Form 3160-3
(June 2015)

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

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

APPLICATION FOR PERMIT TO DRILL OR REENTER

5. Lease Serial No.

6. If Indian, Allotee or Tribe Name

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

8. Lease Name and Well No.

9. API Well No.
30-005-64414

1a. Type of work: ☐ DRILL ☐ REENTER

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

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

2. Name of Operator

3a. Address

3b. Phone No. *(include area code)*

10. Field and Pool, or Exploratory

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

At surface

At proposed prod. zone

11. Sec., T. R. M. or Blk. and Survey or Area

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

12. County or Parish

13. State

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

16. No of acres in lease

17. Spacing Unit dedicated to this well

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

19. Proposed Depth

20. BLM/BIA Bond No. in file

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

22. Approximate date work will start*

23. Estimated duration

24. Attachments

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

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

25. Signature	Name *(Printed/Typed)*	Date
Title		
Approved by *(Signature)*	Name *(Printed/Typed)*	Date
Title	Office	

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.

Confidential

APPROVED WITH CONDITIONS

Approval Date: 04/08/2025

(Continued on page 2)

*(Instructions on page 2)

C-102 Submit Electronically Via OCD Permitting	State of New Mexico Energy, Minerals & Natural Resources Department OIL CONSERVATION DIVISION	Revised July 9, 2024 Submittal Type:	☐ Initial Submittal ☐ Amended Report ☐ As Drilled

WELL LOCATION INFORMATION

API Number 30-005-64414	Pool Code 52770	Pool Name Round Tank; San Andres	
Property Code 337308	Property Name PRESCOTT FEDERAL COM		Well Number 1H
OGRID No. 13837	Operator Name MACK ENERGY CORPORATION		Ground Level Elevation 3732.4
Surface Owner: ☐State ☐Fee ☐Tribal ☐Federal		Mineral Owner: ☐State ☐Fee ☐Tribal ☐Federal	

Surface Location

UL	Section	Township	Range	Lot	Ft. from N/S	Ft. from E/W	Latitude	Longitude	County
O	19	15 S	29 E		839 SOUTH	2455 EAST	32.9964541°N	104.0672274°W	CHAVES

Bottom Hole Location

UL	Section	Township	Range	Lot	Ft. from N/S	Ft. from E/W	Latitude	Longitude	County
O	30	15 S	29 E		1 SOUTH	2310 EAST	32.9797411°N	104.0669858°W	CHAVES

Dedicated Acres	Infill or Defining Well	Defining Well API	Overlapping Spacing Unit (Y/N)	Consolidation Code
Order Numbers.			Well setbacks are under Common Ownership: ☐Yes ☐No	

Kick Off Point (KOP)

UL	Section	Township	Range	Lot	Ft. from N/S	Ft. from E/W	Latitude	Longitude	County
O	19	15 S	29 E		839 SOUTH	2455 EAST	32.9964541°N	104.0672274°W	CHAVES

First Take Point (FTP)

UL	Section	Township	Range	Lot	Ft. from N/S	Ft. from E/W	Latitude	Longitude	County
B	30	15 S	29 E		100 NORTH	2310 EAST	32.9938754°N	104.0667531°W	CHAVES

Last Take Point (LTP)

UL	Section	Township	Range	Lot	Ft. from N/S	Ft. from E/W	Latitude	Longitude	County
O	30	15 S	29 E		100 SOUTH	2310 EAST	32.9800131°N	104.0669774°W	CHAVES

Unitized Area or Area of Uniform Interest	Spacing Unit Type ☐Horizontal ☐Vertical	Ground Floor Elevation:

OPERATOR CERTIFICATIONS

*I hereby certify that the information contained herein is true and complete to the best ofmy knowledge and belief, **and, if the well is a vertical or directional well, 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 a working interest run leased mineral interest, or to a voluntary pooling agreement or a compulsory pooling order here to fore entered by the division.*

If this well is a horizontal well, I further certify that this organization has received the consent of at least one lessee or owner of a working interest or unleased mineral interest in each tract (in the target pool or formation) in which any part of the well's completed interval will be located or obtained a compulsory pooling order from the division.

Signature   Date

Printed Name

Email Address

SURVEYOR CERTIFICATIONS

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.

FILIMON F. JARAMILLO NEW MEXICO 12797 REGISTERED PROFESSIONAL SURVEYOR

Signature and Seal of Professional Surveyor
FILIMON F. JARAMILLO

CertificateNumber	Dateof Survey
PLS 12797	NOVEMBER 22, 2024

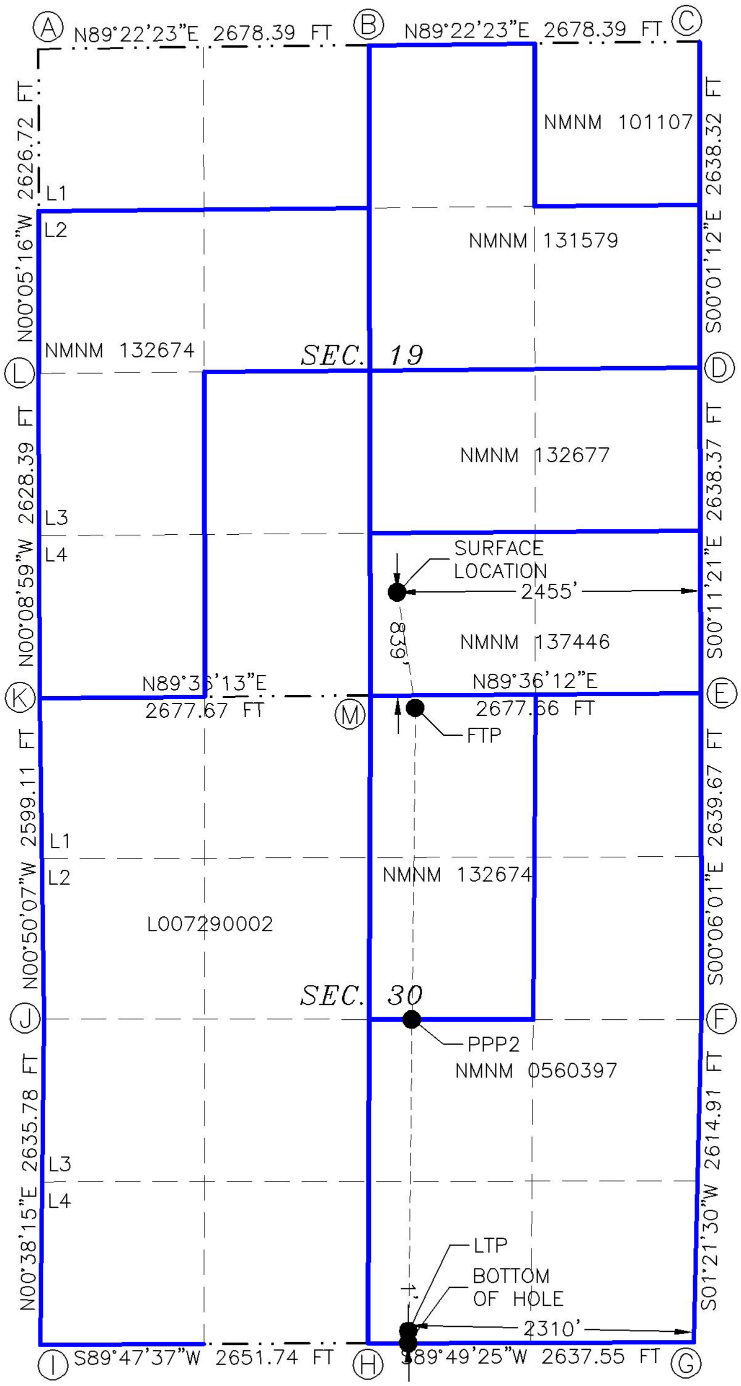
SURVEY NO. 10352

Note: No allowable will be assigned to this completion until all interests have been consolidated or a non-standard unit has been approved by the division.

ACREAGE DEDICATION PLATS

This grid represents a standard section. You may superimpose a non-standard section, or larger area, over this grid. Operators must outline the dedicated acreage in a red box, clearly show the well surface location and bottom hole location, if it is directionally drilled, with the dimensions from the section lines in the cardinal directions. If this is a horizontal wellbore show on this plat the location of the First Take Point and Last Take Point, and the point within the Completed interval (other than the First Take Point or Last Take Point) that is closest to any outer boundary of the tract.

Surveyors shall use the latest United States government survey or dependent resurvey. Well locations will be in reference to the New Mexico Principal Meridian. If the land is not surveyed, contact the OCD Engineering Bureau. Independent subdivision surveys will not be acceptable.



PRESCOTT FEDERAL COM 1H
EL. = 3732.4

GEODETIC COORDINATES
NAD 83 NMSP EAST
SURFACE LOCATION
839' FSL, 2455' FEL
N.=726349.56
E.=622922.72
LAT.=32.9964541°N
LONG.=104.0672274°W

KICK OFF POINT
839' FSL, 2455' FEL
N.=726349.56
E.=622922.72
LAT.=32.9964541°N
LONG.=104.0672274°W

FIRST TAKE POINT
100' FNL, 2310' FEL
N.=725411.73
E.=623070.52
LAT.=32.9938754°N
LONG.=104.0667531°W

LAST TAKE POINT
100' FSL, 2310' FEL
N.=720368.08
E.=623014.51
LAT.=32.9800131°N
LONG.=104.0669774°W

BOTTOM OF HOLE
1' FSL, 2310' FEL
N.=720269.09
E.=623012.17
LAT.=32.9797411°N
LONG.=104.0669858°W

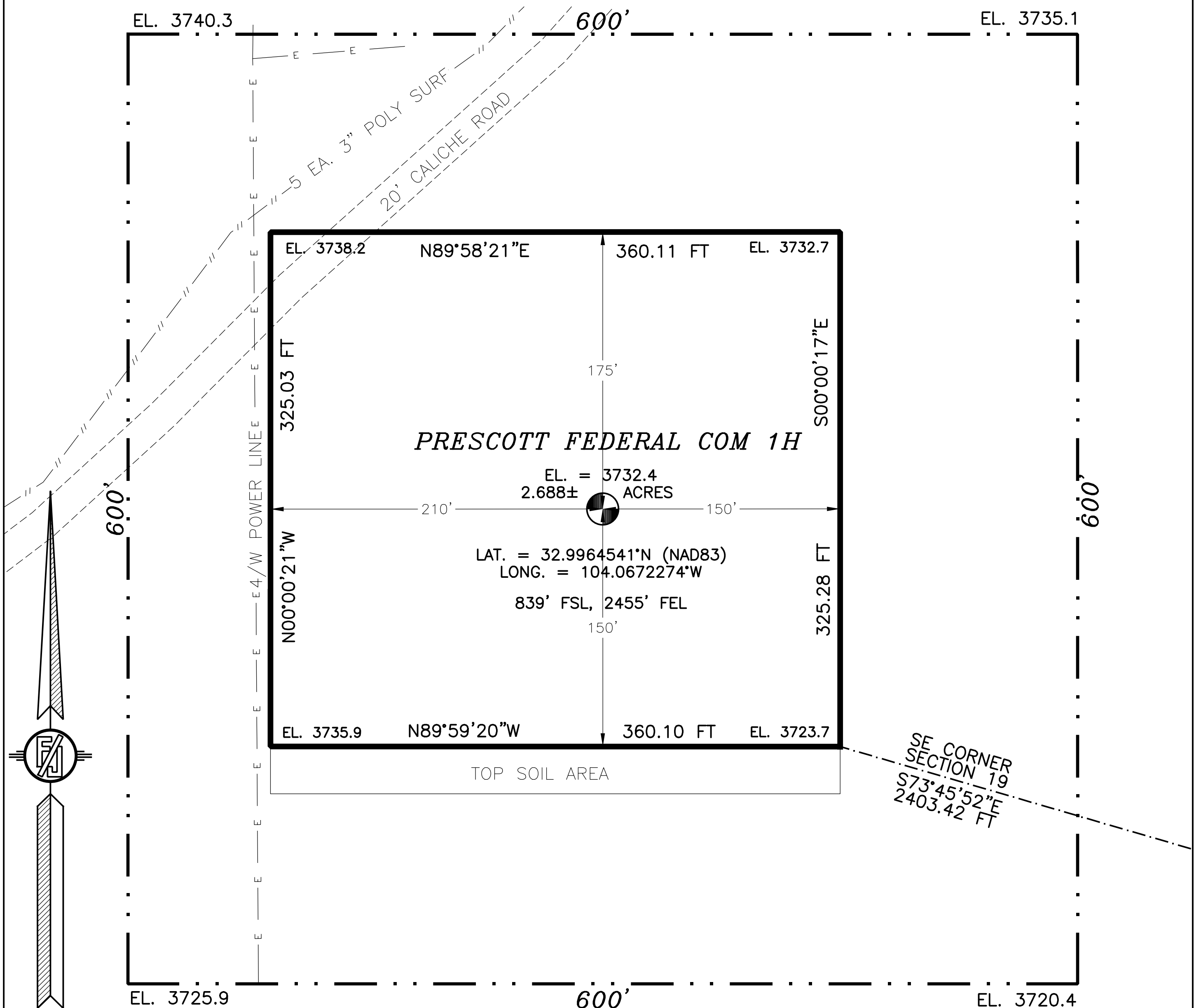
PPP2
2622' FNL, 2342' FEL
N.=722890.36
E.=623042.53
LAT.=32.9869455°N
LONG.=104.0668652°W

CORNER COORDINATES TABLE
NAD 83 NMSP EAST

A	N.=730744.38	E.=620015.02
B	N.=730773.68	E.=622692.56
C	N.=730802.99	E.=625370.10
D	N.=728165.36	E.=625371.02
E	N.=725527.69	E.=625379.72
F	N.=722888.70	E.=625384.34
G	N.=720275.20	E.=625322.37
H	N.=720267.08	E.=622685.51
I	N.=720257.54	E.=620034.47
J	N.=722892.47	E.=620063.79
K	N.=725490.64	E.=620025.90
L	N.=728118.34	E.=620019.04
M	N.=725509.16	E.=622702.82

LEGEND
SECTION LINE
QUARTER LINE
LEASE LINE
WELL PATH

PRESCOTT FEDERAL COM 1H
MACK ENERGY CORPORATION
IN THE NW/4 SW/4 SE/4 OF
SECTION 19, TOWNSHIP 15 SOUTH, RANGE 29 EAST, N.M.P.M.
CHAVES COUNTY, STATE OF NEW MEXICO
NOVEMBER 22, 2024



SEE NEXT SHEET (2-7) FOR DESCRIPTION

0 10 50 100 200
SCALE 1" = 100'

GENERAL NOTES
1.) THE INTENT OF THIS SURVEY IS TO ACQUIRE A BUSINESS LEASE FOR THE PURPOSE OF BUILDING A WELL PAD

2.) BASIS OF BEARING IS NEW MEXICO STATE PLANE EAST ZONE MODIFIED TO THE SURFACE (NAD83), COORDINATES ARE NAD 83, ELEVATIONS ARE NAVD 88

DRIVING DIRECTIONS: FROM THE INTERSECTION OF U.S. HWY. 82 (LOVINGTON HWY) AND CO. RD. 217 (HAGERMAN CUTOFF) GO NORTH ON CO. RD. 217 APPROX. 10 MILES, TURN LEFT (WEST-NORTHWEST) ON CALICHE ROAD APPROX. 4.7 MILES, CONTINUE THROUGH INTERSECTION AND GO NORTH-NORTHWEST APPROX. 0.8 MILES, TURN RIGHT AND GO EAST-NORTHEAST APPROX. 0.15 MILES TO THE NORTHWEST PAD CORNER FOR THIS LOCATION.

SURVEYOR CERTIFICATE
I, FILIMON F. JARAMILLO, A NEW MEXICO PROFESSIONAL SURVEYOR NO. 12797, HEREBY CERTIFY THAT I HAVE CONDUCTED AND AM RESPONSIBLE FOR THIS SURVEY, THAT THIS SURVEY IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF, AND THAT THIS SURVEY AND PLAT MEET THE MINIMUM STANDARDS FOR LAND SURVEYING IN THE STATE OF NEW MEXICO.

IN WITNESS WHEREOF, THIS CERTIFICATE IS EXECUTED AT CARLSBAD, NEW MEXICO, THIS 9 DAY OF JANUARY 2025

FILIMON F. JARAMILLO NEW MEXICO 12797 REGISTERED PROFESSIONAL SURVEYOR

FILIMON F. JARAMILLO PLS 12797

MADRON SURVEYING, INC.
301 SOUTH CANAL
CARLSBAD, NEW MEXICO 88220
Phone (575) 234-3327

SHEET: 1-7
SURVEY NO. 10352

MADRON SURVEYING, INC. 301 SOUTH CANAL (575) 234-3327 CARLSBAD, NEW MEXICO

PRESCOTT FEDERAL COM 1H
MACK ENERGY CORPORATION
IN THE NW/4 SW/4 SE/4 OF SECTION 19, TOWNSHIP 15 SOUTH, RANGE 29 EAST, N.M.P.M. CHAVES COUNTY, STATE OF NEW MEXICO
NOVEMBER 22, 2024

DESCRIPTION

A CERTAIN PIECE OR PARCEL OF LAND AND REAL ESTATE LYING IN BUREAU OF LAND MANAGEMENT LAND IN THE NW/4 SW/4 SE/4 OF SECTION 19, TOWNSHIP 15 SOUTH, RANGE 29 EAST, N.M.P.M., CHAVES COUNTY, NEW MEXICO.

BEGINNING AT THE SOUTHEAST CORNER OF THE PARCEL, WHENCE THE SOUTHEAST CORNER OF SECTION 19, TOWNSHIP 15 SOUTH, RANGE 29 EAST, N.M.P.M. BEARS S73°45'52"E, A DISTANCE OF 2403.42 FEET;
THENCE N89°59'20"W A DISTANCE OF 360.10 FEET TO THE SOUTHWEST CORNER OF THE PARCEL;
THENCE N00°00'21"W A DISTANCE OF 325.03 FEET TO THE NORTHWEST CORNER OF THE PARCEL;
THENCE N89°58'21"E A DISTANCE OF 360.11 FEET TO THE NORTHEAST CORNER OF THE PARCEL;
THENCE S00°00'17"E A DISTANCE OF 325.28 FEET TO THE SOUTHEAST CORNER OF THE PARCEL, THE POINT OF BEGINNING;
CONTAINING 2.688 ACRES MORE OR LESS.

GENERAL NOTES

1.) THE INTENT OF THIS SURVEY IS TO ACQUIRE A BUSINESS LEASE FOR THE PURPOSE OF BUILDING A WELL PAD

2.) BASIS OF BEARING IS NEW MEXICO STATE PLANE EAST ZONE MODIFIED TO THE SURFACE (NAD83), COORDINATES ARE NAD 83, ELEVATIONS ARE NAVD 88

SURVEYOR CERTIFICATE

I, FILIMON F. JARAMILLO, A NEW MEXICO PROFESSIONAL SURVEYOR NO. 12797, HEREBY CERTIFY THAT I HAVE CONDUCTED AND AM RESPONSIBLE FOR THIS SURVEY, THAT THIS SURVEY IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF, AND THAT THIS SURVEY AND PLAT MEET THE MINIMUM STANDARDS FOR LAND SURVEYING IN THE STATE OF NEW MEXICO.

IN WITNESS WHEREOF, THIS CERTIFICATE IS EXECUTED AT CARLSBAD,

NEW MEXICO, THIS 9 DAY OF JANUARY 2025

FILIMON F. JARAMILLO NEW MEXICO 12797 REGISTERED PROFESSIONAL SURVEYOR

FILIMON F. JARAMILLO PLS 12797

MADRON SURVEYING, INC.
301 SOUTH CANAL
CARLSBAD, NEW MEXICO 88220
Phone (575) 234-3327

SHEET: 2-7

SURVEY NO. 10352

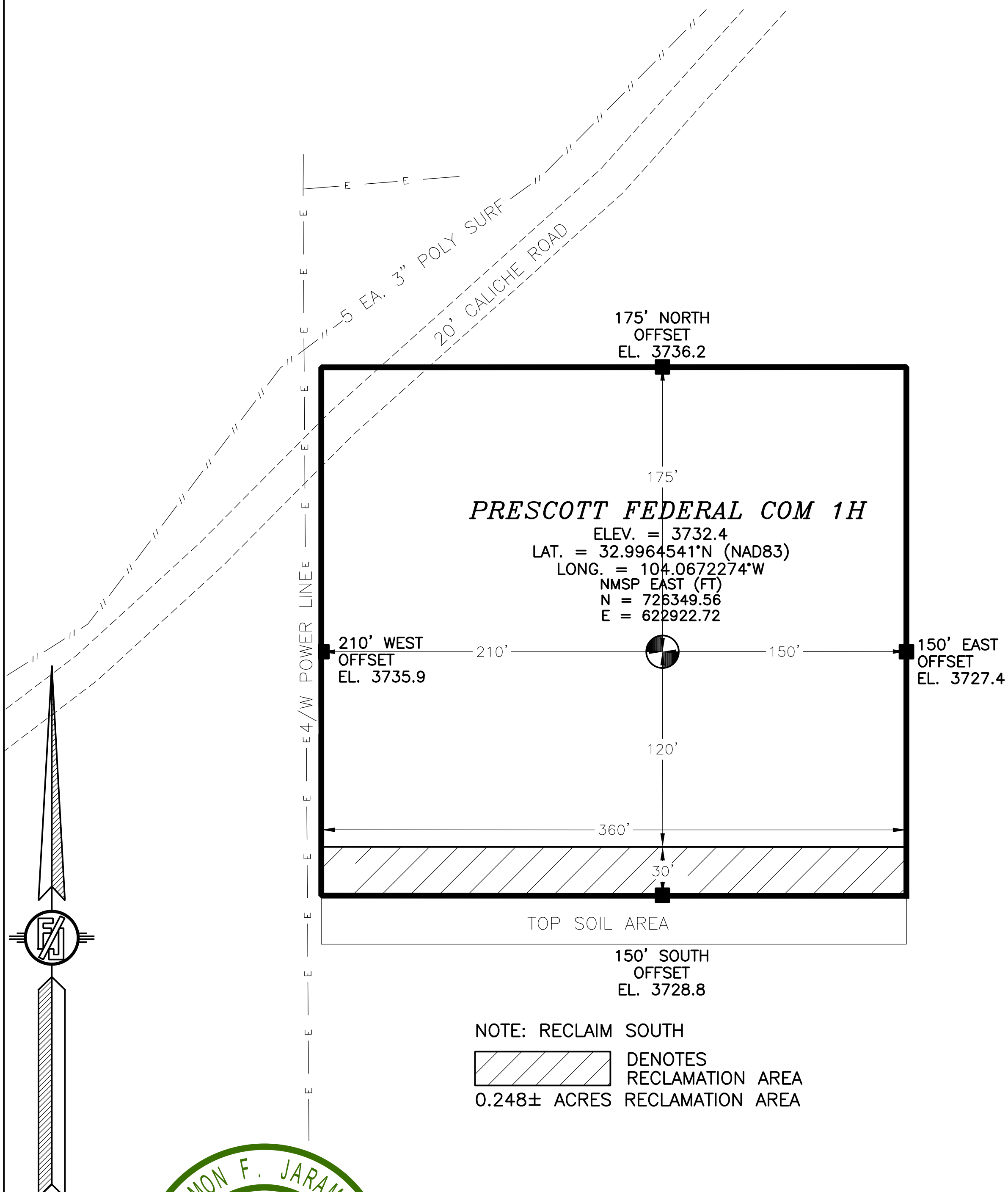
MADRON SURVEYING, INC. 301 SOUTH CANAL (575) 234-3327 CARLSBAD, NEW MEXICO

PRESCOTT FEDERAL COM 1H

MACK ENERGY CORPORATION

IN THE NW/4 SW/4 SE/4 OF
SECTION 19, TOWNSHIP 15 SOUTH, RANGE 29 EAST, N.M.P.M.
CHAVES COUNTY, STATE OF NEW MEXICO
NOVEMBER 22, 2024

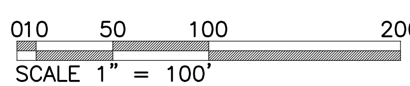
SITE MAP



I, FILIMON F. JARAMILLO, A NEW MEXICO REGISTERED PROFESSIONAL SURVEYOR CERTIFY THAT I DIRECTED AND AM RESPONSIBLE FOR THIS SURVEY, THAT THIS SURVEY IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF, AND THIS SURVEY MEETS THE MINIMUM STANDARDS FOR SURVEYING IN NEW MEXICO.

FILIMON F. JARAMILLO, PLS 12797

FILIMON F. JARAMILLO NEW MEXICO 12797 REGISTERED PROFESSIONAL SURVEYOR



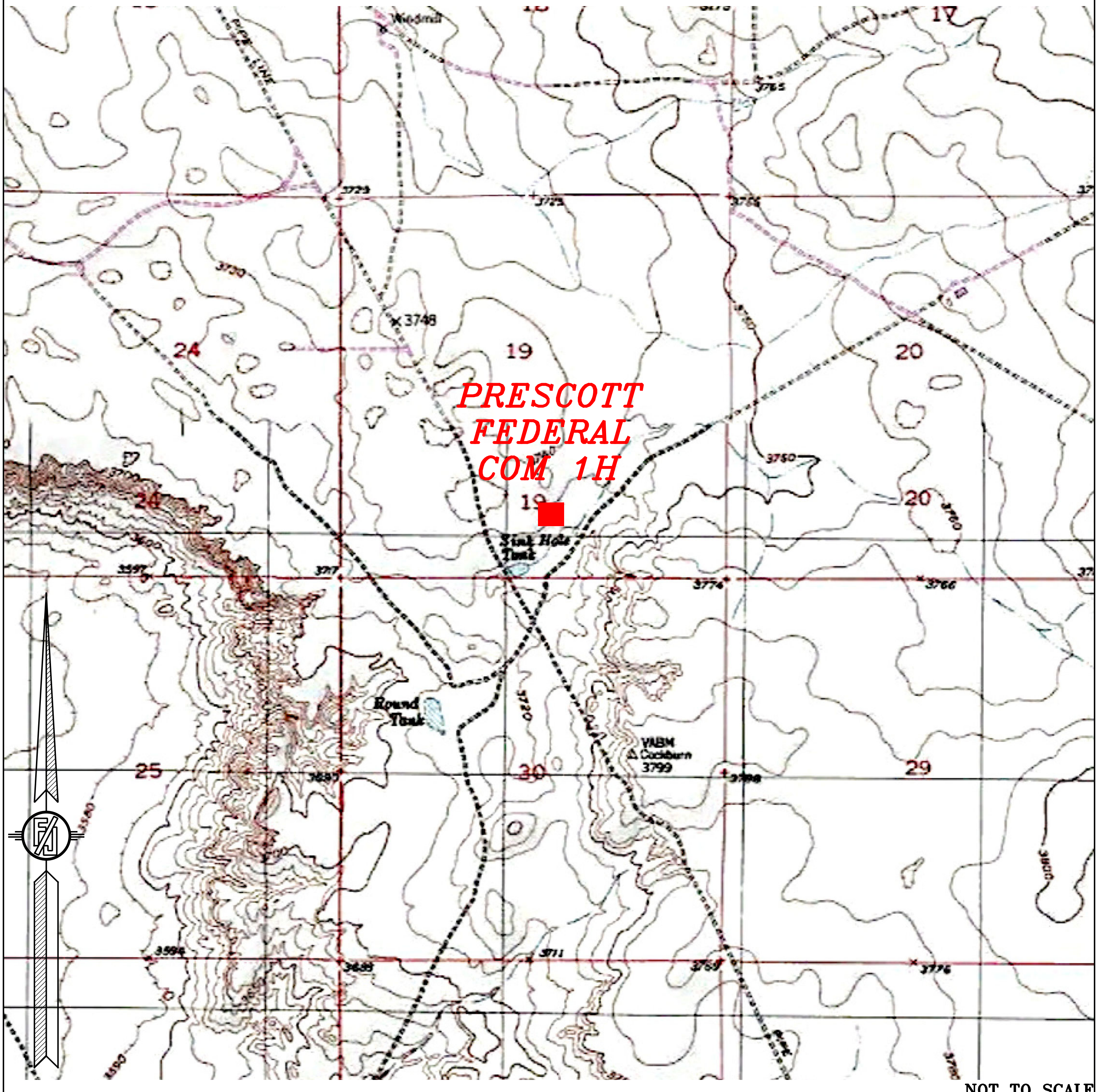
SHEET: 3-[illegible]

SURVEY NO. 10352

MADRON SURVEYING, INC. 301 SOUTH CANAL (575) 234-3327 CARLSBAD, NEW MEXICO

PRESCOTT FEDERAL COM 1H
MACK ENERGY CORPORATION
IN THE NW/4 SW/4 SE/4 OF
SECTION 19, TOWNSHIP 15 SOUTH, RANGE 29 EAST, N.M.P.M.
CHAVES COUNTY, STATE OF NEW MEXICO
NOVEMBER 22, 2024

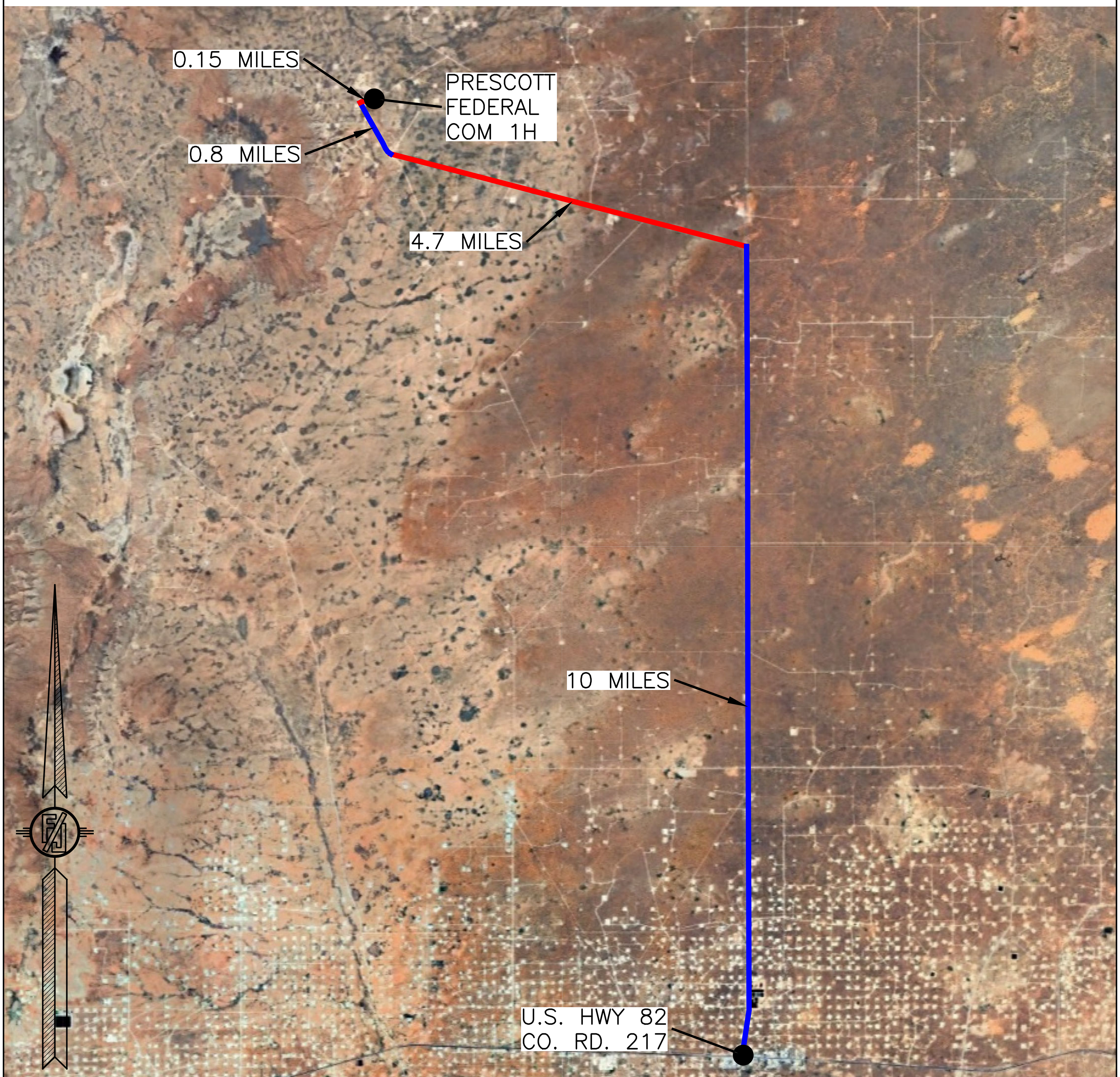
LOCATION VERIFICATION MAP



SHEET: 4-7
SURVEY NO. 10352
MADRON SURVEYING, INC. 301 SOUTH CANAL (575) 234-3327 CARLSBAD, NEW MEXICO

PRESCOTT FEDERAL COM 1H
MACK ENERGY CORPORATION
IN THE NW/4 SW/4 SE/4 OF
SECTION 19, TOWNSHIP 15 SOUTH, RANGE 29 EAST, N.M.P.M.
CHAVES COUNTY, STATE OF NEW MEXICO
NOVEMBER 22, 2024

AERIAL ACCESS ROUTE MAP



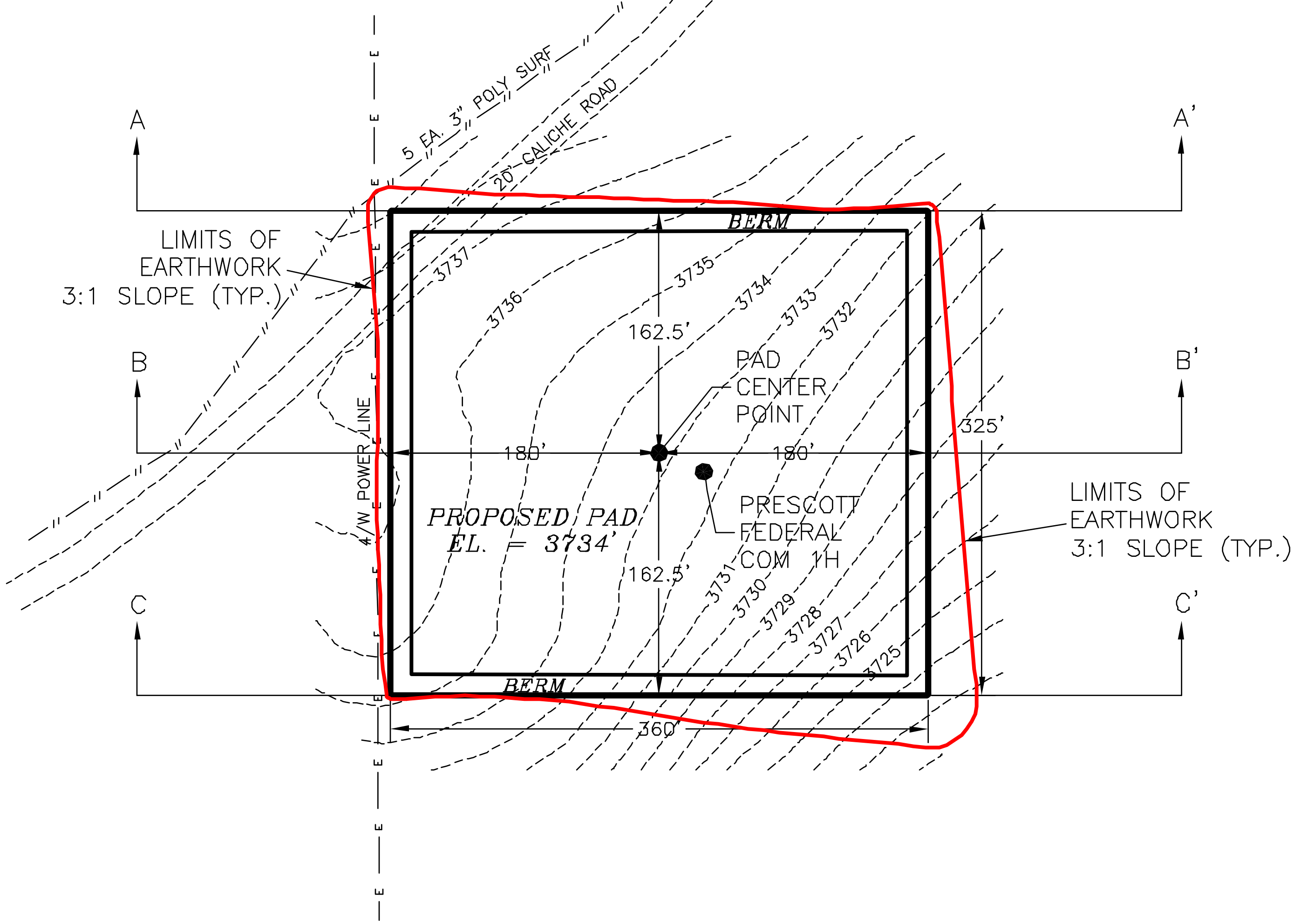
NOT TO SCALE
AERIAL PHOTO: GOOGLE EARTH

DRIVING DIRECTIONS: FROM THE INTERSECTION OF U.S. HWY. 82 (LOVINGTON HWY) AND CO. RD. 217 (HAGERMAN CUTOFF) GO NORTH ON CO. RD. 217 APPROX. 10 MILES, TURN LEFT (WEST–NORTHWEST) ON CALICHE ROAD APPROX. 4.7 MILES, CONTINUE THROUGH INTERSECTION AND GO NORTH–NORTHWEST APPROX. 0.8 MILES, TURN RIGHT AND GO EAST–NORTHEAST APPROX. 0.15 MILES TO THE NORTHWEST PAD CORNER FOR THIS LOCATION.

SHEET: 5–7 SURVEY NO. 10352

MADRON SURVEYING, INC. 301 SOUTH CANAL (575) 234–3327 CARLSBAD, NEW MEXICO

PLAN VIEW



I, FILIMON F. JARAMILLO, NEW MEXICO REGISTERED PROFESSIONAL SURVEYOR CERTIFY THAT I DIRECTED AND AM RESPONSIBLE FOR THIS SURVEY, THAT THIS SURVEY IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF AND THIS SURVEY AND PLAT MEET THE MINIMUM STANDARDS FOR SURVEYING IN NEW MEXICO.

FILIMON F. JARAMILLO P.S. 12797

FILIMON F. JARAMILLO NEW MEXICO 12797 REGISTERED PROFESSIONAL SURVEYOR

MACK ENERGY CORPORATION
PAD ELEVATIONS AND CROSS SECTIONS
FOR PRESCOTT FEDERAL COM 1H
SECTION 19, TOWNSHIP 15 SOUTH, RANGE 29 EAST, N.M.P.M.
CHAVES COUNTY, STATE OF NEW MEXICO

NOVEMBER 22, 2024

0 12 60 120 240
SCALE 1" = 120'

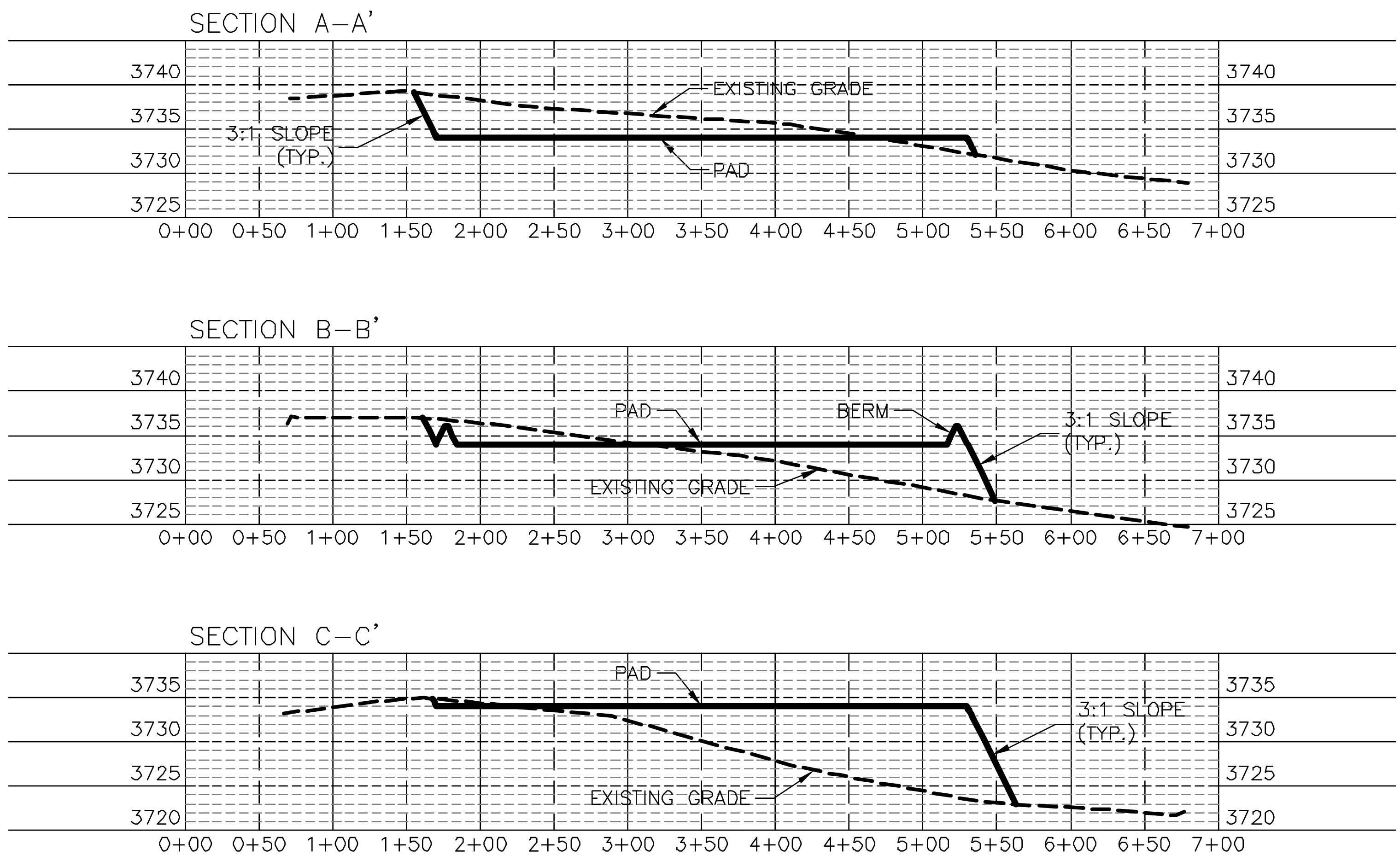
CUT	FILL	NET
2966 CU. YD	9610 CU. YD	6644 CU. YD (FILL)

EARTHWORK QUANTITIES ARE ESTIMATED

MADRON SURVEYING, INC. 301 SOUTH CANAL (575) 234-3327 *CARLSBAD, NEW MEXICO*

SHEET 6-7
SURVEY NO. 10352

CROSS-SECTIONS



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FILIMON F. JARAMILLO P.S. 12797

FILIMON F. JARAMILLO NEW MEXICO 12797 REGISTERED PROFESSIONAL SURVEYOR

MACK ENERGY CORPORATION
PAD ELEVATIONS AND CROSS SECTIONS
FOR PRESCOTT FEDERAL COM 1H
SECTION 19, TOWNSHIP 15 SOUTH,
RANGE 29 EAST, N.M.P.M.
CHAVES COUNTY, STATE OF NEW MEXICO

NOVEMBER 22, 2024

012 60 120 240
SCALE 1" = 120' – 1" = 20' VER

CUT	FILL	NET
2966 CU. YD	9610 CU. YD	6644 CU. YD (FILL)

EARTHWORK QUANTITIES ARE ESTIMATED

MADRON SURVEYING, INC. 301 SOUTH CANAL (575) 234-3327 *CARLSBAD, NEW MEXICO*

SHEET 7-7
SURVEY NO. 10352

State of New Mexico
Energy, Minerals and Natural Resources Department

Submit Electronically
Via E-permitting

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

NATURAL GAS MANAGEMENT PLAN

This Natural Gas Management Plan must be submitted with each Application for Permit to Drill (APD) for a new or recompleted well.

Section 1 – Plan Description

Effective May 25, 2021

I. Operator: Mack Energy Corporation **OGRID:** 013837 **Date:** 02 / 27 / 2025

II. Type: ☒ Original ☐ Amendment due to ☐ 19.15.27.9.D(6)(a) NMAC ☐ 19.15.27.9.D(6)(b) NMAC ☐ Other.

If Other, please describe: ______

III. Well(s): Provide the following information for each new or recompleted well or set of wells proposed to be drilled or proposed to be recompleted from a single well pad or connected to a central delivery point.

Well Name	API	ULSTR	Footages	Anticipated Oil BBL/D	Anticipated Gas MCF/D	Anticipated Produced Water BBL/D
Prescott Federal Com 1H		Sec 19 T15S R29E	839FSL 2455 FEL	100	100	1,000

IV. Central Delivery Point Name: ______ [See 19.15.27.9(D)(1) NMAC]

V. Anticipated Schedule: Provide the following information for each new or recompleted well or set of wells proposed to be drilled or proposed to be recompleted from a single well pad or connected to a central delivery point.

Well Name	API	Spud Date	TD Reached Date	Completion Commencement Date	Initial Flow Back Date	First Production Date
Prescott Federal Com 1H		8/1/2025	8/21/2025	9/21/2025	9/21/2025	9/21/2025

VI. Separation Equipment: ☒ Attach a complete description of how Operator will size separation equipment to optimize gas capture.

VII. Operational Practices: ☒ Attach a complete description of the actions Operator will take to comply with the requirements of Subsection A through F of 19.15.27.8 NMAC.

VIII. Best Management Practices: ☒ Attach a complete description of Operator's best management practices to minimize venting during active and planned maintenance.

Section 2 – Enhanced Plan
EFFECTIVE APRIL 1, 2022

Beginning April 1, 2022, an operator that is not in compliance with its statewide natural gas capture requirement for the applicable reporting area must complete this section.

☒ Operator certifies that it is not required to complete this section because Operator is in compliance with its statewide natural gas capture requirement for the applicable reporting area.

IX. Anticipated Natural Gas Production:

Well	API	Anticipated Average Natural Gas Rate MCF/D	Anticipated Volume of Natural Gas for the First Year MCF

X. Natural Gas Gathering System (NGGS):

Operator	System	ULSTR of Tie-in	Anticipated Gathering Start Date	Available Maximum Daily Capacity of System Segment Tie-in

XI. Map. ☐ Attach an accurate and legible map depicting the location of the well(s), the anticipated pipeline route(s) connecting the production operations to the existing or planned interconnect of the natural gas gathering system(s), and the maximum daily capacity of the segment or portion of the natural gas gathering system(s) to which the well(s) will be connected.

XII. Line Capacity. The natural gas gathering system ☐ will ☐ will not have capacity to gather 100% of the anticipated natural gas production volume from the well prior to the date of first production.

XIII. Line Pressure. Operator ☐ does ☐ does not anticipate that its existing well(s) connected to the same segment, or portion, of the natural gas gathering system(s) described above will continue to meet anticipated increases in line pressure caused by the new well(s).

☐ Attach Operator's plan to manage production in response to the increased line pressure.

XIV. Confidentiality: ☐ Operator asserts confidentiality pursuant to Section 71-2-8 NMSA 1978 for the information provided in Section 2 as provided in Paragraph (2) of Subsection D of 19.15.27.9 NMAC, and attaches a full description of the specific information for which confidentiality is asserted and the basis for such assertion.

Section 3 - Certifications

Effective May 25, 2021

Operator certifies that, after reasonable inquiry and based on the available information at the time of submittal:

☒ Operator will be able to connect the well(s) to a natural gas gathering system in the general area with sufficient capacity to transport one hundred percent of the anticipated volume of natural gas produced from the well(s) commencing on the date of first production, taking into account the current and anticipated volumes of produced natural gas from other wells connected to the pipeline gathering system; or

☐ Operator will not be able to connect to a natural gas gathering system in the general area with sufficient capacity to transport one hundred percent of the anticipated volume of natural gas produced from the well(s) commencing on the date of first production, taking into account the current and anticipated volumes of produced natural gas from other wells connected to the pipeline gathering system. ***If Operator checks this box, Operator will select one of the following:***

Well Shut-In. ☐ Operator will shut-in and not produce the well until it submits the certification required by Paragraph (4) of Subsection D of 19.15.27.9 NMAC; or

Venting and Flaring Plan. ☐ Operator has attached a venting and flaring plan that evaluates and selects one or more of the potential alternative beneficial uses for the natural gas until a natural gas gathering system is available, including:

(a) power generation on lease;
(b) power generation for grid;
(c) compression on lease;
(d) liquids removal on lease;
(e) reinjection for underground storage;
(f) reinjection for temporary storage;
(g) reinjection for enhanced oil recovery;
(h) fuel cell production; and
(i) other alternative beneficial uses approved by the division.

Section 4 - Notices

1. If, at any time after Operator submits this Natural Gas Management Plan and before the well is spud:

(a) Operator becomes aware that the natural gas gathering system it planned to connect the well(s) to has become unavailable or will not have capacity to transport one hundred percent of the production from the well(s), no later than 20 days after becoming aware of such information, Operator shall submit for OCD's approval a new or revised venting and flaring plan containing the information specified in Paragraph (5) of Subsection D of 19.15.27.9 NMAC; or

(b) Operator becomes aware that it has, cumulatively for the year, become out of compliance with its baseline natural gas capture rate or natural gas capture requirement, no later than 20 days after becoming aware of such information, Operator shall submit for OCD's approval a new or revised Natural Gas Management Plan for each well it plans to spud during the next 90 days containing the information specified in Paragraph (2) of Subsection D of 19.15.27.9 NMAC, and shall file an update for each Natural Gas Management Plan until Operator is back in compliance with its baseline natural gas capture rate or natural gas capture requirement.

2. OCD may deny or conditionally approve an APD if Operator does not make a certification, fails to submit an adequate venting and flaring plan which includes alternative beneficial uses for the anticipated volume of natural gas produced, or if OCD determines that Operator will not have adequate natural gas takeaway capacity at the time a well will be spud.

I certify that, after reasonable inquiry, the statements in and attached to this Natural Gas Management Plan are true and correct to the best of my knowledge and acknowledge that a false statement may be subject to civil and criminal penalties under the Oil and Gas Act.

Signature:	Delilah Flores
Printed Name:	Delilah Flores
Title:	Regulatory Technician I
E-mail Address:	delilah@mec.com
Date:	2/27/2025
Phone:	575-748-1288

OIL CONSERVATION DIVISION (Only applicable when submitted as a standalone form)
Approved By:
Title:
Approval Date:
Conditions of Approval:

VI. Separation Equipment:

Mack Energy Corporation(MEC) production facilities include separation equipment designed to efficiently separate gas from liquid phases to optimize gas capture based on projected and estimated volumes from the targeted pool of our completion project. MEC will utilize flowback separation equipment and production separation equipment designed and built to industry specifications after the completion to optimize gas capture and send gas to sales or flare based on analytical composition. MEC operates facilities that are typically multi-well facilities. Production separation equipment is upgraded prior to new wells being completed, if determined to be undersized or inadequate. This equipment is already on-site and tied into our sales gas lines prior to the new drill operations.

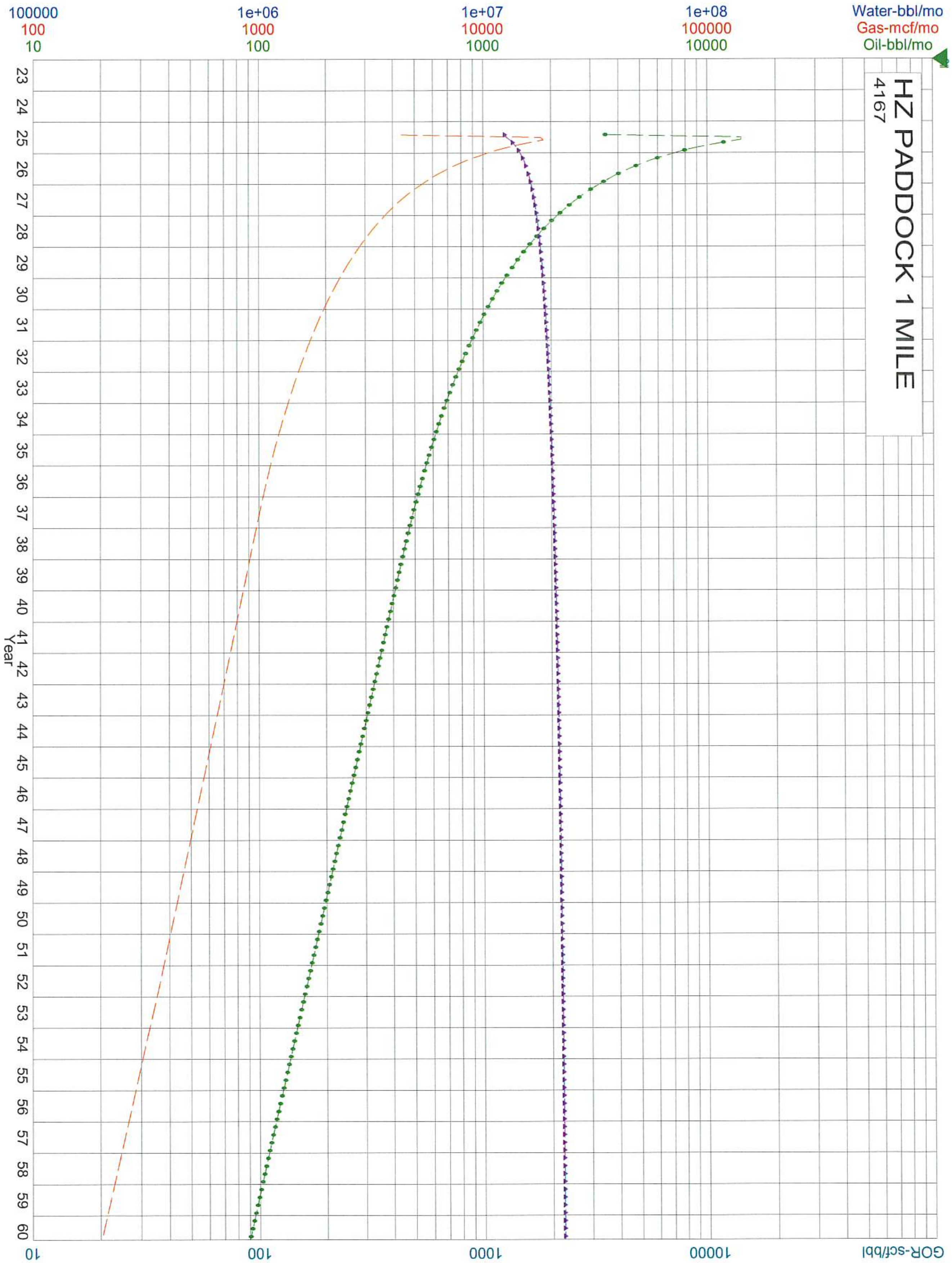
VII. Operational Practices:

1. Subsection (A) Venting and Flaring of Natural Gas. MEC understands the requirements of NMAC 19.15.27.8 which outlines that the venting and flaring of natural gas during drilling, completion or production operations that constitutes waste as defined in 19.15.2 are prohibited.
2. Subsection (B) Venting and Flaring during drilling operations. This gas capture plan isn't for a well being drilled.
3. Subsection (C) Venting and flaring during completion or recompletion. Flowlines will be routed for flowback fluids into a completion or storage tank and if feasible under well conditions, flare rather than vent and commence operation of a separator as soon as it is technically feasible for a separator to function.
    - At any point in the well life (completion, production, inactive) an audio, visual and olfactory inspection be performed at prescribed intervals (weekly or monthly) pursuant to Subsection D of 19.15.27.8 NMAC, to confirm that all production equipment is operating properly and there are no leaks or releases.
4. Subsection (D) Venting and flaring during production operations ○ At any point in the well life (completion, production, inactive) an audio, visual and olfactory inspection be performed at prescribed intervals (weekly or monthly) pursuant to Subsection D of 19.15.27.8 NMAC, to confirm that all production equipment is operating properly and there are no leaks or releases.
    - Monitor manual liquid unloading for wells on-site or in close proximity (<30 minutes' drive time), take reasonable actions to achieve a stabilized rate and pressure at the earliest practical time, and take reasonable actions to minimize venting to the maximum extent practicable.
    - MEC will not vent or flare except during the approved activities listed in NMAC 19.15.27.8 (D) 14.
5. Subsection (E) Performance standards ○ All tanks and separation equipment are designed for maximum throughput and pressure to minimize waste.
    - If a flare is utilized during production operations it will have a continuous pilot and is located more than 100 feet from any known well or storage tanks.
    - At any point in the well life (completion, production, inactive) an audio, visual and olfactory inspection be performed at prescribed intervals (weekly or monthly) pursuant to Subsection D of 19.15.27.8 NMAC, to confirm that all production equipment is operating properly and there are no leaks or releases.

6. Subsection (F) Measurement or estimation of vented and flared natural gas ○ Measurement equipment is installed to measure the volume of natural gas flared from process piping.
    - When measurement isn't practicable, estimation of vented and flared natural gas will be completed as noted in 19.15.27.8 (F) 5-6.

VIII. Best Management Practices:

1. MEC has adequate storage and takeaway capacity for wells it chooses to complete as the flowlines at the sites are already in place and tied into a gathering system.
2. MEC will flare rather than vent vessel blowdown gas when technically feasible during active and/or planned maintenance to equipment on-site.
3. MEC combusts natural gas that would otherwise be vented or flared, when technically feasible.
4. MEC will shut in wells in the event of a takeaway disruption, emergency situation, or other operations where venting or flaring may occur due to equipment failures.
5. MEC has a gas gathering system in place(CTB-887)a with multiple purchaser's to limit venting or flaring, due to purchaser shut downs.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4167
Water-bbl/mo
Gas-mcf/mo
Oil-bbl/mo
100000
100
10
1e+06
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100
1e+07
10000
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1e+08
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10000
Year
GOR-scf/bbl

Month	Gas (MCF)
1	10550
2	8917
3	7769
4	6913
5	6247
6	5712
7	5273
8	4904
9	4589
10	4317
11	4080
12	3871
13	3685
14	3518
15	3368
16	3231
17	3107
18	2993
19	2889
20	2792
21	2702
22	2619
23	2542
24	2469
25	2402
26	2338
27	2278
28	2221
29	2168
30	2118
31	2070
32	2024
33	1981
34	1940
35	1900
36	1863
37	1827
38	1793
39	1760
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AFMSS
U.S. Department of the Interior
BUREAU OF LAND MANAGEMENT

Drilling Plan Data Report

04/09/2025

APD ID: 10400103845 **Submission Date:** 03/05/2025

Highlighted data reflects the most recent changes

Show Final Text

Operator Name: MACK ENERGY CORPORATION

Well Name: PRESCOTT FEDERAL COM **Well Number:** 1H

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

Section 1 - Geologic Formations

Formation ID	Formation Name	Elevation	True Vertical	Measured Depth	Lithologies	Mineral Resources	Producing Formatio
15369611	QUATERNARY	3732	0	0	ANHYDRITE, SILTSTONE	NONE	N
15369610	TOP OF SALT	3492	240	240	ANHYDRITE, DOLOMITE, SILTSTONE	NATURAL GAS, OIL	N
15369612	BASE OF SALT	3112	620	620	ANHYDRITE, DOLOMITE, SILTSTONE	NATURAL GAS, OIL	N
15369613	YATES	2962	770	770	ANHYDRITE, DOLOMITE, SILTSTONE	NATURAL GAS, OIL	N
15369609	SEVEN RIVERS	2731	1001	1001	ANHYDRITE, DOLOMITE, SILTSTONE	NATURAL GAS, OIL	N
15369616	QUEEN	2242	1490	1490	ANHYDRITE, DOLOMITE, SILTSTONE	NATURAL GAS, OIL	Y
15369614	GRAYBURG	1846	1886	1886	ANHYDRITE, DOLOMITE, SILTSTONE	NATURAL GAS, OIL	Y
15369615	SAN ANDRES	1549	2183	2183	ANHYDRITE, DOLOMITE, SILTSTONE	NATURAL GAS, OIL	Y

Section 2 - Blowout Prevention

Pressure Rating (PSI): 3M **Rating Depth:** 8863

Equipment: Rotating Head, Mud Gas Separator

Requesting Variance? NO

Variance request:

Testing Procedure: The BOP/BOPE test shall include a low pressure test from 250 to 300 psi. The test will be held for a minimum of 10 minutes if test is done with a test plug and 30 minutes without a test plug. The estimated Bottom Hole at TD is 120 degrees and estimated maximum bottom hole pressure is 1493 psig (0.052*3121'TVD*9.2pps) less than 2900 bottom hole pressure. Based on calculations we test BOP/BOPE to 2000 psi.

Choke Diagram Attachment:

choke_manifold_diagram_20250304103848.pdf

choke_manifold_20250304103848.pdf

BOP Diagram Attachment:

Operator Name: MACK ENERGY CORPORATION

Well Name: PRESCOTT FEDERAL COM **Well Number:** 1H

choke_manifold_diagram_20250304103848.pdf

choke_manifold_20250304103848.pdf

bop_diagram_20250304103858.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	210	0	210	3732	3522	210	J-55	48	ST&C	7.412	4.701	BUOY	4.74	BUOY	52.87
2	INTERMEDIATE	12.25	9.625	NEW	API	N	0	1200	0	1200	3732	2532	1200	J-55	36	ST&C	3.237	7.04	BUOY	7.04	DRY	10.768
3	PRODUCTION	8.75	7.0	NEW	API	N	0	3250	0	3250	3732	482	3250	HCP-110	26	BUTT	4.165	3.317	BUOY	3.317	DRY	7.355
4	PRODUCTION	8.75	5.5	NEW	API	N	3250	8863	3250	8863	482	-5131	5613	HCP-110	17	BUTT	5.287	3.547	BUOY	3.547	DRY	4.491

Casing Attachments

Casing ID: 1 **String** SURFACE

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

Prescott_Federal_Com_1H___Surface_20250304105846.pdf

Operator Name: MACK ENERGY CORPORATION

Well Name: PRESCOTT FEDERAL COM **Well Number:** 1H

Casing Attachments

Casing ID: 2 **String** INTERMEDIATE

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

Prescott_Federal_Com_1H___Intermediate_20250304110225.pdf

Casing ID: 3 **String** PRODUCTION

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

Prescott_Federal_Com_1H___Production_20250304110418.pdf

Casing ID: 4 **String** PRODUCTION

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

Prescott_Federal_Com_1H___Production_20250304110613.pdf

Section 4 - Cement

Operator Name: MACK ENERGY CORPORATION

Well Name: PRESCOTT FEDERAL COM **Well Number:** 1H

String Type	Lead/Tail	Stage Tool Depth	Top MD	Bottom MD	Quantity(sx)	Yield	Density	Cu Ft	Excess%	Cement type	Additives
SURFACE	Lead		0	210	100	1.61	14.4	146		RFC+12% PF53+2%PF1+5ppsPF42+.125pps PF29	20bbls gelled water. 50 sx of 11# Scavenger cmt.
SURFACE	Tail		0	210	250	1.34	14.8	146	100	Class C+1%PF1	20bbls gelled water. 50 sx of 11# Scavenger cmt.
INTERMEDIATE	Lead		210	1200	460	1.73	13.5	376	50	Class C+4%PF20+ .4ppsPF44+.125pps PF29	20bbls gelled water. 50 sx of 11# Scavenger cmt.
INTERMEDIATE	Tail		210	1200	200	1.34	14.8	376	50	Class C+1%PF1	20bbls gelled water. 50 sx of 11# Scavenger cmt.
PRODUCTION	Lead		1200	8863	300	2.82	11.5	2281	50	Class C4% PF20+4pps PF45+125pps PF29	20bbls gelled water. 20bbls chemical wash. 50 sx of 11# Scavenger cmt.
PRODUCTION	Tail		1200	8863	2150	1.34	14.2	2281	50	PVL+1.3(BWOW) PF44+5%PF174+ .5%PF606+.1%PF153+.4ppsPF44	20bbls gelled water. 20bbls chemical wash. 50 sx of 11# Scavenger cmt.

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 43 CFR 3172:

Diagram of the equipment for the circulating system in accordance with 43 CFR 3172:

Describe what will be on location to control well or mitigate other conditions: BOPE Brine Water

Describe the mud monitoring system utilized: Pason PVT with Pit Volume Recorder

Circulating Medium Table

Operator Name: MACK ENERGY CORPORATION

Well Name: PRESCOTT FEDERAL COM **Well Number:** 1H

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	210	SPUD MUD	8.5	10	74.8	0.1	11		15	15	
210	1200	LSND/GEL	8.3	10	74.8	0.1	11		12000	15	
1200	3250	LSND/GEL	8.3	10	74.8	0.1	11		12000	15	
3250	8863	LSND/GEL	8.3	9.2	74.8	0.1	11		12000	15	The estimated bottom hole at TD is 120 degrees and estimated maximum bottom hole pressure is 1493 psig (0.052*3121'TVD*9.2) less than 2900 bottom hole pressure.

Section 6 - Test, Logging, Coring

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

None

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

CNL/FDC,GAMMA RAY LOG,FORMATION DENSITY COMPENSATED LOG,

Coring operation description for the well:

Will evaluate after logging to determine the necessity for sidewall coring.

Section 7 - Pressure

Anticipated Bottom Hole Pressure: 1493 **Anticipated Surface Pressure:** 798

Anticipated Bottom Hole Temperature(F): 95

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

Describe:

Contingency Plans geoharzards description:

Contingency Plans geohazards

Hydrogen Sulfide drilling operations plan required? NO

Hydrogen sulfide drilling operations

Operator Name: MACK ENERGY CORPORATION

Well Name: PRESCOTT FEDERAL COM **Well Number:** 1H

Section 8 - Other Information

Proposed horizontal/directional/multi-lateral plan submission:

Prescott_Federal_Com_1H___Horizontal_Spacing_20250304135524.pdf
Prescott_Federal_Com__1H_Preliminary_Horizontal_Well_Plan_1_20250304135538.pdf
Prescott_Federal_Com_1H___Escape_Route_20250304135551.pdf
Prescott_Federal_Com_1H___Drilling_Program_20250304135601.pdf
Prescott_Federal_Com_1H___H2S_20250304135616.pdf
Prescott_Federal_Com_1H___Natural_Gas_Management_Plan_20250304135636.pdf
Prescott_Federal_Com__1H_Plan__1_AC_Report_20250325085940.pdf

Other proposed operations facets description:

Other proposed operations facets attachment:

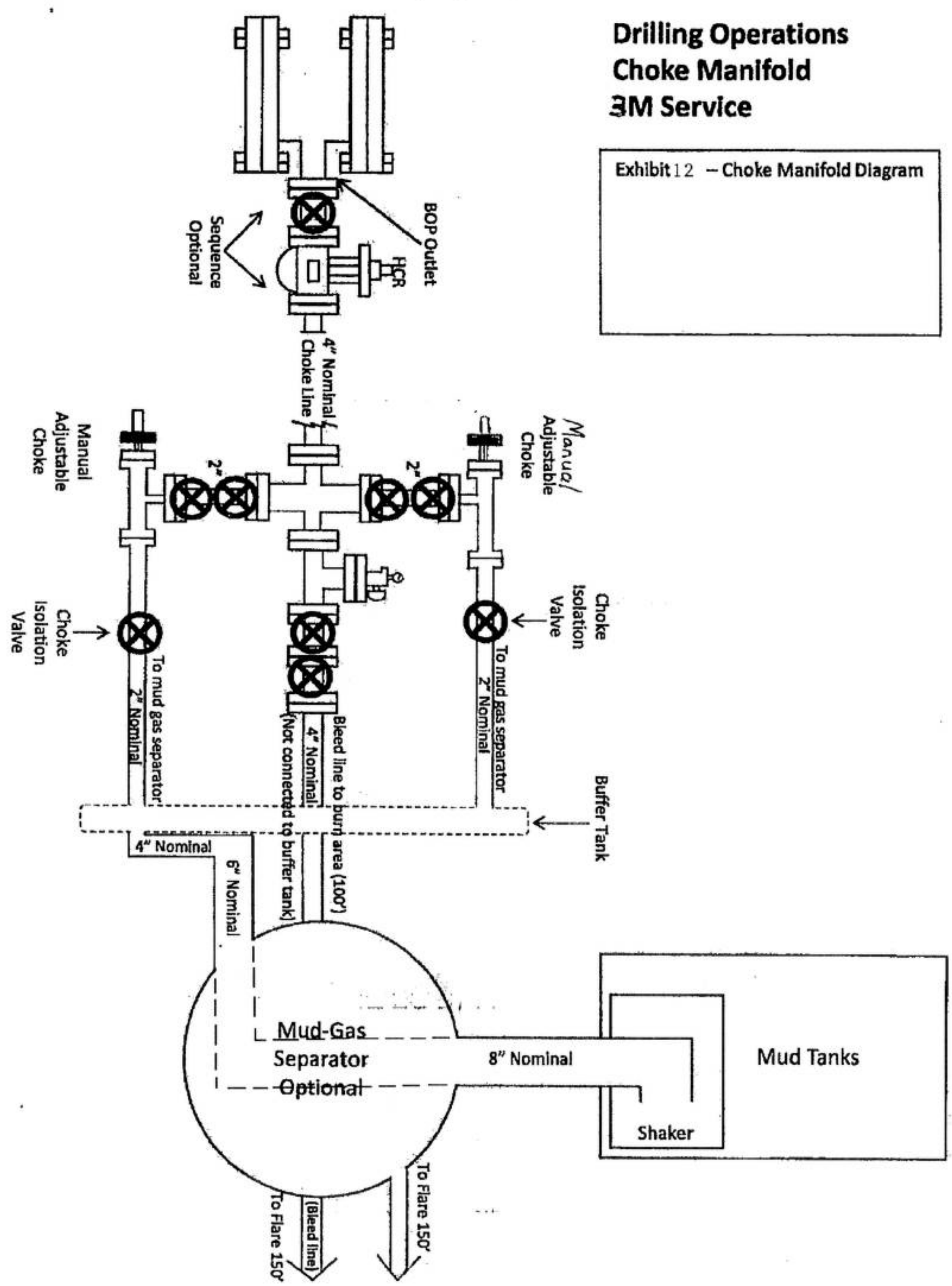
Other Variance attachment:

CCC__Rig_6_20250304135728.pdf
Variance_request_20250304135805.pdf
Cactus_Wellhead_installation_Procedure_20250304135712.pdf
Hose_cert_rig_3_20250325090033.pdf

Mack Energy Corporation

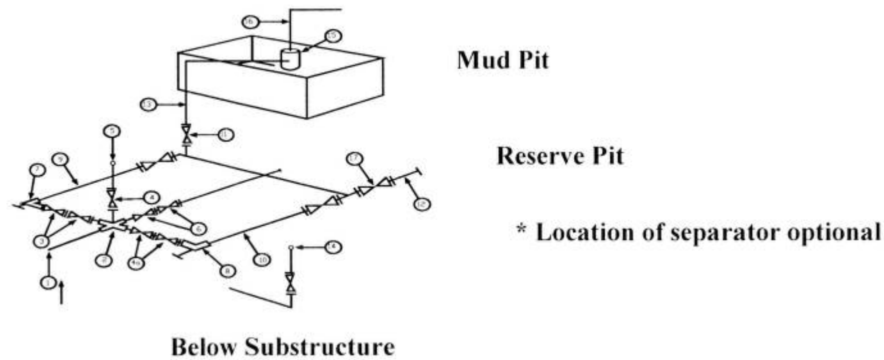
MANIFOLD SCHEMATIC

Exhibit #12



Mack Energy Corporation

Exhibit #11
MIMIMUM CHOKE MANIFOLD
3,000, 5,000, and 10,000 PSI Working Pressure
3M will be used
3 MWP - 5 MWP - 10 MWP



Mimimum requirements

		3,000 MWP			5,000 MWP			10,000 MWP		
No.		I.D.	Nominal	Rating	I.D.	Nominal	Rating	I.D.	Nominal	Rating
1	Line from drilling Spool		3"	3,000		3"	5,000		3"	10,000
2	Cross 3" x 3" x 3" x 2"			3,000			5,000			
2	Cross 3" x 3" x 3" x 2"									10,000
3	Valve Gate Plug	3 1/8		3,000	3 1/8		5,000	3 1/8		10,000
4	Valve Gate Plug	1 13/16		3,000	1 13/16		5,000	1 13/16		10,000
4a	Valves (1)	2 1/16		3,000	2 1/16		5,000	2 1/16		10,000
5	Pressure Gauge			3,000			5,000			10,000
6	Valve Gate Plug	3 1/8		3,000	3 1/8		5,000	3 1/8		10,000
7	Adjustable Choke (3)	2"		3,000	2"		5,000	2"		10,000
8	Adjustable Choke	1"		3,000	1"		5,000	2"		10,000
9	Line		3"	3,000		3"	5,000		3"	10,000
10	Line		2"	3,000		2"	5,000		2"	10,000
11	Valve Gate Plug	3 1/8		3,000	3 1/8		5,000	3 1/8		10,000
12	Line		3"	1,000		3"	1,000		3"	2,000
13	Line		3"	1,000		3"	1,000		3"	2,000
14	Remote reading compound Standpipe pressure quage			3,000			5,000			10,000
15	Gas Separator		2' x5'			2' x5'			2' x5'	
16	Line		4"	1,000		4"	1,000		4"	2,000
17	Valve Gate Plug	3 1/8		3,000	3 1/8		5,000	3 1/8		10,000

(1) Only one required in Class 3M
(2) Gate valves only shall be used for Class 10 M
(3) Remote operated hydraulic choke required on 5,000 psi and 10,000 psi for drilling.

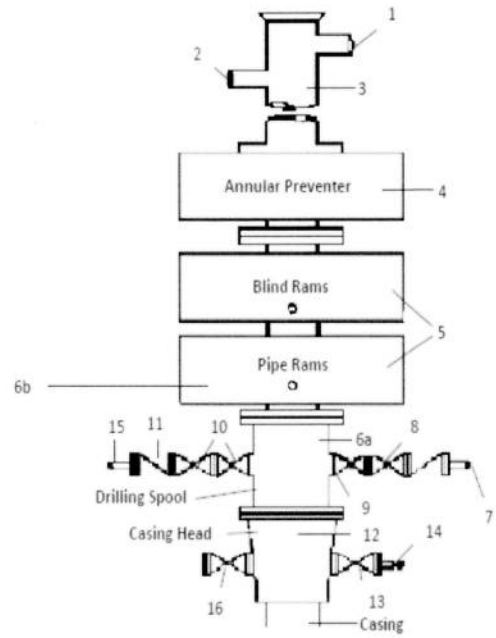
EQUIPMENT SPECIFICATIONS AND INSTALLATION INSTRUCTION

1. All connections in choke manifold shall be welded, studded, flanged or Cameron clamp of comparable rating.
2. All flanges shall be API 6B or 6BX and ring gaskets shall be API RX or BX. Use only BX for 10 MWP.
3. All lines shall be securely anchored.
4. Chokes shall be equipped with tungsten carbide seats and needles, and replacements shall be available.
5. alternate with automatic chokes, a choke manifold pressure gauge shall be located on the rig floor in conjunction with the standpipe pressure gauge.
6. Line from drilling spool to choke manifold should bee as straight as possible. Lines downstream from chokes shall make turns by large bends or 90 degree bends using bull plugged tees

Mack Energy Corporation
Minimum Blowout Preventer Requirements
5000 psi Working Pressure
13 5/8 inch- 5 MWP
11 Inch - 5 MWP

Stack Requirements

NO.	Items	Min. I.D.	Min. Nominal
1	Flowline		2"
2	Fill up line		2"
3	Drilling nipple		
4	Annular preventer		
5	Two single or one dual hydraulically operated rams		
6a	Drilling spool with 2" min. kill line and 3" min choke line outlets		2" Choke
6b	2" min. kill line and 3" min. choke line outlets in ram. (Alternate to 6a above)		
7	Valve Gate Plug	3 1/8	
8	Gate valve-power operated	3 1/8	
9	Line to choke manifold		3"
10	Valve Gate Plug	2 1/16	
11	Check valve	2 1/16	
12	Casing head		
13	Valve Gate Plug	1 13/16	
14	Pressure gauge with needle valve		
15	Kill line to rig mud pump manifold		2"



OPTIONAL

16	Flanged Valve	1 13/16	

CONTRACTOR'S OPTION TO 10.

CONTRACTOR'S OPTION TO FURNISH: ME

1. All equipment and connections above bradenhead or casinghead. Working pressure of preventers to be 2000 psi minimum.
2. Automatic accumulator (80 gallons, minimum) capable of closing BOP in 30 seconds or less and, holding them closed against full rated working pressure.
3. BOP controls, to be located near drillers' position.
4. Kelly equipped with Kelly cock.
5. Inside blowout preventer or its equivalent on derrick floor at all times with proper threads to fit pipe being used.
6. Kelly saver-sub equipped with rubber casing protector at all times.
7. Plug type blowout preventer tester.
8. Extra set pipe rams to fit drill pipe in use on location at all times.
9. Type RX ring gaskets in place of Type R.

MEC TO FURNISH:

1. Bradenhead or casing head and side valves.
2. Wear bushing. If required.

GENERAL NOTES:

1. Deviations from this drawing may be made only with the express permission of MEC's Drilling Manager.
2. All connections, valves, fittings, piping, etc., subject to well or pump pressure must be flanged (suitable clamp connections acceptable) and have minimum working pressure equal to rated working pressure of preventers up through choke valves must be full opening and suitable for high pressure mud service.
3. Controls to be of standard design and each marked, showing opening and closing position
4. Chokes will be positioned so as not to hamper or delay changing of choke beans. Replaceable parts for adjustable choke, or bean sizes, retainers, and choke wrenches to be conveniently located for immediate use.
5. All valves to be equipped with hand-wheels or handles ready for immediate use.
6. Choke lines must be suitably anchored.
7. Handwheels and extensions to be connected and ready for use.
8. Valves adjacent to drilling spool to be kept open. Use outside valves except for emergency.
9. All seamless steel control piping (2000 psi working pressure) to have flexible joints to avoid stress. Hoses will be permitted.
10. Casinghead connections shall not be used except in case of emergency.
11. Does not use kill line for routine fill up operations.

Casing Design **Well:** Prescott Federal Com #1H

String Size & Function: 13 3/8 in surface x intermediate

Total Depth: 210 ft

Pressure Gradient for Calculations **(While drilling)**

Mud weight, collapse:	9.6 #/gal	Safety Factor Collapse:	1.125
Mud weight, burst:	9.6 #/gal	Safety Factor Burst:	1.25
Mud weight for joint strength:	9.6 #/gal	Safety Factor Joint Strength	1.8

BHP @ TD for: collapse: 104.832 psi Burst: 104.832 psi, joint strength: 104.832 psi

Partially evacuated hole? Pressure gradient remaining: 10 #/gal

Max. Shut in surface pressure: 500 psi

1st segment	200 ft to	0 ft	Make up Torque ft-lbs		Total ft = 200
O.D.	Weight	Grade / Threads	opt.	min.	mx.
13.375 inches	**48** #/ft	**J-55** / **ST&C**	**3,220**	**2,420**	**4,030**
Collapse Resistance	Internal Yield	Joint Strength	Body Yield		Drift
740	**2,370** psi	**433** ,000 #	**744** ,000 #		**12.559**

2nd segment	0 ft to	0 ft	Make up Torque ft-lbs		Total ft = 0
O.D.	Weight	Grade / Threads	opt.	min.	mx.
inches	#/ft				
Collapse Resistance	Internal Yield	Joint Strength	Body Yield		Drift
psi	psi	,000 #	,000 #		

3rd segment	0 ft to	0 ft	Make up Torque ft-lbs		Total ft = 0
O.D.	Weight	Grade / Threads	opt.	min.	mx.
inches	#/ft				
Collapse Resistance	Internal Yield	Joint Strength	Body Yield		Drift
psi	psi	,000 #	,000 #		

4th segment	0 ft to	0 ft	Make up Torque ft-lbs		Total ft = 0
O.D.	Weight	Grade / Threads	opt.	min.	mx.
inches	#/ft				
Collapse Resistance	Internal Yield	Joint Strength	Body Yield		Drift
psi	psi	,000 #	,000 #		

5th segment	0 ft to	0 ft	Make up Torque ft-lbs		Total ft = 0
O.D.	Weight	Grade / Threads	opt.	min.	mx.
inches	#/ft				
Collapse Resistance	Internal Yield	Joint Strength	Body Yield		Drift
psi	psi	,000 #	,000 #		

6th segment	0 ft to	0 ft	Make up Torque ft-lbs		Total ft = 0
O.D.	Weight	Grade / Threads	opt.	min.	mx.
inches	#/ft				
Collapse Resistance	Internal Yield	Joint Strength	Body Yield		Drift
psi	psi	,000 #	,000 #		

Select 1st segment bottom	210	**S.F.**	Actual		Desire
		collapse	7.058913	>=	1.125
210 ft to 0 ft		burst-b	4.69895	>=	1.25
13.375 0 J-55 ST&C		burst-t	4.74		
Top of segment 1 (ft)	0	**S.F.**	Actual		Desire
Select 2nd segment from bottom		collapse	#DIV/0!	>=	1.125
		burst-b	0	>=	1.25
0 ft to 0 ft		burst-t	0		
0 0 0 0		jnt strngth	50.35206	>=	1.8

			Top of segment 2 (ft)		**S.F.**	Actual		Desire
Select	3rd segment from bottom				collapse	#DIV/0!	>=	1.125
					burst-b	0	>=	1.25
	0 ft	to	0 ft		burst-t	0		
	0	0	0	0	jnt strngth	0	>=	1.8
			Top of segment 3 (ft)		**S.F.**	Actual		Desire
Select	4th segment from bottom				collapse	#DIV/0!	>=	1.125
					burst-b	0	>=	1.25
	0 ft	to	0 ft		burst-t	0		
	0	0	0	0	jnt strngth	0	>=	1.8
			Top of segment 4 (ft)		**S.F.**	Actual		Desire
Select	5th segment from bottom				collapse	#DIV/0!	>=	1.125
					burst-b	0	>=	1.25
	0 ft	to	ft		burst-t	0		
	0	0	0	0	jnt strngth	0	>=	1.8
			Top of segment 5 (ft)		**S.F.**	Actual		Desire
Select	6th segment from bottom				collapse	#DIV/0!	>=	1.125
					burst-b	0	>=	1.25
	0 ft	to	ft		burst-t	0		
	0	0	0	0	jnt strngth	0	>=	1.8
			Top of segment 6 (ft)		jnt strngth		>=	1.8

use in colapse calculations across different pressured formations

Three gradient pressure function

Depth of evaluation:	1,200	ft			516	psi @	1,200 ft
Top of salt:	2,400	ft	fx #1	516			
Base of salt:	3,700	ft	fx #2	900			
TD of intermediate:	4,600	ft	fx #3	540			

Pressure gradient to be used above each top to be used as a function of depth. ex. psi/ft

fx #1	fx #2	fx #3
0.43	0.75	0.45

1) Calculate neutral point for buckling with temperature affects computed also
2) Surface burst calculations & kick tolerance in surface pressure for burst
3) Do a comparison test to determine which value is lower joint strength or body yield to use in tensile strength calculations
4) Raise joint strength safety factor up to next level on page #2
5) Sour service what pipe can be used with proper degrading of strength factors and as function of temp

Adjust for best combination of safety factors

	Secondary
S.F. Collapse bottom of segment:	
S.F. Collapse top of segment:	#DIV/0!
S.F. Burst bottom of segment:	
S.F. Burst top of segment	
S.F. Joint strength bottom of segment:	214.782
S.F. Joint strength top of segment:	
S.F. Body yield strength bottom of segment:	369.048
S.F. Body yield strength top of segment:	86.5172

Collapse calculations for 1st segment - casing evacuated

Buoyancy factor collapse: 0.85312

calculations for bottom of segment @	210	ft	
hydrostatic pressure collapse - backside:	104.832	psi	
Axial load @ bottom of section	0	lbs	previous segments
Axial load factor:	0		load/(pipe body yield strength)
Collapse strength reduction factor:	1		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	740	psi	
Actual safety factor	7.05891		adjusted casing rating / actual pressure

calculations for top of segment @	0	ft	
hydrostatic pressure collapse - backside:	0	psi	
Axial load @ top of section	8599.45	lbs	previous segments + (this segment x BF)
Axial load factor:	0.01156		load/(pipe body yield strength)
Collapse strength reduction factor:	0.99693		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	737.73	psi	
Actual safety factor	#DIV/0!		adjusted casing rating / actual pressure

Burst calculations for 1st segment - Completion fracture treatment

calculations for bottom of segment @	210	ft	
Differential burst pressure	504.368	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	2370	psi	
Actual safety factor	4.69895		casing rating / differential burst pressure
calculations for top of segment @	0	ft	
Differential burst pressure	500	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	2370	psi	
Actual safety factor	4.74		casing rating / differential burst pressure

Joint strength calculations for 1st segment

Buoyancy factor for joint strength calc.:	0.85312		
calculations for bottom of segment @	210	ft	
Axial load @ bottom of section	2016	lbs	weight of previous segments
Joint Strength of segment	433000	lbs	
Body Yield Strength of segment	744000	lbs	
Actual safety factor joint strength	214.782		csg joint strength / axial load
Actual safety factor body yield	369.048		csg body yield strength / axial load
calculations for top of segment @	0	ft	
Axial load @ top of section	8599.45	lbs	weight of previous segments + (this segment x BF)
Joint Strength of segment	433000	lbs	
Body Yield Strength of segment	744000	lbs	
Actual safety factor joint strength	50.3521		csg joint strength / axial load
Actual safety factor body yield	86.5172		csg body yield strength / axial load

Adjust for best combination of safety factors

	Secondary
S.F. Collapse bottom of segment:	
S.F. Collapse top of segment:	#DIV/0!
S.F. Burst bottom of segment:	
S.F. Burst top of segment	
S.F. Joint strength bottom of segment:	0
S.F. Joint strength top of segment:	
S.F. Body yield strength bottom of segment:	0
S.F. Body yield strength top of segment:	0

Collapse calculations for 2nd segment - casing evacuated

Buoyancy factor collapse:	0.85312		
calculations for bottom of segment @	0	ft	
hydrostatic pressure collapse - backside:	0	psi	
Axial load @ bottom of section	8599.45	lbs	load @ top of last segment
Axial load factor:	#DIV/0!		load/(pipe body yield strength)
Collapse strength reduction factor:	#DIV/0!		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	#DIV/0!	psi	
Actual safety factor	#DIV/0!		adjusted casing rating / actual pressure
calculations for top of segment @	0	ft	
hydrostatic pressure collapse - backside:	0	psi	
Axial load @ top of section	8599.45	lbs	previous segments + (this segment x BF)
Axial load factor:	#DIV/0!		load/(pipe body yield strength)
Collapse strength reduction factor:	#DIV/0!		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	#DIV/0!	psi	
Actual safety factor	#DIV/0!		adjusted casing rating / actual pressure

Burst calculations for 2nd segment - Completion fracture treatment

calculations for bottom of segment @	0	ft	
Differential burst pressure	500	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	0	psi	
Actual safety factor	0		casing rating / differential burst pressure
calculations for top of segment @	0	ft	

Differential burst pressure	500	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	0	psi	
Actual safety factor	0		casing rating / differential burst pressure

Joint strength calculations for 2nd segment

Buoyancy factor for joint strength calc.:	0.85312		
calculations for bottom of segment @	0	ft	
Axial load @ bottom of section	8599.45	lbs	weight of previous segments
Joint Strength of segment	0	lbs	
Body Yield Strength of segment	0	lbs	
Actual safety factor joint strength	0		csg joint strength / axial load
Actual safety factor body yield	0		csg body yield strength / axial load
calculations for top of segment @	0	ft	
Axial load @ top of section	8599.45	lbs	weight of previous segments + (this segment x BF)
Joint Strength of segment	0	lbs	
Body Yield Strength of segment	0	lbs	
Actual safety factor joint strength	0		csg joint strength / axial load
Actual safety factor body yield	0		csg body yield strength / axial load

Adjust for best combination of safety factors

	Secondary
S.F. Collapse bottom of segment:	
S.F. Collapse top of segment:	#DIV/0!
S.F. Burst bottom of segment:	
S.F. Burst top of segment	
S.F. Joint strength bottom of segment:	0
S.F. Joint strength top of segment:	
S.F. Body yield strength bottom of segment:	0
S.F. Body yield strength top of segment:	0

Collapse calculations for 3rd segment - casing evacuated

Buoyancy factor collapse:	0.85312		
calculations for bottom of segment @	0	ft	
hydrostatic pressure collapse - backside:	0	psi	
Axial load @ bottom of section	8599.45	lbs	load @ top of last segment
Axial load factor:	#DIV/0!		load/(pipe body yield strength)
Collapse strength reduction factor:	#DIV/0!		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	#DIV/0!	psi	
Actual safety factor	#DIV/0!		adjusted casing rating / actual pressure
calculations for top of segment @	0	ft	
hydrostatic pressure collapse - backside:	0	psi	
Axial load @ top of section	8599.45	lbs	previous segments + (this segment x BF)
Axial load factor:	#DIV/0!		load/(pipe body yield strength)
Collapse strength reduction factor:	#DIV/0!		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	#DIV/0!	psi	
Actual safety factor	#DIV/0!		adjusted casing rating / actual pressure

Burst calculations for 3rd segment - Completion fracture treatment

calculations for bottom of segment @	0	ft	
Differential burst pressure	500	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	0	psi	
Actual safety factor	0		casing rating / differential burst pressure
calculations for top of segment @	0	ft	
Differential burst pressure	500	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	0	psi	
Actual safety factor	0		casing rating / differential burst pressure

Joint strength calculations for 3rd segment

Buoyancy factor for joint strength calc.:			
calculations for bottom of segment @	0	ft	
Axial load @ bottom of section	8599.45	lbs	load @ top of last segment
Joint Strength of segment	0	lbs	
Body Yield Strength of segment	0	lbs	
Actual safety factor joint strength	0		csg joint strength / axial load
Actual safety factor body yield	0		csg body yield strength / axial load
calculations for top of segment @	0	ft	
Axial load @ top of section	8599.45	lbs	weight of previous segments + (this segment x BF)

Joint Strength of segment	0	lbs	
Body Yield Strength of segment	0	lbs	
Actual safety factor joint strength	0		csg joint strength / axial load
Actual safety factor body yield	0		csg body yield strength / axial load

Adjust for best combination of safety factors

	Secondary
S.F. Collapse bottom of segment:	
S.F. Collapse top of segment:	#DIV/0!
S.F. Burst bottom of segment:	
S.F. Burst top of segment	
S.F. Joint strength bottom of segment:	0
S.F. Joint strength top of segment:	
S.F. Body yield strength bottom of segment:	0
S.F. Body yield strength top of segment:	0

Collapse calculations for 4th segment - casing evacuated

Buoyancy factor collapse: 0.85312

calculations for bottom of segment @	0	ft	
hydrostatic pressure collapse - backside:	0	psi	
Axial load @ bottom of section	8599.45	lbs	load @ top of last segment
Axial load factor:	#DIV/0!		load/(pipe body yield strength)
Collapse strength reduction factor:	#DIV/0!		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	#DIV/0!	psi	
Actual safety factor	#DIV/0!		adjusted casing rating / actual pressure

calculations for top of segment @	0	ft	
hydrostatic pressure collapse - backside:	0	psi	
Axial load @ top of section	8599.45	lbs	previous segments + (this segment x BF)
Axial load factor:	#DIV/0!		load/(pipe body yield strength)
Collapse strength reduction factor:	#DIV/0!		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	#DIV/0!	psi	
Actual safety factor	#DIV/0!		adjusted casing rating / actual pressure

Burst calculations for 4th segment - Completion fracture treatment

calculations for bottom of segment @	0	ft	
Differential burst pressure	500	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	0	psi	
Actual safety factor	0		casing rating / differential burst pressure

calculations for top of segment @	0	ft	
Differential burst pressure	500	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	0	psi	
Actual safety factor	0		casing rating / differential burst pressure

Joint strength calculations for 4th segment

Buoyancy factor for joint strength calc.: 0.85312

calculations for bottom of segment @	0	ft	
Axial load @ bottom of section	8599.45	lbs	load @ top of last segment
Joint Strength of segment	0	lbs	
Body Yield Strength of segment	0	lbs	
Actual safety factor joint strength	0		csg joint strength / axial load
Actual safety factor body yield	0		csg body yield strength / axial load

calculations for top of segment @	0	ft	
Axial load @ top of section	8599.45	lbs	weight of previous segments + (this segment x BF)
Joint Strength of segment	0	lbs	
Body Yield Strength of segment	0	lbs	
Actual safety factor joint strength	0		csg joint strength / axial load
Actual safety factor body yield	0		csg body yield strength / axial load

Adjust for best combination of safety factors

	Secondary
S.F. Collapse bottom of segment:	
S.F. Collapse top of segment:	#DIV/0!
S.F. Burst bottom of segment:	
S.F. Burst top of segment	
S.F. Joint strength bottom of segment:	0
S.F. Joint strength top of segment:	
S.F. Body yield strength bottom of segment:	0
S.F. Body yield strength top of segment:	0

Collapse calculations for 5th segment - casing evacuated

Buoyancy factor collapse:	0.85312	
calculations for bottom of segment @	0 ft	
hydrostatic pressure collapse - backside:	0 psi	
Axial load @ bottom of section	8599.45 lbs	load @ top of last segment
Axial load factor:	#DIV/0!	load/(pipe body yield strength)
Collapse strength reduction factor:	#DIV/0!	Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	#DIV/0! psi	
Actual safety factor	#DIV/0!	adjusted casing rating / actual pressure
calculations for top of segment @	0 ft	
hydrostatic pressure collapse - backside:	0 psi	
Axial load @ top of section	8599.45 lbs	previous segments + (this segment x BF)
Axial load factor:	#DIV/0!	load/(pipe body yield strength)
Collapse strength reduction factor:	#DIV/0!	Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	#DIV/0! psi	
Actual safety factor	#DIV/0!	adjusted casing rating / actual pressure

Burst calculations for 5th segment - Completion fracture treatment

calculations for bottom of segment @	0 ft	
Differential burst pressure	500 psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	0 psi	
Actual safety factor	0	casing rating / differential burst pressure
calculations for top of segment @	0 ft	
Differential burst pressure	500 psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	0 psi	
Actual safety factor	0	casing rating / differential burst pressure

Joint strength calculations for 5th segment

Buoyancy factor for joint strength calc.:	0.85312	
calculations for bottom of segment @	0 ft	
Axial load @ bottom of section	8599.45 lbs	load @ top of last segment
Joint Strength of segment	0 lbs	
Body Yield Strength of segment	0 lbs	
Actual safety factor joint strength	0	csg joint strength / axial load
Actual safety factor body yield	0	csg body yield strength / axial load
calculations for top of segment @	0 ft	
Axial load @ top of section	8599.45 lbs	weight of previous segments + (this segment x BF)
Joint Strength of segment	0 lbs	
Body Yield Strength of segment	0 lbs	
Actual safety factor joint strength	0	csg joint strength / axial load
Actual safety factor body yield	0	csg body yield strength / axial load

Adjust for best combination of safety factors

	Secondary
S.F. Collapse bottom of segment:	
S.F. Collapse top of segment:	#DIV/0!
S.F. Burst bottom of segment:	
S.F. Burst top of segment	
S.F. Joint strength bottom of segment:	0
S.F. Joint strength top of segment:	
S.F. Body yield strength bottom of segment:	0
S.F. Body yield strength top of segment:	0

Collapse calculations for 6th segment - casing evacuated

Buoyancy factor collapse:	0.85312		
calculations for bottom of segment @	0	ft	
hydrostatic pressure collapse - backside:	0	psi	
Axial load @ bottom of section	8599.45	lbs	load @ top of last segment
Axial load factor:	#DIV/0!		load/(pipe body yield strength)
Collapse strength reduction factor:	#DIV/0!		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	#DIV/0!	psi	
Actual safety factor	#DIV/0!		adjusted casing rating / actual pressure
calculations for top of segment @	0	ft	
hydrostatic pressure collapse - backside:	0	psi	
Axial load @ top of section	8599.45	lbs	previous segments + (this segment x BF)
Axial load factor:	#DIV/0!		load/(pipe body yield strength)
Collapse strength reduction factor:	#DIV/0!		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	#DIV/0!	psi	
Actual safety factor	#DIV/0!		adjusted casing rating / actual pressure

Burst calculations for 6th segment - Completion fracture treatment

calculations for bottom of segment @	0	ft	
Differential burst pressure	500	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	0	psi	
Actual safety factor	0		casing rating / differential burst pressure
calculations for top of segment @	0	ft	
Differential burst pressure	500	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	0	psi	
Actual safety factor	0		casing rating / differential burst pressure

Joint strength calculations for 6th segment

Buoyancy factor for joint strength calc.:	0.85312		
calculations for bottom of segment @	0	ft	
Axial load @ bottom of section	8599.45	lbs	load @ top of last segment
Joint Strength of segment	0	lbs	
Body Yield Strength of segment	0	lbs	
Actual safety factor joint strength	0		csg joint strength / axial load
Actual safety factor body yield	0		csg body yield strength / axial load
calculations for top of segment @	0	ft	
Axial load @ top of section	8599.45	lbs	weight of previous segments + (this segment x BF)
Joint Strength of segment	0	lbs	
Body Yield Strength of segment	0	lbs	
Actual safety factor joint strength	0		csg joint strength / axial load
Actual safety factor body yield	0		csg body yield strength / axial load

Casing Design **Well:** Prescott Federal Com #1H

String Size & Function: 7 x 5.5 in Production x

Total Depth: 8863 ft **TVD:** 3121 ft

Pressure Gradient for Calculations **(While drilling)**

Mud weight, collapse:	10 #/gal	Safety Factor Collapse:	1.125
Mud weight, burst:	10 #/gal	Safety Factor Burst:	1.25
Mud weight for joint strength:	10 #/gal	Safety Factor Joint Strength	1.8

BHP @ TD for: collapse: 1622.92 psi Burst: 1622.92 psi, joint strength: 1622.92 psi

Partially evacuated hole? Pressure gradient remaining: 10 #/gal

Max. Shut in surface pressure: 3000 psi

1st segment	8863 ft	to	3250 ft		Make up Torque ft-lbs			Total ft =	5613
O.D.	Weight	Grade	Threads	opt.	min.	mx.			
5.5 inches	17 #/ft	HCP-110	Buttress	4,620	3,470	5,780			
Collapse Resistance	Internal Yield	Joint Strength		Body Yield		Drift			
8,580 psi	10,640 psi-lrcr	568 ,000 #		546 ,000 #		4.767			

2nd segment	3250 ft	to	0 ft		Make up Torque ft-lbs			Total ft =	3250
O.D.	Weight	Grade	Threads	opt.	min.	mx.			
7 inches	26 #/ft	HCP-110	Buttress	6,930	5,200	8,660			
Collapse Resistance	Internal Yield	Joint Strength		Body Yield		Drift			
7,800 psi	9,950 psi-lrcr	853 ,000 #		830 ,000 #		6.151			

3rd segment	0 ft	to	0 ft		Make up Torque ft-lbs			Total ft =	0
O.D.	Weight	Grade	Threads	opt.	min.	mx.			
7 inches	26 #/ft	HCP-110	LT&C	6930	5200	8660			
Collapse Resistance	Internal Yield	Joint Strength		Body Yield		Drift			
7,800 psi	9,950 psi	693 ,000 #		830 ,000 #		6.151			

4th segment	0 ft	to	0 ft		Make up Torque ft-lbs			Total ft =	0
O.D.	Weight	Grade	Threads	opt.	min.	mx.			
inches	#/ft								
Collapse Resistance	Internal Yield	Joint Strength		Body Yield		Drift			
psi	psi	,000 #		,000 #					

5th segment	0 ft	to	0 ft		Make up Torque ft-lbs			Total ft =	0
O.D.	Weight	Grade	Threads	opt.	min.	mx.			
inches	#/ft								
Collapse Resistance	Internal Yield	Joint Strength		Body Yield		Drift			
psi	psi	,000 #		,000 #					

6th segment	0 ft	to	0 ft		Make up Torque ft-lbs			Total ft =	0
O.D.	Weight	Grade	Threads	opt.	min.	mx.			
inches	#/ft								
Collapse Resistance	Internal Yield	Joint Strength		Body Yield		Drift			
psi	psi	,000 #		,000 #					

Select 1st segment bottom		9128	S.F.	Actual		Desire
			collapse	5.286767	>=	1.125
8863 ft to 3500 ft			burst-b	3.546667	>=	1.25
5.5 0 HCP-110 Buttress			burst-t	3.546667		
Top of segment 1 (ft)		3500	S.F.	Actual		Desire
Select 2nd segment from bottom			collapse	4.164713	>=	1.125
			burst-b	3.316667	>=	1.25
3500 ft to 0 ft			burst-t	3.316667		
7 26 HCP-110 Buttress			jnt strngth	7.355432	>=	1.8

	Top of segment 2 (ft)			S.F.	Actual		Desire
Select	3rd segment from bottom			collapse	#DIV/0!	>=	1.125
				burst-b	3.316667	>=	1.25
	0 ft to 0 ft			burst-t	3.316667		
	7 26 HCP-110 LT&C			jnt strngth	5.528234	>=	1.8
	Top of segment 3 (ft)	0		S.F.	Actual		Desire
Select	4th segment from bottom			collapse	#DIV/0!	>=	1.125
				burst-b	0	>=	1.25
	0 ft to 0 ft			burst-t	0		
	0 0 0 0			jnt strngth	4.49128	>=	1.8
	Top of segment 4 (ft)			S.F.	Actual		Desire
Select	5th segment from bottom			collapse	#DIV/0!	>=	1.125
				burst-b	0	>=	1.25
	0 ft to ft			burst-t	0		
	0 0 0 0			jnt strngth	0	>=	1.8
	Top of segment 5 (ft)			S.F.	Actual		Desire
Select	6th segment from bottom			collapse	#DIV/0!	>=	1.125
				burst-b	0	>=	1.25
	0 ft to ft			burst-t	0		
	0 0 0 0			jnt strngth	0	>=	1.8
	Top of segment 6 (ft)			jnt strngth		>=	1.8

use in colapse calculations across different pressured formations

Three gradient pressure function

Depth of evaluation:	1,200 ft			516	psi @	1,200 ft
Top of salt:	2,400 ft	fx #1	516			
Base of salt:	3,700 ft	fx #2	900			
TD of intermediate:	4,600 ft	fx #3	540			

Pressure gradient to be used above each top to be used as a function of depth. ex. psi/ft

fx #1	fx #2	fx #3
0.43	0.75	0.45

1) Calculate neutral point for buckling with temperature affects computed also
2) Surface burst calculations & kick tolerance in surface pressure for burst
3) Do a comparison test to determine which value is lower joint strength or body yield to use in tensile strength calculations
4) Raise joint strength safety factor up to next level on page #2
5) Sour service what pipe can be used with proper degrading of strength factors and as function of temp

Adjust for best combination of safety factors

	Secondary
S.F. Collapse bottom of segment:	
S.F. Collapse top of segment:	4.49676
S.F. Burst bottom of segment:	
S.F. Burst top of segment	
S.F. Joint strength bottom of segment:	795.518
S.F. Joint strength top of segment:	
S.F. Body yield strength bottom of segment:	764.706
S.F. Body yield strength top of segment:	7.07054

Collapse calculations for 1st segment - casing evacuated

Buoyancy factor collapse: 0.847

calculations for bottom of segment @	3121	ft	
hydrostatic pressure collapse - backside:	1622.92	psi	
Axial load @ bottom of section	0	lbs	previous segments
Axial load factor:	0		load/(pipe body yield strength)
Collapse strength reduction factor:	1		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	8580	psi	
Actual safety factor	5.28677		adjusted casing rating / actual pressure

calculations for top of segment @	3500	ft	
hydrostatic pressure collapse - backside:	1820	psi	
Axial load @ top of section	77221.8	lbs	previous segments + (this segment x BF)
Axial load factor:	0.14143		load/(pipe body yield strength)
Collapse strength reduction factor:	0.95386		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	8184.11	psi	
Actual safety factor	4.49676		adjusted casing rating / actual pressure

Burst calculations for 1st segment - Completion fracture treatment

calculations for bottom of segment @	8863	ft	
Differential burst pressure	3000	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	10640	psi	
Actual safety factor	3.54667		casing rating / differential burst pressure
calculations for top of segment @	3500	ft	
Differential burst pressure	3000	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	10640	psi	
Actual safety factor	3.54667		casing rating / differential burst pressure

Joint strength calculations for 1st segment

Buoyancy factor for joint strength calc.:	0.847		
calculations for bottom of segment @	8863	ft	
Axial load @ bottom of section	714	lbs	weight of previous segments
Joint Strength of segment	568000	lbs	
Body Yield Strength of segment	546000	lbs	
Actual safety factor joint strength	795.518		csg joint strength / axial load
Actual safety factor body yield	764.706		csg body yield strength / axial load
calculations for top of segment @	3500	ft	
Axial load @ top of section	77221.8	lbs	weight of previous segments + (this segment x BF)
Joint Strength of segment	568000	lbs	
Body Yield Strength of segment	546000	lbs	
Actual safety factor joint strength	7.35543		csg joint strength / axial load
Actual safety factor body yield	7.07054		csg body yield strength / axial load

Adjust for best combination of safety factors

	Secondary
S.F. Collapse bottom of segment:	
S.F. Collapse top of segment:	#DIV/0!
S.F. Burst bottom of segment:	
S.F. Burst top of segment	
S.F. Joint strength bottom of segment:	11.0461
S.F. Joint strength top of segment:	
S.F. Body yield strength bottom of segment:	10.7483
S.F. Body yield strength top of segment:	5.37917

Collapse calculations for 2nd segment - casing evacuated

Buoyancy factor collapse:	0.847		
calculations for bottom of segment @	3500	ft	
hydrostatic pressure collapse - backside:	1820	psi	
Axial load @ bottom of section	77221.8	lbs	load @ top of last segment
Axial load factor:	0.09304		load/(pipe body yield strength)
Collapse strength reduction factor:	0.97177		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	7579.78	psi	
Actual safety factor	4.16471		adjusted casing rating / actual pressure
calculations for top of segment @	0	ft	
hydrostatic pressure collapse - backside:	0	psi	
Axial load @ top of section	154299	lbs	previous segments + (this segment x BF)
Axial load factor:	0.1859		load/(pipe body yield strength)
Collapse strength reduction factor:	0.93542		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	7296.29	psi	
Actual safety factor	#DIV/0!		adjusted casing rating / actual pressure

Burst calculations for 2nd segment - Completion fracture treatment

calculations for bottom of segment @	3500	ft	
Differential burst pressure	3000	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	9950	psi	
Actual safety factor	3.31667		casing rating / differential burst pressure
calculations for top of segment @	0	ft	

Differential burst pressure	3000	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	9950	psi	
Actual safety factor	3.31667		casing rating / differential burst pressure

Joint strength calculations for 2nd segment

Buoyancy factor for joint strength calc.:	0.847		
calculations for bottom of segment @	3500	ft	
Axial load @ bottom of section	77221.8	lbs	weight of previous segments
Joint Strength of segment	853000	lbs	
Body Yield Strength of segment	830000	lbs	
Actual safety factor joint strength	11.0461		csg joint strength / axial load
Actual safety factor body yield	10.7483		csg body yield strength / axial load
calculations for top of segment @	0	ft	
Axial load @ top of section	154299	lbs	weight of previous segments + (this segment x BF)
Joint Strength of segment	853000	lbs	
Body Yield Strength of segment	830000	lbs	
Actual safety factor joint strength	5.52823		csg joint strength / axial load
Actual safety factor body yield	5.37917		csg body yield strength / axial load

Adjust for best combination of safety factors

	Secondary
S.F. Collapse bottom of segment:	
S.F. Collapse top of segment:	#DIV/0!
S.F. Burst bottom of segment:	
S.F. Burst top of segment	
S.F. Joint strength bottom of segment:	4.49128
S.F. Joint strength top of segment:	
S.F. Body yield strength bottom of segment:	5.37917
S.F. Body yield strength top of segment:	5.37917

Collapse calculations for 3rd segment - casing evacuated

Buoyancy factor collapse:	0.847		
calculations for bottom of segment @	0	ft	
hydrostatic pressure collapse - backside:	0	psi	
Axial load @ bottom of section	154299	lbs	load @ top of last segment
Axial load factor:	0.1859		load/(pipe body yield strength)
Collapse strength reduction factor:	0.93542		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	7296.29	psi	
Actual safety factor	#DIV/0!		adjusted casing rating / actual pressure
calculations for top of segment @	0	ft	
hydrostatic pressure collapse - backside:	0	psi	
Axial load @ top of section	154299	lbs	previous segments + (this segment x BF)
Axial load factor:	0.1859		load/(pipe body yield strength)
Collapse strength reduction factor:	0.93542		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	7296.29	psi	
Actual safety factor	#DIV/0!		adjusted casing rating / actual pressure

Burst calculations for 3rd segment - Completion fracture treatment

calculations for bottom of segment @	0	ft	
Differential burst pressure	3000	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	9950	psi	
Actual safety factor	3.31667		casing rating / differential burst pressure
calculations for top of segment @	0	ft	
Differential burst pressure	3000	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	9950	psi	
Actual safety factor	3.31667		casing rating / differential burst pressure

Joint strength calculations for 3rd segment

Buoyancy factor for joint strength calc.:			
calculations for bottom of segment @	0	ft	
Axial load @ bottom of section	154299	lbs	load @ top of last segment
Joint Strength of segment	693000	lbs	
Body Yield Strength of segment	830000	lbs	
Actual safety factor joint strength	4.49128		csg joint strength / axial load
Actual safety factor body yield	5.37917		csg body yield strength / axial load
calculations for top of segment @	0	ft	
Axial load @ top of section	154299	lbs	weight of previous segments + (this segment x BF)

Joint Strength of segment	693000	lbs	
Body Yield Strength of segment	830000	lbs	
Actual safety factor joint strength	4.49128		csg joint strength / axial load
Actual safety factor body yield	5.37917		csg body yield strength / axial load

Adjust for best combination of safety factors

	Secondary
S.F. Collapse bottom of segment:	
S.F. Collapse top of segment:	#DIV/0!
S.F. Burst bottom of segment:	
S.F. Burst top of segment	
S.F. Joint strength bottom of segment:	0
S.F. Joint strength top of segment:	
S.F. Body yield strength bottom of segment:	0
S.F. Body yield strength top of segment:	0

Collapse calculations for 4th segment - casing evacuated

Buoyancy factor collapse: 0.847

calculations for bottom of segment @	0	ft	
hydrostatic pressure collapse - backside:	0	psi	
Axial load @ bottom of section	154299	lbs	load @ top of last segment
Axial load factor:	#DIV/0!		load/(pipe body yield strength)
Collapse strength reduction factor:	#DIV/0!		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	#DIV/0!	psi	
Actual safety factor	#DIV/0!		adjusted casing rating / actual pressure
calculations for top of segment @	0	ft	
hydrostatic pressure collapse - backside:	0	psi	
Axial load @ top of section	154299	lbs	previous segments + (this segment x BF)
Axial load factor:	#DIV/0!		load/(pipe body yield strength)
Collapse strength reduction factor:	#DIV/0!		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	#DIV/0!	psi	
Actual safety factor	#DIV/0!		adjusted casing rating / actual pressure

Burst calculations for 4th segment - Completion fracture treatment

calculations for bottom of segment @	0	ft	
Differential burst pressure	3000	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	0	psi	
Actual safety factor	0		casing rating / differential burst pressure
calculations for top of segment @	0	ft	
Differential burst pressure	3000	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	0	psi	
Actual safety factor	0		casing rating / differential burst pressure

Joint strength calculations for 4th segment

Buoyancy factor for joint strength calc.: 0.847

calculations for bottom of segment @	0	ft	
Axial load @ bottom of section	154299	lbs	load @ top of last segment
Joint Strength of segment	0	lbs	
Body Yield Strength of segment	0	lbs	
Actual safety factor joint strength	0		csg joint strength / axial load
Actual safety factor body yield	0		csg body yield strength / axial load
calculations for top of segment @	0	ft	
Axial load @ top of section	154299	lbs	weight of previous segments + (this segment x BF)
Joint Strength of segment	0	lbs	
Body Yield Strength of segment	0	lbs	
Actual safety factor joint strength	0		csg joint strength / axial load
Actual safety factor body yield	0		csg body yield strength / axial load

Adjust for best combination of safety factors

	Secondary
S.F. Collapse bottom of segment:	
S.F. Collapse top of segment:	#DIV/0!
S.F. Burst bottom of segment:	
S.F. Burst top of segment	
S.F. Joint strength bottom of segment:	0
S.F. Joint strength top of segment:	
S.F. Body yield strength bottom of segment:	0
S.F. Body yield strength top of segment:	0

Collapse calculations for 5th segment - casing evacuated

Buoyancy factor collapse:	0.847		
calculations for bottom of segment @	0	ft	
hydrostatic pressure collapse - backside:	0	psi	
Axial load @ bottom of section	154299	lbs	load @ top of last segment
Axial load factor:	#DIV/0!		load/(pipe body yield strength)
Collapse strength reduction factor:	#DIV/0!		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	#DIV/0!	psi	
Actual safety factor	#DIV/0!		adjusted casing rating / actual pressure
calculations for top of segment @	0	ft	
hydrostatic pressure collapse - backside:	0	psi	
Axial load @ top of section	154299	lbs	previous segments + (this segment x BF)
Axial load factor:	#DIV/0!		load/(pipe body yield strength)
Collapse strength reduction factor:	#DIV/0!		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	#DIV/0!	psi	
Actual safety factor	#DIV/0!		adjusted casing rating / actual pressure

Burst calculations for 5th segment - Completion fracture treatment

calculations for bottom of segment @	0	ft	
Differential burst pressure	3000	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	0	psi	
Actual safety factor	0		casing rating / differential burst pressure
calculations for top of segment @	0	ft	
Differential burst pressure	3000	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	0	psi	
Actual safety factor	0		casing rating / differential burst pressure

Joint strength calculations for 5th segment

Buoyancy factor for joint strength calc.:	0.847		
calculations for bottom of segment @	0	ft	
Axial load @ bottom of section	154299	lbs	load @ top of last segment
Joint Strength of segment	0	lbs	
Body Yield Strength of segment	0	lbs	
Actual safety factor joint strength	0		csg joint strength / axial load
Actual safety factor body yield	0		csg body yield strength / axial load
calculations for top of segment @	0	ft	
Axial load @ top of section	154299	lbs	weight of previous segments + (this segment x BF)
Joint Strength of segment	0	lbs	
Body Yield Strength of segment	0	lbs	
Actual safety factor joint strength	0		csg joint strength / axial load
Actual safety factor body yield	0		csg body yield strength / axial load

Adjust for best combination of safety factors

	Secondary
S.F. Collapse bottom of segment:	
S.F. Collapse top of segment:	#DIV/0!
S.F. Burst bottom of segment:	
S.F. Burst top of segment	
S.F. Joint strength bottom of segment:	0
S.F. Joint strength top of segment:	
S.F. Body yield strength bottom of segment:	0
S.F. Body yield strength top of segment:	0

Collapse calculations for 6th segment - casing evacuated

Buoyancy factor collapse:	0.847		
calculations for bottom of segment @	0	ft	
hydrostatic pressure collapse - backside:	0	psi	
Axial load @ bottom of section	154299	lbs	load @ top of last segment
Axial load factor:	#DIV/0!		load/(pipe body yield strength)
Collapse strength reduction factor:	#DIV/0!		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	#DIV/0!	psi	
Actual safety factor	#DIV/0!		adjusted casing rating / actual pressure
calculations for top of segment @	0	ft	
hydrostatic pressure collapse - backside:	0	psi	
Axial load @ top of section	154299	lbs	previous segments + (this segment x BF)
Axial load factor:	#DIV/0!		load/(pipe body yield strength)
Collapse strength reduction factor:	#DIV/0!		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	#DIV/0!	psi	
Actual safety factor	#DIV/0!		adjusted casing rating / actual pressure

Burst calculations for 6th segment - Completion fracture treatment

calculations for bottom of segment @	0	ft	
Differential burst pressure	3000	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	0	psi	
Actual safety factor	0		casing rating / differential burst pressure
calculations for top of segment @	0	ft	
Differential burst pressure	3000	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	0	psi	
Actual safety factor	0		casing rating / differential burst pressure

Joint strength calculations for 6th segment

Buoyancy factor for joint strength calc.:	0.847		
calculations for bottom of segment @	0	ft	
Axial load @ bottom of section	154299	lbs	load @ top of last segment
Joint Strength of segment	0	lbs	
Body Yield Strength of segment	0	lbs	
Actual safety factor joint strength	0		csg joint strength / axial load
Actual safety factor body yield	0		csg body yield strength / axial load
calculations for top of segment @	0	ft	
Axial load @ top of section	154299	lbs	weight of previous segments + (this segment x BF)
Joint Strength of segment	0	lbs	
Body Yield Strength of segment	0	lbs	
Actual safety factor joint strength	0		csg joint strength / axial load
Actual safety factor body yield	0		csg body yield strength / axial load

Casing Design **Well:** Prescott Federal Com #1H

String Size & Function: 7 x 5.5 in Production x

Total Depth: 8863 ft **TVD:** 3121 ft

Pressure Gradient for Calculations **(While drilling)**

Mud weight, collapse:	10 #/gal	Safety Factor Collapse:	1.125
Mud weight, burst:	10 #/gal	Safety Factor Burst:	1.25
Mud weight for joint strength:	10 #/gal	Safety Factor Joint Strength	1.8

BHP @ TD for: collapse: 1622.92 psi Burst: 1622.92 psi, joint strength: 1622.92 psi

Partially evacuated hole? Pressure gradient remaining: 10 #/gal

Max. Shut in surface pressure: 3000 psi

1st segment 8863 ft to 3250 ft — Make up Torque ft-lbs — Total ft = 5613

O.D.	Weight	Grade	Threads	opt.	min.	mx.
5.5 inches	**17** #/ft	**HCP-110**	**Buttress**	**4,620**	**3,470**	**5,780**
Collapse Resistance	**Internal Yield**	**Joint Strength**		**Body Yield**		**Drift**
8,580 psi	**10,640** psi-lrcr	**568** ,000 #		**546** ,000 #		**4.767**

2nd segment 3250 ft to 0 ft — Make up Torque ft-lbs — Total ft = 3250

O.D.	Weight	Grade	Threads	opt.	min.	mx.
7 inches	**26** #/ft	**HCP-110**	**Buttress**	**6,930**	**5,200**	**8,660**
Collapse Resistance	Internal Yield	Joint Strength		Body Yield		Drift
7,800 psi	**9,950** psi-lrcr	**853** ,000 #		**830** ,000 #		**6.151**

3rd segment 0 ft to 0 ft — Make up Torque ft-lbs — Total ft = 0

O.D.	Weight	Grade	Threads	opt.	min.	mx.
7 inches	**26** #/ft	**HCP-110**	**LT&C**	**6930**	**5200**	**8660**
Collapse Resistance	Internal Yield	Joint Strength		Body Yield		Drift
7,800 psi	**9,950** psi	**693** ,000 #		**830** ,000 #		**6.151**

4th segment 0 ft to 0 ft — Make up Torque ft-lbs — Total ft = 0

O.D.	Weight	Grade	Threads	opt.	min.	mx.
inches	#/ft					
Collapse Resistance	Internal Yield	Joint Strength		Body Yield		Drift
psi	psi	,000 #		,000 #		

5th segment 0 ft to 0 ft — Make up Torque ft-lbs — Total ft = 0

O.D.	Weight	Grade	Threads	opt.	min.	mx.
inches	#/ft					
Collapse Resistance	Internal Yield	Joint Strength		Body Yield		Drift
psi	psi	,000 #		,000 #		

6th segment 0 ft to 0 ft — Make up Torque ft-lbs — Total ft = 0

O.D.	Weight	Grade	Threads	opt.	min.	mx.
inches	#/ft					
Collapse Resistance	Internal Yield	Joint Strength		Body Yield		Drift
psi	psi	,000 #		,000 #		

Select 1st segment bottom 9128

S.F.	Actual		Desire
collapse	5.286767	>=	1.125
burst-b	3.546667	>=	1.25
burst-t	3.546667		

8863 ft to 3500 ft
5.5 0 HCP-110 Buttress

Top of segment 1 (ft) 3500

Select 2nd segment from bottom

S.F.	Actual		Desire
collapse	4.164713	>=	1.125
burst-b	3.316667	>=	1.25
burst-t	3.316667		
jnt strngth	7.355432	>=	1.8

3500 ft to 0 ft
7 26 HCP-110 Buttress

Top of segment 2 (ft)				S.F.	Actual		Desire
Select	3rd segment from bottom			collapse	#DIV/0!	>=	1.125
				burst-b	3.316667	>=	1.25
0 ft	to	0 ft		burst-t	3.316667		
7	26 HCP-110	LT&C		jnt strngth	5.528234	>=	1.8
Top of segment 3 (ft)			0	S.F.	Actual		Desire
Select	4th segment from bottom			collapse	#DIV/0!	>=	1.125
				burst-b	0	>=	1.25
0 ft	to	0 ft		burst-t	0		
0	0	0	0	jnt strngth	4.49128	>=	1.8
Top of segment 4 (ft)				S.F.	Actual		Desire
Select	5th segment from bottom			collapse	#DIV/0!	>=	1.125
				burst-b	0	>=	1.25
0 ft	to	ft		burst-t	0		
0	0	0	0	jnt strngth	0	>=	1.8
Top of segment 5 (ft)				S.F.	Actual		Desire
Select	6th segment from bottom			collapse	#DIV/0!	>=	1.125
				burst-b	0	>=	1.25
0 ft	to	ft		burst-t	0		
0	0	0	0	jnt strngth	0	>=	1.8
Top of segment 6 (ft)				jnt strngth		>=	1.8

use in colapse calculations across different pressured formations

Three gradient pressure function

Depth of evaluation:	1,200 ft		516	psi @	1,200	ft
Top of salt:	2,400 ft	fx #1	516			
Base of salt:	3,700 ft	fx #2	900			
TD of intermediate:	4,600 ft	fx #3	540			

Pressure gradient to be used above each top to be used as a function of depth. ex. psi/ft

fx #1	fx #2	fx #3
0.43	0.75	0.45

1) Calculate neutral point for buckling with temperature affects computed also
2) Surface burst calculations & kick tolerance in surface pressure for burst
3) Do a comparison test to determine which value is lower joint strength or body yield to use in tensile strength calculations
4) Raise joint strength safety factor up to next level on page #2
5) Sour service what pipe can be used with proper degrading of strength factors and as function of temp

Adjust for best combination of safety factors

	Secondary
S.F. Collapse bottom of segment:	
S.F. Collapse top of segment:	4.49676
S.F. Burst bottom of segment:	
S.F. Burst top of segment	
S.F. Joint strength bottom of segment:	795.518
S.F. Joint strength top of segment:	
S.F. Body yield strength bottom of segment:	764.706
S.F. Body yield strength top of segment:	7.07054

Collapse calculations for 1st segment - casing evacuated

Buoyancy factor collapse: 0.847

calculations for bottom of segment @	3121	ft	
hydrostatic pressure collapse - backside:	1622.92	psi	
Axial load @ bottom of section	0	lbs	previous segments
Axial load factor:	0		load/(pipe body yield strength)
Collapse strength reduction factor:	1		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	8580	psi	
Actual safety factor	5.28677		adjusted casing rating / actual pressure

calculations for top of segment @	3500	ft	
hydrostatic pressure collapse - backside:	1820	psi	
Axial load @ top of section	77221.8	lbs	previous segments + (this segment x BF)
Axial load factor:	0.14143		load/(pipe body yield strength)
Collapse strength reduction factor:	0.95386		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	8184.11	psi	
Actual safety factor	4.49676		adjusted casing rating / actual pressure

Burst calculations for 1st segment - Completion fracture treatment

calculations for bottom of segment @	8863	ft	
Differential burst pressure	3000	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	10640	psi	
Actual safety factor	3.54667		casing rating / differential burst pressure
calculations for top of segment @	3500	ft	
Differential burst pressure	3000	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	10640	psi	
Actual safety factor	3.54667		casing rating / differential burst pressure

Joint strength calculations for 1st segment

Buoyancy factor for joint strength calc.:	0.847		
calculations for bottom of segment @	8863	ft	
Axial load @ bottom of section	714	lbs	weight of previous segments
Joint Strength of segment	568000	lbs	
Body Yield Strength of segment	546000	lbs	
Actual safety factor joint strength	795.518		csg joint strength / axial load
Actual safety factor body yield	764.706		csg body yield strength / axial load
calculations for top of segment @	3500	ft	
Axial load @ top of section	77221.8	lbs	weight of previous segments + (this segment x BF)
Joint Strength of segment	568000	lbs	
Body Yield Strength of segment	546000	lbs	
Actual safety factor joint strength	7.35543		csg joint strength / axial load
Actual safety factor body yield	7.07054		csg body yield strength / axial load

Adjust for best combination of safety factors

	Secondary
S.F. Collapse bottom of segment:	
S.F. Collapse top of segment:	#DIV/0!
S.F. Burst bottom of segment:	
S.F. Burst top of segment	
S.F. Joint strength bottom of segment:	11.0461
S.F. Joint strength top of segment:	
S.F. Body yield strength bottom of segment:	10.7483
S.F. Body yield strength top of segment:	5.37917

Collapse calculations for 2nd segment - casing evacuated

Buoyancy factor collapse:	0.847		
calculations for bottom of segment @	3500	ft	
hydrostatic pressure collapse - backside:	1820	psi	
Axial load @ bottom of section	77221.8	lbs	load @ top of last segment
Axial load factor:	0.09304		load/(pipe body yield strength)
Collapse strength reduction factor:	0.97177		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	7579.78	psi	
Actual safety factor	4.16471		adjusted casing rating / actual pressure
calculations for top of segment @	0	ft	
hydrostatic pressure collapse - backside:	0	psi	
Axial load @ top of section	154299	lbs	previous segments + (this segment x BF)
Axial load factor:	0.1859		load/(pipe body yield strength)
Collapse strength reduction factor:	0.93542		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	7296.29	psi	
Actual safety factor	#DIV/0!		adjusted casing rating / actual pressure

Burst calculations for 2nd segment - Completion fracture treatment

calculations for bottom of segment @	3500	ft	
Differential burst pressure	3000	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	9950	psi	
Actual safety factor	3.31667		casing rating / differential burst pressure
calculations for top of segment @	0	ft	

Differential burst pressure	3000	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	9950	psi	
Actual safety factor	3.31667		casing rating / differential burst pressure

Joint strength calculations for 2nd segment

Buoyancy factor for joint strength calc.:	0.847		
calculations for bottom of segment @	3500	ft	
Axial load @ bottom of section	77221.8	lbs	weight of previous segments
Joint Strength of segment	853000	lbs	
Body Yield Strength of segment	830000	lbs	
Actual safety factor joint strength	11.0461		csg joint strength / axial load
Actual safety factor body yield	10.7483		csg body yield strength / axial load
calculations for top of segment @	0	ft	
Axial load @ top of section	154299	lbs	weight of previous segments + (this segment x BF)
Joint Strength of segment	853000	lbs	
Body Yield Strength of segment	830000	lbs	
Actual safety factor joint strength	5.52823		csg joint strength / axial load
Actual safety factor body yield	5.37917		csg body yield strength / axial load

Adjust for best combination of safety factors

	Secondary
S.F. Collapse bottom of segment:	
S.F. Collapse top of segment:	#DIV/0!
S.F. Burst bottom of segment:	
S.F. Burst top of segment	
S.F. Joint strength bottom of segment:	4.49128
S.F. Joint strength top of segment:	
S.F. Body yield strength bottom of segment:	5.37917
S.F. Body yield strength top of segment:	5.37917

Collapse calculations for 3rd segment - casing evacuated

Buoyancy factor collapse:	0.847		
calculations for bottom of segment @	0	ft	
hydrostatic pressure collapse - backside:	0	psi	
Axial load @ bottom of section	154299	lbs	load @ top of last segment
Axial load factor:	0.1859		load/(pipe body yield strength)
Collapse strength reduction factor:	0.93542		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	7296.29	psi	
Actual safety factor	#DIV/0!		adjusted casing rating / actual pressure
calculations for top of segment @	0	ft	
hydrostatic pressure collapse - backside:	0	psi	
Axial load @ top of section	154299	lbs	previous segments + (this segment x BF)
Axial load factor:	0.1859		load/(pipe body yield strength)
Collapse strength reduction factor:	0.93542		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	7296.29	psi	
Actual safety factor	#DIV/0!		adjusted casing rating / actual pressure

Burst calculations for 3rd segment - Completion fracture treatment

calculations for bottom of segment @	0	ft	
Differential burst pressure	3000	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	9950	psi	
Actual safety factor	3.31667		casing rating / differential burst pressure
calculations for top of segment @	0	ft	
Differential burst pressure	3000	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	9950	psi	
Actual safety factor	3.31667		casing rating / differential burst pressure

Joint strength calculations for 3rd segment

Buoyancy factor for joint strength calc.:			
calculations for bottom of segment @	0	ft	
Axial load @ bottom of section	154299	lbs	load @ top of last segment
Joint Strength of segment	693000	lbs	
Body Yield Strength of segment	830000	lbs	
Actual safety factor joint strength	4.49128		csg joint strength / axial load
Actual safety factor body yield	5.37917		csg body yield strength / axial load
calculations for top of segment @	0	ft	
Axial load @ top of section	154299	lbs	weight of previous segments + (this segment x BF)

Joint Strength of segment	693000	lbs	
Body Yield Strength of segment	830000	lbs	
Actual safety factor joint strength	4.49128		csg joint strength / axial load
Actual safety factor body yield	5.37917		csg body yield strength / axial load

Adjust for best combination of safety factors

	Secondary
S.F. Collapse bottom of segment:	
S.F. Collapse top of segment:	#DIV/0!
S.F. Burst bottom of segment:	
S.F. Burst top of segment	
S.F. Joint strength bottom of segment:	0
S.F. Joint strength top of segment:	
S.F. Body yield strength bottom of segment:	0
S.F. Body yield strength top of segment:	0

Collapse calculations for 4th segment - casing evacuated

Buoyancy factor collapse:	0.847		
calculations for bottom of segment @	0	ft	
hydrostatic pressure collapse - backside:	0	psi	
Axial load @ bottom of section	154299	lbs	load @ top of last segment
Axial load factor:	#DIV/0!		load/(pipe body yield strength)
Collapse strength reduction factor:	#DIV/0!		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	#DIV/0!	psi	
Actual safety factor	#DIV/0!		adjusted casing rating / actual pressure
calculations for top of segment @	0	ft	
hydrostatic pressure collapse - backside:	0	psi	
Axial load @ top of section	154299	lbs	previous segments + (this segment x BF)
Axial load factor:	#DIV/0!		load/(pipe body yield strength)
Collapse strength reduction factor:	#DIV/0!		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	#DIV/0!	psi	
Actual safety factor	#DIV/0!		adjusted casing rating / actual pressure

Burst calculations for 4th segment - Completion fracture treatment

calculations for bottom of segment @	0	ft	
Differential burst pressure	3000	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	0	psi	
Actual safety factor	0		casing rating / differential burst pressure
calculations for top of segment @	0	ft	
Differential burst pressure	3000	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	0	psi	
Actual safety factor	0		casing rating / differential burst pressure

Joint strength calculations for 4th segment

Buoyancy factor for joint strength calc.:	0.847		
calculations for bottom of segment @	0	ft	
Axial load @ bottom of section	154299	lbs	load @ top of last segment
Joint Strength of segment	0	lbs	
Body Yield Strength of segment	0	lbs	
Actual safety factor joint strength	0		csg joint strength / axial load
Actual safety factor body yield	0		csg body yield strength / axial load
calculations for top of segment @	0	ft	
Axial load @ top of section	154299	lbs	weight of previous segments + (this segment x BF)
Joint Strength of segment	0	lbs	
Body Yield Strength of segment	0	lbs	
Actual safety factor joint strength	0		csg joint strength / axial load
Actual safety factor body yield	0		csg body yield strength / axial load

Adjust for best combination of safety factors

	Secondary
S.F. Collapse bottom of segment:	
S.F. Collapse top of segment:	#DIV/0!
S.F. Burst bottom of segment:	
S.F. Burst top of segment	
S.F. Joint strength bottom of segment:	0
S.F. Joint strength top of segment:	
S.F. Body yield strength bottom of segment:	0
S.F. Body yield strength top of segment:	0

Collapse calculations for 5th segment - casing evacuated

Buoyancy factor collapse:	0.847		
calculations for bottom of segment @	0	ft	
hydrostatic pressure collapse - backside:	0	psi	
Axial load @ bottom of section	154299	lbs	load @ top of last segment
Axial load factor:	#DIV/0!		load/(pipe body yield strength)
Collapse strength reduction factor:	#DIV/0!		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	#DIV/0!	psi	
Actual safety factor	#DIV/0!		adjusted casing rating / actual pressure
calculations for top of segment @	0	ft	
hydrostatic pressure collapse - backside:	0	psi	
Axial load @ top of section	154299	lbs	previous segments + (this segment x BF)
Axial load factor:	#DIV/0!		load/(pipe body yield strength)
Collapse strength reduction factor:	#DIV/0!		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	#DIV/0!	psi	
Actual safety factor	#DIV/0!		adjusted casing rating / actual pressure

Burst calculations for 5th segment - Completion fracture treatment

calculations for bottom of segment @	0	ft	
Differential burst pressure	3000	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	0	psi	
Actual safety factor	0		casing rating / differential burst pressure
calculations for top of segment @	0	ft	
Differential burst pressure	3000	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	0	psi	
Actual safety factor	0		casing rating / differential burst pressure

Joint strength calculations for 5th segment

Buoyancy factor for joint strength calc.:	0.847		
calculations for bottom of segment @	0	ft	
Axial load @ bottom of section	154299	lbs	load @ top of last segment
Joint Strength of segment	0	lbs	
Body Yield Strength of segment	0	lbs	
Actual safety factor joint strength	0		csg joint strength / axial load
Actual safety factor body yield	0		csg body yield strength / axial load
calculations for top of segment @	0	ft	
Axial load @ top of section	154299	lbs	weight of previous segments + (this segment x BF)
Joint Strength of segment	0	lbs	
Body Yield Strength of segment	0	lbs	
Actual safety factor joint strength	0		csg joint strength / axial load
Actual safety factor body yield	0		csg body yield strength / axial load

Adjust for best combination of safety factors

	Secondary
S.F. Collapse bottom of segment:	
S.F. Collapse top of segment:	#DIV/0!
S.F. Burst bottom of segment:	
S.F. Burst top of segment	
S.F. Joint strength bottom of segment:	0
S.F. Joint strength top of segment:	
S.F. Body yield strength bottom of segment:	0
S.F. Body yield strength top of segment:	0

Collapse calculations for 6th segment - casing evacuated

Buoyancy factor collapse:	0.847		
calculations for bottom of segment @	0	ft	
hydrostatic pressure collapse - backside:	0	psi	
Axial load @ bottom of section	154299	lbs	load @ top of last segment
Axial load factor:	#DIV/0!		load/(pipe body yield strength)
Collapse strength reduction factor:	#DIV/0!		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	#DIV/0!	psi	
Actual safety factor	#DIV/0!		adjusted casing rating / actual pressure
calculations for top of segment @	0	ft	
hydrostatic pressure collapse - backside:	0	psi	
Axial load @ top of section	154299	lbs	previous segments + (this segment x BF)
Axial load factor:	#DIV/0!		load/(pipe body yield strength)
Collapse strength reduction factor:	#DIV/0!		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	#DIV/0!	psi	
Actual safety factor	#DIV/0!		adjusted casing rating / actual pressure

Burst calculations for 6th segment - Completion fracture treatment

calculations for bottom of segment @	0	ft	
Differential burst pressure	3000	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	0	psi	
Actual safety factor	0		casing rating / differential burst pressure
calculations for top of segment @	0	ft	
Differential burst pressure	3000	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	0	psi	
Actual safety factor	0		casing rating / differential burst pressure

Joint strength calculations for 6th segment

Buoyancy factor for joint strength calc.:	0.847		
calculations for bottom of segment @	0	ft	
Axial load @ bottom of section	154299	lbs	load @ top of last segment
Joint Strength of segment	0	lbs	
Body Yield Strength of segment	0	lbs	
Actual safety factor joint strength	0		csg joint strength / axial load
Actual safety factor body yield	0		csg body yield strength / axial load
calculations for top of segment @	0	ft	
Axial load @ top of section	154299	lbs	weight of previous segments + (this segment x BF)
Joint Strength of segment	0	lbs	
Body Yield Strength of segment	0	lbs	
Actual safety factor joint strength	0		csg joint strength / axial load
Actual safety factor body yield	0		csg body yield strength / axial load

Casing Design **Well:** Prescott Federal Com #1H

String Size & Function: 9 5/8 in surface intermediate x

Total Depth: 1200 ft **TVD:** 1200 ft

Pressure Gradient for Calculations **(While drilling)**

Mud weight, collapse:	10 #/gal	Safety Factor Collapse:	1.125
Mud weight, burst:	10 #/gal	Safety Factor Burst:	1.25
Mud weight for joint strength:	10 #/gal	Safety Factor Joint Strength	1.8

BHP @ TD for: collapse: 624 psi Burst: 624 psi, joint strength: 624 psi

Partially evacuated hole? Pressure gradient remaining: 10 #/gal

Max. Shut in surface pressure: 500 psi

1st segment 1200 ft to 0 ft — Make up Torque ft-lbs — Total ft = 1200

O.D.	Weight	Grade	Threads	opt.	min.	mx.
9.625 inches	**36** #/ft	**J-55**	**ST&C**	**3,940**	**2,960**	**4,930**
Collapse Resistance	Internal Yield	Joint Strength		Body Yield		Drift
2,020 psi	**3,520** psi	**394** ,000 #		**564** ,000 #		**8.765**

2nd segment ft to ft — Make up Torque ft-lbs — Total ft = 0

O.D.	Weight	Grade	Threads	opt.	min.	mx.
inches	#/ft					
Collapse Resistance	Internal Yield	Joint Strength		Body Yield		Drift
psi	psi	,000 #		,000 #		

3rd segment 0 ft to 0 ft — Make up Torque ft-lbs — Total ft = 0

O.D.	Weight	Grade	Threads	opt.	min.	mx.
inches	#/ft					
Collapse Resistance	Internal Yield	Joint Strength		Body Yield		Drift
psi	psi	,000 #		,000 #		

4th segment 0 ft to 0 ft — Make up Torque ft-lbs — Total ft = 0

O.D.	Weight	Grade	Threads	opt.	min.	mx.
inches	#/ft					
Collapse Resistance	Internal Yield	Joint Strength		Body Yield		Drift
psi	psi	,000 #		,000 #		

5th segment 0 ft to 0 ft — Make up Torque ft-lbs — Total ft = 0

O.D.	Weight	Grade	Threads	opt.	min.	mx.
inches	#/ft					
Collapse Resistance	Internal Yield	Joint Strength		Body Yield		Drift
psi	psi	,000 #		,000 #		

6th segment 0 ft to 0 ft — Make up Torque ft-lbs — Total ft = 0

O.D.	Weight	Grade	Threads	opt.	min.	mx.
inches	#/ft					
Collapse Resistance	Internal Yield	Joint Strength		Body Yield		Drift
psi	psi	,000 #		,000 #		

Select 1st segment bottom 1200

1200 ft to 0 ft
9.625 0 J-55 ST&C

S.F.	Actual		Desire
collapse	3.237179	>=	1.125
burst-b	7.04	>=	1.25
burst-t	7.04		

Top of segment 1 (ft) 0

Select 2nd segment from bottom

0 ft to 0 ft
0 0 0 0

S.F.	Actual		Desire
collapse	#DIV/0!	>=	1.125
burst-b	0	>=	1.25
burst-t	0		
jnt strngth	10.76785	>=	1.8

	Top of segment 2 (ft)				S.F.	Actual		Desire
Select	3rd segment from bottom				collapse	#DIV/0!	>=	1.125
					burst-b	0	>=	1.25
	0 ft	to	0 ft		burst-t	0		
	0	0	0	0	jnt strngth	0	>=	1.8
	Top of segment 3 (ft)				S.F.	Actual		Desire
Select	4th segment from bottom				collapse	#DIV/0!	>=	1.125
					burst-b	0	>=	1.25
	0 ft	to	0 ft		burst-t	0		
	0	0	0	0	jnt strngth	0	>=	1.8
	Top of segment 4 (ft)				S.F.	Actual		Desire
Select	5th segment from bottom				collapse	#DIV/0!	>=	1.125
					burst-b	0	>=	1.25
	0 ft	to	ft		burst-t	0		
	0	0	0	0	jnt strngth	0	>=	1.8
	Top of segment 5 (ft)				S.F.	Actual		Desire
Select	6th segment from bottom				collapse	#DIV/0!	>=	1.125
					burst-b	0	>=	1.25
	0 ft	to	ft		burst-t	0		
	0	0	0	0	jnt strngth	0	>=	1.8
	Top of segment 6 (ft)				jnt strngth		>=	1.8

use in colapse calculations across different pressured formations

Three gradient pressure function

Depth of evaluation:	1,200	ft			516	psi @	1,200 ft
Top of salt:	2,400	ft	fx #1	516			
Base of salt:	3,700	ft	fx #2	900			
TD of intermediate:	4,600	ft	fx #3	540			

Pressure gradient to be used above each top to be used as a function of depth. ex. psi/ft

fx #1	fx #2	fx #3
0.43	0.75	0.45

1) Calculate neutral point for buckling with temperature affects computed also
2) Surface burst calculations & kick tolerance in surface pressure for burst
3) Do a comparison test to determine which value is lower joint strength or body yield to use in tensile strength calculations
4) Raise joint strength safety factor up to next level on page #2
5) Sour service what pipe can be used with proper degrading of strength factors and as function of temp

Adjust for best combination of safety factors

	Secondary
S.F. Collapse bottom of segment:	
S.F. Collapse top of segment:	#DIV/0!
S.F. Burst bottom of segment:	
S.F. Burst top of segment	
S.F. Joint strength bottom of segment:	260.582
S.F. Joint strength top of segment:	
S.F. Body yield strength bottom of segment:	373.016
S.F. Body yield strength top of segment:	15.4139

Collapse calculations for 1st segment - casing evacuated

Buoyancy factor collapse: 0.847

calculations for bottom of segment @	1200	ft	
hydrostatic pressure collapse - backside:	624	psi	
Axial load @ bottom of section	0	lbs	previous segments
Axial load factor:	0		load/(pipe body yield strength)
Collapse strength reduction factor:	1		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	2020	psi	
Actual safety factor	3.23718		adjusted casing rating / actual pressure

calculations for top of segment @	0	ft	
hydrostatic pressure collapse - backside:	0	psi	
Axial load @ top of section	36590.4	lbs	previous segments + (this segment x BF)
Axial load factor:	0.06488		load/(pipe body yield strength)
Collapse strength reduction factor:	0.98117		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	1981.96	psi	
Actual safety factor	#DIV/0!		adjusted casing rating / actual pressure

Burst calculations for 1st segment - Completion fracture treatment

calculations for bottom of segment @	1200	ft	
Differential burst pressure	500	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	3520	psi	
Actual safety factor	7.04		casing rating / differential burst pressure
calculations for top of segment @	0	ft	
Differential burst pressure	500	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	3520	psi	
Actual safety factor	7.04		casing rating / differential burst pressure

Joint strength calculations for 1st segment

Buoyancy factor for joint strength calc.:	0.847		
calculations for bottom of segment @	1200	ft	
Axial load @ bottom of section	1512	lbs	weight of previous segments
Joint Strength of segment	394000	lbs	
Body Yield Strength of segment	564000	lbs	
Actual safety factor joint strength	260.582		csg joint strength / axial load
Actual safety factor body yield	373.016		csg body yield strength / axial load
calculations for top of segment @	0	ft	
Axial load @ top of section	36590.4	lbs	weight of previous segments + (this segment x BF)
Joint Strength of segment	394000	lbs	
Body Yield Strength of segment	564000	lbs	
Actual safety factor joint strength	10.7679		csg joint strength / axial load
Actual safety factor body yield	15.4139		csg body yield strength / axial load

Adjust for best combination of safety factors

	Secondary
S.F. Collapse bottom of segment:	
S.F. Collapse top of segment:	#DIV/0!
S.F. Burst bottom of segment:	
S.F. Burst top of segment	
S.F. Joint strength bottom of segment:	0
S.F. Joint strength top of segment:	
S.F. Body yield strength bottom of segment:	0
S.F. Body yield strength top of segment:	0

Collapse calculations for 2nd segment - casing evacuated

Buoyancy factor collapse:	0.847		
calculations for bottom of segment @	0	ft	
hydrostatic pressure collapse - backside:	0	psi	
Axial load @ bottom of section	36590.4	lbs	load @ top of last segment
Axial load factor:	#DIV/0!		load/(pipe body yield strength)
Collapse strength reduction factor:	#DIV/0!		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	#DIV/0!	psi	
Actual safety factor	#DIV/0!		adjusted casing rating / actual pressure
calculations for top of segment @	0	ft	
hydrostatic pressure collapse - backside:	0	psi	
Axial load @ top of section	36590.4	lbs	previous segments + (this segment x BF)
Axial load factor:	#DIV/0!		load/(pipe body yield strength)
Collapse strength reduction factor:	#DIV/0!		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	#DIV/0!	psi	
Actual safety factor	#DIV/0!		adjusted casing rating / actual pressure

Burst calculations for 2nd segment - Completion fracture treatment

calculations for bottom of segment @	0	ft	
Differential burst pressure	500	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	0	psi	
Actual safety factor	0		casing rating / differential burst pressure
calculations for top of segment @	0	ft	

Differential burst pressure	500	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	0	psi	
Actual safety factor	0		casing rating / differential burst pressure

Joint strength calculations for 2nd segment

Buoyancy factor for joint strength calc.:	0.847		
calculations for bottom of segment @	0	ft	
Axial load @ bottom of section	36590.4	lbs	weight of previous segments
Joint Strength of segment	0	lbs	
Body Yield Strength of segment	0	lbs	
Actual safety factor joint strength	0		csg joint strength / axial load
Actual safety factor body yield	0		csg body yield strength / axial load
calculations for top of segment @	0	ft	
Axial load @ top of section	36590.4	lbs	weight of previous segments + (this segment x BF)
Joint Strength of segment	0	lbs	
Body Yield Strength of segment	0	lbs	
Actual safety factor joint strength	0		csg joint strength / axial load
Actual safety factor body yield	0		csg body yield strength / axial load

Adjust for best combination of safety factors

	Secondary
S.F. Collapse bottom of segment:	
S.F. Collapse top of segment:	#DIV/0!
S.F. Burst bottom of segment:	
S.F. Burst top of segment	
S.F. Joint strength bottom of segment:	0
S.F. Joint strength top of segment:	
S.F. Body yield strength bottom of segment:	0
S.F. Body yield strength top of segment:	0

Collapse calculations for 3rd segment - casing evacuated

Buoyancy factor collapse:	0.847		
calculations for bottom of segment @	0	ft	
hydrostatic pressure collapse - backside:	0	psi	
Axial load @ bottom of section	36590.4	lbs	load @ top of last segment
Axial load factor:	#DIV/0!		load/(pipe body yield strength)
Collapse strength reduction factor:	#DIV/0!		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	#DIV/0!	psi	
Actual safety factor	#DIV/0!		adjusted casing rating / actual pressure
calculations for top of segment @	0	ft	
hydrostatic pressure collapse - backside:	0	psi	
Axial load @ top of section	36590.4	lbs	previous segments + (this segment x BF)
Axial load factor:	#DIV/0!		load/(pipe body yield strength)
Collapse strength reduction factor:	#DIV/0!		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	#DIV/0!	psi	
Actual safety factor	#DIV/0!		adjusted casing rating / actual pressure

Burst calculations for 3rd segment - Completion fracture treatment

calculations for bottom of segment @	0	ft	
Differential burst pressure	500	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	0	psi	
Actual safety factor	0		casing rating / differential burst pressure
calculations for top of segment @	0	ft	
Differential burst pressure	500	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	0	psi	
Actual safety factor	0		casing rating / differential burst pressure

Joint strength calculations for 3rd segment

Buoyancy factor for joint strength calc.:			
calculations for bottom of segment @	0	ft	
Axial load @ bottom of section	36590.4	lbs	load @ top of last segment
Joint Strength of segment	0	lbs	
Body Yield Strength of segment	0	lbs	
Actual safety factor joint strength	0		csg joint strength / axial load
Actual safety factor body yield	0		csg body yield strength / axial load
calculations for top of segment @	0	ft	
Axial load @ top of section	36590.4	lbs	weight of previous segments + (this segment x BF)

Joint Strength of segment	0	lbs	
Body Yield Strength of segment	0	lbs	
Actual safety factor joint strength	0		csg joint strength / axial load
Actual safety factor body yield	0		csg body yield strength / axial load

Adjust for best combination of safety factors

	Secondary
S.F. Collapse bottom of segment:	
S.F. Collapse top of segment:	#DIV/0!
S.F. Burst bottom of segment:	
S.F. Burst top of segment	
S.F. Joint strength bottom of segment:	0
S.F. Joint strength top of segment:	
S.F. Body yield strength bottom of segment:	0
S.F. Body yield strength top of segment:	0

Collapse calculations for 4th segment - casing evacuated

Buoyancy factor collapse: 0.847

calculations for bottom of segment @	0	ft	
hydrostatic pressure collapse - backside:	0	psi	
Axial load @ bottom of section	36590.4	lbs	load @ top of last segment
Axial load factor:	#DIV/0!		load/(pipe body yield strength)
Collapse strength reduction factor:	#DIV/0!		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	#DIV/0!	psi	
Actual safety factor	#DIV/0!		adjusted casing rating / actual pressure

calculations for top of segment @	0	ft	
hydrostatic pressure collapse - backside:	0	psi	
Axial load @ top of section	36590.4	lbs	previous segments + (this segment x BF)
Axial load factor:	#DIV/0!		load/(pipe body yield strength)
Collapse strength reduction factor:	#DIV/0!		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	#DIV/0!	psi	
Actual safety factor	#DIV/0!		adjusted casing rating / actual pressure

Burst calculations for 4th segment - Completion fracture treatment

calculations for bottom of segment @	0	ft	
Differential burst pressure	500	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	0	psi	
Actual safety factor	0		casing rating / differential burst pressure

calculations for top of segment @	0	ft	
Differential burst pressure	500	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	0	psi	
Actual safety factor	0		casing rating / differential burst pressure

Joint strength calculations for 4th segment

Buoyancy factor for joint strength calc.: 0.847

calculations for bottom of segment @	0	ft	
Axial load @ bottom of section	36590.4	lbs	load @ top of last segment
Joint Strength of segment	0	lbs	
Body Yield Strength of segment	0	lbs	
Actual safety factor joint strength	0		csg joint strength / axial load
Actual safety factor body yield	0		csg body yield strength / axial load

calculations for top of segment @	0	ft	
Axial load @ top of section	36590.4	lbs	weight of previous segments + (this segment x BF)
Joint Strength of segment	0	lbs	
Body Yield Strength of segment	0	lbs	
Actual safety factor joint strength	0		csg joint strength / axial load
Actual safety factor body yield	0		csg body yield strength / axial load

Adjust for best combination of safety factors

	Secondary
S.F. Collapse bottom of segment:	
S.F. Collapse top of segment:	#DIV/0!
S.F. Burst bottom of segment:	
S.F. Burst top of segment	
S.F. Joint strength bottom of segment:	0
S.F. Joint strength top of segment:	
S.F. Body yield strength bottom of segment:	0
S.F. Body yield strength top of segment:	0

Collapse calculations for 5th segment - casing evacuated

Buoyancy factor collapse:	0.847		
calculations for bottom of segment @	0	ft	
hydrostatic pressure collapse - backside:	0	psi	
Axial load @ bottom of section	36590.4	lbs	load @ top of last segment
Axial load factor:	#DIV/0!		load/(pipe body yield strength)
Collapse strength reduction factor:	#DIV/0!		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	#DIV/0!	psi	
Actual safety factor	#DIV/0!		adjusted casing rating / actual pressure
calculations for top of segment @	0	ft	
hydrostatic pressure collapse - backside:	0	psi	
Axial load @ top of section	36590.4	lbs	previous segments + (this segment x BF)
Axial load factor:	#DIV/0!		load/(pipe body yield strength)
Collapse strength reduction factor:	#DIV/0!		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	#DIV/0!	psi	
Actual safety factor	#DIV/0!		adjusted casing rating / actual pressure

Burst calculations for 5th segment - Completion fracture treatment

calculations for bottom of segment @	0	ft	
Differential burst pressure	500	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	0	psi	
Actual safety factor	0		casing rating / differential burst pressure
calculations for top of segment @	0	ft	
Differential burst pressure	500	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	0	psi	
Actual safety factor	0		casing rating / differential burst pressure

Joint strength calculations for 5th segment

Buoyancy factor for joint strength calc.:	0.847		
calculations for bottom of segment @	0	ft	
Axial load @ bottom of section	36590.4	lbs	load @ top of last segment
Joint Strength of segment	0	lbs	
Body Yield Strength of segment	0	lbs	
Actual safety factor joint strength	0		csg joint strength / axial load
Actual safety factor body yield	0		csg body yield strength / axial load
calculations for top of segment @	0	ft	
Axial load @ top of section	36590.4	lbs	weight of previous segments + (this segment x BF)
Joint Strength of segment	0	lbs	
Body Yield Strength of segment	0	lbs	
Actual safety factor joint strength	0		csg joint strength / axial load
Actual safety factor body yield	0		csg body yield strength / axial load

Adjust for best combination of safety factors

	Secondary
S.F. Collapse bottom of segment:	
S.F. Collapse top of segment:	#DIV/0!
S.F. Burst bottom of segment:	
S.F. Burst top of segment	
S.F. Joint strength bottom of segment:	0
S.F. Joint strength top of segment:	
S.F. Body yield strength bottom of segment:	0
S.F. Body yield strength top of segment:	0

Collapse calculations for 6th segment - casing evacuated

Buoyancy factor collapse:	0.847		
calculations for bottom of segment @	0	ft	
hydrostatic pressure collapse - backside:	0	psi	
Axial load @ bottom of section	36590.4	lbs	load @ top of last segment
Axial load factor:	#DIV/0!		load/(pipe body yield strength)
Collapse strength reduction factor:	#DIV/0!		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	#DIV/0!	psi	
Actual safety factor	#DIV/0!		adjusted casing rating / actual pressure
calculations for top of segment @	0	ft	
hydrostatic pressure collapse - backside:	0	psi	
Axial load @ top of section	36590.4	lbs	previous segments + (this segment x BF)
Axial load factor:	#DIV/0!		load/(pipe body yield strength)
Collapse strength reduction factor:	#DIV/0!		Messrs, Westcott, Dunlop, Kemler,1940
Adjusted collapse rating of segment:	#DIV/0!	psi	
Actual safety factor	#DIV/0!		adjusted casing rating / actual pressure

Burst calculations for 6th segment - Completion fracture treatment

calculations for bottom of segment @	0	ft	
Differential burst pressure	500	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	0	psi	
Actual safety factor	0		casing rating / differential burst pressure
calculations for top of segment @	0	ft	
Differential burst pressure	500	psi	(frac. pres.-mud pres.) + max. surf. pres.
Burst rating of segment	0	psi	
Actual safety factor	0		casing rating / differential burst pressure

Joint strength calculations for 6th segment

Buoyancy factor for joint strength calc.:	0.847		
calculations for bottom of segment @	0	ft	
Axial load @ bottom of section	36590.4	lbs	load @ top of last segment
Joint Strength of segment	0	lbs	
Body Yield Strength of segment	0	lbs	
Actual safety factor joint strength	0		csg joint strength / axial load
Actual safety factor body yield	0		csg body yield strength / axial load
calculations for top of segment @	0	ft	
Axial load @ top of section	36590.4	lbs	weight of previous segments + (this segment x BF)
Joint Strength of segment	0	lbs	
Body Yield Strength of segment	0	lbs	
Actual safety factor joint strength	0		csg joint strength / axial load
Actual safety factor body yield	0		csg body yield strength / axial load

Attached to Form 3160-3
Mack Energy Corporation
Prescott Federal Com #1H NMNM-132674
SHL : 839 FSL & 2455 FEL, SWSE, Sec. 19 T15S R29E
BHL : 1 FSL & 2310 FEL, SWSE, Sec. 30 T15S R29E
Chaves County, NM

DRILLING PROGRAM

1. Geologic Name of Surface Formation

Quaternary

2. Estimated Tops of Important Geologic Markers:

Top Salt	240’
Base Salt	620’
Yates	770’
Seven Rivers	1,001’
Queen	1,490’
Grayburg	1,886’
San Andres	2,183’

3. Estimated Depths of Anticipated Fresh Water, Oil and Gas:

Water Sand	150’	Fresh Water
Yates	770’	Oil/Gas
Seven Rivers	1,001’	Oil/Gas
Queen	1,490’	Oil/Gas
Grayburg	1,886’	Oil/Gas
San Andres	2,183’	Oil/Gas

No other formations are expected to give up oil, gas or fresh water in measurable quantities. Setting 13 3/8” casing to 210’ and circulating cement back to surface will protect the surface fresh water sand. Salt section and shallower zones above TD, which contain commercial quantities of oil and/or gas, will have cement circulated across them by cementing 5 ½” production casing, sufficient cement will be pumped to circulate back to surface.

4. Casing Program:

Hole Size	Interval	OD Casing	Wt, Grade, Jt, cond, collapse/burst/tension
17 1/2”	0-210’	13 3/8”	48#, J-55, ST&C, New, 7.411859/4.700889/4.74
12 1/4”	0-1200’	9 5/8”	36#, J-55, ST&C, New, 3.237179/7.04/7.04
8 ¾”	0-3250’	7”	26#, HCP110, Buttress, New, 4.164713/3.316667/3.316667
8 ¾”	3250-8863’	5 ½”	17#, HCP110, Buttress, New, 5.286767/3.546667/3.546667

Variance request: A variance is requested to use a Multi Bowl System and Flex Hose as the choke line from the BOP to the Choke Manifold. If this hose is used, a copy of the manufacturer’s certification and pressure test will be kept on the rig.
Perforation – 3563 TD 3121 TVD 8750 TD 3157 TVD

Attached to Form 3160-3
Mack Energy Corporation
Prescott Federal Com #1H NMNM-132674
SHL : 839 FSL & 2455 FEL, SWSE, Sec. 19 T15S R29E
BHL : 1 FSL & 2310 FEL, SWSE, Sec. 30 T15S R29E
Chaves County, NM

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5. Cement Program:

13 3/8" Surface Casing: Lead 100sx, RFC+12% PF53+2%PF1+5ppsPF42+.125pps PF29, yld 1.61, wt 14.4 ppg, 7.357 gals/sx Tail: 250sx, Class C+1% PF1, yld 1.34, wt 14.8 ppg, 6.323 gals/sx, excess 100%

9 5/8" Intermediate Casing: Lead 460sx, Class C+4%PF20+.4ppsPF44+.125pps PF29, yld 1.73, wt 13.5 ppg, 9.102 gals/sx, Tail: 200sx, Class C+1% PF1, yld 1.34, wt 14.8 ppg, 6.323 gals/sx, excess 50%

7" & 5 ½" Production Casing: Lead 300sx Class C 4% PF 20+4 pps PF45 +125pps PF29, yld 2.82, wt 11.5 ppg, 9.914 gals/sx, excess 50%, Slurry Top-Surface Tail 2150sx, PVL+1.3 (BWOW) PF44 + 5% PF174 + .5% PF606 + .1% PF153 +.4pps PF44, yield 1.34, wt 14.2, 7.577 gals/sx, 50% excess, Slurry Top 2,300'

Option 2 – Run a DV tool @1400' +/- if an air pocket is encountered. Cmt Stage 1-2050 sx 50/50 POZ/C +5% (BWOW) PF44+2% PF20+0.2% PF13+0.2% PF606 +0.1% FP 153+0.4pps PF45, yld 1.34, density 14.2, mix H20 gals/sx 6085, 50% access, Slurry Top 1400' cmt State 2-200 sx C+2% PF1, yld 1.34, density 14.8, 0% excess, Slurry Top Surface. 2,205.1 Cy/Ft per Line/Ft.

6. Minimum Specifications for Pressure Control:

The blowout preventer equipment (BOP) shown in Exhibit #10 will consist of a double ram-type (3000 psi WP) minimum preventer. This unit will be hydraulically operated and the ram type preventer will be equipped with blind rams on top of 4 1/2" drill pipe rams on bottom. The 11" BOP will be nippled up on the 8 5/8" surface casing and tested by a 3rd party to 2000 psi used continuously until TD is reached. All BOP's and accessory equipment will be tested to 2000 psi before drilling out of intermediate casing. 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 (Exhibit #10) will include a Kelly cock and floor safety valve and choke lines and choke manifold (Exhibit #11) with a minimum 3000 psi WP rating

7. Types and Characteristics of the Proposed Mud System:

The well will be drilled to TD with a combination of fresh and cut brine mud system. The applicable depths and properties of this system are as follows:

DEPTH	TYPE	WEIGHT	VISCOSITY	WATERLOSS
0-210'	Fresh Water	8.5	28	N.C.
210'-1200'	Cut Brine	9.1	29	N.C.
1200'-TD	Cut Brine	9.1	29	N.C.

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

Attached to Form 3160-3
Mack Energy Corporation
Prescott Federal Com #1H NMNM-132674
SHL : 839 FSL & 2455 FEL, SWSE, Sec. 19 T15S R29E
BHL : 1 FSL & 2310 FEL, SWSE, Sec. 30 T15S R29E
Chaves County, NM

8. Auxiliary Well Control and Monitoring Equipment:

A. Kelly cock will be kept in the drill string at all times.
B. A full opening drill pipe-stabbing valve with proper drill pipe connections will be on the rig floor at all times.

9. Logging, Testing and Coring Program:

A. The electric logging program will consist of GR-Dual Laterolog, Spectral Density, Dual Spaced Neutron, CSNG Log from T.D. to 8 5/8 casing shoe.
B. Drill Stem test is not anticipated.
C. No conventional coring is anticipated.
D. Further testing procedures will be determined at TD.

10. Abnormal Conditions, Pressures, Temperatures and Potential Hazards:

No abnormal pressures or temperatures are anticipated. The estimated bottom hole at TD is 120 degrees and estimated maximum bottom hole pressure is 1493 psig (0.052*3121'TVD*9.2). Low levels of Hydrogen sulfide have been monitors in producing wells in the area, so H2S may be present while drilling of the well; a plan is attached to the Drilling program. No major loss of circulation zones has been reported in offsetting wells.

11. Anticipated Starting Date and Duration of Operations:

Road and location work will not begin until approval has been received from the BLM. The anticipated spud date is June 1, 2025. Once commenced, the drilling operation should be finished in approximately 20 days. If the well is productive, an additional 30 days will be required for completion and testing before a decision is made to install permanent facilities.

Attachment to Exhibit #10
NOTES REGARDING THE BLOWOUT PREVENTERS
Prescott Federal Com 1H
Chaves County, New Mexico

1. Drilling nipple to be so constructed that it can be removed without use of a welder through rotary table opening, with minimum I.D. equal to preventer bore.

2. Wear ring to be properly installed in head.

3. Blow out preventer and all fittings must be in good condition, 2000 psi WP minimum.

4. All fittings to be flanged.

Attached to Form 3160-3
Mack Energy Corporation
Prescott Federal Com #1H NMNM-132674
SHL : 839 FSL & 2455 FEL, SWSE, Sec. 19 T15S R29E
BHL : 1 FSL & 2310 FEL, SWSE, Sec. 30 T15S R29E
Chaves County, NM

5. Safety valve must be available on rig floor at all times with proper connections, valve to be full 2000 psi WP minimum.

6. All choke and fill lines to be securely anchored especially ends of choke lines.

7. Equipment through which bit must pass shall be at least as large as the diameter of the casing being drilled through.

8. Kelly cock on Kelly.

9. Extension wrenches and hands wheels to be properly installed.

10. Blow out preventer control to be located as close to driller's position as feasible.

11. Blow out preventer closing equipment to include minimum 40-gallon accumulator, two independent sources of pump power on each closing unit installation all API specifications.

Cactus
Wellhead

Installation Procedure Prepared For:

Mack Energy Corporation

13-3/8” x 9-5/8” x 7” 10M
MBU-LR Wellhead System With
CTH-DBLHPS Tubing Head

Publication # IP0228

May, 2014

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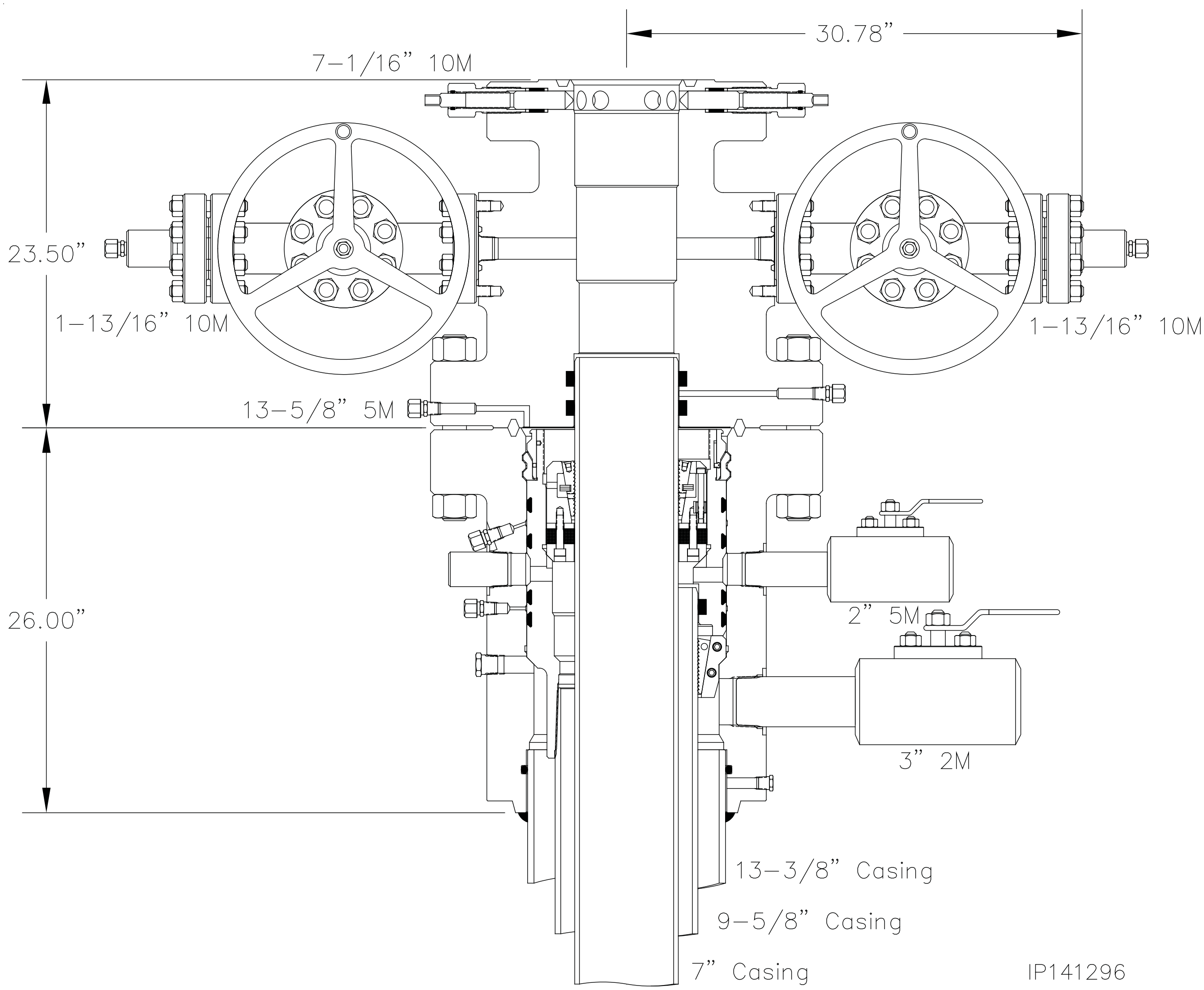
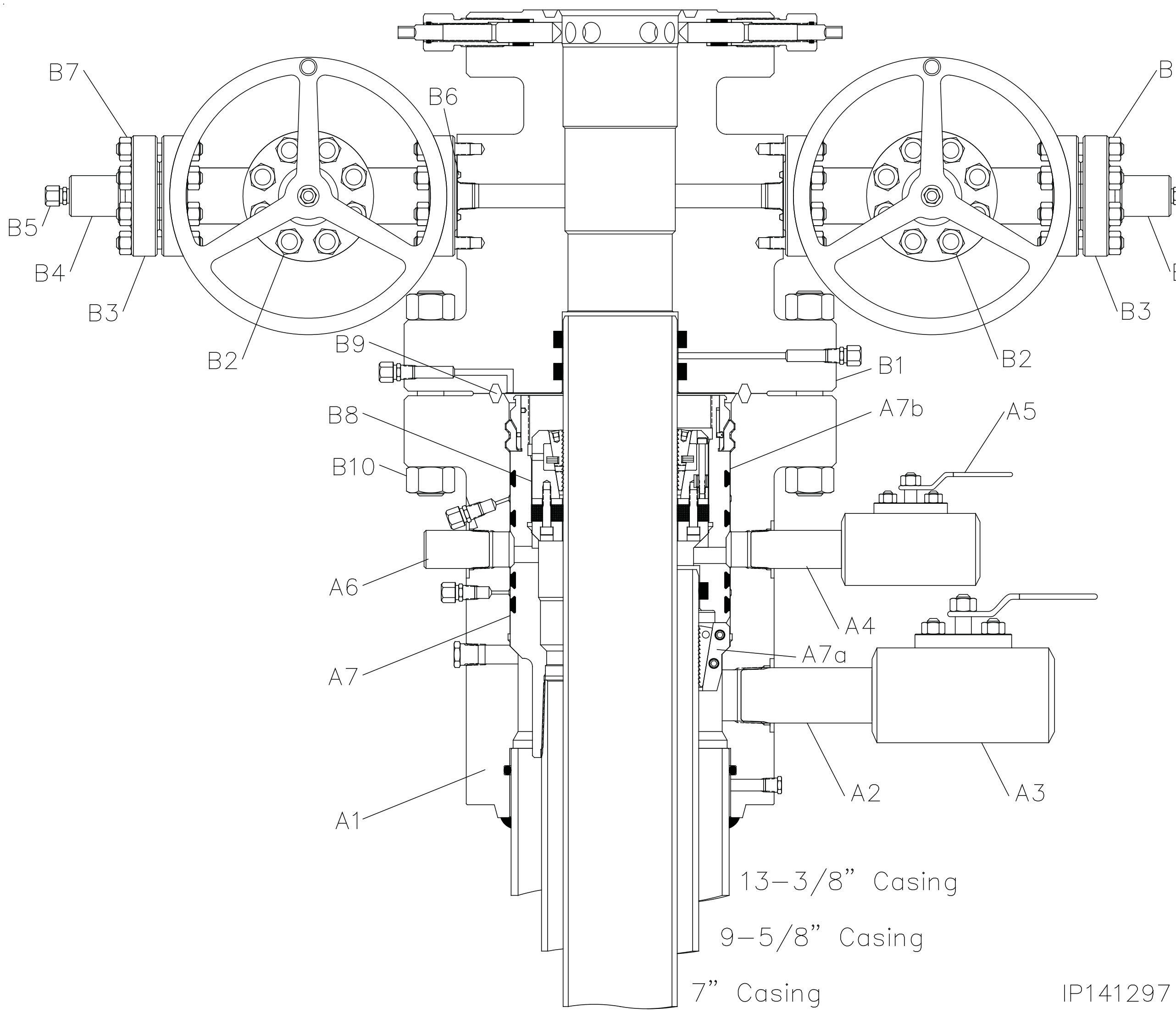
System Drawing



Bill of Materials



Mack Energy Corporation.
13-3/8" x 9-5/8" x 7" 10M MBU-LR Wellhead System
With CTH-DBLHPS Tubing Head

Cactus Wellhead

MBU-LR HOUSING ASSEMBLY

Item	Qty	Description
A1	1	Housing, CW, MBU-LR, 13-5/8" 5M x 13-3/8" SOW, with two 2" line pipe upper outlets and one 3" line pipe lower outlet, one piece, 6A-PU-AA-1-1 Part # 102513
A2	1	Nipple, 3" line pipe x 12" long, XH Part # 101610
A3	1	Ball Valve, KF, AH, 3 RP 2M LP, DI: Body, CS: Trim, nylon seats, HNBR: seals, with handle standard non-nace service Part # 100535
A4	1	Nipple, 2" line pipe x 6" long, XH Part # NP6A
A5	1	Ball Valve, 2" RP, 5M LP x 2" LP, WCB body, 304SS ball, CR13 stem, RPTFE seats, API 596 Part # 103877
A6	1	Bull Plug, 2" line pipe solid, 4130 60K Part # BP2P
A7	1	Casing Hanger, CW, MBU-LR, 13-5/8" x 9-5/8" LC box bottom x 11.250" 4 Stub Acme 2G LH box top, mandrel, 6A-U-AA-1-1 Part # 100482

EMERGENCY EQUIPMENT

Item	Qty	Description
A7a	1	Casing Hanger, CW, MBU, 13-5/8" x 9-5/8" 6A-PU-DD-3-1 Part # 100569
A7b	1	Packoff, CW, MBU-LR Emergency, 13-5/8" x 11" x 9-5/8" with 11.250" 4 Stub Acme 2G LH top, slotted for CL outlets, 6A-PU-AA-1-1 Part # 100538

TUBING HEAD ASSEMBLY

Item	Qty	Description
B1	1	Tubing Head, CW, CTH-DBLHPS, 7, 13-5/8" 5M x 7-1/16" 10M, with two 1-13/16" 10M studded outlets 6A-PU-EE-0,5-2-1 Part #
B2	2	Gate Valve, DSG-22, 1-13/16" 10M, flanged end, EE-0,5 trim, (6A-PU-EE-0,5-3-1) Part # 102284
B3	2	Companion Flange, 1-13/16" 10M x 2" line pipe (5,000 psi max WP), (6A-PU-EE-NL-1) Part # 200010
B4	2	Bull Plug, 2" line pipe x 1/2" line pipe, API 6A-DD-NL Part # BP2T
B5	2	Fitting, Grease, Vented Cap, 1/2" NPT, Alloy Non-Nace Part # FTG1
B6	4	Ring Gasket, 151, 1-13/16" 10M Part # BX151
B7	16	Studs, all thread with two nuts, black, 3/4" x 5-1/2" long, B7/2H Part # 780080
B8	1	Casing Hanger, C22, 11" x 7" Part # 50020
B9	1	Ring Gasket, 160, 13-5/8" 5M Part # BX160
B10	16	Studs, all thread with two nuts, black, 1-5/8" x 12-3/4" long, B7/2H Part # 780087

RECOMMENDED SERVICE TOOLS

Item	Qty	Description
ST1	1	Test Plug/Retrieving Tool, CW, 13-5/8" x 4-1/2" IF, 1-1/4" LP bypass and spring loaded lift dogs Part # 800002
ST2	1	Wear Bushing, CW, MBU-LR-LWR, 13-5/8" x 12.38" ID x 20.31" long Part # 100546
ST3	1	Casing Hanger Running Tool, CW, MBU-LR, 13-5/8" x 9-5/8" long casing box top x 11.250" 4 Stub Acme LH pin bottom, 4140 110K Part # 102304
ST4	1	Packoff Running Tool, CW, MBU-LR, 13-5/8" x 4-1/2" IF box bottom and top, with 11.250" 4 Stub Acme 2G LH pin bottom Part # 100556
ST5	1	Test Plug/Retrieving Tool, CW, 11" x 4-1/2" IF, 1-1/4" LP bypass and spring loaded lift dogs Part # 800001
ST6	1	Wear Bushing, MBU-LR-UPR, 13-5/8" x 11" x 9.00" I.D. x 16.0" long Part # 102789
ST7	1	Wash Tool, CW, Casing Hanger, MBU-LR/MBS2, fluted, 13-5/8" x 4-1/2" IF box top threads, fabricated Part # 102787

TA CAP ASSEMBLY

Item	Qty	Description
C1	1	Flange, Blind, 7-1/16" 10M X 1/2 LP ,With Two 3/4" Part # 101464
C2	1	Needle Valve, MFA, 1/2" Line Pipe, 10M Part # NVA
C3	12	Studs, All Thread With Two Nuts, Black, 1-1/2" X 11-3/4" Long, B7/H2 Part # 780082

Stage 1 — Install the MBU-LR Wellhead Housing

1. Run the conductor and 13-3/8” surface casing to the required depth and cement as required.

2. Determine the correct elevation for the MBU-LR Wellhead Assembly.

3. Cut the 13-3/8” at 53.5” below the cellar to accommodate the wellhead. Grind stub level with the horizon and place an 1/8” x 1/8” bevel on the OD of the stub.

Note: The slip on and weld preparation is 4.25” in depth.

4. Examine the ***13-5/8” 5M x 13-3/8” SOW MBU-LR Wellhead Assembly (Item A1)***. Verify the following:
   - bore is clean and undamaged
   - weld socket is clean and free of grease and debris and o-ring is in place and in good condition
   - all seal areas are clean and undamaged
   - valves are intact and in good condition

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

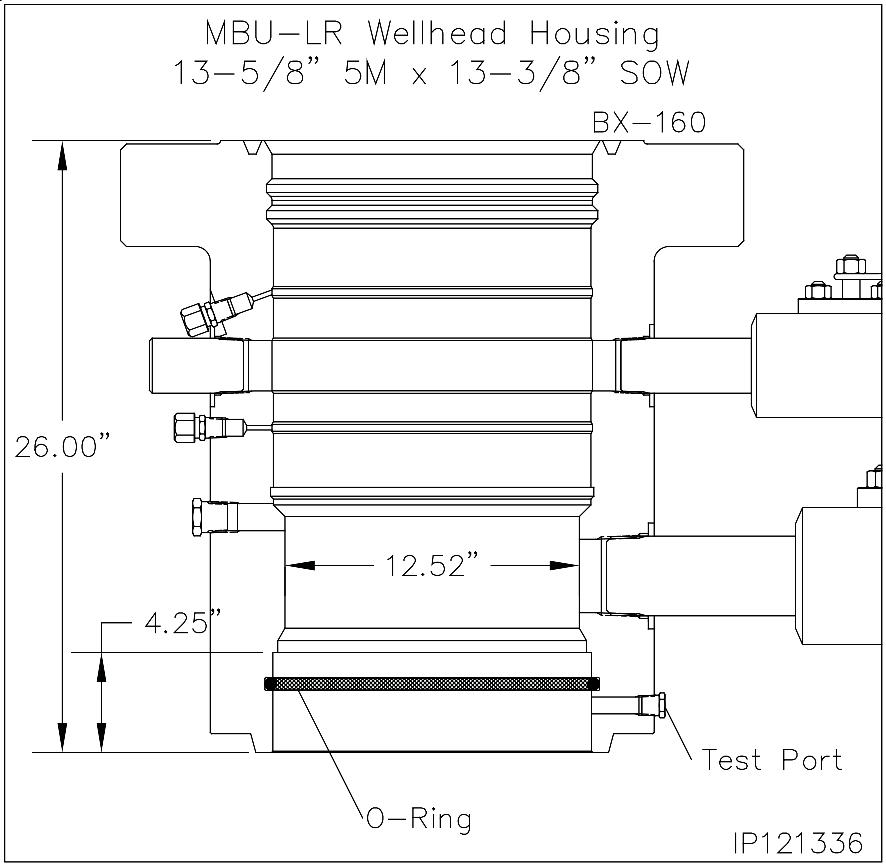
6. Remove the pipe plug from the port on the bottom of the Head.

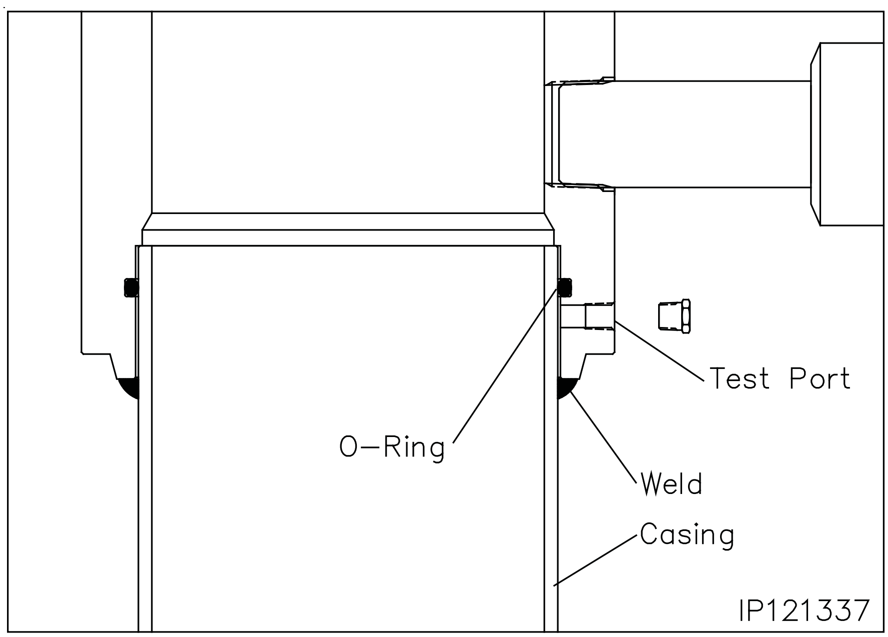
7. Slowly and carefully lower the assembly over the casing stub, weld and test the MBU-LR housing to the surface casing.

8. Replace the pipe plug in the port on the bottom of the housing.

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

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





Cactus Wellhead

Stage 2 — Test the BOP Stack

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

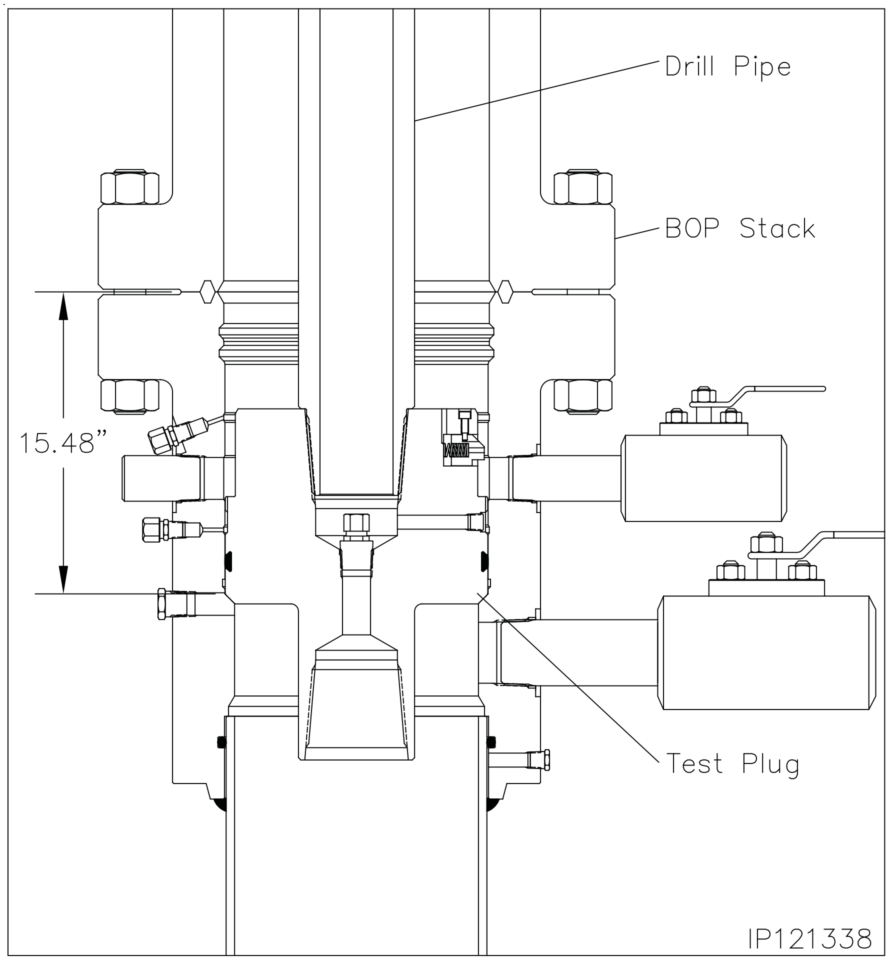
1. Examine the ***13-5/8" Nominal x 4-1/2" IF CW Test Plug/ Retrieving Tool (Item ST1)***. Verify the following:
   - 1-1/4" VR plug and weep hole plug are in place and tightened securely
   - elastomer seal is in place and in good condition
   - retractable lift lugs are in place, clean, and free to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

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

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

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

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



6. Carefully lower the test plug through the BOP and land it on the load shoulder in the housing, 15.48" below the top of the housing.
7. Close the BOP rams on the pipe and test the BOP to 5,000 psi.

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

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

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

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

Stage 3 — Run the Lower Wear Bushing

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

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

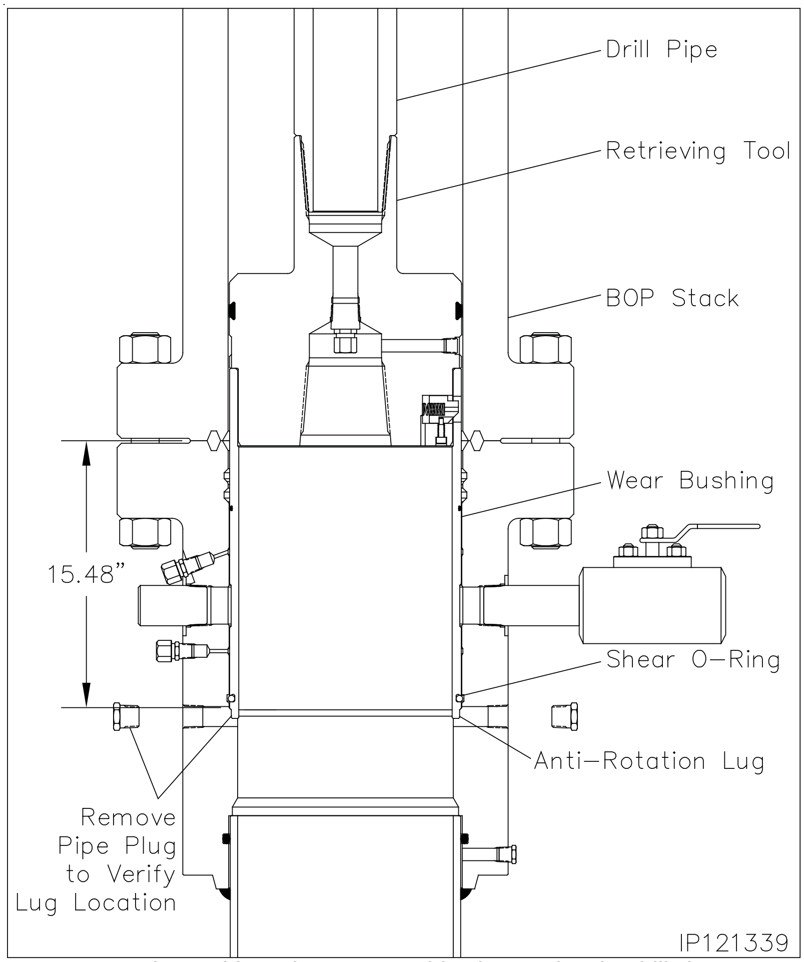
Run the Wear Bushing Before Drilling

2. Orient the ***13-5/8" Nominal x 4-1/2" IF CW Test Plug/Retrieving Tool (Item ST1)*** with drill pipe connection up.
3. Attach the Retrieving Tool to a joint of drill pipe.
4. Align the retractable lift lugs of the tool with the retrieval holes of the bushing and the carefully lower the tool into the Wear Bushing until the lugs snap into place.

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

5. Apply a heavy coat of grease, not dope, to the OD of the bushing.
6. Slowly lower the Tool/Bushing Assembly through the BOP stack and land it on the load shoulder in the housing, 15.48" below the top of the housing.
7. Rotate the drill pipe clockwise (right) to locate the stop lugs in their mating notches in the head. When properly aligned the bushing will drop an additional 1/2".
8. Remove one of the 1" sight port pipe plugs from the OD of the housing and look through the hole to verify the lug has engaged the slot. The painted lug will be clearly visible through the port. Reistall the pipe plug and tighten securely.

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



9. Remove the Tool from the Wear Bushing by rotating the drill pipe counter clockwise (left) 1/4 turn and lifting straight up.
10. Once set is highly recommended to inject a minimum of two full tubes of grease through the housing test ports To keep trash from accumulating behind the bushing.
11. Drill as required.

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

Retrieve the Wear Bushing After Drilling

12. Make up the Retrieving Tool to the drill pipe .
13. Slowly lower the Tool into the Wear Bushing.
14. Pick up and balance the riser weight.
15. Rotate the Retrieving Tool clockwise until a positive stop is felt. This indicates the lugs have snapped into the holes in the bushing.
16. Retrieve the Wear Bushing, and remove it and the Retrieving Tool from the drill string.

Stage 4 — Hang Off the 9-5/8" Casing

Due to the possible build up of debris in the bore and lockring groove of the MBU-LR wellhead it is recommended to run the 13-5/8" Wash Tool prior to running the 9-5/8 casing.

Running the 13-5/8" Wash Tool

1. Examine the ***13-5/8" x 4-1/2" IF Wash Tool (Item ST7).*** Verify the following:
   - drill pipe threads and bore are clean and in good condition
   - all ports are open and free of debris
   - brushes are securely attached and in good condition

2. Orient the Wash Tool with drill pipe box up. Make up a joint of drill pipe to the tool.

3. Carefully lower the Wash Tool through the BOP and land it on top of the 9-5/8" casing hanger, 15.48" below the top flange of the housing.

4. Place a paint mark on the drill pipe level with the rig floor and then pick up on the tool approximately 1".

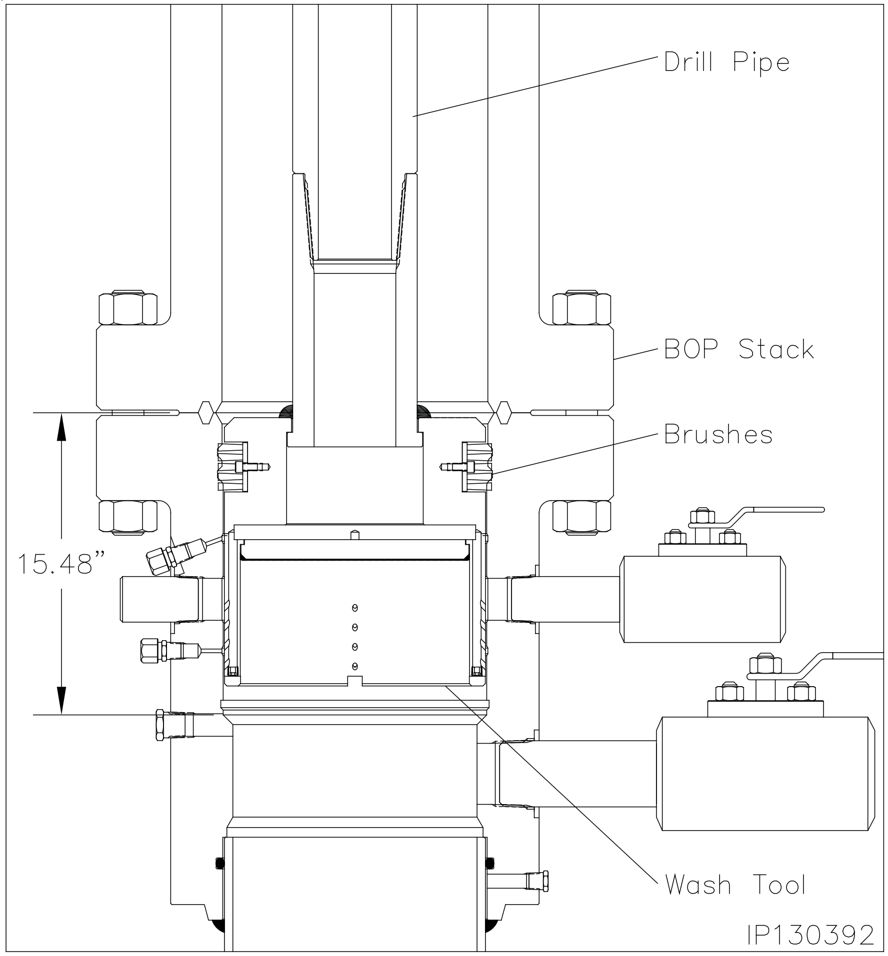
5. Attach a high pressure water line to the end of the drill pipe and pump water through the tool and up the Diverter stack.

6. While flushing, raise and lower the tool the full length of the wellhead and BOP stack. The drill pipe should be slowly rotate while raising and lowering to wash the inside of the housing and BOP stack to remove all caked on debris.

7. Once washing is complete, shut down pumps and then open the housing lower outlet valve and drain the BOP stack.

Note: If returns are not clean, continue flushing until they are.

8. Once the returns are clean and free of debris, retrieve the tool to the rig floor.

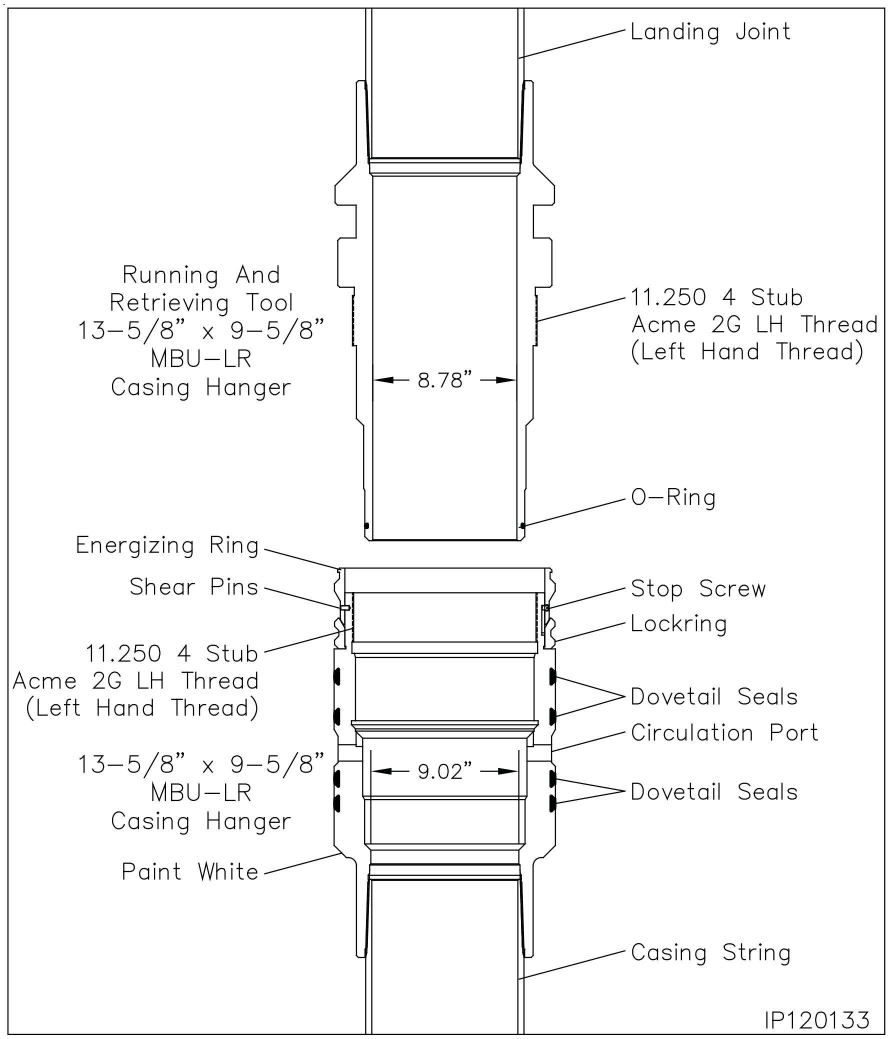


Stage 4 — Hang Off the 9-5/8” Casing

The 9-5/8” MBU-LR casing hanger and running and retrieving tool should be shipped to location pre assembled as a full joint. If not, follow steps 1 through for assembling on the pipe rack.

1. Examine the ***13-5/8” x 9-5/8” LC MBU-LR Casing Hanger (Item A7)***. Verify the following:
   - bore and internal Acme threads are clean and in good condition
   - lockring is in place and free to rotate
   - energizing ring is in its upper most position and secured with shear pins
   - dovetail seals are clean and in good condition
   - pup joint is in good condition and properly made up. Thoroughly clean, inspect, and lubricate pin threads
   - paint the 45° load shoulder white as indicated

2. Examine the ***13-5/8” x 9-5/8” LC MBU-LR Casing Hanger Running and Retrieving Tool (Item ST3)***. Verify the following:
   - bore is clean and free of debris
   - O.D. Acme threads are clean and in good condition
   - o-ring is in place and in good condition
   - proper length landing joint is made up in top of the tool with thread lock compound



Stage 4 — Hang Off the 9-5/8” Casing

3. Thoroughly clean and lightly lubricate the mating Acme threads and seal surfaces of the hanger and running tool.

4. Carefully slide the running tool into the hanger and then rotate the tool clockwise (Right) to locate the thread start and then counter clockwise (Left) approximately 8 turns or until the tool makes contact with the top of the energizing ring.

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

5. Run the 9-5/8” casing as required and space out appropriately for the mandrel casing hanger.

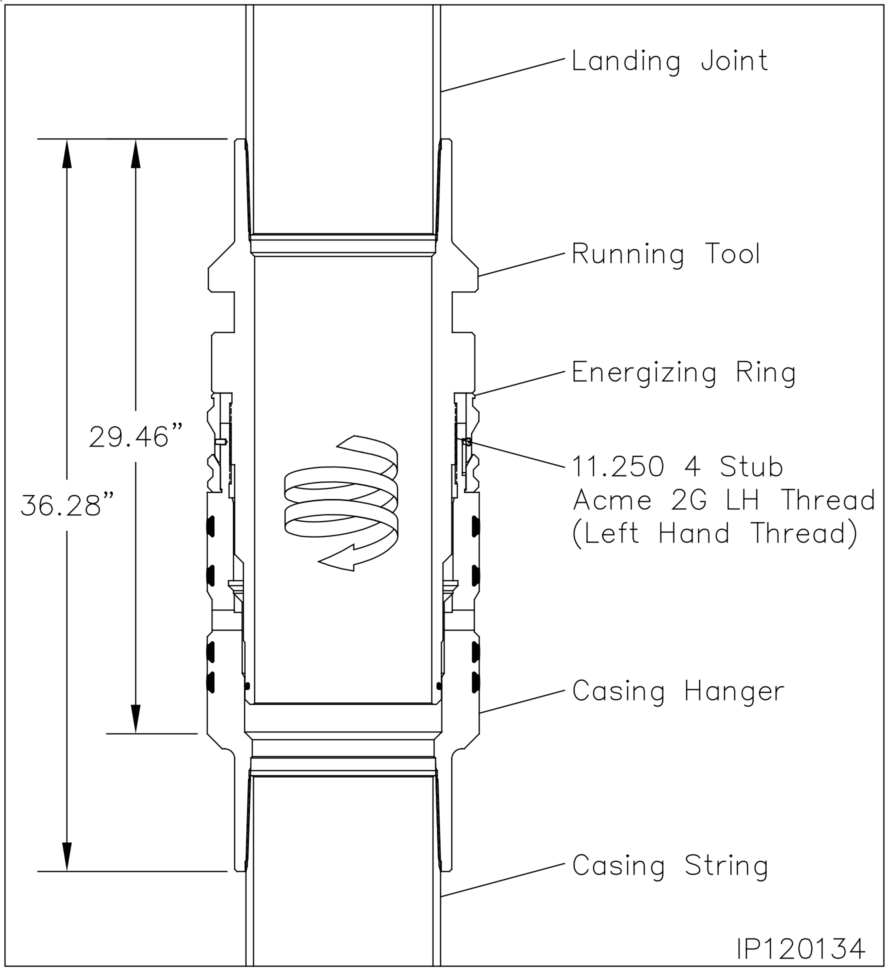
Note: If the 9-5/8” casing becomes stuck and the mandrel casing hanger can not be landed, Refer to **Stage 4A** for the emergency procedure.

6. Set the last joint of casing run in the floor slips.

7. Pick up the casing hanger/running tool assembly and make it up in the casing string. Torque connection to thread manufacturer’s optimum make up torque.

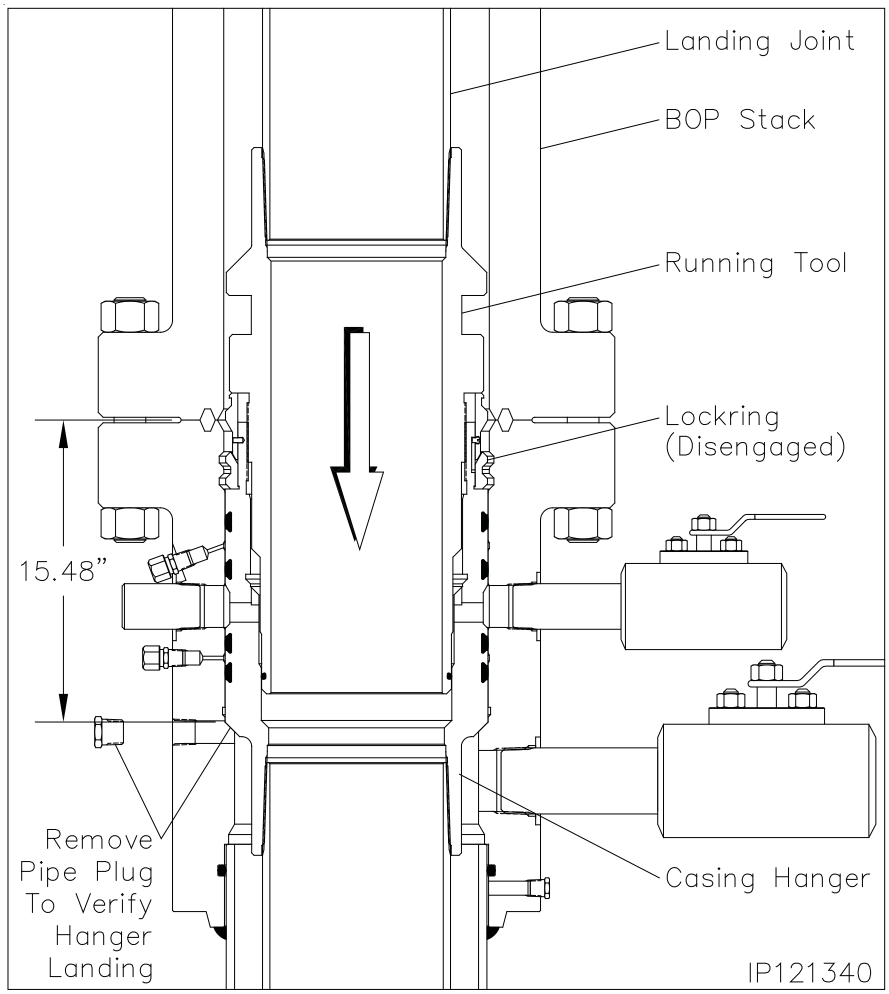
8. ***Using chain tongs only***, back off the running tool with clockwise rotation (Right) one full turn to verify ease of operation and then re make the connection with counter clockwise rotation (Left) just until contact with the energizing ring is.

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



Stage 4 — Hang Off the 9-5/8" Casing

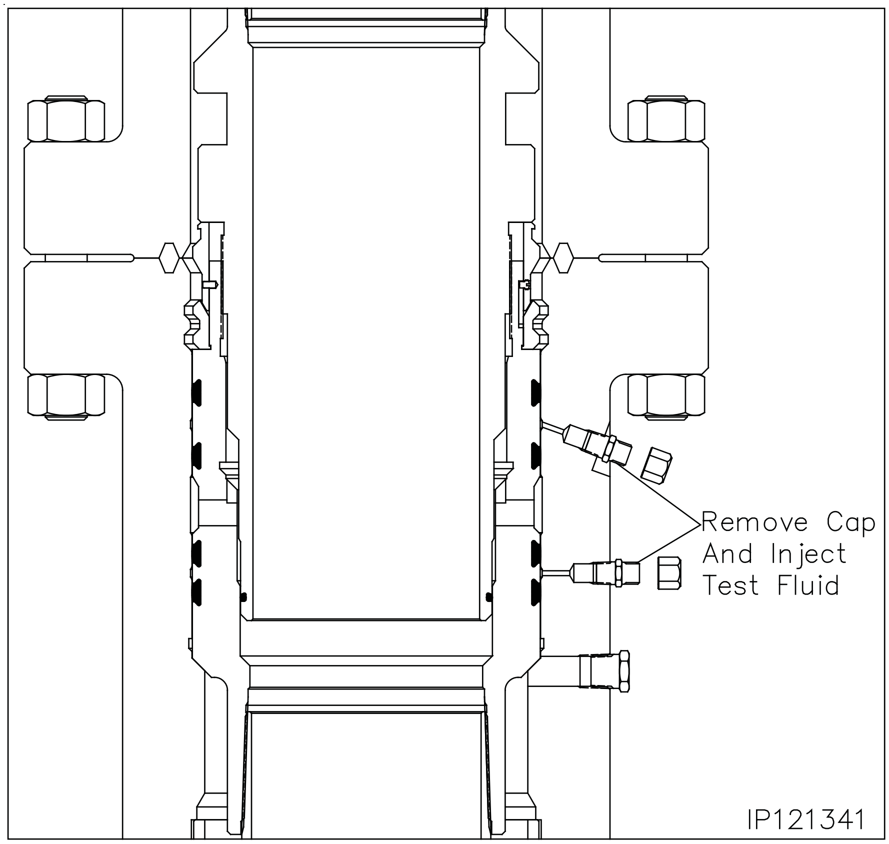
9. Calculate the total landing dimension by adding the previously attained RKB dimension and 15.48", the depth of the wellhead.
10. Drain the BOP stack and wellhead through the 3" ball valve.
11. Starting at the top of the 45° angle load shoulder of the casing hanger measure up 5 feet and place a horizontal paint mark on the landing joint and write 5 next to the mark.
12. Using the 5 foot stick, slowly and carefully lower the Hanger through the BOP, marking the landing joint at five foot increments until you come to the calculated total landing dimension. Place a paint mark on the landing joint at that dimension and write the landing dimension next to the mark. Place an additional mark on the landing joint 1-1/2" above the first mark and write engaged.
13. Continue carefully lowering the hanger through the BOP stack and land it on the load shoulder in the housing, 15.48" below the top of the MBU-LR housing and slack off all weight and verify that the landing dimension paint mark has aligned with the rig floor.
14. Locate the 1" LP sight port on the lower O.D. of the housing and remove the pipe plug.
15. Look through the port to verify the hanger is properly landed. The white painted load shoulder will be clearly visible in the open port.
16. Reinstall the 1" pipe plug and tighten securely.



Stage 4 — Hang Off the 9-5/8" Casing

Seal Test

17. Locate the upper and lower seal test fittings on the O.D. of the housing and remove the dust caps from both fittings.
18. Attach a test pump to one of the open fittings and pump clean test fluid between the seals until a stable test pressure of 5,000 psi is attained.
19. If a leak develops, bleed off test pressure, remove the hanger from the wellhead and replace the leaking seals.
20. Repeat steps 17 through 19 for the remaining seal test.
21. After satisfactory test are achieved, bleed off all test pressure, remove test pump and reinstall the dust caps on the open fittings



Stage 4 — Hang Off the 9-5/8" Casing

Engaging the Lockring

22. ***Using Chain Tongs Only located 180° apart***,, rotate the landing joint approximately 6 turns counter clockwise (Left) to engage the casing hanger lockring in its mating groove in the bore of the MBU-LR housing.

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

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

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

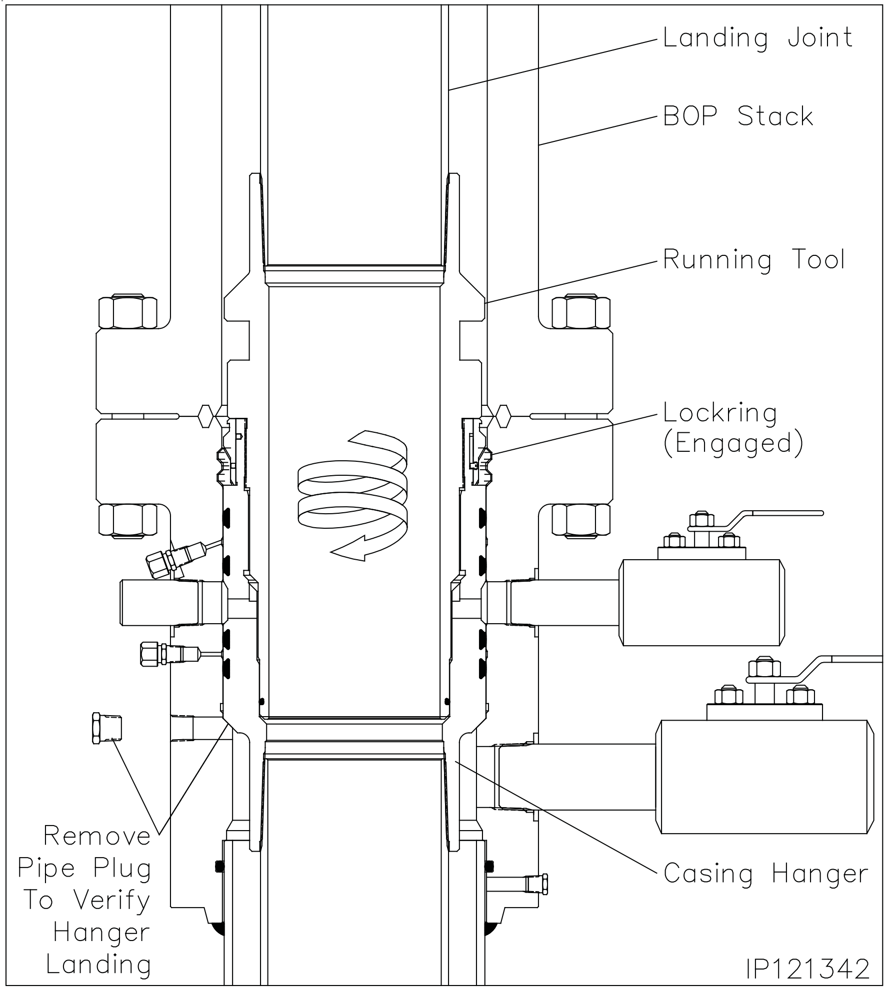
WARNING: If the required turns to engage the lockring or not met or excessive torque is encountered, remove the casing hanger and call Houston Engineering.

23. Back off the landing joint/running tool approximately three turns clockwise (Right). Using the elevators, exert a 30,000 lbs. over string weight pull on the landing joint to confirm positive lockring engagement.

24. Slack off all weight and place a vertical paint mark on the landing joint to verify if the casing string rotates during the cementing process.

Note: It is not necessary to remake the casing hanger running tool connection after the over pull. If desired two counter clockwise rotations may be made but full make up is not required.

25. Cement the casing as required, taking returns through the lower 3" outlet.



26. With cement in place, bleed off cement pressure and remove cementing equipment.

27. If well condition permit, remove the 1" sight port pipe plug to observe if the hanger rotates during the removal of the running tool.

28. ***Using Chain Tongs Only located 180° apart,*** retrieve the Running Tool and landing joint by rotating the landing joint clockwise (Right) an additional 11 turns or until the tool comes free of the hanger. Retrieve the tool with a straight vertical lift.

29. Reinstall the 1" pipe plug and tighten securely.

Cactus Wellhead

Stage 4 — Hang Off the 9-5/8" Casing

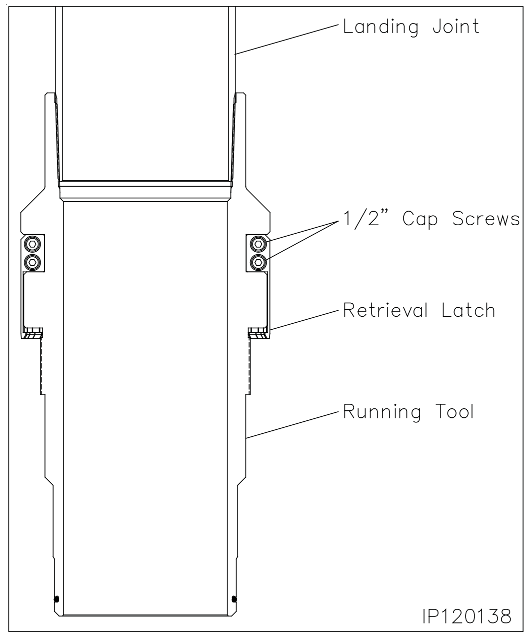
Retrieving The Casing Hanger

In the event that the casing hanger needs to be remove the 13-5/8" x 9-5/8" MBU-LR Casing Hanger Running and retrieving tool can be fitted with a retrieval latch that will lift the casing hanger energizing ring and allow the lockring to disengage.

1. Examine the ***13-5/8" x 9-5/8" LC MBU-LR Casing Hanger Running and Retrieving Tool (Item ST3)***. Verify the following:
   - bore is clean and free of debris
   - O.D. Acme threads are clean and in good condition
   - o-ring is in place and in good condition
   - proper length landing joint is made up in top of the tool with thread lock compound
   - retrieval latch is available and in good condition

2. Thoroughly clean and lightly the latch groove of the tool with oil or light grease.

3. Remove the (4) 1/2" cap screws retaining the two halves of the retrieval latch.



4. Install the retrieval latch around the Retrieving Tool body as indicated and reinstall the 1/2" cap screws. Tighten screws securely.

WARNING: Ensure the latch rotates freely on the tool. If not remove and check the latch and tool for burrs or imperfections in the groove.

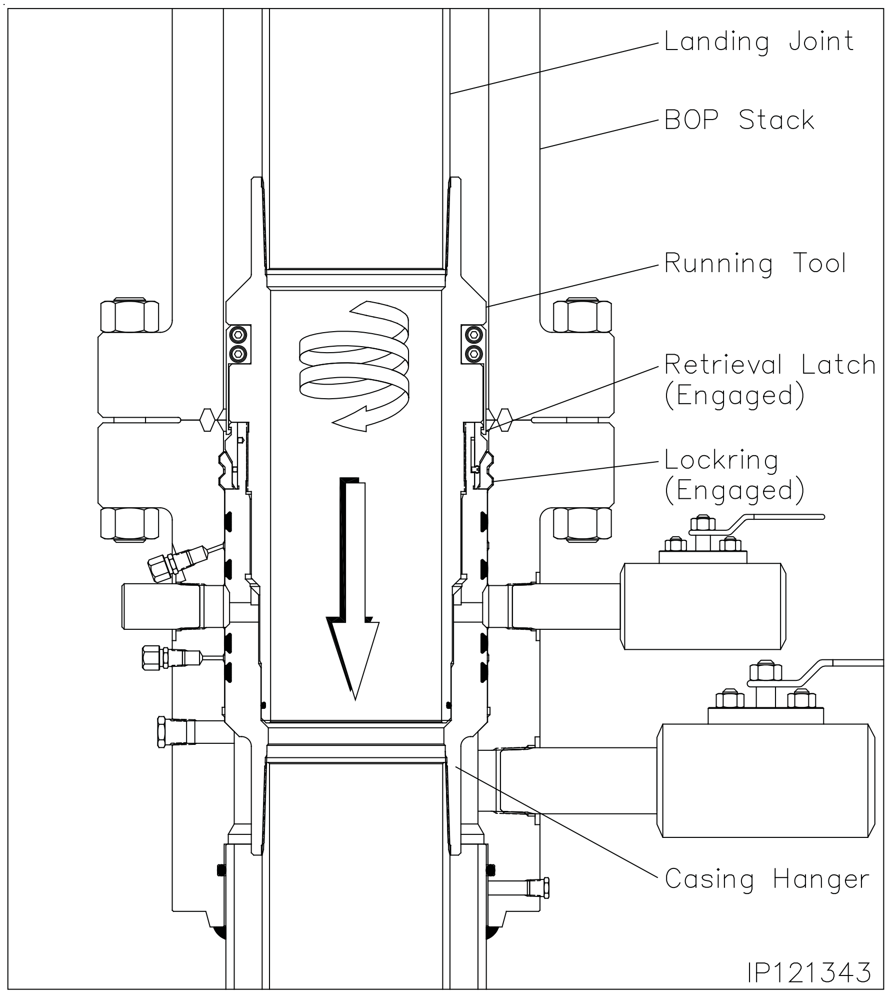
5. Thoroughly clean and lightly lubricate the seal surfaces and Acme threads of the tool with oil or a light grease.

6. Using the casing elevators, carefully lower the tool through the BOP stack and into the casing hanger bore until the tool contacts the top of the hanger Acme threads

Note: Contact should be made at previously attained RKB dimension.

7. **Using chain tongs only located 180° apart**, rotate the landing joint clockwise (Right) to locate the thread start then counter clockwise (Left) approximately 13 turns.

WARNING: Slowly make the last two revolutions. The torque will increase slightly as the latch passes over the top of the energizing ring and snaps into position under the lip of the ring.



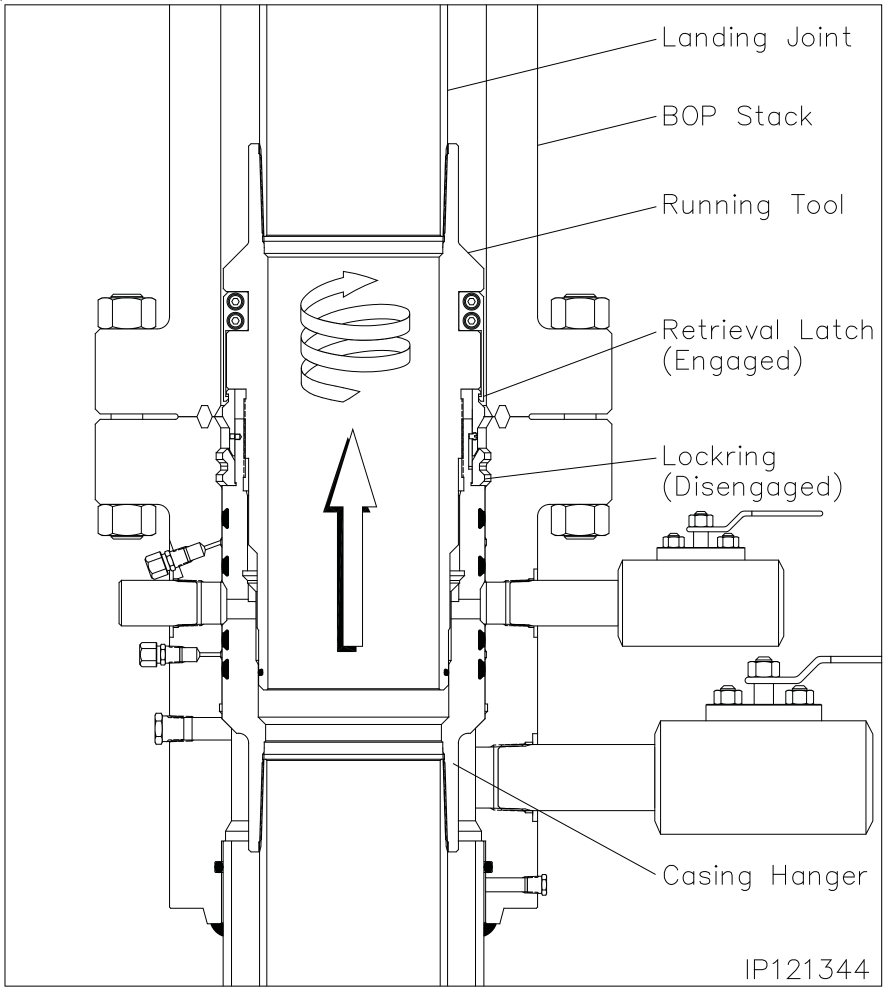
Stage 4 — Hang Off the 9-5/8" Casing

WARNING: The landing joint must remain concentric with the well bore when screwing into the hanger.

8. With positive engagement attained, reposition the tongs for clockwise (Right) rotation and then rotate the landing joint approximately 6 turns to lift the energizing ring and release the lockring.

Note: The landing joint should rise approximately 1-1/2" and come to a positive stop against the stop screws.

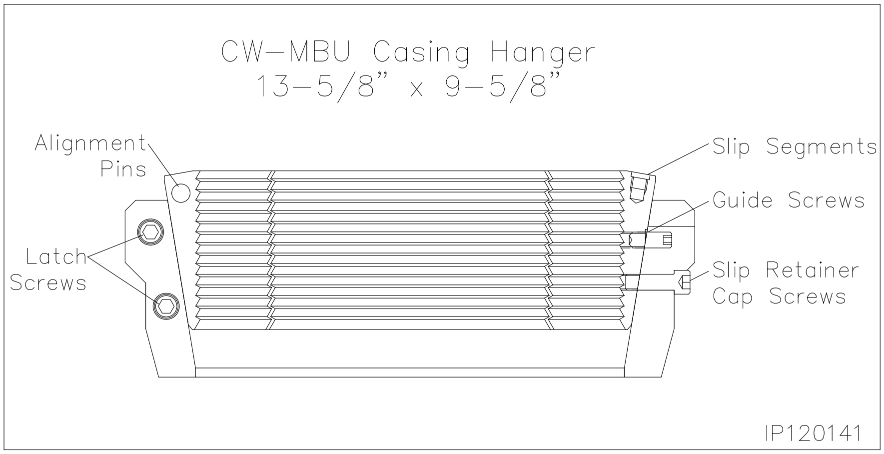
9. Halt rotation and remove the chain tongs.
10. Using the drill pipe elevators, slowly pick up on the casing hanger and retrieve it from the wellhead.
11. With the tool and hanger at the rig floor, set the casing in the floor slips and slack off.
12. Rotate the landing joint counter clockwise (Left) one turn.
13. Remove the (4) 1/2" cap screws from the retrieval latch and remove the latch assembly from the tool.
14. Remove the casing hanger and running tool from the casing string.

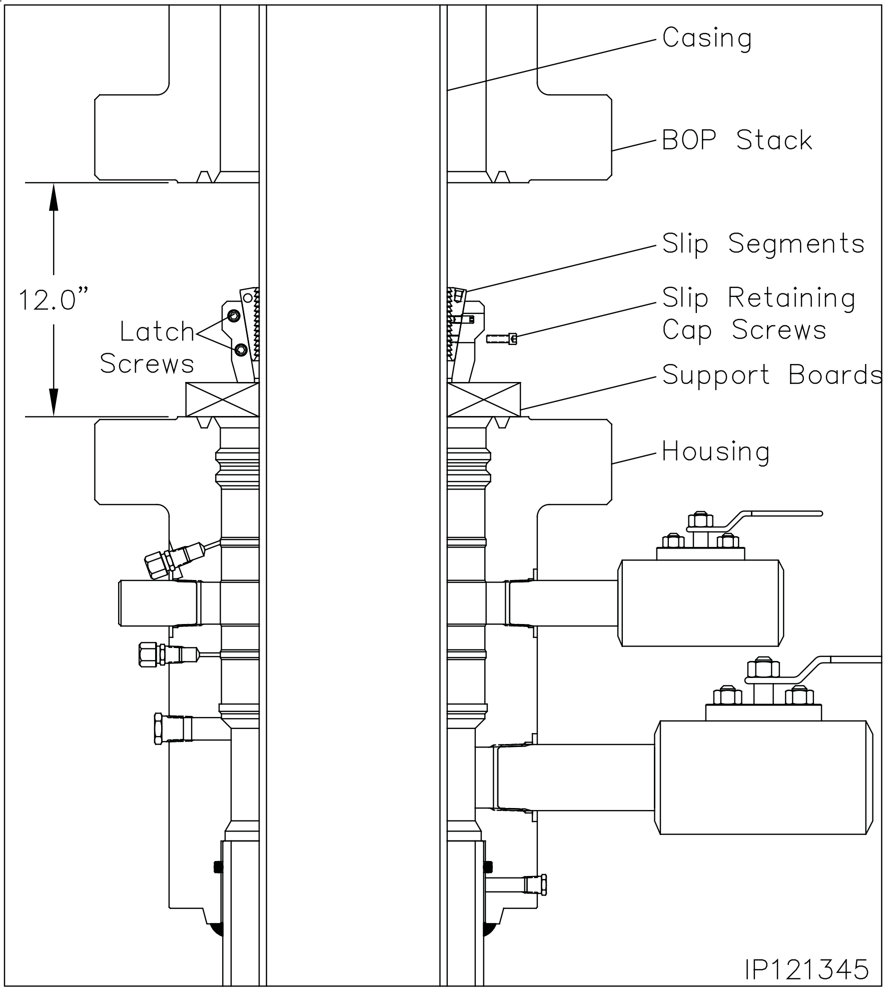


Stage 4A — Hang Off the 9-5/8” Casing (Emergency)

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

1. Cement the hole as required.
2. Drain the BOP stack through the housing side outlet valve.
3. Separate the connection between the BOP and the MBU-LR housing.
4. Pick up on the BOP stack a minimum of 12” and secure with safety slings.
5. Washout as required.
6. Examine the ***13-5/8” x 9-5/8” MBU Slip Casing Hanger (Item A7a).*** Verify the following:
   - slips and internal bore are clean and in good condition
   - all screws are in place
7. There are two latch screws located in the top of the casing hanger. Using a 5/16” Allen wrench, remove the two latch screws located 180° apart and separate the hanger into two halves.
8. Place two boards on the housing flange against the casing to support the Hanger.
9. Pick up one half of the hanger and place it around the casing and on top of the boards.
10. Pick up the second hanger half and place it around the casing adjacent the first half.
11. Slide the two hanger halves together ensuring the slip alignment pins properly engage the opposing hanger half.
12. Reinstall the latch screws and tighten securely.





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

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

WARNING: Do Not Drop the Casing Hanger!

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

15. Remove the boards and allow the Hanger to slide into the housing bowl. When properly positioned the top of the hanger will be approximately 14.05" below the top of the housing.

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

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

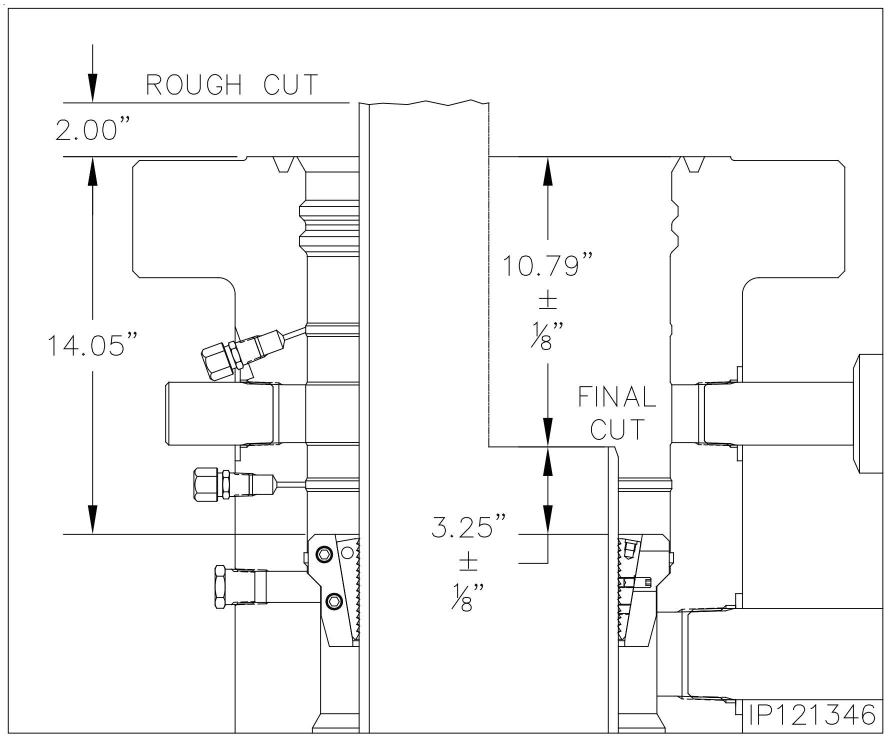
WARNING: Because of the potential fire hazard and the risk of loss of life and property, It is highly recommended to check the casing annulus and pipe bore for gas with an approved sensing device prior to cutting off the casing. If gas is present, do not use an open flame torch to cut the casing. It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

17. Rough cut the casing approximately 2" above the top flange and move the excess casing out of the way.

WARNING: Install the long wear bushing in the housing to ensure the housing bore is not damaged with the torch or cutting debris.

18. Final cut the casing at 10.79" ± 1/8" below the housing flange or 3.25" ± 1/8" above the hanger body.

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



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

20. Remove the wear bushing and then thoroughly clean the housing bowl, removing all cement and cutting debris.

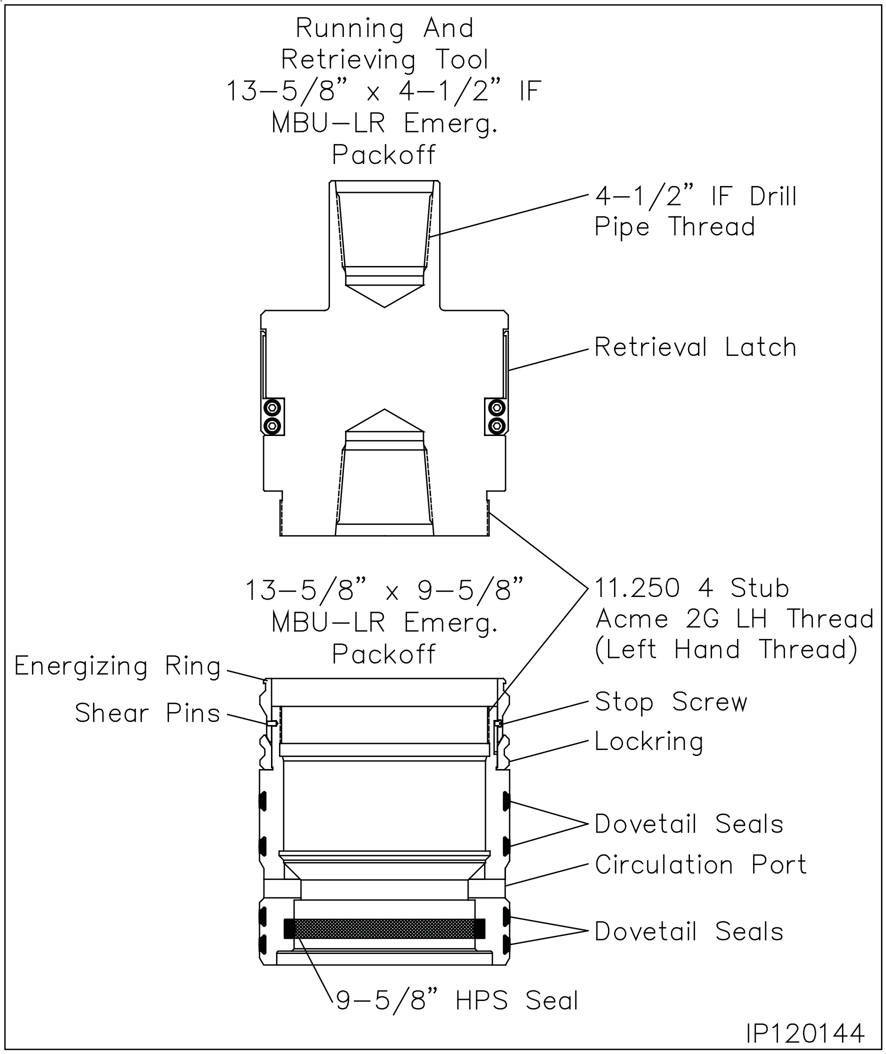
Stage 4B — Install the 9-5/8” MBU-LR Emergency Packoff

The following steps detail the installation of the CW MBU-LR Packoff Assembly for the emergency casing hanger.

1. Examine the ***13-5/8” Nominal x 9-5/8” x 11.250” 4 Stub Acme 2G LH box top MBU-LR Packoff Assembly (Item A7b).*** Verify the following:
   - all elastomer seals are in place and undamaged
   - internal bore, and ports, are clean and in good condition
   - lockring is fully retracted
   - energizer ring is in its upper most position and retained with shear pins
   - anti-rotation plunger is in place, free to move

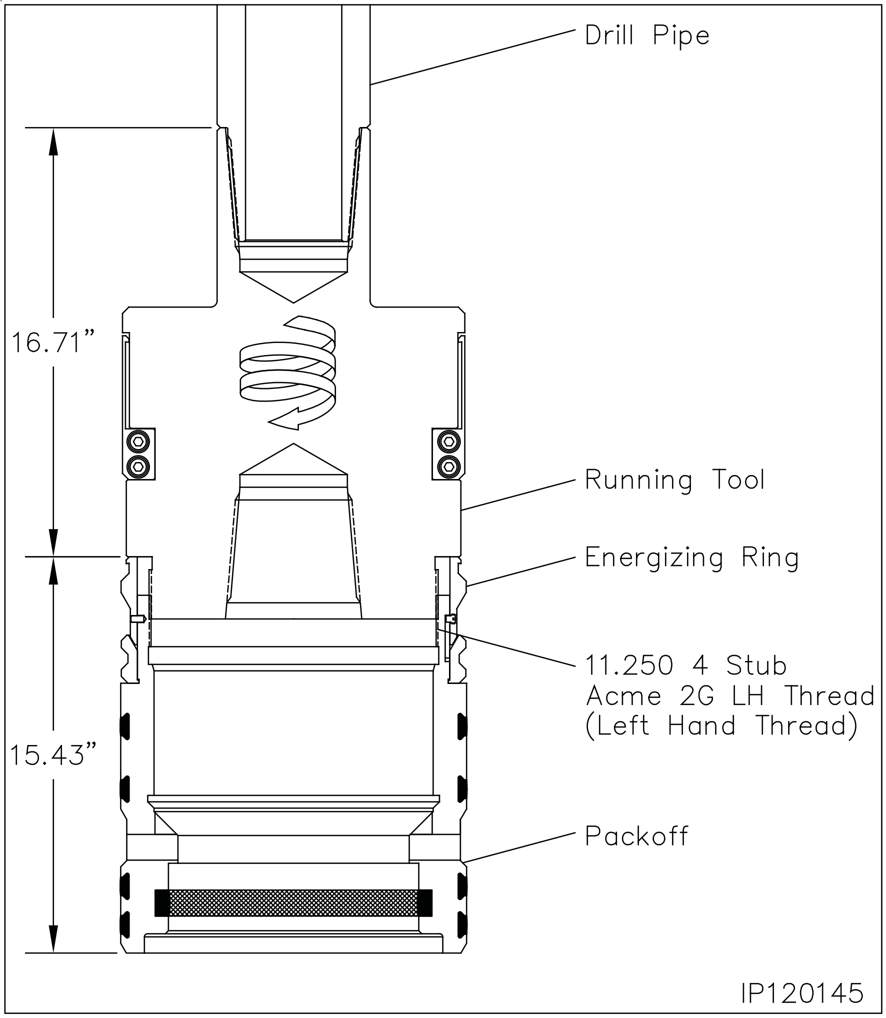
2. Lubricate the ID of the ‘HPS’ seal and the OD of the dovetail seals liberally with a light oil or grease.

3. Examine the ***13-5/8” Nominal x 4-1/2” IF x 11.250” 4 Stub Acme 2G LH box top MBU-LR Packoff Running Tool (Item ST4).*** Verify the following:
   - Acme threads are clean and in good condition
   - actuation sleeve is clean, in good condition and rotates freely
   - retrieval latch is removed and stored is safe place



Stage 4B — Install the 9-5/8” MBU-LR Emergency Packoff

4. Make up a 4-1/2” IF drill collar to the top of the Running Tool and tighten connection to thread manufacturer’s maximum make up torque.
5. Run in the hole with two stands of drill pipe and set in floor slips.
6. Thoroughly clean and lightly lubricate the mating Acme threads of the running tool and packoff with oil or light grease.
7. Pick up the packoff and carefully pass it over the drill pipe and set it on top of the floor slips.
8. Pick up the Running Tool with landing joint and make it up to the drill pipe in the floor slips.
9. Pick up the packoff and thread it onto the running tool with clockwise (Right) rotation until the Energizing Ring makes contact with the bottom shoulder of the tool. Approximately 4 turns.
10. Thoroughly clean and lightly lubricate the packoff ID ‘HPS’ seal and the OD dovetail seals with oil or light grease.



Stage 4B — Install the 9-5/8" MBU-LR Emergency Packoff

Landing the Packoff

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

2. Carefully lower the packoff through the rig floor and into the housing until it lands on top of the slip hanger.

Note: When properly positioned the top of the running tool will be approximately 18.10" above the top of the MBU-LR Housing

Seal Test

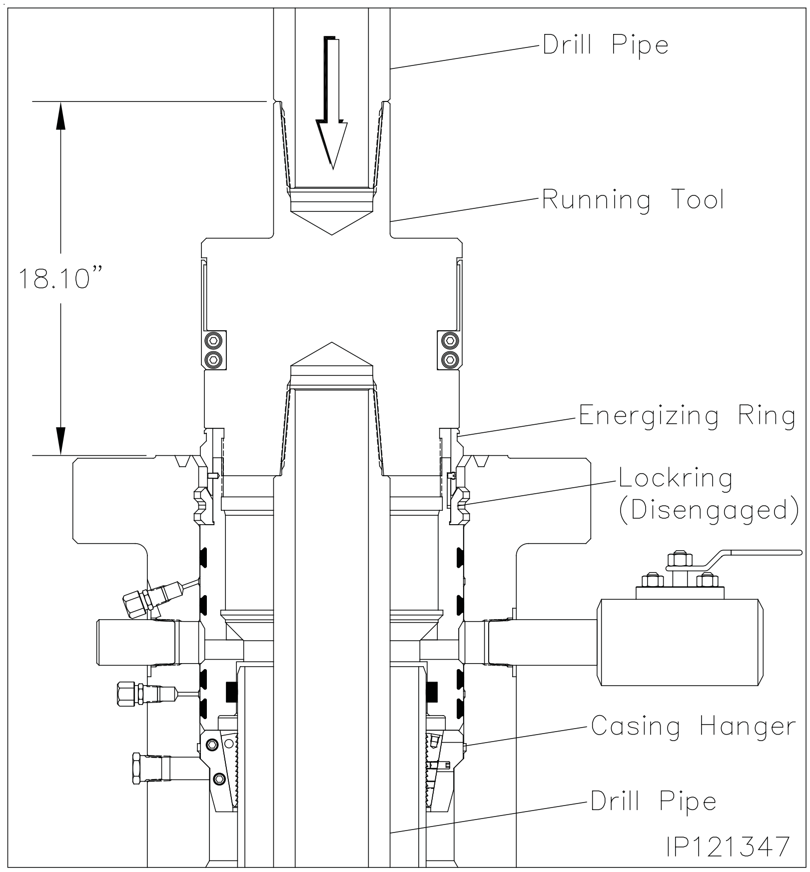
3. Locate the upper and lower seal test fittings on the O.D. of the housing and remove the dust caps from both fittings.

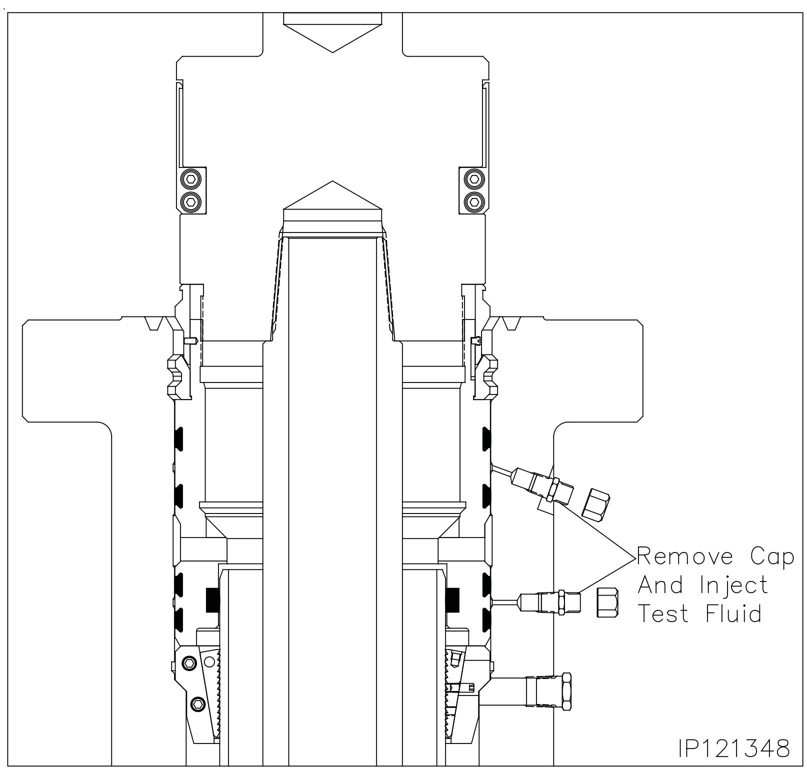
4. Attach a test pump to one of the open fittings and pump clean test fluid between the seals until a stable test pressure of 5,000 psi is attained.

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

6. Repeat steps 3 through 5 for the remaining seal test.

7. After satisfactory test are achieved, bleed off all test pressure, remove test pump and reinstall the dust caps on the open fittings





Stage 4B — Install the 9-5/8” MBU-LR Emergency Packoff

Engaging the Lockring

8. Using only chain tongs, rotate the landing joint approximately 6 turns counter clockwise (Left) to engage the packoff lockring in its mating groove in the bore of the MBU-LR housing.

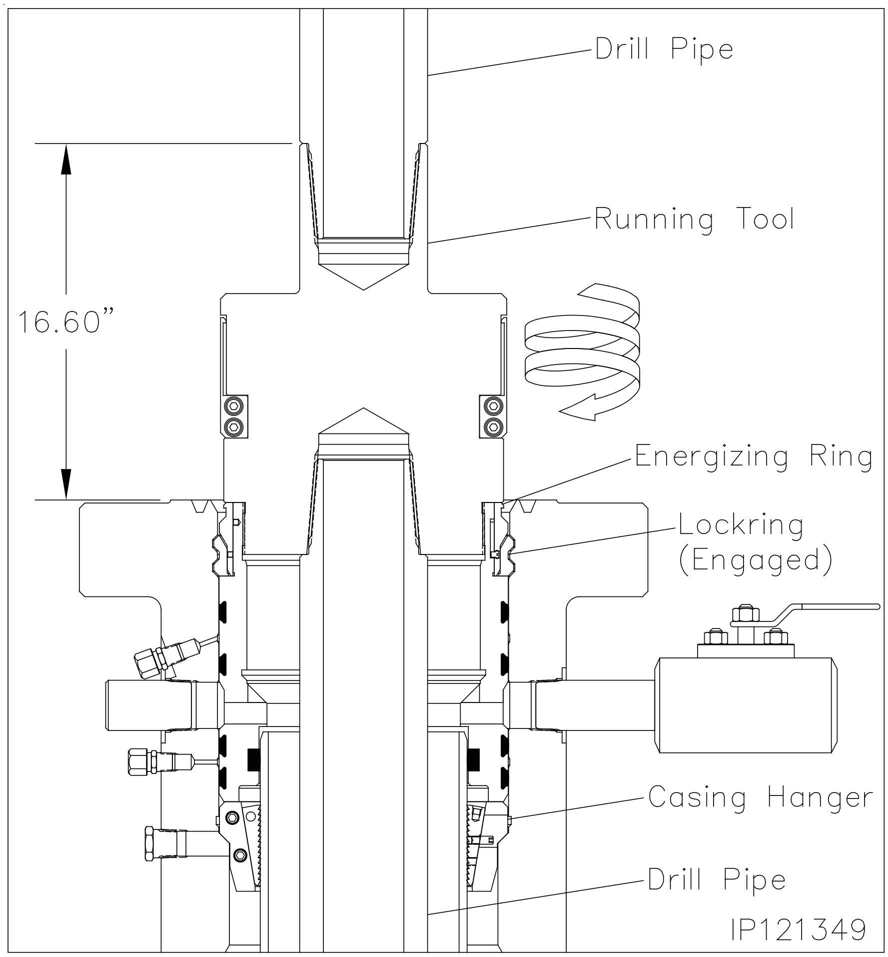
Note: Approximately 800 to 900 ft. lbs. of torque will be required to break over the shear pins in the packoff. The torque will drop off and then increase slightly when the energizing ring pushes the lockring out. A positive stop will be encountered when the lockring is fully engaged.

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

WARNING: If the required turns to engage the lockring or not met or excessive torque is encountered, remove the packoff and call Houston Engineering.

9. Back off the landing joint/running tool approximately three turns. Using the drill pipe elevators, exert a 20,000 lbs. pull on the landing joint.

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



Cactus Wellhead

Stage 4B — Install the 9-5/8” MBU-LR Emergency Packoff

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

Retrieving the Packoff

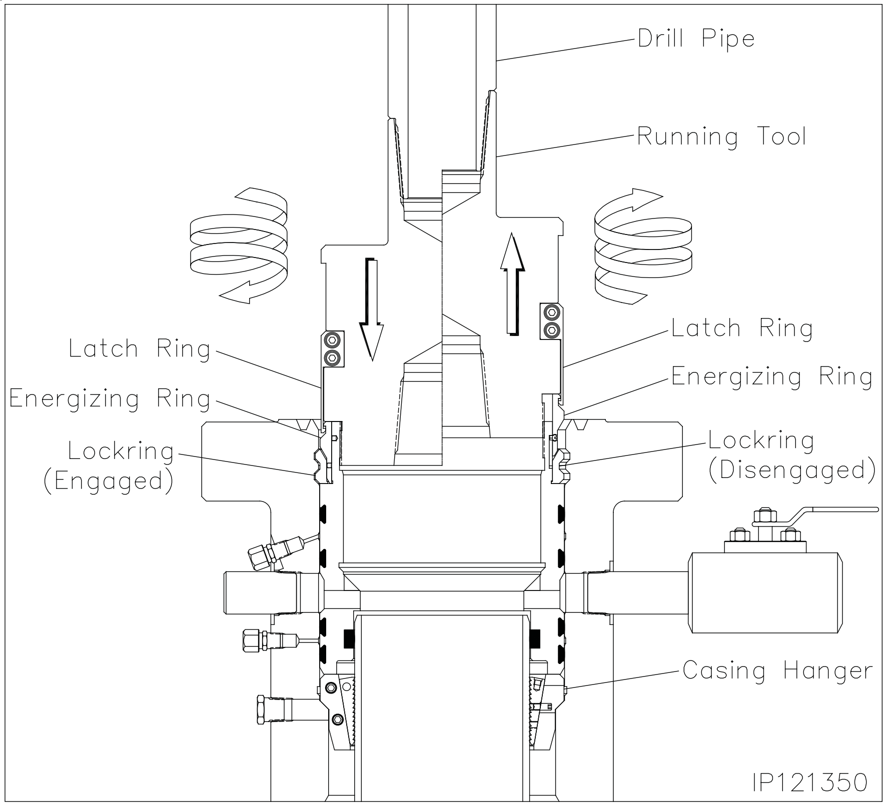
1. Locate the retrieval latch assembly with (4) 1/2” cap screws
2. Install the retrieval latch onto the running tool with the latch fingers facing down and install the cap screws and tighten them securely.
3. Ensure the retrieval latch freely rotates on the running tool actuation sleeve.
4. Carefully lower the running tool into the packoff.
5. Rotate the drill pipe clockwise (Right)to locate the thread start and then counter clockwise (Left) (approximately 10 turns) to a positive stop.

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

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

Warning: Do not exceed the 6-1/2 turns or the packoff may be seriously damaged.

7. Carefully pick up on the drill pipe and remove the packoff from the MBU-LR wellhead with a straight vertical lift.
8. Redress the Packoff and reset as previously outlined.



Stage 5 — Test the BOP Stack

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

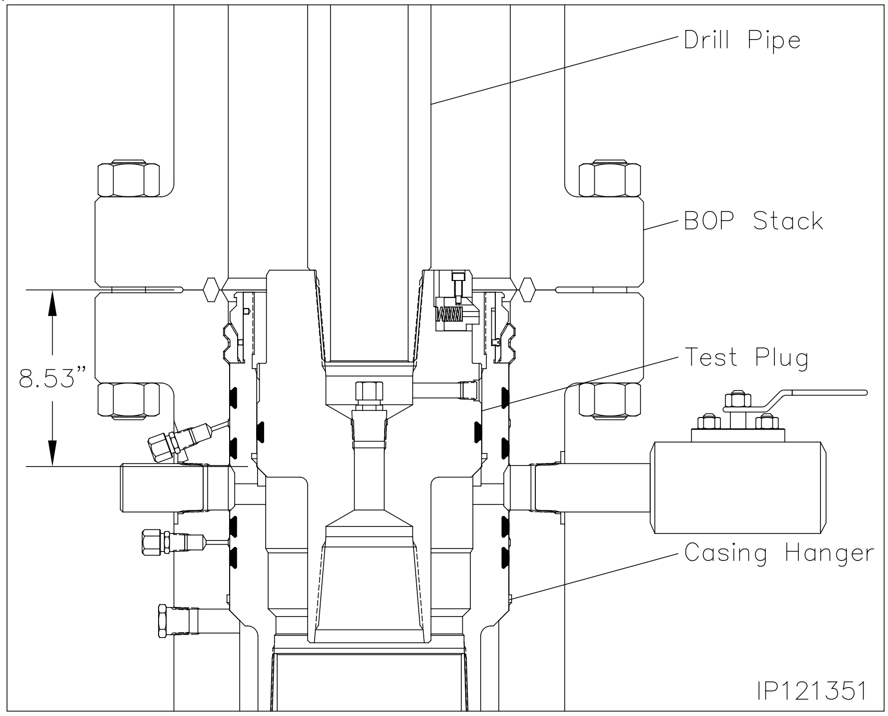
1. Examine the ***11" Nominal x 4-1/2" IF CW Test Plug/Retrieving Tool (Item ST5)***. Verify the following:
   - 1-1/4" VR plug and weep hole plug are in place and tightened securely
   - elastomer seal is in place and in good condition
   - retractable lift lugs are in place, clean, and free to move
   - drill pipe threads are clean and in good condition

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

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

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

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



4. Open the housing upper side outlet valve.

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

6. Carefully lower the test plug through the BOP and land it on the load shoulder in the packoff, 8.53" below the top of the housing.

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

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

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

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

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

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

Stage 6 — Run the Upper Wear Bushing

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

1. Examine the ***13-5/8" x 11" x 9.00" ID MBU-LR-UPR Wear Bushing(Item ST6).*** Verify the following
   - internal bore is clean and in good condition
   - o-ring is in place and in good condition
   - shear o-ring cord is in place and in good condition
   - paint anti-rotation lugs white and allow paint to dry

Run the Wear Bushing Before Drilling

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

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

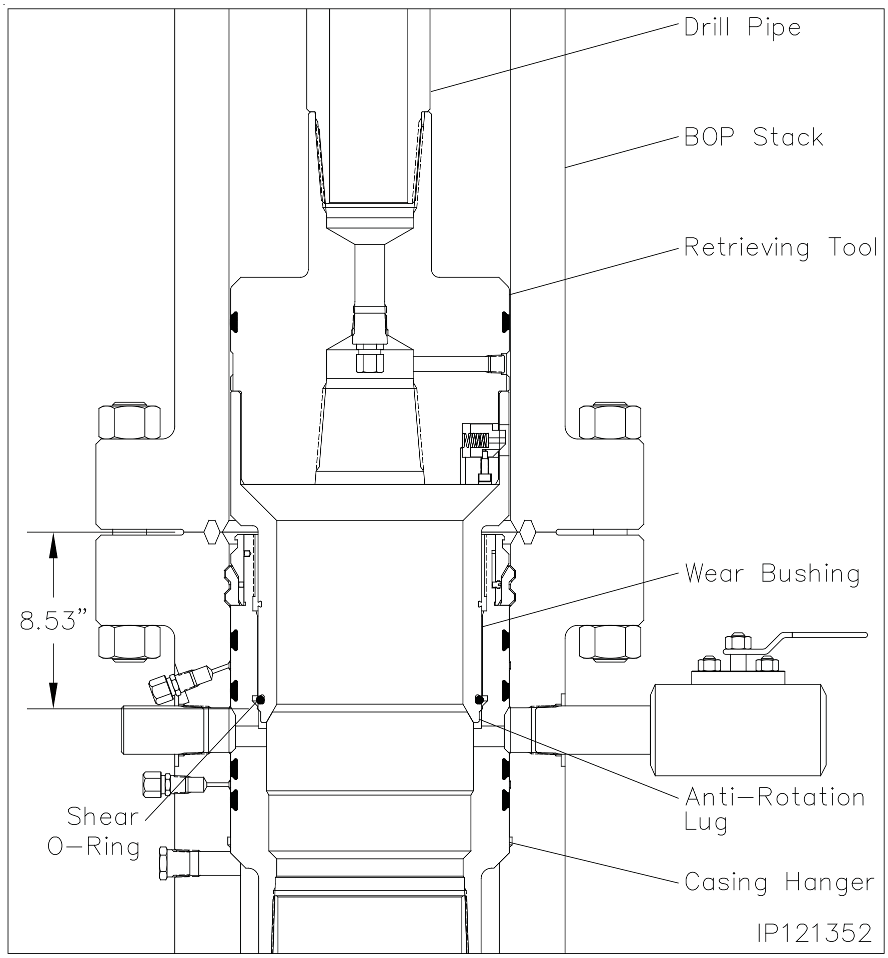
4. Align the retractable lift lugs of the tool with the retrieval holes of the bushing and the carefully lower the tool into the Wear Bushing until the lugs snap into place.

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

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

6. Slowly lower the Tool/Bushing Assembly through the BOP stack and land it on the load shoulder in the packoff, 8.53" below the top of the housing.

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



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

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

9. Drill as required.

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

Retrieve the Wear Bushing After Drilling

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

11. Slowly lower the Tool into the Wear Bushing.

12. Pick up and balance the riser weight.

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

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

Stage 7 — Hang Off the 7" Casing

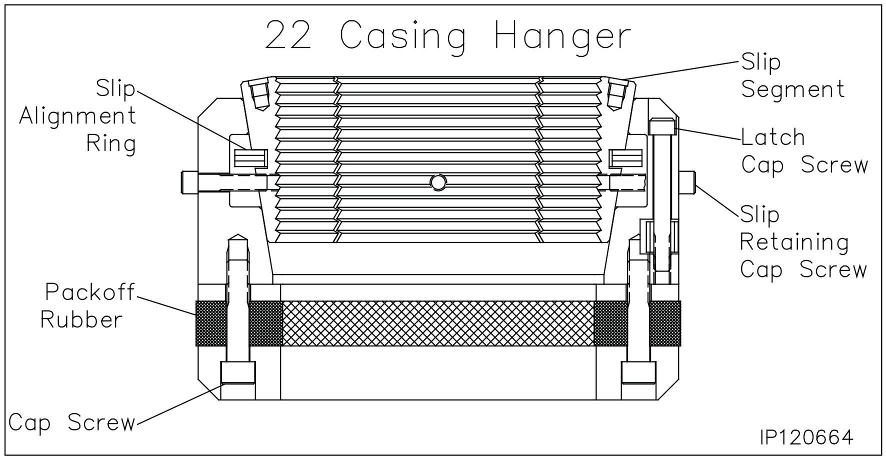
1. Run the 7" casing string as required and cement in place.
2. Drain the housing bowl through the upper side outlet.
3. Separate the BOP from the MBU-LR housing and lift the BOP approximately 14" above the housing and secure BOP with safety slings.
4. Using a fresh water hose, thoroughly wash out the packoff bowl.

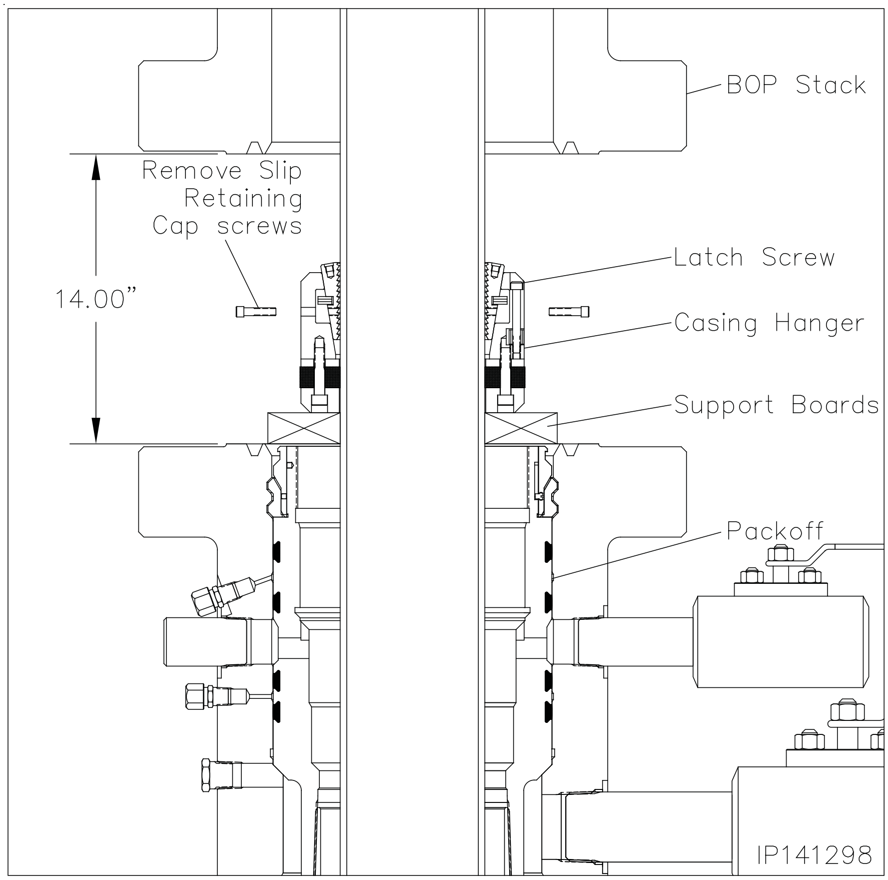
Note: Casing Head side outlet valve to remain open while setting the casing hanger.

5. Examine the ***11" X 7" C22 Casing Hanger (Item B9).*** Verify the following:
   - slips and internal bore are clean and in good condition
   - all screws are in place
   - seal element is in good condition

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

6. Remove the latch screw to open the Hanger.
7. Place two boards on the Casing Head flange against the casing to support the Hanger.
8. Wrap the Hanger around the casing and replace the latch screw.
9. Prepare to lower the Hanger into the Casing Head bowl.
10. Grease the Casing Hanger's body and remove the slip retaining cap screws.





Stage 7 — Hang Off the 7” Casing

11. Remove the boards and allow the Hanger to slide into the packoff bowl. When the Hanger is down, the top of the hanger body will be approximately 2.27” below the top of the housing, pull tension on the casing to the desired hanging weight and then slack off..

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

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

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

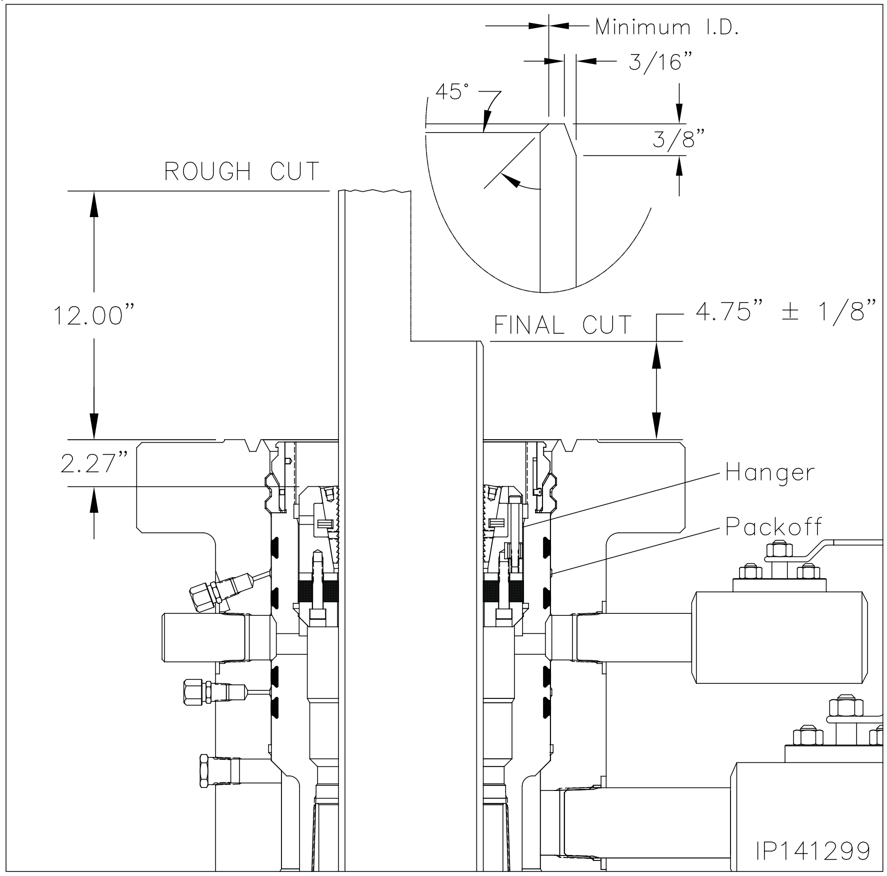
13. Final cut the casing at 4.75” ± 1/8” above the top flange of the housing.

14. Grind the casing stub level and then place a 3/16” x 3/8” bevel on the O.D. and a I.D. chamfer to match the minimum bore of the tubing head to be installed.

15. Using a high pressure water hose thoroughly clean the top of the casing hanger and void area above the hanger. Ensure all cutting debris are removed .

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

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



Cactus Wellhead

Stage 8 — Install the Tubing Head

1. Examine the ***13-5/8" 5M x 7-1/16" 10M CW, CTH-DBLHPS Tubing Head (Item B1).*** Verify the following:
   - seal area and bore are clean and in good condition
   - ***HPS Secondary Seals*** are in place and in good condition
   - all peripheral equipment is intact and undamaged

2. Clean the mating ring grooves of the MBU-LR and Tubing Head.

3. Lightly lubricate the ID of the Tubing Head HPS Seals, and the casing stub with a light grease.

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

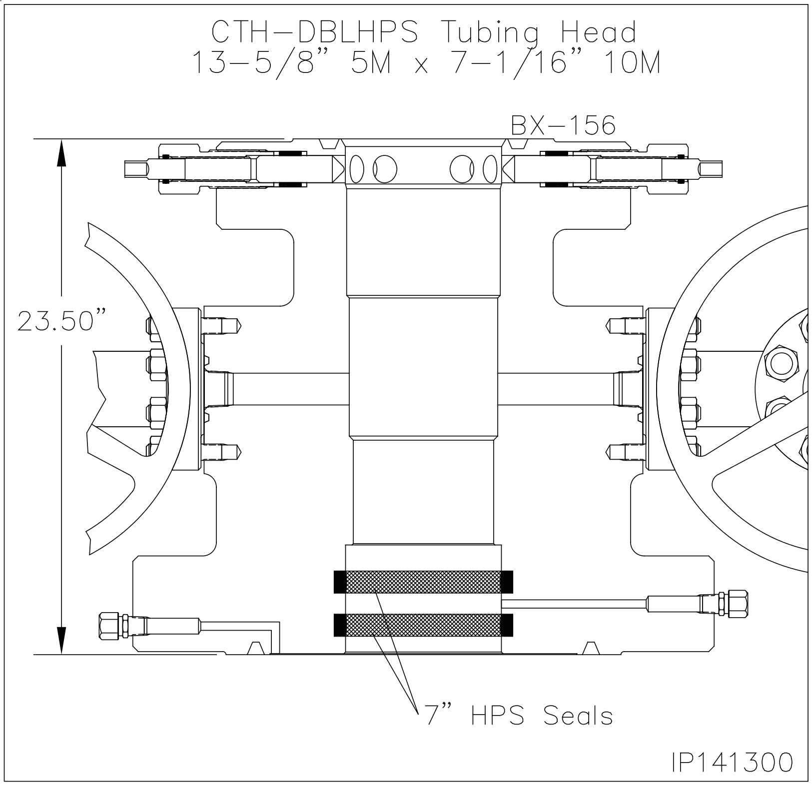
4. Install a new ***BX-160 Ring Gasket (Item B14)*** in the ring groove of the MBU-LR Housing.

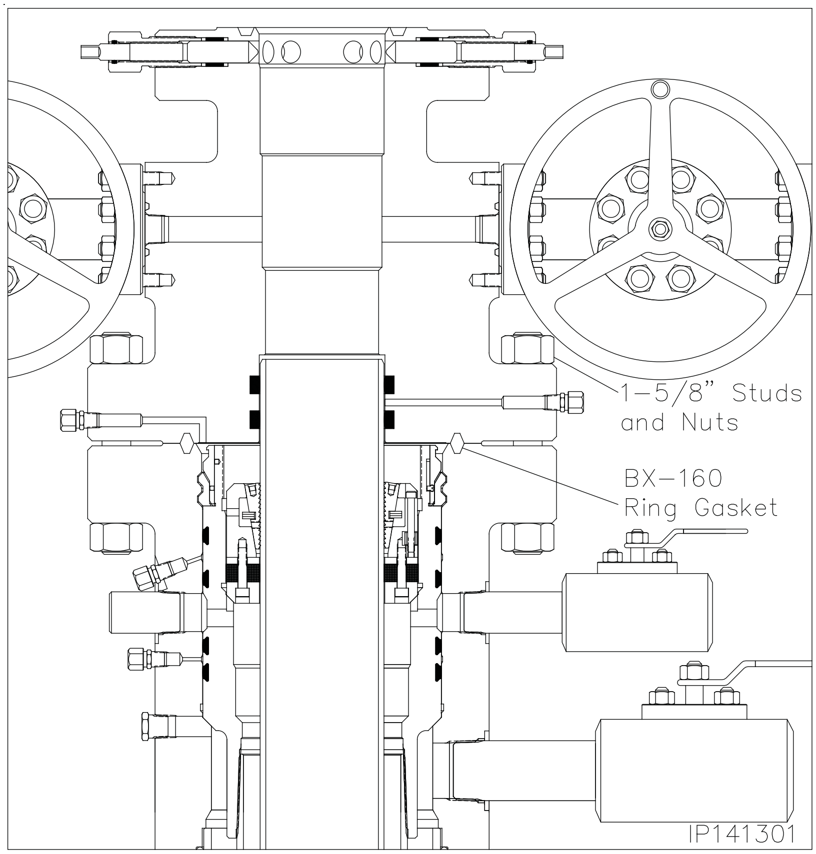
5. Pick up the Tubing Head and suspend it above the MBU-LR Housing and casing stub.

6. Orient the Tubing Head so the outlets are in the proper position and then carefully lower the head and DSPA over the casing stub and land it on the ring gasket.

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

7. Make up the flange connection using the DSPA studs and nuts, tightening them in an alternating cross pattern.





Cactus Wellhead

Stage 8 — Install the Tubing Head

Seal Test

1. Locate the "SEAL TEST" fitting and one of the "FLG TEST" fittings on the Tubing Head and remove the dust cap from both fittings.

2. Attach a Bleeder Tool to the open "FLG TEST" fitting and open the Tool.

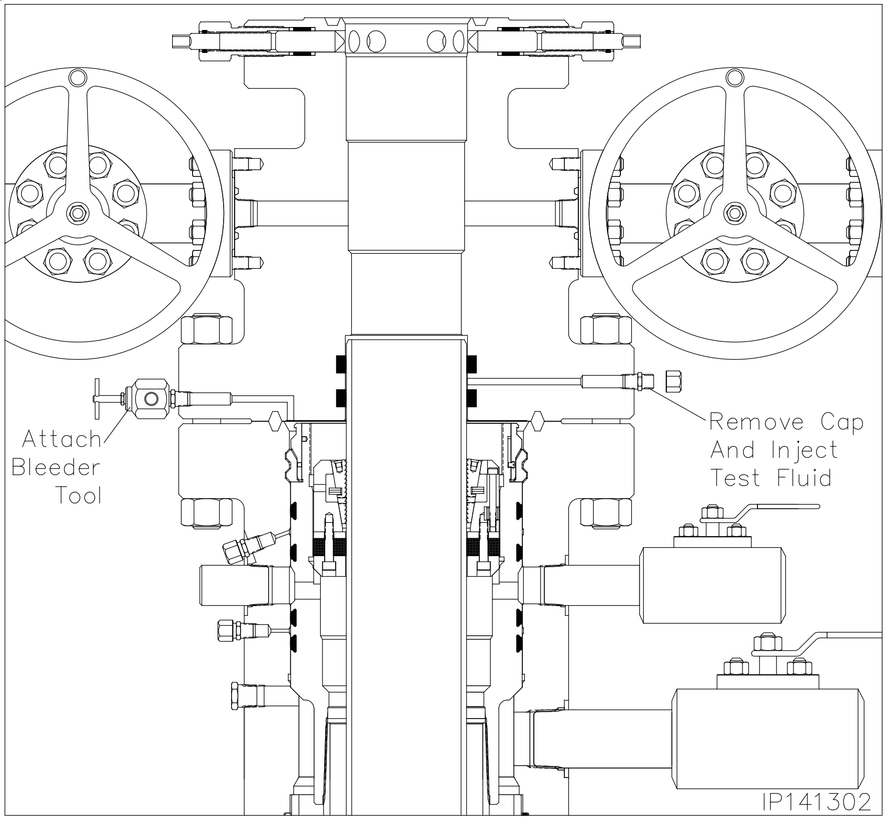
3. Attach a Hydraulic Test Pump to the "SEAL TEST" fitting and pump clean test fluid between the HPS Seals until a test pressure of ***10,000 psi. or 80% of casing collapse — whichever is less***

4. Hold the test pressure for fifteen (15) minutes or as desired by the drilling supervisor.

5. If pressure drops a leak has developed. Take the appropriate action in the table below.

6. Repeat steps 1 - 5 until a satisfactory test is achieved.

7. When a satisfactory test is achieved, remove Test Pump, drain test fluid, and reinstall the dust cap on the open "SEAL TEST" fitting.

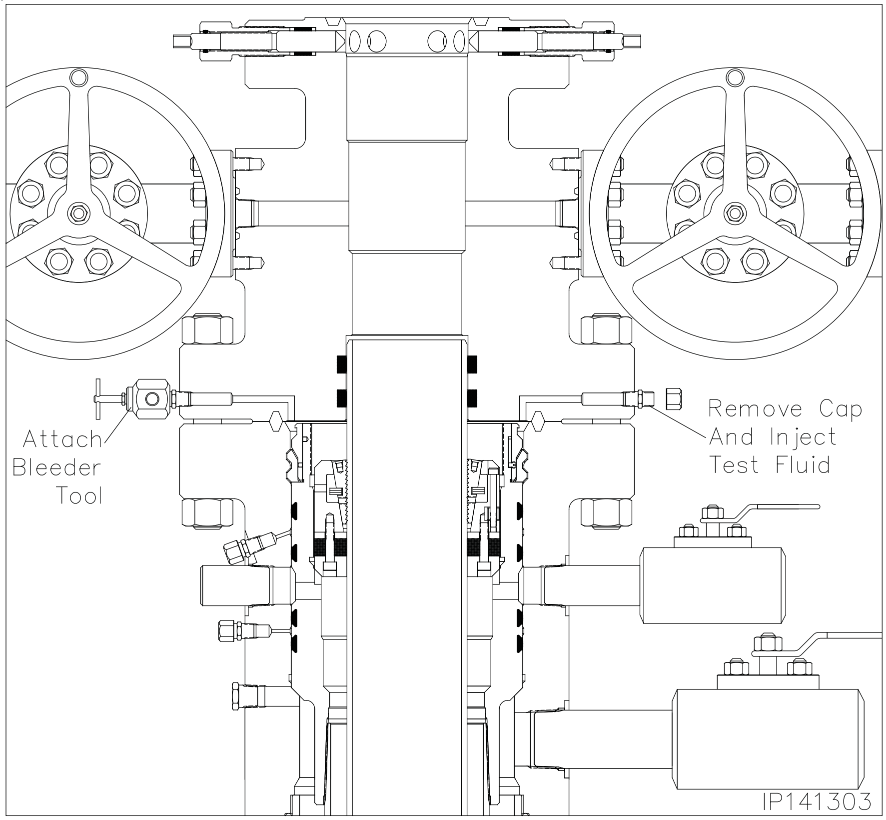


Seal Test	
Leak Location	**Appropriate Action**
Open bleeder tool - Lower HPS seal leaking	Remove Tubing Head and replace leaking seals. Re land and retest seals
Into the Tubing Head bore- Upper HPS Seal is Leaking	

Stage 8 — Install the Tubing Head

Flange Test

1. Locate the remaining "FLG TEST" fitting on the Tubing Head and remove the dust cap from the fitting.
2. Attach a test pump to the open "FLG TEST" fitting and pump clean test fluid into the flange connection until a continuous stream flows from the open "FLG TEST" bleeder tool.
3. Close the bleeder tool and continue pumping test fluid to ***5,000 psi. or 80% of casing collapse — whichever is less.***
4. Hold the test pressure for fifteen (15) minutes or as desired by the drilling supervisor.
5. If pressure drops a leak has developed. Take the appropriate action from the adjacent chart.
6. Repeat steps 1 through 6 until a satisfactory test is achieved.
7. Once a satisfactory test is achieved, remove the test pump and "FLG TEST" bleeder tool, drain test fluid, and reinstall the dust caps on the open fittings.



Flange Test	
Leak Location	**Appropriate Action**
Into casing annulus - casing hanger seal element is leaking	Remove tubing head, spear casing and reset the casing hanger. Redress the casing, reinstall the Tubing Head and retest
Flange connection - Ring gasket is leaking	Further tighten the flange connection

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

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

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

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

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

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

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

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

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

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

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

   a. Wellhead members containing o-rings and other polymeric seals have tight limits on the preheat and interpass temperatures. Those temperatures must be controlled at 200ºF to 325ºF or 93 ºC to 160ºC and closely monitored to prevent damage to the o-ring or seals.

   b. Wellhead members not containing o-rings and other polymeric seals should be maintained at a preheat and interpass temperature of 400ºF to 600ºF or 200ºC to 300ºC.

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

   a. Test ports should be open when welding is performed to prevent pressure buildup within the test cavity.

   b. During welding the temperature of the base metal on either side of the weld should be maintained at 200 to 300°F (93 to 149°C).

   c. Care should be taken to insure that the welding cable is properly grounded to the casing, but ground wire should not be welded to the casing or the wellhead. Ground wire should be firmly clamped to the casing, the wellhead, or fixed in position between pipe slips. Bad contact may cause sparking, with resultant hard spots beneath which incipient cracks may develop. The welding cable should not be grounded to the steel derrick, nor to the rotary-table base.

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

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

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

    a. Wellhead members containing o-rings and other polymeric seals have tight limits on the post-heating temperatures. Those temperatures must be controlled at 250ºF to 300ºF or 120 ºC to 150ºC and closely monitored to prevent damage to the o-ring or seals.

    b. Wellhead members not containing o-rings and other polymeric seals should be post-heated at a temperature of 400ºF to 600ºF or 200ºC to 300ºC.

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

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

Certificate of Conformance

DW INDUSTRIES INC.
6287 Long Drive
Houston, TX 77087
Tel. 713 644-8372 Fax 713-644-4947

Name of Customer:		AUSTIN HOSE		
Purchase Order Information	Purchase Order Number:	4115582	Drawing Reference Number: (Specification)	CUSTOMER SPECIFICATION
	Part Number:	5604-4825S-R35	Age Control:	N/A
	NSN	N/A	Lot Number:	19040198
	Part Description:	HOSE ASSEMBLY	QTY Ordered:	1

I DO HEREBY CERTIFY, AS THE AUTHORIZED REPRESENTATIVE OF DW INDUSTRIES, THAT THE PRODUCT LISTED ABOVE ARE OF THE QUALITY SPECIFIED AND CONFORM TO ALL REQUIREMENTS OF THE PURCHASE ORDER, INCLUDING: QUALITY CONTROL CLAUSES, DESIGN SPECIFICATIONS, DRAWINGS, PRESERVATION, PACKAGING, PACKING, MARKING, AND PHYSICAL IDENTIFICATION REQUIREMENTS AND HAS BEEN PROCESSED IN ACCORDANCE WITH ISO-9001:2015, API Q1 AND API SPEC 7K.

Certificate Issue Date: 04/19/19

Richard Weaver
Quality Assurance,
DW Industries Inc.

Prescott Federal Com #1H, Plan 1

Operator	Mack Energy Corp	**Units**	feet, °/100ft		15:56 Tuesday, January 14, 2025 Page 1 of 4
Field	Round Tank	**County**	Chaves	**Vertical Section Azimuth**	180.65
Well Name	Prescott Federal Com #1H	**State**	New Mexico	**Survey Calculation Method**	Minimum Curvature
Plan	1	**Country**	USA	**Database**	Access

Location	SL: 839 FSL & 2455 FEL Section 19-T15S-R29E BHL: 1 FSL & 2310 FEL Section 30-T15S-R29E			**Map Zone**	UTM	**Lat Long Ref**	
Site				**Surface X**	1926440.3	**Surface Long**	
Slot Name		**UWI**		**Surface Y**	11978563	**Surface Lat**	
Well Number		**API**		**Surface Z**	3749.9	**Global Z Ref**	KB
Project		**MD/TVD Ref**	KB	**Ground Level**	3736	**Local North Ref**	Grid

DIRECTIONAL WELL PLAN

MD*	INC*	AZI*	TVD*	N*	E*	DLS*	V. S.*	MapE*	MapN*	SysTVD*
ft	deg	deg	ft	ft	ft	°/100ft	ft	ft	ft	ft
*** TIE (at MD = 2210.00)										
2210.00	0.00	0.0	2210.00	0.00	0.00		0.00	1926440.30	11978563.00	1539.90
2250.00	0.00	0.0	2250.00	0.00	0.00	0.00	0.00	1926440.30	11978563.00	1499.90
2300.00	0.00	0.0	2300.00	0.00	0.00	0.00	0.00	1926440.30	11978563.00	1449.90
*** KOP 8 DEGREE (at MD = 2310.00)										
2310.00	0.00	0.0	2310.00	0.00	0.00	0.00	0.00	1926440.30	11978563.00	1439.90
2350.00	3.20	168.0	2349.98	-1.09	0.23	8.00	1.09	1926440.53	11978561.91	1399.92
2400.00	7.20	168.0	2399.76	-5.52	1.17	8.00	5.51	1926441.47	11978557.48	1350.14
2450.00	11.20	168.0	2449.11	-13.34	2.84	8.00	13.31	1926443.14	11978549.66	1300.79
2500.00	15.20	168.0	2497.78	-24.51	5.21	8.00	24.45	1926445.51	11978538.49	1252.12
2550.00	19.20	168.0	2545.53	-38.97	8.28	8.00	38.87	1926448.58	11978524.03	1204.37
2600.00	23.20	168.0	2592.14	-56.65	12.04	8.00	56.51	1926452.34	11978506.35	1157.76
2650.00	27.20	168.0	2637.37	-77.47	16.47	8.00	77.28	1926456.77	11978485.53	1112.53
2700.00	31.20	168.0	2681.01	-101.32	21.54	8.00	101.07	1926461.84	11978461.68	1068.89
2750.00	35.20	168.0	2722.84	-128.10	27.23	8.00	127.78	1926467.53	11978434.90	1027.06
2800.00	39.20	168.0	2762.66	-157.66	33.51	8.00	157.27	1926473.81	11978405.34	987.24
2850.00	43.20	168.0	2800.27	-189.87	40.36	8.00	189.40	1926480.66	11978373.13	949.63
2900.00	47.20	168.0	2835.50	-224.57	47.73	8.00	224.01	1926488.03	11978338.43	914.40
2950.00	51.20	168.0	2868.16	-261.58	55.60	8.00	260.93	1926495.90	11978301.42	881.74
*** 55 DEGREE TANGENT (at MD = 2997.50)										
2997.50	55.00	168.0	2896.67	-298.73	63.50	8.00	297.99	1926503.80	11978264.27	853.23
3000.00	55.00	168.0	2898.11	-300.73	63.92	0.00	299.99	1926504.22	11978262.27	851.79
3050.00	55.00	168.0	2926.79	-340.80	72.44	0.00	339.95	1926512.74	11978222.20	823.11
3100.00	55.00	168.0	2955.47	-380.86	80.95	0.00	379.92	1926521.25	11978182.14	794.43
3150.00	55.00	168.0	2984.14	-420.92	89.47	0.00	419.88	1926529.77	11978142.08	765.76
*** 10 DEGREE BUILD (at MD = 3197.50)										
3197.50	55.00	168.0	3011.39	-458.98	97.56	0.00	457.84	1926537.86	11978104.02	738.51
3200.00	55.23	168.1	3012.82	-460.99	97.98	10.00	459.85	1926538.28	11978102.01	737.08
3250.00	59.90	170.2	3039.63	-502.42	105.89	10.00	501.19	1926546.19	11978060.58	710.27
3300.00	64.60	172.2	3062.90	-546.14	112.65	10.00	544.83	1926552.95	11978016.86	687.00
3350.00	69.33	173.9	3082.46	-591.80	118.21	10.00	590.42	1926558.51	11977971.20	667.44
3400.00	74.07	175.6	3098.16	-639.06	122.53	10.00	637.63	1926562.83	11977923.94	651.74
3450.00	78.82	177.2	3109.87	-687.56	125.57	10.00	686.09	1926565.87	11977875.44	640.03
3500.00	83.59	178.7	3117.52	-736.92	127.31	10.00	735.43	1926567.61	11977826.08	632.38
3550.00	88.35	180.3	3121.03	-786.78	127.75	10.00	785.28	1926568.05	11977776.22	628.87
*** LANDING POINT (at MD = 3563.08)										
3563.08	89.60	180.7	3121.26	-799.86	127.64	10.00	798.36	1926567.94	11977763.14	628.64
3600.00	89.60	180.7	3121.52	-836.78	127.23	0.00	835.28	1926567.53	11977726.22	628.38
3650.00	89.60	180.7	3121.87	-886.77	126.66	0.00	885.28	1926566.96	11977676.23	628.03

Prescott Federal Com #1H, Plan 1

Operator	Mack Energy Corp	**Units**	feet, °/100ft		15:56 Tuesday, January 14, 2025 Page 2 of 4
Field	Round Tank	**County**	Chaves	**Vertical Section Azimuth**	180.65
Well Name	Prescott Federal Com #1H	**State**	New Mexico	**Survey Calculation Method**	Minimum Curvature
Plan	1	**Country**	USA	**Database**	Access

Location	SL: 839 FSL & 2455 FEL Section 19-T15S-R29E BHL: 1 FSL & 2310 FEL Section 30-T15S-R29E			**Map Zone**	UTM	**Lat Long Ref**	
Site				**Surface X**	1926440.3	**Surface Long**	
Slot Name		**UWI**		**Surface Y**	11978563	**Surface Lat**	
Well Number		**API**		**Surface Z**	3749.9	**Global Z Ref**	KB
Project		**MD/TVD Ref**	KB	**Ground Level**	3736	**Local North Ref**	Grid

DIRECTIONAL WELL PLAN

MD* ft	INC* deg	AZI* deg	TVD* ft	N* ft	E* ft	DLS* °/100ft	V. S.* ft	MapE* ft	MapN* ft	SysTVD* ft
3700.00	89.60	180.7	3122.22	-936.77	126.09	0.00	935.28	1926566.39	11977626.23	627.68
3750.00	89.60	180.7	3122.57	-986.76	125.52	0.00	985.27	1926565.82	11977576.24	627.33
3800.00	89.60	180.7	3122.92	-1036.76	124.96	0.00	1035.27	1926565.26	11977526.24	626.98
3850.00	89.60	180.7	3123.27	-1086.75	124.39	0.00	1085.27	1926564.69	11977476.25	626.63
3900.00	89.60	180.7	3123.62	-1136.75	123.82	0.00	1135.27	1926564.12	11977426.25	626.28
3950.00	89.60	180.7	3123.96	-1186.74	123.26	0.00	1185.27	1926563.56	11977376.26	625.94
4000.00	89.60	180.7	3124.31	-1236.74	122.69	0.00	1235.27	1926562.99	11977326.26	625.59
4050.00	89.60	180.7	3124.66	-1286.74	122.12	0.00	1285.27	1926562.42	11977276.26	625.24
4100.00	89.60	180.7	3125.01	-1336.73	121.55	0.00	1335.27	1926561.85	11977226.27	624.89
4150.00	89.60	180.7	3125.36	-1386.73	120.99	0.00	1385.26	1926561.29	11977176.27	624.54
4200.00	89.60	180.7	3125.71	-1436.72	120.42	0.00	1435.26	1926560.72	11977126.28	624.19
4250.00	89.60	180.7	3126.06	-1486.72	119.85	0.00	1485.26	1926560.15	11977076.28	623.84
4300.00	89.60	180.7	3126.41	-1536.71	119.28	0.00	1535.26	1926559.58	11977026.29	623.49
4350.00	89.60	180.7	3126.76	-1586.71	118.72	0.00	1585.26	1926559.02	11976976.29	623.14
4400.00	89.60	180.7	3127.11	-1636.70	118.15	0.00	1635.26	1926558.45	11976926.30	622.79
4450.00	89.60	180.7	3127.46	-1686.70	117.58	0.00	1685.26	1926557.88	11976876.30	622.44
4500.00	89.60	180.7	3127.80	-1736.70	117.02	0.00	1735.26	1926557.32	11976826.30	622.10
4550.00	89.60	180.7	3128.15	-1786.69	116.45	0.00	1785.25	1926556.75	11976776.31	621.75
4600.00	89.60	180.7	3128.50	-1836.69	115.88	0.00	1835.25	1926556.18	11976726.31	621.40
4650.00	89.60	180.7	3128.85	-1886.68	115.31	0.00	1885.25	1926555.61	11976676.32	621.05
4700.00	89.60	180.7	3129.20	-1936.68	114.75	0.00	1935.25	1926555.05	11976626.32	620.70
4750.00	89.60	180.7	3129.55	-1986.67	114.18	0.00	1985.25	1926554.48	11976576.33	620.35
4800.00	89.60	180.7	3129.90	-2036.67	113.61	0.00	2035.25	1926553.91	11976526.33	620.00
4850.00	89.60	180.7	3130.25	-2086.66	113.05	0.00	2085.25	1926553.35	11976476.34	619.65
4900.00	89.60	180.7	3130.60	-2136.66	112.48	0.00	2135.25	1926552.78	11976426.34	619.30
4950.00	89.60	180.7	3130.95	-2186.66	111.91	0.00	2185.25	1926552.21	11976376.34	618.95
5000.00	89.60	180.7	3131.30	-2236.65	111.34	0.00	2235.24	1926551.64	11976326.35	618.61
5050.00	89.60	180.7	3131.64	-2286.65	110.78	0.00	2285.24	1926551.08	11976276.35	618.26
5100.00	89.60	180.7	3131.99	-2336.64	110.21	0.00	2335.24	1926550.51	11976226.36	617.91
5150.00	89.60	180.7	3132.34	-2386.64	109.64	0.00	2385.24	1926549.94	11976176.36	617.56
5200.00	89.60	180.7	3132.69	-2436.63	109.08	0.00	2435.24	1926549.38	11976126.37	617.21
5250.00	89.60	180.7	3133.04	-2486.63	108.51	0.00	2485.24	1926548.81	11976076.37	616.86
5300.00	89.60	180.7	3133.39	-2536.62	107.94	0.00	2535.24	1926548.24	11976026.38	616.51
5350.00	89.60	180.7	3133.74	-2586.62	107.37	0.00	2585.24	1926547.67	11975976.38	616.16
5400.00	89.60	180.7	3134.09	-2636.62	106.81	0.00	2635.23	1926547.11	11975926.38	615.81
5450.00	89.60	180.7	3134.44	-2686.61	106.24	0.00	2685.23	1926546.54	11975876.39	615.46
5500.00	89.60	180.7	3134.79	-2736.61	105.67	0.00	2735.23	1926545.97	11975826.39	615.11

Prescott Federal Com #1H, Plan 1

Operator	Mack Energy Corp	**Units**	feet, °/100ft		15:56 Tuesday, January 14, 2025 Page 3 of 4
Field	Round Tank	**County**	Chaves	**Vertical Section Azimuth**	180.65
Well Name	Prescott Federal Com #1H	**State**	New Mexico	**Survey Calculation Method**	Minimum Curvature
Plan	1	**Country**	USA	**Database**	Access

Location	SL: 839 FSL & 2455 FEL Section 19-T15S-R29E BHL: 1 FSL & 2310 FEL Section 30-T15S-R29E			**Map Zone**	UTM	**Lat Long Ref**	
Site				**Surface X**	1926440.3	**Surface Long**	
Slot Name		**UWI**		**Surface Y**	11978563	**Surface Lat**	
Well Number		**API**		**Surface Z**	3749.9	**Global Z Ref**	KB
Project		**MD/TVD Ref**	KB	**Ground Level**	3736	**Local North Ref**	Grid

DIRECTIONAL WELL PLAN

MD* ft	INC* deg	AZI* deg	TVD* ft	N* ft	E* ft	DLS* °/100ft	V. S.* ft	MapE* ft	MapN* ft	SysTVD* ft
5550.00	89.60	180.7	3135.13	-2786.60	105.10	0.00	2785.23	1926545.40	11975776.40	614.77
5600.00	89.60	180.7	3135.48	-2836.60	104.54	0.00	2835.23	1926544.84	11975726.40	614.42
5650.00	89.60	180.7	3135.83	-2886.59	103.97	0.00	2885.23	1926544.27	11975676.41	614.07
5700.00	89.60	180.7	3136.18	-2936.59	103.40	0.00	2935.23	1926543.70	11975626.41	613.72
5750.00	89.60	180.7	3136.53	-2986.58	102.84	0.00	2985.23	1926543.14	11975576.42	613.37
5800.00	89.60	180.7	3136.88	-3036.58	102.27	0.00	3035.22	1926542.57	11975526.42	613.02
5850.00	89.60	180.7	3137.23	-3086.58	101.70	0.00	3085.22	1926542.00	11975476.42	612.67
5900.00	89.60	180.7	3137.58	-3136.57	101.13	0.00	3135.22	1926541.43	11975426.43	612.32
5950.00	89.60	180.7	3137.93	-3186.57	100.57	0.00	3185.22	1926540.87	11975376.43	611.97
6000.00	89.60	180.7	3138.28	-3236.56	100.00	0.00	3235.22	1926540.30	11975326.44	611.62
6050.00	89.60	180.7	3138.63	-3286.56	99.43	0.00	3285.22	1926539.73	11975276.44	611.27
6100.00	89.60	180.7	3138.97	-3336.55	98.87	0.00	3335.22	1926539.17	11975226.45	610.93
6150.00	89.60	180.7	3139.32	-3386.55	98.30	0.00	3385.22	1926538.60	11975176.45	610.58
6200.00	89.60	180.7	3139.67	-3436.54	97.73	0.00	3435.21	1926538.03	11975126.46	610.23
6250.00	89.60	180.7	3140.02	-3486.54	97.16	0.00	3485.21	1926537.46	11975076.46	609.88
6300.00	89.60	180.7	3140.37	-3536.54	96.60	0.00	3535.21	1926536.90	11975026.46	609.53
6350.00	89.60	180.7	3140.72	-3586.53	96.03	0.00	3585.21	1926536.33	11974976.47	609.18
6400.00	89.60	180.7	3141.07	-3636.53	95.46	0.00	3635.21	1926535.76	11974926.47	608.83
6450.00	89.60	180.7	3141.42	-3686.52	94.90	0.00	3685.21	1926535.20	11974876.48	608.48
6500.00	89.60	180.7	3141.77	-3736.52	94.33	0.00	3735.21	1926534.63	11974826.48	608.13
6550.00	89.60	180.7	3142.12	-3786.51	93.76	0.00	3785.21	1926534.06	11974776.49	607.78
6600.00	89.60	180.7	3142.47	-3836.51	93.19	0.00	3835.21	1926533.49	11974726.49	607.44
6650.00	89.60	180.7	3142.81	-3886.50	92.63	0.00	3885.20	1926532.93	11974676.50	607.09
6700.00	89.60	180.7	3143.16	-3936.50	92.06	0.00	3935.20	1926532.36	11974626.50	606.74
6750.00	89.60	180.7	3143.51	-3986.50	91.49	0.00	3985.20	1926531.79	11974576.50	606.39
6800.00	89.60	180.7	3143.86	-4036.49	90.92	0.00	4035.20	1926531.22	11974526.51	606.04
6850.00	89.60	180.7	3144.21	-4086.49	90.36	0.00	4085.20	1926530.66	11974476.51	605.69
6900.00	89.60	180.7	3144.56	-4136.48	89.79	0.00	4135.20	1926530.09	11974426.52	605.34
6950.00	89.60	180.7	3144.91	-4186.48	89.22	0.00	4185.20	1926529.52	11974376.52	604.99
7000.00	89.60	180.7	3145.26	-4236.47	88.66	0.00	4235.20	1926528.96	11974326.53	604.64
7050.00	89.60	180.7	3145.61	-4286.47	88.09	0.00	4285.19	1926528.39	11974276.53	604.29
7100.00	89.60	180.7	3145.96	-4336.46	87.52	0.00	4335.19	1926527.82	11974226.54	603.94
7150.00	89.60	180.7	3146.30	-4386.46	86.95	0.00	4385.19	1926527.25	11974176.54	603.60
7200.00	89.60	180.7	3146.65	-4436.46	86.39	0.00	4435.19	1926526.69	11974126.54	603.25
7250.00	89.60	180.7	3147.00	-4486.45	85.82	0.00	4485.19	1926526.12	11974076.55	602.90
7300.00	89.60	180.7	3147.35	-4536.45	85.25	0.00	4535.19	1926525.55	11974026.55	602.55
7350.00	89.60	180.7	3147.70	-4586.44	84.69	0.00	4585.19	1926524.99	11973976.56	602.20

Prescott Federal Com #1H, Plan 1

Operator	Mack Energy Corp	**Units**	feet, °/100ft	15:56 Tuesday, January 14, 2025	Page 4 of 4
Field	Round Tank	**County**	Chaves	**Vertical Section Azimuth**	180.65
Well Name	Prescott Federal Com #1H	**State**	New Mexico	**Survey Calculation Method**	Minimum Curvature
Plan	1	**Country**	USA	**Database**	Access

Location	SL: 839 FSL & 2455 FEL Section 19-T15S-R29E BHL: 1 FSL & 2310 FEL Section 30-T15S-R29E			**Map Zone**	UTM	**Lat Long Ref**	
Site				**Surface X**	1926440.3	**Surface Long**	
Slot Name		**UWI**		**Surface Y**	11978563	**Surface Lat**	
Well Number		**API**		**Surface Z**	3749.9	**Global Z Ref**	KB
Project		**MD/TVD Ref**	KB	**Ground Level**	3736	**Local North Ref**	Grid

DIRECTIONAL WELL PLAN

MD* ft	INC* deg	AZI* deg	TVD* ft	N* ft	E* ft	DLS* °/100ft	V. S.* ft	MapE* ft	MapN* ft	SysTVD* ft
7400.00	89.60	180.7	3148.05	-4636.44	84.12	0.00	4635.19	1926524.42	11973926.56	601.85
7450.00	89.60	180.7	3148.40	-4686.43	83.55	0.00	4685.18	1926523.85	11973876.57	601.50
7500.00	89.60	180.7	3148.75	-4736.43	82.98	0.00	4735.18	1926523.28	11973826.57	601.15
7550.00	89.60	180.7	3149.10	-4786.42	82.42	0.00	4785.18	1926522.72	11973776.58	600.80
7600.00	89.60	180.7	3149.45	-4836.42	81.85	0.00	4835.18	1926522.15	11973726.58	600.45
7650.00	89.60	180.7	3149.80	-4886.42	81.28	0.00	4885.18	1926521.58	11973676.58	600.10
7700.00	89.60	180.7	3150.14	-4936.41	80.71	0.00	4935.18	1926521.01	11973626.59	599.76
7750.00	89.60	180.7	3150.49	-4986.41	80.15	0.00	4985.18	1926520.45	11973576.59	599.41
7800.00	89.60	180.7	3150.84	-5036.40	79.58	0.00	5035.18	1926519.88	11973526.60	599.06
7850.00	89.60	180.7	3151.19	-5086.40	79.01	0.00	5085.17	1926519.31	11973476.60	598.71
7900.00	89.60	180.7	3151.54	-5136.39	78.45	0.00	5135.17	1926518.75	11973426.61	598.36
7950.00	89.60	180.7	3151.89	-5186.39	77.88	0.00	5185.17	1926518.18	11973376.61	598.01
8000.00	89.60	180.7	3152.24	-5236.38	77.31	0.00	5235.17	1926517.61	11973326.62	597.66
8050.00	89.60	180.7	3152.59	-5286.38	76.74	0.00	5285.17	1926517.04	11973276.62	597.31
8100.00	89.60	180.7	3152.94	-5336.38	76.18	0.00	5335.17	1926516.48	11973226.62	596.96
8150.00	89.60	180.7	3153.29	-5386.37	75.61	0.00	5385.17	1926515.91	11973176.63	596.61
8200.00	89.60	180.7	3153.64	-5436.37	75.04	0.00	5435.17	1926515.34	11973126.63	596.27
8250.00	89.60	180.7	3153.98	-5486.36	74.48	0.00	5485.16	1926514.78	11973076.64	595.92
8300.00	89.60	180.7	3154.33	-5536.36	73.91	0.00	5535.16	1926514.21	11973026.64	595.57
8350.00	89.60	180.7	3154.68	-5586.35	73.34	0.00	5585.16	1926513.64	11972976.65	595.22
8400.00	89.60	180.7	3155.03	-5636.35	72.77	0.00	5635.16	1926513.07	11972926.65	594.87
8450.00	89.60	180.7	3155.38	-5686.35	72.21	0.00	5685.16	1926512.51	11972876.66	594.52
8500.00	89.60	180.7	3155.73	-5736.34	71.64	0.00	5735.16	1926511.94	11972826.66	594.17
8550.00	89.60	180.7	3156.08	-5786.34	71.07	0.00	5785.16	1926511.37	11972776.66	593.82
8600.00	89.60	180.7	3156.43	-5836.33	70.51	0.00	5835.16	1926510.81	11972726.67	593.47
8650.00	89.60	180.7	3156.78	-5886.33	69.94	0.00	5885.16	1926510.24	11972676.67	593.12
8700.00	89.60	180.7	3157.13	-5936.32	69.37	0.00	5935.15	1926509.67	11972626.68	592.77
8750.00	89.60	180.7	3157.47	-5986.32	68.80	0.00	5985.15	1926509.10	11972576.68	592.43
8800.00	89.60	180.7	3157.82	-6036.31	68.24	0.00	6035.15	1926508.54	11972526.69	592.08
8850.00	89.60	180.7	3158.17	-6086.31	67.67	0.00	6085.15	1926507.97	11972476.69	591.73
*** TD (at MD = 8863.08)										
8863.08	89.60	180.7	3158.26	-6099.39	67.52	0.00	6098.23	1926507.82	11972463.61	591.64

PECOS DISTRICT
DRILLING OPERATIONS
CONDITIONS OF APPROVAL

OPERATOR'S NAME:	**Mack Energy Corporation**
LEASE NO.:	**NMNM-132674**
WELL NAME & NO.:	**Prescott Federal Com 1H**
SURFACE HOLE FOOTAGE:	**0839' FSL & 2455' FEL**
BOTTOM HOLE FOOTAGE	**0001' FSL & 2310' FEL Sec. 30, T. 15 S., R 29 E.**
LOCATION:	**Section 19, T. 15 S., R 29 E., NMPM**
COUNTY:	**Chaves County, New Mexico**

Communitization Agreement

· The operator will submit a Communitization Agreement to the Roswell Field Office, 2909 West 2nd Street Roswell, New Mexico 88220, at least 90 days before the anticipated date of first production from a well subject to a spacing order issued by the New Mexico Oil Conservation Division. The Communitization Agreement will include the signatures of all working interest owners in all Federal and Indian leases subject to the Communitization Agreement (i.e., operating rights owners and lessees of record), or certification that the operator has obtained the written signatures of all such owners and will make those signatures available to the BLM immediately upon request.

· If the operator does not comply with this condition of approval, the BLM may take enforcement actions that include, but are not limited to, those specified in 43 CFR 3163.1.

· In addition, the well sign shall include the surface and bottom hole lease numbers. When the Communitization Agreement number is known, it shall also be on the sign.

The Gamma Ray and Neutron well logs must be run from total depth to surface and e-mailed to McKitric Wier at mwier@blm.gov or hard copy mailed to 2909 West Second Street Roswell, NM 88201 to his attention.

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 hours cll (575) 627-0205.

A. Hydrogen Sulfide

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

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

3. Floor controls are required for 3M or Greater systems. These controls will be on the rig floor, unobstructed, readily accessible to the driller and will be operational at all times during drilling and/or completion activities. Rig floor is defined as the area immediately around the rotary table; the area immediately above the substructure on which the draw works is located, this does not include the dog house or stairway area.
4. **The record of the drilling rate along with the GR/N well log run from TD to surface (horizontal well – vertical portion of hole) shall be submitted to the BLM office as well as all other logs run on the borehole 30 days from completion. If available, a digital copy of the logs is to be submitted in addition to the paper copies. The Rustler top and top and bottom of Salt are to be recorded on the Completion Report.**

B. CASING

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

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.

Approval Date: 04/08/2025

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

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

High Cave/Karst
Possibility of water flows in the Rustler, Queen, Salado and Artesia Group.
Possibility of lost circulation in the Rustler, Artesia Group, and San Andres.

1. The **13-3/8** inch surface casing shall be set at approximately **210** feet (a minimum of 25 feet into the Rustler Anhydrite and above the salt) and cemented to the surface. **If salt is encountered, set casing at least 25 feet above the salt.**

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

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

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

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.

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

3. The minimum required fill of cement behind the **7 X 5-1/2** inch production casing is:

Option #1:

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

Option #2:

Operator has proposed DV tool at depth of 1400', but will adjust cement proportionately if moved. DV tool shall be set a minimum of 50' below previous shoe and a minimum of 200' above current shoe. Operator shall submit sundry if DV tool depth cannot be set in this range. If an ECP is used, it is to be set a minimum of 50' below the shoe to provide cement across the shoe. If it cannot be set below the shoe, a CBL shall be run to verify cement coverage.

a. First stage to DV tool:

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

b. Second stage above DV tool:

☒ Cement to surface. If cement does not circulate, contact the appropriate BLM office. **Excess calculates to 16% - Additional cement maybe required.**

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

C. PRESSURE CONTROL

1. Variance approved to use flex line from BOP to choke manifold. Check condition of flexible line from BOP to choke manifold, replace if exterior is damaged or if line fails test. Line to be as straight as possible with no hard bends and is to be anchored according to Manufacturer's requirements. The flexible hose can be exchanged with a hose of equal size and equal or greater pressure rating. **Anchor requirements, specification sheet and hydrostatic pressure test certification matching the hose in service, to be onsite for review. These documents shall be posted in the company man's trailer and on the rig floor.** If the BLM inspector questions the straightness of the hose, a BLM engineer will be contacted and will review in the field or via picture supplied by inspector to determine if changes are required (operator shall expect delays if this occurs).

Approval Date: 04/08/2025

2. **Operator has proposed a multi-bowl wellhead assembly. This assembly will only be tested when installed on the surface casing. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the surface casing shoe shall be 3000 (3M) psi (testing to 2,000 psi).**
    a. **Wellhead shall be installed by manufacturer's representatives, submit documentation with subsequent sundry.**
    b. **If the welding is performed by a third party, the manufacturer's representative shall monitor the temperature to verify that it does not exceed the maximum temperature of the seal.**
    c. **Manufacturer representative shall install the test plug for the initial BOP test.**
    d. **Operator shall perform the intermediate casing integrity test to 70% of the casing burst. This will test the multi-bowl seals.**
    e. **If the cement does not circulate and one inch operations would have been possible with a standard wellhead, the well head shall be cut off, cementing operations performed and another wellhead installed.**

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

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

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

 Approval Date: 04/08/2025

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

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

D. DRILL STEM TEST

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

E. WASTE MATERIAL AND FLUIDS

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

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

JAM 03282025

Approval Date: 04/08/2025

Attached to Form 3160-3
Mack Energy Corporation
Prescott Federal Com #1H NMNM-132674
SHL : 839 FSL & 2455 FEL, SWSE, Sec. 19 T15S R29E
BHL : 1 FSL & 2310 FEL, SWSE, Sec. 30 T15S R29E
Chaves County, NM

Mack Energy Corporation
Onshore Order #6
Hydrogen Sulfide Drilling Operation Plan

I. HYDROGEN SULFIDE TRAINING

All personnel, whether regularly assigned, contracted, or employed on an unscheduled basis, will receive training from a qualified instructor in the following areas prior to commencing drilling operations on this well:

1. The hazards an characteristics of hydrogen sulfide (H2S)
2. The proper use and maintenance of personal protective equipment and life support systems.
3. The proper use of H2S detectors alarms warning systems, briefing areas, evacuation procedures, and prevailing winds.
4. The proper techniques for first aid and rescue procedures.

In addition, supervisory personnel will be trained in the following areas:

1. The effects of H2S on metal components. If high tensile tubular are to be used, personnel well be trained in their special maintenance requirements.
2. Corrective action and shut-in procedures when drilling or reworking a well and blowout prevention and well control procedures.
3. The contents and requirements of the H2S Drilling Operations Plan and Public Protection Plan.

There will be an initial training session just prior to encountering a known or probable H2S zone (within 3 days or 500 feet) and weekly H2S and well control drills for all personnel in each crew. The initial training session shall include a review of the site specific H2S Drilling Operations Plan and the Public Protection Plan. **The concentrations of H2S of wells in this area from surface to TD are low enough that a contingency plan is not required.**

II. H2S SAFETY EQUIPMENT AND SYSTEMS

Note: All H2S safety equipment and systems will be installed, tested, and operational when drilling reaches a depth of 500 feet above, or three days prior to penetrating the first zone containing or reasonable expected to contain H2S.

1. Well Control Equipment:

A. Flare line.
B. Choke manifold.
C. Blind rams and pipe rams to accommodate all pipe sizes with properly sized closing unit.
D. Auxiliary equipment may include if applicable: annular preventer & rotating head.

2. Protective equipment for essential personnel:

A. Mark II Survive air 30-minute units located in the doghouse and at briefing areas, as indicated on well site diagram.

3. H2S detection and monitoring equipment:

A. 1 portable H2S monitors positioned on location for best coverage and response. These units have warning lights and audible sirens when H2S levels of 20 PPM are reached.

4. Visual warning systems:

A. Wind direction indicators as shown on well site diagram (Exhibit #8).
B. Caution/Danger signs (Exhibit #7) shall be posted on roads providing direct access to location. Signs will be painted a high visibility yellow with black lettering of sufficient size to be readable at a reasonable distance from the immediate location. Bilingual signs will be used, when appropriate. See example attached.

5. Mud program:

A. The mud program has been designed to minimize the volume of H2S circulated to surface. Proper mud weight, safe drilling practices and the use of H2S scavengers will minimize hazards when penetrating H2S bearing zones.

6. Metallurgy:

A. All drill strings, casings, tubing, wellhead, blowout preventer, drilling spool, kill lines, choke manifold and lines, and valves shall be suitable for H2S service.
B. All elastomers used for packing and seals shall be H2S trim.

7. Communication:

A. Radio communications in company vehicles including cellular telephone and 2-way radio.
B. Land line (telephone) communication at Office.

8. Well testing:

A. Drill stem testing will be performed with a minimum number of personnel in the immediate vicinity, which are necessary to safely and adequately conduct the test. The drill stem testing will be conducted during daylight hours and formation fluids will not be flowed to the surface. All drill-stem-testing operations conducted in an H2S environment will use the closed chamber method of testing.

Attached to Form 3160-3
Mack Energy Corporation
Prescott Federal Com #1H NMNM-132674
SHL : 839 FSL & 2455 FEL, SWSE, Sec. 19 T15S R29E
BHL : 1 FSL & 2310 FEL, SWSE, Sec. 30 T15S R29E
Chaves County, NM

B. There will be no drill stem testing.

EXHIBIT #7

WARNING

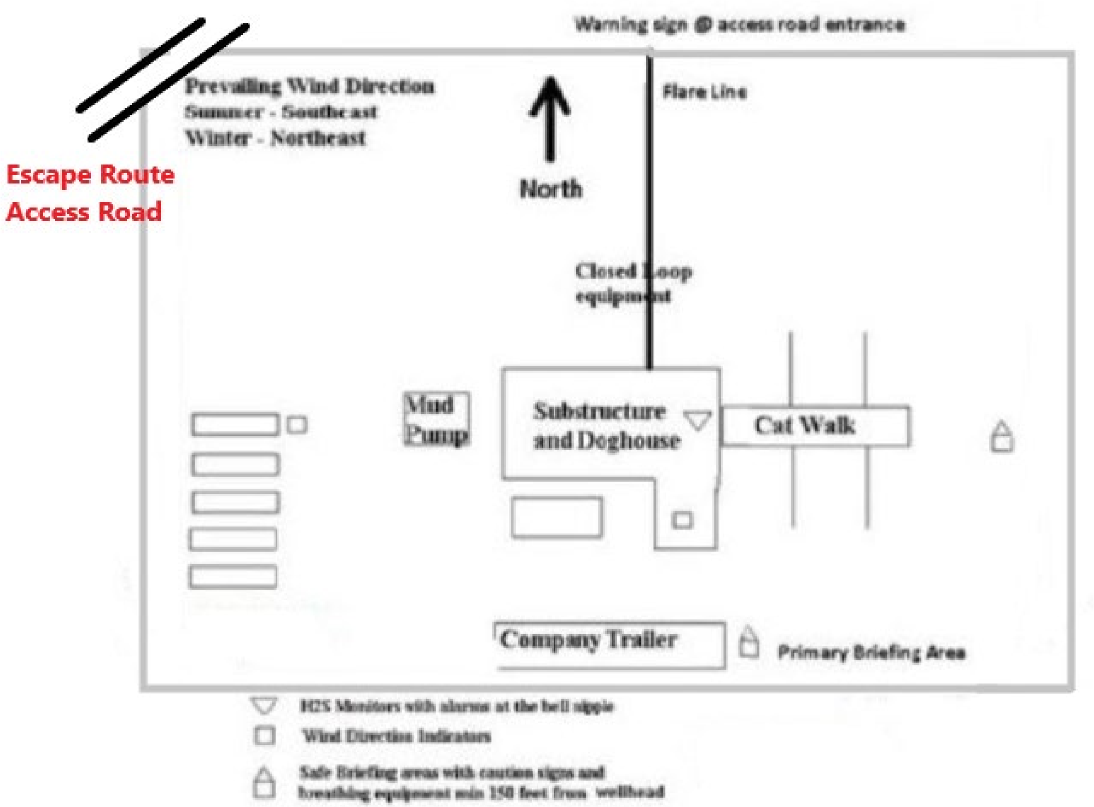
YOU ARE ENTERING AN H2S

AUTHORIZED PERSONNEL ONLY

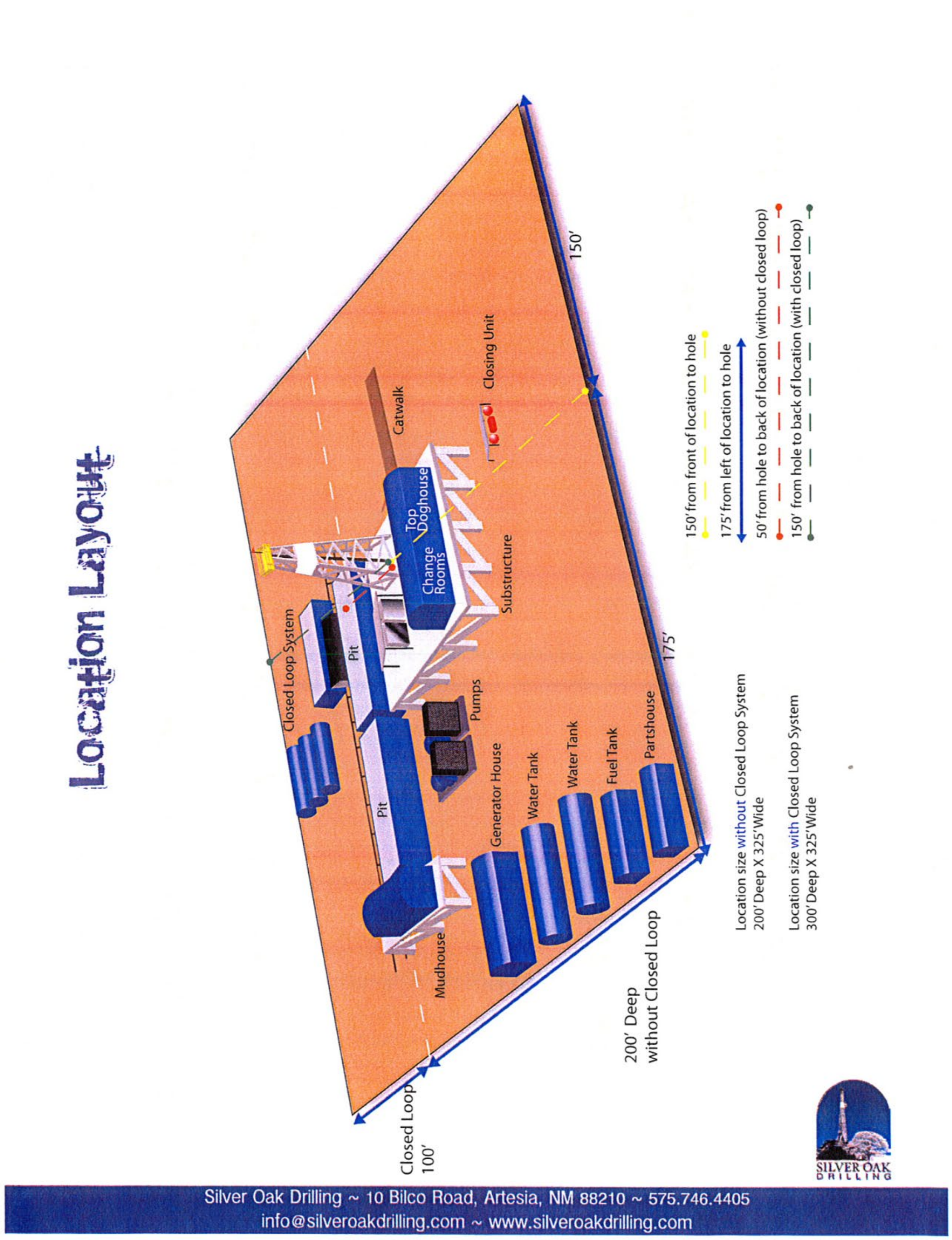
1. BEARDS OR CONTACT LENSES NOT ALLOWED
2. HARD HATS REQUIRED
3. SMOKING IN DESIGNATED AREAS ONLY
4. BE WIND CONSCIOUS AT ALL TIMES
5. CHECK WITH MACK ENERGY FOREMAN AT OFFICE

MACK ENERGY CORPORATION

1-575-748-1288



DRILLING LOCATION H2S SAFTY EQUIPMENT
Exhibit # 8



Mack Energy Corporation Call List, Chaves County

Artesia (575)	Cellular	Office
Jim Krogman	432-934-1596	748-1288
Emilio Martinez	432-934-7586	748-1288

Agency Call List (575)

Roswell

State Police……………………………………………..622-7200
City Police……………………………………………...624-6770
Sheriff's Office…………………………………………624-7590
Ambulance……………………………………………...624-7590
Fire Department……………………………………...624-7590
LEPC (Local Emergency Planning Committee………...624-6770
NMOCD………………………………………………...748-1283
Bureau of Land Management…………………………...627-0272

Emergency Services

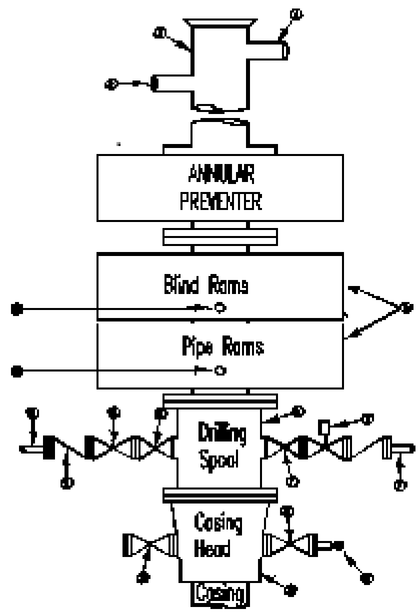
Boots & Coots IWC……………...…1-800-256-9688 or (281)931-8884
Cudd pressure Control……………….(915)699-0139 or (915)563-3356
Halliburton……………………………………………..746-2757
Par Five………………………………………………..748-9539

Flight For Life-Lubbock, TX……..……………………(806)743-9911
Aerocare-Lubbock, TX………………………………...(806)747-8923
Med Flight Air Amb-Albuquerque, NM……………….(505)842-4433
Lifeguard Air Med Svc. Albuquerque, NM……………(505)272-3115

Mack Energy Corporation
Minimum Blowout Preventer Requirements
3000 psi Working Pressure
13 3/8 inch- 3 MWP
11 Inch - 3 MWP
EXHIBIT #10

Stack Requirements

NO.	Items	Min. I.D.	Min. Nominal
1	Flowline		2"
2	Fill up line		2"
3	Drilling nipple		
4	Annular preventer		
5	Two single or one dual hydraulically operated rams		
6a	Drilling spool with 2" min. kill line and 3" min choke line outlets		2" Choke
6b	2" min. kill line and 3" min. choke line outlets in ram. (Alternate to 6a above)		
7	Valve Gate Plug	3 1/8	
8	Gate valve-power operated	3 1/8	
9	Line to choke manifold		3"
10	Valve Gate Plug	2 1/16	
11	Check valve	2 1/16	
12	Casing head		
13	Valve Gate Plug	1 13/16	
14	Pressure gauge with needle valve		
15	Kill line to rig mud pump manifold		2"



OPTIONAL

16	Flanged Valve	1 13/16	

CONTRACTOR'S OPTION TO
CONTRACTOR'S OPTION TO FURNISH:

1. All equipment and connections above bradenhead or casinghead. Working pressure of preventers to be 2000 psi minimum.
2. Automatic accumulator (80 gallons, minimum) capable of closing BOP in 30 seconds or less and, holding them closed against full rated working pressure.
3. BOP controls, to be located near drillers' position.
4. Kelly equipped with Kelly cock.
5. Inside blowout preventer or its equivalent on derrick floor at all times with proper threads to fit pipe being used.
6. Kelly saver-sub equipped with rubber casing protector at all times.
7. Plug type blowout preventer tester.
8. Extra set pipe rams to fit drill pipe in use on location at all times.
9. Type RX ring gaskets in place of Type R.

MEC TO FURNISH:

1. Bradenhead or casing head and side valves.
2. Wear bushing. If required.

10.

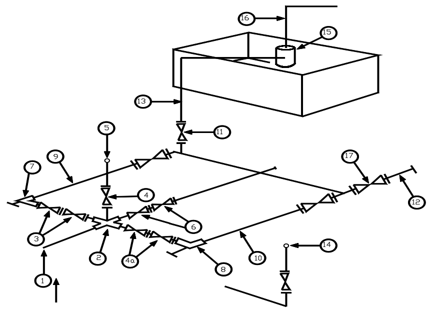
ME

GENERAL NOTES:

1. Deviations from this drawing may be made only with the express permission of MEC's Drilling Manager.
2. All connections, valves, fittings, piping, etc., subject to well or pump pressure must be flanged (suitable clamp connections acceptable) and have minimum working pressure equal to rated working pressure of preventers up through choke valves must be full opening and suitable for high pressure mud service.
3. Controls to be of standard design and each marked, showing opening and closing position
4. Chokes will be positioned so as not to hamper or delay changing of choke beans. Replaceable parts for adjustable choke, or bean sizes, retainers, and choke wrenches to be conveniently located for immediate use.
5. All valves to be equipped with hand-wheels or handles ready for immediate use.
6. Choke lines must be suitably anchored.
7. Handwheels and extensions to be connected and ready for use.
8. Valves adjacent to drilling spool to be kept open. Use outside valves except for emergency.
9. All seamless steel control piping (2000 psi working pressure) to have flexible joints to avoid stress. Hoses will be permitted.
10. Casinghead connections shall not be used except in case of emergency.
11. Does not use kill line for routine fill up operations.

Mack Energy Corporation

Exhibit #11
MIMIMUM CHOKE MANIFOLD
3,000, 5,000, and 10,000 PSI Working Pressure
3M will be used
3 MWP - 5 MWP - 10 MWP



Mimimum requirements

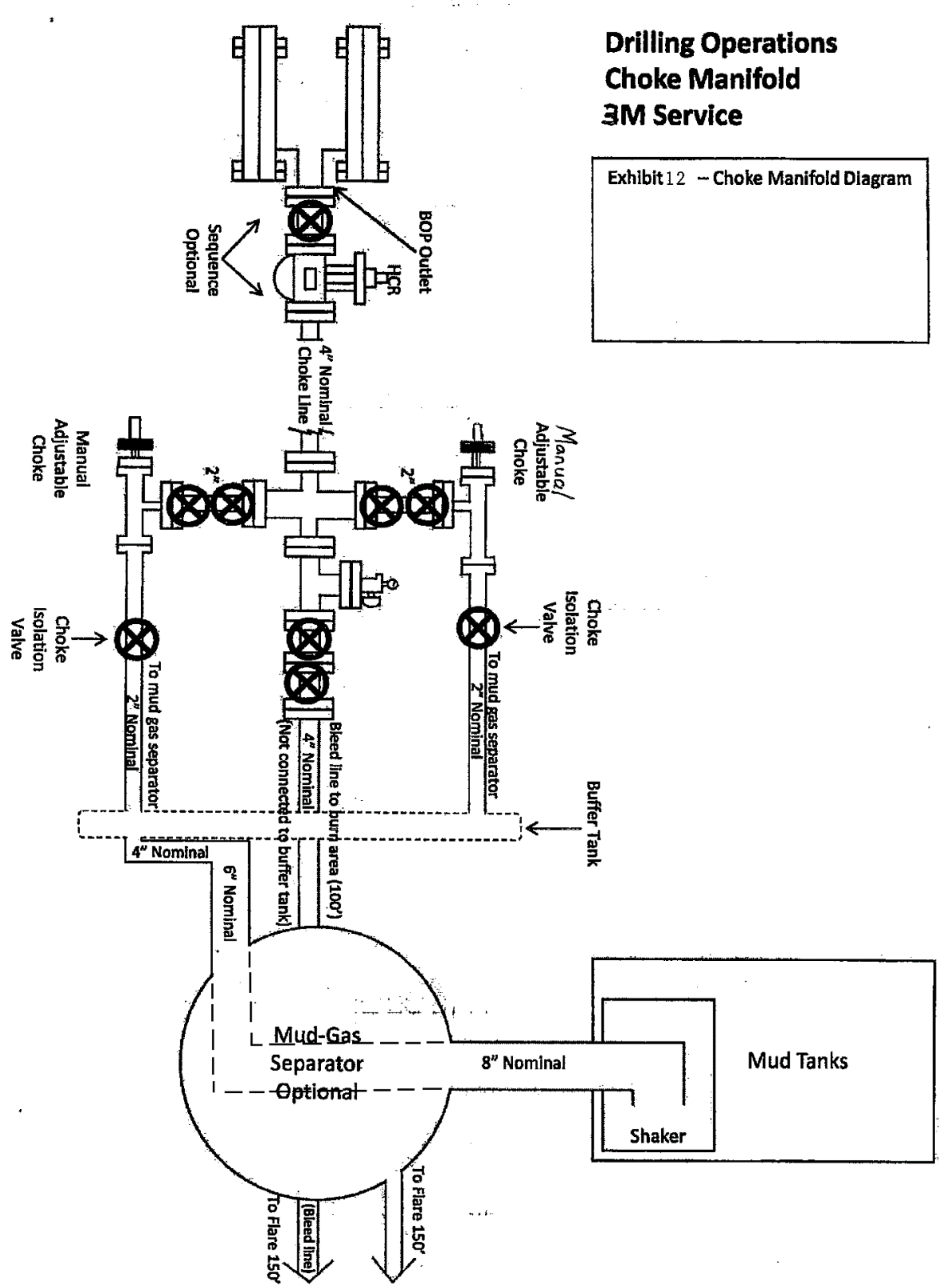
No.		3,000 MWP I.D.	Nominal	Rating	5,000 MWP I.D.	Nominal	Rating	10,000 MWP I.D.	Nominal	Rating
1	Line from drilling Spool		3"	3,000		3"	5,000		3"	10,000
2	Cross 3" x 3" x 3" x 2"			3,000			5,000			
2	Cross 3" x 3" x 3" x 2"									10,000
3	Valve Gate Plug	3 1/8		3,000	3 1/8		5,000	3 1/8		10,000
4	Valve Gate Plug	1 13/16		3,000	1 13/16		5,000	1 13/16		10,000
4a	Valves (1)	2 1/16		3,000	2 1/16		5,000	2 1/16		10,000
5	Pressure Gauge			3,000			5,000			10,000
6	Valve Gate Plug	3 1/8		3,000	3 1/8		5,000	3 1/8		10,000
7	Adjustable Choke (3)	2"		3,000	2"		5,000	2"		10,000
8	Adjustable Choke	1"		3,000	1"		5,000	2"		10,000
9	Line		3"	3,000		3"	5,000		3"	10,000
10	Line		2"	3,000		2"	5,000		2"	10,000
11	Valve Gate Plug	3 1/8		3,000	3 1/8		5,000	3 1/8		10,000
12	Line		3"	1,000		3"	1,000		3"	2,000
13	Line		3"	1,000		3"	1,000		3"	2,000
14	Remote reading compound Standpipe pressure quage			3,000			5,000			10,000
15	Gas Separator		2' x5'			2' x5'			2' x5'	
16	Line		4"	1,000		4"	1,000		4"	2,000
17	Valve Gate Plug	3 1/8		3,000	3 1/8		5,000	3 1/8		10,000

(1) Only one required in Class 3M
(2) Gate valves only shall be used for Class 10 M
(3) Remote operated hydraulic choke required on 5,000 psi and 10,000 psi for drilling.

EQUIPMENT SPECIFICATIONS AND INSTALLATION INSTRUCTION

1. All connections in choke manifold shall be welded, studded, flanged or Cameron clamp of comparable rating.
2. All flanges shall be API 6B or 6BX and ring gaskets shall be API RX or BX. Use only BX for 10 MWP.
3. All lines shall be securely anchored.
4. Chokes shall be equipped with tungsten carbide seats and needles, and replacements shall be available.
5. alternate with automatic chokes, a choke manifold pressure gauge shall be located on the rig floor in conjunction with the standpipe pressure gauge.
6. Line from drilling spool to choke manifold should bee as straight as possible. Lines downstream from chokes shall make turns by large bends or 90 degree bends using bull plugged tees

Mack Energy Corporation
MANIFOLD SCHEMATIC
Exhibit #12



Sante Fe Main Office
Phone: (505) 476-3441

General Information
Phone: (505) 629-6116

Online Phone Directory
https://www.emnrd.nm.gov/ocd/contact-us

State of New Mexico
Energy, Minerals and Natural Resources
Oil Conservation Division
1220 S. St Francis Dr.
Santa Fe, NM 87505

CONDITIONS

Action 450497

CONDITIONS

Operator:	OGRID:
MACK ENERGY CORP P.O. Box 960 Artesia, NM 882110960	13837
	Action Number: 450497
	Action Type: [C-101] BLM - Federal/Indian Land Lease (Form 3160-3)

CONDITIONS

Created By	Condition	Condition Date
delilah	Cement is required to circulate on both surface and intermediate1 strings of casing.	4/9/2025
delilah	If cement does not circulate on any string, a Cement Bond Log (CBL) is required for that string of casing.	4/9/2025
ward.rikala	Notify the OCD 24 hours prior to casing & cement.	6/2/2025
ward.rikala	File As Drilled C-102 and a directional Survey with C-104 completion packet.	6/2/2025
ward.rikala	Once the well is spud, to prevent ground water contamination through whole or partial conduits from the surface, the operator shall drill without interruption through the fresh water zone or zones and shall immediately set in cement the water protection string.	6/2/2025
ward.rikala	Oil base muds are not to be used until fresh water zones are cased and cemented providing isolation from the oil or diesel. This includes synthetic oils. Oil based mud, drilling fluids and solids must be contained in a steel closed loop system.	6/2/2025