



11 $\frac{3}{4}$ " x 13 $\frac{3}{8}$ " MetalSkin® Monobore Open-Hole Liner (MMOL)

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DW GOM MMOL INSTALLATION DOWNHOLE FORMABLE CONE

- Segmented cone formed downhole minimizes liner OD upset
- Upper cone segments 'dove tail' into lower cone segment tracks
- Formed cone releases running tool torque lock segments
- Shearable lock ring locks cone segments together





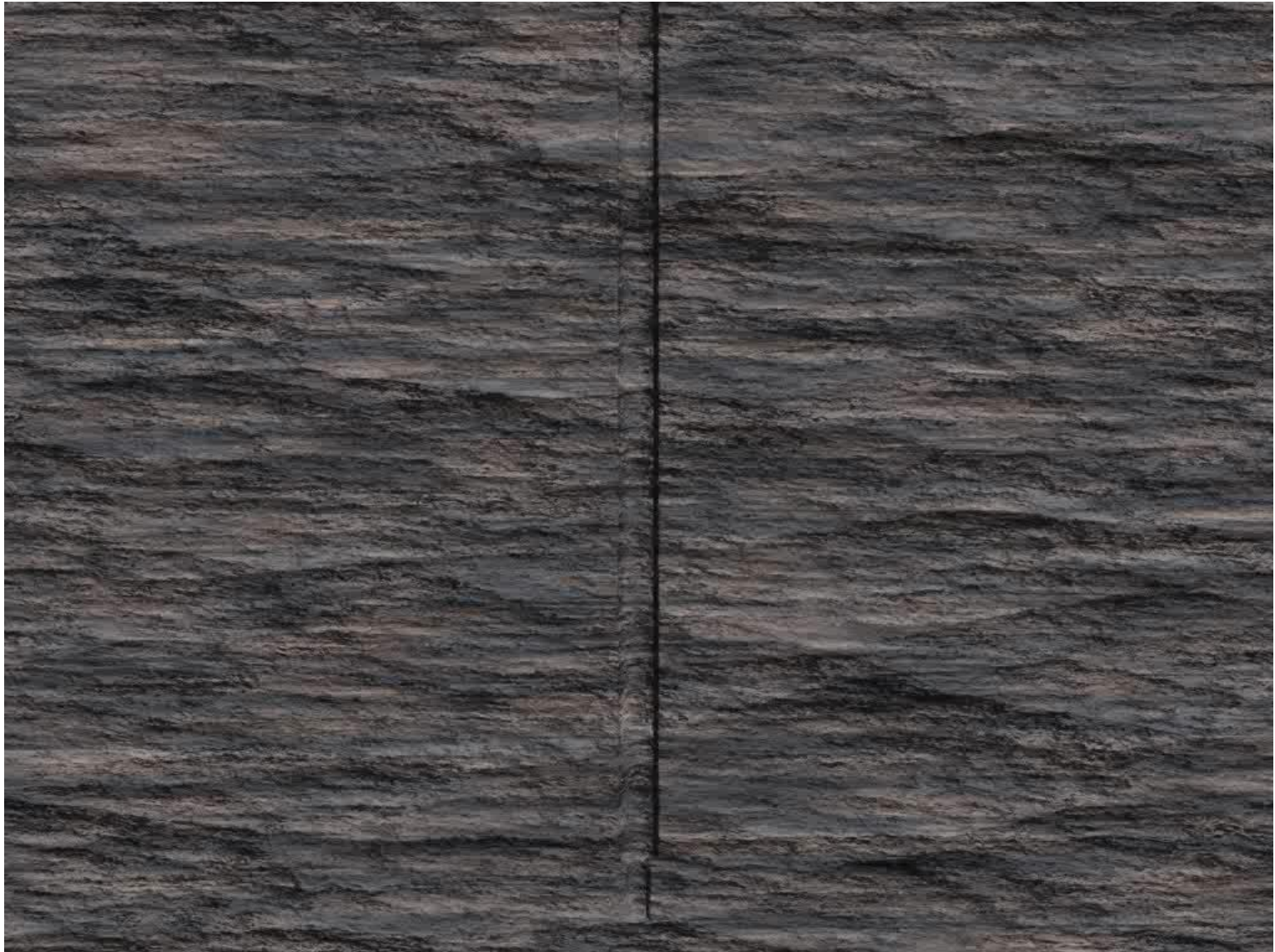
DW GOM MMOL INSTALLATION DOWNHOLE FORMABLE CONE

- Ball diverts pressure to setting cylinders
- Cone forms and creates launcher downhole
- Cement job performed
- Rotate off liner and apply expansion pressure from surface
- Expand back into tie back shoe
- Mechanically expand last 10 feet
- After expansion ~2-ft. of liner left unexpanded
- Drill out w/ 10 5/8" bit and back-mill unexpanded tube.





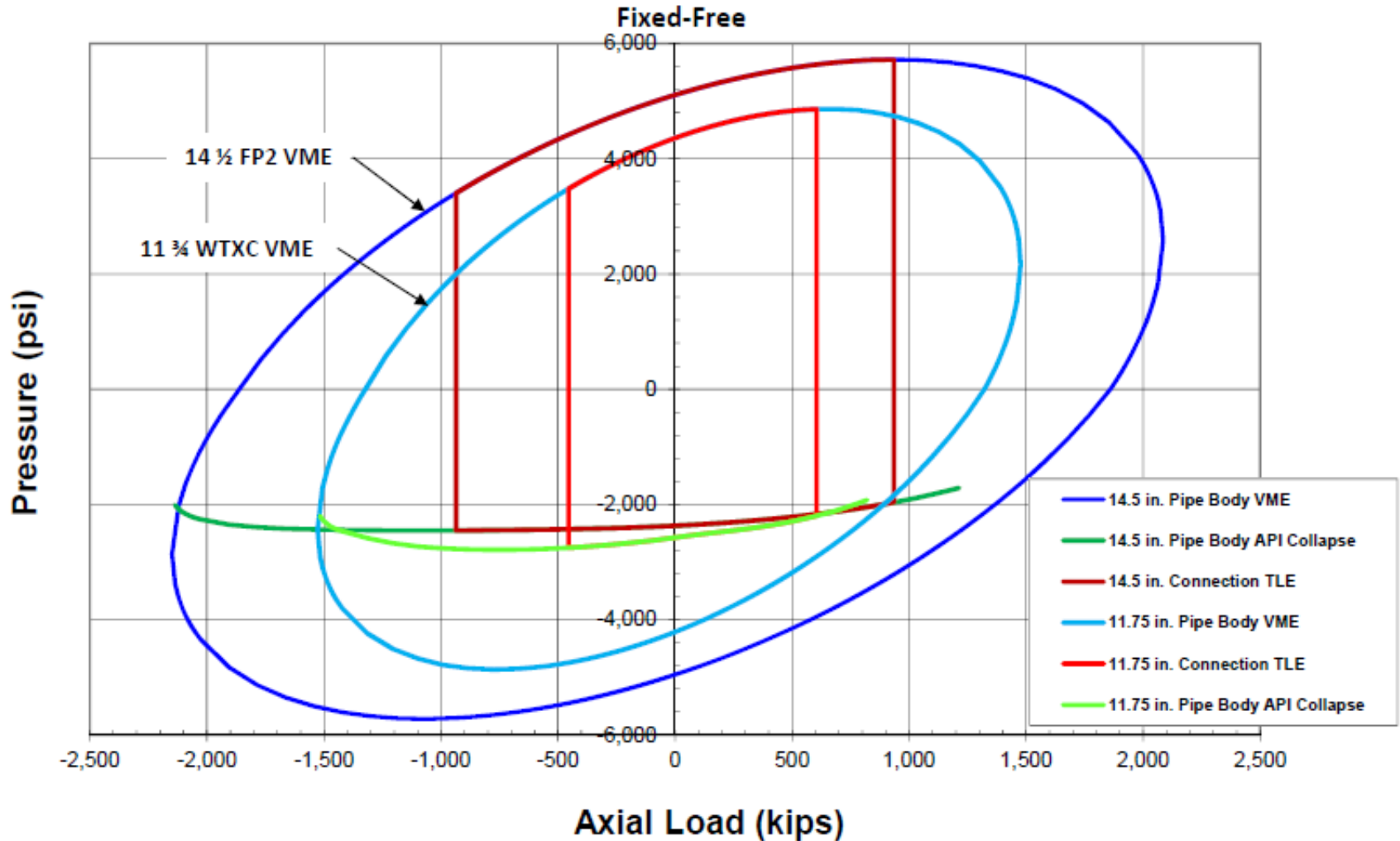
DW GOM MMOL INSTALLATION ANIMATION





VME Overlay 11-3/4" WTXC / 14 1/2" FP2 (80ksi) Fixed-Free Expansion

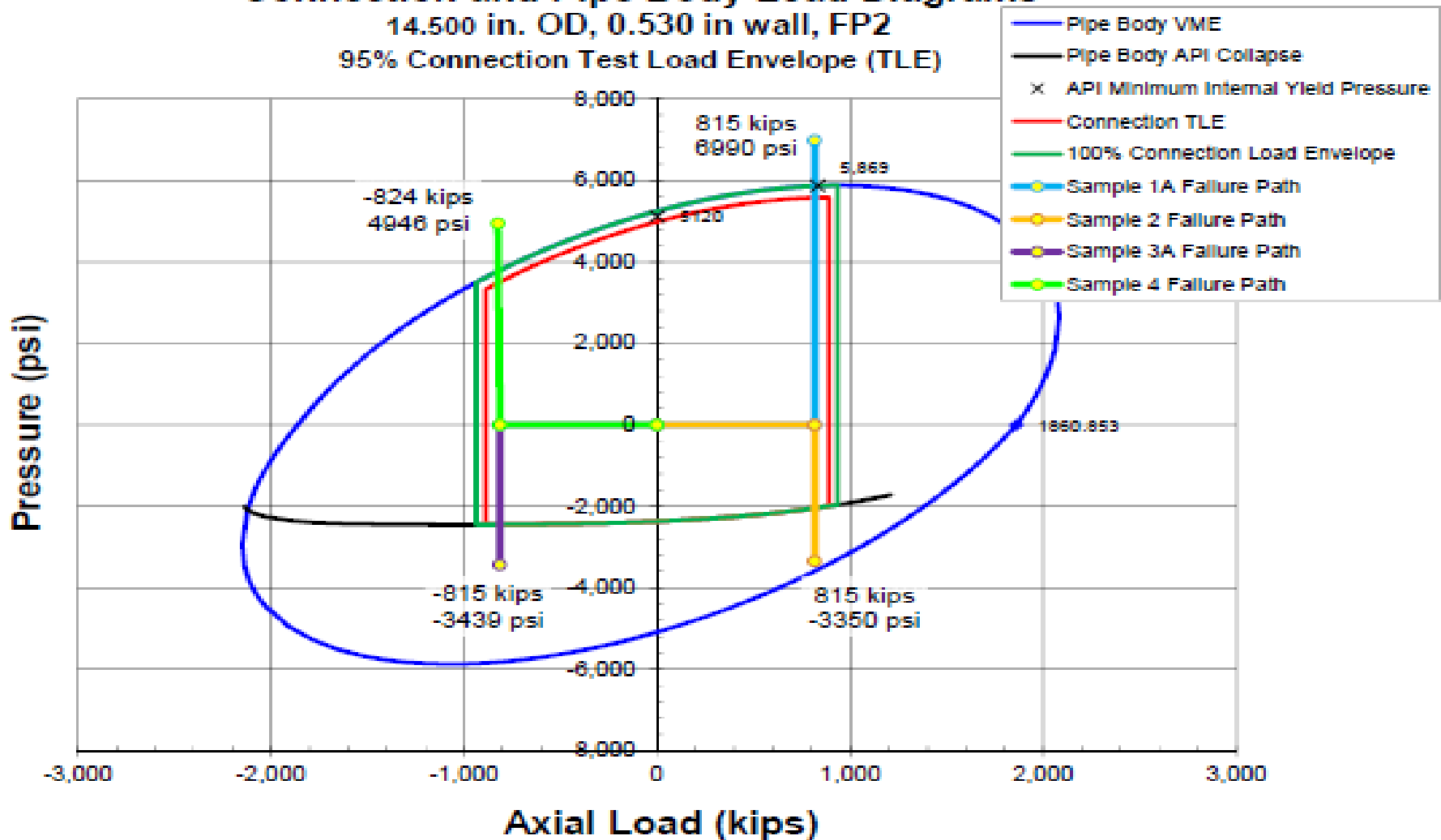
Connection and Pipe Body Load Diagrams
MMOL VME Charts - 11 3/4 WTXC and 14 1/2 FP2



Connection and Pipe Body Load Diagrams

14.500 in. OD, 0.530 in wall, FP2

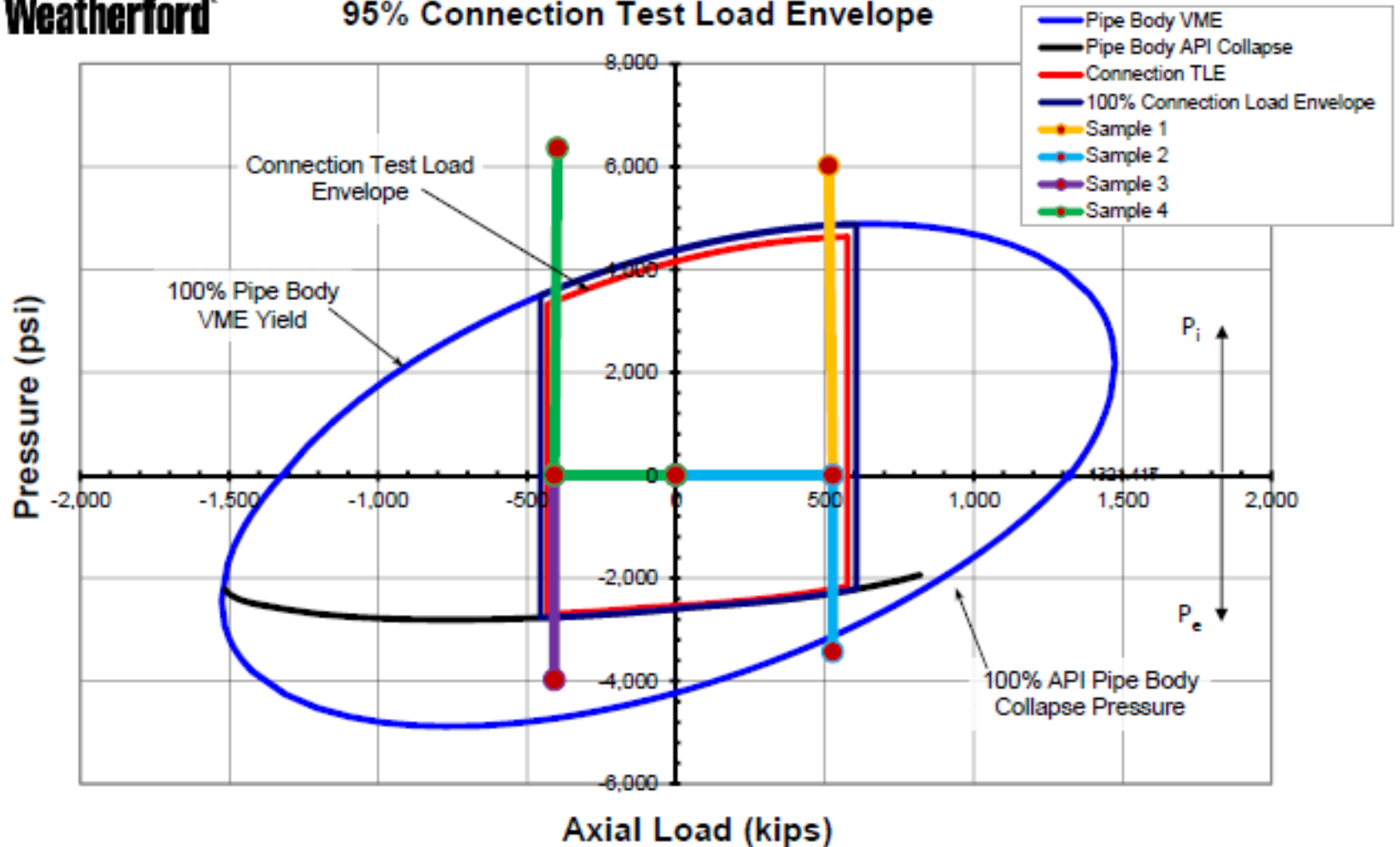
95% Connection Test Load Envelope (TLE)





Connection and Pipe Body Load Diagrams

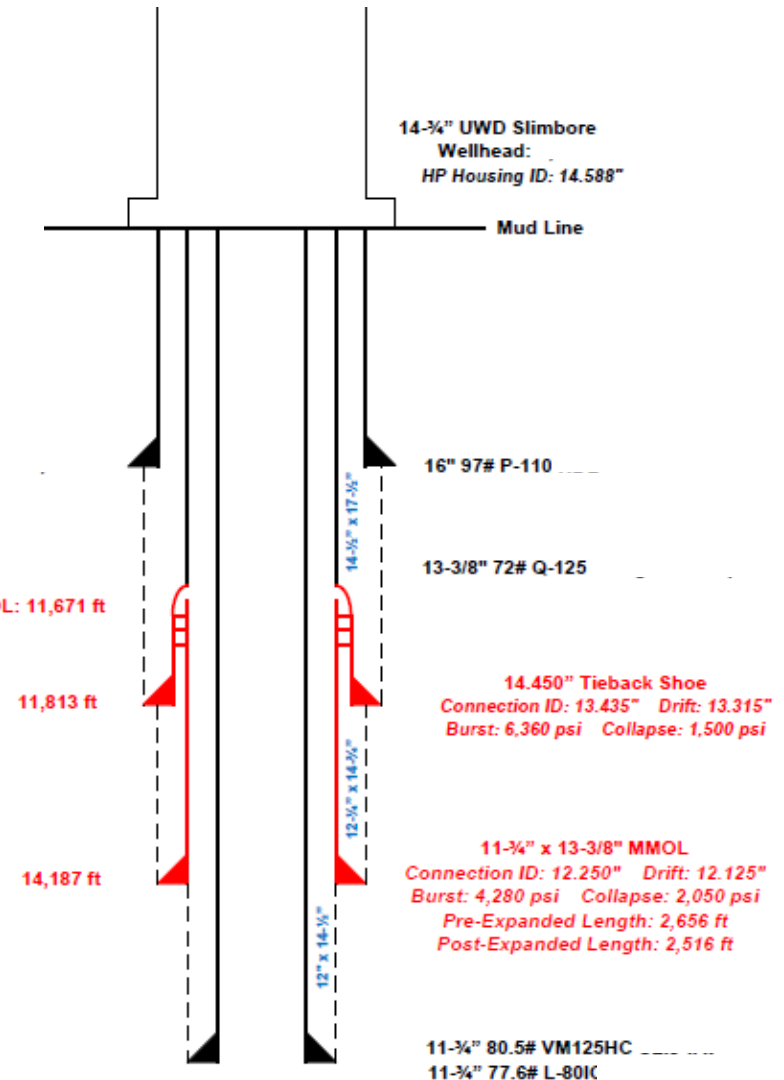
13.408 in. OD, 12.27 in. Cone, 60000 psi yield, WTXC
95% Connection Test Load Envelope





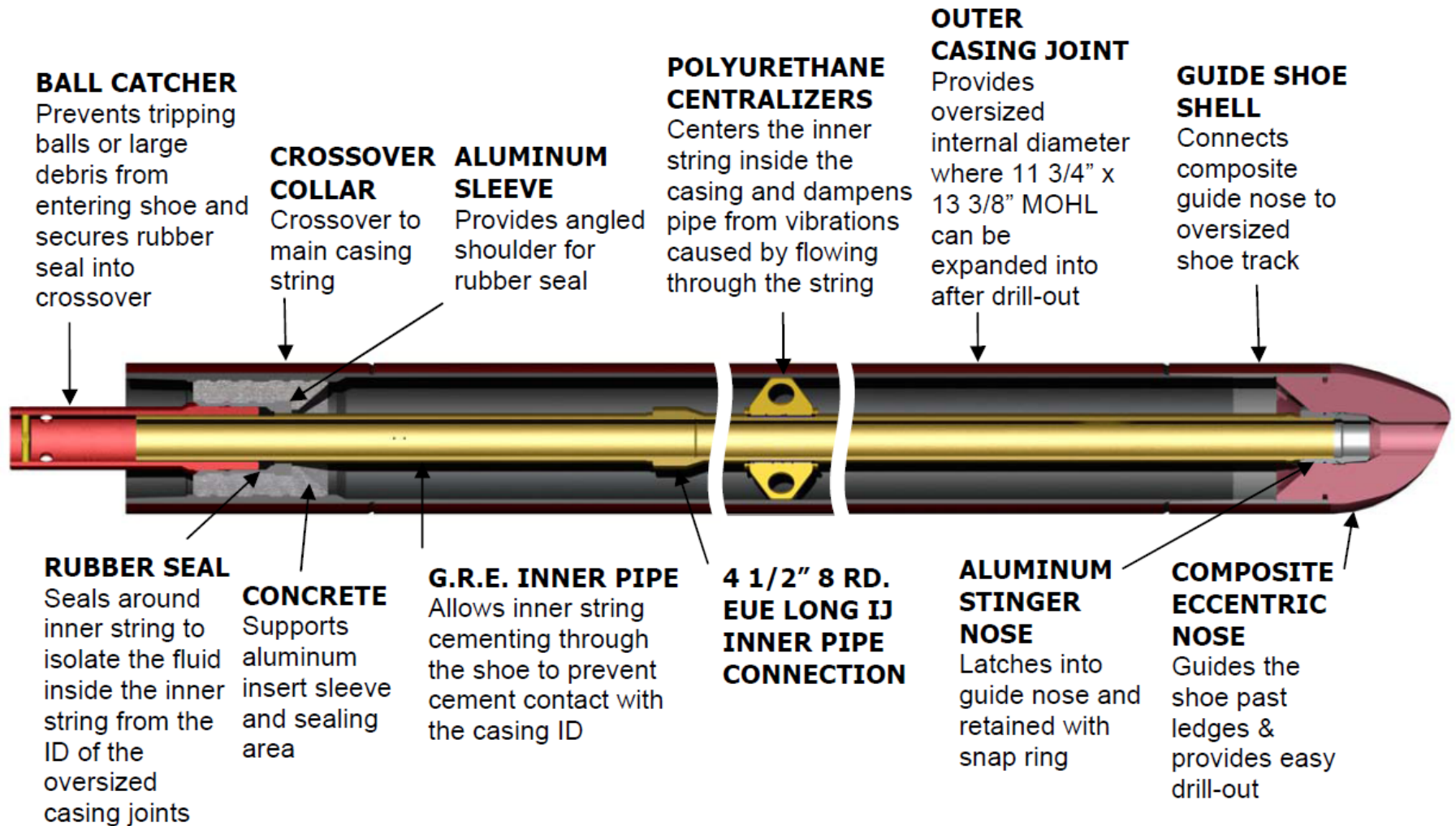
DW GOM MMOL INSTALLATION KEY APPLICATION CHALLENGES

- Reaching deep Wilcox from existing structure and slot
- 16" 97# pre installed w/14 3/4" Slimbore Wellhead
- Wellhead Restriction 14.588-in.
- Tight restriction – High ECD inside 16" w/14 1/2" Tie back Shoe
- Liner length of 2,656-ft. pre and 2,516-ft. post expanded
- 1st Surge reduction tool with Monobore Liner
- 1st instance of running and cementing 11 3/4" long string through 11 3/4" Expanded Liner
- 1st cement Diverter tool inside of MMOL Liner





DW GOM MMOL INSTALLATION TIE BACK SHOE FEATURES





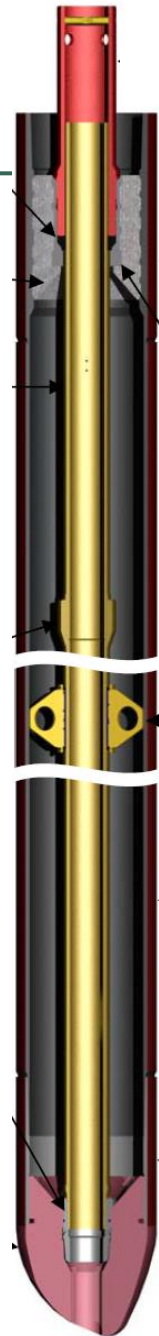
GOM MMOL INSTALLATION WELLHEAD RESTRICTION

- Graphics half scale
- Tie back shoe joints 14 ½” casing & Wellhead
 - API Min Nominal -0.5% 14.428-in.
 - Wellhead Restriction 14.588-in.
 - API Max Nominal +1% 14.645-in.
- Laser OD measure and full length UT wall
- Calculated Wall map
- OD ground 14 ½” joints to 14.460-in. +/- 0.030
- Laser OD measure and full length UT post grind
- Re-calculate wall map and collapse numbers
- Initial losses slowed speed stopped losses



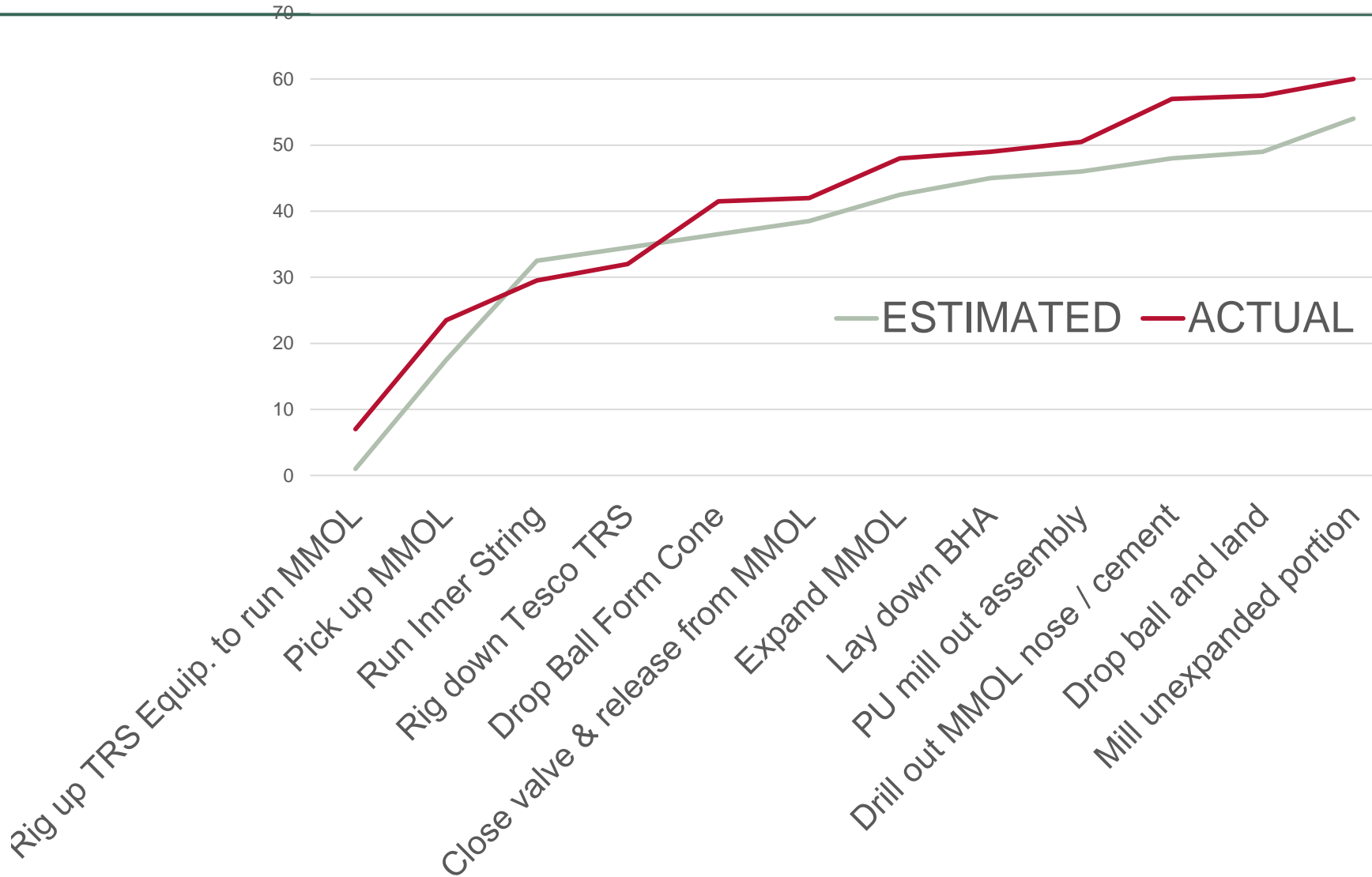
GOM MMOL INSTALLATION TIE BACK SHOE INSTALLATION

- 8 joints 14 ½” (ground to 14.460-in.)
- OD Drifted connections to 14.480-in. after make up
- Run 10 joints 4 ½” fiberglass inner pipe and latched
- Crossover and seal gasket installed RIH
- Losses 11 bbl/std @ 1.5 min/std
- Losses stopped at 3-4 min/std
- RIH with proper displacement through 16”
- Drilled fiberglass cement conduit in 9.5 hours (31.8 ft/hr)





DW GOM MMOL INSTALLATION ESTIMATED TIME VS ACTUAL TIME





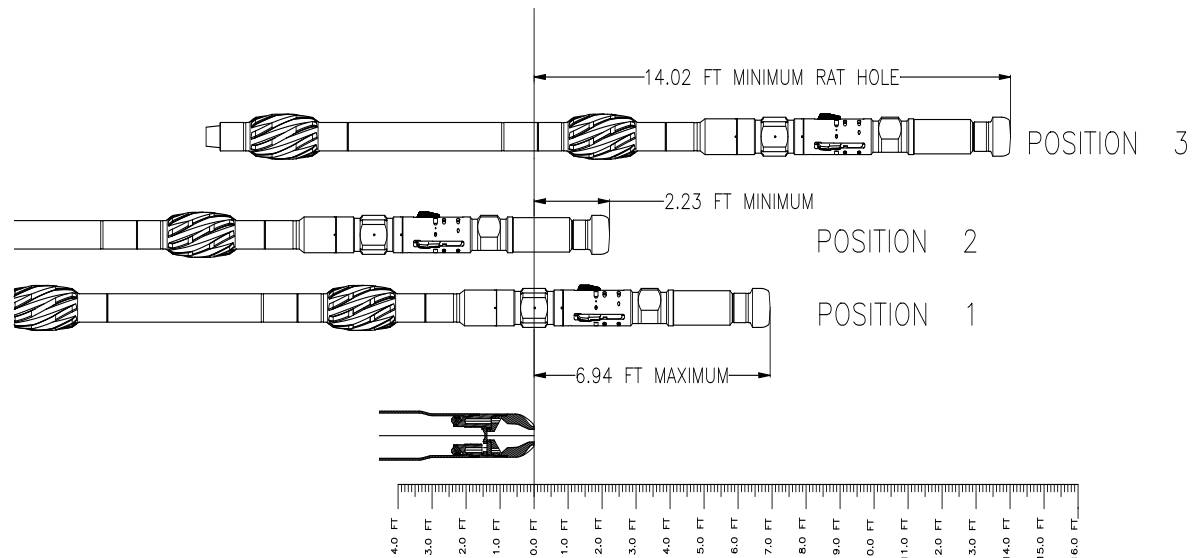
DW GOM MMOL INSTALLATION LINER INSTALLATION / EXPANSION

- BHA picked up and thread locked shoe and 1st joints
- Picked up 71 Liner joints @ 4-5 joints per hour (2,656 ft.)
- Rigged up false rotary and run Inner string
- Screwed into expansion assembly
- Run in hole
- Circulated hole and dropped ball to form cone
 - Ball did not land on seat. trouble shoot and action
 - Ball suspected in dart catcher restriction
 - Drop dart to dislodge ball – successful
- Formed cone with 3,000psi
- Performed cement job without losses
- Rotate off liner
- Expand liner in 6 hours



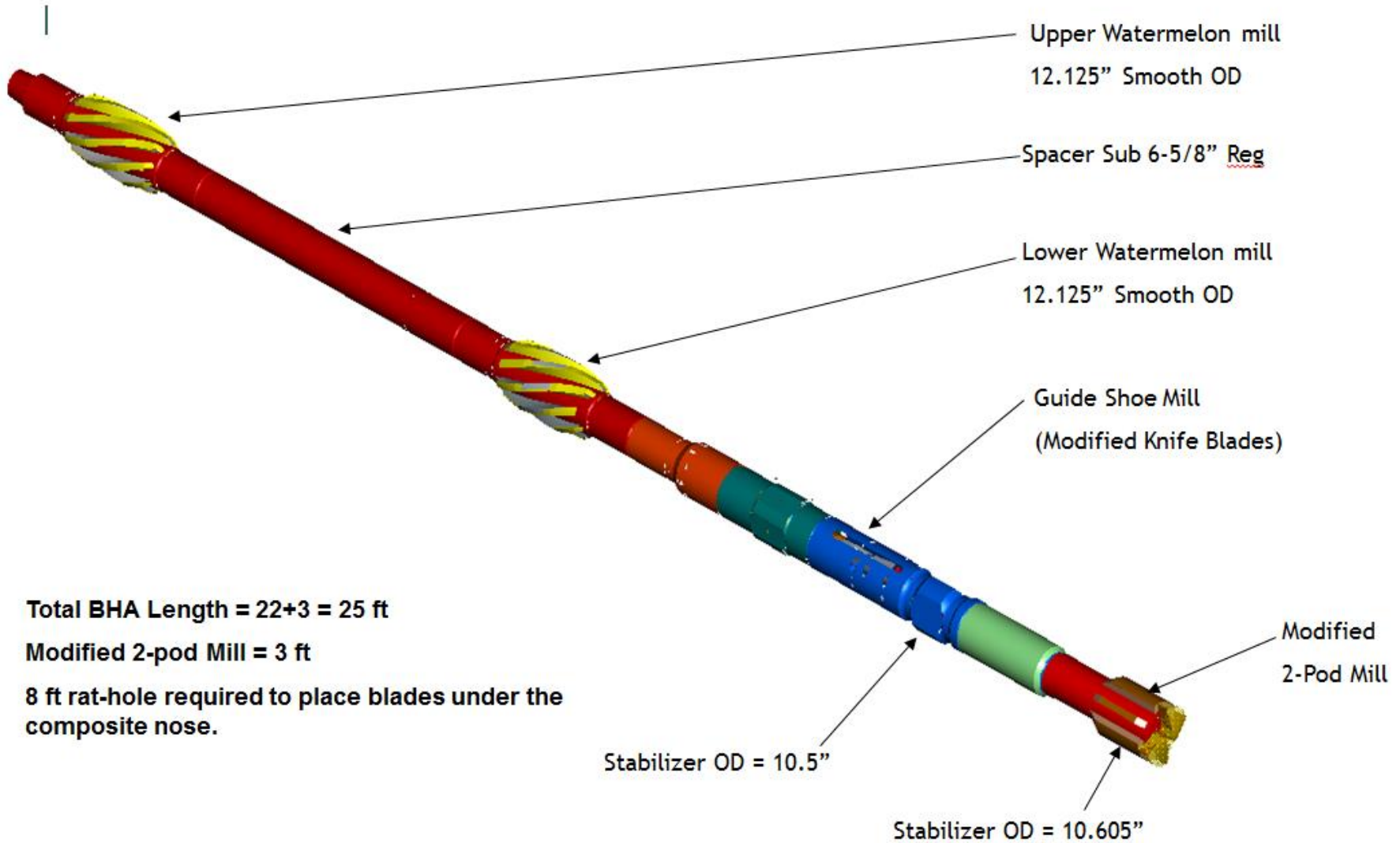
DW GOM MMOL INSTALLATION DRILL-OUT / MILL OUT

- Drill-out Assembly
 - 10 5/8” roller cone bit, mill out tool and tandem watermelon mills
- Encountered restriction at the Liner seals – worked through without rotation
- Tagged at depth - base of tie back shoe would not pass without rotation
- Worked and reamed 1.5 hours until pass freely
- Tagged shoe and drilled out in 6.5 hours
- Dropped ball to open mill-out tool
- Milled unexpanded 1 hr.
- Passed mills 0.5 hr.
- Total 9.5 hours
- Pressure test
 - 500 psi
 - Held 30 min.
 - 9.9 ppg





DW GOM MMOL INSTALLATION DRILL-OUT / MILL OUT GENERAL BHA LAYOUT





DW GOM MMOL INSTALLATION CONCLUSIONS

- OD Grinding of the tie back shoe joints successful to pass wellhead restriction
- Cemented all 3 strings without issues;
 - 13 3/8" w/ 304 feet of 14 1/2" tie back shoe
 - 11 3/4" expandable liner
 - 11 3/4" 80# long string
- Tie back shoe drill-out was easy and without incident
- Liner run without issues
- Ball did not land on seat 1st attempt - remediated
- Liner expanded as per plan in 6 hours
- Drill-out / Mill-out with milling operation 1.5 hours total
- Subsequent casing landed and cemented
- Ticked all the boxes successfully
- Next install before end of the year.



Questions?