PACIFIC GAS AND ELECTRIC COMPANY

CALIFORNIA GAS TRANSMISSION
GAS SYSTEM MAINTENANCE & TECHNICAL SUPPORT
SYSTEM INTEGRITY SECTION
Risk Management

Procedure for Risk Management

Procedure No. RMP-05
Rev. 0
Design/Materials Threat Algorithm

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1.0 PURPOSE

The purpose of this procedure is to provide a guideline for determining the Design/ Materials Threat Algorithm for the determination of Likelihood of Failure and Risk for California Gas Transmission's (CGT) Risk Management Program (RMP).

2.0 SCOPE

This guideline is applicable to all of CGT's gas transmission pipeline facilities and is to be used in conjunction with RMP Procedure 01. The algorithm provided in this procedure is Pipelines. It is not applicable to regulator, compressor, or storage station facilities

The RMP is responsible for managing risk within the scope of this procedure. The RMP shall establish and manage the risk of each pipeline facility by utilizing industry and regulatory accepted methodologies appropriate for PG&E's CGT facilities and shall be in conformance with this procedure. The Lead Risk Management Engineer shall be responsible for compliance with this procedure.

3.0 INTRODUCTION

The RMP is a process of calculating risk, developing risk mitigation plans to bring and maintain risk within an acceptable risk profile, and monitoring risk to accommodate changes in the factors which affect risk. (Procedure RMP-01 provides a guidelines for the Risk Management Process.) This procedure supports the calculation of risk, required by Procedure RMP-01, due to one of the basic threats imposed on gas pipelines, Design/ Materials (DM).

As described in RMP-01, Risk is defined as the product of the Likelihood of Failure (LOF) and the Consequence of Failure (COF). A relative risk calculation methodology is used to establish risk for all pipeline segments within the scope of RMP-01. The method used to calculate risk is based on an index model and qualitative scoring approach. Likelihood Of Failure (LOF) is defined as the sum of the following threat categories: External Corrosion (EC), Third Party (TP), Ground Movement (GM) and Design/Materials (DM).

Each threat category is weighted in proportion to PG&E and industry failure experience. DM is weighted at 10%. The weightings on the threat categories will be reviewed and approved annually by the Consequence Steering Committee. For each threat category, the appropriate steering committee will identify the significant factors that influence the threat's likelihood of failure. For each factor, a percentage weighting will be established to identify the factor's relative significance in determining the threat's likelihood of failure within the threat algorithm. Points will be established based on criteria that the committee feels is significant to determining the threat's likelihood of failure due to each factor and the relative severity of failure (leak-before-break vs. rupture). (Negative points may be assigned where current assessments have been made to confirm pipeline integrity and/or mitigation efforts have eliminated or lowered susceptible to a threat.) Generally, the

summation of the percentage weightings for all of the factors within each threat will be 100%. (There may be exceptions to permit the consideration of very unusual conditions.) For the threat of DM, the scoring is based on direction from the DM Steering Committee.

4.0 DESIGN/ MATERIALS THREAT ALGORITHM

Design Materials (DM) shall be calculated per the direction of the DM Steering Committee. The committee has determined that the factors in A through F of this section are significant to determining the Likelihood of Failure (LOF) of a gas pipeline due to *design/material* issues. The DM contribution to LOF shall be the summation of assigned points times the assigned weighting for the following factors:

A) Pipe Seam Design* (30% Weighting): Points will be awarded as follows:

Criteria	Points	Contrib.
Furnace Butt Weld (FBW) (Jef = 0.6)	100	30
Single Submerged Arc Weld SSAW (Jef = 0.6)	60	18
Low Freq. ERW* (Jef = 1.0)	90	27
High Freq. ERW (Jef = 1.0)	20	6
Double Submerged Arc Weld (DSAW) (Jef = 1.0)	10	3
Seamless	10	3
Spiral (Jef = 0.6)	90	27
Other**/ Unknown (Jef = 0.6)	100	30

* Welds made prior to 1970 using the ERW welding process are assumed to be made using low frequency.

** "Other" includes pipe manufactured using the A. O. Smith Process.

B) Girth Weld Condition (15% Weighting): Points will be awarded as follows:

Criteria	Points	Contrib.
Pre 1930 Girth Welds (Both Arc and oxyacetylene, regardless of seismic zone)	100	20
Pre 1947 Girth Welds within area of ground acceleration > 0.2g	100	20
Shielded pre-1960 Bell-Spigot/BBCR**	40	6
All others	0	0

** Shielded Metal Arc Welds (SMAW) made prior to 1960 or girth weld joints made with Bell-Spigot or BBCR joints.

C) Material Flaws or Unique Joints (20% Weighting): Points awarded as follows:

Criteria	Points	Contrib.
Wrinkle Bends in Pipe w/ OD < 12"	100	20
Wrinkle Bends in Pipe w/ OD > 12"	50	10
Dresser Couplings	100	20
Hard Spots	100	20
Pre-1950 Miter Bends	90	18
None	0	0

D) Pipe Age (15% Weighting): Points awarded as follows:

Criteria	Points	Contrib.
Greater than 50 Years	100	15
>40 to 50 Years	75	11.25
>30 to 40 Years	30	4.5
0 to 30 Years	10	1.5

E) MOP vs. Pipe Strength* (15% Weighting): Points awarded as follows:

Criteria	Points	Contrib.
>60%	100	15
50% to 60%	80	12
40% to <50%	50	7.5
30% to <40%)	30	4.5
20% to <30%	10	1.5
Less than 20%	5	0.75

* Pipe Strength shall be determined to be equal to (SMYS)(2)(t)/(OD)(Jef).

F) Design/Materials Leak Rate (5% Weighting): Points awarded as follows:

Criteria	Points	Contrib.
1 or more leaks per leak age	200	10
0.5 to < 1 leaks per leak age	160	8
>0 to < 0.5 leaks per leak age	100	5
0 leaks	0	0

G) Test Pressure vs. Pipe Strength* (20% Weighting): Points awarded as follows:

Criteria	Points	Contrib.
Pressure Tested to > 100 % PS	-200	-40
Pressure Tested to > 90% to 100 % PS	-150	-30
Pressure Tested to 80% to 90% PS	-50	-10
Pressure Tested to 0% to < 80% PS	0	0
No Pressure Test	150	30

* Pipe Strength (PS) shall be determined to be equal to (SMYS)(2)(t)/(OD)(Jef).

material redacted