Comment Report

Project Name:	2018-04 Modifications to PRC-024-2 | Standard Authorization Request
Comment Period Start Date:	12/19/2018
Comment Period End Date:	1/18/2019
Associated Ballots:	

There were 35 sets of responses, including comments from approximately 118 different people from approximately 94 companies representing 10 of the Industry Segments as shown in the table on the following pages.

Questions

1. Do you agree with the project scope as outlined in the SAR? If you do not agree, or if you agree but have comments or suggestions, provide your recommendation or proposed modification below:

2. Do you agree with the Detailed Description section of the SAR? If you do not agree, or if you agree but have comments or suggestions, provide your recommendation or proposed modification below:

3. If you have any other comments on this SAR that you haven't already mentioned above, provide them here:

Organization Name	Name	Segment(s)	Region	Group Name	Group Member Name	Group Member Organization	Group Member Segment(s)	Group Member Region
Florida Municipal Power Agency	Brandon McCormick	3,4,5,6	FRCC	FMPA	Tim Beyrle	City of New Smyrna Beach Utilities Commission	4	FRCC
					Jim Howard	Lakeland Electric	5	FRCC
					Javier Cisneros	Fort Pierce Utilities Authority	3	FRCC
					Randy Hahn	Ocala Utility Services	3	FRCC
					Don Cuevas	Beaches Energy Services	1	FRCC
					Jeffrey Partington	Keys Energy Services	4	FRCC
					Tom Reedy	Florida Municipal Power Pool	6	FRCC
					Steven Lancaster	Beaches Energy Services	3	FRCC
					Chris Adkins	City of Leesburg	3	FRCC
					Ginny Beigel	City of Vero Beach	3	FRCC
Duke Energy	Colby Bellville	1,3,5,6	FRCC,RF,SERC	Duke Energy	Doug Hils	Duke Energy	1	RF
					Lee Schuster	Duke Energy	3	FRCC
					Dale Goodwine	Duke Energy	5	SERC
					Greg Cecil	Duke Energy	6	RF
MRO	Dana Klem	1,2,3,4,5,6	MRO	MRO NSRF	Joseph DePoorter	Madison Gas & Electric	3,4,5,6	MRO
					Larry Heckert	Alliant Energy	4	MRO
					Amy Casucelli	Xcel Energy	1,3,5,6	MRO
					Michael Brytowski	Great River Energy	1,3,5,6	MRO

					Jodi Jensen	Western Area Power Administration	1,6	MRO
					Kayleigh Wilkerson	Lincoln Electric System	1,3,5,6	MRO
					Mahmood Safi	Omaha Public Power District	1,3,5,6	MRO
					Brad Parret	Minnesota Powert	1,5	MRO
					Terry Harbour	MidAmerican Energy Company	1,3	MRO
					Tom Breene	Wisconsin Public Service Corporation	3,5,6	MRO
					Jeremy Voll	Basin Electric Power Cooperative	1	MRO
					Kevin Lyons	Central Iowa Power Cooperative	1	MRO
					Mike Morrow	Midcontinent ISO	2	MRO
PPL - Louisville Gas and Electric Co.	Devin Shines	3,5,6	RF,SERC	Louisville Gas and Electric Company and Kentucky Utilities Company	Charles Freibert	PPL - Louisville Gas and Electric Co.	3	SERC
					JULIE HOSTRANDER	PPL - Louisville Gas and Electric Co.	5	SERC
					Linn Oelker	PPL - Louisville Gas and Electric Co.	6	SERC
Great Plains Energy - Kansas City Power and Light Co.	Douglas Webb	1,3,5,6	MRO,SPP RE	Westar-KCPL	Doug Webb	Westar	1,3,5,6	MRO
					Doug Webb	KCP&L	1,3,5,6	MRO
ACES Power Marketing	Jodirah Green	6	NA - Not Applicable	ACES Standard Collaborations	John Shaver	Arizona Electric Power Cooperative, Inc.	1	WECC

					Bob Solomon	Hoosier Energy Rural Electric Cooperative, Inc.	1	SERC
					Greg Froehling	Rayburn Country Electric Cooperative, Inc.	3,6	Texas RE
					Kevin Lyons	Central Iowa Power Cooperative	1	MRO
					Jenny Knernschield	Old Dominion Electric Cooperative	3,4	SERC
					Susan Sosbe	Wabash Valley Power Association	3	RF
					Ginger Mercier	Prairie Power , Inc.	1,3	SERC
					Kagen DelRio	North Carolina Electric Membership Cooperative	3,4,5	SERC
DTE Energy - Detroit Edison Company	Karie Barczak	3,4,5		DTE Energy - DTE Electric	Jeffrey Depriest	DTE Energy - DTE Electric	5	RF
					Daniel Herring	DTE Energy - DTE Electric	4	RF
					Karie Barczak	DTE Energy - DTE Electric	3	RF
Manitoba Hydro	Mike Smith	1,3,5,6		Manitoba Hydro	Yuguang Xiao	Manitoba Hydro	5	MRO
					Karim Abdel-Hadi	Manitoba Hydro	3	MRO
					Blair Mukanik	Manitoba Hydro	6	MRO
					Mike Smith	Manitoba Hydro	1	MRO
Southern Company - Southern Company Services, Inc.	Pamela Hunter	1,3,5,6	SERC	Southern Company	Katherine Prewitt	Southern Company Services, Inc.	1	SERC
					Joel Dembowski	Southern Company - Alabama	3	SERC

						Power Company		
					William D. Shultz	Southern Company Generation	5	SERC
					Jennifer G. Sykes	Southern Company Generation and Energy Marketing	6	SERC
Northeast Power Coordinating Council	Ruida Shu	1,2,3,4,5,6,7,8,9,10	NPCC	RSC no Dominion	Guy V. Zito	Northeast Power Coordinating Council	10	NPCC
					Randy MacDonald	New Brunswick Power	2	NPCC
					Glen Smith	Entergy Services	4	NPCC
					Brian Robinson	Utility Services	5	NPCC
					Alan Adamson	New York State Reliability Council	7	NPCC
					David Burke	Orange & Rockland Utilities	3	NPCC
					Michele Tondalo	UI	1	NPCC
					Helen Lainis	IESO	2	NPCC
					Michael Jones	National Grid	3	NPCC
					Sean Cavote	PSEG	4	NPCC
					Kathleen Goodman	ISO-NE	2	NPCC
					David Kiguel	Independent	NA - Not Applicable	NPCC
					Silvia Mitchell	NextEra Energy - Florida Power and Light Co.	6	NPCC
					Paul Malozewski	Hydro One Networks, Inc.	3	NPCC
					Gregory Campoli	New York Independent	2	NPCC

						System Operator		
					Caroline Dupuis	Hydro Quebec	1	NPCC
					Chantal Mazza	Hydro Quebec	2	NPCC
					Michael Forte	Con Edison	1	NPCC
					Laura McLeod	NB Power Corporation	5	NPCC
					Nick	Kowalczyk	1	NPCC
					Dermot Smyth	Con Ed - Consolidated Edison Co. of New York	1	NPCC
					John Hastings	National Grid	1	NPCC
					Peter Yost	Con Ed - Consolidated Edison Co. of New York	3	NPCC
					Sofia Gadea-Omelchenko	Con Edison	5	NPCC
					Joel Charlebois	AESI - Acumen Engineered Solutions International Inc.	5	NPCC
					Quintin Lee	Eversource Energy	1	NPCC
					Mike Cooke	Ontario Power Generation, Inc.	4	NPCC
					Salvatore Spagnolo	New York Power Authority	1	NPCC
					Shivaz Chopra	New York Power Authority	5	NPCC
Dominion - Dominion Resources, Inc.	Sean Bodkin	3,5,6		Dominion	Connie Lowe	Dominion - Dominion Resources, Inc.	3	NA - Not Applicable
					Lou Oberski	Dominion - Dominion Resources, Inc.	5	NA - Not Applicable

					Larry Nash	Dominion - Dominion Virginia Power	1	NA - Not Applicable

1. Do you agree with the project scope as outlined in the SAR? If you do not agree, or if you agree but have comments or suggestions, provide your recommendation or proposed modification below:

Dana Klem - MRO - 1,2,3,4,5,6 - MRO, Group Name MRO NSRF

Answer	No
Document Name	

Comment

The SDT should clearly state the scope of protective devices or relays. Is the scope protective relays only or is it protective devices in addition to relays?

The MRO NSRF recommends that SDT clarify item e in the SAR to align with the PRC-024 reliability objective and the current NERC Protection System definition. Item e from:

Clarify if the voltage and frequency protective functions within an inverter control system that trip the inverter are subject to the requirements of PRC-024-2.3

to:

Clarify the PRC-024 scope is to identify and set frequency and voltage protective relays or protective devices that respond to electrical quantities and directly trip the generator

This attempts to remain technology neutral, is consistent with the NERC Protection System definition, and specifically targets protective functions that directly trip the generator, and avoids other unintended consequences.

Regarding Item d and the reference to “individual” generating units, the objective is to cover or “consider” the largest and smallest impedances in the voltage drop calculations. We recommend striking the “individual” generating unit reference and state, “…the Generator Owner needs to consider the largest and smallest impedances in its voltage drop calculations”. This should meet the reliability object without forcing entities to show voltage drop calculations for each wind turbine or solar inverter for zero defect compliance audits.

Likes 0	
Dislikes 0	

Response

Sean Bodkin - Dominion - Dominion Resources, Inc. - 3,5,6, Group Name Dominion

Answer	No
Document Name	

Comment

Dominion Energy supports the comments submitted by EEI regarding items included in the current SAR that should not be included in the scope of this proposed project.

Likes 0	

Dislikes 0	

Response

Richard Vine - California ISO - 2	
Answer	No
Document Name	

Comment
The California ISO supports the comments of the ISO/RTO Council Standards Review Committee (SRC)

Likes 0	
Dislikes 0	

Response

Colby Bellville - Duke Energy - 1,3,5,6 - FRCC,SERC,RF, Group Name Duke Energy	
Answer	No
Document Name	

Comment
Issue B: The SDT should also consider making this minimum time delay greater than 0.1 sec. A suggested minimum time delay around 0.5 to 1.0 seconds would be more appropriate. This will allow for better ride-through of somewhat prolonged, slower swings. It will also better coordinate with the minimum time delay for UFLS actuation. (At least in SERC, a minimum time delay of 6 cycles [0.1 sec] is required per UFLS standard PRC-006-SERC-02.) A longer time delay in the suggested range will have no adverse impact on system operation or equipment damage. **Issue C:** RMS should be used as a practical matter in terms of the typical instrumentation available for calibration of the equipment involved. We would also suggest that distinguishing between “fundamental frequency RMS” and “True RMS” (i.e. all frequency components) is unnecessary from a practical perspective. In the vast majority of cases, fundamental frequency is the very dominant component. Recognizing that inverters themselves can create a significant level of harmonics, if this is considered by the SDT as important, the ride-through value(s) selected for the curves/equations should be modified to accommodate either without the need to make special instrument accommodations to determine one or the other. **Issue G:** The use of momentary cessation within the “No Trip” zone of PRC-024-2 should be disallowed. If it happens, it should be reported as an equipment limitation per Requirement R3. Since the momentary cessation is an integral part of the basic inverter design, the SDT should consider working with the NERC Inverter-Based Resource Performance Task Force (IRPTF) to incorporate some explanation in PRC-024 regarding the different considerations for inverter-based generation resources as compared to synchronous generation resources. The Rationale section of PRC-024 might be a good place for such explanation.

Likes 0	
Dislikes 0	

Response

Tamara Evey - Ameren - Ameren Services - 1,3,5,7 - SERC	
Answer	No
Document Name	
Comment	
Ameren agrees with and supports EEI comments for question #1.	
Likes 0	
Dislikes 0	
Response	
Douglas Johnson - American Transmission Company, LLC - 1	
Answer	No
Document Name	
Comment	
American Transmission Company LLC (ATC) supports and endorses the comments submitted by the Edison Electric Institute (EEI) on behalf of the EEI member companies.	
Likes 0	
Dislikes 0	
Response	
Ruida Shu - Northeast Power Coordinating Council - 1,2,3,4,5,6,7,8,9,10 - NPCC, Group Name RSC no Dominion	
Answer	No
Document Name	
Comment	
Reliability standards should be technology neutral. The project scope should be limited to removing ambiguity from the standard. Technical Rationale documents and/or Compliance Implementation Guidance documents could be written if the drafting team determines that further explanation is needed for inverter-based generation.	
Likes 0	
Dislikes 0	
Response	

Douglas Webb - Great Plains Energy - Kansas City Power and Light Co. - 1,3,5,6 - MRO, Group Name Westar-KCPL	
Answer	No
Document Name	

Comment

Kansas City Power & Light and Westar Energy (“the Company”) supports the Edison Electric Institute’s (EEI) submitted responses.

Also, the Company offers that, broadly, for the Company’s full response, it supports NERC’s efforts to revise PRC-024. It believes the project will contribute to improving reliability and resilience with the result of strengthening performance of the grid operations. Clarity, consistency and communications for all stakeholders is a strong step forward in grid reliability.

Additionally, revisions to PRC-024 should accommodate a wide view when considering Inverter Based Resources (IBR), and take care not to consider IBRs singularly within a narrow focus, which may inadvertently omit something with an equally large system impact.

It is within the framework of the above statements we offer the following comments on the proposed SAR project scope:

Item a: The Company endorses EEI’s comments.

Item b: The Company endorses EEI’s comments.

Item c: The Company endorses EEI’s comments.

Item d: The Company endorses EEI’s comments.

Additionally, the Company would highlight it does not have a predetermined point of view regarding the need for additional Implementation Guidance. On the other hand, it may very well be necessary. Development of Implementation Guidance is an option of every Standards Drafting project and / or team, the Company believes the reference in the SAR is unnecessary and be removed.

Item e: The Company endorses EEI’s comments.

Item f: The Company endorses EEI’s comments; however, takes exception on one point.

The Company supports the SAR in adding a definition of momentary cessation to mitigate confusion within the compliance arena, the Company believes this to be necessary.

Item g:

The Company endorses EEI’s comments and supplements its response with the following:

The Company does not have a predetermined point of view regarding the need for additional Implementation Guidance. On the other hand, it may very well be necessary. Development of Implementation Guidance is an option of every Standards Drafting project and / or team, the Company believes the reference in the SAR is unnecessary and be removed.

Likes 0	
Dislikes 0	

Response

Mark Gray - Edison Electric Institute - NA - Not Applicable - NA - Not Applicable

Answer	No
Document Name	

Comment

EEI supports revisions to PRC-024-2 that seek to address ambiguities and inconsistencies related to inverter-based resources; however, the SAR project scope does not appear to be technology-neutral. EEI agrees with FERC and NERC that the Reliability Standards should be technology-neutral (FERC Order 779, P81). The project scope should focus on removing ambiguity and enhancing Generator Owner understanding of how resources, regardless of type, are to be configured to ensure generator protection, regardless of where it resides, is properly set to ensure correct operation during defined frequency and voltage excursions.

It is within the context of above stated concerns that we offer the following comments on the current SAR project scope:

Item a: Overall, we support this scope item because we agree that operation outside of the “No Trip” zone should not be interpreted as a must trip zone. However, we do not agree with footnote 2 because it adds confusion to the scope and recommend that it be struck from the SAR. Additionally, we suggest consideration be given to removing the use of quotes and capitalization with regards to the term “May Trip,” in order to provide the SDT with the necessary latitude to select the best language to define this region.

Item b: Instantaneous sampling of frequency by IBRs was a contributing factor in the Blue Cut Fire and we understand that manufacturers of IBRs have already addressed this issue. (See 900 MW Fault Induced Solar Photovoltaic Resource Interruption Disturbance Report (i.e., Canyon 2 Report), Key Findings 1 on page iv). The SDT should limit their work on this item to clarifying that frequency should not be calculated instantaneously to define trip parameters. We recommend changing “and ensure” to “to ensure” and adding “to define the trip parameters” to the end of item b. We believe that the scope of this SAR should steer clear of defining technology specifications. Organizations such as the IEEE are more effective and efficient venues for developing such specifications for how frequency is to be measured because their process would allow the manufacturers and the industry to work through these issues. This is similar to when relay manufacturers began developing microprocessor relays for the Industry. Relay manufacturers worked with appropriate standards making organizations such as the IEEE, which worked with industry and manufacturers to develop products that met the needs of the industry.

Item c: EEI supports clarifications to the Voltage Ride-Through Curve Clarifications for Curve Details 1, 3 and 5; however, encourages NERC to do this in a technology-neutral manner rather than providing IBR specifications.

Item d: EEI recommends that item “d" be removed from the SAR scope. It is unclear why the requirements would need to be reinforced or clarified further since the language contained in Requirement R2 is clear that generator voltage protective relay settings are to be set so that generator voltage relays do not trip as a result of defined voltage excursions at the Point of Interconnection. We are unaware of any on-going compliance concerns or confusion on this point and are concerned that this scope item may lead to prescriptive language in an attempt to address specific resource types or site configurations, which will move the standard away from a results-based standard. If during the development process for this standard the SDT determines that new Implementation Guidance is needed, based on their modifications to PRC-024-2; we would support such actions but do not believe this needs to be in the SAR language.

Item e: EEI supports the concept that generator voltage and frequency protection within an inverter control system, regardless of where it resides, should do so in conformance with PRC-024. We support the SAR’s position that there is a lack of clarity in the language of the currently enforceable version of PRC-024, noting that the intent is to limit this Reliability Standard to generator frequency and generator voltage protective relays but there is no clear acknowledgement or guidance related to generator trips that could result from a generating plant’s auxiliary equipment protection systems (either directly or via tripping signals). We suggest modifying this SAR scope item to: “Clarify that the PRC-024 reliability objective is to identify and set generator frequency and generator voltage protective relays or other protective devices that respond to electrical quantities and directly trip the generator.”

Item f: While EEI member companies have varied views on this issue, we agree that there are reliability benefits to providing language in PRC-024 that state that momentary cessation (a control function) is an unacceptable response during system disturbances within the “No Trip” zone as defined within PRC-024. While we recognize that this mode of operation can be a useful response for resources connected at a distribution level, those resources are generally excluded from consideration due to the BES definition exclusion rules. We also recommend that the second sentence under this scope item be struck from the SAR since all BES resources should be held to the same standard in a technology neutral manner. EEI sees benefit in defining

momentary cessation, within the Glossary of Terms, if the SDT decides to utilize this term within revisions to PRC-024. However, we do not believe that the last sentence in this scope item is necessary for the SAR Scope. Although the sentence includes “may need,” it is understood that the SDT has flexibility to determine whether momentary cessation should be defined and whether guidance should be provided.

Item g: EEI recommends that this scope item be removed from the SAR Scope because we do not believe that compliance treatment for specific non-compliance violations is an appropriate element of a NERC Reliability Standard. We also believe that it is clear that all BES resources, regardless of type or technology, at a plant site should operate in line with the frequency and voltage requirements as set forth in this Reliability Standard (i.e., do not trip within the “No Trip” zone), unless there are known regulatory or equipment limitations. In those cases, the equipment limitations are to be reported to the Planning Coordinator and Transmission Coordinator per Requirement R3. For this reason, we do not believe that this scope item is needed. The SDT may decide that implementation guidance may be appropriate to help address compliance questions; however, we do not believe that Implementation Guidance should be a SAR Scope item because it is understood that this is an option for all SDTs.

Likes 0	
Dislikes 0	

Response

Devin Shines - PPL - Louisville Gas and Electric Co. - 3,5,6 - SERC, Group Name Louisville Gas and Electric Company and Kentucky Utilities Company

Answer	No
Document Name	

Comment

Louisville Gas and Electric Company and Kentucky Utilities Company (LG&E/KU) supports the comments submitted by the Edison Electric Institute (EEI).

Likes 0	
Dislikes 0	

Response

Charles Yeung - Southwest Power Pool, Inc. (RTO) - 2

Answer	No
Document Name	Unofficial_Comment_Form_20180718_Jan18.docx

Comment

There is a concern that in the pursuit of clarification through explanatory text, the standards drafting team might include non-essential verbiage which could be subject to compliance and audit when that is not the intent.

While we generally agree with the scope, the bullet “a” for the project scope should be modified to reflect that the region outside the trip curve should reflect equipment limitations and not simply be a “May Trip” zone. Generators should provide grid support during disturbances until equipment limitations are reached. Bullet “a” should be modified as reflected below.

The proposed scope of this project is as follows:

Update the PRC-024-2 ride-through curves to specify that the area outside the “No Trip” zone is an “Equipment Limitation” “May Trip” zone, so that it is not erroneously interpreted as a “Must Trip” zone and define that region to have generators set to allow ride-through until an equipment limitation is reached (Redlines and strikethoughs cannot be shown in this text box - please to the attachment word file for clarity)

With respect to part d of the Project Scope portion of the SAR, the following portion appears to be outside the scope of the existing standard, which is protection, not voltage settings:

“. . . and clarify further that the Generator Owner needs to consider this when developing the voltage settings for individual generating units (this pertains to both synchronous and inverter-based resources). If possible, provide either Implementation Guidance or example calculations within the standard for dispersed power producing (inverter-based) resources.”

Likes 0	
Dislikes 0	

Response

Pamela Hunter - Southern Company - Southern Company Services, Inc. - 1,3,5,6 - SERC, Group Name Southern Company

Answer	No
Document Name	

Comment

We do not completely agree with the project scope. Please find comments, suggestions, and recommendations for certain sections below.

Project Scope Item a: We believe that the wording found footnote 1 is adequate and sufficient to indicate that the voltage and frequency protective equipment application is neither required to be installed or activated due to the requirements of this standard. Note the wording of the footnote reads "Each Generator Owner is not required to have frequency or voltage protective relaying (…) installed or activated on its unit.

Project Scope Item b: The Off Nominal Frequency Capability Curve is drawn on a semi-log graph which makes it impossible to show the zero time stamp. The table of values provides this clarification. We agree that inaccurate frequency measurements should not be used in protection trip equations.

Project Scope Item c: The voltage ride-through time duration curve is plotted in per unit voltage, so the specific voltage chosen to be evaluated may be either RMS or crest values.

Project Scope Items e and f: Since the standard pertains to the voltage and frequency protective functions which directly trip the plant and are applied to the individual generating unit, we agree that voltage and frequency protection functions applied uniformly within each inverter controller, when acting together to emulate a single protection element for the entire plant, should be included in the scope of the existing PRC-024. While the parenthetical elements found in footnote 1 of the existing standard were addressing the multi-function microprocessor based protective relays and the microprocessor-based excitation control systems with protection elements that replicated the digital protective relays, we believe that it applies to inverter-based protection elements set commonly across a plant for tripping. Further, the notion of what is meant by "tripping" needs to be clarified to be the shutdown action performed by the protection system which requires manual intervention for restarting the plant (reset, reclose, re-sync, etc.) The pause and automatic restart control function performed at many inverter-based generating stations is a control feature rather than a protection system feature. Automatic restarts are not advisable for any protection system operation without manual intervention and investigation. Project Scope Item g: Owners of power conversion equipment used for power generation whose control functionality does not have the capability to be set up to eliminate momentary cessation should be provided the documentation option provided in Requirement R3 of PRC-024-2. This could be clarified as permissible through modification of the existing footnote 5 by "not excluding the limitations that are cause by the setting capability of the control system."

Likes 0	
Dislikes 0	

Response

Kevin Salsbury - Berkshire Hathaway - NV Energy - 5

Answer	No
Document Name	

Comment

NV Energy supports revisions to PRC-024-2 that seek to address ambiguities and inconsistencies related to inverter-based resources; however, the SAR project scope does not appear to be technology-neutral. NV Energy agrees with FERC and NERC that the Reliability Standards should be technology-neutral (FERC Order 779, P81). The project scope should focus on removing ambiguity and enhancing Generator Owner understanding of how resources, regardless of type, are to be configured to ensure generator protection, regardless of where it resides, is properly set to ensure correct operation during defined frequency and voltage excursions.

It is within the context of above stated concerns that we offer the following comments on the current SAR project scope:

Item a: Overall, we support this scope item because we agree that operation outside of the “No Trip” zone should not be interpreted as a must trip zone. However, we do not agree with footnote 2 because it adds confusion to the scope and recommend that it be struck from the SAR. Additionally, we suggest consideration be given to removing the use of quotes and capitalization with regards to the term “May Trip,” in order to provide the SDT with the necessary latitude to select the best language to define this region.

Item b: Instantaneous sampling of frequency by IBRs was a contributing factor in the Blue Cut Fire and we understand that manufacturers of IBRs have already addressed this issue. (See 900 MW Fault Induced Solar Photovoltaic Resource Interruption Disturbance Report (i.e., Canyon 2 Report), Key Findings 1 on page iv). The SDT should limit their work on this item to clarifying that frequency should not be calculated instantaneously to define trip parameters. We recommend changing “and ensure” to “to ensure” and adding “to define the trip parameters” to the end of item b. We believe that the scope of this SAR should steer clear of defining technology specifications. Organizations such as the IEEE are more effective and efficient venues for developing such specifications for how frequency is to be measured because their process would allow the manufacturers and the industry to work through these issues. This is similar to when relay manufacturers began developing microprocessor relays for the Industry. Relay manufacturers worked with appropriate standards making organizations such as the IEEE, which worked with industry and manufacturers to develop products that met the needs of the industry.

Item c: NV Energy supports clarifications to the Voltage Ride-Through Curve Clarifications for Curve

Details 1, 3 and 5; however, encourages NERC to do this in a technology-neutral manner rather than providing IBR specifications.

Item d: NV Energy recommends that item “d" be removed from the SAR scope. It is unclear why the requirements would need to be reinforced or clarified further since the language contained in

Requirement R2 is clear that generator voltage protective relay settings are to be set so that generator voltage relays do not trip as a result of defined voltage excursions at the Point of Interconnection. We are unaware of any on-going compliance concerns or confusion on this point and are concerned that this scope item may lead to prescriptive language in an attempt to address specific resource types or site configurations, which will move the standard away from a results-based standard. If during the development process for this standard the SDT determines that new Implementation Guidance is needed, based on their modifications to PRC-024-2; we would support such actions but do not believe this needs to be in the SAR language.

Item e: NV Energy supports the concept that generator voltage and frequency protection within an inverter control system, regardless of where it resides, should do so in conformance with PRC-024. We support the SAR’s position that there is a lack of clarity in the language of the currently enforceable version of PRC-024, noting that the intent is to limit this Reliability Standard to generator frequency and generator voltage protective relays but there is no clear acknowledgement or guidance related to generator trips that could result from a generating plant’s auxiliary equipment protection systems (either directly or via tripping signals). We suggest modifying this SAR scope item to: “Clarify that the PRC-024 reliability objective is to identify and set generator frequency and generator voltage protective relays or other protective devices that respond to electrical quantities and directly trip the generator.”

Item f: While NV Energy member companies have varied views on this issue, we agree that there are reliability benefits to providing language in PRC-024 that state that momentary cessation (a control function) is an unacceptable response during system disturbances within the “No Trip” zone as defined within PRC-024. While we recognize that this mode of operation can be a useful response for resources connected at a distribution level, those resources are generally excluded from consideration due to the BES definition exclusion rules. We also recommend that the second sentence under this scope item be struck from the SAR since all BES resources should be held to the same standard in a technology neutral manner. NV Energy sees benefit in defining momentary cessation, within the Glossary of Terms, if the SDT decides to utilize this term within revisions to PRC-024. However, we do not believe that the last sentence in this scope item is necessary for the SAR Scope. Although the sentence includes “may need,” it is understood that the SDT has flexibility to determine whether momentary cessation should be defined and whether guidance should be provided.

Item g: NV Energy recommends that this scope item be removed from the SAR Scope because we do not believe that compliance treatment for specific non-compliance violations is an appropriate element of a NERC Reliability Standard. We also believe that it is clear that all BES resources, regardless of type or technology, at a plant site should operate in line with the frequency and voltage requirements as set forth in this Reliability Standard (i.e., do

not trip within the “No Trip” zone), unless there are known regulatory or equipment limitations. In those cases, the equipment limitations are to be reported to the Planning Coordinator and Transmission Coordinator per Requirement R3. For this reason, we do not believe that this scope item is needed. The SDT may decide that implementation guidance may be appropriate to help address compliance questions; however, we do not believe that Implementation Guidance should be a SAR Scope item because it is understood that this is an option for all SDTs.	
Likes 0	
Dislikes 0	
Response	
Aaron Cavanaugh - Bonneville Power Administration - 1,3,5,6 - WECC	
Answer	Yes
Document Name	
Comment	
None	
Likes 0	
Dislikes 0	
Response	
Leonard Kula - Independent Electricity System Operator - 2	
Answer	Yes
Document Name	
Comment	
The IESO supports the clarifications proposed in the SAR	
Likes 0	
Dislikes 0	
Response	
Sandra Shaffer - Berkshire Hathaway - PacifiCorp - 6	
Answer	Yes
Document Name	
Comment	

PacifiCorp supports the SAR, as it pertains to GOs only.

Likes 0	
Dislikes 0	

Response

Tara Lightner - Sunflower Electric Power Corporation - 1 - MRO

Answer	Yes
Document Name	

Comment

We agree with the scope as long as it is implemented properly. The SAR primarily addresses inverter-based resources, but we are assuming that most of the scope would logically extend to all generators.

Likes 0	
Dislikes 0	

Response

Thomas Breene - WEC Energy Group, Inc. - 3,4,5,6

Answer	Yes
Document Name	

Comment

WEC Energy Group Comment: WEC Agrees. STD should consider adding example calculations to recently published Implementation Guidance: *PRC-024-2 R2 Generator Voltage Protective Relay Settings*

Likes 0	
Dislikes 0	

Response

Jodirah Green - ACES Power Marketing - 6, Group Name ACES Standard Collaborations

Answer	Yes
Document Name	

Comment

We agree that system events, including the Blue Cut and Canyon 2 fires in California have emphasized the likelihood that certain requirements of PRC-024-2 are being misinterpreted ,thus putting the Bulk Electric System at risk. As such, the project scope is appropriate.

Likes 0	
Dislikes 0	

Response

Amy Casuscelli - Xcel Energy, Inc. - 1,3,5,6 - MRO,WECC

Answer	Yes
Document Name	

Comment

While Xcel Energy generally supports the scope outlined in the SAR, we do have some concern regarding applicability to our traditional equipment.

Page 5 of the Gaps White paper states: "Similarly, frequency trip settings for generation resources should be set as wide as possible while still ensuring equipment protection and personnel safety to support BPS reliability. This aligns with the intent of PRC- 024-2. One possible solution could be to change the requirement such that relay settings be set based on equipment limitations but no narrower than the “No-Trip” zones.”

In regards to this statement, we do not have unit-specific frequency limits or unit-specific V/Hz damage curves in some instances. We have generally set our relays per long-standing, general OEM recommendation or by coordinating with equipment type and typical V/Hz damage curves provided by IEEE, EPRI, CIGRE, etc. Our concern if this is changed in the standard, is use of general OEM recommendations and industry typical equipment damage curves and if this would be sufficient to show compliance/due diligence with setting relays “as wide as possible”. We would like to make sure that none of the recommended changes for inverter-based generation would be detrimental to conventional generators or inconsistent with the burdens placed on conventional generators by the standard.

Likes 0	
Dislikes 0	

Response

Maryanne Darling-Reich - Black Hills Corporation - 1,3,5,6 - WECC

Answer	Yes
Document Name	

Comment

Likes 0	
Dislikes 0	

Response

Mike Smith - Manitoba Hydro - 1,3,5,6, Group Name Manitoba Hydro	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Anton Vu - Los Angeles Department of Water and Power - 1,3,5,6	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Karie Barczak - DTE Energy - Detroit Edison Company - 3,4,5, Group Name DTE Energy - DTE Electric	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thomas Foltz - AEP - 3,5	
Answer	Yes
Document Name	
Comment	

Likes 0	
Dislikes 0	
Response	
Teresa Cantwell - Lower Colorado River Authority - 1,5	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Matthew Lewis - Lower Colorado River Authority - 1,5	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Brandon McCormick - Florida Municipal Power Agency - 3,4,5,6 - FRCC, Group Name FMPA	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Richard Jackson - U.S. Bureau of Reclamation - 1,5	

Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Ruth Miller - Exelon - 1,3,5,6	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Junji Yamaguchi - Hydro-Qu?bec Production - 1,5	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Nicolas Turcotte - Hydro-Qu?bec TransEnergie - 1	
Answer	Yes
Document Name	
Comment	
Likes 0	

Dislikes 0	
Response	
Constantin Chitescu - Ontario Power Generation Inc. - 5	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Jesus Sammy Alcaraz - Imperial Irrigation District - 1,3,5,6	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Rachel Coyne - Texas Reliability Entity, Inc. - 10	
Answer	
Document Name	
Comment	
The SAR appears to addresses the majority of the solar inverter issues observed in the Blue Cut and Canyon 2 disturbances. The SAR does not, however, appear to address specific issues observed with voltage ride-through tolerances of wind generation that have been observed in ERCOT. One specific issue that has been observed in ERCOT, as well as the 2016 South Australia blackout, is wind turbine voltage ride through settings for multiple disturbances. Turbine manufacturers will set their voltage ride-through settings to disconnect or reduce turbine output if a specified number of voltage disturbances occur within a given time frame, even if the individual disturbances are within the ride-through curve. This issue was documented by NERC Events Analysis in Lesson Learned LL20170701. Technical issue #6 on page 6 of the SAR may also need to be expanded to include other types of voltage and frequency control systems within a wind turbine, specifically “smart crowbar” protective functions which can trip a turbine during transient voltage conditions. Texas RE requests the SAR include these issues.	
Likes 0	

Dislikes 0	
Response	

2. Do you agree with the Detailed Description section of the SAR? If you do not agree, or if you agree but have comments or suggestions, provide your recommendation or proposed modification below:

Kevin Salsbury - Berkshire Hathaway - NV Energy - 5	
Answer	No
Document Name	
Comment	

NV Energy submits the following as itemized comments to the SAR's Detailed Description:

Item 1: While NV Energy agrees that the region outside of the "No Trip" zone should not be interpreted as a must trip zone, we do not think that the SAR should predetermine what this region should be called and agree that the SDT should be given latitude to determine how best to address this concern. We are also concerned with the heavy emphasis on one type of resource (i.e., IBRs) within the SAR rather than addressing ambiguities affecting all resources and resource owners currently contained within PRC-024-2. While we understand the current concerns relate to IBRs, trying to resolve all misunderstandings by technology type within a Reliability Standard is not consistent with a technology neutral approach. We support the statements made by the Essential Reliability Task Force that recognized "that ERSs are technology neutral and must be provided regardless of the resource mix composition for a given operating area or Balancing Area (BA)." (see ERSTF – Concept Paper on ERS that Characterizes BPS Reliability | October 2014, page vi). From this perspective, we believe that PRC-024 should address current concerns and ambiguities broadly without focusing on specific technologies but be inclusive of considerations for IBRs.

Item 2: While NV Energy agrees that frequency cannot and should not be measured or calculated using instantaneously sampled values, clarifications may be useful to manufacturers who have less familiarity with the methods used by the industry to measure frequency. Additionally, while adding clarification may be useful, we suggest care be given to ensure those clarifications being considered do not extend into areas that might be better suited to guidelines and technical standards (such as produced by the IEEE) rather than what would be appropriate to a Reliability Standard. Moreover, issues related to this concern, as described in the Blue Cut Fire Report, were resolved by IBR manufacturers and the industry as a result of the NERC Alerts and confirmed by the Canyon 2 Report. (see our comments to Question 1, Item b)

Item 3, 4 and 5: NV Energy agrees and supports the detailed descriptions contained in these items.

Item 6: NV Energy agrees with the IRPTF that there is ambiguity related to whether IBRs are required to comply with PRC-024-2. We believe that the uncertainty is due to language contained within this Reliability Standard that only requires compliance from generator frequency and voltage protective relays and does not specifically address whether these functions embedded or emulated within generator control systems would also be required to comply with this Reliability Standard. We also agree that Footnote 1 does not clarify that protection functions contained within generator control systems are considered part of this standard. Footnote 1 simply states that GOs are not required to have frequency or voltage protective relaying installed or activated on their units. NV Energy supports clarifications to the standard to ensure that protection functions provided through other mechanisms, such as resource control systems, should be required to comply with the PRC-024 Reliability Standard. We encourage NERC and the SDT to ensure that newly added language is not technology specific and broadly addresses the reliability needs of the BES.

Likes 0	
Dislikes 0	

Response

Pamela Hunter - Southern Company - Southern Company Services, Inc. - 1,3,5,6 - SERC, Group Name Southern Company	
Answer	No
Document Name	
Comment	
The same comments to question #1 apply here.	
Likes 0	
Dislikes 0	
Response	
Charles Yeung - Southwest Power Pool, Inc. (RTO) - 2	
Answer	No
Document Name	
Comment	

The industry needs a wide and open process to substantiate the findings and confirm the solutions offered in the details of the SAR. This SAR and the NERC standards process is the first time such an open process is being offered to confirm the findings and proposed “fixes” of the IRPTF and the details in the SAR should not be interpreted as the “boundaries” of what the SDT can propose.

The PRC-024-2 Gaps White Paper is a very well written description and background reference to the problems which arose from the Blue Cut Fire and the Canyon 2 events which propelled the need for this SAR. The Detailed Description of the SAR captures what the IRPTF perceives are some of the needed clarifications to existing requirements and additional requirements to address problems exemplified from the forensic analysis of those two events. However, the SRC asks that the SAR not restrict the SDT from offering alternative solutions to what is proposed in the details of the SAR and in the GAPS whitepaper.

As one example, the standard could be revised to completely prohibit momentary cessation in the ‘No Trip’ zone for inverters not yet installed (for newer equipment which meet the new IEEE 1547 requirements). To address older inverters already installed, momentary cessation can be used in the ‘No Trip’ zone is, if that equipment has been reported as an equipment limitation as per Requirement R3.

Similar to the comment in the scope section, Bullet #1 in the description should be revised to indicate that the region outside the trip curve should reflect equipment limitations and not simply be a “May Trip” zone. Generators should provide grid support until equipment limitations are reached.

Please consider rewording the details contained in the SAR to allow for the problems to be addressed but not be read as the “only” way the issue can be addressed by the SDT.

Likes 0	
Dislikes 0	

Response

Devin Shines - PPL - Louisville Gas and Electric Co. - 3,5,6 - SERC, Group Name Louisville Gas and Electric Company and Kentucky Utilities Company

Answer	No
Document Name	

Comment

Louisville Gas and Electric Company and Kentucky Utilities Company (LG&E/KU) supports the comments submitted by the Edison Electric Institute (EEI).

Likes 0	
Dislikes 0	

Response

Mark Gray - Edison Electric Institute - NA - Not Applicable - NA - Not Applicable

Answer	No
Document Name	

Comment

Item 1: While EEI agrees that the region outside of the “No Trip” zone should not be interpreted as a must trip zone, we do not think that the SAR should predetermine what this region should be called and agree that the SDT should be given latitude to determine how best to address this concern. We are also concerned with the heavy emphasis on one type of resource (i.e., IBRs) within the SAR rather than addressing ambiguities affecting all resources and resource owners currently contained within PRC-024-2. While we understand the current concerns relate to IBRs, trying to resolve all misunderstandings by technology type within a Reliability Standard is not consistent with a technology neutral approach. We support the statements made by the Essential Reliability Task Force that recognized “that ERSs are technology neutral and must be provided regardless of the resource mix composition for a given operating area or Balancing Area (BA).” (see ERSTF – Concept Paper on ERS that Characterizes BPS Reliability | October 2014, page vi). From this perspective, we believe that PRC-024 should address current concerns and ambiguities broadly without focusing on specific technologies but be inclusive of considerations for IBRs.

Item 2: While EEI agrees that frequency cannot and should not be measured or calculated using instantaneously sampled values, clarifications may be useful to manufacturers who have less familiarity with the methods used by the industry to measure frequency. Additionally, while adding clarification may be useful, we suggest care be given to ensure those clarifications being considered do not extend into areas that might be better suited to guidelines and technical standards (such as produced by the IEEE) rather than what would be appropriate to a Reliability Standard. Moreover, issues related to this concern, as described in the Blue Cut Fire Report, were resolved by IBR manufacturers and the industry as a result of the NERC Alerts and confirmed by the Canyon 2 Report. (see our comments to Question 1, Item b)

Item 3, 4 and 5: EEI agrees and supports the detailed descriptions contained in these items.

Item 6: EEI agrees with the IRPTF that there is ambiguity related to whether IBRs are required to comply with PRC-024-2. We believe that the uncertainty is due to language contained within this Reliability Standard that only requires compliance from generator frequency and voltage protective

relays and does not specifically address whether these functions embedded or emulated within generator control systems would also be required to comply with this Reliability Standard. We also agree that Footnote 1 does not clarify that protection functions contained within generator control systems are considered part of this standard. Footnote 1 simply states that GOs are not required to have frequency or voltage protective relaying installed or activated on their units. EEI supports clarifications to the standard to ensure that protection functions provided through other mechanisms, such as resource control systems, should be required to comply with the PRC-024 Reliability Standard. We encourage NERC and the SDT to ensure that newly added language is not technology specific and broadly addresses the reliability needs of the BES.

Item 7: See EEI Comments to Items f and g under question 1 above.

Likes 0	
Dislikes 0	

Response

Douglas Webb - Great Plains Energy - Kansas City Power and Light Co. - 1,3,5,6 - MRO, Group Name Westar-KCPL

Answer	No
Document Name	

Comment

EEI submitted the following as itemized comments to the SAR's Detailed Description. The Company's response is offered in a like manner

Item 1: The Company agrees the region outside of the "No Trip" zone requires clarity; however, a SAR should not establish predetermined outcomes for the SDT. The SDT, by design, requires latitude to determine how best to address this concern. The Company believes that a broad approach or consideration for many technologies will strengthen grid operations and avoid missing a specific type of resource, but ensure inclusion of Inverter Based Resources.

The Company understands the current concerns related to IBRs, however, it holds a view that resolution of emerging issues by technology type within a Reliability Standard is not a sustainable path for the future for NERC or the industry.

The Company agrees with EEI's highlighting of the work from the Essential Reliability Task Force that recognized "…ERSs are technology neutral and must be provided regardless of the resource mix composition for a given operating area or Balancing Area (BA)." (see ERSTF – Concept Paper on ERS that Characterizes BPS Reliability | October 2014, page vi) From this perspective, PRC-024 revisions will be more effective in strengthening reliability and resilience by addressing clarifications in a broad fashion without focusing on specific technologies.

Item 2: The Company endorses EEI's comments.

Item 3, 4 and 5: The Company endorses EEI's comments.

Item 6: The Company endorses EEI's comments.

Item 7: Please see the Company's comments on items f and g.

Likes 0	
Dislikes 0	

Response

Ruida Shu - Northeast Power Coordinating Council - 1,2,3,4,5,6,7,8,9,10 - NPCC, Group Name RSC no Dominion	
Answer	No
Document Name	
Comment	

Reliability Standards should be technology neutral. The detailed description should be limited to removing ambiguity from the standard. Technical Rationale documents and/or compliance Implementation Guidance documents could be written if the drafting team determines that further explanation is needed for inverter-based generation.

We propose the following clarifications be added to the detailed description of the SAR:

The Generator Owner and/or manufacturer of the equipment should convert their phase voltage measurements to positive-sequence values. We propose that the term 'positive-sequence' be added as follows:

"If RMS, clarify that the RMS signal pertains to positive-sequence to the fundamental frequency RMS signal rather than the true RMS signal.

It is not clear what is meant by start, stop, and reset under Item 5 on page 5 of SAR. Please clarify what is meant by each position.

The region outside the trip curve should reflect equipment limitations only and not simply be a "May Trip" zone. Generators should provide grid support during disturbances until equipment limitations are reached. We propose that the detailed description clarifies that for inverters not yet installed, momentary cessation should be completely prohibited in the 'No Trip' zone. For inverters already installed, the only time momentary cessation can be used in the 'No Trip' zone is, if it has been reported as an equipment limitation as per Requirement R3.

Likes 0	
Dislikes 0	
Response	

Douglas Johnson - American Transmission Company, LLC - 1	
Answer	No
Document Name	
Comment	

American Transmission Company LLC (ATC) supports and endorses the comments submitted by the Edison Electric Institute (EEI) on behalf of the EEI member companies.

Likes 0	
Dislikes 0	
Response	

Tamara Evey - Ameren - Ameren Services - 1,3,5,7 - SERC

Answer	No
Document Name	
Comment	
Ameren agrees with and supports EEI comments for question #2.	
Likes 0	
Dislikes 0	
Response	
Thomas Breene - WEC Energy Group, Inc. - 3,4,5,6	
Answer	No
Document Name	
Comment	

3. *Point #5 in the Curve Details section of the "Voltage Ride-Through Curve Clarifications" (page 11 of PRC-024-2) states, "voltages in the curve assume minimum fundamental frequency phase to ground or phase to phase voltage for the low duration curve and the greater of maximum RMS (Root Mean Square) or crest phase to phase voltage for the high voltage duration curve." There are a number of ways this can be interpreted, and issues that need to be addressed.*

- *To minimize the probability of incorrect tripping (as noted in point 2 above), any voltage compared with the PRC-024-2 voltage ride through curves should be a well-filtered, fundamental frequency component of the voltage waveform. This will filter out spurious voltage spikes caused by switching action on the BPS. Voltage protective relays should not operate at the voltage levels specified in the voltage ride-through curve using instantaneously sampled values. The clarification should focus on using the RMS value of the voltage, and that the voltage signal should be adequately filtered to obtain this fundamental component.*

WEC Energy Group Comment: WEC Disagrees. Consider the impact of this requirement on electromechanical protective relays as they have no filtering capabilities.

Likes 0	
Dislikes 0	
Response	
Tara Lightner - Sunflower Electric Power Corporation - 1 - MRO	
Answer	No
Document Name	
Comment	

We generally agree with the detailed description. However, there appears to be some overreach or ambiguity in the way some of the detailed descriptions are written, and care must be taken to not overstep the intent of the standard.

1. OK with adding “May Trip” labels to the curves. However, the description states: *“This will enhance reliability since the generator owner, operator, developer, and equipment manufacturer will understand that the inverter protective trip settings should be based on equipment capability…”* We believe that a lot of legacy generators use settings based on “best industry practices” and not necessarily actual generator capability, and any requirement or even implication that these must be set based on generator capability could result in excessive burden attempting to determine what the actual settings should be and we believe this is outside the scope of this standard.
2. OK with adding requirement for filtering to determine frequency. Filter time needs to be a reasonable value based on industry practices or “expert” recommendations.
3. Generally supportive of clarifications. Filter time needs to be a reasonable value based on industry practices or “expert” recommendations.
4. Support using the nominal BES voltage at the point of interconnection.
5. Supportive of clarifications.
6. Supportive that standard should clearly state applicability to individual inverters encompassing both protective relay functions and control functions.
7. Supportive that clarification of the use of momentary cessation within the “No Trip” zone is in violation of the standard.

Likes 0	
Dislikes 0	

Response

Richard Vine - California ISO - 2

Answer	No
Document Name	

Comment

The California ISO supports the comments of the ISO/RTO Council Standards Review Committee (SRC)

Likes 0	
Dislikes 0	

Response

Sean Bodkin - Dominion - Dominion Resources, Inc. - 3,5,6, Group Name Dominion

Answer	No
Document Name	

Comment

Dominion Energy supports the comments of EEI regarding the details of the items included in the current SAR that should be removed from scope.

Likes 0	
Dislikes 0	

Response

Jodirah Green - ACES Power Marketing - 6, Group Name ACES Standard Collaborations

Answer	Yes
Document Name	

Comment

We agree that the deliverables outlined in the Detailed Description section support the identified Project Scope. While inverter based resources appear to be the primary focus for the revisions, we request that the potential for scope creep be closely monitored as it relates to Item 1 in the detailed description. Specifically, the language noting that inverter protective trip settings should be based on equipment capability is cause for concern. It would be overly burdensome if this issue results in traditional generation needing to conduct capability testing or produce studies to demonstrate that their trip settings are based on equipment capability.

Likes 0	
Dislikes 0	

Response

Leonard Kula - Independent Electricity System Operator - 2

Answer	Yes
Document Name	

Comment

We propose the following clarifications be added to the detailed description of the SAR:

- The Generator Owner and/or manufacturer of the equipment should convert their phase voltage measurements to positive-sequence values. We propose that the term ‘positive-sequence’ be added as follows:

“ If RMS, clarify that the RMS signal pertains to positive-sequence to the fundamental frequency RMS signal rather than the true RMS signal.

- It is not clear what is meant by start, stop, and reset under Item 5 on page 5 of SAR. Please clarify what is meant by each position.

- The region outside the trip curve should reflect equipment limitations only and not simply be a “May Trip” zone. Generators should provide grid support during disturbances until equipment limitations are reached. We propose that the detailed description clarifies that for inverters not yet installed, momentary cessation should be completely prohibited in the ‘No Trip’ zone. For inverters already installed, the only time momentary cessation can be used in the ‘No Trip’ zone is, if it has been reported as an equipment limitation as per Requirement R3.

Likes 0	
Dislikes 0	

Response

Aaron Cavanaugh - Bonneville Power Administration - 1,3,5,6 - WECC

Answer	Yes
Document Name	

Comment

Per the many discussions surrounding PRC-024 that were brought up last year, BPA is happy to see that the SAR has finally been submitted. With the scope of this SAR, issues regarding the voltage relay operating at the voltage levels in the voltage ride-through will not occur.

Likes 0	
Dislikes 0	

Response

Jesus Sammy Alcaraz - Imperial Irrigation District - 1,3,5,6

Answer	Yes
Document Name	

Comment

Likes 0	
Dislikes 0	

Response

Constantin Chitescu - Ontario Power Generation Inc. - 5

Answer	Yes
Document Name	

Comment

Likes 0	
Dislikes 0	
Response	
Amy Casuscelli - Xcel Energy, Inc. - 1,3,5,6 - MRO,WECC	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Nicolas Turcotte - Hydro-Qu?bec TransEnergie - 1	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Junji Yamaguchi - Hydro-Qu?bec Production - 1,5	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Ruth Miller - Exelon - 1,3,5,6	

Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Richard Jackson - U.S. Bureau of Reclamation - 1,5	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Brandon McCormick - Florida Municipal Power Agency - 3,4,5,6 - FRCC, Group Name FMPA	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Matthew Lewis - Lower Colorado River Authority - 1,5	
Answer	Yes
Document Name	
Comment	
Likes 0	

Dislikes 0	
Response	
Teresa Cantwell - Lower Colorado River Authority - 1,5	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Dana Klem - MRO - 1,2,3,4,5,6 - MRO, Group Name MRO NSRF	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thomas Foltz - AEP - 3,5	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Karie Barczak - DTE Energy - Detroit Edison Company - 3,4,5, Group Name DTE Energy - DTE Electric	
Answer	Yes

Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Anton Vu - Los Angeles Department of Water and Power - 1,3,5,6	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Rachel Coyne - Texas Reliability Entity, Inc. - 10	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Mike Smith - Manitoba Hydro - 1,3,5,6, Group Name Manitoba Hydro	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	

Response	
Maryanne Darling-Reich - Black Hills Corporation - 1,3,5,6 - WECC	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	

3. If you have any other comments on this SAR that you haven't already mentioned above, provide them here:

Maryanne Darling-Reich - Black Hills Corporation - 1,3,5,6 - WECC

Answer	
Document Name	

Comment

Although at this time, BHC does not have inverter-based resources within its generation fleet; some of the other gaps identified do pertain to BHC and we look forward to the clarifications that this SAR could provide.

Likes 0	
Dislikes 0	

Response

Rachel Coyne - Texas Reliability Entity, Inc. - 10

Answer	
Document Name	

Comment

Texas RE does not have additional comments.

Likes 0	
Dislikes 0	

Response

Karie Barczak - DTE Energy - Detroit Edison Company - 3,4,5, Group Name DTE Energy - DTE Electric

Answer	
Document Name	

Comment

We are in support of NERC and the industry addressing the ambiguities, inconsistencies, and technical errors as identified in this SAR.

Likes 0	
Dislikes 0	

Response

Aaron Cavanaugh - Bonneville Power Administration - 1,3,5,6 - WECC	
Answer	
Document Name	
Comment	
BPA believes that this SAR will further clarify some of the peculiar language posed in several areas. BPA is in full support of this SAR.	
Likes 0	
Dislikes 0	
Response	

Leonard Kula - Independent Electricity System Operator - 2	
Answer	
Document Name	
Comment	
The SAR should not restrict the SDT from offering alternative solutions to what is proposed in the details of the SAR and in the GAPS whitepaper. An alternative solution for consideration would be to increase the ride-through time and have inverter-based units stay connected for longer periods. Please consider rewording the details contained in the SAR to allow for the problems to be addressed but not be read as the “only” way the issue can be addressed by the SDT.	
Likes 0	
Dislikes 0	
Response	

Dana Klem - MRO - 1,2,3,4,5,6 - MRO, Group Name MRO NSRF	
Answer	
Document Name	
Comment	
The NSRF understands this is applicable to Generator Owners but does not understand the opening statement of: “…equipment manufacturers clearly understand the intent of the standard, so their plants respond to grid disturbances in a manner that contributes to the reliable operation of the bulk power system “. This does not assure that all new inverter type devices (and currently in-service inverter devices) will come from the manufacture meeting the soon to be created criteria of the new PRC-024 Standard. The SAR should also contain what Entities should do if they cannot meet this Standard based on Manufacture guidance. The current PRC-024-2 R1, bullet three gives Entities guidance on this based on equipment limitations. The NSRF recommends that this statement is maintained within the updated PRC-024. The NERC standard PRC-024 has a Standard Authorization Requirement (SAR) request that could change the scope of PRC-024 compliance. FERC, NERC, and the drafting team have identified a need to include converters / inverters in the new PRC-024 standard as a result of the Blue Cut Fire and	

Canyon 2 disturbances in southern California. However, revised language must be carefully drafted to include only those low-voltage protective device settings that could have a measurable BES electrical impact in aggregate.

PRC-024 footnote 1 is unclear should be clarified to include only electrical protective devices and clearly exclude non-electrical protective devices. We recommend that this be added to the SAR, for review.

Plant Distributed Control Systems (DCS) [i.e., collector systems] should be clarified that they are not in-scope. DCS systems weren't clearly addressed in past NERC standards including PRC-005 and PRC-024. The BES definition, Inclusion, I4, part A and B is the only source that collector systems are not in-scope. The NSRF recommends that this be addressed and could be accomplished by a simple foot note.

The NSRF also recommends the last sentence in Item 1 of the Detailed Description be removed in order to avoid scope creep and ensure application of the standard as originally intended.

Likes 0	
Dislikes 0	

Response

Sean Bodkin - Dominion - Dominion Resources, Inc. - 3,5,6, Group Name Dominion

Answer	
Document Name	

Comment

Dominion Energy supports EEI comments and supports SARs and Relaibility Standards that are technology neutral. Specific technolgies, such as inverters, should not have specific mandatory requirements. Rather, Reliability Standards should be results based so that any equipment or technology that s used by an entity has the same requirements to meet the relaibility objective.

Likes 0	
Dislikes 0	

Response

Richard Vine - California ISO - 2

Answer	
Document Name	

Comment

The California ISO supports the comments of the ISO/RTO Council Standards Review Committee (SRC)

Likes 0	
Dislikes 0	

Response

Teresa Cantwell - Lower Colorado River Authority - 1,5	
Answer	
Document Name	
Comment	
None.	
Likes 0	
Dislikes 0	
Response	
Matthew Lewis - Lower Colorado River Authority - 1,5	
Answer	
Document Name	
Comment	
None	
Likes 0	
Dislikes 0	
Response	
Thomas Breene - WEC Energy Group, Inc. - 3,4,5,6	
Answer	
Document Name	
Comment	
WEC Energy Group supports efforts to clean and clarify the standard and agrees that current standard language is synchronous generator-centric language. However, it is WEC's opinion that introducing terms that describe inverter's form of operation (e.g. momentary cessation, partial tripping, etc.) could potentially create more confusion in standard interpretation. Unless term applies to all dispersed power producing resources, it should be stated what type of dispersed power producing resources the term applies to.	
Likes 0	
Dislikes 0	
Response	

Tamara Evey - Ameren - Ameren Services - 1,3,5,7 - SERC	
Answer	
Document Name	
Comment	
Ameren agrees with and supports EEI comments for question #3.	
Likes 0	
Dislikes 0	
Response	
Ruth Miller - Exelon - 1,3,5,6	
Answer	
Document Name	
Comment	
Exelon Nuclear would like the SDT to clarify that PRC-024 is applicable only to generator frequency and generator voltage protective relays that respond to electrical quantities and directly or through lockout relays trip the generator. Footnote 1, or a different mechanism could be used to clarify that the voltage and frequency limits are not applicable to a generating plant's auxiliary equipment protection systems that could result in a generator trip (either directly or via tripping signals).	
Likes 0	
Dislikes 0	
Response	
Douglas Johnson - American Transmission Company, LLC - 1	
Answer	
Document Name	
Comment	
American Transmission Company LLC (ATC) supports and endorses the comments submitted by the Edison Electric Institute (EEI) on behalf of the EEI member companies.	
Likes 0	
Dislikes 0	
Response	

Ruida Shu - Northeast Power Coordinating Council - 1,2,3,4,5,6,7,8,9,10 - NPCC, Group Name RSC no Dominion	
Answer	
Document Name	
Comment	
The SAR should not restrict the SDT from offering alternative solutions to what is proposed in the details of the SAR and in the GAPS whitepaper. An alternative solution for consideration would be to increase the ride-through time and have inverter-based units stay connected for longer periods. Please consider rewording the details contained in the SAR to allow for the problems to be addressed but not be read as the “only” way the issue can be addressed by the SDT.	
Likes 0	
Dislikes 0	
Response	
Douglas Webb - Great Plains Energy - Kansas City Power and Light Co. - 1,3,5,6 - MRO, Group Name Westar-KCPL	
Answer	
Document Name	
Comment	
The Company endorses EEI’s response to Question 3.	
Likes 0	
Dislikes 0	
Response	
Junji Yamaguchi - Hydro-Qu?bec Production - 1,5	
Answer	
Document Name	
Comment	
Hydro-Quebec has had an issue since 2009 with the LVRT curve. The technical requirements for the connection of generating stations to the Hydro-Quebec Transmission System (Grid Code), as adopted by the Regulator in Quebec, show a LVRT curve that is different from what PRC-024-2 requires (attachment 2). The LVRT requirement reflects the specific needs to ensure reliability of the Quebec Interconnection, taking into account the conventional and non-conventional generation. The LVRT curve was established in response to FERC Order No. 661-A issued on December 12, 2005, which considered the integration of wind generation. Thus, Hydro-Quebec requests to add this item into this SAR for PRC-024-2.	
Likes 0	

Dislikes 0	

Response

Mark Gray - Edison Electric Institute - NA - Not Applicable - NA - Not Applicable

Answer	
Document Name	

Comment

EEI agrees that IBRs present new challenges that are specific to the manner and method by which they operate and support the BES. We believe that changes to the affected Reliability Standards can be accomplished in a manner that is technology neutral. From this perspective, we recommend that in efforts to improve the SAR, NERC consider avoiding language that may push the SDT into a direction that changes how Reliability Standards are written. We believe that the goal for PRC-024 modifications should be to ensure that resources, regardless of the type, operate in a manner that ensures all resources remain connected (within their technical limits) during defined frequency and voltage excursions regardless of how the resource protection functions are effectuated.

Likes 0	
Dislikes 0	

Response

Jodirah Green - ACES Power Marketing - 6, Group Name ACES Standard Collaborations

Answer	
Document Name	

Comment

In finalizing the SAR, consider benefits to clarity of including a discussion of the frequency bands associated with other NERC standards, for example PRC-006-3 R3. The PRC-006-3 requirement includes a frequency bandwidth less than 60.7 and greater than 59.3 (Eastern Interconnection), while PRC-024 includes a continuous operation bandwidth greater than 59.5 and less than 60.5 (Eastern Interconnection). Although the bandwidths associated with the two standards may address different underlying concerns, clarifying language in PRC-024, could eliminate confusion across the industry with regards to the differences.

The SAR may also want to consider potential impacts on traditional generation (as opposed to solar, wind, battery storage, etc.), if the requirements of PRC-024 are revised to be overly specific.

Likes 0	
Dislikes 0	

Response

Nicolas Turcotte - Hydro-Qu?bec TransEnergie - 1

Answer	

Document Name	

Comment

Hydro-Quebec has had an issue since 2009 with the LVRT curve. The LVRT requirement specific to Quebec reflects the specific needs to ensure reliability of the Quebec Interconnection, taking into account the conventional and non-conventional generation and whether or not the generating facilities are connected or not to the main transmission system. This situation is problematic for the Transmission Owner at Hydro-Quebec therefore, Hydro-Quebec requests to add this item into this SAR for PRC-024-2.

Likes 0	
Dislikes 0	

Response

Devin Shines - PPL - Louisville Gas and Electric Co. - 3,5,6 - SERC, Group Name Louisville Gas and Electric Company and Kentucky Utilities Company

Answer	
Document Name	

Comment

Louisville Gas and Electric Company and Kentucky Utilities Company (LG&E/KU) supports the comments submitted by the Edison Electric Institute (EEI). Additionally, LG&E/KU have comments on the proposed revisions to PRC-024-2 as set forth below.

LG&E/KU believes the proposed revisions to PRC-024-2 may be unnecessary for a number of reasons.

- First, viewed from a broad policy perspective, this SAR appears reactionary to events that produced issues in a single, particular region. The Project Background states that the issues at hand were identified by the Inverter-Based Resource Performance Task Force (IRPTF) while analyzing the Blue Cut and Canyon 2 fires in southern California.

  NERC summarizes the purpose and characteristics of Regional Reliability Standards on its own website, saying: “Regional Reliability Standards shall provide for as much uniformity as possible relative to NERC Reliability Standards across the interconnected bulk power system of the North American continent. A regional Reliability Standard shall be more stringent than a continent-wide Reliability Standard, including a regional difference that addresses matters that the continent wide Reliability Standard does not, or shall be a regional difference necessitated by a physical difference in the bulk power system.”

  The results of wildfires are inarguably devastating, and the investigations and analyses that contribute to ensuring Reliability during these instances are inherently valuable. However, we believe that the issues the IRPTF identified as problematic may be more effectively addressed within that region specifically, rather than applying what may be inapplicable or unnecessary requirements to the industry as a whole. LG&E/KU suggest NERC carefully consider whether or which potential revisions to PRC-024-2 are properly industry-wide, rather than targeted for regional needs.

- Second, as detailed by EEI’s comments, we believe that points included in the SAR Scope requesting clarification are unnecessary due to Implementation Guidance recently endorsed by NERC on January 3, 2019. Further clarification of Requirement R2 should be unnecessary given the timeliness of the recent guidance.

Likes 0	

Dislikes 0	
Response	
Kevin Salsbury - Berkshire Hathaway - NV Energy - 5	
Answer	
Document Name	
Comment	
NV Energy agrees that IBRs present new challenges that are specific to the manner and method by which they operate and support the BES. We believe that changes to the affected Reliability Standards can be accomplished in a manner that is technology neutral. From this perspective, we recommend that in efforts to improve the SAR, NERC consider avoiding language that may push the SDT into a direction that changes how Reliability Standards are written. We believe that the goal for PRC-024 modifications should be to ensure that resources, regardless of the type, operate in a manner that ensures all resources remain connected (within their technical limits) during defined frequency and voltage excursions regardless of how the resource protection functions are effectuated.	
Likes 0	
Dislikes 0	
Response	