

**SOUTHWEST POWER POOL
SYSTEM PROTECTION AND CONTROL ADVISORY GROUP MEETING**

**Tuesday August 9, 2022 1:00PM - 5:00PM (MPT)
Wednesday August 10, 2022 8:30AM - 12:00PM (MPT)**

Xcel Energy Offices, Denver, Colorado

SUMMARY OF MOTIONS AND ACTION ITEMS

MOTIONS:

- Jeff Beasley (GRDA) motioned to approve the May 10-11, 2022 SPCAG Meeting Minutes. David Wheeler (SPS) seconded the motion. The motion carried without opposition or abstention.
- David Wheeler (SPS) motioned to approve the requested change to the previously approved SPP working group review recommendation to the Thunderhead RAS. Jeff Wells (GRDA) seconded the motion. The motion carried without opposition or abstention.

ACTION ITEMS:

- #167: Submit an initiative request to improve the MDAG short circuit models for use with system protection and control.
- #168: Share available resources and education materials on IEEE 2800-2022.
- A poll to determine the expected attendees for the November 8th – 9th SPCAG meeting currently planned to be held at the Evergy offices; 1200 Main Street; Kansas City, MO 64105.

SYSTEM PROTECTION AND CONTROL ADVISORY GROUP MINUTES 8/9-10/2022

MINUTES

AGENDA ITEM 1 – ADMINISTRATIVE ITEMS

SPCAG Chair John Anderson (Evergy, Inc.) called the meeting to order at 1:05 PM on 8/9/2022. New members Spencer Riddle (WAPA) and Michael Speck (ITC) were welcomed. The meeting reconvened at 8:04 AM on 8/10/2022.

William Holden (SPP) took attendance and established a meeting quorum. A record of member attendance is an attachment to these minutes.

William Holden (SPP) read the SPP Antitrust Statement.

Chairman John Anderson (Evergy, Inc.) reviewed the agenda and made requested changes:

- Adjustment to the Thunderhead RAS item being changed from an update to approval
- Swapped the order of the Three Terminal Line Whitepaper discussion and the Ambient Adjusted Ratings Implementation Task Force update
- Adjustment to the expected duration of the MRO PRS Protection System Commissioning Webinar and Cooper PCB3308 Internal Fault and Multiple Trips
- Addition of PRC-004 Reportable Operation discussion requested by Shawn Jacobs (OKGE)

A record of the updated Agenda is an attachment to these minutes.

Jeff Beasley (GRDA) motioned to approve the May 10-11, 2022 SPCAG Meeting Minutes. David Wheeler (SPS) seconded the motion. The motion carried without opposition or abstention.

AGENDA ITEM 2 – REMEDIAL ACTION SCHEMES

THUNDERHEAD

Arash Ghodsian (Invenergy) requested a change to the conditions in the previously approved SPP working group review recommendation for the Thunderhead RAS:

- Require agreement between NPPD, WAPA, and Invenergy on compliance responsibilities.
- Contingent on execution of the GIA including the identified network upgrades and the timeline for installation and completion.

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- Maximum of a two year time frame of being in-service, with the implementation of the RAS to begin no more than two years prior to the expected in-service date of the "R-Line" or other contingency project.
- Programming of the relay setting files will match the presented parameters of the design, and that these settings files will be provided to the SPP, via the SPPRAS@spp.org email address. Upon receipt, this will be provided to the SPCAG.

The requested change to the conditions, as shown below in **bold**, was approved by the TWG and ORWG at the August meetings with an ongoing MOPC approval vote:

- Require agreement between NPPD, WAPA, and Invenergy on compliance responsibilities.
- Contingent on execution of the GIA including the identified network upgrades and the timeline for installation and completion.
- **RAS in-service not to exceed two years.**
- Programming of the relay setting files will match the presented parameters of the design, and that these settings files will be provided to the SPP, via the SPPRAS@spp.org email address. Upon receipt, this will be provided to the SPCAG.

Chris Angland (OPPD) sought SPPs perspective on the RAS Entity PRC-012-2 Attachment 1 submission. William Holden (SPP) outlined the status of the Thunderhead RAS within the SPP Reliability Coordinator and Planning Coordinator NERC Reliability Standard PRC-012-2 Process Document for the Eastern Interconnection (<https://spp.org/documents/62226/spp%20prc-012-2%20process%20ei.pdf>). The process is initiated with the Attachment 1 submission followed by the SPP Reliability Coordinator (RC) initial review, Working Group review and recommendation, coordination with neighboring RCs, and concluding with the Final SPP RC approval. The currently executed GIA identifies the R-Line (Holt-Thedford-Gentleman 345 kV) as network upgrades with a late 2025 timeline for installation and completion.

David Wheeler (SPS) motioned to approve the requested change to the previously approved SPP working group review recommendation to the Thunderhead RAS. Jeff Wells (GRDA) seconded the motion. The motion carried without opposition or abstention.

CROSSROADS SAGAMORE

David Wheeler (SPS) and William Holden (SPP) confirmed for the group that the SPS Crossroads Sagamore RAS has been successfully retired and decommissioned.

Antitrust: SPP strictly prohibits use of participation in SPP activities as a forum for engaging in practices or communications that violate the antitrust laws. Please avoid discussion of topics or behavior that would result in anti-competitive behavior, including but not limited to, agreements between or among competitors regarding prices, bid and offer practices, availability of service, product design, terms of sale, division of markets, allocation of customers or any other activity that might unreasonably restrain competition.

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RAPID CITY

Jeremy Severson (BEPC) gave an update on the upcoming Rapid City RAS Retirement. The RAS is no longer expected to be necessary following upgrades to the DC Tie including local control and voltage dependent limiter as well as various new transmission facilities in the area since the RAS was brought on-line. Analysis performed by Schweitzer, to confirm that the RAS is no longer necessary, is underway with study models provided. Study results are anticipated within the next few months.

POLICY REVISION REQUEST

Matt Jackson (SPP) provided an update on the MOPC action item for TWG to coordinate with ORWG to develop policy paper. RR505 (<https://www.spp.org/documents/67644/rr505.zip>) has been posted and is currently in the comment period ending 8/18/2022. The Revision Request (RR) Routing Criteria (<https://spp.org/documents/28322/rr%20routing%20criteria.xlsx>) lists TWG as the Primary Working Group, RTWG as the Secondary Working Group, and the RCAG as an Advisory Group. The document states that "as needed Advisory Groups and User Forums (e.g. RCAG, SPCAG, CUF) should be consulted to provide their groups expertise." The SPCAG is not explicitly listed, however, the SPCAG is the currently identified owner of Planning Criteria Section 8 being amended by the RR. Review of comments and continued discussion, particularly on the MW threshold values, is anticipated in the September TWG and ORWG meetings. Any comments from the SPCAG would be beneficial in these discussions.

AGENDA ITEM 3 – SPP SYSTEM PLANNING SHORT CIRCUIT MODEL

Erin Cathey (SPP) presented on the SPP Comprehensive Roadmap Development Process (<https://spp.org/stakeholder-center/spp-roadmap/>) in alignment with SPCAG Action item #165. It was stated that SPP staff involved with the group may submit a request on behalf of the group directly by email to Erin rather than through RMS. An SPP directed impact analysis would commence following submission of an initiative request. The overall SPP initiative portfolio is refreshed annually around October, however new initiative requests are considered at time of submission.

Xu Zhang (Aspen) provided a walkthrough of Aspen Oneliner conversion of a PSS/E .raw file of a network positive sequence model accompanied by a zero sequence data file. The walkthrough included a demonstration of some GUI features of a one-line diagram to illustrate a subset of the network model. The conversion process into ASPEN one-liner is performed by the application as the data files are loaded based on selected conversion options.

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Sherman Chan (Aspen) identified no bus limitation to model conversions. Thanh Nguyen (Aspen) confirmed that a model with 299,646 buses converted without issue. In response to inquiry on software limitations, mutual coupling was identified as having a limit of 800 transmission lines in each group with no other limits changed in recent software versions. It was noted that a 12 character limit had been increased to 16 characters. As part of the software conversion issues, Aspen was stated as using both bus name and kV as a unique identifier vs PSS/E bus number. Aspen allows bus number 0 to be non-unique but all other buses must have a unique number.

Lynn Schroeder (SUNC) inquired about transformer connection code and IBR type variances in conversion or challenges. Thanh Nguyen (Aspen) explained that a single conversion is not an issue, conversion and back again is problematic due to unique identifier variances. Transformers in Aspen are represented from a set of options, some PSS/E formats are incompatible and data may be lost during conversion. There is a log file with data conversion issues that outlines any conversion issues encountered.

Steve Wadas (NPPD) inquired on whether there was a way to compare planning and protections models for a subsystem. It was stated that data submission for positive sequence models often don't include proper connection codes for transformers which is a common variance in models across systems.

Thanh Nguyen (ASPEN) stated that IBRs may require manual action for appropriate representation. It was also discussed that zero Impedance branches are represented with a small impedance branch to facilitate computation. Additional questions may be submitted to support@aspeninc.com.

Lynn Schroeder (SECI) provided an update on the NERC SPCWG Inter-Entity Short Circuit whitepaper approval process which is anticipated to be approved at the September RSTC meeting prior to posting on the SPCWG page. Highlights under best practices included: annual or more frequent review of neighboring system, equivalencing 2-3 buses into neighboring system, bus number consistency, and quality assurance checks for N-1 conditions. Highlights under recommendations included: short circuit models provided in short circuit software rather than powerflow software, converted models should be fully validated, acquisition and inclusion of neighboring system data, modeling of IBRs is evolving and requires improvement, system-wide model rather than boundary equivalents at tie-lines, boundary equivalents for conditions beyond peak, improved method for efficient data exchange between short-circuit software.

Chris Angland (OPPD) highlighted that the recommendations stated that converted models should be fully validated. Jeff Beasley (GRDA) noted that current coordination with some adjacent areas results in model data that is missing sequence data. John Anderson (Evergy)

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mentioned that from past experience in some cases newer resources seem to be represented with initial facility data used for interconnection studies from several years prior.

Eric Sullivan (SPP) presented on the background on the current SPP process and options to provide an SPP developed Aspen short circuit model. Impact assessments following an initiative submission will determine impacts from various groups including man-hours and other anticipated costs.

Action item #167 was created for SPP staff (William and Eric) to develop a draft initiative request to improve the MDAG short circuit models for use with system protection and control in coordination with Steve Wadas (NPPD), Lynn Schroeder (SUNC), and John Anderson (Evergy) for submission by mid-September. Status update to be brought back at the November meeting.

AGENDA ITEM 4 – INDUSTRY REC'S AND STANDARDS ON IBR INTERCONNECTION

Doug Bowman (SPP) presented on Industry recommendations and standards on Inverter Based Resource interconnection. The direction from discussion at the TWG is for SPP Staff to internally develop and pursue an implementation plan in lieu of the initial recommendation for a TWG Task Force.

Jeff Beasley (GRDA) expressed concern with impacts related to IBR response degrading system protection and controls. Differential relays on each resource interconnection radial will alleviate some of these concerns.

Steve Wadas (NPPD) sought interest from the group to learn more about IEEE 2800. This topic was requested by members to be included in the agenda for discussion at a future meeting. Jeff Beasley (GRDA) offered to provide some overview bullets. Lynn Schroeder (SUNC) mentioned available resources via NATF IEEE webinars, asked to request shareable versions be provided. Michael Fleck (ITC) mentioned associated EPRI webinars and inquired into inclusion of provisions into TO GIA requirements.

Action item #168 was created for available resources and education materials on IEEE 2800-2022 (i.e. NATF webinars) to be shared with the group.

AGENDA ITEM 5 – FAC-008-5

Michael Fleck (ITC) presented on experience with FAC-008-5 including a method to replace a circuit based approach with a node breaker based approach for considering secondary circuitry and a recent audit.

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Louis Guidry (Cleco) shared a perspective on the applicability of a current transformer (CT) to determine line ratings. CTs used in high voltage applications, do not have a primary conductor and only conduct secondary currents through magnetic coupling. The primary rating of the CT is only a derived value from the ratio of secondary turns and it does not represent an actual ampacity rating of a primary conductor. The CT does not affect or limit the continuous current carrying capacity of the facility. It was stated that at least a few utilities, which exclude CT limitations from facility ratings, have been audited across various Reliability Entity regions without findings or concerns with this approach.

AGENDA ITEM 6 – AMBIENT ADJUSTED RATINGS IMPLEMENTATION TASK FORCE

Jason Bulloch (SPP) staff secretary of the AARITF provided an overview of the meetings and summarized outcomes. Notified the group of the staff secretary position transitioning to Jack Williamson (SPP) due to a transfer. The group is asked to assess potential impacts to protection systems, documents under the SPCAG, and on-going NERC efforts for discussion at the Q4 2022 SPCAG meeting.

AGENDA ITEM 7 – THREE TERMINAL LINE WHITEPAPER

John Anderson (Evergy, Inc.) provided an update on the status of the paper. William Holden (SPP) and John Anderson will coordinate to update the figure prior to posting the document on the SPCAG page.

AGENDA ITEM 8 – RELIABILITY GROUPS

NERC SPCWG AND LESSONS LEARNED

Lynn Schroeder (Sunflower) provided an update from the May meeting of the NERC SPCWG. Topics included: PRC-025-2 Hybrid Plants, Liaison Updates - IEEE & IRPS, February 2021 Cold weather recommendation 22 approval, Inter-Entity Short Circuit whitepaper, Compliance Implementation Guidance, and FERC 881 Discussion. There were no new lessons learned posted since the prior SPCAG meeting.

SPP NERC

Shannon Mickens (SPP) gave updates on the status of modifications to PRC-024, PRC-002-4, PRC-023-4, and Reliability Guideline - BPS-Connected Inverter-Based Resource Performance.

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MRO PRS MEETING

David Wheeler (SPS) shared the agenda for the upcoming meeting and provided an overview of the topics.

MRO PRS PROTECTION SYSTEM COMMISSIONING WEBINAR

Jeff Beasley (GRDA) gave an overview of the webinar events discussion of Protection System Commissioning Report and best practices to avoid associated mis-operations.

AGENDA ITEM 9 – PROTECTION IN YOUR SHOP

Steve Wadas (NPPD) deferred his presentation on Cooper PCB3308 internal fault and multiple trips until the Q4 2022 meeting.

AGENDA ITEM 10 – PRC-004 REPORTABLE OPERATION

Shawn Jacobs (OKGE) led a discussion on whether BES equipment operation from a direct transfer trip from non-BES equipment may be either a reportable operation or mis-operation. The information shared with the group along with the reference MIDAS DRI document (https://www.nerc.com/pa/RAPA/Documents/MIDAS_DRI_2022.pdf) supported a mutual understanding by the group that the discussed operation situation was not reportable.

AGENDA ITEM 11 – CHAIR AND VICE-CHAIR NOMINATIONS

William Holden (SPP) provided a verbal update on the status of the Chair nomination process for 2023-2024. John Anderson (Eversource) provided his intent not to seek continuation as SPCAG Chair. Nominations were solicited by email with a single nomination received. Chris Angland (OPPD) was nominated and received a unanimous recommendation by the group over email. The nomination and recommendation were shared for consideration by the Corporate Governance Committee nominee selection and subsequently for the Chair appointment by the Board of Directors. **Email notices will be provided to members as the process progresses.**

Vice-Chair nominations will occur during the November 8th – 9th, 2022 SPCAG meeting.

AGENDA ITEM 12 – CLOSING ADMINISTRATIVE DUTIES

William Holden (SPP) reviewed new, open and closure pending action items.

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Action Item 152 remained as Closure pending until RC Final approval and implementation of Thunderhead RAS. Action Item 157 remained as Closure pending to allow SPCAG discussion following publication of NERC whitepaper on short circuit models. Action item 161 remains as In Progress with Chair and Secretary to revise draft whitepaper and pursue posting. Action item 162 remains marked as In Progress with SPP Planning Modeling staff to present requested topics during SPCAG discussion of Short Circuit Models and analysis. Action item 165 remains marked as In Progress for SPCAG to explore SPP roadmap for short circuit modeling program purchase. Action item 166 remains marked as In Progress for SPCAG to create sub-group for coordination with MDAG. Action item 167 was created to submit an initiative request to improve the MDAG short circuit models for use with system protection and control. Action item 168 was created to share available resources and education materials on IEEE 2800-2022. A record of action items is an attachment to these minutes.

John Anderson (Evergy, Inc.) led a discussion on potential topics for the November 8th – 9th, 2022 SPCAG meeting, including:

- Short Circuit Models (standing agenda item): update on initiative and MDAG Focus Group meetings
- Education materials on IEEE 2800-2022
- Protection in your shop:
 - Internal fault and multiple trips (Steve Wadas (NPPD), Q4 2022)
 - Automation of Wide Area Coordination, SARA (Jeff Beasley (GRDA), Q1 2023)
 - Traveling Wave Relays (future topic, no users to date)
- Vice-Chair nominations
- 2023 meeting schedule

William Holden (SPP) informed the group that the SPP meeting criteria list a guideline of at least 10 expected attendees for in-person meetings. A poll will be sent out to determine the expected attendees for the November 8th – 9th SPCAG meeting currently planned to be held at the Evergy offices; 1200 Main Street; Kansas City, MO 64105. In the event that the expected attendees is insufficient the meeting may need to be converted to a net conference.

SPCAG Chair John Anderson (Evergy, Inc.) recessed the SPCAG at 4:42 PM on 8/9/2022 and adjourned the SPCAG and at 12:00 PM on 8/10/2022.

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Respectfully Submitted,

William Holden, System Protection and Control Advisory Group, Staff Secretary

PRE-APPROVAL

**SYSTEM PROTECTION AND CONTROL ADVISORY GROUP MINUTES
8/9-10/2022**

SUMMARY OF ATTACHMENTS:

SPCAG 8/9-10/2022 Agenda (pg. 12-13)

SPCAG 8/9-10/2022 Member Attendance (pg. 14)

SPCAG Action Item Tracking (pg. 15-16)

SPCAG Approved *May 10-11, 2022 SPCAG Meeting Minutes*

SOUTHWEST POWER POOL, INC.

SYSTEM PROTECTION AND CONTROL ADVISORY GROUP MEETING

August 9, 2022 1:00PM - 5:00PM MDT (2:00PM - 6:00PM CDT)

August 10, 2022 8:00AM - 12:00PM MDT (9:00AM - 1:00PM CDT)

Xcel Energy Offices, Denver, Colorado

AGENDA

1. Administrative Items:
 - a. Call to Order and new members John Anderson
 - b. AttendanceWilliam Holden
 - c. Antitrust Statement.....William Holden
 - d. Agenda Review John Anderson
 - e. Review minutes of May 10-11, 2022 meeting (Approval) John Anderson
2. Remedial Action Schemes: https://spp.org/documents/62226/spp_prc-012-2_process_ei.pdf
 - a. Proposed Thunderhead RAS (Approval)Arash Ghodsian (15m)
 - b. Sagamore Retirement (Update).....William Holden (5m)
 - c. Rapid City RAS Retirement (Update) Jeremy Severson (5m)
 - d. Policy RR (Update)..... Matt Jackson (15m)
3. SPP System Planning Short Circuit Model:
 - a. SPP Roadmap Initiative Process: A/I #165 (Update).....Erin Cathey (10m)
 - b. [MDAG](#) Focus Group: A/I #166 (Update)..... Lynn Schroeder (10m)
 - c. NERC SPCWG whitepaper (Update)..... Lynn Schroeder (10m)
 - d. Model conversion (Update)Thanh Nguyen (ASPEN Inc.) (30m)
 - e. SPCAG Activities (Discussion).....Eric Sullivan (60m)
4. Industry Rec’s and Standards on IBR Interconnection (Discussion).....Doug Bowman (60m)
5. FAC-008-5 (Discussion)..... Michael Fleck (30m)
6. [Ambient Adjusted Ratings Implementation Task Force](#) (Update)..... Jason Bulloch (10m)
7. Three Terminal Line Whitepaper (Discussion) John Anderson (10m)
8. Reliability Groups (Update):
 - a. NERC SPCWG and Lessons Learned Lynn Schroeder (20m)
 - b. SPP NERCShannon Mickens (30m)
 - Project 2020-02 Modifications to PRC-024 (Generator Ride-through)

- Project 2021-04 Modifications to PRC-002
- Project 2021-05 Modifications to PRC-023-4
- BPS-Connected Inverter-Based Resource Performance
- c. MRO PRS MeetingDavid Wheeler (5m)
- d. MRO PRS Protection System Commissioning Webinar..... Jeff Beasley (20m)
- 9. Protection in your shop (Discussion)John Anderson (5m)
 - a. Cooper PCB3308 Internal Fault and Multiple Trips.....Steve Wadas (30m)
- 10. PRC-004 Reportable Operation (Discussion).....Shawn Jacobs (10m)
- 11. Chair and Vice-Chair nominations John Anderson (10m)
- 12. Closing Administrative Duties:
 - a. Review of New, Open and Closure Pending Actions.....William Holden
 - b. Discuss upcoming meeting topics and location John Anderson
 - 11/8-9/2022 (Eversource location in Kansas City, MO)
 - 2023 schedule
 - c. Adjourn meeting John Anderson

PRE-APPROVAL

SPCAG MEMBER ATTENDANCE:

Name	Company	Role	8/9/2022	8/10/2022
John Anderson	Evergy, Inc	Chair	✓	✓
Chris Angland	Omaha Public Power District	Vice Chair	✓	✓
Jeff Beasley	Grand River Dam Authority	Member	✓	✓
Michael Fleck	ITC Great Plains	Member	✓	✓
Shawn Jacobs	Oklahoma Gas & Electric	Member	✓	✓
David Oswald	Liberty Utilities	Member		
Spencer Riddle	Western Area Power Administration Upper Great Plains Region	Member	✓	✓
Lynn Schroeder	Sunflower Electric Power Corp	Member	✓	✓
Steve Wadas	Nebraska Public Power District	Member	✓	✓
David Wheeler	Xcel Energy	Member	✓	✓
Ken Zellefrow	City Utilities of Springfield MO	Member		
William Holden	Southwest Power Pool	Staff Secretary	✓	✓

SPCAG ACTION ITEMS

Action Item	Origin Date	Action Item	Update Summary	Status	Owner	Date Closed
152	07/22/20	Zachary Sharp to collect additionally requested material from Invenergy concerning the Thunderhead RAS (relay settings and control schematics), and provide to the SPCWG members for review. Zachary Sharp will set up an ad-hoc meeting for the SPCWG to discuss the material and comments from the ORWG and TWG prior to the scheduled October meeting.	The ORWG delayed taking action on the Thunderhead RAS, negating the need for an ad-hoc meeting. 10/14/20: Tom Kay gave an update to the group. Tom is going to research the open protection response time of the DC supply at the Thunderhead station and clarify what the response will be. 5/12/21: Trey to send out relay settings to the SPCAG as soon as received. New motion approved 5/11. 8/11/21: Thunderhead RAS approved by MOPC in July 2021. Still waiting on relay settings from Invenergy. 8/25/21: Relay settings shared with SPCAG. 2/9/22: Closure pending implementation of RAS 5/11/22: Closure pending implementation of RAS 8/10/22: Closure pending implementation of RAS	Closure pending	William Holden	
157	02/10/21	SPP Staff to reach out to SPCAG to determine interest in developing PSSE/ASPEN/CAPE Conversion Whitepaper.	5/12/21: Trey to send list to Lynn, and resend the request for participation. 8/11/21: There's a current NERC effort to develop a whitepaper, and the SPP action is on hold until that paper is developed. 11/10/21: Closure pending review of NERC paper, Q2 2022. 5/11/22: Closure pending review of NERC paper, Q2 2022. 8/9/22: Closure pending review of NERC paper, Q4 2022.	Closure pending	William Holden	
161	08/11/21	SPCAG to replace the Recommendation section at the end of the Three Terminal Line Whitepaper with a SPCAG Position section, and post to spp.org.	11/9/21: No progress to report 2/9/22: SPP to revise draft whitepaper and pursue posting. 5/11/22: Chair and Secretary to revise draft whitepaper and pursue posting. 8/10/22: Chair and Secretary to revise draft whitepaper and pursue posting.	In progress	Jeff Beasley Lynn Schroeder Chris Angland	

Action Item	Origin Date	Action Item	Update Summary	Status	Owner	Date Closed
					William Holden John Anderson	
162	11/10/21	SPP Planning Modeling staff to present requested topics during SPCAG discussion of Short Circuit Models and analysis	<p>2/9/22: SPP solicited members for topics, survey being conducted for preferred fault model software with review of results at the May 22' meeting. Zach Sabey committed to provide updates on external Short Circuit data collection efforts.</p> <p>5/11/22: Eric Sullivan (SPP) shared MDAG survey results on short circuit model software and other preferences. The topic for discussion at the August meeting was selected to be update on short circuit build and any quality checks to be discussed.</p> <p>8/9/22: Erin Cathey (SPP) presented on the SPP Roadmap Process, Aspen presented on Short Circuit model conversion, and A/I #167 opened to submit an initiative request to improve the MDAG short circuit models for use with system protection and control</p>	In progress	Zach Sabey	
165	05/11/22	SPCAG to explore SPP Roadmap for Short Circuit modeling program purchase.	8/10/20: Process presented to the group, A/I #167 opened to submit an initiative request to improve the MDAG short circuit models for use with system protection and control	In progress	William Holden	
166	05/11/22	SPCAG to create sub-group for coordination with MDAG.	8/10/22: SPCAG members have been attending MDAG Focus Group meetings	In progress	John Anderson	
167	08/09/22	Submit an initiative request to improve the MDAG short circuit models for use with system protection and control		Not Started	William Holden	
168	08/10/22	Share available resources and education materials on IEEE 2800-2022 (i.e. NATF webinars)		Not Started	Lynn Schroeder	

**SOUTHWEST POWER POOL
SYSTEM PROTECTION AND CONTROL ADVISORY GROUP MEETING**

**Tuesday May 10, 2022 1:00PM - 5:00PM (CPT)
Wednesday May 11, 2022 8:30AM - 12:00PM (CPT)**

Net Conference

SUMMARY OF MOTIONS AND ACTION ITEMS

MOTIONS:

- Ken Zellefrow (SPRM) motioned to approve the *February 8-9, 2022 SPCAG Meeting Minutes*. Shawn Jacobs (OKGE) seconded the motion. The motion carried without opposition or abstention.

ACTION ITEMS:

- #165: SPCAG to explore SPP roadmap for short circuit modeling program purchase
- #166: SPCAG to participate or send delegates to the MDAG Focus Group meeting in the June/July timeframe

SYSTEM PROTECTION AND CONTROL ADVISORY GROUP MINUTES 5/10-11/2022

MINUTES

AGENDA ITEM 1 – ADMINISTRATIVE ITEMS

SPCAG Chair John Anderson (Evergy, Inc.) called the meeting to order at 1:04 PM on 5/10/2022 and introduced Michael Fleck (ITC) and Spencer Riddle (WAPA) as new SPCAG members. The meeting was reconvened at 8:36 AM on 5/11/2022.

Brett Springfield (SPP) took attendance and established a meeting quorum. A record of member attendance is an attachment to these minutes.

Brett Springfield (SPP) read the SPP Antitrust Statement.

Chairman John Anderson (Evergy, Inc.) reviewed the agenda and made an addition to include a brief update on the upcoming Rapid City RAS retirement at 2c. A record of the Agenda is an attachment to these minutes.

Ken Zellefrow (SPRM) motioned to approve the *February 8-9, 2022 SPCAG Meeting Minutes*. Shawn Jacobs (OKGE) seconded the motion. The motion carried without opposition or abstention.

AGENDA ITEM 2 – REMEDIAL ACTION SCHEMES

THUNDERHEAD

Brett Springfield (SPP) gave a verbal update on the status of the proposed Thunderhead RAS. Multiple upgrade options are under evaluation and selection of an upgrade is anticipated by Invenergy in the June timeframe. SPP RC final approval remains pending a GIA revision with an appropriate upgrade timeline and agreement on compliance responsibilities. Approval and subsequent implementation remains deferred until estimated upgrade completion is within two years.

CROSSROADS SAGAMORE

Brett Springfield (SPP) provided an update that the Crossroads Sagamore RAS remains on schedule for retirement in the June timeframe. Planned equipment outages over the next month may reactivate the RAS to address system constraints. The April MOPC approved the RAS retirement, all that remains is the RC final approval.

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RAPID CITY

Jeremy Severson (BEPC) gave an update on the upcoming Rapid City RAS Retirement. After re-evaluation of the RAS, it was determined that it is no longer needed due to the protection that exists at the DC tie. They are currently working with Schweitzer on the analysis.

AGENDA ITEM 3 – SPP SYSTEM PLANNING SHORT CIRCUIT MODEL - MODEL CHECKS

Eric Sullivan (SPP) presented on the system planning short circuit model checks and software survey noting that over 50% of respondents prefer a software other than PSSE. SPP is currently working with Aspen to run a short circuit model conversion for the ITP with a subsequent effort with CAPE. SPP intends to present difficulties in the conversion process at the May ERAG. SPCAG members encourage to participate in the model build process.

Lynn Schroeder (SECI) asked if there was any thoughts on purchasing an ASPEN license. That purchase request was identified as needing to go through the SPP roadmap process.

Action item #165 was added for SPCAG to explore SPP roadmap for short circuit modeling program purchase.

SPCAG members are requested to review the current short circuit model checks in place and suggest additional checks. SPP is scheduled to commence with the next annual short circuit model build around the August – September time frame.

Lynn Schroeder (SECI) notified the group that the Short-Circuit paper was approved at NERC SPCWG and is going to the September RSTC.

Steve Wadas, Lynn Schroeder, Chris Angland, and John Anderson agreed to participate or send delegates to the MDAG Focus Group meeting in June/July timeframe.

Action item #166 was added for SPCAG to participate or send delegates to the MDAG Focus Group meeting in the June/July timeframe.

AGENDA ITEM 4 – THREE TERMINAL LINE WHITEPAPER

John Anderson (Evergy, Inc.) presented the questions that were posed by SPP on the Three Terminal Line Whitepaper. The questions and SPCAG responses are as follows:

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Question #1: If the goal is to stay high-level, I would consider moving some of the detailed protection scheme discussion to an appendix-it gets pretty deep in places for a casual reader. SPCAG response: leave as-is for the paper.

Question #2: I'd also consider whether there are any other options in addition to the two proposed. SPCAG response: white paper edits were made during the meeting with Jeff Beasley tasked to updated option 1 picture in paper to display a ring bus.

Question #3: Are there situations where the benefits of constructing a switch station are not worth the cost and what are those? SPCAG response: situationally dependent, leave as-is for the paper.

Question #4: Does voltage level enter into the calculus at all? i.e. would the recommendation be the same for 69 kV as for 345 kV? SPCAG response: leave as-is for the paper.

AGENDA ITEM 5 – FERC 881 AMBIENT ADJUSTED RATINGS

Charles Cates (SPP) gave an update on FERC 881 and the current impacts to the TOs and SPP. RR490 was approved at ORWG and MOPC, the compliance filing is due 7/12/2022, there is an upcoming task force to help mitigate the challenges. Charles asked the group to assess potential impacts to protection systems, documents under the SPCAG, and on-going NERC efforts. Plan to bring back the topic at the Q4 2022 SPCAG meeting.

AGENDA ITEM 6 – CMEP PRACTICE GUIDE CONSIDERATIONS FOR TPL-001-4

Jeff McDiamid (SPP) presented an update on the NERC TPL-001-4 standard to request feedback on coordination between system protection and control on development of contingencies.

AGENDA ITEM 7 – RELIABILITY GROUPS

NERC SPCWG AND LESSONS LEARNED

Lynn Schroeder (Sunflower) provided an update on the February and April NERC SPCWG meeting and NERC Lessons Learned. The February agenda items included: IEEE and IRPWG liaison reports, data modeling and assessment, cold weather recommendations, large transformer backup protection. The April agenda items included: IEEE and IRPS liaison reports, cold weather recommendations, short circuit model paper *Inter-Entity Short Circuit Model*

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Technical Report was approved by the NERC SPCWG, and compliance implementation guidance for PRC-024-3 and PRC-025-2 on Hybrid plants.

SPP NERC

Shannon Mickens (SPP) gave updates from the NERC SPIDERWG Analysis and Coordination Sub-Groups. Topics included: Distributed Battery Energy Storage Modeling Guideline, DER Impacts to UVLS Programs, BPS Planning under Increasing DER, Simulation Improvements and Techniques, Beyond Positive Sequence RMS Simulations for High Penetration Conditions, Draft report on Inter-Entity Short Circuit Model (NERC SPCWG), NERC Standards Review and DERs, BPS Perspectives on the DER Aggregator, Standards Committee Engagement, & Security Related Topics from Aggregate DER.

MRO PRS MEETING

David Wheeler (SPS) gave an update from the 5/3/2022 MRO PRS meeting. The PRS reviewed the charter, discussed retaining membership at 19, and reviewed action items. Updates were provided by the NERC SPCWG as presented by Lynn, NERC MIDAS UG which discussed the absence of a fault type column and cap bank misoperation categorization, Commissioning Program with an MRO focused webinar in July, and TADS with an August 15th 2022 deadline for Q1 2023. Misoperation review yielded a higher 2021 Q4 rate due to fewer overall operations and included a review of 6 NERC lessons learned. The group reviewed all summer 2021 BES category 1 events. Discussion of FERC Order 881 Ambient Adjusted Ratings and the FERC Notice of Inquiry on dynamic line rating requirements and application by PJM. Next meetings are expected on August 16th 2022 and December 6th 2022.

AGENDA ITEM 8 – PROTECTION IN YOUR SHOP

J.V. (John) Kelley (SPS) presented the MRO PRS topic on misoperation of Crossroads capacitors from voltage differential from a ferroresonant condition from missing loading resistors.

AGENDA ITEM 9 – CLOSING ADMINISTRATIVE DUTIES

Brett Springfield (SPP) reviewed new, open and closure pending action items. Action items 163 & 164 were marked as Closed. Action Item 152 remained as Closure pending until RC Final approval and implementation of Thunderhead RAS. Action Item 157 remained as Closure pending to allow SPCAG discussion following publication of NERC whitepaper on short circuit models. Action item 161 remains as In Progress with Jeff Beasley tasked to update a diagram. Action item 162 remains marked as In Progress with SPP modeling staff to provide Short Circuit

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build update and any quality checks to be discussed. A record of action items is an attachment to these minutes. Action item 165 was added for SPCAG to explore SPP roadmap for short circuit modeling program purchase. Action item 166 was added for SPCAG to participate or send delegates to attend the MDAG Focus Group meeting in the June/July timeframe.

John Anderson (Evergy, Inc.) led a discussion on potential topics for the August 8th – 9th, 2022 SPCAG meeting, including:

- Short Circuit Models (standing agenda item): update on short circuit build and any quality checks to be discussed following the forthcoming MDAG Focus Group meeting
- Audit experience: Chris Angland (OPPD) to share feedback on the process
- Coordination of FAC-008, Thermal ratings including secondary side and CT circuits, with other standards such as relay load-ability (Michael Fleck (ITC))
- Protection in your shop:
 - Automation of Wide Area Coordination, SARA (Jeff Beasley (GRDA), Q3 2022)
 - Traveling Wave Relays (future topic, no users to date)
 - Pole failure experienced on a 345kV breaker (Steve Wadas (NPPD), Q3 2022)
 - Fire on line failure event (Steve Wadas (NPPD), Q3 2022)

John Anderson (Evergy, Inc.) led a discussion on potential Face-to-Face location options for the August 9th – 10th, 2022 and November 8th – 9th SPCAG meetings, including:

- A SPCAG member hosted location
 - David Wheeler (SPS) offered an Xcel location in Denver, CO for August
- Evergy; 1200 Main Street; Kansas City, MO 64105
- GRDA; 9933 East 16th Street; Tulsa, OK 74128
- SPP Campus; 201 Worthen Drive; Little Rock, AR 72223
- Tri-State; 1100 West 116th Avenue; Westminster, CO 80234 (November only)

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The SPCAG elected to transition the August meeting to Face-to-Face at the Xcel location in Denver, CO and move the November meeting to the Evergy location in Kansas City, MO.

SPCAG Chair John Anderson (Evergy, Inc.) recessed the SPCAG at 4:52 PM on 5/10/2022 and adjourned the SPCAG and at 9:10 AM on 5/11/2022.

System Protection And Control Advisory Group

Respectfully Submitted,

William Holden SPCAG Staff Secretary with assistance from Brett Springfield as acting SPCAG Staff Secretary

**SYSTEM PROTECTION AND CONTROL ADVISORY GROUP MINUTES
5/10-11/2022**

SUMMARY OF ATTACHMENTS:

SPCAG 5/10-11/2022 Agenda (pg. 9)

SPCAG 5/10-11/2022 Member Attendance (pg. 10)

SPCAG Action Item Tracking (pg. 11-12)

SOUTHWEST POWER POOL, INC.

SYSTEM PROTECTION AND CONTROL ADVISORY GROUP MEETING

May 10, 2022 1:00PM - 5:00PM CDT

May 11, 2022 8:30AM - 12:00PM CDT

Net Conference

AGENDA

1. Administrative Items:
 - a. Call to Order and new members John Anderson
 - b. Attendance Brett Springfield
 - c. Antitrust Statement Brett Springfield
 - d. Agenda Review John Anderson
 - e. Review minutes of February 8-9, 2022 meeting (Approval) John Anderson
2. Remedial Action Schemes: https://spp.org/documents/62226/spp_prc-012-2_process_ei.pdf
 - a. Proposed Thunderhead RAS (Update) Brett Springfield (5m)
 - b. Sagamore RAS Retirement (Update) Brett Springfield (5m)
 - c. Rapid City RAS Retirement (Update) Jeremy Severson (5m)
3. SPP System Planning Short Circuit Model - Model Checks (Discussion) Eric Sullivan (15m)
4. Three Terminal Line Whitepaper (Discussion) John Anderson (45m)
5. FERC 881 Ambient Adjusted Ratings (Update) Charles Cates (15m)
6. CMEP Practice Guide Considerations for TPL-001-4 (Discussion) Jeff McDiarmid (30m)
7. Reliability Groups (Update):
 - a. NERC SPCWG and Lessons Learned Lynn Schroeder (20m)
 - b. SPP NERC Shannon Mickens (30m)
 - c. MRO PRS Meeting David Wheeler (5m)
8. Protection in your shop (Discussion) John Anderson (5m)
 - a. Misoperation of Crossroads capacitors J.V. (John) Kelley (15m)
9. Closing Administrative Duties:
 - a. Review of New, Open and Closure Pending Actions Brett Springfield
 - b. Discuss upcoming meeting topics and location John Anderson
 - 8/9-10/2022 (Net Conference)
 - 11/8-9/2022 (SPP Campus)
 - c. Adjourn meeting John Anderson

SPCAG MEMBER ATTENDANCE:

Name	Company	Role	5/10/2022	5/11/2022
John Anderson	Evergy, Inc	Chair	✓	✓
Chris Angland	Omaha Public Power District	Vice Chair	✓	✓
Jeff Beasley	Grand River Dam Authority	Member		
Michael Fleck	ITC Great Plains	Member		✓
Ryan Godwin	American Electric Power	Member		
Shawn Jacobs	Oklahoma Gas & Electric	Member	✓	✓
David Oswald	Liberty Utilities	Member	✓	
Spencer Riddle	Western Area Power Administration Upper Great Plains Region	Member		
Lynn Schroeder	Sunflower Electric Power Corp	Member	✓	
Steve Wadas	Nebraska Public Power District	Member	✓	✓
David Wheeler	Xcel Energy	Member	✓	✓
Ken Zellefrow	City Utilities of Springfield MO	Member	✓	✓
Brett Springfield	Southwest Power Pool	Acting Secretary	✓	✓

SPCAG ACTION ITEMS

Action Item	Origin Date	Action Item	Update Summary	Status	Owner	Date Closed
152	07/22/20	Zachary Sharp to collect additionally requested material from Invenergy concerning the Thunderhead RAS (relay settings and control schematics), and provide to the SPCWG members for review. Zachary Sharp will set up an ad-hoc meeting for the SPCWG to discuss the material and comments from the ORWG and TWG prior to the scheduled October meeting.	The ORWG delayed taking action on the Thunderhead RAS, negating the need for an ad-hoc meeting. 10/14/20: Tom Kay gave an update to the group. Tom is going to research the open protection response time of the DC supply at the Thunderhead station and clarify what the response will be. 5/12/21: Trey to send out relay settings to the SPCAG as soon as received. New motion approved 5/11. 8/11/21: Thunderhead RAS approved by MOPC in July 2021. Still waiting on relay settings from Invenergy. 8/25/21: Relay settings shared with SPCAG. 2/9/22: Closure pending implementation of RAS 5/11/22: Closure pending implementation of RAS	Closure pending	Zachary Sharp	
157	02/10/21	SPP Staff to reach out to SPCAG to determine interest in developing PSSE/ASPEN/CAPE Conversion Whitepaper.	5/12/21: Trey to send list to Lynn, and resend the request for participation. 8/11/21: There's a current NERC effort to develop a whitepaper, and the SPP action is on hold until that paper is developed. 11/10/21: Closure pending review of NERC paper, Q2 2022. 5/11/22: Closure pending review of NERC paper, Q2 2022.	Closure pending	Trey Rosel	
161	08/11/21	SPCAG to replace the Recommendation section at the end of the Three Terminal Line Whitepaper with a SPCAG Position section, and post to spp.org.	11/9/21: No progress to report 2/9/22: SPP to revise draft whitepaper and pursue posting. 5/11/22: Chair and Secretary to revise draft whitepaper and pursue posting.	In progress	Jeff Beasley Lynn Schroeder Chris Angland	

Action Item	Origin Date	Action Item	Update Summary	Status	Owner	Date Closed
162	11/10/21	SPP Planning Modeling staff to present requested topics during SPCAG discussion of Short Circuit Models and analysis	2/9/22: SPP solicited members for topics, survey being conducted for preferred fault model software with review of results at the May 22' meeting. Zach Sabey committed to provide updates on external Short Circuit data collection efforts. 5/11/22: Eric Sullivan (SPP) shared MDAG survey results on short circuit model software and other preferences. The topic for discussion at the August meeting was selected to be update on short circuit build and any quality checks to be discussed.	In progress	Zach Sabey	
163	02/09/22	Staff Secretary to solicit MOPC for new member nominations and review with the chair to seek approval from COO and President.	5/11/22: Michael Fleck (ITC) and Spencer Riddle (WAPA) were welcomed as new members	Closed	William Holden	05/11/22
164	02/09/22	SPCAG members to review and provide feedback to the RAS Criteria document prior to the March 22' TWG.	5/11/22: the feedback period has concluded	Closed	Adam Bell	05/11/22
165	05/11/22	SPCAG to explore SPP Roadmap for Short Circuit modeling program purchase.		In progress	William Holden	
166	05/11/22	SPCAG to create sub-group for coordination with MDAG.		In progress	John Anderson	