PACIFIC GAS AND ELECTRIC COMPANY

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

Risk Management Procedure

Procedure No. RMP-03
Rev. 5
Third Party Threat Algorithm

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1.0 PURPOSE

The purpose of this procedure is to provide a guideline for determining the Third Party (TP) Threat Algorithm for the determination of Likelihood of Failure and Risk for PG&E's 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 for pipelines. It is not applicable to regulator, compressor, or storage station 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 facilities and shall be in conformance with this procedure. The Integrity Management Program Manager shall be responsible for compliance with this procedure.

2.2 Distribution

Gas Distribution System Integrity risk ranking is intended to meet the requirements of subpart P of 49 CFR 192. Currently it uses a Subject Matter Expert approach to identify and prioritize risks. That process is detailed in Section 7.0 of this document. 5

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-06 provides procedures for compliance with the Integrity Management Program. This procedure supports the calculation of risk, required by Procedure RMP-01 and RMP-06, due to one of the basic threats imposed on gas pipelines, Third Party (TP).

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. TP is weighted at 45%. 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 TP, the scoring is based on direction from the Third Party Damage Committee.
The Third Party Damage Committee shall meet once each calendar year and shall review this procedure per the requirements of RMP-01.

The Distribution 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 RMP-15 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, Third Party (TP). 5

The TP threat for distribution piping is addressed in section 7 of this document. Currently this algorithm determines the highest risk items so they can be prioritized as a group.

4.0 Roles and Responsibility

Specific responsibilities for ensuring compliance with this procedure are as follows:

Title	Reports to:	Responsibilities
Integrity Management Program Manager	Manager System Integrity	• Supervise completion of work (schedule/quality) • Monitor compliance to procedure – take corrective actions as necessary. • Assign qualified individuals • Ensure Training of assigned individuals • Assign Steering Committee Chairman, and ensure that meetings are held once each calendar year.
Steering Committee Chairman (Risk Management Engineers)	Appointed by Integrity Management Program Manager. Who the chairmen reports to will vary.	• Arrange meetings. • Review procedure with committee per RMP-01. • Provides meeting minutes • Ensures action items are completed.
Steering Committee Members (Subject Matter Experts)	Various	1. Attend meetings as requested by Steering Committee Chairman. 2. Provide review and direction to procedure.
Risk Management Engineers	Integrity Management Program Manager	• Perform calculations per procedure.

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5.0 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
Integrity Management Program Manager	Procedure review of RMP-01 and RMP-03	• Upon initial assignment • Once each calendar year.
Steering Committee Chairman	Procedure review of RMP-01 and RMP-03	• Upon initial assignment • Once each calendar year or as changes are made to the procedure.
Steering Committee Members (Subject Matter Experts)	RMP-03 and Steering Committee requirements of RMP-01	• Once each calendar year at the time of the steering committee meeting.
Risk Management Engineers	Integrity Management Program Manager	• Once each calendar year or as changes are made to the procedure.

6.0 Transmission TP Threat Algorithm

Transmission Third Party (TTP) threats shall be calculated per the direction of the Third Party Damage Committee. The committee determined that the factors in A through J of this section are significant for determining the Likelihood of Failure (LOF) of a transmission gas pipeline due to *third party* damage. The TTP contribution to LOF shall be the summation of assigned points times the assigned weighting of the following factors:

A) Potential Ground Breaking Frequency (13% Weighting): Points will be awarded as follows:

Criteria	Points	Contrib.
Dig-in Concern*	100	13
Class 3 and 4 Areas	100	13
Class 2 Area	50	6.5
Class 1 Area	10	1.3

* Dig-in concerns will be reported to the RMP by District/Division personnel every two years. They shall also be within a ½ mile of a leak that has occurred within the last 10 years, unless some mitigation efforts have been documented.

B) Third Party Damage Prevention (10% Weighting): Points will be awarded as follows:

Criteria	Points	Contrib.
None	0	0
Standby	-100	-10
Aerial Patrol	-20	-2

C) Ground Cover Protection (15% Weighting): Points awarded as follows:

Criteria	Points	Contrib.
More than 5.99'	10	1.5
> 2.99' to 5.99'	40	6
> 2' to 2.99'	80	12
> 0' to 2'	100	15
0' 60		9
Unknown*	40	6

*DEFAULT.

D) Pipe Diameter (7% Weighting): Points awarded as follows:

Criteria	Points	Contrib.
Pipe Diameter <12"	100	7
Pipe Diameter ≥ 12"	0	0

E) Wall Thickness (13% Weighting): Points awarded as follows:

Criteria	Points	Contrib.
Less than 0.250 inches	100	13
0.250 to 0.500 inches	30	3.9
Greater than 0.500 inches	10	1.3

F) Line Marking (5% Weighting): Points awarded as follows:

Criteria	Points	Contrib.
Line of Sight	10	0.5
Poor Condition	60	3.0
None*	100	5

*Default

G) MOP vs. Pipe Strength* (10% Weighting): Points awarded as follows:

Criteria	Points	Contrib.
>60% (Default)	100	10
50% to 60%	80	8
40% to <50%	50	5
30% to <40%)	30	3
20% to <30%	10	1
Less than 20%	5	0.5

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

H) Third Party Leak* Rate (18% Weighting): Points awarded as follows:

Criteria	Points	Contrib.
Pipe Segments with more than one leak** within the impact zone of that segment	150	27
Pipe Segment with one leak within its impact zone	100	18
Pipe Segment in proximity (Leak within the route impact zone and within one mile)	50	9
No Leak	0	0

* Includes both leaks and hits within the last twenty years.

** Only leaks or hits on the same route and within the impact zone are awarded points. Intentionally exceeds 100% weighting.

I) Public Education Program (9% Weighting): Points awarded as follows:

Criteria	Points	Contrib.
Field Contact*	-100	-9
Landowner Notification**	-70	-6.3
Trade Show***	-25	-2.25
Public Education not done	0	0

* Field Contact is defined as direct contact at the job site within the last 12 months.

** Points for Landowner Notification will be awarded if a letter was sent to the landowner within the last 24 months.

*** Points are awarded to pipe segments within a 30 mile radius of a trade show when a trade show has been performed within the last 12 months. The Public Awareness Program Manager will keep a record of the trade shows and will establish the area credited for the trade show.

7.0 Distribution TP Threats

PG&E's Distribution Integrity Management Plan (DIMP) (RMP-15) addresses each of the GPTC Appendix G-192-8 guide's seven major components. These components are as follows: 5

- Knowledge of the distribution system – design, maintenance and operation
- Threat Identification process
- Risk evaluation and ranking of threats
- Implement measures to manage risks
- Measure and monitor results
- Periodic evaluation of program for improvements
- Reports to government agencies

Third Party (TP) Damage threat algorithms for Gas Distribution are developed following the guidelines in RMP-15.

a. Knowledge of the system – PG&E's records and databases that define the distribution system and what type of information they provide are described in Table 1.3 of RMP-15.
b. How Threats are identified - Distribution Third Party (DTP) threats were identified and prioritized for mitigation by the Third Party Damage Committee. The following categories of threats are significant for determining the Likelihood of Failure (LOF) of a distribution gas pipeline due to *third party* damage.
c. Summary Table of Relative Risk Value (R) Per SMEs ballot results Risk Evaluation and ranking of threats-Identification is performed by the SME team who then rank the Likelihood and Consequence of each threat with H, M or L. A value is then assigned to each of the ranch such as: H=3, M=2 and L=1. The value of the Likelihood (l) X Consequence © of each SME's judgment will be calculated and then the average of all SME's risk values will be calculated as the relative risk value, R. The relative risk values of the threat, $R = 1/n (\sum (Li X Ci))$ (i = 1 to n). The following table shows the combined Risk of LOF and COF is shown on the last Risk column.
d. Implement Measure to Manage Risk – These risk rankings will be used to identify and implement measures to manage the risk.

Summary Table of Relative Risk Value (R) Per SMEs ballot results

Category	Sub1	Sub2	Threat	Risk
Excavation	3rd party damage		Failure to call USA - Third party fails to call USA and excavates without facilities being located.	6.00
Other Outside Force	Trenchless technology	Piercing Tools	Piercing tool cross bore - Service installations cross bored with other underground infrastructure using pneumatic piercing tools.	5.94
Excavation	Mark and Locate	Mis-marking	Plastic pipe with no locating wire - Difficult to locate	5.00
Other Outside Force (PG&E)	Trenchless technology	HDD	HDD cross bore - Main or service installations cross bored with other underground infrastructure using HDD. Gas migration can cause explosions.	4.81
Excavation (Others)	3rd party damage	HDD	HDD 3rd party damages gas pipe.	4.56
Excavation	3rd party damage		Contractor digs outside the marked excavation area.	4.40
Other Outside Force	Vehicular	Meter & Service	Unprotected Meter meeting criteria - Vehicular damage to above ground facilities that meet PG&E's criteria for inclusion in the meter protection program but have not been protected.	4.14
Other Outside Force	Vehicular	Meter & Service	Unprotected Meter meeting criteria where owner refuses protection - Vehicular damage to above ground facilities with in PG&E criteria for mitigation but property owner refuses additional protection.	3.45
Excavation	3rd party damage		Map deficiencies - causing damage	3.40
Excavation	PG&E as excavator		PG&E not following excavation standard. (NOT FOLLOWING PROCEDURES - NOT TRAINED)	3.20
Excavation	PG&E as excavator		Excavator Training - Content and frequency of training inadequate is a threat to safe excavation.	3.20
Other Outside Force	Vehicular	Meter & Service	Unprotected Meter outside criteria - Vehicular damage to above ground facilities that don't meet PG&E's criteria for inclusion in the meter protection program.	3.11
Other Outside Force	Vehicular	Meter & Service	Protected Meter meeting criteria - Vehicular damage to above ground facilities that meet PG&E's criteria for inclusion in the meter protection program and have been protected.	3.11

Category	Sub1	Sub2	Threat	Risk
Excavation	3rd party damage		TP Excavating practices - failure to hand-dig	3.00
Excavation	3rd party damage		PG&E does not perform field meet/standby at critical facilities.	3.00
Excavation	3rd party damage		PG&E Fails to mark its facilities. - This is related to "Mark and Locate" sub category.	2.60
Excavation	Mark and Locate	Mis-marking	Copper services - Difficult to locate	2.60
Other Outside Force	Vehicular	Meter & Service	Vehicle damage to protected manifold	2.70
Other Outside Force	Vandalism		Vandalism, operating valves - Unauthorized operation of gas facilities by a third party.	2.65
Other Outside Force			Sink Hole, pipe over stress - Water main or sewer breaks can result in street wash outs and cave ins exposing gas facilities. Stress due to excess spans and bending of line.	2.65
Excavation	3rd party damage		Joint trench, failed electric cable - 3rd party causes damage to electric circuit. The event releases heat in adjacent soil and melts plastic pipe to failure or reduces plastic service life.	2.60
Other Outside Force	Vandalism		Vandalism, small arms fire - Shooting above ground facilities with firearms.	2.53
Excavation	3rd party damage		TP Excavating practices - failure to wait 2 working days - excavation before marked.	2.50
Excavation	3rd party damage		PG&E mis-marks facilities - This is related to "Mark and Locate" sub category.	2.30
Excavation	Large Projects		Damage to gas lines by excavators e.g. infrastructure improvement.	2.20
Excavation	PG&E as excavator		Map deficiencies - causing damage (procedure is to review map before dig)	2.10
Excavation	Mark and Locate		PG&E Locating on time - Late locates are a threat to third party damage when excavator digs without PG&E's being marked.	2.10
Excavation	Mark and Locate	Mis-marking	Plastic inserted lines - difficult to locate.	2.10
Other Outside Force	Vandalism		Vandalism, gas theft - Unauthorized modification to gas facilities with the intent to energy diversion. Modifications may involve fittings and equipment not rated for the application. Public and employee safety threat.	2.09
Excavation	3rd party damage		NO DELINEATION - excavation takes place.	1.90
Excavation	Mark and Locate	Mis-marking	Plastic without taped lead wire - difficult to locate	1.90
Other Outside Force	Vandalism		Damage to sensing lines - monitors	1.40
Excavation	3rd party damage		CP leads damaged during excavation	1.20

Excavation	PG&E as excavator		CP leads damaged during excavation	1.00