Pipeline Integrity Verification Process Workshop

Event Summary Report

The Westin Arlington Gateway
Arlington, VA

August 7, 2013

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Executive Summary

On August 7, 2013, the Department of Transportation's Pipeline and Hazardous Material Safety Administration (PHMSA) and the National Association of State Pipeline Safety Representatives (NAPSR) sponsored a public workshop on the subject of Pipeline Integrity Verification. This workshop was designed as an open forum for the exchange of information, ideas, challenges, and concerns associated with pending regulatory approaches to establish – or, in some cases, to re-establish - the mechanical integrity of certain natural gas and hazardous liquid pipelines. This regulatory initiative is intended to address several specific Congressional mandates and National Transportation Safety Board (NTSB) recommendations related to recent accidents that have occurred on pipelines with previously undetected integrity issues associated with original material manufacturing, construction, installation, testing, or records.

As a basis for these discussions, PHMSA issued a draft proposal for an Integrity Verification Process (IVP) prior to the workshop (see Appendix A). The input received via this workshop and comments provided to the docket related to this draft IVP are all intended to inform the regulatory approach to be pursued by PHMSA. The workshop included presentations by: PHMSA's Office of Pipeline Safety; the NAPSR; the NTSB; the Pipeline Safety Trust (PST); and, members of the gas transmission and hazardous liquid pipeline operating community.

The external drivers for this regulatory initiative include Section 23 of the Pipeline Safety, Regulatory Certainty, and Job Creation Act of 2011 and NTSB's Recommendations P-11-14, P-11-15, and P-11-17. Together, these mandates and recommendations call for: removal of the existing "Grandfather clause" within PHMSA's regulations (§ 192.619(c)); new pressure testing requirements; integrity verification plans for pipeline segments that do not have complete records establishing their maximum operating pressures; and, the conversion of all gas transmission pipelines to accommodate inspection by inline inspection (ILI) technology (i.e., smart pigs).

The open floor question and answer sessions generated clarifications and further questions for PHMSA and NAPSR to consider relating to regulatory approaches to be considered. PHMSA requested that all comments be submitted to Docket #PHMSA-2013-0119.

All presentation material and transcripts are permanently available for viewing on the meeting website. The webcast recording, however, is only available for six months after the event date at http://primis.phmsa.dot.gov/meetings/MtgHome.mtg?mtg=91 .

The State pipeline safety regulators represented by NAPSR reminded stakeholders that, in the late 1960's, both the DOT and the Congress were discussing the same underlying challenges discussed at the 2013 IVP Workshop. Furthermore, NAPSR discussed the uncertainties of "knowing your systems" after illustrating several examples of operators who discovered they had different pipe materials and wall thicknesses in their system than previously believed.

After the national state pipeline safety regulator presentation, a perspective was conveyed by the PST, which is a non-profit pipeline public safety advocacy group. The PST shared the public assumption that implementation of Integrity Management regulations had already dealt with this issue and was surprised that an operator can have an integrity management plan to assess the risks to their pipe, if they don't know key characteristics of the pipe. These were key fundamentals noted by the PST who supported those attributes identified in the proposed IVP. The PST further noted that the mandate to design and

implement a solution was overdue and that there were some concerns over handling low stress pipelines, designing the rigor of engineering critical assessments, and that there may be too much operator flexibility in the proposed IVP.

Both the natural gas intrastate and interstate pipeline operators stated their committed to reducing pipeline incidents. However, they were both concerned that the draft IVP appears to incorporate too many technical issues within one process. One suggestion was to re-organize the IVP goals and sub-processes into a separate process for each aspect but to concurrently address. The industry is committed to the testing of untested gas transmission lines in class 3 & 4 locations and class 1 & 2 High Consequence Areas (HCAs) operating at > 30% Specified Minimum Yield Stress (SMYS) using pressure testing or ILI and that the final process must involve federal, state regulators and Commissioners due to the potential costs of implementation. The natural gas pipeline operators requested a longer comment period to facilitate development of balanced solutions that are feasible and practicable.

The hazardous liquid pipeline perspective echoed much as presented by the natural gas industry in that key technical details are missing in the IVP such as document verification requirements, hydrotest requirements, spike test requirements, and derating guidelines, and specifications for an Engineering Critical Assessment (ECA). It was noted that liquid systems are primarily piggable and that aspects of the process would be different for hazardous liquid systems.

Introduction

The Pipeline Integrity Verification Process Workshop was held on August 7, 2013, at the Westin Arlington Gateway Hotel in Arlington, Virginia, and was designed to provide an open forum to present information and seek any and all stakeholder comments on PHMSA's proposed Integrity Verification Process (IVP), which could serve as the basis for future PHMSA regulations. The proposed IVP seeks to address the various technical issues and challenges associated with verifying the mechanical integrity of existing pipelines which had either been "grandfathered" under existing regulations, or where adequate records do not exist to establish existing pressure limits. PHMSA's objective is to define a clear process for establishing safe operating pressure limits based on verifiable, complete, and traceable records.

Stakeholder turnout included more than 240 attendees in person and over 1,200 virtual connections via the webcast. Federal, state and provincial pipeline safety regulatory agencies from North America were represented, as were industry standards developing organizations, service providers, pipeline operators, trade organizations, independent contractors, and members of the general public.

Organizing the IVP Workshop

In organizing the event, PHMSA solicited diverse and balanced representation on the various panels, seeking the perspectives of various stakeholders. Together, PHMSA and NAPSR worked with various organizations and pipeline operators to establish the agenda, define the topics, and identify and select presenters for the workshop. The draft IVP flowchart developed by PHMSA (see Appendix A) was made public in advance via the Federal Register and Docket #PHMSA-2013-0119.

Presenters were asked to construct their presentations around the proposed IVP flowchart and the following questions in order to place the draft IVP into full context. In particular, presenters were asked to comment, where possible, when costs, timeframes, alternatives, and experiences relating to integrity testing were significant or limiting factors.

1. How should an IVP be implemented to validate a pipeline that operates under the Grandfather Clause (192.619(c)) and does not have complete records such as:
    a. Lack of material records to confirm wall thickness, grade, or seam type
    b. Lack of pressure tests records
    c. Lack of safe operating history – operating pressure, corrosion, coating, leak, and failure history

2. How should the following methods be used to validate pipe that is being operated in accordance with the Grandfather Clause?
    a. Pressure testing - test pressures and spike test pressures including duration
    b. Internal Inspections/Inline Inspections (ILI)
        i. Ability to evaluate, with special emphasis on cracks and crack-like defects, including interactions with other defects and girth welds, seams, Stress Corrosion Cracking (SCC), Selective Seam Corrosion (SSC), laminations, dents, combined stresses, and interactive threats
    c. Other Technologies - identify any new technologies that should be considered

3. How should the equivalency of ILI to pressure tests be determined? Address process for determining critical flaw size that would fail a pressure test and if ILI tools are capable of reliably identifying such anomalies.

4. See IVP flow chart and comment:
    a. How long should be allowed for analysis and assessment implementation?
    b. What re-assessment intervals, if any, should be used for IVP?
    c. Address special considerations for verifying Maximum Allowable Operating Pressure (MAOP) for pipelines operating above 72% Specified Minimum Yield Strength (SMYS)

5. Discuss the analytical approach, data needed (e.g., ILI data, coating, close interval, and interference surveys, operating pressure, leaks and failure history including cause), and analysis or other threat criteria, for conducting an engineering critical assessment that can demonstrate equivalency to pressure testing.

6. Regarding material verification:
    a. Address determination of sampling size/rate, including target confidence level, and criteria for expanding sample size
    b. Non-Destructive Evaluation (NDE) and destructive tests to confirm pipe mechanical and chemical properties?
    c. How should material being verified be treated when sampling shows pipe strength to be less than the value used to establish existing MAOP?
    d. What criteria should be used for establishing MAOP and/or revising anomaly evaluation criteria, when material strength is discovered to be lower than the value used to establish the existing MAOP?
    e. What role can in-the-ditch material evaluation methods contribute to the success of IVP? Are in-the-ditch tools for nondestructively analyzing material properties reliable enough to provide an acceptably high degree of confidence in the result/outcome?

PHMSA's IVP Approach

As proposed, PHMSA's draft IVP is designed to be a multi-disciplinary, risk-based engineering approach to verify that safe operating pressure limits are appropriately and demonstrably established and documented. The proposed process can also be applied to pipelines that may contain flaws, have sustained damage, or have aged so that integrity cannot be evaluated solely by reliance on original construction codes or regulations. PHMSA estimated that the scope of the proposed IVP would apply to approximately 91,000 miles of steel natural gas transmission pipelines, or roughly 30% of the existing gas transmission infrastructure.

PHMSA's proposed process is based on 4 principles:

1. Apply to higher risk locations such as High Consequence Areas (HCAs) and Moderate Consequence Areas (MCAs)
2. Screen segments for categories of concern (e.g., "Grandfathered" segments)
3. Assure adequate material and documentation
4. Perform assessments to establish MAOP

Principle #1: Apply to Higher Risk Locations

The IVP applies to natural gas transmission pipelines in High Consequence Areas (HCAs) and Moderate Consequence Areas (MCAs), with the definition for MCAs to be established in future regulations. PHMSA proposes that MCAs as non-HCA pipe segments in Class 2, 3, and 4 locations, and Class 1 locations that are populated within the line's Potential Impact Radius (proposed 1 house or occupied site) to align with the INGAA Commitment to Land Owners. Finally for MCAs, it will be applied to a house count and occupied site definition same as HCA, except for 1 house or 1 person at a site (instead of 20).[1]

Principle #2: Screen for Categories of Concern

The IVP will apply to pipeline segments with:

- Grandfathered pipe
- Lack of records to substantiate (MAOP)
- Lack of adequate pressure tests
- Operating pressures over 72% SMYS (pre-Code)
- History of failures attributable to manufacturing and construction defects

Principle #3: Know and Document Pipe Material

PHMSA recognizes the challenges of recordkeeping for legacy or grandfathered systems. However, to resolve with a high degree of confidence any missing or inadequately validated, or traceable material documentation, operators would design and implement a program to establish material properties by one or more of the following:

- Cutting out and testing pipe samples (Code-approved process)
- In situ non-destructive testing (if validated and Code-approved)
- Field verification of code stamp for components such as valves, flanges, and fabrications
- Other verifications

Principle #4: Assessments to Establish MAOP

Operators must utilize all available data and information – and secure additional information as needed – in order to design an appropriate methodology. Candidate IVP options for establishing MAOP include:

- Subpart J test with spike test
- Derate the pipeline (lower the existing MAOP)
- Perform an Engineering Critical Assessment (ECA)
- Replace pipe and components
- Other options PHMSA should consider?

[1] Class locations are specified as Class 1, 2, 3 or 4. Class 1 indicates the least heavily populated of the class locations, representing an offshore area or an area with 10 or fewer buildings intended for human occupancy. In comparison, Class 4 indicates the most heavily populated of the class locations, representing an area where buildings with four or more stories above ground are prevalent.

Draft – IVP Process Steps

The draft IVP flowchart is included in Appendix A. The following is a summary of how the IVP flowchart is structured and how the 21-step process embodies the 4 principles:

- Grandfather Clause and MAOP Review – Process Steps 1 – 4
- Integrity Review – Process Steps 5 – 8
- Location Risk Review (HCA/MCA) – Process Step 9
- Low Stress Review – Process Steps 10 – 12
- Material Documentation Review – Process Steps 13 – 15
- Assessment and Analysis Review – Process Steps 16 – 20
- Implementation – Process Step 21
- Deadlines for Implementation (TBD)

The IVP flowchart represents a relatively high-level concept and is designed to begin the dialog. Details and guidelines that would need to be added to it are still under development, all of which will be informed by the IVP Workshop and the comments supplied via the Docket. The following examples are just some of the known technical issues still requiring further design and refinement:

- Spike pressure test specs (pressure, hold time, etc.)
- De-rate criteria (amount of MAOP reduction)
- ILI program requirements and specifications
- Material verification specs (# of cutouts, etc.)

The implementation timeframe will be a multi-year effort and is still to be determined. There will also be graduated timeframes with priority to legacy pipe segments, HCAs and high stress segments. The data from the 2012 Annual Reports for Natural and Other Gas Transmission Pipelines will be utilized to further evaluate regulatory impacts as well as in the determination of the implementation timeline.

Presentations

All presentation material and transcripts are permanently available for viewing on the meeting website. As such, this report will not repeat that information. However, there were several overarching comments that were made as noted below:

- The issue of the adequacy of existing records related to pressure testing, material and seam types, and MAOP determination is not new, and has been a subject of discussion since the 1960's.
- There have been many instances where operators were unaware that they had different pipe materials and wall thicknesses than what they expected or believed. Also, a full accounting of the consequences (e.g., impact of methane and other greenhouse gas releases to the environment) needs to be incorporated within the evaluation process.
- Knowing with a high degree of certainty what equipment, material, and components are installed is fundamental to sound risk management, effective integrity verification, and, ultimately, safe operation.
- Details of the IVP are currently under development, including the rigor of the ECA requirements and the degree of flexibility allowed. Additional detail should be provided by PHMSA so that more specific feedback can be provided by commenters.
- The IVP as proposed may attempt to incorporate too many technical issues within one process.

- The gas transmission industry is committed to the testing of untested transmission lines in Class 3 & 4 locations and Class 1 & 2 HCAs operating at > 30% SMYS using pressure testing or ILI; the final integrity verification process must involve federal and state regulators and Commissioners due to the potential costs of implementation.

Open Floor Question and Answer Sessions

Questions were taken from the floor and on-line following each panel discussion. The following is a list of those questions which pertained to the draft IVP, the rulemaking, or the rulemaking process (as opposed to questions pertaining to clarifications to a presenter's presentation) that were raised for consideration as the rulemaking process progresses. These have been grouped into three categories as follows:

Pertaining to the IVP Concept

1. Should the rulemaking combine the several issues it seems to be addressing, or should the apparently 4 issues be addressed separately? (MAOP validation; Expansion of IM concepts/rule; Records verification; and, Risk priorities. Or another suggested segregation was Statutory vs. NTSB.) Each has their own safety objective, purpose, compliance challenges, etc. – maybe each warrants its own methodology? Even so, they could be packaged together in order to move one rulemaking forward versus three or four separate rulemakings.
2. Should the records review for § 192.619(a)(1) through (a)(4) be represented as "AND" or "OR" logic? What is the original intent of the regs?
3. For operators who are already pressure testing and/or replacing lines that previously were untested or were missing records, would operators have to then redo this work as a result of IVP?
4. How will the statutory requirements relating to consideration of the environment and safety and minimization of costs and service disruptions be addressed?
5. Why is there no difference in the records review for § 192.619(a)(1) through (a)(4) for pre-regulation and post-regulation lines?
6. NTSB commented that PHMSA should use the pertinent accidents that have occurred to "back test" IVP.

Pertaining to the General Scope of the IVP/Rulemaking

7. Should IVP apply to all sections of pipelines and not be restricted to HCAs and MCAs?
8. Why is IVP addressing low stress lines (<20%) in the flow chart?
9. Are offshore lines included?
10. Does PHMSA plan to expand this to gas gathering or gas distribution lines? (Note: PHMSA stated that the current plan is to expand this to hazardous liquid lines next, but that PHMSA has no current plans to apply IVP to gas gathering and gas distribution.)
11. Does IVP apply to station/facility/terminal piping?
12. The Annual Report data collected specifically for this initiative will need to be carefully checked to verify its accuracy and acceptability for use in the regulatory scoping, planning, and evaluation process.

Pertaining to the Technical Specifics of the IVP

13. What are the specific requirements for a "Spike" test?

14. Will there be provisions to allow for in-the-ditch methodologies to establish material/pipe properties in lieu of cut outs? Some methodologies are appropriate for new installation, but not practical for existing pipe.
15. Will PHMSA be providing additional guidance on what constitutes adequate records?
16. Will PHMSA be providing additional guidance with respect to the de-rating option?
17. Will PHMSA be providing additional guidance with respect to Remaining Life Analysis?
18. Will there be different records/material verification requirements for fittings and components?

Summary and Next Steps

The IVP Workshop provided an open forum to present information and sought stakeholder comment on a proposed integrity verification process. This methodology is being considered as a means to satisfy Congressional mandates and NTSB Recommendations. The draft IVP flowchart was developed and presented as a means to further the dialogue on this regulatory initiative. Based on input from this workshop, PHMSA will further refine their thinking related to the integrity verification process, eventually moving to a Notice of Proposed Rulemaking that will continue the dialog but in the more structured and formal rulemaking process. The focus will continue on technical issues but will include timeline and burden of costs considerations as required by statute. The announcement of that process will be forthcoming.

Please send comments to Docket #PHMSA-2013-0119 which can be accessed at http://www.regulations.gov.

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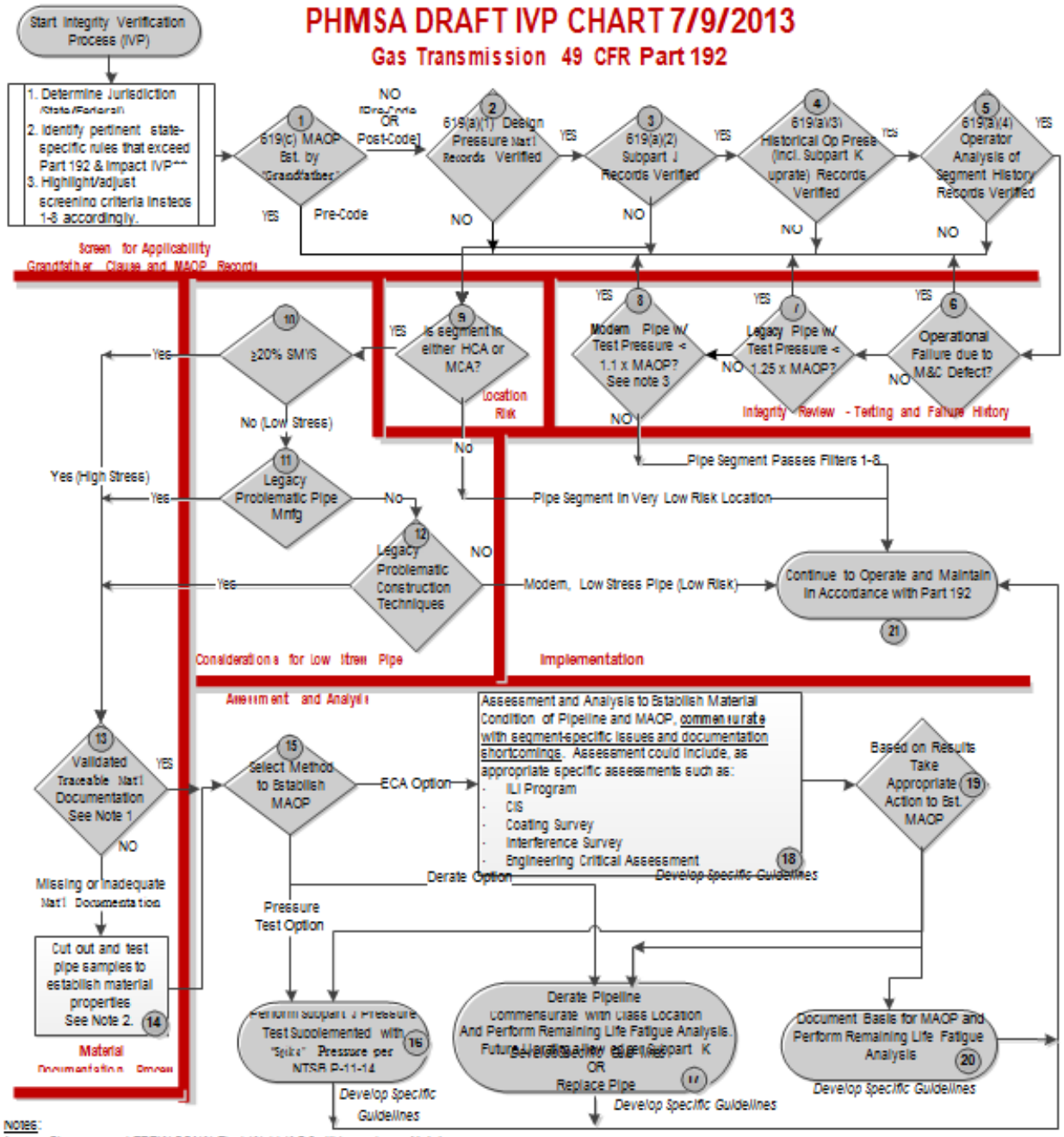
Appendix A: Draft IVP Flowchart as presented on Aug 7, 2013



Notes:

Legacy Pipe means LFERW, SSAW, Flash Weld (AO Smith), or pipe w/ joint factor < 1 (e.g., lap welded pipe) regardless of date of manufacture.

Modern Pipe means post-code pipe not manufactured with any techniques listed under Legacy Pipe.

Legacy Problematic Construction Techniques means wrinkle bends, miter > 3 degrees, Dresser Couplings, non-standard fittings, arc welds, oxyacetylene welds, bell spigots, puddle weld repairs, etc.

Moderate Consequence Area (MCA) means non-HCA pipe in Class 4, 3, 2, locations & Class 1 locations with [TBD] houses/sites in PIR.

Note 1: Required for Pipe, Fittings, Valves, Flanges & Components.

Note 2: Validated matl properties req'd for X42 and greater & pipe ≥ 2" OD if on the mainline.

Note 3: Revise 619(a) to require min. 1.25 MAOP pressure test for new pipe

Note 4: Validation of MAOP per 619(d), Alt MAOP, not considered a problem and not addressed in IVP requirements

PROPOSED DEADLINES FOR COMPLETING INTEGRITY VERIFICATION						
	≥ 50% SMYS		20 – 50% SMYS		< 20% SMYS	
Location	Legacy	Modern	Legacy	Modern	Legacy	Modern
HCA	TBD	TBD	TBD	TBD	TBD	na
MCA Class 4	TBD	TBD	TBD	TBD	TBD	na
MCA Class 3	TBD	TBD	TBD	TBD	TBD	na
MCA Class 2	TBD	TBD	TBD	TBD	TBD	na
MCA Class 1	TBD	TBD	TBD	TBD	TBD	na

***Some state requirements exceed Part 192. For example:

- Pressure test at 150% MAOP to establish MAOP, or
- All gas transmission (GT) to be classified and constructed to Class 4 requirements, or
- Define as GT if MAOP>125 psig, etc.