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87505

State of New Mexico
Energy, Minerals and Natural Resources

Form C-103
Revised July 18, 2013

OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

WELL API NO. 30-025-46746
5. Indicate Type of Lease STATE [ ] FEE [x]
6. State Oil & Gas Lease No.
7. Lease Name or Unit Agreement Name SALT CREEK AGI
8. Well Number 1
9. OGRID Number 373554
10. Pool name or Wildcat AGI: Delaware
11. Elevation (Show whether DR, RKB, RT, GR, etc.) 2,927' (GR)

SUNDRY NOTICES AND REPORTS ON WELLS
(DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM C-101) FOR SUCH PROPOSALS.)
1. Type of Well: Oil Well [ ] Gas Well [ ] Other [x] ACID GAS INJECTION
2. Name of Operator Salt Creek Midstream, LLC
3. Address of Operator 5825 N Sam Houston Pkwy W, Suite 150 Houston, TX 77086
4. Well Location Unit Letter L : 2,362 feet from the SOUTH line and 595 feet from the WEST line Section 21 Township 26S Range 36E NMPM County LEA

12. Check Appropriate Box to Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:
PERFORM REMEDIAL WORK [ ] PLUG AND ABANDON [ ]
TEMPORARILY ABANDON [ ] CHANGE PLANS [x]
PULL OR ALTER CASING [ ] MULTIPLE COMPL [ ]
DOWNHOLE COMMINGLE [ ]
CLOSED-LOOP SYSTEM [ ]
OTHER: [ ]
SUBSEQUENT REPORT OF:
REMEDIAL WORK [ ] ALTERING CASING [ ]
COMMENCE DRILLING OPNS. [ ] P AND A [ ]
CASING/CEMENT JOB [ ]
OTHER: [ ]

13. Describe proposed or completed operations. (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work). SEE RULE 19.15.7.14 NMAC. For Multiple Completions: Attach wellbore diagram of proposed completion or recompletion.

SALT CREEK AGI #1 REQUEST TO REVISE CASING AND TUBING DESIGN

On behalf of Salt Creek Midstream, LLC (Salt Creek), we (Geolex, Inc.) are requesting approval for revision to the Salt Creek AGI #1 (API: 30-025-46746) casing and tubing schedule, due to current challenges relating to material availability. Salt Creek was granted authorization to inject, via the Salt Creek AGI #1 well with the issuance of Orders R-20913-C and 20913-D by the New Mexico Oil Conservation Commission (NMOCC).

The requested changes to the casing and tubing schedule are summarized below and a revised well schematic has been included as an attachment to this sundry request. All proposed revisions have been thoroughly reviewed to assess the suitability of the materials and the proposed change will not result in inadequate safety and performance standards.

Production Casing String: Propose revision to utilize 7-5/8", 29.7 #/ft., L-80 HC ERW R3, USS Liberty FJM Premium, in lieu of originally proposed 7", 9.3 #/ft., L80 grade, VAMTOP casing, due to current material availability constraints.

Injection Tubing String: Propose revision to utilize 3-1/2", 9.3 #/ft., L-80, BENOIT BTS-8 (2-step gas-tight connection), in lieu of originally proposed identical tubing with VAMTOP connection, along depth interval from 0' to 5,110' (TVD).

All proposed revisions to the Salt Creek AGI #1 are illustrated in the attached amended well schematic. Additionally, we include, as attachments to this request, detailed supplemental materials relating to the USS Liberty FJM and Benoit BTS-8 premium connections proposed.

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNATURE [Signature] TITLE Consultant to Salt Creek DATE 08/18/2022

Type or print name David A. White, P.G. E-mail address: dwhite@geolex.com PHONE: 505-842-8000

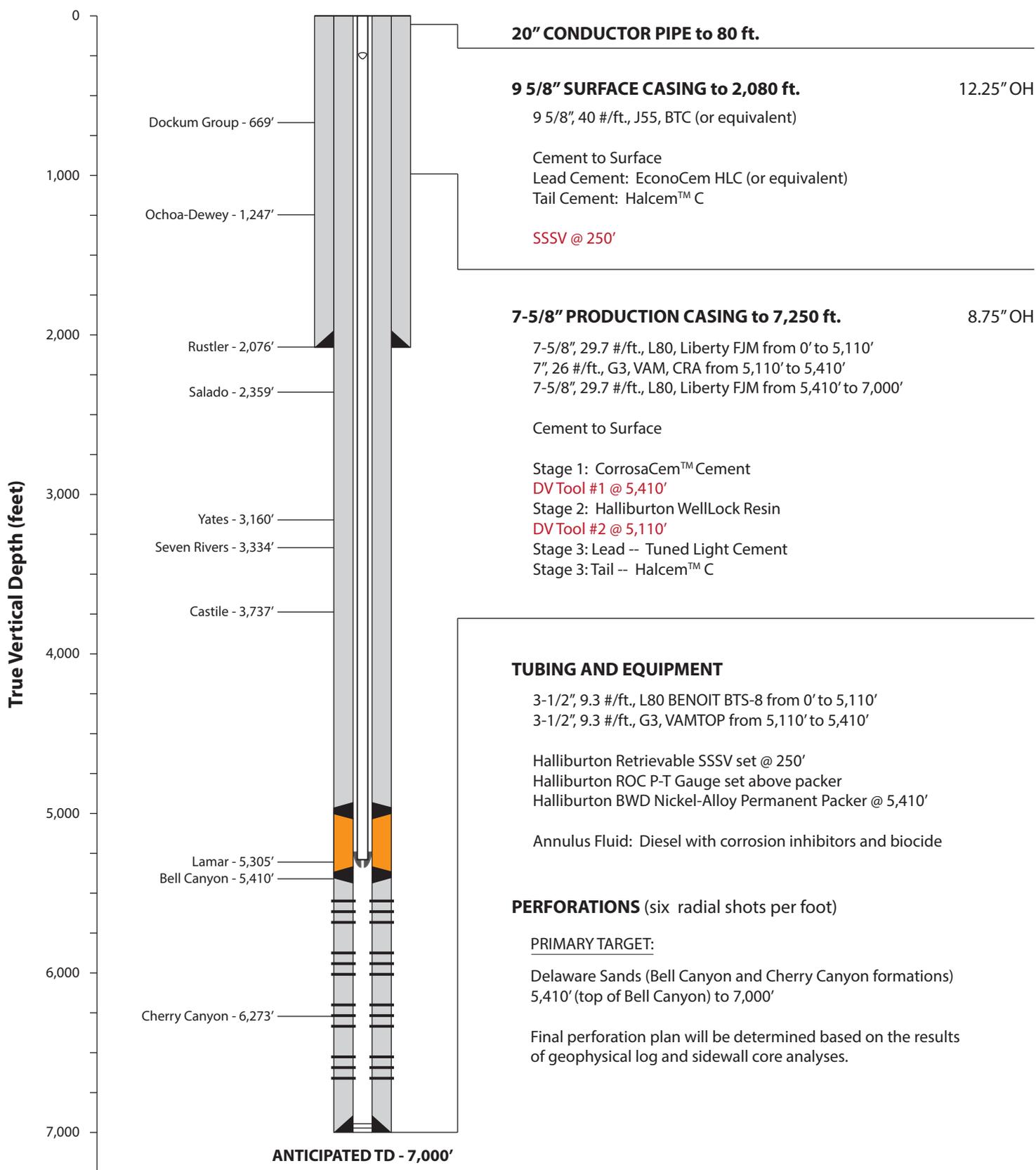
For State Use Only APPROVED BY: [Signature] TITLE UIC Manager DATE 08/18/2022

**SALT CREEK AGI #1 WELL  
API: 30-025-46746**

**Amended Well Schematic  
August 18, 2022**



# SALT CREEK AGI #1 PROPOSED WELL SCHEMATIC



\*All depths are approximate and subject to change based off of the geology encountered

Date prepared: 07/01/2022

## Proposed Salt Creek AGI #1 Well Schematic

**SUPPLEMENTAL MATERIALS AND SPECIFICATIONS  
FOR USS LIBERTY PREMIUM CONNECTIONS**

## USS-LIBERTY FJM® Premium OCTG Connections

Our premium connection provides true flush OD for clearance-critical applications.



U. S. Steel Tubular Products USS-LIBERTY FJM® is a **flush joint connection with a true flush OD designed for clearance-critical applications**. Applications include use as a repair liner where casing has been damaged by corrosion or wear.

The proprietary thread form overcomes a typical weakness in flush joint connections – the compressive strength. **USS-LIBERTY FJM® has a compressive strength rating that is equal to the tensile strength in all OD sizes.**

The design of the connection also addresses the issue of integrity under pressure by featuring both **internal and external gas-tight, metal-to-metal seals**. The U. S. Steel Tubular Products USS-LIBERTY FJM® has advantages in clearance, strength, and gas-tight sealing that make it a superior solution for your next clearance-critical application.

**USS-LIBERTY FJM® has been tested to ISO 13679 testing requirements**, including internal and external pressure testing combined with tension and compression loads. USS-LIBERTY FJM® connections are available in sizes from 3-1/2 to 8-5/8 inches.

- **True flush outside diameter** for clearance critical applications
- **Hooked thread form** to overcome the typical compressive strength weakness of flush joint connections
- **Metal-to-metal internal and external pressure seal** to ensure integrity under pressure
- **Collapse and internal yield pressure** equal to pipe body
- **High compression strength** for rotating and reciprocating during cementing

## **U. S. Steel Tubular Products OCTG Distributors**

U. S. Steel Tubular Products are available through authorized distributors. [See our complete U. S. Steel Tubular Products OCTG product distributor list here.](#)



# U. S. Steel Tubular Products

7/30/2020 3:29:27 PM

## 7.625" 29.70lbs/ft (0.375" Wall) L80 HC USS-LIBERTY FJM<sup>®</sup>



MECHANICAL PROPERTIES	Pipe	USS-LIBERTY FJM <sup>®</sup>	
Minimum Yield Strength	80,000	--	psi
Maximum Yield Strength	95,000	--	psi
Minimum Tensile Strength	95,000	--	psi
DIMENSIONS	Pipe	USS-LIBERTY FJM <sup>®</sup>	
Outside Diameter	7.625	7.625	in.
Wall Thickness	0.375	--	in.
Inside Diameter	6.875	6.789	in.
Standard Drift	6.750	6.750	in.
Alternate Drift	--	--	in.
Nominal Linear Weight, T&C	29.70	--	lbs/ft
Plain End Weight	29.06	--	lbs/ft
SECTION AREA	Pipe	USS-LIBERTY FJM <sup>®</sup>	
Critical Area	8.541	5.074	sq. in.
Joint Efficiency	--	59.4	%
PERFORMANCE	Pipe	USS-LIBERTY FJM <sup>®</sup>	
Minimum Collapse Pressure	5,780	5,780	psi
Minimum Internal Yield Pressure	6,880	6,880	psi
Minimum Pipe Body Yield Strength	683,000	--	lbs
Joint Strength	--	406,000	lbs
Compression Rating	--	406,000	lbs
Reference Length	--	9,320	ft
Maximum Uniaxial Bend Rating	--	28.6	deg/100 ft
MAKE-UP DATA	Pipe	USS-LIBERTY FJM <sup>®</sup>	
Make-Up Loss	--	3.92	in.
Minimum Make-Up Torque	--	9,200	ft-lbs
Maximum Make-Up Torque	--	12,300	ft-lbs

1. Other than proprietary collapse and connection values, performance properties have been calculated using standard equations defined by API 5C3 and do not incorporate any additional design or safety factors. Calculations assume nominal pipe OD, nominal wall thickness and Specified Minimum Yield Strength (SMYS).
2. Compressive & Tensile Connection Efficiencies are calculated by dividing the connection critical area by the pipe body area.
3. Uniaxial bending rating shown is structural only, and equal to compression efficiency.
4. USS-LIBERTY FJM<sup>™</sup> connections are optimized for each combination of OD and wall thickness and cannot be interchanged.
5. Torques have been calculated assuming a thread compound friction factor of 1.0 and are recommended only. Field make-up torques may require adjustment based on actual field conditions (e.g. make-up speed, temperature, thread compound, etc.).
6. Reference length is calculated by joint strength divided by nominal plain end weight with 1.5 safety factor.
7. Connection external pressure leak resistance has been verified to 100% API pipe body collapse pressure following the guidelines of API 5C5 Cal III.

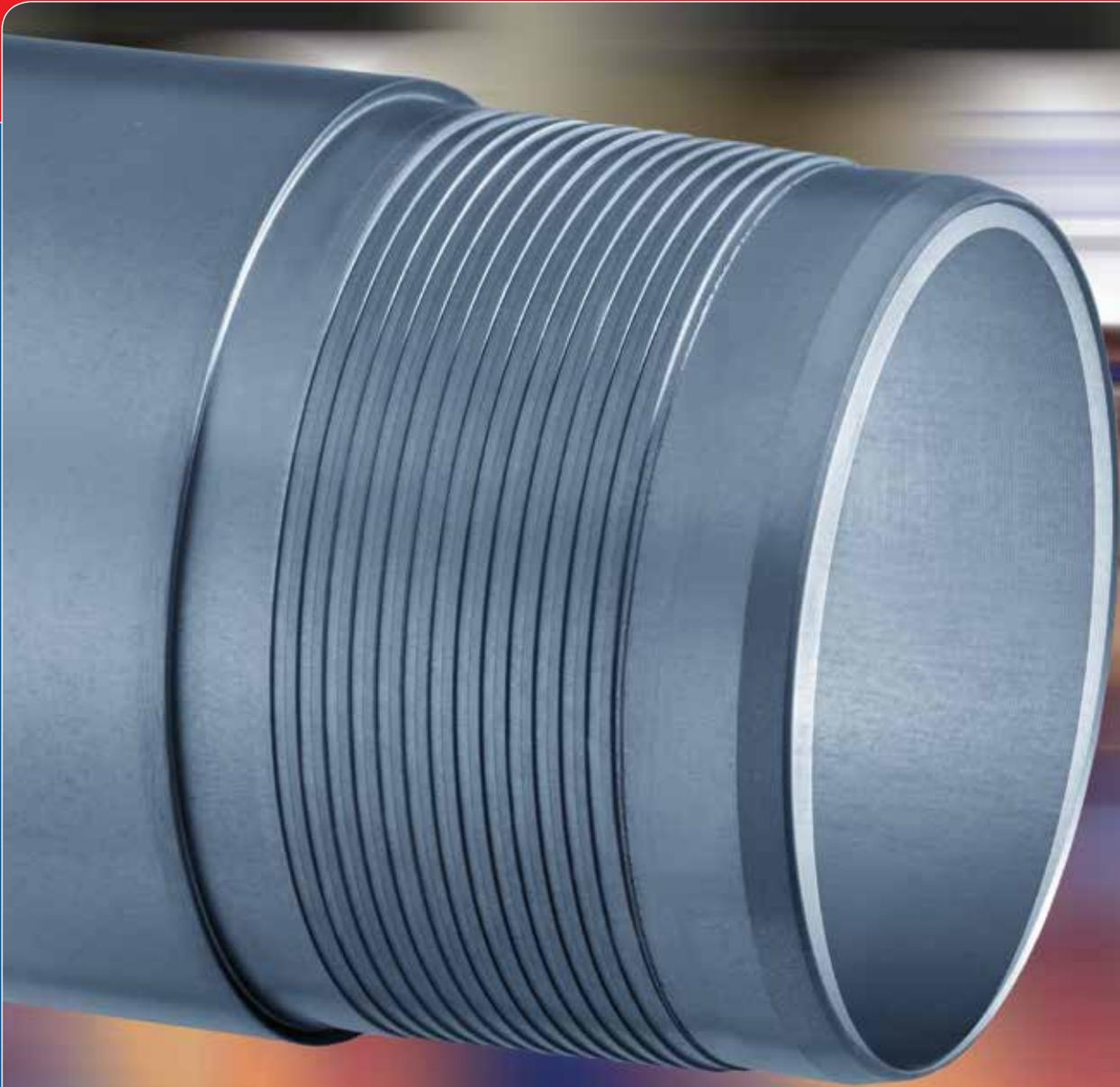
### Legal Notice

USS-LIBERTY FJM<sup>®</sup> is a trademark of U. S. Steel Corporation. All material contained in this publication is for general information only. This material should not therefore be used or relied upon for any specific application without independent competent professional examination and verification of accuracy, suitability and applicability. Anyone making use of this material does so at their own risk and assumes any and all liability resulting from such use. U.S. Steel disclaims any and all expressed or implied warranties of fitness for any general or particular application.

U. S. Steel Tubular Products  
460 Wildwood Forest Drive, Suite 300S  
Spring, Texas 77380

1-877-893-9461  
connections@uss.com  
www.usstubular.com

# USS-LIBERTY FJM<sup>®</sup>



A TRUE FLUSH CONNECTION FOR CLEARANCE-CRITICAL APPLICATIONS

 U. S. Steel Tubular Products

# USS-LIBERTY FJM<sup>®</sup>

A TRUE FLUSH CONNECTION FOR CLEARANCE-CRITICAL APPLICATIONS





**W**hen clearance between tubes is of paramount concern, the optimal solution is a flush joint connection. U. S. Steel Tubular Products offers USS-LIBERTY FJM<sup>®</sup>, a flush joint connection with a true flush outside diameter designed for clearance-critical applications. Such applications include use as a repair liner where casing has been damaged by corrosion or wear or as intermediate casing in horizontal wells.

**Proprietary thread form** delivers a compressive strength rating that is equal to the tensile strength in all outside diameter sizes, overcoming a typical weakness in flush joint connections.

**Internal and external gas-tight, metal-to-metal seals** ensure integrity of the connection under pressure.

**Clearance, strength and gas-tight sealing** advantages make USS-LIBERTY FJM<sup>®</sup> a superior solution for clearance-critical applications.

**Rigorous testing** to API 5C5/ISO 13679 requirements, including internal and external pressure testing combined with tension and compression loads, confirms connection integrity.

**Available in 3-1/2" to 8-5/8"** pipe outside diameter sizes.

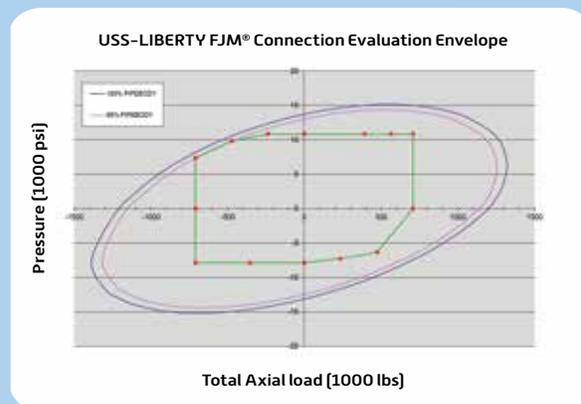
## PERFORMANCE PROPERTIES

Pipe Nominal OD	Nominal Weight	Plain-End Weight	Nominal Wall	Drift Diameter	Pin Bored ID	Makeup Loss	Connection Efficiency	55 KSI Tensile and Compressive Strength	80 KSI Tensile and Compressive Strength	95 KSI Tensile and Compressive Strength
inches	lbs/ft	lbs/ft	inches	inches	inches	inches		1000 lbs	1000 lbs	1000 lbs
3 1/2	9.2	8.81	2.992	2.867	2.906	2.93	63.10%	90	131	155
3 1/2	10.2	9.92	2.922	2.797	2.836	3.17	62.64%	100	146	173
3 1/2	12.7	12.53	2.750	2.625	2.664	3.67	61.77%	125	182	216
3 1/2	14.3	14.11	2.640	2.515	2.554	4.05	61.48%	140	204	242
4	9.5	9.12	3.548	3.423	3.462	2.81	63.97%	94	137	163
4	11.0	10.47	3.476	3.351	3.390	2.93	62.77%	106	154	183
4	11.6	11.35	3.428	3.303	3.342	3.18	63.02%	116	168	200
4	13.2	12.95	3.340	3.215	3.254	3.43	62.45%	131	190	226
4 1/2	11.6	11.36	4.000	3.875	3.914	2.94	63.57%	117	170	202
4 1/2	12.6	12.25	3.958	3.833	3.872	3.07	63.24%	125	182	216
4 1/2	13.5	13.05	3.920	3.795	3.834	3.19	62.80%	132	193	229
4 1/2	15.1	15.00	3.826	3.701	3.740	3.44	62.28%	151	220	261
5	11.5	11.24	4.560	4.435	4.474	2.70	63.70%	116	168	200
5	13.0	12.84	4.494	4.369	4.408	2.95	63.15%	131	191	226
5	15.0	14.88	4.408	4.283	4.322	3.20	62.69%	151	219	261
5	18.0	17.95	4.276	4.151	4.190	3.58	62.00%	180	262	311
5	20.3	20.03	4.184	4.059	4.098	3.83	61.59%	199	290	344
5	20.8	20.65	4.156	4.031	4.070	3.95	61.56%	205	299	355
5	21.4	21.32	4.126	4.001	4.040	4.08	61.57%	212	309	366
5	23.2	23.11	4.044	3.919	3.958	4.33	61.42%	229	334	396
5 1/2	15.5	15.36	4.950	4.825	4.864	2.80	58.02%	144	210	249
5 1/2	17.0	16.89	4.892	4.767	4.806	2.97	58.14%	159	231	274
5 1/2	20.0	19.83	4.778	4.653	4.692	3.30	58.09%	186	271	322
5 1/2	23.0	22.56	4.670	4.545	4.584	3.47	57.66%	210	306	363
5 1/2	26.0	25.56	4.548	4.500	4.539	3.80	54.10%	224	325	386
6 5/8	20.0	19.51	6.049	5.924	5.963	3.27	59.60%	188	273	325
6 5/8	23.2	22.21	5.965	5.840	5.879	3.60	59.95%	215	313	372
6 5/8	24.0	23.60	5.921	5.796	5.835	3.76	60.03%	229	333	396
6 5/8	28.0	27.67	5.791	5.666	5.705	4.10	59.56%	266	388	460
6 5/8	28.6	28.60	5.761	5.636	5.675	4.10	59.21%	274	398	473
6 5/8	32.0	31.23	5.675	5.550	5.589	4.43	59.44%	300	436	518
6 5/8	33.0	32.74	5.625	5.500	5.539	4.60	59.38%	314	457	543
7	20.0	19.56	6.456	6.331	6.370	3.41	60.12%	190	277	328
7	23.0	22.65	6.366	6.250	6.289	3.58	58.80%	215	313	372
7	26.0	25.69	6.276	6.151	6.190	3.91	59.57%	247	360	427
7	29.0	28.75	6.184	6.125	6.164	4.24	56.15%	261	380	451
7	32.0	31.70	6.094	6.000	6.039	4.41	57.92%	297	432	513
7 5/8	26.40	25.59	0.328	6.844	6.883	3.76	59.94%	248	360	428
7 5/8	29.70	29.06	0.375	6.750	6.789	3.92	59.41%	279	406	482
7 5/8	33.70	33.07	0.430	6.640	6.679	4.26	59.23%	316	460	547
7 5/8	35.80	35.59	0.465	6.570	6.609	4.42	59.09%	340	495	587
7 5/8	39.00	38.08	0.500	6.500	6.539	4.75	59.55%	366	533	633
7 5/8	42.80	42.43	0.562	6.376	6.415	5.09	59.42%	407	593	704
7 5/8	45.30	44.71	0.595	6.310	6.349	5.25	59.34%	429	623	740
7 3/4	46.10	45.51	0.595	6.500	6.539	5.26	56.81%	418	608	722
8 5/8	28.00	27.04	0.304	7.892	7.931	3.91	60.71%	265	386	458
8 5/8	32.00	31.13	0.352	7.875	7.914	4.25	55.57%	280	407	483
8 5/8	36.00	35.17	0.400	7.700	7.739	4.58	60.70%	345	502	596
8 5/8	40.00	39.33	0.450	7.625	7.664	4.91	59.48%	378	550	653

**NOTES:**

1. Connection efficiency is calculated by dividing the connection-critical area by the nominal pipe body area.
  2. Tensile and compressive strengths are calculated by multiplying the pipe body yield and connection critical area.
- Contact U. S. Steel Tubular Products to receive information for grades not listed.

110 KSI Tensile and Compressive Strength	125 KSI Tensile and Compressive Strength
1000 lbs	1000 lbs
180	204
201	228
250	284
280	319
189	214
212	241
231	263
261	297
233	265
250	285
265	301
302	343
231	263
262	298
302	343
360	409
399	453
411	467
424	482
459	521
288	327
317	361
372	423
421	478
447	508
376	427
430	489
458	521
533	605
547	622
600	682
628	714
380	432
430	489
495	562
522	593
594	675
495	563
558	634
633	719
680	773
733	832
815	926
857	974
836	950
531	603
560	636
690	784
756	860



USS-LIBERTY FJM® connection is API RP 5C5:2014 CAL II Qualified



USS-LIBERTY FJM® Capped End FEA



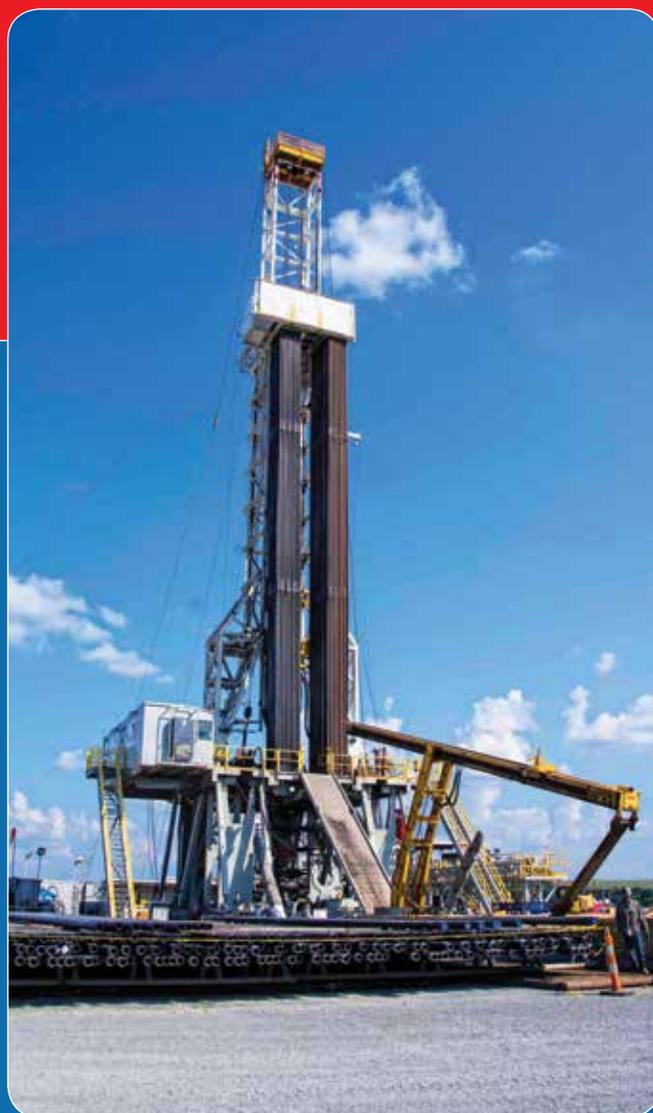
USS-LIBERTY FJM® Make-Up FEA

## RIG SITE SERVICES

U. S. Steel Oilwell Services recognizes the value of quality rig site services, particularly when running premium connections such as USS-LIBERTY FJM® connections.

Trained and experienced technicians are available to assist in running casing and tubing connections worldwide, both onshore and offshore. Rig site personnel will inspect U. S. Steel Tubular Products connections in the storage yard or at the rig site, and are trained to perform minor field repairs. Rig site services and benefits include:

- 24/7/365 service, onshore or offshore
- Assurance that correct running procedures are followed
- Visual inspection of connections
- Tools and training required to perform field repair
- Knowledge of full technical specifications and product performance data
- Ongoing training and direct access to engineering and technical staff
- Direct contact with licensed repair facilities



U. S. Steel Oilwell Services  
Rig Site Services  
24 HR: +1-281-671-3815  
[rigsiteservices@uss.com](mailto:rigsiteservices@uss.com)

U. S. Steel Oilwell Services provides rig site services throughout North America and the Gulf of Mexico. Contact us for a list of international rig site services locations.

- Casper
- Pittsburgh
- Oklahoma City
- Midland
- Dallas
- Houston
- Rig Site Services Field Locations





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 **U. S. Steel Tubular Products**

**BENOIT BTS-8 PREMIUM CONNECTION  
MATERIAL TESTING AND SPECIFICATIONS**



## CONNECTION PERFORMANCE DATA

3 1/2 in. 9.30 lbs/ft L-80 BTS-8

The Benoit BTS-8 is an 8 pitch integral premium upset two-step connection that utilizes one of the industries most-tested designs. The BTS-8 is a modified non-interference thread which eliminates high connection stress and galling. The two-step thread design helps eliminate cross-threading and prevents damage to the thread during stabbing and impact loading.

### TUBULAR DATA

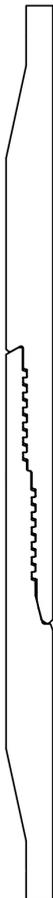
TUBE O.D.	3.5	in.
TUBE I.D.	2.992	in.
GRADE	L-80	
WALL	0.254	in.
DRIFT DIA.	2.867	in.
PIPE BODY CSA	2.59	in. <sup>2</sup>
YLD. IN TENSION	207,000	lbs.
INTERNAL PRESSURE YLD.	10,160	psi.
COLLAPSE PRESSURE YLD.	10,540	psi.
TUBE COMPRESSION YLD.	207,000	lbs.
TORSION YLD.	15,089	ft-lbs.
BENDING YLD.	105	°/100ft.

### CONNECTION DATA

CONNECTION OD	3.915	in.	
CONNECTION ID	2.920	in.	
S/C DIA.	3.859	in.	
MAKE-UP LOSS	2.840	in.	
CONN. CSA	2.676	in <sup>2</sup>	
TENSION EFFICENCY	106	%	
STRING LENGTH (1.6 SF)	13,910	ft.	
CONN. INT. YLD.	10,160	psi.	100% eff.
CONN. COLLAPSE YLD.	10,540	psi.	100% eff.
CONN. COMPRESSION YLD.	139,220	lbs.	67% eff.
CONN. TORSION YLD.	6,200	ft-lbs.	41% eff.
CONN. BENDING YLD.	71.6	°/100ft.	68% eff.
OPERATING TORQUE	4,960	ft-lbs	

### MAKE-UP TORQUE

MIN.MAKE-UP TORQUE	3,000	ft-lbs
OPTIMUM MAKE-UP TORQUE	3,375	ft-lbs
MAXIMUM MAKE-UP TORQUE	3,750	ft-lbs



The content of this Technical Data Sheet is for general information only and does not guarantee performance or imply fitness for a particular purpose, which only a competent drilling professional can determine considering the specific installation and operation parameters. Information that is printed or downloaded is no longer controlled by Benoit and might not be the latest information. Anyone using the information herein does so at their own risk. To verify that you have the latest Benoit technical information, please contact Benoit Technical Sales toll-free at 833-827-2488, [TechnicalSupport@benoit-inc.com](mailto:TechnicalSupport@benoit-inc.com)

September 17, 2020, 1:50  
pm



*Consistently Exceeding Customer Expectations*

P.O. Box 2618 Houma, LA 70361 Main Office (985) 879-2487 [www.benoit-inc.com](http://www.benoit-inc.com)

April 4, 2022

**RE: BENOIT® “BTS®” CONNECTION PRESSURE INTEGRITY**

Benoit Premium Threading, LLC is the proprietor of the “BTS®” line of tubing connections and maintains that based on extensive finite element analysis (FEA) and physical testing, it has been determined that the metal-to-metal seals of “BTS-8®” and “BTS-6®” tubing connections remain completely gas-tight when used in accordance with Benoit’s Recommended Practices and within the operating range of the performance properties published in Technical Data Sheets for each size, weight, and grade of BTS connection. **BTS®** Recommended Practices and Technical Data Sheets can be found on Benoit’s website at [www.benoit-inc.com](http://www.benoit-inc.com).



*Patrick Knight*

Patrick Knight, V.P. of Operations  
Benoit Premium Threading, LLC





*Consistently Exceeding Customer Expectations*

P.O. Box 2618 Houma, LA 70361 Main Office (985) 879-2487 www.benoit-inc.com

## Benoit “BTS®” Product Line Testing

Qualification testing of Benoit BTS® connections consisted of a physical test program in line with a modified CAL III test protocol and finite element analysis of the connection performance under a multitude of simulated well load combinations.

A connection “**product line**” is that set of products (connections) that are designed with common criteria; such as: uniform seal geometry, consistent geometric changes, uniform thread profile, and similar and consistent seal interference across the sizes, masses, and grades specified.

As qualification testing is extremely time-consuming and costly, when possible, it is beneficial to both the manufacturer and the end-user to use interpolation or extrapolation of significant performance parameters over a range of sizes and material grades to qualify a “product line” of connections. Testing is performed on worst-case combinations of the product population while verifying the material specifications, in order to give a level of confidence that the sizes not tested will perform as predicted.

The following sizes of Benoit’s BTS® product line have completed and passed qualification testing consisting of a physical test program with finite element analysis also being run on these sizes:

2-3/8” 4.70# 13Cr-95 BTS-8	2-3/8” 5.95# 13Cr-95 BTS-6
3-1/2” 12.95# L80 BTS-6	4-1/2” 15.50# 13Cr-95 BTS-6
4-1/2” 12.75# 13Cr-95 BTS-8	4-1/2” 19.20# 13Cr-95 BTS-6
5-1/2” 26.0# 13Cr-110 BTS-4	4” 13.40# 13Cr-110 BTS-6

Benoit BTS® connections have been accepted and used in all parts of the world by both major and independent oil & gas companies including:

Chevron	Marubeni O&G	El Paso
Marathon	XTO Energy	Anadarko
ExxonMobil	Noble Energy	Exco Resources
ConocoPhillips	Murphy	Pan Meridian
Hess	Total	Key Energy
Energy XXI	Petroquest	Century Exploration
Chesapeake	Forest Oil	Quantum Resources
W&T Offshore	Petro Hawk	LLOG
Stone Energy	Unit Petroleum	EOG
Nexen	Samson Resource	Quicksilver
Cimarex		

For more information concerning Benoit’s BTS® connections, please visit our website at [www.benoit-inc.com](http://www.benoit-inc.com) or contact us by phone at 985-879-2487 or by email at [technicalsupport@benoit-inc.com](mailto:technicalsupport@benoit-inc.com).



**SUMMARY REPORT FOR  
BENOIT “BTS-8” PRODUCT LINE  
EVALUATION TESTING**

	<b>Subject:</b> BTS-8 Product Line Qualification Testing	<b>Date of Test:</b> 2005
	<b>Test Location:</b> Houston, Texas	SUMMARY TEST REPORT

## **INTRODUCTION**

In 2005, Benoit Machine, L.L.C., together with a major operator, performed extensive testing on 2-3/8" 4.70# and 4-1/2" 12.75# 13CR-95ksi BTS-8 in order to evaluate and qualify the BTS-8 product line. The evaluation consisted of finite element analysis (FEA) and physical testing. Physical testing was performed on a number of specimens to verify the FEA results and to explore performance parameters that cannot be studied conveniently through FEA, such as galling resistance and the effects of multiple make and breaks on the sealing capacity of the connections.

## **THE CONNECTIONS PASSED ALL PHASES OF THE TESTING.**

This report supplies a brief summary of the testing performed. To view the entire report, please contact Benoit Machine, LLC, Quality Assurance Department, at (985) 879-2487.

## **FEA Overview**

Finite Element Analysis was used to study structural and sealability performance of the connection design. CRM Engineering Services of Kilgore, Texas, was contracted to perform the analysis. The connection model for the FEA consisted of minimum thread clearance and minimum seal interference. Evaluated, were the performance of both the metal-to-metal seals and the structural integrity of the connection. The analysis was performed in the Abaqus FEA program using a linear element approach. The results indicate gas and liquid sealability throughout the entire load range.

## **Physical Testing Overview**

Physical testing of the BTS-8 connections was performed in the test laboratory of a major oil and gas company in Houston, Texas.

The physical testing consisted of the connections being subjected to multiple make and break tests, combined load gas sealability tests, thermal cycle test, external pressure test, and structural failure tests. The test loads were obtained using the BTS connection performance envelope and the pipe body yield envelope. The connections were also subjected to additional test loads in excess of the targeted performance envelopes to confirm the connections failure limits, modes, and locations.

## **Test Specimens**

Eight specimens from each the 2-3/8" 4.70# and 4-1/2" 12.75# were prepared for the physical test program, with two of the specimens being spares for use in case of problems. The test connections were machined on Kawasaki KO-HP1-13Cr95 integral joint tubing sections.

Specimen 1 was machined to minimum thread clearance and maximum seal interference. Specimen 2 was machined to maximum thread clearance and minimum seal interference. Specimens 3, 4, 5, 6, 13, and 15 were machined to minimum thread clearance and minimum seal interference (#13 & 15 were spares).

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**Connection Gauging**

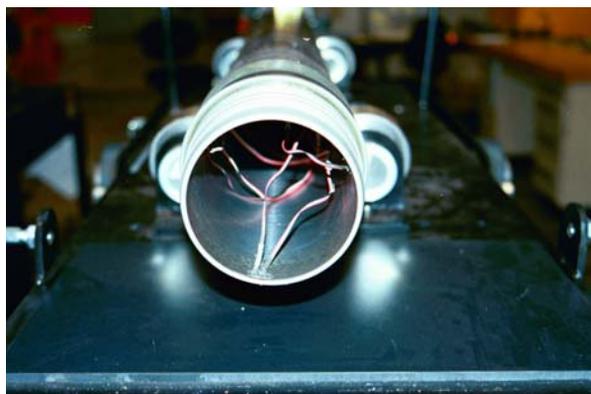
The gauging and inspection of each connection was performed and documented by Benoit Quality Control personnel and witnessed by a PPI third party monitor. The gauging was performed in accordance with Benoit’s standard operating procedures.

**SEA Inspection**

After threading and gauging, all specimens were shipped to Tuboscope for SEA inspection to ensure that the test material had no unseen flaws that could affect the test results.

**Strain Gauging**

Biaxial strain gauges were installed inside the pins and outside the boxes on all test specimens prior to make and break cycles. Strain gauges were attached to each connection directly opposite of the internal 14degree seal in equally spaced locations around the diameter. Strain gauge readings were monitored during the make and break testing to determine the trapping of any thread compound in the seal area.



**SUMMARY OF MAKE & BREAK TESTING**

Make and break tests were conducted as follows:

Specimen	Activity
1, 3, 5	10 M&B’s at maximum torque + Final Makeup at minimum torque
2, 4, 6	1 Makeup at minimum torque

After each M&B cycle, the thread compound was removed and the connections were inspected for galling, burrs, gouges, and scratches in the threads, seals, and shoulder areas.

The thread compound used for testing was Bestolife 72733 with the amount being .1 to .3 ounces per connection.

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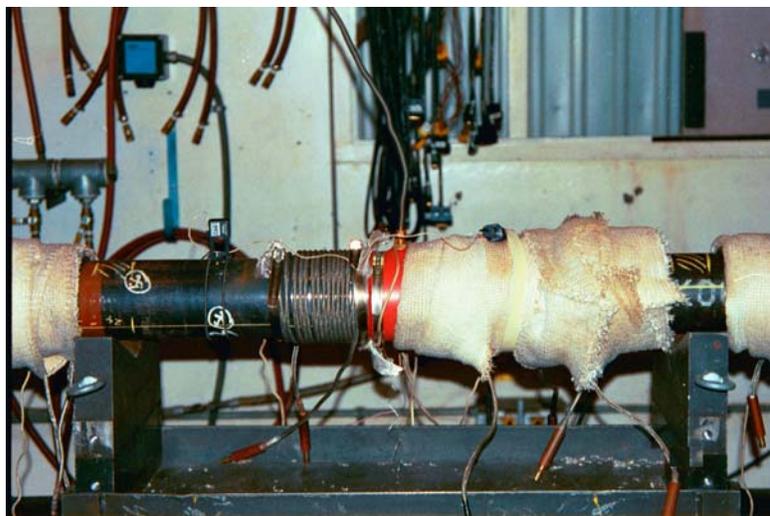


*Results of M&B Testing: No galling, scratches, burrs, etc., was found on any connection during visual inspection. No field repairs were necessary. All strain gauge readings were normal.*

### SEALABILITY TESTING

Sealability tests were conducted on specimens 2, 3, 4, 5, and 6.

The pressurization medium was nitrogen with helium added as a tracer gas. A rubber boot was installed around the mated pin and box external shoulder seal and was piped to an inverted flask filled with water and fitted with a leak detection device. Appearance of bubbles in the flask would indicate suspected leak. For the elevated temperature sealability tests, the temperature was held at 300°F +/- 30°F.



SPECIMEN #2 was subjected to an 18-step schedule of combined loads including internal pressure, tension/compression, and bending at ambient temperature and again at 300° F with stresses up to 94% VME.

	<b>Subject:</b> BTS-8 Product Line Qualification Testing	<b>Date of Test:</b> 2005
	<b>Test Location:</b> Houston, Texas	SUMMARY TEST REPORT

*RESULT: The specimen exhibited no leaks during the ambient or elevated temperature load cycles.*

SPECIMENS #3 and #4 were subjected to a 32-step schedule of combined loads including internal pressure, tension/compression, and bending at ambient temperature and again at 300° F with stresses up to approximately 100% VME.

*RESULT: Specimens 3 and 4 exhibited no leaks during testing.*

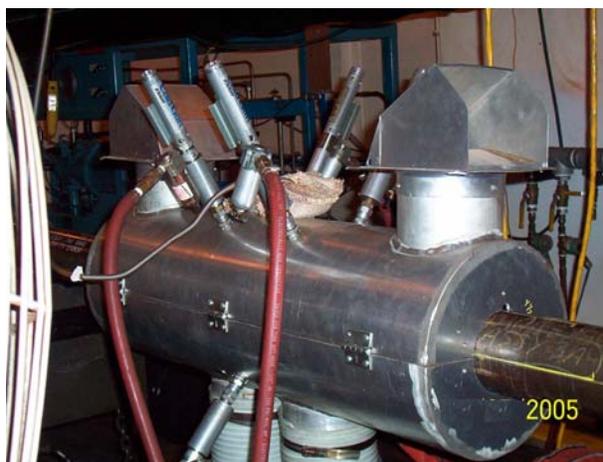
SPECIMENS #5 and #6 were subjected to a 45-step schedule of combined loads including internal pressure, tension/compression, and bending. Specimen #5 was tested at ambient temperature and specimen #6 at 300° F. This was the most severe load schedule with many of the load-steps well above 100% VME (see the last 4 pages for VME plot of test loads for #5 & #6).

*RESULT: The specimens exhibited no leaks during the entire load schedule.*

### **THERMAL-CYCLE TESTING**

Following sealability testing, specimen #3 and #5 were thermally cycled between 120°F or less and 300°F while applying 75% of the API Pipe Body Rating in tension and 80% of the API PBR internal pressure. The specimens were subjected to 20 cycles each.

*RESULT: The specimens exhibited no leaks during the thermal cycles testing.*



**TEST SPECIMENS INSIDE THE THERMAL CYCLE CHAMBER**

### **TENSILE-TO-FAILURE TESTING**

Pure tension, with no pressure, was applied to Specimen #1 and gradually increased to establish the tensile failure mode. The tensile load was gradually increased until the specimen began elongating without applying any higher load. Both the 2-3/8" and 4-1/2" specimens failed in the pipe body and not the connections with loads as follows:

	<b>Subject:</b> BTS-8 Product Line Qualification Testing	<b>Date of Test:</b> 2005
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2-3/8" 4.70# BTS-8 @ 162,000 lbs. or 130% of the API PBR  
 4-1/2" 12.75# BTS-8 @ 431,000 lbs. or 126% of the API PBR



4-1/2" 12.75# TENSILE FAILURE



2-3/8" 4.70# TENSILE FAILURE

**INTERNAL PRESSURE TO FAILURE**

Specimens 1, 5, & 6 were internally pressured with water at ambient temperature until failure.

*RESULTS: All specimens ruptured in the pipe body at 160% to 173% of the API Pipe Body Ratings as followings:*

2-3/8" 4.70# BTS-8: #1 @ 21,273 psi, #5 @ 22,999 psi, and #6 @ 22,830 psi.  
 4-1/2" 12.75# BTS-8: #1 @ 16,393 psi, #5 @ 16,434 psi, and #6 @ 16,710 psi.



**EXAMPLE OF INTERNAL PRESSURE TO FAILURE**

	<b>Subject:</b> BTS-8 Product Line Qualification Testing	<b>Date of Test:</b> 2005
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**EXTERNAL PRESSURE TEST**

Specimen #3 from each the 2-3/8" and 4-1/2" was subjected to a 10-step schedule of loads combining tension/compression with external pressure. Initial loading was 90% of the API pipe body minimum tension rating with no pressure. Gradually, external pressure was increased while lessening the tension load until the specimens were loaded in compression with and external pressure equal to 84% of the API collapse rating for the pipe body.

*RESULT: No leaks were observed.*



**TEST SPECIMENS INSIDE THE EXTERNAL PRESSURE CHAMBER**

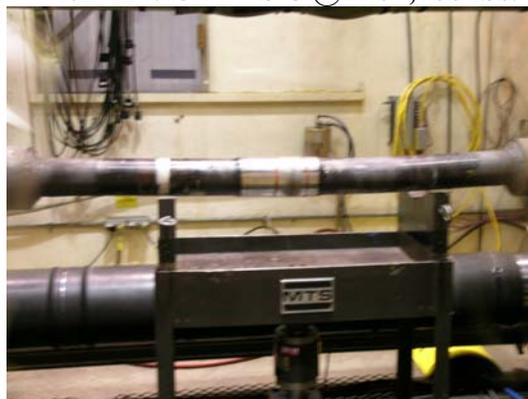
**COMPRESSION-TO-FAILURE TEST**

After sealability testing and thermal cycling, Specimen #4 from each size was shortened as much as the load frame would allow. A compressive force was gradually increased on the specimen (with no internal or external pressure) until yielding began. Both sizes buckled in the tube-body of the specimen, with no measurable yielding to the connections. The final compression loads were as follows:

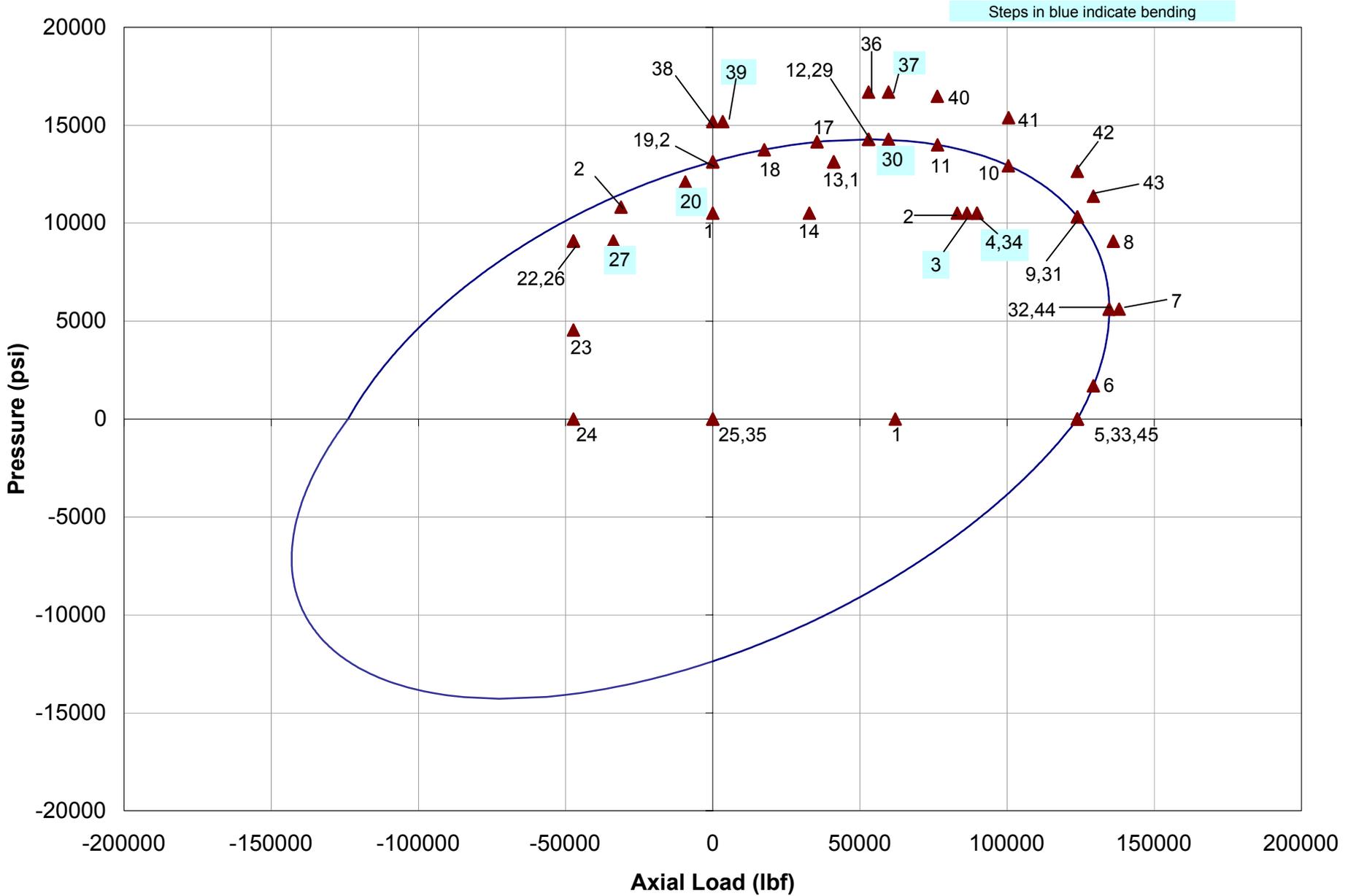
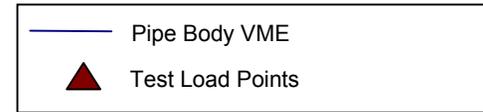
**2-3/8" 4.70# BTS-8 @ -122,200 lbs.**



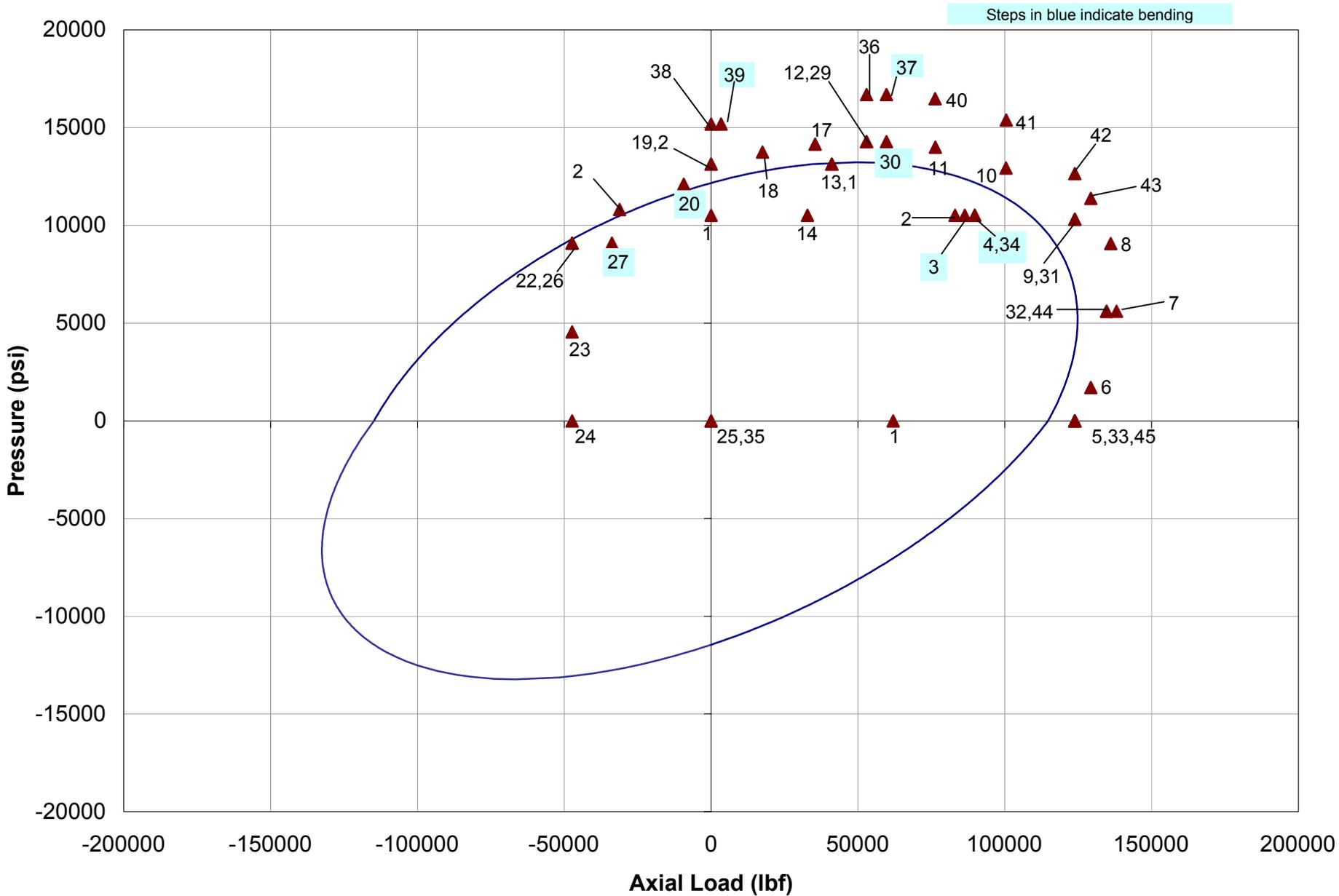
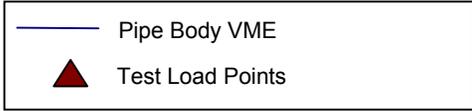
**4-1/2" 12.75# BTS-8 @ -401,700 lbs.**



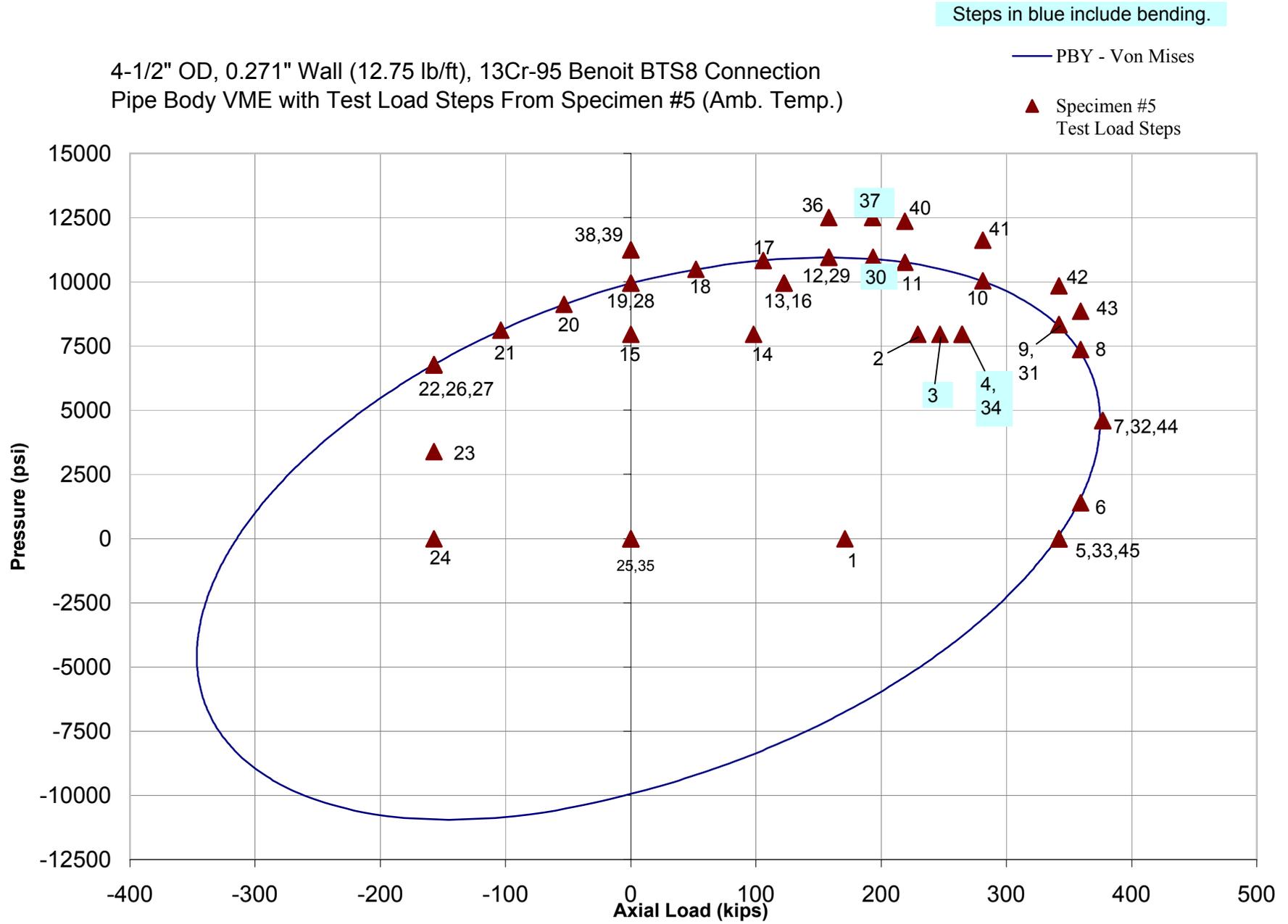
2-3/8" OD, .190" Wall (4.70 lb/ft), 13Cr-95 Benoit BTS-8 Connection  
 Pipe Body VME with Test Load Steps From Specimen #5 @ Amb. Temp.



2-3/8" OD, .190" Wall (4.70 lb/ft), 13Cr-95 Benoit BTS-8 Connection  
 Pipe Body VME with Test Load Steps From Specimen #6 @ 300° F.



4-1/2" OD, 0.271" Wall (12.75 lb/ft), 13Cr-95 Benoit BTS8 Connection  
Pipe Body VME with Test Load Steps From Specimen #5 (Amb. Temp.)

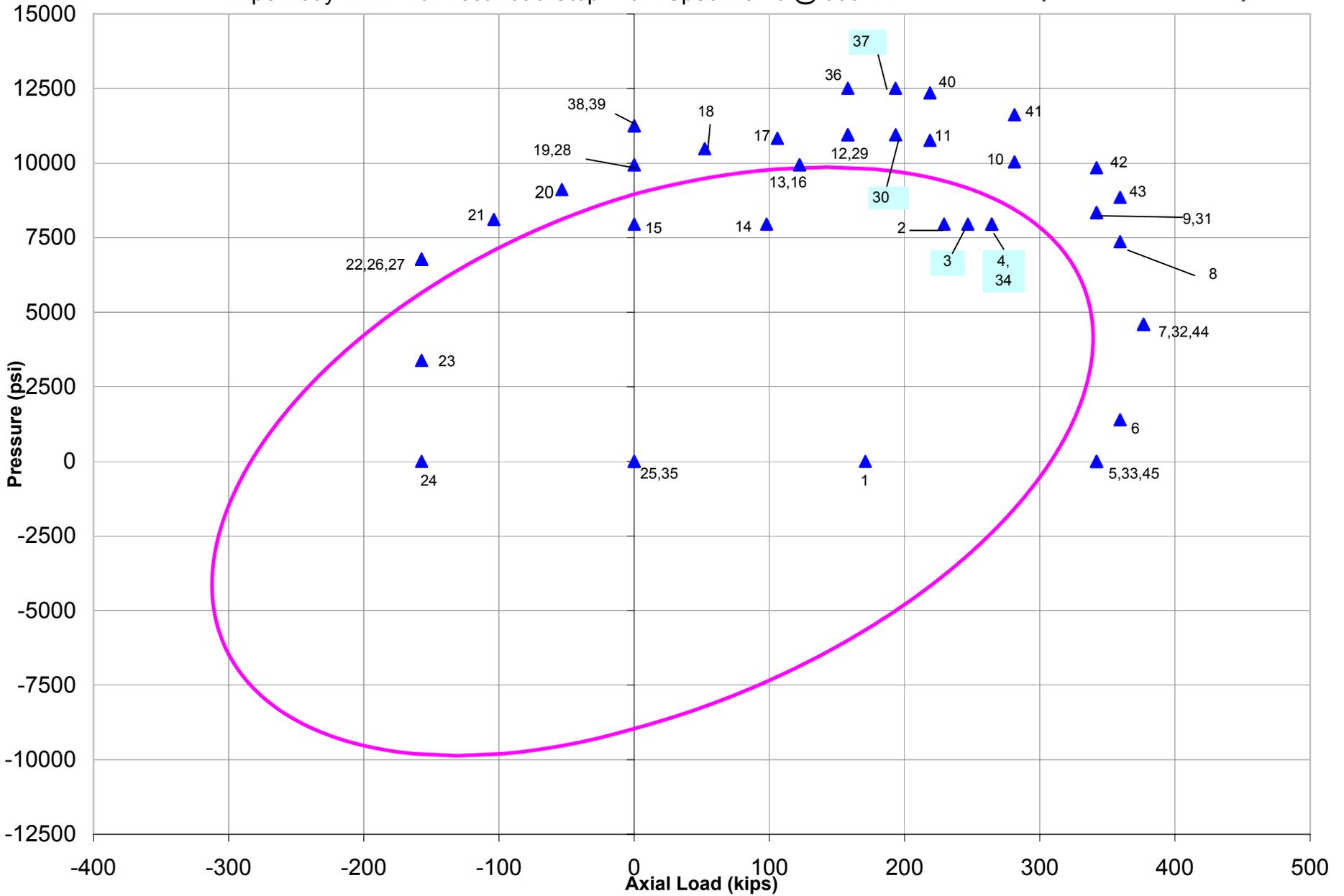


4-1/2" OD, 0.271" Wall (12.75 lb/ft), 13Cr-95 Benoit BTS8 Connection  
Pipe Body VME with Test Load Step From Specimen 6 @ 300° F.

Steps in blue include bending.

PBY - Von Mises (300 F)

▲ Specimen #6 Test Load Steps



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

CONDITIONS

Action 133127

**CONDITIONS**

Operator: Salt Creek Midstream, LLC 5825 N Sam Houston Pkwy W Houston, TX 77086	OGRID: 373554
	Action Number: 133127
	Action Type: [C-103] NOI Change of Plans (C-103A)

**CONDITIONS**

Created By	Condition	Condition Date
pgoetze	Minor modification of well design. All other conditions of Commission Order No. R-20913-D remain in full force and effect.	8/18/2022