

# PACIFIC GAS AND ELECTRIC COMPANY

GAS TRANSMISSION AND DISTRIBUTION  
GAS ENGINEERING  
GAS INTEGRITY MANAGEMENT AND TECHNICAL SUPPORT  
Risk Management



## Procedure for Risk Management Procedure No. RMP-05 Rev. 4 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 (DM) Threat Algorithm for the determination of Location of Failure Analysis (LFA) Risk Management Program (RMP) and Integrity Management Program.



## 2.0 SCOPE

### 2.1 Transmission

This guideline is applicable to all of PG&E's gas transmission pipeline facilities and is to be used in conjunction with RMP Procedure 01. The algorithm provided in this procedure is Procedure 01 is not applicable to regulatory requirements for storage vessel facilities.

The Integrity Management Group is responsible for managing risk within the scope of this procedure. The Integrity Management Group shall establish and manage the risk of each pipeline facility by utilizing industry and regulatory accepted methodologies appropriate for PG&E's OCT facilities and shall be in conformance with this procedure. The Integrity Management Program Manager shall be responsible for compliance with this procedure.



## 3.0 INTRODUCTION

The risk management process 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. The Transmission Integrity Management Program (TIMP) is a program established by PG&E to address the integrity management rules in 49 CFR Part 192 Subpart O. (Procedure RMP-01 provides a procedure for the Risk Management Process.) Procedure RMP-03 provides procedures for compliance with the Integrity Management Program. This procedure supports the calculation of risk, required by Procedure RMP-01 and RMP-02, due to one of the threats imposed on gas pipelines, Design Materials (DM).




As defined 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-03. 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 three 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 likelihood of failure. For each factor, a percentage weighting will be established to identify the factors 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 (break-before-break vs. bypass). (Negative points may be assigned when current assessments have been made to confirm pipeline integrity and mitigation efforts have diminished or lowered susceptibility to a threat.) Generally, the summation of the percentage weightings for all fit the factors within each threat will be 100%. (There may be exceptions to permit the consideration of new threat conditions.)

For the threat of IIR, this process is based on a review from the DM Steering Committee. The DM Steering Committee shall meet once each calendar year and shall review this procedure per the requirements of 49 CFR 192.

The Distributed Integrity Management Program (DIMP) is a program established by PG&E to address the integrity management rules in 49 CFR Part 192 Subpart P. Procedure 3307-10 provides details for compliance with the Integrity Management Program. This procedure supports the calculation of risk due to one of the basic threats imposed on gas pipelines, Design-Related Risks (DRR). 

The DIM threat for Distribution piping is addressed in section 7 of this document. Currently this requires assessment the highest risk items as they can be prioritized as a group.

#### 4.3 Roles and Responsibility

Specific responsibilities for executing components with this procedure are as follows:



Title	Reports to:	Responsibilities
Design Management Program Manager	Manager System Integrity	<ul style="list-style-type: none"> <li>Supervise completion of work for the following:</li> <li>Monitor compliance to procedures – take corrective action as necessary</li> <li>Assign qualified individuals</li> <li>Ensure that assigned individuals</li> <li>Assign Steering Committee Chairman, and ensure that meetings are held once each calendar year.</li> </ul>
Steering Committee Chairman (Subject Matter Expert)	Integrity Management Program Manager or Manager for the Steering Committee – also issues requests to the Design System Integrity Division	<ul style="list-style-type: none"> <li>Attend meetings.</li> <li>Monitor procedure with compliance per RMP-01</li> <li>Provide meeting minutes</li> <li>Ensure that the process is controlled</li> </ul>
Steering Committee Members (Subject Matter Experts)		<ul style="list-style-type: none"> <li>Attend meetings as requested by Steering Committee Chairman</li> <li>Provide review and advice to procedure</li> </ul>
RMP Management Engineers	Design Management Program Manager	<ul style="list-style-type: none"> <li>Perform calculations, etc. procedure.</li> </ul>

### 5.3 Training and Qualifications

See RMP-06 for qualification requirements. Specific training to ensure compliance with this procedure is as follows:

Position	Type of Training	How Often
Design Management Program Manager	Procedure review of RMP-05 and RMP-06	<ul style="list-style-type: none"> <li>Upon initial assignment</li> <li>Once each calendar year.</li> </ul>
Steering Committee Chairman	Procedure review of RMP-05 and RMP-06	<ul style="list-style-type: none"> <li>Upon initial assignment</li> <li>Once each calendar year.</li> <li>As changes are made to the procedure.</li> </ul>
Steering Committee Members (Subject Matter Experts)	RMP-05 and Steering Committee requirements of RMP-01	<ul style="list-style-type: none"> <li>Once each calendar year at the time of the steering committee meeting.</li> </ul>
RMP Management Engineers	Integrity Management Program Manager	<ul style="list-style-type: none"> <li>Upon initial assignment</li> <li>Once each calendar year.</li> <li>As changes are made to the procedure.</li> </ul>

## 6.0 DESIGN MATERIALS THREAT ALGORITHM

### 6.1 Gas Transfection

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 in determining the likelihood of Failure (LOF) of a gas pipeline due to design/material issues. This DM contribution to LOF shall be the summation of assigned points from the assigned weighting for the following factors:

A) Pipe Beam Design (10% Weighting): Points will be awarded as follows:

Criteria	Points	Weight
Designs that meet ASME B31.8	100	10
Designs that meet ASME B31.8 (with exceptions)	80	8
Designs that meet ASME B31.8	70	7
ASME B31.8 or other ASME code (e.g., ASME B31.4, ASME B31.9)	60	6
Designs that meet ASME B31.8 (with exceptions)	50	5
Designs that meet ASME B31.8 (with exceptions)	40	4
Designs that meet ASME B31.8 (with exceptions)	30	3
Designs that meet ASME B31.8 (with exceptions)	20	2
Designs that meet ASME B31.8 (with exceptions)	10	1
Designs that meet ASME B31.8 (with exceptions)	0	0

Notes: Points will be awarded for 10% weighting process are assumed to be made using low frequency

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

Criteria	Points	Weight
100% of all welds meet ASME B31.8	100	15
95% of all welds meet ASME B31.8 (with exceptions)	80	12
90% of all welds meet ASME B31.8 (with exceptions)	60	9
85% of all welds meet ASME B31.8 (with exceptions)	40	6
80% of all welds meet ASME B31.8 (with exceptions)	20	3
75% of all welds meet ASME B31.8 (with exceptions)	0	0

Notes: Points will be awarded for 15% weighting process are assumed to be made using low frequency



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

Criteria	Points	Credits
Visible Bands in Pipe w/ OD > 36"	100	20
Visible Bands in Pipe w/ OD > 12"	50	10
Cracks/Scraps	150	30
Hard Spots*	100	20
Pre-1950 Man Bands	50	10
None	0	0

\* Hard Spots point shall be awarded based on mill and age regardless of whether hard spots have been found

D) Pipe Age (10% Weighting): Points awarded as follows:

Criteria	Points	Credits
Pre 1970 Pipe	100	10
1970 and newer pipe	0	0

E) MOP vs Pipe Strength\* (10% Weighting): Points awarded as follows:

Criteria	Points	Credits
> 80%	100	20
60% to < 80%	90	18
40% to < 60%	80	16
20% to < 40%	70	14
20% to < 30%	60	12
Less than 20%	50	10

\* Pipe strength shall be determined to be equal to  $(SMYS)(2)(t)/(OD)$

F) Design Material Leak Rate (8% Weighting): Points awarded as follows:

Criteria	Points	Credits
More than 1 leak	200	16
1 leak	100	8
0 leak	0	0

Leak within the last twenty years on a pipe segment or on adjacent segments with the same pipe properties and installed job or project number within a one mile radius of the leak

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

Criteria	Points	Credits
TP > 100% ST (TP > 1.5 x (SMYS)(2)(t)/(OD))	200	40
TP > 100% ST (test more than 5 years old)	150	30
TP < 100% ST	50	10
No Pressure Test or TP/ST < 1	0	0

\* Pipe Strength (ST) shall be determined to be equal to  $(SMYS)(2)(t)/(OD)$

\*\* Pressure Tests performed earlier than 1950 will not be credited.

