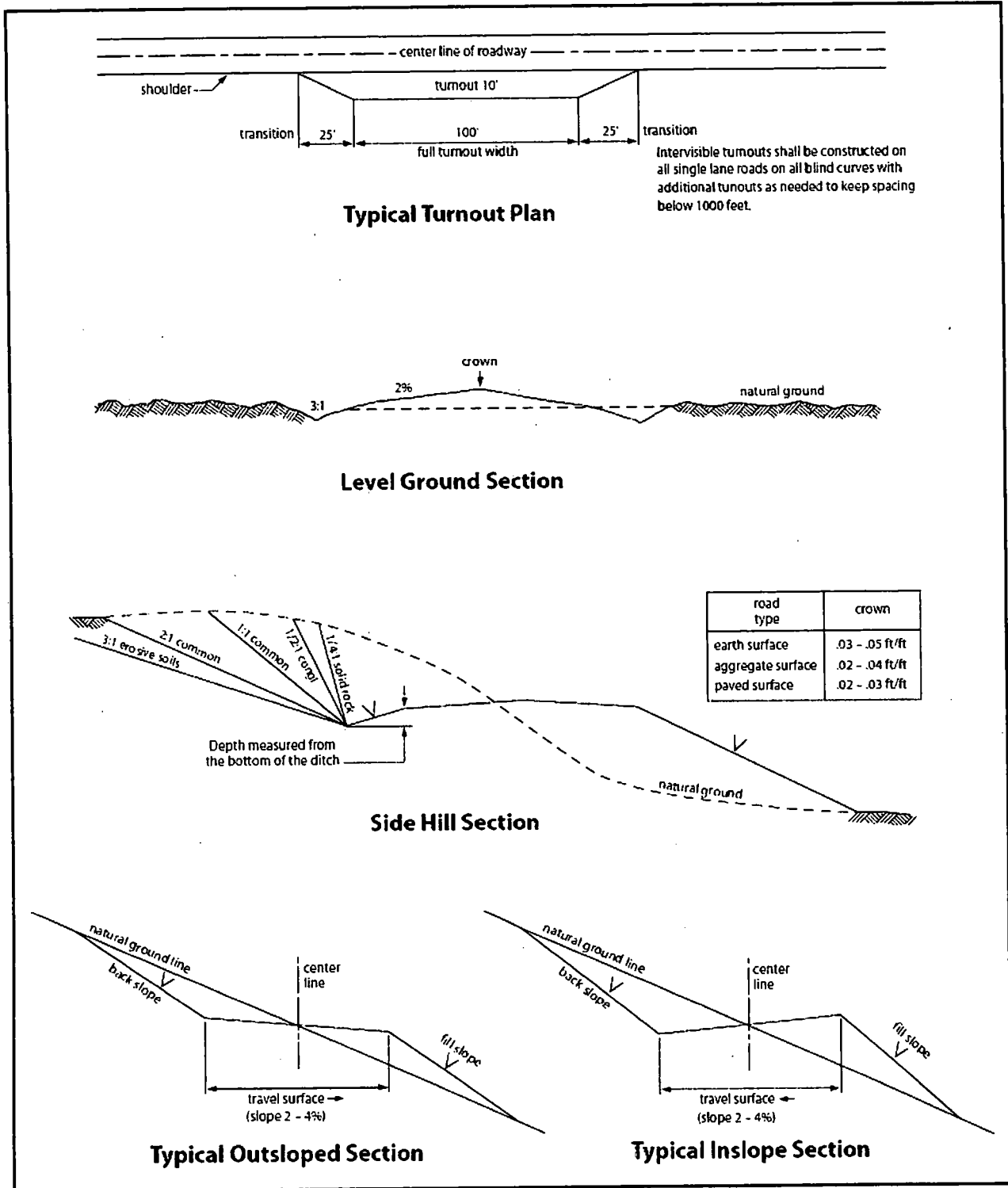


Figure 1. Cross-sections and plans for typical road sections representative of BLM resource or FS local and higher-class roads.

## **VII. PRODUCTION (POST DRILLING)**

### **A. WELL STRUCTURES & FACILITIES**

#### **Placement of Production Facilities**

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

#### **Exclosure Netting (Open-top Tanks)**

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

#### **Chemical and Fuel Secondary Containment and Exclosure Screening**

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

#### **Open-Vent Exhaust Stack Exclosures**

The operator will construct, modify, equip, and maintain all open-vent exhaust stacks on production equipment to prevent birds and bats from entering, and to discourage perching, roosting, and nesting. (*Recommended exclosure structures on open-vent exhaust stacks are in the shape of a cone.*) Production

equipment includes, but may not be limited to, tanks, heater-treaters, separators, dehydrators, flare stacks, in-line units, and compressor mufflers.

#### **Containment Structures**

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

#### **Painting Requirement**

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

### **B. PIPELINES**

#### **STANDARD STIPULATIONS FOR SURFACE INSTALLED PIPELINES**

**A copy of the Grant and attachments, including stipulations, survey plat(s) and/or map(s), shall be on location during construction. BLM personnel may request to review a copy of your permit during construction to ensure compliance with all stipulations.**

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

1. Holder shall indemnify the United States against any liability for damage to life or property arising from the occupancy or use of public lands under this grant.
2. Holder shall comply with all applicable Federal laws and regulations existing or hereafter enacted or promulgated. In any event, Holder shall comply with the Toxic Substances Control Act of 1976 as amended, 15 USC § 2601 *et seq.* (1982) with regard to any toxic substances that are used, generated by or stored on the right-of-way or on facilities authorized under this right-of-way grant (see 40 CFR, Part 702-799 and in particular, provisions on polychlorinated biphenyls, 40 CFR 761.1-761.193). Additionally, any release of toxic substances (leaks, spills, etc.) in excess of the reportable quantity established by 40 CFR, Part 117 shall be reported as required by the Comprehensive Environmental Response, Compensation, and Liability Act, section 102b. A copy of any report required or requested by any Federal agency or State government as a result of a reportable release or spill of any toxic substances shall be furnished to the Authorized Officer concurrent with the filing of the reports to the involved Federal agency or State government.
3. Holder agrees to indemnify the United States against any liability arising from the release of any hazardous substance or hazardous waste (as these terms

are defined in the Comprehensive Environmental Response, Compensation and Liability Act of 1980, 42 U.S.C. § 9601, *et seq.* or the Resource Conservation and Recovery Act, 42 U.S.C. 6901, *et seq.*) on the Right-of-Way (unless the release or threatened release is wholly unrelated to activity of the Right-of-Way Holder's activity on the Right-of-Way), or resulting from the activity of the Right-of-Way Holder on the Right-of-Way. This provision applies without regard to whether a release is caused by Holder, its agent, or unrelated third parties.

4. Holder shall be liable for damage or injury to the United States to the extent provided by 43 CFR Sec. 2883.1-4. Holder shall be held to a standard of strict liability for damage or injury to the United States resulting from pipe rupture, fire, or spills caused or substantially aggravated by any of the following within the right-of-way or permit area:

- a. Activities of Holder including, but not limited to: construction, operation, maintenance, and termination of the facility;
- b. Activities of other parties including, but not limited to:
  - (1) Land clearing
  - (2) Earth-disturbing and earth-moving work
  - (3) Blasting
  - (4) Vandalism and sabotage;

c. Acts of God.

The maximum limitation for such strict liability damages shall not exceed one million dollars (\$1,000,000) for any one event, and any liability in excess of such amount shall be determined by the ordinary rules of negligence of the jurisdiction in which the damage or injury occurred.

This section shall not impose strict liability for damage or injury resulting primarily from an act of war or from the negligent acts or omissions of the United States.

5. If, during any phase of the construction, operation, maintenance, or termination of the pipeline, any oil, salt water, or other pollutant should be discharged from the pipeline system, impacting Federal lands, the control and total removal, disposal, and cleaning up of such oil, salt water, or other pollutant, wherever found, shall be the responsibility of Holder, regardless of fault. Upon failure of Holder to control, dispose of, or clean up such discharge on or affecting Federal lands, or to repair all damages resulting therefrom, on the Federal lands, the Authorized Officer may take such measures as he/she deems necessary to control and clean up the discharge and restore the area, including, where appropriate, the aquatic environment and fish and wildlife habitats, at the full expense of Holder. Such action by the Authorized Officer shall not relieve Holder of any responsibility as provided herein.

6. All construction and maintenance activity shall be confined to the authorized

right-of-way width of 20 feet. If the pipeline route follows an existing road or buried pipeline right-of-way, the surface pipeline shall be installed no farther than 10 feet from the edge of the road or buried pipeline right-of-way. If existing surface pipelines prevent this distance, the proposed surface pipeline shall be installed immediately adjacent to the outer surface pipeline. All construction and maintenance activity shall be confined to existing roads or right-of-ways.

7. No blading or clearing of any vegetation shall be allowed unless approved in writing by the Authorized Officer.

8. Holder shall install the pipeline on the surface in such a manner that will minimize suspension of the pipeline across low areas in the terrain. In hummocky or dune areas, the pipeline shall be "snaked" around hummocks and dunes rather than suspended across these features.

9. The pipeline shall be buried with a minimum of 24 inches under all roads, "two-tracks," and trails. Burial of the pipe will continue for 20 feet on each side of each crossing. The condition of the road, upon completion of construction, shall be returned to at least its former state with no bumps or dips remaining in the road surface.

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

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

12. Excluding the pipe, all above-ground structures not subject to safety requirement shall be painted by the holder to blend with the natural color of the landscape. The paint used shall be a color which simulates "Standard Environmental Colors" – **Shale Green**, Munsell Soil Color No. 5Y 4/2; designated by the Rocky Mountain Five State Interagency Committee.

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

14. The holder shall not use the pipeline route as a road for purposes other than routine maintenance as determined necessary by the Authorized Officer in consultation with the holder. The holder will take whatever steps are necessary to ensure that the pipeline route is not used as a roadway.

15. Any cultural and/or paleontological resource (historic or prehistoric site or object) discovered by the holder, or any person working on his behalf, on public or Federal land shall be immediately reported to the authorized officer. Holder shall suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the authorized officer. An evaluation of the discovery will be made by the authorized officer to determine appropriate cultural or scientific values. The holder will be responsible for the cost of evaluation and any decision as to proper mitigation measures will be made by the authorized officer after consulting with the holder.

16. 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, powerline 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.

17. Surface pipelines shall be less than or equal to 4 inches and a working pressure below 125 psi.

## **VIII. INTERIM RECLAMATION**

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

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

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

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

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

## **IX. FINAL ABANDONMENT & RECLAMATION**

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

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

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

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

### **Seed Mixture 1 for Loamy Sites**

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

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

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

<u>Species</u>	<u>lb/acre</u>
Plains lovegrass ( <i>Eragrostis intermedia</i> )	0.5
Sand dropseed ( <i>Sporobolus cryptandrus</i> )	1.0
Sideoats grama ( <i>Bouteloua curtipendula</i> )	5.0
Plains bristlegrass ( <i>Setaria macrostachya</i> )	2.0

\*Pounds of pure live seed:

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



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

## Operator Certification Data Report

06/22/2018

### 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:** Bradley Bishop

**Signed on:** 12/15/2017

**Title:** Regulatory

**Street Address:** PO Box 5270

**City:** Hobbs

**State:** NM

**Zip:** 88240

**Phone:** (575)393-5905

**Email address:** bbishop@mewbourne.com

### Field Representative

**Representative Name:**

**Street Address:**

**City:**

**State:**

**Zip:**

**Phone:**

**Email address:**



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

## Application Data Report

06/22/2018

APD ID: 10400025531

Submission Date: 12/15/2017

Application Data  
Report  
Recent Changes

Operator Name: MEWBOURNE OIL COMPANY

Well Name: PRINCE 31 W2DA FED COM

Well Number: 2H

[Show Final Text](#)

Well Type: CONVENTIONAL GAS WELL

Well Work Type: Drill

### Section 1 - General

APD ID: 10400025531

Tie to previous NOS?

Submission Date: 12/15/2017

BLM Office: CARLSBAD

User: Bradley Bishop

Title: Regulatory

Federal/Indian APD: FED

Is the first lease penetrated for production Federal or Indian? FED

Lease number: 10400025531

Lease Area: 20

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: MEWBOURNE OIL COMPANY

Operator letter of designation: Prince31W2DAFedCom2H\_operatorletterofdesignation\_20171215150032.pdf

### Operator Info

Operator Organization Name: MEWBOURNE OIL COMPANY

Operator Address: PO Box 5270

Zip: 88240

Operator PO Box:

Operator City: Hobbs

State: NM

Operator Phone: (575)393-5905

Operator Internet Address:

### Section 2 - Well Information

Well in Master Development Plan? NO

Master Development Plan name:

Well in Master SUPO? NO

Master SUPO name:

Well in Master Drilling Plan? NO

Master Drilling Plan name:

Well Name: PRINCE 31 W2DA FED COM

Well Number: 2H

Well API Number:

Field/Pool or Exploratory? Field and Pool

Field Name: PURPLE-SAGE  
WOLFCAMP GAS

Pool Name: WOLFCAMP

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

Operator Name: MEWBOURNE OIL COMPANY

Well Name: PRINCE 31 W2DA FED COM

Well Number: 2H

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:

Number: 2

Well Class: HORIZONTAL

PRINCE 31 DA

Number of Legs:

Well Work Type: Drill

Well Type: CONVENTIONAL GAS WELL

Describe Well Type:

Well sub-Type: APPRAISAL

Describe sub-type:

Distance to town: 25 Miles

Distance to nearest well: 35 FT

Distance to lease line: 330 FT

Reservoir well spacing assigned acres Measurement: 318.76 Acres

Well plat: Prince31W2DAFedCom2H\_wellplat\_20171215150149.pdf

Well work start Date: 02/13/2018

Duration: 60 DAYS

### Section 3 - Well Location Table

Survey Type: RECTANGULAR

Describe Survey Type:

Datum: NAD83

Vertical Datum: NAVD88

Survey number:

	NS-Foot	NS Indicator	EW-Foot	EW Indicator	Twsp	Range	Section	Aliquot/Lot/Tract	Latitude	Longitude	County	State	Meridian	Lease Type	Lease Number	Elevation	MD	TVD
SHL Leg #1	850	FNL	330	FWL	24S	29E	31	Lot 1	32.17880 98	- 104.0311 715	EDD Y	NEW MEXI CO	NEW MEXI CO	F	FEE	293 9	0	0
KOP Leg #1	440	FNL	10	FWL	24S	29E	31	Lot 1	32.17993 65	- 104.0322 054	EDD Y	NEW MEXI CO	NEW MEXI CO	F	FEE	- 730 8	102 68	102 47
PPP Leg #1	440	FNL	330	FWL	24S	29E	31	Lot 1	32.17993 65	- 104.0311 678	EDD Y	NEW MEXI CO	NEW MEXI CO	S	STATE	- 782 2	109 07	107 61

Operator Name: MEWBOURNE OIL COMPANY

Well Name: PRINCE 31 W2DA FED COM

Well Number: 2H

	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	440	FNL	131 7	FWL	24S	29E	31	Lot 1	32.17993 66	- 104.0279 776	EDD Y	NEW MEXI CO	NEW MEXI CO	F	NMNM 120353	- 789 7	119 03	108 36
EXIT Leg #1	440	FNL	132 7	FEL	24S	29E	31	Aliquot NWNE	32.17993 62	- 104.0194 251	EDD Y	NEW MEXI CO	NEW MEXI CO	F	NMNM 120353	- 795 6	145 50	108 95
BHL Leg #1	440	FNL	330	FEL	24S	29E	31	Aliquot NENE	32.17993 59	- 104.0161 993	EDD Y	NEW MEXI CO	NEW MEXI CO	F	FEE	- 797 9	155 48	109 18



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

## Drilling Plan Data Report

06/22/2018

APD ID: 10400025531

Submission Date: 12/15/2017

Highlighted data  
reflects the most  
recent changes

Operator Name: MEWBOURNE OIL COMPANY

Well Name: PRINCE 31 W2DA FED COM

Well Number: 2H

Show Final Text

Well Type: CONVENTIONAL GAS WELL

Well Work Type: Drill

### Section 1 - Geologic Formations

Formation ID	Formation Name	Elevation	True Vertical Depth	Measured Depth	Lithologies	Mineral Resources	Producing Formation
1	UNKNOWN	2939	27	27		NONE	No
2	CASTILE	1722	1217	1217	SALT	NONE	No
3	BASE OF SALT	439	2500	2500	SALT	NONE	No
4	LAMAR	224	2715	2715	LIMESTONE	NATURAL GAS,OIL	No
5	BELL CANYON	184	2755	2755	SANDSTONE	NATURAL GAS,OIL	No
6	CHERRY CANYON	-691	3630	3630	SANDSTONE	NATURAL GAS,OIL	No
7	MANZANITA	-806	3745	3745		NONE	No
8	BRUSHY CANYON	-3211	6150	6150	SANDSTONE	NATURAL GAS,OIL	No
9	BONE SPRING	-3486	6425	6425	LIMESTONE,SHALE	NATURAL GAS,OIL	No
10	BONE SPRING 1ST	-4426	7365	7365	SANDSTONE	NATURAL GAS,OIL	No
11	BONE SPRING 2ND	-5211	8150	8150	SANDSTONE	NATURAL GAS,OIL	No
12	BONE SPRING 3RD	-6336	9275	9275	SANDSTONE	NATURAL GAS,OIL	No
13	WOLFCAMP	-6701	9640	9640	LIMESTONE,SHALE,SANDSTONE	NATURAL GAS,OIL	Yes

### Section 2 - Blowout Prevention

Operator Name: MEWBOURNE OIL COMPANY

Well Name: PRINCE 31 W2DA FED COM

Well Number: 2H

Pressure Rating (PSI): 5M

Rating Depth: 15545

Equipment: Annular, Pipe Ram, Blind Ram

Requesting Variance? YES

**Variance request:** A variance is requested for the use of a flexible choke line from the BOP to Choke Manifold. A variance is requested for the use of a multi-bowl wellhead. See attached schematic.

**Testing Procedure:** 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.

**Choke Diagram Attachment:**

Prince\_31\_W2DA\_Fed\_Com\_2H\_5M\_BOPE\_Choke\_Diagram\_20171214163748.pdf

Prince\_31\_W2DA\_Fed\_Com\_2H\_Flex\_Line\_Specs\_20171214163802.pdf

**BOP Diagram Attachment:**

Prince\_31\_W2DA\_Fed\_Com\_2H\_5M\_BOPE\_Schematic\_20171214163819.pdf

Prince\_31\_W2DA\_Fed\_Com\_2H\_Multi\_Bowl\_WH\_20171214163855.pdf

### 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	17.5	13.375	NEW	API	N	0	380	0	380	2939	2559	380	H-40	48	STC	4.33	9.73	DRY	17.65	DRY	29.66
2	INTERMEDIATE	12.25	9.625	NEW	API	N	0	2640	0	2640	2939	299	2640	J-55	36	LTC	1.47	2.56	DRY	4.77	DRY	5.93
3	PRODUCTION	8.75	7.0	NEW	API	N	0	11152	0	10820	2939	-7881	11152	P-110	26	LTC	1.45	1.68	DRY	2.21	DRY	2.86
4	LINER	6.125	4.5	NEW	API	N	10247	15545	10247	10918	-7308	-7979	5298	P-110	13.5	LTC	1.45	1.68	DRY	4.73	DRY	5.9

**Casing Attachments**

**Operator Name:** MEWBOURNE OIL COMPANY

**Well Name:** PRINCE 31 W2DA FED COM

**Well Number:** 2H

### Casing Attachments

---

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

**Inspection Document:**

**Spec Document:**

**Tapered String Spec:**

**Casing Design Assumptions and Worksheet(s):**

Prince\_31\_W2DA\_Fed\_Com\_2H\_Csg\_Assumptions\_20171215083233.pdf

---

**Casing ID:** 2      **String Type:** INTERMEDIATE

**Inspection Document:**

**Spec Document:**

**Tapered String Spec:**

**Casing Design Assumptions and Worksheet(s):**

Prince\_31\_W2DA\_Fed\_Com\_2H\_Csg\_Assumptions\_20171215083243.pdf

---

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

**Inspection Document:**

**Spec Document:**

**Tapered String Spec:**

**Casing Design Assumptions and Worksheet(s):**

Prince\_31\_W2DA\_Fed\_Com\_2H\_Csg\_Assumptions\_20171215083256.pdf

---

Operator Name: MEWBORNE OIL COMPANY

Well Name: PRINCE 31 W2DA FED COM

Well Number: 2H

#### Casing Attachments

Casing ID: 4 String Type: LINER

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

Prince\_31\_W2DA\_Fed\_Com\_2H\_Csg\_Assumptions\_20171215083307.pdf

#### Section 4 - Cement

String Type	Lead/Tail	Stage Tool Depth	Top MD	Bottom MD	Quantity(sx)	Yield	Density	Cu Ft	Excess%	Cement type	Additives
SURFACE	Lead		0	193	130	2.12	12.5	276	100	Class C	Salt, Gel, Extender, LCM
SURFACE	Tail		193	380	200	1.34	14.8	268	100	Class C	Retarder
INTERMEDIATE	Lead		0	1981	380	2.12	12.5	806	25	Class C	Salt, Gel, Extender, LCM
INTERMEDIATE	Tail		1981	2640	200	1.34	14.8	268	25	Class C	Retarder
PRODUCTION	Lead	3745	2440	3075	60	2.12	12.5	127	25	Class C	Gel, Retarder, Defoamer, Extender
PRODUCTION	Tail		3075	3745	100	1.34	14.8	134	25	Class C	Retarder
PRODUCTION	Lead	3745	3745	8664	440	2.12	12.5	933	25	Class C	Gel, Retarder, Defoamer, Extender
PRODUCTION	Tail		8664	11152	400	1.18	15.6	472	25	Class H	Retarder, Fluid Loss, Defoamer
LINER	Lead		10247	15545	220	2.97	11.2	653	25	Class C	Salt, Gel, Fluid Loss, Retarder, Dispersant, Defoamer, Anti-Settling Agent

**Operator Name:** MEWBOURNE OIL COMPANY

**Well Name:** PRINCE 31 W2DA FED COM

**Well Number:** 2H

## 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:** Lost circulation material Sweeps Mud scavengers in surface hole

**Describe the mud monitoring system utilized:** Pason, PVT & visual monitoring

### Circulating Medium Table

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	380	SPUD MUD	8.6	8.8							
380	2640	SALT SATURATED	10	10							
2640	1024 7	WATER-BASED MUD	8.6	9.5							
1024 7	1554 5	OIL-BASED MUD	10	13							MW up to 13.0 ppg may be required for shale control. The highest MW needed to balance formation pressure is expected to be 12.0 ppg.

**Operator Name:** MEWBOURNE OIL COMPANY

**Well Name:** PRINCE 31 W2DA FED COM

**Well Number:** 2H

## **Section 6 - Test, Logging, Coring**

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

Will run GR/CNL from KOP (10247') to surface

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

CNL,DS,GR,MWD,MUDLOG

**Coring operation description for the well:**

None

## **Section 7 - Pressure**

**Anticipated Bottom Hole Pressure:** 6812

**Anticipated Surface Pressure:** 4311.92

**Anticipated Bottom Hole Temperature(F):** 165

**Anticipated abnormal pressures, temperatures, or potential geologic hazards?** NO

**Describe:**

**Contingency Plans geohazards description:**

**Contingency Plans geohazards attachment:**

**Hydrogen Sulfide drilling operations plan required?** YES

**Hydrogen sulfide drilling operations plan:**

Prince\_31\_W2DA\_Fed\_Com\_2H\_H2S\_Plan\_20171215084616.pdf

## **Section 8 - Other Information**

**Proposed horizontal/directional/multi-lateral plan submission:**

Prince\_31\_W2DA\_Fed\_Com\_2H\_Dir\_Plan\_20171215084655.pdf

Prince\_31\_W2DA\_Fed\_Com\_2H\_Dir\_Plot\_20171215084707.pdf

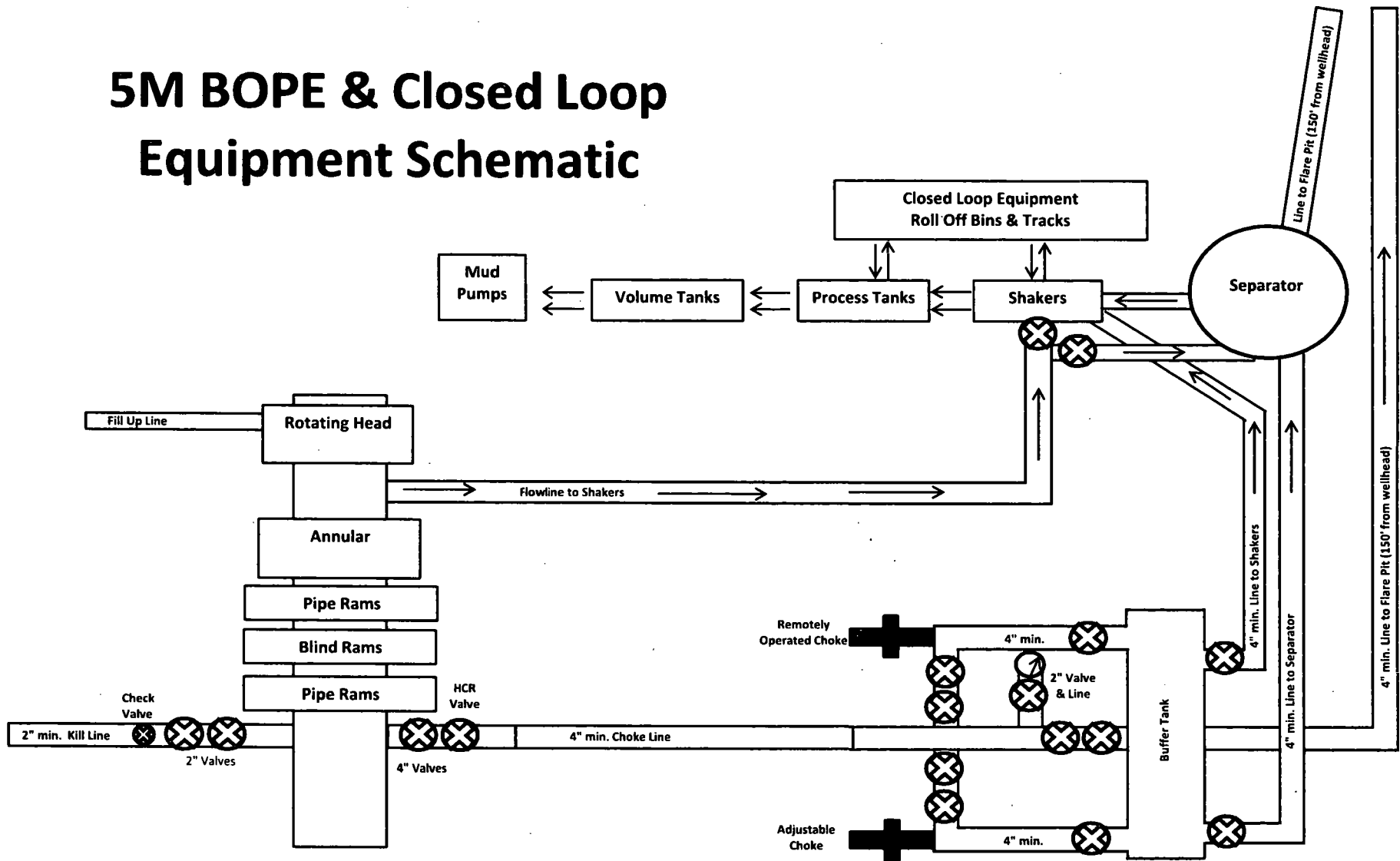
**Other proposed operations facets description:**

**Other proposed operations facets attachment:**

Prince\_31\_W2DA\_Fed\_Com\_2H\_Drlg\_Program\_20171215084735.docx

**Other Variance attachment:**

# 5M BOPE & Closed Loop Equipment Schematic



Drawing not to scale

Note: All valves & lines on choke manifold are 4" unless otherwise noted. Exact manifold configuration may vary.



ENGINEERING  
& SERVICES

GATES E & S NORTH AMERICA, INC.  
134 44TH STREET  
CORPUS CHRISTI, TEXAS 78405

PHONE: 361-887-9807  
FAX: 361-887-0812  
EMAIL: [Tim.Cantu@gates.com](mailto:Tim.Cantu@gates.com)  
WEB: [www.gates.com](http://www.gates.com)

## 10K CEMENTING ASSEMBLY PRESSURE TEST CERTIFICATE

Customer :

AUSTIN DISTRIBUTING

Customer Ref. :

4060578

Invoice No. :

500506

Test Date:

4/30/2015

Hose Serial No.:

D-043015-7

Created By:

JUSTIN CROPPER

Product Description:

10K3.548.0CK4.1/1610KFLGE/E LE

End Fitting 1 :

4 1/16 10K FLG

End Fitting 2 :

4 1/16 10K FLG

Gates Part No. :

4773-6290

Assembly Code :

L36554102914D-043015-7

Working Pressure :

10,000 PSI

Test Pressure :

15,000 PSI

Gates E & S North America, Inc. certifies that the following hose assembly has been tested to the Gates Oilfield Roughneck Agreement/Specification requirements and passed the 15 minute hydrostatic test per API Spec 7K/Q1, Fifth Edition, June 2010, Test pressure 9.6.7 and per Table 9 to 15,000 psi in accordance with this product number. Hose burst pressure 9.6.7.2 exceeds the minimum of 2.5 times the working pressure per Table 9.

Quality Manager :

QUALITY

Date :

4/30/2015

Signature :

Production:

PRODUCTION

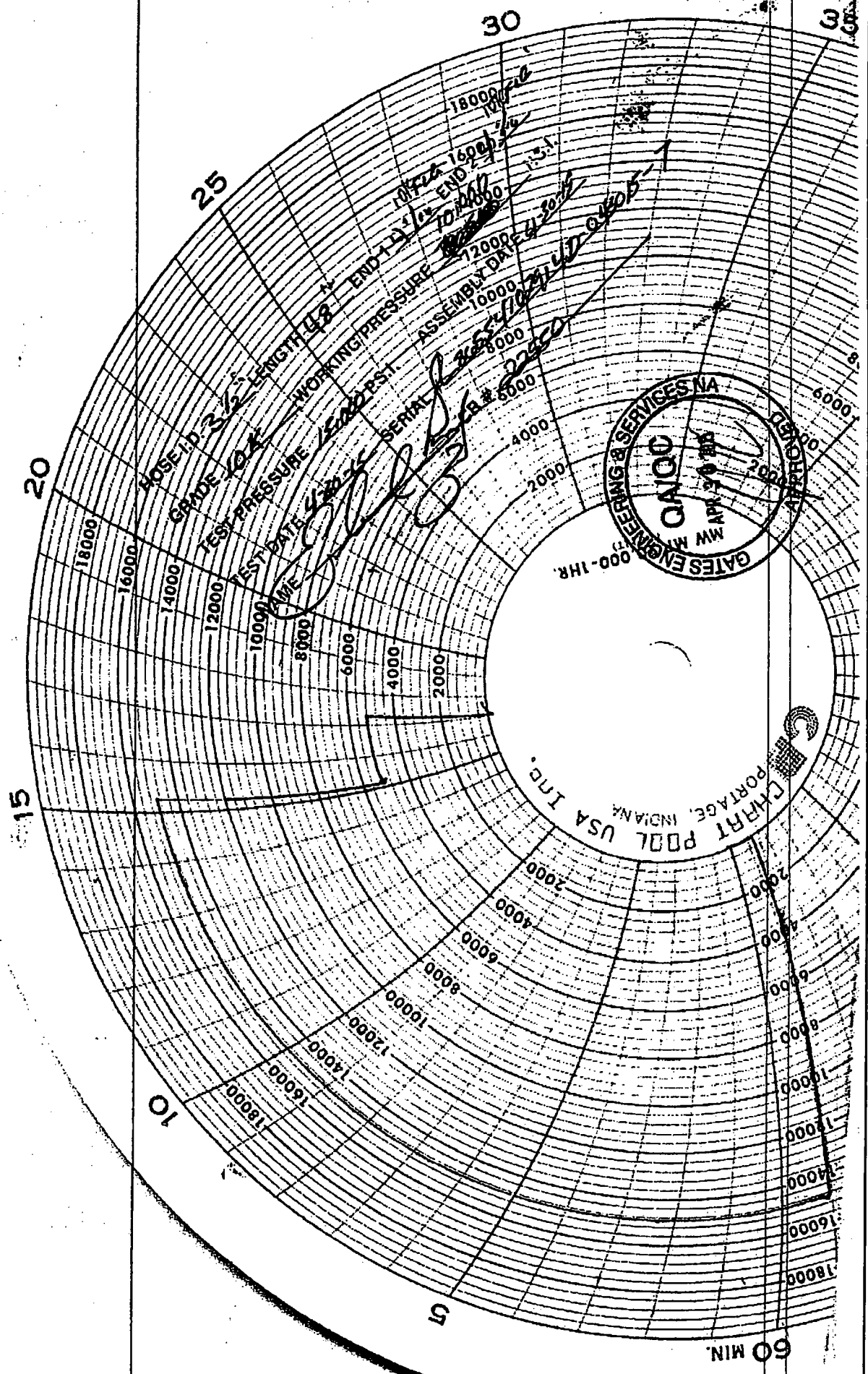
Date :

4/30/2015

Signature :

Form PTC - 01 Rev.02

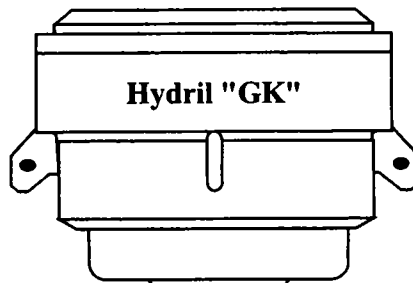
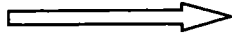




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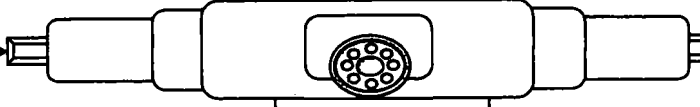
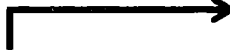
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Hydril "GK"  
13 5/8" 5M

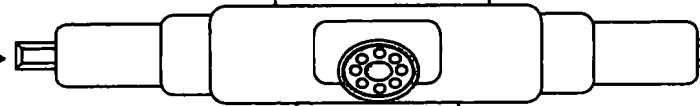


Hydril "GK"

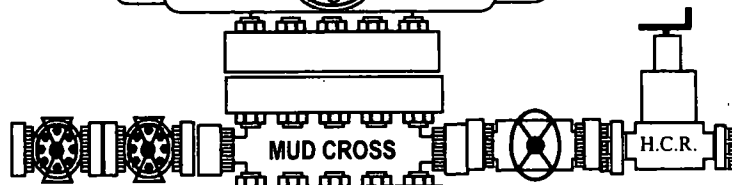
Cameron Type U  
13 5/8" 5M



4 1/2" x 5 7/8" VBR



BLIND RAMS



MUD CROSS

H.C.R.



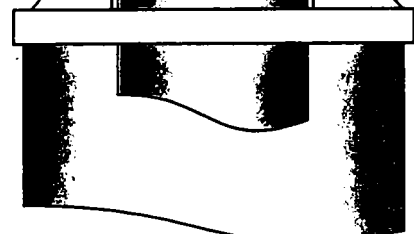
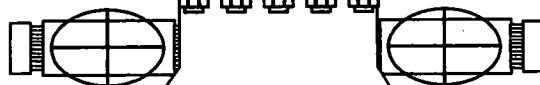
7" RAMS



13 5/8" 5M

13 5/8" 5M

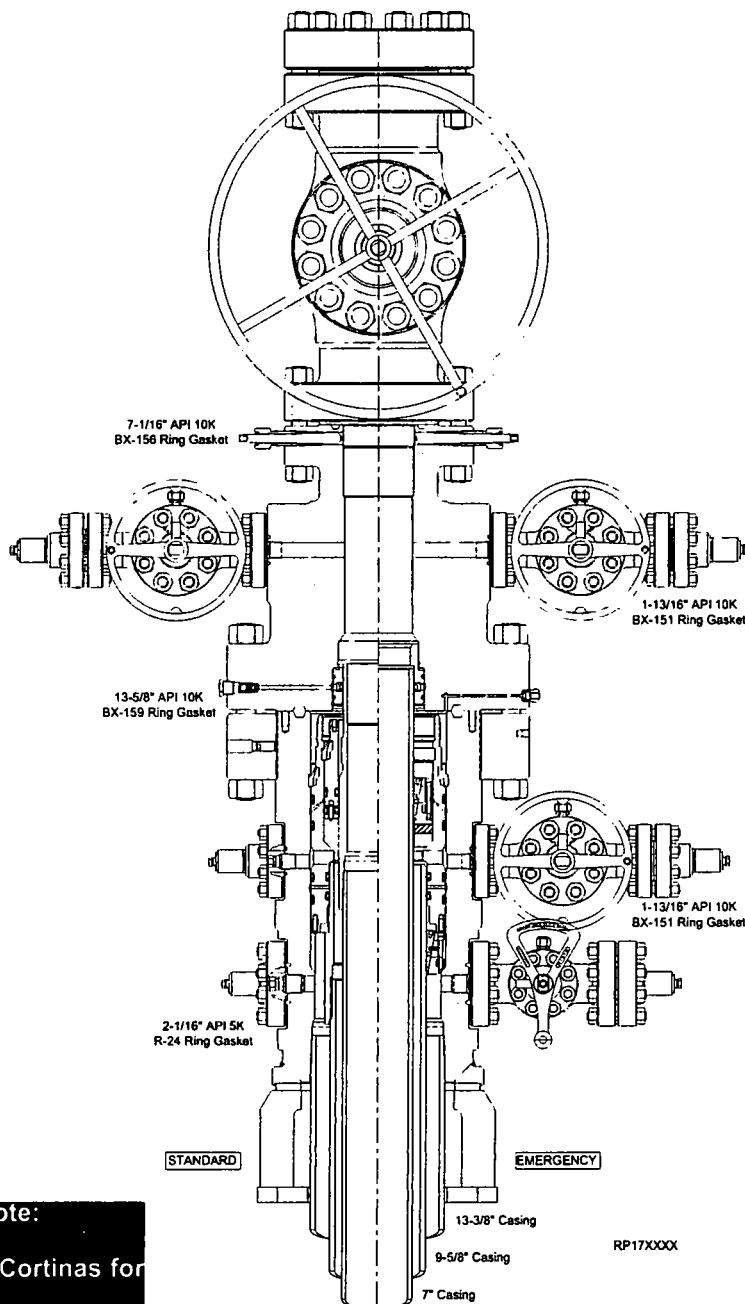
13 5/8" 5M



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## RUNNING PROCEDURE

# Mewbourne Oil Co



### Publication Status Note:

Draft A sent to John Cortinas for review; RA 04/29/17

## Surface Systems Publication



13-5/8" 10K MN-DS System  
13-3/8" x 9-5/8" x 7" Casing Program

RP-003815  
Rev 01 Draft A

## Safety Hazard Indicators

The Safety Hazard Indicators listed below will be used throughout this procedure to indicate potentially hazardous and/or personnel risks that may be encountered during the performance of the tasks outlined in this procedure.



Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury



Indicates a hazardous situation which, if not avoided, could result in death or serious injury



Indicates a hazardous situation which, if not avoided, will result in death or serious injury



Preferred to address practices not related to personal injury

ES-000175-02

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To confirm the correct version is in use, make sure the revision and release date match those on the controlled version of the document in SAP. Refer to the Document Control page for the document revision history.

**NOTE** This document alone does not qualify an individual to Install/Run the Equipment. This document is created and provided as a reference for Qualified Cameron Service Personnel and does not cover all scenarios that may occur.

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## **RUNNING PROCEDURE GENERAL WARNING**

**READ AND UNDERSTAND ALL INSTRUCTIONS.** Failure to follow may result in serious personal injury and damage not only to the equipment but also the environment.

1. Safety is a combination of staying alert, common sense, and experience with the oil field equipment and environment. Read this Running Procedure prior to operating and installing the equipment. Be familiar with the operation terminologies of oil field equipment.
2. This document includes basic installation guidance. The field service personnel shall be fully trained in all aspects of handling pressure control equipment as well as of the job that they are going to perform. If any of the procedures and policies listed in this procedure cannot be followed, contact a Cameron Representative for the best course of action.
3. Proper Personal Protective Equipment (PPE) shall be utilized according to Company policies. Always use proper tools when servicing the equipment.
4. A Job Hazard Analysis (JHA) must be performed prior to beginning any service on a well location. A JHA review meeting will be held with all affected rig personnel PRIOR to the commencement of work to review the results of the JHA, evacuation routes, emergency contacts, etc. All meeting attendees and a Company Representative will sign-off on the JHA to acknowledge this meeting has taken place.
5. Be aware of unexpected circumstances that may arise when operating or servicing the equipment. Utilize the Step Back 5X5 Process in order to assess the hazards posed before, during, and after the servicing of equipment under pressure or with the potential of hazardous chemicals present. Be familiar with the company's and facility's Lockout/Tagout program in order to ensure all sources of energy (i.e. electrical, pneumatic, pressure) are isolated and/or de-energized prior to beginning work.
6. All governmental or Company safety requirements shall be met before working on the equipment. Requirements of fully tested pressure barriers prior to servicing the equipment shall be observed. Cameron recommends that two mechanical pressure barriers is the preferred practice. Additional precautions should be taken to ensure that the mechanical pressure barriers are functioning correctly prior to any work being carried out on this particular equipment.
7. Always check for any trapped pressure before servicing the equipment. All valves downstream of the pressure barriers must be cycled several times to release any trapped pressure.
8. Ensure the chemical and physical properties of the fluid flow product inside the equipment are known. Obtain applicable Material Safety Data Sheets (MSDS) for commonly encountered chemicals such as hydrogen sulfide, cements, etc. in order to identify appropriate PPE to use, emergencies, procedures, and methods or exposure control.
9. Always use correct lifting devices and follow safety rules in handling heavy products. The actual weight can vary for the system configurations. Never attempt to lift the equipment by hand.
10. Cameron manufactures a variety of oil field equipment with different features and operating requirements. Be certain of the equipment model and refer to the appropriate procedure, before attempting any operation or service on the equipment. This procedure is to assist field personnel in the operation and installation of the equipment that is listed in this document. Different procedures are available for other oil field products.

SD-046058-01 Rev 01 - RP General Warning M. Contreras 28/07/2010

## HSE Hand Safety Rules



### 1. No Hands on Loads

Select the appropriate device to control the load



### 2. Hands on Handles Only

Use manufacturers handles or safe alternatives



### 3. Permission to Touch

Use lifting assistance/technology for loads > 20kg or 44 lbs



### 4. Hands Off...Energy On

Remove hands from load BEFORE setting in motion



### 5. Safe Cargo Handling

Use pallets & crates designed to prevent tip over or loss of load



### 6. Use the Correct PPE

Use the right glove for the job (chemical, hot work, impact, etc.)

HSE VISION: NO ONE GETS HURT; NOTHING GETS HARMED

HEALTH, SAFETY & ENVIRONMENT

## HSE Tenets of Operation



### Stop Work

Stop work immediately until unsafe behaviors and conditions are addressed.



### Report ALL Incidents

Immediately report incidents, including injuries, illnesses, property damage, near misses, and environmental releases.



### Leadership & Accountability

Hold each other accountable for working safely and complying with applicable regulations.



### Equipment Operations

Always operate equipment and vehicles with safety devices enabled, and never beyond their capabilities, environmental limits, or designed purposes.



### Follow Procedures

Maintain all training and follow established HSE policies and practices.



### HSE Observations

Recognize safe behaviors and conditions, and address those at-risk.



### PPE

Always wear the correct Personal Protective Equipment for the task.



### Ask

Ask questions when in doubt, and for assistance when dealing with new or unusual situations.

HSE VISION: NO ONE GETS HURT; NOTHING GETS HARMED

HEALTH, SAFETY & ENVIRONMENT

## Valve Removal Plugs



**For Installation and Removal  
of Valve Removal Plugs  
Refer to:**

Publication: RP-001558

(Assembly Procedure for  
VR Plugs and Recommended  
Torque Values)

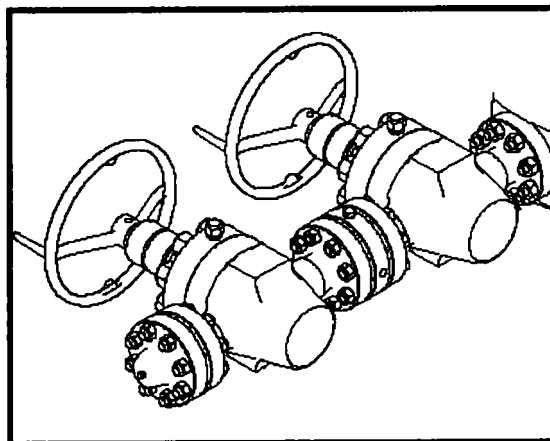


## Make-up Requirements for API Flange Connections



**For Make-up Requirements  
for API Flange Connections  
Refer to:**

Publication: RP-002153



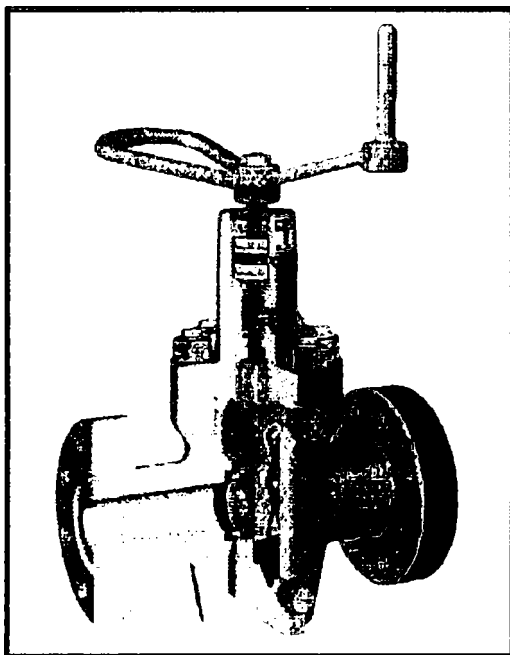
## **WKM Model M Power R- Seal Gate Valves**



**For Operation and Maintenance  
refer to:**

Publication: TC9084-2

(Operation and Maintenance  
Manual)



TC9084-2

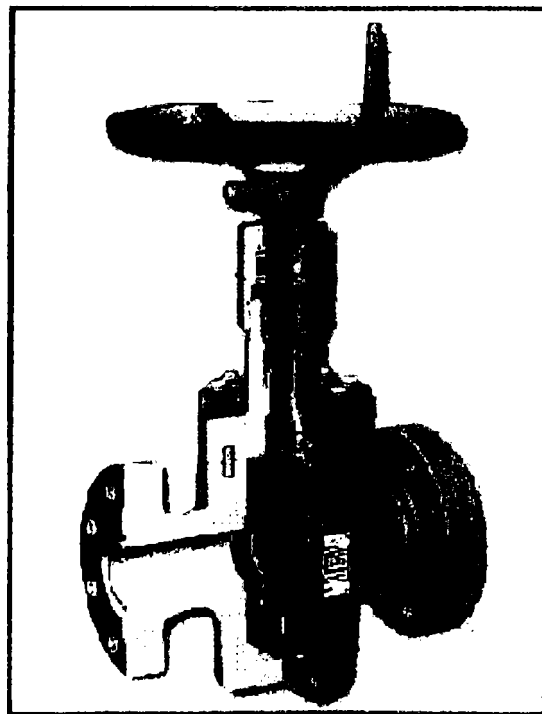
## **Cameron Type FL & FLS Gate Valves**



**For Operation and Maintenance  
refer to:**

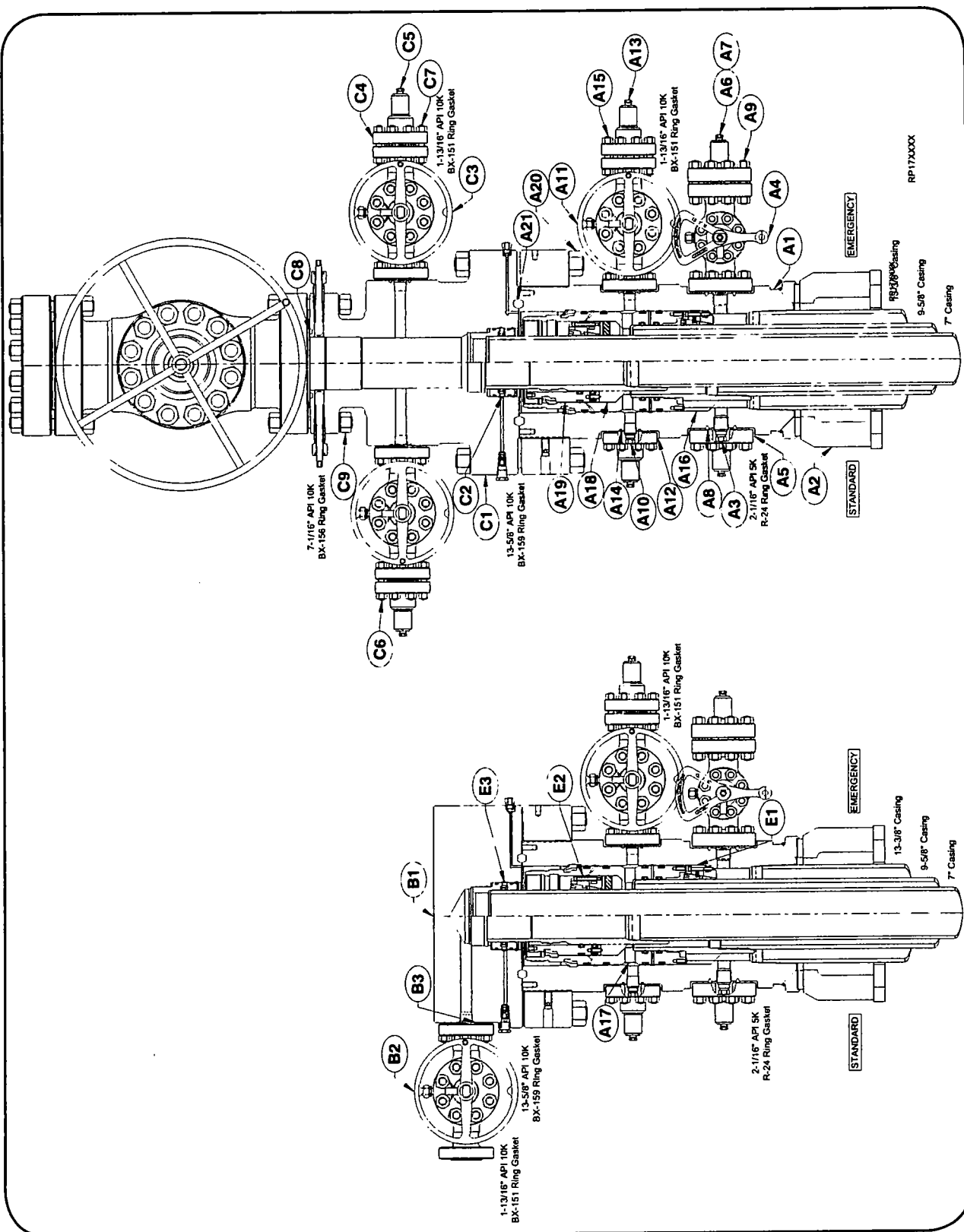
Publication: TC148-2

(FL & FLS Gate Valves  
Operation and Maintenance  
Manual)



TC148-2

## System Drawing



# Bill of Materials

**NOTE** Contact your Cameron representative for replacement part inquiries. Cameron personnel can check the latest revision of the assembly bill-of-material to obtain the appropriate and current replacement part number.

MN-DS HOUSING	
Item Qty	Description
A1 1	Assy; Casing Head Housing, MN-DS 10K, 13-5/8" Nom 10K OEC BX-159 w/ 20.500"-4TPI LH Stub Acme Top f/ Thd'd Flg and Prep f/ Internal Snap Ring x 13-3/8" BC Box Thd Btm, w/ (2) Upper 1-13/16" API 10K BX-151 Outlets w/ 1-13/16" API VR Thds and (2) Lower 2-1/16" API 5KR-24 Outlets w/ 2-1/16" API VR Thds, w/ 4 Grout Ports, Min Bore: 12.615" Part# 2345472-10-01
A2 1	Assy, Landing Base f/ 'MN-DS' Thd'd Housings 13-5/8" Csg, 24" OD Base Plate w/ 3" Flow-by Slots, 850K Lbs Capacity Part# 2057661-06-01
A3 1	VR Plug 1-1/2" 11-1/2 TPI-3/4 TPF 'Vee' Tubing Thd, 2-1/16" 2K - 10K Part# 2222164-02-01
A4 1	Gate Valve, Manual, Model Aop Distributed, 2-1/16" Bore, 5K Psi, 2-1/16" API Flg x Flg Part# 2737400-01-01
A5 2	Companion Flange, 2-1/16" API 5K x 2" API LP Part# 142362-01-03-02
A6 2	Bull Plug 2" LP w/ 1/2" NPT x 3-3/4" Lg Part# 007481-01
A7 2	Bleeder Fitting, Plug 1/2" NPT, 10K Psi Max Part# 2738068-02
A8 3	Ring Gasket, R-24 Part# 702001-24-02
A9 8	Stud W/ (2) Nuts, 7/8" x 6" Lg Part# Y51201-20220301

MN-DS HOUSING	
Item Qty	Description
A10 1	VR Plug 1-1/4" LP Thd, 1-13/16" 2K - 10K Part# 2222164-01-01
A11 1	Gate Valve, Manual, Model FLS, 1-13/16" Bore, 10K Psi, 1-13/16" API Flg x Flg Part# 141510-41-91-01
A12 2	Companion Flange, 1-13/16" API 10K w/ 2" API LP, 5K Psi WP Part# 142359-01-03-02
A13 1	Nipple, API 2" LP x 6" Lg Part# 021013-12
A14 3	Ring Gasket, BX-151 Part# 702003-15-12
A15 8	Stud w/ (2) Nuts, 3/4" x 5-1/4" Lg Part# Y51201-20120201
A16 1	Casing Hanger, Mandrel, Type 'MN-DS', 13-5/8" Nom x 9-5/8" API LC Box Thd Btm x 10.000"-4TPI LH Stub Acme Running Thd, Min Bore: 8.835", Max WP: 8K Psi, Max Hanging Load: 800KLbs Part# 2345509-04
A17 1	Assy; Packoff Support Bushing, Type 'MN-DS', 13-5/8" 10K, w/ 13-5/8" Nom Dovetail Seal, and 9-5/8" Nom 'T' Seal and w/ Internal and External-lock Ring Prep, Min Bore: 8.835" Part# 2161673-01-01
A18 1	Mandrel Hanger, Type 'MN-DS', 11" Nom x 7" 29 Lb/Ft API Buttress Thd Btm x 7.500"-4TPI LH Stub Acme Running Thd w/ 7" Nom Slick Neck Top w/ Flow-by Slots, Min Bore: 6.169" Part# 2345649-36-01

MN-DS HOUSING	
Item Qty	Description
A19 1	Assy; Seal Packoff f/ 11" Nom Type 'MN-DS', w/ 9.875"-4TPI LH Stub Acme Thd w/ 7-3/4" Dbl 'T' Seals At ID and Dovetails At OD Part# 2217588-05-03
A20 20	Stud w/ (2) Nuts, 1-7/8" x 17-3/4" Lg Part# 621650-15
A21 1	Ring Gasket, BX-159 Part# 702003-15-92
ABANDONMENT CAP	
Item Qty	Description
B1 1	Assy; Capping Flg, 7-1/16" API 10K BX-156 Std'd Blind Top x 13-5/8" API 10K BX-159 Std'd Btm, w/ (1) 1-13/16" API 10K BX-151 SSO, w/ 1-13/16" API VR Thd, w/ 11" 'NX' Btm Prep, Oal: 12" Part# 2392883-03-01
B2 1	Gate Valve, Manual, Model FLS, 1-13/16" Bore, 10K Psi, 1-13/16" API Flg x Flg Part# 141510-41-91-01
B3 1	Ring Gasket, BX-151 Part# 702003-15-12
TUBING SPOOL	
Item Qty	Description
C1 1	Assy; Tbg Spl, Type 'C', 13-5/8" API 10K Flg Btm x 7-1/16" API 10K Flg Top, w/ (2) 1-13/16" API 10K SSO's w/ 1-13/16" API VR, w/ Spcl 11" 'NX' Btm Prep Part# 2329584-01-02
C2 1	Assy; 'NX' Bushing Nom 11" w/ 7" OD Csg Part# 608783-17

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13-5/8" 10K MN-DS System  
13-3/8" x 9-5/8" x 7" Casing Program

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## Bill of Materials

**NOTE** Contact your Cameron representative for replacement part inquiries. Cameron personnel can check the latest revision of the assembly bill-of-material to obtain the appropriate and current replacement part number.

TUBING SPOOL			SERVICE TOOLS			SERVICE TOOLS		
Item	Qty	Description	Item	Qty	Description	Item	Qty	Description
C3	2	Gate Valve, Manual, Model FLS, 1-13/16" Bore, 10K Psi, 1-13/16" API Flg x Flg Part# 141510-41-91-01	ST1	1	Conversion Assy; Casing Head Torque Tool, f/ 'Mn-Ds' w/ Lift Plate, 13-3/8" API 8Rnd Short Thd Casing Box Thd Top x .750"-10Unc (16) Bolt Pattern Btm (8) Torque Pins, Min Bore: 12.605" Safe Hanging Load: 290K Lbf Max Rated Torque: 20K Lbf-Ft Max Rated Pressure: 3K Psi Part# 2143701-75	ST7	1	Running Tool, Type 'MN-DS' f/ 13-5/8" Nom Packoff Support Bushing w/ 4-1/2" API IF Thd Top x 4-1/2" API IF Thd Btm and 12.375" 4-TPI LH Stub Acme Thd, Working Load: 275K Lbf Part# 2017712-10-01
C4	2	Companion Flange, 1-13/16" API 10K w/ 2" API LP, 5K Psi WP Part# 142359-01-03-02	ST2	1	Assy; Test Plug, Type 'C', 13-5/8" Nom f/ Use In Cactus Head w/ 'WQ' Seat 4-1/2" IF Box X 4-1/2" IF Pin Btm, w/ Weep Hole On Top Portion Of Test Plug Part# 2247044-01-01	ST8	1	Assy; Test Plug, Type 'IC', 11" Nom, 4-1/2" IF Box Top x Pin Btm, w/ Weep Hole On Top Portion of Test Plug, w/ (2) Dovetail Seal Grooves Part# 2247042-10-01
C5	1	Nipple, API 2" LP x 6" Lg Part# 021013-12	ST3	1	Running Tool, 13-5/8" Nom, w/ Dbl Lead Pin Thd Btm x 4-1/2" IF Box Thd Top, w/ 6-1/2" OD Ext'D Neck Part# 608536-19	ST9	1	Tool f/ Running & Retrieving Wear Bushing 11" Nom x 4-1/2" API IF Thd w/ Dbl Lead Thd Part# 661822-06
C6	3	Ring Gasket, BX-151 Part# 702003-15-12	ST4	1	Assy; Wear Bushing, f/ 13-5/8" Nom MN-DS, w/ 4 O-Rings f/ Use w/ Thd'D Running Tool, Min Bore: 12.615" Part# 2394103-01-01	ST10	1	Assy; Wear Bushing, f/ 11" Nom Type 'MN-DS', Dbl Lead Thd, Min Bore: 8.910" Part# 2125720-10-01
C7	16	Stud w/ (2) Nuts, 3/4" x 5-1/4" Lg Part# Y51201-20120201	ST5	1	Assy; Running Tool, 13-5/8" Nom, w/ 9-5/8" API 8Rd LC Box Thd Top x 10.000"-4TPI LH Stub Acme Running Thd Btm, w/ Single O-Ring and (3) Centralizing Ribs, Min Bore: 8.73" Part# 2161757-69-01	ST11	1	Assy; Running Tool f/ Fluted Mandrel Hanger, 'MN-DS', 11" Nom x 7.500"-4 TPI LH Stub Acme Thd Btm x 7" API Buttress Box Thd Top, Min Bore: 6.66", Max Lifting Load Capacity: 500K Lbs Part# 2161757-87-01
C8	1	Ring Gasket, BX-156 Part# 702003-15-64	ST6	1	Assy; Jetting Tool, 13-5/8" Nom Compact Housing, Type 'SSMC' Part# 2125914-01	ST12	1	Assy; Weldment, Wash-Tool, 11" Nom x 23.00" Lgw/ NC50 (4-1/2" IF) Box Thd Top Part# 2017726-05-01
C9	12	Stud w/ (2) Nuts, 1-1/2" x 11-1/4" Lg Part# 621650-07				ST13	1	Running Tool, f/ 11" Nom Seal Assembly w/ 4-1/2" API IF Thd Top x 2-7/8" API IF Thd Btm and 9.875"-4TPI LH Stub Acme Thd, Oal: 21.60" Part# 2017712-07-01
EMERGENCY EQUIPMENT								
Item	Qty	Description						
E1	1	Assy; Type MN-DS-IC-1, Casing Slip, 13-5/8" Nom x 9-5/8" Csg, w/ Holes f/ Anti-Rotation Pins Part# 2161741-08-01						
E2	1	Casing Hanger, IC-2, 11" x 7" Part# Y15001-21303801						
E3	1	Assy; 'NX' Bushing, 11" Nom x 7" Csg w/ Integral Bit Guide Part# 2161829-01-01						

**NOTE** DRAFT Publication is for Review ONLY. NOT approved for System Installation. NOT approved for field usage. NOT approved for distribution. If you obtain a DRAFT copy - it is your responsibility to verify SAP revision level or contact Houston Engineering to ensure document has been approved and released.

## Bill of Materials

**NOTE** Contact your Cameron representative for replacement part inquiries. Cameron personnel can check the latest revision of the assembly bill-of-material to obtain the appropriate and current replacement part number.

### MN-DS HOUSING

Item Qty	Description
ST14 1	Lockring Installation Tool Part# 2360305-48
ST15 1	Assy; 13-5/8" Nom Combo Tool, Running & Testing, 3-1/2" IF API Box Thd Top & Btm w/ 2.485" OD 4-TPI LH Type 'H' BPV Thd Part# 2247068-03-01
ST16 1	Assy; 13-5/8" Nom MN-DS Bit Guide, f/ 7" Csg w/ (4) Communication/ Weep Holes, (4) Welded Stop Lugs, Min Bore: 6.34" Part# 2254334-06

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13-5/8" 10K MN-DS System  
13-3/8" x 9-5/8" x 7" Casing Program



## Stage 1.0 — 13-3/8" Casing

**SAFETY NOTE:** Always wear proper PPE (Personal Protective Equipment) such as safety shoes, safety glasses, hard hat, gloves, etc. to handle and install equipment.



**CAUTION** Do not use the Torque Tool assembly as a lever to lift or move the Casing Head Housing. The Torque Tool assembly is designed to be used to install the Landing Base and the Landing Joint.

**CAUTION** Do not use the Torque Tool assembly to pry or lever the Casing Head Housing. The Torque Tool assembly is designed to be used to install the Landing Base and the Landing Joint.

### 1.1. Install the Casing Head Housing

- 1.1.1. Run the 13-3/8" casing and space out as required. Retrieve the landing joint.

**NOTE** Lift plate, Running Tool, Landing Joint, Casing Head Housing, and Lower Pup Joint (Steps 1.1.2. - 1.1.9.) will be made up offline and shipped to location as one assembly.

- 1.1.2. Examine the **MN-DS Housing (Item A1)**. Verify the following:

- bore is clean and free of debris
- ring groove and seal areas are clean and undamaged
- all threads are clean and undamaged
- pup joint and all outlet equipment are properly installed, clean and undamaged
- outlet equipment removed and flush plugs are installed
- **Landing Base (Item A2)** is properly installed, clean and undamaged

- 1.1.3. Orient the assembly as illustrated on page 14.

- 1.1.4. Examine the **Casing Head Torque Tool assembly (Item ST1)**. Verify the following:

- bore is clean and free of debris
- all threads are clean and undamaged
- o-rings are properly installed, clean and undamaged
- all torque pins are properly installed, retracted, clean and undamaged

- 1.1.5. Make up a landing joint to the top of the Torque Tool assembly.

**NOTE** Landing joint may be made up to the Running Tool in advance.

- 1.1.6. Lubricate the o-rings of the Lift Plate and the ID of the Housing with a light coat of oil or grease.

**WARNING** Excessive oil or grease may prevent a positive seal from forming.

- 1.1.7. Lift and suspend the Torque Tool assembly over the Housing.

- 1.1.8. Lower the Torque Tool assembly into the Housing and align the capscrew holes on the Lift Plate and the threaded holes on the Housing.

- 1.1.9. Run in all (16) capscrews to a positive stop to hold the Torque Tool assembly and the Housing together.

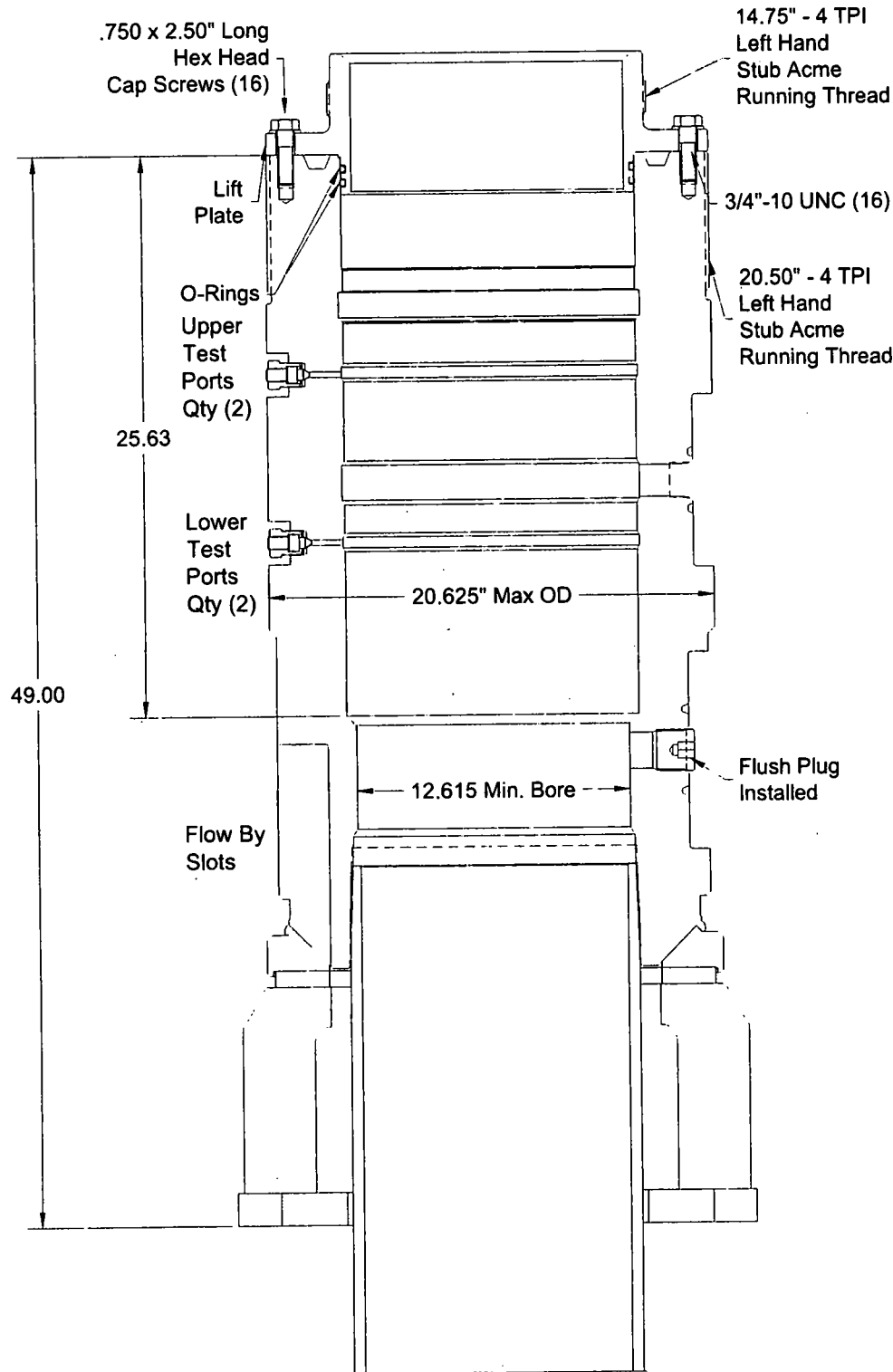
**NOTE** Capscrews will be made up and torqued offline per API 6A (referenced in the torque chart at the back of this manual).

OFFLINE

OFFLINE

# Stage 1.0 — 13-3/8" Casing

## MN-DS Casing Head Housing 13-5/8" 10K OEC Top x 13-3/8" Threaded Bottom



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13-5/8" 10K MN-DS System  
13-3/8" x 9-5/8" x 7" Casing Program

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## Stage 1.0 — 13-3/8" Casing

- 1.1.10. Carefully lower the Housing assembly until the mating threads of the 13-3/8" casing and the pin threads of the pup joint make contact. Make up the connection to the thread manufacturer's recommended optimum torque.

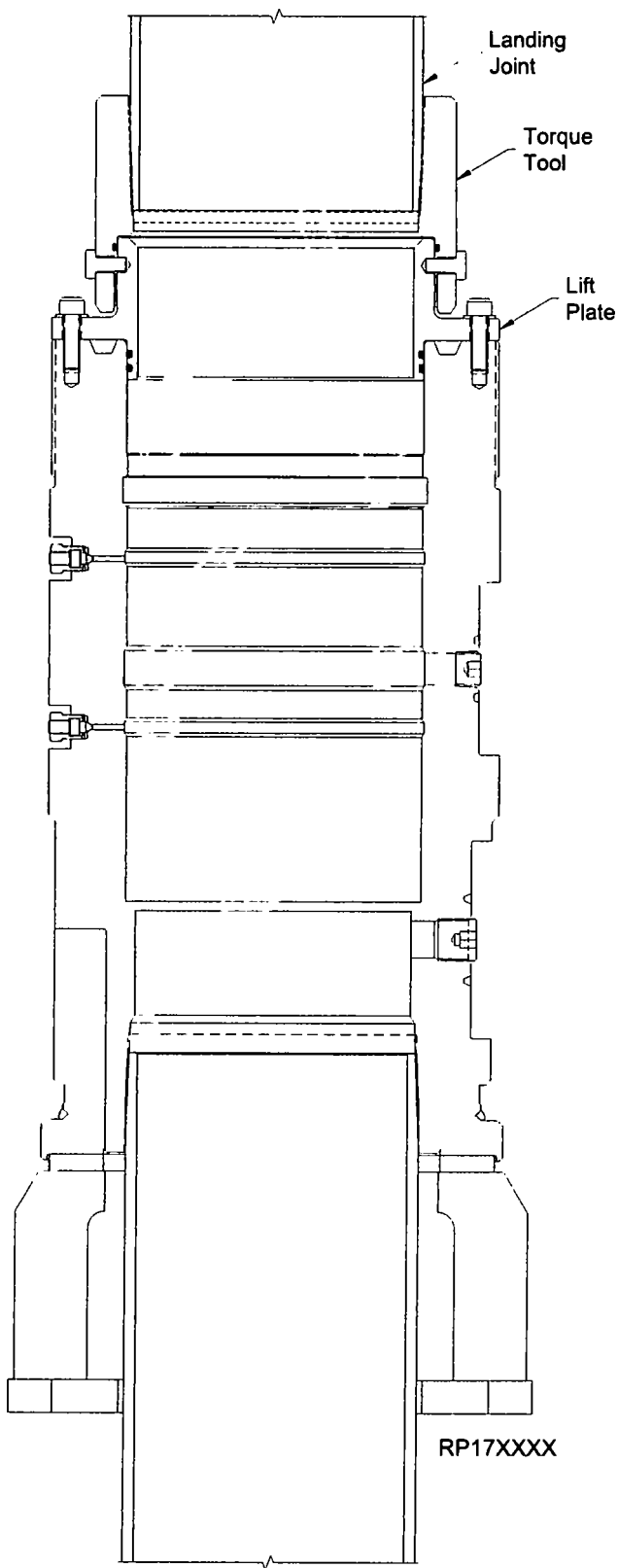
**NOTE** Max torque 20,000 ft/lbs.

- 1.1.11. Pick up and release Casing from floor slips. Turn and orient outlets as required.
- 1.1.12. Carefully lower the Housing assembly and land as required.
- 1.1.13. Rig should chain down landing joint during cement to prevent the Housing from rising during the cement operations.

**NOTE** Make sure landing joint remains level after it is chained down.

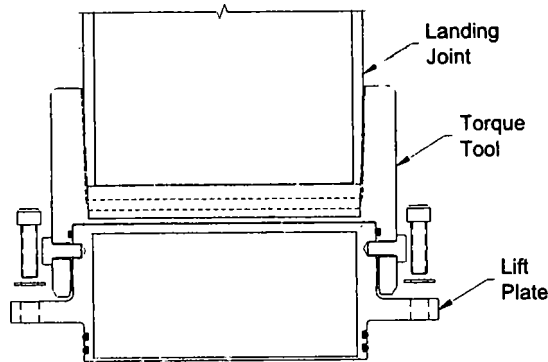
- 1.1.14. With the Housing properly landed and oriented, cement the casing as required.

**NOTE** Cement returns may be taken through the Flow-by Slots of the Housing.



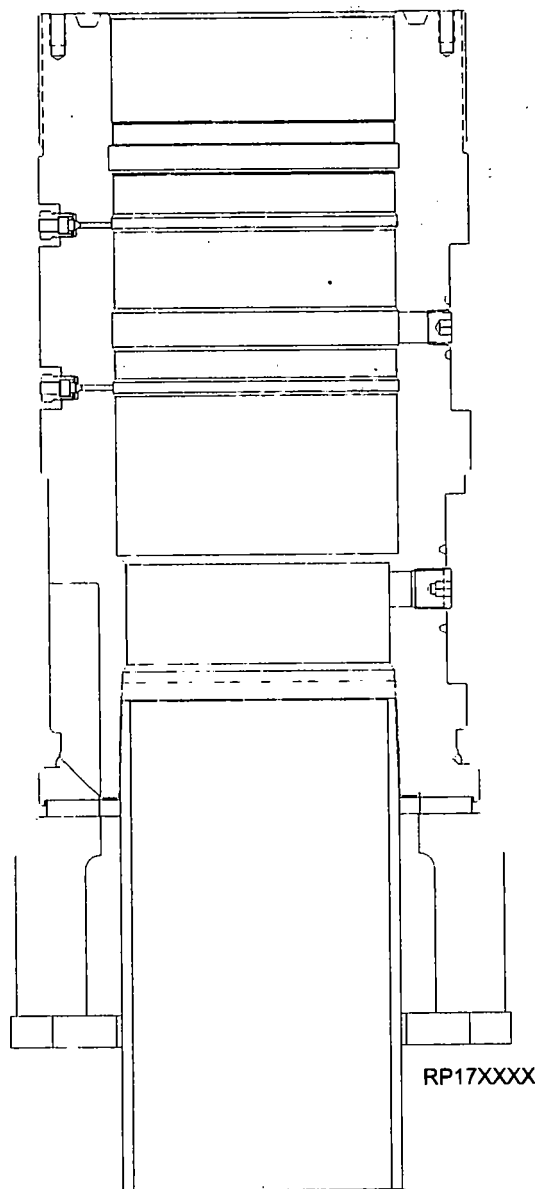
## Stage 1.0 — 13-3/8" Casing

- 1.1.15. With cementing complete, remove the Torque Tool assembly from the top of the Housing by removing the capscrews and washers of the Lift Plate and lifting straight up.
- 1.1.16. Retrieve the Torque Tool assembly to the rig floor.
- 1.1.17. Remove all (8) Torque Pins from the Torque Tool.
- 1.1.18. Turn the landing joint clockwise to remove the Torque Tool from the Lift Plate, approximately 6-1/2 to 7 turns.



**NOTE** Running Tool may be made up to landing joint permanently.

- 1.1.19. Clean, grease and store the Lift Plate and Torque Tool as required.



## Stage 1.0 — 13-3/8" Casing

- 1.1.20. Install the Threaded Flange to the top of the Casing Head Housing.

### ⚠ CAUTION

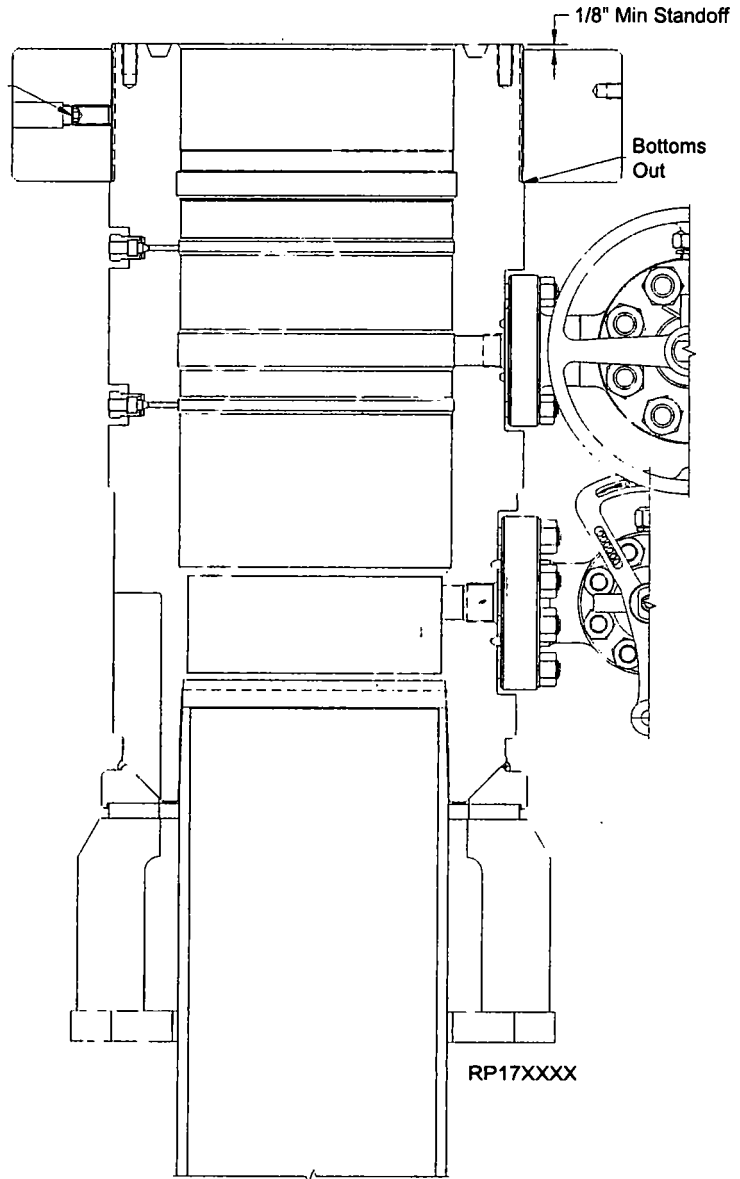
Always verify the casing head is properly installed to the casing head.

Before the threaded flange is installed, verify the casing head is properly installed to the casing head. Verify the casing head is properly installed to the casing head. Verify the casing head is properly installed to the casing head.

Verify the casing head is properly installed to the casing head. Verify the casing head is properly installed to the casing head. Verify the casing head is properly installed to the casing head.

Approved, Remanufactured casing head and casing head.

Run in (2)  
Set Screws



- 1.1.21. Remove Flush Plugs and install upper and lower Housing outlet equipment.

- 1.1.22. Install VR Plugs, and test the outlet valves to:

- Lower Valves to 5,000 psi
- Upper Valves to 10,000 psi

- 1.1.23. Remove VR Plugs, and close Upper and Lower outlet valves.

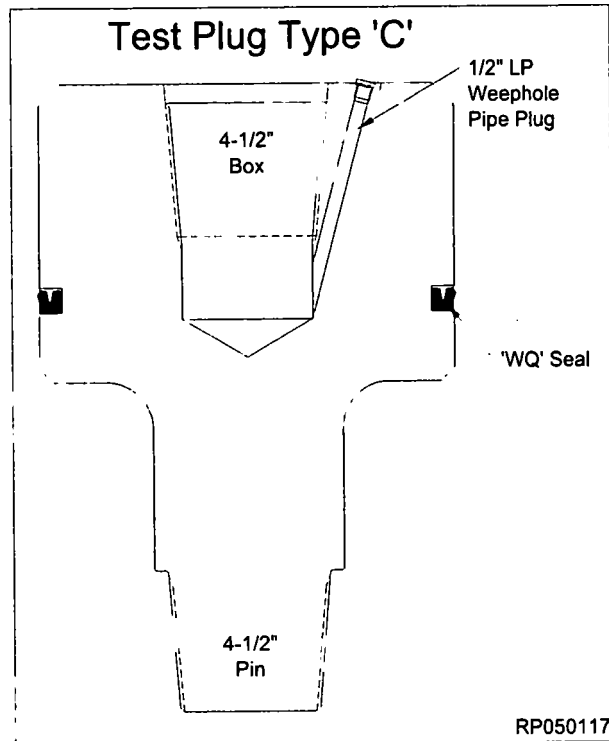
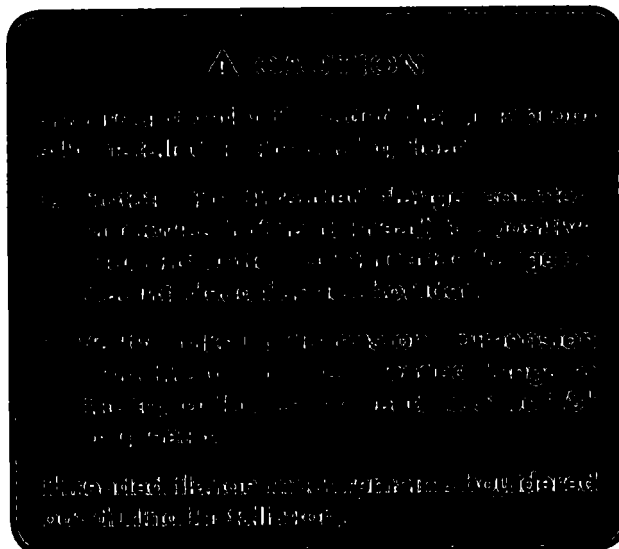
## Stage 2.0 — 9-5/8" Casing

### 2.1. Test the BOP Stack

**NOTE** Immediately after making up the BOP Stack and periodically during the drilling of the hole for the next casing string, the BOP Stack (connections and rams) must be tested.

**WARNING** Previously used BOP Test Plug must be inspected for damage due to wear. Where warranted such as highly deviated wells the Test Plug must be checked periodically to insure integrity.

2.1.1. Make up the BOP Stack using a spare **BX-159** ring gasket.



2.1.2. Examine the **Test Plug (Item ST2)**. Verify the following:

- seal is in place and undamaged
- 1/2" pipe plug is installed, if required
- all threads are clean and undamaged

2.1.3. Orient the Tool as illustrated.

2.1.4. Make up a joint of drill pipe to the top of the Tool.

**WARNING** A minimum of one joint of Drill Pipe is required on the bottom of the BOP Test Plug to ensure BOP Test plug remains centralized.

2.1.5. Lubricate the seal of the Tool with a light coat of oil or grease.

**WARNING** Excessive oil or grease may prevent a positive seal from forming.

## Stage 2.0 — 9-5/8" Casing

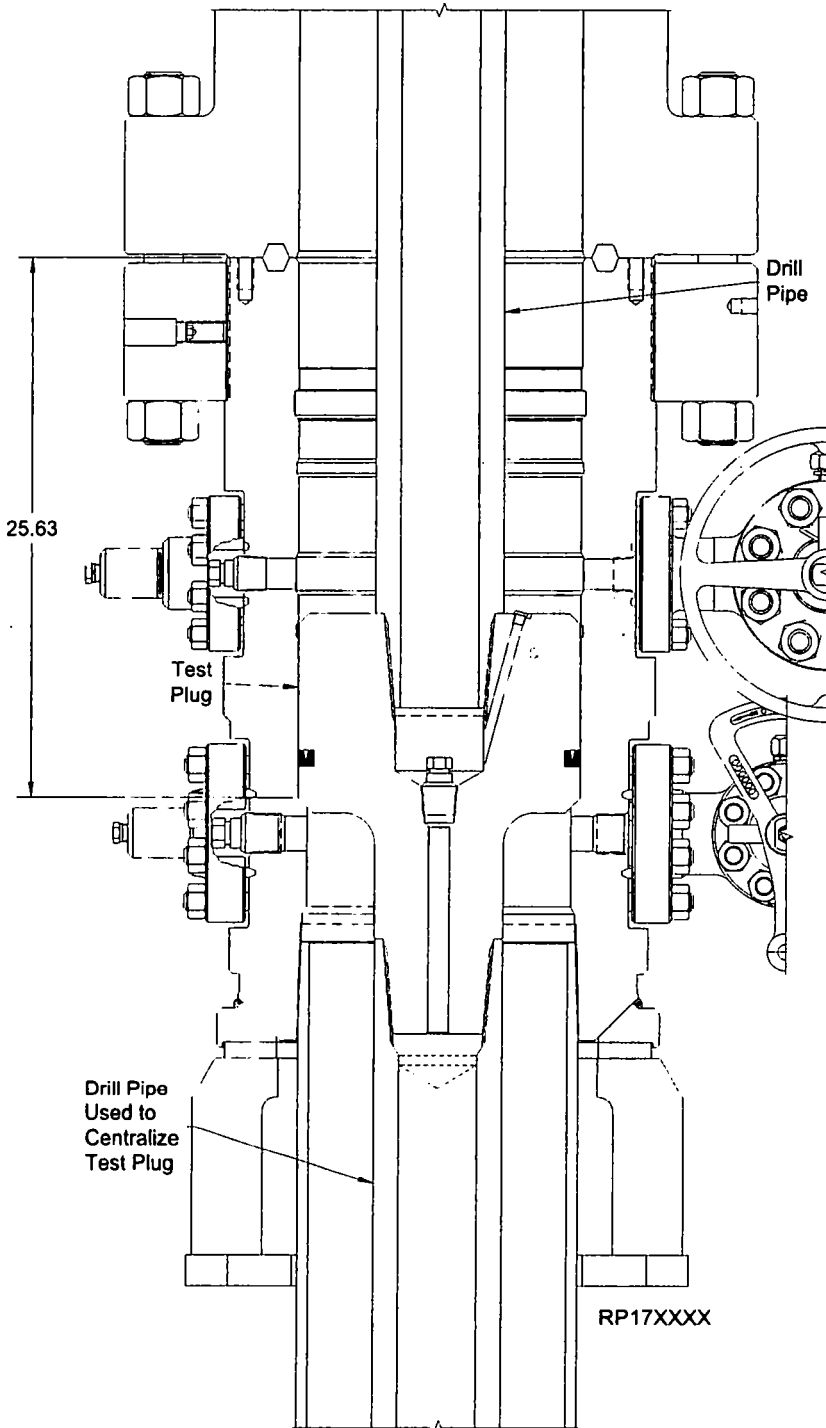
- 2.1.6. Open the lowermost annulus valve of the Housing and drain fluid to land the Test Plug. Leave valve open.
- 2.1.7. Slowly lower the Tool through the BOP Stack, measure and record, until it lands on the load shoulder in the Housing.

**NOTE** Distance from the Housing load shoulder to the face of the BOP flange is 25.63".

- 2.1.8. Close the BOP rams on the drill pipe and test to **10,000 psi maximum**.
- 2.1.9. Monitor the annulus valve for signs of pressure.
- 2.1.10. After a satisfactory test is achieved, release pressure, close the annulus valve and open the rams.
- 2.1.11. Remove as much fluid from the BOP as possible.
- 2.1.12. Retrieve the Test Plug slowly to avoid damage to the seal.

**NOTE** It may be necessary to open the annulus valve when starting to retrieve the Test Plug to relieve any vacuum that may occur. Leaving annulus valve open during testing insures safety of surface casing.

- 2.1.13. Close lower annulus valve.



## Stage 2.0 — 9-5/8" Casing

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

**WARNING** Previously used Wear Bushings must be inspected for damage and significant reduction in wall thickness due to wear. Where warranted such as highly deviated wells the Wear Bushing must be checked periodically to insure integrity.

### 2.2. Run the Wear Bushing Before Drilling

2.2.1. Examine the **Wear Bushing Running Tool** (Item ST3). Verify the following:

- all threads are clean and undamaged
- bore is clean and free of debris
- pup joint is properly installed for tonging

2.2.2. Orient the Tool as illustrated.

2.2.3. Examine the **Wear Bushing** (Item ST4). Verify the following:

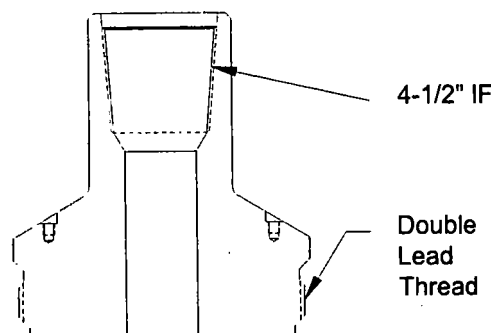
- bore is clean and free of debris
- threads are clean and free of debris
- o-ring seals are in place, clean and undamaged

2.2.4. Orient the Wear Bushing as illustrated.

**WARNING** Do NOT cut o-rings.

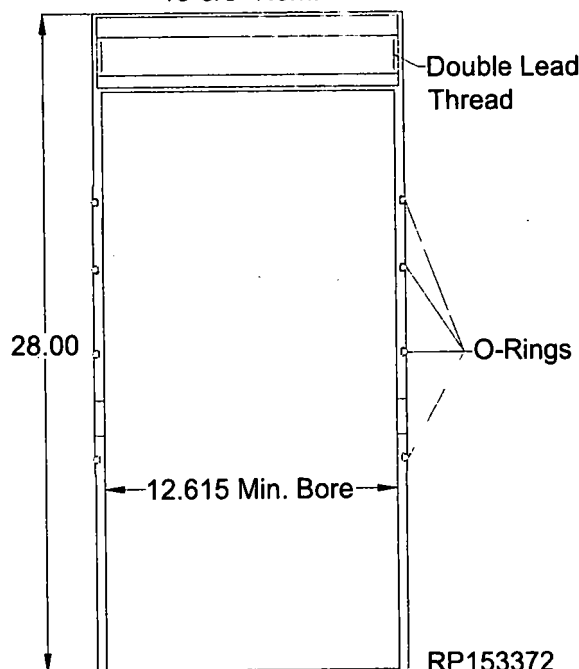
**CAUTION** This Wear Bushing has no mechanical retention device. Care must be exercised when tripping out the hole to avoid dislodging the Wear Bushing which could compromise safety if it becomes lodged in the BOP.

### Wear Bushing Running Tool



RP120744

### Wear Bushing 13-5/8" Nom.



RP153372

RP-003815

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13-5/8" 10K MN-DS System  
13-3/8" x 9-5/8" x 7" Casing Program



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## Stage 2.0 — 9-5/8" Casing

- 2.2.5. Lubricate the o-ring seals of the Wear Bushing with a light coat of oil or grease.

**WARNING** Excessive oil or grease may prevent a positive seal from forming.

- 2.2.6. Make up a joint of drill pipe to the top of the Tool.

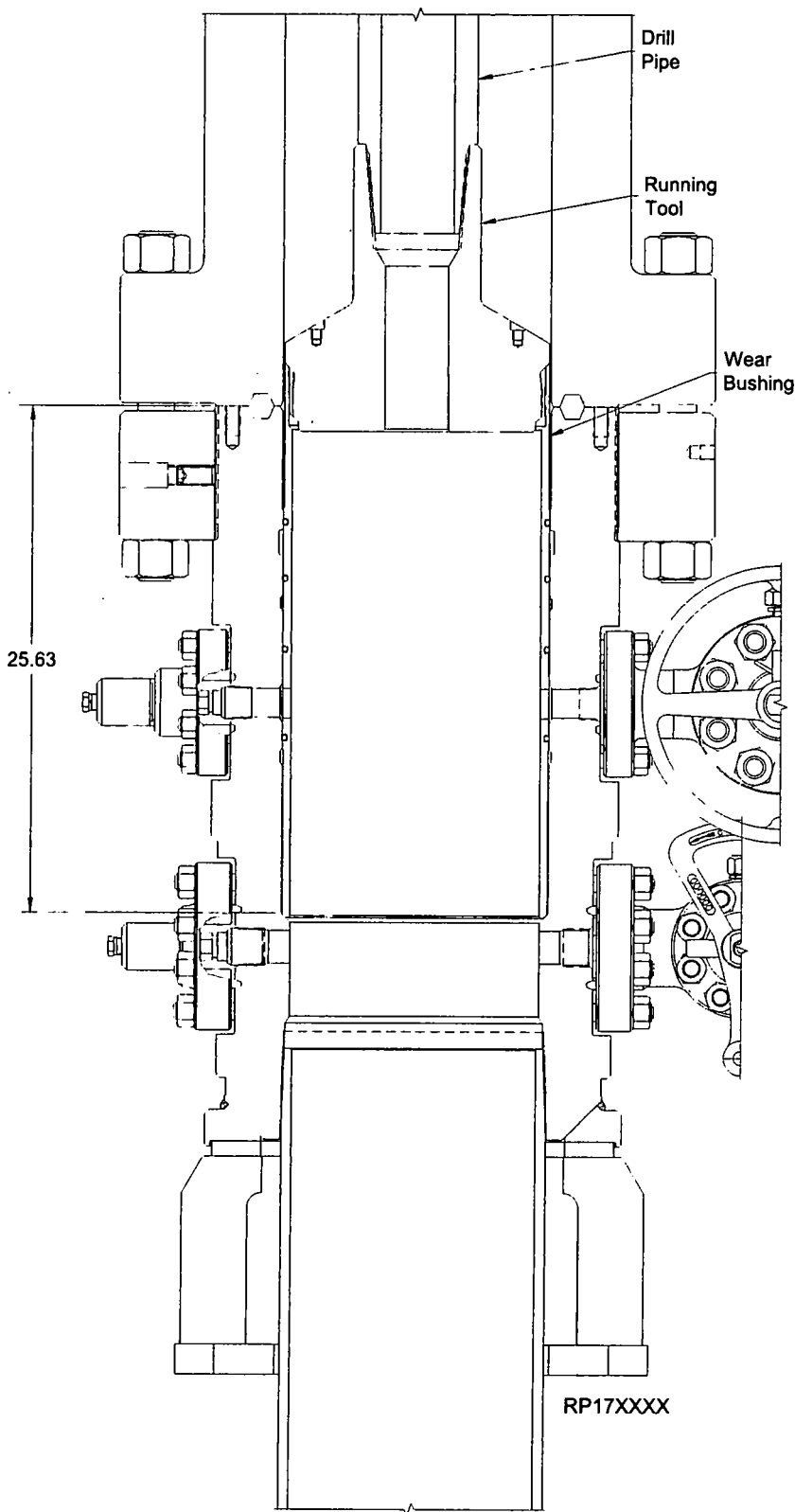
- 2.2.7. Lower the Tool into the Wear Bushing and turn the drill pipe counterclockwise until thread 'jump' can be felt, then clockwise to a positive stop to thread the Tool into the Wear Bushing.

**WARNING** Do NOT overtighten the Tool/ Wear Bushing connection.

- 2.2.8. Carefully lower the Tool/ Wear Bushing assembly through the BOP, measure and record, until it lands on the load shoulder of the Housing.

**NOTE** Distance from the Housing load shoulder to the face of the BOP flange is 25.63".

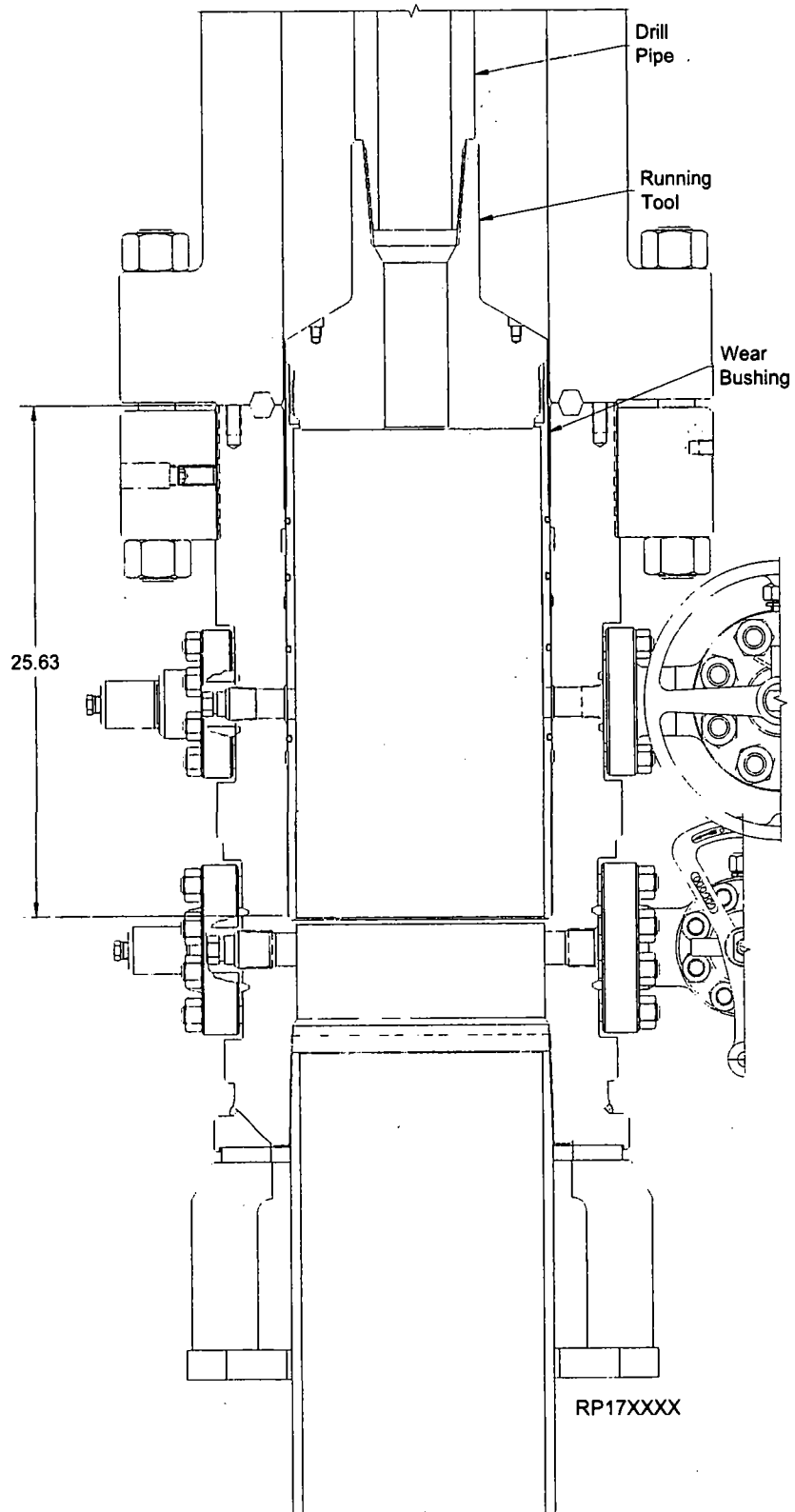
- 2.2.9. Disengage the Tool from the Wear Bushing by turning the drill pipe counterclockwise and lifting straight up.
- 2.2.10. Remove the Tool from the drill string.
- 2.2.11. Clean, grease, and store the Tool as required.
- 2.2.12. Drill as required.



## Stage 2.0 — 9-5/8" Casing

### 2.3. Retrieve the Wear Bushing After Drilling

- 2.3.1. Make up the Tool to the drill pipe with the threads down.
- 2.3.2. Slowly lower the Tool into the Wear Bushing.
- 2.3.3. Turn the Tool counter clockwise until thread jump can be felt. Slack off all weight to make sure the Tool is down. Then turn clockwise to a positive stop.
- 2.3.4. Slowly retrieve the Wear Bushing to the rig floor and remove it and the Tool from the drill string.
- 2.3.5. Clean, grease and store the Tool and Wear Bushing as required.



## Stage 2.0 — 9-5/8" Casing

### Landing of Mandrel Hangers

Cameron service personnel must verify that the mandrel hanger is landed properly on the load shoulder in the wellhead. This can be accomplished by one of three methods.

- Visually observe the scribe line mark around mandrel hanger running tool through upper side outlet valve.
- Conduct a dry run and mark the dedicated landing joint prior to running the casing or tubing.
- Calculate the distance from the rig floor to the landing shoulder and confirm that the hanger has traveled the required distance.

### 2.4. Hang Off the Casing

**NOTE** In the event the 9-5/8" casing should become stuck, and the Mandrel Hanger is unable to be used, refer to Section 2.5.

2.4.1. Run the 9-5/8" casing and space out appropriately.

2.4.2. Hang off the last joint of casing to be run in the floor slips at height that will enable easy handling and make up of the Hanger and landing joint.

2.4.3. Examine the **Casing Hanger Running Tool (Item ST5)**. Verify the following:

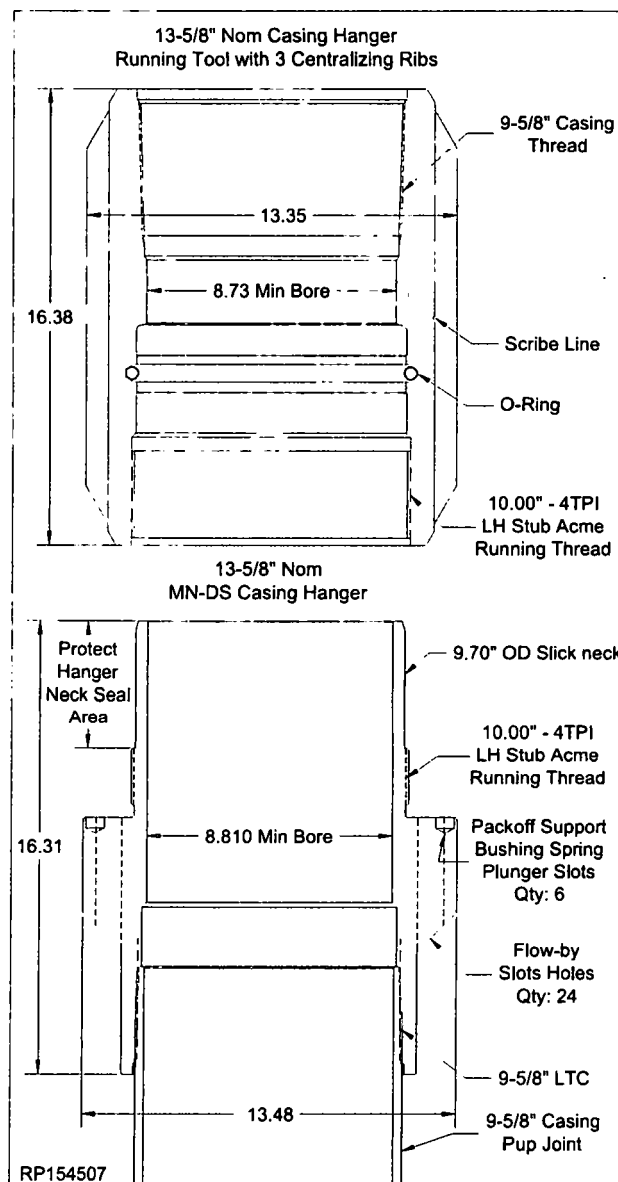
- bore is clean and free of debris
- all threads are clean and undamaged
- internal seal is properly installed, clean and undamaged
- scribe line is properly identified with paint as required

2.4.4. Orient the Tool as illustrated.

2.4.5. Examine the **Casing Hanger (Item A16)**. Verify the following:

- bore is clean and free of debris
- all threads are clean and undamaged
- neck seal area is clean and undamaged
- casing pup joint is properly installed
- flow-by slots are clean and free of debris

2.4.6. Orient the Hanger as illustrated.



## Stage 2.0 — 9-5/8" Casing

- 2.4.7. Make up a landing joint to the top of the Running Tool.
- 2.4.8. Lubricate the running threads of both the Tool and the Hanger and the seal of the Tool with a light coat of oil or grease.

**WARNING** Excessive oil or grease may prevent a positive seal from forming.

- 2.4.9. Lift and suspend the Tool over the Hanger.
- 2.4.10. Lower the Tool onto the Hanger until the mating threads make contact.
- 2.4.11. While balancing the weight, turn the Tool clockwise until the thread 'jump' can be felt then counterclockwise to a positive stop. Approximately 8-1/2 turns.

**WARNING** Do NOT torque the connection.

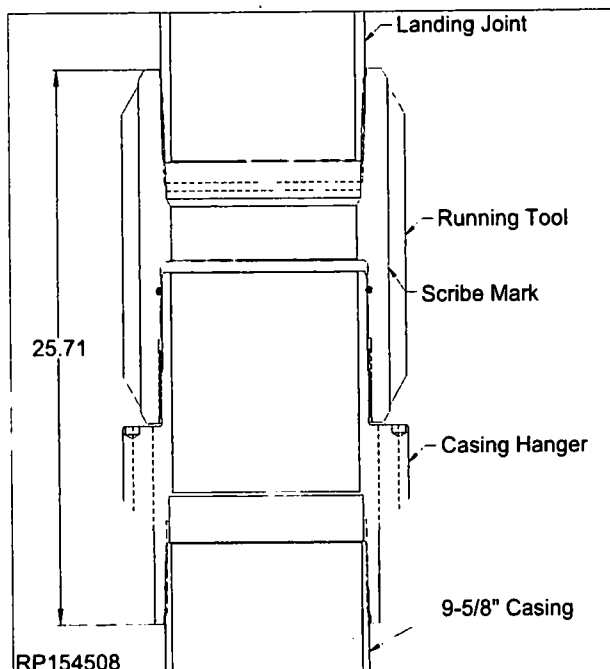
### CAUTION

Do not use the tool joint to make a seal. The tool joint is designed for the purpose of making a seal. It is not designed to be used as a seal. The tool joint will not seal and will not be replaced.

- 2.4.12. Back the Tool off 1/2 a turn clockwise to keep the threads from binding up.
- 2.4.13. Lift the Hanger above the casing hung off in the floor.
- 2.4.14. Lower the Hanger assembly until the mating threads of the casing and the pin threads of the pup joint make contact.

**NOTE** When making up the Hanger to the casing do not use the seal neck area for back up.

- 2.4.15. While balancing the weight, turn the Hanger assembly counterclockwise until the thread 'jump' can be felt then clockwise to the thread manufacturer's recommended optimum torque.



## Stage 2.0 — 9-5/8" Casing

2.4.16. Open the lowermost side outlet valve of the Housing.

2.4.17. Release the casing from the floor slips and lower it into the well, measure and record, until the Hanger lands on the load shoulder in the Housing.

**NOTE** Distance from the Housing load shoulder to the face of the BOP flange is 25.63".

2.4.18. Ensure Hanger is centered in well bore.

2.4.19. Slack off all weight on the casing.

2.4.20. Verify through the open outlet on the MN-DS Housing that the Hanger has landed properly. Ensure the scribe line on the Tool is in the middle of the uppermost outlet of the MN-DS Housing.

2.4.21. Cement as required.

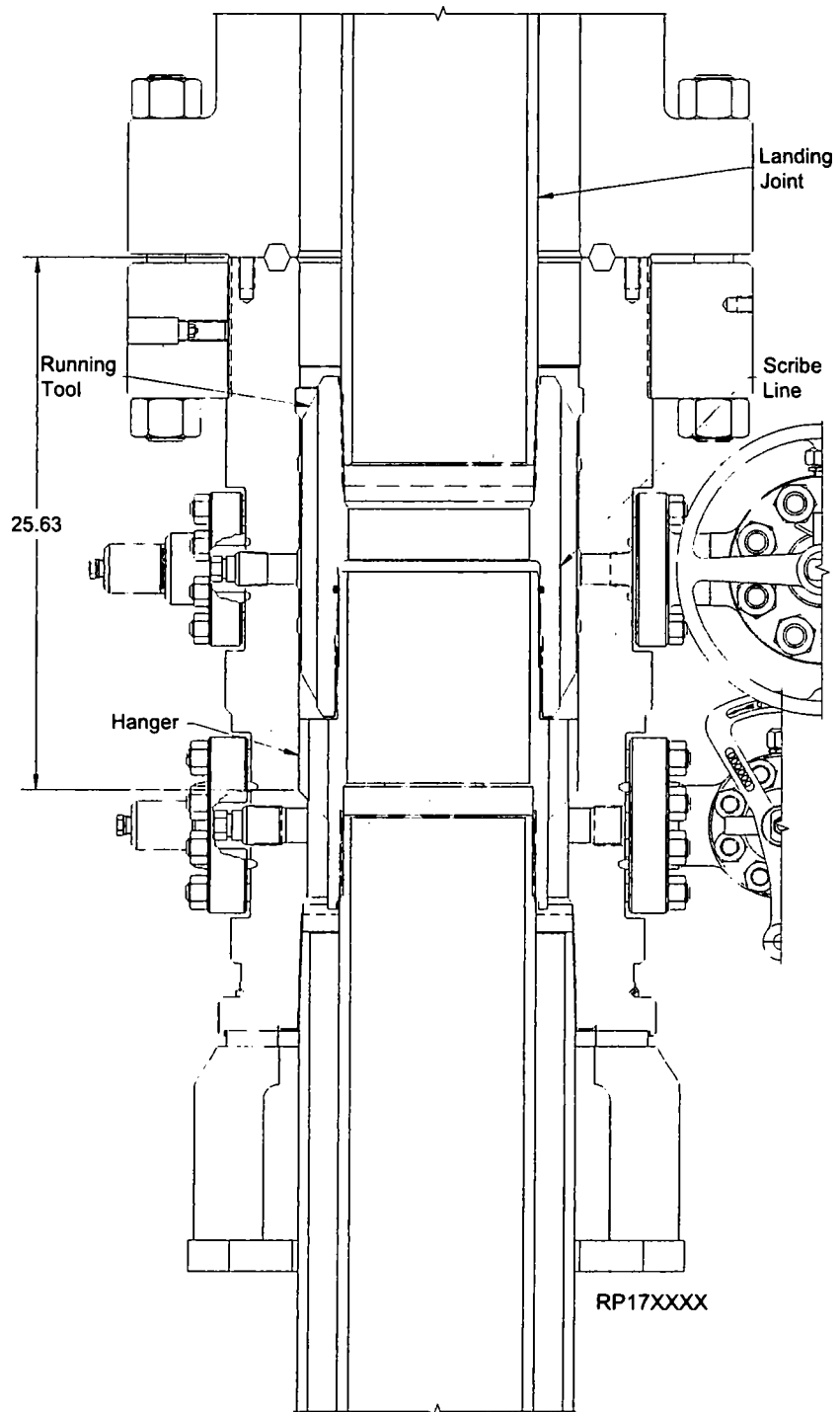
**NOTE** Cement returns may be taken through the flow-by slots of the Hanger and out of the BOP Stack.

2.4.22. With cementing completed, turn the landing joint clockwise 8-1/2 turns to release the Tool from the Hanger.

**NOTE** Only use chain tongs to turn the landing joint. Do NOT use top drive or CRT as this will damage the Hanger and Tool threads.

2.4.23. Retrieve the Tool to the rig floor.

2.4.24. Clean, grease and store the Tool as required.



## Stage 2.0 — 9-5/8" Casing

**SAFETY NOTE:** Always wear proper PPE (Personal Protective Equipment) such as safety shoes, safety glasses, hard hat, gloves, etc. to handle and install equipment.

### **⚠ DANGER**



### **NOTE**

1. Reconfirm the Casing OD and grade. Remove and clean loose scale from Casing OD.
2. Verify Slip Bowl taper is smooth, clean with no corrosion and damage free.
3. Disassembly of the Hanger to re-orient the slips is not required.

## 2.5. Hang Off the Casing (Emergency)

**NOTE** The following procedure should be followed **ONLY** if the casing should become stuck. If the Mandrel Casing Hanger was used, skip this stage.

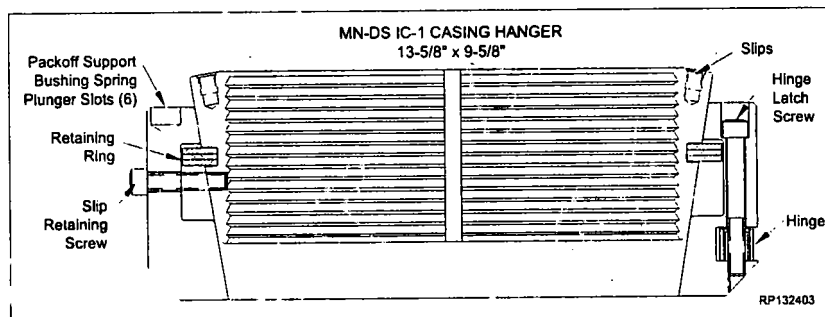
- 2.5.1. Run the Casing and cement as required.

**NOTE** Ensure that the Casing is centralized. Hanger clearances are small and centering must be accurate.

- 2.5.2. Drain the BOP and Housing bowl through the lowermost valve of the Housing. Leave the valve open until the Casing Hanger is set.
- 2.5.3. Ensure the well is safe and under control.

**NOTE** Ensure hang off weight desired is picked up before installing slips around casing.

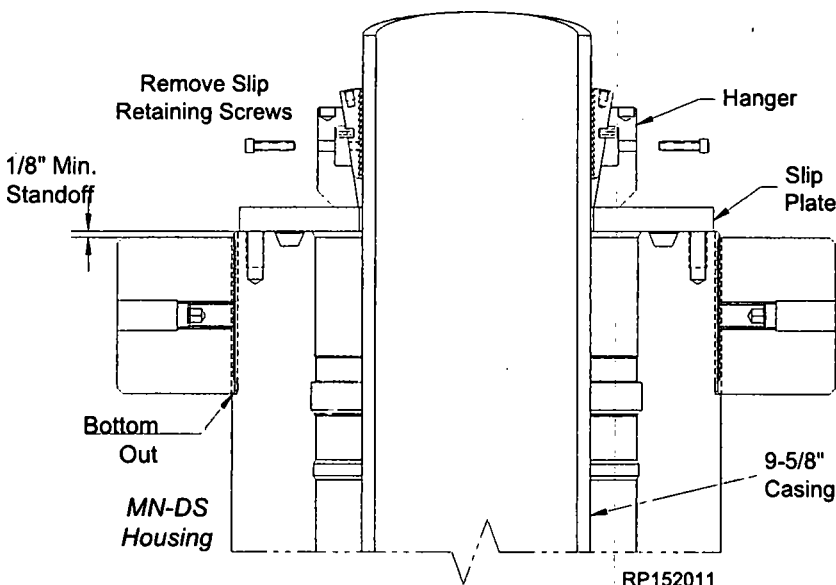
- 2.5.4. Separate the BOP Stack from Housing and suspend it above the Housing high enough to facilitate installation of the Slip Casing Hanger.
- 2.5.5. Washout as required.



- 2.5.6. Examine the **MN-DS-IC-1 Slip Type Casing Hanger (Item E1)**. Verify the following:
  - segments are clean, undamaged and secure
  - all screws are in place and snug

## Stage 2.0 — 9-5/8" Casing

- 2.5.7. Remove the latch screw and separate the Hanger halves.
- 2.5.8. Place a slip plate on the Housing flange against the casing to support the Hanger.
- 2.5.9. Ensure the casing is centered in well bore.
- 2.5.10. Wrap the Hanger around the casing and replace the latch screw.
- 2.5.11. Remove the four slip retainer screws on the OD of the slip bowl. These screws hold the slips in retracted position. Slips will **NOT** set unless these screws are removed before Hanger is placed in the Housing.
- 2.5.12. Grease the Hanger's body.
- 2.5.13. Remove the slip plate and carefully lower the Hanger into the Housing bowl, using a cat-line to center the casing, if necessary. Measure and record.



**WARNING** Do NOT drop the Casing Hanger!



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## Stage 2.0 — 9-5/8" Casing

2.5.14. When the Hanger is down pull tension on the casing to the desired hanging weight (no minimum weight is required).

2.5.15. Slack off the casing.

**NOTE** A sharp decrease on the weight indicator will signify that the Hanger has taken weight and is supporting the Casing.

2.5.16. Rough cut the casing approximately 5-1/2" above the top flange of the Housing and move the BOP and excess casing out of the way.

2.5.17. Using an internal cutter, final cut the casing at 15-1/4"  $\pm 1/8$ " below the Housing flange.

2.5.18. Place a 3/8" x 3/16" bevel on the casing stub and remove all burrs and sharp edges.

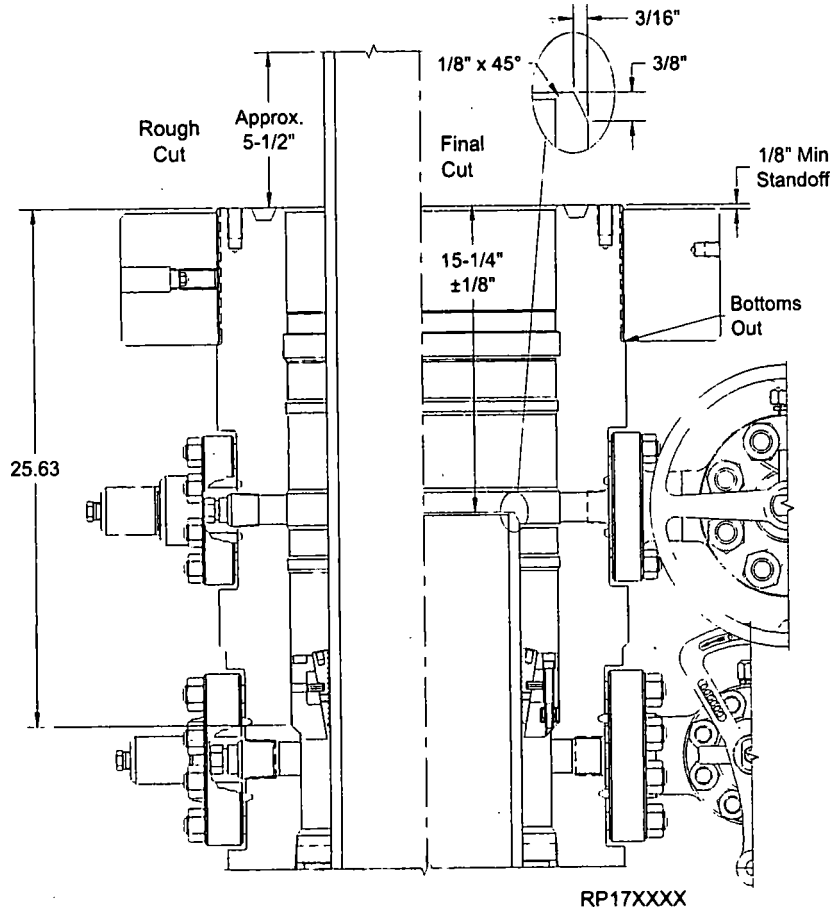
**NOTE** There must not be any rough edges on the casing or the seals of the Packoff will be damaged.

2.5.19. Remove and discard the used ring gasket from the Housing flange.

2.5.20. Clean the mating ring grooves of the Housing and BOP Stack.

2.5.21. Install the spare **BX-159 Ring Gasket** in the Housing ring groove.

2.5.22. Reconnect the BOP Stack to the Housing using the **Studs and Nuts (Item A20)** and tightening the studs and nuts in an alternating cross pattern to the torque referenced in the chart in the back of this manual.



**▲ CAUTION**

**Ensure and verify Threaded Flange is properly installed to the Casing Head.**

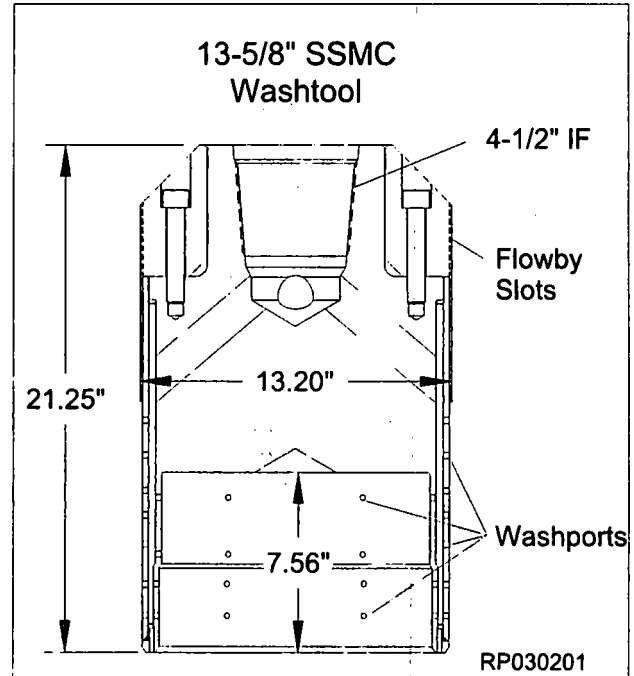
1. Rotate the threaded flange counterclockwise (left hand thread) to a positive stop and bottom out threaded flange on Casing Head flange shoulder.
2. Verify make up dimension. Dimension from the top of the threaded flange to the top of the casing head must be 1/8" or greater.

**Threaded flange must remain shouldered out during installation.**

## Stage 2.0 — 9-5/8" Casing

### 2.6. Washout the Housing

- 2.6.1. Examine the **Wash Tool (Item ST6)**. Verify the following:
- bore is clean and free of debris
  - threads are clean and undamaged
  - washports are clean and unobstructed
- 2.6.2. Orient the wash tool with the box connection up.
- 2.6.3. Make up a joint of drill pipe to the top of the Tool.



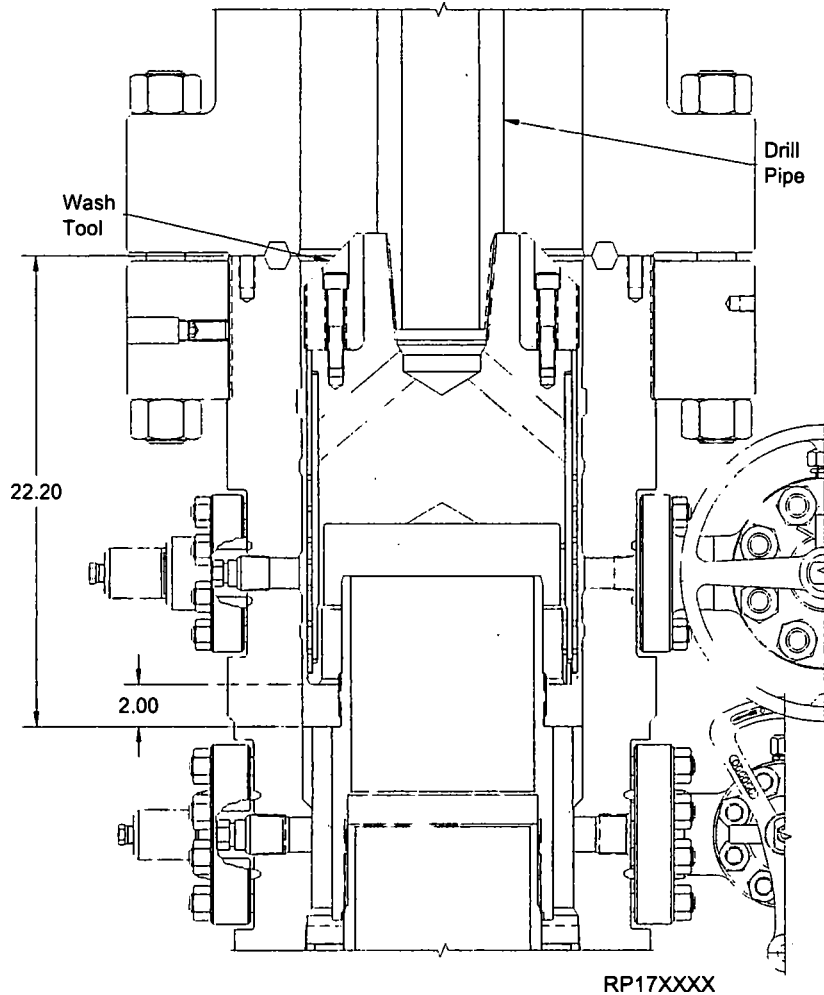
## Stage 2.0 — 9-5/8" Casing

- 2.6.4. Ensure lowermost outlet valve or Housing is open.
- 2.6.5. Carefully lower the Tool into the well until it lands on the top of the 9-5/8" Casing Hanger. Measure and Record.
- 2.6.6. Lift the Tool approximately 2" and supply pressure through the drill pipe. At the same time the pressure is being supplied, turn the Tool.

**NOTE** The maximum pressure rating for the Wash Tool is 1,000 PSI, at the flow rate of 75 GPM.

**NOTE** Do NOT reciprocate the Wash Tool.

- 2.6.7. Monitor the outlet valve for returns.
- 2.6.8. Once the returns are clean and free of debris, stop the rotation and the pump.
- 2.6.9. Retrieve the Tool to the rig floor.
- 2.6.10. Clean, grease and store the Tool as required.



## Stage 2.0 — 9-5/8" Casing

### 2.7. Install the Packoff Support Bushing

2.7.1. Examine the **Packoff Support Bushing Running Tool (Item ST7)**. Verify the following:

- bore is clean and free of debris
- all threads are clean and undamaged
- required pin x pin crossover stub is properly installed

2.7.2. Orient the Running Tool as illustrated.

2.7.3. Examine the **Packoff Support Bushing (Item A17)**. Verify the following:

- bore is clean and free of debris
- all elastomer seals are in place, clean and undamaged
- all threads are clean and undamaged
- locking is in place
- scribe line is properly identified with paint as required
- ensure spring plunger pins on the inside of the Packoff Support Bushing are properly installed and spring loaded pins retract properly.

2.7.4. Orient the Packoff Support Bushing as illustrated.

2.7.5. Lubricate the external running threads of the Packoff Support Bushing and threads of the Running Tool with a light coat of oil or grease.

**WARNING** Excessive oil or grease may prevent a positive seal from forming.

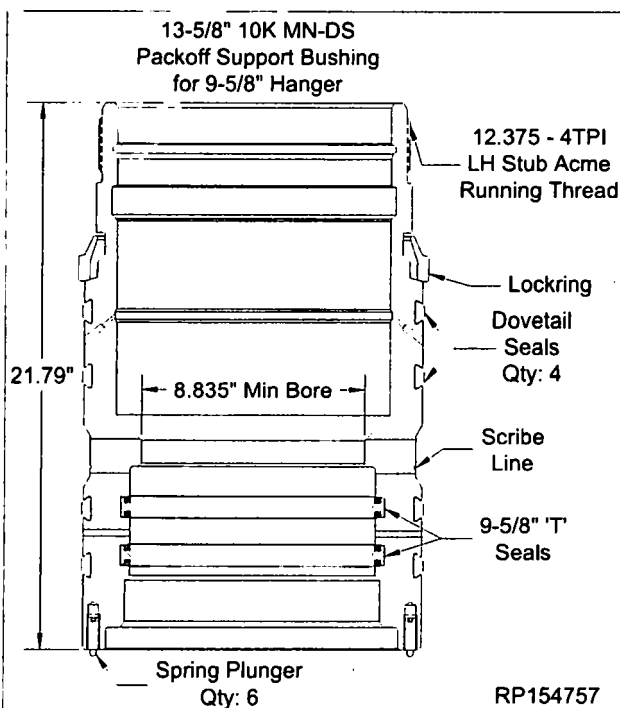
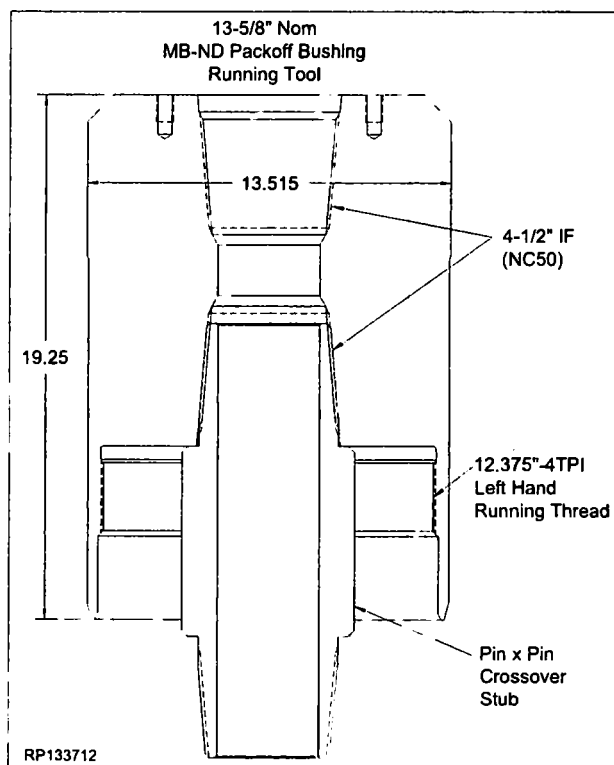
2.7.6. Run drill pipe or heavy weight collars through the rotary table and hang off in the floor slips. This will be used for weight to set the Packoff Support Bushing into position.

**NOTE** Heavy weight drill pipe or drill collars are used to aid in landing the Packoff Support Bushing. Weight required to run the Packoff Support Bushing into the Housing is approximately 10,000 lbs.

2.7.7. Make up a stand of drill pipe to the top of the Tool.

2.7.8. Install a **Lockring Installation Tool (Item ST14)** onto the lockring of the Support Bushing.

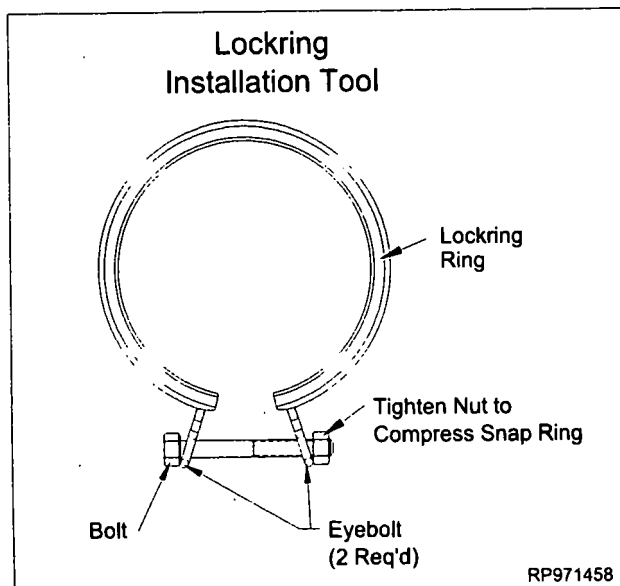
**NOTE** See APPENDIX 1 for Optional Lockring Installation Tool on the back of this procedure.



## Stage 2.0 — 9-5/8" Casing

2.7.9. Fully compress the locking.

**NOTE** The Lockring Installation Tool will assist in minimizing the length of time that the locking is compressed.



2.7.10. Carefully lower the Running Tool onto the Pack-off Support Bushing Assembly until the threads make contact.

2.7.11. Make up the connection by first turning the Tool clockwise to align the threads then counterclockwise until the Tool engages the locking.

**NOTE** Approximately 8 turns are required for full make-up. Write down the number of turns to make up the Tool to the Packoff Support Bushing in the Field Service Report.

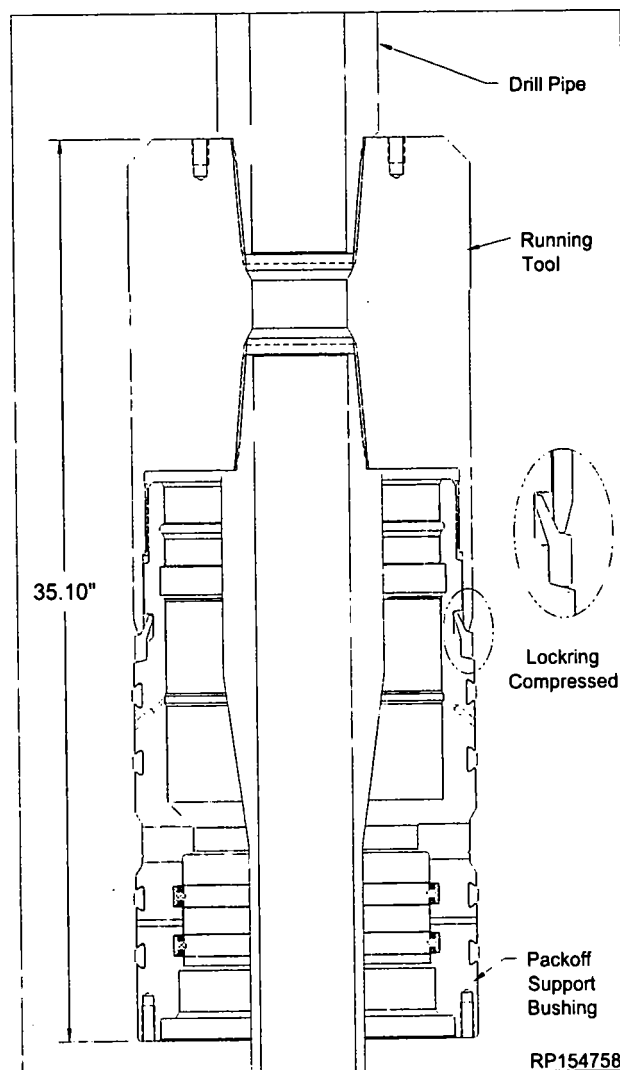
2.7.12. Once the locking is engaged remove the Lockring Installation Tool.

**NOTE** Ensure the Lockring is flush or below of the OD of the Packoff Support Bushing.

2.7.13. Lift and suspend the assembly over the drill pipe hung off in the rig floor.

2.7.14. Lower the assembly onto the threads of the drill pipe and make up the connection.

**WARNING** Do NOT damage the internal seals of the Packoff Support Bushing!



2.7.15. Lubricate the ID of the 'T' seals and the OD of the dovetail seals with a light coat of oil or grease. Do NOT use pipe dope.

**WARNING** Excessive oil or grease may prevent a positive seal from forming.

2.7.16. Open the uppermost and lowermost valves of the Housing.

**NOTE** The uppermost valve is to remain open during the setting of the Seal Assembly.

## Stage 2.0 — 9-5/8" Casing

- 2.7.17. Center and lower assembly through the BOP Stack, measure and record, until the Support Bushing lands on the Hanger. Mark the landing joint.

**NOTE** Distance from the Mandrel Casing Hanger landing shoulder or the top of the Emergency Casing Hanger to the face of the BOP flange is 22.20".

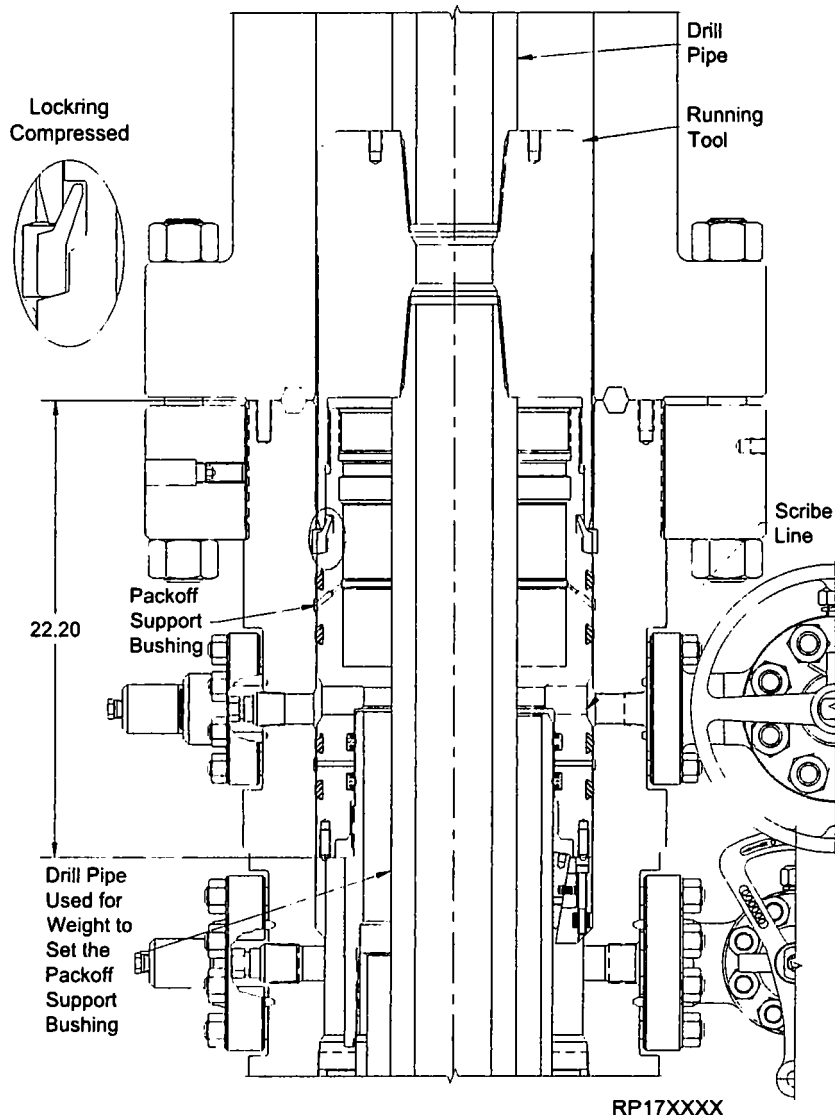
- 2.7.18. Compare and confirm dimension against BOP stack drilling adapter and Housing.

- 2.7.19. Verify the Packoff Support Bushing has landed properly through the uppermost outlet valve of the Housing:

- using a flash light, verify the scribe line is visible in the center of the port

- 2.7.20. Turn the landing joint counterclockwise until the (6) Spring Plunger pins engage the Hanger mating slots. When the pins engage the Hanger, STOP turning when a positive stop is felt.

**NOTE** Test between the lower seals of the Packoff Support Bushing will be conducted after the Lockdown Ring has been properly engaged/ set into the Housing.



## Stage 2.0 — 9-5/8" Casing

### 2.8. Set the Packoff Support Bushing Lockdown Ring

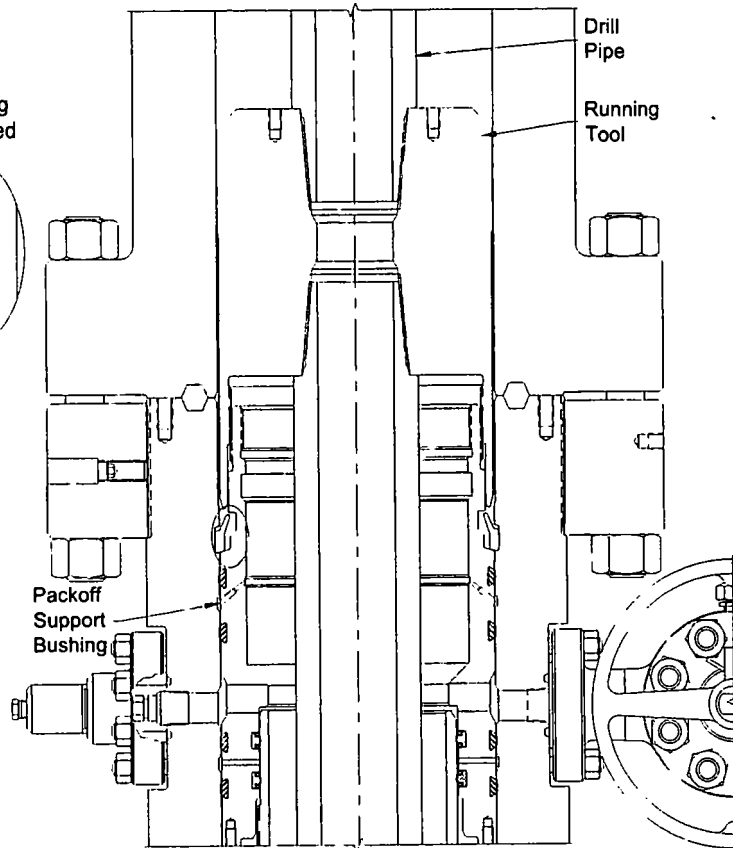
**NOTE** Confirm the Packoff Support Bushing has properly landed on Mandrel or Emergency Casing Hanger by (1) confirming dimension (2) viewing through the upper open annulus valve of the Housing. The scribe line should be in the center of the outlet bore.

- 2.8.1. Make a horizontal mark on the landing joint to monitor the number of turns.
- 2.8.2. Using chain tongs, back out the Tool 3-1/2 turns clockwise to allow the Lockring to expand into its mating groove in the Housing.

**NOTE** Horizontal mark should raise no more than .875".

**WARNING** Do NOT attempt to back out more than 3 turns.

Lockring Expanded



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- 2.8.4. Once a successful over pull has been achieved, slack off over pull and ensure elevators are well clear of the drill pipe tool joint.

#### CAUTION

Clear out personnel from rig floor during over pull test. Precaution must be taken for personnel verifying the over pull.

#### CAUTION

There should be maximum of 1/8" vertical movement during over pull. If vertical movement is greater than 1/8" verify the position of the Packoff Support Bushing by checking the location of the scribe line relative to the upper side outlets. If the scribe line has risen more than 1/8", drive the Packoff Support Bushing back down until it lands as per step 2.7.17.

- 2.8.3. Perform an over pull 50,000 lbs over block weight to confirm the locking has properly engaged.

**NOTE** If initial over pull test is unsuccessful, do not immediately collapse the locking for a second installation attempt. Conduct the following steps prior to Support Bushing retrieval:

- Ensure Packoff Support Bushing Running Tool is backed off 3-1/2 turns.
- Re-apply the installation load (10,000 - 20,000 lbs) to force the Packoff and Lockring down into the groove of the housing.
- Re-attempt 50,000 lbs over pull test.

#### CAUTION

If a successful over pull test is not achieved after three installation attempts, follow steps 2.11.3 and 2.11.4. to fully retract the locking and remove the Packoff Support Bushing. Retrieve the Packoff Support Bushing and locking to the rig floor for trouble shooting.

**NOTE** Dovetail seals must be replaced prior to re-installing the Packoff Support Bushing.

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## Stage 2.0 — 9-5/8" Casing

### 2.9. Test Between the Lower Seals of the Packoff Support Bushing

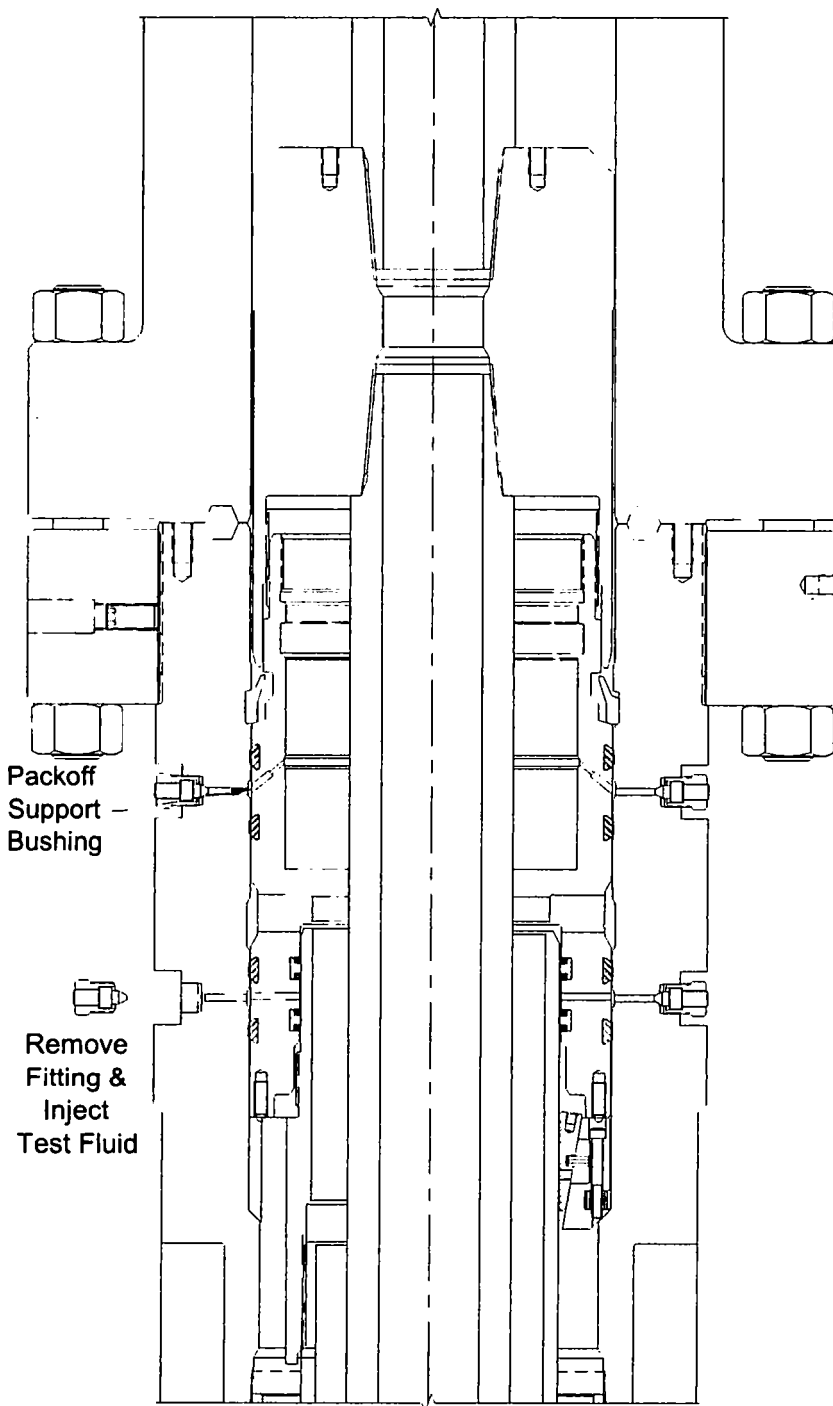
- 2.9.1. Locate the lowermost test port on the OD of the Housing and remove the fitting.
- 2.9.2. Attach a hydraulic test pump to the open test port and inject test fluid into the Packoff Support Bushing to **5,000 psi or 80% of casing collapse—whichever is less.**

**NOTE** If Emergency Hanger was installed do not exceed 80% of casing collapse.

**NOTE** Contact the Drilling Supervisor to determine the collapse pressure of the specific grade and weight of the casing used.

**Do NOT over pressurize!**

- 2.9.3. Hold and monitor the test pressure for fifteen minutes or as required by the Drilling Supervisor.
- 2.9.4. Once a satisfactory test is achieved, carefully bleed off all test pressure, remove the test pump and re-install the fitting.
- 2.9.5. Release the Tool from the Packoff Support Bushing by turning the drill pipe (with chain tongs) clockwise approximately 4-1/2 turns or until it comes free from the Seal Assembly.
- 2.9.6. Retrieve the Tool to the rig floor and remove it from landing joint.
- 2.9.7. Clean, grease and store the Tool as required.



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## Stage 2.0 — 9-5/8" Casing

### 2.10. Test Between the Upper Seals of the Packoff Support Bushing

**WARNING** Previously used BOP Test Plugs must be inspected for damage due to wear. Where warranted such as highly deviated wells the Test Plugs must be checked periodically to insure integrity.

2.10.1. Examine the **Test Plug (Item ST8)**. Verify the following:

- both upper and lower seals are in place and undamaged
- 1/2" pipe plug is removed
- all threads are clean and undamaged

**NOTE** Ensure the 1/2" LP pipe plug is removed

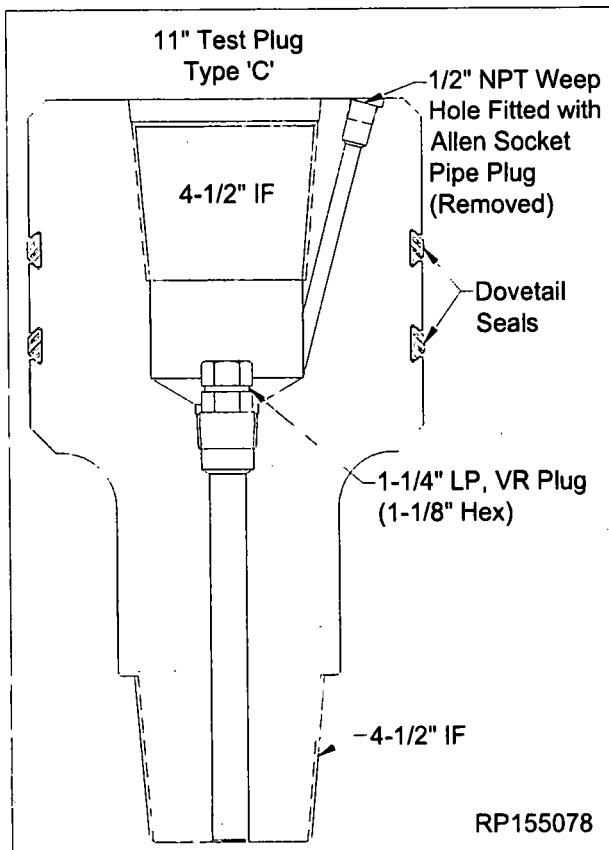
2.10.2. Orient the Tool as illustrated.

2.10.3. Make up a joint of drill pipe to the top of the Tool.

**WARNING** A minimum of one joint of Drill Pipe is required on the bottom of the BOP Test Plug to ensure BOP Test plug remains centralized.

**NOTE** A minimum weight of 1,500 lbs is required per dovetail seal to land the Test Plug.

2.10.4. Lubricate the dovetail seal of the Tool with a coat of light oil or grease.

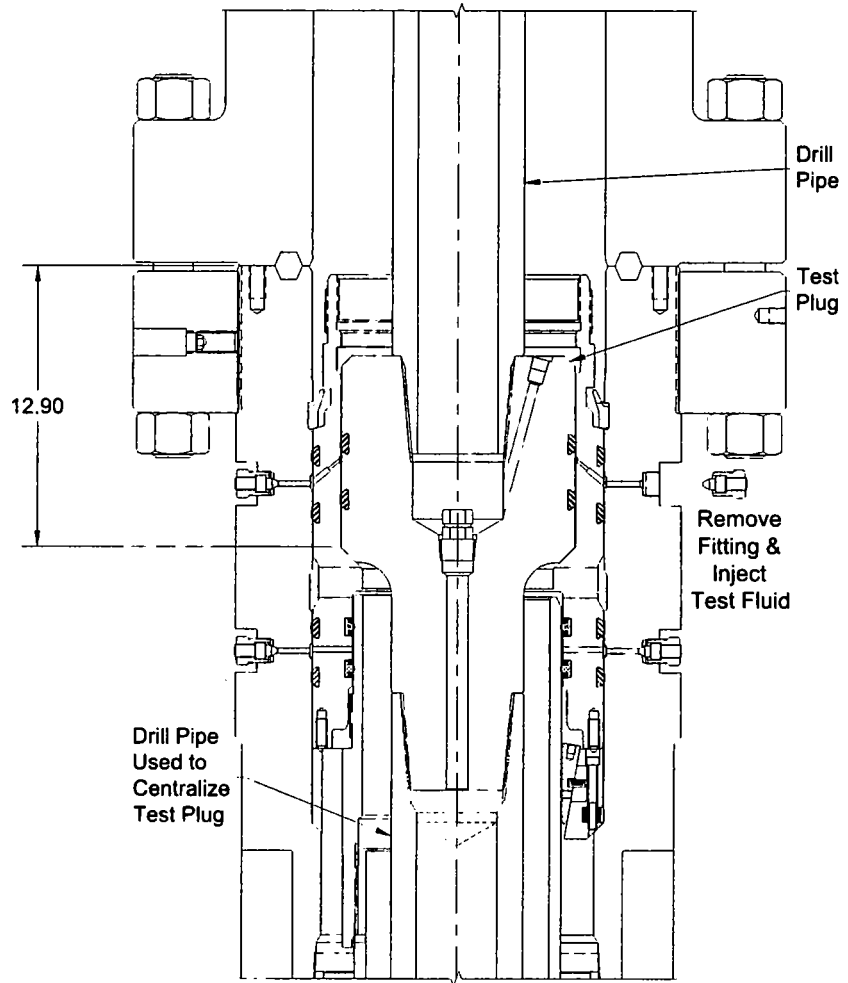


## Stage 2.0 — 9-5/8" Casing

- 2.10.5. Open the upper annulus valve of the Housing, and drain fluid to land the Test Plug. Leave valve open.
- 2.10.6. Slowly lower the Tool through the BOP Stack, measure and record, until it lands on the load shoulder in the Packoff.

**NOTE** Distance from the Pack-off Support Bushing load shoulder to the face of the BOP Flange is 12.90".

- 2.10.7. Locate the uppermost test port on the OD of the Housing and remove the fitting.
- 2.10.8. Attach a hydraulic test pump to the open test port and inject test fluid into the Packoff Support Bushing to **10,000 psi maximum**.
- 2.10.9. Hold and monitor the test pressure for fifteen minutes or as required by the Drilling Supervisor.
- 2.10.10. Once a satisfactory test is achieved, carefully bleed off all test pressure, remove the test pump and re-install the fitting.
- 2.10.11. Retrieve the Test Plug slowly to avoid damage to the seal.
- 2.10.12. Drain BOP stack.



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## Stage 2.0 — 9-5/8" Casing

### ▲ CAUTION

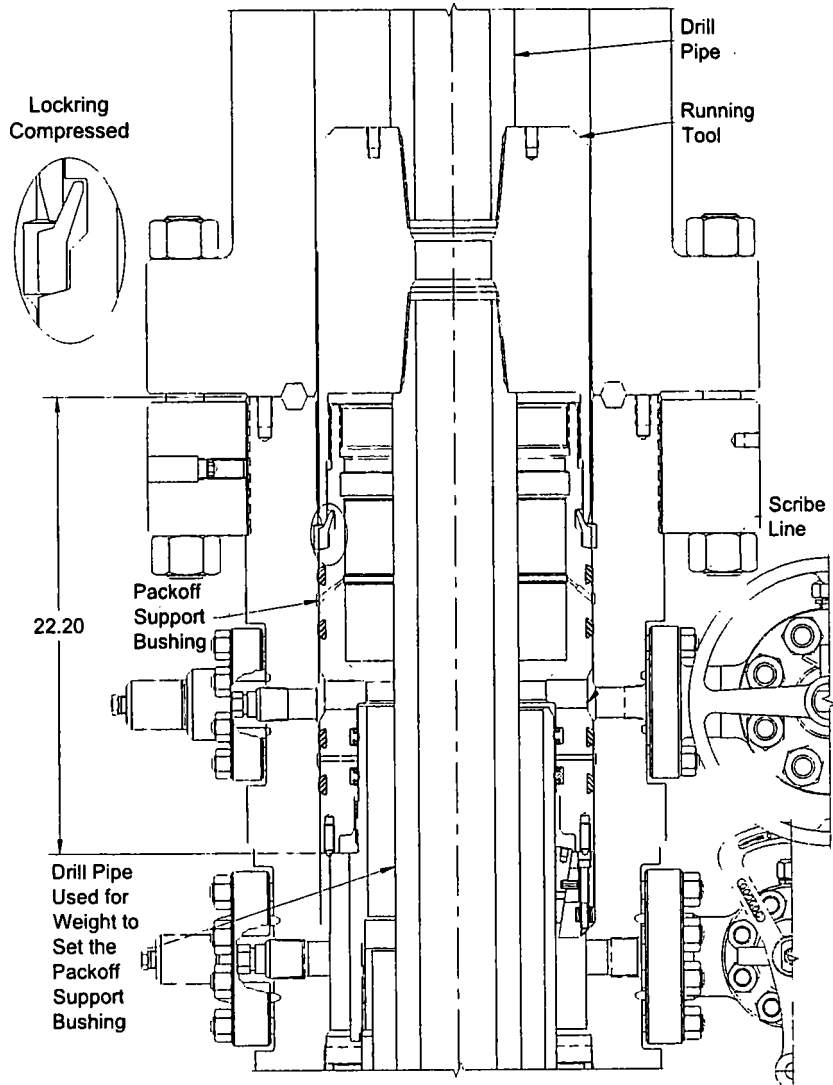
The following procedure should be followed **ONLY** in the event Retrieval of the Packoff Support Bushing is necessary. If the Packoff Support Bushing Assembly was properly landed, skip this procedure.

### 2.11. Retrieval of Packoff Support Bushing Assembly

- 2.11.1. Make up a joint of drill pipe to the top of the **Packoff Support Bushing Running Tool (Item ST7)**.
- 2.11.2. Lower the Tool through BOP stack and land on top of Packoff Support Bushing.
- 2.11.3. Turn the Tool counterclockwise approximately 8 turns or the number of turns documented per Section 2.7, until the Tool fully engages the locking and a firm stop is encountered. Back off from this point a maximum 1/8 of a turn.

### ▲ CAUTION

**Do not use Top Drive to engage/ disengage the Running Tool. Using Top Drive will permanently damage the equipment running threads and will require damaged part to be replaced.**



- 2.11.5. Retrieve the Packoff Support Bushing by pulling vertically (approximately 15,000 to 20,000 lbs).

**WARNING** If overpull exceeds this value, repeat counter-clockwise rotation until a firm stop is encountered and repeat overpull.

- 2.11.6. To remove Packoff Support Bushing from the Tool, install the **Lockring Tool (Item ST14)** and fully compress the locking.

**NOTE** Dovetail seals must be replaced prior to re-installing the Packoff Support Bushing.

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## Stage 3.0 — 7" Casing

### 3.1. Test the BOP Stack

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

**WARNING** Previously used BOP Test Plugs must be inspected for damage due to wear. Where warranted such as highly deviated wells the Test Plugs must be checked periodically to insure integrity.

3.1.1. Examine the **Test Plug (Item ST8)**. Verify the following:

- both upper and lower seals are in place and undamaged
- 1/2" pipe plug is removed
- all threads are clean and undamaged

**NOTE** Ensure the 1/2" LP pipe plug is removed

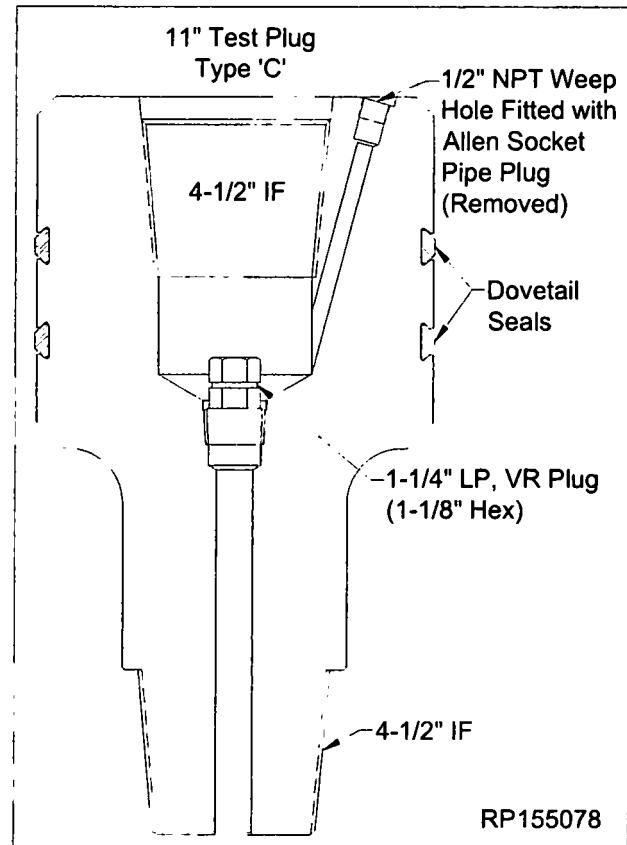
3.1.2. Orient the Tool as illustrated.

3.1.3. Make up a joint of drill pipe to the top of the Tool.

**WARNING** A minimum of one joint of Drill Pipe is required on the bottom of the BOP Test Plug to ensure BOP Test plug remains centralized.

**NOTE** A minimum weight of 1,500 lbs is required per dovetail seal to land the Test Plug.

3.1.4. Lubricate the dovetail seal of the Tool with a coat of light oil or grease.



## Stage 3.0 — 7" Casing

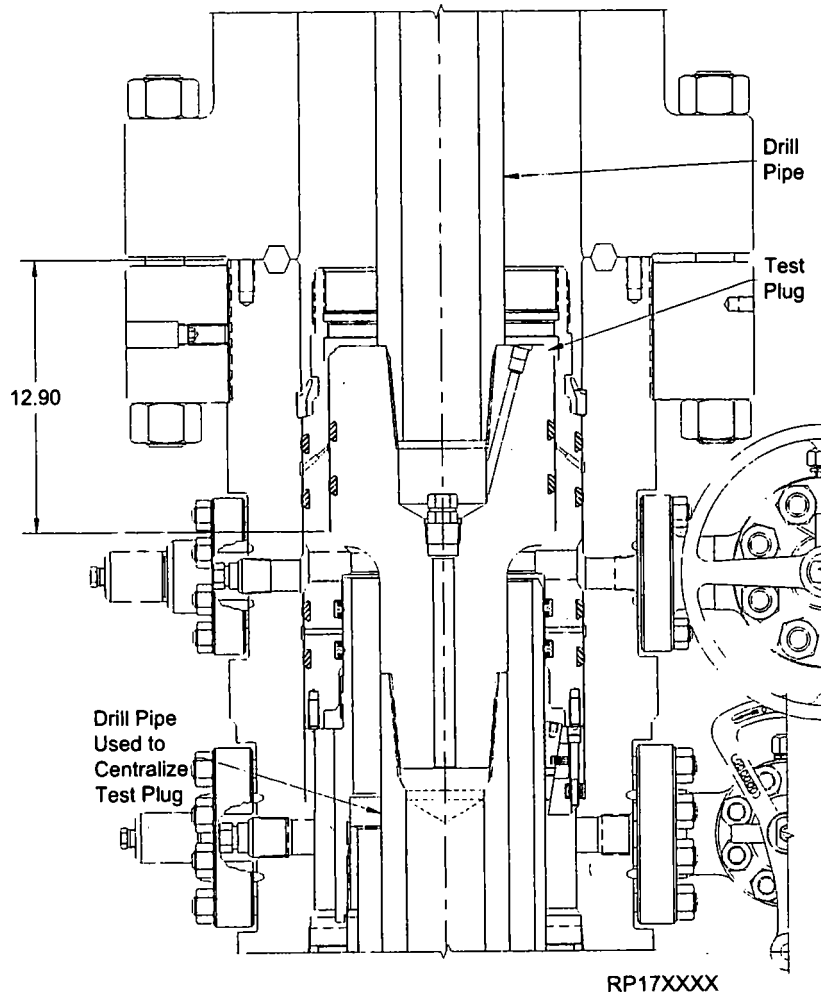
- 3.1.5. Open the upper annulus valve of the Housing, and drain fluid to land the Test Plug. Leave valve open.
- 3.1.6. Slowly lower the Tool through the BOP Stack, measure and record, until it lands on the load shoulder in the Packoff.

**NOTE** Distance from the Pack-off Support Bushing load shoulder to the face of the BOP Flange is 12.90".

- 3.1.7. Close the BOP rams on the drill pipe and test to **10,000 psi maximum**.
- 3.1.8. Monitor the annulus valve for signs of pressure.
- 3.1.9. After a satisfactory test is achieved, release pressure and open the annulus valve.
- 3.1.10. Retrieve the Test Plug slowly to avoid damage to the seal.

**NOTE** It may be necessary to open the annulus valve when starting to retrieve the Test Plug to relieve any vacuum that may occur. Leaving annulus valve open during testing insures safety of surface casing.

- 3.1.11. Drain BOP stack.
- 3.1.12. Close upper annulus valve.



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## Stage 3.0 — 7" Casing

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

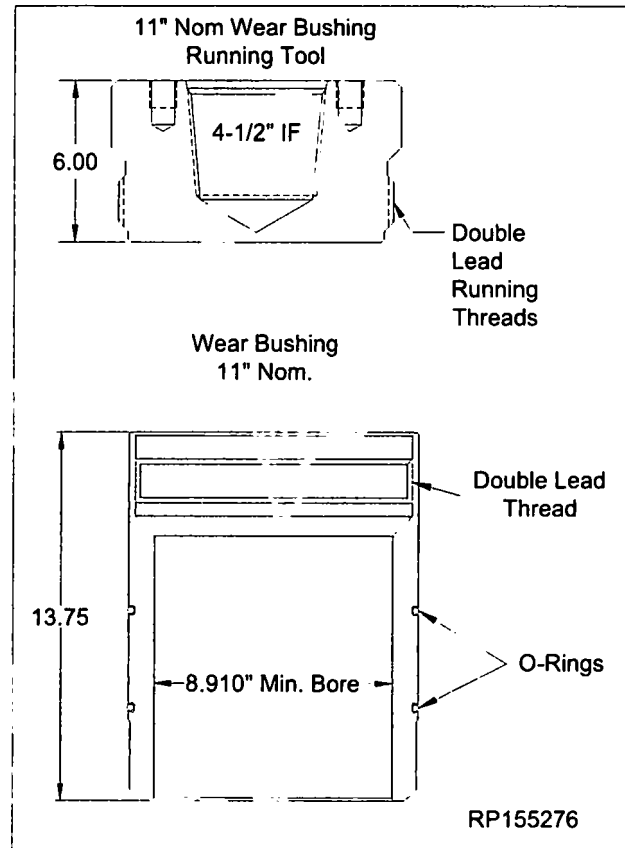
**WARNING** Previously used Wear Bushings must be inspected for damage and significant reduction in wall thickness due to wear. Where warranted such as highly deviated wells the Wear Bushing must be checked periodically to insure integrity.

### 3.2. Run the Wear Bushing Before Drilling

- 3.2.1. Examine the **Running Tool (Item ST9)**. Verify the following:
  - all threads are clean and undamaged
- 3.2.2. Orient the Tool with the lift lugs down.
- 3.2.3. Examine the **Wear Bushing (Item ST10)**. Verify the following:
  - bore is clean and free of debris
  - o-rings are properly installed, clean and undamaged
- 3.2.4. Orient the Wear Bushing as illustrated.

**WARNING** Do NOT cut o-rings.

**CAUTION** This Wear Bushing has no mechanical retention device. Care must be exercised when tripping out the hole to avoid dislodging the Wear Bushing which could compromise safety if it becomes lodged in the BOP.



## Stage 3.0 — 7" Casing

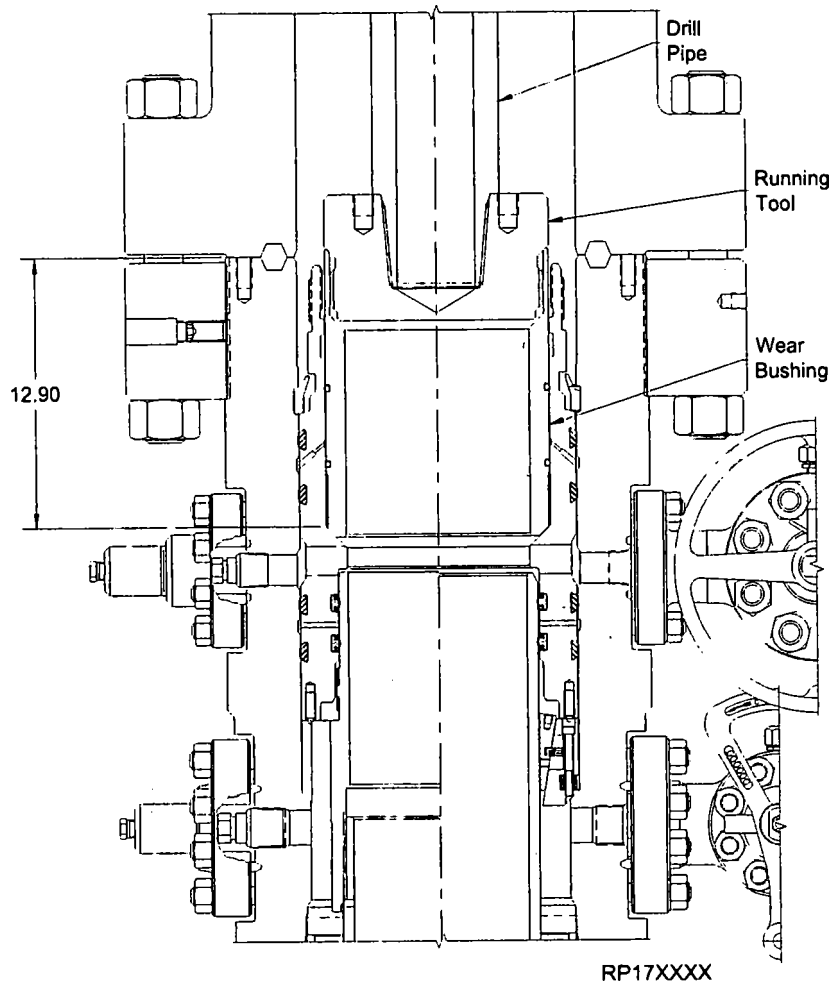
- 3.2.5. Lubricate the o-ring seals of the wear bushing with a light coat of oil or grease.
- 3.2.6. Make up a joint of drill pipe to the top of the Tool.
- 3.2.7. Lower the Tool into the Wear Bushing and turn the drill pipe counterclockwise until thread 'jump' can be felt, then clockwise to a positive stop, to thread the Tool into the Wear Bushing.

**WARNING** Do NOT overtighten the Tool/ Wear Bushing connection.

- 3.2.8. Carefully lower the Tool/ Wear Bushing assembly through the BOP, measure and record, until it lands on the load shoulder of the Packoff Support Bushing.

**NOTE** Distance from the Pack-off Support Bushing load shoulder to the face of the BOP flange is 12.90".

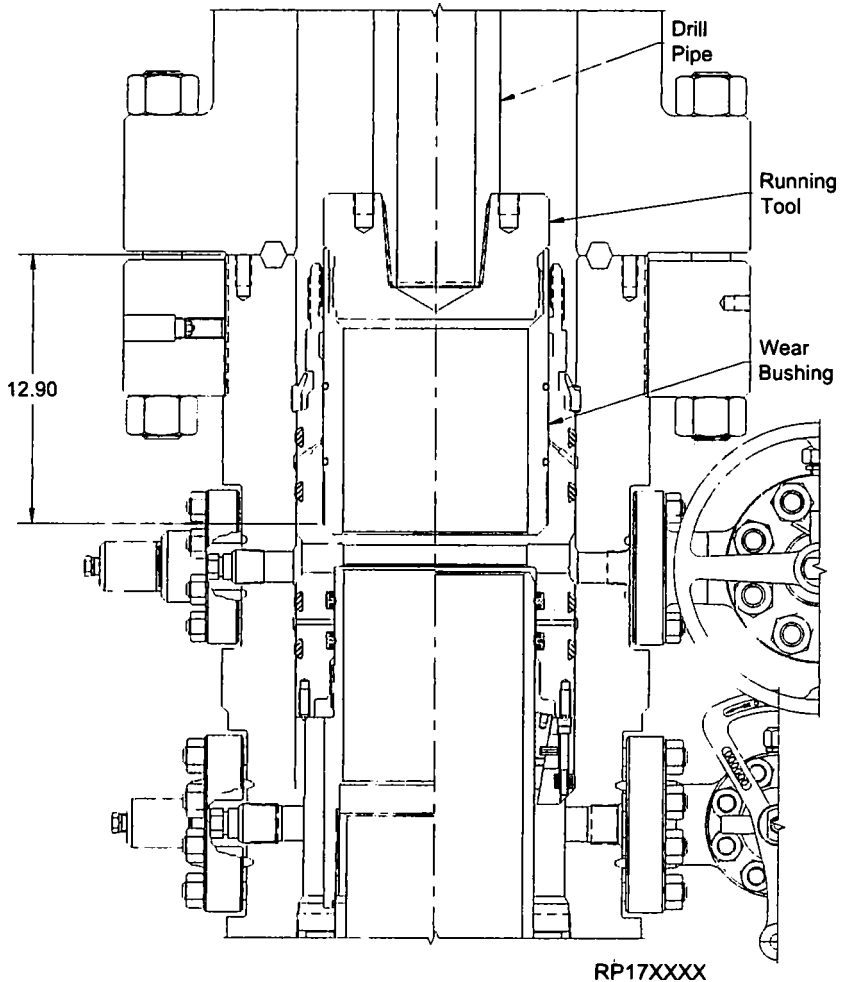
- 3.2.9. Remove the Tool from the Wear Bushing by turning the drill pipe counterclockwise and lift straight up.
- 3.2.10. Remove the Tool from the drill string.
- 3.2.11. Clean, grease, and store the Tool as required.
- 3.2.12. Drill as required.



## Stage 3.0 — 7" Casing

### 3.3. Retrieve the Wear Bushing After Drilling

- 3.3.1. Make up the Tool to the drill pipe.
- 3.3.2. Slowly lower the Tool into the Wear Bushing.
- 3.3.3. Turn the Tool counterclockwise until thread 'jump' can be felt, slack off all weight then turn clockwise to a positive stop.
- 3.3.4. Slowly retrieve the Wear Bushing to the rig floor and remove it and the Tool from the drill string.
- 3.3.5. Clean, grease and store the Tool and Wear Bushing.



## Stage 3.0 — 7" Casing

### Landing of Mandrel Hangers

Cameron service personnel must verify that the mandrel hanger is landed properly on the load shoulder in the wellhead. This can be accomplished by one of three methods.

- Visually observe the scribe line mark around mandrel hanger running tool through upper side outlet valve.
- Conduct a dry run and mark the dedicated landing joint prior to running the casing or tubing.
- Calculate the distance from the rig floor to the landing shoulder and confirm that the hanger has traveled the required distance.

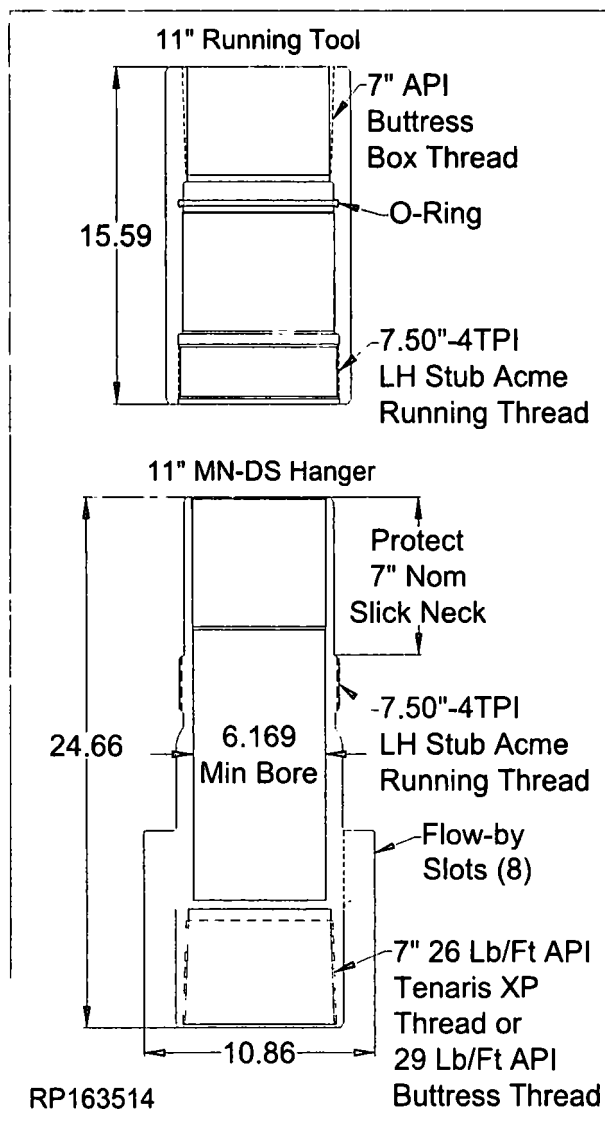
### 3.4. Hang Off the Casing

**NOTE** In the event the 7" casing should become stuck, and the Mandrel Hanger is unable to be used, refer to Section 3.13.

- 3.4.1. Run the 7" casing and space out appropriately.
- 3.4.2. Hang off the last joint of casing to be run in the floor slips at height that will enable easy handling and make up of the hanger and landing joint.

**NOTE** Steps 3.4.3-3.4.12 may be conducted offline in the shop and shipped to location as one assembly.

- 3.4.3. Examine the **Running Tool (Item ST11)**. Verify the following:
- bore is clean and free of debris
  - all threads are clean and undamaged
  - o-ring is properly installed and undamaged
- 3.4.4. Orient the Running Tool as illustrated.
- 3.4.5. Examine the **Casing Hanger (Item A18)**. Verify the following:
- bore is clean and free of debris
  - all threads are clean and undamaged
  - flow-by slots are clean and free of debris
  - casing pup joint is properly installed.
- 3.4.6. Orient the Hanger as illustrated.



## Stage 3.0 — 7" Casing

- 3.4.7. Make up a landing joint to the top of the Running Tool.
- 3.4.8. Lubricate the running threads of both the Tool and the Hanger and also the seal of the Tool with a coat of light oil or grease.

**CAUTION** Excessive oil or grease may prevent a positive seal from forming.

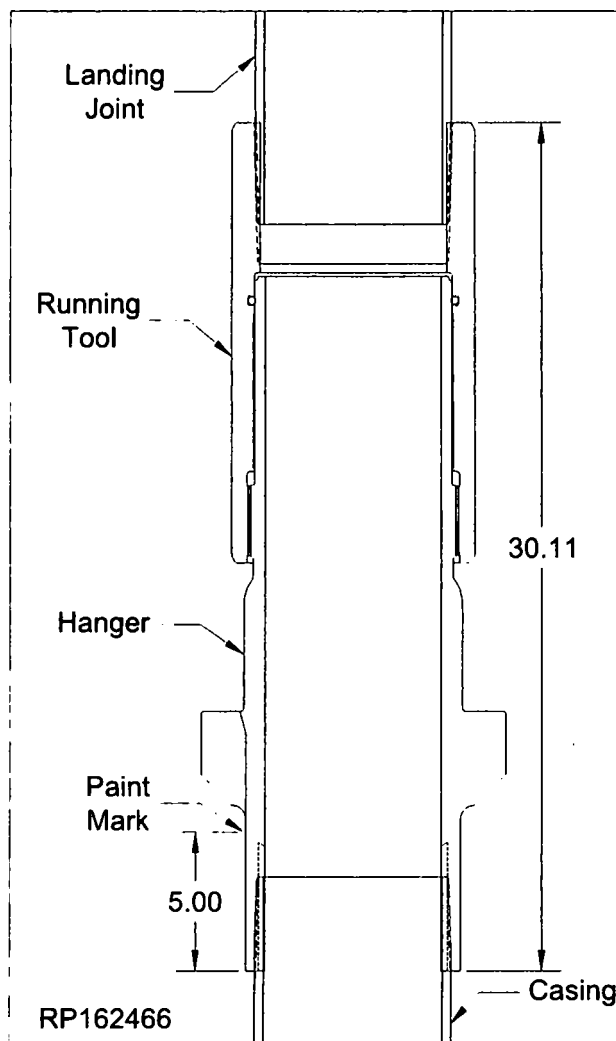
- 3.4.9. Lift and suspend the Tool over the Hanger.
- 3.4.10. Lower the Tool onto the Hanger until the mating threads make contact.
- 3.4.11. While balancing the weight, turn the Tool clockwise until the thread 'jump' can be felt then counterclockwise to a positive stop (approximately 10 turns) then back off the Tool clockwise 1/2 turn.

**CAUTION** DO NOT torque the connection.

- 3.4.12. Lift the Hanger above the casing hung off in the floor.
- 3.4.13. Lower the Hanger assembly until the mating threads of the 7" casing and the pin threads of the pup joint make contact.

**NOTE** When making up the Hanger to the casing do not use the seal neck area for back up.

- 3.4.14. While balancing the weight, turn the assembly counterclockwise until the thread 'jump' can be felt then clockwise to the thread manufacturer's recommended optimum torque.
- 3.4.15. Make a paint mark all the way around the Hanger at 5.00" from the bottom of the Hanger for landing verification.



## Stage 3.0 — 7" Casing

- 3.4.16. Open the uppermost side outlet valve of the Housing.
- 3.4.17. Release the casing from the floor slips and lower it into the well, measure and record, until the Hanger lands on the load shoulder of the Packoff.

**NOTE** Distance from the Pack-off Support Bushing load shoulder to the face of the BOP flange is 12.90".

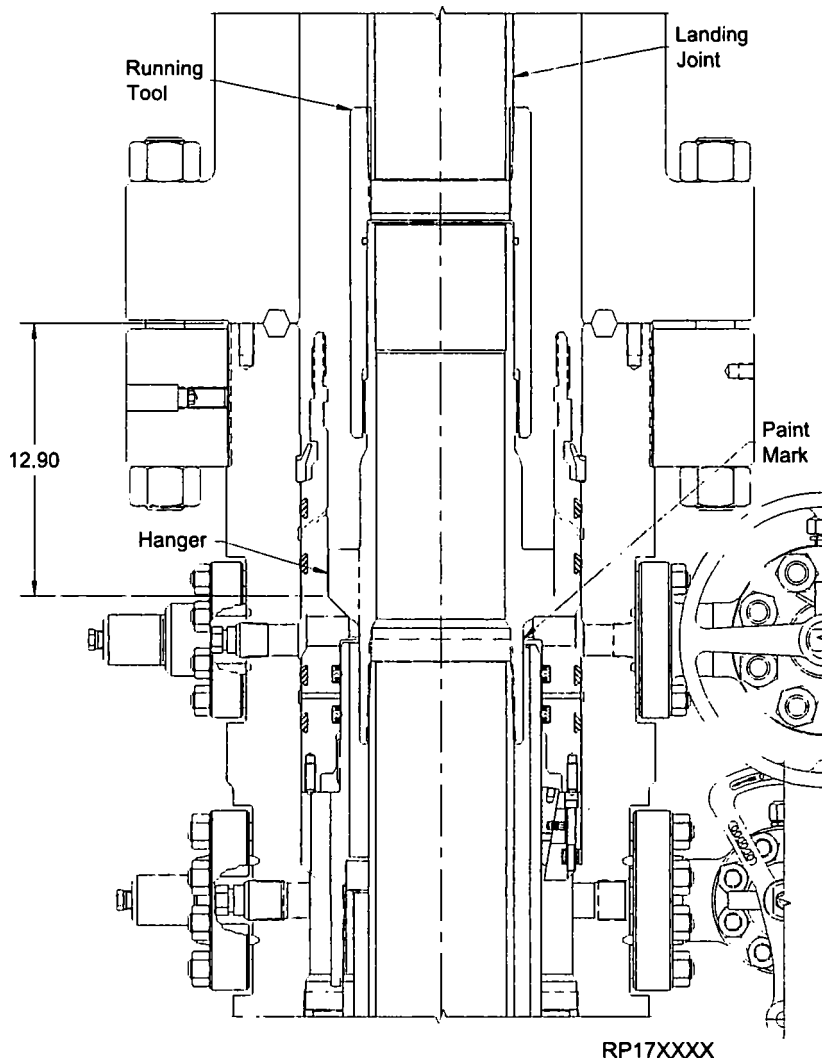
- 3.4.18. Make sure Hanger is centered in well bore.
- 3.4.19. Slack off all weight on the casing.
- 3.4.20. Verify the through the open outlet the Hanger has landed properly.

**NOTE** Scribed line on the Hanger should be just above the middle of the uppermost outlet of the MN-DS Housing.

- 3.4.21. Cement the casing as required.

**NOTE** Cement returns may be taken through the flow-by slots of the Hanger/Running Tool and out of the BOP Stack.

- 3.4.22. With cementing completed, turn the landing joint clockwise to release the Tool from the Hanger, approximately 10 turns.
- 3.4.23. Retrieve the Tool to the rig floor.
- 3.4.24. Clean, grease and store the Tool as required.



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13-5/8" 10K MN-DS System  
13-3/8" x 9-5/8" x 7" Casing Program

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## Stage 3.0 — 7" Casing

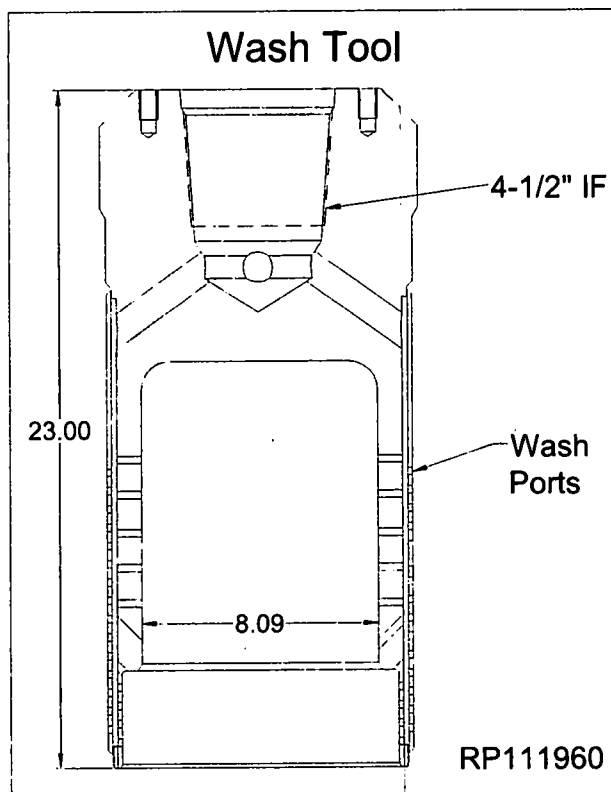
### 3.5. Washout the Housing

3.5.1. Examine the **Wash Tool (Item ST12)**. Verify the following:

- bore is clean and free of debris
- threads are clean and undamaged
- washports are clean and unobstructed

3.5.2. Orient the wash tool as illustrated.

3.5.3. Make up a joint of drill pipe to the top of the Tool.



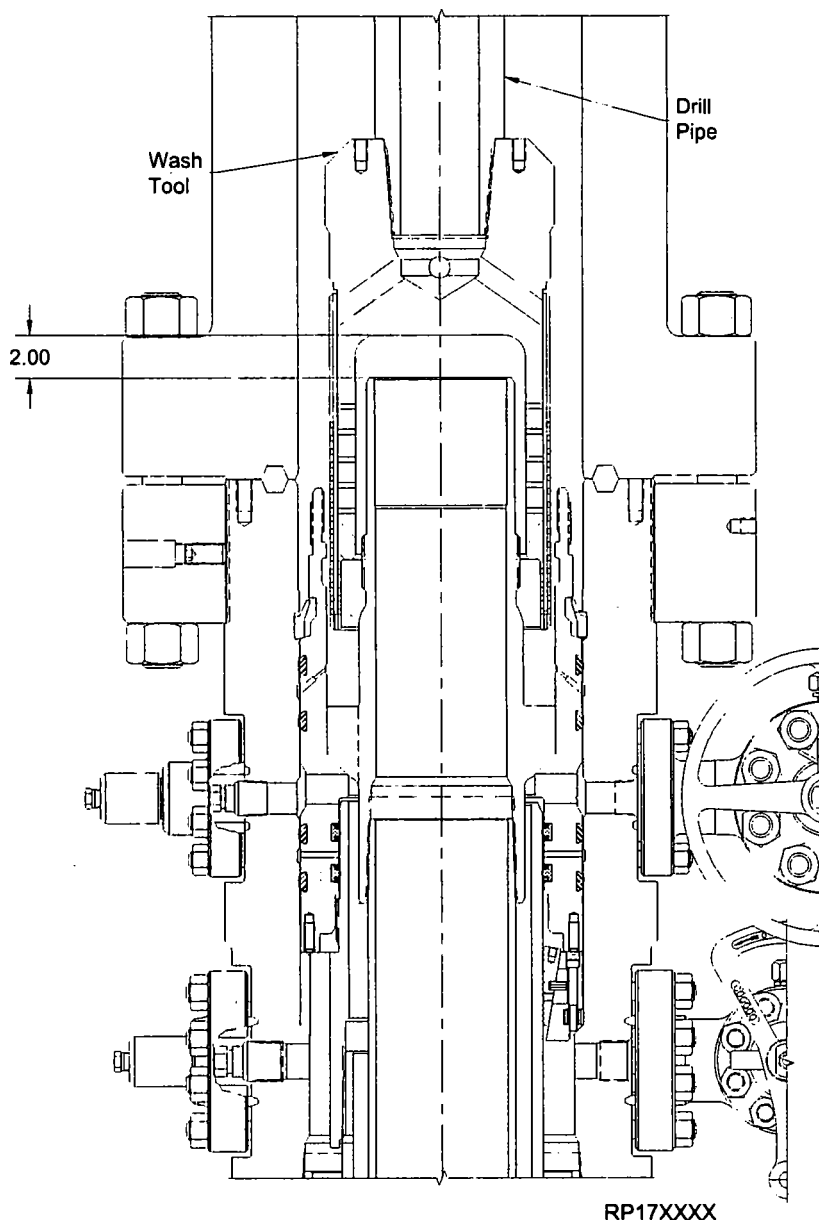
## Stage 3.0 — 7" Casing

- 3.5.4. Ensure uppermost outlet valve on the Housing is open.
- 3.5.5. Carefully lower the Tool into the well, measure and record, until it lands on the top of the 7" Casing Hanger.
- 3.5.6. Lift the Tool approximately 2" and supply pressure through the drill pipe. At the same time the pressure is being supplied, turn the Tool.

**NOTE** The maximum pressure rating for the Wash Tool is 1,000 PSI at the flow rate of 75GPM.

**NOTE** Do NOT reciprocate the Wash Tool.

- 3.5.7. Monitor the outlet valve for returns.
- 3.5.8. Once the returns are clean and free of debris, stop the rotation and the pump.
- 3.5.9. Retrieve the Tool to the rig floor.
- 3.5.10. Clean, grease and store the Tool as required.



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**13-5/8" 10K MN-DS System**  
**13-3/8" x 9-5/8" x 7" Casing Program**

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## Stage 3.0 — 7" Casing

### 3.6. Install the Seal Assembly

3.6.1. Examine the **Seal Assembly Running Tool (Item ST13)**. Verify the following:

- bore is clean and free of debris
- all threads are clean and undamaged

3.6.2. Orient the Running Tool as illustrated.

3.6.3. Examine the **Seal Assembly (Item A19)**. Verify the following:

- bore is clean and free of debris
- all elastomer seals are in place, clean and undamaged
- all threads are clean and undamaged
- locking is in place
- ensure spring plunger pins on the inside of the Seal Assembly are properly installed and spring loaded pins retract properly.

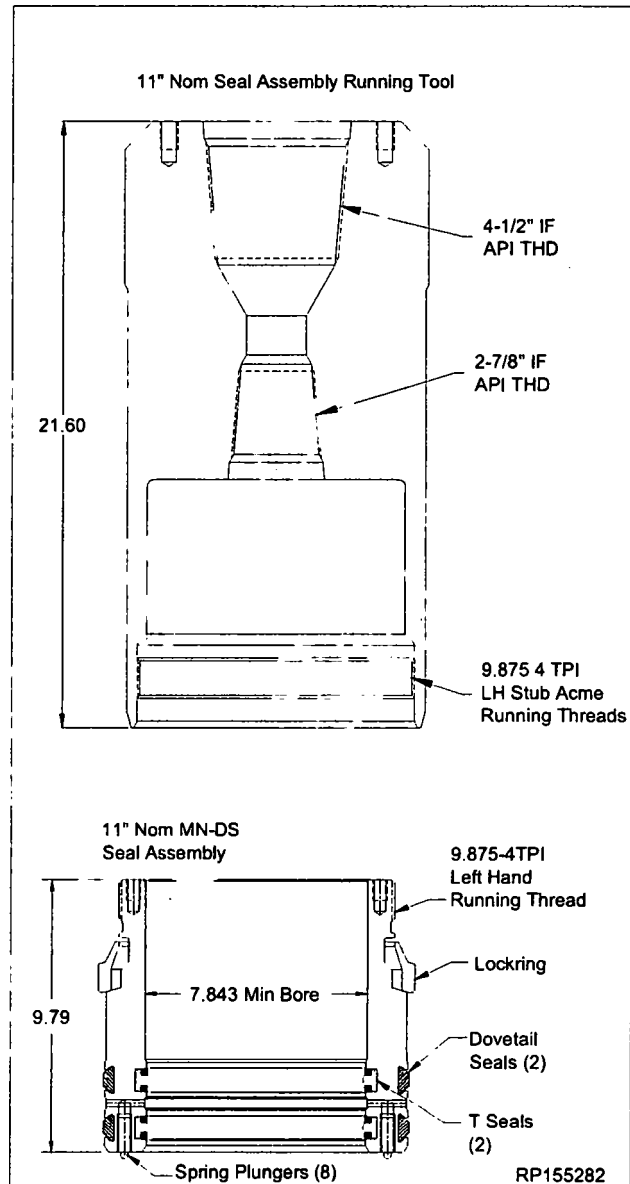
3.6.4. Orient the Seal Assembly as illustrated.

3.6.5. Lubricate the running threads of the Seal Assembly and threads of the Running Tool with a light coat of oil or grease.

3.6.6. Run drill pipe or heavy weight collars through the rotary table and hang off in the floor slips. This will be used for weight to set the Seal assembly into position. If running heavy weight pipe, measure OD of all pipe and connection to make sure pipe will drift casing.

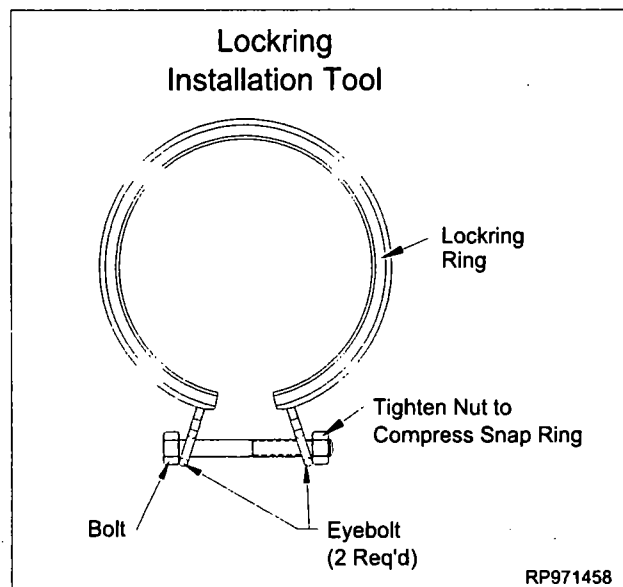
**NOTE** Heavy weight drill pipe or drill collars are used to aid in landing the Seal Assembly. Weight required to run the Seal Assembly into the Housing is approximately 3,000 lbs.

3.6.7. Make up a joint of drill pipe to the top of the Running Tool.



## Stage 3.0 — 7" Casing

- 3.6.8. Install a **Lockring Installation Tool (Item ST14)** onto the locking of the Seal Assembly.



**NOTE** See APPENDIX 1 for optional Lockring Installation Tool on the back of this procedure.

- 3.6.9. Fully compress the locking.

**NOTE** The Lockring Installation Tool will assist in minimizing the length of time that the locking is compressed.

- 3.6.10. Carefully lower the Running Tool onto the Seal Assembly until the threads make contact.

- 3.6.11. Make up the connection by first turning the Tool clockwise to align the threads then counterclockwise until the Tool engages the locking.

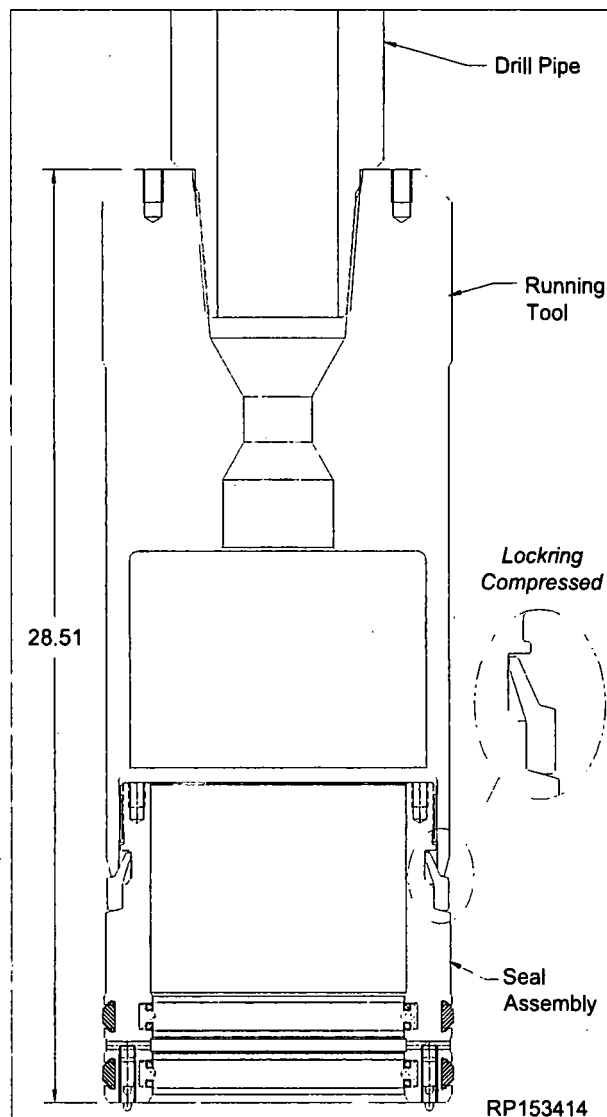
**NOTE** Approximate 6-1/2 turns are required for full make-up. Write down the number of turns to make up the Tool to the Seal Assembly in the Field Service Report.

- 3.6.12. Once the locking is engaged remove the Lockring Installation Tool.

**NOTE** Ensure the locking is flush or below the OD of the Seal Assembly.

- 3.6.13. Lubricate the ID of the 'T' seals and the OD of the dovetail seals with a light coat of oil or grease.

**WARNING** Excessive oil or grease may prevent a positive seal from forming.



- 3.6.14. Lift and suspend the Seal Assembly over the drill pipe hung off in the rig floor.

- 3.6.15. Lower the Seal Assembly onto the threads of the drill pipe and make up the connection.

**WARNING** Do NOT damage the internal seals of the Packoff Support Bushing assembly.

- 3.6.16. Open the uppermost side outlet valves on the Housing.

**NOTE** The uppermost side outlet valve is to remain open during the setting of the Seal Assembly.

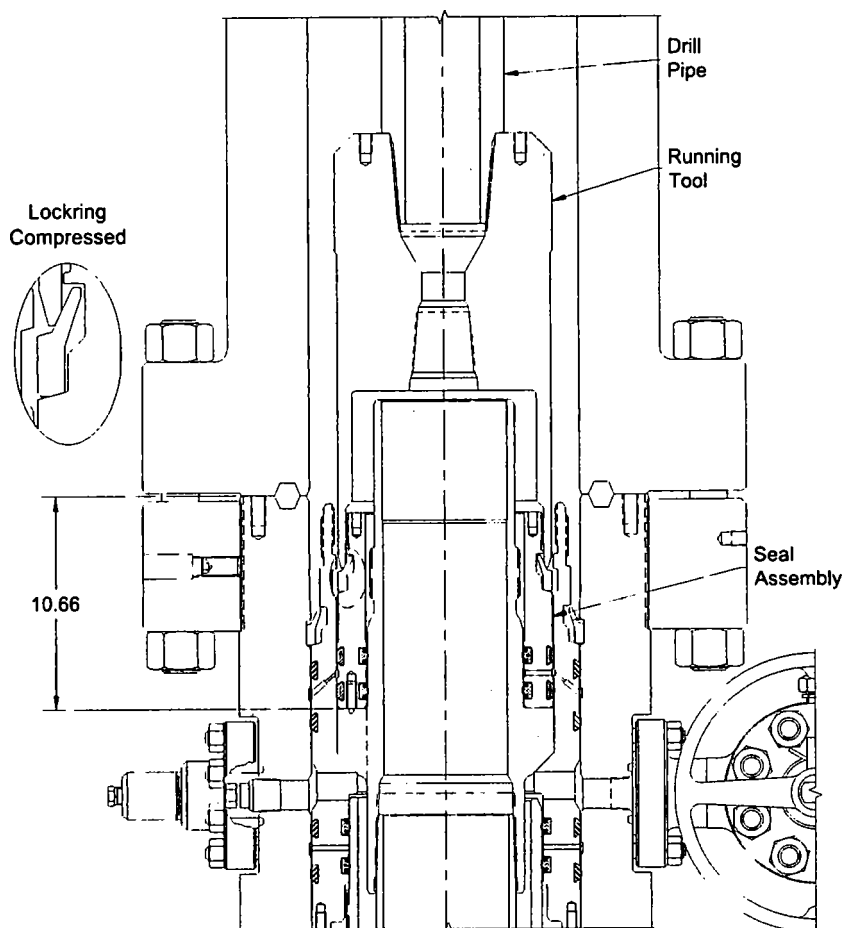
## Stage 3.0 — 7" Casing

- 3.6.17. Center and lower the assembly through the BOP Stack and Housing, measure and record, until the Seal Assembly lands on the Casing Hanger.

**NOTE** Distance from the Mandrel Casing Hanger landing shoulder to the face of the BOP flange is 10.66".

- 3.6.18. Turn the landing joint counterclockwise until the (8) Spring Plunger pins engage the Hanger mating slots. When the pins engage the Hanger, STOP turning when a positive stop is felt.

**NOTE** Test between the seals of the Seal Assembly will be conducted after the Lockdown Ring has been properly engaged/ set into the Packoff Support Bushing.



## Stage 3.0 — 7" Casing

### 3.7. Set the Seal Assembly Lockdown Ring

**NOTE** Confirm the Seal Assembly has properly landed on Mandrel Casing Hanger.

- 3.7.1. Make a vertical mark on the landing joint to monitor the number of turns.
- 3.7.2. Using chain tongs, back out the Tool 3 turns clockwise to allow the Locking ring to expand into its mating groove in the Packoff Support Bushing.

**NOTE** Horizontal mark should raise no more than .75".

**WARNING** DO NOT ATTEMPT TO BACK OUT MORE THAN 3 TURNS.

- 3.7.3. Perform an over pull 50,000 lbs to confirm the locking has properly engaged.

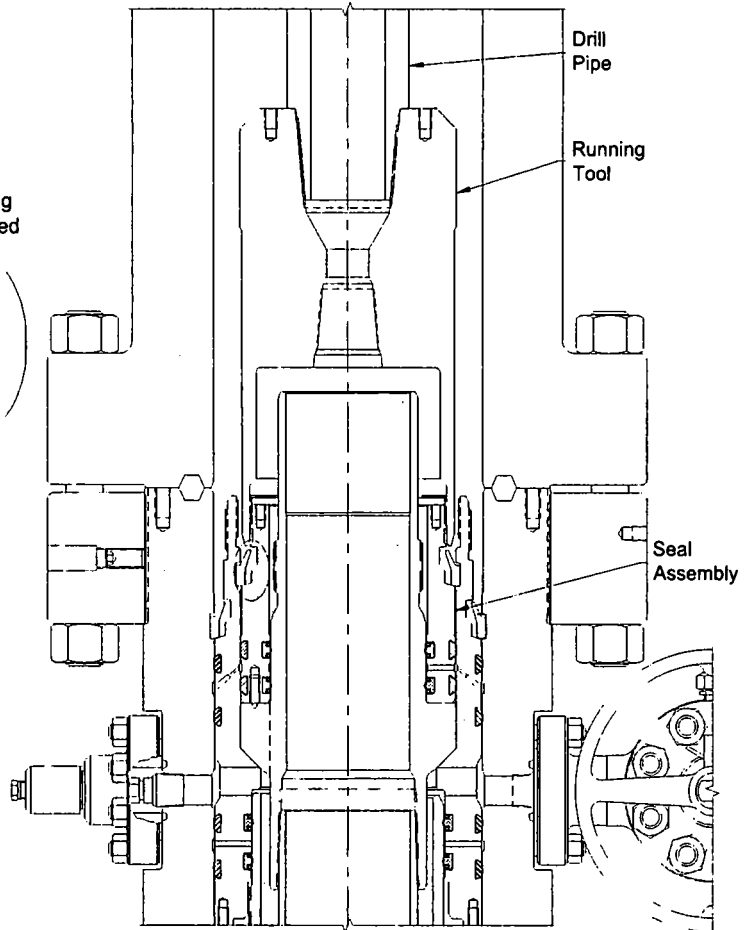
#### CAUTION

Clear out personnel from rig floor during overpull test. Precautions must be taken for personnel verifying the overpull.

#### CAUTION

There should be minimum upper movement on the landing joint at any point during the overpull. Actual nominal locking clearance is 1/8". If vertical movement is greater, check and verify if Seal Assembly has been lifted off from its land off position. If such situation arises, collapse locking and retrieve Seal Assembly to rig floor to troubleshoot.

Lockring Expanded



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**NOTE** If initial over pull test is unsuccessful, do not immediately collapse the locking for a second installation attempt. Conduct the following steps prior to Support Bushing retrieval:

- Ensure Packoff Support Bushing Running Tool is backed off 3-1/2 turns.
- Re-apply the installation load (10,000 - 20,000 lbs) to force the Packoff and Lockring down into the groove of the housing.
- Re-attempt 50,000 lbs over pull test.

#### CAUTION

If a successful over pull test is not achieved after three installation attempts, follow steps 4.6.3 and 4.6.4 to fully retract the locking and remove the Packoff Support Bushing. Retrieve the Packoff Support Bushing and locking to the rig floor for troubleshooting.

**NOTE** Dovetail seals must be replaced prior to re-installing the Packoff Support Bushing.

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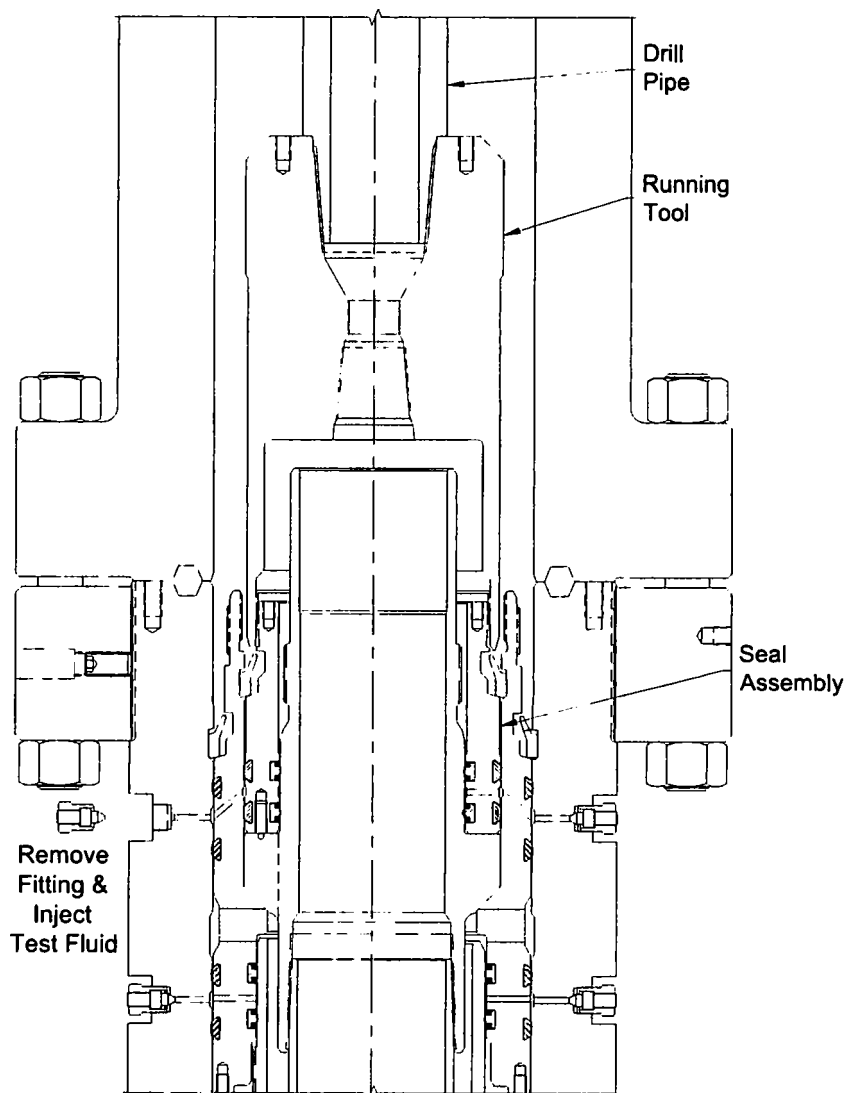
## Stage 3.0 — 7" Casing

### 3.8. Testing Between the 9-5/8" Packoff Upper Seals & 7" Packoff Seals (ID & OD)

- 3.8.1. Locate the upper test port on the Housing and remove fitting from the port.
- 3.8.2. Attach a hydraulic test pump to the open test port and inject fluid into the seal assembly to the **10,000 psi maximum**.

**Do NOT over pressurize!**

- 3.8.3. Hold and monitor the test pressure for 15 minutes or as required by the Drilling Supervisor.
- 3.8.4. After a satisfactory test is achieved, carefully bleed off the test pressure, remove the test pump, re-install fitting in the open port.
- 3.8.5. Retrieve the Tool by turning the drill pipe (with chain tongs) clockwise approximately 3-1/2 turns or until it comes free from the Seal Assembly. A straight lift will retrieve the Tool.
- 3.8.6. Remove the Tool from the drill string. Clean, grease, and store the Tool as required.



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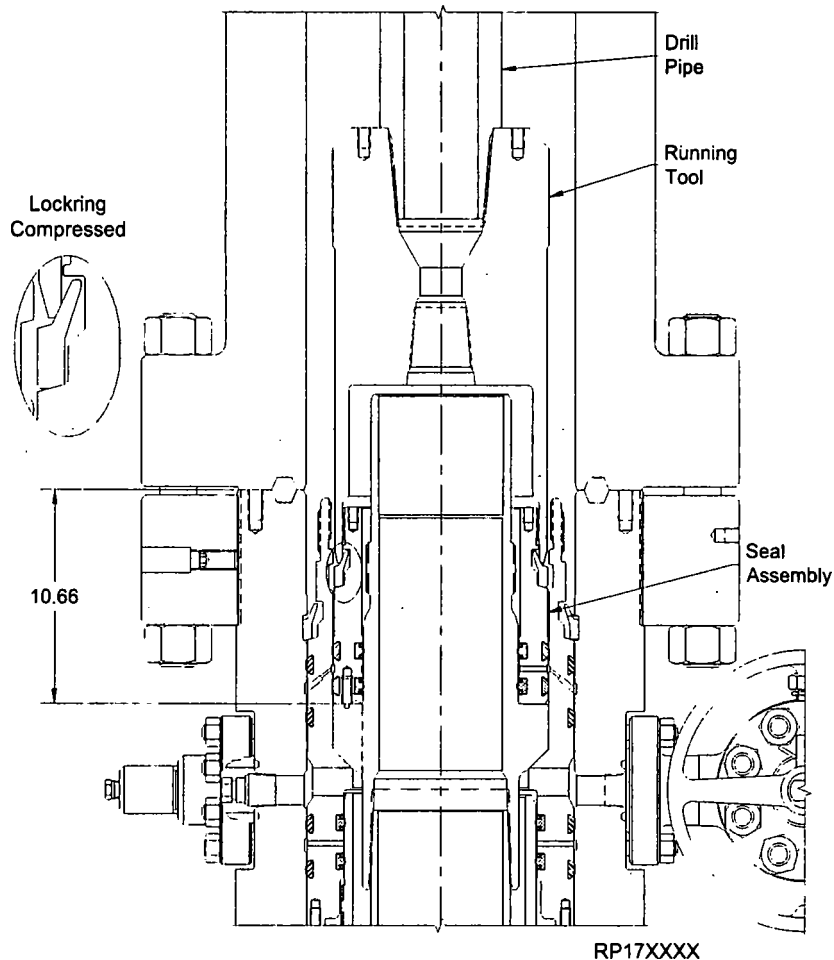
## Stage 3.0 — 7" Casing

### ⚠ CAUTION

The following procedure should be followed **ONLY** in the event Retrieval of the Seal Assembly is necessary. If the Seal Assembly was properly landed, skip this procedure.

### 3.9. Retrieval of Seal Assembly

- 3.9.1. Make up a joint of drill pipe to the top of the **Seal Assembly Running Tool (Item ST13)**.
- 3.9.2. Lower the Running Tool through BOP stack and land on top of Seal Assembly.
- 3.9.3. Turn the Tool counterclockwise approximately 6-1/2 turns or the number of turns documented per section 4.3, until the tool fully engages the locking and a firm stop is encountered. Back off from this point a maximum 1/8 of a turn.
- 3.9.4. Retrieve the Seal Assembly by pulling vertically (approximately 3,000 lbs).



**⚠ WARNING** If overpull exceeds this value, repeat counter-clockwise rotation until a firm stop is encountered and repeat overpull.

- 3.9.5. To remove Seal Assembly from the running tool, install **Locking Installation Tool (Item ST14)** and fully compress the Locking.

**NOTE** Dovetail seals must be replaced prior to re-installing the Seal assembly.

## Stage 3.0 — 7" Casing

### 3.10. Install the Bit Guide

3.10.1. Examine the **Combination Tool (Item ST15)**. Verify the following:

- lift lugs are intact and undamaged
- all threads are clean and undamaged
- o-ring seals are in place and undamaged

3.10.2. Orient the Tool as illustrated.

3.10.3. Make up a joint of drill pipe to the top of the Tool.

**Make sure the lift lugs are down and the elastomer is up when latching into the Bit Guide.**

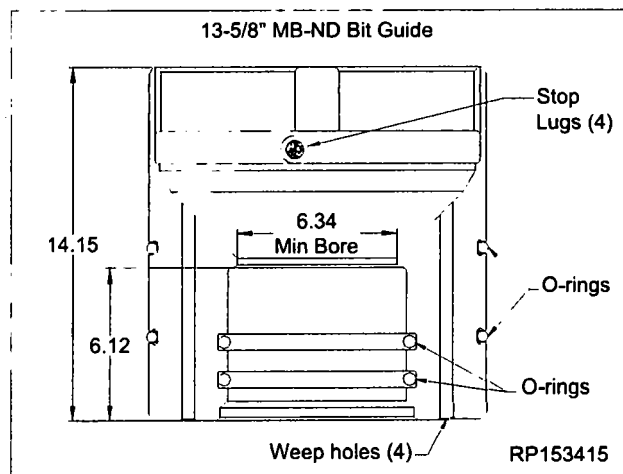
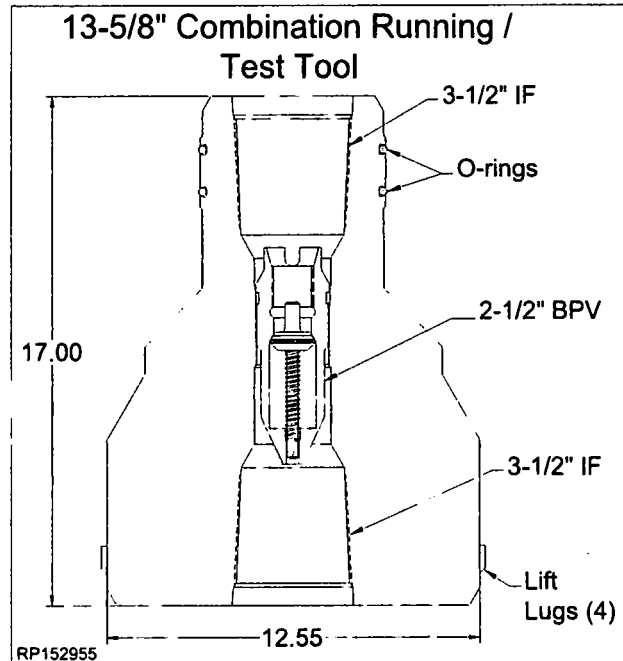
3.10.4. Examine the **Bit Guide (Item ST16)**. Verify the following:

- bore is clean and free of debris
- stop lugs are properly installed
- j-slots are clean and free of debris
- o-ring seals are in place and undamaged

3.10.5. Orient the Bit Guide as illustrated.

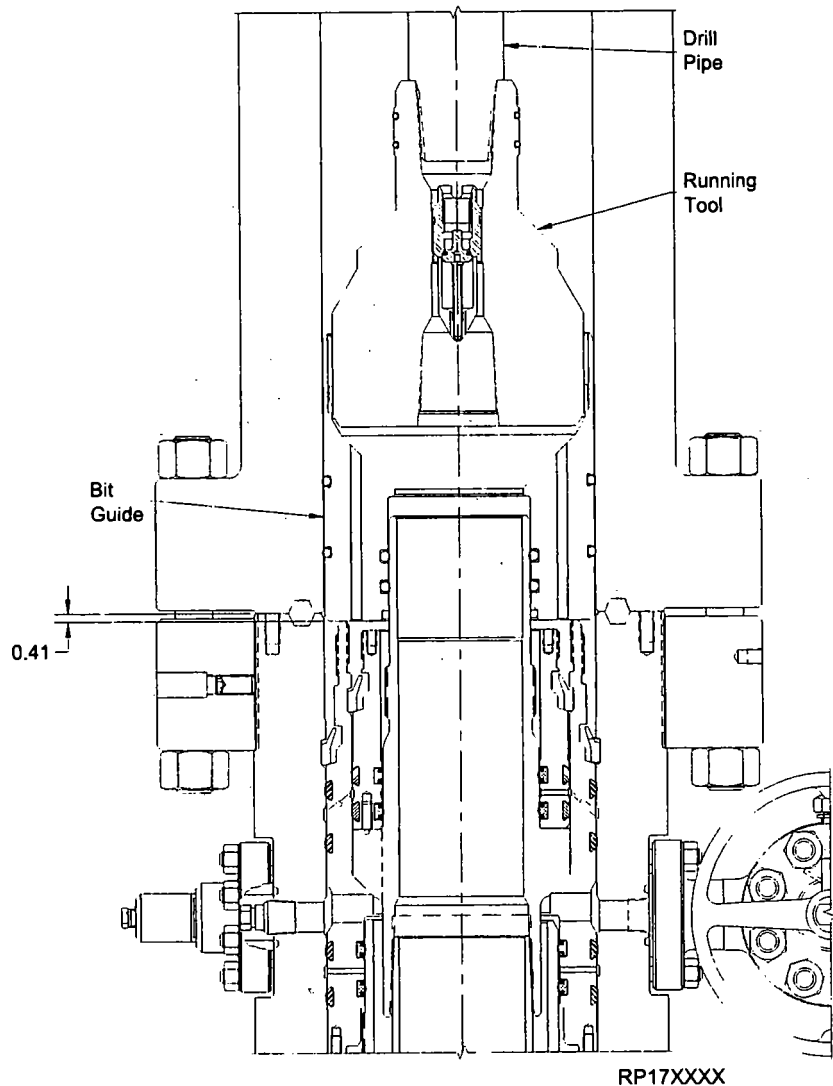
3.10.6. Lubricate OD of Bit Guide and O-ring seals with a light coat of oil or grease.

**Excessive oil or grease may prevent a positive seal from forming.**



## Stage 3.0 — 7" Casing

- 3.10.7. Lower the Tool into the Bit Guide and turn the drill pipe 1/4 turn clockwise.
- 3.10.8. Slowly lower the Bit Guide assembly through the BOP stack, measure and record, until it lands on top of the Packoff Support Bushing.
- 3.10.9. Disengage the Tool from the Bit Guide by turning the drill pipe counterclockwise 1/4 turn and lifting straight up.



## Stage 3.0 — 7" Casing

### 3.11. Test the Seal Assembly

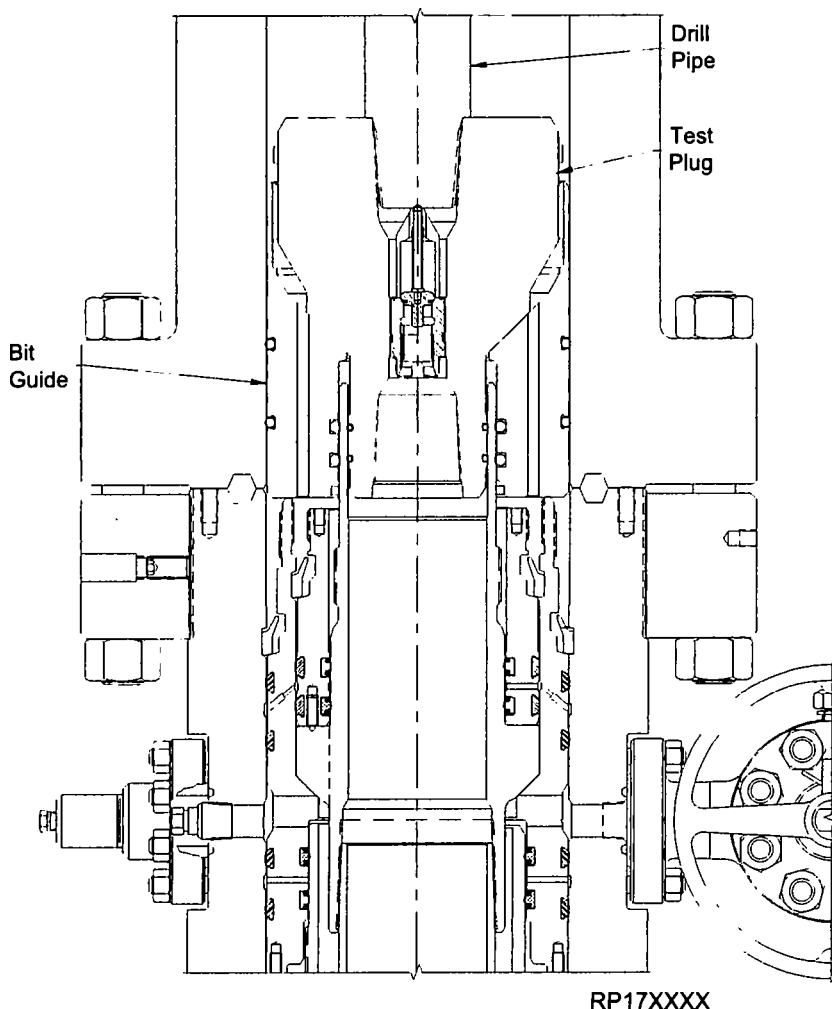
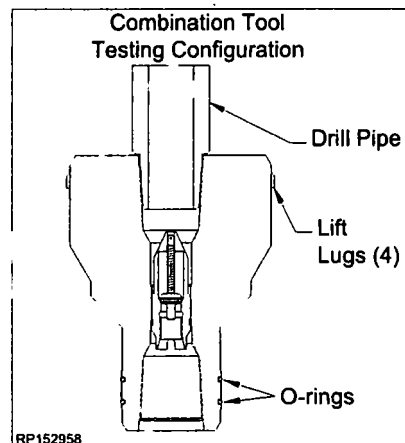
- 3.11.1. After retrieving the Tool, remove the drill pipe out of the Tool.
- 3.11.2. Position the **Combination Tool (Item ST15)** with the lift lugs up and make up the drill pipe to the top of the Tool to the thread manufacturer's recommended shoulder torque.

**NOTE** Verify Combination Tool seal neck will drift ID bore of casing or Hanger prior to install. Major downtime will occur if Tool will not drift.

- 3.11.3. Open the uppermost annulus valve of the Housing.
- 3.11.4. Lower the Tool through the BOP stack, measure and record, until it lands on the Bit Guide and into the Casing Hanger.
- 3.11.5. Close the BOP rams on the drill pipe and test to **10,000 psi maximum**.

**Do NOT over pressurize!**

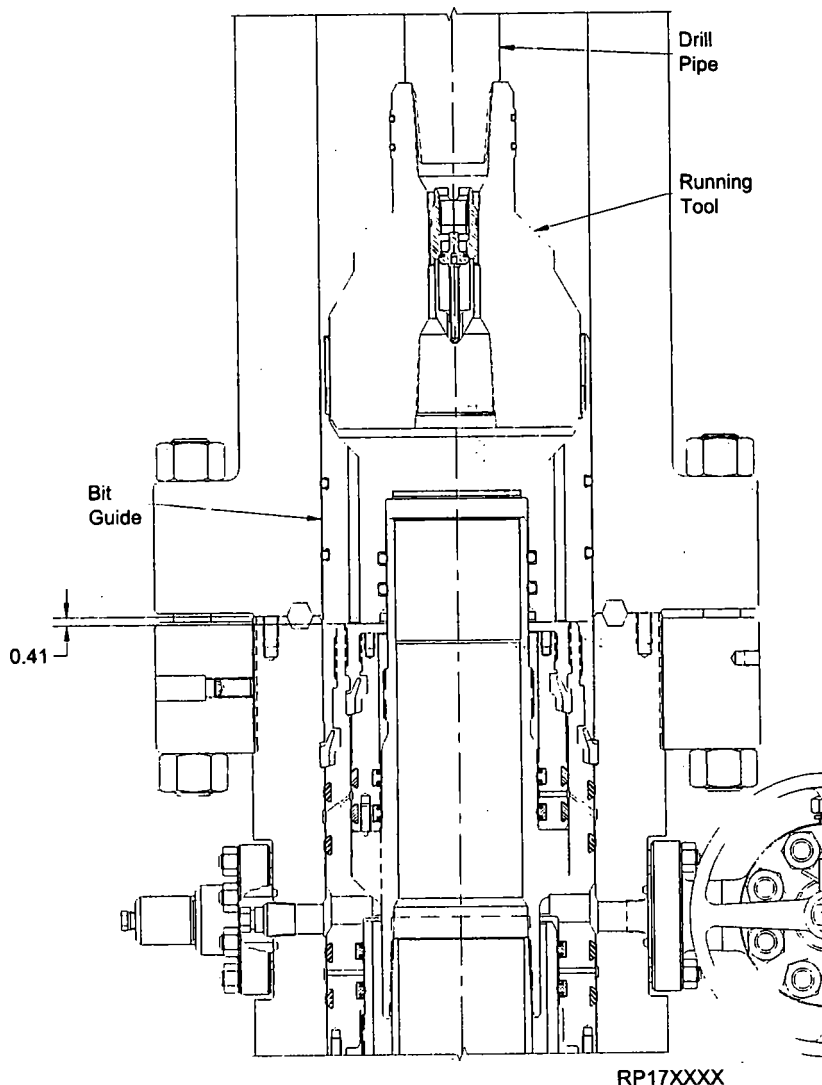
- 3.11.6. Monitor the open outlet for signs of leakage past the Seal Assembly.
- 3.11.7. After a satisfactory test is achieved, release pressure, and open the rams.
- 3.11.8. Slowly retrieve the Tool to the rig floor.
- 3.11.9. Close upper annulus valve.
- 3.11.10. Drill as required.



## Stage 3.0 — 7" Casing

### 3.12. Retrieve the Bit Guide After Drilling

- 3.12.1. Remove the drill pipe out of the Tool.
- 3.12.2. Make up the Tool to the drill pipe with the lift lugs down and the elastomer up.
- 3.12.3. Slowly lower the Tool into the Bit Guide.
- 3.12.4. Turn the Tool clockwise until the drill pipe drops approximately 2". This indicates the lugs have aligned with the Bit Guide slots.
- 3.12.5. Turn clockwise 1/4 turn to fully engage the lugs in the Bit Guide.
- 3.12.6. Slowly retrieve the Bit Guide and remove it and the Tool from the drill string.
- 3.12.7. Clean, grease and store the Tool and Bit Guide as required.



## Stage 3.0 — 7" Casing

3.12.8. With the well safe and secure, nipple down the BOP stack.

3.12.9. Measure and record Hanger neck/ standoff height.

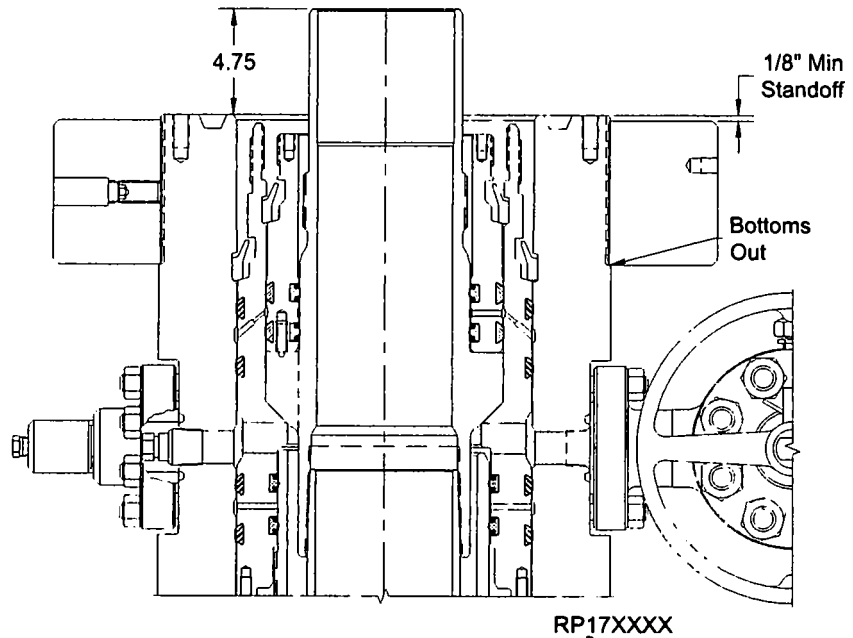
### CAUTION

Ensure and verify threaded hanger is properly installed and secured by hand.

Do not use any tools or equipment to assist in the installation of the hanger. The hanger is designed to be installed by hand. The use of tools or equipment may damage the hanger or the wellbore.

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## Stage 3.0 — 7" Casing

**SAFETY NOTE** Always wear proper PPE (Personal Protective Equipment) such as safety shoes, safety glasses, hard hat, gloves, etc. to handle and install equipment.



### NOTE

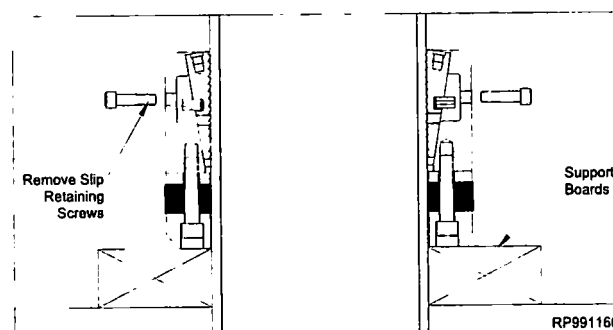
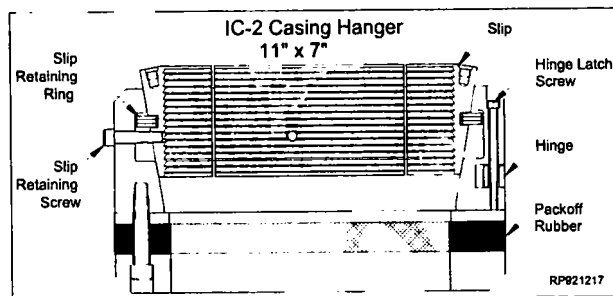
1. Reconfirm the Casing OD and grade. Remove and clean loose scale from Casing OD.
2. Verify Slip Bowl taper is smooth, clean with no corrosion and damage free.
3. Disassembly of the Hanger to re-orient the slips is not required.

### 3.13. Hang Off the Casing (Emergency)

**NOTE** The following procedure should be followed ONLY if the casing should become stuck. If the Mandrel Casing Hanger was used, skip this stage.

**NOTE** Since the IC-2 Casing Hanger is an automatic, weight energized Hanger, it is necessary to ensure there is adequate casing weight to create an annular seal.

- 3.13.1. Run the casing through the BOP to the required depth and cement the hole as required.
- 3.13.2. Drain the Casing Head bowl through its side outlet.
- 3.13.3. Measure Slip Bowl from load shoulder to top of Housing and record.
- 3.13.4. There are two methods used to install the Casing Hanger:
  - from the rig floor through a full opening BOP stack, provided no casing collars are between the rig floor and the Head
  - underneath the BOP stack, provided the well is safe and under control. This option allows the Hanger bowl to be inspected and thoroughly washed prior to the Hanger Installation.
- 3.13.5. Examine the **Casing Hanger (Item E2)**. Verify the following:
  - the packoff rubber is clean and undamaged
  - all screws are in place and intact
  - slips are intact, clean, and undamaged
  - seal element is not compressed beyond the OD of the Hanger



- 3.13.6. Remove the latch screw to open the Hanger.

**Do NOT over open the Hanger. This can damage the Packoff Rubber.**

- 3.13.7. Place two boards of equal size against the casing to support the Hanger.
- 3.13.8. Wrap the Hanger around the casing and replace the latch screws.
- 3.13.9. Verify that the seal element is not compressed beyond the OD of the Hanger. If it is, loosen the cap screws in the bottom of the Hanger. The seal **MUST NOT BE COMPRESSED** prior to slacking off casing weight onto the Hanger.
- 3.13.10. Remove the slip retaining screws.
- 3.13.11. Grease the Hanger body and packoff rubber.

## Stage 3.0 — 7" Casing

3.13.12. Remove the boards and carefully lower the Hanger into the Housing, using a cat-line to center the casing, if necessary. Measure and record.

3.13.13. Once slips are landed, measure from top of Housing to verify that slip bowl is on the load shoulder prior to putting weight on the slips.

3.13.14. When the Hanger is down, pull tension on the casing to the desired hanging weight + 1-1/2" then slack off.

**NOTE** A sharp decrease on the weight indicator will signify that the Hanger has taken weight and at what point.

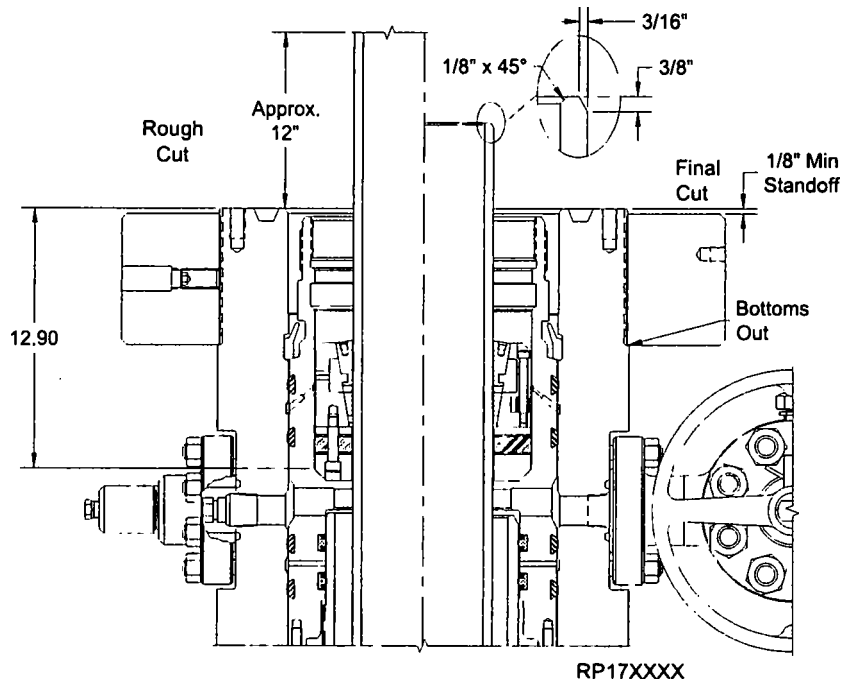
3.13.15. Rough cut the casing at approximately 12" above the flange of the Housing.

3.13.16. Move the BOP and excess casing out of the way.

**NOTE** Always physically measure the exact cutoff height by measuring the bottom bore of the next component to be installed and subtract 1/4" from this dimension, prior to making the final cutoff.

3.13.17. Final cut the casing at 4-1/4" ± 1/8" above the top of the Housing flange. Place a 3/8" x 3/16" bevel on the casing stub and remove all burrs and sharp edges.

**NOTE** The ID edge of the casing may be ground slightly to allow drill pipe and casing collars to pass smoothly.



## Stage 3.0 — 7" Casing

### 3.14. Install the TA Cap

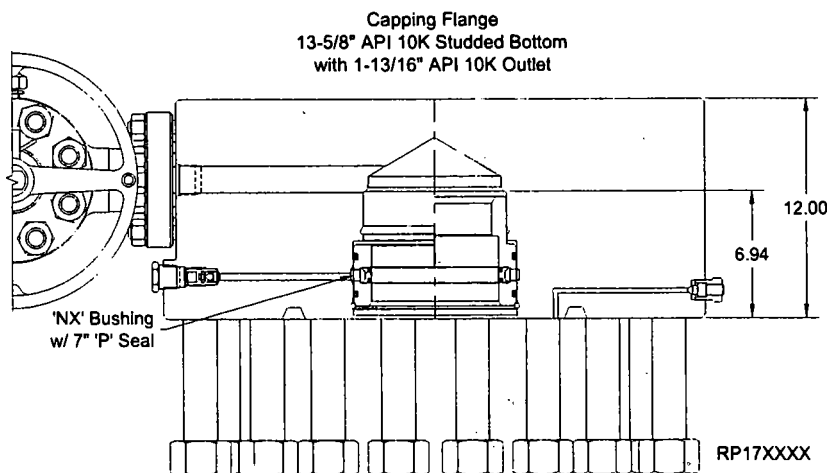
#### 3.14.1. Examine the **TA Cap (Item B1)**. Verify the following:

- bore is clean and free of debris
- seal areas are clean and undamaged
- all peripheral equipment is intact and undamaged
- **'NX' Bushing (Item C2 or E3)** is properly installed, clean and undamaged

#### 3.14.2. Orient the TA Cap as illustrated.

#### 3.14.3. Clean the mating ring grooves of the Housing and TA Cap. Lubricate each groove, the ID of the TA Cap and the OD of the Hanger neck/casing stub with a light coat of oil or grease.

**WARNING** Excessive oil or grease may prevent a positive seal from forming.



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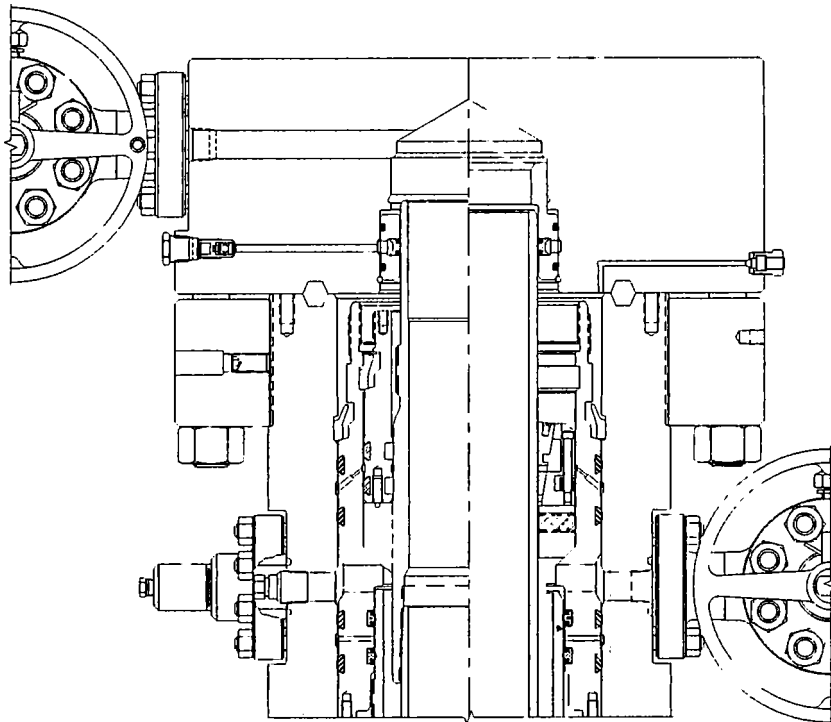
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**13-5/8" 10K MN-DS System**  
**13-3/8" x 9-5/8" x 7" Casing Program**

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## Stage 3.0 — 7" Casing

- 3.14.4. Install a new **BX-159 Ring Gasket (Item A20)** into the ring groove of the Housing.
- 3.14.5. Orient the TA Cap per customer's requirements and carefully lower the TA Cap over the casing stub until it lands on the ring gasket.
- 3.14.6. Make up the connection using the **studs and nuts provided with the TA Cap** and tighten the connection in an alternating cross fashion to the torque referenced in the chart in the back of this manual.



RP17XXXX

### A. ONLY FOR

Use the following steps to install the TA Cap on the casing stub.

1. Rotate the TA Cap so that the ring gasket is aligned with the ring groove of the casing stub. The TA Cap should be lowered onto the casing stub until it lands on the ring gasket.

2. Verify that the TA Cap is properly aligned with the ring groove of the casing stub. The TA Cap should be lowered onto the casing stub until it lands on the ring gasket.

Threaded flange should be shouldered, not the pin flange.

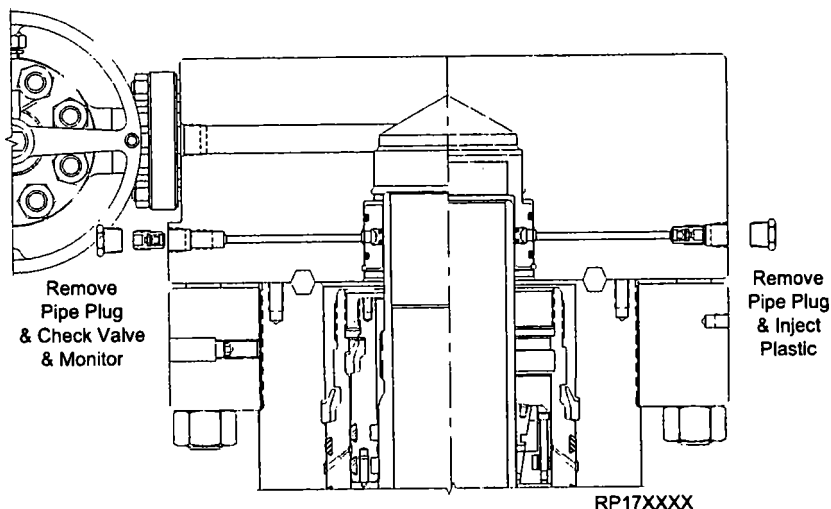
## Stage 3.0 — 7" Casing

### 3.15. Energize the 'NX' Bushing 'P' Seal

**CAUTION** Extreme care and time must be used when injecting plastic packing into 'NX' Bushing with thin-walled cross-sections. Pump plastic packing slowly and allow additional time for pressure to stabilize between pump iterations on the hydraulic pump.

#### **WARNING**

**SEE RP-000589  
PROCEDURE FOR  
PACKING INJECTION  
AND ENERGIZING THE  
'P' SEALS**



### 3.16. Test the Connection

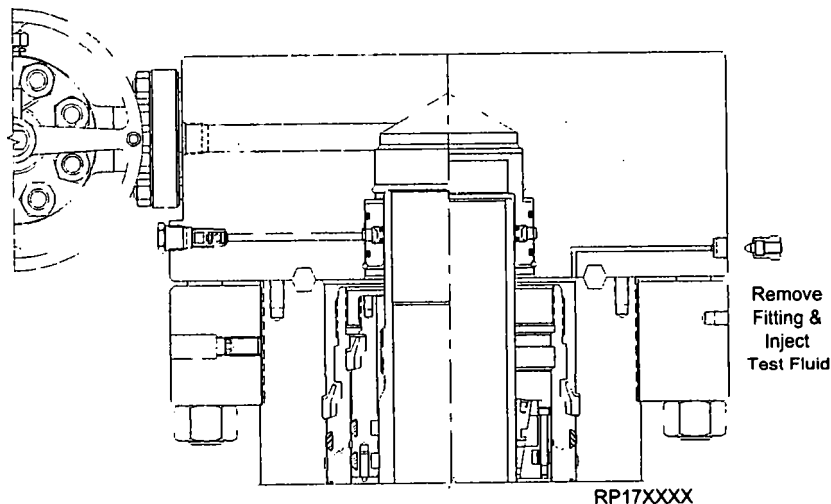
- 3.16.1. Locate the port on the OD of the TA Cap for testing the connection and remove the fitting.
- 3.16.2. Install a test pump to the open port and inject test fluid to **10,000 psi or 80% of casing collapse—whichever is less.**

**NOTE** If Emergency Hanger was installed, do not exceed 80% of casing collapse.

**NOTE** Contact the Drilling Supervisor to determine the collapse pressure of the specific grade and weight of the casing used.

**WARNING** Do NOT over pressurize.

- 3.16.3. Hold and monitor the test pressure for fifteen minutes or as required by the Drilling Supervisor.



- 3.16.4. Once a satisfactory test is achieved, carefully bleed off all test pressure and remove the test pump.

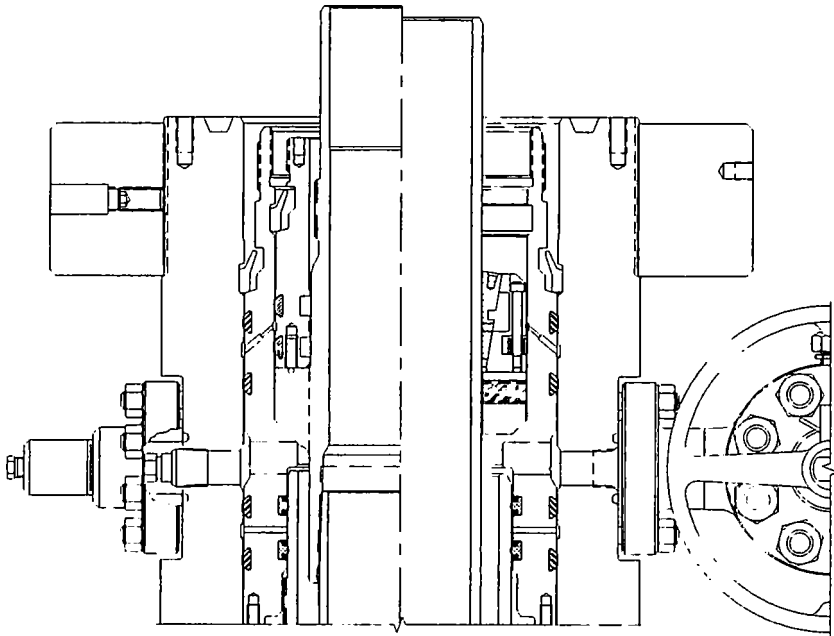
- 3.16.5. Re-install the fitting.

## Stage 3.0 — 7" Casing

### 3.17. Remove the TA Cap

**NOTE** Verify the well is safe and secure and that there is no trapped pressure in the well.

- 3.17.1. With the well safe and secure, nipple down the TA Cap.
- 3.17.2. With the appropriate lifting device, lift the TA Cap straight up and retrieve to the rig floor.
- 3.17.3. Inspect the Hanger neck/casing stub for signs of damage and report immediately.



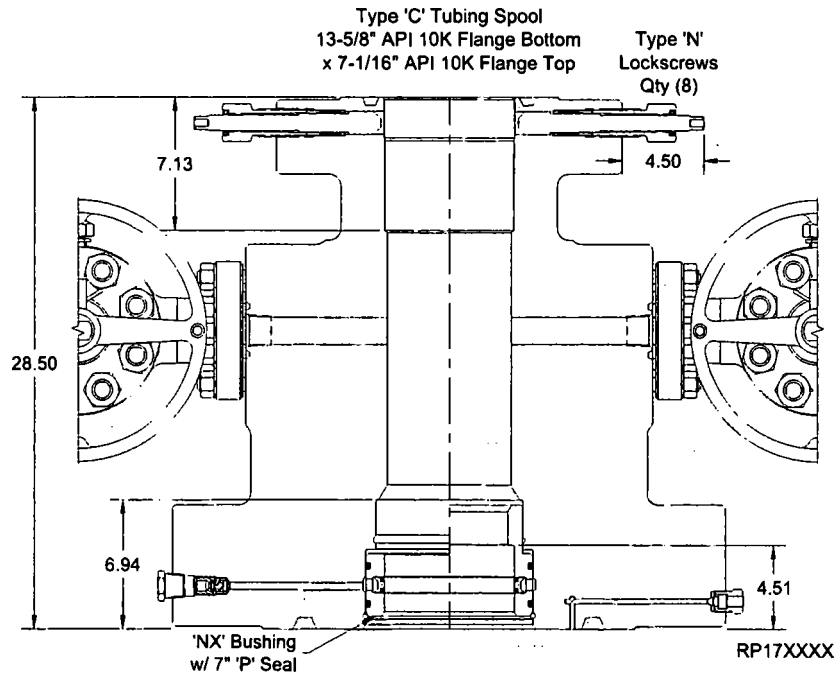
RP17XXXX

## Stage 3.0 — 7" Casing

### 3.18. Install the Tubing Spool

3.18.1. Examine the **Tubing Spool (Item C1)**. Verify the following:

- bore is clean and free of debris
- **'NX' Bushing (Item C2 or E3)** is properly installed and undamaged
- ring grooves and seal areas are clean and undamaged
- peripheral equipment is intact and undamaged
- all lockscrews are retracted from the bore as indicated



**WARNING** All Lockscrews **MUST** achieve positions as indicated. Otherwise contact Surface Engineering for guidance.

3.18.2. Lubricate the ID of the 'P' seal or 'T' seals (depending on the Bushing installed) and the OD of the casing stub with a light coat of oil or grease.

**WARNING** Excessive oil or grease may prevent a positive seal from forming.

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13-5/8" 10K MN-DS System  
13-3/8" x 9-5/8" x 7" Casing Program



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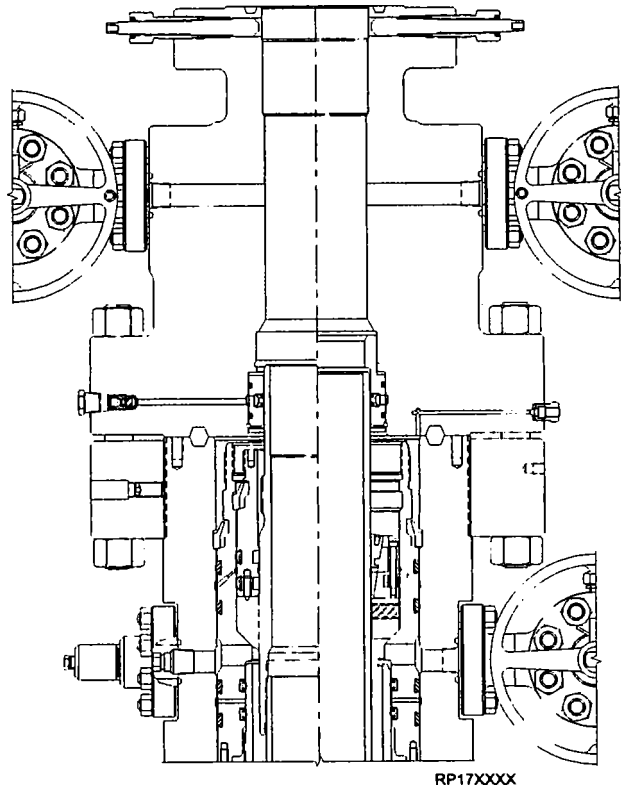
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## Stage 3.0 — 7" Casing

- 3.18.3. Install a new **Ring Gasket BX-159 (Item A21)** into the ring groove of the MN-DS Housing.
- 3.18.4. Lift and suspend the Tubing Spool over the casing stub, ensuring it is level. Align the spool outlets as required. Align the bolts of the Spool as required (two hole).
- 3.18.5. Carefully lower the Tubing Spool and land it on the Housing flange.

**CAUTION** Do NOT damage the 'P' seal or its sealing ability will be impaired.

- 3.18.6. Make up the connection using the **studs and nuts (Item A20)** in an alternating cross fashion to the torque referenced in the chart in the back of this manual.



**CAUTION**

Do not use a crane to lift the casing. The casing is heavy and can cause injury or death if not handled properly.

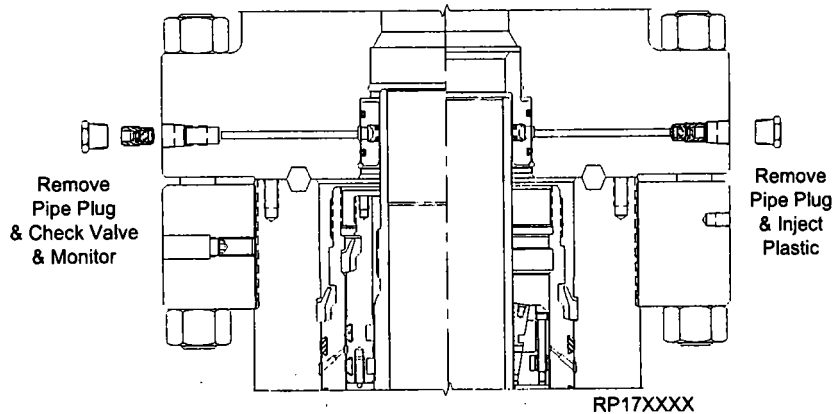
1. Before lifting the casing, ensure the casing is properly supported and the lifting equipment is rated for the weight of the casing.
2. Verify the casing is level and the lifting equipment is properly aligned before lifting the casing.

Threading the casing should be completed on the ground.

## Stage 3.0 — 7" Casing

### 3.19. Energize the 'NX' Bushing 'P' Seal

**CAUTION** Extreme care and time must be used when injecting plastic packing into 'NX' Bushing with thin-walled cross-sections. Pump plastic packing slowly and allow additional time for pressure to stabilize between pump iterations on the hydraulic pump.



#### **WARNING**

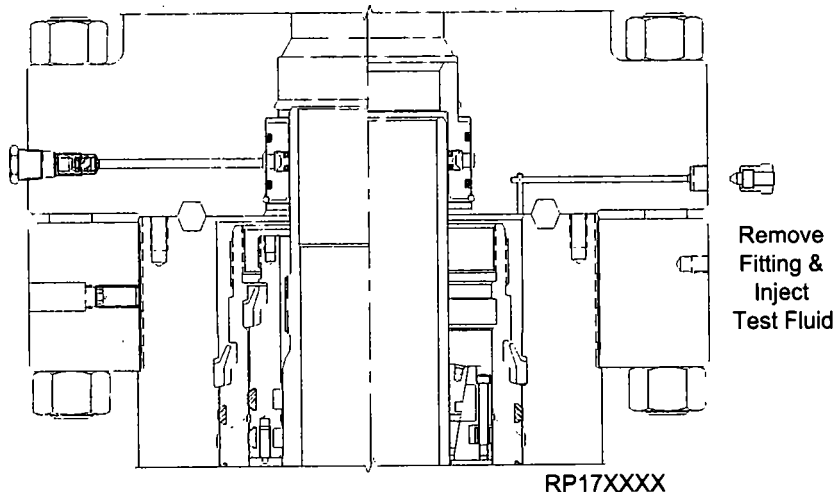
**SEE RP-000589**

### PROCEDURE FOR PACKING INJECTION AND ENERGIZING THE 'P' SEALS

### 3.20. Test the Connection

- 3.20.1. Locate the port on the bottom flange of the Tubing Spool for testing the connection and remove the fitting.
- 3.20.2. Install a test pump into the port and inject test fluid to **10,000 psi or 80% of casing collapse—whichever is less.**

**NOTE** If Emergency Hanger was installed, do not exceed 80% of casing collapse.



**NOTE** Contact the Drilling Supervisor to determine the collapse pressure of the specific grade and weight of the casing used.

**WARNING** Do NOT over pressurize.

- 3.20.3. Hold and monitor the test pressure for fifteen minutes or as required by the Drilling Supervisor.

- 3.20.4. Once a satisfactory test is achieved, carefully bleed off the test pressure and remove the test pump.

- 3.20.5. Re-install the fitting.

**NOTE** Not all injection and testing port configurations are the same and should be handled accordingly.

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13-5/8" 10K MN-DS System  
13-3/8" x 9-5/8" x 7" Casing Program

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## Stage 3.0 — 7" Casing

### 3.21. Install the Lower Master Valve

3.21.1. Examine the **Lower Master Valve**. Verify the following:

- bore is clean and free of debris
- ring groove are clean and undamaged
- drift diameter

3.21.2. Orient the Lower Master Valve as required.

3.21.3. Clean the mating ring grooves of the Tubing Spool and the Lower Master Valve. Lubricate each groove with a light coat of oil or grease.

**CAUTION** Excessive oil or grease may prevent a positive seal from forming.

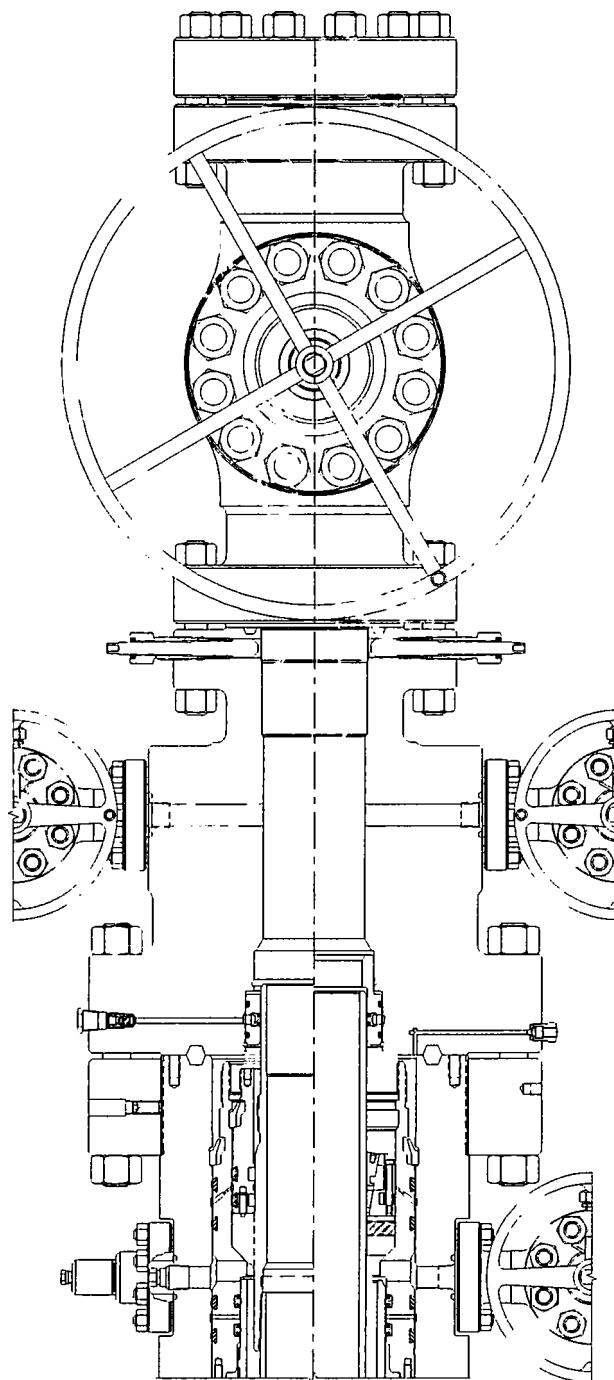
3.21.4. Install a new **Ring Gasket BX-156 (Item C8)** into the ring groove of the Tubing Spool.

3.21.5. With the appropriate lifting device, lift and suspend the Lower Master Valve over the Tubing Spool, ensuring assembly is level. Align the bolts as required (two hole).

3.21.6. Slowly and carefully lower the Lower Master Valve until it lands on the Tubing Spool ring gasket.

3.21.7. Make up the connection using the **studs and nuts (Item C9)** in an alternating cross fashion to the torque referenced in the chart in the back of this manual.

3.21.8. Test as required.



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

The following procedure is a direct extraction (except for the numeric footnote designators) from the Fourteenth Edition of API 6A<sup>1</sup>. Editorial footnotes have been added to provide additional information that may be of benefit when developing procedures for specific field welding applications. The recommended procedure and footnotes are for general information purposes and it should be mentioned that Cameron is not responsible for determining or administering any field welding practices. The organization performing the welding should qualify their welding procedure(s) and welder(s) in accordance with applicable codes and standards<sup>2</sup>. The success of any field weld should be verified by subsequent hydrostatic test at the direction of the customer.

**B.1 Introduction and Scope.** - The following recommended procedure has been prepared with particular regard to attaining pressure-tight welds when attaching casing heads, flanges, etc., to casing. Although most of the high strength casing used (such as P-110) is not normally considered field weldable, some success may be obtained by using the following or similar procedures<sup>3</sup>.

**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.

1. 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.
2. **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.

**B.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.

**B.3 Welding.** - The welding should be done by the shielded metal-arc<sup>4</sup> or other approved process.

**B.4 Filler Metal.** - After the root pass, low hydrogen electrodes or filler wires of a yield strength equal to the casing yield strength should be used<sup>5</sup>. The low hydrogen electrodes include classes EXX15, EXX16, EXX18, EXX28 of AWS A5.1 (latest edition): *Mild Steel Covered Arc-Welding Electrodes\** and AWS A5.5 (latest edition): *Low Alloy Steel Covered Arc-Welding Electrodes\**. Low hydrogen electrodes should not be exposed to the atmosphere until ready for use. Electrodes exposed to atmosphere should be dried 1 to 2 hours at 500 to 600°F (260 to 316°C) just before use<sup>6</sup>.

\*Available from the American Society for Testing and Materials, 1916 Race street, Philadelphia, Pa. 19103.

**B.5 Preparation of Base Metal.** - The area to be welded should be dry and free of any paint, grease, scale, rust or dirt.

**B.6 Preheating.** - Both the casing and the wellhead member should be preheated to 250-400°F (121 to 204°C) for a distance of at least 3 inches (76.2 mm) on either side of the weld location, using a suitable preheating torch. Before applying preheat, the fluid should be bailed out of the casing to a point several inches (mm) below the weld location. 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<sup>7</sup>.

**NOTE** Preheating may have to be modified because of the effect of temperature on adjacent packing elements which may be damaged by exposure to temperatures 200°F (93°C) and higher. Temperature limitations of the packing materials should be determined before the application of preheat.

**WARNING** If Casing Head is designed with an internal o-ring bottom prep and the internal o-ring is installed, ensure the o-ring preheat temperature does not exceed 300°F

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

**B7. Welding technique.** - Use a 1/8 or 5/32 inch (3.2 or 4.0 mm) E6010 electrode<sup>8</sup> and step weld the first bead (root pass); that is, 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). Then 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. The second pass should be made with a 5/32 (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, and each bead after the root pass should be thoroughly peened before applying the next bead. There should be no undercutting and welds shall be workmanlike in appearance.

**NOTE** E7018 RODS HAVE BEEN SUCCESSFULLY USED FOR ROOT PASS.

1. Test ports should be open when welding is performed to prevent pressure build-up within the test cavity.
2. During welding the temperature of the base metal on either side of the weld should be maintained at 250°F (121°C) minimum.
3. 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.

**B.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.

**B.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.

**B.10 Postheating.** - For the removal of all brittle areas on high strength steel casing, a post heat temperature of 1050-1100°F (566 to 593°C)<sup>9</sup> is desirable. It is recognized, however, that this temperature is difficult or impossible to obtain in the field, and that the mechanical properties of the wellhead parts and the pipe may be considerably reduced by these temperatures. As a practical matter, the temperature range of 500-900°F (260 to 482°C) has been used with satisfactory results.

**B.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 a blanket of asbestos<sup>10</sup> or other suitable insulating material. 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 250°F (121°C) (measured with a heat sensitive crayon) prior to permitting the mud to rise in the casing.

**NOTE** The above procedure is presented for the convenience of our customers. Please Contact Cameron's Land Wellhead engineering Group in Houston, Texas if any additional assistance is required.

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

<sup>1</sup>API SPECIFICATION 6A - Fourteenth Edition, March 1983, Appendix B, Page 109

<sup>2</sup>ASME Section IX is one such code that provides guidelines for the qualification of welding procedures and welders. It specifically assigns the responsibility of qualification of welding procedures and welders to the organization with "responsible operational control" over the production welding.

<sup>3</sup>Many of the high strength casing grades are weldable but weldability will vary from one casing manufacturer to another even within a given casing grade. The weldability of any base metal is determined largely by its chemical composition. Casing materials, even within a given grade vary widely in their chemical makeup. This necessitates the qualification of welding procedures, not just for a particular grade but also for each different chemical makeup. When qualifying welding procedures intended for field application, it is recommended that field welding conditions be simulated as much as is possible. It is very important that the welding parameters and techniques qualified are duplicated in the field.

<sup>4</sup>American Welding Society designation SMAW (Shielded Metal Arc Welding), commonly referred to as "stick welding."

<sup>5</sup>Finding filler metals that will match the strength of the high strength casings will be very difficult if not impossible to do. For instance, E12018M is the highest strength electrode classified by AWS A5.5. It has a minimum specified yield strength of 108 ksi. That does not meet the minimum specified yield strength for P-110 or Q-125 casing. When joining carbon and low alloy materials of different strengths, it is standard practice to use a carbon steel or low alloy filler metal that will match, as a minimum, the strength of the weaker of the two materials being joined. When dealing with the high strength casings such as N-80, P-110 and Q-125, the material to which any one of these is to be joined will probably be the weaker of the two. In such cases, filler metals should be selected based on the minimum specified strength of the weaker material. It is the responsibility of the user to specify the size of weld required based on anticipated loads and strength of weld metal being used.

<sup>6</sup>The reason for maintaining low moisture in the electrodes is to minimize the amount of hydrogen that is liberated at the arc during welding. When welding high strength low alloy steels, hydrogen can promote delayed cold cracking in hardened weld metals and heat affected zones. One of the ways to reduce the chance of cold cracking is to minimize the hydrogen potential of the electrodes through moisture control.

<sup>7</sup>Internal pre-heaters for preheating the casing and wellhead member from the inside are available from Cameron and are highly recommended.

<sup>8</sup>E6010 electrodes contain high levels of moisture in their coating. Hydrogen which is liberated from moisture under the intense heat of the electric arc, migrates into the weld metal and heat affected zone and can promote hydrogen induced cold cracking as the weld cools down. For this reason, some companies elect not to use E6010 electrodes for the first pass, even though there are benefits from the standpoint of operator appeal and penetration. If they are used, precautions must be taken to get rid of the diffusible hydrogen before the weld cools from preheating temperatures. Given enough time at elevated temperatures, the hydrogen will diffuse out of the metal. The rate of diffusion is time and temperature dependant. Therefore, the diffusion process can be promoted through the use of high preheats, post weld stress relief, post weld soaks at or above preheat temperatures and slow cooling.

**NOTE E7018 RODS HAVE BEEN SUCCESSFULLY USED FOR ROOT PASS**

<sup>9</sup>Low alloy welds that are required to meet NACE MR0175 specification must be stress relieved at 1150°F (621°C) minimum.

<sup>10</sup>For health reasons, Cameron strongly recommends against the use of asbestos insulating blankets. There are many good non-asbestos materials that can be used as an acceptable substitute.

## Torque Chart

Recommended Makeup Torques for Flange Bolting Ft•Lbf				
Per API 6A: preload = .50Sy				
Bolt Size Nom OD - TPI	B7M, L7M (Sy=80 ksi)		B7, L7, 660 (Sy=105 ksi)	
	cf=0.07	cf=0.13	cf=0.07	cf=0.13
.500-13	27	45	35	59
.625-11	52	88	68	115
.750-10	90	153	118	200
.875-9	143	243	188	319
1.000-8	213	361	279	474
1.125-8	305	523	401	686
1.250-8	421	726	553	953
1.375-8	563	976	739	1280
1.500-8	733	1280	962	1680
1.625-8	934	1640	1230	2150
1.750-8	1170	2050	1530	2700
1.875-8	1440	2540	1890	3330
2.000-8	1750	3090	2300	4060
2.250-8	2500	4440	3280	5820
2.500-8	3430	6120	4500	8030
2.625-8	3970	7100	4720	8430
2.750-8	4570	8180	5420	9700
3.000-8	5930	10700	7050	12700
3.250-8	7550	13600	8970	16100
3.500-8	9430	17000	11200	20200
3.750-8	11600	21000	13800	24900
3.875-8	12800	23200	15200	27500
4.000-8	14100	25500	16700	30300

### NOTE

- The information in this table is based on API-6A's recommended torque for a given bolt size. The information is presented for the convenience of the user and is based on assumptions of certain coefficients of friction (cf). The coefficients of friction are based on approximations of the friction between the studs and nuts, as well as the nuts and flange face. A coefficient friction of 0.13 assumes the threads and nut bearing surfaces are bare metal and are well lubricated with thread compound. A coefficient of friction of 0.07 assumes the thread and nuts are coated with a fluoropolymer material.
- Lubrication
 

It is essential that threads and nut faces be well lubricated with an appropriate grease prior to assembly. Cameron clamps and fast clamps require lubrication on the hub-clamp contact area. Acceptable lubricants include thread joint compounds which meet the formulation, evaluation and testing requirements specified in API Recommended Practice 5A3/ISO13678. (Reference - Jet Lube Grease, 1 lb can PN: 2737980-02).

Studs and nuts coated with Xylan/PTFE compound in accordance with a Cameron procedure do not require lubrication. However, a light coat of API Recommended Practice 5A3/ISO13678 thread compound is recommended for Xyland-coated bolting as an aid to assembly.

Material gaskets should be lightly coated with lubricant prior to assembly. Acceptable lubricants include motor oil or Cameron gate valve greases.

## IC Test Plug Load Chart

IC Test Plug Maximum Load							
Bowl		Maximum Hanging Load (in 1000s lbs) at Test Pressure					
Size	Pressure	0 psi	2,000 psi	3,000 psi	5,000 psi	10,000 psi	15,000 psi
7-1/16"	2,000 to 5,000 psi	213	135	96	19	N/A	N/A
	10,000 psi	253	175	136	59	0	N/A
	15,000 psi	477	399	360	282	88	0
9"	2,000 to 10,000 psi	600	479	419	299	0	N/A
	15,000 psi	751	630	570	450	149	0
11"	2,000 to 10,000 psi	1277	1091	998	812	348	N/A
	15,000 psi	1596	1410	1317	1131	667	202
13-5/8"	2,000 to 10,000 psi	1713	1426	1283	997	281	N/A
	15,000 psi	2142	1855	1712	1426	710	5
16-3/4"	2,000 to 5,000 psi	3076	2641	2424	1990	N/A	N/A
20"	2,000 to 5,000 psi	2733	2096	1778	1142	N/A	N/A

## Minimum Casing Load Chart for IC Type Hangers

Minimum Casing Load for IC-2 & IC-6 Casing Hangers		
Hanger Nom. Size	Casing Size	Load (Pounds)
11"	4-1/2"	78,000
	5"	74,000
	5-1/2"	70,000
	6-5/8"	59,000
	7"	55,000
	7-5/8"	48,000
	8-1/2"	44,000
13-5/8"	5-1/2"	120,000
	7"	106,000
	7-5/8"	99,000
	8-5/8"	86,000
	9-5/8"	72,000
	10-3/4"	54,000

Minimum Casing Load for IC-2 & IC-6 Casing Hangers		
Hanger Nom. Size	Casing Size	Load (Pounds)
16-3/4"	9-5/8"	146,000
	10-3/4"	128,000
	11-3/4"	110,000
	11-7/8"	109,000
	13-3/8"	79,000
	14-3/4"	64,000
20-3/4" 21-1/4"	10-3/4"	228,000
	13-3/8"	180,000
	13-5/8"	175,000
	16"	120,000

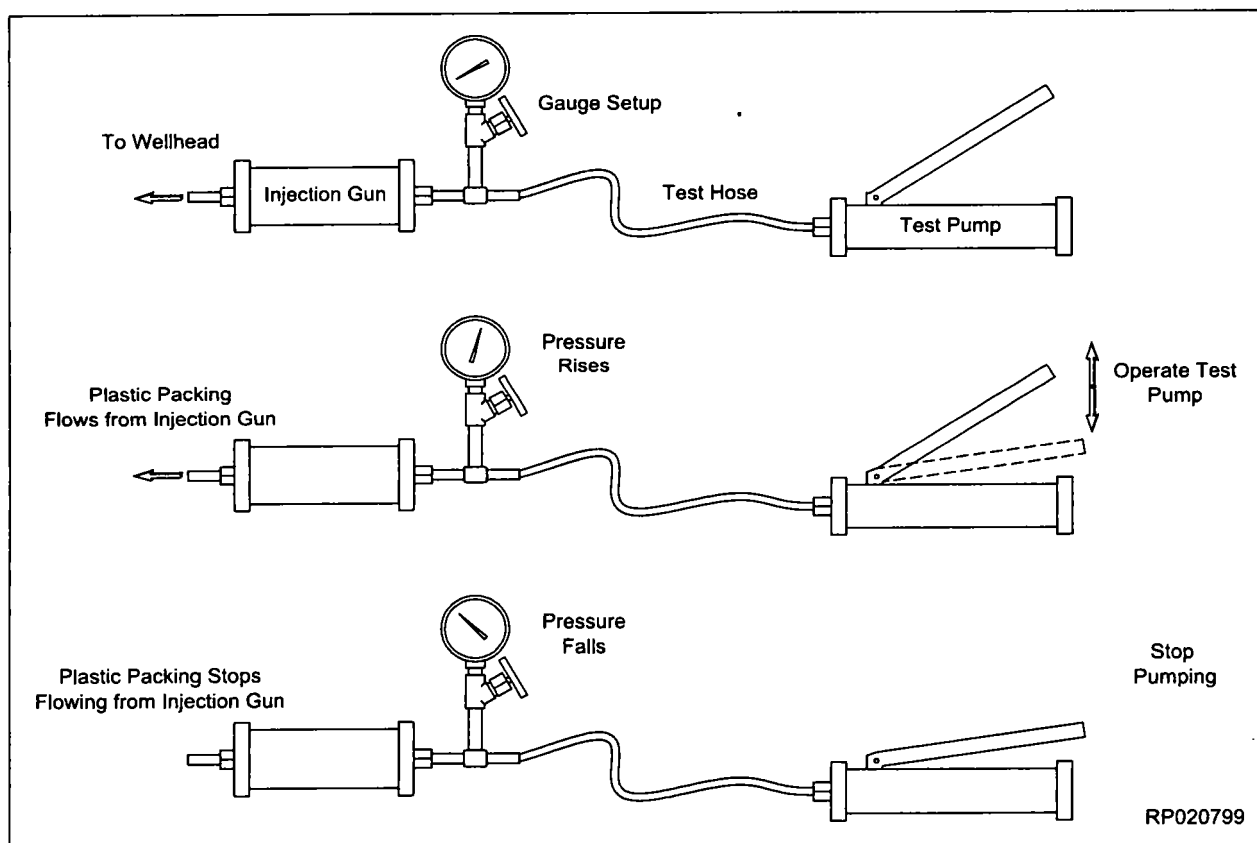
## Injection Gun Preparation

1. Maintaining the Injection Gun at ambient temperatures, prepare Test Pump and Injection Gun for injecting P seals.
2. Operate Test Pump to inject fluid into Injection gun.
3. Monitor open end of Injection Gun for signs of plastic packing.
4. After plastic packing begins to flow from open end of Injection Gun continue to inject fluid from Test Pump increasing pressure an additional 200 to 400 psi.
5. Stop pumping Test Pump and monitor plastic packing movement and pressure on the pressure gauge.
6. Once packing has stopped flowing and the pressure gauge has stabilized observe the reading on gauge and record the pressure. **This will be your P1 pressure.**

Screw Type Injection Gun	
Applied Torque (ft-lb)	Packing Pressure (psi)
25	1,600
50	5,000
75	7,000
100	8,800
150	14,100
200	17,700
220	20,000

**NOTE** The pressure recorded will become "0". This is the pressure required to move the plastic packing and is not included in the actual injection pressure.


**NOTE** The amount of pressure required to force plastic packing to flow from the Injection Gun is dependent on several factors including outside temperature and the plastic injection gun itself. The example given above is for illustration purposes only.



# Fraction to Decimal Conversion Chart

FRACTION TO DECIMAL CONVERSION CHART													
4THS	8THS	16THS	32NDS	64THS	TO 3 PLACES	TO 2 PLACES	4THS	8THS	16THS	32NDS	64THS	TO 3 PLACES	TO 2 PLACES
				1/64	.016	.02					33/64	.516	.52
			1/32		.031	.03				17/32		.531	.53
				3/64	.047	.05					35/64	.547	.55
			1/16		.062	.06				9/16		.562	.56
				5/64	.078	.08					37/64	.578	.58
			3/32		.094	.09				19/32		.594	.59
				7/64	.109	.11					39/64	.609	.61
			1/8		.125	.12				5/8		.625	.62
				9/64	.141	.14					41/64	.641	.64
			5/32		.156	.16				21/32		.656	.66
				11/64	.172	.17					43/64	.672	.67
			3/16		.188	.19				11/16		.688	.69
				13/64	.203	.20					45/64	.703	.70
			7/32		.219	.22				23/32		.719	.72
				15/64	.234	.23					47/64	.734	.73
			1/4		.250	.25				3/4		.750	.75
				17/64	.266	.27					49/64	.766	.77
			9/32		.281	.28				25/32		.781	.78
				19/64	.297	.30					51/64	.797	.80
			5/16		.312	.31				13/16		.812	.81
				21/64	.328	.33					53/64	.828	.83
			11/32		.344	.34				27/32		.844	.84
				23/64	.359	.36					55/64	.859	.86
			3/8		.375	.38				7/8		.875	.88
				25/64	.391	.39					57/64	.891	.89
			13/32		.406	.41				29/32		.906	.91
				27/64	.422	.42					59/64	.922	.92
			7/16		.438	.44				15/16		.938	.94
				29/64	.453	.45					61/64	.953	.95
			15/32		.469	.47				31/32		.969	.97
				31/64	.484	.48					63/64	.984	.98
			1/2		.500	.50				1		1.000	1.00

## Appendix 1

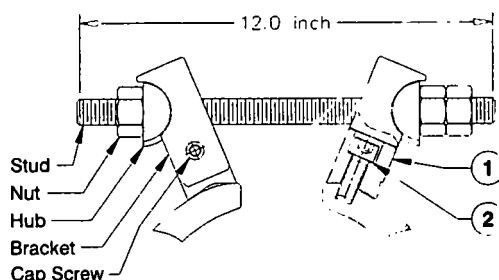
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### RECOMMENDED LOCKDOWN RING (COLLAPSING/EXPANDING) TOOL FOR SSMC AND E-LOCK

#### Scope

Recommended tool Top level assembly 2273869-05 contains common assembly parts with optional interchangeable adaptors and associated cap screws for specific lockdown ring size.

Table 1 lists recommended and existing tool Part numbers.



Install adaptor with Undercut Facing out

Figure 1 – Components in recommended tool top level assembly 2273869-05 (optional Item 1 – adaptor; comes with associated Item 2 – cap screw)

#### Procedure to use recommended tool 2273869-05

##### (A) Collapsing lockdown ring



##### Step 1

Power tight dedicated adaptor and cap screw to the specific lockdown ring size.

⚠ Adaptor "Legs" **must rest fully** on ring profile to prevent loading stress on cap screw.



##### Step 2

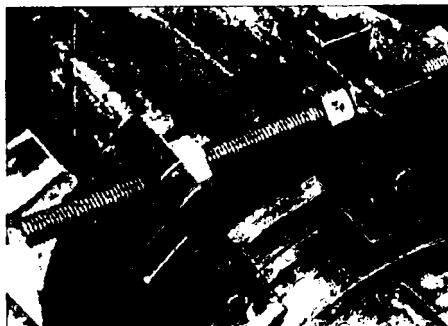
Make up brackets to receive Hub.

##### Step 3

Torque nut sufficiently to collapse ring.

⚠ Torque **should not exceed 10ft-lbs**. Verify collapse interference by wiggling lock ring.

##### (B) Expanding lockdown ring



##### Step 1

Power tight dedicated adaptor and cap screw to specific lockdown ring size.

##### Step 2

Make up bracket to receive Hub.

##### Step 3

Torque nut sufficiently to expand ring.

⚠ Similar checks as collapsing the ring.

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## Appendix 1


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Table 1 Recommended and Existing Tool PN						
Type	Size	Recommended* and Existing Tools	Tool Model (Table 2)	Adaptor (Fig 1 - Item 1)	Cap Screw (Fig 1 - Item 2)	Use on Lock Down Ring PN
SSMC	7-1/16	2273869-05*	(A)	2309218-05	702550-05-00-12	2017505-01
		2017561-06	(D)	NA		
	9	2273869-05*	(A)	2309218-06	702550-05-00-12	2202370-01 2236286-01
		2017561-06	(D)	NA		
		2017561-14	(D)			
	11	2273869-05*	(A)	2309218-07	702550-05-00-14	2094484-02 2094484-02-01 2094484-05 2094484-06
		2209192-01	(D)	NA		
		2017561-06	(D)			
		2017561-14	(D)			
	13-5/8	2273869-05*	(A)	2309218-02	702550-06-00-12	2062967-02 2062967-02-13 2062967-06
		2017561-02	(D)	NA		
		2017561-15	(D)			
		2273869-02	(E)			
		2230761-02	(C)			
		2230761-05	(C)			
	18-3/4	2273869-05*	(A)	2309218-08	702550-06-00-14	2125281-01 2125281-02 2125281-04
		2017561-15	(D)	NA		
		2230761-01	(C)			
		2209898-01	(D)			
	21-1/4	2273869-05*	(A)	2309218-08	702550-06-00-14	2125281-03
		2230761-01	(C)	NA		
E-LOCK	9	2273869-05*	(A)	2309218-11**	702503-16-00-40	2236573-01
	11	2273869-05*	(A)	2309218-01	702550-05-00-22	2216464-01 2216464-03
		2017561-13	(D)	NA		
		2273869-04	(B)			
** Only to use on E-lock Union Connector with <u>Enlarged Window</u> (PN 2236288-03)						

\*\* Only to use on E-lock Union Connector with Enlarged Window (PN 2236288-03)

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## Appendix 1


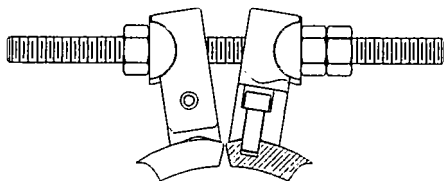
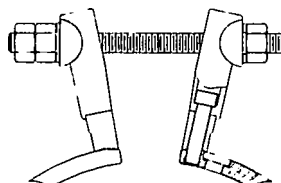
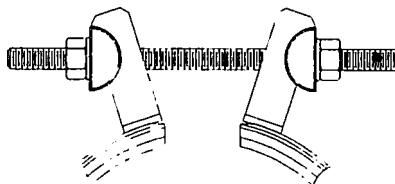
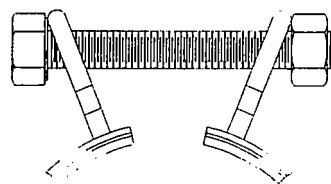

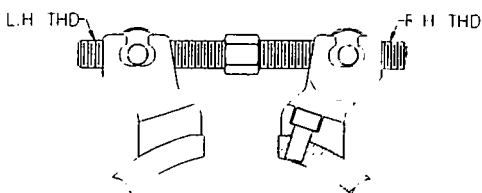
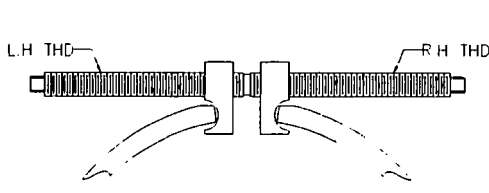

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Table 2 Tool Models	
	
<p><b>Model A - PN: 2273869-05</b></p> <ul style="list-style-type: none"><li>Recommended tool for SSMC and E-lock</li><li>Common assembly component</li><li>Interchangeable adaptor and cap screw for specific lock ring size</li></ul>	<p><b>Model B - PN: 2273869-04</b></p> <ul style="list-style-type: none"><li>Specifically designed for 11" E-lock</li><li>Adaptor not interchangeable for other lock ring sizes.</li></ul>
	
<p><b>Model C - PN: 2230761</b></p> <ul style="list-style-type: none"><li>Historically used on SSMC</li><li>Various body components per ring size.</li><li>Comes with extension pin for E-lock</li></ul>	<p><b>Model D - PN: 2017561 / 2209192 / 2209898</b></p> <ul style="list-style-type: none"><li>Most common tool for SSMC and E-lock</li><li>High occurrence to replace eyebolt</li></ul> <p> Potential hazard due to shearing of eyebolt.</p>
	
<p><b>Model E - PN: 2273869-02</b></p> <ul style="list-style-type: none"><li>Specifically designed for 13-5/8" SSMC</li><li>Opposite direction threaded ends to facilitate quick collapsing/expansion.</li></ul>	<p><b>Model F - PN: 2273869-03</b></p> <ul style="list-style-type: none"><li>Specifically designed for expanding process</li></ul>

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	APPROVED BY	DATE	04	
	MARK SVOBODA	23 AUG 16		

### MAKE-UP AND BREAK OUT PROCEDURE FOR TYPE N LOCKSCREW ASSEMBLIES

#### 1.0 SCOPE

This document provides recommended tools, assembly, make up and break out procedures for Type N lockscREW assemblies.

#### 2.0 RECOMMENDED GREASE

All lockscREW assemblies require grease application at each threaded interface. Grease used on lockscREW assemblies must have a coefficient of friction within the range of 0.11 - 0.13. Table 1 provides recommended part numbers for grease to be used in lockscREW assemblies. Similar grease may be used if it has an acceptable coefficient of friction, as listed in this section.

Cameron PN	Description
708503	NeverSeez Regular Grade
700670	TF-41 Valve Grease

Table 1 - Standard Grease Part Numbers

#### 3.0 LOCKSCREW ASSEMBLY

The standard lockscREW assembly is the type N lockscREW assembly (reference ES-000115-01). This consists of a lockscREW, gland, graphite packing, and spacer rings. Reference Figure 1 for the standard lockscREW assembly configuration.

##### CAUTION:

New gland PN 2165861-02-04 listed in ES-000115-01 rev 05 will not work with respective old N type lockscREW PNs on the following flange sizes because the old lockscREWS will not retract all the way to clear the bore. The lockscREWS listed on ES-000115-01 rev 05 must be used with this gland part number for the following flange sizes.


4-1/16 10K	5-1/8 10K	11 3K
4-1/16 15K	5-1/8 15K	13-5/8 2K
		13-5/8 3K

Contact local or regional engineering support for questions and/or additional support.


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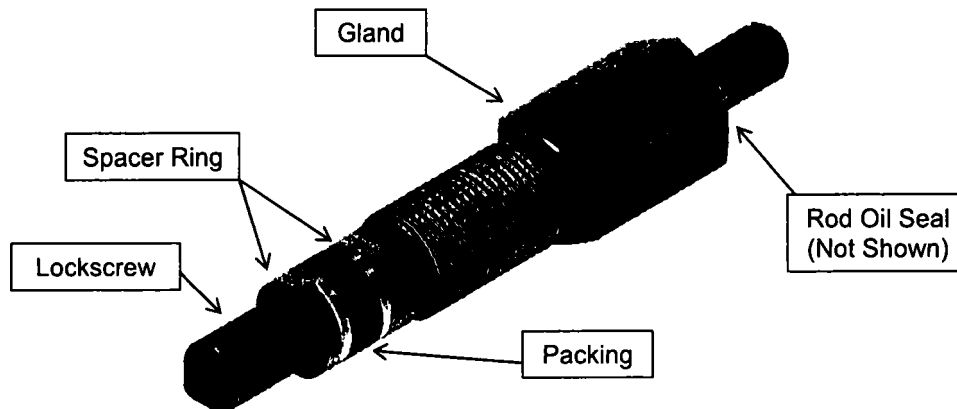
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<b>RP-003815</b> <b>Rev 01 Draft A</b> Page 80	<b>13-5/8" 10K MN-DS System</b> <b>13-3/8" x 9-5/8" x 7" Casing Program</b>	 <b>CAMERON</b> A Schlumberger Company
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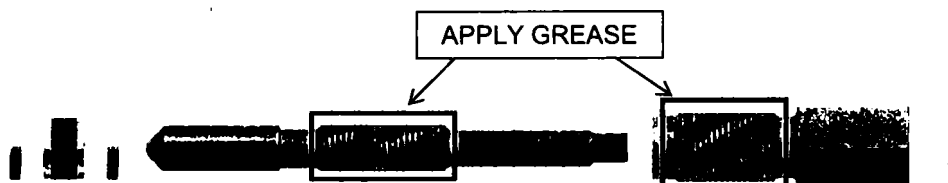
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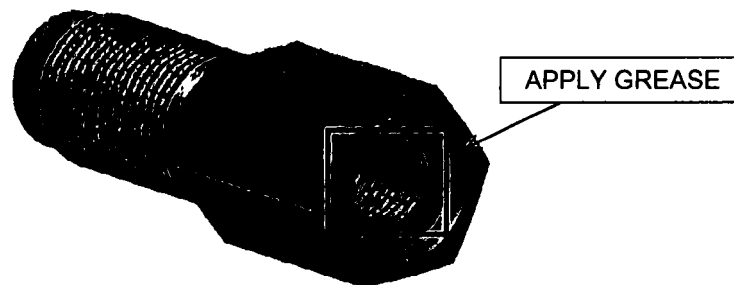


**Figure 1 - Standard Type N Lockscrew Assembly**

Spacer rings are placed on each side of the graphite packing, and this sub-assembly is then placed along the lockscrew shaft. The lockscrew external threads, along with the gland external and internal threads, must be fully coated with a layer of the recommended grease from Section 2.0, or a grease with a coefficient of friction within the range specified. Reference Figure 2 and Figure 3 for required grease locations.



**Figure 2 - Grease Locations (External)**




**Figure 3 - Grease Location (Internal)**

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The lockscrew gland must then be made up to the lockscrew. Once the gland is in place, insert the rod oil seal (Note: groove on rod oil seal must face out towards square drive on lockscrew). Lockscrew ports in housings must also be coated with a layer of grease. The lockscrew assembly may then be made up to the housing. It is acceptable for the graphite packing and junk rings to come in contact with grease, but not required.

### 4.0 LOCKSCREW ASSEMBLY MAKE UP PROCEDURE

The geometry and quantity of each assembly require all lockscrew assemblies to be fully engaged to be able to retain the casing or tubing hanger. Lockscrews should never be operated under pressure.

#### 4.1 TORQUE TOOLS

Part numbers have been created for torque wrenches, sockets, and open ended torque wrench adapters required to achieve setting torques for Type N lockscrew assemblies.

Description	Drive	Length	Part Number
Torque Wrench (120-600 ft-lb)	3/4"	41.19"	2824392-01
Torque Wrench (200-1,000 ft-lb)	1"	69"	2824392-02
Torque Wrench (400-2,000 ft-lb)	1"	107.5"	2824392-03

Table 2 - Torque Wrench Part Numbers

Description	Drive	Size	Part Number
Socket	1/2"	9/16" - 8 pt	2824402-01
Socket	1/2"	5/8" - 8 pt	2824402-02
Socket	1/2"	11/16" - 8 pt	2824402-03
Socket	1/2"	3/4" - 8 pt	2824402-04
Socket	1/2"	1" - 8 pt	2824402-05
Socket Adapter (3/4" drive to 1/2" drive)	-	-	2824403-01

Table 3 - Lockscrew Socket Part Numbers

Description	Drive	Size	Part Number
Gland Adapter	3/4"	1-3/4" - 12 pt	2379114-01-03
Gland Adapter	1"	1-3/4" - 12 pt	2379114-01-02
Gland Adapter	3/4"	2-1/4" - 12 pt	2379114-01-05
Gland Adapter	1"	2-1/4" - 12 pt	2379114-01-04

Table 4 - Gland Nut Wrench Adapters

#### 4.2 GENERAL OPERATIONAL SEQUENCE


- Ensure the lockscrew void is free of pressure
- Loosen gland to relieve packing compression on lockscrew
- Retighten gland to 50 ft-lb
- Torque lockscrews in alternating cross pattern to the required torque listed in Section 4.3 and Section 4.4.
- Retighten gland to the required torque listed in Section 4.5.

Note: Ensure the lockscrew is held stationary while torque is applied to the gland.


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### 4.3 LOCKSCREW TORQUE ON SOLID SHOULDER

All mandrel hangers or packoff assemblies that do not have compression style seals are to be considered to have a solid shoulder. When making up lockscrews to solid shoulders, **150 ft-lb** of torque must be applied to each lockscrew. This is to ensure that the lockscrew has fully engaged the shoulder to be retained without providing excessive preload throughout the lockscrew assembly.

### 4.4 LOCKSCREW TORQUE FOR ELASTOMER SEAL COMPRESSION


Table 5 displays the torque range required for all applications other than solid shoulder. The minimum torque values are derived from load required to set an slip hanger elastomer seal (1,500 – 3,000 psi) , using either zinc coated or Xylan coated lockscrews, or 150 ft-lbs for cases where the derived torques is less than 150 ft-lbs. The maximum torque values listed are based on allowable stress limits of the lockscrew assembly presented in the Design Files. See ES-000115-01 for further information.

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Size and Pressure	4140 Lockscrew - Zinc		718 Lockscrew - Xylan		4140 Lockscrew - Xylan	
	Min	Max	Min	Max	Min	Max
4-1/16 10K	150	300	150	240	-	-
4-1/16 15K	150	300	150	240	-	-
5-1/8 10K	150	300	150	240	-	-
5-1/8 15K	150	300	150	240	-	-
7-1/16 2K	150	250	150	185	-	-
7-1/16 3K	150	250	150	185	-	-
7-1/16 5K	150	250	150	185	150	250
7-1/16 10K	150	450	150	340	150	300
7-1/16 15K	150	450	150	300	150	300
7-1/16 20K	150	550	150	440	150	550
9 2K	200	300	150	240	-	-
9 3K	200	300	150	240	-	-
9 5K	175	450	150	340	175	450
9 10K	150	450	150	340	150	450
9 15K	150	550	150	440	150	550
9 20K	150	1350	150	440	150	550
11 2K	200	300	150	240	-	-
11 3K	200	300	150	240	-	-
11 5K	175	450	150	340	175	450
11 10K	150	450	150	340	150	450
11 15K	150	450	150	340	150	450
11 20K	300	1350	300	440	300	550
13-5/8 2K	200	300	150	240	-	-
13-5/8 3K	200	300	150	240	150	250
13-5/8 5K	150	450	150	340	150	450
13-5/8 10K	150	450	150	340	150	450
13-5/8 15K	150	1350	150	440	150	550
16-3/4 2K	350	450	200	250	-	-
16-3/4 3K	300	450	200	340	-	-
16-3/4 5K	200	450	200	340	-	-
16-3/4 10K	150	450	150	340	-	-
18-3/4 5K	250	450	200	340	-	-
18-3/4 10K	250	1350	200	440	-	-
20-3/4 3K	250	450	200	340	-	-
21-1/4 2K	375	450	200	340	-	-
21-1/4 5K	200	550	200	440	-	-
21-1/4 10K	175	1350	150	440	-	-
26-3/4 5K	500	1350	150	440	-	-


Table 5 - Torque Ranges for Lockscrews

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### 4.5 PACKING GLAND MAKE UP PROCEDURE

The recommended manufacturing gland torque is **200 ft-lb (ER-4542)** for factory assembly. The manufacturing torque assumes there is no torque on the lockscrew prior to making up the gland. The recommended manufacturing packing gland torque is the expected value to hold hydraulic pressure at ambient temperature for the one time proof test.

Table 6 lists the torque range for the Type N packing gland for field installation. The packing gland field torque is the torque required to maintain pressure for the life of the well, and is from Annex F testing experience. The field gland torque also assumes the worst case loading combination between working pressure of the well and torque applied on the lockscrew.

The maximum torque values listed are based on allowable stress limits of the lockscrew assembly presented in the Design Files. See ES-000115-01 for further information.

In manufacturing applications, lab test applications and in field applications when possible, the packing gland should not be adjusted while under pressure (Reference Section 4.2).

Flange Pressure	Torque	
	Min	Max
Size		
2K	400	500
3K	400	500
5K	500	600
10K	600	700
15K	800	850
20K	1000	1300

**Table 6 - Torque Ranges for Glands**

**CAUTION:** Do NOT use the Table 6 values to set or read torque wrench values when using a Gland Nut Wrench Adapter. Doing so would result in applying more torque than intended.

When using a Gland Nut Wrench Adapter included in section 4.1 the torque setting and/or reading on the torque wrench will be lower than the values listed in Table 6 to compensate for the length of the Gland Nut Wrench Adapter since the Gland Nut Wrench Adapter effectively makes the torque wrench longer.

Table 7 shows the torque wrench setting for the Type N packing gland for field installation for each of the torque wrenches in Table 2.

Torque on Gland Nut (From Table 6)	Torque Wrench Setting/Reading When Using Gland Nut Wrench Adapter from Table 4		
	Wrench p/n <b>2824392-01</b>	Wrench p/n <b>2824392-02</b>	Wrench p/n <b>2824392-03</b>
200 (factory use only)	188	192	196
400	376	384	392
500	470	480	490
600	564	576	588
700	658	672	686
800	752	768	784
850	799	816	833
1,000	940	960	980
1,300	1,222	1,248	1,274


**Table 7 - Torque Wrench Setting/Reading When Using Gland Nut Wrench Adapter from Table 4**

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CAM-2174 NW

May 30, 2014

## Appendix 2

 <b>CAMERON</b> A Schlumberger Company	DRAWN BY JOE NAVAR	DATE 05 MAY 16	REVISION  04	X-270842-01  PAGE 7 OF 8
	APPROVED BY MARK SVOBODA	DATE 23 AUG 16		

Example: Using Torque Wrench p/n 2824392-02 and the Gland Nut Wrench Adapter listed on Table 4 to make up a Gland Nut on a 11" 10,000 psi flange the required minimum torque for the Gland Nut is 600 ft-lbs so the Torque Wrench setting or reading will be 576 ft-lbs using the above table.

Torque on Gland Nut (From Table 6)	Torque Wrench Setting/Reading When Using Gland Nut Wrench Adapter from Table 4		
	Wrench p/n 2824392-01	Wrench p/n 2824392-02	Wrench p/n 2824392-03
200 (factory use only)	188	192	196
400	376	384	392
500	470	480	490
600	564	576	588
700	658	672	686
800	752	768	784
850	799	816	833
1,000	940	960	980
1,300	1,222	1,248	1,274

**CAUTION:** Do NOT use Table 7 torque values when using a Gland Nut Adapter with any torque wrench not listed in Table 2. Contact Engineering prior to using a Gland Nut Wrench Adapter in Table 4 with any torque wrench other than the part numbers listed in Table 2 to determine the setting / reading for the torque wrench being used.

### 5.0 Break Out Procedure

All test port plugs and check valves shall be removed prior to removing lockscrews and packing glands in a made up connection to verify there is no pressure behind the screw. Also, the annulus below the retained equipment must be checked to verify absence of pressure. Failure to verify and bleed down pressure prior to disassembly could lead to personal injury.

The lockscrew cannot be retrieved though the packing gland, so the gland must be completely removed upon disassembly. The break out torque of the gland is approximately equal to the makeup torque. However, higher than expected break out torque can be caused from poor thread conditions, old lubrication or trapped pressure. If higher than expected break out torque is encountered, try removing other glands. If the other glands can be removed, the high torque is a result of thread conditions, and not trapped pressure.

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CAM-2174 NW

May 30, 2014

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**Rev 01 Draft A**  
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**13-5/8" 10K MN-DS System**  
**13-3/8" x 9-5/8" x 7" Casing Program**

 **CAMERON**  
A Schlumberger Company

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	JOE NAVAR	05 MAY 16		
	APPROVED BY	DATE	04	PAGE 8 OF 8
	MARK SVOBODA	23 AUG 16		

## Appendix

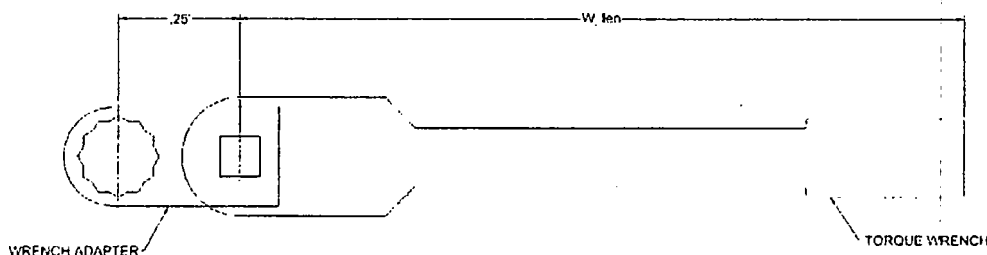
### Calculation of torque wrench setting/reading when using Gland Nut Wrench Adapter

When using a Gland Nut Wrench Adapter in Table 4, a torque factor (TF) must be derived to determine the adjustment required to the torque wrench setting.

This torque factor is derived as follows:

- Determine wrench length: W\_len in feet.
- $TF = W\_len / (W\_len + .25')$   
[Note: for the gland nut wrench adapters listed in Table 4, the length from center of square drive to center of socket is 0.25 ft]
- The torque factor must then be multiplied to the gland torque listed in Table 6 to determine the torque reading/setting required on the wrench:  $T = TF * T_{table\ 6}$

**Note:** When the torque wrench being used is one of the part numbers listed in Table 7, the wrench setting in Table 7 shall be used. The calculation in this appendix is required when the torque wrench being used is not one of the wrenches listed in Table 7.



**Figure 4 - Wrench Adapter and Wrench Torque Arm Dimensions**

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CAM-2174 NW

May 30, 2014

## Document Control

### Revision History

Revision	Date	Description	Prepared by:
01		Initial Release per ZE 650265717	Rodrigo Araujo

### About this Revision

Owner: Surface Systems Engineering - Running Procedures Department, Houston, TX

Author: Rodrigo Araujo

Reviewer: Name

Approver: Name

Released by: Name, SAP

**Mewbourne Oil Company, Prince 31 W2DA Fed Com #2H**  
**Sec 31, T24S, R29E**  
**SL: 850' FNL & 330' FWL**  
**BHL: 440' FNL & 330' FEL**

**Casing Program**

Hole Size	Casing Interval		Csg. Size	Weight (lbs)	Grade	Conn.	SF Collapse	SF Burst	SF Jt Tension	SF Body Tension
	From	To								
17.5"	0'	380'	13.375"	48	H40	STC	4.33	9.73	17.65	29.66
12.25"	0'	2640'	9.625"	36	J55	LTC	1.47	2.56	4.77	5.93
8.75"	0'	11152'	7"	26	HCP110	LTC	1.46	1.87	2.21	2.86
6.125"	10247'	15545'	4.5"	13.5	P110	LTC	1.45	1.68	4.73	5.90
BLM Minimum Safety Factor							1.125	1	1.6 Dry 1.8 Wet	1.6 Dry 1.8 Wet

All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h  
Must have table for contingency casing

	Y or N
Is casing new? If used, attach certification as required in Onshore Order #1	Y
Is casing API approved? 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 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?	
Is well within the designated 4 string boundary.	
Is well located in SOPA but not in R-111-P?	N
If yes, are the first 2 strings cemented to surface and 3 <sup>rd</sup> string cement tied back 500' into previous casing?	
Is well located in R-111-P and SOPA?	N
If yes, are the first three strings cemented to surface?	
Is 2 <sup>nd</sup> string set 100' to 600' below the base of salt?	
Is well located in high Cave/Karst?	Y
If yes, are there two strings cemented to surface?	
(For 2 string wells) If yes, is there a contingency casing if lost circulation occurs?	
Is well located in critical Cave/Karst?	N
If yes, are there three strings cemented to surface?	

**Mewbourne Oil Company, Prince 31 W2DA Fed Com #2H**  
**Sec 31, T24S, R29E**  
**SL: 850' FNL & 330' FWL**  
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**Mewbourne Oil Company, Prince 31 W2DA Fed Com #2H**  
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**Sec 31, T24S, R29E**  
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If yes, are there two strings cemented to surface?	
(For 2 string wells) If yes, is there a contingency casing if lost circulation occurs?	
Is well located in critical Cave/Karst?	N
If yes, are there three strings cemented to surface?	

**Hydrogen Sulfide Drilling Operations Plan**  
**Mewbourne Oil Company**

**1. General Requirements**

Rule 118 does not apply to this well because MOC has researched this area and no high concentrations of H<sub>2</sub>S were found. MOC will have on location and working all H<sub>2</sub>S safety equipment before the Delaware formation for purposes of safety and insurance requirements.

**2. Hydrogen Sulfide Training**

All personnel, whether regularly assigned, contracted, or employed on an unscheduled basis, will have received training from a qualified instructor in the following areas prior to entering the drilling pad area of the well:

1. The hazards and characteristics of hydrogen sulfide gas.
2. The proper use of personal protective equipment and life support systems.
3. The proper use of hydrogen sulfide detectors, alarms, warning systems, briefing areas, evacuation procedures.
4. The proper techniques for first aid and rescue operations.

Additionally, supervisory personnel will be trained in the following areas:

- 1 The effects of hydrogen sulfide on metal components. If high tensile tubular systems are utilized, supervisory personnel will be trained in their special maintenance requirements.
- 2 Corrective action and shut in procedures, blowout prevention, and well control procedures while drilling a well.
- 3 The contents of the Hydrogen Sulfide Drilling Operations Plan.

There will be an initial training session prior to encountering a known hydrogen sulfide source. The initial training session shall include a review of the site specific Hydrogen Sulfide Drilling Operations Plan.

**3. Hydrogen Sulfide Safety Equipment and Systems**

All hydrogen sulfide safety equipment and systems will be installed, tested, and operational prior to drilling below the 9 5/8" intermediate casing.

1. Well Control Equipment
  - A. Choke manifold with minimum of one adjustable choke/remote choke.
  - B. Blowout preventers equipped with blind rams and pipe rams to accommodate all pipe sizes with properly sized closing unit
  - C. Auxiliary equipment including annular type blowout preventer.
2. Protective Equipment for Essential Personnel

Thirty minute self contained work unit located in the dog house and at briefing areas.

Additionally: If H<sub>2</sub>S is encountered in concentrations less than 10 ppm, fans will be placed in work areas to prevent the accumulation of hazardous amounts of poisonous gas. If higher concentrations of H<sub>2</sub>S are detected the well will be shut in and a rotating head, mud/gas separator, remote choke and flare line with igniter will be installed.

3. Hydrogen Sulfide Protection and Monitoring Equipment

Two portable hydrogen sulfide monitors positioned on location for optimum coverage and detection. The units shall have audible sirens to notify personnel when hydrogen sulfide levels exceed 20 PPM.

4. Visual Warning Systems

A. Wind direction indicators as indicated on the wellsite diagram.

B. Caution signs shall be posted on roads providing access to location. Signs shall be painted a high visibility color with lettering of sufficient size to be readable at reasonable distances from potentially contaminated areas.

4. **Mud Program**

The mud program has been designed to minimize the amount of hydrogen sulfide entrained in the mud system. Proper mud weight, safe drilling practices, and the use of hydrogen sulfide scavengers will minimize hazards while drilling the well.

5. **Metallurgy**

All tubular systems, wellheads, blowout preventers, drilling spools, kill lines, choke manifolds, and valves shall be suitable for service in a hydrogen sulfide environment when chemically treated.

6. **Communications**

State & County Officials phone numbers are posted on rig floor and supervisors trailer. Communications in company vehicles and toolpushers are either two way radios or cellular phones.

7. **Well Testing**

Drill stem testing is not an anticipated requirement for evaluation of this well. If a drill stem test is required, it will be conducted with a minimum number of personnel in the immediate vicinity. The test will be conducted during daylight hours only.

8. **Emergency Phone Numbers**

Eddy County Sheriff's Office	911 or 575-887-7551
Ambulance Service	911 or 575-885-2111
Carlsbad Fire Dept	911 or 575-885-2111
Loco Hills Volunteer Fire Dept.	911 or 575-677-3266
Closest Medical Facility - Columbia Medical Center of Carlsbad	575-492-5000

Mewbourne Oil Company	Hobbs District Office	575-393-5905
	Fax	575-397-6252
	2 <sup>nd</sup> Fax	575-393-7259

District Manager	Robin Terrell	575-390-4816
Drilling Superintendent	Frosty Lathan	575-390-4103
	Bradley Bishop	575-390-6838
Drilling Foreman	Wesley Noseff	575-441-0729

# **Mewbourne Oil Company**

**Eddy County, New Mexico NAD 83**

**Prince 31 W2DA Fed Com #2H**

**Sec 31, T24S, R29E**

**SL: 850' FNL & 330' FWL**

**BHL: 440' FNL & 330' FEL**

**Plan: Design #1**

## **Standard Planning Report**

**13 December, 2017**

# Planning Report

**Database:** Hobbs  
**Company:** Mewbourne Oil Company  
**Project:** Eddy County, New Mexico NAD 83  
**Site:** Prince 31 W2DA Fed Com #2H  
**Well:** Sec 31, T24S, R29E  
**Wellbore:** BHL: 440' FNL & 330' FEL  
**Design:** Design #1

**Local Co-ordinate Reference:** Site Prince 31 W2DA Fed Com #2H  
**TVD Reference:** WELL @ 2939.0usft (Original Well Elev)  
**MD Reference:** WELL @ 2939.0usft (Original Well Elev)  
**North Reference:** Grid  
**Survey Calculation Method:** Minimum Curvature

<b>Project</b>	Eddy County, New Mexico NAD 83		
<b>Map System:</b>	US State Plane 1983	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	North American Datum 1983		
<b>Map Zone:</b>	New Mexico Eastern Zone		

Site	Prince 31 W2DA Fed Com #2H				
Site Position:		Northing:	428,917.00 usft	Latitude:	32° 10' 43.715 N
From:	Map	Easting:	634,822.00 usft	Longitude:	104° 1' 52.218 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.16 °

Well	Sec 31, T24S, R29E					
Well Position	+N/-S	0.0 usft	Northing:	428,917.00 usft	Latitude:	32° 10' 43.715 N
	+E/-W	0.0 usft	Easting:	634,822.00 usft	Longitude:	104° 1' 52.218 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	2,939.0 usft	Ground Level:	2,912.0 usft

<b>Wellbore</b>	BHL: 440' FNL & 330' FEL				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2010	12/13/2017	6.99	59.91	47,896

Design	Design #1			
Audit Notes:				
Version:	Phase:	PROTOTYPE	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	84.78

Plan Sections										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00	
2,675.0	0.00	0.00	2,675.0	0.0	0.0	0.00	0.00	0.00	0.00	
2,876.8	4.04	321.87	2,876.6	5.6	-4.4	2.00	2.00	0.00	321.87	
10,063.4	4.04	321.87	10,045.4	403.4	-316.6	0.00	0.00	0.00	0.00	
10,265.1	0.00	0.00	10,247.0	409.0	-321.0	2.00	-2.00	0.00	180.00	KOP @ 10,247'
11,152.7	88.72	89.84	10,820.0	410.6	239.4	10.00	10.00	0.00	89.84	
15,545.4	88.72	89.84	10,918.0	423.0	4,631.0	0.00	0.00	0.00	0.00	BHL: 440' FNL & 330'

# Planning Report

Database: Hobbs  
 Company: Mewbourne Oil Company  
 Project: Eddy County, New Mexico NAD 83  
 Site: Prince 31 W2DA Fed Com #2H  
 Well: Sec 31, T24S, R29E  
 Wellbore: BHL: 440' FNL & 330' FEL  
 Design: Design #1

Local Co-ordinate Reference: Site Prince 31 W2DA Fed Com #2H  
 TVD Reference: WELL @ 2939.0usft (Original Well Elev)  
 MD Reference: WELL @ 2939.0usft (Original Well Elev)  
 North Reference: Grid  
 Survey Calculation Method: Minimum Curvature

## Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
SL: 850' FNL & 330' FWL									
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	0.00
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	0.00
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	0.00	0.00
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	0.00
700.0	0.00	0.00	700.0	0.0	0.0	0.0	0.00	0.00	0.00
800.0	0.00	0.00	800.0	0.0	0.0	0.0	0.00	0.00	0.00
900.0	0.00	0.00	900.0	0.0	0.0	0.0	0.00	0.00	0.00
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.0	0.00	0.00	0.00
1,100.0	0.00	0.00	1,100.0	0.0	0.0	0.0	0.00	0.00	0.00
1,200.0	0.00	0.00	1,200.0	0.0	0.0	0.0	0.00	0.00	0.00
1,300.0	0.00	0.00	1,300.0	0.0	0.0	0.0	0.00	0.00	0.00
1,400.0	0.00	0.00	1,400.0	0.0	0.0	0.0	0.00	0.00	0.00
1,500.0	0.00	0.00	1,500.0	0.0	0.0	0.0	0.00	0.00	0.00
1,600.0	0.00	0.00	1,600.0	0.0	0.0	0.0	0.00	0.00	0.00
1,700.0	0.00	0.00	1,700.0	0.0	0.0	0.0	0.00	0.00	0.00
1,800.0	0.00	0.00	1,800.0	0.0	0.0	0.0	0.00	0.00	0.00
1,900.0	0.00	0.00	1,900.0	0.0	0.0	0.0	0.00	0.00	0.00
2,000.0	0.00	0.00	2,000.0	0.0	0.0	0.0	0.00	0.00	0.00
2,100.0	0.00	0.00	2,100.0	0.0	0.0	0.0	0.00	0.00	0.00
2,200.0	0.00	0.00	2,200.0	0.0	0.0	0.0	0.00	0.00	0.00
2,300.0	0.00	0.00	2,300.0	0.0	0.0	0.0	0.00	0.00	0.00
2,400.0	0.00	0.00	2,400.0	0.0	0.0	0.0	0.00	0.00	0.00
2,500.0	0.00	0.00	2,500.0	0.0	0.0	0.0	0.00	0.00	0.00
2,600.0	0.00	0.00	2,600.0	0.0	0.0	0.0	0.00	0.00	0.00
2,675.0	0.00	0.00	2,675.0	0.0	0.0	0.0	0.00	0.00	0.00
2,700.0	0.50	321.87	2,700.0	0.1	-0.1	-0.1	2.00	2.00	0.00
2,800.0	2.50	321.87	2,800.0	2.1	-1.7	-1.5	2.00	2.00	0.00
2,876.8	4.04	321.87	2,876.8	5.6	-4.4	-3.9	2.00	2.00	0.00
2,900.0	4.04	321.87	2,899.8	6.9	-5.4	-4.7	0.00	0.00	0.00
3,000.0	4.04	321.87	2,999.5	12.4	-9.7	-8.6	0.00	0.00	0.00
3,100.0	4.04	321.87	3,099.3	17.9	-14.1	-12.4	0.00	0.00	0.00
3,200.0	4.04	321.87	3,199.0	23.5	-18.4	-16.2	0.00	0.00	0.00
3,300.0	4.04	321.87	3,298.8	29.0	-22.8	-20.0	0.00	0.00	0.00
3,400.0	4.04	321.87	3,398.5	34.6	-27.1	-23.9	0.00	0.00	0.00
3,500.0	4.04	321.87	3,498.3	40.1	-31.5	-27.7	0.00	0.00	0.00
3,600.0	4.04	321.87	3,598.0	45.6	-35.8	-31.5	0.00	0.00	0.00
3,700.0	4.04	321.87	3,697.8	51.2	-40.2	-35.3	0.00	0.00	0.00
3,800.0	4.04	321.87	3,797.5	56.7	-44.5	-39.2	0.00	0.00	0.00
3,900.0	4.04	321.87	3,897.3	62.2	-48.8	-43.0	0.00	0.00	0.00
4,000.0	4.04	321.87	3,997.0	67.8	-53.2	-46.8	0.00	0.00	0.00
4,100.0	4.04	321.87	4,096.8	73.3	-57.5	-50.6	0.00	0.00	0.00
4,200.0	4.04	321.87	4,196.6	78.8	-61.9	-54.4	0.00	0.00	0.00
4,300.0	4.04	321.87	4,296.3	84.4	-66.2	-58.3	0.00	0.00	0.00
4,400.0	4.04	321.87	4,396.1	89.9	-70.6	-62.1	0.00	0.00	0.00
4,500.0	4.04	321.87	4,495.8	95.4	-74.9	-65.9	0.00	0.00	0.00
4,600.0	4.04	321.87	4,595.6	101.0	-79.3	-69.7	0.00	0.00	0.00
4,700.0	4.04	321.87	4,695.3	106.5	-83.6	-73.6	0.00	0.00	0.00
4,800.0	4.04	321.87	4,795.1	112.1	-87.9	-77.4	0.00	0.00	0.00
4,900.0	4.04	321.87	4,894.8	117.6	-92.3	-81.2	0.00	0.00	0.00
5,000.0	4.04	321.87	4,994.6	123.1	-96.6	-85.0	0.00	0.00	0.00

# Planning Report

Database: Hobbs  
 Company: Mewbourne Oil Company  
 Project: Eddy County, New Mexico NAD 83  
 Site: Prince 31 W2DA Fed Com #2H  
 Well: Sec 31, T24S, R29E  
 Wellbore: BHL: 440' FNL & 330' FEL  
 Design: Design #1

Local Co-ordinate Reference: Site Prince 31 W2DA Fed Com #2H  
 TVD Reference: WELL @ 2939.0usft (Original Well Elev)  
 MD Reference: WELL @ 2939.0usft (Original Well Elev)  
 North Reference: Grid  
 Survey Calculation Method: Minimum Curvature

## Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
5,100.0	4.04	321.87	5,094.3	128.7	-101.0	-88.9	0.00	0.00	0.00
5,200.0	4.04	321.87	5,194.1	134.2	-105.3	-92.7	0.00	0.00	0.00
5,300.0	4.04	321.87	5,293.8	139.7	-109.7	-96.5	0.00	0.00	0.00
5,400.0	4.04	321.87	5,393.6	145.3	-114.0	-100.3	0.00	0.00	0.00
5,500.0	4.04	321.87	5,493.3	150.8	-118.4	-104.1	0.00	0.00	0.00
5,600.0	4.04	321.87	5,593.1	156.3	-122.7	-108.0	0.00	0.00	0.00
5,700.0	4.04	321.87	5,692.8	161.9	-127.0	-111.8	0.00	0.00	0.00
5,800.0	4.04	321.87	5,792.6	167.4	-131.4	-115.6	0.00	0.00	0.00
5,900.0	4.04	321.87	5,892.3	172.9	-135.7	-119.4	0.00	0.00	0.00
6,000.0	4.04	321.87	5,992.1	178.5	-140.1	-123.3	0.00	0.00	0.00
6,100.0	4.04	321.87	6,091.8	184.0	-144.4	-127.1	0.00	0.00	0.00
6,200.0	4.04	321.87	6,191.6	189.5	-148.8	-130.9	0.00	0.00	0.00
6,300.0	4.04	321.87	6,291.3	195.1	-153.1	-134.7	0.00	0.00	0.00
6,400.0	4.04	321.87	6,391.1	200.6	-157.5	-138.6	0.00	0.00	0.00
6,500.0	4.04	321.87	6,490.9	206.2	-161.8	-142.4	0.00	0.00	0.00
6,600.0	4.04	321.87	6,590.6	211.7	-166.1	-146.2	0.00	0.00	0.00
6,700.0	4.04	321.87	6,690.4	217.2	-170.5	-150.0	0.00	0.00	0.00
6,800.0	4.04	321.87	6,790.1	222.8	-174.8	-153.8	0.00	0.00	0.00
6,900.0	4.04	321.87	6,889.9	228.3	-179.2	-157.7	0.00	0.00	0.00
7,000.0	4.04	321.87	6,989.6	233.8	-183.5	-161.5	0.00	0.00	0.00
7,100.0	4.04	321.87	7,089.4	239.4	-187.9	-165.3	0.00	0.00	0.00
7,200.0	4.04	321.87	7,189.1	244.9	-192.2	-169.1	0.00	0.00	0.00
7,300.0	4.04	321.87	7,288.9	250.4	-196.6	-173.0	0.00	0.00	0.00
7,400.0	4.04	321.87	7,388.6	256.0	-200.9	-176.8	0.00	0.00	0.00
7,500.0	4.04	321.87	7,488.4	261.5	-205.2	-180.6	0.00	0.00	0.00
7,600.0	4.04	321.87	7,588.1	267.0	-209.6	-184.4	0.00	0.00	0.00
7,700.0	4.04	321.87	7,687.9	272.6	-213.9	-188.3	0.00	0.00	0.00
7,800.0	4.04	321.87	7,787.6	278.1	-218.3	-192.1	0.00	0.00	0.00
7,900.0	4.04	321.87	7,887.4	283.7	-222.6	-195.9	0.00	0.00	0.00
8,000.0	4.04	321.87	7,987.1	289.2	-227.0	-199.7	0.00	0.00	0.00
8,100.0	4.04	321.87	8,086.9	294.7	-231.3	-203.5	0.00	0.00	0.00
8,200.0	4.04	321.87	8,186.6	300.3	-235.7	-207.4	0.00	0.00	0.00
8,300.0	4.04	321.87	8,286.4	305.8	-240.0	-211.2	0.00	0.00	0.00
8,400.0	4.04	321.87	8,386.1	311.3	-244.3	-215.0	0.00	0.00	0.00
8,500.0	4.04	321.87	8,485.9	316.9	-248.7	-218.8	0.00	0.00	0.00
8,600.0	4.04	321.87	8,585.6	322.4	-253.0	-222.7	0.00	0.00	0.00
8,700.0	4.04	321.87	8,685.4	327.9	-257.4	-226.5	0.00	0.00	0.00
8,800.0	4.04	321.87	8,785.1	333.5	-261.7	-230.3	0.00	0.00	0.00
8,900.0	4.04	321.87	8,884.9	339.0	-266.1	-234.1	0.00	0.00	0.00
9,000.0	4.04	321.87	8,984.7	344.5	-270.4	-238.0	0.00	0.00	0.00
9,100.0	4.04	321.87	9,084.4	350.1	-274.8	-241.8	0.00	0.00	0.00
9,200.0	4.04	321.87	9,184.2	355.6	-279.1	-245.6	0.00	0.00	0.00
9,300.0	4.04	321.87	9,283.9	361.2	-283.4	-249.4	0.00	0.00	0.00
9,400.0	4.04	321.87	9,383.7	366.7	-287.8	-253.2	0.00	0.00	0.00
9,500.0	4.04	321.87	9,483.4	372.2	-292.1	-257.1	0.00	0.00	0.00
9,600.0	4.04	321.87	9,583.2	377.8	-296.5	-260.9	0.00	0.00	0.00
9,700.0	4.04	321.87	9,682.9	383.3	-300.8	-264.7	0.00	0.00	0.00
9,800.0	4.04	321.87	9,782.7	388.8	-305.2	-268.5	0.00	0.00	0.00
9,900.0	4.04	321.87	9,882.4	394.4	-309.5	-272.4	0.00	0.00	0.00
10,000.0	4.04	321.87	9,982.2	399.9	-313.9	-276.2	0.00	0.00	0.00
10,063.4	4.04	321.87	10,045.4	403.4	-316.6	-278.6	0.00	0.00	0.00
10,100.0	3.30	321.87	10,081.9	405.3	-318.1	-279.9	2.00	-2.00	0.00
10,200.0	1.30	321.87	10,181.9	408.4	-320.5	-282.1	2.00	-2.00	0.00
10,265.1	0.00	0.00	10,247.0	409.0	-321.0	-282.5	2.00	-2.00	0.00

# Planning Report

Database: Hobbs  
 Company: Mewbourne Oil Company  
 Project: Eddy County, New Mexico NAD 83  
 Site: Prince 31 W2DA Fed Com #2H  
 Well: Sec 31, T24S, R29E  
 Wellbore: BHL: 440' FNL & 330' FEL  
 Design: Design #1

Local Co-ordinate Reference: Site Prince 31 W2DA Fed Com #2H  
 TVD Reference: WELL @ 2939.0usft (Original Well Elev)  
 MD Reference: WELL @ 2939.0usft (Original Well Elev)  
 North Reference: Grid  
 Survey Calculation Method: Minimum Curvature

## Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
<b>KOP @ 10,247'</b>									
10,300.0	3.48	89.84	10,281.8	409.0	-319.9	-281.4	10.00	10.00	0.00
10,400.0	13.48	89.84	10,380.6	409.0	-305.2	-266.7	10.00	10.00	0.00
10,500.0	23.48	89.84	10,475.3	409.1	-273.6	-235.2	10.00	10.00	0.00
10,600.0	33.47	89.84	10,563.1	409.3	-225.9	-187.8	10.00	10.00	0.00
10,700.0	43.47	89.84	10,641.3	409.4	-163.8	-125.9	10.00	10.00	0.00
10,800.0	53.47	89.84	10,707.5	409.7	-89.0	-51.4	10.00	10.00	0.00
10,900.0	63.46	89.84	10,759.8	409.9	-3.9	33.4	10.00	10.00	0.00
10,904.4	63.90	89.84	10,761.7	409.9	0.0	37.3	10.00	10.00	0.00
<b>FTP: 440' FNL &amp; 330' FWL</b>									
11,000.0	73.46	89.84	10,796.4	410.2	89.0	125.9	10.00	10.00	0.00
11,100.0	83.46	89.84	10,816.4	410.4	186.8	223.4	10.00	10.00	0.00
11,152.7	88.72	89.84	10,820.0	410.6	239.4	275.7	10.00	10.00	0.00
<b>LP: 440' FNL &amp; 569' FWL</b>									
11,200.0	88.72	89.84	10,821.1	410.7	286.7	322.9	0.00	0.00	0.00
11,300.0	88.72	89.84	10,823.3	411.0	386.7	422.4	0.00	0.00	0.00
11,400.0	88.72	89.84	10,825.5	411.3	486.6	522.0	0.00	0.00	0.00
11,500.0	88.72	89.84	10,827.7	411.6	586.6	621.6	0.00	0.00	0.00
11,600.0	88.72	89.84	10,830.0	411.8	686.6	721.2	0.00	0.00	0.00
11,700.0	88.72	89.84	10,832.2	412.1	786.6	820.8	0.00	0.00	0.00
11,800.0	88.72	89.84	10,834.4	412.4	886.5	920.4	0.00	0.00	0.00
11,900.0	88.72	89.84	10,836.7	412.7	986.5	1,020.0	0.00	0.00	0.00
12,000.0	88.72	89.84	10,838.9	413.0	1,086.5	1,119.5	0.00	0.00	0.00
12,100.0	88.72	89.84	10,841.1	413.3	1,186.5	1,219.1	0.00	0.00	0.00
12,200.0	88.72	89.84	10,843.4	413.5	1,286.4	1,318.7	0.00	0.00	0.00
12,300.0	88.72	89.84	10,845.6	413.8	1,386.4	1,418.3	0.00	0.00	0.00
12,400.0	88.72	89.84	10,847.8	414.1	1,486.4	1,517.9	0.00	0.00	0.00
12,500.0	88.72	89.84	10,850.1	414.4	1,586.4	1,617.5	0.00	0.00	0.00
12,600.0	88.72	89.84	10,852.3	414.7	1,686.3	1,717.1	0.00	0.00	0.00
12,700.0	88.72	89.84	10,854.5	415.0	1,786.3	1,816.7	0.00	0.00	0.00
12,800.0	88.72	89.84	10,856.8	415.2	1,886.3	1,916.2	0.00	0.00	0.00
12,900.0	88.72	89.84	10,859.0	415.5	1,986.3	2,015.8	0.00	0.00	0.00
13,000.0	88.72	89.84	10,861.2	415.8	2,086.2	2,115.4	0.00	0.00	0.00
13,100.0	88.72	89.84	10,863.4	416.1	2,186.2	2,215.0	0.00	0.00	0.00
13,200.0	88.72	89.84	10,865.7	416.4	2,286.2	2,314.6	0.00	0.00	0.00
13,300.0	88.72	89.84	10,867.9	416.7	2,386.2	2,414.2	0.00	0.00	0.00
13,400.0	88.72	89.84	10,870.1	416.9	2,486.1	2,513.8	0.00	0.00	0.00
13,500.0	88.72	89.84	10,872.4	417.2	2,586.1	2,613.3	0.00	0.00	0.00
13,600.0	88.72	89.84	10,874.6	417.5	2,686.1	2,712.9	0.00	0.00	0.00
13,700.0	88.72	89.84	10,876.8	417.8	2,786.1	2,812.5	0.00	0.00	0.00
13,800.0	88.72	89.84	10,879.1	418.1	2,886.0	2,912.1	0.00	0.00	0.00
13,900.0	88.72	89.84	10,881.3	418.3	2,986.0	3,011.7	0.00	0.00	0.00
14,000.0	88.72	89.84	10,883.5	418.6	3,086.0	3,111.3	0.00	0.00	0.00
14,100.0	88.72	89.84	10,885.8	418.9	3,186.0	3,210.9	0.00	0.00	0.00
14,200.0	88.72	89.84	10,888.0	419.2	3,285.9	3,310.4	0.00	0.00	0.00
14,300.0	88.72	89.84	10,890.2	419.5	3,385.9	3,410.0	0.00	0.00	0.00
14,400.0	88.72	89.84	10,892.4	419.8	3,485.9	3,509.6	0.00	0.00	0.00
14,500.0	88.72	89.84	10,894.7	420.0	3,585.9	3,609.2	0.00	0.00	0.00
14,600.0	88.72	89.84	10,896.9	420.3	3,685.8	3,708.8	0.00	0.00	0.00
14,700.0	88.72	89.84	10,899.1	420.6	3,785.8	3,808.4	0.00	0.00	0.00
14,800.0	88.72	89.84	10,901.4	420.9	3,885.8	3,908.0	0.00	0.00	0.00
14,900.0	88.72	89.84	10,903.6	421.2	3,985.8	4,007.5	0.00	0.00	0.00
15,000.0	88.72	89.84	10,905.8	421.5	4,085.7	4,107.1	0.00	0.00	0.00

# Planning Report

**Database:** Hobbs  
**Company:** Mewbourne Oil Company  
**Project:** Eddy County, New Mexico NAD 83  
**Site:** Prince 31 W2DA Fed Com #2H  
**Well:** Sec 31, T24S, R29E  
**Wellbore:** BHL: 440' FNL & 330' FEL  
**Design:** Design #1

**Local Co-ordinate Reference:** Site Prince 31 W2DA Fed Com #2H  
**TVD Reference:** WELL @ 2939.0usft (Original Well Elev)  
**MD Reference:** WELL @ 2939.0usft (Original Well Elev)  
**North Reference:** Grid  
**Survey Calculation Method:** Minimum Curvature

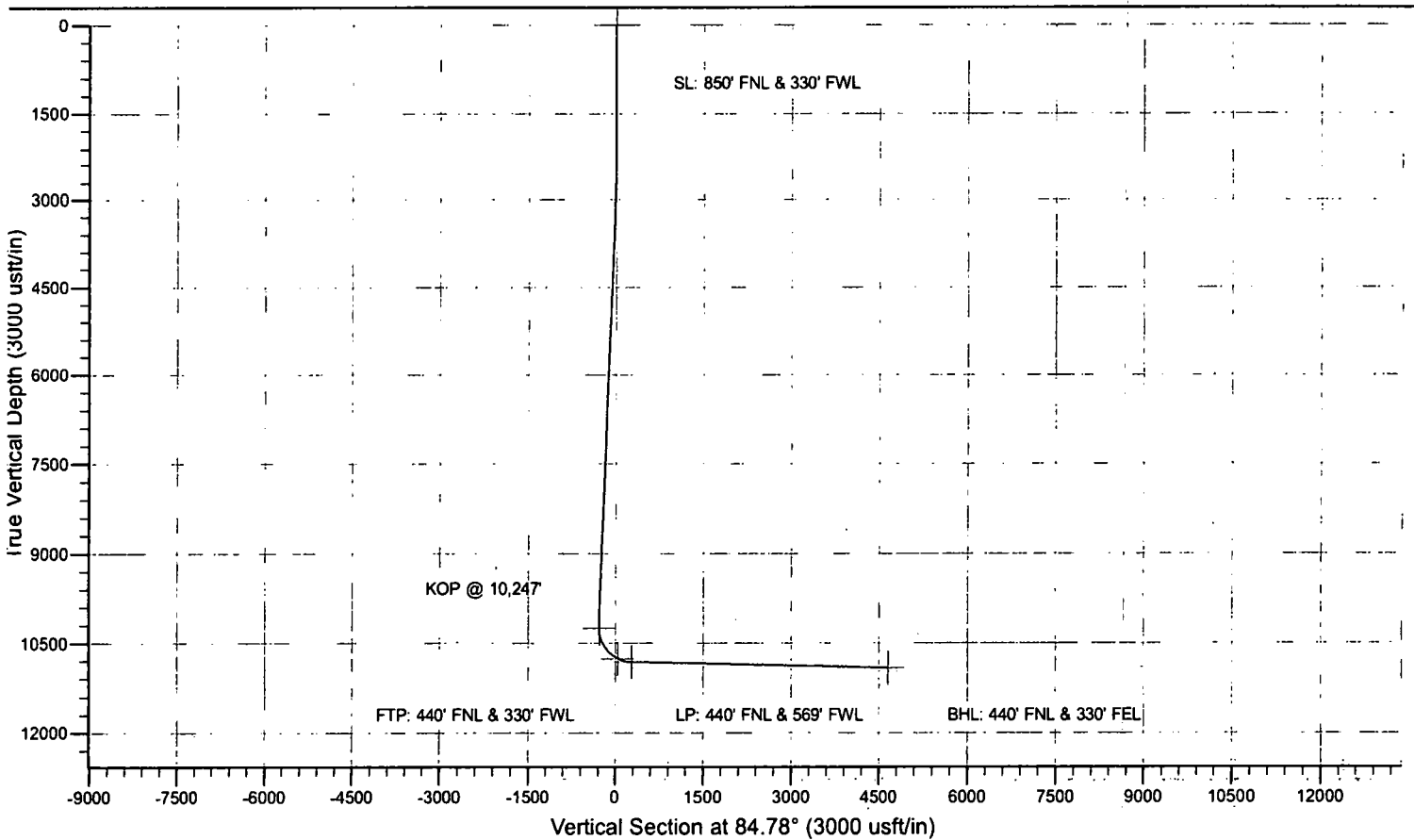
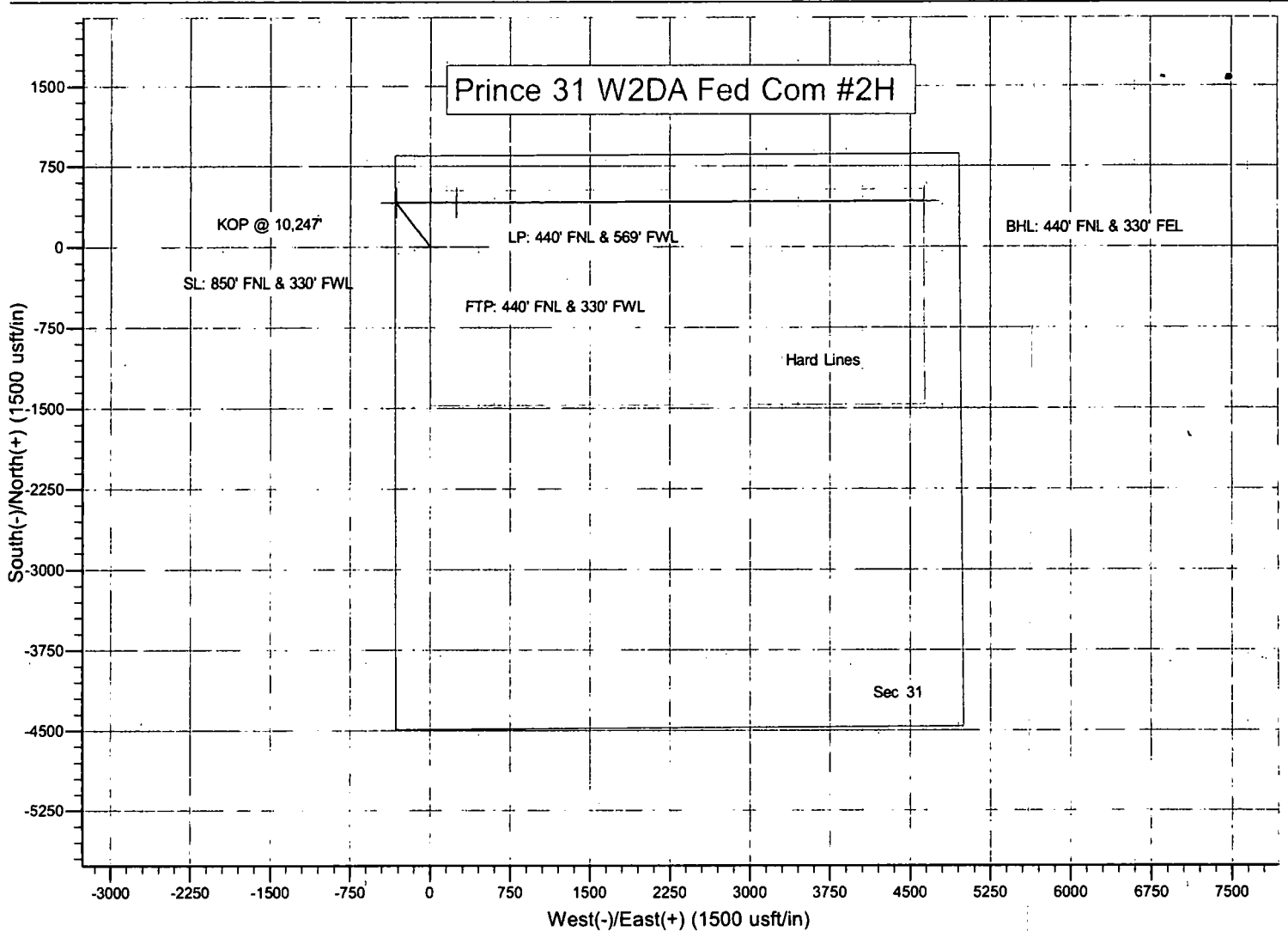
## Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
15,100.0	88.72	89.84	10,908.1	421.7	4,185.7	4,206.7	0.00	0.00	0.00
15,200.0	88.72	89.84	10,910.3	422.0	4,285.7	4,306.3	0.00	0.00	0.00
15,300.0	88.72	89.84	10,912.5	422.3	4,385.7	4,405.9	0.00	0.00	0.00
15,400.0	88.72	89.84	10,914.8	422.6	4,485.6	4,505.5	0.00	0.00	0.00
15,500.0	88.72	89.84	10,917.0	422.9	4,585.6	4,605.1	0.00	0.00	0.00
15,545.4	88.72	89.84	10,918.0	423.0	4,631.0	4,650.3	0.00	0.00	0.00

BHL: 440' FNL & 330' FEL

## Design Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
SL: 850' FNL & 330' FWI - plan hits target center - Point	0.00	0.00	0.0	0.0	0.0	428,917.00	634,822.00	32° 10' 43.715 N	104° 1' 52.218 W
KOP @ 10,247' - plan hits target center - Point	0.00	0.00	10,247.0	409.0	-321.0	429,326.00	634,501.00	32° 10' 47.771 N	104° 1' 55.939 W
FTP: 440' FNL & 330' Fv - plan hits target center - Point	0.00	0.00	10,761.7	409.9	0.0	429,326.91	634,822.00	32° 10' 47.771 N	104° 1' 52.204 W
LP: 440' FNL & 569' FWI - plan hits target center - Point	0.00	0.00	10,820.0	410.6	239.4	429,327.58	635,061.36	32° 10' 47.771 N	104° 1' 49.419 W
BHL: 440' FNL & 330' FE - plan hits target center - Point	0.00	0.00	10,918.0	423.0	4,631.0	429,340.00	639,453.00	32° 10' 47.769 N	104° 0' 58.318 W



**Mewbourne Oil Company, Prince 31 W2DA Fed Com #2H**  
**Sec 31, T24S, R29E**  
**SL: 850' FNL & 330' FWL**  
**BHL: 440' FNL & 330' FEL**

**1. Geologic Formations**

TVD of target	10918'	Pilot hole depth	NA
MD at TD:	15545'	Deepest expected fresh water:	50'

**Basin**

<b>Formation</b>	<b>Depth (TVD) from KB</b>	<b>Water/Mineral Bearing/ Target Zone?</b>	<b>Hazards*</b>
Quaternary Fill	Surface		
Rustler			
Top of Salt			
Castile	1217		
Base of Salt	2500		
Lamar	2715	Oil/Gas	
Bell Canyon	2755	Oil/Gas	
Cherry Canyon	3630	Oil/Gas	
Manzanita Marker	3745		
Brushy Canyon	6150	Oil/Gas	
Bone Spring	6425	Oil/Gas	
1 <sup>st</sup> Bone Spring Sand	7365	Oil/Gas	
2 <sup>nd</sup> Bone Spring Sand	8150	Oil/Gas	
3 <sup>rd</sup> Bone Spring Sand	9275	Oil/Gas	
Abo			
Wolfcamp	9640	Target Zone	
Devonian			
Fusselman			
Ellenburger			
Granite Wash			

\*H<sub>2</sub>S, water flows, loss of circulation, abnormal pressures, etc.

**2. Casing Program**

Mewbourne Oil Company, Prince 31 W2DA Fed Com #2H  
 Sec 31, T24S, R29E  
 SL: 850' FNL & 330' FWL  
 BHL: 440' FNL & 330' FEL

Hole Size	Casing Interval		Csg. Size	Weight (lbs)	Grade	Conn.	SF Collapse	SF Burst	SF Jt Tension	SF Body Tension
	From	To								
17.5"	0'	380'	13.375"	48	H40	STC	4.33	9.73	17.65	29.66
12.25"	0'	2640'	9.625"	36	J55	LTC	1.47	2.56	4.77	5.93
8.75"	0'	11152'	7"	26	HCP110	LTC	1.46	1.87	2.21	2.86
6.125"	1024 7'	15545'	4.5"	13.5	P110	LTC	1.45	1.68	4.73	5.90
BLM Minimum Safety Factor	1.125	1	1.6 Dry 1.8 Wet	1.6 Dry 1.8 Wet						

All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h  
 Must have table for contingency casing

	Y or N
Is casing new? If used, attach certification as required in Onshore Order #1	Y
Is casing API approved? 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 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?	
Is well within the designated 4 string boundary.	
Is well located in SOPA but not in R-111-P?	N
If yes, are the first 2 strings cemented to surface and 3 <sup>rd</sup> string cement tied back 500' into previous casing?	
Is well located in R-111-P and SOPA?	N
If yes, are the first three strings cemented to surface?	
Is 2 <sup>nd</sup> string set 100' to 600' below the base of salt?	
Is well located in high Cave/Karst?	Y
If yes, are there two strings cemented to surface?	
(For 2 string wells) If yes, is there a contingency casing if lost circulation occurs?	
Is well located in critical Cave/Karst?	N
If yes, are there three strings cemented to surface?	

**Mewbourne Oil Company, Prince 31 W2DA Fed Com #2H**  
**Sec 31, T24S, R29E**  
**SL: 850' FNL & 330' FWL**  
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**3. Cementing Program**

Casing	# Sks	Wt. lb/ gal	Yld ft <sup>3</sup> / sack	H <sub>2</sub> O gal/ sk	500# Comp. Strength (hours)	Slurry Description
Surf.	130	12.5	2.12	11	10	Lead: Class C + Salt + Gel + Extender + LCM
	200	14.8	1.34	6.3	8	Tail: Class C + Retarder
Inter.	380	12.5	2.12	11	10	Lead: Class C + Salt + Gel + Extender + LCM
	200	14.8	1.34	6.3	8	Tail: Class C + Retarder
Prod. Stg 1	440	12.5	2.12	11	9	Lead: Class C + Gel + Retarder + Defoamer + Extender
	400	15.6	1.18	5.2	10	Tail: Class H + Retarder + Fluid Loss + Defoamer
ECP/DV Tool @ 3745'						
Prod. Stg 2	60	12.5	2.12	11	9	Lead: Class C + Gel + Retarder + Defoamer + Extender
	100	14.8	1.34	6.3	8	Tail: Class C + Retarder
Liner	220	11.2	2.97	18	16	Class C + Salt + Gel + Fluid Loss + Retarder + Dispersant + Defoamer + Anti-Settling Agent

A copy of cement test will be available on location at time of cement job providing pump times & compressive strengths.

Casing String	TOC	% Excess
Surface	0'	100%
Intermediate	0'	25%
Production	2440'	25%
Liner	10247'	25%

**Mewbourne Oil Company, Prince 31 W2DA Fed Com #2H**  
**Sec 31, T24S, R29E**  
**SL: 850' FNL & 330' FWL**  
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**4. Pressure Control Equipment**

	Variance: None
--	----------------

BOP installed and tested before drilling which hole?	Size?	System Rated WP	Type	<input type="checkbox"/>	Tested to:
12-1/4"	13-5/8"	5M	Annular	X	2500#
			Blind Ram	X	5000#
			Pipe Ram	X	
			Double Ram		
			Other*		

\*Specify if additional ram is utilized.

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.
Y	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?
Y	<p>A multibowl wellhead is being used. The BOP will be tested per Onshore Order #2 after installation on the surface casing which will cover testing requirements for a maximum of 30 days. If any seal subject to test pressure is broken the system must be tested.</p> <ul style="list-style-type: none"> <li>Provide description here: See attached schematic.</li> </ul>

**Mewbourne Oil Company, Prince 31 W2DA Fed Com #2H**  
**Sec 31, T24S, R29E**  
**SL: 850' FNL & 330' FWL**  
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**5. Mud Program**

Depth		Type	Weight (ppg)	Viscosity	Water Loss
From	To				
0'	380'	FW Gel	8.6-8.8	28-34	N/C
380'	2640'	Saturated Brine	10.0	28-34	N/C
2640'	10247'	Cut Brine	8.6-9.5	28-34	N/C
10247'	15545'	OBM	10.0-13.0	30-40	<10cc

Sufficient mud materials to maintain mud properties and meet minimum lost circulation and weight increase requirements will be kept on location at all times. Mud weight up to 13.0 ppg may be required for shale control. The highest mud weight needed to balance formation is expected to be 12.0 ppg.

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

**6. Logging and Testing Procedures**

<b>Logging, Coring and Testing.</b>	
X	Will run GR/CNL from KOP (10247') 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? If yes, explain
	Coring? If yes, explain

<b>Additional logs planned</b>		<b>Interval</b>
X	Gamma Ray	10247' (KOP) to TD
	Density	
	CBL	
	Mud log	
	PEX	

**Mewbourne Oil Company, Prince 31 W2DA Fed Com #2H**  
**Sec 31, T24S, R29E**  
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**7. Drilling Conditions**

Condition	Specify what type and where?
BH Pressure at deepest TVD	6812 psi
Abnormal Temperature	No

Mitigation measure for abnormal conditions. Describe. Lost circulation material/sweeps/mud scavengers in surface hole.

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.	
	H2S is present
X	H2S Plan attached

**8. Other facets of operation**

Is this a walking operation? If yes, describe.

Will be pre-setting casing? If yes, describe.

**Attachments**

\_\_\_ Directional Plan

\_\_\_ Other, describe

## 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:

Describe precipitated solids disposal:

Precipitated solids disposal permit:

Lined pit precipitated solids disposal schedule:

Lined pit precipitated solids disposal schedule attachment:

Lined pit reclamation description:

Lined pit reclamation attachment:

Leak detection system description:

Leak detection system attachment:

Lined pit Monitor description:

Lined pit Monitor attachment:

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

Is the reclamation bond a rider under the BLM bond?

Lined pit bond number:

Lined pit bond amount:

Additional bond information attachment:

### **Section 3 - Unlined Pits**

**Would you like to utilize Unlined Pit PWD options? NO**

**Produced Water Disposal (PWD) Location:**

**PWD surface owner:**

**PWD disturbance (acres):**

**Unlined pit PWD on or off channel:**

**Unlined pit PWD discharge volume (bbl/day):**

**Unlined pit specifications:**

**Precipitated solids disposal:**

**Describe precipitated solids disposal:**

**Precipitated solids disposal permit:**

**Unlined pit precipitated solids disposal schedule:**

**Unlined pit precipitated solids disposal schedule attachment:**

**Unlined pit reclamation description:**

**Unlined pit reclamation attachment:**

**Unlined pit Monitor description:**

**Unlined pit Monitor attachment:**

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

**Beneficial use user confirmation:**

**Estimated depth of the shallowest aquifer (feet):**

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

**TDS lab results:**

**Geologic and hydrologic evidence:**

**State authorization:**

**Unlined Produced Water Pit Estimated percolation:**

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

**Is the reclamation bond a rider under the BLM bond?**

**Unlined pit bond number:**

**Unlined pit bond amount:**

**Additional bond information attachment:**

### **Section 4 - Injection**

**Would you like to utilize Injection PWD options? NO**

**Produced Water Disposal (PWD) Location:**

**PWD surface owner:**

**PWD disturbance (acres):**

**Injection PWD discharge volume (bbl/day):**

**Injection well mineral owner:**

**Injection well type:**

**Injection well number:**

**Injection well name:**

**Assigned injection well API number?**

**Injection well API number:**

**Injection well new surface disturbance (acres):**

**Minerals protection information:**

**Mineral protection attachment:**

**Underground Injection Control (UIC) Permit?**

**UIC Permit attachment:**

## **Section 5 - Surface Discharge**

**Would you like to utilize Surface Discharge PWD options? NO**

**Produced Water Disposal (PWD) Location:**

**PWD surface owner:**

**PWD disturbance (acres):**

**Surface discharge PWD discharge volume (bbl/day):**

**Surface Discharge NPDES Permit?**

**Surface Discharge NPDES Permit attachment:**

**Surface Discharge site facilities information:**

**Surface discharge site facilities map:**

## **Section 6 - Other**

**Would you like to utilize Other PWD options? NO**

**Produced Water Disposal (PWD) Location:**

**PWD surface owner:**

**PWD disturbance (acres):**

**Other PWD discharge volume (bbl/day):**

**Other PWD type description:**

**Other PWD type attachment:**

**Have other regulatory requirements been met?**

**Other regulatory requirements attachment:**



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

## Bond Info Data Report

06/22/2018

### Bond Information

Federal/Indian APD: FED

BLM Bond number: NM1693

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: