

The SPP Reliability Coordinator

RELIABILITY PLAN

Southwest Power Pool

June 1, 2015

Change History

6/1/05	Complete re-write to align with revised NERC Policy 9 as approved by NERC 06/15/04.
6/15/05	Per NERC ORS request, removed Appendix B – Reliability Assessment Process and Procedure.
1/11/06	Added CLECO to the plan.
1/26/06	Added Constellation Balancing Authorities BCA, CNWY, DENL, DERS, PUPP, and WMUC to the plan.
1/27/06	Updated to reflect changes in SPP processes and procedures after the SPP EIS Market is implemented.
2/9/06	Made necessary changes to conform with NERC functional model terminology present in existing reliability standards.
9/8/06	Added LAGN to the plan with an effective date of November 1, 2006
12/5/06	Added Constellation Balancing Authority BUBA
1/1/09	Changes consistent with Criteria 12.3. Corrected Batesville Generating Station acronym from BCA to BBA. Added Missouri Public Service (MPS) to footprint.
4/1/09	Added Nebraska entities – LES, NPPD and OPPD
10/1/09	Added Constellation Balancing Authorities OMLP and PLUM
4/1/10	DENL Balancing Authority moved from operation by Constellation to operation by NRG and changing DENL to NLR
1/1/11	CNWY and WMUC Balancing Authority moved from operation by Constellation to operation by NRG and changed from CNWY to CWAY and from WMUC to WMU
2-15-11	City Utilities of Springfield (SPRM) becoming a stand-alone Balancing Authority area instead of a TOP imbedded inside the SPA Balancing Authority area.
4/11/12	Added Brazos Electric to list of Balancing Authorities. Updated map to reflect addition. Changed “OPS1” application in reference to outage scheduling to “CROW” application reference. Clarified the RTCA and monitored elements by voltage in sections C.4. and E.1. Noted the primary and BUCC location changes in 2012 in section I.
6/1/13	Transferred the southern reliability members from SPP to MISO (with exception of the CECD entities) per Entergy move to MISO
12/19/13	Removal of the CECD entities from the SPP Reliability footprint.. Changed cover page date to Dec 19, 2013.
3/1/14	Replaced “EIS” with “Integrated”, removed OPS1 references, replaced PowerWorld with E-terravision, removed member map, and changed list of BA/TOPs to reflect new consolidated BA (SPP BA).
6/1/15	Added the IS entities of WAPA, Corn Belt to the TOP list within the Introduction and the SPP Reliability area
2/19/15	Reflected change of WECC to Peak Reliability and added additional DC ties with the IS integration

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Introduction

The North American Electric Reliability Corporation (NERC) Standards require every Regional Reliability Organization (RRO), sub-region, or interregional coordinating group to establish a Reliability Coordinator to continually assess transmission reliability and coordinate emergency operations among the operating entities within the region and across the regional boundaries.

Southwest Power Pool (SPP) is recognized by the membership of the SPP RRO as the Reliability Coordinator for all of the Balancing Authorities and Transmission Operators in the SPP Region. SPP is also recognized by the Midwest Reliability Organization (MRO) as the Reliability Coordinator for Lincoln Electric System (LES), Nebraska Public Power District (NPPD), Omaha Public Power District (OPPD), Western Area Power Association-Upper Great Plains East, ([WAUE](#)), [Western Area Power Association-Rocky Mountain Region \(WACM\)](#), Corn Belt Power Cooperative (CBPC), and [Tri-State G&T \(TSGT\)](#). The SPP Reliability Coordination Area consists of the Balancing Authorities and Transmission Operators listed in Appendix A.

The SPP Reliability Coordinator (RC) is responsible for the bulk transmission reliability and power supply reliability within its Reliability Coordination Area. Bulk transmission reliability functions include assessment of real-time, current day and next-day operating conditions, loading relief procedures, re-dispatch of generation, coordination of transmission and generation outages and ordering curtailment of transactions and/or load. Power supply reliability entails monitoring Balancing Authority Area performance and ordering the Balancing Authorities to take actions, including load curtailment and increasing/decreasing generation in situations where an imbalance between generation and load places the system in jeopardy. SPP RC procedures and policies are consistent with those of NERC.

This document represents the Reliability Plan for the SPP Reliability Coordinator. Upon approval of the NERC Operating Reliability Subcommittee, this plan will succeed the previously approved plan.

A. Responsibilities – Authorization

1. SPP is responsible for the reliable operation of the bulk electric system within the SPP RC Area in accordance with NERC Reliability Standards, the SPP Membership Agreement, SPP Criteria, and the Agreement between Southwestern Power Administration (SPA) and SPP. The SPP RC Area is composed of the Balancing Authorities and Transmission Operators listed in Appendix A. SPP's members have executed the SPP Membership Agreement that is posted on the SPP web site under SPP Documents & Filings/Governing. The SPA-SPP Agreement is posted on the SPP web site under SPP Documents & Filings/Governing/Seams Agreements.
 - 1.1. The SPP RC has a wide-area view, operating tools, processes and procedures and the authority given to it by the SPP Membership Agreement and the SPA-SPP Agreement to prevent or mitigate emergency operating situations in current day analysis, next-day analysis and real-time conditions. More detail is provided in appropriate sections of this document.
 - 1.2. The Membership Agreement and the SPA-SPP Agreement give the SPP RC clear decision-making authority to act and direct actions to be taken by the SPP members to preserve the integrity and reliability of the bulk electric system. SPP's responsibilities and authorities as well as its Members' responsibilities are clearly defined in the Membership Agreement, the SPP Criteria, and the SPA-SPP Agreement.
 - 1.3. The SPP RC has not delegated any of its Reliability Coordinator responsibilities.
2. SPP does and will act first and foremost in the best interest of the reliability for its RC Area and the Eastern Interconnection before that of any other entity. This expectation is clearly identified in the SPP Membership Agreement, the SPA-SPP Agreement and in the job description of the SPP personnel acting in the role of Reliability Coordinator.
3. Per the SPP Membership Agreement and the SPA-SPP Agreement, the Balancing Authorities, Transmission Operators, and other operating entities in the SPP RC Area shall carry out required emergency actions as directed by the SPP RC, including the shedding of firm load if required, except in cases involving endangerment to the safety of employees or the public. In those cases, SPP members must immediately inform the SPP RC of the inability to perform the directive.

B. Responsibilities – Delegation of Tasks

1. The SPP RC has not delegated any Reliability Coordination tasks.

C. Common Tasks for Next-Day and Current-Day Operations

1. SPP coordinates operations and ensures reliable operation of the Bulk Electric System by utilizing System Operating Limits (SOLs) and Interconnection Reliability Operating Limits (IROLs) during the real-time and next-day operating horizons for the SPP RC Area including additional thermal, voltage and stability related analysis as necessary. SPP will communicate and coordinate the results of its reliability assessments with those performed by the SPP members to ensure that any potential or actual SOL violations are properly identified and reported. SPP models a sufficient wide-area view to ensure properly coordinated operations with neighboring Reliability Coordinators. This wide-area view is explained in more detail later in this document.
2. SPP is responsible for determination of IROLs within the SPP RC Area. The methodology for determination of IROLs in the SPP RC Area is located in SPP Criteria 12. As part of the daily reliability analysis, additional potential SOLs are highlighted. That list of potential SOLs and the existing list of SOLs is screened for potential IROL criteria. The potential IROL condition will be reviewed further by evaluating the system response to the loss of the SOL violated facility. The original potential IROL contingency will be assumed to be a confirmed IROL condition if the evaluation reveals that the ensuing SOL violated facility contingency results in cascading outages or widespread voltage problems, unless there are studies or system knowledge that the SOL is not an IROL. Additionally, when temporary flowgates are defined for various operating circumstances identified through reliability analysis, this process is performed to verify if an IROL exists. SPP disseminates IROL information within its RC Area and with neighboring RCs. SPP posts all flowgates that it monitors and the applicable IROLs that have been determined to exist on a web page associated with a tool that provides for electronic submission and repository of operational data that is accessible by appropriate SPP members. Neighboring RCs are notified via the Reliability Coordinator Information System (RCIS) or direct phone call.
3. SPP ensures that SPP members operate to prevent the likelihood that a disturbance, action or non-action in the SPP RC Area will result in an SOL or IROL violation in another area of the interconnection. SPP's members are required by the SPP Membership Agreement to adhere to NERC Reliability Standards and SPP Criteria. SPP is required by its seams agreements with its neighbors to coordinate maintenance outages in such a way that impacts on the other systems' reliability are minimized. SPP performs reliability analyses on a daily basis for the current day and next day. If a potential SOL or IROL violation is observed on a neighboring party's system, SPP will coordinate with the impacted and impacting parties to develop an appropriate mitigation plan, if one does not already exist. In instances where there are differences in operating limits derived by SPP and its neighbors or SPP and its members, SPP will operate to the most conservative result until the reasons for these differences can be identified.

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4. SPP ensures that its members are always operating under known and studied conditions and ensures that they reassess and re-posture their systems following contingency events within 30 minutes. SPP performs current-day and next-day reliability analyses pursuant to the Reliability Assessment Process Overview. These analyses are performed daily with the exception of the weekend and holiday analyses being performed on the previous Friday, or day prior to the holiday. These analyses model peak conditions for the day being studied including scheduled generation and transmission outages and anticipated generation dispatch to support the forecasted load plus net interchange. SPP performs an N-1 contingency analysis monitoring the post-contingency flow of both SPP and neighboring system facilities. If a potential SOL or IROL violation is observed, SPP will coordinate with the impacted and impacting parties to develop an appropriate mitigation plan, if one does not already exist.

SPP performs a next-day assessment of capacity and adequacy for each hour of the day. SPP also performs a next-hour assessment of capacity and adequacy on an hourly basis. These analyses model peak conditions for the day/hour being studied including scheduled generation and transmission outages and anticipated generation dispatch to support the forecasted load plus net interchange. If a capacity issue is observed, SPP will coordinate with the impacted and impacting parties to develop an appropriate mitigation plan.

SPP monitors in real-time all facilities considered critical. In the SPP EMS, real-time flows on all critical facilities are monitored and alarmed at the facility ratings, SOL and IROL levels. SPP also uses a flowgate monitoring spreadsheet application that tracks real-time and applicable post-contingency flows on all flowgates and alarms when applicable SOLs and IROLs are approaching the limit or are exceeded. Additionally, when any identified IROL is exceeded in real-time, an email notification of the exceedance is sent to operations management and engineering staff.

SPP also uses a State-Estimator solution to run its Real-Time Contingency Analysis (RTCA) application at least every 6 minutes. SPP has defined all branches and transformers with low side voltages of 138 kV and higher (with some 115kV) within the SPP RC Area and all branches and transformers with low side voltages of 230 kV and higher within the first-tier Balancing Authority Areas as contingencies in RTCA. SPP monitors the post-contingency flow on all SPP branches and transformers with low side voltages of 115kV and higher. Alarms are triggered if that flow exceeds the emergency rating of the branch or transformer. Additionally, SPP monitors post-contingency flow on all branches and transformers with low side voltages of 230 kV and higher within neighboring systems as well as selected lower voltage facilities within neighboring systems that are known to be impacted by an SPP contingency. The RC receives an audible alarm for any RTCA violation.

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5. SPP acts as the Transmission Service Provider (TSP) for all Transmission Owners within the SPP RRO, with the exception of INDN and KACY. SPP uses flowgates as proxies for transmission limitations in the determination of ATC. The same flowgates monitored in real-time by the SPP RC and their associated SOLs are also incorporated in the models used by SPP to calculate ATC and administer its OATT. SPP limits sales of transmission service to the SOLs of all identified flowgates. When a need for a new flowgate and associated SOL/IROL is determined by the SPP RC, it is quickly included in the models used by the SPP TSP for calculation of ATC. These flowgates and associated SOLs/IROLs are also posted on the SPP OASIS for purposes of notifying other TSPs within the SPP RC Area.
 6. SPP communicates reliability directives in a clear, concise, and definitive manner. Per SPP RC procedures, the SPP RC requires the recipient to repeat back any reliability directive communicated by the SPP RC. Proper communications protocols are included in RC operator training provided by SPP.

D. Next-Day Operations

1. SPP performs next-day reliability analyses to identify potential SOL and IROL violations pursuant to the Reliability Assessment Process Overview. These analyses are performed daily with the exception of the weekend and holiday analyses being performed on the previous Friday, or day prior to the holiday. SPP's day-ahead reliability assessment consists of off-line PSS/E studies of the modeled system conducted by the Shift Engineer with support from Operations Engineering staff. Both an N-1 contingency analysis and a flowgate-based analysis are conducted daily. In these contingency analyses, SPP includes its and its neighbors' facilities above 100 kV as contingencies and monitors its and its neighbors' facilities above 100 kV. SPP also runs a 7-day N-1 contingency analysis and flowgate-based analysis to review upcoming operating conditions over the next week. Planned transmission and generation outages within the SPP RC Area are input into this analysis from SPP's maintenance outage tracking system (CROW) and then into the SDX for inclusion into the IDC. Outages external to the SPP RC Area are obtained from the SDX database. Peak conditions are modeled using anticipated generation dispatch to support the forecasted load plus expected scheduled net interchange.
 - 1.1 If in the next-day reliability analysis, parallel flows from the SPP RC Area are observed as causing a potential problem on a neighboring system, SPP will contact the neighboring RC and coordinate to determine if the problem could result in an IROL violation. If it is agreed that an IROL violation could occur, SPP will coordinate with the neighboring RC to develop an appropriate mitigation plan, if one does not already exist. The mitigation plan will identify appropriate actions to be taken to prevent the IROL violation from materializing which may include creation of appropriate flowgates to be monitored, commitment of appropriate generation capacity, reconfiguration of the transmission system, or re-dispatch of generation as well as actions to be taken in the event the IROL violation materializes in real-time, including identifying potential transmission system reconfigurations, generation that can be re-dispatched, schedules that can be curtailed, and, if necessary, load that can be shed.
2. SPP receives information, such as transmission and generation facility maintenance schedules, load forecasts, generation resource plans, and operating reserve projections, required for performing reliability analyses from responsible SPP members through a web interface & CROW tool. SPP Criteria 5 and Appendix 7 require SPP members to submit the necessary data to SPP. SPP receives similar information from its neighbors via SDX. SPP uses tag dump data as its basis for incorporating Interchange Transactions into the reliability analyses.
3. SPP shares the results of its reliability analyses, when conditions warrant, or upon request, with other RCs either directly by phone or via daily conference calls. SPP also posts the results of its analyses on its OPS1 web site for appropriate SPP members to access. If the results of the reliability analyses indicate potential

reliability problems and efforts outlined in (4.) below do not resolve the potential condition, the SPP RC issues the appropriate alerts via the RCIS.

4. The SPP RC initiates conference calls, or other appropriate communications, as necessary when conditions revealed by the reliability analyses warrant. Conditions that warrant communications with other RCs include potential IROL violations determined as described in part 1.1 of this section and capacity deficiencies that could result in shedding of firm load.

E. Current-Day Operations

1. SPP monitors all facilities, including sub-transmission information, within the SPP RC Area and adjacent RC Areas as necessary to ensure that, at any time, regardless of prior planned or unplanned events, SPP is able to determine any potential SOL and IROL violations within the SPP RC Area. SPP monitors real-time flow and status information of all facilities 100 kV and above and selected lower voltage facilities down to 60 kV. SPP also uses a State-Estimator solution to run its RTCA application at least every 6 minutes. SPP has defined all branches and transformers with low side voltages of 138kV and higher (with some 115kV) within the SPP RC Area and all branches and transformers with low side voltages of 230 kV and higher within the first-tier Balancing Authority Areas as contingencies in RTCA. SPP monitors the post-contingency flow on all SPP branches and transformers with low side voltages of 115kV and higher. Alarms are triggered if that flow exceeds the emergency rating of the branch or transformer. Additionally, SPP monitors post-contingency flow on all branches and transformers with low side voltages of 230 kV and higher within neighboring systems as well as selected lower voltage facilities within neighboring systems that are known to be impacted by an SPP contingency.

SPP utilizes the E-terravision Real-Time Monitoring System. This graphical display system is designed to help SPP RC operators monitor and visualize on a mapboard, utilizing real-time and/or state estimator data, the current state of the SPP RC Area and an appropriate portion of the neighboring RC Areas.

- 1.1 As required by the seams agreements it has with its neighboring RCs, SPP will make reasonable efforts to provide notice to a neighboring RC if SPP identifies a potential reliability problem in that RC's Area. Once both parties agree that a reliability problem exists, SPP will coordinate with its neighboring RCs any actions required to mitigate the situation. This coordination may include evaluation of the impact of maintenance and forced outages on the situation, implementation of existing emergency procedures or operating guides, reconfiguration of the transmission system, curtailment of point-to-point transactions, redispatch of generation, and load shedding.
2. In the SPP EMS, real-time flows on all critical facilities are monitored and alarmed at both SOL and applicable IROL levels. SPP also uses a flowgate monitoring spreadsheet application that tracks post-contingency flows on all flowgates and alarms as applicable SOLs and IROLs are approached and/or exceeded. Post-contingency flows on flowgates are calculated using real-time flows and Line Outage Distribution Factors (LODFs) that are updated to reflect current system topography every 6 minutes. Alarm limits are set such that the operator is aware of any facility approaching its SOL and/or IROL. Additionally, when any identified IROL is exceeded in real-time, an email notification of the exceedance is sent to operations management and engineering staff.. SPP has knowledge of current and planned critical facility status through monitoring of key facilities across the SPP RC Area via

real-time and near real-time data sent to SPP by its members. Planned facility status is communicated to SPP via its CROW tool. SPP's members are required to submit this data to SPP in accordance with SPP Criteria.

3. SPP monitors the necessary RC Area parameters to ensure it is continuously aware of conditions within the SPP RC Area.

- 3.1. SPP monitors the status of bulk electric system elements using an EMS system complete with State Estimator, Alarming, Real-Time Contingency Analysis, and Power Flow applications. SPP receives this data from its members in accordance with SPP Criteria.

- 3.2. SPP monitors, in real-time, pre-contingency element conditions. SPP's EMS model has just over 15,500 buses modeled. Approximately 35% of these buses are within SPP's RC Area, 25% of these buses are within first-tier Balancing Authority Areas, and the remaining buses (40%) are in Balancing Authority Areas beyond the first-tier Balancing Authority Areas. The portion of the EMS model that represents the SPP RC Area, the first-tier Balancing Authority Areas and a portion of the second-tier Balancing Authority Areas (totaling 70% of the model) is modeled with nodes and breakers while the remaining portion of the model (30%) is modeled bus-branch. (First-tier designates those Balancing Authorities adjacent to the SPP RC Area while second-tier refers to those Balancing Authorities beyond the first-tier Balancing Authorities.) SPP receives real-time data for the SPP RC Area, the first-tier Balancing Authority Areas and a portion of the second-tier Balancing Authority Areas via SPPNET and/or NERCNET.

SPP currently receives 84,000 real-time EMS data points from SPP members and neighboring Balancing Authorities, Transmission Operators and RCs. These points are updated every 10 - 30 seconds. The real-time data points received include real and reactive flows on lines, transformers, generating units, loads, and shunts; status points of breakers, switches, and disconnects; frequency values; and voltage measurements on buses.

- 3.3. SPP monitors, in real-time, anticipated post-contingency element conditions. This is achieved through usage of SPP's RTCA and through usage of the flowgate monitoring spreadsheet. SPP's Real-Time Line Outage Distribution Factor (RTLLODF) application runs every 6 minutes calculating LODFs for each flowgate based on the latest system topology.

- 3.4. SPP monitors real and reactive reserves. SPP receives real-time operating reserves data from its members via ICCP and compares this data to the operating reserves required as specified by the SPP reserve-sharing program. SPP monitors and displays the reactive output of generators within the SPP RC Area as well as the remaining reactive capability by Balancing Authority Area using a generation display. SPP receives real-time voltages and voltage limits

on critical buses which alarm the RC when a voltage limit is violated. SPP will call the appropriate Transmission Operator or Balancing Authority and develop appropriate mitigation plans in the event an alarm is received.

- 3.5. SPP monitors capacity and adequacy conditions. SPP receives planned capacity and reserves daily from each of its Balancing Authorities. This is monitored throughout the day as contingencies occur using the SPP Reserve Sharing System (RSS) program. SPP also receives resource plan information for all resources participating in the SPP Integrated Market. This information contains data for each resource for each hour of a 7-day horizon beginning with the current day and is updated as necessary throughout the day. SPP will use this and other system information to perform hourly assessments of capacity and adequacy for the next hour.
 - 3.6. SPP monitors current ACE and frequency in real-time for all Balancing Authority Areas in the SPP RC Area using the real-time data sent by the Balancing Authorities through ICCP pursuant to SPP Criteria. This information is displayed to the SPP RC constantly.
 - 3.7. SPP monitors current local or TLR procedures in effect using the IDC, Constraint Manager (MOS), and the RCIS.
 - 3.8. SPP monitors planned generation dispatches. SPP receives and reviews resource plans from its members.
 - 3.9. SPP monitors planned transmission and generation outages. SPP's members are required to submit all generator and transmission outages per SPP Criteria 5 via SPP's outage tracking system (CROW). Timing requirements and approval procedures are documented in the SPP Membership Agreement and SPP Criteria. The generator and transmission outages are sent to the Outage Scheduler database of the EMS system and used by the State Estimator and RTCA if the real-time measurements of the facility do not contradict with the submitted outage. The SPP RC Operators are constantly verifying the submitted outage data using State Estimator displays and its alarming application. They contact the appropriate SPP member if a scheduled outage does not materialize in real-time as planned or if a line, transformer or unit trips without having a scheduled outage.
 - 3.10. SPP monitors contingency events using its alarming application and State Estimator displays.
4. SPP monitors bulk electric system parameters that may have significant impacts upon its RC Area and neighboring RC Areas as follows:
 - 4.1. Not only does SPP maintain awareness of all Interchange Transactions that wheel-through, source, or sink in the SPP RC Area but SPP, acting as a

Scheduling Entity on behalf of the Balancing Authorities in its RC Area, is also involved as an approval entity for all transactions that wheel-through, source and sink in its area. SPP can and will make that information available to all RCs in the Interconnection as necessary. Tags are submitted to the IDC for those Interchange Transactions that sink in an SPP Balancing Authority Area.

- 4.2. SPP evaluates and assesses additional Interchange Transactions that could violate SOLs and/or IROLs. SPP utilizes tag information in the IDC, real-time data in the SPP EMS, and SPP's flowgate monitoring tool to make an assessment of the impacts of additional transactions on flowgate loading. SPP is authorized per the SPP Membership Agreement and the SPA-SPP Agreement to utilize all resources, including load shedding, to address a potential or actual IROL violation. This authorization is reiterated to each RC operator in his job description and by a personal memorandum from SPP's Chief Operating Officer.
- 4.3. SPP monitors operational data submitted by Balancing Authorities within the SPP RC Area to ensure that the required amount of Operating Reserves are provided and available as required to meet NERC Control Performance Standards (CPS) and Disturbance Control Standards (DCS). If necessary, SPP will direct the Balancing Authorities in the SPP RC Area to arrange for assistance from neighboring Balancing Authorities. The SPP Membership Agreement and the SPA-SPP Agreement give SPP the authority to direct the acquisition of generation capacity and, if that direction is not satisfied, direct the shedding of load in the deficient Balancing Authority Area.

Reserve requirements are allocated to the SPP Reserve Sharing Group members based on each member's peak load. Members that are participants in the SPP Integrated Market are also required to submit ancillary service plans that include their plans for meeting their reserve requirements. These plans are submitted for each hour of the upcoming operating day and may be changed as necessary throughout the day. The SPP RC checks the members' forecasted reserves for the current-day to determine if each member plans to meet its reserve requirement. Deficient members are contacted to determine if the deficiency is real or simply an error in submitting their daily numbers. Errors are corrected at that time. If a member is experiencing a true deficiency, group reserves are checked to make sure sufficient reserves are still available in the group even if a member may be deficient. If group reserves are sufficient, the deficient member is required to submit a "contingency" event indicating the extent of their deficiency. If it is only a matter of having insufficient reserves, the member relies on the remaining members of the group to provide reserves during a contingency. If a member does not have sufficient capacity or energy to carry their load, group reserves may be used to supply the load. NERC Energy Emergency Alerts (EEAs) will be filed as needed to assist in finding additional capacity or energy.

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- 4.4. SPP will identify the cause of potential or actual SOL or IROL violations. SPP shall initiate control actions or emergency procedures to relieve the potential or actual IROL violation without delay, and no longer than 30 minutes. SPP will choose the most effective means of relieving the IROL violation within 30 minutes including directing generation redispatch, facility switching, and load shedding. SPP is authorized by the SPP Membership Agreement and the SPA-SPP Agreement to direct utilization of all resources, including load shedding, to address a potential or actual IROL violation.
 - 4.5. SPP will communicate start and end times for time error corrections to all Balancing Authorities within its RC Area. SPP will ensure that all Balancing Authorities within its RC Area are aware of Geo-Magnetic Disturbance (GMD) forecast information and will assist in the development of any required response plans. SPP uses a dedicated messaging system to communicate time error correction and GMD forecast information to its Balancing Authorities.
 - 4.6. SPP will participate in NERC Hotline discussions, assist in the assessment of the reliability of the Regions and the overall interconnected system, and coordinate actions in anticipated or actual emergency situations. SPP will disseminate this information within its RC Area as necessary using the SPP Emergency Communications Network.
 - 4.7. SPP monitors system frequency and its Balancing Authorities' performance, and will direct any necessary rebalancing required for a Balancing Authority to return to CPS and DCS compliance. SPP receives at least one real-time frequency point via ICCP for each Balancing Authority Area in the SPP RC Area. At the direction of SPP, its Balancing Authorities shall utilize all resources, including firm load shedding, to balance load and generation. The SPP RSS system is normally the resource used by SPP Balancing Authorities to relieve an emergency condition associated with CPS and DCS compliance.
 - 4.8. SPP coordinates with other RCs and neighboring Balancing Authorities or Transmission Operators, as needed, in the development and implementation of action plans to mitigate potential or actual SOL, IROL, CPS or DCS violations. SPP coordinates pending generation and transmission maintenance outages with other RCs, as necessary, in both the real-time and next-day reliability analysis timeframes. SPP participates in periodic conference calls with neighboring RCs as necessary.
 - 4.9. SPP will assist the Balancing Authorities in the SPP RC Area in arranging for assistance from neighboring RCs or Balancing Authorities by issuing reserve sharing contingency notifications or EEAs as appropriate.
 - 4.10. SPP identifies sources of large ACEs that may be contributing to frequency, time error, or inadvertent interchange and will implement corrective actions with the appropriate Balancing Authority. SPP receives the real-time ACE for

each Balancing Authority Area in the RC Area via ICCP. The SPP RC receives an alarm if any ACE values change significantly or exceed a predefined limit. Excessive ACEs would be addressed by a call to the Balancing Authority to determine the cause of the deviation and the course of action that the Balancing Authority has planned and/or implemented to address the situation. Assistance would be provided in accessing operating reserves with the Reserve Sharing Group to address the deviation should that be required. Should the situation be causing overloads on system facilities, direction would be issued to dispatch/redispach generation to relieve the situation.

- 4.11. SPP maintains awareness that any Special Protection System (SPS) within the SPP RC Area is armed. The host Balancing Authority/Transmission Operator is required pursuant to Appendix 7 of SPP Criteria to keep SPP informed of the operational status of the SPS.
5. SPP will issue an alert to all Balancing Authorities and Transmission Operators in its RC Area, and all RCs within the Interconnection via the RCIS when it foresees an IROL violation or a significant loss of real and/or reactive generation capacity within its RC Area. SPP will disseminate this information to its Balancing Authorities and Transmission Operators by phone call or use of the SPP Emergency Communication Network.
6. SPP confirms reliability assessment results and determines the effects within its RC Area and adjacent RC Areas. SPP will derive and discuss options to mitigate potential or actual SOL or IROL violations and identify and implement only those actions as necessary as to always act in the best interest of the Interconnection at all times.

F. Emergency Operations

1. SPP will direct its members to return facility loadings on the transmission system to within applicable IROLs as soon as possible, but no longer than 30 minutes. SPP will direct the necessary actions such as system reconfiguration, generation redispatch or load shedding until relief requested through the TLR process can be achieved. The SPP Membership Agreement and the SPA-SPP Agreement give SPP this authority.
2. SPP will implement processes and procedures described in its IROL Relief Guide when it deems that IROL violations are imminent. SPP will coordinate its alert and emergency procedures with other RCs as required by its seams agreements with its neighbors.
3. In the event the loading of transmission facilities progresses to or is projected to progress to an SOL violation and significantly impacting Interchange Transactions and/or flows created by the SPP Integrated Market or any other markets (Market Flows) exist, SPP will use TLR to reduce the loading. If no significantly impacting Interchange Transactions or Market Flows exist, SPP will identify appropriate actions to be taken to reduce the loading, including generation redispatch and system reconfiguration. In the event the loading of transmission facilities progresses to or is projected to progress to an IROL violation, SPP will take immediate actions as described in the SPP IROL Relief Guide. These actions may include TLR initiation, generation redispatch, system reconfiguration, and load shedding.
 - 3.1. SPP may implement a local transmission loading relief procedure or the NERC TLR procedures for resolving a potential or actual SOL or IROL violation on the transmission system within the SPP RC Area. SPP maintains copies of all pertinent operating guides/directives as supplied by SPP members. SPP reviews and coordinates these directives with the Balancing Authorities and Transmission Operators in the SPP RC Area. The SPP RC operator maintains communication with the Transmission Operator who may be implementing these guides for local area relief to ensure regional reliability is not jeopardized by the implementation of said procedures. SPP will implement NERC TLR for resolving SOL and or potential IROL situations where NERC TLR is effective. In the event of potential IROL violations, SPP RC operators will direct the appropriate transmission operators to take specific actions on how to mitigate the situation. These mitigation procedures are outlined in the SPP IROL Relief Guides.
 - 3.2. Local relief procedures via operating directives/guides are applicable to the Transmission Operators who supply the directives to SPP. These guides may also impact neighboring Transmission Operator facilities, in which case, SPP will ensure appropriate communications and coordination occurs between the affected entities.

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- 3.3. SPP may implement a local transmission loading relief procedure simultaneously with the NERC TLR procedures. Typically, it is assumed that NERC TLR or other Interconnection-wide relief procedures are ineffective in dealing with local area problems. In the event of local area problems, the affected Transmission Operator will implement applicable operating directives with any coordinating action necessary taken by the SPP RC. Flowgates may exist which allow for operating directives to increase the SOL. In these cases, the operating directive is typically instituted prior to calling for interconnection-wide relief procedures.
- 3.4. SPP will comply with the provisions of the NERC TLR procedure as follows. If the SPP RC is the sink RC and receives notification via the IDC that another RC has issued a TLR that calls for curtailment and/or halts of transactions sinking in SPP, the SPP RC will use the IDC to acknowledge the transaction curtailments and/or halts for the next hour, or current hour, and monitor the transactions to ensure that the transaction curtailments/halts are properly implemented. SPP acts as the sink RC in the IDC for transactions sinking into ERCOT across the East and North DC ties and for transactions sinking into PEAK Reliability across the Eddy County, Blackwater, Lamar, Sidney, Stegall, Rapid City and Miles City HVDC ties.

If SPP determines, through true source-to-sink impact evaluation, that curtailment of a transaction as identified by the IDC would actually increase flows on the flowgate for which relief has been requested, it will not acknowledge curtailment of such transaction. SPP may also determine that, through true source-to-sink impact evaluation, transactions having a significant impact on the flowgate exist but are not identified for curtailment by the IDC. In those cases, SPP will direct curtailment of those transactions as necessary.

If SPP receives notification from the IDC that SPP Market Flows need to be curtailed in response to a TLR issuance, SPP will utilize its market systems to calculate and send dispatch instructions to its market participants necessary to achieve the curtailment. SPP updates its Market Flow information in the IDC every 15 minutes and will monitor this information to verify that SPP implemented the appropriate Market Flow curtailment instructions from the IDC.

- 3.5. SPP will follow procedures included in Market Protocols and its RC Procedures Manual to implement relief procedures, up to the point that emergency action is necessary. When SPP observes flowgate loading that approaches the applicable SOL, it will communicate with the flowgate owner to verify actual real-time flows and coordinate necessary actions to be taken. SPP will make a coordinated decision based on current and/or anticipated conditions to pursue relief by using either the NERC TLR procedures or an available operating guide.

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4. SPP will monitor system frequency and its Balancing Authorities' performance. If SPP determines that one or more of its Balancing Authority Areas are contributing to a frequency excursion, SPP will direct the Balancing Authority(ies) to use all resources available, including load shedding, to comply with CPS and DCS requirements.
 5. SPP will take or direct whatever action is needed, including load shedding, to mitigate an energy emergency within the SPP RC Area. SPP's Integrated Market and/or the RSS program are primarily used within the SPP RC Area to mitigate an energy emergency. SPP will provide assistance to other RCs experiencing an energy emergency as necessary.
 6. SPP requires that any Balancing Authority Area within its RC Area that is experiencing an energy emergency, first use Operating Reserves available within the SPP Reserve Sharing Group. If the energy emergency still persists, SPP will issue an EEA on behalf of the deficient Balancing Authority Area.

G. System Restoration

1. SPP is knowledgeable of the restoration plans of each of the Transmission Operators in its RC Area and has a written copy of each plan in its possession. SPP verifies that the most current plans are on file on an annual basis. Additionally, the SPP Reliability Coordinators are trained on individual plans during regular training sessions. During system restoration, SPP monitors the restoration progress and coordinates any needed assistance.
2. SPP has a regional restoration plan for the SPP RC Area that provides coordination between individual restoration plans of each SPP Transmission Operator and that ensures reliability is maintained during system restoration events. The SPP RC Area Regional Restoration Plan and NERC Reliability Standards require that the role of the SPP RC during system restoration is to facilitate this coordination. Furthermore, the SPP RC approves, communicates, and coordinates re-synchronization of system islands or synchronizing points such that a burden is not caused on adjacent Transmission Operator, Balancing Authority, or Reliability Coordinator Areas. SPP Criteria 10 delineates the processes for Emergency Communications.
3. SPP will disseminate information regarding restoration to neighboring RCs and Balancing Authorities/Transmission Operators not immediately involved in restoration by posting pertinent information on the RCIS and/or via direct phone call. SPP will also use the NERC Hotline for periodic updates to other RCs.

H. Coordination Agreements and Data Sharing

1. SPP and Midwest ISO have executed a Joint Operating Agreement that includes details of procedures for coordinating seams reliability issues. SPP has executed coordination agreements with the PEAK Reliability, TVA, and Saskatchewan Power Corporation to augment and further support the reliability of their respective RC Areas. SPP has also executed a letter of understanding with ERCOT for similar purposes.
2. SPP and other RCs share data (via ISN and RCIS) as requested to support reliability coordination. SPP's members are required to submit data necessary to support SPP's RC function pursuant to Appendix 7 of SPP Criteria.

I. Facility

SPP performs the Reliability Coordinator function at its Coordination Center located in Little Rock, Arkansas. The Coordination Center has the necessary facilities for the SPP RCs to perform their responsibilities. The backup facility, in nearby Maumelle, Arkansas, provides a functional workspace for personnel to perform the Reliability Coordination function. Full functionality is provided with full backup of the systems, communications, data, and tools required for SPP to perform as the Reliability Coordinator for its members.

1. SPP has adequate, redundant telecommunications circuits providing both voice and data connectivity with its members. A major telecommunications provider with a separate long distance carrier provides SPP's primary voice/data communication at the Coordination Center. The Coordination Center phone system consists of fully redundant hardware with automatic fail-over across both SPP locations. All Coordination Center official business voice calls are recorded in the primary mode of operation. Cell phones are used as the secondary voice communication capability.

SPP IT on-call staff provides 24x7x365 support of the voice and data communications at SPP. The on-call support is also available 24x7x365 for hardware and application software. SPP contracts with a third party to monitor the communications links 24x7x365 with authority to open and assist in troubleshooting telecommunication provider-based issues. The communication service companies provide second-tier voice/data circuit support upon notification by designated staff. NERCNET consists of "managed" circuits with 24x7x365 monitoring and automatic initiation of repair services upon failure. NERC personnel manage and support NERCNET connectivity with SPP.

2. A satellite phone system is installed at the SPP primary and disaster recovery centers as well as at all SPP member Balancing Authority/Transmission Operator operations centers, with the exception of one Balancing Authority and one Transmission Operator, for purposes of communicating during emergency conditions per protocols described in SPP Criteria 10. This system bypasses the Public Switched Telephone Network (PSTN) and can be used for point-to-point or broadcast (all-call) communications. The satellite service can also route a phone call to a land line, providing access to any operable wire or wireless phone.

Data link communication with SPP member companies is accomplished via a private telecommunications network known as SPPNET. Redundant DS3 circuits are installed at the SPP primary and disaster recovery centers and redundant T-1 circuits are installed at all SPP member Balancing Authorities/Transmission Operators. An alternate telecommunications provider is utilized to provide redundant circuits to each member's primary facility and failover between the primary and secondary circuits is automatic. SPPNET is used for the exchange of ICCP real-time data, issuing dispatch instructions to SPP market participants, Reserve Sharing System (RSS) coordination,

and access to the OATI-provided tagging and scheduling systems. As previously mentioned, SPPNET is monitored 24x7x365 via an independent third party service.

Communication with NERC and adjacent Reliability Coordinators is via the NERCNET frame relay network. SPP also has redundant links to NERC.

Communication with NERC applications, including the IDC is via the Internet. SPP has installed fully redundant Internet DS3 circuits using two different telecommunications providers. As with the SPPNET network, failover is automatic and monitored 24x7x365.

3. SPP has detailed real-time monitoring capability of the SPP RC Area and sufficient monitoring capability of surrounding RC Areas to ensure that potential or actual SOL or IROL violations are identified. SPP has monitoring systems that provide information that can be easily understood and interpreted, giving particular emphasis to alarm management and awareness systems, automated data transfers, synchronized information systems, over a redundant and highly reliable infrastructure. SPP monitors bulk electric system elements (generators, transmission lines, buses, transformers, breakers, etc.) that could result in SOL or IROL violations within the SPP RC Area. SPP monitors both real and reactive power system flows, operating reserves, and the status of system elements that are or could be critical to SOLs and IROLs and system restoration requirements within the SPP RC Area.

SPP's EMS network model has just over 15,500 buses modeled. Approximately 35% of these buses are within SPP's RC Area, 25% of these buses are within first-tier Balancing Authority Areas, and the remaining buses (40%) are in Balancing Authority Areas beyond the first-tier Balancing Authority Areas. The portion of the EMS model that represents the SPP RC Area, the first-tier Balancing Authority Areas and a portion of the second-tier Balancing Authority Areas (totaling 70% of the model) is modeled with nodes and breakers while the remaining portion of the model (30%) is modeled bus-branch. (First-tier designates those Balancing Authorities adjacent to the SPP RC Area while second-tier refers to those Balancing Authorities beyond the first-tier Balancing Authorities.) SPP receives real-time data for the SPP RC Area, the first-tier Balancing Authority Areas and a portion of the second-tier Balancing Authority Areas via SPPNET and/or NERCNET.

SPP currently receives 84,000 real-time EMS data points from SPP members, neighboring Balancing Authorities/Transmission Operators and RCs. These points are updated every 10 - 30 seconds. The real-time data points received include real and reactive flows on lines, transformers, units, loads, and shunts; status points of breakers, switches, and disconnects; frequency values; and voltage measurements on buses.

SPP monitors, in real-time, all facilities 100 kV and above and selected lower voltage facilities down to 60 kV. In the SPP EMS, real-time flows on all critical facilities are monitored and alarmed at both SOL and IROL levels. SPP also uses a flowgate

monitoring spreadsheet application that tracks post-contingency flows on all flowgates and alarms when applicable SOLs and IROLs are exceeded. Alarm limits are set such that the operator is aware of any facility approaching its ratings, SOL and/or IROL. Additionally, when any identified IROL is exceeded in real-time, an email notification of the exceedance is sent to operations management and engineering staff.

The SPP RC receives alarms when a line or generator trips, when loading on facilities and flowgates approach their SOLs or IROLs, when bus voltages reach their low and high voltage limits, when ICCP links change status, when analog errors or unreasonable values are detected, when frequency deviates by more than ± 0.05 Hz and when ACE values change significantly or exceed a predefined limit.

4. SPP has adequate analysis tools. SPP uses an EMS that consists of the following applications:
 - State Estimator
 - Alarming
 - Real-Time Contingency Analysis (RTCA)
 - Power flow
- 4.1 SPP uses a State-Estimator solution to run its RTCA application at least every 6 minutes. SPP has defined all branches and transformers with low side voltages of 138kV and higher (with some 115kV) within the SPP RC Area and all branches and transformers with low side voltages of 230 kV and higher within the first-tier Balancing Authority Areas as contingencies in RTCA. SPP monitors the post-contingency flow on all SPP branches and transformers with low side voltages of 115 kV and higher. Alarms are triggered if that flow exceeds the emergency rating of the branch or transformer. Additionally, SPP monitors post-contingency flow on all branches and transformers with low side voltages of 230 kV and higher within neighboring systems as well as selected lower voltage facilities within neighboring systems that are known to be impacted by an SPP contingency.

SPP utilizes E-terravision Real-Time Monitoring System. This graphical display system is designed to help SPP RC operators monitor and visualize on a mapboard, utilizing real-time and/or state estimator data, the current state of the SPP RC Area and an appropriate portion of the neighboring RC Areas.
- 4.2. SPP continuously monitors the SPP RC Area. SPP has provisions for backup facilities that shall be exercised if the primary systems required for Reliability Coordination are unavailable. The SPP Emergency Evacuation Procedure – SPP Operations Centers outlines steps to be taken in the event that conditions require transfer to the backup facility. SPP will ensure that SOL and IROL monitoring will continue if the primary monitoring system is unavailable.

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- 4.3. The SPP EMS is fully redundant. Fail-over is automatic and is typically completed within 30 seconds. Real-time data is acquired by the ICCP subsystem. SPP has implemented "high availability" ICCP consisting of a redundant pair of servers at the primary site and a redundant pair of servers at the backup site. Per the SPP Criteria, member Balancing Authorities/Transmission Operators are required to send real-time data to both the primary and backup sites concurrently. Data from both sites are fed to the EMS providing an alternate data source for use when the primary source is failed for any reason.

J. Staffing

1. The SPP RC is staffed at all times with appropriately trained, NERC-Certified RC operators on a 24 hours/day, 7 days/week basis. SPP requires its RC operators to complete a minimum of five days per year of training and drills using realistic simulations of system emergencies, in addition to other training required to maintain qualified operating personnel.
2. SPP ensures that its RC operators have a comprehensive understanding of the SPP RC Area and required interaction with neighboring RCs. The SPP RC operators have an extensive understanding of the member systems within the SPP RC Area such as staff, operating practices and procedures, restoration priorities and objectives, outage plans, equipment capabilities and restrictions. SPP strongly encourages all certified SPP operations personnel to take more than the minimum required NERC Continuing Education hours per year. Therefore, SPP operations personnel strive to attain CE hours above the minimum NERC requirement. SPP makes year-round training opportunities available for the RC operators, which includes the five days per year of training and drills using a Dispatcher Training Simulator to provide realistic simulations of system emergencies described in the previous section.

SPP creates training and performance support to ensure the SPP RC operators understand the SPP region and the interface with neighboring regions. This includes opportunities for continuing education hours, including required emergency operations and simulation hours. This training includes familiarization with member Balancing Authorities/Transmission Operators by including RC training on the members' operating guides, system configuration, and transmission facilities down to 115kV. Backup Control Center training and performance-based exercises are provided annually through instructor-led courses. Operations personnel who have a role in the BUCC plan are required to participate in the BUCC training and performance-based exercise annually. In addition, SPP conducts eight subregional and two regional system restoration drills per year.

SPP's training department documents all training in the Learning Management System for recordkeeping and reporting purposes. The SPP Learning Center (LMS) contains all information required by the NERC Continuing Education program in a variety of report formats.

3. An Officer of SPP has signed the NERC Reliability Coordinator Standards of Conduct on behalf of the SPP RC. Each SPP RC operator is required to sign and receive training on the SPP Standard of Conduct annually. The SPP Standard of Conduct requires the signatory to maintain proper confidentiality procedures and processes. SPP is an independent organization with an independent Board of Directors. SPP's independence enables its staff to fully comply with both the NERC and SPP Standards of Conduct.

Appendix A

Balancing Authority and Transmission Operator Areas in the SPP Reliability Coordination Area:

- American Electric Power – West (TOP)
- Corn Belt Power Cooperative (TOP)
- City Utilities of Springfield (TOP)
- The Empire District Electric Company (TOP)
- Grand River Dam Authority (TOP)
- City of Independence Power & Light Department, Missouri (TOP)
- ITC Great Plains (TOP)
- The Board of Public Utilities, Kansas City, Kansas (TOP)
- Kansas City Power and Light Company (TOP)
- KCP&L Greater Missouri Operations Company (TOP)
- Lincoln Electric System (TOP)
- Midwest Energy, Inc. (MIDW) – (TOP)
- Nebraska Public Power District (TOP)
- Oklahoma Gas and Electric (TOP)
- Omaha Public Power District (TOP)
- Sunflower Electric Power Corporation (TOP)
- Southwest Power Pool (SPP BA)
- Southwestern Power Administration (SPA BA & TOP)
- Southwestern Public Service Company (TOP)
- Tri-State G & T (TOP)
- Western Area Power Administration – WAUE (TOP)
- [Western Area Power Administration WACM– ---- \(TOP\)](#)
- Western Farmers Electric Cooperative (TOP)
- Westar Energy, Inc. (TOP)