Seven Step Process for Performance Category Upgrade Request

Background

The Seven Step Process for Performance Category Upgrade Request[1] (PCUR) is the vehicle by which an applicant can request a change to a path's performance Category level. The NERC/WECC Planning Standards identifies the Category Level that a bulk transmission path[2] actual outage performance must meet. Table I of the Planning Standards provides a deterministic matching between various contingencies and Category levels A through D. Table W-1 (see Attachment A) of this same standard provides a probabilistic matching between a line's Outage Frequency and Category levels A through D. It is the outage frequency (i.e., probabilistic) matching identified in Table W-1 upon which this Seven Step Process is based.

An adjustment to a path's performance Category is accomplished through a PCUR. The Seven Step Process described herein outlines the necessary elements of a PCUR. Step 3 of the Seven Step Process requires a comparison of the path's actual outage performance to the probabilistic performance criteria defined in Table W-1. This comparison involves a critical review of the outage data to ascertain whether the Mean Time Between Failure (MTBF) is sufficient to justify the PCUR request. A path that fails to meet or exceed the MTBF as defined in Table W-1 will not be upgraded and may be downgraded. A new path or a path with little or no outage history can also apply for a performance Category adjustment. The application may use available actual outage data, similar line outage data and/or may rely on the other requirements identified within other steps of the Seven Step Process.

Process

This document describes the process the applicant must follow in preparing and presenting its upgrade request to the Reliability Performance Evaluation Work Group (RPEWG). See Attachment B for an overview of the process.

In preparing a PCUR, the applicant can provide additional information beyond the information required by the Seven Steps Process. The applicant is requested to fully address and explain how all elements within each step are met. If a step or part of a step does not apply to the applicant's request, then a statement of explanation is required. The applicant is encouraged to augment each step with additional information as deemed appropriate.

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[1] The source document for the Seven Step process is the Phase I Probabilistic Base Reliability Criteria Implementation Procedure, June 14, 2001.

[2] A path may consist of a single line or multiple lines in a common corridor.

The following provides an outline of the elements of the Seven Step Process.

Step 1. Project (Facility) Description

A. Provide a complete project description and why it is being considered for a PBRC adjusted rating.

B. The project description should include, but is not limited to, the following supportive data:

1. Overview of terminations;
2. Physical Layout and Transmission Construction including lightning protection;
3. Substation Configurations;
4. Protective Relaying and Related Communication;
5. Isokeraunic Level;
6. Aircraft Hazard;
7. Fire Hazard;
8. Terrain;
9. Climate; and
10. Mileage – total length and length of critical/important sections (e.g., miles within common corridor on common towers or miles without lightning protection, etc.).

Step 2. Outage Database - The Sample

A. The outage database that will be used in the evaluation must include the following:

1. A minimum of 10 years of outage data is required.
2. If more than 10 year of data is available, the data greater than 10 years old can be used in the evaluation at the facility owner's discretion.
3. For facilities that have been in operation for less than ten years, data for the operational period will be used together with representative data from other similar facilities.
4. All data collected will be used as the sample. That is, do not eliminate any of the outage data because all data will constitute the sample to be used in calculating the MTBF for the Unadjusted Data described in Step 3.

B. The outage database can be taken from the following sources:

1. Actual historical outage data of the line(s) being evaluated.
2. If there is no actual data available or if actual outage data history is less than 10 years then the historical outage data from similarly situated lines should be used.

C. All outage data identified in Step 2 B shall constitute the Outage Database Sample.

D. If no outage data exists or if no data can be identified from either the existing line history or from similar line data, then provide full explanation and proceed to Step 4.

Step 3. Mean Time Between Failure Calculation

A. Use the outage data Sample identified in Step 2 to calculate MTBF.

B. Calculate the MTBF two times as described below.

1. Unadjusted Sample
    a. Use all outage data defined in Step 2 (Unadjusted Database Sample) as the basis for computing the MTBF.
    b. Compute and tabulate the MTBF using all data and identify the confidence interval.
2. Adjusted Sample
    a. If appropriate, adjust the Outage Database Sample from Step 2 by removing outage events that do not apply to the line(s) being evaluated.
    b. All outage events that are removed must be fully justified. Use the following information as a guide[3]:
        i. For categories C and D, forced[4] common-mode[5] outages may be counted. This can include:
            (a.) Right-of-way or corridor outages; and
            (b.) Failures of unknown nature.

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[3] Taken from Phase I Probabilistic Base Reliability Criteria Implementation Procedure, June 14, 2001, page 11, section 3.6

[4] Forced is an outage that is the result from automatic operation of switching devices.

[5] A related multiple outage event consisting of two or more primary outage occurrences initiated by a single incident where the outage occurrences are not consequences of each other.

ii. For categories A and B, all forced automatic outages may be counted.Outages not counted may include:

(a.) System wide outages that are initiated outside the facility in question;

(b.) Scheduled outages;

(c.) Major natural disasters, earthquakes, or sabotage; and

(d.) Non-overlapping outages.

c. Each outage event (or groups of outage events if similar) that is excluded must be fully described and justified why it is appropriate to exclude the data from the sample.

i. For example, see the Robust Line Design[6] features document as a means to justify removing the outage data.

ii. Consider other robustness features employed on the line(s) to reduce the risk of outage.

d. Compute and tabulate the MTBF using the adjusted sample and identify the confidence interval.

Step 4. Robust Line Design

A. List any features used in Step 3 B 2, and include other features that may exist that are not otherwise addressed.

B. In the event a MTBF calculation is not possible due to limited data, an upgrade application may be made using only the Robust Line Design features. The Applicant must be able to fully justify and conclude that significant risk (i.e., exposure to and consequence of the outage, see Step 5 and 6) does not exist for their project or that they have mitigation measures in place that will limit risk to an acceptable level.

Step 5. Exposure Analysis

A. Describe the hours per year that customers would be exposed to compliance violation should the critical outages occur. A load duration curve could be used to describe the exposure.

1. For example, if the critical loading is expected during summer conditions only, the applicant may be able to exclude snow outage type events as a risk.

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[6] See the Robust Line Design Features document provided in RPEWG's location on WECC's website.

Step 6. Illustrate the Consequence of An Outage

A. Using power flow and/or stability study results the applicant must describe the consequence of the outage such as transient voltage dip violation, transformer or line overloading, MW customer loss, or cascading.

B. The applicant must illustrate entities impacted by the outage and the severity of the impact.

C. Include a discussion of any existing mitigating measures such as a safety net.

Step 7. Report

A. Provide a comprehensive written report to the RPEWG that fully details information described within Steps 1-6.

B. The report must include an Executive Summary that provides an overview and a Conclusion that describes why the upgrade adjustment is justified by the information presented in Step 1-6.

PCC APPROVAL: October 8, 2004

BOARD APPROVAL: December 2, 2004

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Attachment A
NERC/WECC Planning Standards[7]

NERC/WECC Planning Standards

I. System Adequacy and Security **A. Transmission Systems**

WECC DISTURBANCE-PERFORMANCE TABLE
OF ALLOWABLE EFFECTS ON OTHER SYSTEMS

NERC and WECC Categories	Outage Frequency Associated with the Performance Category (outage/year)	Transient Voltage Dip Standard	Minimum Transient Frequency Standard	Post Transient Voltage Deviation Standard (See Note 2)
A	Not Applicable	Nothing in addition to NERC		
B	≥ 0.33	Not to exceed **25%** at load buses or **30%** at non-load buses. Not to exceed **20% for more than 20 cycles** at load buses.	Not below **59.6** Hz for 6 cycles or more at a load bus.	Not to exceed **5%** at any bus.
C	0.033 – 0.33	Not to exceed **30%** at any bus. Not to exceed **20% for more than 40 cycles** at load buses.	Not below **59.0** Hz for 6 cycles or more at a load bus.	Not to exceed **10%** at any bus.
D	< 0.033	Nothing in addition to NERC		

Notes:

1. *The WECC Disturbance-Performance Table applies equally to either a system with all elements in service, or a system with one element removed and the system adjusted.*

2. *As an example in applying the WECC Disturbance-Performance Table, a Category B disturbance in one system shall not cause a transient voltage dip in another system that is greater than 20% for more than 20 cycles at load buses, or exceed 25% at load buses or 30% at non-load buses at any time other than during the fault.*

3. *Additional voltage requirements associated with voltage stability are specified in Standard I-D. If it can be demonstrated that post transient voltage deviations that are less than the values in the table will result in voltage instability, the system in which the disturbance originated and the affected system(s) should cooperate in mutually resolving the problem.*

Table W-1

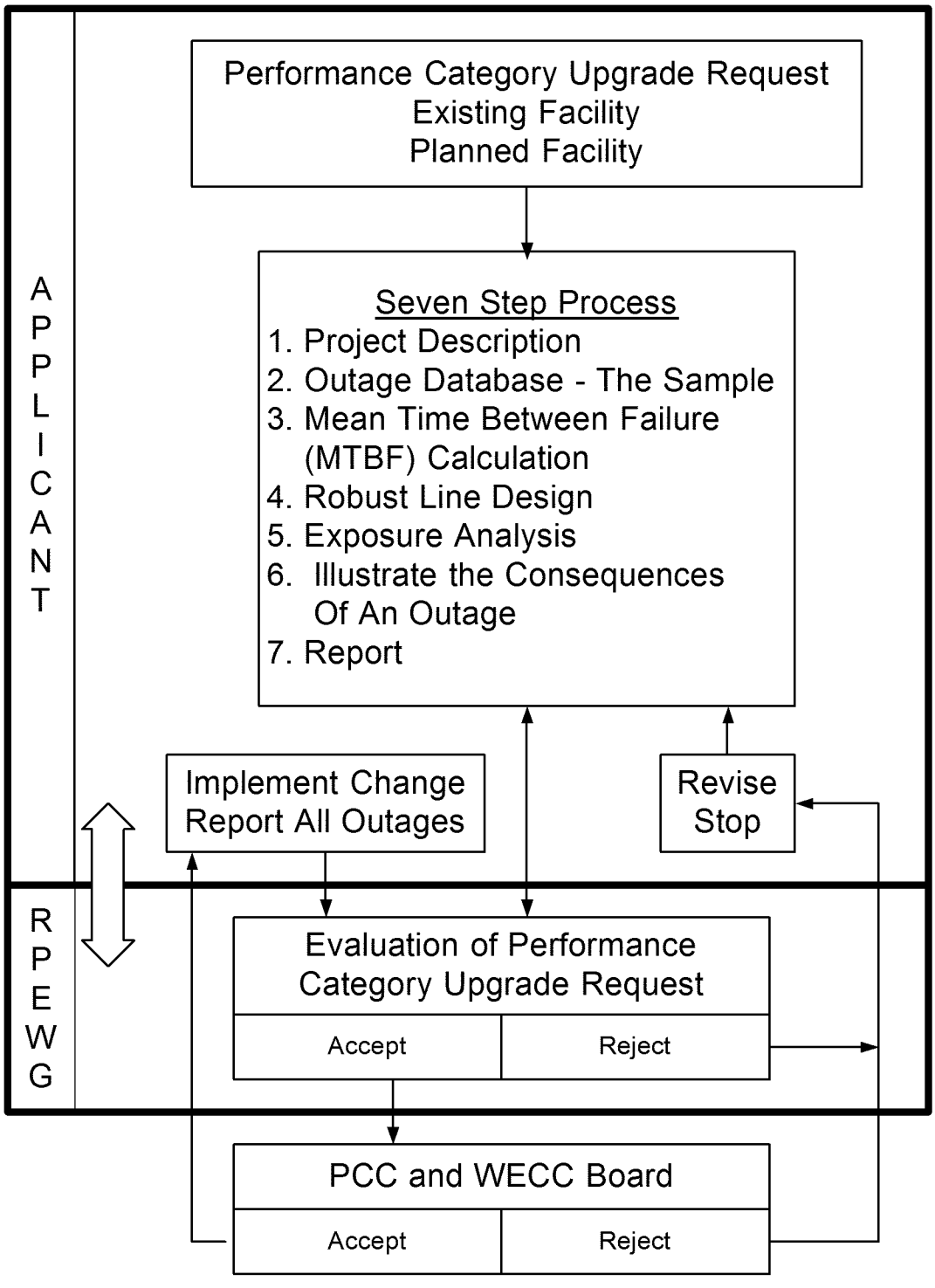
NERC/WECC Planning Standards

III-18

[7] See WECC website for latest version of the Reliability Criteria NERC/WECC Planning Standards

Attachment B

Seven Step Process



RPEWG = Reliability Performance Evaluation Work Group