National Transportation
Safety Board

Memorandum

Date: September 29, 2011

To: File

From: Ravindra M. Chhatre

Subject: San Bruno, CA, Accident Investigation - DCA 10MP008

In response to the NTSB information request, the PG&E provided Risk Management Instructions (RMI-06, Rev. 1) to the staff, and the document was placed in the docket on February 5, 2011, before the Public Hearing, as exhibit number 2-AG. The same document was also placed in the docket as a part of exhibit number 2-AI (pages 9-22).

However, on April 6, 2011, PG&E sent a letter to the NTSB and CPUC, informing the staff that there was an error on PG&E's part and that the document submitted earlier as RMI-06, Rev. 01 was a draft, and not a final approved version of the document.

Also, PG&E enclosed with the letter copies of the approved version of RMI-06, Rev. 0 and RMI-06, Rev. 1.

Pacific Gas and Electric Company®

111 Almaden Boulevard, 8th Floor
San Jose, CA 95113

VIA EMAIL

April 6, 2011

Mr. Ravindra Chhatre, P.E., Accident Investigator
National Transportation Safety Board
490 L'Enfant Plaza, East S.W.
Washington, DC 20594

Mr. Sunil Shori
Utilities Safety and Reliability Branch
Consumer Protection and Safety Division
California Public Utilities Commission
505 Van Ness Avenue, Room 2005
San Francisco, CA 94102-3298

Re: San Bruno GT Line Incident - NTSB Investigation

Dear Ravi and Sunil:

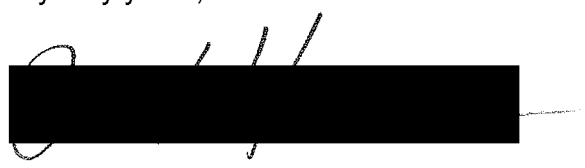
We have recently discovered that the version of PG&E's RMI-06 which PG&E submitted to the NTSB and became NTSB Exhibit No. 2-AG included the cover sheet approval for RMI-06 revision 0 but attached the text for RMI-06 draft revision 1. This document provides that pipeline segments with a potential manufacturing threat, as described in 49 CFR § 192.917(e)(4), "will be prioritized as a high risk segment for the baseline assessment or reassessment if they have been operated over the maximum operating pressure (MOP) experienced during the preceding five years plus 10 percent of the historical operating pressure."

We have not identified a cover sheet approval for this RMI-06 revision 1, and we have no indication that it was ever approved. It appears that the IM group tracked instances where certain analysis suggested that the five-year MOP on HCA segments with a manufacturing or seam threat may have been exceeded. We are currently evaluating all such instances for safety implications and appropriate action.

The approved RMI-06 (Rev. 0) at the time of our original submission is enclosed along with the currently-effective RMI-06 (Rev. 1). Neither of them includes the 10 percent provision found in the unapproved version.

We apologize for any inconvenience our error may have caused. Please let me know if you have any questions.

Very truly yours,



William D. Hayes

Enclosures

PACIFIC GAS AND ELECTRIC COMPANY

ENGINEERING & OPERATIONS
GAS TRANSMISSION AND DISTRIBUTION
GAS ENGINEERING INTEGRITY MANAGEMENT & COMPLIANCE
TRANSMISSION GAS SYSTEM INTEGRITY

Risk Management Instruction

Instruction No. RMI-06

GIS DATA QUERIES and DATA GATHERING OF HISTORIC (5 YEAR) MOP DATA IN SUPPORT OF 49 CFR§192.917 (e)(4) ERW Pipe

Prepared By: Gene Muse Date: 2/14/08

Approved By: Bill Manegold Data: 3/12/08

Integrity Management Program Manager

Rev. No.	Date	Description	Prepared By	Approved By
0	3/13/08	Original documentation of RMI-06	[redacted]	[redacted]
1				
2				
3				

GIS DATA QUERIES and DATA GATHERING OF HISTORIC (5 YEAR) MOP DATA IN SUPPORT OF 49 CFR§192.917 (e)(4) ERW Pipe

1.0 PURPOSE

The purpose of this instruction is to map out a process for collecting historic MOP values in support of analyzing the Manufacturing Threat that deals with seam type, joint factor and operating pressure history which is outlined in 49 CFR §192.917 (e)(4) *ERW Pipe*. 49 CFR §192.917 (e)(4) *ERW Pipe* states:

If a covered pipeline segment contains low frequency electric resistance welded pipe (ERW), lap welded pipe or other pipe that satisfies the conditions specified in ASME/ANSI B31.8S, Appendices A4.3 and A4.4, and any covered or noncovered segment in the pipeline system with such pipe has experienced seam failure, or operating pressure on the covered segment has increased over the maximum operating pressure experienced during the preceding five years, an operator must select an assessment technology or technologies with a proven application capable of assessing seam integrity and seam corrosion anomalies. The operator must prioritize the covered segment as a high risk segment for the baseline assessment or a subsequent reassessment.

This is a multistep process that involves GIS data queries as well as a review of operational history records.

2.0 INTRODUCTION

Manufacturing threat, this instruction provides one method for performing the relevant queries to identify HCA pipe segments that have a Manufacturing Threat due to seam issues and the processes for reviewing job packages and system pressures related to pipe segments dealing with seam issues. It also offers a method to identify similar non-HCA segments that might become HCA's. Lastly, it provides guidance on how to use the results of the data survey for future pipeline operations.

3.0 GIS Pipe Property Review and Data Capture

A review of Transmission pipeline properties, in the GIS Pipeline attribute table, is completed to ensure that covered pipelines that have a potential seam issue in an HCA and non-HCA have the following attribute values: Route Name, Segment number, HCA Identification, Transmission Definition, MOP, MAOP, OD, Wall Thickness, SMYS, and Joint Efficiency. Sections 4 and 5 of RMI06 will outline the process to gather missing or assumed values.

Station piping (Routes beginning with STA) will be reviewed for purposes of what is an HCA from data being collected through RMI05, Station HCA Identification. Station pipe, that is mapped in GIS, will be included in the selected set through the queries below.

The following sections describe the process that will extract out the values that are needed to verify the restrictions and guidelines described in 49 CFR §192.921 (e)(4) ERW Pipe:

3.1 From the **Pipeline** Feature class, create queries for extracting out Manufacturing Threats dealing with Long Seams.
(STATUS = 601 AND STYPE = 1201) AND (TRANS_DEF <> 'D' AND TRANS_DEF <> 'D1') AND (FAC_TYPE <> 515 AND FAC_TYPE <> 514 AND FAC_TYPE <> 511) AND (TRANS_DEF <> '')
Where STATUS 601 is Active pipe, STYPE 1201 is Active Pipe, TRANSDEF_D and D1 are classified distribution, and FAC_TYPE 515 is GG-U, 514 is GG-B and 511 is GG-A.

3.2 Create a shapefile called **PipelineTransDef_T.shp** by exporting the selected records from step 3.1 from the Pipeline Feature class using the "export to shapefile" button,  . This will extract out only Active pipe that has a TransDef_T*. (* refers to the many Transdef_T values) into a selected set.

Note:

When creating a new shapefile from an existing shapefile (that used the "export to shapefile" button), the codes for attribute values i.e. FAC_TYPE = 515 will not have the code value 515 but will have the alias GG-U.

3.3 From the shapefile PipelineTransDef_T.shp, extract out Low Frequency ERW pipe.
This query extracts out Low Frequency ERW pipe, Pre-1970
YR_INSTALL <= date '1969-12-31' AND LONG_SEAM = 'ERW'

3.4 Create a shapefile called **PipelineLowFreqERW.shp** by exporting the selected records from step 3.3 from the PipelineTransDef_T.shp shapefile (not using "export to shapefile" button), right click on PipelineTransDef_T.shp scroll down to data and chose export, use selected data. This will extract out only Low Frequency ERW pipe and pipe that has a TransDef_T*.

3.5 From the shapefile PipelineTransDef_T.shp, create queries for extracting out JE less than 1.0 and excluding pipe less than or equal to 2"
"JNTEFF" in ('-0.600', '-0.800', '0.600', '0.800', 'UNK') AND "LONG_SEAM" <> 'ERW'

3.6 Create a shapefile called **PipelineJE_Less_than_1.shp** by exporting the selected records from step 3.5 from the PipelineTransDef_T.shp shapefile (not using export to shapefile button), right click on PipelineTransDef_T.shp scroll down to data and chose export, use selected data. This will extract out only selected records that have a JE value less than ABS 1.0 and OD greater than 2" pipe.

3.7 From the shapefile PipelineTransDef_T.shp, create query for extracting out JE equal to 1.0 with Long Seams considered to have a Manufacture Threat.
"LONG_SEAM" = 'AOS' OR "LONG_SEAM" = 'CW' OR "LONG_SEAM" = 'FBW' OR "LONG_SEAM" = 'FLASH_WLD' OR "LONG_SEAM" = 'LAP' OR "LONG_SEAM" = 'SPIRAL' OR "LONG_SEAM" = 'UNK' AND "JNTEFF" in ('-1.000', '1.000', 'UNK')

3.8 Create a shapefile called **PipelineJE_equal_to_1_w_manuf_thrt.shp** by exporting the selected records from step 3.7 from the PipelineTransDef_T.shp shapefile (not using "export to shapefile" button), right click on PipelineTransDef_T.shp scroll down to data and chose export, use selected data. This will extract out only selected records that have a JE value greater than ABS 1.0 with a Long Seam that is considered to have a Manufacture Threat.

3.9 Create shapefiles for every Division using the "Select by Location" selection tool. Using the PGE_division feature class in the LandBase layer, select one division at a time for using with the shapefiles created in steps 3.4, 3.6 and 3.8. Shapefiles will be created from the selected sets and the shapefiles should be named (MaintOrg)_LowFreqERW.shp, (MaintOrg)_JE_Less_than_1.shp and (MaintOrg)_JE_equal_to_1.shp, example DDIA_LowFreqERW.shp refers to Diablo Division.

Note:

Additional research is needed on all values that are suspect in JE, Year installed, Long_Seam etc. Research consists of, but not limited to, pulling job files, comparing adjacent pipe segments to verify pipe specs are the same (Job number, year installed (i.e. 1993 could be 1939), reviewing company records for minimum values for unknown data, etc.
Unknown values need to be reconciled through methods mentioned in above note.

4.0 Analysis of GIS Data and Reporting of Potential Seam Issues

In section 3.0, pipe segments with a manufacturing seam threat described in section 1.0 were identified. The next step is to establish the 5 year maximum operating pressure for these lines and find out if the manufacturing threat has been activated since these pipe segments were identified as being in high consequence areas.
The following steps will outline the process involved in extracting out the pressure information using an excel program called GasHist.xls or if assistance is needed, to give the Transmission Planners as much useful information as possible to be able to extract out the requested pressure data.

4.1 Each division pipeline shapefile created needs to be reviewed. The review process consists of extracting out a excel spreadsheet of pipelines with the pipeline specifications. Assumed values need to be highlighted for validation and verification which is described in more detail in section 5. There might be a opportunity to capture information and change the HCA or reduce the areas of concern dealing with Manufacturing Threats dealing with seam issues.

4.2 To determine when the Historic 5 year MOP evaluation should begin, the date that an HCA was determined for the affected pipe segment with the Manufacturing Threat that has a seam issue, needs to be researched and documented using the spreadsheet in section 4.1.
The date of the HCA is located in separate object tables that are related to the pipeline feature in GasMap. The two tables are Cgt.sde.ASSESS_08 and Cgt.sde.BAP_07. Add the tables to GasMap and then create a relationship to the pipeline feature. Document, in a spreadsheet, the dates of affected pipelines to be used to determine the date to start the research for the MOP value.

4.3 Using the information gathered (dates for each affected pipe segment) in section 4.2, if it is not obvious what the sources are for the gas pressure for the pipe segments with potential seam issues are, work with the Transmission Planner for those areas to determine what stations are the sources for gas pressure. Once the stations are identified, use WinTerm to find the scada point at those stations to get the PVID number. The PVID number is input into an excel program called

GasHist.xls to extract out the pressure data (hourly). The past 5 years of pressure data, if available, is gathered for each station that affects the pipe segments at risk.
Using the same method for collecting pressure data to establish the 5 year high, collect the pressure data from the date the HCA was determined to the present day, sorting out the highest pressure recorded per year.

4.4 Using the pressure data from 4.3, create a tab for each pipe segment and record the highest pressures by year along with Route, MP range, year installed, STPR data from GIS, STPR Hard Copy, OD, seam type and station that pressure data was collected from. File should be named <Division>_MT_StaPress.xls.

4.5 Create PDF files of each Division or if the area is to large then create a PDF of a manageable area that would fit on an 8.5"x11" or 11"x17" map format. Maps should have affected areas symbolized so as to be easily identified along with Stations, both Transmission and Distribution.

5.0 Research Job Packages to Collect Missing or Assumed Data in GIS

After gathering the GIS data for the specific pipe segments, it might be beneficial to research the Jobs that installed the pipelines with the assumed values. Some pipelines with missing information were purchased by PG&E and the records\files for these pipelines will be difficult to locate.
Job Packages and test records that are found might hold the missing data or they might be able to allow us to use a more reasonable value, for example SMYS -24000 is for pipelines we know nothing about but the year installed and the size of the pipeline. If we had test records that tested the yield strength in a few locations along the pipe in question we might be able to assume a higher SMYS value, say -42000.
The following steps outline the basic steps for recovering data.

5.1 With the spreadsheet created in section 4.1, use the Job numbers for each pipe segment that have assumed values in pipe specifications (Grade, SMYS, Joint Eff, OD, WT, Hydro Test Information, upgradejob, MaintOrg). Sort out all segments that have assumed values.

5.2 Contact the Senior Distribution Engineer for the division of research and set up a meeting to go over the pipe segments of concern. The Senior Dist. Eng. should be able to introduce the Mapping group that will help pull jobs to search for assumed pipe specs.
The Senior Dist. Eng. might also have binders that were created for the Transmission lines in their territory that have documentation on the pipelines that had their MOP\MAOP's established in 1970.

5.3 Work with the Mapping group in the Division to have them pull the jobs listed in the spreadsheet created in section 4.1. Any information that will confirm pipe specifications listed in 5.1 should have copies made. Any maps of pipelines that are being reviewed should have copies made. Any Bill of Materials, Hydro test information, pipe tests to determine the pipe properties, any references to other jobs (Foreign pipelines purchased by PG&E).

5.4 Some job packages might be located or stored in the Records Center in Brisbane (8-579-2174). Need to call to see if the Records center has the Job Packages. Also check with other Mapping Departments in adjacent Divisions.

6.0 SCADA, Electronic Recorder and Pressure Chart Data Gathering

If the SCADA data can not be gathered per section 4.3, then the following process should be used when working with the Transmission Planners.

After the pipeline segments that qualify for investigation under 49 CFR §192.917 (e)(4) ERW Pipe have been identified in section 3.0, specific organizations in PG&E need to be enlisted in the gathering of pressure data for establishing the historic 5 year MOP high for the segment. The following sections describe what needs to be collected and who might be able to help in that data collection.

6.1 The Transmission Planners, in specific areas\Divisions, will be given the pipeline segments with line number, beginning and ending Mile Points (MP's), Maps of the Division boundaries they are responsible for with affected segments highlighted along with Transmission and Distribution stations added to the map (ask Trans Planners before creating maps if they are needed). The planners will also be given the dates that pressure data will need to be gathered (see section 6.2) and any information that will aide them in collecting the information requested from the Integrity Management Group.

6.2 The Transmission Planners will need to gather the historic 5 year pressure data for each given segment from when the segment was determined to be an HCA (see section 4.2). The highest pressure recorded for the time period then becomes the baseline MOP pressure for the affected segments.
Example: If a segment was converted into an HCA 12-04-2004 then the Planner would need to gather pressure data back to 12-04-1998 to 12-04-2004. An excel spreadsheet dump from SCADA or Electronic Recorders with the date and time would be acceptable.

6.3 The Transmission Planners will need to gather the pressure data from the time the segment became an HCA to the present day to determine if the pressure at that segment location exceeded the Historic 5 year high pressure that was established from the process described in section 6.2.

6.4 If no SCADA data is available the Transmission Planner should be able to get pressure data from Electronic Recorders, if they exist in the areas of concern, from the local T&R supervisor and their M&C Techs. The M&C Techs will be able to extract out the pressure data information needed that is described in sections 6.2 and 6.3. The M&C Techs can deliver the data in an excel format. We would need the data for the dates determined in section 4.2, to establisb the Historic 5 year MOP if the data exists. The M&C techs only maintain a 5 year history, some Divisions may have more than 5 years of data.

6.5 The following information will be gathered by the M&C Techs in each division.

- Regulator settings immediately upstream of pipe segments with potential manufacture threat with seam issues need to be collected to document the history of those regulators.
- Regulator and Transducer manufacture information needs to be collected for the years the data was collected. Equipment could be removed and stations could be upgraded after 5 year high was established.
- All equipment tolerances and accuracies need to be collected if any issues on the pressure readings collected come up, i.e. pressure exceeds 5 year MOP high and the reading looks like an error.

- The calibration records for the Transducers and ER equipment

6.6 If there is no electronic data that exists for the segments of concern, then the data collection will need to revert to looking through pressure charts. The T&R supervisor will be a good contact along with the M&C Techs for the Division\Office where the charts are located. The Transmission Planner will be a good source for what stations would be best to collect chart data from. The M&C Techs will be the best source in locating the charts, if they exist. The M&C Techs will also be able to give more insight for a better location to collect pressure information needed that is described in sections 6.2 and 6.3.

NOTE: This data collection method (Pressure chart research) will be the most time consuming and tedious.

7.0 Notification to Mapping Group to Update GIS

The process and steps outlined in sections 1.0 through 6.0 describe how to extract out data from GIS, research Job files for missing information and gathering pressure data from the Transmission Planners and M&C Techs.
If the data that was collected changes any information that is currently in GIS, an initial meeting will be held with Mapping to look over the data. The spreadsheets with the information that needs to be updated will be handed over to the Mapping Group to update GIS.
The Mapping group will be given any updates by Division to minimize any confusion in data entry.

8.0 Gas Control Notification and Reporting Process

The process and steps outlined in sections 1.0 through 6.0 describe how to extract out data from GIS, research Job files for missing information and gathering pressure data from the Transmission Planners and M&C Techs.
A meeting will be held to discuss any issues that arise from the research and data collection that could affect the operating pressure in the system.
Gas Control needs to know any critical dates and pressures that need to be maintained that were established when determining the 5 year high for MOP. When all data is gathered and examined by the System Integrity team, a meeting will be called to discuss solutions to communicating the critical dates and pressures on the pipe segments in question.

Process for meeling and how the dates and pressures will be communicated TBD.

8.1 Pipe segments that have a potential Manufacturing Threat with a seam issue and are in an HCA need to have the upstream pressures tracked and maintained at the current 5 year MOP high.

8.2 Pipe segments that have a potential Manufacturing Threat with a seam issue, **but are not in an HCA (non-HCA),** should also have there pressures tracked to make sure that the MOP is maintained. If the non-HCA status for the pipe segment changes to an HCA we will need to establish the 5 year MOP high and we will want the pressure of the pipe segment to be at the MOP of the line.

9.0 Maintaining Historical Records

The data collected in sections 3.0 through 6.0 needs to be collected and documented so that when a review is done on the pipe segments, if a non-HCA turns into an HCA, the establishing a 5 year MOP high or the MOP pressure on a given pipe segment is maintained, the data for that pipe segment will be readily accessible. The data will be stored by Division or District then broken down by office, if necessary.

9.1 Section 3.0 data needs to be stored on the network folders located in **\\walnutcrk01\Mapping\ Documentation\Weld Const Material Threats\MOPSeamIssues.**
The folder\filing structure will be:

- GIS Shapefile data
- GIS queries data (word doc describing other queries besides the ones documented in section 3.0).

9.2 Section 4.0 data needs to be stored on the network folders located in **\\walnutcrk01\Mapping\ Documentation\Weld Const Material Threats\MOPSeamIssues.**
The folder\filing structure will be:

- PipeSpec_data
- 5_year_MOP_high data
- Upstream_Station data
- Pipe_segment_data

9.3 Section 5.0 data needs to be stored on the network folders located in **\\walnutcrk01\Mapping\ Documentation\Weld Const Material Threats\MOPSeamIssues .**
The folder\filing structure will be:

- Assumed_values_data
- Job_Package_data

Hard copy job package information will be stored in the IM library (TBD)

- Word documentation on what was collected for what specific pipe segments

9.4 Section 6.0 data needs to be stored on the network folders located in **\\walnutcrk01\Mapping\ Documentation\Weld Const Material Threats\MOPSeamIssues.**
The folder\filing structure will be:

- PipeSpec_data
- 5_year_MOP_high data
- Upstream_Station data
- Pipe_segment_data
- Equipment_Specs
- Shapefiles_stations – PVID will need to be put in as an attribute value for each regulator scada point used.

Hard copy equipment information will be stored in the IM library (TBD)

- Calibration records
- Chart records
- Regulator settings

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ENGINEERING & OPERATIONS
GAS TRANSMISSION AND DISTRIBUTION
GAS ENGINEERING INTEGRITY MANAGEMENT
RISK MANAGEMENT

Risk Management Instruction

Instruction No. RMI-06

Stability Determination of Seam Related Manufacturing Threats

Prepared By: Gene Muse Date: 2/14/08
Risk Management Engineer

Reviewed By: Bill Manegold Date: 3/12/08
Integrity Management Program Manager

Rev. No.	Date	Description	Prepared By	Reviewed By	Approved Manager, System Integrity
0	2/14/2008	Original documentation of RMI-06	EEM6	WJM8	--
1	4/5//2011	Added definition section, response criteria, controls, general revisions	[redacted]	[redacted]	[redacted]

Contents

1.0 PURPOSE

The purpose of this instruction is to map out a process for analyzing the stability of seam related Manufacturing Threats covered under 49 CFR §192.917 (e)(3) and (e)(4) and Risk Management Procedure (RMP) 06.

49 CFR §192.917 (e)(3) and (e)(4):

(3) Manufacturing and construction defects. If an operator identifies the threat of manufacturing and construction defects (including seam defects) in the covered segment, an operator must analyze the covered segment to determine the risk of failure from these defects. The analysis must consider the results of prior assessments on the covered segment. An operator may consider manufacturing and construction related defects to be stable defects if the operating pressure on the covered segment has not increased over the maximum operating pressure experienced during the five years preceding identification of the high consequence area. If any of the following changes occur in the covered segment, an operator must prioritize the covered segment as a high risk segment for the baseline assessment or a subsequent reassessment.

(i) Operating pressure increases above the maximum operating pressure experienced during the preceding five years;

(ii) MAOP increases; or

(iii) The stresses leading to cyclic fatigue increase.

(4) ERW pipe. If a covered pipeline segment contains low frequency electric resistance welded pipe (ERW), lap welded pipe or other pipe that satisfies the conditions specified in ASME/ANSI B31.8S, Appendices A4.3 and A4.4, and any covered or noncovered segment in the pipeline system with such pipe has experienced seam failure, or operating pressure on the covered segment has increased over the maximum operating pressure experienced during the preceding five years, an operator must select an assessment technology or technologies with a proven application capable of assessing seam integrity and seam corrosion anomalies. The operator must prioritize the covered segment as a high risk segment for the baseline assessment or a subsequent reassessment.

This multistep process involves Geographic Information System (GIS) data queries and a review of operational history records using GasHistorian and SCADACitect.

Manufacturing threats related to non-seam issues in the presence of ground movement are addressed in RMP-06, Risk Management Instruction (RMI) 04 (Gas Transmission Plan and Earthquake Response Procedure), and RMI-04A (Gas Transmission Rainfall Plan and Response Instruction).

2.0 ROLES, RESPONSIBILITIES, & TRAINING

Title	Responsibilities	Training
Manager of Integrity Management	Responsible for the final approval of and adherence to this instruction and reviews the Engineering Critical Assessments.	Upon initial assignment and when revisions are made to the procedure.
Integrity Management Program Manager	Responsible for the implementation of the instruction and reviews the Engineering Critical Assessments.	Upon initial assignment and when revisions are made to the procedure.
Manager of Transmission System Planning and Gas Planning Support	Responsible to know the requirements of this instruction and ensure support of the Transmission System Planners to this process.	Upon initial assignment and when revisions are made to the procedure.
Manager of Gas Engineering and Local Support	Responsible to know the requirements of this instruction and ensure support of the Senior Gas Distribution Engineers to this process.	Upon initial assignment and when revisions are made to the procedure.
Senior Gas Distribution Engineer	Responsible for providing assistance and support for researching records to address missing, assumed, or conflicting values in GIS.	Upon initial assignment and when revisions are made to the procedure.
Pipeline Engineer	Responsible for providing assistance and support for researching records to address missing, assumed, or conflicting values in GIS.	Upon initial assignment and when revisions are made to the procedure.
Transmission System Planner	Responsible for providing pressure data for systems that do not have SCADA monitoring points.	Upon initial assignment and when revisions are made to the procedure.

3.0 DEFINITIONS

Maximum Actual Operating Pressure – The maximum pressure that occurs during normal operations over a period of 1 year. [49 CFR §192.3]

Maximum Allowable Operating Pressure (MAOP) – The maximum pressure at which a pipeline segment of a pipeline may be operated. [49 CFR §192.3]

Maximum Operating Pressure (MOP) – The maximum pressure at which a pipeline system may be operated at. (PG&E nomenclature used to distinguish this value from the MAOP for a pipe segment).

5-Year MOP - the highest maximum operating pressure experienced during the five years preceding identification of an High Consequence Area. For most segments this is the time period from 12/13/1999 to 12/13/2004. 12/13/1999 is the date 5 years preceding the signing of the Baseline Assessment Plan (BAP). The BAP is the date in which

virtually all High Consequence Areas were originally identified. The 5-Year MOP is a distinct definition and numerical value from the MOP definition above.
NOTE: for new HCAs identified after the first BAP, the 5-Year MOP is not from 12/13/1999 to 12/13/2004, but is the highest maximum operating pressure experienced during the five years preceding identification of that new segment as an HCA.

Recent Historical Operating Pressure (RHOP) - Maximum operating pressure experienced during the preceding five years – highest pressure recorded in the past (or preceding) 5 years [ASME B31.8S-2004 Appendix A4.4]

High Consequence Area (HCA) – PG&E utilizes Method 2 for HCA identification:
(2) The area within a potential impact circle containing
(i) 20 or more buildings intended for human occupancy, unless the exception in paragraph (4) applies; or
(ii) An identified site.
[49 CFR §192.903]

Geographical Information System (GIS) – Geographical database containing the physical layout of PG&E Gas Transmission System as well as specific characteristics of a given pipeline (wall thickness, year installed, etc.).

GasHistorian – Excel database that retrieves hourly averaged pressure data. Pressure data is averaged on the hour (from 12 o'clock to 11 o'clock). For this procedure, historic pressure data from GasHistorian is utilized from 2000 to present.

SCADACitect – Real time pressure database that retrieves second by second pressure data. Data extends back to 2008.

Point Name – Unique identification of each SCADA monitoring location. SCADACitect Point Names are formatted: RRR__XXXNNNNN where;
RRR indicates the RTU,
XXX indicates the point type, and
NNNNN is a unique alphanumeric identifier.
Reference Attached: SCADACitect Quick Start Guide, Gas RTU List, PVID lookup Table

Electronic Pressure Recorder (ERX) – Pressure recording device that measures second by second data however data cannot be retrieved in real time. This data is locally stored within the division offices.

Engineering Critical Assessment (ECA) – An engineering analysis supported by investigation (as necessary) to evaluate whether a seam threat has become unstable and, therefore, requires a seam integrity assessment

4.0 INTRODUCTION

This instruction provides a method for performing the relevant data queries to identify High Consequence Area (HCA) pipe segments that have a seam related manufacturing threat. It also provides a method to determine if the pipe segments identified with this threat are stable.

A pipeline segment with a seam related manufacturing threat will be considered stable unless any of the following conditions occur:

- operating pressure increases above the maximum operating pressure experienced during the five years preceding identification as an HCA (i.e. above the 5-Year MOP); or
- Operating pressure increases above the maximum operating pressure experienced during the preceding five years (i.e. above the RHOP); or
- MOP increases; or
- The stresses leading to cyclic fatigue increase; or
- Any covered or noncovered segment in the pipeline system with such pipe has experienced seam failure

5.0 GIS Pipe Property Review

A review of transmission pipeline properties, in the GIS Pipeline attribute table, shall be queried annually to ensure that covered pipeline segments that have a potential seam related manufacturing threat are identified. The follow minimum data sets should be collected and reviewed from GIS:

- Route Name (ROUTE)
- Segment number (SEGMENT_NO)
- Milepoint start and end (MP1) (MP2)
- HCA Identification (HCA_ID)
- Transmission Definition (TRANS_DEF)
- MOP
- MAOP
- Outside Diameter (OD)
- Wall Thickness (W_THICK)
- Specified Minimum Yield Stress (SMYS)
- Joint Efficiency (JNTEFF)
- Footage
- Year of Installation (Yr_Install)
- Long Seam Type (LONG_SEAM)
- Manufacturer (MANUF)

Station piping is reviewed through RMI-05, Station HCA Identification. Station pipe, that is mapped in GIS, (Routes beginning with STA) will be included in the selected set through the queries below.

The following queries can be used to extract from the Pipeline Attribute Table, all pipeline segments that qualify under 49 CFR §192.917 (e)(3) and (e)(4) for seam related manufacturing threats.

5.1 HCA Only Pipe

STYPE = 1201 AND STATUS = 601 AND (HCA_ID LIKE 'A%' OR HCA_ID LIKE 'B%' OR HCA_ID LIKE 'I%') AND (YR_INSTALL IS NULL OR YR_INSTALL < '1970-01-01

00:00:00') AND ((LONG_SEAM IN (0, 100, 353, 354, 356, 357, 358, 359, 360, 363, 364)) OR (LONG_SEAM IS NULL))

This query selects all pipeline segments that satisfy all 4 of the following criteria:

- Active Pipe and Enabled Pipe
- HCA ID
- Year installed is blank or pre 1970
- Long Seam is 0, Unknown, AOS, CW, ERW, ERW/SMLS, FBW, Flash Weld, LAP, Spiral, SSAW

5.2 NonHCA Pipe

(STYPE = 1201 AND STATUS = 601) AND TRANS_DEF LIKE 'T%' AND NOT FAC_TYPE IN (507, 509, 514, 515) AND (YR_INSTALL IS NULL OR YR_INSTALL < '1970-01-01 00:00:00') AND ((LONG_SEAM IN (0, 100, 353, 354, 356, 357, 358, 359, 360, 363, 364)) OR (LONG_SEAM IS NULL)) and not (HCA_ID LIKE 'A%' OR HCA_ID LIKE 'B%' OR HCA_ID LIKE 'I%')

This query selects all pipeline segments that satisfy all 6 of the following criteria:

- Active Pipe and Enabled Pipe
- Select only Transmission Pipe
- Remove Facilities that are Foreign, Distribution (60 psig), GG-B, GG-U
- Year installed is blank or pre 1970
- Long Seam is 0, Unknown, AOS, CW, ERW, ERW/SMLS, FBW, Flash Weld, LAP, Spiral, SSAW
- NonHCA Pipe

5.3 HCA and NonHCA Pipe

(STYPE = 1201 AND STATUS = 601) AND TRANS_DEF LIKE 'T%' AND NOT FAC_TYPE IN (507, 509, 514, 515) AND (YR_INSTALL IS NULL OR YR_INSTALL < '1970-01-01 00:00:00') AND ((LONG_SEAM IN (0, 100, 353, 354, 356, 357, 358, 359, 360, 363, 364)) OR (LONG_SEAM IS NULL))

Save selected sets as .shp file and export to a spreadsheet as necessary.

6.0 Research Job Packages to Collect Additional Information

After gathering the GIS data for the specific pipe segments, more research is needed on pipeline segments with missing, assumed, or conflicting values. Some pipelines with missing information were purchased by PG&E and the records\files for these pipelines may be difficult to locate.

Job files and test records that are located through additional research may contain the missing data or they might be able to allow us to use a more reasonable value. For example specified minimum yield strength (SMYS) value of -24000 is assigned to pipelines where the size and year installed are unknown (the negative sign indicates this is a conservatively assumed value). The job files likely contain this information and it could result in a more accurate SMYS value for the pipe segment in question.

In addition to researching missing or assumed data, conflicting GIS information also needs to be researched. Discrepant values should be compared to Gas Standard and Specification (GS&S) A-11 which contains probable pipe data based on historical purchasing information. As new data becomes available through records review

activities external to this specific process, the most up to data shall be used for this analysis.

The following steps outline the basic steps for researching data.

6.1 With the spreadsheet created in section 5.0, use the Job numbers for each pipe segment that have assumed values in pipe specifications (SMYS, Joint Eff, WT, Hydro Test Information, upgradejob, MaintOrg). Sort out all segments that have assumed values. Conservatively assumed values are denoted in GIS with negative values.

6.2 Contact the Senior Distribution Engineer for the division of research and set up a meeting to go over the pipe segments of concern. The Senior Distribution Engineer should be able to introduce the Mapping group that will help pull jobs to search for assumed pipe specifications.
The Senior Distribution Engineer might also have binders that were created for the Transmission lines in their territory that contain documentation on the pipelines that had their MOP\MAOP's established in 1970. See Reference, PG&E Drawing No. 086868.

6.3 Work with the Mapping group in the Division to have them pull the jobs listed in the spreadsheet created in Section 5.0. Any information that will confirm pipe specifications listed in Section 6.1 should have copies made. Any maps of pipelines that are being reviewed should have copies made. Any Bill of Materials, Strength Test information, pipe tests to determine the pipe properties, mill inspection reports if available, and any references to other jobs (Foreign pipelines purchased by PG&E) should also be copied.

6.4 Some job packages might be located or stored in the centralized Records Center in Brisbane (8-579-2174). If necessary, a request should be made to see if the Records Center has the Job Packages. It may also be necessary to check with other Mapping Departments in adjacent Divisions.

6.5 In addition to the Senior Distribution Engineer, the responsible Pipeline Engineer should also be contacted where additional records are needed to address missing, assumed, or conflicting values in GIS.

7.0 SCADACitect and GasHistorian Data

In section 5.0, pipe segments with a seam related manufacturing threat are identified. The next step is to establish the 5-Year MOP and RHOP for these lines. The following steps outline the process to extract pressure history data using a combination of GasHistorian, SCADACitect, and GIS software.

7.1 Using the selected set of pipeline segment identified in Section 5.0, zoom to each segment. If multiple segments are identified on the same line, pipeline segments can be grouped and zoomed to.

7.2 For each pipeline segment, determine the upstream and downstream SCADACitect Point Names by locating the nearest upstream and downstream

station. (Point Names have replaced PVID as referenced in Rev.0 of this Instruction) Note that SCADA monitoring points do not necessarily have to be at the nearest regulating station and may require research of more upstream or downstream stations before a SCADA monitoring point is determined. Reference Operating Diagrams, Operating Maps, and SCADACitect for locations of nearest Point Names.

7.3 Once the Point Name has been determined for a pipeline segment, use GasHistorian to extract out pressure history data back to 12/13/1999 (if the segment was identified as an HCA in the original 2004 BAP). If the HCA was subsequently added through the annual HCA review process, the pressure data will need to be extracted according to five years prior to the date the new HCA was identified. This will ensure that the 5-Year MOP is accurately identified for existing and newly identified HCAs.

7.4 Determine the highest pressure recorded from 12/13/2009 to 12/13/2004 (or previous five years specific to a newly identified HCA) based on hourly averages from GasHistorian. This is the 5 Year MOP.

7.5 Determine the highest pressure recorded in the preceding five years based on the hourly averages from GasHistorian. This is the RHOP.

7.6 Compare the highest pressure recorded in the last year to the 5-Year MOP and the RHOP to determine if any actions must be taken to comply with 49 CFR §192.917 (e)(3) and §192.917 (e)(4) and Risk Management Procedure (RMP) 06. Section 12.0 provides further instruction if review of pressure data indicates pressure measurement which is above the 5-Year MOP or RHOP.

8.0 SCADA, Electronic Recorder and Pressure Chart Data Gathering

For pipeline segments that do not have SCADA monitoring points, or where SCADA data is insufficient, the following process should be used when working with the Transmission Planning Group.

After the pipeline segments that qualify for investigation under 49 CFR §192.917 (e)(3) & (e)(4) (e)(4) have been identified in section 5.0, specific organizations in PG&E need to be enlisted in the gathering of pressure data for establishing the 5-year MOP and RHOP for the segment. The following sections describe what needs to be collected and who might be able to help in that data collection.

8.1 The Transmission Planners, in specific areas\Divisions, will be given the pipeline segments with line number, beginning and ending Mile Points (MP's), Maps of the Division boundaries they are responsible for with affected segments highlighted along with Transmission and Distribution stations added to the map (ask Trans Planners before creating maps if they are needed). The planners will also be given the dates that pressure data will need to be gathered and any information that will aide them in collecting the information requested from the Integrity Management Group.

8.2 The Transmission Planners will need to gather the pressure data from the time the segment became an HCA to the present day to determine if the pressure at that segment location was ever recorded above the 5-Year MOP or the RHOP.

8.3 If no SCADA data is available, the Transmission Planner should be able to get pressure data from Electronic Recorders (ERX), if they exist in the areas of concern, from the local T&R supervisor and their M&C Techs. The M&C Techs will be able to extract out the pressure data information needed that is described in sections 7.4 and 7.5. The M&C Techs can deliver the data in an excel format. The M&C techs are only required to maintain a 5 year history; some Divisions may have more than 5 years of data.

8.4 In the absence of SCADA and ERX data, the following information will be gathered by the M&C Techs in each division.

- Regulator settings immediately upstream of pipe segments with a potential seam related manufacturing threat need to be collected to document the history of those regulators.
- Regulator and transducer manufacturer information needs to be collected for the years the data was collected. Equipment could be removed and stations could be upgraded after 5 year high was established.
- All equipment tolerances and accuracies need to be collected if any pressure reading discrepancies are identified, i.e. pressure exceeds 5 year MOP high and the reading looks like an error.
- The calibration records for the Transducers and ERX equipment

8.5 If no electronic data exists for the segments of concern, then the data collection will need to revert to looking through pressure charts. The T&R supervisor will be a good contact along with the M&C Techs for the Division\Office where the charts are located. The Transmission Planner will be a good source for what stations would be best to collect chart data from. The M&C Techs will be the best source in locating the charts, if they exist. The M&C Techs will also be able to give more insight for a better location to collect pressure information needed that is described above.

9.0 Research Seam Failures

9.1 Any pipeline segment that contains Low Frequency Electric Resistance Welded (LFERW), lap welded pipe or other pipe that satisfies the conditions specified in ASME B31.8S, Appendices A.4.3 and A.4.4, shall be reviewed and monitored for seam failures on that segment and on any other covered or noncovered segment with similar pipe. In accordance with Section 11.0, on an annual basis, a system wide query of the A-Form layer in GIS shall be performed to detect all seam related leak repairs. Each repair will be analyzed for its potential impact to any pipeline segments with an identified manufacturing threat. If a seam failure on a pipe segment meeting the above criteria is confirmed through the analysis, all similar pipe will be assumed to have an unstable seam threat requiring assessment.

The following query can be used to extract from the A-Form Table pipeline segments that may have experienced a seam leak:

CAUSE = 943 OR CAUSE = 948 OR CAUSE_DESC like '%seam%' or REMARKS LIKE '%seam%' or SOURCE = 910 OR SOURCE = 912

This query selects leaks where the cause was due to Construction Defect or Material Failure or where the leak source is on the Longitudinal Weld or Outside Weld. In addition if the word "seam" appears in the cause description or remarks field, it will be selected. A further review of all the queried A-Forms should be performed to ensure that selected leaks only occurred on the long seam. Another source for seam leak history is the Root Cause Analysis Spreadsheet: < \\Walnutcrk01\Mapping\RiskMgmt\Program Mileage\Root Cause Investigations>

10.0 Research Pressure Cycle Induced Fatigue

10.1 **ASME B31.8S-2004 Section 2.2**
"Historically, metallurgical fatigue has not been a significant issue for gas pipelines. However, if operational modes change and pipelines segments operate with significant pressure fluctuations, fatigue shall be considered by the operate as an additional factor"

Comparison of Integrity Management Assessment Techniques for Natural Gas Transmission Pipelines , INGAA Report F-2007-09
"A review of the operating pressure history for gas transmission pipelines indicates that pressure cycles are minimal in both magnitude and frequency. Therefore, the pipe segments have not experienced cyclic fatigue. Consequently, since these threats are not occurring, the manufacturing defect threat is considered stable."

While there is a low likelihood of typical natural gas operations leading to cycling impacting pipeline integrity, cyclic fatigue will be reviewed during the annual review process as a factor in determining seam related manufacturing threat stability.

11.0 Annual Review

11.1 A pipeline segment identified with a seam related manufacturing threat will be considered stable unless any of the following conditions occur:

- Operating pressure on the covered segment has increased over the maximum operating pressure experienced in the preceding five years (i.e. RHOP)
- Operating pressure on the covered segment has increased over the maximum pressure experienced in the five years preceding the identification of the HCA (i.e. 5-Year MOP)

- Any covered or noncovered segment in the pipeline system with such pipe has experienced seam failure
- Stresses leading to cyclic fatigue increase

An annual review will be performed of the above four conditions to determine the stability of seam related manufacturing threats.

Each year, a review of the RHOP, seam failures, and stresses leading to cyclic fatigue will be performed for the preceding calendar year. The 5-Year MOP and the RHOP are the pressure values used for the purposes of stability determination. Annually, all seam failures in the previous year shall also be reviewed and pipeline systems experiencing stresses leading to cyclic fatigue increase must be identified and analyzed. The process described in Sections 6.0 through Section 10.0 will be followed during the annual review to ensure that the MOP Controls described in Section 13.0 are adequately working. If the annual review determines the established controls to be ineffective, these controls must be reviewed and changes shall be made as appropriate.

If a noncovered segment in the pipeline system experiences a seam failure, the Table in RMP-06 Section 3.3 shall be followed to ensure that all similar pipe has been identified and evaluated.

For any pipeline segments where the 5-Year MOP or the RHOP may have been exceeded by any amount, refer to Section 12.0.

If an incident involving the above conditions occurs, an ad hoc review shall be performed at the time of the incident to determine pipeline integrity impacts.

12.0 Response to Pressure Above 5-Year MOP or RHOP

12.1 An Engineering Critical Assessment (ECA) shall be performed of all segments where the research performed under Sections 6.0, 7.0, and 8.0 indicates a recent pressure measurement which is above the 5-Year MOP or RHOP. The purpose of the ECA is to determine whether or not the seam related manufacturing threat has become unstable. Where the threat is determined to be unstable, a seam assessment shall be performed in accordance with RMP-06.

At a minimum, the ECA should analyze and integrate the following factors:

Diameter
Wall Thickness
Grade
Age of the Pipeline
Long Seam type
Manufacturer
% SMYS at MOP and MAOP
Pressure test history
Calibration tolerances of pressure transducers and calibration equipment
Results of prior In-line Inspections (ILI) or Direct Assessments (DA)

Operational history and any recent operation changes to the pipeline
Cycle Induced Fatigue*

* ASME B31.8S-2004 Section 2.2
"Historically, metallurgical fatigue has not been a significant issue for gas pipelines. However, if operational modes change and pipelines segments operate with significant pressure fluctuations, fatigue shall be considered by the operator as an additional factor"

The ECAs need to be clearly documented and the results shall be reviewed with the Design/Materials Threat Committee, the Integrity Management Program Manager, and the Manager of Integrity Management. As needed, additional Subject Matter Experts may also provide review and input into the ECA.

13.0 MOP Controls

Detective, administrative and preventative controls ensure that operating pressures are monitored and controlled to make certain all pipeline segments with manufacturing seam threats remain stable.

13.1 Detective Controls

- High (or High-High) Alarm in the Gas System Operation (GSO) Control room will provide immediate notification when the pressure has exceeded its approved set point.
- GSO will make a notification to the Risk Management Group for an evaluation
- A periodic review of the Gas Event Reporting tool should also be performed to identify any over pressure events which may require further review

13.2 Administrative Controls

- This Risk Management Instruction (RMI) documents the processes to be followed and necessary communications governing the pressure controls and monitoring for affected pipelines.

13.3 Preventative Controls

All pipelines containing segments with an identified seam related manufacturing threat must have their regulator and monitoring equipment set below the governing 5 Year MOP or RHOP.

14.0 AnnualMOP Communication

14.1 For pipelines with a manufacturing threat, the governing pressure value required to maintain stability will be communicated to operations, planning and the pipeline engineers annually to ensure Alarm Set Points and Overpressure Protection devices are set to maintain operating pressures below historic

maximums. Furthermore this communication will provide updates to other company standards as appropriate. (e.g. MAOP List DWG No. 086868)

15.0 Notification to Mapping Group to Update GIS

15.1 The process and steps outlined in sections 5.0 through 8.0 describe how to extract out data from GIS, research Job files for missing information and gathering pressure data from the Transmission Planners and M&C Techs.

The spreadsheets with the information that needs to be updated will be handed over to the Mapping Group to update GIS. The Mapping group will be given any updates by Division to minimize any confusion in data entry.

16.0 Maintaining Historical Records

16.1 All information collected during RMI-06 Rev.0 during the years of 2008 and 2009 is stored in the following directory: <\\walnutcrk01\Mapping\RiskMgmt\Documentation\Weld Const Material Threats\MOPSeamIssues_Archive>

16.2 All information collected during RMI-06 Rev.0 and Rev.1 during the years of 2010 and onward is stored in the following directory: <\\walnutcrk01\Mapping\RiskMgmt\Documentation\Weld Const Material Threats\MOPSeamIssues >

17.0 PHMSA FAQ's

PHMSA Gas Integrity Management

FAQ-165: Databases as records

Go To FAQ#: [ ] Go

Question: Is information in an electronic database considered satisfactory documentation?

Answer: Yes. An operator should be prepared to discuss with inspectors evidence demonstrating that the database was used as a contemporary record, rather than having been created after the fact. Procedures, historical printouts, and archived copies of the database are examples of means that can be used to demonstrate that the database is relevant documentation.

FAQ-205: Quality of information

Go To FAQ#: [ ] Go

Question: Does an operator have to provide the original source documents for the covered segment of the pipeline? (Source document means actual pressure test chart for MAOP, mill test report on pipe, etc.) In the absence of original source material, will DOT accept inventory map data for pipeline information, MAOP database information, etc.?

Answer: Operators should use the best information that they have available in performing the data integration and analysis associated with integrity management and must assure the quality of information used. Information of this nature would be subject to review during integrity management inspections.

FAQ-219: Manufacturing and Construction Defects if Subpart J tested

Go To FAQ#: Go

Question: Are integrity assessments required for manufacturing and construction defects, including seam defects, if the pipeline has been pressure tested in accordance with Subpart J?

Answer: OPS considers a successful Subpart J pressure test to be sufficient to reveal any manufacturing and construction defects that could jeopardize pipeline integrity at operating pressures less than or equal to MAOP, as of the date of the pressure test. Any manufacturing and construction defects that survive the Subpart J pressure test are considered to be stable and not subject to failure, unless other threats adversely affect the stability of the residual manufacturing and construction defects. An operator is expected to conduct its threat identification analysis in sufficient detail to identify if other interacting threats could adversely affect the stability of residual manufacturing and construction defects, as required by ASME B31.8S, Section 2.2, and establish its assessment plans accordingly.

Assessments addressing the threat of manufacturing and construction defects are required for pipe that has never been tested to Subpart J requirements if operating conditions on the line change. (See FAQ-220)

FAQ-220: Manufacturing and Construction defects if never Subpart J tested

Go To FAQ#: Go

Question: Are assessments required for manufacturing and construction defects, including seam defects, if the pipeline has not been pressure tested in accordance with Subpart J?

Answer: Assessments may be required, if operating conditions on the line change. Initially, manufacturing and construction defects may be considered to be stable based on operating history, if no pipeline failures have been caused by manufacturing and construction defects. However, the rule requires that pipeline segments be prioritized as high risk, and appropriately scheduled for an assessment, if the operating conditions change significantly. The specific operating conditions that require an assessment for manufacturing and construction defects are any one or more of the following:
o Operating pressure, including abnormal operating conditions, which exceed the maximum operating pressure experienced during the five years preceding identification of the HCA; or
o MAOP increases; or
o The stresses leading to cyclic fatigue increase.

In addition, other interacting threats could adversely affect the stability of residual manufacturing and construction defects. An operator is expected to conduct its threat identification analysis in sufficient detail to identify if other interacting threats could adversely affect the stability of residual manufacturing and construction defects, as required by ASME B31.8S, Section 2.2, and establish its assessment plans accordingly.

Assessments for manufacturing and construction defects generally are not required for pipe that has successfully passed a Subpart J pressure test even if these changes in operating conditions occur. (See FAQ-219.)

FAQ-221: Amount of pressure increase to trigger assessment of M&C defects

Go To FAQ#: Go

Question: Relative to the requirement in 192.917(e)(3)(i), how much pressure increase (above the maximum experienced in the preceding five years of operation) will trigger the requirement to treat the segment as high risk for purposes of integrity assessments.

Answer: The rule specifies that any pressure increase, regardless of amount, will require that the segment be prioritized as high risk for integrity assessment.

FAQ-231: Reference period for M&C threats

Go To FAQ#: Go

Question: What 5-year period must I consider to establish a reference pressure for stability of manufacturing and construction defects?

Answer: Section 192.917(e)(3) requires that operators consider the five years preceding identification of a high consequence area to determine a maximum operating pressure that will assure the stability of manufacturing and construction (M&C) threats.

As long as operation does not involve pressures higher than the highest operating pressure experienced during those five years, any M&C threats can be considered stable. (The "preceding five years" referred to in sub-paragraph 192.917(e)(3)(i) is the same five years preceding HCA identification.)

Operators should note that section 192.917(e)(3) specify that "the analysis must consider the results of prior assessments on the covered segment." This includes any prior hydrostatic tests, including tests conducted after the pipe was installed. OPS considers that a hydrostatic test, meeting subpart J requirements, is sufficient to demonstrate that any manufacturing and construction defects will remain stable at the operating pressures related to that test. Operators need not consider the operating pressure in the five years preceding HCAidentification for segments that have passed a Subpart J hydrostatic test

18.0 References

Final Report No. 05-12R, Evaluating the Stability of Manufacturing and Construction Defects in Natural Gas Pipelines, John F. Kiefner, April 26, 2007

TTO-05, Low Frequency ERW and Lap Welded Longitudinal Seam Evaluation, Final Report, Michael Baker Jr., Inc., April 2004

Paper No. ETCE2002/PIPE-29029, Dealing with Low-Frequency-Welded ERW Pipe and Flash-Welded Pipe with Respect to HCA-Related Integrity Assessments, John F. Kiefner, February 2002

Comparison of Integrity Management Assessment Techniques for Natural Gas Transmission Pipelines, Process Performance Improvement Consultants, LLC, September 2007

ASME B31.8S-2004, Managing System Integrity of Gas Pipelines (including Nonmandatory Appendix A)

Final Integrity Management Program Rule preamble

PG&E Standard Practice No. 463-8 MAOP of Pipelines and Mains Operating At or Above 20% of SMYS April 15, 1975

PG&E Drawing No. 0868868 Rev. 0 April 9, 1979 (Replaces SP No. 463-8)

PG&E Drawing No. 0868868 Rev. 20 March 15, 2010

RMP- 06 Section 3.5 and Section 4.3