

Consideration of Comments

Project Name: 2019-04 Modifications to PRC-005-6 | Standard Authorization Request (Fourth Posting)
Comment Period Start Date: 7/27/2021
Comment Period End Date: 8/25/2021

There were 39 sets of responses, including comments from approximately 123 different people from approximately 90 companies representing 10 of the Industry Segments as shown in the table on the following pages.

All comments submitted can be reviewed in their original format on the [project page](#).

If you feel that your comment has been overlooked, please let us know immediately. Our goal is to give every comment serious consideration in this process. If you feel there has been an error or omission, contact Vice President, Engineering and Standards [Howard Gugel](#) (via email) or at (404) 446-9693.

Questions

1. [Based on comments, the SAR DT team revised the scope of the original SAR to be more comprehensive of industry concerns with PRC-005. Do you agree that the scope as described above would allow the future SDT to thoroughly assess issues with PRC-005 and present them along with possible solutions to industry during the standards development phase of the project? If not, please provide your detailed thoughts.](#)

Summary Response

Per the standards development process, the SAR was posted and a SAR Drafting Team was formed to consider the comments received from industry and modify the SAR as appropriate to establish the project scope (parameters of work) for the future standing drafting team. In response to industry comments from four postings for the SAR, the SAR Drafting Team revised the project scope. Based on comments received by industry, the SAR Drafting Team revised the scope of the original SAR to be more comprehensive of industry concerns with PRC-005. The scope of the SAR allows the future Standard Drafting Team to thoroughly assess issues with PRC-005 and present them along with possible solutions to industry during the standards development phase of the project.

The SAR Drafting Team has the responsibility of outlining the scope within which the future Standard Drafting Team operates. Additionally, the SAR and future Standard Drafting Teams are tasked with producing quality standards centered around the risk to the Bulk Electric System, not around specific technologies such as synchronous generator excitation systems. Since failing to maintain protection systems embedded in control systems presents the same risk to the BES regardless of the control system in question (synchronous generator excitation system or otherwise), the scope was expanded to ensure the future Standard Drafting Team has all the available tools to create a standard which meets the quality and intent of NERC standards. This was based on industry comments, in addition to the desire to produce quality standards.

In June of 2016, Xcel Energy submitted a Request for Interpretation¹ (RFI) to NERC seeking clarification on what equipment should be included in the scope of an entity's Protection System Maintenance Program relative to NERC Reliability Standard PRC-005-6. Xcel Energy noted that many modern generator excitation systems have the capability to respond to electrical quantities and initiate trip signals to either the

¹[Xcel_RFI_PRC-005-6](#)

generator lockout or generator output breaker. Xcel Energy asked whether a protection function (if enabled) that is embedded in a generator's excitation system or voltage regulator would meet the definition of Protection System, and therefore be included in the scope of PRC-005-6. The RFI was rejected by the NERC Standards Committee at the recommendation of NERC staff, the standards developer, and leadership of the PRC-005-6 drafting team for the following reason:

"The generator excitation systems and voltage regulators described in Xcel Energy's RFI are capable of monitoring electrical quantities, such as voltage or current, and responding to those quantities, by causing a trip of the generator in response to these signals. Therefore, it is clear that these embedded protective functions, if enabled, would be included in the scope of Reliability Standard PRC-005-6 as set out in the Applicability section of the standard."

Despite this perceived clarity, the North American Generator Forum (NAGF) received feedback from members indicating that significant confusion still remains throughout the industry regarding the applicability of protective functions inside synchronous generator excitation systems to PRC-005. Consequently, in May 2019, the NAGF submitted a SAR to NERC requesting revisions be made to PRC-005-6 that would provide clear and unambiguous language within the standard pertaining to the applicability of protective functions within an Automatic Voltage Regulators (AVR) and any maintenance requirements (activities and intervals) associated with those protective functions.

Generator excitation systems and voltage regulators may have imbedded protective functions and are capable of monitoring BES electrical quantities, such as voltage or current, and responding to those quantities, by causing a trip of the generator in response to these signals in the same manner as a protective relay. Therefore, if the embedded protective functions are enabled, they are already included in the scope of Reliability Standard PRC-005-6 as set out in the Applicability section of the standard (refer to Standard Committee's answer to the 2016 RFI by Xcel Energy). The SAR is seeking further clarification that the enabled protective functions are applicable to the standard in order to help the industry and ensure a reliable BES. Protective Relays and Protective Functions within the excitation system and voltage regulators are indeed coordinated with the limiters via PRC-019, but PRC-019 is not a maintenance standard.

The current maintenance tables in PRC-005-6 contain activities for traditional batteries and for alternative non-battery DC supplies. The intent of the SAR Drafting Team is to give the future Standards Drafting Team the ability to include maintenance activities for alternative battery DC supplies for Protection Systems (e.g., lithium ion, flow).

It is important to note that the SAR scope does not cover the complete control systems; but rather the specific BES protective functions, wherever they may reside. The SAR scope includes BES protective functions already identified in the PRC-005-6 FAQ (pages 38-39), regardless of the system in which they are deployed (relay or otherwise). The deviation from exclusively synchronous generator excitation systems was

necessary to maintain neutrality in regard to different types of generation or transmission assets, and to produce a quality standard based on risk presented to the BES regardless of the system in which protective functions are deployed.

Entities registered as UFLS-only DPs have PRC-005-applicable Protection Systems, but are not expressly listed as Applicable Entities in Section 4.1. UFLS-only DPs should be added to the Applicability section to avoid any confusion and to be consistent with the FERC-approved Risk-Based Registration (RBR) changes. The inclusion of this within the scope of the SAR is a carry-over from the Project 2017-07 Standards Alignment with Registration.

From page 98 of Supplementary Reference and FAQ PRC-005-6 Protection System, Automatic Reclosing, and Sudden Pressure Relaying Maintenance and Testing: “While UFLS and UVLS equipment are located on the distribution network, their job is to protect the Bulk Electric System. This is not beyond the scope of NERC’s Section 215 authority. FPA section 215(a) definitions section defines bulk power system as: “(A) facilities and control Systems necessary for operating an interconnected electric energy transmission network (or any portion thereof).” That definition, then, is limited by a later statement which adds the term bulk power system “...does not include facilities used in the local distribution of electric energy.” Also, Section 215 also covers users, owners, and operators of bulk power Facilities. UFLS and UVLS (when the UVLS is installed to prevent system voltage collapse or voltage instability for BES reliability) are not “used in the local distribution of electric energy,” despite their location on local distribution networks. Further, if UFLS/UVLS Facilities were not covered by the reliability standards, then in order to protect the integrity of the BES during under- frequency or under-voltage events, that Load would have to be shed at the Transmission bus to ensure the Load-generation balance and voltage stability is maintained on the BES.”

All comments received from each posting of the SAR regarding the preferred direction of the future Standard Drafting Team have been well documented and will be provided to the future Standard Drafting Team to provide industry input into the direction of that team.

The Industry Segments are:

- 1 — Transmission Owners
- 2 — RTOs, ISOs
- 3 — Load-serving Entities
- 4 — Transmission-dependent Utilities
- 5 — Electric Generators
- 6 — Electricity Brokers, Aggregators, and Marketers
- 7 — Large Electricity End Users
- 8 — Small Electricity End Users
- 9 — Federal, State, Provincial Regulatory or other Government Entities
- 10 — Regional Reliability Organizations, Regional Entities

Organization Name	Name	Segment(s)	Region	Group Name	Group Member Name	Group Member Organization	Group Member Segment(s)	Group Member Region
BC Hydro and Power Authority	Adrian Andreoiu	1,3,5	WECC	BC Hydro	Hootan Jarollahi	BC Hydro and Power Authority	3	WECC
					Helen Hamilton Harding	BC Hydro and Power Authority	5	WECC
					Adrian Andreoiu	BC Hydro and Power Authority	1	WECC
Southwest Power Pool, Inc. (RTO)	Charles Yeung	2	SPP RE	SRC PRC005	Helen Lainis	IESO	1	NPCC
					Greg Campoli	NYISO	1	NPCC
					Dave Zwergel	MISO	2	MRO
					Charles Yeung	SPP	1	MRO
					Matt Goldberg	ISONE	1	NPCC
					Matt Goldberg	ISONE	1	NPCC
Tacoma Public Utilities (Tacoma, WA)	Jennie Wike	1,3,4,5,6	WECC	Tacoma Power	Jennie Wike	Tacoma Public Utilities	1,3,4,5,6	WECC
					John Merrell	Tacoma Public Utilities (Tacoma, WA)	1	WECC
					Marc Donaldson	Tacoma Public Utilities (Tacoma, WA)	3	WECC

Organization Name	Name	Segment(s)	Region	Group Name	Group Member Name	Group Member Organization	Group Member Segment(s)	Group Member Region
					Hien Ho	Tacoma Public Utilities (Tacoma, WA)	4	WECC
					Terry Gifford	Tacoma Public Utilities (Tacoma, WA)	6	WECC
					Ozan Ferrin	Tacoma Public Utilities (Tacoma, WA)	5	WECC
MRO	Kendra Buesgens	1,2,3,4,5,6	MRO	MRO NSRF	Bobbi Welch	Midcontinent ISO, Inc.	2	MRO
					Christopher Bills	City of Independence Power & Light	4	MRO
					Fred Meyer	Algonquin Power Co.	1	MRO
					Jamie Monette	Allete - Minnesota Power, Inc.	1	MRO
					Jodi Jensen	Western Area Power Administration - Upper Great Plains East (WAPA)	1,6	MRO

Organization Name	Name	Segment(s)	Region	Group Name	Group Member Name	Group Member Organization	Group Member Segment(s)	Group Member Region
					John Chang	Manitoba Hydro	1,3,6	MRO
					Larry Heckert	Alliant Energy Corporation Services, Inc.	4	MRO
					Marc Gomez	Southwestern Power Administration	1	MRO
					Matthew Harward	Southwest Power Pool, Inc.	2	MRO
					LaTroy Brumfield	American Transmission Company, LLC	1	MRO
					Bryan Sherrow	Kansas City Board Of Public Utilities	1	MRO
					Terry Harbour	MidAmerican Energy	1,3	MRO
					Jamison Cawley	Nebraska Public Power	1,3,5	MRO
					Seth Shoemaker	Muscatine Power & Water	1,3,5,6	MRO

Organization Name	Name	Segment(s)	Region	Group Name	Group Member Name	Group Member Organization	Group Member Segment(s)	Group Member Region
					Michael Brytowski	Great River Energy	1,3,5,6	MRO
					Jeremy Voll	Basin Electric Power Cooperative	1,3,5	MRO
					Joe DePoorter	Madison Gas and Electric	4	MRO
					David Heins	Omaha Public Power District	1,3,5,6	MRO
					Bill Shultz	Southern Company Generation	5	MRO
Duke Energy	Kim Thomas	1,3,5,6	FRCC,RF,SERC,Texas RE	Duke Energy	Laura Lee	Duke Energy	1	SERC
					Dale Goodwine	Duke Energy	5	SERC
					Greg Cecil	Duke Energy	6	RF
FirstEnergy - FirstEnergy Corporation	Mark Garza	1,3,4,5,6		FE Voter	Julie Severino	FirstEnergy - FirstEnergy Corporation	1	RF
					Aaron Ghodooshim	FirstEnergy - FirstEnergy Corporation	3	RF
					Robert Loy	FirstEnergy - FirstEnergy Solutions	5	RF

Organization Name	Name	Segment(s)	Region	Group Name	Group Member Name	Group Member Organization	Group Member Segment(s)	Group Member Region
					Ann Carey	FirstEnergy - FirstEnergy Solutions	6	RF
					Mark Garza	FirstEnergy-FirstEnergy	4	RF
Southern Company - Southern Company Services, Inc.	Pamela Hunter	1,3,5,6	SERC	Southern Company	Matt Carden	Southern Company - Southern Company Services, Inc.	1	SERC
					Joel Dembowski	Southern Company - Alabama Power Company	3	SERC
					Ron Carlsen	Southern Company - Southern Company Generation	6	SERC
					Jim Howell	Southern Company - Southern Company Services, Inc. - Gen	5	SERC

Organization Name	Name	Segment(s)	Region	Group Name	Group Member Name	Group Member Organization	Group Member Segment(s)	Group Member Region
Northeast Power Coordinating Council	Ruida Shu	1,2,3,4,5,6,7,8,9,10	NPCC	NPCC Regional Standards Committee	Guy V. Zito	Northeast Power Coordinating Council	10	NPCC
					Randy MacDonald	New Brunswick Power	2	NPCC
					Glen Smith	Entergy Services	4	NPCC
					Alan Adamson	New York State Reliability Council	7	NPCC
					David Burke	Orange & Rockland Utilities	3	NPCC
					Helen Lainis	IESO	2	NPCC
					David Kiguel	Independent	7	NPCC
					Nick Kowalczyk	Orange and Rockland	1	NPCC
					Joel Charlebois	AESI - Acumen Engineered Solutions International Inc.	5	NPCC

Organization Name	Name	Segment(s)	Region	Group Name	Group Member Name	Group Member Organization	Group Member Segment(s)	Group Member Region
					Mike Cooke	Ontario Power Generation, Inc.	4	NPCC
					Salvatore Spagnolo	New York Power Authority	1	NPCC
					Shivaz Chopra	New York Power Authority	5	NPCC
					Deidre Altobell	Con Ed - Consolidated Edison	4	NPCC
					Dermot Smyth	Con Ed - Consolidated Edison Co. of New York	1	NPCC
					Peter Yost	Con Ed - Consolidated Edison Co. of New York	3	NPCC
					Cristhian Godoy	Con Ed - Consolidated Edison Co. of New York	6	NPCC

Organization Name	Name	Segment(s)	Region	Group Name	Group Member Name	Group Member Organization	Group Member Segment(s)	Group Member Region
					Nurul Abser	NB Power Corporation	1	NPCC
					Randy MacDonald	NB Power Corporation	2	NPCC
					Michael Ridolfino	Central Hudson Gas and Electric	1	NPCC
					Vijay Puran	NYSPS	6	NPCC
					ALAN ADAMSON	New York State Reliability Council	10	NPCC
					Sean Cavote	PSEG - Public Service Electric and Gas Co.	1	NPCC
					Brian Robinson	Utility Services	5	NPCC
					Quintin Lee	Eversource Energy	1	NPCC
					Jim Grant	NYISO	2	NPCC
					John Pearson	ISONE	2	NPCC
					Nicolas Turcotte	Hydro-Quebec TransEnergie	1	NPCC
					Chantal Mazza	Hydro-Quebec	2	NPCC

Organization Name	Name	Segment(s)	Region	Group Name	Group Member Name	Group Member Organization	Group Member Segment(s)	Group Member Region
					Michele Tondalo	United Illuminating Co.	1	NPCC
					Paul Malozewski	Hydro One Networks, Inc.	3	NPCC
					Sean Bodkin	Dominion - Dominion Resources, Inc.	6	NPCC
					John Hastings	National Grid	1	NPCC
					Michael Jones	National Grid USA	1	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
					Rachel Snead	Dominion - Dominion	5	NA - Not Applicable

Organization Name	Name	Segment(s)	Region	Group Name	Group Member Name	Group Member Organization	Group Member Segment(s)	Group Member Region
						Resources, Inc.		
OGE Energy - Oklahoma Gas and Electric Co.	Sing Tay	1,3,5,6	SPP RE	OKGE	Sing Tay	OGE Energy - Oklahoma	6	MRO
					Terri Pyle	OGE Energy - Oklahoma Gas and Electric Co.	1	MRO
					Donald Hargrove	OGE Energy - Oklahoma Gas and Electric Co.	3	MRO
					Patrick Wells	OGE Energy - Oklahoma Gas and Electric Co.	5	MRO

1. Based on comments, the SAR DT team revised the scope of the original SAR to be more comprehensive of industry concerns with PRC-005. Do you agree that the scope as described above would allow the future SDT to thoroughly assess issues with PRC-005 and present them along with possible solutions to industry during the standards development phase of the project? If not, please provide your detailed thoughts.

Israel Perez - Salt River Project - 1,3,5,6 - WECC

Answer No

Document Name

Comment

SRP does not agree with considering a voltage regulator a protective rely in purview of PRC-005. The excitation system is a generator control system and the imbedded enabled “protective” functions, if any are enabled, should not be categorized the same as protective relays. Relyas are coordinated to the exciters via PRC-019.

Likes 1 Platte River Power Authority, 5, Archie Tyson

Dislikes 0

Response

Thank you for the comment. Generator excitation systems and voltage regulators may have imbedded protective functions and are capable of monitoring BES electrical quantities, such as voltage or current, and responding to those quantities, by causing a trip of the generator in response to these signals in the same manner as a protective relay. Therefore, if the embedded protective functions are enabled, they are already included in the scope of Reliability Standard PRC-005-6 as set out in the Applicability section of the standard (refer to Standard Committee’s answer to the 2016 RFI by Xcel Energy). The SAR is seeking further clarification that the enabled protective functions are applicable to the standard in order to help the industry and ensure a reliable BES. Protective Relays and Protective Functions within the excitation system and voltage regulators are indeed coordinated with the limiters via PRC-019, but PRC-019 is not a maintenance standard.

Donna Wood - Tri-State G and T Association, Inc. - 1,3,5

Answer	No
Document Name	
Comment	
<p>Tri-State agrees with the need to clarify that the BES protective functions enabled within analog/digital AVRs, and excitation systems are within the scope of the standard however, the phrase “or via lockout or auxiliary tripping relays” should be removed. The scope should be limited to only what can directly trip the BES element. Also, there needs to be specific detail around the “BES protective functions enabled within control systems” phrase. This is too vague and will lead to more confusion.</p> <p>Tri-State agrees with the inclusion of new DC supplies (e.g., lithium ion, flow) for Protection Systems in the maintenance tables.</p> <p>We are concerned with including entities registered as UFLS-Only Distribution Providers in the Applicability section. Modifying the applicability for this standard only will create confusion for the UFLS only Distribution Providers. Instead we recommend all applicable standards be updated at the same time.</p>	
Likes 0	
Dislikes 0	
Response	
<p>Thank you for your comment. The SAR Drafting Team maintained wording consistent with the existing PRC-005-6 standard, which makes no distinction between direct tripping and tripping via lockout or auxiliary relays. It is important to note that the SAR scope does not cover the complete control systems; but rather the specific BES protective functions, wherever they may reside. The SAR scope includes BES protective functions already identified in the PRC-005-6 FAQ (pages 38-39), regardless of the system in which they are deployed (relay or otherwise). The SAR Drafting Team agrees that specific detail is needed primarily around the term BES protective functions, as this is what ultimately determines the scope of PRC-005. This will be addressed by the future Standards Drafting Team (within the limitations of response to measured BES quantities) and in continuity with the existing FAQ pg. 38-39.</p> <p>Entities registered as UFLS-only DPs have PRC-005-applicable Protection Systems, but are not expressly listed as Applicable Entities in Section 4.1. UFLS-only DPs should be added to the Applicability section to avoid any confusion and to be consistent with the FERC-</p>	

approved RBR changes. The inclusion of this within the scope of the SAR is a carry-over from the Project 2017-07 Standards Alignment with Registration.

From page 98 of Supplementary Reference and FAQ PRC-005-6 Protection System, Automatic Reclosing, and Sudden Pressure Relaying Maintenance and Testing: “While UFLS and UVLS equipment are located on the distribution network, their job is to protect the Bulk Electric System. This is not beyond the scope of NERC’s Section 215 authority. FPA section 215(a) definitions section defines bulk power system as: “(A) facilities and control Systems necessary for operating an interconnected electric energy transmission network (or any portion thereof).” That definition, then, is limited by a later statement which adds the term bulk power system “...does not include facilities used in the local distribution of electric energy.” Also, Section 215 also covers users, owners, and operators of bulk power Facilities. UFLS and UVLS (when the UVLS is installed to prevent system voltage collapse or voltage instability for BES reliability) are not “used in the local distribution of electric energy,” despite their location on local distribution networks. Further, if UFLS/UVLS Facilities were not covered by the reliability standards, then in order to protect the integrity of the BES during under- frequency or under-voltage events, that Load would have to be shed at the Transmission bus to ensure the Load-generation balance and voltage stability is maintained on the BES.”

Marty Hostler - Northern California Power Agency - 3,4,5,6

Answer

No

Document Name

Comment

No changes to the standard are necessary. AVRs should stay out of scope.

Likes 0

Dislikes 0

Response

Thank you for the comment. Generator excitation systems and voltage regulators may have imbedded protective functions and are capable of monitoring BES electrical quantities, such as voltage or current, and responding to those quantities, by causing a trip of the

generator in response to these signals in the same manner as a protective relay. Therefore, if the embedded protective functions are enabled, they are already included in the scope of Reliability Standard PRC-005-6 as set out in the Applicability section of the standard (refer to Standard Committee’s answer to the 2016 RFI by Xcel Energy). The SAR is seeking further clarification that the enabled protective functions are applicable to the standard in order to help the industry and ensure a reliable BES.

Thomas Foltz - AEP - 3,5,6

Answer

No

Document Name

Comment

For reasons expressed in the previous comment period, AEP once again strongly encourages the Standards Drafting Team to abandon the scope, direction, and path proposed in the most recent versions of this SAR, and to instead pursue the objective, scope, and direction as originally proposed in the first draft of the SAR presented to industry in July 2019. While the word “other” has indeed been struck from “other control systems” in the latest SAR draft, the phrase “control systems” remains and is still too broad for this standard. The initial SAR was clearly and appropriately addressing protective functions within the AVRs themselves, however the most recently-revised SARs inclusion of the phrase “control systems”, and the lack of boundaries and specifics that phrase infers, not only expands the scope but essentially changes the intended purpose of PRC-005. Not only would the inclusion change the intention and purpose of this standard, but it would also be detrimental to the synergy in which PRC-005 integrates-with and relates-to other standards.

While the “Background Information” section of the project comment forms continue to reference the efforts-of and authorship-by the North American Generator Forum on the proposed SAR, it should be noted that only the very first draft of the SAR was fully authored by these subject matter experts. Since then, the SAR has been rewritten by the Standard Drafting Team in a way that AEP believes deviates from both the spirit and intent of its original authors, and which in turn, would fundamentally change the intended purpose of PRC-005. In fact, the NAGF in their previously submitted comments state that they could “no longer support” the second re-draft of the SAR. AEP believes the original SAR suggested valid, potential improvements to PRC-005, but their pursuit is being prevented by augmenting the original SAR with more expansive and undefined elements. While AEP has chosen in this comment period to not provide the entirety of our concerns expressed in *previous* comment periods, those comments still stand.

Despite our objections to the current SAR, AEP indeed appreciates the efforts of this Standard Drafting Team, and we hope they will consider the alternative approach that we have suggested, and as originally authored by the North American Generator Forum.

Likes 1	Platte River Power Authority, 5, Archie Tyson
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Dislikes 0	
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Response

Thank you for your comments. It is important to note that the SAR scope does not cover the complete control systems; but rather the specific BES protective functions, wherever they may reside. The SAR scope includes BES protective functions already identified in the PRC-005-6 FAQ (pages 38-39), regardless of the system in which they are deployed (relay or otherwise). The SAR Drafting Team finds that specific detail is needed primarily around the term BES protective functions, as this is what ultimately determines the scope of PRC-005. This will be addressed by the future Standards Drafting Team (within the limitations of response to measured BES quantities) and in continuity with the existing FAQ pg. 38-39. The consideration of protective functions outside of traditional relays has been implemented or proposed in other PRC standards (see PRC-024-3 and Project 2021-01) to maintain standards which are based on risk to the BES regardless of the technology, and the SAR Drafting Team has an obligation to do the same.

Based on comments received by industry, the SAR Drafting Team revised the scope of the original SAR to be more comprehensive of industry concerns with PRC-005. The scope of the SAR allows the future SDT to thoroughly assess issues with PRC-005 and present them along with possible solutions to industry during the standards development phase of the project.

Lenise Kimes - City and County of San Francisco - 1 - WECC

Answer	No
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Document Name	
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Comment

The introduction and installation of digital excitation systems (e.g. Emerson’s Ovation Excitation System) that integrate excitation controller, automatic voltage regulation, power system stabilizer, sensors and protection functions with various multi-function modules and software are quickly blurring the line between control and protection. Many of these newer systems are completely run by software. They lack the conventional paradigm of a standalone excitation system equipped with an AVR/PSS, voltage and current sensors, and separate protective relays. How do you practically separate the protection functions from the control function when they share the same

CPU and software? Minimum maintenance requirements for these microprocessor-controlled hybrid systems and software needs to be specifically addressed. The Supplementary and FAQ need to provide recommendations for how these systems can be efficiently verified and tested to meet reliability standards.

Additionally, the current version of PRC-005-6 is silent when it comes to addressing the increasing penetration of Distributed Energy Resources (renewables) and their effect on the BES. Most concerning is the lack of specific maintenance information with regards to inverter-based frequency support functions and large battery storage systems—both of which can help or hinder the BES during an event. States such as California are mandating the joining of flow type batteries with renewables to supplement energy demand as the sun goes down or to potentially help stabilize the grid.

Islanding of these Utility Scale projects makes the grid less resilient and hence less reliable. Minimum maintenance activities for Utility Scale Solar and Wind projects’ protection systems need to be addressed before these type projects make larger penetration of the grid. Additionally, Utility Scale renewable projects are being paired with large scale flow type battery storage systems. The current PRC-005-6 completely ignores this huge stored energy reservoir and the minimum maintenance required to keep this storage system reliable. Finally, Solar and storage battery inverters can positively or negatively affect the frequency of the BES. PRC-005-6 does not address this unique situation and the minimum maintenance required for these devices.

Likes 0

Dislikes 0

Response

Thank you for your comments. The SAR Drafting Team agrees that protective functions within control systems often share resources with control functions, and this will need to be considered when the future Standard Drafting Team specifies the maintenance requirements. Those concerns will be forwarded to the future Standard Drafting Team. The future Standard Drafting Team will also have the responsibility of updating the Supplementary and FAQ documents.

The SAR scope includes BES protective functions already identified in the PRC-005-6 FAQ (pages 38-39), regardless of the system in which they are deployed (relay or otherwise). The SAR Drafting Team determined that specific detail is needed primarily around the term BES protective functions, as this is what ultimately determines the scope of PRC-005 and draws the line between control and protection as these systems become more and more integrated. This will be addressed by the future Standards Drafting Team (within the limitations of response to measured BES quantities) and in continuity with the existing FAQ pg. 38-39.

The SAR scope includes inverter-based resources at their point of aggregation of 75 MVA or greater, which is consistent with the existing PRC-005-6 standard. This is because the likelihood of many individual resources failing simultaneously is small. However those Protection Systems which can interrupt the BES level MVA would present significant risk if not properly maintained. The loss of many individual resources would more likely be caused by improper settings, as they are likely duplicated in the individual resources. This risk is addressed in generator settings standards such as PRC-019, 024, and 025.

The SAR Drafting Team understands the concern regarding inverters for battery storage systems. However, the SAR Drafting team finds that a separate SAR that addresses this issue more holistically (not just dealing with Protection System maintenance) would be more appropriate if the entity wishes to pursue that route.

Daniela Atanasovski - APS - Arizona Public Service Co. - 1,3,5,6

Answer	No
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Document Name	
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Comment

AZPS appreciates the SDT’s consideration of its comments to previous versions of the SAR.

AZPS recognizes that the SDT’s proposed changes create more certainty regarding the scope of the SAR. AZPS provides the following recommendations to further clarify the intent:

- The term “control system” is too broad and should be limited to specific systems.
- The term “BES electrical quantities” should be defined as or limited to generator/line or neutral voltage and generator/line or neutral current.
- The term “BES protective function” as applied to these other control systems should be limited to those ANSI defined protective functions typically found in generator protection relays.

Additionally, AZPS requests that further clarification be added to the “Industry Need” section of the SAR to further explain the BES reliability benefit of the SAR. Additionally, because the SAR proposes to bring secondary or tertiary protection into scope, it may have the unintended consequence of encouraging entities to disable these functions, negatively impacting overall reliability.

Likes 0	
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Dislikes	0
Response	
<p>Thank you for your comment. It is important to note that the SAR scope does not cover the complete control systems; but rather the specific BES protective functions, wherever they may reside. The SAR scope includes BES protective functions already identified in the PRC-005-6 FAQ (pages 38-39), regardless of the system in which they are deployed (relay or otherwise). The SAR Drafting Team agrees that specific detail is needed primarily around the term BES protective functions, as this is what ultimately determines the scope of PRC-005. This will be addressed by the future Standards Drafting Team (within the limitations of response to measured BES quantities) and in continuity with the existing FAQ pg. 38-39, as you have suggested. The future Standard Drafting Team will additionally have the responsibility of clarifying the BES electrical quantities in continuity with the PRC-005-6 FAQ and the BES Definition Guidance Document. Your suggestion will be forwarded to that team.</p> <p>The SAR Drafting Team seeks to add clarity and the primary risk being addressed is the misinterpretation of the existing guidance provided by the Standards Committee in their response to the 2016 RFI submitted by Xcel Energy. Lastly, the scope of PRC-005-6 does not consider redundancy of protection (secondary or tertiary), and the SAR Drafting Team is not proposing this change. The risk of BES protective functions failing and tripping unnecessarily is not mitigated by redundant protective relays. Additionally, data regarding the frequency of these types of misoperations is not available due to the lack of clarity as to whether these functions meet the definition of a Protection System (and therefore are subject to PRC-004 and its associated Section 1600 data request). The SAR Drafting Team considers the risk and probability of unmaintained protective functions causing Misoperations to be the same as the risk of unmaintained protective relays because they provide the same function and outcome. While the likelihood of a single transmission line misoperating due to a protective relay is both small and of minimal impact, the industry has already generally agreed that it is great enough to justify the existence of PRC-005. The SAR Drafting Team believes that same justification should be used for BES protective functions, especially those which protect the grid's most critical elements such as generators, which can have long lead times and cannot be quickly restored from an outage.</p>	
Wayne Sipperly - Nort American Generator Forum - 5 - MRO,WECC,Texas RE,NPCC,SERC,RF	
Answer	No
Document Name	
Comment	

One area of concern in the proposed SAR is the inclusion of this phrase in various portions of the SAR: "..., and BES protective functions enabled within control systems...". The use of this open ended, non control system specific, additional scope item creates more confusion than existed with the original NAGF request for clarification on synchronous machine excitation control systems. If there are other specific types of control systems at generating facilities that are meant to be the target of this broad statement, they need to be identified. There exist many other independent closed loop feedback control systems within electric generating facilities. Being familiar with the protective relaying systems at these facilities, we are not aware of any of the other control systems [providing protective functions base on the BES electrical quantities of voltage and current] which use the "PRC-005 protection system dc control circuitry" to trip the unit. With none existing, the inclusion of the offending phrase is both confusing and unnecessary.

The modification of the maintenance tables, with respect to the excitation control system protective functions, should be limited to the same activities that are specified in Table 1 for microprocessor based relays.

Rather than invoking the ANSI Standard Device numbers to address protective functions responding to electrical quantities, recommend to leave the scoped functions as they currently are defined. Many discrete or multifunction microprocessor relays are already clearly known to be included in the scope of PRC-005 without the use of the ANSI device numbering, and therefore the additional detail is not necessary.

Likes	0
Dislikes	0

Response

Thank you for your comment. It is important to note that the SAR scope does not cover the complete control systems; but rather the specific BES protective functions, wherever they may reside. The SAR scope includes BES protective functions already identified in the PRC-005-6 FAQ (pages 38-39), regardless of the system in which they are deployed (relay or otherwise). The deviation from exclusively synchronous generator excitation systems was necessary to maintain neutrality in regard to different types of generation or transmission assets, and to produce a quality standard based on risk presented to the BES regardless of the system in which protective functions are deployed.

The comments received regarding the preferred direction of the future Standard Drafting Team (including this comment) are being well documented and will be provided to the future Standard Drafting Team to provide industry input into the direction of that team.

Joe McClung - JEA - 1,3,5	
Answer	No
Document Name	
Comment	
<p>These comments have been approved by LPPC and APPA. At this time the SAR includes the potential of “developing new terms and/or revising existing terms in the NERC Glossary of Terms”. Within the SAR it does not clearly discuss why such a substantial change would be necessary. The SAR DT has in the past commented that the inclusion of the AVR protection functions was already determined in 2016. The purpose of this SAR was to provide clarity within PRC-005 that these protective functions embedded within AVR and similar type systems be included.</p> <p>A change to the NERC Glossary definition of Protection System would potentially have unintended and unnecessary impact to other NERC standards and supporting documents that would be outside the scope of this SAR. The intent of this SAR can be accomplished without the significant impacts of a definition change.</p> <p>We would like the SAR DT to be able to accomplish the intent of the SAR by modifications to the applicability section of PRC-005 as well as additional clarification within the Supplementary Reference document to PRC-005. The changes within the applicability section should be able to clearly identify what sort of protective functions are included (for example an AVR that is able to trip a BES generator offline) and what is not (an inverter which is tripping offline a non-BES generator which is part of a dispersed power producing resource), similar to how the Automatic Reclosing was added to section 4.2.7. We do not foresee being able to support any “developing new terms and/or revising existing terms in the NERC Glossary of Terms” to accomplish the goals of the SAR.</p>	
Likes 1	Tacoma Public Utilities (Tacoma, WA), 1,3,4,5,6, Wike Jennie
Dislikes 0	
Response	
<p>Thank you for your comment. The SAR Drafting Team is including the option for the future Standard Drafting Team to revise or add NERC Glossary term(s) as necessary to address the issue. The comments received regarding the preferred direction of the future Standard</p>	

Drafting Team (including this comment) are being well documented and will be provided to the future Standard Drafting Team to provide industry input into the direction of that team.

Kendra Buesgens - MRO - 1,2,3,4,5,6 - MRO, Group Name MRO NSRF

Answer No

Document Name

Comment

Most of the revisions to the SAR are acceptable and do provide direction and clarity for a SDT to use. The specification to address the protection functions performed within analog and digital excitation control systems that use BES electrical quantities (voltage and current) to decide when to trip BES elements directly or via lockout/auxiliary tripping relays precisely addresses the 2016 Xcel concern and the 2019 NAGF concerns prompting this SAR. Addressing new dc supply technologies not currently addressed in PRC-005 will, indeed, close an open gap in the scope of the DC Supply section of the standard. The inclusion of the sentence "The individual generators identified through inclusion I4 of the BES definition are to remain outside the scope of the project." into the Project Scope section is appreciated and necessary.

One area of concern in the proposed SAR is the inclusion of the phrase, "..., and BES protective functions enabled within control systems...", in various portions of the SAR. The use of this open-ended, non-control system-specific, additional scope item creates more confusion than existed with the original request for clarification on synchronous machine excitation control systems. If there are other specific types of control systems at generating facilities that are meant to be the target of this broad statement, they need to be identified, as was the system of the original request. There exist many other independent closed-loop feedback control systems within electric generating facilities. Being familiar with the protective relaying systems at these facilities, we are not aware of any of the other control systems [providing protective functions based on the BES electrical quantities of voltage and current] which use the "PRC-005 protection system dc control circuitry" to trip the unit. With none existing, the inclusion of the offending phrase is both confusing and unnecessary. The removal of this phrase from the SAR will make it more palatable for approval. The initial purpose of this SAR was merely to clarify the applicability of PRC-005 to the protective functions within an Automatic Voltage Regulator (AVR) and provide the prescribed maintenance activities. Thus, the scope of this SAR should be limited to minor modifications of the original wording of: "Revise PRC-005-6 to clearly define the applicability of Protection Systems associated with analog or digital AVR protective functions, excitation systems that respond to measured BES electrical quantities and trip BES elements either directory or via lockout, or auxiliary tripping relays,. In addition, revise the PRC-005-6 Supplementary Reference and FAQ to provide additional guidance related to AVR protective

functions and acceptable methods of testing to meet PRC-005 required maintenance activities”. The NSRF recommends removing all wording, including “control systems”, that is not critical to the objective of the original SAR. We believe this will avoid industry confusion and the possible defeat of the NERC standard revision.

The modification of the maintenance tables, with respect to the excitation control system protective functions, should be limited to the same activities that are specified in Table 1 for microprocessor-based relays.

Rather than incorporating the ANSI Standard Device numbers into the Standard language to address protective functions responding to electrical quantities, we feel it would be best to leave the scoped functions as they currently are identified. Many discrete or multifunction microprocessor relays are already clearly known to be included in the scope of PRC-005 without the use of the ANSI device numbering, and that additional detail is not necessary in the PRC-005 Standard. If the ANSI Standard Device numbers were modified or expanded for future technology, this could create conflict with the PRC-005 language. We encourage the Drafting Team to include the ANSI Standard Device numbers in a technical guideline or reference document.

Changes to the Definition of Protection System should not be expanded to include the protective functions of excitation or other control systems. A change to the NERC Glossary definition of Protection System could have an unintended or unnecessary impact to other NERC standards and support documents that would be outside of the scope of this SAR. Applicability should be explicitly clarified within the PRC-005 standard, with consistent supporting guidance in the Supplementary Reference and FAQ document.

Additionally, since power plant analog/digital AVRs, excitation systems, and BES protective functions enabled within control systems were not designed to be made redundant and cannot be retrofitted reasonably, they should be specifically excluded from TPL-001-5 Footnote 13 to avoid future confusion and unnecessary disputes. We propose adding the language, **“For purposes of this standard, BES protective functions enabled within analog/digital AVRs, excitation systems, and BES protective functions enabled within control systems are specifically excluded from TPL-001-5 Footnote 13 Protection Systems applicability, meaning these systems are not required to be redundant”** after the first paragraph in the Project Scope narrative. We also suggest addition of a modification of TPL-001-5 Footnote 13 to this project, to ensure exclusion from any redundancy requirements.

Likes	0
Dislikes	0
Response	

Thank you for your comments. It is important to note that the SAR scope does not cover the complete control systems; but rather the specific BES protective functions, wherever they may reside. The SAR scope includes BES protective functions already identified in the PRC-005-6 FAQ (pages 38-39), regardless of the system in which they are deployed (relay or otherwise). The deviation from exclusively synchronous generator excitation systems was necessary to maintain neutrality in regard to different types of generation or transmission assets, and to produce a quality standard based on risk presented to the BES regardless of the system in which protective functions are deployed. The SAR Drafting Team will forward your suggestions regarding maintenance activities to the future Standard Drafting Team. The SAR Drafting Team also agrees that modifications should be made in continuity with the scoped functions as defined in the existing FAQ.

The SAR Drafting Team is including the option for the future Standard Drafting Team to revise or add NERC Glossary term(s) as necessary to address the issue. The comments received regarding the preferred direction of the future Standard Drafting Team (including this comment) are being well documented and will be provided to the future Standard Drafting Team to provide industry input into the direction of that team.

Modifications to TPL-001 are not within the scope of Project 2019-04.

Jennie Wike - Tacoma Public Utilities (Tacoma, WA) - 1,3,4,5,6 - WECC, Group Name Tacoma Power

Answer	No
Document Name	
Comment	
Tacoma Power supports the comments submitted by LPPC and APPA.	
Likes	0
Dislikes	0
Response	
Thank you for your comment. Please see responses to JEA comments.	

Jamie Monette - Allete - Minnesota Power, Inc. - 1	
Answer	No
Document Name	
Comment	
Minnesota Power agrees with MRO's NERC Standards Review Forum's (NSRF) comments.	
Likes 0	
Dislikes 0	
Response	
Thank you for your comment. Please see response to MRO NRSF comments.	
Sing Tay - OGE Energy - Oklahoma Gas and Electric Co. - 1,3,5,6, Group Name OKGE	
Answer	No
Document Name	
Comment	
Oklahoma Gas & Electric supports MRO NSRF's comments.	
Likes 0	
Dislikes 0	
Response	
Thank you for your comment. Please see response to MRO NRSF comments.	
Sean Bodkin - Dominion - Dominion Resources, Inc. - 3,5,6, Group Name Dominion	
Answer	No

Document Name	
Comment	
<p>The SAR does not appear to identify a clear existing gap in reliability being addressed. DC based technologies, as stated in the SAR, are emerging and addressing them in a revised Reliability Standard is premature. The clarity being sought on protection systems in excitation systems seems to be a very narrow issue that a standard revision is not necessary to address and could potentially conflict with exiting testing of voltage regulators in PRC-019.</p>	
Likes	0
Dislikes	0
Response	
<p>Thank you for your comment.</p> <p>The current maintenance tables in PRC-005-6 contain activities for traditional batteries and for alternative non-battery DC supplies. The intent of the SAR Drafting Team is to give the future Standards Drafting Team the ability to include maintenance activities for alternative battery DC supplies for Protection Systems (e.g., lithium ion, flow). The comments received regarding the preferred direction of the future Standard Drafting Team (including this comment) are being well documented and will be provided to the future Standard Drafting Team to provide industry input into the direction of that team.</p> <p>Generator excitation systems and voltage regulators may have imbedded protective functions and are capable of monitoring BES electrical quantities, such as voltage or current, and responding to those quantities, by causing a trip of the generator in response to these signals in the same manner as a protective relay. Therefore, if the embedded protective functions are enabled, they are already included in the scope of Reliability Standard PRC-005-6 as set out in the Applicability section of the standard (refer to Standard Committee’s answer to the 2016 RFI by Xcel Energy). The SAR is seeking further clarification that the enabled protective functions are applicable to the standard in order to help the industry and ensure a reliable BES. Protective Relays and Protective Functions within the excitation system and voltage regulators are coordinated with the limiters via PRC-019, but PRC-019 is not a testing or maintenance standard.</p>	
<p>Kim Thomas - Duke Energy - 1,3,5,6 - SERC,RF, Group Name Duke Energy</p>	

Answer	No
Document Name	
Comment	
<p>Scope Response:</p> <p>Duke Energy supports the clarification of BES protective functions within the NERC Glossary of Terms.</p> <p>Potential Standard Impacts Response:</p> <p>Per NERC request, the following NERC Reliability Standards may be impacted by this project:</p> <p>PRC-004 - Need to be monitored for inclusion in the misoperation determination process and reported as part of MIDAS?</p> <p>PRC-12/17 - Include as part of RAS and test as such as both PRC-005 and overall function test of RAS?</p> <p>PRC-019 - Do all studies need to be redone to include these protective functions?</p> <p>PRC-024 - Are these protective functions considered part of the voltage and frequency relays if transition to using IEEE function numbers or do they fall under control systems protective functions whereby all studies need to be redone upon classification as relay?</p> <p>PRC-025 - Will these protection functions be considered valid as load responsive relays which must meet Attachment 1 of PRC-025? Additionally, do all studies need to be redone upon classification as a relay?</p> <p>PRC-026 - Will these protective function relays be a part of Transmission's Planning Assessment where relay tripping occurs due to stable or unstable power swings? Additionally, will Generation need to monitor them for inclusion under R2 2.2 and be required to evaluate them to meet the criteria of Attachment B?</p> <p>PRC-027 - Will these protective functions be required to be coordinated under PRC-027?</p> <p>Estimated Costs Response:</p>	

Per NERC request, Duke Energy Total Maintenance Technician Costs is estimated as \$730,800. A detailed estimate can be provided upon request.

Likes 0

Dislikes 0

Response

Thank you for your comments. The comments received regarding the preferred direction of the future Standard Drafting Team (including this comment) are being well documented and will be provided to the future Standard Drafting Team to provide industry input into the direction of that team.

Jack Cashin - American Public Power Association - 4

Answer

No

Document Name

Comment

APPA and its membership concurs with the comments filed by Joe McClung of JEA.

Likes 0

Dislikes 0

Response

Thank you. Please see responses to JEA's comments.

Alan Kloster - Evergy - 1,3,5,6 - MRO

Answer

No

Document Name

Comment

Evergy endorses the comments provided by the Edison Electric Institute, however, is voting no due to inclusion of control systems without definition, potential conflicts with existing standards, lack of definition around maintenance activities specific to electrical components that do not provide protective functions and overall lack of understanding for the technical basis to broadly expand the scope and potential regulation encompassed in the proposed revised SAR.

Likes 0

Dislikes 0

Response

Thank you for your comments. It is important to note that the SAR scope does not cover the complete control systems; but rather the specific BES protective functions, wherever they may reside. The SAR scope includes BES protective functions already identified in the PRC-005-6 FAQ (pages 38-39), regardless of the system in which they are deployed (relay or otherwise). The consideration of protective functions outside of traditional relays has been implemented or proposed in other PRC standards (see PRC-024-3 and Project 2021-01) to maintain standards which are based on risk to the BES, regardless of the technology.

The future Standard Drafting Team has the responsibility of revising the standard, which includes specification of maintenance activities. However, electrical components that do not provide protective functions are outside the scope of the standard, meaning that their maintenance shall remain excluded from the requirements of PRC-005. The deviation from exclusively synchronous generator excitation systems is necessary to maintain neutrality in regard to different types of generation or transmission assets, and to produce a quality standard based on risk presented to the BES regardless of the system in which protective functions are deployed.

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

Answer

No

Document Name

Comment

1. The title of the SAR is revised, where “applicability to AVR protective functions” is removed, implying a significant increase in scope. The latest SAR includes control systems outside of generating plants. For example, control systems associated with capacitor banks, SVCs etc. are now in the scope. Although, this change may be appropriate, is a major and unjustified/unnecessary

change in scope compared to the initial SAR. To knowledge, industry has not raised any concern or confusion with this matter. If the scope is not limited to control systems with the generating plant then it is requested that the SDT is balanced and represents all industry segments.

2. Most of the revisions to the SAR are acceptable and do provide direction and clarity for a SDT to use. The specification to address the protection functions performed within analog and digital excitation control systems that use BES electrical quantities (voltage and current) to decide when to trip BES elements directly or via lockout/auxiliary tripping relays precisely addresses the 2016 Xcel concern and the 2019 NAGF concerns prompting this SAR. Addressing new dc supply technologies not currently addressed in PRC-005 will, indeed, close an open gap in the scope of the DC Supply section of the standard. We are indifferent on the proposal to modify the UFLS-only DPs into the Applicability scope. The inclusion of the sentence "The individual generators identified through inclusion 14 of the BES definition are to remain outside the scope of the project." into the Project Scope section is appreciated and necessary.

One area of concern in the proposed SAR is the inclusion of this phrase in various portions of the SAR: "..., and BES protective functions enabled within control systems...". The use of this open ended, non control system specific, additional scope item creates more confusion than existed with the original request for clarification on synchronous machine excitation control systems. If there are other specific types of control systems at generating facilities that are meant to be the target of this broad statement, they need to be identified, as was the system of the original request. There exist many other independent closed loop feedback control systems within electric generating facilities. Being familiar with the protective relaying systems at these facilities, we are not aware of any of the other control systems [providing protective functions base on the BES electrical quantities of voltage and current] which use the "PRC-005 protection system dc control circuitry" to trip the unit. With none existing, the inclusion of the offending phrase is both confusing and unnecessary. The removal of this phrase from the SAR will make it palatable for approval.

The modification of the maintenance tables, with respect to the excitation control system protective functions, should be limited to the same activities that are specified in Table 1 for microprocessor based relays.

Rather than invoking the ANSI Standard Device numbers to address protective functions responding to electrical quantities, it is believed to be best to leave the scoped functions as they currently are scoped. Many discrete or multifunction microprocessor relays are already clearly known to be included in the scope of PRC-005 without the use of the ANSI device numbering, and that additional detail is not necessary.

Likes 0

Dislikes	0
Response	
<p>Thank you for your comments. The deviation from exclusively synchronous generator excitation systems was necessary to maintain neutrality in regard to different types of generation or transmission assets, and to produce a quality standard based on risk presented to the BES regardless of the system in which protective functions are deployed. The SAR Drafting Team agrees with seeking additional nominations to balance industry representation.</p> <p>It is important to note that the SAR scope does not cover the complete control systems; but rather the specific BES protective functions, wherever they may reside. The SAR scope includes BES protective functions already identified in the PRC-005-6 FAQ (pages 38-39), regardless of the system in which they are deployed (relay or otherwise).</p> <p>The comments received regarding the preferred direction of the future Standard Drafting Team (including this comment) are being well documented and will be provided to the future Standard Drafting Team to provide industry input into the direction of that team.</p>	
Glenroy Smith - Entergy - 4 - SERC,RF	
Answer	Yes
Document Name	
Comment	
No additional comment	
Likes	0
Dislikes	0
Response	
Thank you for your support.	
Christopher McKinnon - Eversource Energy - 1,3	

Answer	Yes
Document Name	
Comment	
While Eversource supports the SAR Scope, the Company would like to reiterate that the definition of Protection System should not be modified.	
Likes 0	
Dislikes 0	
Response	
Thank you for your support. The comments received regarding the preferred direction of the future Standard Drafting Team (including this comment) are being well documented and will be provided to the future Standard Drafting Team to provide industry input into the direction of the team.	
M Lee Thomas - Tennessee Valley Authority - 1,3,5,6	
Answer	Yes
Document Name	
Comment	
While TVA believes sufficient detail has been provided for the SDT to thoroughly assess the issues described, concern remains with details that are being provided. A significant burden to equipment owners will result from the proposed expansive applicability of PRC-005 to protective relay functions within the broad groups of exciter, inverter, or other control systems. Based on the breadth of exciter/AVR, inverter, and control system technologies in service today, and the equally diverse methods of testing likely required, significant training hours will be required to prepare existing and new resources to perform the required tests, especially for legacy systems.	
Additional burden will be required to evaluate all applicable configurations, develop test procedures that will satisfy new standard requirements, and develop the necessary associated training content. Implementation of newly required maintenance activities will invariably be scheduled concurrent with generating unit or other Facility outages. Due to these and other unexpected logistical	

challenges, coupled with the existing confusion regarding these imbedded protective functions, TVA cannot support any proposed revision of PRC-005-6 without a staged implementation approach for any new requirement or any specific components added to the applicability tables. The duration and milestones of this staged implementation should be based on component maintenance intervals, commensurate with those of the existing PRC-005-6 implementation plan, but starting with a new baseline date related to the effective date of the new version of PRC-005.

Further, TVA finds the additional scope and the associated ambiguity of the SAR to be unacceptable. Specifically, use of the following has departed from the original intent of the NAGF proposal and, if transcribed into the resulting standard, would create more ambiguity, confusion, and burden on all BES equipment owners, not just GO/GOP entities, without extensive clarification of applicability or complete elimination:

• *“Other control systems”*

1. This phrase is unnecessarily expansive and ambiguous. Prerequisite to including this phrase in a revised standard would be establishment of a bright-line between out-of-scope control functions and the applicable protective functions (BES Protective Functions) potentially implemented within in a control system.

• *“Excitation systems (including analog/digital AVR)s”*

1. Expansion of the original scope which did not include analog AVR is unacceptable. Any requirement to inject signals and activate outputs in analog AVR is widely recognized as being very difficult, if feasible.

• *“May measure and utilize similar quantities as protective relays and may perform similar functions as protective relays”* (in the SAR);

“Protective functions that are typically (but not always) associated with relays” (in the SAR);

“May measure similar quantities and may yield similar outcome” (in this form):

1. Use of these or similar phrases in the revised standard would increase ambiguity and confusion. The potential breadth of interpretations would create an intolerable environment for compliance, especially in conjunction with “other control systems.”

• *“Trip BES Elements either directly or via lockout or auxiliary tripping relays;”*

“The clarifying changes would apply to BES Protection Systems and protective functions applied on generators, dispersed power-producing resources from the point of aggregation (greater than 75 MVA) to the point of Interconnection, static and synchronous condensers and other BES elements as defined.”

1. At first glance, the drafting team’s intention seemed to be to focus on generation elements, but the generic term of BES Elements again represents a significant expansion of scope. This is unacceptable in that it would unnecessarily blend the non-generator applicability criteria with the generator applicability criteria, confusion and inconsistency would ensue without any improvement to reliability.

Likes 0

Dislikes 0

Response

Thank you for your comments. Concerning the "proposed expansive applicability of PRC-005 to protective relay functions within the broad groups of exciter, inverter, or other control systems," the SAR Scope does not seek to modify the applicability to individual dispersed power producing resources (i.e. inverters). Nonetheless, the SAR Drafting Team agrees that the implementation plan should carefully consider the factors presented in the comment. This suggestion will be forwarded to the future Standard Drafting Team.

Regarding the phrase "Other Control Systems", this phrase was replaced with the phrase "control systems". It is important to note that the SAR scope does not cover the complete control systems; but rather the specific BES protective functions, wherever they may reside. The SAR scope includes BES protective functions already identified in the PRC-005-6 FAQ (pages 38-39), regardless of the system in which they are deployed (relay or otherwise). The SAR Drafting Team agrees that specific detail is needed primarily around the term BES protective functions, as this is what ultimately determines the scope of PRC-005. This will be addressed by the future Standards Drafting Team (within the limitations of response to measured BES quantities) and in continuity with the existing FAQ pg. 38-39.

Analog AVRs were included in the revised SAR because the Standards Committee response to Xcel Energy's 2016 RFI was not specific to digital AVRs, and the primary purpose of the SAR is to add clarity within the standard in continuity with that response.

Words/phrases included within the SAR do not imply their use within the standard itself. Nonetheless, suggestions regarding proposed wording in the standard itself will be forwarded to the future Standard Drafting Team.

The most recent posting of the SAR specifies that the clarifying changes would apply to the Facilities as defined in PRC-005-6. The purpose of this statement is to clarify that the generation/non-generator applicability criteria would remain separate within the standard.

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

Answer Yes

Document Name

Comment

EI generally supports this SAR and the modified **Industry Need** statement of the revised SAR, due to the clarification provided by the statement that “Control systems that do not contain BES protective functions that respond to measured BES electrical quantities are not within the scope of this project.” However, the expansion of this SAR and the recommended changes to PRC-005, as it relates to control systems, could result in expanding the Standard beyond its original intent. While EI supports the modifications made to the **Project Scope** statement that clarifies that “[o]nly those control systems that contain BES protective functions that respond to measured BES electrical quantities are within the scope of this project” and that “individual generators identified through inclusion I4 of the BES definition are to remain outside the scope of the project”, these changes may not be sufficiently clear to ensure auditors do not take the broad and undefined term “control systems” to mean that all controls associated with BES elements are to be included under PRC-005. For example, many power transformer have load tap changer controls that respond to electrical quantities to ensure transformer voltage is effectively regulated and controlled. While this is not a protective function, some may take the view that there is little difference between an AVR system and a load tap changer’s automatic function.

To address these issues, we recommend the following:

1. Modify PRC-005-6 to provide greater clarity that the BES protective functions enabled within analog/Digital AVRs, excitation systems that respond to measured BES electrical quantities and trip BES elements either directly or via lockout or auxiliary tripping relays are within the scope of the standard.
2. Define control systems in order to better delineate and target the scope of this change. (e.g., ensuring control systems such as transformer load tap changes do not become part of the scope of PRC-005).
3. Add limits within the SAR that would make it clear that owners of impacted control systems, such as older AVR systems, would not be obligated to add redundant systems. (e.g., inferred obligations through other Reliability Standards such as the TPL-001 Standard).

Likes	0
Dislikes	0
Response	
<p>Thank you for your comments. The SAR Drafting Team agrees with all concerns and recommendations proposed.</p> <p>It is important to note that the SAR scope does not cover the complete control systems; but rather the specific BES protective functions, wherever they may reside. The SAR scope includes BES protective functions already identified in the PRC-005-6 FAQ (pages 38-39), regardless of the system in which they are deployed (relay or otherwise). The SAR Drafting Team agrees that specific detail is needed primarily around the term BES protective functions, as this is what ultimately determines the scope of PRC-005. This will be addressed by the future Standards Drafting Team (within the limitations of response to measured BES quantities) and in continuity with the existing FAQ pg. 38-39. Nonetheless, the concerns regarding Load Tap Changers, etc. will be forwarded to ensure that the intent of the SAR is preserved.</p> <p>The Standard Drafting Team will have the responsibility of ensuring that changes only impact Reliability Standard PRC-005, unless changes are made to the Glossary of Terms which may impact other standards. Regardless, this suggestion will also be forwarded to the future Standard Drafting Team to ensure that this is done.</p>	
Bruce Reimer - Manitoba Hydro - 1,3,5,6	
Answer	Yes
Document Name	
Comment	
Likes	0
Dislikes	0
Response	

Thank you for your support.	
Anthony Jablonski - ReliabilityFirst - 10	
Answer	Yes
Document Name	
Comment	
Likes	0
Dislikes	0
Response	
Thank you for your support.	
Maryanne Darling-Reich - Black Hills Corporation - 1,3,5,6 - MRO,WECC	
Answer	Yes
Document Name	
Comment	
Likes	0
Dislikes	0
Response	
Thank you for your support.	
David Jendras - Ameren - Ameren Services - 1,3,6	
Answer	Yes

Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thank you for your support.	
Glenn Barry - Los Angeles Department of Water and Power - 1,3,5,6	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thank you for your support.	
Adrian Andreoiu - BC Hydro and Power Authority - 1,3,5, Group Name BC Hydro	
Answer	Yes
Document Name	
Comment	
Likes 0	

Dislikes	0
Response	
Thank you for your support.	
Carl Pineault - Hydro-Qu?bec Production - 1,5	
Answer	Yes
Document Name	
Comment	
Likes	0
Dislikes	0
Response	
Thank you for your support.	
Amy Casuscelli - Xcel Energy, Inc. - 1,3,5,6 - MRO,WECC	
Answer	Yes
Document Name	
Comment	
Likes	0
Dislikes	0
Response	
Thank you for your support.	

Glen Farmer - Avista - Avista Corporation - 1,3,5	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thank you for your support.	
LaTroy Brumfield - American Transmission Company, LLC - 1	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thank you for your support.	
Cain Braveheart - Bonneville Power Administration - 1,3,5,6 - WECC	
Answer	Yes
Document Name	
Comment	

Likes	0
Dislikes	0
Response	
Thank you for your support.	
Mark Garza - FirstEnergy - FirstEnergy Corporation - 1,3,4,5,6, Group Name FE Voter	
Answer	Yes
Document Name	
Comment	
Likes	0
Dislikes	0
Response	
Thank you for your support.	
Gail Elliott - International Transmission Company Holdings Corporation - NA - Not Applicable - MRO,RF	
Answer	Yes
Document Name	
Comment	
Likes	0
Dislikes	0
Response	

Thank you for your support.	
Lindsay Wickizer - Berkshire Hathaway - PacifiCorp - 6	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thank you for your support.	
Ruida Shu - Northeast Power Coordinating Council - 1,2,3,4,5,6,7,8,9,10 - NPCC, Group Name NPCC Regional Standards Committee	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thank you for your support.	
Daniel Gacek - Exelon - 1,3,5,6	
Answer	Yes

Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thank you for your support.	
Charles Yeung - Southwest Power Pool, Inc. (RTO) - 2, Group Name SRC PRC005	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thank you for your support.	
Rachel Coyne - Texas Reliability Entity, Inc. - 10	
Answer	
Document Name	
Comment	

Texas RE is concerned with the following statement in the Project Scope section: "The clarifying changes would apply to the Facilities as defined in PRC-005-6. The individual generators identified through inclusion I4 of the BES definition are to remain outside the scope of the project." The statement appears to be at odds with sections 4.2.5 and 4.2.6 of the current standard, which reference I4 of the BES:

4.2.5 Protection Systems and Sudden Pressure Relaying for generator Facilities that are part of the BES, except for generators identified through Inclusion I4 of the BES definition, including:

4.2.6 Protection Systems and Sudden Pressure Relaying for the following BES generator Facilities for dispersed power producing resources identified through Inclusion I4 of the BES definition:

Both sections have some additional bullets providing more detail about I4 inclusion or exclusion. Texas RE submits that the physical characteristics, including voltage control characteristics, of dispersed power producing resources should be considered as part of this project consistent with the existing language set forth in the current PRC-005-6 section 4.2.6. Texas RE recommends the SDT consider protective systems for AVRs of dispersed power producing resources and the various configurations employed to better understand the potential impact of their omission from the proposed Standard as part of the proposed project scope.

Likes	0
Dislikes	0

Response

Thank you for your comment. The intent of the statement was to specify that the existing language set forth in PRC-005-6 section 4.2.6 will be preserved. The SAR scope includes inverter-based resources at their point of aggregation of 75 MVA or greater, which is consistent with the existing PRC-005-6 standard. This is because the likelihood of many individual resources failing simultaneously is small. However, those Protection Systems which can interrupt the BES level MVA would present significant risk if not properly maintained. The loss of many individual resources would more likely be caused by improper settings, as they are likely duplicated in the individual resources. This risk is addressed in generator settings standards such as PRC-019, 024, and 025.

End of Report