Stakeholder Comparison Comment Rationale Matrix

2011-09-28

AESO AUTHORITATIVE DOCUMENT PROCESS

Alberta Reliability Standard – Alberta PRC-023-AB-1 Draft 2.1-Transmission Relay Loadability

Date of Request for Comment [yyyy/mm/dd]: 2011-09-28	Contact: Mark Apuzzo
Period of Consultation [yyyy/mm/dd]: 2011-09-28 through 2011-10-21	Phone:
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Date [yyyy/mm/dd]: 2011-10-19	

COMPARISON BETWEEN NERC PRC-023-1 AND CURRENT ALBERTA PRC-023-AB-1 TRANSMISSION RELAY LOADABILITY					
NERC PRC-023-1	**Alberta PRC-023-AB-1 Draft 2 (From previous consultation)[1]**	**Alberta PRC-023-AB-1 Draft 2.1 (Revised version for re-consultation)**	**Differences between Alberta PRC-023-AB-1 Draft 2.1 and NERC PRC-023-1**	**New Stakeholder Comments (Insert comments here)**	**AESO Replies**
Purpose Protective relay settings shall not limit transmission loadability; not interfere with system operators' ability to take remedial action to protect system reliability and; be set to reliably detect all fault conditions and protect the electrical network from these faults.	**Purpose** The purpose of this reliability standard is to ensure the protective relay settings do not limit transmission loadability, do not interfere with system operators ability to take remedial action to protect system reliability and, are set to reliably detect all fault conditions and protect the electrical network from these faults.	**Purpose** The purpose of this **reliability standard** is to ensure the protective relay settings do not limit transmission loadability, do not interfere with an **operator**'s ability to take remedial action to protect the **reliability** of the system**,** and are set to reliably detect all fault conditions and protect the electrical network from these faults.	Clarified the purpose to align with the content of proposed PRC-023-AB-1 Draft 2.1.	Clarification: Will this standard supersede the NERC 8a standard for loadability, or will both s-Atandards be effective simultaneously?	
Applicability **4.1.** Transmission Owners with load-responsive phase protection systems as described in Attachment A, applied to facilities defined below: **4.1.1** Transmission lines operated at 200 kV and above. **4.1.2** Transmission lines operated at 100 kV to 200 kV as designated by the Planning Coordinator as critical to the reliability of the Bulk Electric System. **4.1.3** Transformers with low voltage terminals connected at 200 kV and above.	**Applicability** This reliability standard applies to: • TFOs with load-responsive phase protection systems, as described in Attachment A, and with any of the facilities defined below: ○ transmission lines operated at 200 kV and above. ○ transmission lines operated at 100 kV to 200 kV as identified by the ISO as critical to the reliability of the BES as required in requirement R3.	**Applicability** This **reliability standard** applies to: (a) the **legal owner** of a **transmission facility**, (b) **legal owner** of a **generating unit** (c) **legal owner** of an **aggregated generating facility** with **load**-responsive phase **protection systems**, as described in Appendix 1 applied to any one of the facilities defined below: (i) transmission lines operated at 200 kV	The terms used to describe applicable entities in proposed PRC-023-AB-1 Draft 2.1 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's *Consolidated Authoritative Documents Glossa*ry. ☐ New ☒ Amended ☐ Deleted The Applicability section in proposed PRC-023-AB-1 Draft 2.1 has been amended to		

[1] This column is for information only.

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4.1.4 Transformers with low voltage terminals connected at 100 kV to 200 kV as designated by the Planning Coordinator as critical to the reliability of the Bulk Electric System. **4.2.** Generator Owners with load-responsive phase protection systems as described in Attachment A, applied to facilities defined in 4.1.1 through 4.1.4. **4.3.** Distribution Providers with load-responsive phase protection systems as described in Attachment A, applied according to facilities defined in 4.1.1 through 4.1.4., provided that those facilities have bi-directional flow capabilities. **4.4.** Planning Coordinators.	○ transformers with low voltage terminals connected at 200 kV and above. ○ transformers with low voltage terminals connected at 100 kV to 200 kV as designated by the ISO as critical to the reliability of the BES. • ISO	and above; (ii) transmission lines operated at 100 kV to 200 kV as identified by the **ISO** as critical to the **reliability** of the **bulk electric system** as required in requirement R3; (iii) transformers with low voltage terminals connected at 200 kV and above; or (iv) transformers with low voltage terminals connected at 100 kV to 200 kV as designated by the **ISO** as critical to the **reliability** of the **bulk electric system** as required in requirement R3; and (d) the **ISO**.	identify the responsible entities in Alberta. The legal owner of an electric distribution system was not included as all facilities in Alberta that apply to proposed PRC-023-AB-1 Draft 2.1 are managed by a legal owner of a transmission facility**,** the legal owner of a generating unit, or legal owner of an aggregated generating facility.		
Effective Date **5.1.** Requirement 1, Requirement 2: **5.1.1** For circuits described in 4.1.1 and 4.1.3 above (except for switch-on-to-fault schemes)	**Effective Date** For requirements R1 and R2 for transmission lines operated at 200kV and above and transformers with low voltage terminals connected at 200kV and	**Effective Date** For requirements R1 and R2 for transmission lines operated at 200kV and above and transformers with low voltage terminals connected at 200kV	☐ New ☒ Amended ☐ Deleted The proposed effective date has been amended to October		

COMPARISON BETWEEN NERC PRC-023-1 AND CURRENT ALBERTA PRC-023-AB-1 TRANSMISSION RELAY LOADABILITY					
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—the beginning of the first calendar quarter following applicable regulatory approvals. **5.1.2** For circuits described in 4.1.2 and 4.1.4 above (including switch-on-to-fault schemes) — at the beginning of the first calendar quarter 39 months following applicable regulatory approvals. **5.1.3** Each Transmission Owner, Generator Owner, and Distribution Provider shall have 24 months after being notified by its Planning Coordinator pursuant to R3.3 to comply with R1 (including all sub-requirements) for each facility that is added to the Planning Coordinator's critical facilities list determined pursuant to R3.1. **5.2.** Requirement 3: 18 months following applicable regulatory approvals.	above, except for switch-on-to-fault schemes, the beginning of the first calendar quarter following ninety (90) days after the date of approval by the Commission. For requirements R1 and R2 for transmission lines operated at 100 kV to 200 kV as identified by the ISO as critical to the reliability of the BES and transformers with low voltage terminals connected at 100 kV to 200 kV as designated by the ISO as critical to the reliability of the BES, including switch-on-to-fault schemes, on the first day of the month after the 39th full month following the date of approval by the Commission. Requirement R3, the first day of the month after the 18th full month following the date of approval by the Commission.	and above, except for switch-on-to-fault schemes, on October 1, 2012. For requirements R1 and R2 for transmission lines operated at 100 kV to 200 kV as identified by the **ISO** as critical to the **reliability** of the **bulk electric system** and transformers with low voltage terminals connected at 100 kV to 200 kV as designated by the ISO as critical to the **reliability** of the **bulk electric system**, including switch-on-to-fault schemes, on July 1, 2015. Requirement R3, on January 1, 2014.	1, 2012 in proposed PRC-023-AB-1 Draft 2.1 to allow a reasonable amount of time for Alberta entities to implement proposed PRC-023-AB-1 Draft 2.1.		
R1 . Each Transmission Owner, Generator Owner, and Distribution Provider shall use any one of the following criteria (R1.1 through R1.13) for any specific circuit terminal to	**R1** Each TFO must use one of the criteria set out in requirements R1.1 through R1.13, inclusive, for each of its specific circuit terminals to prevent its phase protective relay settings from	**R1** Each **legal owner** of a **transmission facility, legal owner** of a **generating unit** and **legal owner** of an **aggregated generating facility** must use one of the criteria set out in	☐ New ☒Amended ☐ Deleted NERC requirement R1 has been amended for clarity and		

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prevent its phase protective relay settings from limiting transmission system loadability while maintaining reliable protection of the Bulk Electric System for all fault conditions. Each Transmission Owner, Generator Owner, and Distribution Provider shall evaluate relay loadability at 0.85 per unit voltage and a power factor angle of 30 degrees: [Violation Risk Factor: High] [Mitigation Time Horizon: Long Term Planning].	limiting transmission system loadability while maintaining reliable protection of the BES for all fault conditions; and evaluate relay loadability at 0.85 per unit voltage and a power factor angle of 30 degrees.	requirements R1.1 through R1.13, inclusive, for each specific circuit terminal to prevent its phase protective relay settings from limiting **transmission system** loadability while maintaining reliable protection of the **bulk electric system** for all fault conditions and evaluate the above relay's loadability at 0.85 per unit voltage and a **power factor** angle of 30 degrees.	consistency and to identify the responsible entities in Alberta. NERC sub-requirements R1.3.1 and R1.3.2 have been amended in proposed PRC-023-AB-1 Draft 2.1 to reflect their inter-relationship.		
R1.1. Set transmission line relays so they do not operate at or below 150% of the highest seasonal Facility Rating of a circuit, for the available defined loading duration nearest 4 hours (expressed in amperes).	**R1.1.** Set transmission line relays so they do not operate at or below 150% of the highest seasonal facility rating of a circuit for the available defined loading duration nearest to four hours, expressed in amperes;	**R1.1.** Set transmission line relays so they do not operate at or below 150% of the highest seasonal facility rating of a circuit for the available defined loading duration nearest to four (4) hours, expressed in amperes;			
R1.2. Set transmission line relays so they do not operate at or below 115% of the highest seasonal 15-minute Facility Rating[2] of a circuit (expressed in amperes). [2] When a 15-minute rating has been calculated and published for use in real-time operations,	**R1.2.** Set transmission line relays so they do not operate at or below 115% of the highest seasonal 15-minute facility rating of a transmission line expressed in amperes;	**R1.2.** Set transmission line relays so they do not operate at or below 115% of the highest seasonal 15-minute facility rating of a circuit expressed in amperes;			

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the 15-minute rating can be used to establish the loadability requirement for the protective relays.					
R1.3. Set transmission line relays so they do not operate at or below 115% of the maximum theoretical power transfer capability (using a 90-degree angle between the sending-end and receiving-end voltages and either reactance or complex impedance) of the circuit (expressed in amperes) using one of the following to perform the power transfer calculation:	**R1.3.** Set transmission line relays so they do not operate at or below 115% of the maximum theoretical power transfer capability (using a 90-degree angle between the sending-end and receiving-end voltages and either reactance or complex impedance) of the transmission line expressed in amperes, using one of the following to perform the power transfer calculation:	**R1.3.** Set transmission line relays so they do not operate at or below 115% of the maximum theoretical power transfer capability, using a 90-degree angle between the sending-end and receiving-end voltages and either reactance or complex impedance, of the circuit expressed in amperes, using one of the following to perform the power transfer calculation:			
R1.3.1. An infinite source (zero source impedance) with a 1.00 per unit bus voltage at each end of the line.	**R1.3.1.** an infinite source (zero source impedance) with a 1.00 per unit bus voltage at each end of the transmission line; or	**R1.3.1.** an infinite source, i.e. zero source impedance, with a 1.00 per unit **bus** voltage at each end of the transmission line; or			
R1.3.2. An impedance at each end of the line, which reflects the actual system source impedance with a 1.05 per unit voltage behind each source impedance.	**R1.3.2.** an impedance at each end of the transmission line, which reflects the actual system source impedance with a 1.05 per unit voltage behind each source impedance.	**R1.3.2.** an impedance at each end of the transmission line, which reflects the actual **system** source impedance with a 1.05 per unit voltage behind each source impedance.			
R1.4. Set transmission line relays on series compensated	**R1.4.** Set transmission line relays on series compensated	**R1.4.** Set transmission line relays on series compensated			

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transmission lines so they do not operate at or below the maximum power transfer capability of the line, determined as the greater of: - 115% of the highest emergency rating of the series capacitor. - 115% of the maximum power transfer capability of the circuit (expressed in amperes), calculated in accordance with R1.3, using the full line inductive reactance.	transmission lines so they do not operate at or below the maximum power transfer capability of the transmission line, determined as the greater of: ■ 115% of the highest emergency rating of the series capacitor, or ■ 115% of the maximum power transfer capability of the transmission line (expressed in amperes), calculated in accordance with requirement R1.3, using the full transmission line inductive reactance;	transmission lines so they do not operate at or below the maximum power transfer capability of the transmission line, determined as the greater of: (a) 115% of the highest emergency rating of the series capacitor, or (b) 115% of the maximum power transfer capability of the circuit (expressed in amperes), calculated in accordance with requirement R1.3, using the full transmission line inductive reactance;			
R1.5. Set transmission line relays on weak source systems so they do not operate at or below 170% of the maximum end-of-line three-phase fault magnitude (expressed in amperes).	**R1.5.** Set transmission line relays on weak source systems so they do not operate at or below 170% of the maximum end-of-line three-phase fault magnitude, expressed in amperes;	**R1.5.** Set transmission line relays on weak source systems so they do not operate at or below 170% of the maximum end-of-line three-phase fault magnitude, expressed in amperes;			
R1.6. Set transmission line relays applied on transmission lines connected to generation stations remote to load so they do not operate at or below 230% of the aggregated generation nameplate capability.	**R1.6.** Set transmission line relays applied on transmission lines connected to generating facilities remote to load so they do not operate at or below 230% of the aggregated generating unit(s) nameplate capability;	**R1.6.** Set transmission line relays applied on transmission lines connected to a generating facility remote to **load** so they do not operate at or below 230% of the total nameplate capability of all the **generating units** at the generating facility;			

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R1.7. Set transmission line relays applied at the load center terminal, remote from generation stations, so they do not operate at or below 115% of the maximum current flow from the load to the generation source under any system configuration.	**R1.7.** Set transmission line relays applied at the load center terminal, remote from generating facilities, so they do not operate at or below 115% of the maximum current flow from the load to the generation source under any system configuration;	**R1.7.** Set transmission line relays applied at the **load** center terminal, remote from a generating facility, so they do not operate at or below 115% of the maximum current flow from the **load** to the generation source under any **system** configuration;			
R1.8. Set transmission line relays applied on the bulk system-end of transmission lines that serve load remote to the system so they do not operate at or below 115% of the maximum current flow from the system to the load under any system configuration.	**R1.8.** Set transmission line relays applied on the bulk system-end of transmission lines that serve load remote to the system so they do not operate at or below 115% of the maximum current flow from the system to the load under any system configuration;	**R1.8.** Set transmission line relays applied on the **system**-end of transmission lines that serve **load** remote to the **system** so they do not operate at or below 115% of the maximum current flow from the **system** to the **load** under any **system** configuration;			
R1.9. Set transmission line relays applied on the load-end of transmission lines that serve load remote to the bulk system so they do not operate at or below 115% of the maximum current flow from the load to the system under any system configuration.	**R1.9.** Set transmission line relays applied on the load-end of transmission lines that serve load remote to the BES so they do not operate at or below 115% of the maximum current flow from the load to the system under any system configuration;	**R1.9.** Set transmission line relays applied on the **load**-end of transmission lines that serve **load** remote to the **system** so they do not operate at or below 115% of the maximum current flow from the **load** to the **system** under any **system** configuration;			
R1.10. Set transformer fault	**R1.10.** Set transformer fault	**R1.10.** Set transformer fault protection relays and transmission line relays on transmission lines terminated			

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protection relays and transmission line relays on transmission lines terminated only with a transformer so that they do not operate at or below the greater of: - 150% of the applicable maximum transformer nameplate rating (expressed in amperes), including the forced cooled ratings corresponding to all installed supplemental cooling equipment. - 115% of the highest operator established emergency transformer rating. **R1.11.** For transformer overload protection relays that do not comply with R1.10 set the relays according to one of the following: Set the relays to allow the transformer to be operated at an overload level of at least 150% of the maximum applicable nameplate rating, or 115% of the highest operator established emergency transformer rating, whichever is greater. The protection must allow this overload for at least 15 minutes to allow for the	protection relays and transmission line relays on transmission lines terminated only with a transformer so that they do not operate at or below the greater of: ■ 115% of the applicable maximum transformer nameplate rating expressed in amperes, including the forced cooled ratings corresponding to all installed supplemental cooling equipment; or ■ 115% of the highest operator established emergency transformer rating; **R1.11.** For transformer overload protection relays that do not comply with requirement R1.10 set the relays according to the following: Set the relays to allow the transformer to be operated at an overload level of at least 150% of the maximum applicable nameplate rating, or 115% of the highest emergency transformer rating, whichever is greater. The protection must allow this overload for at least 15 minutes to allow for the system operator to take controlled action to relieve the	only with a transformer so that they do not operate at or below the greater of: (a) 150% of the applicable maximum transformer nameplate rating, expressed in amperes, including the forced cooled ratings corresponding to all installed supplemental cooling equipment; or (b) 115% of the highest established emergency transformer rating; **R1.11.** For transformer overload protection relays that do not comply with requirement R1.10 set the relays to allow the transformer to be operated at an overload level of at least 150% of the maximum applicable nameplate rating, or 115% of the highest emergency transformer rating, whichever is greater. The protection relay must allow this overload for at least fifteen (15) minutes to allow the system **operator** to take controlled action to relieve the overload. Install supervision for the relays using either a top oil or simulated winding hot spot temperature	The typographical error made in Alberta requirement R1.10 of the previously proposed PRC-023-AB-1 Draft 2 has been corrected in proposed PRC-023-AB-1 Draft 2.1 to reflect “150%” of the applicable maximum transformer nameplate rating which was incorrectly stated as “115%”.		

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operator to take controlled action to relieve the overload. Install supervision for the relays using either a top oil or simulated winding hot spot temperature element. The setting should be no less than 100° C for the top oil or 140° C for the winding hot spot temperature[3]. [3] IEEE standard C57.115, Table 3, specifies that transformers are to be designed to withstand a winding hot spot temperature of 180 degrees C, and cautions that bubble formation may occur above 140 degrees C.	overload. Install supervision for the relays using either a top oil or simulated winding hot spot temperature element. The setting should be no less than 100°C for the top oil or 140°C for the winding hot spot temperature;	element. The setting should be no less than 100°C for the top oil or 140°C for the winding hot spot temperature;			
R1.12. When the desired transmission line capability is limited by the requirement to adequately protect the transmission line, set the transmission line distance relays to a maximum of 125% of the apparent impedance (at the impedance angle of the transmission line) subject to the following constraints: **R1.12.1.** Set the maximum torque angle (MTA) to 90	**R1.12.** When the desired transmission line capability is limited by the requirement to adequately protect the transmission line, set the transmission line distance relays to a maximum of 125% of the apparent impedance (at the impedance angle of the transmission line) subject to the following constraints: **R1.12.1.** Set the maximum torque angle (MTA) to 90 degrees or the	**R1.12.** When the desired transmission line capability is limited by the requirement to adequately protect the transmission line, set the transmission line distance relays to a maximum of 125% of the apparent impedance (at the impedance angle of the transmission line) subject to the following constraints: **R1.12.1.** Set the maximum torque angle to ninety (90) degrees or the highest setting supported by the manufacturer.			

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degrees or the highest supported by the manufacturer. **R1.12.2.** Evaluate the relay loadability in amperes at the relay trip point at 0.85 per unit voltage and a power factor angle of 30 degrees. **R1.12.3.** Include a relay setting component of 87% of the current calculated in R1.12.2 in the Facility Rating determination for the circuit. **R1.13.** Where other situations present practical limitations on circuit capability, set the phase protection relays so they do not operate at or below 115% of such limitations.	highest setting supported by the manufacturer. **R1.12.2.** Evaluate the relay loadability in amperes at the relay trip point at 0.85 per unit voltage and a power factor angle of 30 degrees; and **R1.12.3.** Include a relay setting component of 87% of the current calculated in requirement **R1.12.2.** in the facility rating determination for the circuit. **R1.13.** Where other situations present practical limitations on circuit capability, set the phase protection relays so they do not operate at or below 115% of such limitations.	**R1.12.2.** Evaluate the relay loadability in amperes at the relay trip point at 0.85 per unit voltage and a **power factor** angle of 30 degrees; and **R1.12.3.** Include a relay setting component of 87% of the current calculated in requirement **R1.12.2.** in the **facility** rating determination for the circuit. **R1.13.** Where other situations present practical limitations on circuit capability, set the phase protection relays so they do not operate at or below 115% of such limitations.			
R2. The Transmission Owner, Generator Owner, or Distribution Provider that uses a circuit capability with the practical limitations described in R1.6, R1.7, R1.8, R1.9, R1.12, or R1.13 shall use the calculated circuit capability as the Facility Rating of the circuit and shall obtain the agreement	**R2** A TFO that uses a circuit capability with the practical limitations described in requirements R1.6, R1.7, R1.8, R1.9, R1.12, or R1.13 must use the calculated circuit capability as the facility rating of the circuit and must obtain the agreement of the ISO to use the calculated circuit capability	**R2.** A **legal owner** of a **transmission facility**, **legal owner** of a **generating unit** and **legal owner** of an **aggregated generating facility** that uses a circuit capability with the practical limitations described in requirements R1.6, R1.7, R1.8, R1.9, R1.12, or R1.13 must use the calculated circuit capability as	☐ New ☒ Amended ☐ Deleted NERC requirement R2 amended in proposed PRC-023-AB-1 Draft 2.1 to identify requirements of the responsible entities in Alberta.		

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of the Planning Coordinator, Transmission Operator, and Reliability Coordinator with the calculated circuit capability. [Violation Risk Factor: Medium] [Time Horizon: Long Term Planning]		the facility rating of the circuit and must obtain the agreement of the **ISO** to use the calculated circuit capability.	**Alberta Variance[2]:** The WECC Reliability Coordinator is not included in Alberta requirement R2. NERC requirement R2 states that agreement shall be obtained from the Planning Coordinator, Transmission Operator, and Reliability Coordinator. The AESO is the authority from which legal owners of transmission facilities, generating units and aggregated generating units will obtain agreement for the calculated circuit capability and the AESO will consult with the WECC Reliability Coordinator at its discretion.		
R3. The Planning Coordinator shall determine which of the facilities (transmission lines operated at 100 kV to 200 kV and transformers with low voltage terminals connected at 100 kV to 200 kV) in its Planning Coordinator Area are critical to the reliability of the Bulk Electric System to identify the facilities from 100 kV to 200	**R3.** The ISO must identify which transmission lines operated at 100 kV to 200 kV and transformers with low voltage terminals connected at 100 kV to 200 kV are critical to the reliability of the BES in order to prevent potential cascade tripping that may occur when protective relay settings limit transmission loadability. In order to carry out this requirement, the	**R3.** The **ISO** must identify which transmission lines operated at 100 kV to 200 kV and transformers with low voltage terminals connected at 100 kV to 200 kV are critical to the **reliability** of the **bulk electric system** in order to prevent potential **cascading** that may occur when protective relay settings limit transmission	☐ New ☒Amended ☐ Deleted NERC requirement R3 has been amended in proposed PRC-023-AB-1 Draft 2.1 for clarity, consistency and to identify requirements of the responsible entities in Alberta.		

[2] An Alberta variance is a change from the US Reliability Standard that the AESO has determined is material.

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kV that must meet Requirement 1 to prevent potential cascade tripping that may occur when protective relay settings limit transmission loadability. [Violation Risk Factor: Medium] [Time Horizon: Long Term Planning]	ISO must do the following:	loadability. In order to carry out this requirement, the **ISO** must do the following:	Deleted redundant NERC requirement in R3 that states, "These identified facilities must meet requirement R1" from Alberta requirement in proposed PRC-023-AB-1 Draft 2.1.		
R3.1. The Planning Coordinator shall have a process to determine the facilities that are critical to the reliability of the Bulk Electric System.	**R3.1** The ISO must have a process to determine the facilities that are critical to the reliability of the BES and must consider input from adjoining planning coordinators and affected reliability coordinators.	**R3.1** The **ISO** must have a process to determine the facilities that are critical to the **reliability** of the **bulk electric system** and must consider input from adjoining planning coordinators and affected **reliability** coordinators.			
R3.2. The Planning Coordinator shall maintain a current list of facilities determined according to the process described in R3.1.	**R3.2** The ISO must maintain a current list of facilities determined according to the process specified in requirement R3.1.	**R3.2** The **ISO** must maintain a current list of facilities determined according to the process specified in requirement R3.1.			
R3.3. The Planning Coordinator shall provide a list of facilities to its Reliability Coordinators, Transmission Owners, Generator Owners, and Distribution Providers within 30 days of the establishment of the initial list and within 30 days of any	**R3.3** The ISO must provide a list of facilities maintained pursuant to requirement R3.2 to each TFO within 30 days of the establishment of the initial list and within 30 days of any changes to the list.	**R3.3** The **ISO** must provide a list of facilities maintained pursuant to requirement R3.2 to each **legal owner** of a **transmission facility, legal owner** of a **generating unit** and **legal owner** of an **aggregated generating facility** on such list within thirty (30) days of the			

COMPARISON BETWEEN NERC PRC-023-1 AND CURRENT ALBERTA PRC-023-AB-1 TRANSMISSION RELAY LOADABILITY					
NERC PRC-023-1	**Alberta PRC-023-AB-1 Draft 2 (From previous consultation)[1]**	**Alberta PRC-023-AB-1 Draft 2.1 (Revised version for re-consultation)**	**Differences between Alberta PRC-023-AB-1 Draft 2.1 and NERC PRC-023-1**	**New Stakeholder Comments (Insert comments here)**	**AESO Replies**
changes to the list.		establishment of the initial list and within thirty (30) days of any changes to the list.			
	R4 TFOs must comply with requirement R1 for all new facilities added to the ISO's list of facilities within 2 years of receipt from the ISO as contemplated in requirement R3.3	**R4** The **legal owner** of a **transmission facility, legal owner** of a **generating unit** and **legal owner** of an **aggregated generating facility** must comply with requirement R1 for all facilities added to the **ISO**'s list of facilities, as contemplated in requirement R3.3, within two (2) years of receipt of such list.	☒ New ☐Amended ☐ Deleted Alberta requirement R4 added to in proposed PRC-023-AB-1 Draft 2.1 to address timelines for responsible entities to meet Alberta requirement R1 for new facilities added to the AESO list of facilities. This is consistent with the timelines in the effective date section of the NERC reliability standard.		
M1. The Transmission Owner, Generator Owner, and Distribution Provider shall each have evidence to show that each of its transmission relays are set according to one of the criteria in R1.1 through R1.13. (R1)	**MR1.** The TFO must have evidence to show that each of its transmission relays is set according to one of the criteria in requirements R1.1 through R1.13. Records of actual settings are within acceptable tolerances of the applicable criteria in requirements R1.1 through R1.13.	**MR1**. Evidence of using one of the criteria identified in requirements R1.1 through R1.13 as required in requirement R1 exists. Evidence may include spreadsheets or summaries of calculations to show that each of its transmission relays is set in accordance with requirement R1.			
M2. The Transmission Owner, Generator Owner, and	**MR2** The TFO with transmission relays set according to the criteria	**MR2**. Evidence of using and obtaining the agreement to use			

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Distribution Provider with transmission relays set according to the criteria in R1.6, R1.7, R1.8, R1.9, R1.12, or R.13 shall have evidence that the resulting Facility Rating was agreed to by its associated Planning Coordinator, Transmission Operator, and Reliability Coordinator. (R2)	in requirements R1.6, R1.7, R1.8, R1.9, R1.12, or R.13 must have evidence that the ISO agreed to the resulting facility rating.	the calculated circuit capability as required in requirement R2 exists. Evidence may include: (a) facility rating spreadsheets or facility rating database to show that the calculated circuit capability was used as the facility rating of the circuit; and (b) dated correspondence to show that the calculated circuit capability was agreed to by the **ISO**.			
M3. The Planning Coordinator shall have a documented process for the determination of facilities as described in R3. The Planning Coordinator shall have a current list of such facilities and shall have evidence that it provided the list to the appropriate Reliability Coordinators, Transmission Operators, Generator Operators, and Distribution Providers. (R3)	**MR3.1** Written process exists which includes input from adjoining planning coordinators and affected reliability coordinators and is of sufficient detail to meet requirements specified in requirement R3.1. **MR3.2** List is complete and up to date as specified in requirement R3.2.	**MR3**. The measures for requirement R3 are identified in the sub-measures below. **MR3.1** Evidence of having a process and considering input as required in requirement R3.1 exists. Evidence may include a documented process and documentation to show input from adjoining planning coordinators and affected **reliability** coordinators were considered. **MR3.2** Evidence of maintaining a current list of facilities as required in requirement R3.2 exists. Evidence may include a list			

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		published on the AESO website which identifies the issue date, version, and revision history. **MR3.3** Evidence of providing a list of facilities as required in requirement R3.3 exists. Evidence may include email or mail to appropriate recipients.			
	MR3.3 Confirmation that the ISO provided the list as specified in requirement R3.3.				
		MR4 Evidence of complying with requirement R1 as required in requirement R4 exists. Evidence may include spreadsheets or summaries of calculations to show that each facility added to the **ISO**'s list is set in accordance with requirement R1 and the date the protective relay setting changed, if required.			
Compliance To view the compliance section D of the NERC reliability standard follow this link: http://www.nerc.com/files/PRC-023-1.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		

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Regional Differences None identified.	**Regional Differences** None identified.	**Regional Differences** None identified.			

Attachment A / Appendix 1

COMPARISON BETWEEN NERC PRC-023-1 AND CURRENT ALBERTA PRC-023-AB-1 TRANSMISSION RELAY LOADABILITY					
NERC PRC-023-1	**Alberta PRC-023-AB-1 Draft 2 (From previous consultation)[3]**	**Alberta PRC-023-AB-1 Draft 2.1 (Revised version for re-consultation)**	**Differences between Alberta PRC-023-AB-1 Draft 2.1 and NERC PRC-023-1**	**Stakeholder Comments (Insert comments here)**	**AESO Replies**
Attachment A **1.** This reliability standard includes any protective functions which could trip with or without time delay, on load current, including but not limited to: **1.1.** Phase distance. **1.2.** Out-of-step tripping. **1.3.** Switch-on-to-fault. **1.4.** Overcurrent relays. **1.5.** Communications aided protection schemes including but not limited to: **1.5.1** Permissive overreach transfer	**Appendix 1** **1.** This reliability standard includes any protective functions which could trip with or without time delay, on load current, including but not limited to: **1.1.** Phase distance. **1.2.** Out-of-step tripping. **1.3.** Switch-on-to-fault. **1.4.** Overcurrent relays. **1.5.** Communications aided protection schemes including but not limited to: **1.5.1** Permissive overreach transfer trip (POTT).	**Appendix 1** **1.** This **reliability standard** includes any protective functions which could trip with or without time delay, on **load** current, including: **1.1.** Phase distance; **1.2.** Out-of-step tripping; **1.3.** Switch-on-to-fault; **1.4.** Overcurrent relays; and **1.5.** Communications aided protection schemes including: **1.5.1** Permissive overreach transfer trip;			

[3] This column is for information only.

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trip (POTT). **1.5.2** Permissive under-reach transfer trip (PUTT). **1.5.3** Directional comparison blocking (DCB). **1.5.4** Directional comparison unblocking (DCUB).	**1.5.2** Permissive under-reach transfer trip (PUTT). **1.5.3** Directional comparison blocking (DCB). **1.5.4** Directional comparison unblocking (DCUB).	**1.5.2** Permissive under-reach transfer trip; **1.5.3** Directional comparison blocking; and **1.5.4** Directional comparison unblocking.			
2. This reliability standard includes out-of-step blocking schemes which must be evaluated to ensure that they do not block trip for faults during the loading conditions defined within this reliability standard's requirements.	**2.** This reliability standard includes out-of-step blocking schemes which must be evaluated to ensure that they do not block trip for faults during the loading conditions defined within this reliability standard's requirements.	**2.** This **reliability standard** includes out-of-step blocking schemes such that that they do not block trip for faults during the loading conditions defined within the requirements of this **reliability standard**.			
3. The following protection systems are excluded from the requirements of this reliability standard: **3.1.** Relay elements that are only enabled when other relays or associated systems fail. For example: • Overcurrent elements that are only enabled during loss of potential	**3.** The following protection systems are excluded from the requirements of this reliability standard: **3.1.** Relay elements that are only enabled when other relays or associated systems fail. For example: • Overcurrent elements that are only enabled during loss of potential conditions;	**3.** The following **protection systems** are excluded from the requirements of this **reliability standard**: **3.1.** Relay elements that are only enabled when other relays or associated systems fail. For example: • Overcurrent elements that are only enabled during loss of potential			

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conditions; or • Elements that are only enabled during a loss of communications.	or • Elements that are only enabled during a loss of communications.	conditions; or • Elements that are only enabled during a loss of communications.			
3.2. Protection systems intended for the detection of ground fault conditions.	**3.2.** Protection systems intended for the detection of ground fault conditions.	**3.2. Protection systems** intended for the detection of ground fault conditions.			
3.3. Protection systems intended for protection during stable power swings.	**3.3.** Protection systems intended for protection during stable power swings.	**3.3. Protection systems** intended for protection during stable power swings.			
3.4. Generating unit protection relays that are susceptible to load.	**3.4.** Generating unit protection relays that are susceptible to load.	**3.4. Generating unit** protection relays that are susceptible to **load**.			
3.5. Relay elements used only for Special Protection Systems applied and approved in accordance with NERC Reliability Standards PRC-012 through PRC-017.	**3.5.** Relay elements used only for RASs applied and approved in accordance with reliability standards PRC-015-AB-0, PRC-016-AB-0 and PRC-017-AB-0.	**3.5.** Relay elements used only for **remedial action schemes** identified in the ISO RAS database as published by the ISO on the AESO website, and as amended from time to time by the ISO on notice to market participants.			
3.6. Protection systems that are designed only to respond in time periods which allow operators 15	**3.6.** Protection systems that are designed only to respond in time periods which allow operators 15 minutes or	**3.6. Protection systems** that are designed only to respond in time periods which allow **operators**			

COMPARISON BETWEEN NERC PRC-023-1 AND CURRENT ALBERTA PRC-023-AB-1 TRANSMISSION RELAY LOADABILITY					
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minutes or greater to respond to overload conditions. **3.7.** Thermal emulation relays which are used in conjunction with dynamic Facility Ratings. **3.8.** Relay elements associated with DC lines. **3.9.** Relay elements associated with DC converter transformers.	greater to respond to overload conditions. **3.7.** Thermal emulation relays which are used in conjunction with dynamic Facility Ratings. **3.8.** Relay elements associated with DC lines. **3.9.** Relay elements associated with DC converter transformers.	fifteen (15) minutes or greater to respond to overload conditions. **3.7.** Thermal emulation relays which are used in conjunction with dynamic facility ratings. **3.8.** Relay elements associated with direct current lines. **3.9.** Relay elements associated with direct current converter transformers.			