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NPCC
Regional Reliability Reference Directory # 5
Reserve

Task Force on Coordination of Operations Revision Review Record:
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Adopted by the Members of the Northeast Power Coordinating Council, Inc. this December 2, 2010 based on recommendation by the Reliability Coordinating Committee, in accordance with Section VIII of the NPCC Amended and Restated Bylaws dated January 1, 2012 as amended to date.

Version History

Version	Date	Action	Change Tracking (New, Errata or Revisions)
1	12/2/2010		New
2	10/11/2012	Revised/clarified Criteria: (radial source cont., time zero)	Revisions
3	9/27/2019	NERC style reformat, Revised/clarified Criteria (Synchronized Reserve Adjustment Calculations, Elimination of certain Procedures identified in Appendices	Reformat, Revisions
4	1/16/2020	Errata corrected in Requirement R4.3	Errata
5	4/26/2020	Errata corrected in Attachments B & C and Appendix C Participation Request Form.	Errata

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1. Introduction

1.1 Title Reserve

1.2 Directory Number 5

1.3 Objective

The purpose of this Directory is to present the requirements with which the applicable entity must plan for and deploy adequate **reserve**. This Directory provides minimum requirements governing the amount, availability, distribution, and activation of **reserve** in addition to those specified in applicable NERC standards.

1.4 Effective Date: December 2, 2010

1.5 Background:

This Directory was developed from the NPCC A-6 Operating **Reserve** Criteria document. Guidelines and procedures for consideration in the implementation of this Directory are provided in the Appendices. Content from various NPCC B and C documents were used in both the body of this Directory and in the Appendices.

1.6 Applicability

1.6.1 Functional Entities (Responsible Entities)

- Reliability Coordinators
- Balancing Authorities
- Generator Operators
- Distribution Providers

1.6.2 Applicability of NPCC Criteria

Requirements to abide by an NPCC Directory may also reside in external tariff requirements, bilateral contracts and other agreements between facility owners and/or operators, and their assigned Reliability Coordinator, Planning Coordinator, Transmission Operator, Balancing Authority and/or Transmission Owner as applicable and may be enforceable through those external tariff requirements, bilateral contracts and other agreements. NPCC will not enforce compliance to the NPCC Directory requirements in this

document on any entity that is not an NPCC Full Member.

2. Defined Terms

Unless specifically noted in this document, terms in bold typeface are defined in the NPCC Glossary of Terms.

3. NERC ERO **Reliability** Standard Requirements

The NERC ERO **Reliability** Standards containing requirements that are associated with this Directory include, but may not be limited to:

- [BAL-002: Disturbance Control Standard: Contingency Reserve for Recovery from a Balancing Contingency Event](#)
- [BAL-005: Automatic Generation Control](#)
- [EOP-011: Emergency Operations](#)

4. NPCC Regional Reliability Standard Requirements

None.

5. NPCC Full Member More Stringent Criteria Requirements and Measures

Ten-Minute Reserve Requirements

R1. Each Balancing Authority shall have **ten-minute reserve** available to it that is at least equal to its **first contingency loss**. NPCC **ten-minute reserve** meets the requirements for the **Contingency Reserve** requirements within the NERC standards.

- If a Balancing Authority becomes deficient in **ten-minute reserve** or forecasts a deficiency, it shall restore its **ten-minute reserve** as soon as possible and within the duration specified in the appropriate NERC standard.
- If a Balancing Authority cannot restore its **ten-minute reserve** per requirement R2, it shall minimize the magnitude and duration of the **ten-minute reserve** deficiency.

Thirty-Minute Reserve Requirements

R2. Each Balancing Authority shall have **thirty-minute reserve** available to it that is at least equal to one-half its **second contingency loss**.

- A Balancing Authority deficient in **thirty-minute reserve** for four hours, or forecasting a deficiency of any duration beyond a four-hour horizon, shall eliminate the deficiency if possible, or minimize the magnitude and duration of the deficiency.

Requirement for **Synchronized Reserve** Available Within Ten Minutes

- R3.** A Balancing Authority's requirement for **synchronized reserve** available within ten minutes shall be calculated by the twentieth day of each month, for the previous month, and shall be applied at the beginning of the next month.
- R4.** A Balancing Authority's requirement for **synchronized reserve** available within ten minutes shall be adjusted as follows:
- R4.1.** A Balancing Authority's maximum requirement for **synchronized reserve** available within ten minutes shall be 100 percent of its **ten-minute reserve**. A Balancing Authority's minimum requirement for **synchronized reserve** available within ten minutes shall be 25 percent of its **ten-minute reserve**.
- R4.2.** A Balancing Authority's calculated requirement for **synchronized reserve** available within ten minutes shall increase by 20 percent of the **ten-minute reserve** requirement for every time it fails to return its **ACE** to pre-**contingency** values or to zero within fifteen minutes following the start of a **reportable event** that is less than a NERC reportable Balancing Contingency Event. Recovery of reporting **ACE** occurs when a Balancing Authority returns its reporting **ACE** to pre-contingency values (if it's pre-contingency reporting **ACE** was negative) or to zero (if it's pre-contingency reporting **ACE** was positive or equal to zero).
- R4.3.** A Balancing Authority's calculated requirement for **synchronized reserve** available within ten minutes may only be reduced by a maximum of 20 percent of the **ten-minute reserve** requirement, per month following the implementation month of any **synchronized reserve** requirement increase per R4.2.
- R5.** If a Balancing Authority becomes deficient in **synchronized reserve** available within ten minutes, it shall restore its **synchronized reserve** available within ten minutes in accordance with R1 for the restoration of **ten-minute reserve**.

Refer to Attachment A for example scenarios of **synchronized reserve** requirement penalty adjustments.

Sustainability of Operating Reserve

- R6.** A Balancing Authority's **synchronized reserve, ten-minute reserve, and thirty-minute reserve**, if activated, shall be sustainable for at least one hour from the time of activation.

Resource-Specific Requirements

- R7.** A Balancing Authority shall not count **synchronized reserve, ten-minute reserve, or thirty-minute reserve** from **loads** that are already counted in other demand response programs and would result in double counting the same **capacity**.
- R8.** A Balancing Authority shall not count **synchronized reserve** from a **load** if the reduction in **load** is dependent on starting a generator to replace energy that is supplied from the grid.
- R9.** The Balancing Authority shall specify the following criteria for **resources** to be eligible to provide **synchronized reserve, ten-minute reserve, or thirty-minute reserve**:
- R9.1.** Requirements for metering and testing
 - R9.2.** Requirements for continuously meeting the dispatch instructions
 - R9.3.** Requirements for operating capabilities and response rates
- R10.** **Resources** allocating inter-Balancing Area **reserve** shall not offer the same **reserve** to more than one acquiring Balancing Authority for the same scheduling interval.

Distribution of Reserve

- R11.** A Balancing Authority shall ensure that **reserve** is distributed so that it can be utilized without exceeding applicable **element** ratings or transfer limitations.

Activation of Inter-Balancing Area Reserve

- R12.** A Balancing Authority providing **reserve** to another Balancing Authority through direct procurement, bilateral, multi-lateral operating agreements, or through reserve sharing agreements, shall deliver an increase in energy as requested, up to the amount of **reserve** agreed upon.
- R13.** A Balancing Authority shall not curtail an existing or planned non-recallable energy schedule in order to support the activation of reserve, unless agreed to by all affected Balancing Authorities.

- R14.** A Balancing Authority providing or receiving inter-Balancing Area **reserve** shall meet the following requirements:
- R14.1.** Decision-making related to the specific **resources** to be activated to provide inter-Balancing Area reserve shall be restricted to the affected Balancing Authorities.
 - R14.2.** The provision of inter-Balancing Area **reserve** shall be limited to adjacent Balancing Authorities only, unless specifically facilitated by an approved NPCC procedure or multilateral Balancing Authority/Reliability Coordinator procedure.
 - R14.3.** Shall agree on Interchange Schedule modifications when activating and terminating inter-Balancing Area **reserve**.
 - R14.4.** Where Dynamic Transfers are used to activate inter-Balancing Area **reserve**, it shall be agreed to by the affected Balancing Authorities, and approved by the TFCO.
- R15.** A Balancing Authority shall activate inter-Balancing Area **reserve** within 5 minutes if utilized for a NERC DCS Balancing Contingency Event or a NPCC **reportable event**.
- R16.** A Balancing Authority acquiring inter-Balancing Area **reserve** shall notify the host Balancing Authority and affected Reliability Coordinators when changes are made to the scheduling of inter-Balancing Area **reserve**.

Energy Scheduling and Managing Reserve

- R17.** A Balancing Authority providing (allocating or activating) inter-Balancing Area **reserve**, not as part of a Reserve Sharing Group, shall not count that **reserve** to meet its own **reserve** requirement.
- R18.** A Balancing Authority providing **recallable energy** to another Balancing Authority shall advise the other Balancing Authority that the energy is recallable, and shall inform the receiving Balancing Authority of any change to the recallable status of this energy.
- R19.** A Balancing Authority shall meet its **Operating Reserve** requirement using **capacity** available from resources internal to its Balancing Authority or by using capacity that is deliverable from another Balancing Authority.
- R20.** A Balancing Authority delivering **recallable energy** to another Balancing Authority may count that energy toward meeting their **Operating Reserve**

requirement.

- R21.** A Balancing Authority receiving **recallable energy** from another Balancing Authority must carry additional **Operating Reserve** at least equal to the amount of **recallable energy** being received.

Simultaneous Activation of **Ten-Minute Reserve**

- R22.** Balancing Authorities participating in the “Simultaneous Activation of **Ten-Minute Reserve**”, (SAR) program shall conform to the procedures, as specified in Attachment B.

ACE Diversity Interchange

- R23.** Balancing Authorities participating in the “ACE Diversity Interchange”, (ADI) program shall conform to the procedures, as specified in Attachment C.

6. Compliance

6.1 Compliance Monitoring Process

Compliance with the requirements set forth in this Directory will be in accordance with the NPCC Criteria Compliance and Enforcement Program (CCEP).

Measures and corresponding Levels of Non Compliance for these requirements are contained within the compliance template associated with this Directory.

6.2 Data Retention

Responsible Entities shall keep evidence of compliance for a minimum of three (3) years. A Responsible Entity found non-compliant shall keep information related to the non-compliance until found compliant.

Prepared by: Task Force on Coordination of Operation

Review and Approval: Revision to any portion of this Directory will be posted by the lead Task Force in the NPCC Open Process for a 45-day review and comment period. Upon satisfactorily addressing all the comments in this forum, the Directory document will be sent to the remaining Task Forces for their recommendation to seek RCC approval.

Upon approval of the RCC, this Directory will be sent to the Full Member Representatives for their final approval if sections pertaining to the Requirements and Criteria portion have been revised. All voting and approvals will be conducted according to the most current "NPCC Bylaws" in effect at the time the ballots are cast.

Revisions pertaining to the Appendices or any other portion of the document such as links, glossary terms, etc., only RCC Members will need to conduct the final approval ballot of the document.

This Directory will be updated at least once every three years and as often as necessary to keep it current and consistent with NERC, Regional Reliability Standards and other NPCC documents.

References: NPCC Glossary of Terms

Attachment A – Synchronized Reserve Detail Calculation

Month	ACE Recovery Failures and Successes	Requirement Implementation Date	Monthly Synchronized Reserve Penalty	Total Synchronized Reserve Penalty	Detail Behind Penalty
September	2 Failures	November 1	+40%	40%	2 x 20%
October	1 Failure	December 1	+20%	40%	40% - 20% + (1 x 20%)
November	1 Failure	January 1	+20%	40%	40% - 20% + (1 x 20%)
December	No Qualifying Events	February 1	0%	20%	40% - 20%
January	2 Successes	March 1	0%	0%	20% - 20%
February	No Qualifying Events	April 1	0%	0%	0%
March	1 Failure	May 1	+20%	20%	0% + (1 x 20%)
April	5 Successes	June 1	0%	0%	20% - 20%
May	No Qualifying Events	July 1	0%	0%	0%

Attachment B - Simultaneous Activation of Ten-Minute Reserve (SAR) Contingencies

1.0 Introduction

The simultaneous activation of **ten-minute reserve** (SAR) is a program in which two or more Balancing Authorities agree to individually maintain but jointly activate **ten-minute reserve** to facilitate a more rapid recovery from an NPCC reportable event or for stressed system conditions. Timely action facilitates full deployment of **reserve** assistance assigned prior to the expiration of the NERC Contingency Event Recovery Period. Balancing Authority participation in SAR is contingent on submission of the form located in Appendix C and approval by TFCO. This form will also be used to indicate if a Balancing Authority wishes to act as the SAR Coordinator for the SAR program, contingent upon the approval of TFCO. All participating Balancing Authorities in the SAR program shall form an electrically contiguous area. Adjacent and directly connected non-NPCC Balancing Authorities may participate in the SAR program described in this Directory.

Given that **reserve** is not shared under this arrangement, the SAR program is not a Reserve Sharing Group as defined by NERC.

Assisting Balancing Authorities provide SAR energy by implementing Schedule changes with a zero ramp time, assuring that the **reserve** being activated responds as quickly as possible.

When the **resource** loss is a generator, the contingent Balancing Authority's loss equals the total output of the generator irrespective of any energy or **capacity** sales from that generator to any other Balancing Authority. Contingent Balancing Authorities are solely responsible for their NERC DCS recovery requirements.

Simultaneous Activation of Ten-Minute Reserve

1.1 Preliminary **Reserve Assessment**

On a continuing basis, participating Balancing Authorities shall keep the SAR Coordinator(s) informed of the **first contingency loss (FCL)** in their respective Balancing Areas.

Information pertaining to a Balancing Authority's inability to participate in SAR shall be reported to the SAR Coordinator by the participating Balancing Authorities.

1.2 Notification of **Contingency**

A participating Balancing Authority that experiences a **contingency** and wishes to receive SAR assistance shall report the following information to the SAR Coordinator via the direct telephone lines:

- Estimated Time T+0 (See Appendix D)
- If applicable, name of generating **resource** and megawatts lost
- If applicable, name of energy purchase and megawatts lost
- Megawatts of assistance requested including that provided by the contingent Balancing Authority
- Cause of SAR request

The contingent Balancing Authority shall request SAR assistance, providing sufficient time for the SAR Coordinator to distribute the shares, and for the assisting Balancing Authorities to implement the Schedule changes within five minutes of the **contingency**.

1.3 Allocation of SAR

The SAR Coordinator shall assign 100% of the **contingency** to the contingent and assisting Balancing Authorities collectively. The SAR Coordinator shall assign allocations to the assisting Balancing Authorities that are within their respective response capability.

After receiving a request for the activation of SAR, the SAR Coordinator shall:

- a. Determine each Balancing Authority's SAR allocation in accordance with the following:
 - At least fifty percent (50%) of a loss is allocated to the contingent Balancing Authority.
 - The remainder of a loss is allocated among the assisting Balancing Authorities.
 - A Balancing Authority shall not be requested to provide more assistance during a **reserve** pickup than is required to meet its own **first contingency loss**.
- b. Immediately inform each Balancing Authority of its SAR allocation, the time that the Schedule change is effective, and the time that the **contingency** occurred.

SAR participants may activate additional **reserve** beyond the SAR allocations to ensure that the needed **ten-minute reserve** is provided successfully.

1.4 Provision of SAR Assistance

Assisting Balancing Authorities shall initiate immediate action to provide their allocated SAR assistance.

The contingent Balancing Authority shall initiate immediate action to provide its share assigned by the SAR Coordinator to recover from the **resource** loss, and the contingent Balancing Authority shall prepare for the replacement of the SAR assistance energy assigned to assisting Balancing Authorities.

Assisting Balancing Authorities shall activate **ten-minute reserve** and provide assistance by **interchange** Schedules that are:

- a. Implemented at a zero time Ramp rate immediately following allocation notification.
- b. Maintained until the contingent Balancing Authority requests a return to normal up to a maximum of thirty minutes.
- c. Sustained, from the time of implementation, for a minimum of ten minutes unless **reliability** is affected adversely.

1.5 Termination of SAR

The contingent Balancing Authority shall notify the SAR Coordinator when it wishes to terminate the delivery of SAR assistance.

- The SAR Coordinator shall notify all participating Balancing Authorities and confirm the time that the activation is terminated. Revised **interchange** Schedules are mutually established as required so that the assisting Balancing Authorities properly recall assistance.
- The contingent Balancing Authority shall replace the **reserve** assistance assigned to assisting Balancing Authorities in a manner consistent with mutually established **interchange** Schedules.
- **Interchange** Schedules associated with SAR shall be Ramped out at a ten-minute ramp rate following communications initiated by the contingent Balancing Authorities, resulting in mutually established **interchange** Schedules.
- In the event that a contingent Balancing Authority is not prepared to replace the remaining portion of its **reserve** obligation within the time specified in section 1.4, the contingent Balancing Authority shall arrange for additional assistance in accordance with applicable policies and agreements covering **interchange** and emergency energy.

1.6 Reallocation and/or Subsequent **Contingencies**

In the event that the **reliability** of an assisting Balancing Authority becomes jeopardized, that Balancing Authority may cancel all or part of its allocation (using a step Schedule change) by notifying the SAR Coordinator, which shall then notify the contingent Balancing Authority to increase its SAR allocation to replace the assistance that has been withdrawn.

In the event that a subsequent loss of **generation** or imported energy transaction occurs during the period when SAR is in progress, regardless of the size of the **contingency**, the second contingent Balancing Authority may, at its discretion, withdraw SAR assistance and request the SAR Coordinator to reallocate the assistance in accordance with the provisions of this procedure. Upon such notification, the SAR Coordinator shall notify the first contingent Balancing Authority of the amount of withdrawal. Both contingent Balancing Authorities shall immediately enter new **interchange** Schedules that reflect the loss of the assistance, using a zero time Ramp.

In the event that a second Balancing Authority experiences a **contingency** that qualifies for SAR, the SAR Coordinator shall allocate assistance from the remaining Assisting Balancing Authorities in accordance with this procedure, upon the request of that contingent Balancing Authority.

If the second **contingency** occurs in the Balancing Authority that has incurred the first **contingency**, that Balancing Authority may request additional assistance, in accordance with this procedure, regardless of the size of the **contingency**.

2.0 Handling of Radial Source Contingencies with Several Balancing Authorities Receiving Energy

If the **resource** loss is an energy transaction from another Balancing Authority connecting via HVDC lines, see sections 2.0 through 4.0 below for determining the Balancing Authority's loss.

Radial source **tie lines** crossing Balancing Area boundaries may have energy delivered over these lines to more than one Balancing Authority. Handling of large **contingencies** on radial sources crossing Balancing Area boundaries is described in section 4.0 below. The methodology presented in section 4.0 below is generic and should be used for allocation of SAR assistance whenever single, multiple, or overlapping single **contingencies** occur on radial source **tie lines**.

3.0 Radial Source Contingencies with Counter flow Transactions

Coincident with energy Transactions delivered out of the Balancing Authority on radial source **tie lines**, countervailing Transactions may be scheduled simultaneously into the Balancing Authority. The **contingency** loss of one of these lines when it is carrying counter flow Transactions may be a relatively small net energy loss to the Eastern Interconnection. However, the size of the individual counter flow transactions could be quite large. The methodology presented in section 4.0 below may be used for allocation of SAR assistance whenever radial line **contingencies** with counter flow Transactions occur. In instances when the net of the scheduled Transactions is less than the **reportable event** threshold, the net **interchange** Schedules may be ramped out instead of using the SAR procedure. The SAR Coordinator and the Balancing Authorities party to the Transactions may agree to this action and the duration of the Ramp.

4.0 SAR Allocations for Radial Source Contingencies with More Than One Balancing Authority Receiving Energy

Some of the radial source **tie lines** crossing Balancing Area boundaries from HQ-TE to NYISO, ISO-NE, and NBP-SO have maximum transfer capabilities in excess of the Balancing Authority's single largest internal **capacity contingency**. Energy may be delivered over these lines to more than one Balancing Authority, with Transmission Service being provided by the Transmission Service Provider for the Balancing Authority to which the respective line is directly connected. A Balancing Authority may limit the flow such that the loss would not exceed its **first contingency loss** to maintain **reserve** requirements at reasonable levels. Transmission restrictions in other Balancing Authorities may also limit these flows.

As the delivering entity, HQ-TE has no practical means to provide **reserves** from its own system in the event of the loss of a tie. When only the directly connected Balancing Authority receives the delivery, it can treat the energy as an internal source and carry **reserve** to cover the sudden loss. However, when the energy is delivered to

more than one Balancing Authority, the responsibility for the directly connected Balancing Authority to carry all of the **reserve** can become overly burdensome.

This section describes the handling of large **contingencies** on radial sources crossing Balancing Area boundaries, such as Hydro-Quebec (HQ-TE) to NYISO. At times, these flows may be composed of simultaneous energy deliveries to the directly connected Balancing Authority and one or more other Balancing Authorities. It allows for the use of the SAR procedure to allocate the portion of energy not designated for the directly connected receiving Balancing Authority to other Balancing Authorities participating in the simultaneous activation of **ten-minute reserve** procedure.

This same methodology can be applied for scenarios with simultaneous imports and exports of energy (counter flow transactions) by one or more Balancing Authorities on radial sources crossing Balancing Area boundaries. The Balancing Authority losing its ability to deliver energy may receive negative assistance shares from other Balancing Authorities. In these scenarios, affected Balancing Authorities should require smaller **generation** changes to restore **ACE** while the procedure is in effect and should have a longer period to adjust fully after the **contingency**. The use of negative assistance is illustrated in examples 5 and 6 in Section 4.2 below.

4.1 Management of NPCC Radial Source **Contingencies**

SAR support for radial source **contingencies** will be limited to SAR participants. Radial Source Transactions will be limited to only one intermediary Balancing Authority unless all Balancing Authorities on the Scheduling Path are SAR participants. Non-SAR participants are expected to recover energy sinking in their respective BAs in accordance with prevailing NERC standards.

Each hour the SAR Coordinator must be notified of Scheduled wheel-through transactions among SAR participants.

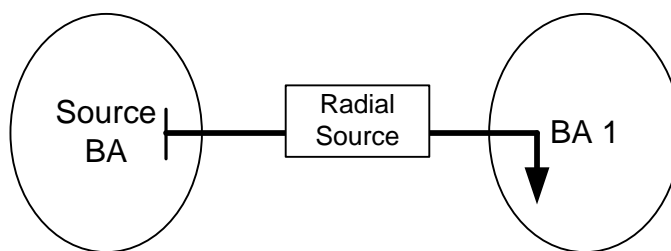
When SAR is requested, the SAR Coordinator will incorporate wheel-through transactions in its SAR software.

All e-tags will be curtailed using phone communications by all applicable BAs.

E-tags will be maintained to account for the **contingency** and relevant SAR related activity. Four examples that apply to the management of Radial Source **Contingencies** that occur within NPCC for SAR and non-SAR events are provided below.

Example 1 Source BA and Sink BA1

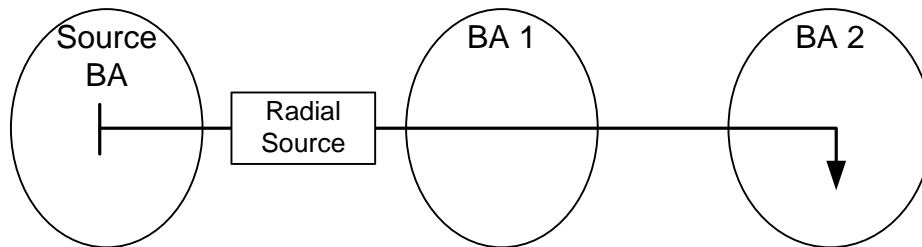
<p>The net energy flows from the radial Source BA and sinks in BA1 at the receiving end of that radial tie.</p>	<p>BA1 is responsible to recover for the entire loss as if the source was a generator inside the BA 1 footprint. Immediately following the contingency loss of the radial tie, the source and directly connected Balancing Authorities will verbally communicate.</p> <p>If the MW loss is greater than the NPCC reportable event threshold, or, if system conditions are stressed, BA1 may call for SAR. When SAR is requested, BA1 notifies the SAR Coordinator</p> <p>The E-TAG(s) associated with the energy delivered to BA1 is curtailed immediately over a zero minute Ramp due to the flow path being removed.</p>
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Example 2 Source BA, intermediary BA1, and sink BA2

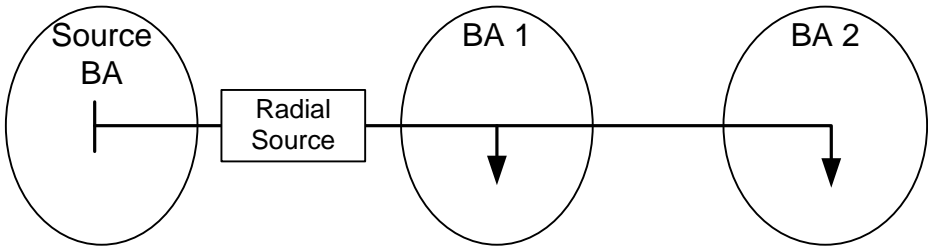
<p>The net energy is wheeled from the radial Source BA through BA1 and sinks in BA2. This example applies to SAR participants.</p>	<p>BA2 is responsible to recover the MW sinking in its BA. Immediately following the contingency loss of the radial tie, the source and directly connected Balancing Authorities will verbally communicate.</p> <p>If the MW loss is greater than the NPCC reportable event threshold, or for stressed system conditions, BA1 notifies the SAR Coordinator to request SAR activation.</p> <p><u>Verbal communications between the Balancing Authorities will be as follows:</u></p> <ul style="list-style-type: none"> ▪ <u>Pre-Contingency:</u> BA1 will communicate BA2 Schedule to SAR Coordinator ▪ <u>Post Contingency:</u>
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	<p>BA1 contacts SAR Coordinator to activate SAR. The SAR Coordinator issues shares.</p> <p>All E-tag(s) associated with the energy wheeled through BA1 and into BA2 will be curtailed upon termination of the SAR using a ten-minute Ramp.</p> <p><u>For non-SAR events:</u></p> <p>If SAR is not requested, all E-tag(s) associated with the energy wheeled through BA1 and into BA2 will be curtailed on a mutually agreed upon start time and Ramp duration by the affected BAs.</p>
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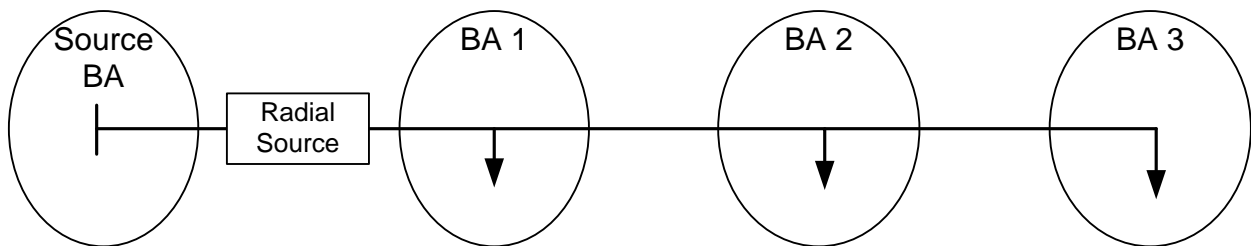
Example 3 Source BA, intermediary sink BA1, and sink BA2

<p>The energy is flowing from the radial Source BA with portions sinking in BA1, and BA 2. This example applies to SAR participants.</p>	<p>BA1 and BA2 are responsible to recover the portions of the MW sinking in each of their BAs. Immediately following the contingency loss of the radial tie the source and directly connected Balancing Authorities will verbally communicate.</p> <p>If the net MW loss is greater than the NPCC reportable event threshold, or for stressed system conditions, BA1 notifies the SAR Coordinator to request SAR activation.</p> <p><u>Verbal communications between the Balancing Authorities will be as follows:</u></p> <ul style="list-style-type: none">▪ <u>Pre-contingency:</u> BA1 will communicate the BA1 and BA2 Schedules to SAR Coordinator▪ <u>Post contingency:</u> BA1 contacts SAR Coordinator to activate SAR. The SAR Coordinator issues shares. <p>The E-tag(s) associated with the energy sinking in BA1 is curtailed immediately over a zero minute Ramp due to the flow path being removed.</p> <p>The E-tag(s) associated with the energy wheeled through BA1 and sinking in BA2 will be curtailed upon termination of the SAR using a ten-minute Ramp.</p> <p>For non-SAR events:</p> <ul style="list-style-type: none">• The E-tag(s) associated with the energy sinking in BA1 is curtailed immediately over a zero minute Ramp.• All E-tag(s) associated with the energy wheeled through BA1 and into BA2 will be curtailed on a mutually agreed upon start time and Ramp duration by the affected BAs.
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Example 4 Source BA, intermediary sink BA1, intermediary sink BA2, and sink BA3

<p>The energy is flowing from the radial Source BA, with portions sinking in BA 1, BA 2, and BA3.</p>	<p>The rules governing this scenario are the same as presented in Example 3. Radial Source transactions will be limited to only one intermediary Balancing Authority unless all Balancing Authorities on the Scheduling Path are SAR participants.</p>
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4.2 Modification to the SAR Procedure

The SAR procedure is modified to allocate portions of the total delivery to Balancing Authorities in addition to the directly connected Balancing Authority during an ordinary simultaneous activation of **reserve**. When the **tie line** trips, the directly connected Balancing Authority may choose to activate the SAR procedure, and then each recipient’s share will be allocated to other participants based on the principle of mutual assistance, according to share allocation rules in the SAR procedure.

Each Balancing Authority receiving a portion of energy from the **tie line** through the directly connected Balancing Authority will contribute energy to and receive assistance for their portion of the **contingency**. The Balancing Authorities supplying this assistance would not have this energy replaced by the directly connected Balancing Authority when the directly connected Balancing Authority picks up its **reserve** to cover its purchase from HQ-TE. Thus, the directly connected Balancing Area’s **reserve** requirement remains the greater of the largest internal **contingency** or its share of the respective **tie line** flow.

When MSC 7040 in NYISO, Sandy Pond in ISO-NE, or Eel River in NBP-SO and/or Madawaska in HQ-TE trips, the directly connected Balancing Authority may initiate the SAR procedure. In order to have each Balancing Authority receiving energy from HQ-TE prior to the **contingency** be presented with the correct **ACE**, all Balancing Authorities that were receiving energy set their HQ-TE **interchange** Schedules to zero as soon as possible.

Initially, SAR shares would be calculated based on energy scheduled to the Balancing Authorities receiving energy from the tripped **element**. Initial shares would be allocated to each energy recipient according to the ordinary share allocation rules in the SAR procedure. Thus, each energy recipient is assigned one-half of the energy received initially. A Balancing Authority would then receive additional allocations to provide assistance to each other Balancing Authority, until the total amount of the **contingency** is allocated.

Once recovery from the **contingency** occurs, the contingent and recipient Balancing Authorities provide the remainder of their respective **reserve** obligations. A recipient Balancing Authority uses its own **generation** to replace the energy initially received (unless additional alternative arrangements are made) after SAR assistance is withdrawn.

The methodology is iterative. One pass is required to allocate shares for each of the Balancing Authorities requiring assistance. Key features of the method are demonstrated in the examples below. NBP-SO participation is excluded from these examples for simplicity. The values shown are rounded to whole numbers.

Example 1. PJM Buys 400 MW from HQ-TE on MSC 7040, NYISO Buys 1200 MW:

MSC 7040 flow = 1600 MW
 HQ-TE – NYISO Transaction = 1200 MW
 HQ-TE – PJM Transaction = 400 MW

Area	Initial Share/ Assistance Sought	First Pass	Second Pass	Total Generation Picked Up When SAR Energy Is Supplied Fully	Total Gen. Picked Up After SAR Is Canceled And All ACEs = 0
IESO		200	67	267	0
ISO-NE		200	67	267	0
NYISO	600		67	667	1200
PJM	200	200		400	400
Sum	800	600	200	1600	1600

Initial Shares – NYISO and PJM are initially assigned one-half of their respective purchases from HQ-TE. Consequently, under the ordinary SAR rules, they would be ‘seeking’ assistance for an equal amount. The total assistance sought is 800 MW for the entire **contingency** amount.

First Pass – NYISO is provided 600 MW of assistance. These shares are allocated equally, 200 MW each, among the other three participants – including PJM.

Second Pass – PJM is provided 200 MW of assistance. These shares are allocated equally, 67 MW each, among the other three participants – including NYISO.

Total **Generation Picked-up** – The additional **generation** in each Balancing Authority, after all Balancing Authorities provided their shares, and the composite NPCC/PJM **ACE** is restored, and the SAR procedure is about to be canceled, is shown in the next to last column of the table above. The additional **generation** after the SAR procedure is canceled and each Balancing Authority returns its **ACE** to zero is shown in the last column.

The table below summarizes the changes in Schedule and **ACE** from just prior to the **contingency**, through the cancellation of assistance and full recovery by both Balancing Authorities losing energy due to the **contingency** (Note that the HVDC Schedule is not shown, as it is modeled as an internal generator for NYISO within this example).

Time	IESO Sch	IESO ACE	NE Sch	NE ACE	PJM Sch	PJM ACE	NY Sch	NY ACE	Tot Sch	Tot ACE
Pre-contingency	0	0	0	0	-400	0	+400	0	0	0
Contingency	0	0	0	0	-400	0	+400	-1600	0	-1600
PJM/NY Schedule change	0	0	0	0	0	-400	0	-1200	0	-1600
No response, SAR entries	+267	-267	+267	-267	-200 +200 = 0	-400	-600 +67= -533	-667	0	-1600
Full response, SAR not canceled	+267	0	+267	0	0	0	-533	0	0	0
SAR just canceled	0	+267	0	+267	0	0	0	-533	0	0
All get back to ACE = 0	0	0	0	0	0	0	0	0	0	0

Example 2. PJM Buys 1200 MW from HQ-TE on MSC 7040, NYISO Buys 400 MW:

MSC 7040 flow = 1600 MW
 HQ-TE – NYISO Transaction = 400 MW
 HQ-TE – PJM Transaction = 1200 MW

Area	Initial Share/ Assistance Sought	First Pass	Second Pass	Total Generation Picked Up When SAR	Total Gen. Picked Up After SAR Is Canceled And All ACEs =
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				Energy Is Supplied Fully	0
IESO		67	200	267	0
ISO-NE		67	200	267	0
NYISO	200		200	400	400
PJM	600	67		667	1200
Sum	800	200	600	1600	1600

Initial Shares – NYISO and PJM are initially assigned one-half of their respective purchases from HQ-TE. Consequently, under the ordinary SAR rules, they would be ‘seeking’ assistance for an equal amount. The total assistance sought is 800 MW for the entire **contingency** amount.

First Pass – NYISO is provided 200 MW of assistance. These shares are allocated equally, 67 MW each, among the other three participants – including PJM.

Second Pass – PJM is provided 600 MW of assistance. These shares are allocated equally, 200 MW each, among the other three participants- including the NYISO.

Total Generation Picked-up –The additional **generation** in each Balancing Authority, after all Balancing Authorities provided their shares, and the composite NPCC/PJM **ACE** is restored, and the SAR procedure is about to be canceled, is shown in the next to last column of the table above. The additional **generation** after the SAR procedure is canceled and each Balancing Authority returns its **ACE** to zero is shown in the last column.

The table below summarizes the changes in Schedule and ACE from just prior to the **contingency**, through the cancellation of assistance and full recovery by both Balancing Authorities losing energy due to the **contingency** (Note that the HVDC Schedule is not shown, as it is modeled as an internal generator for NYISO within this example).

Time	IESO Sch	IESO ACE	NE Sch	NE ACE	PJM Sch	PJM ACE	NY Sch	NY ACE	Tot Sch	Tot ACE
Pre-contingency	0	0	0	0	-1200	0	+1200	0	0	0
Contingency	0	0	0	0	-1200	0	+1200	-1600	0	-1600
PJM/NY Schedule change	0	0	0	0	0	-1200	0	-400	0	-1600
No response, SAR entries	+267	-267	+267	-267	-600 +67 =-533	-667	-200 +200 = 0	-400	0	-1600

Full response, SAR not canceled	+267	0	+267	0	-533	0	0	0	0	0
SAR just canceled	0	+267	0	+267	0	-533	0	0	0	0
All get back to ACE = 0	0	0	0	0	0	0	0	0	0	0

Example 3. PJM and NYISO Buy 200 MW from Quebec on Sandy Pond, NE Buys 1200 MW:

Sandy Pond flow = 1600 MW
 HQ-TE – NY transaction = 200 MW
 HQ-TE – NE transaction = 1200 MW
 HQ-TE – PJM transaction = 200 MW

Area	Initial Share/ Assistance Sought	First Pass	Second Pass	Third Pass	Total Generation Picked Up When SAR Energy Is Supplied Fully	Total Gen. Picked Up After SAR Is Canceled And All ACEs = 0
IESO		200	33	33	267	0
ISO-NE	600		33	33	667	1200
NYISO	100	200		33	333	200
PJM	100	200	33		333	200
Sum	800	600	100	100	1600	1600

Initial Shares – ISO-NE, NYISO and PJM are initially assigned one-half of their respective purchases from HQ-TE. Consequently, under the ordinary SAR rules, they would be ‘seeking’ assistance for an equal amount. The total assistance sought is 800 MW for the entire **contingency** amount.

First Pass – ISO-NE is provided with 600 MW of assistance. These shares are allocated equally, 200 MW each, among the other three participants.

Second Pass – NYISO is provided 100 MW of assistance. These shares are allocated equally, 33 MW each, among the other three participants.

Third Pass – A third pass is now required to allocate assistance shares to the third component of the **contingency**. PJM is provided 100 MW of assistance. These shares are allocated equally, 33 MW each, among the other three participants.

Total Generation Picked up – The additional **generation** in each Balancing Authority, after all Balancing Authorities provided their shares, and the composite NPCC/PJM ACE is restored, and the SAR procedure is about to be canceled, is shown

in the next to last column of the table above. The additional **generation** after the SAR procedure is canceled and each Balancing Authority returns its **ACE** to zero is shown in the last column.

The table below summarizes the changes in Schedule and **ACE** from just prior to the **contingency**, through the cancellation of assistance and full recovery by both Balancing Authorities losing energy due to the **contingency** (Note that the HVDC .Schedule is not shown, as it is modeled as an internal generator for ISO-NE).

Time	IESO Sch	IESO	NE Sch	NE ACE	PJM Sch	PJM ACE	NY Sch	NY ACE	Tot Sch	Tot ACE
Pre-contingency	0	0	+400	0	-200	0	-200	0	0	0
Contingency	0	0	+400	-1600	-200	0	-200	0	0	-1600
PJM/NY/NE schedule change	0	0	0	-1200	0	-200	0	-200	0	-1600
No response, SAR entries			-600 +33 +33= -533		-100 +200 +33= +133		-100 +200 +33= +133			
	+267	-267		-667		-333		-333	0	-1600
Full response, SAR not canceled	+267	0	-533	0	+133	0	+133	0	0	0
SAR just canceled	0	+267	0	-533	0	+133	0	+133	0	0
All get back to ACE = 0	0	0	0	0	0	0	0	0	0	0

Example 4. ISO-NE, PJM and NYISO Purchase 700 MW each from Quebec on Sandy Pond:

Sandy Pond flow = 2100 MW
 HQ-TE – NYISO transaction = 700 MW
 HQ-TE – ISONE transaction = 700 MW
 HQ-TE – PJM transaction = 700 MW

Area	Initial Share/ Assistance Sought	First Pass	Second Pass	Third Pass	Total Generation Picked Up When SAR Energy Is Supplied Fully	Total Gen. Picked Up After SAR Is Canceled And All ACEs = 0
IESO		117	117	117	350	0
ISO-NE	350		117	117	584	700

NYISO	350	117		117	584	700
PJM	350	117	117		584	700
Sum	1050	350	350	350	2100	2100

Initial Shares – ISO-NE, NYISO, and PJM are initially assigned one-half of their respective purchases from HQ-TE. Consequently, under the ordinary SAR rules, they would be ‘seeking’ assistance for an equal amount. The total assistance sought is 1050 MW for the entire **contingency** amount.

First Pass – ISO-NE is provided 350 MW of assistance. These shares are allocated equally, 117 MW each, among the other three participants.

Second Pass – NYISO is provided 350 MW of assistance. These shares are allocated equally, 117 MW each, among the other three participants.

Third Pass –PJM is provided 350 MW of assistance. These shares are allocated equally, 117 MW each, among the other three participants.

Total **Generation** Picked up – The additional **generation** in each Balancing Authority after all Balancing Authorities provided their shares, and the composite NPCC/PJM **ACE** is restored, and the SAR procedure is about to be canceled, is shown in the next to last column of the table above. The additional **generation** after the SAR procedure is canceled and each Balancing Authority returns its **ACE** to zero is shown in the last column.

The table below summarizes the changes in Schedule and **ACE** from just prior to the **contingency**, through the cancellation of assistance and full recovery by both Balancing Authorities losing energy due to the **contingency** (Note that the HVDC Schedule is not shown, as it is modeled as an internal generator for ISO-NE).

Time	IESO Sch	IESO ACE	NE Sch	NE ACE	PJM Sch	PJM ACE	NY Sch	NY ACE	Tot Sch	Tot ACE
Pre-contingency	0	0	+140 0	0	-700	0	-700	0	0	0
Contingency	0	0	+140 0	-2100	-700	0	-700	0	0	-2100
PJM/NY/NE Schedule change	0	0	0	-700	0	-700	0	-700	0	-2100
No response, SAR entries	+350	-350	-117	-583	-117	-583	-117	-583	0	-2100
Full response, SAR not canceled	+350	0	-117	0	-117	0	-117	0	0	0

SAR just canceled	0	+350	0	-117	0	-117	0	-117	0	0
All get back to ACE = 0	0	0	0	0	0	0	0	0	0	0

Radial Source Contingencies with Counter flow Transactions

Example 5. Counter flow Transactions on MSC 7040
PJM Exports 400 MW to HQ-TE on MSC 7040, NYISO Imports 1200 MW:

MSC 7040 flow = 800 MW
 HQ-TE – NYISO transaction = 1200 MW
 HQ-TE – PJM transaction = -400 MW (flow is PJM to HQ-TE)

Area	Initial Share/ Assistance Sought	First Pass	Second Pass	Total Generation Picked Up When SAR Energy Is Supplied Fully	Total Gen. Picked Up After SAR Is Canceled And All ACEs = 0
IESO		200	-67	133	0
ISO-NE		200	-67	133	0
NYISO	600		-67	533	1200
PJM	-200	200		0	-400
Sum	400	600	-200	400	800

Initial Shares – NYISO and PJM are initially assigned one-half of their respective purchase from and delivery to HQ-TE. Consequently, under the ordinary SAR rules, they would be ‘seeking’ assistance for both flows into and out of Quebec. The total net assistance sought is 400 MW for the net **contingency** amount.

First Pass – The NYISO is provided 600 MW of assistance. These shares are allocated equally, 200 MW each, among the other three participants – including PJM.

Second Pass – PJM is provided -200 MW of assistance. These shares are allocated equally, -67 MW each, among the other three participants – including NYISO. These negative shares reduce the net pick-ups required of the assisting Balancing Authorities.

Total Generation Picked up – The additional **generation** in each Balancing Authority, after all Balancing Authorities provided their shares, and the composite NPCC/PJM **ACE** is restored, and the SAR procedure is about to be canceled, is shown in the next to last column of the table above. The additional **generation** after the SAR procedure is canceled and each Balancing Authority returns its **ACE** to zero is shown in the last column.

Example 6. ISO-NE Purchase 2000 MW from HQ-TE, PJM and NYISO Deliver 500 MW each to Quebec on Sandy Pond:

Sandy Pond flow =	1000 MW
NYISO - HQ-TE transaction =	-500 MW (flow is NY to HQ-TE)
HQ-TE – ISONE transaction =	2000 MW
PJM – HQ-TE transaction =	-500 MW (flow is PJM to HQ-TE)

	Initial Share/ Assistance Sought	First Pass	Second Pass	Third Pass	Total Generation Picked Up When SAR Energy Is Supplied Fully	Total Gen. Picked Up After SAR Is Canceled And All ACEs = 0
IESO		333	-83	-83	167	0
ISO-NE	1000		-83	-83	834	2000
NYISO	-250	333		-83	0	-500
PJM	-250	333	-83		0	-500
Sum	500	1000	-250	-250	1000	1000

Initial Shares – ISO-NE, NYISO and PJM are initially assigned one-half of their respective purchase from and delivery to Quebec. Consequently, under the ordinary SAR rules, they would be ‘seeking’ assistance for flows into and out of Quebec. The total assistance sought is 1000 MW for the net **contingency** amount.

First Pass – ISO-NE is provided 1000 MW of assistance. These shares are allocated equally, 333 MW each, among the other three participants.

Second Pass – NYISO is provided -250 MW of assistance. These shares are allocated equally, -83 MW each, among the other three participants.

Third Pass –PJM is provided -250 MW of assistance. These shares are allocated equally, -83 MW each, among the other three participants.

Total Generation Picked up – The additional **generation** in each Balancing Authority after all Balancing Authorities provided their shares, and the composite NPCC/PJM **ACE** is restored, and the SAR procedure is about to be canceled, is shown in the next to last column of the table above. The additional **generation** after the SAR procedure is canceled and each Balancing Authority returns its **ACE** to zero is shown in the last column.

Attachment C – ACE Diversity Interchange (ADI)

ACE Diversity Interchange (ADI) is a method of regional regulation among participating Balancing Authorities that can achieve a mutual reduction in requirements for **reserve on Automatic Generation Control (AGC)** and generator output adjustments. ADI uses the sign diversity of the Area Control Error (ACE) values of the participating Balancing Authorities to achieve this mutual reduction. ADI is a form of supplemental regulation as permitted by NERC Standards.

All participating Balancing Authorities in ACE Diversity Interchange shall form an electrically contiguous area. Adjacent and directly connected non NPCC Balancing Authorities may participate in ACE Diversity Interchange. Participation in ACE Diversity Interchange is contingent on submission of the form located in Appendix C and approval by TFCO.

This form will also be used to indicate if a Balancing Authority wishes to act as the ADI Coordinator for the ADI participants, contingent upon the approval of TFCO.

Balancing Authorities that participate in Ace Diversity Interchange (ADI) shall do so in accordance with the requirements in sections 1.0 (ADI General Requirements) & 2.0 (ADI Methodology) below.

1.0 ADI General Requirements

In order to participate in ADI, Balancing Authorities shall establish the appropriate data exchange and apply the ADI term to their respective ACE in AGC.

Transmission limits or other internal constraints that preclude the normal implementation of ADI shall be communicated immediately to the ADI Coordinator. Whenever normal implementation of the procedure is precluded, the ADI Coordinator shall notify the other participants.

The industry sign standard for ACE is used, i.e., a negative ACE indicates under-generation. The ADI sign convention is such that a positive ADI allocation will make the adjusted ACE of the participating Balancing Authority less negative with respect to the unadjusted ACE. The positive ADI limit will restrict the amount of positive ADI that can be allocated to make a participating Balancing Authority's adjusted ACE less negative with respect to a negative unadjusted ACE. The converse is applied to positive ACE values and negative ADI allocation and limits.

Inadvertent interchange is affected by the implementation of ADI. In general, the unadjusted ACE values have equal likelihood over an hour to be positive or negative. ADI allocations will be monitored carefully for inequitable or inordinately large accumulations of inadvertent. These issues will be addressed and remedied promptly.

ADI may be biased to correct for inadvertent among participants that have accumulated balances that are opposite in sign. Two or more ADI participants may engage in this

activity. At least one participant's accumulated inadvertent balance must be opposite in sign to the other's.

2.0 ADI Methodology

Changes to the ADI states (enable/disable) and parameters are coordinated through the ADI Coordinator. The ADI Coordinator has the authority to globally disable ADI. Following this action, all participants shall be notified. A change to an individual participating Balancing Authority's enable/disable status is communicated electronically and is available to all participants.

The participating Balancing Authorities have the authority to disable their respective participation in ADI. The ADI Coordinator has the capability to disable any individual participating Balancing Authority, but shall only do so at the participating Balancing Authority's request, unless a reliability problem requires immediate action by the ADI Coordinator.

- a) The ADI Coordinator notifies all participating Balancing Authorities of any changes in a participating Balancing Authority's ADI state. Limit changes to control inadvertent accumulations will be made simultaneously by the ADI Coordinator and communicated to all participants.
- b) The ADI Coordinator has the authority to enable or disable ADI exchange and/or related parameters if:
 - Control Performance is adversely affected by the ADI
 - ADI contributes to inordinately large or inequitable accumulations of inadvertent
 - Flows on the transmission system are affected adversely by ADI
 - Data received from a participating Balancing Authority do not meet the data refresh criterion.
- c) Participating Balancing Authorities determine their level of participation in conjunction with the NPCC Working Group CO-1. ADI values that determine the limit for total ADI participation shall be recommended by NPCC Working Group CO-1 and require approval by the TFCO.
- d) Any Participating Balancing Authority may request that ADI be enabled or disabled globally.
- e) All actions to globally enable or disable ADI or otherwise modify ADI parameters shall be communicated by the ADI Coordinator to the other ADI participants. A concise reason for the change is to be given.
- f) Participating Balancing Authorities will disable ADI participation if AGC execution is paused, suspended, placed in a monitor mode, or if data quality problems result in an unreliable calculation of the unadjusted ACE.

g) The NPCC Control Performance Working Group (CO-1) shall monitor the ADI process to determine the appropriate ADI operating parameters and to assure that reliability is not adversely affected by its use. CO-1 shall periodically verify that unadjusted ACE values used for ADI assignments are reasonably close to an equal distribution of positive and negative values, and monitor ADI monthly on and off peak accumulations to assure that inadvertent accumulations are not experiencing a significant adverse impact. CO-1 will assure that any increase in ADI limits will not have an adverse impact on reliability, and will coordinate any limit and parameter changes with NPCC CO-8 members of participating Balancing Authorities.

h) As ADI is treated as a pseudo-tie, data retention requirements shall match those specified for tie-line data in accordance with applicable NERC standards.

Appendix A- Monitoring Procedures for Operating Reserve Criteria

Introduction

This procedure establishes the monitoring and reporting processes for **resource** losses in addition to those required for meeting the NERC **Disturbance** Control Standard (DCS). The NPCC Control Performance Working Group (CO-1) has primary responsibility for performing the monitoring and reporting processes described herein.

Monitoring Criteria

As an indication of the adequacy of **ten-minute reserve**, the monitoring and reporting criteria for Balancing Authorities within NPCC focus on performance during **reportable events** where the supply side **resource** loss is equal to or less than the **first contingency loss**.

Monthly Monitoring Procedures

For each NPCC **reportable event** and NERC Balancing Contingency Event, a NERC CR-1 Form must be filled out. The CR1-Form has been modified to include a new tab for filling in additional information relative to schedule times and recovery times that are useful in the event post-analysis.

At the conclusion of each calendar month, NPCC Balancing Authorities review all of their **reportable events** and any SAR assistance that was provided. Each Balancing Authority sends an electronic copy of the report completed for each of their **reportable events** and any SAR assistance within a month to the Chair of CO-1 (or his/her designee). Additionally, monthly reports include frequency crosschecks; BAAL, CPS-1, and CPS-2 performance; inadvertent accumulation and unilateral payback. All reports in a month are due by the fifteenth calendar day of the following month.

Each month, CO-1 monitors the performance of the SAR program, including the timeliness of Schedule changes, the successful provision of the assigned assistance, and any anomalies that may have occurred in each SAR event. CO-1 shall report any anomalies or performance shortfalls to the TFCO.

Quarterly Monitoring Procedures

The Chair (or his or her designee) of CO-1 compiles all monthly submissions at the end of each quarter to determine Disturbance Control Standard (DCS) compliance for all NPCC Balancing Authorities.

Annual Monitoring Procedures

CO-1 prepares an annual summary for the Task Force on Coordination of Operation (TFCO) indicating, for each Balancing Authority and for NPCC as a whole, the number of violations and the number of events for which performance was successful. The summary report also compares current year's performance with the performance of the four previous years. CO-1

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provides supplementary information, as necessary, to the TFCO for their review.

The Chair of CO-1 (or his/her designee) on an annual basis produces an electronic archive of all **reportable events**, and distributes the archive to CO-1 members and NPCC Staff.

Appendix B - Procedures during Abnormal Operating Conditions

1.0 Introduction

This procedure provides specific instructions to Balancing Authorities and Reliability Coordinators for: making notifications upon the occurrence of deficiencies in **operating reserve**; restoration of **ten-minute reserve**, **synchronized reserve** available within ten minutes, and **thirty-minute reserve**.

2.0 Objectives

- 2.1 To mitigate the impact of an evolving event.
- 2.2 To alert other Balancing Authorities and Reliability Coordinators when any Balancing Authority is deficient **operating reserve**, or anticipates being deficient in **ten-minute reserve**.
- 2.3 To enhance **reliability** within NPCC through the coordination of **resources** when any Balancing Authority becomes deficient in **ten-minute reserve** and cannot restore it in a timely manner
- 2.4 To return to normal operating conditions as soon as possible.

3.0 Action to Mitigate **Ten-Minute Reserve** Shortages

3.1 Actions When Becoming Deficient in **Ten-Minute Reserve**

To minimize the magnitude and duration of a **Ten-Minute Reserve** deficiency, a Balancing Authority may implement any or all of the actions below, in no implied order:

- Commit sufficient off-line supply-side **resources** to create additional **ten-minute reserve** within the restoration period.
- Recall applicable exports respecting Balancing Authority **operating procedures**. The Source Balancing Authority of the applicable exports shall give proper notification to the Sink Balancing Authority.
- Obtain additional **resources** from outside the Balancing Authority in accordance with regional and local practices. These additional **resources** shall not be from the portion of another Balancing Authority's **reserve** that is needed to meet the other Balancing Authority's **reserve** requirements in coincident hours.

- Recall planned generator outages and coordinate with the Reliability Coordinator for possible assistance available by recalling transmission outages (or taking other actions) that will increase **reserve** or **transfer capability** if it can reasonably be expected that additional **resources** are available to assist in reducing or eliminating the shortage.
- Count interruptible customer **load** that can be interrupted within ten minutes in its **ten-minute reserve**, if it has not already been counted.
- Count voltage reduction that can be implemented within ten minutes in its **ten-minute reserve**, if it has not already been counted.
- Consider the use of Public Appeals if sufficient time exists to activate them, or if the shortage is expected to last for an extended period.

3.2 Deficiencies of the **Synchronized Reserve** Available Within Ten Minutes

When a Balancing Authority becomes deficient in the **synchronized reserve** available within ten minutes but is not deficient in **ten-minute reserve**, the deficient Balancing Authority considers any or all of the following actions in no implied order to eliminate or minimize the deficiency as soon as practical:

- Activate off-line **generation** to increase the supply of the **synchronized reserve** available within ten minutes.
- Re-dispatch online **generation** to increase the supply of the **synchronized reserve** available within ten minutes.
- Obtain additional **resources** from outside the Balancing Area in accordance with regional and local practices. These **resources** cannot be from the portion of another Balancing Authority's **reserve** that is needed to meet the other Balancing Authority's **reserve** requirements in coincident hours.
- Disconnect **interruptible loads**, which are not contributing to the **synchronized reserve** available within ten minutes due to implementation delays in excess of ten minutes, if permitted by market and other applicable rules.

3.3 Notifications

When a Balancing Authority becomes deficient or forecasts a deficiency in either the **synchronized reserve** available within ten minutes or **ten-minute reserve**, and, the Balancing Authority cannot restore these **reserves** using the actions specified in section 3.1 and 3.2 of this Appendix, the following actions are required:

- The Balancing Authority informs its Reliability Coordinator.
- The Reliability Coordinator informs the remaining NPCC Areas.
- The Reliability Coordinator considers the need to initiate, or request NPCC Staff to initiate, an NPCC Emergency Preparedness Conference Call among the Reliability Coordinators of NPCC, and PJM and MISO if necessary.

These actions are repeated whenever there is a change in the status of the available **reserve** with respect to their corresponding restoration requirements specified above. For the sole purpose of these notification actions, the restoration requirements specified above for **ten-minute reserve** applies to the **synchronized reserve** available within ten minutes as well.

4.0 Actions to Mitigate **Thirty-Minute Reserve** Shortages

4.1 Actions When Becoming Deficient in **Thirty-Minute Reserve**

To minimize the magnitude and duration of a **thirty-minute reserve** deficiency, a Balancing Authority may implement any or all of the actions below, in no implied order:

- Obtain additional **resources** from outside the Balancing Authority in accordance with regional and local practices. These additional **resources** shall not be from the portion of another Balancing Authority's **reserve** that is needed to meet the other Balancing Authority's **reserve** requirements in coincident hours. Emergency energy purchases between Balancing Authority Areas are optional.
- Recall planned generator outages and coordinate with the Reliability Coordinator for possible assistance available by recalling transmission outages that will increase **reserve** or **transfer capability** if it can reasonably be expected that additional **resources** are available to assist in reducing or eliminating the shortage.
- Recall applicable exports or convert applicable exports to a recallable product and include this energy and/or **capacity** in its **thirty-minute reserve**, while respecting Balancing Authority operating procedures. The Source Balancing Authority of the applicable exports gives proper notification to the Sink Balancing Authority if this action is taken.
- Count interruptible customer **load** that can be interrupted within thirty minutes in its **thirty-minute reserve**, if it has not already been counted.
- Count **voltage reduction** that can be implemented within thirty minutes in its **thirty-minute reserve**, if it has not already been counted.

4.2 Actions When Forecasting a Deficiency of **Thirty-Minute Reserve**

- Count additional **resources** from outside the Balancing Authority in accordance with regional and local practices. These additional resources shall not be from the portion of another Balancing Authority's **reserve** that is needed to meet the other Balancing Authority's **reserve** requirements in coincident hours. Emergency energy purchases between Balancing Authority Areas are optional.
- Obtain additional resources from inside the Balancing Authority in accordance with regional and local practices.

4.3 Notifications

When a Balancing Authority becomes deficient in **thirty-minute reserve** and the Balancing Authority cannot restore these **reserves** using the actions specified in section 4.1 of this Appendix, the following actions are required:

- The Balancing Authority informs its Reliability Coordinator.
- The Reliability Coordinator informs the remaining NPCC Areas.
- The Reliability Coordinator considers the need to initiate, or request NPCC Staff to initiate, an NPCC Emergency Preparedness Conference Call among the Reliability Coordinators of NPCC, and PJM and MISO, if necessary.

These actions are repeated whenever there is a change in the status of the available **operating reserve** with respect to their corresponding restoration requirements specified above.

Appendix C – Participation Request Form - Simultaneous Activation of Reserve and ACE Diversity Interchange

Instructions

NPCC Balancing Authorities and adjacent Balancing Authorities must complete this form to request participation in the following NPCC Programs:

- Simultaneous Activation of Reserve (SAR)
- **ACE** Diversity Interchange (ADI)

This form must be completed in full and submitted to the NPCC Task Force on Coordination of Operation (TFCO) for review and approval. The form must be authorized by an officer of the company submitting the form. On review of the form, the TFCO will notify the submitting Balancing Authority of the programs that they are approved to participate in.

The Coordinator role for all programs must also be approved by the TFCO.

Participation Request Form

Balancing Authority Name: _____

The Balancing Authority named above requests participation in the following programs (check one or more):

Simultaneous Activation of Reserve:

ACE Diversity Interchange (ADI):

The Balancing Authority named above wishes to act as the coordinator for:

Coordinator: (SAR)

Coordinator: (ADI)

The undersigned must be an officer of the Balancing Authority named above with the authority to authorize participation by their company:

Name: _____

Title: _____

Signature: _____

Date: _____

Appendix D – Guideline for Determining the Time T+0

The determination of time T+0 for **resource** losses is consistent with the methodology described in the NERC Performance Standard Reference Guide. For performing compliance evaluations, time T+0 for NPCC **reportable events** is determined by the following process:

1. A sliding 60-second interval (with EMS scan rate data as a source) is used to determine when the magnitude of the **resource** loss qualifies as an NPCC **reportable event**.
2. When the change in output of the **resource** loss exceeds the NPCC **reportable event** threshold within a sliding 60-second interval, time T+0 is the first observation of declining output within that sliding 60-second interval.
3. When the change in output of the **resource** loss exceeds the DCS event threshold within a sliding 60-second interval, time T+0 is the first observation of declining output within that sliding 60-second interval.
4. If (2) and (3) above result in differing computations of T+0, the DCS computation in (3) takes precedence.
5. Any portion of the **resource** loss preceding the sliding 60-second interval identified in (2) and/or (3) is not included in the determination of the megawatts lost for the event.

For system conditions not directly associated with a **contingency**, T+0 is the time of the request for SAR assistance.