

**Comparison between PRC-004-WECC-1 and Alberta PRC-004-WECC-AB-1
Protection System and Remedial Action Scheme Misoperation**

Section	WECC PRC-004-WECC-1	Alberta PRC-004-WECC-AB-1	Reason for Difference ¹
Purpose	Regional Reliability Standard to ensure all transmission and generation Protection System and Remedial Action Scheme (RAS) Misoperations on Transmission Paths and RAS defined in section 4 are analyzed and/or mitigated.	<p>The purpose of this reliability standard is Regional Reliability Standard to ensure all misoperations of transmission and generation Protection-protection System-systems and RASs on transmission paths and Remedial-remedial Action-action Scheme-scheme (RAS misoperations on Transmission-transmission Paths-paths, and RAS-as defined in the following documents <u>Section 4</u> are analyzed and or mitigated.</p>	Align the purpose with the contents of the reliability standard.
Applicability	<p>4.1. Transmission Owners of selected WECC major transmission path facilities and RAS listed in tables titled “Major WECC Transfer Paths in the Bulk Electric System” provided at (http://www.wecc.biz/documents/library ...) and “Major WECC Remedial Action Schemes (RAS)” provided at (http://www.wecc.biz/documents/library ...) 4.2. Generator Owners that own RAS listed in the Table titled “Major WECC Remedial Action Schemes (RAS)” provided at (http://www.wecc.biz/documents/library ...)</p>	<p><u>This reliability standard applies to:</u></p> <ul style="list-style-type: none"> • Transmission Owners TFOs of selected WECC major transmission path facilities and RAS listed in the tables titled “Major WECC Transfer Paths in the Bulk Electric System” provided at (http://www.wecc.biz/documents/library) and “Major WECC Remedial Action Schemes (RAS)” provided at (http://www.wecc.biz/documents/library) • Generator Owners GFOs that own components of RASs listed in the Ttable titled “Major WECC Remedial Action Schemes (RAS)” provided at (http://www.wecc.biz/documents/library) • GOPs Operators of generating units that operate 	

¹ The following revisions have been made throughout this proposed reliability standard:

- Identified the responsible entities in Alberta.
- Applied a consistent writing style and added clarity.
- Changed passive terms such as “shall” to “must”.
- Developed measures specific to the requirements.

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	<p>...) 4.3. Transmission Operators that operate major transmission path facilities and RAS listed in Tables titled “Major WECC Transfer Paths in the Bulk Electric System” provided at (http://www.wecc.biz/documents/library ...) and “Major WECC Remedial Action Schemes (RAS)” provided at (http://www.wecc.biz/documents/library ...)</p>	<p>RASs listed in the Ttable titled “Major WECC Remedial Action Schemes (RAS)” provided at (http://www.wecc.biz/documents/library)</p> <ul style="list-style-type: none"> <u>ISO</u> <p>4.3. Transmission Operators TFOs that operate major transmission path facilities and RAS listed in Tables titled “Major WECC Transfer Paths in the Bulk Electric System” provided at (http://www.wecc.biz/documents/library ...) and “Major WECC Remedial Action Schemes (RAS)” provided at (http://www.wecc.biz/documents/library ...)</p>	
Effective Date	<p>On the first day of the second quarter following applicable regulatory approval.</p>	<p>On the first day of the second quarter following applicable regulatory approval. 10 <u>Thirty calendar days after the date of approval by the Commission.</u></p>	<p>Changed effective date from 10 days to 30 days after the date of approval by the Commission.</p>
Definitions		<p>Italicized terms used in this reliability standard have the same meanings as set out in the Alberta Reliability Standards Glossary of Terms and Part 1 of the ISO Rules.²</p>	<p>Added definitions section to the Alberta reliability standard.</p>
Requirement	<p>R.1. System Operators and System Protection personnel of the Transmission Owners and Generator Owners shall analyze all Protection System and RAS operations. [<i>Violation Risk Factor: Lower</i>] [<i>Time Horizon:</i></p>	<p>R.1 <u>Each TFO, GFO and GOP operator of a generating unit must ensure that its Ssystem Operators operators and System system Protection protection</u> personnel of the each Transmission Owners and Generator Owners shall analyze all <u>Protection protection System system</u> and RAS operations <u>as follows:</u></p>	

² Defined terms are not italicized in this document, but will appear in the Alberta Reliability Standards document.
Filed with Commission: 2009-12-08

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	<i>Operations Assessment]</i>		
Measure	M1. Transmission Owners and Generation Owners shall have evidence that they reported and analyzed all Protection System and RAS operations.	<u>MR1 Measures for this requirement are identified in the subsections below.</u>	No measure required, refer to measures in the sub-requirements.
Requirement	R1.1. System Operators shall review all tripping of transmission elements and RAS operations to identify apparent Misoperations within 24 hours.	R1.1 <u>Each TFO and GPOperator of a generating unit system operators System Operators operators shall must</u> review all tripping of transmission elements and RAS operations to identify apparent Misoperations misoperations within 24 hours. <u>of such identification.</u>	
Measure	M1.1 Transmission Owners and Generation Owners shall have evidence that System Operating personnel reviewed all operations of Protection System and RAS within 24 hours.	<u>MR1.1 Documentation exists that confirms an operatora review was completed and in the timelines as specified in per requirement R1.1</u>	
Requirement	R1.2. System Protection personnel shall analyze all operations of Protection Systems and RAS within 20 business days for correctness to characterize whether a Misoperation has occurred that may not have been identified by System Operators.	R1.2 <u>TFO and GFO System Protection-protection</u> personnel <u>must shall</u> analyze all operations of <u>Protection-protection Systems-systems</u> and RAS within 20 business days <u>of the operation of either such system or RASfor correctness to determine</u> <u>characterize</u> whether a Misoperation-misoperation has occurred. <u>that may not have has not been identified by System Operators.</u>	



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Measure	M1.2 Transmission Owners and Generation Owners shall have evidence that System Protection personnel analyzed all operations of Protection System and RAS for correctness within 20 business days.	<u>MR1.2 Documentation exists that confirms an analysis review was completed and in the timelines as specified in per requirement R1.2.</u>	

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Section	WECC PRC-004-WECC-1	Alberta PRC-004-WECC-AB-1	Reason for Difference ¹
Requirement	<p>R.2. Transmission Owners and Generator Owners shall perform the following actions for each Misoperation of the Protection System or RAS. It is not intended that Requirements R2.1 through R2.4 apply to Protection System and/or RAS actions that appear to be entirely reasonable and correct at the time of occurrence and associated system performance is fully compliant with NERC Reliability Standards. If the Transmission Owner or Generator Owner later finds the Protection System or RAS operation to be incorrect through System Protection personnel analysis, the requirements of R2.1 through R2.4 become applicable at the time the Transmission Owner or Generator Owner identifies the Misoperation:.</p>	<p>R.2 Transmission OwnersTFOs and Generator OwnersGFOs shall <u>must each</u> perform the <u>following actions listed in requirements requirements R2.1 to R2.4 inclusive</u> for each <u>Misoperation misoperation</u> of the <u>Protection protection System system</u> or RAS, <u>subject to the following:-</u></p> <p>It is not intended that Requirements Requirements R2.1 through to R2.4 inclusive do not apply to <u>Protection protection System system</u> and/or RAS <u>actions operations</u> that appear to <u>have operated correctly be entirely reasonable and correct</u> at the time of occurrence, and associated system performance is fully compliant with NERC Reliability reliability Standards standards. If the <u>Transmission Owner TFO</u> or <u>Generator Owner GFO</u> later finds <u>through system protection personnel analysis that</u> the <u>Protection protection System system</u> or RAS <u>misoperated operation to be incorrect through System system Protection protection personnel analysis</u>, the requirements of R2.1 through to <u>R2.4 inclusive</u> become applicable at the time the <u>Transmission Owner TFO</u> or <u>Generator GFO Owner</u> identifies the <u>Misoperation misoperation.</u></p> <p><u>Table 1 is provided as a simplified summary of the requirements in R2.1 to R2.4 inclusive.</u></p>	<p>Added Table 1 at the end of this document to provide a simplified summary of the requirements in R2 and its subsections.</p>
Measure	<p>M2. Transmission Owners and Generation Owners shall have evidence for the following.</p>	<p>MR2 <u>Measures for this requirement are identified in the subsections below.</u></p>	<p>No measure required, refer to measures in the sub-requirements.</p>

**Comparison between PRC-004-WECC-1 and Alberta PRC-004-WECC-AB-1
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Section	WECC PRC-004-WECC-1	Alberta PRC-004-WECC-AB-1	Reason for Difference ¹
Requirement	<p>R2.1. If the Protection System or RAS has a Security-Based Misoperation and two or more Functionally Equivalent Protection Systems (FEPS) or Functionally Equivalent RAS (FERAS) remain in service to ensure Bulk Electric System (BES) reliability, the Transmission Owners or Generator Owners shall remove from service the Protection System or RAS that misoperated within 22 hours following identification of the Misoperation. Repair or replacement of the failed Protection System or RAS is at the Transmission Owners' and Generator Owners' discretion. <i>[Violation Risk Factor: High] [Time Horizon: Same-day Operations]</i></p>	<p>R2.1 If the Protection-protection System-system or RAS has a Securitysecurity-Based-based Misoperation-misoperation and two or more Functionally functionally Equivalent equivalent Protection-protection Systems-systems (FEPS) or Functionally functionally Equivalent equivalent RAS (or FERAS) remain in service to ensure Bulk-BES reliability, each-the Transmission OwnersTFOs or Generator OwnersGFOs shall must remove from service the Protection-protection System-system or RAS that misoperated, -This must be done within 22 hours following the identification of the Misoperation misoperation.</p> <p>Repair or replacement of the failed Protection protection System-system or RAS is at the discretion of the Transmission OwnersTFO or Generator OwnersGFO. <i>[Violation Risk Factor: High] [Time Horizon: Same-day Operations]</i></p>	
Measure	<p>M2.1 Transmission Owners and Generation Owners shall have evidence that they removed the Protection System or RAS that misoperated from service within 22 hours following identification of the Protection System or RAS</p>	<p>MR2.1 <u>Evidence exists and shows that required actions were taken in the timelines as specified in requirement R2.1.</u></p>	

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Protection System and Remedial Action Scheme Misoperation**

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	Misoperation.		
Requirement	<p>R2.2. If the Protection System or RAS has a Security-Based Misoperation and only one FEPS or FERAS remains in service to ensure BES reliability, the Transmission Owner or Generator Owner shall perform the following. <i>[Violation Risk Factor: High] [Time Horizon: Same-day Operations]</i></p>	<p>R2.2 If the Protection-protection System-system or RAS has a Securitysecurity-Based-based Misoperation-misoperation and only one FEPS or FERAS remains in service to ensure BES reliability, the Transmission Owner or Generator Owner <u>TFO or GFO responsible for the protection system or RAS, as the case may be, must</u> shall perform the following: <i>[Violation Risk Factor: High] [Time Horizon: Same-day Operations]</i></p>	
Measure	<p>M2.2 Transmission Owners and Generation Owners shall have evidence that they removed from service and repaired the Protection System or RAS that misoperated per measurements M2.2.1 through M2.2.2.</p>	<p>MR2.2 <u>Measures for this requirement are identified in the subsections below.</u></p>	
Requirement	<p>R2.2.1. Following identification of the Protection System or RAS Misoperation, Transmission Owners and Generator Owners shall remove from service within 22 hours for repair or modification the Protection System or RAS that misoperated.</p>	<p>R2.2.1 Following the identification of the Protection-protection System-system or RAS Misoperation-misoperation, Transmission Owners and Generator Owners shall the TFOs and GFOs must remove-Remove from service, within 22 hours for repair or modification, the Protection-protection System-system or RAS that misoperated.</p>	
Measure	<p>M2.2.1 Transmission Owners and Generation Owners shall have evidence that they removed the Protection System or RAS that misoperated from service within 22 hours following identification of the</p>	<p>MR2.2.1 <u>Evidence exists and shows that required actions were taken in the timelines as specified in requirement R2.2.1.</u></p>	

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Protection System and Remedial Action Scheme Misoperation**

Section	WECC PRC-004-WECC-1	Alberta PRC-004-WECC-AB-1	Reason for Difference ¹
	Protection System or RAS Misoperation.		
Requirement	R2.2.2. The Transmission Owner or Generator Owner shall repair or replace any Protection System or RAS that misoperated with a FEPS or FERAS within 20 business days of the date of removal. The Transmission Owner or Generator Owner shall remove the Element from service or disable the RAS if repair or replacement is not completed within 20 business days	R2.2.2 The Transmission Owner TFO or Generator Owner shall GFO must repair Repair or replace any Protection-protection System-system or RAS that misoperated with a FEPS or FERAS within 20 business days of the date of removal. R 2.2.3 The Transmission Owner TFO or Generator Owner GFO shall musut Remove the Element-element from service or disable the RAS if repair or replacement is not completed within 20 business days.	
Measure	M2.2.2 Transmission Owners and Generation Owners shall have evidence that they repaired or replaced the Protection System or RAS that misoperated within 20 business days or either removed the Element from service or disabled the RAS.	MR2.2.2 <u>Evidence exists and shows that required actions were taken in the timelines as specified in requirement R2.2.2.</u> MR2.2.3 <u>Evidence exists and shows that required actions were taken in the timelines as specified in requirement R2.2.3.</u>	
Requirement	R2.3. If the Protection System or RAS has a Security-Based or Dependability-Based Misoperation and a FEPS and FERAS is not in service to ensure BES reliability, Transmission Owners or Generator Owners shall repair and place back in service within 22 hours the Protection System or RAS that misoperated. If this cannot be done,	R2.3 If the Protection-protection System-system or RAS has a Securitysecurity-Based-based or Dependabilitydependability-Based-based Misoperation misoperation and a FEPS and or FERAS is not in service to ensure BES reliability, the TFO or GFO responsible for the protection system or RAS, as the case may be, each Transmission Owners or Generator Owners shall TFOs or GFOs must repair and place back in service within 22 hours the Protection	

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Protection System and Remedial Action Scheme Misoperation**

Section	WECC PRC-004-WECC-1	Alberta PRC-004-WECC-AB-1	Reason for Difference ¹
	then Transmission Owners and Generator Owners shall perform the following. <i>[Violation Risk Factor: High] [Time Horizon: Same-day Operations]</i>	protection System or RAS that misoperated. If this cannot be done, the responsible each then Transmission Owners TFOs or and Generator Owners GFOs must shall perform the following: <i>[Violation Risk Factor: High] [Time Horizon: Same-day Operations]</i>	
Measure	M2.3 The Transmission Owners and Generation Owners shall have evidence that they repaired the Protection System or RAS that misoperated within 22 hours following identification of the Protection System or RAS Misoperation.	MR2.3 Evidence exists and shows that required actions were taken in the timelines as specified in requirement R2.3.	
Requirement	R2.3.1. When a FEPS is not available, the Transmission Owners shall remove the associated Element from service.	R2.3.1 When a FEPS is not available, the Transmission Owners shall TFO must remove the associated Element from service.	
Measure	M2.3.1 The Transmission Owner shall have evidence that it removed the associated Element from service.	MR2.3.1 Evidence exists and shows that required actions were taken in the timelines as specified in requirement R2.3.1.	
Requirement	R2.3.2. When FERAS is not available, then	R2.3.2 When FERAS is not available, meet then one of the following requirements: must be met:	No measure required, refer to measures in the sub-requirements.

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Measure	M2.3.2 The Generator Owners and Transmission Operators shall have documentation describing all actions taken that adjusted generation or SOLs and operated facilities within established limits.	<u>MR2.3.2 Measures for this requirement are identified in the subsections below.</u>	
Requirement	R2.3.2.1. The Generator Owners shall adjust generation to a reliable operating level, or	<u>R2.3.2.1 If the responsible entity is a The Generator Owners GFOs shall it must advise the ISO and adjust generation to a reliable operating level as directed by the ISO., or</u>	
Measure		<u>MR2.3.2.1 Evidence exists and shows that required actions were taken in the timelines as specified in requirement R2.3.2.1.</u>	
Requirement	R2.3.2.2. Transmission Operators shall adjust the SOL and operate the facilities within established limits.	<u>R2.3.2.2 Transmission Operators If the responsible entity is a The TFOs shall it must advise the ISO and operate the facilities within established the limits adjusted SOL as determined and directed by the ISO.</u>	
Measure		<u>MR2.3.2.2 Evidence exists and shows that required actions were taken in the timelines as specified in requirement R2.3.2.2.</u>	
Requirement	R2.4. If the Protection System or RAS has a Dependability-Based Misoperation but has one or more FEPS or FERAS that operated correctly, the associated Element or transmission path may remain in service without removing from service the Protection System or RAS that	<u>R2.4 If the Protection-protection System-system or RAS has a Dependability dependability-Based-based Misoperation-misoperation but has one or more FEPS or FERAS that operated correctly, the associated Element-element or transmission path may remain in service without removing from service the Protection-protection System-system or RAS that failed, provided one of the following is performed:</u>	

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Protection System and Remedial Action Scheme Misoperation**

Section	WECC PRC-004-WECC-1	Alberta PRC-004-WECC-AB-1	Reason for Difference ¹
	failed, provided one of the following is performed.		
Measure	M2.4 Transmission Owners and Generation Owners shall have evidence that they repaired or replaced the Protection System or RAS that misoperated including documentation that describes the actions taken.	<u>MR2.4 Measures for this requirement are identified in the subsections below.</u>	No measure required, refer to measures in the sub-requirements.
Requirement	R2.4.1. Transmission Owners or Generator Owners shall repair or replace any Protection System or RAS that misoperated with FEPS and FERAS within 20 business days of the date of the Misoperation identification, or	R2.4.1 Each Transmission OwnersTFOs or Generator OwnersGFOs shall must repair or replace any Protection-protection System-system or RAS that misoperated with FEPS and FERAS within 20 business days of the date of the Misoperation misoperation identification, or	
Measure	M2.4.1 Transmission Owners and Generation Owners shall have evidence that they repaired or replaced the Protection System or RAS that misoperated within 20 business days of the misoperation identification.	<u>MR2.4.1 Evidence exists and shows that required actions were taken in the timelines as specified in requirement R2.4.1.</u>	
Requirement	R2.4.2. Transmission Owners or Generator Owners shall remove from service the associated Element or RAS. <i>[Violation Risk Factor: Lower] [Time Horizon: Operations Assessment]</i>	R2.4.2 Each Transmission OwnersTFOs or Generator OwnersGFOs shall must remove from service the associated Element element or RAS. [Violation Risk Factor: Lower] [Time Horizon: Operations Assessment]	

**Comparison between PRC-004-WECC-1 and Alberta PRC-004-WECC-AB-1
Protection System and Remedial Action Scheme Misoperation**

Section	WECC PRC-004-WECC-1	Alberta PRC-004-WECC-AB-1	Reason for Difference ¹
Measure	M2.4.2 Transmission Owners and Generation Owners shall have evidence that they removed the associated Element or RAS from service.	<u>MR2.4.2 Evidence exists and shows that required actions were taken in the timelines as specified in requirement R2.4.2.</u>	
Requirement	R.3. Transmission Owners and Generation Owners shall submit Misoperation incident reports to WECC within 10 business days for the following. <i>[Violation Risk Factor: Lower] [Time Horizon: Operations Assessment]</i>	R.3. Transmission Owners and Generation Owners shall TFOs and GFOs must submit a Misoperation misoperation incident reports to WECC the ISOAESO within six610 business days of identifying the misoperation for the following: <i>[Violation Risk Factor: Lower] [Time Horizon: Operations Assessment]</i>	
Measure	M3. Transmission Owners and Generation Owners shall have evidence that they reported the following within 10 business days.	M3 Each Transmission EOwners and GFOeneration Owners shall must have evidence that it they reported the following within six610 business days. <u>MR3. Misoperation incident reports containing content as specified in requirements R3.1 and R3.2.</u> <u>Misoperation incident report is submitted within timelines as specified in requirement R3.</u>	
Requirement	R3.1. Identification of a Misoperation of a Protection System and/or RAS,	R3.1 Identification of a Misoperation-misoperation of a Protection-protection System-system and/or RAS,	
Measure	M3.1 Identification of all Protection System and RAS Misoperations and corrective actions taken or planned.	M3.1 Identification of all Pprotection Ssystem and RAS Mmisoperations and corrective actions taken or planned. <u>MR3.1 Misoperation incident report contains content as specified in requirement R3.1.</u>	Moved part of measure MR3 into MR3.1.
Requirement	R3.2. Completion of repairs or the	R3.2 Completion of repairs or the replacement of <u>the</u>	

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Protection System and Remedial Action Scheme Misoperation**

Section	WECC PRC-004-WECC-1	Alberta PRC-004-WECC-AB-1	Reason for Difference ¹
	replacement of Protection System and/or RAS that misoperated.	Protection-protection System-system and/or RAS that misoperated.	
Measure	M3.2 Completion of repair or replacement of Protection System and/or RAS that misoperated.	M3.2 Completion of repair or replacement of Pprotection System and/or RAS that misoperated. MR3.2 Misoperation incident report contains content as specified in requirements R3.2.	Moved part of measure MR3 into MR3.2.
Requirement		R4 The ISOAESO must submit misoperation incident reports to WECC within 10 business days <u>of identifying the misoperation.</u>	
Measure		MR4 Confirmation exists that incident reports as <u>specified in requirement R4 were received within the timelines specified, or evidence that requests for confirmation were made for the incident reports provided as specified in requirement R4.</u>	
Procedures	None identified	None identified	
Compliance	To view the compliance section D of the NERC reliability standard follow this link: http://www.nerc.com/files/PRC-004-WECC-1.pdf		There is no compliance section currently proposed in the Alberta Reliability Standards. A compliance program will be developed at a later date for Alberta Reliability Standards that recognizes the compliance monitoring and enforcement structure in Alberta. This approach is deemed consistent with the existing ISO Rules.



**Comparison between PRC-004-WECC-1 and Alberta PRC-004-WECC-AB-1
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Regional Differences	None identified	None identified	Not applicable in Alberta

Table 1

<u>PRC - 004 - WECC - 1 Requirement R2 - Table of Required Actions for Protection System or RAS Misoperation</u>					
<u>Protective System/RAS Situation</u>			<u>Required Mitigating Actions</u>		
<u>Protection Basis:</u>	<u>Number of FEPS or RAS in place after misoperation</u>	<u>Misoperating protection system is :</u>	<u>Protection System/RAS Removal Requirement (Column x)</u>	<u>Protection System/RAS Repair or Replacement Requirement (Column y)</u>	<u>Element Removal Requirement (Column z)</u>
<u>Security</u>	<u>2 or more</u>	<u>PS</u>	<u>Remove within 22h.</u>	<u>At owners discretion.</u>	
	<u>1</u>	<u>PS</u>	<u>Remove within 22h.</u>	<u>Repair within 20 days.</u>	<u>Remove element from service.</u>
	<u>0</u>	<u>PS</u>	<u>None.</u>	<u>Repair within 22 hours.</u>	<u>If not repaired in 22 hours then remove element from service.</u>
	<u>2 or more</u>	<u>RAS</u>	<u>Remove within 22h.</u>	<u>At owners discretion.</u>	
	<u>1</u>	<u>RAS</u>	<u>Remove within 22h.</u>	<u>Repair within 20 days.</u>	<u>If not repaired in 20 days then disable RAS or remove element from service.</u>
	<u>0</u>	<u>RAS</u>	<u>None.</u>	<u>Repair within 22 hours.</u>	<u>Either the TFO or GFO must advise the ISO and adjust generating operating levels to a reliable operating level as directed by the ISO or the ISO will adjust the SOL and the TFOs will operate the facilities within established limits.</u>
<u>Dependability</u>	<u>1 or more that operated correctly</u>	<u>PS</u>	<u>Can leave in service.</u>	<u>Repair in 20 days or remove element from service.</u>	
	<u>0</u>	<u>PS</u>	<u>None.</u>	<u>Repair within 22 hours.</u>	<u>If not repaired in 22 hours then remove element from service.</u>
	<u>1 or more that operated correctly</u>	<u>RAS</u>	<u>Can leave in service.</u>	<u>Repair in 20 days or remove RAS or element from service.</u>	
	<u>0</u>	<u>RAS</u>	<u>None.</u>	<u>Repair within 22 hours.</u>	<u>Either the TFO or GFO must advise the ISO and adjust generating operating levels to a reliable operating level as directed by the ISO or the ISO will adjust the SOL and the TFOs will operate the facilities within established limits.</u>

Proposed Terms for the ARS Glossary:

“dependability-based misoperation” means the absence of a protection system or RAS operation when intended. Dependability is a component of reliability and is the measure of a device’s certainty to operate when required.

“functionally equivalent protection system or “FEPS” means a protection system that provides performance as follows:

- Each protection system can detect the same faults within the zone of protection and provide the clearing times and coordination needed to comply with all reliability standards.
- Each protection system may have different components and operating characteristics.

“functionally equivalent RAS” or “FERAS” means a RAS that provides the same performance as follows:

- Each RAS can detect the same conditions and provide mitigation to comply with all reliability standards.
- Each RAS may have different components and operating characteristics.

“security-based misoperation” means a misoperation caused by the incorrect operation of a protection system or RAS. Security is a component of reliability and is the measure of a device’s certainty not to operate falsely.

Defined Terms Used in this Standard:

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

- bulk electric system (BES)*
- day
- element*
- facility
- generation facility owner (GFO)
- Independent System Operator (ISO)
- misoperation*
- protection system*
- reliability standard
- remedial action scheme (RAS)
- system*
- system operating limit (SOL)▼
- transmission facility owner (TFO)
- Western Electricity Coordinating Council (WECC)

* Term appears in the Alberta Reliability Standards Glossary of Terms – April 2009 rules cycle

♦ Term appears in the Alberta Reliability Standards Glossary of Terms – July 2009 rules cycle

▼ “system operating limit” is being amended to include its acronym “SOL”. There is no further change to the definition.