

AESO Assessment and Conversion of NERC BAL-002-0 to Alberta BAL-002-AB-0 Disturbance Control Performance			
Section	NERC BAL-002-0	Alberta BAL-002-AB-0	Reason for Difference
Purpose	The purpose of the Disturbance Control Standard (DCS) is to ensure the Balancing Authority is able to utilize its Contingency Reserve to balance resources and demand and return Interconnection frequency within defined limits following a Reportable Disturbance. Because generator failures are far more common than significant losses of load and because Contingency Reserve activation does not typically apply to the loss of load, the application of DCS is limited to the loss of supply and does not apply to the loss of load.	The purpose of <u>this reliability standard</u> is to ensure the <u>JSO</u> is able to utilize its <u>contingency reserve</u> to balance resources and demand and return <u>interconnection frequency</u> within defined limits following a <u>reportable disturbance</u> .	As load is not recovered using CR it will be removed from the standard.
Applicability	<p>4.1. Balancing Authorities</p> <p>4.2. Reserve Sharing Groups (Balancing Authorities may meet the requirements of Standard 002 through participation in a Reserve Sharing Group.)</p> <p>4.3. Regional Reliability Organizations</p>	4.1. <u>JSO</u>	The Alberta reliability standard will not cover requirements for the reserve sharing group or regional entity.
Effective Date	April 1, 2005	<u>Ten calendar days after the date of approval by the Commission.</u>	Proposed effective date in Alberta.
Definitions		<u>Italicized terms used in this reliability standard have the same meanings as set out</u>	Added definitions section to the Alberta reliability standard

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		<u>in the Alberta Reliability Standards Glossary of Terms and Part 1 of the ISO Rules.¹</u>	
Requirement	R1. Each Balancing Authority shall have access to and/or operate Contingency Reserve to respond to Disturbances. Contingency Reserve may be supplied from generation, controllable load resources, or coordinated adjustments to Interchange Schedules.	R1. The ISO must have access to contingency reserve to respond to disturbances.	Added two sub-requirements to add clarity.
Measure		MR1. Requirements R1.1 and R1.2 are met.	

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- Deleted: Contingency Reserve may be supplied from generation, controllable load resources, or coordinated adjustments to Interchange Schedules.

¹ Defined terms are not italicized in this document, but will appear in the Alberta Reliability Standards document.

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		<u>R1.1 Contingency reserve must be supplied from generation, controllable load resources, or coordinated adjustments to interchange schedules.</u>	
Measure		<u>MR1.1 Documentation exists and shows that contingency reserves are of types specified in R1.1</u>	
		<u>R1.2 For a reportable event, the criteria in Appendix A must be used to calculate the recovery of ACE:</u>	
Measure		<u>MR1.2 The calculations are accurate and completed in accordance with R1.2 and Appendix A.</u>	
Measure	<p>For loss of generation:</p> <p>if $ACE_A < 0$ then $R_i = \frac{MW_{Loss} - \max(0, ACE_A - ACE_M)}{MW_{Loss}} * 100\%$</p> <p>if $ACE_A \geq 0$ then $R_i = \frac{MW_{Loss} - \max(0, -ACE_M)}{MW_{Loss}} * 100\%$</p> <p>where:</p>		The measure is part of Appendix A seen below. This is consistent with other Alberta reliability standards

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For loss of generation:

if $ACE_A < 0$
then

$$R_i = \frac{MW_{Loss} - \max(0, ACE_A - ACE_M)}{MW_{Loss}}$$

if $ACE_A \geq 0$
then

$$R_i = \frac{MW_{Loss} - \max(0, -ACE_M)}{MW_{Loss}}$$

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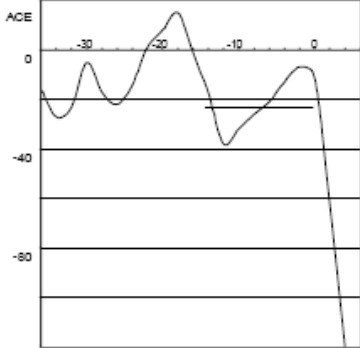
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	<ul style="list-style-type: none"> • MWLOSS is the MW size of the Disturbance as measured at the beginning of the loss, • ACEA is the pre-disturbance ACE, • ACEM is the maximum algebraic value of ACE measured within the fifteen minutes following the Disturbance. A Balancing Authority or Reserve Sharing Group may, at its discretion, set ACEM = ACE15 min, and <p>The Balancing Authority or Reserve Sharing Group shall record the MWLOSS value as measured at the site of the loss to the extent possible. The value should not be measured as a change in ACE since governor response and AGC response may introduce error. The Balancing Authority or Reserve Sharing Group shall base the value for ACEA on the average ACE over the period just prior to the start of the Disturbance (10 and 60 seconds prior and including at least 4 scans of ACE). In the illustration below, the horizontal line</p>		

AESO Assessment and Conversion of NERC BAL-002-0 to Alberta BAL-002-AB-0 Disturbance Control Performance

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	<p>represents an averaging of ACE for 15 seconds prior to the start of the Disturbance with a result of ACEA = - 25 MW.</p>  <p>The average percent recovery is the arithmetic average of all the calculated Ri's for Reportable Disturbances during a given quarter. Average percent recovery is similarly calculated for excludable Disturbances.</p>		
Requirement	R1.1. A Balancing Authority may elect to fulfill its Contingency Reserve obligations by participating as a member of a	<p>▼</p>	Not applicable to the ISO

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AESO Assessment and Conversion of NERC BAL-002-0 to Alberta BAL-002-AB-0 Disturbance Control Performance

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	Reserve Sharing Group. In such cases, the Reserve Sharing Group shall have the same responsibilities and obligations as each Balancing Authority with respect to monitoring and meeting the requirements of Standard BAL- 002.		
Measure			
Requirement	R2. Each Regional Reliability Organization, sub-Regional Reliability Organization or Reserve Sharing Group shall specify its Contingency Reserve policies, including:	▼	Not applicable to the ISO
Measure			
Requirement	R2.1. The minimum reserve requirement for the group.	▼	
Measure			
Requirement	R2.2. Its allocation among members.	▼	
Measure			
Requirement	R2.3. The permissible mix of Operating Reserve – Spinning and Operating Reserve – Supplemental that may be included in Contingency Reserve.	▼	
Measure			
Requirement	R2.4. The procedure for applying Contingency Reserve in practice.	▼	
Measure			
Requirement	R2.5. The limitations, if any, upon the	▼	

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AESO Assessment and Conversion of NERC BAL-002-0 to Alberta BAL-002-AB-0 Disturbance Control Performance

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	amount of interruptible load that may be included.		
Measure			
Requirement	R2.6. The same portion of resource capacity (e.g. reserves from jointly owned generation) shall not be counted more than once as Contingency Reserve by multiple Balancing Authorities.		
Measure			
Requirement	R3. Each Balancing Authority or Reserve Sharing Group shall activate sufficient Contingency Reserve to comply with the DCS.	R2. <i>The ISO must activate sufficient contingency reserve to comply with the DCS.</i>	
Measure		MR2. <i>Documentation shows contingency reserve amounts meet requirements in R2.</i>	
Requirement	R3.1. As a minimum, the Balancing Authority or Reserve Sharing Group shall carry at least enough Contingency Reserve to cover the most severe single contingency. All Balancing Authorities and Reserve Sharing Groups shall review, no less frequently than annually, their probable contingencies to determine their prospective most severe single contingencies.	R3. <i>The ISO must have access to at least enough contingency reserve to cover its most severe single contingency (MSSC).</i> R4. <i>The ISO must review, at least annually, its probable contingencies to determine its prospective MSSC.</i>	Requirement split into R3 and R4

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Measure		<p><u>MR3. Documentation shows contingency reserve amounts meet requirements in R2.</u></p> <p><u>MR4. Documentation exists confirming the review was completed in the timeframe specified in R3.</u></p>	
Requirement	R4. A Balancing Authority or Reserve Sharing Group shall meet the Disturbance Recovery Criterion within the Disturbance Recovery Period for 100% of Reportable Disturbances. The Disturbance Recovery Criterion is:	<u>R5. The ISO must meet the Disturbance Recovery Criterion within the Disturbance Recovery Period for 100% of reportable disturbances. The disturbance recovery criterion is:</u>	
Measure		<u>MR5. Requirements R5.1 and R5.2 are met for all reportable disturbances.</u>	
Requirement	R4.1. A Balancing Authority shall return its ACE to zero if its ACE just prior to the Reportable Disturbance was positive or equal to zero. For negative initial ACE values just prior to the Disturbance, the Balancing Authority shall return ACE to its pre- Disturbance value.	<u>R5.1. The ISO must return its ACE to zero if its ACE just prior to the reportable disturbance was positive or equal to zero.</u>	Split into two sub-requirements for clarity.

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<u>Measure</u>		MR5.1. Documentation exists confirming that ACE levels meet requirements specified in R5.1.	
		R5.2. The ISO must return its ACE to its pre-disturbance value if its ACE just prior to the reportable disturbance was negative.	
Measure		MR5.2. Documentation exists confirming that ACE levels meet requirements specified in R5.2.	
Requirement	R4.2. The default Disturbance Recovery Period is 15 minutes after the start of a Reportable Disturbance. This period may be adjusted to better suit the needs of an Interconnection based on analysis approved by the NERC Operating Committee.	R6. The ISO must meet the Disturbance Recovery Criterion and return its ACE within the disturbance recovery period for 100% of reportable disturbances.	The adjustment is based more for the eastern interconnection practice. It is not practiced in the WECC.
Measure		MR6. Documentation exists confirming that ACE levels meet requirements specified in R6.	
Requirement	R5. Each Reserve Sharing Group shall comply with the DCS. A Reserve Sharing Group shall be considered in a Reportable Disturbance condition whenever a group member has experienced a Reportable Disturbance and calls for the activation of Contingency Reserves from one or more other group		R5 is a NWPP requirement, does not apply to the ISO.

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AESO Assessment and Conversion of NERC BAL-002-0 to Alberta BAL-002-AB-0 Disturbance Control Performance

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	members. (If a group member has experienced a Reportable Disturbance but does not call for reserve activation from other members of the Reserve Sharing Group, then that member shall report as a single Balancing Authority.) Compliance may be demonstrated by either of the following two methods:		
Measure			
Requirement	R5.1. The Reserve Sharing Group reviews group ACE (or equivalent) and demonstrates compliance to the DCS. To be in compliance, the group ACE (or its equivalent) must meet the Disturbance Recovery Criterion after the schedule change(s) related to reserve sharing have been fully implemented, and within the Disturbance Recovery Period. or		R5.1 is a NWPP requirement and does not apply to the ISO.
Measure			
Requirement	R5.2. The Reserve Sharing Group reviews each member's ACE in response to the activation of reserves. To be in compliance, a member's ACE (or its equivalent) must meet the Disturbance Recovery Criterion after the schedule change(s) related to reserve sharing have been fully implemented, and within the Disturbance Recovery Period.		R 5.2 is a NWPP requirement and does not apply to the ISO.

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Section	NERC BAL-002-0	Alberta BAL-002-AB-0	Reason for Difference
Measure			
Requirement	R6. A Balancing Authority or Reserve Sharing Group shall fully restore its Contingency Reserves within the Contingency Reserve Restoration Period for its Interconnection.	<u>R7. The ISO must fully restore its contingency reserve within the contingency reserve restoration period for the western interconnection.</u>	WECC defines the restoration period in its standard.
Measure		MR7. Documentation exists and confirms that the restoration timing specified in R7 is met.	
Requirement	R6.1. The Contingency Reserve Restoration Period begins at the end of the Disturbance Recovery Period.		
Measure			
Requirement	R6.2. The default Contingency Reserve Restoration Period is 90 minutes. This period may be adjusted to better suit the reliability targets of the Interconnection based on analysis approved by the NERC Operating Committee.		
Measure			
Procedures			
Compliance	1. Compliance Monitoring Process Compliance with the DCS shall be measured on a percentage basis as set forth in the measures above. Each Balancing Authority or Reserve Sharing Group shall submit one completed copy		There is no compliance section currently proposed in the Alberta Reliability Standards. A compliance program will be developed at a later date for Alberta

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AESO Assessment and Conversion of NERC BAL-002-0 to Alberta BAL-002-AB-0 Disturbance Control Performance

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	<p>of DCS Form, "NERC Control Performance Standard Survey – All Interconnections" to its Resource Subcommittee Survey Contact no later than the 10th day following the end of the calendar quarter (i.e. April 10th, July 10th, October 10th, January 10th). The Regional Reliability Organization must submit a summary document reporting compliance with DCS to NERC no later than the 20th day of the month following the end of the quarter.</p> <p>1.1. Compliance Monitoring Responsibility Regional Reliability Organization.</p> <p>1.2. Compliance Monitoring Period and Reset Timeframe Compliance for DCS will be evaluated for each reporting period. Reset is one calendar quarter without a violation.</p> <p>1.3. Data Retention The data that support the calculation of DCS are to be retained in electronic form for at least a one-year period. If the DCS data for a Reserve Sharing Group and Balancing Area are undergoing a review to address a question that has been raised regarding the data, the data are to</p>		<p>Reliability Standards that recognizes the compliance monitoring and enforcement structure in Alberta.</p> <p>This approach is deemed consistent with the existing ISO Rules.</p>

AESO Assessment and Conversion of NERC BAL-002-0 to Alberta BAL-002-AB-0 Disturbance Control Performance

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	<p>be saved beyond the normal retention period until the question is formally resolved.</p> <p>1.4. Additional Compliance Information Reportable Disturbances – Reportable Disturbances are contingencies that are greater than or equal to 80% of the most severe single Contingency. A Regional Reliability Organization, sub-Regional Reliability Organization or Reserve Sharing Group may optionally reduce the 80% threshold, provided that normal operating characteristics are not being considered or misrepresented as contingencies. Normal operating characteristics are excluded because DCS only measures the recovery from sudden, unanticipated losses of supply-side resources.</p> <p>Simultaneous Contingencies – Multiple Contingencies occurring within one minute or less of each other shall be treated as a single Contingency. If the combined magnitude of the multiple Contingencies exceeds the most severe single Contingency, the loss shall be reported, but excluded from compliance evaluation.</p>		

AESO Assessment and Conversion of NERC BAL-002-0 to Alberta BAL-002-AB-0 Disturbance Control Performance

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	<p>Multiple Contingencies within the Reportable Disturbance Period – Additional Contingencies that occur after one minute of the start of a Reportable Disturbance but before the end of the Disturbance Recovery Period can be excluded from evaluation. The Balancing Authority or Reserve Sharing Group shall determine the DCS compliance of the initial Reportable Disturbance by performing a reasonable estimation of the response that would have occurred had the second and subsequent contingencies not occurred.</p> <p>Multiple Contingencies within the Contingency Reserve Restoration Period Additional Reportable Disturbances that occur after the end of the Disturbance Recovery Period but before the end of the Contingency Reserve Restoration Period shall be reported and included in the compliance evaluation. However, the Balancing Authority or Reserve Sharing Group can request a waiver from the Resources Subcommittee for the event if the contingency reserves were rendered inadequate by prior contingencies and a</p>		

AESO Assessment and Conversion of NERC BAL-002-0 to Alberta BAL-002-AB-0 Disturbance Control Performance

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	<p>good faith effort to replace contingency reserve can be shown.</p> <p>2. Levels of Non-Compliance Each Balancing Authority or Reserve Sharing Group not meeting the DCS during a given calendar quarter shall increase its Contingency Reserve obligation for the calendar quarter (offset by one month) following the evaluation by the NERC or Compliance Monitor [e.g. for the first calendar quarter of the year, the penalty is applied for May, June, and July.] The increase shall be directly proportional to the non-compliance with the DCS in the preceding quarter. This adjustment is not compounded across quarters, and is an additional percentage of reserve needed beyond the most severe single Contingency. A Reserve Sharing Group may choose an allocation method for increasing its Contingency Reserve for the Reserve Sharing Group provided that this increase is fully allocated. A representative from each Balancing Authority or Reserve Sharing Group that was noncompliant in the calendar quarter most recently completed shall provide written documentation</p>		

AESO Assessment and Conversion of NERC BAL-002-0 to Alberta BAL-002-AB-0 Disturbance Control Performance

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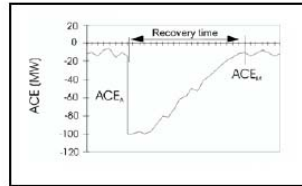
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	<p>verifying that the Balancing Authority or Reserve Sharing Group will apply the appropriate DCS performance adjustment beginning the first day of the succeeding month, and will continue to apply it for three months. The written documentation shall accompany the quarterly Disturbance Control Standard Report when a Balancing Authority or Reserve Sharing Group is non-compliant.</p> <p>2.1. Level 1: Value of the average percent recovery for the quarter is less than 100% but greater than or equal to 95%.</p> <p>2.2. Level 2: Value of the average percent recovery for the quarter is less than 95% but greater than or equal to 90%.</p> <p>2.3. Level 3: Value of average percent recovery for the quarter is less than 90% but greater than or equal to 85%.</p> <p>2.4. Level 4: Value of average percent recovery for the quarter is less than 85%.</p>		
Regional Differences			

[Appendix A – DCS Calculation](#)

For loss of generation:

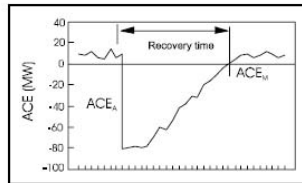
if $ACE_A < 0$
then

$$R_i = \frac{MW_{Loss} - \max(0, ACE_A - ACE_M)}{MW_{Loss}} * 100\%$$



if $ACE_A \geq 0$
then

$$R_i = \frac{MW_{Loss} - \max(0, -ACE_M)}{MW_{Loss}} * 100\%$$



where:

- MW_{Loss} is the MW size of the disturbance as measured at the beginning of the loss. The ISO must record the MW_{Loss} value as measured at the site of the loss to the extent possible. The value should not be measured as a change in ACE since governor response and AGC response may introduce error.
- ACE_A is the pre-disturbance value of ACE measured as the average ACE over the period just prior to the start of the *disturbance* (10 and 60 seconds prior and including at least 4 scans of ACE)
- ACE_M is the maximum algebraic value of ACE measured within the fifteen minutes following the *disturbance*

Proposed Terms for the ARS Glossary:

“contingency reserve restoration period” means the 90 minute period immediately following the “*disturbance recovery period*” when contingency reserve has been directed for a *disturbance*.

“*disturbance recovery period*” means the 15 minute period immediately following a *disturbance* which has required the use of a *balancing authority’s contingency reserve*.

“regional reliability organization” means an entity that ensures that a defined area of the *bulk electric system* is reliable, adequate and secure and can serve as the *compliance monitor*.



“reportable disturbance” means any event that causes an *ACE* change greater than or equal to 80% of a *balancing authority’s* or reserve sharing group’s most severe single contingency.

“reserve sharing group” means a group whose members consist of two or more *balancing authorities* that collectively maintain, allocate, and supply *operating reserves* required for each *balancing authority’s* use in recovering from *contingencies* within the group.

Defined Terms Used in this Standard:

(As included in the ISO Rules Definitions or Alberta Reliability Standards Glossary)

“area control error”

“automated generation control”

“balancing authorities”

“contingency reserve”

“disturbance”

“disturbance control standard” (DCS)

“interconnection”

“operating reserve”

Standard Owner: Anita Lee

AESO Requirement Owner(s): Neil Curtis

AESO Subject Matter Expert(s): Jason Murray, Ivan Doucette, Rob Baker, Peter Wong, Lane Belsher, Jim Edgar



Work Group Comments: None

Work Group Response: None

Acceptance Recommendation:

Developed by: Don Olson

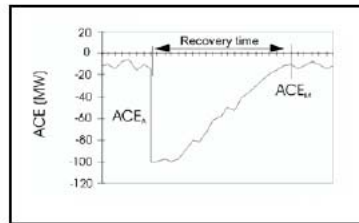
Name	Organization	Role
Peter Wong	AESO	Compliance Measures
Jason Murray	AESO	SME
Ivan Doucette	AESO	SME
Rob Baker	AESO	SME
Lane Belsher	AESO	SME
Jim Edgar	AESO	SME
Don Olson	AESO	SME

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For loss of generation:

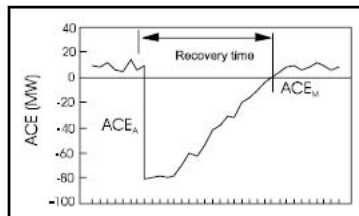
if $ACE_A < 0$
then

$$R_i = \frac{MW_{Loss} - \max(0, ACE_A - ACE_M)}{MW_{Loss}} * 100\%$$



if $ACE_A \geq 0$
then

$$R_i = \frac{MW_{Loss} - \max(0, -ACE_M)}{MW_{Loss}} * 100\%$$



where:

- MW_{LOSS} is the MW size of the Disturbance as measured at the beginning of the loss,
- ACE_A is the pre-disturbance ACE,
- ACE_M is the maximum algebraic value of ACE measured within the fifteen minutes following the

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group shall record the MW_{LOSS} value as measured at the site of the loss to the extent possible. The value should not be measured as a change in ACE since governor response and AGC response may introduce error. The Balancing Authority or Reserve Sharing Group shall base the value for ACE_A on the average ACE over the period just prior to the start of the

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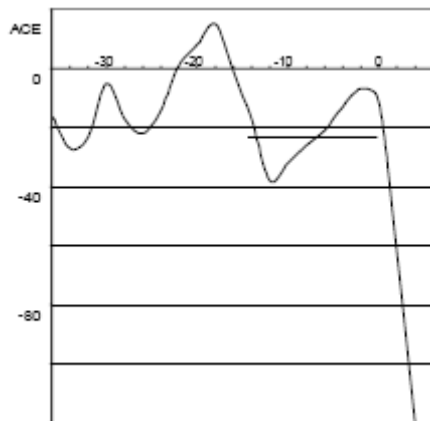
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disturbance (10 and 60 seconds prior and including at least 4 scans of ACE). In the illustration below, the horizontal line represents an averaging of ACE for 15 seconds prior to the start of the

Page 3: [15] Deleted olsond 2009-03-03 11:20:00 AM

disturbance with a result of $ACE_A = -25$ MW.



The average percent recovery is the arithmetic average of all the calculated R_i 's for

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Page 3: [17] Deleted olsond 2009-03-03 11:20:00 AM

disturbances during a given quarter. Average percent recovery is similarly calculated for excludable

Page 7: [18] Deleted olsond 2009-03-03 9:23:00 AM

group shall then it carry at least enough Contingency Reserve to cover the most severe single contingency. All Balancing Authorities and Reserve Sharing Groups shall review, no less frequently than annually,

Page 7: [19] Deleted olsond 2009-03-03 9:23:00 AM

its probable contingencies to determine

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its prospective most severe single contingencies.

R5. Each Reserve Sharing Group shall comply with the DCS. A Reserve Sharing Group shall be considered in a Reportable Disturbance condition whenever a group member has experienced a Reportable Disturbance and calls for the activation of Contingency Reserves from one or more other group members. (If a group member has experienced a Reportable Disturbance but does not call for reserve activation from other members of the Reserve Sharing Group, then that member shall report as a single Balancing Authority.) Compliance may be demonstrated by either of the following two methods: