Transmission Relay Loadability

Asset/System Management and Maintenance

System Protection

WECC Intent

The *Controls Guidance and Compliance Failure Points* document guides registered entities in assessing risks associated with their business activities and designing appropriate internal controls in response. WECC's intent is to provide examples supporting the efforts of registered entities to design controls specific to operational risk *and* compliance with the North American Electric Reliability Corporation (NERC) Reliability Standards. The registered entity may use this document as a starting point in assessing risk and designing appropriate internal controls. Each registered entity should perform a risk assessment to identify its entity-specific risks and design appropriate internal controls to mitigate those risks; 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

The purpose of PRC-023-6 is to ensure Protective relay settings do not "limit transmission loadability; not interfere with system operators' ability to take remedial action to protect system reliability and; be set to reliably detect all fault conditions and protect the electrical network from these faults." The following are risk categories that apply to PRC-023-6, as identified by the Electric Reliability Organization (ERO) Enterprise.

Asset/System Management and Maintenance: BPS reliability depends on an entity's success in tracking, managing, and maintaining significant amounts of data, components, assets, and systems. The scope and complexity of this effort require programs to ensure that the entity effectively performs these activities. Failure to execute these programs can result in various types of lapses and may compromise the integrity and reliability of the BPS.

PRC-023-6 requires an entity to track phase protective relay settings to ensure they meet specified criteria.

System Protection: BPS reliability and security requires adequate generation supplies to meet existing load during steady-state and expected dynamic conditions. When faults or failures occur, the system must isolate the problem but maintain BPS integrity as much as possible. Protection systems must identify the type and location of the problem and isolate the appropriate part of the BPS while minimizing the disturbance to the remainder of the system. This requires Protection Systems associated with the generation, transmission, and load to accurately detect system properties and respond appropriately to unsafe conditions. Protection System settings must allow control systems to provide a full range of control and allow the system to "ride-through" expected transients. Owners of interconnecting BPS devices and systems must coordinate their system settings with neighboring systems to ensure they achieve the desired outcome and prevent unnecessary disconnection of equipment. Protection Systems must also respond to Misoperations of primary protection. Entities must identify and correct the source of operational failures.

Phase protective relay settings should be set to ensure system operators are able to take controlled actions to respond to short term overloads while maintaining reliable protection of the electrical network.

Control Objectives

Your entity should perform a risk assessment and identify entity-specific control objectives to mitigate the identified risks. To help entities get started, WECC has identified generic control objectives to mitigate the risks associated with the risk categories mentioned above and PRC-023-6. You may want to consider these three objectives:

> **Control Objective 1**: Track data associated with applicable circuits and equipment. (Asset/System Management and Maintenance)
>
> **Control Objective 2**: Determine protection system settings. (System Protection)
>
> **Control Objective 3**: Coordinate protection system settings with external entities. (System Protection)

Reliability and Security Control Activities

Control activities are how your entity meets your control objectives. When designing and maturing 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: Track data associated with applicable circuits and equipment.

Control Activity A (PC): Ensure all applicable circuits are identified (Relates to risk associated with R6)

1. How does your entity ensure an accurate list of circuits to evaluate?
    a. Do you compare to current operational models?
2. What process, studies, or tools does your entity use to assess the identified circuits?
    a. If different types of studies are conducted for different circuits, how is that selected?
    b. How is that information maintained?
3. When does your entity's assessment for circuit inclusion occur compared to your assessments for the Near-term Transmission Planning Horizon?
4. What process does your entity have to track criteria for circuit inclusion per Attachment B, Part B1?
    a. How do you determine the applicability of Facility Ratings in the circuit selection process?
    b. How do you coordinate inclusion of circuits selected by other functional entities?
5. Does your entity conduct off-cycle circuit reviews and assessments in response to changes or updates?
    a. If so, what triggers a new analysis?
    b. How do you monitor for changes?

Control Activity B: Ensure all applicable circuits and equipment are identified (Relates to risk associated with R1)

1. How does your entity identify applicable transmission lines operated at 200 kV and above and transformers with low voltage terminals connected at 200 kV and above?
2. What process, studies, or tools does your entity use to assess the identified circuits?
    a. If different types of studies are conducted for different circuits, how is that selected?
    b. How is that information maintained?
3. Does your entity perform any quality control on the list of transformers and transmission lines under 200 kV provided by the Planning Coordinator to ensure all transmission lines and transformers are represented?
4. How does your entity ensure all phase protective relays are identified?
    a. What tools or job aids do you use (e.g., one line diagrams, relay and control diagrams, etc.)?
    b. Is there an as-built process that includes notifications related to the criteria?
    c. Do you consider other owners' protective relays in Facilities with multiple owners?
5. Does your entity use PRC-023 setting criteria for any elements to which PRC-023 is not applicable but that operate electrically in parallel with BES Elements?
    a. If so, are they tracked together with applicable protection systems?
6. If protection system settings change or new protection systems are installed, what process does your entity follow to manage these changes to the list?
    a. Do you have a process to notify other entities of changes to the list?
    b. Do you have the ability to monitor for changes at other entities?

Control Activity C: Ensure necessary information is tracked and readily available (Relates to risk associated with R1)

1. What tool or automated system does your entity use to track applicable circuits and equipment? (e.g. database, spreadsheet, etc.)
    a. Is it integrated with any other automated systems? (e.g. PRC-005 workorder system)
    b. If so, are there any flags or alerts to trigger PRC-023-6 criteria analysis based on changes made to applicable or like equipment?
2. What attributes does your entity track?
    a. Settings
    b. Criteria used to calculate settings
    c. Calculation summaries
    d. Data (such as 15-minute seasonal Facility Ratings) used to calculate settings
    e. Date of most recent calculations
    f. Year of circuit inclusion
    g. Operations, including Misoperations, associated with circuits/equipment
    h. Date of notification(s)

i. Criteria attributed to circuits for inclusion
j. Agreement status with other entities (as applicable)

3. If protection systems are re-evaluated, or if new protection systems are installed, who has the authority to update your entity's tracking tool?

Control Objective 2: Determine protection system settings.

Control Activity A: Determine which criteria to apply to each circuit (Relates to risk associated with R1)

1. How does your entity determine which criteria to use for each specific circuit?
   a. How do you ensure it results in a setting that prevents it from limiting transmission system capability?
   b. How do you ensure it results in a setting that maintains reliable protection of the electrical network for all fault conditions?
2. Who is responsible for determining the appropriate criteria to apply?
   a. Is the decision made by a team?
   b. Do you have a peer review process?

Control Activity B: Ensure calculations are accurate (Relates to risk associated with R1)

1. Does your entity perform an initial review of calculations? (e.g., peer review, manager approval, etc.)
2. Does your entity's process require periodic or event-driven reviews of all settings?
   a. What triggers require a review? (e.g., major system changes)
   b. How frequently are periodic reviews conducted (e.g., annually)?
3. Do you have processes to address changes to:
   1. Relay settings?
   2. Inputs to calculations (such as Facility Ratings)?
   3. Other?
4. Does your entity have an automated tool to alert you to changes?

Control Objective 3: Coordinate protection system settings with external entities

Control Activity A: Ensure data inputs are agreed upon (Relates to risk associated with R3)

1. For those circuits that use Criterion 7, 8, 9, 12, or 13, what process does your entity follow to obtain agreement of the applicable entities?
   a. Who has roles and responsibilities in the process?
   b. Do you conduct any review step (peer or manager) to confirm agreement was obtained?

Control Activity B: Provide data to affected entities (Relates to risk associated with R4, R5)

1. For those circuits that use Criterion 2, how does your entity ensure timely notification of applicable entities?
   a. Do you use any automated reminders or notifications?

   b. Does your database have any flags or alerts to remind you of this requirement?
   c. Do you provide the full list or an incremental list each year?
      i. If an incremental list, how do you ensure the applicable entity is referencing the correct previous list?
   d. Do you conduct any QA/QC step to confirm lists are received?
2. How does your entity ensure that a list of circuits associated with relays set using Criterion 12 are sent to WECC annually?
   a. Do you provide the full list or an incremental list each year?
      i. If an incremental list, how do you ensure the applicable entity is referencing the correct previous list?
   b. Do you conduct any QA/QC step to confirm lists are received?
   c. If the settings are updated during the year, does your entity have a procedure to notify WECC midyear?
3. How does your entity ensure the PRC-023 assessment and the associated list of applicable circuits is distributed each year?
   a. Do you use any alerts or alarms to prompt distribution of the PRC-023 assessment results?
   b. Do you perform any QA/QC to confirm the results were sent?
   c. Do you follow up to confirm receipt of the results?
4. Does your entity have processes in place to notify or be notified of protection system circuit addition or removal?

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): Failure to use one of the specified criteria for each circuit terminal.

1. How does your entity document the circuit terminal, phase protective relay settings, and criteria used to determine the settings?

Potential Failure Point (R1): Failure to evaluate relay loadability at .85 per unit voltage and a power factor angle of 30 degrees.

Potential Failure Point (R3): Failure to obtain agreement to the calculated circuit capability by the associated Planning Coordinator, Transmission Operator and Reliability Coordinator.

1. How does your entity document this agreement?

Potential Failure Point (R4): Failure to provide the PC, TOP, and the RC with an updated list of circuits

associated with transmission line relays that use Criterion 2 as their basis at least once each calendar year with no more than 15 months between reports.

1. Does your entity have automated reminders to provide this list?
2. How does your entity document that the information was provided to the applicable entities?

Potential Failure Point (R5): Failure to provide the Regional Entity with an updated list of circuits associated with transmission line relays that use Criterion 12 as their basis at least once each calendar year with no more than 15 months between reports.

1. Does your entity have automated reminders to provide this list?
2. How does your entity document that the information was provided to the Regional Entity(ies)?

Potential Failure Point (R6): Failure to assess all applicable circuits in your entity's Planning Coordinator area to determine the applicability of PRC-023-6 Requirements R1 through R5.

1. How does your entity ensure all applicable circuits are evaluated?
2. How does your entity ensure an assessment is conducted at least once each calendar year with no more than 15 months between assessments?
    a. Do you have any automated reminders?

Potential Failure Point (R6): Failure to maintain a list of circuits, with identification of year applicable, subject to PRC-023-6.

Potential Failure Point (R6): Failure to provide the list of circuits to all Regional Entities, Reliability Coordinators, Transmission Owners, Generator Owners, and Distribution Providers within your entity's Planning Coordinator area.