

ERO Enterprise CMEP Practice Guide

Evaluation of Facility Ratings and System Operating Limits

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Background

In support of successful implementation of and compliance with the North American Electric Reliability Corporation (NERC) Reliability Standards, the Electric Reliability Organization (ERO) Enterprise¹ adopted the Compliance Guidance Policy.² The Compliance Guidance Policy outlines the purpose, development, use, and maintenance of guidance for implementing Reliability Standards. According to the Compliance Guidance Policy, Compliance Guidance includes two types of guidance – Implementation Guidance and Compliance Monitoring and Enforcement Program (CMEP) Practice Guides.³

Purpose

CMEP Practice Guides are developed solely by the ERO Enterprise to reflect the independent, objective professional judgment of ERO Enterprise CMEP staff (CMEP staff), and, at times, may be initiated following policy discussions with industry stakeholders. Following development, they are posted for transparency on the NERC website. It is to be noted, especially to registered entities using this guide as a reference, that while some aspects of this guide may assist CMEP staff directly in determining compliance, some parts of the guide are to assist CMEP staff in understanding how an entity mitigates risk in order to inform risk-based compliance monitoring. This understanding of the controls to mitigate risk can affect monitoring activities, such as substation walkdowns, requests for information, and adjustments to an entity's compliance oversight plan.

The purpose of this CMEP Practice Guide is to provide guidance to CMEP staff on practices for evaluating an entity's determination and use of Facility Ratings, although the guidance is not limited to FAC-008 and other standards identified. Recent years' audit experience and data suggest generally that registered entities with strong controls and asset change management procedures typically have more accurate ratings, and those entities that have not taken meaningful steps to develop strong controls, change management focus, and/or validated field conditions with Facility Ratings databases are most prone to discrepancies that may support noncompliance. While specific facts and circumstances ultimately shape compliance monitoring determinations, CMEP staff will consider and apply the practices identified below.

¹ The ERO Enterprise consists of NERC and the Regional Entities.

² The ERO Enterprise Compliance Guidance Policy is located on the NERC website at

http://www.nerc.com/pa/comp/Resources/ResourcesDL/Compliance_Guidance_Policy_FINAL_Board_Accepted_Nov_5_2015.pdf

³ Implementation Guidance provides a means for registered entities to develop examples or approaches to illustrate how registered entities could comply with a Standard that are vetted by industry and endorsed by the ERO Enterprise. CMEP Practice Guides differ from Implementation Guidance in that they address how ERO Enterprise CMEP staff executes compliance monitoring and enforcement activities, rather than examples of how to implement the Standard.

Validation of Facility Ratings in EMS and Operations Models

During the process to validate Facility Ratings, CMEP staff may encounter various facts and circumstances beyond one line diagrams and other artifacts traditionally considered when making a compliance determination. For example, EMS values used to trigger alarms or support other Real-time applications may not align with a Facility Rating determined through FAC-008-3. Auditors are being asked to understand the whole facility rating environment including the associated internal controls. In such case, CMEP staff should investigate the rationale and supporting data to determine the cause of the discrepancy. Some questions to consider include (please note this is not an exhaustive list and is provided for illustrative purposes only):

- What is an entity's responsibility with respect to the Requirements being audited?
- Does a Facility Rating discrepancy exist between Real-time models (e.g., State Estimator and RTCA), models used for Operational Planning Analysis, and models used in the Short-Term and Long-Term Transmission Planning Horizon? If so, why are the Facility Rating values different?
- When a Facility Rating used in the Applications listed above is not the same as that supplied by the Facility Owner, why does that difference exist?
- Does the Facility Rating, based on how the Facility is defined in the Facility Ratings methodology, accurately reflect the most limiting applicable Equipment Rating of the individual equipment that comprises that Facility?
- Is the Facility rated using a temperature adjusted rating or seasonal ambient temperature rating?
- Is the Facility Rating different in EMS due to a nodal operations model vs. a bus line planning model?

It is noted the Standard Requirements applicable to Facility Ratings are silent with respect to the period of time that may elapse when a change in a Facility Rating results in the change to Real-time applications. In such Real-time applications, an auditor should determine if compliance is relevant to a particular Reliability Standard. Depending on the timeframe and the entity's registered function, different standards may be used to perform Facility Ratings validation, including:

- FAC-008-3 – confirm TO and GO have Facility Ratings consistent with the Facility Ratings Methodology (FRM)
- FAC-011-3 – confirm SOL methodology in use states SOLs do not exceed Facility Ratings (R1.2) and that the SOLs used result in all Facilities being within Facility Ratings in both the pre-contingent and post-contingent states (R2.1 and R2.2, respectively)
- FAC-014-2– confirm RC and TOP SOLs are consistent between Real-time models and models used for Operational Planning Analysis
- FAC-014-2 – confirm PA/PC and TP SOLs are consistent in planning models
- TOP-001-4 and TOP-002-4 – confirm TOP SOLs are consistent between Real-time and the models used for Operational Planning Analysis

Dynamic Facility Ratings

CMEP staff may encounter asset owners utilizing dynamic line rating (DLR), a term which includes temperature adjusted ratings. Entities using DLR develop real-time ratings based on ambient temperature in the location of the Facility. When performing verification between Facility Ratings and Real-time models using DLR, CMEP staff should ask the entity to provide evidence that Facility Ratings observed are consistent with the calculation method as described in the entities FRM.

Field Verification of Equipment

Comparison of equipment in a Facility Ratings database with one-lines and a physical walk-down of equipment in the field is one way to validate Facility Ratings are consistent with documentation and the FRM. Field verification can also be combined with other Reliability Standards such as PRC-005 (relay maintenance and testing) to validate that an entity's documentary evidence and records match actual field conditions. Due to geographic limitations and/or time constraints during an on-site audit, CMEP Staff may conduct non-statistical sampling to perform Facility selection before coming on-site.

Similarly, it may be useful to understand internal controls the registered entity has implemented to validate Facility Ratings, along with associated asset change management activities undertaken to modify or correct any discrepancies that are identified. Registered entity emphasis and focus on such verification can inform and support monitoring and scoping determinations.

CMEP staff may identify situations where the documentation of Equipment Ratings for a non-limiting element is inconsistent with or missing from the data used to calculate the Facility Ratings. In these cases, auditors should evaluate if the problem is isolated or systemic.

Applicability of Design Ratings

Prior to substation construction, design drawings are used to specify substation equipment, bus work, and jumpers. Design drawings are not included in FAC-008-3 R2 and R3 as an allowable method of attaining Equipment Ratings. Equipment ratings derived from design drawings may not reflect the actual installed equipment. Thus, CMEP staff shall not accept design drawings as sole evidence of Equipment Ratings, as allowing registered entities to plan and operate their systems using unverified Equipment Ratings from design drawings is a risk to the BPS.

Impact of Internal Controls

A review of internal controls should be integrated into the audit process and documented in work papers supporting the assessment of FAC-008-3 R6. Asset change management procedures, periodic review of ratings, adequate management oversight, procedures for tracking equipment, a Facility Ratings database/program, peer review, and written procedures to address operational impacts are a few of the many aspects of the program subject to consideration. Also, as described above, the extent to which a registered entity has proactively sought to verify Facility Ratings through physical comparison and database correction can be considered when evaluating internal controls.

When reviewing compliance with FAC-008-3 R6, the following practices should be considered with the sampled Facilities:

- Identification of each BES Facility and its Facility Rating is consistent with FRM
- Identification of all equipment comprising the Facility
- Ratings of all the equipment comprising a Facility are consistent with FRM
- Identification of the Most Limiting Series Element (and if applicable, the next Most Limiting Series Element)
 - For each owner and each joint owner
 - Identification of Normal and Emergency Ratings, as appropriate
- Comparison of Facility Ratings between Facility Rating database and:
 - Planning models
 - EMS/SCADA (tools used to alarm and perform RTCA)
 - One-lines and/or design drawings
 - Actual field equipment

Possible control questions to ask the registered entity include:

- What tools do you use to track and update your Equipment and Facility Ratings in your Facility Ratings database?
- How often do you conduct substation walkdowns to ensure what's in the field matches system one-lines and/or design drawings?
- Do you perform an independent review of ratings for all equipment for correctness in the Facility Rating database to ensure the Equipment Ratings are consistent with the FRM?
- What is your process following an acquisition or merger to incorporate the new equipment into the Facility Rating database?
- What is the Asset Change Management process following a change of equipment in the field, for either a scheduled project or unplanned/emergency repair?
- When equipment is changed that impacts Facility Ratings, how are the planning models and online operating/EMS models updated?
- When Facility Ratings are changed, how are the revised Facility Ratings communicated with other relevant entities (e.g., the TOP, RC, TP, PA, etc.)?
- What types of access controls and segregation-of-duty controls do you have with the Facility Ratings database?