

Controls Guidance and Compliance Failure Points

MOD-027-1
August 2025

Verification of Models and Data for Turbine/Governor and Load Control or Active Power/Frequency Control Functions

Modeling Data

WECC Intent

The *Controls Guidance and Compliance Failure Points* document is intended to provide a starting point for registered entities in assessing risks associated with their business activities and designing appropriate internal controls in response. It contains examples supporting registered entities' efforts to design controls specific to operational risk and compliance with the North American Electric Reliability Corporation (NERC) Reliability Standards. WECC does not intend for this document to establish a standard or baseline for entity risk assessment or control objectives.

Note: *Guidance questions help an entity understand and document controls. Any responses, including lack of affirmative feedback, will have no consequences on an entity's demonstration of compliance during a Compliance Monitoring and Enforcement Program (CMEP) engagement.*

** Please send feedback to internalcontrols@WECC.org with suggestions on controls guidance and potential failure points questions.*

Definitions

Control Objective: The aim or purpose of specified controls; control objectives address the risks related to achieving an entity's larger objectives.

Control Activities: The policies, procedures, techniques, and mechanisms that enforce management's directives to achieve the entity's objectives and address related risks.

Internal Control: The processes, practices, policies or procedures, system applications and technology tools, and skilled human capital that an entity employs to address risks associated with the reliable operation of its business. Internal control components include:

- Control Environment;
- Risk Assessment;
- Control Activities;
- Information and Communication; and
- Monitoring.

Quality Assurance / Quality Control (QA/QC): How an entity verifies whether it performed an activity or verifies an activity was performed correctly (examples include separation of duties, having a supervisor double-check someone's work, etc.).

Risk Category: Type of operational and inherent risks identified by the Electric Reliability Organization (ERO) Enterprise for use in the Compliance Oversight Plan (COP). Entities should use Risk Categories to understand, monitor, and mitigate known and future risks.

Risk Category

Modeling Data: Simulation tools model individual components and their control systems, when applicable. The models form the building blocks of power system studies in the planning and operations horizons. Models that entities have verified as accurate are critical to a range of reliability studies, including transmission planning assessments and establishing SOLs and IROLs, as well as state estimation for Realtime Assessments (RTA) and Operation Planning Assessments (OPA). The validity of those assessments depends on modeling data, including, but not limited to, correct Facility Ratings, verified generator real and reactive capability, and knowing how control systems respond to dynamic system conditions. Failure to provide data in a timely manner and at intervals to ensure model accuracy during retirements and new construction may compromise BPS reliability and security.

Control Objectives

Your entity should perform a risk assessment and identify entity-specific control objectives to mitigate those risks. To help entities get started, WECC has identified generic control objectives to mitigate the risks associated with the risk categories mentioned above and MOD-027-1. You may want to consider these three objectives:

Control Objective 1: Periodically verify that the turbine/governor and load control or active power/frequency control system model and the model parameters used in dynamic simulations accurately represent system behavior.

Control Objective 2: Ensure all received data is technically sound and usable.

Control Objective 3: Inform connected entities of verification activities.

Reliability and Security Control Activities

Control activities are how your entity meets your control objectives. When designing and strengthening controls, they should be tailored to meet the applicable objectives.

Below are examples of control activities based on good practices WECC has observed that are designed to meet the objectives listed above. WECC does not intend for these activities or the associated questions to be prescriptive. Rather, they should help your entity consider how you might meet your objectives in your own unique environment. They also may help your entity identify controls you did not realize you had.

Control Objective 1: Periodically verify that the turbine/governor and load control or active power/frequency control system model and the model parameters used in dynamic simulations accurately represent system behavior.

Control Activity A: Ensure data is usable in acceptable models. (Relates to risk associated with R2)

1. Does your entity use a checklist or other job aid to ensure the verification meets Transmission Planner documentation requirements?
 - a. Do you submit additional documentation beyond R2.1 requirements?
2. How does your entity track Transmission Planner requirement changes?
3. What modeling software does your entity use? (e.g., PSS/E, PSLF)
 - a. Does your process include maintaining data sets in multiple formats?
 - b. Does your process periodically ensure revision levels of software are supported by the Transmission Planner's software?
4. Does your entity have a process to convert acceptable models to other formats?
 - a. How do you validate these?
5. If your entity has more than one Transmission Planner, how does your entity ensure the verification models are acceptable to all Transmission Planners?
6. What qualifications does the person reviewing model data have?
 - a. If you use manufacturer-provided models, how do you ensure they meet all Transmission Planner model requirements?
 - b. Do you have more than one person with qualifications to review model data?
7. Does your entity verify models provided are on the WECC approved model list and the data provided is in accordance with the WECC Data Preparation Manual?

Control Activity B: Ensure model data matches actual system behavior and accurately represents generator responses. (GO) (Relates to risk associated with R2)

1. How does your entity ensure the physical properties and responses are accurately represented in dynamic models?
 - a. How do you account for differences between the control mode tested and the final simulation model?
 - b. How do you ensure and document units are equivalent for verifying turbine/governor and load control system?
 - c. Is your verification testing consistent with established best practices as outlined in NERC Reliability and Security Technical Committee (RSTC) Reliability Guidelines for synchronous machines and inverter-based resources? (GO IBR)
2. What qualifications does the person who performs the verifications have?
 - a. If you use contractors, what reviews do you conduct to ensure the quality of the verifications?

Control Activity C: Revise model data for changes that alter the equipment response characteristic (Relates to the risk associated with R4)

1. How does your entity define a change that alters the equipment response characteristic? Do you consider:



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- a. Software alterations?
 - b. Plant digital control system addition or replacement?
 - c. Plant digital control system software alterations or updates?
 - d. Plant digital control system software alterations that alter droop, and/or dead band, and/or frequency response?
 - e. Change in the frequency control mode (such as going from droop control to constant MW control, etc.)?
2. Does your entity have a change management process or tool to track changes to applicable equipment that would affect the plant digital control system or plant frequency control function mode?
 - a. How do you identify changes to which this process applies?
 - b. Does this consider both planned and unplanned changes?
 - c. Does this consider tracking of calendar days of making changes to ensure notification?
 3. Does your entity track and preserve previous test/verification data for use as a baseline?

Control Objective 2: Ensure all received data is technically sound and usable.

Control Activity A: Review data for usability (TP) (Relates to the risk associated with R5)

1. Does your entity use any automated tools to review data that is submitted?
2. Does your entity use any job aids (e.g., checklists, workflows, desk-level procedures) when reviewing submitted data?
3. Do the tools used include checks:
 - a. That the interconnection-wide (or localized) study case initializes properly for dynamic simulation?
 - b. For positive damping before and after the new model is added to the case?
 - c. The simulated turbine/governor and load control or active power/frequency control response approximates the recorded response for transmission system events?
 - d. That model parameter values make logical sense and pass a sensibility check (e.g., are they physically possible (e.g., governor droop setting of 5% as recommended, valve or gate position not greater than physically possible) or do they reasonably represent the expected responses)?
4. Does your entity review the Steady State and Dynamic Dashboard spreadsheet provided by WECC, to verify current model parameters are correct and usable?

Control Objective 3: Inform connected entities of verification activities.

Control Activity A: Inform Transmission Planner when unit does not require verification. (Relates to the risk associated with R2)

1. How does your entity track changes that would establish responsive control mode operation?
2. How does your entity track average net capacity factor over three years for each applicable unit?

Control Activity B: Request corrected data as needed. (TP) (Relates to the risk associated with R5)

1. What tools does your entity have in place to track resubmission of data to confirm:



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- a. Requested reviews or verifications are completed?
 - b. Corrected data is received and is incorporated into the models?

Control Activity C: Send a response when notified of concerns with data submitted (GO) (Relates to risk associated with R3)

1. Has your entity assigned roles and responsibilities for responding to requests from the Transmission Planner?
2. Does your entity have a process to request clarification if the technical basis is not understood?
3. Does your entity have a job aid or automated system (e.g., calendar reminders, workflow, checklist) used to track information sent to the Transmission Planner?
 - a. Can you track activities and due dates when plans to verify the model are submitted?

Compliance Potential Failure Points

The control activities listed above are specifically targeted at mitigating risk to the reliability and security of the BPS but also promote compliance with the referenced standard. Your entity should also develop controls specifically to mitigate compliance risk. The following compliance potential failure points relate directly to compliance risk and warrant consideration.

Potential Failure Point (R1) (TP): Failure to provide instructions on how to obtain the list of acceptable turbine/governor and load control or active power/frequency control system models or model library block diagrams and/or data sheets within 90 calendar days of receiving a written request.

1. What tracking tools or job aids does your entity use to ensure information is provided within 90 calendar days?

Potential Failure Point (R1) (TP): Failure to provide required current modeling data within 90 calendar days of receiving a written request.

1. What tracking tools or job aids does your entity use to ensure information is provided within 90 calendar days?

Potential Failure Point (R2) (GO): Failure to provide verified turbine/governor and load control or active power/frequency control model and supporting documentation and data per the periodicity specified in MOD-027-1 Attachment 1.

1. How does your entity ensure subsequent verification is transmitted timely?

Potential Failure Point (R2) (GO): Failure to include documentation of model verification according to R2.1.

1. What quality assurance does your entity do to confirm the provided model verification includes each part specified in R2.1.?

Potential Failure Point (R3) (GO): Failure to respond within 90 calendar days to comments regarding model response accuracy or usability.



Potential Failure Point (R4) (GO): Failure to provide revised model data or plans to perform model verification within 180 calendar days of making changes to the turbine/governor and load control or active power/frequency control system that alters the equipment response characteristic.

1. What tracking tools or job aids does your entity use to ensure information is provided within 180 calendar days?

Potential Failure Point (R5) (TP): Failure to respond within 90 calendar days that the Generator Owner's verified turbine/governor and load control or active power/frequency control model is or is not usable.

1. What tracking tools or job aids does your entity use to ensure response is provided within 90 calendar days?