

Stakeholder Comparison Comment Rationale Matrix

2011-09-27

AESO AUTHORITATIVE DOCUMENT PROCESS

Alberta Reliability Standard – BAL-002-AB-1 Draft 2.1 Disturbance Control Performance

<p>Date of Request for Comment [yyyy/mm/dd]: <u>2011-09-27</u></p> <p>Period of Consultation [yyyy/mm/dd]: <u>2011-09-27</u> through <u>2011-10-14</u></p> <p>Comments From: <u>ATCO Power</u></p> <p>Date [yyyy/mm/dd]: <u>2011/10/14</u></p>	<p>Contact: <u>Aliza Dewji</u></p> <p>Phone: <u>403-245-7727</u></p> <p>E-mail: <u>Aliza.dewji@atcopower.com</u></p>
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**COMPARISON BETWEEN NERC BAL-002-1 AND CURRENT ALBERTA BAL-002-AB-1
DISTURBANCE CONTROL PERFORMANCE**

NERC BAL-002-1	BAL-002-AB-0 Draft 2 (from previous consultation) ¹	Alberta BAL-002-AB-1 Draft 2.1 (Revised version for re-consultation)	Differences between Alberta BAL-002-AB-1 Draft 2.1 and NERC BAL-002-1	Stakeholder Comments (Insert comments here)	AESO Replies
<p>Purpose</p> <p>Note: The AESO decided to convert NERC-BAL-002-1 as of March 16, 2011. The only differences between BAL-002-0 and BAL-002-1 are in Requirements R4.2 and R6.2</p> <p>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</p>	<p>Purpose</p> <p>The purpose of this reliability standard is to ensure the ISO is able to utilize its contingency reserve to balance resources and demand and return interconnection frequency within defined limits following a reportable disturbance.</p>	<p>Purpose</p> <p>The purpose of this reliability standard is to ensure the ISO is able to utilize its contingency reserve to balance resources and demand and return interconnection frequency within defined limits following a disturbance resulting from a loss of supply.</p>	<p>Clarified the purpose to align with the content of the reliability standard.</p>		

¹ This column is informational only.

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load, the application of DCS is limited to the loss of supply and does not apply to the loss of load.					
Applicability 4.1. Balancing Authorities 4.2. Reserve Sharing Groups (Balancing Authorities may meet the requirements of Standard 002 through participation in a Reserve Sharing Group.) 4.3. Regional Reliability Organizations	Applicability This reliability standard applies to: 4.1. ISO	Applicability This reliability standard applies to the following: <ul style="list-style-type: none"> the ISO which may meet the requirements of BAL-002-AB-1 through participation in a reserve sharing group which the ISO has designated as its agent. 	<input type="checkbox"/> New <input checked="" type="checkbox"/> Amended <input type="checkbox"/> Deleted The terms used to describe applicable entities in this reliability standard have been amended from the NERC version in order to correctly identify the applicable entities in Alberta and to align with terms included in the AESO <i>Consolidated Authoritative Documents Glossary</i> .		
Effective Date The first day of the first calendar quarter, one year after applicable regulatory approval; or in those jurisdictions where no	Effective Date Ten calendar days after the date of approval by the Commission.	Effective Date Oct. 1, 2012	To allow a reasonable amount of time for Alberta entities to implement proposed BAL-002-AB-1 Draft 2.1.		

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regulatory approval is required, the first day of the first calendar quarter one year after Board of Trustees' adoption.					
<p>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.</p> <p>R1.1. A Balancing Authority may elect to fulfill its Contingency Reserve obligations by participating as a member of a Reserve Sharing Group. In such cases, the Reserve Sharing Group shall have the same responsibilities and obligations as each</p>	<p>R1 The ISO must have access to contingency reserve to respond to disturbances.</p> <p>R1.1 Contingency reserve must be supplied from generation, controllable load resources, or coordinated adjustments to interchange schedules.</p> <p>R1.2 For a reportable event, the criteria in Appendix A must be used to calculate the recovery of ACE:</p>	<p>R1. The ISO must have access to contingency reserves to respond to disturbances resulting from a loss of supply and requiring the activation of contingency reserves except within the first sixty (60) minutes following the disturbance or except following the deployment of contingency reserves during implementation of the ISO's capacity and energy emergency plan.</p> <p>R2. The ISO must have access to contingency reserves from any, or a combination of: generating units, controllable load</p>	<p><input type="checkbox"/> New <input checked="" type="checkbox"/> Amended <input type="checkbox"/> Deleted</p> <p>NERC requirement R1 contains two requirements and has been split into Alberta requirements R1 and R2. Alberta Requirement R1 sets out when contingency reserves are to be deployed. As well, requirement R1 references timelines set out in WECC BAL-STD-002-0, which are more stringent than the timeline required in NERC BAL-002-1 R6.2. Requirement R1 also clarifies that the AESO has access to, but does not</p>		

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Balancing Authority with respect to monitoring and meeting the requirements of Standard BAL- 002.		resources, or coordinated adjustments to interchange schedules . R3. The ISO must have access to at least enough contingency reserves to cover its most severe single contingency .	operate, contingency reserves. Requirement R2 sets out the sources of contingency reserves to which the ISO must have access. NERC sub-requirement R1.1 does not include an obligation and has been incorporated into Alberta measure MR1. NERC requirement R3.1 contains two requirements and is split into Alberta requirements R3 and R6. Alberta requirement R3 sets out how much contingency reserve is required. Alberta requirement R6 sets out the schedule for review of the most severe single contingency.	Comment on R3: The current definition for contingency as stated in the Consolidated Authoritative Document Glossary is: <i>the unexpected failure or outage of a system component, such as a generating unit, transmission line, circuit breaker, switch or electrical element.</i> ATCO Power is not clear if this definition includes interconnection, and would like to request clarification from the AESO on this matter.	

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<p>R2. Each Regional Reliability Organization, sub-Regional Reliability Organization or Reserve Sharing Group shall specify its Contingency Reserve policies, including:</p> <p>R2.1. The minimum reserve requirement for the group.</p> <p>R2.2. Its allocation among members.</p> <p>R2.3. The permissible mix of Operating Reserve – Spinning and Operating Reserve – Supplemental that may be included in Contingency Reserve.</p> <p>R2.4. The procedure for applying Contingency Reserve in practice.</p> <p>R2.5. The limitations, if any, upon the amount of interruptible load that may be included.</p> <p>R2.6. The same portion of resource capacity (e.g.</p>			<p><input type="checkbox"/> New <input type="checkbox"/> Amended <input checked="" type="checkbox"/> Deleted</p> <p>NERC requirement R2 and its sub-requirements are not adopted in proposed BAL-002-AB-1 Draft 2.1 as they only apply to entities outside Alberta.</p>		

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reserves from jointly owned generation) shall not be counted more than once as Contingency Reserve by multiple Balancing Authorities.					
<p>R3. Each Balancing Authority or Reserve Sharing Group shall activate sufficient Contingency Reserve to comply with the DCS.</p>	<p>R2. The ISO must activate sufficient contingency reserve to comply with the DCS.</p>	<p>R4. The ISO must activate sufficient contingency reserve to restore its area control error to the lesser of zero (0) or the pre-disturbance level within fifteen (15) minutes of any reportable disturbances subject to requirement R4.1.1 through R4.1.3.</p> <p>R4.1.1 The ISO must treat multiple contingencies occurring within one (1) minute or less of each other as a single contingency.</p> <p>R4.1.2 If the magnitude of the single contingency referred to in requirement</p>	<p><input type="checkbox"/> New <input checked="" type="checkbox"/> Amended <input type="checkbox"/> Deleted</p> <p>NERC BAL-002-0 Compliance Section D.1.5 contains requirements regarding reportable disturbances and contingency reserves which have been moved to Alberta requirement R4 and its sub-requirements. Alberta requirement R4.2 references timelines set out in WECC BAL-STD-002-0, which are more stringent than the timeline required in NERC BAL-002-1 R6.2.</p>		

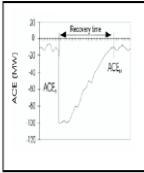
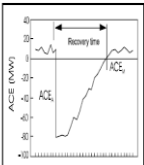
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		<p>R4.1.1 exceeds the ISO's most severe single contingency the ISO must still consider the single contingency as a reportable disturbance but the ISO is excluded from compliance evaluation under requirement R4.</p> <p>R4.1.3 If any subsequent contingency occur between one (1) minute and fifteen (15) minutes after the start of a reportable disturbance, any such subsequent contingency will be excluded from compliance evaluation under requirement R4 and the ISO must only determine compliance with requirement R4 for the initial reportable disturbance by performing a reasonable estimation of the response that would have occurred had any subsequent contingency not occurred.</p> <p>R4.2 Subject to requirement</p>			

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		<p>R4.3, the ISO must report subsequent reportable disturbances that occur fifteen (15) minutes after the initial contingency but before sixty (60) minutes after the initial contingency and include such reportable disturbances in the compliance evaluation.</p> <p>R4.3 If contingency reserves were rendered inadequate by responding to any prior contingency, the ISO must be able to show a good faith effort to activate available contingency reserves however the ISO is not required to successfully restore its area control error to the lesser of zero (0) or the pre-disturbance level within fifteen (15) minutes of any reportable disturbances.</p> <p>R4.4 The ISO must, no later than the tenth (10th) day following the end of each calendar quarter, report all</p>			

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		<p>reportable disturbances for that quarter by submitting one (1) completed copy of DCS Form, “NERC Control Performance Standard Survey – All Interconnections” to the NERC Resources Subcommittee Survey contact.</p>			
		<p>R5 The ISO must use the following formula to calculate the recovery of area control error for a reportable disturbance:</p> <p>For loss of generation:</p> <p>if $ACE_t < 0$ then $R_t = \frac{MW_{Gen} - \max(0, ACE_t - ACE_{t-1})}{MW_{Gen}} * 100\%$</p>  <p>if $ACE_t \geq 0$ then $R_t = \frac{MW_{Gen} - \max(0, -ACE_t)}{MW_{Gen}} * 100\%$</p>  <p>where:</p>	<p><input type="checkbox"/> New <input checked="" type="checkbox"/> Amended <input type="checkbox"/> Deleted</p> <p>NERC BAL-002-1 measure M1 contains the formula used to calculate area control error for reportable disturbance, which is a requirement and has been moved to Alberta requirement R5.</p>		

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		<p>(a) MW_{Loss} is the MW size of the disturbance, resulting from a loss of supply, 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 area control error since governor response and automatic generation control response may introduce error.</p> <p>(b) ACE_A is the pre-disturbance value of area control error measured as the average area control error over the period just prior to the start of the disturbance, resulting from a loss of supply, (10 and 60 seconds prior and including at least 4 scans of area control error).</p>			

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		(c) ACE_M is the maximum algebraic value of area control error measured within the fifteen (15) minutes following the disturbance resulting from a loss of supply.			
<p>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.</p>	<p>R3. The ISO must have access to at least enough contingency reserve to cover its most severe single contingency (MSSC).</p> <p>R4. The ISO must review, at least annually, its probable contingencies to determine its prospective MSSC.</p>	<p>R6. The ISO must determine its prospective most severe single contingency at least once every calendar year by reviewing any probable contingency on the interconnected electric system</p>	<p><input type="checkbox"/> New <input checked="" type="checkbox"/> Amended <input type="checkbox"/> Deleted</p> <p>NERC requirement R3.1 contains two requirements and is split into Alberta requirements R3 and R6. Alberta requirement R3 sets out how much contingency reserve is required. Alberta requirement R6 sets out the schedule for review of the most severe single contingency</p>	<p>Comment on R6: ATCO Power suggests that R6 be revised to include a provision to determine the most severe single largest contingency as soon as possible after any large system changes.</p>	
<p>R4. A Balancing Authority or Reserve Sharing Group shall meet the Disturbance Recovery Criterion within the</p>	<p>R5. The ISO must meet the Disturbance Recovery Criterion within the Disturbance Recovery Period for 100% of</p>		<p><input type="checkbox"/> New <input checked="" type="checkbox"/> Amended <input type="checkbox"/> Deleted</p>		

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<p>Disturbance Recovery Period for 100% of Reportable Disturbances. The Disturbance Recovery Criterion is:</p> <p>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.</p> <p>R4.2. The default Disturbance Recovery Period is 15 minutes after the start of a Reportable Disturbance.</p>	<p>reportable disturbances. The disturbance recovery criterion is:</p> <p>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.</p> <p>R5.2. The ISO must return its ACE to its predisturbance value if its ACE just prior to the reportable disturbance was negative.</p> <p>R6. The ISO must meet the Disturbance Recovery Criterion and return it's ACE within the disturbance recovery period for 100% of reportable disturbances.</p>		<p>NERC requirement R4 has been moved to Alberta requirement R4 in order to include all of the disturbance recovery criteria in one requirement.</p> <p>NERC requirements R4.1 and R4.2 have been incorporated into Alberta requirement R4.</p> <p>The default Disturbance Recovery Period of 15 minutes after the start of a Reportable Disturbance identified in NERC requirement R4.2 has been included in Alberta requirement R4 in order to include all of the disturbance recovery criteria in one requirement.</p>		
<p>R5. Each Reserve Sharing Group shall comply with the DCS. A Reserve Sharing Group shall be considered in a Reportable Disturbance</p>			<p><input type="checkbox"/> New <input type="checkbox"/> Amended <input checked="" type="checkbox"/> Deleted</p> <p>NERC requirement R5 and</p>		

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<p>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:</p> <p>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</p>			<p>its sub-requirements apply to the reserve sharing group and therefore are not applicable in Alberta.</p>		

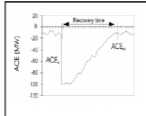
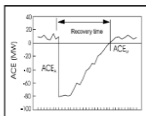
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<p>sharing have been fully implemented, and within the Disturbance Recovery Period. Or</p> <p>R5.2. The Reserve Sharing Group reviews each member's ACE in response to the activation of reserves. To be in compliance, a member's ACE (or its equivalent) 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.</p>					
<p>R6. A Balancing Authority or Reserve Sharing Group shall fully restore its Contingency Reserves within the Contingency Reserve Restoration Period for its Interconnection.</p> <p>R6.1. The Contingency Reserve Restoration Period</p>	<p>R7. The ISO must fully restore its contingency reserve within the contingency reserve restoration period for the western interconnection.</p>		<p><input type="checkbox"/> New <input type="checkbox"/> Amended <input checked="" type="checkbox"/> Deleted</p> <p>NERC requirement R6 and its sub-requirements have been removed as they are covered by Alberta requirement R1.</p>		

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<p>begins at the end of the Disturbance Recovery Period.</p> <p>R6.2. The default Contingency Reserve Restoration Period is 90 minutes.</p>					
	<p>MR1. Requirements R1.1 and R1.2 are met.</p> <p>MR1.1 Documentation exists and shows that contingency reserves are of types specified in R1.1</p> <p>MR1.2 The calculations are accurate and completed in accordance with R1.2 and Appendix A.</p>	<p>MR1. Evidence of having access to contingency reserves as required in requirement R1 exists. Evidence may include records of ancillary services contracts or a reserve sharing group agreement including a reserve sharing group agent appointment agreement.</p> <p>MR2 Evidence of supplying contingency reserves as required in requirement R2 exists. Evidence may include records of ancillary services contracts or a reserve</p>			

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		<p>sharing group agreement including a reserve sharing group agent appointment agreement.</p> <p>MR3. Evidence of having access to contingency reserves as required in requirement R3 exists. Evidence may include records of ancillary services contracts or a reserve sharing group agreement including a reserve sharing group agent appointment agreement.</p>			
<p>M1</p> <p>For loss of generation: if $ACE_t < 0$ then $R_t = \frac{MW_{Loss} - \max(0, ACE_t - ACE_{CL})}{MW_{Loss}} * 100\%$</p>  <p>if $ACE_t \geq 0$ then $R_t = \frac{MW_{Loss} - \max(0, -ACE_t)}{MW_{Loss}} * 100\%$</p>  <p>where:</p>					

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<p>For loss of generation:</p> <p>if $ACE_A < 0$ then $R_i = \frac{MW_{Loss} - \max(0, ACE_d - ACE_M)}{MW_{Loss}} * 100\%$</p> <p>if $ACE_A \geq 0$ then $R_i = \frac{MW_{Loss} - \max(0, -ACE_M)}{MW_{Loss}} * 100\%$</p> <p>where:</p> <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 The Balancing Authority or Reserve Sharing Group shall record the MWLOSS value 					

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<p>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.</p> <p>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 represents an averaging of ACE for 15 seconds prior to the start of the Disturbance with a result of ACEA = - 25 MW.</p>					

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<div data-bbox="115 516 486 881" data-label="Figure"> </div> <p data-bbox="107 901 483 1193">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>					
	<p>MR2. Documentation shows contingency reserve amounts meet requirements in R2.</p>	<p>MR4. Evidence of activating contingency reserves as required in requirement R4 exists. Evidence may include records of calculation showing the value of parameters used</p>			

**COMPARISON BETWEEN NERC BAL-002-1 AND CURRENT ALBERTA BAL-002-AB-1
DISTURBANCE CONTROL PERFORMANCE**

NERC BAL-002-1	BAL-002-AB-0 Draft 2 (from previous consultation) ¹	Alberta BAL-002-AB-1 Draft 2.1 (Revised version for re-consultation)	Differences between Alberta BAL-002-AB-1 Draft 2.1 and NERC BAL-002-1	Stakeholder Comments (Insert comments here)	AESO Replies
		<p>for calculating the percentage recovery (R_i), the calculation formula, a chart (area control area with respect to time) and the result of the calculation or a reserve sharing group agreement including a reserve sharing group agent appointment agreement.</p> <p>MR4.1 Evidence of treating multiple contingencies as required in requirement R4.1 exists. Evidence may include disturbance control performance reports and records of any directive for ancillary services or a reserve sharing group agreement including a reserve sharing group agent appointment agreement.</p> <p>MR4.2 Evidence of determining compliance in a multiple contingency situation as required in requirement R4.2 exists. Evidence may include records of any directive for ancillary</p>			

**COMPARISON BETWEEN NERC BAL-002-1 AND CURRENT ALBERTA BAL-002-AB-1
DISTURBANCE CONTROL PERFORMANCE**

NERC BAL-002-1	BAL-002-AB-0 Draft 2 (from previous consultation) ¹	Alberta BAL-002-AB-1 Draft 2.1 (Revised version for re-consultation)	Differences between Alberta BAL-002-AB-1 Draft 2.1 and NERC BAL-002-1	Stakeholder Comments (Insert comments here)	AESO Replies
		<p>services or a reserve sharing group agreement including a reserve sharing group agent appointment agreement.</p> <p>MR4.3 Evidence of reporting additional reportable disturbances as required in requirement R4.3 exists. Evidence may include disturbance control performance reports or a reserve sharing group agreement including a reserve sharing group agent appointment agreement.</p>			
		<p>MR5 Evidence of using the formula as required in requirement R5 exists. Evidence may include confirmation emails or a reserve sharing group agreement including a reserve sharing group agent appointment agreement.</p>			
	<p>MR3. Documentation shows contingency reserve amounts</p>	<p>MR6. Evidence of determining the prospective most severe</p>			

**COMPARISON BETWEEN NERC BAL-002-1 AND CURRENT ALBERTA BAL-002-AB-1
DISTURBANCE CONTROL PERFORMANCE**

NERC BAL-002-1	BAL-002-AB-0 Draft 2 (from previous consultation) ¹	Alberta BAL-002-AB-1 Draft 2.1 (Revised version for re-consultation)	Differences between Alberta BAL-002-AB-1 Draft 2.1 and NERC BAL-002-1	Stakeholder Comments (Insert comments here)	AESO Replies
	<p>meet requirements in R2.</p> <p>MR4. Documentation exists confirming the review was completed in the timeframe specified in R3.</p>	<p>single contingency as required in requirement R6 exists. Evidence may include email or ISO log sheet or a reserve sharing group agreement including a reserve sharing group agent appointment agreement.</p>			
	<p>MR5. Requirements R5.1 and R5.2 are met for all reportable disturbances.</p> <p>MR5.1. Documentation exists confirming that ACE levels meet requirements specified in R5.1.</p> <p>MR5.2. Documentation exists confirming that ACE levels meet requirements specified in R5.2.</p> <p>MR6. Documentation exists confirming that ACE levels meet requirements specified in R6.</p>				
	<p>MR7. Documentation exists and confirms that the</p>				

**COMPARISON BETWEEN NERC BAL-002-1 AND CURRENT ALBERTA BAL-002-AB-1
DISTURBANCE CONTROL PERFORMANCE**

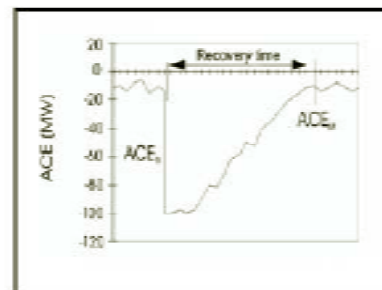
NERC BAL-002-1	BAL-002-AB-0 Draft 2 (from previous consultation) ¹	Alberta BAL-002-AB-1 Draft 2.1 (Revised version for re-consultation)	Differences between Alberta BAL-002-AB-1 Draft 2.1 and NERC BAL-002-1	Stakeholder Comments (Insert comments here)	AESO Replies
	restoration timing specified in R7 is met.				
Compliance To view the compliance section D of the NERC reliability standard follow this link: http://www.nerc.com/files/BAL-002-1.pdf			The Alberta reliability standards do not contain a compliance section. Compliance with all Alberta reliability standards is completed in accordance with the Alberta Reliability Standards Compliance Monitoring Program, available on the AESO website at: http://www.aeso.ca/loadsettlement/17189.html		
Regional Differences None identified.	Regional Differences None identified.	Regional Differences None identified.			

Appendix A: DCS Calculation from BAL-002-AB-1 from previous consulation

For loss of generation:

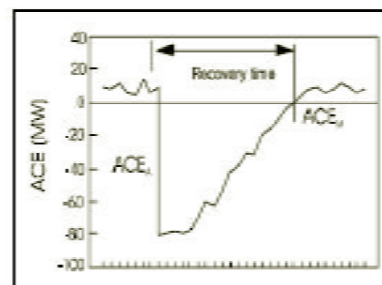
if $ACE_A < 0$
then

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



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*