

Leading Practices in MAOP Reconfirmation

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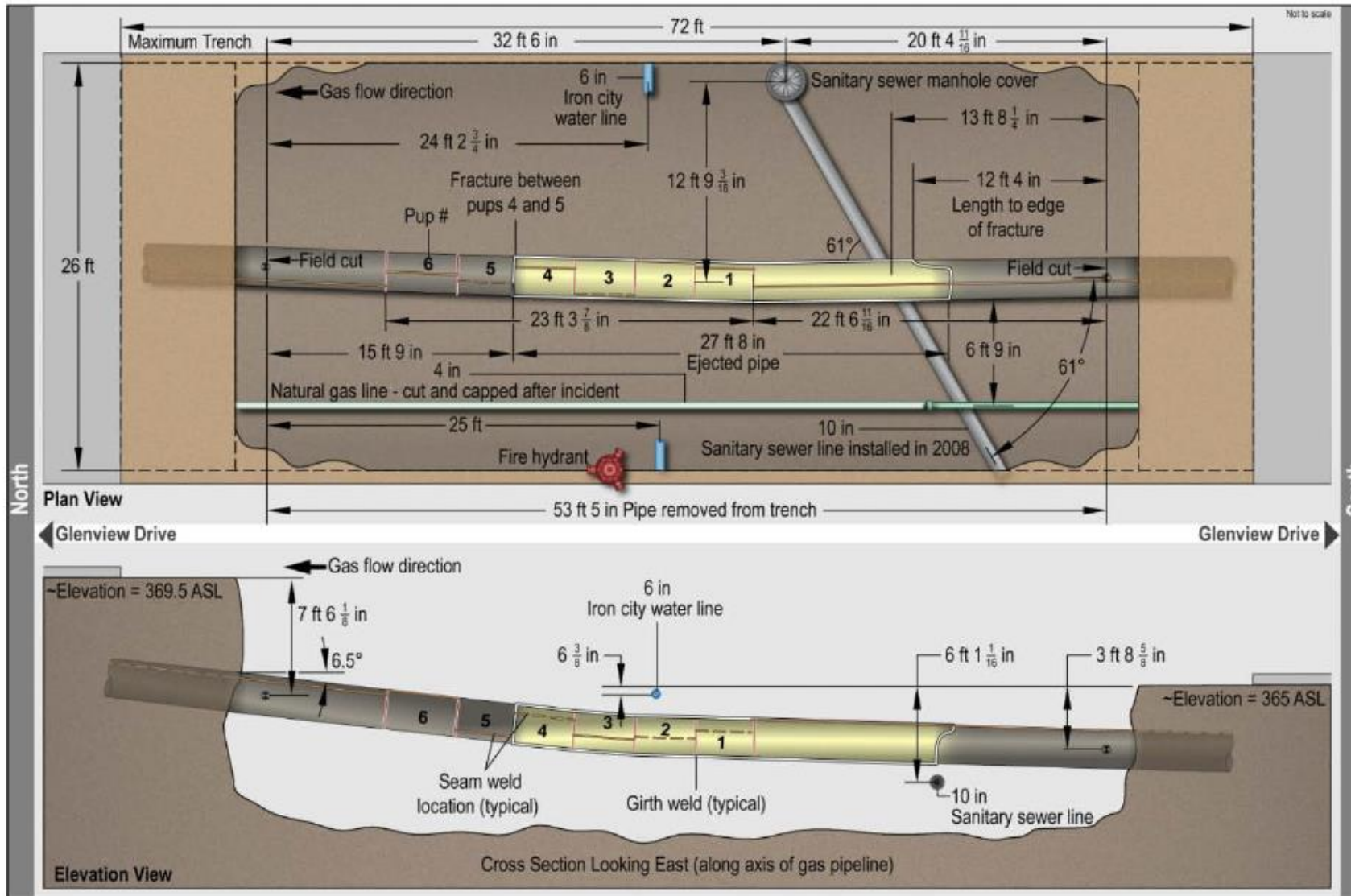
MAOP Reconfirmation - The Precipitating Event

Unknown, unknowns at failure site of PG&E incident in San Bruno, CA.

Six pups installed with varying seam weld quality. One pipe was rolled transversely to mill practice.

No evidence that the pups had been pressure tested.

We are here to address testing of previously untested pipe



Legislative background for establishing material strength of previously untested pipe

Section 23 of the Pipeline Safety Act Amendments of 2011

d. Testing Regulations,

“...the Secretary shall issue regulations for conducting tests to confirm the *material strength of previously untested* natural gas transmission pipelines located in high-consequence areas and operating at a pressure greater than 30 percent of specified minimum yield strength.”

From preamble: "Congress required PHMSA, per the 2011 Pipeline Safety Act, to issue regulations *to confirm the material strength of previously untested* natural gas transmission pipelines located in HCAs and operating at a pressure greater than 30 percent of SMYS. Through this final rule, PHMSA is implementing that congressional directive and other safety measures. This final rule will improve the safety and public confidence of the Nation's onshore natural gas transmission pipeline system." 84 FR 52189

49 CFR 192.624 – MAOP Reconfirmation Applicability

(a) Applicability. Operators of onshore steel transmission pipeline segments must reconfirm the maximum allowable operating pressure (MAOP) of all pipeline segments in accordance with the requirements of this section if either of the following conditions are met:

(1) Records necessary to establish the MAOP in accordance with **§ 192.619(a)(2)**, including **records required by § 192.517(a)**, are not traceable, verifiable, and complete and the pipeline is located in one of the following locations:

- (i) A high consequence area as defined in § 192.903; or
- (ii) A Class 3 or Class 4 location.

(2) The pipeline segment's **MAOP was established in accordance with § 192.619(c)**, the pipeline segment's MAOP is greater than or equal to 30 percent of the specified minimum yield strength, and the pipeline segment is located in one of the following areas:

- (i) A high consequence area as defined in § 192.903;
- (ii) A Class 3 or Class 4 location; or
- (iii) A moderate consequence area as defined in § 192.3, if the pipeline segment can accommodate inspection by means of instrumented inline inspection tools.

Historical background - MAOP determination in 1970

- Two methods for pipe installed prior to 1970 effective date (11/12/1970)
- Method 1 (192.619(a)) – The lowest of:
 - Design basis
 - Pressure test
 - Highest operating pressure over prior five years
 - Condition based on historical review
- Method 2 (192.619(c)) – Highest operating pressure over prior five years – Grandfather Clause
- Two key points
 - Many operators who used the Grandfather Clause also pressure-tested the pipe. A presumption that all Grandfathered pipe was untested is incorrect.
 - A common practice was to conduct the pressure test a few pounds higher than the design basis, so design (192.619(a)(1)) became the basis of MAOP. Some operators chose only to keep the records for the “lowest of.” There were no specific recordkeeping requirements for 192.619.

Original 49 CFR 192.607

- The original gas rule had a provision that required operators to “confirm” that the hoop stress corresponding to the maximum allowable operating pressure for each segment of pipeline was commensurate with the present class location in accordance with 192.611 (Class Change) by December 31, 1974.
- The original 192.607 was withdrawn by OPS in 1996 because the compliance date had long passed.
- There were no specific recordkeeping requirements for the “confirmation” as there were in other provisions such as 192.553(b) for Upgrading. Operators may not have maintained records after the requirement was withdrawn.

Management of previously tested segments subject to 192.624

Two cases:

- Previously tested segments that do not meet TVC requirements of 192.517(a) – 192.624(a)(1).
- Previously tested segments that have operated under 192.619(c) and have a historic test.

PHMSA formed a Work Group to address these issues – RIN 1 Working Group
Andy Drake, Enbridge/ PNGTS; Mark Hereth, Blacksmith; Bill Carem, PST;
Alan Mayberry, PHMSA and Rod Seeley, PHMSA

Work to develop a white paper is near completion

Provisions in House and Senate PLS Reauthorization Bills codify the RIN 1 Working Group

192.624(c) – MAOP Reconfirmation Methods

1. Pressure test
2. Pressure reduction
3. Engineering Critical Analysis (ECA)
4. Pipe replacement
5. Pressure Reduction for Pipeline Segments with Small Potential Impact Radius
6. Alternative technology

MAOP Reconfirmation ECA

- Collaborative of operators developed an MAOP Reconfirmation ECA process
- Collaborative operators met with PHMSA and have undergone initial reviews with PHMSA personnel
- API initiated a task group to develop a recommended practice to codify the process.

Panel Presentations

“The Standard” for pressure tests at the time for pre-1970 tests?

- The standard in effect when 49 CFR 192 was first issued in ASME B31.8
- For pressure testing it required
 - Pressure
 - Medium (water or gas)
 - Note: conservative assumptions can be applied

Note: It was not until regulations were promulgated in 1970 that recordkeeping was required for pressure testing

Role of pressure testing for material strength

- The initial hydrostatic test is one-time test establishing material strength for establishing MAOP
- Material strength is established when the test section reaches maximum pressure
- NPRM Comments submitted in 2016 established technical foundation for “material strength” determination based on test pressure
- Ongoing fitness for service is managed through operations, maintenance, and integrity management
 - We will come back to Integrity Management

Requirements added in 1970 regulations

Language from 49 CFR 192.517(a)

1. Elevation variations, whenever significant for the particular test
2. Test duration
3. Pressure recording charts or other record of pressure readings
4. Leaks and failures noted and their disposition
5. Operator's name, the name of employee responsible for making the test, and the name of any test company used.

Pressure recording charts or other record of pressure readings

- There are instances where charts or tables of pressures do not exist
- Recall, the regulations did not require that these records be maintained
- The essential point is that an operator needs a record of the pressure

Accounting for elevation change for prior tests

- *“Whenever significant for the particular test”*
- If it wasn't significant, it is likely there wouldn't be records
- Even though not required before 1970, an operator can use current elevation profile, and meet the requirement if a conservative **assumption** basis cannot determined

Other parameters

- There are instances where records do not exist, for instance:
- Recall, the regulations did not require that these records be maintained
- Test failures or leaks
 - The essential point is that if a failure occurred, it would have required a retest.
 - If there was a leak, it would be found with subsequent leak surveys
- Operator name, personnel and testing company
 - The essential point is that an operator needs a record that shows the test was conducted

What's required for historic pressure tests

- Linkage of pressure test to pipe
- Pressure
- As necessary, use of conservative assumptions for:
 - Medium
 - Elevation adjustments

Segments meeting these points meet the intent of being previously tested

Initial Pressure Test versus Integrity Management

- “... testing to Subpart J pressure test levels, is a conservative and proven method to establish MAOP. This reasonable safety margin serves as the starting point for managing a pipeline’s integrity. An operator then uses ongoing operation, maintenance, and integrity management activities to manage the condition of the pipeline continually. If its condition deteriorates, a pipeline is evaluated using proven testing methods to ensure safe continued operation, or it is repaired or replaced to restore the conservative safety margin.”
- “Features present from original manufacturing and historical construction techniques are “resident” and do not grow in service unless acted upon by another threat such as external corrosion, outside force, or pressure cycling.”
- Joint Trades Comments of PHMSA NPRM, July 7, 2016, p. 12.

Duration

- “Pressure tests performed before 1970 without an 8-hr hold test should still be considered a valid pressure test to prove the pressure carrying capability of the pipeline. The lack of an 8-hr leak test is immaterial, because would have been found over the subsequent life of the pipeline by the operator through surveys .” Kiefner, Rosenfeld and Haines, Oil and Gas Journal, March 5, 2012.
- Pressure tests in the mill at conducted for 10 seconds to establish the material strength of the pipe as manufactured. API 5L
- B. N. Leis and F. W. Brust, “Hydrotest Strategies for Gas Transmission Pipelines Based on Ductile-Flaw-Growth Considerations,” NG-18 Report No. 194, PRCI Catalogue No. L51665, 1992.

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