



**Reliability Coordinator and Planning Coordinator**  
**NERC Reliability Standard PRC-012-2**  
**Process Document**  
**for the Eastern Interconnection**

Revision 1.0

CURRENT REVISION: Effective 08/01/2020

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## REVISIONS

Revision	Date	Description of Modification
1.0	08/01/2020	Initial Version Effective

## TABLE OF CONTENTS

<b>1. Introduction .....</b>	<b>4</b>
1.1 Purpose .....	4
1.2 Maintenance of this Process.....	4
1.3 Glossary of Terms .....	4
1.4 RAS Correspondence .....	6
<b>2. RC Review of RAS.....</b>	<b>6</b>
2.1 Applicability of RC Review Process .....	7
2.2 Submission Requirements .....	7
2.2.1 PRC-012-2 Attachment 1 Submission Requirements .....	7
2.2.2 Additional SPP RC and PC Submission Requirements .....	10
2.3 Initial RC Review.....	10
2.4 Scope of SPP RC RAS Review .....	11
2.4.1 PRC-012-2 Attachment 2.....	11
2.4.2 Additional SPP RC RAS Review .....	12
2.5 SPP Working Group and Regional Review .....	12
2.6 RAS Coordination – Neighboring RC Areas.....	13
2.6.1 RAS Elements in Multiple RC Areas.....	13
2.6.2 RAS Impacting Neighboring RC Areas .....	13
2.7 Formal RC Feedback to RAS Entity .....	13
2.8 Final Approval and Implementation of RAS .....	13
2.9 Time Needed to Complete Review Process .....	14
<b>3. SPP PC Evaluation .....</b>	<b>14</b>
3.1 Planning Coordinator Assessment of RAS within its Planning Area .....	15
3.2 Planning Coordinator Data requirements .....	16

3.3	Planning Coordinator RAS Study Checklist .....	16
<b>4.</b>	<b>RAS Operations, Failures, and Testing .....</b>	<b>19</b>
4.1	Review of RAS Operation or Failure.....	19
4.2	Corrective Action Plan (CAP).....	19
4.2.1	Developing a CAP.....	19
4.2.2	Implementing a CAP .....	20
4.3	RAS Functional Testing Requirements .....	20
<b>5.</b>	<b>RC RAS Database.....</b>	<b>20</b>

## 1. Introduction

### 1.1 Purpose

NERC Reliability Standard PRC-012-2 (effective 1/1/2021) places the burden of Remedial Action Scheme (RAS) review and approval on the Reliability Coordinator (RC). A portion of PRC-012-2 defines requirements for the Planning Coordinator (PC). The ‘Reliability Coordinator and Planning Coordinator NERC Reliability Standard PRC-012-2 Process Document for the Eastern Interconnection’ (SPP RAS Process EI) is intended to contain the necessary details for RAS Entities, the SPP RC, and the SPP PC to fulfill the requirements of PRC-012-2.

### 1.2 Maintenance of this Process

This document is owned and maintained by SPP staff. This document and any subsequent revisions shall be presented to the below listed applicable SPP Working Groups for recommendations prior to the implementation.

SPP System Protection and Control Working Group (SPCWG)

SPP Transmission Working Group (TWG)

SPP Operating Reliability Working Group (ORWG)

SPP Reliability Compliance Working Group (RCWG)

In the event that a deficiency in this process is identified that could potentially compromise SPP’s compliance with NERC Reliability Standard PRC-012-2, SPP reserves the right to modify this document and implement such modifications as necessary to alleviate potential non-compliance prior to SPP Working Group reviews. The SPP Working Groups identified above will be notified if such action is taken.

### 1.3 Glossary of Terms

Capitalized terms used in this document and not listed below can be found in the NERC Glossary of Terms. Some terms included in this Section 1.3 Glossary of Terms are taken directly from the NERC Glossary of Terms. If a situation should arise where a definition does not match a definition found in the NERC Glossary of Terms, the NERC Glossary of Terms shall supersede any definition included here.

Functionally Modified (as defined in PRC-012-2 itself) – Any modification to a RAS consisting of any of the following:

- Changes to System conditions or contingencies monitored by the RAS
- Changes to the actions the RAS is designed to initiate
- Changes to RAS hardware beyond in-kind replacement; i.e., match the original functionality of existing components
- Changes to RAS logic beyond correcting existing errors
- Changes to redundancy levels; i.e., addition or removal

Limited Impact RAS (as defined in PRC-012-2 itself) – A RAS designated as limited impact cannot, by inadvertent operation or failure to operate, cause or contribute to BES Cascading, uncontrolled separation, angular instability, voltage instability, voltage collapse, or unacceptably damped oscillations.

RAS Entity (as defined in PRC-012-2 itself) – the Transmission Owner, Generator Owner, or Distribution Provider that owns all or part of a RAS.

Remedial Action Scheme – A scheme designed to detect predetermined System conditions and automatically take corrective actions that may include, but are not limited to, adjusting or tripping generation (MW and Mvar), tripping load, or reconfiguring a System(s). RAS accomplish objectives such as:

- Meet requirements identified in the NERC Reliability Standards;
- Maintain Bulk Electric System (BES) stability;
- Maintain acceptable BES voltages;
- Maintain acceptable BES power flows;
- Limit the impact of Cascading or extreme events.

The following do not individually constitute a RAS:

- a. Protection Systems installed for the purpose of detecting Faults on BES Elements and isolating the faulted Elements
- b. Schemes for automatic underfrequency load shedding (UFLS) and automatic undervoltage load shedding (UVLS) comprised of only distributed relays
- c. Out-of-step tripping and power swing blocking
- d. Automatic reclosing schemes
- e. Schemes applied on an Element for non-Fault conditions, such as, but not limited to, generator loss-of-field, transformer top-oil temperature, overvoltage, or overload to protect the Element against damage by removing it from service

- f. Controllers that switch or regulate one or more of the following: series or shunt reactive devices, flexible alternating current transmission system (FACTS) devices, phase-shifting transformers, variable-frequency transformers, or tap-changing transformers; and, that are located at and monitor quantities solely at the same station as the Element being switched or regulated
- g. FACTS controllers that remotely switch static shunt reactive devices located at other stations to regulate the output of a single FACTS device
- h. Schemes or controllers that remotely switch shunt reactors and shunt capacitors for voltage regulation that would otherwise be manually switched
- i. Schemes that automatically de-energize a line for a non-Fault operation when one end of the line is open
- j. Schemes that provide anti-islanding protection (e.g., protect load from effects of being isolated with generation that may not be capable of maintaining acceptable frequency and voltage)
- k. Automatic sequences that proceed when manually initiated solely by a System Operator
- l. Modulation of HVdc or FACTS via supplementary controls, such as angle damping or frequency damping applied to damp local or inter-area oscillations
- m. Sub-synchronous resonance (SSR) protection schemes that directly detect sub-synchronous quantities (e.g., currents or torsional oscillations)
- n. Generator controls such as, but not limited to, automatic generation control (AGC), generation excitation [e.g. automatic voltage regulation (AVR) and power system stabilizers (PSS)], fast valving, and speed governing

## **1.4 RAS Correspondence**

Correspondence with the SPP RC and PC pursuant to PRC-012-2 or any other correspondence related to RASs should use the email address 'SPPRAS@spp.org'.

## **2. RC Review of RAS**

*PRC-012-2 R1. Prior to placing a new or functionally modified RAS in service or retiring an existing RAS, each RAS-entity shall provide the information identified in Attachment 1 for review to the Reliability Coordinator(s) where the RAS is located.*

***PRC-012-2 R2.** Each Reliability Coordinator that receives Attachment 1 information pursuant to Requirement R1 shall, within four full calendar months of receipt or on a mutually agreed upon schedule, perform a review of the RAS in accordance with Attachment 2, and provide written feedback to each RAS-entity.*

***PRC-012-2 R3.** Prior to placing a new or functionally modified RAS in service or retiring an existing RAS, each RAS-entity that receives feedback from the reviewing Reliability Coordinator(s) identifying reliability issue(s) shall resolve each issue to obtain approval of the RAS from each reviewing Reliability Coordinator.*

## **2.1 Applicability of RC Review Process**

The SPP RC and/or PC or any SPP Working Group does not make determinations as to a scheme ‘qualifying’ as a RAS or not per the NERC Glossary of Terms. The entity or entities who own equipment playing a role in the scheme shall make such a determination. Likewise, if at any time a RAS Entity determines that a current RAS should no longer be considered a RAS based on the RAS Entity’s interpretation of the definition of a RAS per the NERC Glossary of Terms, the scheme in question will no longer be considered a RAS by the SPP RC and PC contingent upon a review by SPP of potential reliability impacts of such a change.

The SPP RC and/or PC or any SPP Working Group does not make determinations as to a meeting the definition of Functionally Modified per PRC-012-2. The RAS Entity or Entities who own all or a portion of a RAS shall make such a determination.

## **2.2 Submission Requirements**

A RAS Entity shall submit all information required by PRC-012-2 Attachment 1 as well as any additional information required by the RC or PC as described in this section. RAS Entities shall utilize the ‘PRC-012-2 Attachment 1 Supporting Documentation for RAS Review Checklist.xlsx’ spreadsheet available on SPP’s website to facilitate the submission of all required information.

### **2.2.1 PRC-012-2 Attachment 1 Submission Requirements**

PRC-012-2 Attachment 1 is included below in italicized text. Where appropriate, additional explanation and expanded descriptions of required information is provided by the SPP RC and/or PC in non-italicized text.

***PRC-012-2 Attachment 1***

***Supporting Documentation for RAS Review***

*The following checklist identifies important Remedial Action Scheme (RAS) information for each new or functionally modified RAS that the RAS-entity must document and provide to the reviewing Reliability Coordinator(s) (RC). If an item on this list does not apply to a specific RAS, a response of “Not Applicable” for that item is appropriate. When RAS are submitted for functional modification review and approval, only the proposed modifications to that RAS require review; however, the RAS-entity must provide a summary of the existing functionality. The RC may request additional information on any aspect of the RAS as well as any reliability issue related to the RAS. Additional entities (without decision authority) may be part of the RAS review process at the request of the RC.*

### **I. General**

- 1. Information such as maps, one-line drawings, substation and schematic drawings that identify the physical and electrical location of the RAS and related facilities.*
- 2. Functionality of new RAS or proposed functional modifications to existing RAS and documentation of the pre- and post-modified functionality of the RAS.*
- 3. The Corrective Action Plan (CAP) if RAS modifications are proposed in a CAP.*
- 4. Data to populate the RAS database:*

*a. RAS name.*

*b. Each RAS-entity and contact information.*

Additionally, SPP requirements include the following;

1. NERC Functional Registration of each RAS Entity (TO, GO, DP)
2. One or more management contact of each RAS Entity
3. One or more technical contact for each RAS Entity
4. Other contacts as requested by each RAS Entity

*c. Expected or actual in-service date; most recent RC-approval date (Requirement R3); most recent evaluation date (Requirement R4); and date of retirement, if applicable.*

*d. System performance issue or reason for installing the RAS (e.g., thermal overload, angular instability, poor oscillation damping, voltage instability, under- or over-voltage, or slow voltage recovery).*

*e. Description of the Contingencies or System conditions for which the RAS was designed (i.e., initiating conditions).*

*f. Action(s) to be taken by the RAS.*



*g. Identification of limited impact RAS.*

*h. Any additional explanation relevant to high-level understanding of the RAS.*

## **II. Functional Description and Transmission Planning Information**

*1. Contingencies and System conditions that the RAS is intended to remedy.*

*2. The action(s) to be taken by the RAS in response to disturbance conditions.*

*3. A summary of technical studies, if applicable, demonstrating that the proposed RAS actions satisfy System performance objectives for the scope of System events and conditions that the RAS is intended to remedy. The technical studies summary shall also include information such as the study year(s), System conditions, and Contingencies analyzed on which the RAS design is based, and the date those technical studies were performed.*

*4. Information regarding any future System plans that will impact the RAS.*

*5. RAS-entity proposal and justification for limited impact designation, if applicable.*

*6. Documentation describing the System performance resulting from the possible inadvertent operation of the RAS, except for limited impact RAS, caused by any single RAS component malfunction. Single component malfunctions in a RAS not determined to be limited impact must satisfy all of the following:*

*a. The BES shall remain stable.*

*b. Cascading shall not occur.*

*c. Applicable Facility Ratings shall not be exceeded.*

*d. BES voltages shall be within post-Contingency voltage limits and post-Contingency voltage deviation limits as established by the Transmission Planner and the Planning Coordinator.*

*e. Transient voltage responses shall be within acceptable limits as established by the Transmission Planner and the Planning Coordinator.*

*7. An evaluation indicating that the RAS settings and operation avoid adverse interactions with other RAS, and protection and control systems.*

*8. Identification of other affected RCs.*

## **III. Implementation**

*1. Documentation describing the applicable equipment used for detection, dc supply, communications, transfer trip, logic processing, control actions, and monitoring.*

2. *Information on detection logic and settings/parameters that control the operation of the RAS.*
3. *Documentation showing that any multifunction device used to perform RAS function(s), in addition to other functions such as protective relaying or SCADA, does not compromise the reliability of the RAS when the device is not in service or is being maintained.*
4. *Documentation describing the System performance resulting from a single component failure in the RAS, except for limited impact RAS, when the RAS is intended to operate. A single component failure in a RAS not determined to be limited impact must not prevent the BES from meeting the same performance requirements (defined in Reliability Standard TPL-001-4 or its successor) as those required for the events and conditions for which the RAS is designed. The documentation should describe or illustrate how the design achieves this objective.*
5. *Documentation describing the functional testing process.*

#### **IV. RAS Retirement**

*The following checklist identifies RAS information that the RAS-entity shall document and provide to each reviewing RC.*

1. *Information necessary to ensure that the RC is able to understand the physical and electrical location of the RAS and related facilities.*
2. *A summary of applicable technical studies and technical justifications upon which the decision to retire the RAS is based.*
3. *Anticipated date of RAS retirement.*

### **2.2.2 Additional SPP RC and PC Submission Requirements**

## **2.3 Initial RC Review**

The SPP RC shall perform the following steps in its initial review upon receipt of a RAS review request.

- Provide confirmation of receipt of a RAS review request to the RAS entity(s).
- Verify all RC required information has been included in the submission.
- Perform a review of the RAS as defined in PRC-012-2 Attachment 2 including additional analysis as defined by the SPP RC.
- Inform the RAS entity(s) of anticipated SPP Working Group review schedule.

## 2.4 Scope of SPP RC RAS Review

### 2.4.1 PRC-012-2 Attachment 2

PRC-012-2 Attachment 2 is included below in italicized text. Where appropriate, additional explanation and expanded descriptions are provided by the SPP RC in non-italicized text.

#### *PRC-012-2 Attachment 2*

##### *Reliability Coordinator RAS Review Checklist*

*The following checklist identifies reliability-related considerations for the Reliability Coordinator (RC) to review and verify for each new or functionally modified Remedial Action Scheme (RAS). The RC review is not limited to the checklist items and the RC may request additional information on any aspect of the RAS as well as any reliability issue related to the RAS. If a checklist item is not relevant to a particular RAS, it should be noted as “Not Applicable.” If reliability considerations are identified during the review, the considerations and the proposed resolutions should be documented with the remaining applicable Attachment 2 items.*

#### **I. Design**

- 1. The RAS actions satisfy performance objectives for the scope of events and conditions that the RAS is intended to mitigate.*
- 2. The designed timing of RAS operation(s) is appropriate to its BES performance objectives.*
- 3. The RAS arming conditions, if applicable, are appropriate to its System performance objectives.*
- 4. The RAS avoids adverse interactions with other RAS, and protection and control systems.*
- 5. The effects of RAS incorrect operation, including inadvertent operation and failure to operate, have been identified.*
- 6. Determination whether or not the RAS is limited impact. A RAS designated as limited impact cannot, by inadvertent operation or failure to operate, cause or contribute to BES Cascading, uncontrolled separation, angular instability, voltage instability, voltage collapse, or unacceptably damped oscillations.*
- 7. Except for limited impact RAS as determined by the RC, the possible inadvertent operation of the RAS resulting from any single RAS component malfunction satisfies all of the following:*

- a. The BES shall remain stable.*
  - b. Cascading shall not occur.*
  - c. Applicable Facility Ratings shall not be exceeded.*
  - d. BES voltages shall be within post-Contingency voltage limits and post-Contingency voltage deviation limits as established by the Transmission Planner and the Planning Coordinator.*
  - e. Transient voltage responses shall be within acceptable limits as established by the Transmission Planner and the Planning Coordinator.*
- 8. The effects of future BES modifications on the design and operation of the RAS have been identified, where applicable.*

## **II. Implementation**

- 1. The implementation of RAS logic appropriately correlates desired actions (outputs) with events and conditions (inputs).*
- 2. Except for limited impact RAS as determined by the RC, a single component failure in a RAS does not prevent the BES from meeting the same performance requirements as those required for the events and conditions for which the RAS is designed.*
- 3. The RAS design facilitates periodic testing and maintenance.*
- 4. The mechanism or procedure by which the RAS is armed is clearly described, and is appropriate for reliable arming and operation of the RAS for the conditions and events for which it is designed to operate.*

## **III. RAS Retirement**

*RAS retirement reviews should assure that there is adequate justification for why a RAS is no longer needed.*

### **2.4.2 Additional SPP RC RAS Review**

No additional RAS review requirements beyond or in addition to PRC-012-2 Attachment 2 have been identified by the SPP RC.

## **2.5 SPP Working Group and Regional Review**

After the completion of the initial RC review, the SPCWG, TWG, and ORWG will be requested to provide a recommendation on any new, functionally modified, or retiring RAS.

The SPCWG shall be the primary working group responsible for reviewing and providing a recommendation to the SPP RC on RAS submissions. The SPCWG is expected to complete its responsibilities in relation to each RAS submission prior to review by the TWG or ORWG. Reviews by the TWG and ORWG can occur in any order after the completion of the SPCWG review. RAS submissions may require multiple iterations of review by the above listed working groups if additional concerns are identified or conflicting recommendations are provided.

All RC required information submitted with a RAS review request shall be made available to members of the above listed working groups except in cases of conflicts with FERC Standards of Conduct or other applicable confidentiality requirements.

Based on any recommendations or feedback received from SPP Working Groups and other impacted entities, the SPP RC reserves the right to request additional information and perform additional analysis prior to issuing a final approval of a RAS.

## **2.6 RAS Coordination – Neighboring RC Areas**

### **2.6.1 RAS Elements in Multiple RC Areas**

In cases where a RAS involves one or more elements physically located in a neighboring RC area, SPP expects RAS entities to submit the subject RAS to such an RC for review per PRC-012-2 R2.

### **2.6.2 RAS Impacting Neighboring RC Areas**

In cases where a reliability impact has been identified by either a RAS entity or the SPP RC, SPP RC will notify the impacted RC and determine the level of coordination necessary on a case by case basis.

## **2.7 Formal RC Feedback to RAS Entity**

Formal RC feedback to a RAS entity shall include the results of the RC review including any reliability issues identified and recommendations and/or feedback provided by SPP Working Groups.

## **2.8 Final Approval and Implementation of RAS**

Final RC approval of a RAS shall be issued once all identified reliability related issues have been resolved to the satisfaction of the SPP RC.

If the implementation process of a RAS, new or functionally modified, creates reliability related issues, coordination of an implementation plan shall be completed prior to final approval.

## 2.9 Time Needed to Complete Review Process

SPP shall make every effort to complete its portion of this review process and facilitate reviews by applicable SPP Working Groups and other Reliability Coordinators in a timely manner. In order to effectively complete the entire review process as described previously in Section 2 of this document, SPP recommends RAS entities make submissions a minimum of 6 months in advance of the desired implementation date. SPP cannot guarantee completion of the review process in any given 6 month period given the variable nature of multiple SPP Working Group schedules and in cases of necessary coordination with additional Reliability Coordinators.

## 3. SPP PC Evaluation

*PRC-012-2 R4. Each Planning Coordinator, at least once every five full calendar years, shall:*

*4.1. Perform an evaluation of each RAS within its planning area to determine whether:*

*4.1.1. The RAS mitigates the System condition(s) or Contingency(ies) for which it was designed.*

*4.1.2. The RAS avoids adverse interactions with other RAS, and protection and control systems.*

*4.1.3. For limited impact RAS, the inadvertent operation of the RAS or the failure of the RAS to operate does not cause or contribute to BES Cascading, uncontrolled separation, angular instability, voltage instability, voltage collapse, or unacceptably damped oscillations.*

*4.1.4. Except for limited impact RAS, the possible inadvertent operation of the RAS, resulting from any single RAS component malfunction satisfies all of the following:*

*4.1.4.1. The BES shall remain stable.*

*4.1.4.2. Cascading shall not occur.*

*4.1.4.3. Applicable Facility Ratings shall not be exceeded.*

*4.1.4.4. BES voltages shall be within post-Contingency voltage limits and post-Contingency voltage deviation limits as established by the Transmission Planner and the Planning Coordinator.*

*4.1.4.5. Transient voltage responses shall be within acceptable limits as established by the Transmission Planner and the Planning Coordinator.*

*4.1.5. Except for limited impact RAS, a single component failure in the RAS, when the RAS is intended to operate does not prevent the BES from meeting the same performance requirements (defined in Reliability Standard TPL-001-4 or its successor) as those required for the events and conditions for which the RAS is designed.*

*4.2. Provide the results of the RAS evaluation including any identified deficiencies to each reviewing Reliability Coordinator and RAS-entity, and each impacted Transmission Planner and Planning Coordinator.*

### **3.1 Planning Coordinator Assessment of RAS within its Planning Area**

SPP, as the PC, will perform an evaluation of each RAS within its planning area at least once every five full calendar years. The PC will be coordinating with the RAS entity to ensure that the data contained in the RAS database is the most up to date data for the applicable RAS. SPP will then perform a steady state and stability assessment to ensure that the RAS scheme:

- Mitigates the System condition(s) or Contingency (ies) for which it was designed
- Avoids adverse interactions with other RAS, and protection and control systems
- Satisfies the following for the possible inadvertent operation of the RAS, resulting from any single RAS component malfunction:
  - BES shall remain stable
  - Cascading shall not occur
  - Applicable Facility Ratings shall not be exceeded
  - BES voltages shall be within post-Contingency voltage limits and post-Contingency voltage deviation limits as established by the Transmission Planner and the Planning Coordinator.
  - Transient voltage responses shall be within acceptable limits as established by the Transmission Planner and the Planning Coordinator.
- When the RAS is intended to operate, but experiences a single component failure, this does not prevent the BES from meeting the same performance requirements (defined in Reliability Standard TPL-001-4 or its successor) as those required for the events and conditions for which the RAS is designed.
- For limited impact<sup>1</sup> RAS, the inadvertent operation of the RAS or the failure of the RAS to operate does not cause or contribute to BES Cascading, uncontrolled separation,

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<sup>1</sup> A RAS designated as limited impact cannot, by inadvertent operation or failure to operate, cause or contribute to BES Cascading, uncontrolled separation, angular instability, voltage instability, voltage collapse, or unacceptably damped oscillations.

angular instability, voltage instability, voltage collapse, or unacceptably damped oscillations.

The steady state and stability assessment performed will be similar to the NERC TPL-001 assessment utilizing the current year’s TPL steady state and stability case sets but will focus on the RAS local area with regard to the contingencies. The PC will monitor the BES for its TPs and neighboring PCs and TPs to ensure that there are no adverse impacts to their Systems. The PC will provide the assessment to the RAS-entity (ies), any affected System(s), and the SPP TWG, ORWG, and SPCWG.

### 3.2 Planning Coordinator Data requirements

SPP, as the PC, will request the following data in order to assess the RAS per PRC-012-2. The following items are the minimum need and additional items may be requested on an as needed basis by the PC. A detailed list of needs

- Overview of RAS and the Surrounding BES
- Need for RAS or if it is being modified
- Entities Involved and Impacted by RAS
- Additional Sensitivity Analyses
- System Facilities Involved in the RAS
- Inclusion of any Operating Guidelines

### 3.3 Planning Coordinator RAS Study Checklist

The following is a checklist that the PC will use as a template in order to facilitate the RAS assessment to ensure that PRC-012 and SPP Working Group needs are adequately covered. The RAS Entity will submit the data requested below in conjunction with the data being submitted to the RC for its RAS Review Process. SPP will send out a notification to the RAS Entities in advance of the RAS assessment performed every 5 years to ensure that the data below is up to date with the current RAS scheme.

ITEMS	DESCRIPTION
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<p><b>Overview of RAS and the Surrounding BES:</b></p>	<p>Provide a brief summary of the operational aspects of the BES where the RAS is installed. Describe general system conditions, the generation profile, the directional flow of key facilities, etc., that will help the reviewer understand the nature of the BES in the area of the RAS. Provide a brief summary of the functional operation of the RAS and how it relates to that portion of the BES.</p>
<p><b>Need for RAS:</b></p>	<p>If the RAS is a new/proposed RAS, identify the conditions that caused the need for the RAS. If the RAS is being modified, describe the conditions or circumstances that resulted in a need to modify the RAS.</p>
<p><b>Entities Involved:</b></p>	<p>Identify all companies who have ownership of facilities involved with the functional operation of the RAS.</p>
<p><b>Entities Impacted:</b></p>	<p>Identify all companies who are impacted by the operation of the RAS and have operating knowledge of the RAS and its associated Operating Guides.</p>
<p><b>IROL Involved</b></p>	<p>Identify whether an IROL is involved with or mitigated by the RAS.</p>
<p><b>Study Model Information:</b></p>	<p>Identify all BES models used for studying the RAS, including model building series, years studied, season, and load level. Identify any changes made to the base models, such as interchange modifications, generation dispatch changes, or topology changes.</p>
<p><b>Sensitivity Analyses:</b></p>	<p>Identify any sensitivity or scenario analysis that was performed and the reason for the analysis.</p>
<p><b>Facilities Involved:</b></p>	<p>Clearly identify all monitored and contingency facilities. Identify both their normal and emergency ratings of monitored facilities for the applicable season. Identify their operating limit if it is less than the thermal limit.</p>
<p><b>Voltage Monitoring:</b></p>	<p>Identify any pertinent voltages that were beyond operating limits and that required mitigation.</p>
<p><b>Modified RAS:</b></p>	<p>If the RAS is being modified, clearly identify what functional changes are being made to the existing RAS and the cause of the modification.</p>
<p><b>Analysis Results:</b></p>	<p>Display the results of the analysis in tabular form. For each model or scenario, clearly show pre-contingent flows and contingency flows before and after the RAS operates. Provide both MW and MVA flows. Compare the MVA flow of each monitored facility with the applicable rating/limit to illustrate overloads. Highlight all overloads (and voltage excursions) in bold or red font.</p>
<p><b>RAS Redundancy:</b></p>	<p>Except for limited impact RAS, when the Planning Coordinator identifies through steady state and stability assessment specified in Requirement R4 if the RAS is needed to meet the same performance requirements (defined in TPL-001-4 or its successor) for the events and conditions for which the</p>

	RAS is designed, the RAS Entity shall state that a single component failure in the RAS will not prevent the intended operation of the RAS. Acceptable methods for providing redundancy of RAS Components are listed below.
<b>Inadvertent Operation:</b>	Verify that the inadvertent operation of the RAS (unnecessary operation during system conditions for which the RAS was not required to operate) will not result in any unacceptable operating conditions.
<b>Coordination with other RASs:</b>	Discuss what analysis was done to verify that the RAS coordinates with other neighboring RASs or any other unique system protection schemes in the area of study.
<b>Operating guides:</b>	Provide any associated Operating Guides.
<b>Conclusion:</b>	Provide a brief summary conclusion of the results of the planning study report.
<b>Failure to Operate</b>	Identify any implications of a failure or partial failure to operate. (Examples; SOL Exceedances, cascading, instability)

A RAS cannot, by inadvertent operation or failure to operate, cause or contribute to BES Cascading, uncontrolled separation, angular instability, voltage instability, voltage collapse, or unacceptably damped oscillations. RAS are subject to the single component malfunction and failure tests of PRC-012-2 Requirements R4 Parts 4.1.4 and 4.1.5, respectively for Planning Events. Below are examples of acceptable methods for providing redundancy of RAS Components:

- Protective or auxiliary relays used by the RAS
- Communications systems necessary for correct operation of the RAS
- Sensing devices (i.e. PTs (voltage transformers) and CTs (Current Transformers)) used to measure electrical or other quantities used by the RAS
- Station dc supply associated with RAS functions
- Control circuitry associated with RAS functions through the trip coil(s) of the circuit breakers or other interrupting devices
- Logic processing devices that accept System inputs from RAS components or other sources, make decisions based on those inputs, or initiate output signals to take remedial actions

## **4. RAS Operations, Failures, and Testing**

### **4.1 Review of RAS Operation or Failure**

*PRC-012-2 R5. Each RAS-entity, within 120 full calendar days of a RAS operation or a failure of its RAS to operate when expected, or on a mutually agreed upon schedule with its reviewing Reliability Coordinator(s), shall:*

*5.1. Participate in analyzing the RAS operational performance to determine whether:*

*5.1.1. The System events and/or conditions appropriately triggered the RAS.*

*5.1.2. The RAS responded as designed.*

*5.1.3. The RAS was effective in mitigating BES performance issues it was designed to address.*

*5.1.4. The RAS operation resulted in any unintended or adverse BES response.*

*5.2. Provide the results of RAS operational performance analysis that identified any deficiencies to its reviewing Reliability Coordinator(s).*

A RAS Entity that has experienced a RAS operation or the failure of a RAS to operate will provide to the SPP RC a preliminary report containing all information described in PRC-012-2 R5.1 within 14 calendar days. In coordination with the SPP RC, a final report will be due 120 calendar days after the event. An extension to the previously described 14 day and 120 day requirements can be requested by the RAS Entity. Such a request should contain a description of the circumstances that require an extension. The SPP RC shall review extension requests and provide a response to the RAS Entity with 14 calendar days.

### **4.2 Corrective Action Plan (CAP)**

#### **4.2.1 Developing a CAP**

*PRC-012-2 R6. Each RAS-entity shall participate in developing a Corrective Action Plan (CAP) and submit the CAP to its reviewing Reliability Coordinator(s) within six full calendar months of:*

- Being notified of a deficiency in its RAS pursuant to Requirement R4, or*
- Notifying the Reliability Coordinator of a deficiency pursuant to Requirement R5, Part 5.2, or*

- *Identifying a deficiency in its RAS pursuant to Requirement R8.*

All correspondence related to PRC-012-2 R6 shall be provided using the email address ‘SPPRAS@spp.org’. When necessary, SPP shall contact RAS Entities using the contacts provided as required in Section 2.2.1 of this document.

#### **4.2.2 Implementing a CAP**

*PRC-012-2 R7. Each RAS-entity shall, for each of its CAPs developed pursuant to Requirement R6:*

*7.1. Implement the CAP.*

*7.2. Update the CAP if actions or timetables change.*

*7.3. Notify each reviewing Reliability Coordinator if CAP actions or timetables change and when the CAP is completed.*

All correspondence related to PRC-012-2 R7 shall be provided using the email address ‘SPPRAS@spp.org’. When necessary, SPP shall contact RAS Entities using the contacts provided as required in Section 2.2.1 of this document.

### **4.3 RAS Functional Testing Requirements**

*PRC-012-2 R8. Each RAS-entity shall participate in performing a functional test of each of its RAS to verify the overall RAS performance and the proper operation of non-Protection System components:*

- *At least once every six full calendar years for all RAS not designated as limited impact, or*
- *At least once every twelve full calendar years for all RAS designated as limited impact*

A RAS Entity shall coordinate any functional testing pursuant to PRC-012-2 R8 as described in the ‘SPP Reliability Coordinator Outage Coordination Methodology’. This document is available on SPP’s website.

## **5. RC RAS Database**

*PRC-012-2 R9. Each Reliability Coordinator shall update a RAS database containing, at a minimum, the information in Attachment 3 at least once every twelve full calendar months.*

*PRC-012-2 Attachment 3*

***Database Information***

- 1. RAS name.*
- 2. Each RAS-entity and contact information.*
- 3. Expected or actual in-service date; most recent RC-approval date (Requirement R3); most recent evaluation date (Requirement R4); and date of retirement, if applicable.*
- 4. System performance issue or reason for installing the RAS (e.g., thermal overload, angular instability, poor oscillation damping, voltage instability, under- or over-voltage, or slow voltage recovery).*
- 5. Description of the Contingencies or System conditions for which the RAS was designed (i.e., initiating conditions).*
- 6. Action(s) to be taken by the RAS.*
- 7. Identification of limited impact RAS.*
- 8. Any additional explanation relevant to high-level understanding of the RAS.*

SPP RC shall create and maintain a RAS database pursuant to PRC-012-2 R9. This RAS database shall be created using information provided by the RAS Entity(s) as required by Section 2.1 of this document and other information as deemed necessary by the SPP RC. The RAS database information for each RAS shall be validated by the applicable RAS Entity(s) upon request by SPP RC.