
RELIABILITY
& SECURITY
Oversight Monthly Update
February 15, 2024, 2:00 p.m. MT

<Public>

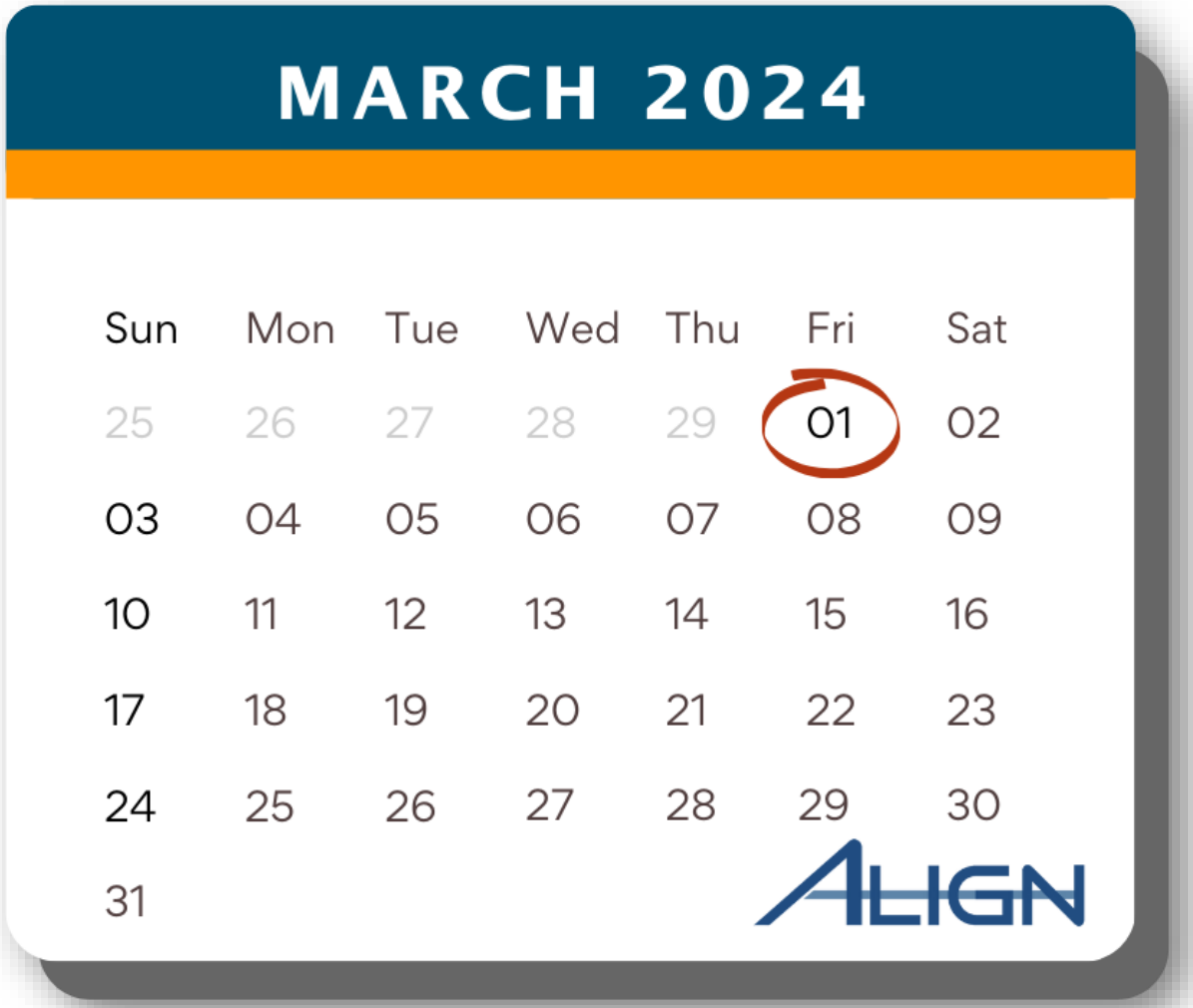
WECC

Reliability & Security Oversight Monthly Update

February 15, 2024

Mailee Cook, Training and Outreach Specialist

Annual Self-Certification Responses Due



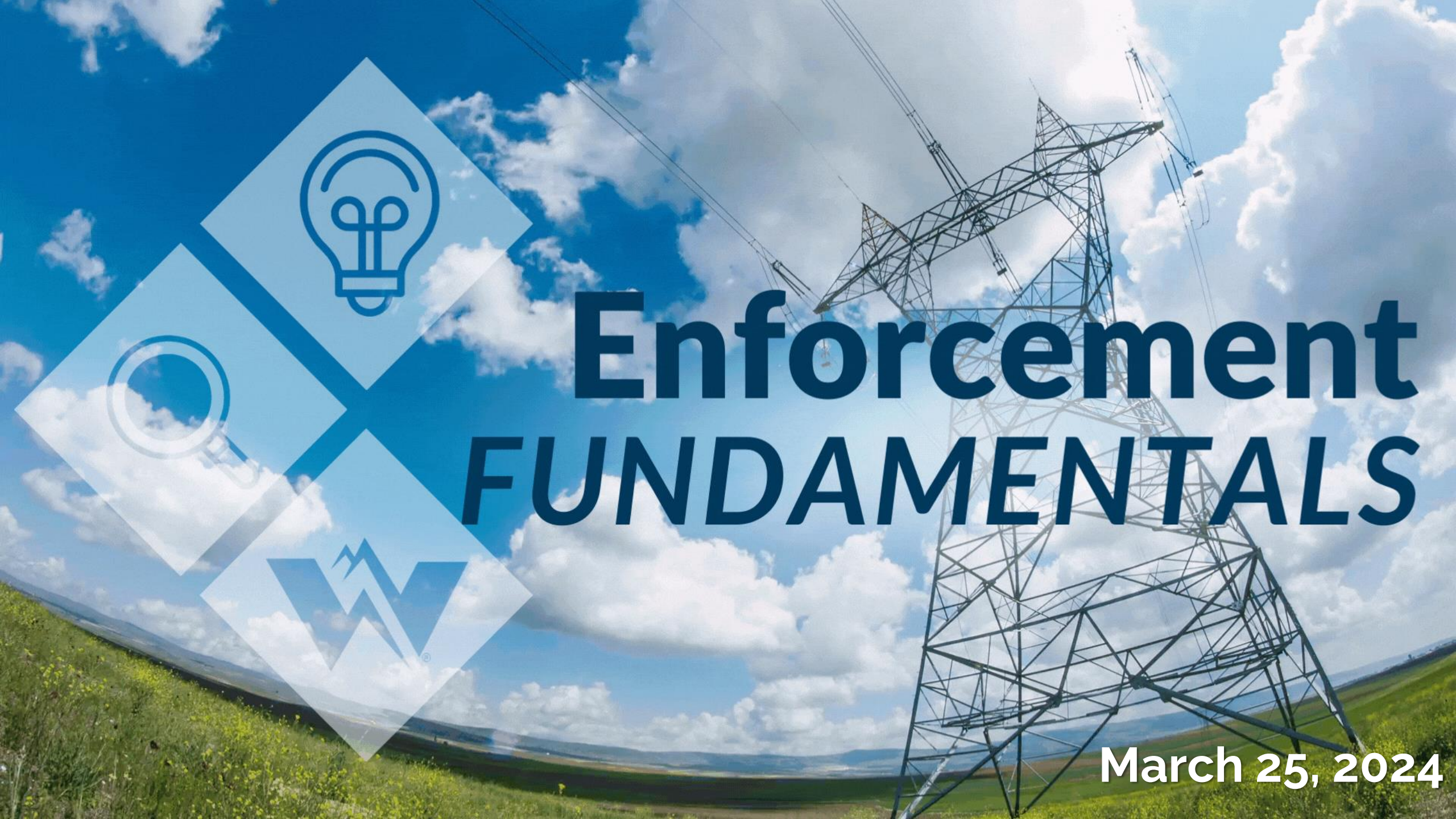

Grid
FUNDAMENTALS
February 27-28, 2024


RELIABILITY
IN THE WEST
A DISCUSSION SERIES

RELIABILITY & SECURITY

Workshop - Salt Lake City, UT

March 26–27, 2024



Enforcement *FUNDAMENTALS*

March 25, 2024

Antitrust Policy

- All WECC meetings are conducted in accordance with the WECC Antitrust Policy and the NERC Antitrust Compliance Guidelines
- All participants must comply with the policy and guidelines
- This meeting is public—confidential or proprietary information should not be discussed in open session

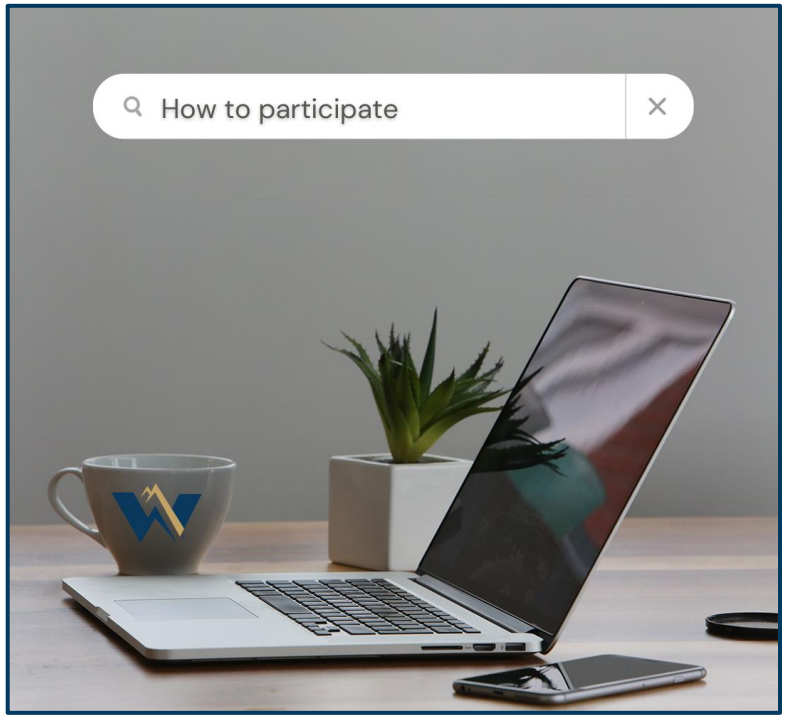
Antitrust Policy

- This webinar is being recorded and will be posted publicly
- By participating, you give your consent for your name, voice, image, and likeness to be included in that recording
- WECC strives to ensure the information presented today is accurate and reflects the views of WECC
- However, all interpretations and positions are subject to change
- If you have any questions, please contact WECC's legal counsel

Agenda

- Protection System Coordination Internal Controls
  - Matthew Westerdale, Electrical Engineer, USBR

Participating



Send questions via chat to WECC Meetings

Use the “raise hand” feature

BUREAU OF RECLAMATION

PRC-027 Internal Controls WECC Webinar

Presented by: Matt Westerdale, P.E.
Electrical Engineer, Bureau of Reclamation

Bureau of Reclamation

- Established in 1902
- Over 50 hydroelectric powerplants across 5 regions
- Over 14,750 MW of capacity
- Thousands of protective relays!

PRC-027 Purpose and Requirements

- To maintain the coordination of Protection Systems installed to detect and isolate Faults on Bulk Electric System (BES) Elements, such that those Protection Systems operate in the intended sequence during faults.
  - R1 – establish a process for developing protection system settings
  - R2 – three options to trigger a protection system coordination study
    - Time interval not to exceed 6 years
    - 15% or greater deviation in fault current values
  - R3 – use the process established in R1

PRC-027 Processes and Internal Controls

- Short circuit model review, updates, and data transmittal with neighboring entities
- Protective Relay Setting Development and Review
- Protective Relay Database
- Peer Review Process
- Compliance Documentation

Relay Setting Development – Model Review and Updates

- Initiating Event – Five-year review, system event, or new equipment
- Information Gathering:
  - As Left Relay Settings
  - Drawings, Wiring, and I/O Information
  - Equipment Ratings and Impedance Information
  - Protection System information from neighboring entities (e.g., Transmission/Generator Owner)
- Develop/update facility and system models
  - Peer Review of Updated Models – ensure calculations are not based on inaccurate data!

Relay Setting Development – Basis of Settings

- Report or write-up detailing why settings are set at specific values
- Summary and findings of setting calculations, simulations, and coordination studies
- Summary of existing and proposed protection system settings
- Other NERC standard PRC compliance documentation updates

Relay Setting Development – Documentation

- Centralized Relay Database:
  - Relay device information and application descriptions
  - As left relay setting files and test reports
  - Instrument transformer and other equipment ratings
  - Version control management and historical timeline of changes, tracking for proposed relay setting changes yet to be implemented
  - Correspondence
  - Protection system and equipment information from neighboring entities

- Query and Generate Reports for Relay Database Information

Peer Review

INITIAL SETTING PEER REVIEW

Initial Settings, Models, and Calculations Checked:		Basis of Settings Documentation:	
TO Settings/Data Requested and Stored in Database:		Logic Diagrams Reviewed:	
"As Left" Relay Setting Files/Test Reports Received:		Database Updated (Relays, CTs, PTs, etc.):	
NERC PRC-023 Spreadsheet Created/Updated:		Arc Flash Implications Verified:	
NERC PRC-024 Spreadsheet Created/Updated:		Arc Flash Report or Addendum, with Labels:	
NERC PRC-025 Spreadsheet Created/Updated:		NERC PRC-019 Coordination Performed:	
		NERC PRC-027 Draft Coordination to TO:	

Peer Review Performed By:

Signature and Date:

PROPOSED SETTINGS AND PEER REVIEW COMMENTS VERIFICATION

PRC-019 8440 Log Updated:		Proposed Settings File Reviewed:	
Peer Review Comments Resolved:		POM-174 Form Signed:	

Peer Review Performed By:

Signature and Date:

Proposed Settings Correspondence

- Summary of proposed protection system changes and the reason for the proposed changes
- Model/Equipment Updates
- Relevant Files:
  - Protection System Setting files (existing and proposed)
  - Relay Event Records
  - Calculation Sheets
- Contact Information and Planned Scheduling Information

Points of Contact

- Develop and maintain points of contact at neighboring entities that are responsible for reviewing protection system settings.
- May also include compliance or other non-technical personnel.
- Improves correspondence response time and can assist with future system event analysis or issues.

PRC-027 Correspondence Summary

- Created after the proposed settings correspondence is completed.
- Provides a summary of the applicable coordination work, discussion with neighboring entity, and other relevant documentation.
- Can be searched by date and facility, assists compliance personnel for audit purposes.

Final Peer Review

FINAL PEER REVIEW, DOCUMENTATION, AND SETTING TRANSMITTAL VERIFICATION

Final PRC Documentation on Network Drive:	NERC PRC-027 Entry in Database:
Working Files Uploaded to Network Drive:	Proposed Settings in Database:
Facility Data (OneLiner) Updates Sent to TO:	Relay Database Updated:
Draft Transmittal of Final Settings to Manager:	POM-174 Form Uploaded to SharePoint:
5-Year Report Tracking Spreadsheet Updated:	PRC-019 SharePoint Tracking Updated:
	PRC-019 Report Signed and Uploaded:

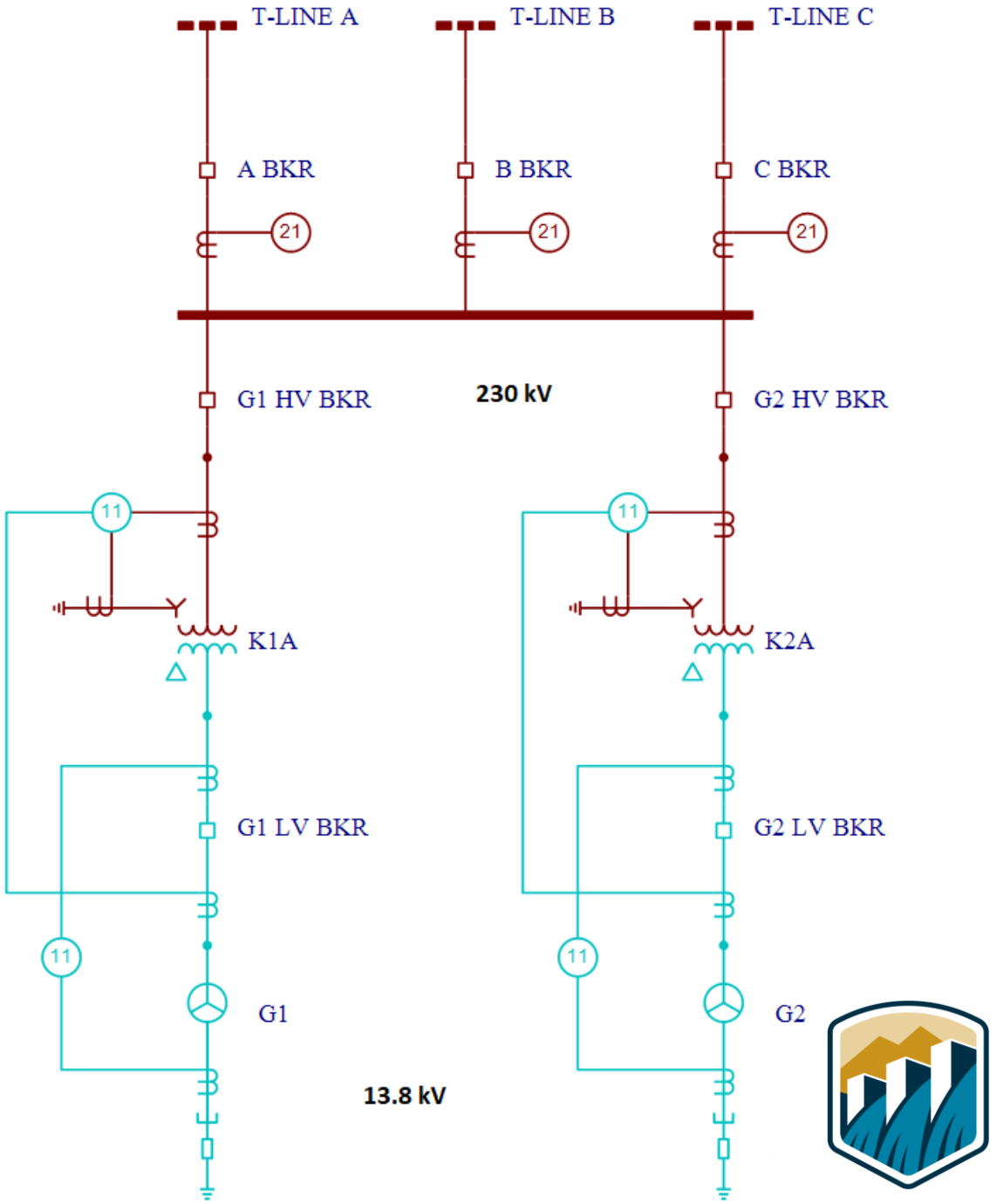
Peer Review Performed By:

Signature and Date:

86-68440 MANAGER SIGNATURE and DATE:

Example Single-Line

- Generator Protection
  - 21 Elements
- Transformer Protection
  - 51 Elements
- Substation Protection
  - 21 Elements
  - 50/51/67 Elements
  - Communication Schemes
  - Reclosing



Example

- New generator step-up transformer being installed to account for a generator rewind and uprate for generator #1.
  - New transformer – nameplate, test, and impedance data
  - Generator uprate – size and machine/impedance parameters

- Review of protection system settings performed and peer reviewed:
  - Resulted in proposed changes to the generator 21 elements and transformer 51 elements.
  - Proposed setting files developed, and correspondence begins with neighboring utility.

Hello Utility,

I am sending this correspondence to communicate planned protection system setting changes at our facility for NERC standard PRC-027 compliance. To accommodate the generator #1 uprate and transformer replacement, we are planning on making adjustments to our generator protection 21 phase distance elements and transformer protection 51 elements, which could operate for faults in the nearby 230 kV system. We have adjusted them to maintain backup protection to the zone 2 time-delayed distance elements in your substation transmission line relays.

I have attached the existing and proposed setting files for comparison purposes, the new transformer nameplate information, generator machine data, and an updated short-circuit model for our facility.

Please confirm that you have received this message and if you have any comments or concerns regarding the proposed settings. We are planning on implementing these changes later this fall.

Regards,

Matt

Hello Matt,

I have received your proposed settings and plan to review them in the next couple of weeks. I will let you know if I have any comments.

Regards,

Utility

1 week later…

Hello Matt,

I incorporated your model updates into our system model and upon reviewing your proposed settings, I noticed that your zone 2 phase distance element could operate for a fault just beyond the next substation for a n-1 contingency scenario. While your zone 2 element still would trip after our relay, I would like to propose increasing your zone 2 time delay by an additional 15 cycles to provide a larger interval from the operating time of our relays based on my coordination study. I have attached the details of this contingency scenario and coordination results.

Please let me know how you would like to proceed.

Regards,

Utility

Hello Utility,

I concur with your results and accept your proposal of increasing the zone 2 time delay for the 21 element in our generator relays to provide additional margin. I have attached updated relay setting files to document this change.

Regards,

Matt

Hello Matt,

I received the updated setting files and have no further comments on the proposed setting files.

Regards,

Utility

Please sign or check N/A as appropriate. All are critical steps.

Relay Description: Generator #1 Protection and Transformer K1A Protective Relays

Task	N/A	Signature if Completed
1) Review and update of short-circuit model data for the power system under study.	☐	Matthew Westerdale
2) Peer review of the developed protection system settings (signed by a protection system engineer who was not involved in developing the original settings).	☐	Jill Smith
3) For protection system settings applied that electrically join facilities owned by separate entities (i.e. WAPA, BPA, etc.) applicable to the settings being developed:		
a) Provide the proposed protection system settings to the owner(s) of the electrically joined facilities. (attach email or documentation of sent information)	☐	Matthew Westerdale
b) Respond to any owner(s) that provided its proposed protection system settings regarding any coordination issue(s) or affirming that no coordination issue(s) were identified. (attach email or documentation of sent information)	☒	
c) Verify that identified coordination issue(s) associated with the proposed protection system settings for the associated elements are addressed prior to implementation. (attach documentation)	☐	Matthew Westerdale
d) Communicate with the other owner(s) of the electrically joined facilities regarding revised protection system settings resulting from unforeseen circumstances that arise during implementation or commission.	☒	
4) Upload this document and all supporting documentation to the Reclamation Relay Database (Aspen) or appropriate repository.	☐	Matthew Westerdale

Provide a short description of relay settings changes and/or summary of attached correspondence:

Protective relay setting changes were necessary for the generator #1 and transformer K1A protective relays (relay designations, manufacturer information, style) to account for the generator #1 rewind/uprate and transformer K1A replacement. Setting changes were necessary for the generator relay 21 elements and transformer 51 elements, which were communicated to (Utility Contact Name and Information).

The Utility requested that we increase our zone 2 time delay in our generator relay 21 element to provide a larger backup time interval to accommodate a n-1 contingency scenario. We agreed with this proposal and implemented this change. No further comments were provided after this change was implemented.

Please see the attached email correspondence and relay database PRC-027 coordination summary for more details.

PRC-027 Requirement 1

1.1. A review and update of short-circuit model data for the BES Elements under study.

1.2. A review of the developed Protection System settings.

1.3. For Protection System settings applied on BES Elements that electrically join Facilities owned by separate functional entities (Transmission Owners, Generator Owners, and Distribution Providers), provisions to:

1.3.1. Provide the proposed Protection System settings to the owner(s) of the electrically joined Facilities.

1.3.2. Respond to any owner(s) that provided its proposed Protection System settings pursuant to Requirement R1, Part 1.3.1 by identifying any coordination issue(s) or affirming that no coordination issue(s) were identified.

1.3.3. Verify that identified coordination issue(s) associated with the proposed Protection System settings for the associated BES Elements are addressed prior to implementation.

1.3.4. Communicate with the other owner(s) of the electrically joined Facilities regarding revised Protection System settings resulting from unforeseen circumstances that arise during implementation or commissioning, Misoperation investigations, maintenance activities, or emergency replacements required as a result of Protection System component failure.

Relay Database PRC-027 Entry

NERC PRC-027 Database Summary

Region: GP

Facility: BOR TEST

Transmission Operator (TO): Utility		**Status:** Completed	
Status Details: Received response from TO		**Subject:** Setting Changes	
Applicable Equipment:	G1 and K1A Protective Relays		
Relay Designation:	111GA/B, 111K1A/B		
Relay Manf/Type:	Company ABC, Model 123		
Protective Elements:	21P and 51		
Summary of Work:	Changes to account for G1 uprate and new K1A		
Communication with TO:	Provided setting changes to TO for review		
Response from TO:	Proposed to Increase Zone 2 Time Delay		
Coordination Originator:	Matt Westerdale	**TO Contact(s):**	Utility Engineer
USBR Contact(s):		**Other Contact(s):**	
Entry Created:	6/1/2024	**Relay/Settings Installed:**	
Coordination Initiated:	2/1/2024	**Coordination Completed:**	6/11/2024

Memo: see memo

Summary of attached email correspondence:

2/1/2024 - requested protective relays settings from Utility to perform coordination study to account for Generator #1 uprate and new K1A transformer. MW

2/15/2024 - received requested information from Utility. MW

6/1/2024 - sent proposed settings to Utility for review. MW

6/8/2024 - Utility requested increasing zone 2 time delay. MW

6/10/2024 - agreed with proposed setting change and provided updated setting files to utility. MW

6/11/2024 - Utility had no further comments on the proposed settings. MW

Relay Database Setting Tracking

- Monthly tracking of pending setting changes and what PRC standard documentation updates are necessary when they are implemented.

Location ID	Protecting	Relay Designation	Relay Dispositic	Application	Manufacturer	Style	Revision	Last saved by:	Setting Sta	Sent to field on:	PRC Updates
BOR TEST	Generator #1	111GA	IN SERVICE	Generator Protection	ABC	123	2	MWESTERDALE-6/11/2024	PENDING	6/11/2024	019, 025
BOR TEST	Generator #1	111GB	IN SERVICE	Generator Protection	ABC	123	2	MWESTERDALE-6/11/2024	PENDING	6/11/2024	019, 025
BOR TEST	Transformer K1A	111KA	IN SERVICE	Transformer Protection	ABC	123	2	MWESTERDALE-6/11/2024	PENDING	6/11/2024	025
BOR TEST	Transformer K1A	111KB	IN SERVICE	Transformer Protection	ABC	123	2	MWESTERDALE-6/11/2024	PENDING	6/11/2024	025

Next Steps

- Add planned implementation schedules to improve tracking of relay database entries.
- Assign tasks and routing of peer review processes and steps, improve workload tracking capabilities.
- Automating protection system compliance documentation to minimize duplicate information.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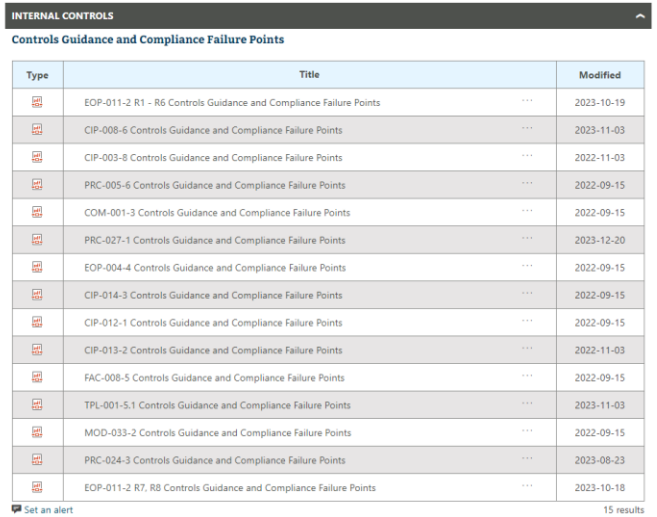
RECLAMATION
Questions?

PRC-027 Controls Resource

- PRC-027 Controls Guidance and Compliance Failure Points
- OR, go to wecc.org and select Compliance/United States/Internal Controls to get the full list of Controls Guidance and Compliance Failure Points documents

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