

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-02 Rev. 5 External Corrosion Threat Algorithm

Prepared By: _____ Date: 11/21/01 _____
 Approved By: _____ Date: 11/21/01 _____
 _____, Lead Risk Management Engineer
 Approved By: _____ Date: 11/22/01 _____
 _____, Manager, System Integrity

Rev. No.	Date	Description	Formed By	Approved By	Approved
					Manager, System Integrity
0	11/20/01	Initial Issue			
1	2/7/02	Revised as shown			
2	6/15/05	Revised as shown to add S.C.			
3	10/22/08	Revised as shown			
4	7/12/09	Revised as shown			
5	1/14/10	Revised as shown			

Position	Type of Training	How Often
Integrity Management Program Manager	Procedure review of RAMP-01 and RAMP-02	<ul style="list-style-type: none"> Upon initial assignment Once each calendar year
Steering Committee Chairman	Procedure review of RAMP-01 and RAMP-02	<ul style="list-style-type: none"> Upon initial assignment Once each calendar year As changes are made to the procedure
Steering Committee Members (Subject Matter Experts)	Review RAMP-01 and Steering Committee requirements of RAMP-01	<ul style="list-style-type: none"> Once each calendar year at the time of the steering committee meeting
Risk Management Program	Risk Procedure RAMP-03	<ul style="list-style-type: none"> Upon initial assignment Once each calendar year As changes are made to the procedure

7

8.6 EC Threat Algorithm

8.6.1 Gas Transmission

Scoring for the External Corrosion (EC) threat algorithm shall be calculated per the direction of the EC Steering Committee. The parameters has determined that the factors in A through M of this section are significant for determining the Likelihood of Failure (LOF) of an pipeline due to EC. The EC algorithm shall be based on the summation of assigned points based the assigned weighting of the following factors:

A) Soil Resistivity (SR) (Weighting) Points will be awarded as follows:

Criteria	Points	Weight
Less than or equal 500 Ohm-Centimeters	100	1
501 to 1000 Ohm-Centimeters	75	0.75
1001 to 2000 Ohm-Centimeters	50	0.5
2001 to 4000 Ohm-Centimeters	25	0.25
Above 4000 Ohm-Centimeters	00	0.0
Above 10,000 Ohm-Centimeters	00	0.0

Default = Above 10,000 Ohm-Centimeters

B) Corrosion Survey Criteria (SR Weighting) Points will be awarded as follows:

Criteria	Points	Weight
No CSE readings	50	0.5
CIS & meet criteria for acceptability	100	1.0
CIS & does not meet acceptance criteria	300	3.0

CIS - Close Interval Survey. This information is provided to the RAMP by the Corrosion Engineer and, if acceptable, is considered valid for ten years. If the CIS does not meet acceptance criteria, it is valid until repaired.

6) Coating Visual Inspection (25% Weighting): Points awarded as follows:

Criteria	Points	Contrib.
Severely deteriorated (20 years)	100	2
Locally damaged, deteriorated (15-20)	80	3
Extensive damage only (10-15)	75	1.5
Intact and bonded (10 or less)	70	0.8
None Pipe or No Inspection (Coating Age < 5 Years)	51	0.52
None Pipe or No Inspection (Coating Age 5 to 20 Years)	79	1.52
None Pipe or No Inspection (Coating Age > 20 to 30 Years)	85	2.32
None Pipe or No Inspection (Coating Age > 30 years)	91	40.8

Inspection data greater than 30 years old shall not be used unless the information reflects a condition that is fair or good. In such cases, points will be awarded per the inspection regardless as to when the inspection was performed.

* For Bare Pipe substitute Pipe Age.

7) Cladding Integrity (20% Weighting): Points awarded as follows:

Criteria	Points	Contrib.
No cladding or failed	0	0
Existing cladding	20	0.8
Inspected cladding (20 or less)	100	8

8) In-line Inspection (ILI) (10% Weighting): Points awarded as follows:

Criteria	Points	Contrib.
NoILI performed	0	0
Inspection < 10 years old	100	1
Inspection 5 to 10 years old	100	1.5
Inspection 3 to 5 years old	100	2.0
Inspection 0 to 3 years old	100	2.5

9) External Corrosion Leak Rate (14% Weighting): Points awarded as follows:

Criteria	Points	Contrib.
Leak at least 5 years	100	7.0
Leak at least 10 years	80	5.6
Leak age 1-10 years	50	3.5
No reported leaks	0	0

Points applied to all pipe segments of similar voltage and coating type within a 1 mile radius of a leak.

6) Coating Design (10% Weighting). Points awarded as follows:

Criteria	Points	Weight
Standard Coatings	100	1.0
Non-Standard Coatings	10	0.1
None	0	0.0
None	10	0.1
Default Protection Date > 1980 - Federal Type (0.0000)	100	1.0
Default Protection Date > 1980 - Associate Type (0.0000)	10	0.1

7) DCRAC Inspections (10% Weighting). Points awarded as follows:

Criteria	Points	Weight
High or medium voltage with a DCRAC of a Class 2 or higher without Cathodic Protection	100	1.0
High or medium voltage with a DCRAC of a Class 1 or higher	50	0.5
No high or medium voltage	0	0.0

8) Coating Age (10% Weighting). Points awarded as follows:

Criteria	Points	Weight
Less than 10 years	100	1.0
10 to 20 years	50	0.5
20 to 30 years or uncoated	10	0.1
30 years or less	0	0.0

9) WSP's - Pipe Strength (10% Weighting). Points awarded as follows:

Criteria	Points	Weight
100%	100	1.0
80% to 99%	50	0.5
40% to 79%	20	0.2
20% to 39%	10	0.1
10% to 19%	5	0.05
Less than 10%	0	0.0

* Pipe strength shall be determined to be equal to or less than 100% (1.0000).

10) Pipe Visual Inspection (10% Weighting). Points awarded as follows:

Criteria	Points	Weight
Heavy rusting or pitting (100%)	100	1.0
Light pitting or staining (50%)	50	0.5
Heavy rusting	20	0.2
Light rusting (10%)	10	0.1
No rusting or staining (0%)	0	0.0
No inspection (less than 10 years)	0	0.0
No inspection (10 to 20 years)	10	0.1
No inspection (20 to 30 years)	20	0.2
No inspection (30 years or more)	40	0.4

Inspection data greater than 30 years old shall include data unless the information reflects a condition that is fair or poor.

In each case, points will be awarded per the inspection regardless as to when the inspection was performed.

(1) Test Procedure (TP) (10% Weighting) Points awarded as follows:

Criteria	Points	Comb.
No Records Available	0	0
TP age is < 2 years more than ASME B31.8S Table C requirements for Hydrostatic Test Interval	-100	-10
TP age is < 2 years more than ASME B31.8S Table C requirements for Hydrostatic Test Interval	-100	-5
TP is > 2 years more than ASME B31.8S Table C requirements for Hydrostatic Test Interval	0	0

3

(2) System Completion Direct Assessment (SCDA) (Weighting 10%)

Points awarded as follows:

Criteria	Points	Comb.
SCDA Completed*	-200	-20
SCDA Not Completed	0	0

* SCDA must have been completed within the last ten years.