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INTRODUCTION:
This document provides a framework for the submission of a Remedial Action Scheme (RAS), also known as a Special Protection System (SPS), to the Remedial Action Scheme Reliability Subcommittee (RASRS) for evaluation and operation within the WECC. All RAS within WECC are required to be reviewed by the RASRS, per the PRC-012-WECC-CRT-1, Remedial Action Schemes (RAS Criterion). The RASRS will also perform detailed evaluation of a RAS at the request of appropriate WECC committees even if such review may not have been otherwise required by the RAS Criterion.

Generally, all elements of a RAS applied at any voltage level intended to remediate performance violations on the Bulk Electric System (BES) are subject to the NERC requirements for RAS. Minimum system performance requirements are identified in the TPL standards and WECC Criteria.

This document applies to classification and review within WECC of Remedial Action Schemes until superseded by implementation of the NERC PRC-012-2 standard, subsequent to approval by FERC.

What is (and is not) a RAS?
On November 19, 2015, the Federal Energy Regulatory Commission (FERC) approved a revised definition of a Remedial Action Scheme for inclusion in the Glossary of Terms Used in NERC Standards. The new definition has an effective date of April 1, 2017, and is accepted by the RASRS as of the effective date of this document.

The definition as approved is as follows:

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.

When is RAS Review Required?
Remedial Action Schemes are reviewed by WECC on the following occasions:

1) Prior to initial installation and commissioning;
2) Prior to being functionally modified. Any modification to a RAS consisting of any of the following is considered a functional modification:
   - 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
3) In the event of failure of a scheme for which functional modifications will be necessary. For the purposes of RASRS review, failures shall be considered for such conditions as:
   - Accidental or unintended RAS operations that do not meet expected performance levels
   - RAS failures to operate that result in system performance outside the expected levels.
4) Removal of a scheme from service. Schemes proposed for removal should first be evaluated by the same planning group (or appropriate successor group) as reviewed the original studies that resulted in the RAS installation or most recent modification. Examples include, but are not limited to:
   - Technical Studies Subcommittee (TSS) for schemes originally identified and reviewed through the WECC Three Phase Rating Process; or,
   - The appropriate Planning Coordinator.

In order to maintain compliance with PRC standards, RAS owners should separately inform the Reliability Coordinator and their neighbors who may be affected by a scheme that the scheme is being functionally modified or removed.

RAS Classifications
WECC uses the NERC RAS/SPS Glossary definition and adds classifications to determine level of scheme review.

The focus of the RASRS in reviewing a scheme includes these considerations; but, it is slightly different. The NERC PRC standards identify system performance as the critical function. Acceptable system performance is described in the NERC Planning (TPL) Standards. Therefore, schemes that are designed to result in system performance meeting the TPL standards are the schemes that the RASRS reviews.

However, the PRC standards do provide WECC with flexibility in designing the review procedure. WECC uses this flexibility to provide more detailed reviews of RAS that may have a significant system performance impact. As an aid to identify the levels of impact, WECC has three classifications of RAS: the Local Area Protection Scheme, the Wide Area Protection Scheme and the Safety Net.[1] These three classifications as defined below are listed by increasing magnitude of impact.

Underfrequency and Under voltage load shedding schemes (UFLS and UVLS) are not covered by this guideline. These types of schemes are separately regulated by PRC-006 and PRC-010.

Local Area Protection Scheme (LAPS)
A classification of RAS that includes the following design features:
Failure of LAPS to operate would *not* result in any of the following:

- Violation of TPL-001-WECC-CRT-3, Transmission System Planning Performance;[2]
- Maximum firm load loss ≥ 300 MW;
- Maximum generation loss ≥ 1000 MW.

Wide Area Protection Scheme (WAPS)
A classification of RAS that includes the following design features:
Failure of WAPS to operate *could* result in any of the following:

- Violation of TPL-001-WECC-CRT-3, Transmission System Planning Performance;[2]
- Maximum firm load loss ≥ 300 MW;
- Maximum generation loss ≥ 1000 MW.

Safety Net (SN)
A classificiation of RAS designed to remediate TPL-001-4 extreme events. Failure of a SN to operate when intended is within the NERC Standard performance requirements. However, inadvertent SN

[1] Although the classification titles suggest they may be geographically specific, the definitions do not impose any specific geographic limits.
[2] The targeted effective date of the WECC Criterion coincides with the September 2016 WECC Board of Directors (Board) meeting.

operation due to a single component malfunction must satisfiy all of the performace requirements common to all planning events P0-P7 listed in TPL-001-4.

The primary purpose of a WECC review of a LAPS is for WECC to confirm that the owner's initial classification of the scheme is correct. Once WECC accepts that a scheme is a LAPS, a detailed review of the reliability impacts of the scheme may be done but is not required. For WAPS or SN, detailed reviews of the reliability impacts are required before WECC can approve such schemes.

This classification method does not affect any NERC standards compliance requirements. The RAS type only affects the level of detail required for scheme review by the RASRS. The defintions are used to focus the review effort on the larger schemes that can have more impact on system operation. This is more effective for both the RASRS and individual WECC members whose schemes need review.

The fact that a scheme may be fully redundant and therefore its failure can be judged not credible is not relevant to this classification. One functional method to draw the line between LAPS and WAPS is at the Transmission Planning study stage. The planner may model "no RAS action" for the critical contingency, observe the modeled system performance, and judge the "local" versus "wide area" impact according to the bullets in the definitions. This may actually be the Planning case that originally identified the need for a RAS, even before the specific RAS functionality is identified.

The Figure 1 flow chart outlines how to apply these definitions to determine which type applies to a specific RAS.

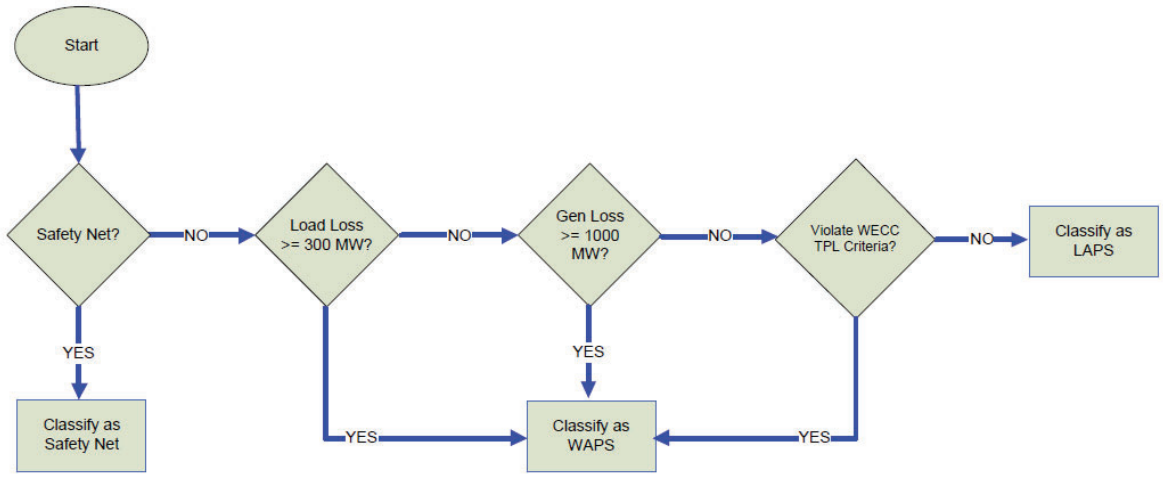

Figure 1. WECC Remedial Action Scheme type defintions

RAS Reviews

Historically WECC has concentrated review efforts on schemes that have larger system impact, (WAPS) even prior to adopting formal type definitions. Prior to about 2011, LAPS, while not being completely

ignored, were reviewed generally only at the request of the owner or when some mis-operation raised scheme visibility within WECC.

The 300 MW firm load loss level in both LAPS and WAPS definitions is derived from the EOP-004, Attachment 1, DOE-OE417 form as well as the NERC Event Analysis categories (Category 2) used when these classifications were first developed. The 1000 MW generation loss value was selected in part as half the upper limit to the NERC Category 2 event; in addition, no WECC non-nuclear individual units were this large, and no WECC RAS were then operated to trip nuclear units.

WAPS remain critically important to BES operation and still require detailed reviews. Review procedures for these schemes remain essentially unchanged. While a LAPS mis-operation will not result in a large-scale impact on the system, these schemes still require a level of WECC review to encourage reliability and document what the scheme does. Similarly, a SN may have a significant system impact, but does not have the same single component failure requirement as a LAPS or WAPS. The overall WECC review process is outlined in Figure 2.

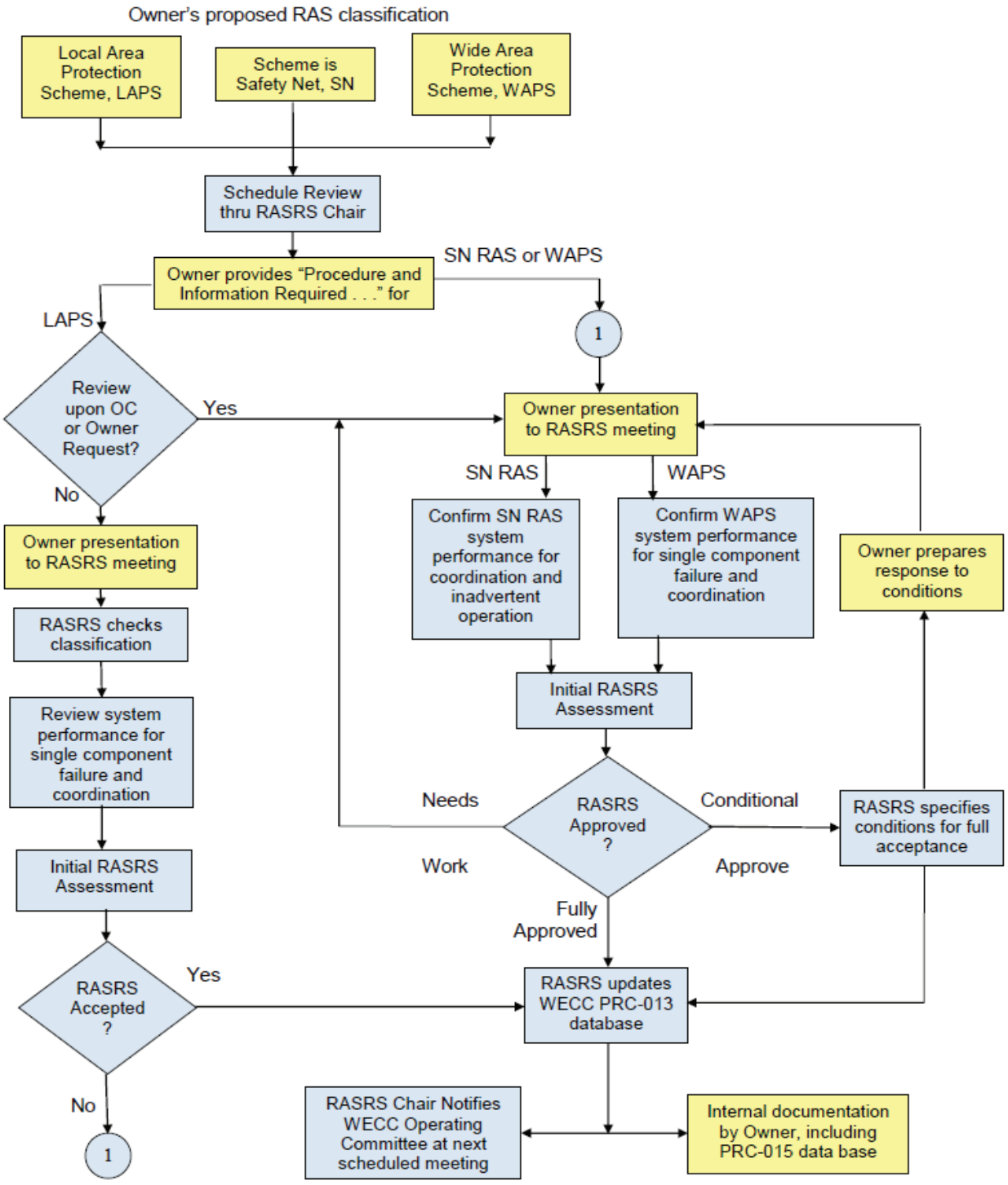

Figure 2. WECC Remedial Action Scheme review process. Owner responsibilities are color coded in yellow and WECC responsibilities in blue.

Since WECC generally does not review LAPS beyond the agreement that a scheme is a LAPS, WECC accepts the classification of such schemes. However, WAPS and SN are reviewed in substantial detail, which allows WECC to approve these schemes.

WAPS are examined by the RASRS at the level of detail necessary to provide an "outside" review to ensure satisfying the requirements of PRC-012-1.

Safety Net RAS are generally reviewed at a slightly lower level of detail than WAPS because the TPL standard does not require that such extreme events actually be remediated. Therefore SN RAS do not require the same single component failure performance as LAPS or WAPS, but still require that system performance for inadvertent operations and coordination with other protection and control systems is satisfied.

LAPS reviews are more limited. The RASRS will review the owner's classification and apparent conformance of the scheme in accordance with the RAS Criterion (single component failure, inadvertent operation, and coordination), and initial assessment. If the RASRS does not agree with the owner's classification, the RASRS will assign the appropriate classification and review the scheme at that level.

The WECC review process is not intended to limit making urgent modifications to a scheme if necessary to maintain BES reliability. However, the reporting party is expected to submit any such urgent modifications to the RASRS for review expeditiously. Reviews of this nature should be rare; but, a review generally can be scheduled via conference call on short notice when required.

Periodic Assessments

WECC recognizes that most, if not all members, include RAS installed on their systems in System Operating Limit (SOL) studies, daily outage planning, real-time contingency analysis (RTCA) or similar studies, typically at least annually. To ensure the information remains up-to-date, NERC and WECC require that a review be performed by the owner at least every five years. If any violations of performance requirements are discovered during these studies, a Corrective Action Plan (CAP) must be developed.[3]

Only the RAS owner is in a position to develop and follow through on a CAP. The NERC Glossary only indicates that the CAP must identify a solution that will fix the identified problem(s) and a timetable when the solution(s) will be implemented. If the CAP solutions involve functional modifications to a RAS (see above), then those modifications must be reviewed by the RASRS through the procedures described in this document.

The information for inclusion in the assessment is outlined in Attachment B. The same summary information is needed for the initial review of a new RAS. The RAS database (below) keeps track of when the most recent assessment occurred, but WECC needs to review the owner's most recent assessment and summary within a 5-year schedule.

[3] Corrective Action Plan is a NERC defined term contained in the Glossary of Terms Used in NERC Reliability Standards.

WECC Remedial Action Scheme Database
Both NERC and WECC require that WECC create and maintain a database of all RAS within WECC. The RAS database has been created and is maintained by the RASRS. The contents of the RAS Criterion, PRC-(012 through 014)-WECC-CRT-2.2, RAS Review and Assessment Plan, Attachment A, the WECC Remedial Action Scheme Information Sheet, currently constitute the minimum data included in the WECC RAS database; however, additional fields may be added to the data set if needed.

The owner (reporting party) for each new or modified RAS is required to fill in the database information as requested. The completed information should be submitted electronically as part of the material required for scheme review by the RASRS. Schemes scheduled for removal need simply include "SCHEME REMOVED" or a similar phrase in the description for the specific scheme.

The RAS Criterion also requires annual reporting of any updated scheme information (if needed). This annual reporting should use the PRC-013 RAS Template or the current RAS Database (also available on the WECC web site with separate versions for each owner (reporting party)). This process is intended to keep the RAS database up to date.

When a scheme has been reviewed and received either full or conditional acceptance by RASRS (as shown in Figure 2), the scheme data is incorporated in the WECC RAS database. The status of scheme conditions (if any) and full acceptance is tracked separately from the WECC RAS database.

Closed RASRS Scheme Review Sessions
Schemes reviewed by RASRS often include facilities classified as Critical Assets, and, depending on implementation, may contain Critical Cyber Assets, BES Cyber Assets or BES Cyber Systems as part of implementing the functionality that the RASRS reviews. The information which RASRS requests and reviews includes at least some aspects of operational procedures, incident response plans, and network topology or similar diagrams. It is also common for presentations to include some floor plan and equipment layout information in the form of pictures or diagrams.

In addition, much of the scheme information requested and discussed is of greater sensitivity than the information specifically listed in the NERC CIP Critical Cyber Asset Information (CCAI) requirement and therefore is expected to be protected. This may include confidential, restricted, or other non-public documents. Some companies have a requirement that CCAI and other restricted information may only be transmitted with a nondisclosure agreement (NDA) in place. If information of this nature were omitted from the RASRS presentations and discussions, or if it were less detailed, the review process would be hampered and less effective.

The RASRS Chair may propose a scheme review in closed session with appropriate notification in the publicly-posted meeting agenda before the RASRS meeting. The scheme owner may request that the RASRS review occur in closed session in time to provide adequate notice of the potential closed session. Closed sessions are subject to a 2/3 vote of RASRS members present. If information to be discussed is covered by an NDA all members present must be signatories to the NDA before the discussions begin. This process is authorized by and further described in the RASRS Charter.

Submitting Information to the RASRS for Review

When making a submittal to the RASRS for RAS review, the following steps are required:

1. Discuss the proposed RAS with the RASRS Chair. If the Chair, or the RASRS designee, determines that the documentation is sufficiently complete, a review will be scheduled at the next in-person meeting of the RASRS. If schedules require, a separate RASRS meeting may be scheduled (either in-person or via web/phone communications).

2. The presenter(s) will supply copies of the completed documentation, including the Information Required to Assess the Reliability of a RAS (following section of this document) to the RASRS members, to be received prior to the presentation date so members have sufficient time for review (prefer at least two weeks). The necessary mailing information may be requested from the RASRS Chair. Electronic copies are strongly preferred, provided that the documents can be opened by using standard MS Office or Adobe *.pdf products, and provided that no special software tools are required. It is the responsibility of the presenter(s) to insure that all submitted materials, attachments, presentation material, and handouts are clearly legible. Electronic documents should be submitted to the RASRS through the WECC web site (the procedure is listed under RASRS Approved Documents), or provided to the RASRS chair, vice chair, or WECC RASRS support staff.

3. The RAS will be included in the WECC RAS database on the WECC RASRS web site (but subject to limited access due to the sensitive nature of the data) for record purposes and for periodic review as part of the WECC/NERC certification process. The database is updated as new schemes are added or existing schemes are modified, retired, or expanded and as part of the annual review and periodic assessments by RAS owners (reporting parties) as required. The RAS applicant, participant, or owner – the "Responsible Party" -- is required to prepare a summary of salient features of the RAS for inclusion in the database as part of the documents submitted for review.

4. Scheme modifications may include changes to the hardware, transfer levels, or any change with possible impact to the overall functionality, timing, or redundancy level approved at the time of the original submission for approval. Note the more detailed description under the heading "When is RAS Review Required?" on page 3.

WECC RAS Initial or Periodic Assessment Summary

For all new or modified RAS, also provide information required by the WECC RAS Initial or Periodic Assessment Summary, as maintained by the RASRS.

1) RAS Name
2) Reporting Party
3) Group Conducting this RAS Assessment
4) Assessment Date
5) Review the scheme purpose and impact to ensure proper classification, is it (still) necessary, does it serve the intended purpose, and does it continue to meet current performance requirements.
6) The RAS assessment including Study Years
7) System Conditions
8) Contingencies analyzed
9) Date when the technical studies were completed
10) Does the RAS comply with NERC standards and adherence to WECC Criteria
11) Discuss any coordination problems found between this RAS and other protection and control systems during this (most recent) assessment.
12) Provide a Corrective Action Plan if this RAS was found to be non-compliant or had coordination problems during this (most recent) assessment (should be NA for owner's initial assessment)

Provide the name and contact information of the person responsible for this RAS data submittal.

If a classification of LAPS is claimed by the Reporting Party, full scheme review by the RASRS is generally not required unless this classification is not agreed to by the RASRS. The Reporting party must provide adequate information for the RASRS to judge the proposed scheme classification.
If a full RASRS scheme review is not required (LAPS), the RAS owner is still responsible for meeting all of the requirements of the RAS Criterion.

If a full RASRS review is required (for WAPS or SN, the following information, Sections A - F must be submitted for review:

A. RAS PURPOSE AND OVERVIEW

1) Identify the ownership of the RAS (the Reporting Party).

2) Provide the name of the RAS, the purpose and the desired in-service date. Include the specific type of system problem(s) being solved, e.g. transient stability, thermal overload, voltage stability, etc.

3) Provide the owner's classification of the RAS as a LAPS, WAPS, or SN.

4) Provide the information required by the RASRS to populate the WECC RAS database. The contents of Attachment A constitute the minimum acceptable data set required for submittal.

5) Provide the name(s) of person(s) within the owner's organization who is(are) responsible for the operation and maintenance of the RAS.

6) Provide a description of the RAS to give an overall understanding of the functionality and a map showing the location of the RAS. Identify other protection and control systems requiring coordination with the RAS. See "RAS Design", below, for additional information.

7) Provide a single line drawing(s) showing all sites involved. The drawing(s) should provide sufficient information to allow RASRS members to assess design reliability, and should include information such as the bus arrangement, circuit breakers, the associated switches, etc. For each site, indicate whether detection, logic, action, or a combination of these is present.

8) Indicate the type of system reliability studies performed and a list of any that are in progress.

9) Provide a discussion of the impact to the WECC power grid, including other protection and control systems that result from the actions taken by the proposed RAS and from its failure to operate as expected. Does a failure to operate or a misoperation impact an Intertie Path? If yes, what Intertie Path?

B. RAS DESIGN

1) Describe the design philosophy (e.g. failure is to be a non-credible event, or what will the RAS do to accomplish the intended system performance?).

2) Describe the design criteria (e.g. failure of a single component, element or system will not jeopardize the successful operation of the RAS, or how is the design philosophy accomplished?).

3) RAS Logic - Provide a description of the RAS Logic in the form of written text, flow charts, matrix logic tables, timing tables, etc. as appropriate and identify the inputs and outputs. Provide appropriate diagrams and schematics.

4) RAS Logic Hardware - Provide a description of the logic hardware (relay, digital computer, etc.) and describe how the RAS logic function is achieved.

5) Redundancy - Provide a discussion of the redundancy configuration and if appropriate, why redundancy is not provided. Include discussion of redundant:

a) Detection.
b) Power supplies, batteries and chargers.
c) Telecommunications (also mentioned in item 10d).
d) Logic controllers (if applicable).
e) RAS trip circuits.

6) Arming - Describe how the RAS is armed (i.e. remotely via SCADA, locally, automatic, etc.).

7) Detection - Define all inputs to the RAS for the scheme to perform its required purpose. Examples:

a) Devices needed to determine line-end-status such as circuit breaker (52 a/b contacts) and disconnect status.
b) Protective relay inputs.
c) Transducer and IED (intelligent electronic device) inputs (watts, vars, voltage, current).
d) Rate-of-change detectors (angle, power, current, voltage)
e) All other inputs (e.g. set points, time from a GPS clock and wide area measurements such as voltage angle between two stations).
f) Provide details of other remote data gathering or control equipment.

8) Coordination with Protection and Control Systems
Describe all protection and control systems interactions with the RAS, in addition to the RAS inputs described in (7) above.

a) System configuration changes due to RAS operation do not adversely affect protective relay functions such as distance relay overcurrent supervision, breaker failure pickup, switching of potential sources, overexcitation protection activation, or other functions pertinent to the specific relays or protection scheme.
b) If studies indicate that transient or sustained low voltages are expected in conjunction with elevated line flows during or after RAS operation, confirm that any protection settings on affected lines will not cause cascading outages related to the low system voltages.
c) Potential adverse interactions with any other protection or control systems.

9) Multifunction Devices.

A multifunction device is a single device that is used to perform the function of a RAS in addition to protective relaying and/or SCADA simultaneously. It is important that other applications in the multifunction device do not compromise the functionality of the RAS when the device is in service or when is being maintained.

a) Describe how the multifunction device is applied in the RAS.
b) Show the general arrangement and describe how the multi-function device is labeled in the design and application, so as to identify the RAS and other device functions.
c) Describe the procedures used to isolate the RAS function from other functions in the device.
d) Describe the procedures used when each multifunction device is removed from service and whether any other coordination with other protection is required.
e) Describe how each multifunction device is tested, both for commissioning and during periodic maintenance testing, with regard to each function of the device.
f) Describe how overall periodic RAS functional and throughput tests are performed if multifunction devices are used for both local protection and RAS.
g) Describe how upgrades to the multifunction device, such as firmware upgrades, are accomplished. How is the RAS function taken into consideration?

10) Telecommunications.

a) Provide a graphical display or diagram for each telecom path used in the proposed RAS scheme, including extent of redundancy employed. See references. Indicate ownership of the circuits, paths, and segments. Indicate responsibility for maintenance. If a telecom circuit utilizes a public network, describe monitoring and maintenance agreements including repair response, details of availability, and how possible change of ownership is addressed. Describe maintenance agreements and response commitments when the RAS communication utilizes multiple private systems.

b) Describe and list the telecommunications media and electronic equipment (e.g. microwave radio, optical fiber cable, multiplex node, power line carrier, wire pair, etc.) including redundancy employed in each telecom path. For each of the paths and segments of the RAS, identify the type of telecom equipment employed. For example, whether analog or digital licensed microwave radio, unlicensed spread spectrum radio, fiber optic SONET node, etc are applied.

c) Provide a description of common facilities used for each RAS telecom path and segment that are not specifically excluded from redundancy by the WECC critical communication circuit design guideline (e.g. towers, generators, batteries). Identify paths or segments routed through common equipment chassis such as Digital Cross-connect System, SONET node, or router. Identify physical media carried or supported by the same structure, such as a transmission line tower, pole structure, or duct bank. Discuss outside plant and inside plant routing diversity. See references.

d) Provide a discussion of communications system performance including, circuit or path quality in terms of availability. Provide details of reliability (e.g., availability of 99.95%), and other supporting reliability information such as equipment age, history, maintenance, etc. Telecommunication reliability information is the average overall percentage, and not point-to-point information. See references.

e) Provide a discussion about performance of any non-deterministic communication systems used (such as Ethernet). If RAS performance is dependent upon successful operation through a non-deterministic communications system or path, then describe how timing and latency issues will be addressed and verified. Include timing and latency planning or management and verification for initial commissioning and in the event of network modifications or additions. Identify which industry standard is applied.

f) Acknowledge provision of appropriate high voltage entrance protection if wire pairs are used.

11) Transfer Trip Equipment - Identify the manufacturer and type (FSK audio tone, FS carrier, digital, etc.), and provide the logic configuration (dual channel, pilot tone, etc.). Identify whether internal device medium is used; e.g. “Relay-to-Relay” communication.

12) Remedial Actions Initiated - Provide a functional description of the action(s) produced by the scheme and include a simplified one-line diagram of the RAS output to the end-device operated by the scheme.

13) Remedial Action Schemes may have elements such as engineering access, routable protocols, and sensitive design documentation included in the design that require compliance with the NERC CIP Standards. Utilities may handle CIP compliance differently. Please provide a high-level overview of how your company’s CIP Compliance Program requirements are incorporated into this RAS design.

The RASRS concern is that CIP compliance does not compromise the reliability of the RAS. RASRS will not assess compliance, validity or completeness of the owner’s CIP program. The owner remains completely and solely responsible that its CIP program complies with NERC standards.

C. MONITORING

1) Provide details of RAS monitoring equipment and time resolution including station alarms, SCADA monitoring, and Sequence of Events Recorders.

2) Provide details of facilities monitored including

a) Equipment self-diagnostics and annunciation
b) Initiation locations
c) Logic facilities
d) Telecommunications
e) Transfer trip equipment
f) RAS actions

D. RAS OPERATING PROCEDURES FOR ABNORMAL SYSTEM CONDITIONS

Provide a summary of the operating procedures or the relevant Dispatch Instructions pertaining to this RAS during abnormal system conditions. Specifically address the operating procedures for the following situations:

1) The RAS operates incorrectly (failure to operate or false operation).
2) One part of a redundant RAS system is unavailable so that complete redundancy is no longer assured.
3) Unscheduled, or unplanned and not coordinated, unavailability of the subject RAS (complete loss of RAS) impacts operation.
4) When a partial or total loss of input data required for arming decisions.

E. COMMISSIONING, MAINTENANCE AND TESTING

1) Describe the RAS commissioning and overall functional test procedure(s).
2) Describe the maintenance and test procedures including:
   a) The provision of test switches and test facilities.
   b) Preventative maintenance; both electrical and telecommunication.
   c) Functional Testing, including system end-to-end checks
   d) Provide the maintenance and test intervals, including any seasonal restrictions.
   e) A copy of the Maintenance and Test Procedure(s).
   f) A discussion of power system curtailment during maintenance and test activities

F. PERFORMANCE AND OPERATIONAL HISTORY

1) Provide assurances that the overall performance and operating time of the RAS will meet the requirements identified in system studies.
2) When using the existing equipment and components, such as the EMS, RAS controllers, and arming devices, address the following items as they pertain to the operational history of such equipment and procedures.
   a) How long has the RAS been in operation and how many times has it operated?
   b) How many times has the RAS failed to operate when it should have? Provide details of causes and impacts.
   c) How many times has it operated unnecessarily? Provide details of causes and impacts.

d) What modifications, if any, are planned as a result of b and c above?

G. REFERENCES

Remedial Action Scheme Reliability Subcommittee (RASRS) Charter
https://www.wecc.biz/Corporate/RASRS%20Charter.pdf

Remedial Action Schemes Application and Implementation Requirements and Performance Assessment Measures – October 25, 2001 Power Point Presentation Before The PCC/OC/WMIC Joint Meeting –
https://www.wecc.biz/Administrative/RASRS%20Presentation%202001-10-25%20RAS%20Application%20and%20Implementation%20Requirements.pdf

WECC, "Remedial Action Scheme Design Guide"
https://www.wecc.biz/Reliability/Remedial%20Action%20Scheme%20Design%20Guide.pdf

WECC, "Communications Systems Performance Guide for Protective Relaying Applications"
https://www.wecc.biz/Reliability/Communication%20System%20Performance%20Guide%20for%20Electric%20Protection%20Systems.pdf

WECC, "Guidelines for the Design of Critical Communications Circuits"
https://www.wecc.biz/Reliability/Guidelines%20for%20the%20Design%20of%20Critical%20Communications%20Circuits.pdf

NERC Reliability Standards and Technical Papers

NERC, Complete set of Reliability Standards (about 31 MB)
http://www.nerc.com/pa/Stand/Reliability%20Standards%20Complete%20Set/RSCompleteSet.pdf

NERC, Project 2010-05.3 Phase 3 of Protection Systems: Remedial Action Schemes (RAS), project development site for PRC-012-2
http://www.nerc.com/pa/Stand/Pages/Project-2010-05_3-Remedial-Action-Schemes_Phase-3-of-Protection-Systems.aspx

NERC, Special Protection Systems (SPS) and Remedial Action Schemes (RAS): Assessment of Definition, Regional Practices, and Application of Related Standards, April 2013
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Version History

Version	Date	Action	Change Tracking
1	March 1999	Initial Release	Initial Release
2	April 2000	Approved by Joint Guidance Committee (JGC)	Added RAS Catalog Information
3	January 2002	RASRS	Incorporated RAS Operating Procedures for Abnormal System Conditions, as part of due process comments. Also, added References and Table of Contents section.
3	April 2002	JGC Approved	Above
4	August 2002	WSCC	Changed WSCC to WECC and updated links in the Reference Section
5	February 2005	RASRS	References to the Remedial Action Scheme Reliability Task Force (RASRTF) have been changed to Subcommittee, in accordance with the updated Scope Statement. RAS Design section is updated to include latest concepts and technologies, address conditions where a multifunction device is shared for RAS and other critical functions such as local protection or SCADA, and the latest telecommunication technologies such as SONET or Device-Device communications.
5	March 2005	Operating Committee Approved	Above
5	April 2005	WECC Board of Directors Approved	Above
6	August 2012	RASRS	Incorporated significant procedural changes related to the PRC(012 thru 014) – WECC – CRT – 1 criterion and RAS type definitions.
7	October 2013	RASRS	Incorporated periodic assessment procedural changes related to the revised PRC-(012 thru 014) – WECC – CRT – 2 criterion.
7	March 25, 2014	Operating Committee Approved	Above
8	January 2017	RASRS	Conformed the document to align with five-year review of the PRC FITB WECC Criterion. Modified language to better conform to new NERC RAS definition and other related changes. Update reference links.

Disclaimer

WECC receives data used in its analyses from a wide variety of sources. WECC strives to source its data from reliable entities and undertakes reasonable efforts to validate the accuracy of the data used. WECC believes the data contained herein and used in its analyses is accurate and reliable. However, WECC disclaims any and all representations, guarantees, warranties, and liability for the information contained herein and any use thereof. Persons who use and rely on the information contained herein do so at their own risk.

Attachments

Attachment A
WECC Remedial Action Scheme Information Sheet
Minimum RAS Database Contents

The WECC Remedial Action Scheme Information Sheet is to be completed in accordance with this WECC Guideline by the Reporting Party designated by the Transmission Owner, the Generation Owner, and the Distribution Provider that owns an existing or proposed RAS for use within the Western Interconnection. Explanations for the Spreadsheet data are contained in the following table.

In accordance with the RAS Criterion, each Reporting Party is to provide the completed spreadsheet to those parties designated in the criterion as well as and the Chair of the Remedial Action Scheme Reliability Subcommittee (RASRS) and designated staff person for the Western Electricity Coordinating Council (WECC).

Remedial Action Scheme Database Information Sheet Explanations

Data Item	Explanation
Reporting Party	The Reporting Party is the primary contact designated by the Transmission Owner(s), Generator Owner(s) and Distribution Provider(s) that owns all or part of an existing or proposed RAS. The Reporting Party will usually be either: 1) the entity that controls the scheme, 2) the primary owner of the scheme or 3) the sole owner of the scheme.
Scheme Name	Provide the name by which the Reporting Party references the scheme.
Classification	WAPS (Wide Area Protection Scheme), LAPS (Local Area Protection Scheme), or Safety Net (SN) as initially classified by the Transmission Owner(s), Generator Owner(s) and Distribution Provider(s) that owns all or part of an existing or proposed RAS as reported by the Reporting Party. This initial classification is subject to review by the RASRS.
Major WECC RAS	If this scheme is in WECC Reliability Standard PRC-STD-003, Table 3, Major WECC RAS List, enter the number from the list. If the scheme is not on the Major WECC RAS List, enter NA.
Operating Procedure	If the Transmission Owner(s), Generator Owner(s) and Distribution Provider(s) that owns all or part of an existing or proposed RAS as reported by the Reporting Party has a written operating procedure for this scheme, provide the identifying procedure number or title. If no operating procedure is available, enter NONE or NA.

Design Objectives	Data required to describe Design Objectives — Contingencies and system conditions which the scheme was designed to mitigate.
Operation	Data required describing Operation — The actions taken by the scheme in response to disturbance conditions.
Modeling	Data required for adequate Modeling — Information on detection logic or relay settings that control operation of the scheme.
Original In Service Year	Enter the year that the scheme originally went into service, not including any subsequent upgrades or other modifications. If specific records are not available, a best estimate such as “early 1980’s” is acceptable.
Recent Assessment Group	Identify the group (typically the Transmission Owner(s), Generator Owner(s) and Distribution Provider(s) that owns all or part of an existing or proposed RAS as reported by the Reporting Party that performed the most recent assessment of scheme operation, coordination and effectiveness.
Recent Assessment Date	Enter the date of the Reporting Party’s most recent assessment performed (mm/yyyy) that evaluated scheme operation, coordination and effectiveness.
RASRS Review Date	RASRS entry. Date of the most recent RASRS review of a Reporting Party’s assessment (mm/yyyy).

Attachments

Attachment B
WECC RAS Initial or Periodic Assessment Summary

Information included in Attachment B will be used by the RASRS to ensure proper analysis, operation, coordination and effectiveness of the RAS.

RAS Name		
Reporting Party (The Reporting Party for this entry will always be the same as the Reporting Party entry listed in the Reporting Party field of Attachment A.)		
Group Conducting this RAS Assessment		
Assessment Date		
Review the scheme purpose and impact to ensure proper classification, is it (still) necessary, does it serve the intended purposes, and does it continue to meet current performance requirements.		
This RAS assessment included the following:		
	Study Years	
	System Conditions	
	Contingencies analyzed (select what applies) N-1 N-1-1 N-2 Extreme	
Date when the technical studies were completed		
Does this RAS comply with NERC standards and WECC Criteria?		
Discuss any coordination problems found between this RAS and other protection and control systems during this (most recent) assessment.		
Provide a Corrective Action Plan if this RAS was found to be non-compliant or had coordination problems during this (most recent) assessment (should be NA for owner's initial assessment).		