Request to Develop or Modify Reliability Rules and Requirements (NYSRC Policy No. 1-7)
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Item	Information
1. PRR No. & Title of Reliability Rule or Requirement change	**PRR 142** Special Protection System (SPS) / Remedial Action Scheme (RAS)
2. Rule Change Requester Information	
Name	RRS
Organization	NYSRC
3. New rule or revision to existing rule?	1. NYSRC Reliability Rules clarification as it relates to the industry use of terms: Special Protection System (SPS) and Remedial Action Scheme (RAS). 2. Addition of a new requirement (i.e. Assessment #6) under B.2: Transmission System Planning Assessments Requirement 1.3. 3. Addition of a new Glossary term: Remedial Action Scheme (RAS); a word-for-word use of the definition as established by NERC.
4. Need for rule change, including advantages and disadvantages	The industry is moving away from the term Special Protection System (SPS) to a new term Remedial Action Scheme (RAS); and as such, this PRR modifies the NYSRC Reliability Rules for the use of RAS/SPS (i.e. NERC RAS & NPCC SPS (which will be eventually retired)). As such, a new Glossary term - Remedial Action Scheme (RAS) - is established (per the existing definition established by NERC). The Glossary term Special Protection System (SPS) does not change with this PRR (as it is still in use). In addition this PRR establishes a new requirement under *B.2: Transmission System Planning Assessments Requirement 1.3* requiring the NYISO to perform, as part of their annual transmission review, an assessment of the interaction of existing and proposed RAS/SPS on the New York Control Area transmission system. This assessment shall include external to NYCA RAS/SPS that were previously identified to have an impact on NYCA. The addition of a requirement is due to the fact that there are no specific NYSRC Reliability Rules that cover RAS/SPS. NYSRC relies (primarily) on NPCC Directories and those Directories address mostly the design aspects of an SPS. Planning Design and Operating criteria assume that an SPS operates properly under contingency. Extreme Contingency assesses the misoperation of an SPS. However, there are no requirements that assess the interaction of existing and proposed RAS/SPS on the New York Control Area transmission system; especially on a re-occurring interval where system conditions continually change.

	*** Advantage: Avoidance of a possible 'land mine' where the current on-going propagation of the uses of RAS/SPS does not result in a reliability violation; or unrecognized and unwanted interaction between SPS in a real time (resulting in a possible Loss of Load events). Disadvantage: None
5. Related NYSRC rules	
6. Section A – Reliability Rule Elements	
1. Reliability Rule	B. Transmission Planning / Introduction **B.2: Transmission System Planning Assessments** 3.2 Glossary
2. Associated NERC & NPCC Standards and Criteria	(as it relates to B.2 above) TPL-001 NPCC Directory 1
3. Applicability	No change.
7. Section B – Requirements	
Requirements	**(the 'red-line' is the addition)** **B. Transmission Planning / Introduction** A Remedial Action Scheme (RAS)/Special Protection System (SPS) may be employed to provide protection for infrequent contingencies or for temporary conditions that may exist such as project delays, unusual combinations of system demand and equipment outages or unavailability, or specific equipment maintenance outages. An RAS/SPS may be applied to preserve system integrity in the event of severe facility outages and extreme contingencies. The decision to employ an RAS/SPS should take into account the complexity of the scheme and the consequence of correct or incorrect operation as well as benefits. An RAS/SPS should be used judiciously and when employed, should be installed consistent with good system design and operating policy. Although there are no specific NYSRC Reliability Rules that cover RAS/SPS requirements, NERC and NPCC maintain~~s~~ criteria providing RAS/SPS requirements that must be observed. *** **B.2: Transmission System Planning Assessments** R1. The NYISO shall conduct Transmission Reviews to demonstrate that the planned NYCA transmission system is in conformance with NYSRC transmission system planning requirements. Specifically, Transmission Reviews shall incorporate assessments for documenting NYISO compliance with Reliability Rule B.1, Requirements R1 through R4. Section 4, "NYSRC Procedure for NYCA Transmission Reviews" provides guidance for NYSRC Transmission Reviews.

	R1.1. The NYISO shall submit a NYCA Transmission Review annually to the Reliability Compliance Monitoring Subcommittee. The type of annual Transmission Review and submission schedule shall be in accordance with NPCC specifications. R1.2. The NYISO shall apply Local Area Operation Reliability Rules G.1 through G.3 requirements in all Transmission Review assessments. R1.3. Transmission Reviews shall incorporate the following ~~five~~ six assessments: • Assessment 1: Thermal, voltage, and stability assessments in accordance with B.R1 (R1). • Assessment 2: Extreme contingency assessments in accordance with B.1 (R2). • Assessment 3: Extreme system condition assessments in accordance with B.1 (R3). • Assessment 4: Fault current assessments in accordance with B.1 (R4). • Assessment 5: Impacts of planned system expansion or configuration facilities on the NYCA System Restoration Plan (NYCA SRP). Any impacts identified shall be described in terms of how and where the NYCA SRP may need to be modified, and made available to the NYISO Operating Group and the planning function of the appropriate Transmission Owners for consideration in the annual review and update of NYISO and Transmission Owner restoration plans as required by Reliability Rule F.1 requirements. • Assessment 6: Assessment of the interaction of existing and proposed RAS/SPS on the New York Control Area transmission system. This assessment shall include external to NYCA RAS/SPS that were previously identified to have an impact on NYCA. R1.4 If the results of a Transmission Review indicate that the planned NYS Bulk Power System will not be in conformance with the Reliability Rule B.1 requirements, the Transmission Review shall incorporate a corrective action plan to achieve conformance. *** Redlined Tables B-1, B-3 and C-1 are in the attached appendix.

	*** New Glossary Term (Based on NERC Definition): Remedial Action Scheme (RAS) – 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)

8. Section C – Compliance Elements	
1. Measures	Changes are not required.
2. Levels of Non-Compliance	Changes are not required.
3. Compliance Monitoring Process (See Policy 4):	Changes are not required.
3.1 Compliance Monitoring Responsibility	Changes are not required.
3.2 Reporting Frequency	Changes are not required.
3.3 Compliance Reporting Requirements	Changes are not required.
9. Implementation Plan	The NYISO shall revise appropriate procedures within 90 days of Executive Committee approval of PRR 142.
10. Comments	
11. Date Rule Adopted	
12. PRR Revision Dates	1/3/2019

APPENDIX: TABLES B-1, B-3, C-1

Table B-1

NYSRC Planning Design Criteria: Contingency Events and Performance Requirements[2]

Contingency events, Fault type and Performance requirements to be applied to bulk power system elements

Category	Contingency events Simulate the removal of all elements that protection systems, including ~~Special Protection Systems~~RAS/SPS, are expected to automatically disconnect for each event that involves an AC fault.	Fault type (permanent) On the listed elements where applicable	Performance requirements
I **Single Event**	1. *Fault* on any of the following: a. transmission circuit b. transformer c. shunt device d. generator e. bus section	Three-phase *fault* with normal *fault clearing*	i to viii
	2. Opening of any circuit breaker or the loss of the following: a. transmission circuit b. transformer c. shunt devise d. generator e. bus section	No *fault*	
	3. Loss of single pole of a direct current facility	No *fault*	
	4. *Fault* on any of the following: a. transmission circuit b. transformer c. shunt device d. generator e. bus section	Phase to ground *fault* with failure of a circuit breaker to operate and correct operation of a breaker failure *protection system* and its associated breakers.	i to viii

[2] Table B-1 incorporates Table 1 of NPCC Directory 1, with the following modifications: (1) bolded NPCC glossary terms have been removed, (2) more stringent NYSRC contingency event criteria are shown in bold, and (3) NYSRC glossary terms are shown in italics. NPCC performance criteria at the bottom of Table B-1 is supplemented by more stringent and specific NYSRC performance criteria in Table B-2.

B. Transmission Planning, cont.

Category	Contingency events Simulate the removal of all elements that protection systems, including ~~Special Protection Systems~~RAS/SPS, are expected to automatically disconnect for each event that involves an AC fault.	Fault type (permanent) On the listed elements where applicable	Performance requirements
	5. *Fault* on a circuit breaker	Phase to ground *fault***,** with normal *fault* clearing.	
	6. Simultaneous *fault* on two adjacent transmission circuits on a multiple circuit tower.	Phase to ground *faults* on different phases of each circuit, with normal *fault clearing*.	
	7. Simultaneous permanent loss of both poles of a direct current bipolar facility	Without an ac *fault*.	
	8. The failure of a circuit breaker to operate when initiated by an RAS/SPS after a *fault* on the following: a. transmission circuit b. transformer c. shunt device d. generator e. bus section	Phase to ground *fault*, with normal *fault clearing***.**	
	9. The failure of a circuit breaker to operate when initiated by an RAS/SPS after opening of any circuit breaker or the loss of the following: a. transmission circuit b. transformer c. shunt devise d. generator e. bus section **f. loss of any element**	No *fault*	

B. Transmission Planning, cont.

Category	Contingency events Simulate the removal of all elements that protection systems, including ~~Special Protection Systems~~RAS/SPS, are expected to automatically disconnect for each event that involves an AC fault.	Fault type (permanent) On the listed elements where applicable	Performance requirements
II Event(s) after a first loss and after System Adjustment	1. Following the loss of any critical: a. transmission circuit, b. transformer, c. series or shunt compensating device or d. generator e. single pole of a direct current facility and after System Adjustment, Category I Contingencies shall also apply.	Any Category I event as described above.	Performance requirements i to viii apply. Allowable system adjustments that can be made within 30 minutes between outages include: generation and power flows by the use of ten (10) minute operating reserve and, where available, phase angle control and HVDC control.

Performance Requirements for the contingencies defined in Table B-1:

i. Loss of a major portion of the system or unintentional separation of a major portion of the system shall not occur.

ii. Loss of small or radial portions of the system is acceptable provided the performance requirements are not violated for the remaining bulk power system.

iii. Voltages and loadings shall be within applicable limits for the pre-contingency conditions.

iv. Voltages and loadings shall be within applicable emergency limits for post-contingency conditions except for small or radial portions of the system as described in it.

v. The *stability* of the bulk power system shall be maintained during and following the most severe *contingencies***,** with due regard to successful and unsuccessful reclosing except for small or radial portions of the system as described in it.

vi. For each of the contingencies that involve *fault clearing*, *stability* shall be maintained when the simulation is based on *fault clearing* initiated by the **"**system A" *protection group* and also shall be maintained when the simulation is based on *fault clearing* initiated by the **"**system B" *protection group*. When applying this requirement to contingency Event *no 6*, the failure of a *protection group* shall apply only to one circuit at a time. When evaluating contingency Event #4 breaker, failure *protection* is assumed to operate correctly, even if only a single breaker failure *protection* system exists.

vii. Regarding contingency *no **6***, if multiple circuit towers are used only for station entrance and exit purposes and if they do not exceed five towers at each station, then this condition is an acceptable risk and therefore can be excluded. Other similar situations can be excluded on the basis of acceptable risk, provided that the NYSRC Executive Committee specifically accepts each request for exclusion.

viii. Transient voltage response shall be within acceptable limits established by the Planning Coordinator and the Transmission Planner, except for small or radial portions of the system as described in it.

Table B-3

Extreme Contingency and System Conditions, Fault type and Performance Assessments to be applied to Bulk Power System elements[3].

Category	Contingency events Simulate the removal of all elements that protection systems, including ~~Special Protection Systems~~RAS/SPS, are expected to automatically disconnect for each event that involves an AC fault.	Fault type (permanent) and/or condition applied On the listed elements where applicable	Performance to be assessed
Extreme Contingency	1. Loss of the entire capability of a generating station.	No *Fault*	i, ii, iii.
	2. Loss of all transmission circuits emanating from a generating station, switching station, substation or dc terminal.	No *Fault*	
	3. Loss of all transmission circuits on a common right-of-way.	No *Fault*	
	4. *Fault* on of any of the following: a. transmission circuit b. transformer c. shunt device d. generator e. bus section	Three-phase fault with failure of a circuit breaker to operate and correct operation of a breaker failure *protection system* and its associated breakers (with due regard to successful and unsuccessful *reclosing*).	
	5. *Fault* on a circuit breaker	Three-phase fault, with normal *fault clearing*	
	6. Sudden loss of a large load or major load center.	No *Fault*	
	7. The effect of severe power swings arising from disturbances outside the *NYS Bulk Power System*.	*Fault* applied as necessary.	
	8. Failure of a *RAS/SPS~~Special Protection System~~*, to operate when required following the normal contingencies listed in Table B-1, Category I, Single Event.	As listed in Table B-1, Category I, Single Event.	
	9. The operation or partial operation of a *RAS/SPS ~~Special Protection System~~* for an event or condition for which it was not intended to operate.	No *Fault*	
	10. Sudden loss of fuel delivery system to multiple plants, (e.g. gas pipeline contingencies).	No *Fault.*	
	Contingency events listed in Table 1, Category I, Single Event	Peak load conditions resulting from extreme weather.	i (b, c), ii, iii.

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C. Transmission Operation, cont.

Category	Contingency events Simulate the removal of all elements that protection systems, including ~~Special Protection Systems~~RAS/SPS, are expected to automatically disconnect for each event that involves an AC fault.	Fault type (permanent) and/or condition applied On the listed elements where applicable	Performance to be assessed
Extreme System Conditions		Generating unit(s) fuel shortage (e.g. gas supply adequacy or low hydro) under normal weather peak conditions.	i (c), ii, iii

Performance Assessment

i.. Model the following pre-contingency conditions:

a. **the testing shall be conducted at megawatt ("MW") transfers at a level which is expected at least 75% of the time on a *load* flow duration basis, but not to exceed the maximum operating limit for the *interface* being tested. This may be at or near the normal transfer limit for some *interface*s**.

b. **load flows chosen for analysis should reflect reasonable power transfer conditions or** highly probable dispatch patterns of generation.

c. appropriate load representation (e.g. active and reactive power as a function of voltage) for transient tests and post transient load flows.

ii.. Examine post *contingency* steady state conditions, as well as stability, overload, cascading outages and voltage collapse to obtain an indication of system robustness and determine the extent of any widespread system disturbance

iii. Where assessment concludes there are serious consequences, an evaluation of implementing a change to design or operating practices to address such *contingencie*s shall be conducted.

Table C-1

NYSRC Operating Transfer Capability Requirements[3]

Contingency events, Fault type and Performance requirements to be applied to bulk power system elements to establish transfer capabilities.

	Contingency events Simulate the removal of all elements that protection systems, including ~~Special Protection Systems~~RAS/SPS, are expected to automatically disconnect for each event that involves an AC fault.	**Fault type (permanent)** On the listed elements where applicable	**Performance requirements**	
			Normal Transfer Capability	Emergency Transfer Capability (only after an Emergency is identified)
	1. *Fault* on any of the following: a. transmission circuit b. transformer c. shunt device d. generator e. bus section	Three-phases *fault*, with normal fault clearing	i, .ii, iii, iv, v, vi, vii, viii, x	i, ii, iii, iv, v, vi, vii, ix, xi
	2. Opening of any circuit breaker or the loss of any of the following: a. transmission circuit b. transformer c. shunt devise d. generator e. bus section	No *fault*		
	3. Loss of single pole of a direct current facility	No *fault*		
	4. *Fault* on any of the following: a. transmission circuit b. transformer c. shunt device d. generator e. bus section	Phase to ground *fault* with failure of a circuit breaker to operate and correct operation of a breaker failure protection system and its associated breakers.	i,ii,iii,iv,v,vi,vii,ix,x	Contingency Events 4 through 8 do not apply after an emergency is identified.
	5. *Fault* on a circuit breaker	Phase to ground *fault*, with normal *fault* clearing		

[3] Table C-1 incorporates Table 3 of NPCC Directory 1, with the following modifications: (1) bolded NPCC glossary terms have been removed, (2) more stringent NYSRC contingency event criteria are shown in bold, and (3) NYSRC glossary terms are shown in italics. NPCC performance criteria at the bottom of Table C-1 is supplemented by more stringent NYSRC performance criteria in Table C-2.

C. Transmission Operation, cont.

	6. Simultaneous *fault* on two adjacent transmission circuits on a multiple circuit tower.	Phase to ground *faults* on different phases of each circuit, with normal *fault* clearing		
	7. Simultaneous permanent loss of both poles of a direct current bipolar facility	Without an ac *fault*		
	8. The failure of a circuit breaker to operate when initiated by a RAS/**SPS** after a fault on the following: a. transmission circuit b. transformer c. shunt device d. generator e. bus section **f. loss of any element (without a fault)**	Phase to ground *fault*, with normal *fault* clearing		
	9. The failure of a circuit breaker to operate when initiated by a RAS/SPS after opening of any circuit breaker or the loss of any of the following: a. transmission circuit b. transformer c. shunt device d. generator e. bus section	No *fault.*	i,ii,iii,iv,v,vi,vii,viii,ix,x	

Performance Requirements for the contingencies defined in Table C-1:

i. Loss of a major portion of the system or unintentional separation of a major portion of the system shall not occur.

ii. Loss of small or radial portions of the system is acceptable provided the performance requirements are not violated for the remaining *bulk power system*.

iii. The NYCA shall be operated in a manner such that contingencies and conditions applied can be withstood without causing significant adverse impact on other Control Areas.

iv. Voltages and loadings shall be within applicable limits for the pre-contingency conditions.

v. Voltages and loadings shall be within applicable limits for post-contingency conditions except for small or radial portions of the system as described in ii.

vi. The *stability* of the *bulk power system* shall be maintained, with due regard to successful and unsuccessful reclosing except for small or radial portions of the system as described in ii.

vii. For each of the contingencies that involve *fault* clearing, *stability* shall be maintained when the simulation is based on *fault* clearing initiated by the "system A" *protection group*, and also shall be maintained when the simulation is based on *fault clearing* initiated by the "system B" *protection group*. When applying this requirement to contingency Event ***no 6***, the failure of a *protection group* shall apply only to one circuit at a time. When evaluating contingency event #4 breaker failure *protection* is assumed to operate correctly even if only a single breaker failure *protection system* exists.

C. Transmission Operation, cont.

viii. Regarding contingency *no 6*, if multiple circuit towers are used only for station entrance and exit purposes, and if they do not exceed five towers at each station, then this condition is an acceptable risk and therefore can be excluded. Other similar situations can be excluded on the basis of acceptable risk, provided that the *NYSRC* Executive Committee specifically accepts each request for exclusion.

ix. Appropriate adjustments shall be made to *NYCA* operation to accommodate the impact of *protection group* outages, including the outage of a *protection group* which is a part of a NPCC Type I *special protection system*. For typical periods of forced outage or maintenance of a *protection group*, it can be assumed, unless there are indications to the contrary, that the remaining *protection* will function as designed. If the *protection group* will be out of service for an extended period of time, additional adjustments to operations may be appropriate considering other system conditions and the consequences of possible failure of the remaining *protection group.*

x. Normal transfer levels shall not require system adjustments before attempting manual reclosing of elements unless specific instructions describing alternate actions are in effect to maintain *stability* of the *BPS.*

xi. Emergency transfer levels may require system adjustments before attempting manual reclosing of elements to maintain stability of the *bulk power system*.

Operating to the *contingencies* listed above in Table C-1 is considered to provide an acceptable level of *bulk power system* security. However, under high risk conditions, such as severe weather, the expectation of the occurrence of *contingencies* not listed in Table C-1 and/or the associated consequences may be judged to be significantly greater.

When these conditions exist, consideration should be given to operating in a more conservative manner.