

SOUTHWEST POWER POOL

SYSTEM PROTECTION AND CONTROL ADVISORY GROUP MEETING

August 13, 2024 1:00PM - 5:00PM (MPT)

August 14, 2024 8:00AM - 11:00PM (MPT)

Xcel Offices, Denver, Colorado

SUMMARY OF MOTIONS AND ACTION ITEMS

MOTIONS:

- Steve Wadas (NPPD) motioned to approve the May 14-15, 2024 SPCAG Meeting Minutes. John Anderson (Evergy) seconded the motion. The motion carried without opposition or abstention.
- Chris Angland (OPPD) motioned to nominate Vice Chair David Oswald (Liberty) as the recommended nomination by the Corporate Governance Committee for consideration and appointment by the Board of Directors for the 2025-2026 SPCAG Chair. John Anderson (Evergy) seconded the motion with David Oswald (Liberty) accepting the recommendation. The motion carried without opposition or abstention.

ACTION ITEMS:

- 171: FERC Order 881 guidance related to system protection and control
- 172: Updates from MRO PRS
- 173: Review HVDC process for impacts to protection
- 174: Investigate SPP documentation revisions for additional guidance on PMU voltage and current measurement locations with stakeholder feedback from at least GIAG, TWG, and ORWG.
- SPP to provide vendor selection update for short circuit model development effort and share scope of work.
- SPP to inform TWG on whether SPCAG expressed concerns on HVDC RR edits to SPP Planning Criteria Section 8
- Include discussion of SPP Planning Criteria Section 8 as a future agenda topic
- Provide Doug Bowman (SPP) with identification of IBR related events

SYSTEM PROTECTION AND CONTROL ADVISORY GROUP MINUTES 8/13-14/2024

MINUTES

AGENDA ITEM 1 – ADMINISTRATIVE ITEMS

SPCAG Chair Chris Angland (OPPD) called the meeting to order at 1:00 PM (Mountain) on 8/13/2024. The meeting reconvened at 7:31 AM (Mountain) on 8/14/2024.

SPCAG Staff Secretary 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.

Chris Angland (OPPD) reviewed the agenda. A record of the agenda is an attachment to these minutes.

Steve Wadas (NPPD) motioned to approve the *May 14-15, 2024 SPCAG Meeting Minutes*. John Anderson (Eversource) seconded the motion. The motion carried without opposition or abstention.

AGENDA ITEM 2 – REMEDIAL ACTION SCHEMES

THUNDERHEAD

Tom Kay (Invenergy) provided an update on the Thunderhead RAS retirement which was previously communicated as approved by the SPP Reliability Coordinator. The transition from utilization of the Thunderhead RAS to an operating guide administered normally-open breaker configuration is scheduled to proceed mid-September. Retirement activities will commence with the transition. The RAS retirement is on track to be completed prior to the November 1, the retirement date presented and approved by the SPP Stakeholder Groups and the SPP RC.

RAPID CITY

William Holden (SPP) relayed an email update from Philip Westby (BEPC). The Rapid City RAS retirement recommendation has been provided by the MOPC with approval on July 15th. BEPC is working on making updates to the operating guide and awaiting SPP Reliability Coordinator approval and working through any outstanding issues identified. Rapid City DC tie is jointly owned and requires formal approval by the operating committee. An anticipated retirement date is near the end of the year.

SYSTEM PROTECTION AND CONTROL ADVISORY GROUP MINUTES 8/13-14/2024

JUDSON TEMPORARY RAS

William Holden (SPP) relayed an email update from Philip Westby (BEPC). Judson RAS Remains enabled, has had zero operations to date, and will be retired upon completion of the Roundup – Kummer Ridge 345 kV line. The best available completion date of Roundup – Kummer Ridge should be found in the publicly available [SPP quarterly project tracking](#) report.

AGENDA ITEM 3 – SPP SYSTEM PLANNING SHORT CIRCUIT MODEL

Eddie Watson (SPP) provided an update on the SPP system short circuit model development effort under [SIR544](#). The effort is budgeted with a consultant being identified to develop the model conversion process in place prior to the upcoming model build cycle. SPP to provide update on vendor selection process. Members requested to be provided with the scope of work for the vendor to provide feedback.

AGENDA ITEM 4 – IBR

Mostafa Sedighizadeh (SPP) presented on a draft revision request for maturing the HVDC interconnection process. Members discussed protection experience with existing DC ties. Bruce Rosenthal with BridgeSource Utilities Solutions (BSUS) shared that national grid and south Australia have experience with HVDC and offered to pass on contacts to Mostafa.

SPCAG members were requested to review the proposed addition to the SPP Planning Criteria Section 8 and provide any feedback by the requested date in September. In the event that no feedback is received, the TWG will be informed that no concerns were raised by the SPCAG. Members requested to include SPP Planning Criteria Section 8 as topic going forward.

Mostafa Sedighizadeh (SPP) presented on the roadmap for IEEE-2800 standard adoption and requested feedback on the proposed staged implementation.

Mostafa Sedighizadeh (SPP) shared a data request from Doug Bowman (SPP) with a requested mid-September response date to identify IBR related events. Bruce Rosenthal (BSUS) suggested that SPP request OEM tickets for more event identification. Identified Steve Sollis (ERCOT) as a contact that is tracking events and may exchange information.

Chris Angland (OPPD) shared a recent NERC alert related to IBR modeling concerns: <https://www.nerc.com/pa/rrm/bpsa/Alerts%20DL/NERC%20Alert%20Level%20-%20Inverter-Based%20Resource%20Model%20Quality%20Deficiencies.pdf>

SYSTEM PROTECTION AND CONTROL ADVISORY GROUP MINUTES

8/13-14/2024

AGENDA ITEM 5 – SPP 2024 UFLS DESIGN ASSESSMENT SCOPE

Scott Jordan (SPP) provided an update that the UFLS study is underway. The SPCAG requested ad-hoc look at the Light Load case, due to reduced inertia and other variables, has an ongoing data request compilation. The consultant to perform the assessment, S&C, will proceed with the Light Load following completion of assessment on the summer and winter cases. Once experience is gained on the ad-hoc Light Load assessment, SPP will formulate a path forward for inclusion in next 5-year assessment. Scope changes would be reviewed by SPCAG and TWG. Members had expressed concerns with their UFLS settings being adequate to meet SPP criteria across additional seasonal cases. SPP plans to evaluate, as part of the Light Load assessment, whether the current criteria is adequate.

AGENDA ITEM 6 – SYNCHROPHASORS (PMU)

William Holden (SPP) shared a discussion with Steve Wadas (NPPD) regarding a question on SPP's PMU requirements. The scenario was for new generating facilities that shared a generator lead to the transmission system. The inquiry was whether PMU devices were required at the customer substation where the two facilities connect to the shared line. The result of this discussion was identification that PMU requirements are described in the GIA as being Transmission Owner Interconnection Facilities. A subsequent question arose on whether the PMU measurements should be limited to the generating facility terminal or extended to each transmission system terminal. Suggestion to the group is to pursue revisions to the [SPP PMU Communications Handbook](#) to clarify the GIA Article 8.5, Phasor Measurement Unit (PMU) Recording Equipment, by expanding the document scope from its current data exchange format to also describe the desired measurement locations.

Steve Wadas (NPPD) expressed that PMU measurements at each facility could assist with identifying the source of oscillation issues. Such an issue was recently identified with oscillations between nearby facilities that was mitigated by instructing the facility operator to utilize manual control. Shawn Jacobs (OGE) suggested that curtailment is an alternate solution that has also been effective in mitigating oscillations until OEM implementation of power conversion system modifications (i.e. control settings).

Members discussed whether requiring PMU measurements on customer stations, for visibility between facilities sharing a POI terminal, would provide value to system operation. Local PMU data storage, such as a phasor data collector (PDC), was not identified as necessary at this time in the [SPP PMU roadmap](#). Bruce Rosenthal (BSUS), suggested that, where available, existing equipment be utilized to meet the PMU requirements. Also that further development is needed

SYSTEM PROTECTION AND CONTROL ADVISORY GROUP MINUTES 8/13-14/2024

in SPP's data usage aspects such as state estimation and to prevent an invaluable requirement to stream unused data.

Mike Nugent (SPP) agreed to coordinate with SPP management, Cody Parker, and Legal on the appropriate route for revising the SPP PMU requirements to provide clarification on which substation terminal(s) to measure and stream voltage and current values. Presentation of the identified route, that may include the revision sponsor, SPCAG, GIAG, ORWG, and TWG, is expected at the November meeting.

AGENDA ITEM 7 – FERC ORDER 881

William Holden (SPP) provided an update on the SPP implementation of FERC Order 881 including the ongoing review of the [SPP Operational Ratings Methodology](#) document. The document is intended to be published prior to the next SPCAG quarterly meeting. Members were requested to volunteer or provide an alternative suggestion on drafting language for the AARITF to include in the Protection Relays section in order to reflect the NERC SPCWG position paper. Chris Angland (OPPD) agreed to coordinate with members.

AGENDA ITEM 8 – RELIABILITY GROUPS

NERC SPCWG

Lynn Schroeder (SECI) reminded the group on the NERC website navigation provided during the prior meeting. RSTC is reviewing comments to the SPCWG *Draft Steady State Approach for PRC-024-3 Evaluation for Inverter-Based Resources* document, outlining how the high-side voltage measurement location may be projected to the IBR terminal protection settings, found on the [RSTC Approved Documents Page](#) under the White Papers section.

The Maintenance for Ethernet P&C technical reference drafting team is working on identifying a definition of protection system as a standard inclusion for TPL-001-5 footnote 13 revision for a trip circuit. The existing MIDAS group, transitioning to a misoperation task force, is focusing on relay types for cause codes and identifying mis-operation issues that may have been prevented with proper commissioning.

The NERC SPCWG discussed the FERC ANOPR for DLR, noting potential extension of some findings from the SPCWG *Orders 881/881-A Position Paper*. Identified that without further considerations DLR that exceed 130% of highest seasonal rating are at higher risk of an undesired protection operation.

SYSTEM PROTECTION AND CONTROL ADVISORY GROUP MINUTES

8/13-14/2024

NERC STANDARDS

Shannon Mickens (SPP) discussed the NERC project roadmap and FERC Order 901 prioritization of NERC Standards as well as IBR and DER related projects.

MRO PRS MEETING

Glenn Bryson (AEP) deferred an update to another member indicating that he was unable to join the recent PRS meeting and that his membership term is ending at the end of the year.

Lynn Schroeder (SECI) shared that a similar NERC SPCWG update was provided at the PRS [June meeting](#). At that meeting Jake Bernhagen (MRO) provided an update from the NERC MIDASUG on a new scoring methodology in documents under review as well as the groups retirement and replacement. A review of recent misoperations identified a lower count with many not occurring during fault.

The next quarterly meeting was discussed as being scheduled jointly with the WECC RWG and adjacent to the NERC 2024 ERO Bulk Electric System Protection System Misoperation Reduction Workshop in Salt Lake City, UT.

Technical presentation by PRS Chair Dennis Lu (Manitoba Hydro) included a request for future presentations and shared how a pot scheme negative sequence issue caused a misoperation. Technical presentation by Rochelle Trefry (MidAmerican Energy Company) presented on a misoperation with a SEL-411L due to a clock synchronization issue and considerations on implementation of C37.94 and C37.118 time standards for improved accuracy.

AGENDA ITEM 9 – PROTECTION IN YOUR SHOP

Chris Angland (OPPD) requested members to review their efforts and experiences to identify and share knowledge. Matt (WFEC) shared an intention to present on a wide area outage event that occurred in May. Chris Angland (OPPD) indicated that Zachary Johnston (OPPD) may be preparing a presentation for a future meeting. Steve Wadas (NPPD) anticipates being able to provide future topics.

Bruce Rosenthal (BSUS) shared that data center load customers are interested in clear and concise interconnection processes and inquired about evaluating system protection impacts from large sudden shifts in energy demand. Proposed semi-annual briefing for coordinating with the mission of the SPCAG as well as development and inclusion of data center or other large loads into EMT study models. Steve Wadas (NPPD) shared that fluctuations in load impact voltage control including transformer taps and other equipment switching based on load ramp

SYSTEM PROTECTION AND CONTROL ADVISORY GROUP MINUTES 8/13-14/2024

rates and in-rush. Identified the need for coordination of protection and reliance on power sources. William Holden (SPP) explained that studies are typically performed using positive sequence based models which utilize much lower fidelity than EMT which is appropriate for most analysis.

AGENDA ITEM 10 – CLOSING ADMINISTRATIVE DUTIES

William Holden (SPP) reviewed new, open and closure pending action items. Action item 170 was marked as Closed as the SPCAG received clarity on Light Load evaluation in the SPP 2024 UFLS Design Assessment Scope. Action Item 171 was added for SPCAG to coordinate draft language for the AARITF FERC Order 881 guidance related to system protection and control. Action Item 172 was added for SPCAG to coordinate a representative to provide MRO PRS updates to the SPCAG. Action Item 173 was added for SPCAG to monitor HVDC RR progress and provide feedback consistent with the group's scope. Action Item 174 was added for SPCAG to investigate SPP documentation revisions for additional guidance on PMU voltage and current measurement locations with stakeholder feedback from at least GIAG, TWG, and ORWG. A record of open action items is an attachment to these minutes.

William Holden (SPP) shared that the 2023-2024 term for Chair is ending at the end of the year. The Corporate Governance Committee is seeking nominations for the 2025-2026 term for consideration and appointment by the Board of Directors. Requested the group for their recommendation.

Chris Angland (OPPD) motioned to nominate Vice Chair David Oswald (Liberty) as the recommended nomination by the Corporate Governance Committee for consideration and appointment by the Board of Directors for the 2025-2026 SPCAG Chair. John Anderson (Evergy) seconded the motion with David Oswald (Liberty) accepting the recommendation. The motion carried without opposition or abstention.

William Holden (SPP) shared that a couple members are seeking to transition out of the group including Chris Angland (OPPD). The coordinated plan is to seek a consolidated new member nominations from MOPC representatives. The request will be made after the November meeting for alignment with the end of the Chair term. A proposal was made for the 2025 meeting schedule to be included in the November meeting agenda.

The 2024 meeting schedule is unchanged and includes the following:

- November 12-13, 2024 (Teleconference)

SYSTEM PROTECTION AND CONTROL ADVISORY GROUP MINUTES
8/13-14/2024

Chris Angland (OPPD) recessed the SPCAG at 4:04 PM (Mountain) on 8/13/2024 and adjourned the SPCAG at 10:55 AM (mountain) on 8/14/2024.

Respectfully Submitted,

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

**SYSTEM PROTECTION AND CONTROL ADVISORY GROUP MINUTES
8/13-14/2024**

SUMMARY OF ATTACHMENTS:

SPCAG 8/13-14/2024 Agenda (pg. 10-11)

SPCAG 8/13-14/2024 Member Attendance (pg. 12)

SPCAG Action Item Tracking (pg. 13-16)

SPCAG Approved *May 14-15, 2024 SPCAG Meeting Minutes*

SOUTHWEST POWER POOL, INC.

SYSTEM PROTECTION AND CONTROL ADVISORY GROUP MEETING

August 13, 2024 1:00PM - 5:00PM MPT
August 14, 2024 8:00AM - 12:00PM MPT

Xcel Offices, Denver, Colorado

AGENDA

1. Administrative Items:
 - a. Call to Order..... Chris Angland
 - b. AttendanceWilliam Holden
 - c. Antitrust Statement.....William Holden
 - d. Agenda Review Chris Angland
 - e. Review [minutes of May 14-15, 2024 meeting](#) (Approval) Chris Angland
2. Remedial Action Schemes: [spp.org/Documents/62226/SPP RC PRC-012-2_0820EXT00137.pdf](http://spp.org/Documents/62226/SPP_RC_PRC-012-2_0820EXT00137.pdf)
 - a. Thunderhead RAS Retirement (Update)..... Tom Kay
 - b. Rapid City RAS Retirement (Update) Philip Westby
 - c. Judson Temporary RAS (Update)..... Philip Westby
3. SPP System Planning Short Circuit Model: [SIR544](#) (Update)Eddie Watson
4. Inverter Based Resources (IBR) (Update):
 - a. IEEE 2800: Summary of gap analysis & Adoption Next Steps.....Mostafa Sedighizadeh
 - b. SPP HVDC Planning Criteria & Manual.....Mostafa Sedighizadeh
5. SPP 2024 [UFLS](#) Design Assessment Scope: Light Load (Discussion)..... Scott Jordan
6. [PMU](#) Measurements (Discussion)..... Micheal Nugent
7. FERC Order 881/[AARITF](#) (Update).....William Holden
8. Reliability Groups (Update):
 - a. [NERC SPCWG](#)..... Lynn Schroeder
 - b. [NERC Standards](#).....Shannon Mickens
 - c. [MRO PRS](#).....Glenn Bryson
9. Protection in your shop (Discussion) Chris Angland

10. Closing Administrative Duties:

- a. Action Item Review.....William Holden
- b. Chair Nomination (Approval) and Membership (Update).....William Holden
- c. Meeting Planning (Discussion)..... Chris Angland
 - i. November 12-13, 2024 (Teleconference)
- d. Adjourn meeting Chris Angland

SPCAG MEMBER ATTENDANCE:

Name	Company	Role	8/13/2024	8/14/2024
*Chris Angland	Omaha Public Power District	Chair	✓	✓
*David Oswald	Liberty Utilities	Vice Chair	✓	✓
*John Anderson	Eergy, Inc	Member	✓	✓
*Matt Boersema Neudahl	Western Farmers Electric Cooperative	Member	✓	✓
Glenn Bryson	American Electric Power	Member	✓	✓
Michael Fleck	ITC Great Plains	Member		✓
Shawn Jacobs	Oklahoma Gas & Electric	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	✓	✓

*in-person attendee

SPCAG ACTION ITEMS

Action Item	Origin Date	Action Item	Update Summary	Status	Owner	Date Closed
157	02/10/21	SPP Staff to reach out to SPCAG to determine interest in developing PSSE/ASPEN/CAPE Conversion Whitepaper.	<p>5/12/21: Trey to send list to Lynn, and resend the request for participation.</p> <p>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.</p> <p>11/10/21: Closure pending review of NERC paper, Q2 2022.</p> <p>5/11/22: Closure pending review of NERC paper, Q2 2022.</p> <p>8/9/22: Closure pending review of NERC paper, Q4 2022.</p> <p>11/9/22: Closure pending discussion of need for additional whitepaper.</p> <p>2/7/23: Closure pending discussion of need for additional whitepaper.</p> <p>4/25/23: Closure pending evaluation of NERC paper incorporation into MDAG process</p> <p>11/8/23: Closure pending MDAG process validations being evaluated and updated to include NERC paper recommendations, Chris Angland will investigate further to achieve closure</p> <p>2/14/24: No progress to update this meeting</p> <p>5/15/24: Re-evaluate mid-2025 following SPP modeling process development to document gaps or solutions identified.</p> <p>8/14/24: Re-evaluate mid-2025 following SPP modeling process development to document gaps or solutions identified.</p>	Closure pending	William Holden	
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 22nd 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> <p>11/9/22: Eric Sullivan (SPP) provided an update on the initiative and opportunity for feedback</p>	In progress	Zach Sabey	

Action Item	Origin Date	Action Item	Update Summary	Status	Owner	Date Closed
			<p>on the current short circuit model development.</p> <p>Lynn Schroeder (SECI) provided a summary of the NERC SPCWG Inter-Entity Short Circuit whitepaper. Nick Stueve (Evergy) demonstrated a short circuit model comparison tool</p> <p>2/7/23: SPCAG requested SPP Modeling Staff provide an overview at the April '23 meeting on the status of the initiative, MDAG Focus Group meetings, improvements steps, and data requests.</p> <p>4/25/23: SPP Modeling Staff deferred detailed update to the next meeting in August.</p> <p>11/8/23: Sub-group to form and update initiative language</p> <p>2/14/24: Eric Sullivan to schedule meeting.</p> <p>5/15/24: Eddie Watson provided an update on modeling teams efforts</p> <p>8/14/24: Eddie Watson provided an update on modeling teams efforts. SPCAG offered their assistance to ensure appropriate scope and development</p>			
165	05/11/22	SPCAG to explore SPP Roadmap for Short Circuit modeling program purchase.	<p>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</p> <p>11/9/22: Eric Sullivan (SPP) provided an update on the initiative</p> <p>2/7/23: no progress to report</p> <p>4/25/23: Closure pending SIR544 prioritization agreeable by SPCAG</p> <p>11/8/23: Closure pending SIR544 prioritization agreeable by SPCAG</p> <p>2/14/24: Closure pending SIR544 prioritization agreeable by SPCAG</p> <p>5/15/24: Eddie Watson provided an update on modeling teams efforts</p> <p>8/14/24: Eddie Watson provided an update on modeling teams efforts. SPCAG offered their assistance to ensure appropriate scope and development</p>	Closure pending	William Holden	
166	05/11/22	SPCAG to create sub-group for coordination with MDAG.	<p>8/10/22: SPCAG members have been attending MDAG Focus Group meetings</p> <p>11/9/22: Eric Sullivan (SPP) provided an update on opportunity for feedback on the current short circuit model development.</p> <p>2/7/23: no progress to report</p> <p>4/25/23: SPP Modeling staff invited SPCAG members to participate in MDAG model process</p> <p>11/8/23: Sub-group to form and update initiative language</p> <p>2/14/24: Eric Sullivan to schedule meeting</p>	In progress	John Anderson	

Action Item	Origin Date	Action Item	Update Summary	Status	Owner	Date Closed
			<p>5/15/24: Meeting with Eric and sub-group occurred, survey was developed and provided but not distributed by modeling</p> <p>8/14/24: Eddie Watson provided an update on modeling teams efforts. SPCAG offered their assistance to ensure appropriate scope and development</p>			
167	08/09/22	Submit an initiative request to improve the MDAG short circuit models for use with system protection and control	<p>11/9/22: Eric Sullivan (SPP) provided an update on the initiative</p> <p>2/7/23: no progress to report</p> <p>4/25/23: SIR544 submitted, in-process for prioritization by working groups (e.g. TWG)</p> <p>8/1/23: Eric Sullivan (SPP) provided an update on the initiative. Will consult with SPP management then provide an update by email.</p> <p>11/8/23: Sub-group to form and update initiative language</p> <p>2/14/24: Eric Sullivan to schedule meeting, to be discussed in this sub-group</p> <p>5/15/24: Eddie Watson provided an update on modeling teams efforts</p> <p>8/14/24: Eddie Watson provided an update on modeling teams efforts. SPCAG offered their assistance to ensure appropriate scope and development</p>	In progress	William Holden	
169	04/25/23	SPCAG to be engaged in TWG and MDAG to appropriately prioritize SIR544	<p>11/8/23: Sub-group to form and update initiative language</p> <p>2/14/24: Eric Sullivan to schedule meeting, to be discussed in this sub-group</p> <p>5/15/24: Eddie Watson provided an update on modeling teams efforts. SPCAG offered their assistance to ensure appropriate scope and development</p> <p>8/14/24: Eddie Watson provided an update on modeling teams efforts. SPCAG offered their assistance to ensure appropriate scope and development</p>	In progress	William Holden	
170	11/08/23	Review and approve the SPP 2024 UFLS Design Assessment Scope in consideration of Light Load evaluation	<p>11/8/23: ad-hoc meeting to evaluate and approve: budget impacts, vendor availability, case conditions compared with TPL sensitivity case, UFLS entity data request, and UFLS data request updates.</p> <p>2/14/24: Completed with out-of-cycle commitment for Light Load</p> <p>5/15/24: Members requested Scott Jordan address at the next meeting how SPP will utilize Light Load results with respect to NERC Standard PRC-006 and impacts to the three 10% steps required by the SPP UFLS Plan</p> <p>8/14/24: Scott Jordan provided an update that the Light Load assessment will be used to inform process and requirement changes prior to inclusion in future study scope</p>	Closed	William Holden	08/14/24

Action Item	Origin Date	Action Item	Update Summary	Status	Owner	Date Closed
171	08/13/24	FERC Order 881 guidance related to system protection and control	8/13/24: Chris Angland agreed to coordinate draft language for the AARITF	Not Started	Chris Angland	
172	08/14/24	Updates from MRO PRS	8/14/24: Chris Angland agreed to coordinate a representative to provide MRO PRS updates to the SPCAG	Not Started	Chris Angland	
173	08/14/24	Review HVDC process for impacts to protection	8/14/24: SPCAG to monitor HVDC RR progress and provide feedback consistent with the group's scope	Not Started	David Oswald	
174	08/14/24	Investigate SPP documentation revisions for additional guidance on PMU voltage and current measurement locations with stakeholder feedback from at least GIAG, TWG, and ORWG.	8/14/24: Mike Nugent agreed to identify the appropriate path with SPP management and Legal and share finding at the November meeting	Not Started	Michael Nugent	

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

May 14, 2024 1:00PM - 5:00PM (CPT)
May 15, 2024 8:00AM - 11:00PM (CPT)

Energy Offices, Kansas City, Missouri

SUMMARY OF MOTIONS AND ACTION ITEMS

MOTIONS:

- Ken Zellefrow (CUS) motioned to approve the February 13-14, 2024 SPCAG Meeting Minutes. David Oswald (Liberty) seconded the motion. The motion carried without opposition or abstention.
- Steve Wadas (NPPD) motioned for approval of retirement of the eastside RCDC RAS. Spencer Riddle (WAPA) seconded the motion. The motion carried without opposition or abstention.

ACTION ITEMS:

- None

SYSTEM PROTECTION AND CONTROL ADVISORY GROUP MINUTES 5/14-15/2024

MINUTES

AGENDA ITEM 1 – ADMINISTRATIVE ITEMS

SPCAG Chair Chris Angland (OPPD) called the meeting to order at 1:00 PM on 5/14/2024. The meeting reconvened at 8:01 AM on 5/15/2024.

SPCAG Staff Secretary 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.

Chris Angland (OPPD) reviewed the agenda. A record of the agenda is an attachment to these minutes.

Ken Zellefrow (CUS) motioned to approve the *February 13-14, 2024 SPCAG Meeting Minutes*. David Oswald (Liberty) seconded the motion. The motion carried without opposition or abstention.

AGENDA ITEM 2 – REMEDIAL ACTION SCHEMES

THUNDERHEAD

Tom Kay (Invenergy) provided an update on the Thunderhead RAS retirement previously approved. Progress is being made on implementing a fiber communication link between Grand Island and Holt along with design of the protection setting changes required to retire the RAS and implement the operating guide. Coordination is ongoing with NPPD and WAPA to achieve a retirement date prior to November 1st, 2024.

RAPID CITY

Philip Westby (BEPC) provided an overview of the Rapid City RAS, history of changes, analysis performed by Schweitzer, overview of completed discussions with NPPD and WAPA, and requested recommendation for retirement. Retirement recommendations have been provided by both TWG and ORWG. These recommendations along with the SPCAG's will be provided to MOPC for approval followed by the SPP Reliability Coordinator.

SYSTEM PROTECTION AND CONTROL ADVISORY GROUP MINUTES 5/14-15/2024

Steve Wadas (NPPD) motioned for approval of retirement of the eastside RCDC RAS. Spencer Riddle (WAPA) seconded the motion. The motion carried without opposition or abstention.

JUDSON TEMPORARY RAS

Philip Westby (BEPC) provided an update that the Judson temporary RAS went into service March 1st, 2024 and has since provided constraint relief. Roundup to Kummer Ridge project construction commenced in April 2024 with completion anticipated by late 2025.

AGENDA ITEM 3 – SPP SYSTEM PLANNING SHORT CIRCUIT MODEL

Eddie Watson (SPP) provided an update on the SPP system short circuit model development effort under [SIR544](#). The initiative requested by the SPCAG is for the MDAG short circuit models to include a separate validated ASPEN model to be used in system protection in addition to PSS/E model currently developed. The initiative was not budgeted for the current financial year and is anticipated to be included in the upcoming budget cycle finalized in July 2024 timeframe. Modeling staff is in the process of identifying a consultant or firm to perform conversion work and/or process development. Initiative may involve a consolidation with another parallel effort. The new annual model will be included in the 2025 model series scheduled for PSS/E portion to be completed in March 2025 with the ASPEN conversion to follow with delivery in approximately Q2 2025. Eddie will work with Eric and William to coordinate on SOW information for bids for training or automation. SPCAG members were asked to review SIR544 and provide feedback.

AGENDA ITEM 4 – IBR

Mostafa Sedighizadeh (SPP) presented on IEEE-2800 standard adoption and the IIRRG progress on the effort. Concerns were expressed regarding OEM feedback on timing needed for developing testing capabilities and SPP's perspective on retroactive application of the standard to existing facilities.

Shannon Mickens (SPP) member of the internal IIRRG, start on legal definitions such as AGIR, shared with IEEE-1547, to identify the applicable entity.

Scott Jordan (SPP) provided an update on SPP adoption of IEEE-1547. During internal and external discussions, regulatory, legal, etc. discovered that the definition of authority governing interconnection requirements (AGIR) as a limitation to implementation. SPP is pursuing a technical adoption of the standard with a detailed reference and is in discussion with EPRI staff

SYSTEM PROTECTION AND CONTROL ADVISORY GROUP MINUTES 5/14-15/2024

for developing a document for sharing at a subsequent meeting. The document would provide entities with coordinated settings guidance.

AGENDA ITEM 5 – FERC ORDER 881

William Holden (SPP) provided an update on the SPP implementation of FERC Order 881 and introduced the group to the Protection Relays section of the [SPP Operational Ratings Methodology](#) document drafted for review by the AARITF. Members shared concerns regarding the conditions that would necessitate facility ratings reflecting existing protection system equipment capabilities or when settings may be required to be adjusted. For example, facility ratings may need to be limited to a limit from a current transformer ratio or mechanical relay capability.

AGENDA ITEM 6 – GEOMAGNETIC DISTURBANCE PROGRAM

Chris Colson (WAPA) presented on recent events associated with awareness and defense against Geomagnetically-induced current (GIC) from Geomagnetic disturbances (GMD) from space weather. This past weekend's event was a series of sustained Corona Mass Ejection (CME) which may cause an electrojet inducing magnetic and geoelectric fields. GIC are quasi-DC that can cause half-cycle saturation and harmonics leading to temperature rise in transformers.

Non-invasive Hall-effect current transformers were installed on the neutral of two transformers in South Dakota in the range of \$15-20k each including SCADA interfacing equipment. Additionally, a neutral blocking device (NBD), DOE funded and developed by Emprimus, was inserted between neutral bushing and ground of each transformer. The NBDs are comprised of three parallel legs. The normal current path is through both AC and DC breakers and a small resistor needed for measurement. During GIC events the DC breaker and AC breakers have a coordinated opening which diverts current through the second leg comprised of a resistor and capacitor in series which effectively blocks the quasi-DC current while allowing AC and fault currents to flow. Once both breakers are open, the DC breaker is then reclosed to prepare the AC breaker to be available to quickly reclose if needed. The third leg includes a spark gap to provide a path for overvoltage flashover if needed. The initial NBD pickup value for measured DC currents was implemented at 5 Amps, well below the 75 Amps determined to potentially cause damage for this device, and was based on experience with past events and modeling.

A solar storm event occurred around 8:35 PM CDT on Friday March 22, 2024 with an X1.1 class flare was observed. (X class 8 event was observed over the weekend of May 10-12, 2024.) At 9:36 AM CDT on Sunday March 24, 2024 the NBD on the White transformer observes the GIC and activates several times during the event to block the GIC whenever it exceeded the pickup

SYSTEM PROTECTION AND CONTROL ADVISORY GROUP MINUTES 5/14-15/2024

value. TVA also installed NBD under the same DOE pilot program. They also experienced GIC during the March event.

The NERC Standard EOP-010 procedures rely on national-level alerts being monitored by RC being relayed to each Transmission Operator. The Hall-effect current transformers provided in-situ monitoring of GICs allowing WAPA Transmission Operator to alert SPP a full hour ahead of the normal process.

Since installation the record amount of GIC on these transformers was 16-17 Amps over the past 2.5 Years. The event occurring the weekend of May 10-12, 2024, with 9-10 distinct CMEs, surpassed this with a new record of 62 Amps being observed. During this event, WAPA experienced high top oil temperature alarms even on lightly loaded devices (i.e. 15% loading) on devices operated but not owned by WAPA. Telemetry of temperatures was not available, only alarms.

AGENDA ITEM 7 – RELIABILITY GROUPS

NERC SPCWG

Lynn Schroeder (SECI) informed the group of a scheduled review of the draft *Transmission System Phase Backup Protection* document and drew attention to transformer overload and protection. This document is located under Technical Reference Documents on the [RSTC Approved Documents Page](#). Also located on this page under the White Papers section is the *SPCWG Orders 881/881-A Position Paper* and *Draft Steady State Approach for PRC-024-3 Evaluation for Inverter-Based Resources*. This draft, which converses on differences between inverter terminals and POI, is under review and once comments are addressed will go to the RSTC for approval.

On the [Compliance Guidance](#) page under the Implementation Guidance section and Proposed Implementation Guidance subsection is the PRC document titled *PRC-023-6 R1 Determination of Practical Transmission Relaying Loadability Settings v1_1* which is undergoing a revision for some modernization updates particularly on OOS protection and reformatting. This document should be reviewed against implementation of FERC Order 881 and AAR processes. As a NERC Standard guidance document, different than a white paper, this document may be utilized by auditors.

The April 11, 2024 SPCAG meeting also included discussion of the Maintenance for Ethernet P&C technical reference, similar to PRC-005, TPL-001 SAR footnote 13 White Paper, and FERC Order for IBRs and grid transformation prioritization delayed drafting team.

SYSTEM PROTECTION AND CONTROL ADVISORY GROUP MINUTES 5/14-15/2024

The purpose of the TPL-001 SAR for footnote 13 is to clarify protection community guidance for single trip coil exception for planning criteria. Trip coil with monitoring can be excluded but not the entire circuit. Pursuit is for a non-delayed method such as an implementation guide. Follow up items with the drafting team includes DC fuses.

Misoperation task force is under development to look into issues that may have been solved by commissioning or other issues. The existing MIDAS group may be dissolved coinciding with this new group taking on the responsibilities for deep dives. Next meeting in July hosted by Hydro Quebec. Each group includes subgroups that don't require membership in the parent group for participation.

Three new IBR focused standards are under development.

NERC STANDARDS

Shannon Mickens (SPP) discussed FERC Order 901 prioritization of NERC Standards regarding the 11 cold weather and virtualization, internal network and security monitoring, IBR performance and disturbance monitoring, extreme weather, and any remaining high priority projects. There were also 14 medium and low priority projects with postings having been deferred to place industry focus on high priority projects. There are now reduced timeframes for comments and feedback which is concerning for wholistic coordination and quality industry comments. Four high level milestones were established for work plan development and implementation. A definition for IBR plant marginally passed ballot whereas definitions for IBR unit and distributed energy resource (DER) remain under development.

MRO PRS MEETING

Lynn Schroeder (SECI) provided an overview of the MRO Q1 2024 Protective Relay Subgroup Meeting that occurred on March 12, 2024. It was recommended not to use high speed drivers for protective relays on solid state contacts. There is a new load loss effort for TADS. OG&E provided an oral report on their misoperations that may be a good topic for the next SPCAG meeting. The Q2 meeting is scheduled for June 11, 2024, the Q3 meeting will occur at the NERC misoperation workshop with a joint meeting between WECC and MRO PRS in September, and the Q4 meeting is scheduled for December 10, 2024.

AGENDA ITEM 8 – PROTECTION IN YOUR SHOP

Matt Wyatt (Liberty) presented on settings development automation internally developed that interfaces Excel with ASPEN and AutoCAD using VBA. An identified pitfall is training new staff on the system. New staff are advised to learn how settings are determined and set prior to

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.

SYSTEM PROTECTION AND CONTROL ADVISORY GROUP MINUTES 5/14-15/2024

adoption of automation so ensure that settings are understood. PRC-027 peer reviews include automation though doesn't offer much additional guidance.

Chris Angland (OPPD) requested volunteer(s) for next meeting and will follow-up with OG&E on sharing their misoperation report with this group.

AGENDA ITEM 11 – CLOSING ADMINISTRATIVE DUTIES

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

Action Item 157 remained as Closure pending to evaluate NERC whitepaper on short circuit models integration into the MDAG process. 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 Closure Pending to allow SIR544 prioritization to be agreeable to the SPCAG. Action item 166 remains marked as In Progress with SPCAG members invited to participate in the MDAG model process. Action item 167 remains marked as In Progress with SIR544 being scoped and budgeted for inclusion in the 2025 Series MDAG models. Action item 169 was marked as In Progress with SPCAG members offering assistance with scoping and budgeting SIR544. Action item 170 remains marked as Closure Pending for SPCAG to receive clarity on Light Load evaluation in the SPP 2024 UFLS Design Assessment Scope. A record of action items is an attachment to these minutes.

The 2024 meeting schedule and locations were discussed.

- August 13-14, 2024 (In-person, Denver)
- November 12-13, 2024 (Teleconference)

Chris Angland (OPPD) recessed the SPCAG at 4:37 PM on 5/14/2024 and adjourned the SPCAG at 12:03 PM on 5/15/2024.

Respectfully Submitted,

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

**SYSTEM PROTECTION AND CONTROL ADVISORY GROUP MINUTES
5/14-15/2024**

SUMMARY OF ATTACHMENTS:

SPCAG 5/14-15/2024 Agenda (pg. 9)

SPCAG 5/14-15/2024 Member Attendance (pg. 10)

SPCAG Action Item Tracking (pg. 11-13)

SPCAG Approved *February 13-14, 2024 SPCAG Meeting Minutes*

**SOUTHWEST POWER POOL, INC.
SYSTEM PROTECTION AND CONTROL ADVISORY GROUP MEETING**

May 14, 2024 1:00PM - 5:00PM CPT
May 15, 2024 8:00AM - 12:00PM CPT
Evergny Offices, Kansas City, Missouri

AGENDA

1. Administrative Items:
 - a. Call to Order..... Chris Angland
 - b. AttendanceWilliam Holden
 - c. Antitrust Statement.....William Holden
 - d. Agenda Review Chris Angland
 - e. Review minutes of February 13-14, 2024 meeting (Approval) Chris Angland
2. Remedial Action Schemes: [spp.org/Documents/62226/SPP RC PRC-012-2 0820EXT00137.pdf](https://spp.org/Documents/62226/SPP_RC_PRC-012-2_0820EXT00137.pdf)
 - a. Thunderhead RAS Retirement (Update)..... Tom Kay
 - b. Rapid City RAS Retirement (Approval)..... Philip Westby
 - c. Judson Temporary RAS (Update)..... Philip Westby
3. SPP System Planning Short Circuit Model: [SIR544](#) (Update)Eric Sullivan
4. Inverter Based Resources (IBR) (Update):
 - a. IEEE 2800: Summary of gap analysis & Adoption Next Steps.....Mostafa Sedighizadeh
 - b. SPP Adoption of IEEE-1547 Scott Jordan
5. FERC Order 881 (Update)William Holden
6. Geomagnetic Disturbance Program (Event Review) Chris Colson
7. Reliability Groups (Update):
 - a. [NERC SPCWG](#)..... Lynn Schroeder
 - b. [NERC Standards](#).....Shannon Mickens
 - c. [MRO PRS](#).....Glenn Bryson
8. Protection in your shop:
 - a. Settings Development and Automation.....Matt Wyatt
9. Closing Administrative Duties:
 - a. Review of New, Open and Closure Pending Actions.....William Holden
 - b. Discuss upcoming meeting schedule, topics, and location Chris Angland
 - i. August 13-14, 2024 (In-person, Xcel Offices, Denver, Colorado)
 - ii. November 12-13, 2024 (Teleconference)
 - c. Adjourn meeting Chris Angland

SPCAG MEMBER ATTENDANCE:

Name	Company	Role	5/14/2024	5/15/2024
Chris Angland	Omaha Public Power District	Chair	✓	✓
David Oswald	Liberty Utilities	Vice Chair	✓	✓
John Anderson	Eergy, Inc	Member	✓	✓
Matt Boersema Neudahl	Western Farmers Electric Cooperative	Member	✓	✓
Glenn Bryson	American Electric Power	Member	✓	
Michael Fleck	ITC Great Plains	Member	✓	✓
Shawn Jacobs	Oklahoma Gas & Electric	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	Unavailable	Unavailable
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
157	02/10/21	SPP Staff to reach out to SPCAG to determine interest in developing PSSE/ASPEN/CAPE Conversion Whitepaper.	<p>5/12/21: Trey to send list to Lynn, and resend the request for participation.</p> <p>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.</p> <p>11/10/21: Closure pending review of NERC paper, Q2 2022.</p> <p>5/11/22: Closure pending review of NERC paper, Q2 2022.</p> <p>8/9/22: Closure pending review of NERC paper, Q4 2022.</p> <p>11/9/22: Closure pending discussion of need for additional whitepaper.</p> <p>2/7/23: Closure pending discussion of need for additional whitepaper.</p> <p>4/25/23: Closure pending evaluation of NERC paper incorporation into MDAG process</p> <p>11/8/23: Closure pending MDAG process validations being evaluated and updated to include NERC paper recommendations, Chris Angland will investigate further to achieve closure</p> <p>2/14/24: No progress to update this meeting</p> <p>5/14/24: Re-evaluate mid-2025 following SPP modeling process development to document gaps or solutions identified.</p>	Closure pending	William Holden	
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</p>	In progress	Zach Sabey	

Action Item	Origin Date	Action Item	Update Summary	Status	Owner	Date Closed
			<p>submit an initiative request to improve the MDAG short circuit models for use with system protection and control</p> <p>11/9/22: Eric Sullivan (SPP) provided an update on the initiative and opportunity for feedback on the current short circuit model development. Lynn Schroeder (SECI) provided a summary of the NERC SPCWG Inter-Entity Short Circuit whitepaper. Nick Stueve (Evergy) demonstrated a short circuit model comparison tool</p> <p>2/7/23: SPCAG requested SPP Modeling Staff provide an overview at the April '23 meeting on the status of the initiative, MDAG Focus Group meetings, improvements steps, and data requests.</p> <p>4/25/23: SPP Modeling Staff deferred detailed update to the next meeting in August.</p> <p>11/8/23: Sub-group to form and update initiative language</p> <p>2/14/24: Eric Sullivan to schedule meeting.</p> <p>5/14/24: Eddie Watson provided an update on modeling teams efforts</p>			
165	05/11/22	SPCAG to explore SPP Roadmap for Short Circuit modeling program purchase.	<p>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</p> <p>11/9/22: Eric Sullivan (SPP) provided an update on the initiative</p> <p>2/7/23: no progress to report</p> <p>4/25/23: Closure pending SIR544 prioritization agreeable by SPCAG</p> <p>11/8/23: Closure pending SIR544 prioritization agreeable by SPCAG</p> <p>2/14/24: Closure pending SIR544 prioritization agreeable by SPCAG</p> <p>5/14/24: Eddie Watson provided an update on modeling teams efforts</p>	Closure pending	William Holden	
166	05/11/22	SPCAG to create sub-group for coordination with MDAG.	<p>8/10/22: SPCAG members have been attending MDAG Focus Group meetings</p> <p>11/9/22: Eric Sullivan (SPP) provided an update on opportunity for feedback on the current short circuit model development.</p> <p>2/7/23: no progress to report</p>	In progress	John Anderson	

Action Item	Origin Date	Action Item	Update Summary	Status	Owner	Date Closed
			<p>4/25/23: SPP Modeling staff invited SPCAG members to participate in MDAG model process</p> <p>11/8/23: Sub-group to form and update initiative language</p> <p>2/14/24: Eric Sullivan to schedule meeting</p> <p>5/14/24: Meeting with Eric and sub-group occurred, survey was developed and provided but not distributed by modeling</p>			
167	08/09/22	Submit an initiative request to improve the MDAG short circuit models for use with system protection and control	<p>11/9/22: Eric Sullivan (SPP) provided an update on the initiative</p> <p>2/7/23: no progress to report</p> <p>4/25/23: SIR544 submitted, in-process for prioritization by working groups (e.g. TWG)</p> <p>8/1/23: Eric Sullivan (SPP) provided an update on the initiative. Will consult with SPP management then provide an update by email.</p> <p>11/8/23: Sub-group to form and update initiative language</p> <p>2/14/24: Eric Sullivan to schedule meeting, to be discussed in this sub-group</p> <p>5/14/24: Eddie Watson provided an update on modeling teams efforts</p>	In progress	William Holden	
169	04/25/23	SPCAG to be engaged in TWG and MDAG to appropriately prioritize SIR544	<p>11/8/23: Sub-group to form and update initiative language</p> <p>2/14/24: Eric Sullivan to schedule meeting, to be discussed in this sub-group</p> <p>5/14/24: Eddie Watson provided an update on modeling teams efforts. SPCAG offered their assistance to ensure appropriate scope and development</p>	In progress	William Holden	
170	11/08/23	Review and approve the SPP 2024 UFLS Design Assessment Scope in consideration of Light Load evaluation	<p>11/8/23: ad-hoc meeting to evaluate and approve: budget impacts, vendor availability, case conditions compared with TPL sensitivity case, UFLS entity data request, and UFLS data request updates.</p> <p>2/14/24: Completed with out-of-cycle commitment for Light Load</p> <p>5/14/24: Members requested Scott Jordan address at the next meeting how SPP will utilize Light Load results with respect to NERC Standard PRC-006 and impacts to the three 10% steps required by the SPP UFLS Plan</p>	Closure pending	William Holden	