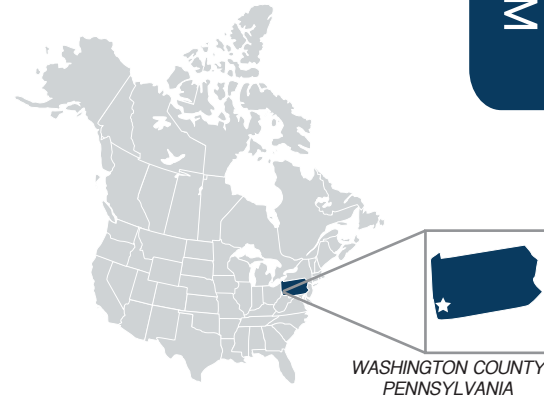




USS-LIBERTY TC™, First Run

SUMMARY

U. S. Steel Tubular Products is the nation's largest domestic OCTG manufacturer. Solutions provided by U. S. Steel Tubular Products support the U.S. oil and gas industry include a full range of proprietary high performance casing grades and the most widely used, industry standard semi-premium casing connection. As U. S. oil and gas operators faced the ongoing challenge of increasingly complex drilling and completion applications, they expressed a clear need for a high torque, high performance premium connection that could be manufactured with the short lead times that they have come to rely on from U. S. Steel Tubular Products.



PREMIUM

USS-LIBERTY TC™, a premium threaded and coupled connection entirely designed, tested and manufactured in the United States, is the answer to this challenge. In line with U. S. Steel Tubular Products' commitment to quality, this rugged connection has been qualified through comprehensive full-scale testing conducted under the most modern and rigorous industry testing standard – **API RP 5C5:2014 CAL IV**.

In collaboration with Range Resources Corporation, the first production casing string incorporating the **USS-LIBERTY TC™** connection was installed in a horizontal natural gas well in the Marcellus Shale formation in Washington County, Pennsylvania.



Greaves 6H

PROJECT PROFILE

Location: Marcellus Shale Formation
Well Type: Horizontal Extended Reach Shale Gas Well
Well Depth: 15,667ft Measured Depth
Well Operator: Range Resources Corporation
Well Name: Greaves 6H
Products Highlighted: USS-LIBERTY TC™ Premium Connection
Product Detail: 5.500" x 20.00 lb/ft P110 HC USS-LIBERTY TC™

USS-LIBERTY TC™



MARCELLUS

The Marcellus is the most expansive shale gas play in the continental United States and was an ideal proving ground for the capabilities of the new **USS-LIBERTY TC™** connection. The Marcellus generates pressure and heat to produce primarily dry natural gas, with a load environment severe enough that choosing the optimal casing grade and connection is critical to ensuring long term well integrity. The high pressures of hydraulic fracturing treatments, along with severe doglegs, present an additional set of challenges since casing strings will be subjected to extensive bending loads. In addition, rotation of the casing string during installation is sometimes necessary to negotiate tight doglegs, requiring increased torque capacity.

APPLICATION

During well construction, a total of **15,667ft of 5.500" x 20 lb/ft P110 HC** casing with **USS-LIBERTY TC™** connections was installed. The well was vertical to a depth of approximately 5,100ft, followed by a build section incorporating doglegs up to **11.6 degrees/100ft**, reaching a 90 degree horizontal orientation at a **True Vertical Depth (TVD) of 6,650ft and Measured Depth (MD) of 8,500ft**.

Rig Site Services technicians were onsite to ensure that all running procedures were properly followed and torque monitoring was performed as required.

Hydraulic Fracturing Results

The well was subsequently fractured in a 38-stage process using industry standard "Plug and Perforation" techniques. The details of the fracture treatment were as follows:

Average Treatment Pressures During the Frac/Completion:	6,587 PSI
Maximum Treatment Pressures During the Frac/Completion:	9,495 PSI
Pressure of Test Performed After Cementing:	9,500 PSI
Average Volume of Fluid Pumped During Completion Per Stage:	7,517 bbls
Average Quantity of Proppant Pumped Per Stage:	297,434 lbs
Production Rate After Flowback Initiated:	15,795 MCF/D
Flowing Pressure:	825 PSI
Composition of Production:	Water/Gas/Liquids



DON ROBINSON, RANGE RESOURCES (L)
DAVID RINTOUL, U. S. STEEL TUBULAR PRODUCTS (R)

CONCLUSION

U. S. Steel Tubular Products is proud to introduce the next generation of American-made high performance premium connections to the oil & gas industry. **USS-LIBERTY TC™** responds to the bending, compression, leak resistance and torque challenges of modern horizontal wells; and supports the efficient drilling and completion operations of oil & gas operators. The innovative design of **USS-LIBERTY TC™** includes the proprietary TightFit™ thread form, and other patent-pending features. The shoulder configuration provides improved performance in collapse, compression and torque.

The first **USS-LIBERTY TC™** installation in the Marcellus Shale presents a milestone that is just the beginning of a reliable and sustained operating history in the most demanding onshore drilling environments. When trouble-free operations and long term well integrity matter, U. S. Steel Tubular Products will be there to support the journey towards American energy independence.