MAOP Verification (New and Anticipated Regulation in North America to Protect pipeline Infrastructure and enhancing safety of the Environment)

4th ICEPIM & OMIC GAS 2018

4TH ICEPIM CONFERENCE IN
PIPELINE INTEGRITY MANAGEMENT
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PARAS AGARWAL
POST GRADUATED IN
PIPELINE ENGINEERING

AGENDA

- **OVERVIEW OF THE VERIFICATION PROCESS.**
- **MAOP VERIFICATION PROCEDURE.**
- **CASE STUDY.**
- **BENEFITS OF MAOP VERIFICATION.**
- **CONCLUSION.**

DEFINITIONS

- **PFL (PIPELINE FEATURES LIST) PACKAGE:**

A Pipeline Features List package consolidates the current pipe features (ex: pipe, valve, bend, reducer, tee, sleeve, tap, flange) into a common worksheet along with feature specifications (ex: pipe size, class, wall thickness, yield strength, seam, rating) using various original design drawings and as-built information. PFLs are intended to include the required information to calculate the Maximum Allowable Operating Pressure (MAOP) of a segment of a pipeline. Furthermore, the PFLs in conjunction with the Marked-Up Drawings can provide traceable access to the verified and complete records of the transmission pipeline. Most important aspect of PFL package is that it can be customize based on requirements of regulatory authorities and pipeline operators.

- **TRACEABLE:**

Traceable records are those which can be clearly linked to original information about a pipeline segment or facility. Traceable records might include pipe mill records, purchase requisition, or as built documentation indicating minimum pipe yield strength, seam type, wall thickness and diameter. Careful attention should be given to records transcribed from original documents as they may contain errors. Information from a transcribed documents, in many cases, should be verified with complementary or supporting documents.

DEFINITIONS

- **VERIFIABLE:**

Verifiable records are those in which information is confirmed by other complementary, but separate, documentation. Verifiable records might include contract specifications for a pressure test of a line segment complemented by pressure charts or field logs. Another example might include a purchase order to a pipe mill with pipe specifications verified by a metallurgical test of a coupon pulled from the same pipe segment. In general, the only acceptable use of an affidavit would be as a complementary document, prepared and signed at the time of the test or inspection by an individual who would have reason to be familiar with the test or inspection.

- **COMPLETE:**

Records are those in which the record is finalized as evidenced by a signature date or other appropriate marking. A record that cannot be specifically linked to an individual pipe segment is not a complete record for that segment. Incomplete or partial records are not an adequate basis for establishing MAOP. If records are unknown or unknowable, a more conservative approach is indicated.

SOURCE- PHEMSA DEFINITION IN ADVISORY BULLETIN (ADB-12-06).

SAN BRUNO INCIDENT

BACKGROUND (SEPT,2010):

- 30 inch diameter gas pipeline ruptured near San Francisco, California.
- 8 deaths, 58 injuries, 108 houses & 74 vehicles damaged or destroyed.
- Records showed pipe as seamless while it contained longitudinal welds.

REGULATORY ACTION (JAN,2011):

- NTSB issued safety recommendations, requiring diligent records search and MAOP Validation of transmission pipelines located in urban areas.
- Use traceable, verifiable, and complete records.

PIPELINE OPERATOR RESPONSE (APR,2013):

- Validating MAOP of all gas transmission pipelines within its service area.
- Ensuring that records accurately reflect pipelines components and specifications.
- Integrating results into an enhanced GIS platform.

SOURCE- PG&E's MAOP Validation Effort, Provided to the California Public Utilities Commission Safety and Enforcement Division; 2013.

OVERVIEW OF THE VERIFICATION PROCESS.

The primary purpose is to verify the Maximum Allowable Operating Pressure for Class 1,2,3 and 4 of Natural gas transmission pipeline.

PRODUCT OVERVIEW:

The output of the MAOP Verification Project is a **Pipeline Features List (PFL) Package worksheet** which will be used to establish and report a maximum Allowable Operating Pressure (MAOP) for Natural gas transmission pipeline segments.

PROCESS OVERVIEW:

Process to develop the PFL package will utilize both pipeline operator employees and contractor personnel, and will consist of following main efforts:

- **Documents Preparation and Listing.**
- **PFL Preparation and Building.**
- **Engineering Review and MAOP Verification.**
- **Line Summary Report Preparation.**
- **GIS Integration.**

DOCUMENTS GATHERING

- Before Documents Preparing Documents Gathering is taken into Consideration from:

BEFORE CONSTRUCTION:

- ✓ **Engineering Design Documents**: Such as Alignment sheets, pipe specification.
- ✓ **Procurement Documents**: Such as Purchase order, Invoices, Material test reports.
- ✓ **Construction Documents**: Such as As-Built drawings, Pipe tally reports, NDT reports.

AFTER CONSTRUCTION:

- ✓ **Commissioning Documents**: Such as Hydro test log and chart, Hydro deadweight cal
- ✓ **Project Closure Documents**: Such as Completion reports, DPR.
- ✓ **In-Service Operation Documents**: Such as In-Ditch examination reports, In-line Inspection (ILI) reports etc.

OTHER RELEVANT DOCUMENTS:

Welding procedure reports, Design-contract specifications, Pipeline replacement reports, Weld maps, Mill test records, Bill of materials, Coating records, Cost summary, Engineering reports, GIS Alignment sheets, Procedures, Quotations etc.

PROCEDURE FOR MAOP VERIFICATION

Step 1: Scanning and Indexing.

Step 2(a): Documents Reviewing.

Step 2(b): Extracting Attributes, Pedigrees and Meta Data from the Documents.

Step 3: Populating PFL Package Worksheet.

Step 4: Align Documents to Pipeline as per Document Matrix.

Step 5: MAOP Conformation and Verification.

Step 6: MAOP Validation through.

Traceable.

Verifiable.

Complete.

NOTE- Document Matrix is based on Pipeline Operator and Regulatory Authority requirement.

PFL PACKAGE (CASE STUDY)

From Measure	To Measure	From Series	To Series	From Station	To Station
0.00	0.48	1000	1000	0.00	0.48
0.48	4.36	1000	1000	0.48	4.36

Feature	Feature Type	Crossing Type	Feature Length Feet	Feature Install Date	Feature Construction Type	Rating Class
FITTING	VALVE	NONE	0.48	01-12-1962	ORIGINAL	ASA CLASS 400
PIPE	NO CASING	NONE	3.88	01-12-1962	ORIGINAL	NONE

Outside Diameter D	Wall Thickness t	Specification	Grade	SMYS S	Seam Type
2.000	NONE	NONE	NONE	NONE	NONE
2.375	0.154	NONE	NONE	24000	SEAMLESS

Current Class Location	HCA	Design Factor F	PT Min Test Pressure	Test Pressure Factor	DP of Pipe a1	Test Pressure a2
C2	NONE	NONE	NONE	1.25	960.00	NONE
C2	NONE	0.60	1400.59	1.25	1120.47	1120.47

PFL PACKAGE

Maximum Safe Pressure a3	Maximum Safe Pressure a3 Document	DP TVC	PT TVC	DP and PT TVC	Governing MAOP
NONE	NONE	YES	NO	NO	960.00
NONE	NONE	NO	NO	NO	3268.04

Established Operating Pressure	OD 1 Document 1	OD 1 Document 2	OD 1 Document 1 URL	OD 1 Document 2 URL	OD 1 Document 1 Type	OD 1 Document 2 Type	OD 1 Matrix Check
662	Electronic_5186.pdf	A-313_074-3.pdf			AS-BUILT DRAWINGS	PURCHASE ORDER	TVC 2
662	Electronic_5186.pdf	A-313_074-3.pdf			AS-BUILT DRAWINGS	PURCHASE ORDER	TVC 2

WT 1 Document 1	WT 1 Document 2	WT 1 Document 1 URL	WT 1 Document 2 URL	WT 1 Document 1 Type	WT 1 Document 2 Type	WT 1 Matrix Check
NONE	NONE			NONE	NONE	NONE
A-313_074-3.pdf	NONE			PURCHASE ORDER	NONE	TVC 1

PFL PACKAGE

Seam Document 1	Seam Document 2	Seam Document 1 URL	Seam Document 2 URL	Seam Document 1 Type	Seam Document 2 Type	Seam Matrix Check
NONE	NONE			NONE	NONE	NONE
ASME History of Line Pipe North America-1.pdf	A-313_047.pdf			ASME HISTORY OF LINE PIPE NORTH AMERICA	PURCHASE ORDER	TVC 2

Spec Grade Document 1	Spec Grade Document 2	Spec Grade Document 1 URL	Spec Grade Document 2 URL	Spec Grade Document 1 Type	Spec Grade Document 2 Type	Spec Grade Matrix Check
NONE	NONE			NONE	NONE	NONE
NONE	NONE			NONE	NONE	NONE

Instrument Dead Weight Elevation	Test Instrument Calibration	Operator Name	PT Person Responsible	PT Test Company Name
NONE	NONE	NONE	NONE	NONE
NONE	NONE	NONE	NONE	NONE

PFL PACKAGE

Rating Class Document 1	Rating Class Document 2	Rating Class Document 1 URL	Rating Class Document 2 URL	Rating Class Document 1 Type	Rating Class Document 2 Type	Rating Class Matrix Check
Electronic_5186.pdf	A-313_074-3.pdf			AS-BUILT DRAWINGS	PURCHASE ORDER	TVC 2
NONE	NONE			NONE	NONE	NONE

Coating Type	Coating Description	Material Type	Manufacturer	Manufacturer Type	Manufacturer Mill	Manufacturer Date
NONE	NONE	STEEL	FIG.2245 1/2 ROCKWELL VALVE	NORTH AMERICA	NONE	NONE
NONE	NONE	STEEL	NONE	NONE	NONE	NONE

PT Hydro test Name and Location	PT Date	PT Duration Hours	Min Elevation	Max Elevation	Pressure Recording Charts
NONE	NONE	NONE	NONE	NONE	NONE
NONE	NONE	NONE	NONE	NONE	NONE

PFL PACKAGE

PT Test Medium	PT Document	PT Document URL	QC Flagged	QC Comment
NONE	NONE		YES	CENTRE OF THE VALVE IS CONSIDERED AS THE BEGIN STATION OF THE LINE .USING FIGURE NUMBER OF VALVE THE RATING CLASS IS TAKEN FROM VENDOR CATALOG AND SPECIFICATION IS BASED ON YEAR OF INSTALLATION
NONE	NONE		YES	WALL THICKNESS IS BASED ON SCHEDULE 40 AS PER A-313_074-3.pdf

DOCUMENT LISTING

Document Name	Original File Name	Document Type	Data Mined Clouded	Image Count	Remarks	Chemical Composition (YES/N/A)
VPO_None_59703.pdf	AS-0085.pdf	AS-BUILT DRAWINGS	YES	1	A-4576 (2" BROWNING TAP LINE)	N/A

BENEFITS OF MAOP VERIFICATION PROCESS

- It will identify each segment of a natural gas transmission pipeline located in a High and moderate populated area.
- It will Develop and implement a “baseline” safety assessment plan through MAOP Verification of each pipe and its fittings.
- It will help to Prioritize covered pipeline segments for assessment.
- It will evaluate which pipe segment and its fittings will require preventive maintenance.
- It will establish the process for continual evaluation and assessment of the integrity of the each segment of natural gas transmission pipeline.

BENEFITS OF MAOP VERIFICATION PROCESS

- Process will give Regulation Authorizes to see how pipeline operator establish and verify the Maximum allowable operating pressure of the pipeline.
- Strengthening Integrity Management requirements for high and moderate populated areas.
- It will help to correct GIS measures if any.
- It will give more distinct information, both on and off the pipeline Infrastructure.
- It will improve data gathering and integration/linking requirement.

CONCLUSION

Hydrostatic pressure testing is the most accurate way to assess certain types of risks at specified MAOP levels, but it the most expensive way to verify the MAOP of an in-service pipeline segment, in part because the line must be shut down during the test. In-line “smart pig” tools represent a less expensive assessment method, but these tools cannot navigate some pipeline segments because of the segment and its fittings’ physical configuration. Therefore “direct assessment” technique is the only other preapproved assessment method which will not only give confidence to the pipeline operators and regulatory Authorities about understanding of there pipe segments and fittings but it will also mitigate the costs associated with MAOP verification and also it will confirm other non MAOP data such as pipe manufacturer, Coating, Evidence of X-rays performed, Hydro test failure in a simple and sophisticated manner through pipeline features list package worksheet which will easily integrate with GIS platform.

Meta-Data Spread-sheets which was generated during the verification process will revise the rule to define Indian pipeline operator’s duty to analyse and integrate data in a Robust Structure format.

PHEMSA Advisory Bulletin (ADB-12-06) is based on Pipeline Safety, Regulatory Certainty, and Job Creation in the field of Pipeline Integrity Management.

QUESTIONS?

THANKS.