

Name (31 Responses)
Organization (31 Responses)
Group Name (50 Responses)
Lead Contact (50 Responses)
IF YOU WISH TO EXPRESS SUPPORT FOR ANOTHER ENTITY'S COMMENTS WITHOUT ENTERING ANY ADDITIONAL COMMENTS, YOU MAY DO SO HERE. (9 Responses)
Comments (50 Responses)
Question 1 (37 Responses)
Question 1 Comments (50 Responses)
Question 2 (33 Responses)
Question 2 Comments (50 Responses)
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Question 5 (39 Responses)
Question 5 Comments (50 Responses)

Texas Reliability Entity
Texas Reliability Entity
NA
NA
No
(1) Texas RE objects to the use of the term Regional Reliability Organization (RRO) in Table 1. RRO is an obsolete term that NERC had been trying to purge from the standards, and we are somewhat alarmed to see it used in a new place in the standards. While we recognize that RRO is defined in the Glossary, it is not in the functional model and, at least in our region, it does not identify any entity and it is ambiguous. We urge you to replace the term RRO with an entity type from the functional model, or to write a description of what is intended without using the term "RRO". (2) Regarding the "Transformers" section on page 7 and footnote 3 on page 10, consider whether it is appropriate to use the "nameplate impedance at the nominal GSU turns ratio" in all instances. In some cases, it is more appropriate to use the calculated (i.e. with compensation) impedance that reflects the lowest value based on the de-energized tap and LTC tap positions for this purpose. (3) For Options 1a, 2a, and 7a, consider using 0.9 per unit instead of 0.95 per unit, because typical disturbance (post-contingency) voltage criterion is 0.9 p.u. (4) Consider clarifying that the Real Power output criteria should be based on the [highest seasonal] MW rating for the applicable unit. There can be significant seasonal variations in MW capabilities for some units. We don't expect pickup settings to be changed from season to season, so an appropriate year-round setting should be determined and applied. (5) Some transmission systems have steady state stability limits that encroach into the generator capability limits. Consider adding exclusion criteria for these types of scenarios.
Texas RE generally supports this standard as written, other than the use of the term *Regional Reliability Organization* in Table 1 as described above. Our other comments are provided for consideration by the drafting team.
Southern Company: Southern Company Services, Inc.; Alabama Power Company; Georgia Power Company; Gulf Power Company; Mississippi Power Company; Southern Company Generation; Southern Company Generation and Energy Marketing
Pamela R. Hunter
Yes

Yes
Yes
Yes
<p>2) We suggest removing Section 3.2.3 and footnote 1. UAT protection is part of the station service system and should not be in this standard. Remove the UAT from Table 1. The UAT relays are not in the category of "all load-responsive protective relays that are affected by increased generator output in response to system disturbances." The highside overcurrent pickup should not be required to be at 150%. Settings at $> \& = 115\%$ should be allowed. 3) We believe that the Purpose statement should end "... do not pose a risk of damaging the generator." 4) The protection of the generator should be the paramount concern. All ANSI standards for generator and main power transformer protection should be considered to be the ruling guide for protecting the equipment. The minimum allowable settings provided in the table in the draft standard do not factor using time delays in order to provide adequate protection for generators. 5) The overload relay that protects the generator from overload may also be the relay that protects the GSU from overload. In the exception list of the draft standard, exception bullet #5 should take precedence over exception bullet #6. 6) The protection requirements (exception bullet #5) from the ANSI standards need additional recognition, development, and emphasis in the Exceptions section. As written, it appears to be an afterthought. The ANSI standard for synchronous generator protection should be recognized, respected, and not violated. The Table 1 setting specifications which contradict the ANSI standards should be submissive to the ANSI standards and itemized in the exception criteria. Consider removing "extremely" from the "extremely inverse time" description as various vendors call the varying inverse time curve by different names. 7) The generator overload protection exception added to Draft 3 for extremely inverse characteristics (fifth exception bullet) is an improvement, but the term "full-load current" needs clarification. Is this the current at normal full-load turbine output and typical PF, the value determined from the generator nameplate MVA at rated voltage, or is it the base or top (no fans, no oil circulation) MVA rating of the GSU? 8) The wording in the sixth exception bullet of the Exceptions section is too vague. How much of an overload is considered an overload? Many vendor relay curves do not provide characteristics showing the value of current that will time out in 15 minutes. It may be difficult to prove a setting to provide 15 minute delay. Existing relays in service do not have the ability to be set by this criterion. 9) The Exceptions section seems to state that the exceptions are allowed only during start up and when off line, which is unacceptable. The exceptions should be allowed at all times. 10) To meet the requirements of table 1 for non-51 relays (distance relays set at approximately 180% of generator MVA) and meet our protection philosophy objectives, we would have to install many new relays for overload protection. 11) Determination of the pickup of the distance relays is too complicated. The calculated impedance should be based on generator nameplate MVA and pf only. The requirements make what should be a simple calculation based on generator electrical characteristics into one that will require the relay engineer to find test MW data is not readily unavailable. 12) PRC-025 should be revised to "grandfather" existing protection settings that have been proven in practice for many decades not to prematurely remove equipment from service. 13) The applicability of PRC-025 should exclude small gensets that are NERC-registered solely due to being black start-capable, whose tripping would not meaningfully affect the ability of the system to ride through Disturbances. It would be best to allow such units to maintain their present loadability relay settings for retoration purposes. 14) Voltage-restrained overcurrent relays are notorious for not having a predictable operation time under fault conditions. If they are included in the types of equipment that mis-operated in the August 2003 blackout, they should be required to be replaced with another relay type rather than requiring that the settings be relaxed to the degree specified in the draft standard. 15) A High VRF and a Severe VSL seems overly harsh given the compliance feasibility uncertainties. 16) Which UATs are proposed to be included, if any, is confusing. Suggest adding diagrams to the reference document. 17) During the webinar there were three slides related to the different trans to Gen interconnections and who is responsible for what; suggest adding and or clarifying these in the reference documents.</p>
Vladimir Stanisic
AESI Inc.
na

na
Yes
No
The team is commended for an extensive effort to provide high level of detail through numerous relay setting examples summarized in Table 1 and elaborated in the document PRC_025_1_Guidelines_and_Technical_Basis_Draft_3_2013_04_24_Redline.pdf. Nonetheless, the following points may need further attention: 1. The settings derived by simulations versus the settings derived by manual calculations are noticeably different, the latter being repeatedly much more conservative (e.g. 8c: 6.6 A pu versus 8a: 9.5 A pu), exposing generators to a higher risk of overloading. It would be expected that the results of manual calculations and simulations would yield closer values, at least for most of typical configurations. It appears that underlying assumptions used in the calculations and simulations may need to be fine-tuned. For example, is it realistic to have field forcing producing 1.5 pu MVAR output and at the same time generator bus voltage at 0.95 pu. 2. The settings derived by manual calculations are such the generators are exposed to a higher risk of overloading: • Example 1a – 21 protection would operate only when unit loading exceeds approx. 280% (at rated power factor). • Example 2a – 51V protection pickup is set at equivalent of approx. 170% loading. Taking into account that overcurrent relays actually react when current exceeds 1.5 pickup setting, equivalent loading on the unit would have to exceed 250% before timing is initiated. Depending on the relay characteristic, time delay can be significant. 3. C37.102 states that acceptable settings for 21 function are 150% to 200% (at rated power factor). These values should guide the requirements of this standard. 4. The Table specifies pickup setting criteria. It remains unclear when are the relays allowed to trip. 5. Examples 7a, b, c, seem to be duplication of 1a, b, c. 6. The following comment from the Guidelines document is not clear: ===== Options 7a and 10, Table 1 – Bus Voltage, calls for a 1.0 per unit of the high-side nominal voltage for generator bus voltage, ***however due to the presence synchronous generator 0.95 per unit bus voltage will be used as (Vgen)***?: =====
No
Please see comments on Question 2.
Yes
Yes
This draft of the standard uses 0.85 pu transmission system voltage as a benchmark for determining the settings. The latest version of PRC-024-1 defines post-disturbance voltage profile where the system voltage is below 0.85 pu up to 3 seconds. Is there a need to take that into consideration for this standard.
Northeast Power Coordinating Council
Guy Zito
Yes
In PRC-023-3, add "Each" to the beginning of R8.
Pepco Holdings Inc. & Affiliates
David Thorne
No
1) The inclusion of Requirements R7 and R8 and the entire Table 1 from PRC-025-1 overly complicates PRC-023-3. In addition, inclusion of these Table 1 requirements without the corresponding Guidelines and Technical Basis document produced for PRC-025 makes the application

of Table 1 in PRC-023 difficult, if not impossible. The intent of the original PRC-023 was to apply to owners of load responsive relays (whether they be TO's or GO's) that are applied on BES transmission circuits and BES power transformers. The new PRC-025 standard should apply to owners of load responsive relays (whether they be TO's or GO's) that are applied on BES generators, GSUs, UAT's and Generator Interconnection Facilities. In a good faith effort to provide a bright line between the two standards, the new PRC-023-3 standard became overly complicated and extremely confusing. It would seem that instead of adding PRC-025 requirements to PRC-023, it would be much simpler to just add Transmission Owners to the Applicability Entities section of PRC-025. The Applicable Facilities section of each standard should identify that any load responsive relay (whether they are owned by GO's or TO's) installed on these types of facilities must comply with the respective requirements of that standard. If this were done then the original PRC-023 could be revised to exclude relays installed on generators, GSU's, UAT's and Generator Interconnection Facilities, as they will be covered by PRC-025. PRC-023 would apply solely to owners of load responsive relays (whether they be TO's or GO's) that are applied on BES transmission circuits and BES power transformers. 2) It is unnecessary to remove Criterion 6 from PRC-023-3 as it represents an acceptable alternative to the methods offered in PRC-025. When load responsive relays are set on transmission line terminals connected to generation stations remote from load in accordance with Criterion 6 of PRC-023 (230% of aggregate generation nameplate capability) the resulting setting provides sufficient margin to accommodate acceptable loadability. This criterion has been successfully used for years and has gone through the full standards development process and been vetted as an acceptable alternative. Consider the example calculation for Option 14a in PRC-025. From Equation 112 the apparent primary impedance seen by the relay on the high side of the GSU is 74.3 ohms primary at an angle of 52.77 degrees. Now assume the 230% method from PRC-023 Criterion 6 was used instead. The new apparent power would be $2.3 \times (767.6 \text{ MW} + j 475.6 \text{ MVAR}) = 2.3 \times 903 \text{ MVA} = 2076.9 \text{ MVA}$ at an angle of 31.8 degrees. Using Equation 112 the apparent primary impedance would be 41.4 ohms at 31.8 degrees. From Equation 115 the setting required to satisfy Option 14a criteria from PRC-025 would be 15.283 ohms sec = 76.42 ohms primary at 85 degrees. The reach of this relay along the 31.8 degree load angle would be $76.42 \times \text{Cos}(85 - 31.8) = 45.77$ ohms primary. Since this is greater than the 41.4 ohm setting resulting from Criterion 6 of PRC-023, the PRC-023 Criterion is slightly more conservative, requiring a slightly smaller relay reach than Option 14a. As such, both methods should be considered equally effective in ensuring relay loadability.

No

For the PRC-025 standard the inclusion of Table 1 along with the Figures and Example Calculations in the Guidelines and Technical Basis document clearly identifies the proposed setting criteria. However, the inclusion of Table 1 in PRC-023 overly complicates the scope of PRC-023, and without inclusion of the corresponding Guidelines and Technical Basis document makes application of Table 1 criteria difficult. We feel strongly that all references to load responsive relays applied on generators, GSU's, UAT's and Generation Interconnection Facilities (including Table 1 and Requirements R7 and R8) should be eliminated from PRC-023 as they are already adequately covered in PRC-025. Transmission Owners that own load responsive relays on those types of facilities should be included as an Applicable Entity under PRC-025. (See comments submitted for Question 1).

No

1) The new term "Generator Interconnection Facilities" is not defined in the NERC Glossary of terms, nor is it defined in the body of the standard. It is defined in the Guidelines and Technical Basis document; however, we feel this term needs to be defined within the body of the standard itself. Perhaps a footnote similar to that used to define Unit Auxiliary Transformers would be appropriate. We would suggest the same definition used in the Guidelines and Technical Basis document be inserted: "Generator interconnection Facility(ies) consists of Elements between the generator step-up transformer and the interface with the portion of the bulk Electric System (BES) where Transmission Owners take over the ownership." 2) In Figures 4 and 5 the CT's supplying the 21, 51V-R and 51V-C relays connected to the generator(s) look like they are connected to the generator neutral. To make it clear that they are supplied from CT's connected in the phase leads, a phase to neutral transition symbol (ref Fig 7.4 in IEEE C37.102) should be used to indicate the CTs are located above the neutral connection point. 3) In Figure 5 there is a 51 relay shown connected to the 22kV bus leads supplying the generator on the left hand side of the drawing. This 51 relay is not revered, or used, in any of the options and therefore should be removed from the drawing. 4) Options 14a, 14b, 15a, 15b, 16a and 16b all use an MVAR value equal to 120% of the aggregate generation MW value, instead of the

150% value used when the relays are located on the generator side of the GSU transformer. Presumably this is to account for the I squared Xt MVAR loss consumed in the GSU transformer. However, there is no mention of this fact in the Guidelines and Technical Basis document. To avoid confusion as to why different MVAR criteria are used, supporting technical justification / explanation should be offered in the document. 5) The example calculations for Options 4 and 10 are combined as a single identical set of calculations. This calculation is appropriate for Option 10 but not for Option 4. Referring to Figure 5, the 21 relays for Option 4 are shown connected to each individual generator. Also the 20MVAR static compensation source is connected upstream of each generator relay. As such, the 21 relay on each individual generator (Option 4) will only see the MW and MVAR flows from a single generator, not the aggregate of all the generation plus the 20MAR reactive source. A separate calculation for Option 4 should be developed. For that Option 4 case the single generator apparent power (assuming three generators of equal size) would be $102/3 = 34$ MW and $63.2/3 = 21$ MVAR, which is 40 MVA for each generator. 6) The example calculations for Option 5 appear to be incorrect. Again referring to Figure 5, the 51V-R relays for Option 5 are shown connected to each individual generator. Also the 20MVAR static compensation source is connected upstream of each generator relay. As such, the 51V-R relay on each individual generator (Option 5) will only see the MW and MVAR flows from a single generator, not the aggregate of all the generation plus the 20MAR reactive source. As such the 51V-R relay should be set to 130% of the maximum MVA rating of that individual generator. Again assuming three units of equal size, each generator would be rated 40MVA and therefore the 51V-R relay should be set to not operate below $1.3 \times 40 = 52$ MVA 7) The example calculations for Options 7a, 10, 8a, 9a, 11, and 12 illustrate a mixture of synchronous and asynchronous generators. However, there is no corresponding one-line drawing which corresponds to these examples. Because of this, it is difficult visualize the topology of this arrangement and where the corresponding relays would be located. If the SDT wishes to provide an example calculation where there is a mix of synchronous and asynchronous generation then we would suggest an additional figure be added (Figure 6) which would illustrate this type of connection.

Yes

No

FirstEnergy

Doug Hohlbaugh

No

FirstEnergy (FE) appreciates the attempt to develop a bright-line method but feel the approach taken is over complicating the standards. FE believes that the changes made to PRC-023 with the inclusion of requirements R7 and R8 and the associated Attachment C cause unnecessary confusion. FE proposes that the team remove R7, R8 and Attachment C from PRC-023 and retain a modified version of PRC-023, R1 item 6. Further, as supported in our comments below, we encourage the team to limit the applicability of PRC-023 to the TO and DP and the applicability of PRC-025 to the GO. FE believes it is imperative for NERC to develop its standards in a consistent approach in regard to terminology that is deemed "transmission" and those deemed "generation". We are concerned that the proposed changes to PRC-023 and PRC-025 overly complicate what most in industry already understand to be "transmission" and "generation" facilities. For example, NERC recently proposed errata changes to PRC-004 and PRC-005 to clarify that for a GO the requirements of those standards extend not only to protection systems associated with the generating facility or station itself, but also to any protection systems associated with the generator interconnection facility. It's difficult to understand why PRC-004 and PRC-005 seem to have clear TO and GO boundaries when it comes to reporting relay misoperations and performing relay maintenance, yet when ensuring relay loadability requirements are met things all of a sudden become much more complicated. To date, generation interconnection facility(ies) as used in NERC standards are generator owner assets, "generator lead", operated at transmission voltage levels. However, if the generator lead happens to be owned by a transmission owner, then it's understood simply to be a transmission line or transmission facility. The two relay loadability standards should maintain this same simplicity and PRC-023 should apply only to TO/DP and PRC-025 to the GO. We suggest that the team take this opportunity to introduce a formally defined NERC Glossary Term for generator interconnection facility. During the recent webinar the

team spent a fair amount of time indicating that when evaluating a generator interconnection facility(ies) as shown in Figure 1 and Figure 2 that it essentially comes down to the relay owner when determining which standard (PRC-023 or PRC-025) is applicable. The team indicated that if the GO owns the relay for line breaker(s) at Bus A then PRC-025 applies, but if the DP/TO owns the relay then PRC-023 applies. The team further described that the GO was left in PRC-023 to handle a situation where they may own relaying for line breaker(s) on networked transmission lines as shown in Figure 3. The team also cited they retained the GO for this situation to avoid a potential "registration tension". The perceived need for the GO in standard PRC-023 calls into question the facility rating for the network transmission line as established under FAC-008-3. NERC standards must maintain consistent philosophies in terminology throughout all standards and cover the most common system configurations. Any unique situations will need to be dealt with on a case by case basis between asset owners. Additionally, NERC drafting teams should not be writing standards to cover one-off configurations simply to address potential entity registration concerns. While FE strongly objects to the use of R7, R8 and Attachment C in PRC-023, if the team does not agree with our proposal to remove the GO completely from PRC-023 then as an alternate approach we support comments filed by Pepco Holdings, Inc. – PHI which suggesting adding the TO/DP to PRC-025 and removing R7, R8 and Attachment C from PRC-023. Either approach (FE's or PHI's) requires retaining item 6 of R1 in PRC-023. In summary, for PRC-023, FE proposes the following: 1.) Remove the Generator Owner applicability 2.) Remove Requirements 7 and 8 since they will be included in PRC-025 3.) Remove Attachment C 4.) Change Requirement 1 Criteria #6 to read as follows: "Set transmission line relays applied on transmission lines connected to generation stations remote to load directional towards the generator so they do not operate at or below 115% of the rating of the generator as calculated according to applicable NERC standards." Although not our preferred option, we also recommend the team considered the suggestion by PHI that would add the TO as an applicable entity to PRC-025 while also removing PRC-023 R7, R8 and Attachment C.

No

As stated above (Question 1) FE does not support the inclusion of Attachment C in PRC-023. See question 1 for more information. From a technical standpoint, we support Table 1 of PRC-025.

Yes

Yes

Yes

FE believes that that the term "generator interconnection Facility" should be a NERC defined term in the Glossary since it is used in other standards, ie, PRC-005, or at the very least, be defined within the standard(s). This term is only defined in the Guidelines and Technical Basis. In the Guidelines and Technical Basis, Figure 2 has a typo on the 3rd sentence and should read as follows: If the Distribution Provider or Transmission Owner owns these relay, they are responsible for them under PRC-023.

John Yale

Chelan County PUD

none

none

No

It seems that GSU and UAT would be subject to PRC-023 and PRC-025. It would be cleaner if one standard applied to GSU and UAT and the other to the transmission circuits.

Yes

Yes

Yes

1. Please, reconsider the applicaiton to small units that are "black start" or auxiliary units in a BES plant. Application of these requirements to a small (750kW) hydro unit that is black start is problamatic particularly due to the age of many of these units. It is difficult to see where loss of a unit of small size would impact the BES during this type of event. Please, consider a minimum size threshold for units where these requirements would be applicable. Perhaps 20MW as is used in the BES definition would be appropriate. Consider also an exclusion for a small unit, say less than 5MW, that is part of an aggregate plant of larger units that exceeds the 75MW plant threshold. An example is our 750kW hydro unit that is in the plant with ten 25MW units. It seems excessive to apply this to the 750kW unit. 2. UATs should be dropped from the standard. The Application Guidelines state that the reliability objective of PRC-025 is to cover, "all load-responsive protective relays that are affected by increased generator output in response to system disturbances," but the relays of UATs are not in this category. A disturbance on the HV system would not affect the real or reactive power draws of auxiliary loads, and it was stated in the 12/13/2012 webinar that UAT relay trips are not known to have caused the loss of any generation units during the northeast blackout of '03. UATs are stated later in the Application Guidelines to have been included to satisfy a FERC directive (Order No. 733, paragraph 104), but such a move nonetheless appears to be incorrect, particularly in light of NERC's recent emphasis on the cost justification of reliability standards. 3. Clarify UAT and station service transformers. Footnote 1 says "Loss of these transformers will result in removing the generator from service." Does that mean it only applies to SS transformers that loss of will remove a unit from service? What about provisions for backup, multiple transformers and busses? Consider an hydro plant with 4 sation service busses and 12 generating units. Would this standard apply to all? This is very different from thermal stations where a unit would have a dedicated transformer that without its power the unit will trip. Consider liminting this only to transformers where loss would cause a direct trip of a BES unit, or eleminiate UAT ans SS transformers completely per comment 2. 4. The generator overload protection exception added to Draft 3 for extremely inverse characteristics (5th bull-dot) is a major improvement, but the term "full-load current" needs clarification. Is this the current at normal full-load turbine output and typical PF, or the value determined from the generator nameplate MVA at rated voltage, or the base (no fans, no oil circulation) rating of the GSU, or FERC hydro nameplate criteria at best gate? 5. PRC-025 should be revised to grandfather existing major equipment, similar to the approach recently used for PRC-024. It may not always be possible to develop PRC-025-conforming means of protection without replacing GSUs or UATs; and, in the absence of any compensation to the owner, it would be inappropriate to outlaw equipment that was acceptable under the rules in effect at the time it was installed. 6. Deeming any and all violations of this standard to have a high violation risk factor and a severe violation severity level seems overly harsh, given the compliance feasibility uncertainties expressed above. Consider a VSL based on the size of the generating unit or amount of generation that would be lost if the standard were not properly applied. A 20MVA unit would have a much lower impact on the reliability of the BES than a 500MW unit.

Barbara Kedrowski

Wisconsin Electric

Wisconsin Electric

Barb Kedrowski

Agree

NAGF

[Empty rows]

Operational Compliance

Ed Croft

Yes

Content is good. However - the two standards should refer to EXACTLY the same table of Relay Loadability Evaluation Criteria with EXACTLY the SAME OPTION #s for each Relay Type/Application.

The table could stand on its own and each record be labeled with PRC-025 and/or PRC-023 applicability (new column(s)).
Yes
But...see comments for Question #1.
Yes
See comments for Question #1. In addition, Figures 1,2 and 3 could be clarified by 1) labelling the Generator Interconnection Facility with a pointer and parentheses, 2) include table with columns for Relay Owners, Function of Owner and Applicable Standard. This way, a quick glance at the figure can clarify which standard is applicable (rather than having to decipher the caption).
Yes
Editorial note: To aid with distinguishing between options: underline the words "is necessary" and "is not necessary" for "Implementation Date" columns.
Clem Cassmeyer
Western Farmers Electric Cooperative
Western Farmers Electric Cooperative
Caleb Muckala
Agree
Western Farmers Electric Cooperative
No
See comments to question 5
No
See comments to question 5
Yes
Many generation Facilities, that are part of the Bulk Electric System, became commercial in the 1950's, 1960's, 1970's, 1980's and 1990's. These Facilities should be Grandfathered in. Many of these units, although reliable, it may not be cost effective to obtain compliance with PRC-025-1. Many of these Facilities would be forced to either: (1) implement very expensive upgrades to existing equipment, (2) replace existing equipment, (3) retire the Facility. It's my opinion this is not consistent with the economic rational NERC is attempting to achieve. Secondly, the Violation Risk Factor of High, seems extreme because several other standards address generator reliability (Under-frequency, Misoperations, Protection System Maintenance and Testing, Generator Verification). These standards, have resulted in many generation Facilities having undergone relay coordination studies to prevent an occurrence similar to the 2003 "blackout."
Michael Mayer
Delmarva Power & Light Company
Pepco Holdings Inc & Affiliates
David Thorne
Agree
Pepco Holdings Inc. & Affiliates
NICOLE BUCKMAN
Atlantic City Electric Company
Pepco Holdings inc. & Affiliates
David Thorne

Agree
Pepco Holdings Inc. and Affiliates
MRO NERC Standards Review Forum
Russel Mountjoy
Yes
Yes
Yes
Yes
The NSRF remains concerned that the proposed calculations for the distance relays will adversely affect reliability of the BES by requiring generators to pull back distance reaches too far which could lead to reduced rely coverage (at least for backup relaying) or longer delays for coordination. Some sample calculations performed by NSRF members show that distance reaches need to be pulled back more than 30%. The NSRF members believe that this is most likely due to the more conservative relay load limit angle calculations at 30 degrees rather than former MidContinent Area Power Pool (MAPP) criteria which used line Maximum Torque Angle calculations which typically averaged near 70 – 85 degrees. Sample MAPP Relay Load Limit Calculation: $(0.85 \cdot kV)^2 / (Z1_{max} \cdot \cos(\max \text{ torque angle} - \text{line power factor angle}))$ NSRF sample calculations show that many generators may require 21 distance setting changes based upon this proposed standard, potentially resulting in potential reductions of relay backup coverage for lines leaving some generating stations. This will put a much higher risk and responsibility on the TO too have extremely reliable protection for the lines. We will no longer be able to trip the generator off in a backup mode if the TO does not clear the phase fault at end of line. This appears to conflict with R1, unless the standard is mandating the installation of additional equipment such as redundant relays systems to maintain reliable fault protection. The NSRF would ask the NERC Standard drafting team to work with NSRF members to help verify the basis for the new calculations and if this does in fact reduce relay coverage or require entities to install additional relaying to maintain system reliability as mandated in R1.
Mark Yerger
Potomac Electric Power Company
Pepco Holdings, Inc & Affiliates
David Thorne
Agree
Pepco Holdings Inc. and Affiliates
Jonathan Meyer
Idaho Power Company
n/a
n/a

Yes
Yes
Yes
Yes
No
Alice Ireland
Xcel Energy
n/a
Alice Ireland
Yes
No
For 51 relay that is installed on the high side of GSU, we suggest it should be an acceptable option if the 51 relay setting meets R1 Criteria 11.
No
In the last paragraph on page 19 of the clean version of the PRC-025-1 Guidelines and Technical Basis, the following sentence appears: "Phase time overcurrent relays applied to the UAT that act to trip the generator directly or via lockout or auxiliary tripping relay are to be compliant with the relay setting criteria in this standard." This typically would be the case for UAT's connected to the generator bus. However, for system connected auxiliary transformers as shown in Fig 6 on page 20, it is very unlikely that the time overcurrent relays protecting the system connected transformers will act to trip the generator directly or via lockout as this is a different zone of protection and to do so might result in an unnecessary challenge of the unit's overspeed protection. Instead, these overcurrent relays will trip the source breakers feeding the system connected auxiliary transformer but will not act to directly trip the generator. The generator will ultimately trip because of the resultant loss of power to the auxiliary system when the source breakers feeding the auxiliary transformer are tripped. The loss of auxiliary power will likely result in some form of a turbine/prime mover trip and the generator breaker will be tripped open once power output drops to zero. In this manner, unit overspeed protection is not unnecessarily challenged. It seems that the quoted sentence on page 19 only serves to confuse the matter. If the goal of this setting requirement is to not to have the plant trip due to a loss of auxiliary power based on overly conservative setting of overcurrent relays, it is immaterial whether the overcurrent relays act to trip the generator directly or via lockout or auxiliary tripping relay or if the plant ultimately trips because a loss of auxiliary power caused by overcurrent relays opening source breakers to the system connected auxiliary transformer. We recommend the quoted sentence be stricken from the guideline and technical basis document.
Yes
Yes
1) Applicability: In the applicability sections, we suggest you replace the phrase "BES generating unit or generating plant" with "BES generating unit or BES generating plant" to be more clear. 2) M1: We recommend you add "simulation results" as acceptable evidence in Measure M1. (reason: Some people may choose to do PRC023 check in the CAPE simulation.)
Michael Falvo
Independent Electricity System Operator
NPCC

Michael Falvo
Yes
Yes
Yes
Yes
No
PacifiCorp
Ryan Millard
Yes
Yes
Yes
Yes
No
Wryan Feil
Northeast Utilities
Wryan Feil
Wryan Feil
Yes
Yes
Yes
Yes
No
SERC Protection and Controls Subcommittee
David Greene
Yes
No
There is a discrepancy between the relay functions listed in PRC-023-3 Attachment A and those identified in PRC-023-3 Attachment C Table 1 and PRC-025-1 Attachment 1 Table 1. PRC-023-3 Attachment A includes under 1.6, "Phase overcurrent supervisory elements (i.e., phase fault

detectors) associated with current-based, communication-assisted schemes (i.e., pilot wire, phase comparison, and line current differential) where the scheme is capable of tripping for loss of communications." These schemes are not accounted for in the Table 1 of either proposed standard. Given these schemes are required to meet loadability criteria on transmission lines not meeting the "generator interconnection facility" designation (i.e. networked lines), the exclusion of the schemes from generator loadability criteria creates confusion. Loadability criteria should be included for "Phase overcurrent supervisory elements (i.e., phase fault detectors) associated with current-based, communication-assisted schemes (i.e., pilot wire, phase comparison, and line current differential) where the scheme is capable of tripping for loss of communications" in Table 1 of both PRC-023-3 and PRC-025-1.

Yes

Yes

Yes

There were three one-line reference drawings described on the webinar. Suggest adding text to these reference drawings or add descriptive wording in reference documents to better explain responsibilities of relay owners for these various configurations. On the webinar there were repetitive questions about these configurations so this would indicate confusion. Also, would suggest adding another drawing to illustrate when you have a generating station where the GO owns GSU relays and the TO owns relays between the GSU and switchyard to clarify that the TO is only responsible for R7 in PRC023-3 and not R8 since the GSU relays are a GO asset.

Nazra Gladu

Manitoba Hydro

Manitoba Hydro

Nazra Gladu

Yes

Yes

(1) Manitoba Hydro suggests eliminating Table 1 from one of the standards and referencing it in the other standard, since both PRC-023-3 and PRC-025-1 are already very lengthy standards.

Yes

Yes

Yes

(1) Section 3.1.1, PRC-025-01 - the repeated word "Facilities" seems unnecessary. For clarity, remove the last instance of the word "Facilities" in the statement: "Generator Owner that applies load-responsive protective relays at the terminals of Facilities listed in 3.2, Facilities." (2) Section 3.2 - it would be useful to add criteria that define which generator units should be included as associated with the BES. Alternatively, should this standard refer to the BES definition for which generator units in this standard will apply to? (3) Section 3.2.5 - It is unclear what elements should be included in this section - Collector lines only? What size (MVA) of generating source that the collector line has to be on to qualify as one of these elements? (4) Implementation Plan, PRC-023-3 - it would be helpful to include the implementation plan within the standard. (5) PRC-023-3, Purpose - suggest re-wording to the following "...not interfere with a system operators ability to take remedial action to protect system reliability...". (6) PRC-023-3, Purpose - capitalize "system operator" because it appears in the Glossary of Terms. (7) PRC-023-3, Applicability, Functional Entity - capitalize "protection system" because it appears in the Glossary of Terms. (8) PRC-023-3, 4.2.1.3 - 'BES' should be written Bulk Electric System (BES) since it is the first appearance of the word. (9) PRC-023-3, 4.2.3.1 - should Transmission lines be written "Transmission lines (and paths)"? (10) PRC-023-3, R1, 4 - capitalize the words "power transfer capability" because it appears in the Glossary of Terms. (11) PRC-023 and PRC-025 - capitalize the words "transmission lines" throughout the document(s). (12) PRC-023 and

PRC-025, D. Compliance 1.1 - the paraphrased definition of 'Compliance Enforcement Authority' from the Rules of Procedure is not the standard language for this section. Is there a reason that the standard CEA language is not being used? (13) PRC-023-3 — Attachment B, Circuits to Evaluate - replace the acronym "BES" with the words "Bulk Electric System". (14) PRC-023-3 — Attachment B, Criteria, B2 - write out the words for "IROL" then use the acronym thereafter. (15) PRC-023-3 — Attachment C - use the acronym "RRO" after the first instance of the words "Regional Reliability Organization". (16) PRC-025-1 – Attachment 1: Relay Settings - use the acronym "RRO" after the first instance of the words "Regional Reliability Organization".

Anthony Jablonski

ReliabilityFirst

ReliabilityFirst

Anthony Jablonski

Yes

Yes

No

1) There appears to be an error in the Guidelines and Technical Basis document on page 23 for option 15b. It indicates that the Reactive Power output that equates 120% of the maximum gross Mvar output whereas Table 1 states 100%. 2) A statement should be inserted that the iterative calculation stopped because the change was < 1%. This applies to options 1b & 7b on page 31 and option 2b on page 38. Also, if an entity knows the resistive and reactive impedances of the transformer, the entity could directly calculate the low-side GSU voltage from the high-side voltage, the per unit current through the GSU and the full impedance of the transformer.

Yes

Yes

1) In Attachment 1, it is not clear that the fifth bulleted exception regarding protection systems that detect generator overloads needs or should be as specific as to cite the 7 seconds at 218% of full-load current operating point or characteristic curve. Typically for a fault right on the generator terminals, the current decays in a couple of seconds to around full load current even with the AVR in service. Even during field forcing, it is more likely that the field overcurrent relay would operate rather than a generator overload relay. Therefore, the exclusion does not appear to be needed. If the exclusion is needed, it is recommended that the exclusion be stated in a more general way such as the following: Protection systems that detect generator overloads that are designed to coordinate with the generator short-time capability by utilizing a relay characteristic set to operate no faster than the capability curve and supervised to prevent operation below 115% of full-load current. 2) The word 'Each' appears to be missing in Requirement R8 of PRC-023-3. 'Each' should be inserted at the beginning of the requirement before Transmission Owner and Distribution Provider. 3) Since there are cases where redundant UATs that allow a generator to continue to remain in service when one UAT trips, this may be rationale to revise 3.2.3 of the Applicability section to indicate exclusion for these configurations. Alternatively, it could be addressed in the Guidelines and Technical Basis document. 4) The Regional Reliability Organization (RRO) is referenced within both standards and it was ReliabilityFirst's understanding that the term RRO was to be removed from all the standards. In Order 693, Paragraphs 146-148 and paragraph 157 state "The Commission adopts the NOPR proposal to eliminate references to the regional reliability organization as a responsible entity in the Reliability Standards. We conclude that this approach is appropriate because, as explained in the NOPR, such entities are not users, owners or operators of the Bulk-Power System. NERC indicates that it can remove such references, except that the Regional Entity should be identified as the compliance monitor where appropriate." ReliabilityFirst suggests replacing the RRO with the Planning Coordinator (PC) or other registered function the SDT determines to have the wide area view and be responsible for determining what these settings and or values should be.

David Jendras

Ameren
Ameren Compliance
Eric Scott
No
(1) For consistency, we believe that PRC-023-3 requirement R7 should only apply at 200kV and above. Therefore, we request the SDT to change 4.2.3.1 to 'Transmission lines operated at 200kV and above that are used...'
No
(1) We ask the SDT to clarify that 'nameplate MVA rating' means the 'generator nameplate MVA rating'. Therefore we request that the SDT either add a statement "Unless otherwise stated, 'nameplate MVA rating' means the 'generator nameplate MVA rating' throughout Table 1", or insert 'generator' before 'nameplate MVA rating'.
No
(1) We request the SDT to add a multiple winding transformer example. We recommend that the SDT include an example with equally rated CTGs connected to equally rated dual secondary transformer windings stepping up to a single high voltage winding, because it is commonly used. (2) The MW capability reported to the Transmission Planner changes by a very small amount from time to time. As written we believe that this could trigger a significant amount of documentation. We request the SDT to show in your example (s) how an increased margin would address such a small change (e.g. a 2% increase from the originally documented value) before triggering such a review. (3) On page 2 of the Guidelines and Technical Basis document, we ask the SDT to delete 'Generator Owner' from the last sentence of Figure 2 caption.
Yes
Yes
(1) The generator overload protection exception on page 8 for "extremely inverse characteristics" (5th bullet-dot) is a major improvement, but we believe that the term "full-load current" needs clarification. We ask the SDT, is this current at 100% of the gross MW capability reported to the TP, or the value determined from the generator nameplate MVA at rated voltage, or the base (no fans, no oil circulation) rating of the GSU or the smallest of these? (2) We believe that Blackstart Resources should be excluded because there is no technical basis for including them. On the contrary, it is more important to assure Blackstart Resources are adequately protected and available for restoration in the extremely unlikely event that a wide-area blackout occurs. Also, we believe that there is no evidence that the tripping of a Blackstart Resources has contributed to widespread outages. In our experience, these resources are below the 20MVA threshold and even if they were on-line and tripped their impact to the BES are minimal. (3) In addition to our comments, we also agree with the SERC Protection & Control Subcommittee (PCS) comments and include them by reference.
Thomas Foltz
American Electric Power
Does Not Apply
Does Not Apply
No
AEP believes that both documents would benefit from the inclusion of a simplified GO/TO interface diagram showing the overlap and applicability of the two standards within the opening section of each standard. Clarity needs to be provided to PRC-023-3 regarding the proper consideration of GO-owned transmission line protection systems. It must be understood that for load responsive relays subject to R7 and R8, the responsibility to perform loadability evaluations is on whoever is the owner of the Protection System. Regarding PRC-023-3, it is unclear exactly what facilities are included in the term "BES Generating Unit". It is requested that this be clarified. AEP also requests clarification on the voltage levels applicable to Regarding PRC-023-3 R7. Section 4.2.3.1 currently applies to "transmission lines" which implies that all voltage levels would be subject to this requirement. It is requested that this be revised to clarify exactly what voltage applies.

No

PRC-023-3 must be clear in stating that, if a Transmission or Distribution line used solely to export energy directly from the GU has its own circuit breaker, then the existing R1 through R5 criteria should be applied based on the rating of the line. PRC-023-3 appears to exclude relays directional toward the Generating Unit. For example, if you attempt to evaluate loadability for two-terminal 345kV line to a windfarm, it appears to be applicable to both PRC-023-3 4.2.1 and 4.2.3. This would make it difficult to determine what Transmission lines are subject to evaluation and which requirement to apply, R1 or R7. Based on the current draft, it is not clear what criteria set to apply. The criteria in Table 1 is based on Generator's power while the criteria in Requirement 1 is based on circuit ratings. It needs to be clarified which criteria set is to be applied. A second example is in a situation when a loadability evaluation is needed for a two-terminal line that is definitely not applicable to 4.2.1., but *is* applicable to 4.2.3. The intent of having two standards appears to be to have the relays on the Generating Unit end owned by the GO, set according to criteria R1 in PRC-025-1; and to have the relays on Generating Unit end owned by the TO, set according to criteria R7 in PRC-023-3. In this example, there would appear to be no criteria required to set relays on the end external to the Generating Unit, for relays owned by either the GO or TO. Clarification is needed to define responsibility based on Protection System ownership as well as to clearly convey the applicability of remote protection systems.

Yes

No

Regarding PRC-025-1: While AEP appreciates the factors considered by the drafting team when developing the proposed implementation plan for PRC-025-1, the plan as proposed will not afford adequate time for large Generator Owners to comply with the standards. AEP has 119 generating units and 2 wind farms that are applicable to PRC-025-1. The resources needed to evaluate the generating units for compliance with PRC-025-1 and PRC-023-3 will also be engaged in implementing the new NERC standards PRC-019-1 and PRC-024-1. For these reasons, AEP believes a phased implementation plan for PRC-025-1 is more appropriate. Such a plan would require entities to show that a minimum percentage of their applicable relays are compliant within a specified time frame. For example: * Entities shall demonstrate that 30% of their applicable load-responsive protective relays are fully compliant with R1 within 48 months of the effective date of this standard. * Entities shall demonstrate that 60% of their applicable load-responsive protective relays are fully compliant with R1 within 60 months of the effective date of this standard. * Entities shall demonstrate that 100% of their applicable load-responsive protective relays are fully compliant with R1 within 72 months of the effective date of this standard. Regarding PRC-023-3: The proposed revision could significantly impact Transmission Owners. Additional research is being conducted within AEP Transmission to determine the extent of that impact. It is possible that the proposed implementation plan would not provide adequate time to achieve compliance with the standard if it is determined to impact a high volume of facilities. Additional research will be needed before a recommendation be made on the extent the additional time required. It is still unclear when TOs, GOs and DPs will be required to complete loadability evaluations for any circuits below 200kV included by the Planning Coordinator per Attachment B. It is understood that we will have 39 months to apply the initial list. There is confusion however on whether or not the 39 months applies to new inclusions to the list. AEP requests that this time frame be clarified and included in the standard, as it is information needed to maintain compliance on an ongoing basis.

Yes

System fed auxiliary transformers whose loss would not result in an instantaneous generating unit trip, and for which operators would have opportunity to reconfigure the plant auxiliary load before a unit trip occurs, should be excluded from this standard. However, if the SDT intends the standard to be applicable to all system fed auxiliary transformers, we recommend removing the text "...that trips the generator either directly or via an interposing/lockout relay" from the standard. This statement is similar to language that entities have used to exclude system fed auxiliary transformers that initiate a process shutdown trip from the scope of other NERC PRC standards. During a disturbance in which system voltage becomes depressed, the generator will respond by increasing excitation in an effort to compensate for the voltage loss. This will result in the generator terminal voltage being greater than the system voltage. For this reason, AEP recommends that settings for applicable relays installed on the generator side of the GSU be based on a generator bus voltage of 1.0 per unit at the generator

terminals, rather than a generator bus voltage calculated from 0.85/0.95 per unit of the GSU high-side nominal voltage.

Chris Mattson

Tacoma Power

Tacoma Power

Chris Mattson

Yes

Yes

Yes

Yes

Yes

Comments 1-4 below pertain to PRC-025-1. 1. Referring to Attachment 1, are phase fault detectors used in current-based local breaker failure schemes excluded from PRC-025-1? 2. Referring to Attachment 1, Footnote 3 still has the terms "no-load tap changers (NLTC)" and "on-load tap changers (OLTC)." 3. Referring to page 22 of 68 of the redlined Guidelines and Technical Basis, the first paragraph after "Generator Interconnection Facilities (Synchronous Generators) Phase Distance Relays – Directional Toward Transmission System (21) (Options 14a and 14b)," change "...for these relay..." to "...for these relays..." (There are also other instances of this issue.) 4. Referring to page 20 of 68 of the redlined Guidelines and Technical Basis, would the UATs shown in Figure 6 necessarily be applicable to PRC-025-1? It seems that phase time overcurrent relays applied to UATs like these might not "act to trip the generator directly or via lockout or auxiliary tripping relay." Comments 5-8 below pertain to PRC-023-3. 5. Referring to Attachment C, why are only two of the bulleted exceptions shown in PRC-025-1 Attachment 1 brought over? 6. Referring to page 12 of 13 of the redlined Implementation Plan, change "...were added to address to situations..." to "...were added to address situations..." 7. Referring to page 13 of 13 of the redlined Implementation Plan, last row in the table, are references to R7 supposed to be references to R8? Additionally, change "...equally and efficient..." to "...equally efficient..."

RoLynda Shumpert

South Carolina Electric and Gas

Self

RoLynda Shumpert

Yes

Yes

Yes

Yes

No

Rick Terrill

Luminant Generation

Luminant Generation

Rick Terrill

No
Luminant recommends the following: (1) Load responsive relays identified in PRC-025-1 and 023-3 connected on generator breaker(s) at the GSU high side and are primarily used for backup of failed transmission line relaying shall use options in Attachment C (PRC-023-3) and Attachment 1 (PRC-025-1). (2) Load responsive relays identified in PRC-023-3 and connected on the high side of the GSU that are primarily used for transmission line protection shall use the existing criteria in PRC-023-2, Requirements R1 through R6. The above recommendations can be done by adding diagrams in PRC-023-3 and clarifying Figures 1, 2, and 3 in PRC-025-1.
No
Luminant disagrees that the criterion for setting load responsive relays is clear because of the bright line is vague. Luminant recommends that each standard be clear in addressing the relay setting criteria by its primary application.
No
Figures 1, 2, and 3 do not provide a sufficient bright line between the application of PRC-025-1 and PRC-023-3 for setting criterion. Luminant recommends that additional information be added that identifies that a load responsive relays located on the transmission line breaker at Bus A and are primarily installed for transmission line protection use PRC-023-3 criterion Requirements R1 through R6 (regardless of the number of generators or transmission lines connected to Bus A). Load responsive relays located on the high side of the GSU and are primarily used for failed transmission line protection should use PRC-023-3 (Attachment C) or PRC-025 (Table 1).
No
Luminant recommends that the phrase "where relay replacement is not required" and "where relay replacement is required" add the word removal; i.e., "replacement or removal".
No
David Gordon
Massachusetts Municipal Wholesale Electric Company
n/a
n/a
Agree
North American Generator Forum
Mark Stein
Tri-State G&T
Tri-State Generation and Transmission Assoc
Mark Stein
No
The generator overload protection exception added to Draft 3 for extremely inverse characteristics is a major improvement, but the term "full-load current" needs clarification. Is this the current at normal full-load turbine output and typical PF, or the value determined from the generator nameplate MVA at rated voltage, or the base (no fans, no oil circulation) rating of the GSU?
Yes

1. UATs should be dropped from the standard. The Application Guidelines state that the reliability objective of PRC-025 is to cover, "all load-responsive protective relays that are affected by increased generator output in response to system disturbances," but the relays of UATs are not in this category. A disturbance on the HV system would not affect the real or reactive power draws of auxiliary loads, and it was stated in the 12/13/2012 webinar that UAT relay trips are not known to have caused the loss of any generation units during the northeast blackout of '03. UATs are stated later in the Application Guidelines to have been included to satisfy a FERC directive (Order No. 733, paragraph 104), but such a move nonetheless appears to be incorrect, particularly in light of NERC's recent emphasis on the cost justification of reliability standards. 2. PRC-025 should be revised to grandfather existing major equipment, similar to the approach recently used for PRC-024. It may not always be possible to develop PRC-025-conforming means of protection without replacing GSUs or UATs; and, in the absence of any compensation to the owner, it would be inappropriate to outlaw equipment that was acceptable under the rules in effect at the time it was installed. 3. The applicability of PRC-025 should exclude small gensets that are NERC-registered solely due to being black start-capable, the tripping of which would not meaningfully affect the ability of the system to ride through Disturbances. It would be best to allow such units to maintain their present loadability relay settings, if they are consistent with a reasonable coordination study, rather than mandate upgrades that augment the degree to which NERC requirements have already eliminated any economic rationale for having black-start facilities. 4. Regarding in particular voltage-restrained overcurrent relays, this type of device is notorious for not having a predictable operation time under fault conditions. If they did mis-operate in the August 2003 blackout they should be changed-out rather than requiring that the settings be set as high as specified in the draft standard.

PPL NERC Registered Affiliates

Brent Ingebrigtsen

Yes

Yes

No

See Comments for Question #5

Yes

Yes

: The PPL NERC Registered Affiliates reiterate their concern in regards to the following comments. The Application Guidelines state that the reliability objective of PRC-025 is to cover, "all load-responsive protective relays that are affected by increased generator output in response to system disturbances." Unit Auxiliary Transformers (UAT's) are not in this category and should therefore be excluded from the Applicability of the Standard in Section 3.2.3. The point was made in the 5/15/13 webinar that a decrease in HV system voltage would affect the plant MV voltage as well, causing a proportional increase in current (at constant power draw by plant auxiliary loads) and thereby potentially tripping UAT loadability relays. Reduction in frequency during disturbances will strongly reduce the power draw of pumps and fans, however, so MV current may actually drop despite the HV voltage reduction being experienced. This point of view is supported by the statement in the 12/13/2012 webinar that UAT relay trips are not known to have caused the loss of any generation units during the northeast blackout of '03, so extending PRC-025 applicability to UATs provides only a hypothetical benefit that has not been observed (or has in fact been disproved) in practice. The PPL NERC Registered Affiliates again state that Facilities' UATs in Section 3.2.3 do not belong in this standard as no technical justification has been provided. An investigation and evaluation of the protection systems for unit auxiliary transformers and the UAT's lack of impact on generator loadability should be considered by the SDT. A cost-benefit analysis for generator UATs should be performed to demonstrate that net benefits will result from any such standard before it is proposed. Without such an analysis, the standard may result in costs without a sufficient reliability benefit and may in some cases actually lessen reliability (see item 5 below). 2.) The generator overload protection exception added to Draft 3 for "extremely inverse characteristics" (5th bull-dot) is a major improvement, but the term "full-load

current” needs clarification The PPL NERC Registered Affiliates suggest that the SDT state in the Guidelines and Technical Basis that “full-load current” is understood to be the generator nameplate MVA at rated voltage 3.) The overload protection exception added to Draft 3 for “extremely inverse characteristics” should be applied for UAT’s as well if eliminating UAT’s in its entirety (per comment #1 above) does not prove feasible. 4.) The PPL NERC Registered Affiliates reiterate their concern in regards to the following comments. PRC-025 should be revised to grandfather existing major equipment, similar to the approach recently used for PRC-024. It may not always be possible to develop PRC-025-conforming means of protection without replacing GSUs or UATs; and, in the absence of any compensation to the owner, it would be inappropriate to outlaw equipment that was acceptable under the rules in effect at the time it was installed. 5.) The applicability of PRC-025 should exclude small gensets that are NERC-registered solely due to being black start-capable, the tripping of which would not meaningfully affect the ability of the system to ride through Disturbances. It would be best to allow such units to maintain their present loadability relay settings, if they are consistent with a reasonable coordination study, rather than mandate upgrades that augment the degree to which NERC requirements have already eliminated any economic rationale for having black-start facilities. Given the numerous CIP standards in effect to afford protection to the critical BS restoration facilities, it would be contradictory to impose a standard that could potentially increase risk of damage to a BlackStart Generator by forcing the BS facility to ride through the disturbance. If that disturbance is a precursor to a blackout, then having BS Resource unavailable to facilitate system restoration would defeat the purpose of designating it as a Blackstart Resource. 6.) The PPL NERC Registered Affiliates reiterate their concern in regards to the following comments. Regarding in particular voltage-restrained overcurrent relays, this type of device is known for not having a predictable operation time under fault conditions. If they did mis-operate in the August 2003 blackout they should be changed-out rather than requiring that the settings be set as high as specified in the draft standard. 7.) Deeming any and all violations of this standard to have a high violation risk factor and a severe violation severity level seems overly harsh, given the compliance feasibility uncertainties expressed above. 8.) The compliance uncertainties expressed above also promote the use of risk based compliance approach rather than a zero tolerance policy. Other standards in development (CIP V5 standards) no longer dictate a zero tolerance policy. This concept should be applied to the PRC-025 standard to align with the direction NERC standard development is progressing.

North American Generator Forum Standards Review Team

Patrick Brown

No

See comments to question 5 below

Yes

1. UATs should be dropped from the standard. The Application Guidelines state that the reliability objective of PRC-025 is to cover, “all load-responsive protective relays that are affected by increased generator output in response to system disturbances,” but the relays of UATs are not in this category. A disturbance on the HV system would not affect the real or reactive power draws of auxiliary loads, and it was stated in the 12/13/2012 webinar that UAT relay trips are not known to have caused the loss of any generation units during the northeast blackout of ‘03. UATs are stated later in the Application Guidelines to have been included to satisfy a FERC directive (Order No. 733, paragraph 104), but such a move nonetheless appears to be incorrect, particularly in light of NERC’s recent emphasis on the cost justification of reliability standards. 2. The generator overload protection exception added to Draft 3 for extremely inverse characteristics (5th bull-dot) is a major improvement, but the term “full-load current” needs clarification. Is this the current at normal full-load turbine output and typical PF, or the value determined from the generator nameplate MVA at rated voltage, or the base (no fans, no oil circulation) rating of the GSU? 3. The exception of comment #2 above, which is presently limited to generator overloads, could be applied for UATs as well if eliminating this equipment in its entirety (per comment #1 above) does not prove feasible. 4. PRC-025 should be revised to grandfather existing major equipment, similar to the approach recently used for PRC-024. It may not always be possible to develop PRC-025-conforming means of protection

without replacing GSUs or UATs; and, in the absence of any compensation to the owner, it would be inappropriate to outlaw equipment that was acceptable under the rules in effect at the time it was installed. 5. The applicability of PRC-025 should exclude small gensets that are NERC-registered solely due to being black start-capable, the tripping of which would not meaningfully affect the ability of the system to ride through Disturbances. It would be best to allow such units to maintain their present loadability relay settings, if they are consistent with a reasonable coordination study, rather than mandate upgrades that augment the degree to which NERC requirements have already eliminated any economic rationale for having black-start facilities. 6. Regarding in particular voltage-restrained overcurrent relays, this type of device is notorious for not having a predictable operation time under fault conditions. If they did mis-operate in the August 2003 blackout they should be changed-out rather than requiring that the settings be set as high as specified in the draft standard. 7. Deeming any and all violations of this standard to have a high violation risk factor and a severe violation severity level seems overly harsh, given the compliance feasibility uncertainties expressed above.

Michelle R. D'Antuono

Ingleside Cogeneration LP

Individual -- Ingleside Cogeneration LP

Michelle R. D'Antuono

No

Even though the language in both standards draws a technically accurate bright line, Ingleside Cogeneration believes that the addition of the generator relay criteria to PRC-023-3 is confusing at best. It appears that the issue has to do with the ownership of the relays. In some cases the DP and/or the TO owns a load responsive relay that is protecting generation equipment. Conversely, some GOs own load responsive relays that protect transmission equipment. If the concept of the two standards is that PRC-023-3 applies to transmission-related relays and PRC-025-1 applies to generation-related relays, then the owner of the relay is not a gating factor. This means that the applicability table for both standards would include DPs, GOs, and TOs. There would be no repeated criteria between the standards in this arrangement – and less confusing in our view.

Yes

Yes

No

Ingleside Cogeneration LP does not agree with the 100% compliance approach that the drafting team has taken in regard to PRC-025-1. Although FERC Order 733 is cited multiple times as the reliability need, there are real dollars that the industry will need to expend to analyze and replace load responsive relays for generators of any size. We do not read Order 733 the same way – and FERC has accepted exceptions for low-impact facilities in the past.

Yes

In the previous posting, the project team requested our estimated compliance costs and comments on the RSAW. Both of these projects are components of risk-based compliance – which Ingleside Cogeneration LP fully supports. However, it appears that these are not considerations at all in the latest postings. We are not sure what has changed in the intellectual basis of risk-based compliance, but it seems we have taken a step backwards. The rationale for far too many of the project team's consideration of comments was that FERC Order 733 mandated some action. Since FERC has been generally supportive of the risk-based initiative, this type of response is inconsistent with their position in our view.

Western Area Power Administration

Lloyd A. Linke

Yes

Yes

Recommend adding reference to Table 1 - Options 7, 8, 9, 10, 11, 12 – Relay Type back to options 1, 2, 3, 4, 5, 6 for applications on the generator side of the GSU. The language and reference used in the Relay Type column for Options 1-6 added clarity and should be mirrored in Options 7-12.

Yes

No

Brenda Hampton

Luminant Energy Company LLC

Luminant

Brenda Hampton

Agree

Luminant Generation Company LLC

No

See Luminant Generation Company LLC comments.

No

See Luminant Generation Company LLC comments.

No

See Luminant Generation Company LLC comments.

No

See Luminant Generation Company LLC comments.

No

John Bee

Exelon and its affiliates

NA

NA

The Constellation Energy Nuclear Generation (CENG) NERC Registered Affiliates reiterate their concern in regards to the following comments. The Application Guidelines state that the reliability objective of PRC-025 is to cover, "all load-responsive protective relays that are affected by increased generator output in response to system disturbances." Section 3.2.3 of PRC-025-1 requires clarification simply because the Unit Auxiliary Transformers (UAT's) are not necessarily directly connected to the generator, but there are indirect link to the generator operation. The UAT's are ok to be included to the applicability of this standard, but section 3.2.3 could use more detailed explanation. Moreover, the webinar on 5/15/13 pointed out that a decrease in HV system voltage would affect the plant MV voltage as well, causing a proportional increase in current (at constant power draw by plant auxiliary loads) and thereby potentially tripping UAT loadability relays. Reduction in frequency during disturbances will strongly reduce the power drawn of pumps and fans, however, so MV current may actually drop despite the HV voltage reduction being experienced. This point of view is supported by the statement in the 12/13/2012 webinar that UAT relay trips are not known to have caused the loss of any generation units during the northeast blackout of '03, so extending PRC-025 applicability to UATs provides only a hypothetical benefit that has not been observed (or has in fact been disproved) in practice. CENG state that Facilities, UAT's in Section 3.2.3 is appropriate to include it, but there need to be a specific explanation as to the affect of MW due to grid disturbance affect the generator output. An investigation and evaluation of the protection systems for unit auxiliary transformers and the UAT's lack of impact on generator loadability should be considered.

Daniel Duff
Liberty Electric Power LLC
none
none
Agree
Generator Forum SDT, as submitted by Patrick Brown, Essential Power
No
Oliver Burke
Entergy Services, Inc. (Transmission)
Entergy Services, Inc. (Transmission Owner)
Oliver Burke
Yes
Yes
No
The Guidelines are still not clear about what to do with start-up transformers when used in lieu of the UATs (Unit Auxiliary Transformer).
Yes
Yes
The implementation plan may be challenging to meet and an alternative implementation plan may need to be provided based on the population of load-responsive protective relays determined affected by this standard and the subset of which that will require replacement relays. Additional resources will be required to (1) determine the population of load-responsive relays at each generating station, (2) determine the settings of the existing load-responsive relays, (3) calculate load-responsive relay settings per the reliability standard, (4) compare the existing load-responsive relay settings to the calculated load-responsive relay settings to determine the population which are acceptable as-is, the population that require a settings change, and the population that requires replacement, (5) schedule the population of load-responsive relays for settings change, (6) order replacement load-responsive relays for the population determined incapable of meeting the reliability standard and schedule relay replacement. The resulting calculations and set-point datasheets will form the basis for the load-responsive relay settings and evidence for meeting the standard's requirements.
Dominion
Randi Heise
Yes
Dominion agrees that the addition of requirements in PRC-023-3, R7 and R8 strengthens the bright line between the two standards. However, we do not agree with use of the term "Transmission" in 4.2.3.1 as it is our position that it does not conform with the intent of the term as defined in the NERC Glossary of Terms. We therefore suggest the sentence be revised to read "Lines that are used solely to export energy directly from a BES generating unit or generating plant to the network."
No
Dominion believes that the appropriate designation of "Real Power output" is the generator nameplate rating however Dominion does recognize that the addition of "gross" prior to MW is an improvement

to the table wording.
Yes
Yes
Yes
<p>PRC-025 -1 Requirement 1: remove the following words: "...while maintaining reliable fault protection." It is not possible for entities to measure or prove this statement. The wording, "while maintaining reliable fault protection", is also included in the Introduction section of PRC-025-1 Guidelines and Technical Basis. The inclusion "describes that the Generator Owner is to comply with this standard while achieving its desired protection goals." Dominion believes that the Generator Owner understands the compliance obligation based upon the requirements of the standards and that the inclusion of the referenced language should be excluded based on the inability of the entity to measure or provide evidence of maintaining reliable fault protection. PRC-025-1: Redline - Page 6 of 18 Table of Compliance Elements; An indication of Lower VSL, Moderate VSL or High VSL needs to be determined with regard to R1. Dominion disagrees with the "all or nothing" approach to VSLs. PRC-023-3 Implementation plan; Redline Pages 3-6, R1-R6 the Requirement wording (in the Applicability column) does not exactly match the Requirement wording in the standard. Dominion suggests correcting the wording to match the Standard as written. PRC-025-1 @ figure 3 - Dominion does not necessarily agree that these lines are part of networked transmission and therefore would not be considered as generator interconnection Facilities. Dominion believes the designation of the lines should be based on registration of the asset owner and will be providing supporting comments in response to the FERC NOPR in docket # RM12-16-000.</p>
Chantel Haswell
Public Service Enterprise Group
PSEG
Chantel Haswell
No
For UATs per PRC-025-1, that are energized from the system (as opposed to from the GSU), the SDT seems to assume that no TO or DP owns the load responsive relays for these UATs. Has that been verified by the SDT?
Yes
The SDT needs to confirm that UATs that are energized from the system (not the GSU) at high-side voltages that are below 100 kV are part of the BES before imposing standards on UAT load-responsive relay settings.
Duke Energy
Michael Lowman
Yes
Yes
No
Examples of calculations are helpful. However, more details on the root of the calculations are needed. Exclusively calculating values on a per unit basis would add more clarity.
No
Duke Energy schedules some of its generating units on a 24 month cycle for minor outages and a 96 month cycle for major outages. This would make the current Implementation Plan very expensive and

difficult to comply with if relay replacements are required. [Duke Energy suggests a 48 month and 96 month Implementation Plan. This would allow for the industry to use existing outage schedules, keeping overall costs at a minimum.]

No

Bret Galbraith

Seminole Electric Cooperative Inc.

Seminole Electric Cooperative, Inc.

N/A

Yes

Seminole Electric reasons that the NERC SDT has not provided sufficient evidence to warrant a High VRF and a Severe VSL for penalties associated with proposed Standard PRC-025-1.

Russ Schneider

Flathead Electric Cooperative

N/A

N/A

No

it is not clear to me how this would impact very small dispersed generators.

Yes

Do not support including Elements utilized in the aggregation of dispersed power producing resources. This seems to have the potential to rope very small generators into significant compliance burdens for very little reliability benefit.

Santee Cooper

Terry L. Blackwell

Yes

Unit Auxiliary Transformers (UATs) should be removed from this standard (Facilities Section 3.2.3). The purpose of this standard is "To set load-responsive protective relays associated with generation Facilities at a level to prevent unnecessary tripping of generators during a system disturbance for conditions that do not pose a risk of damage." The intent as stated in the Application Guidelines is to pertain to relays that "are affected by increased generator output in response to system disturbances." UATs do not fit this criteria. Addressing generating plant unit auxiliary transformers does not have to translate into creating a standard requirement for that equipment. An investigation and evaluation of the protection system for unit auxiliary transformers should be considered by the standard drafting team and deemed to be not related to generator loadability and fulfill the FERC order to address the subject.

Robert Rhodes

Southwest Power Pool

N/A
N/A
Yes
Yes
Yes
Yes
Yes
Yes
For the sake of clarity, I would suggest adding the phrase 'to the generator' at the end of the Purpose of PRC-025-1. This is implied in the existing language but it wouldn't hurt to add this and specifically indicate what damage you're referring to. For consistency within the requirements and between the requirement and corresponding measure in this situation, please add 'Each' at the beginning of Requirement R8. This makes R8 consistent with the rest of the requirements and with Measure M8.
JEA
Tom McElhinney
No
While it has been demonstrated in the 2003 blackout that a small percentage of generating units did trip off line prematurely due to conservative setting of generator protection systems, no evidence has been provided that transformer tripping contributed to the cause of the generation outages. The sole purpose as stated by the SDT for including transformers is a directive from FERC. We believe that there should be some evidence as to the benefit of performing protection modifications to transformers and that they should not simply be included until a study can be performed to show the cost benefit analysis and therefore recommend that transformers be excluded during this phase and be incorporated into a phase III. If transformers are to be included, an exception should be provided to allow the start-up transformer to be used to provide auxiliary power in case of failure of the auxiliary transformer. BES reliability is better served by allowing this exception (which will occur very infrequently) than to keep the generating unit off line for fear of being out of compliance with a standard.
No
Considering that applying new settings and testing will require a major outage, we believe that 48 months is not a sufficient time frame for full implementation when existing equipment can be used and relay replacement is not required. We recommend 72 months be allowed even in the case where existing equipment can be used. It may take a year or more to perform the calculations and evaluated equipment and then another 5 years for a major planned outage to occur.
Yes
We would like to see modifications to violation severity levels. While we recognize the SDT is following NERC binary guidelines "pass/fail", this needs to be improved. The idea that either they "applied" or "did not apply" settings must result in a "severe" violation level does not match the reality that missing 10 out of 20 poses a greater risk to the BES than 1 out of 100.
DTE Electric
Kent Kujala
Agree
No
Comments: The distinction is not clear between these two standards regarding generator owner

relays that look toward the transmission system. Perhaps specifying the application location of the relay (CT and PT inputs) would help in clarifying the differences
No
Comments: Suggest that allowing 72 months to become 100% compliant for both 4a and 4b would better align with the unmonitored protective relay maximum maintenance interval of 6 years specified in PRC-005-2. In this way, relay setting changes or replacements could be accommodated during normal scheduled relay maintenance. Also, 48 months could be difficult to achieve for a company with a large generation fleet.
Bonneville Power Administration
Jamison Dye
No
The requirements for generator interconnection facilities in PRC-023-3 apply to Transmission Owner's (and Distribution Provider's , and the requirements for generator interconnection facilities in PRC-025-1 apply to Generation Owner's. BPA believes that putting requirements for the generator interconnection facilities in two separate standards and making the applicability of the standards different is confusing and unnecessary. BPA recommends that all interconnection facilities, regardless of ownership, should be covered within one standard to provide uniformity in the application of settings for interconnection facilities.
No
Example: A 230kV line that is connected between a substation Terminal and a Generating station. (Comment 1) This circuit fits under 4.2.3 of PRC-023-3, so it is subject to Requirement 7. The circuit also fits under 4.2.1, so it is subject to Requirements R1 throughR5. BPA believes it should only be subject to R1 throughR5 or R7, not both. (Comment 2) R7 requires that the load responsive relays be set in accordance with PRC-023-3, Attachment C. BPA would like to point out that the phase distance relays at the substation terminal looking toward the generation are not covered by Attachment C and believes this creates a problem as it makes it impossible for these relays to be set in accordance with Attachment C. The same problem also exists for relays at the terminal of the generator step up (GSU) transformer looking toward the generation, recognizing that this is not a normal application. Based on these issues, BPA believes Attachment C should address all relays, not just those looking towards the Transmission system.
No
While the Guidelines and Technical Basis provides useful information, BPA is concerned that this document will not be approved by FERC as part of the standard and thus the standard must be capable of standing on its own. For this reason, BPA requests that clarification provided in the Guidelines and Technical Basis document be included into the standard specifically in regards to 'generator interconnection facilities'.
Yes
Yes
Comments: (1) The use of the term generation interconnection facility without an official definition of the term is concerning to BPA. BPA believes that this term may have different meanings between entities. For example, the entire Bulk Electric System (BES) together with all distribution systems could be considered to be a generation interconnection facility because the purpose of the BES and distribution systems is to interconnect generation to the end user (load). Only under the Guidelines and Technical Basis is a description of what a generator interconnection facility found. BPA is concerned with this approach as it does not give an official definition, and this document is not part of the standard. Additionally, BPA believes the description of generator interconnection facility given in the Guidelines and Technical Basis creates problems. The description provided is that the generation interconnection facility consists of elements between the generator step up transformer (GSU) and the interface with the portion of the BES where the Transmission Owner (TO) takes over the

ownership. In many cases the TO owns the line that connects to the generator step up (GSU) transformer and there are no elements between the GSU and the TO. According to this description there is no generation interconnection facility. Due to the ownership arrangements of transmission, generation, and their interconnection facilities throughout the country are highly variable, BPA believes it is not suitable to develop a definition of generation interconnection facilities based on ownership. Such a definition may reflect the ownership arrangements within a particular region while it does not take into account various other arrangements that may exist. BPA recommends for the drafting team to provide a definition of generation interconnection facility that takes into account the various ownership situations that may exist. (2) BPA believes the use of the word associated in the purpose statement of PRC-025-1 as well as in Section 3.2 Facilities is too vague and recommends this term be changed to "whose function is the protection of generation Facilities..." in the purpose statement and Section 3.2 be rewritten to read "3.2 Facilities: The following Bulk Electric System Elements, including those generating units and generating plants identified as Blackstart Resources in the Transmission Operator's system restoration plan:"

Tennessee Valley Authority

Dennis Chastain

TVA electric generators segment agrees with comments submitted by the North American Generator Forum (NAGF).

Yes

Yes

No

Yes

Is the intent of this standard to identify the lines in their normal configuration and not for contingency events? For example, referring to Figure 3 from the Webinar, if a line is lost, causing the system configuration to change to what is shown in Figure 1, does this mean that the configuration then is considered to fall under R7?

ACES Standards Collaborators

Jason Marshall

No

There is definitely much clearer delineation between what is required in PRC-023 by the Transmission Owner and Distribution Provider and in PRC-025 by the Generation Owner for generator step up transformers, generators, auxiliary transformers and generator interconnection facilities. However, PRC-023 still has other requirements that are applicable to Generators Owners that do not make sense, create compliance risks and, thus, detract from reliability by distracting the Generator Owner from value added reliability activities. For example, PRC-023 R1 is still applicable to the Generation Owner and it should not be. A Generation Owner does not own transmission beyond the generator interconnection facility. This is recognized in Project 2010-07 Generator Requirements at the Transmission Interface and NERC's work surrounding the GO/TO and GOP/TOP registration issues. If a Generator Owner owned transmission beyond the generator interconnection facility, they would be registered as a Transmission Owner. Thus, the Generator Owner will be stuck essentially going through a registration exercise for every compliance activity to prove that the requirements do not apply because they do not own transmission facilities. Other requirements in PRC-023 that require removal of Generator Owner include R2, R3, R4, and R5. Until these removals occur, we will not be able to support the standard.

Yes

The table is much clearer than in past versions. However, we do recommend one minor additional change. The option numbers should be reset to 1 for every application and relay type combination since they are truly options within those combinations. Otherwise, a reader may believe they have 19 options and only have to pick one relay type and application to apply.

Yes
We agree with the 48-month and 72-month implementation plan for PRC-025 and R7 and R8 in PRC-023. However, we believe the implementation plan for PRC-023 as a whole is confusing. Since PRC-023-2 has a staggered implementation plan that is still has not fully been implemented, we recommend laying out a graphical timeline or a Gantt chart that compares PRC-023-2 implementation to that of PRC-023-3.
Yes
(1) We are not convinced that applicability of PRC-023 R7 and R8 to a Distribution Provider is necessary. It would be unusual for a generator that meets BES definition criteria and compliance registry criteria to be connected to a Distribution Provider. Both criteria require a single generator to be 20 MVA or a plant site to be 75 MVA. From a practical perspective, this could actually be a detriment to reliability by distracting the Distribution Provider from reliability activities because they have to focus on documenting that they do not have any applicable generators connected. How does including the Distribution Provider as an applicable entity benefit reliability? (2) The High VRFs for PRC-023 R7 and R8 and PRC-25 R1 and R2 are inconsistent with established NERC criteria. In order to meet the High criteria, a single violation of the requirement "could directly cause or contribute to bulk electric instability, separation or a cascading sequence of failures." A single failure to have a relay set to avoid loadability concerns on a single generator could not lead to instability, separation or cascading without violating other standards. For example, TOP-004-2 R2 already require N-1 operation so a single generator tripping due to relay loadability issues would require at least two standards requirements violations. This cannot be viewed as "directly" causing. (3) We believe the VSLs for PRC-023 R7 and R8 and PRC-25 R1 and R2 are written inconsistent FERC guideline 3 which states that the VSL cannot change the requirement. The plain language of the requirements is written in a plural format as though the requirement considers all relays are considered simultaneously. The VSLs are written such that each relay that is not set appropriately is a separate violation. The VSLs, in essence, change the requirements. For example, the Requirement for PRC-023 R7, states "shall set their load responsive relays," while the VSL essentially modifies the requirement to state "shall set each load responsive relay." We recommend modifying the VSL to be in better alignment with the requirement. (4) The wording in the second sentence of the second paragraph in PRC-023 Attachment C needs to be fixed. There seems to be an extra "Facilities." (5) RRO is used throughout both standards. It should be Regional Entity, as stated in NERC's legal memorandum on the "Use of 'Regional Reliability Organization'..." The memo states that in general, drafting teams can replace "RRO" with "RE," provided the functions being performed by the RE are related to their delegated duties. Reliability Standards that refer to REs are legally binding on the REs by operation of Rule 100 of NERC's Rules of Procedure and by the delegation agreements that NERC has entered into with each RE. (6) Please strike "other entity as specified by the Regional Reliability Organization (RRO)" that is used throughout Attachment C in PRC-023 and Attachment 1 in PRC-025. It creates compliance uncertainty and provides the Regional Entity far too much discretion. If the purpose is an attempt to document from other standards where the nameplate rating is communicating, we suggest that the drafting team perform a search of the other standards and explicitly document the entities. Otherwise, the Regional Entity, as the standard is worded, could simply decide to move the dates. FERC has ordered NERC to remove regional discretion from standards development, such as the revision of the BES definition. (7) We appreciate the relay elements that are identified for exclusion in PRC-023 Attachment C. However, we believe that the exclusion should be identified explicitly in Attachment A as well. Attachment A is referenced in applicability section. We are concerned since attachment C is not referenced in the applicability section that exclusion of the relay elements could be lost. (8) We disagree with the applicability of 3.2.5. We not understand how applicability to a distribution collector system for dispersed generation benefits reliability. If a subset of generators in the dispersed generation site trip, it will be a small amount of MWs lost that would not impact the reliability of the Bulk Power System. We can understand inclusion of the main GSU for a large site but not the individual collector elements.
Brett Holland
Kansas City Power and Light
same as individual info
same as individual info

No
We do not think that the Requirements added to the PRC-023-2 are any different than the Requirements in PRC-025-1. We agree that the addition of PRC-025-1 will cause the removal of part 6 of Requirement 1 in PRC-023-2.
No
We do not think that the information that is shown in the Attachment is very easy to understand but the additional information in the Guidelines and Technical Basis section helps to understand what the table is requesting. Please add to the table the examples shown in the Guidelines and Technical Basis or at a minimum refer to the location the example can be found in that document. This will assist in the understanding of the table. In the Guidelines and Technical Basis the calculation the previous value used for MW was based on the PF for Max Generation. In the new example the value of MW used changed why did that value change?
Yes
Yes
Yes
Generators and Generator step up transformers are critical elements of the BES and have very long lead times for replacement or major repair. However, the Transmission Relay load ability standard has less stringent load ability requirements than the Generator load ability standard. Transmission lines are allowed to trip at 150% of four hour rating or 115% of 15 minute rating. We do not understand the newly added portion of the Exceptions of PRC-025-1 why is there only the option of a specific curve type specified for the Generator. There is no exception available for the GSU or Aux Transformers therefore the GSU and Aux transformers that would allow them to be set like large auto transformers it is not our belief that these transformers should be required to be set with more Stringent settings. We believe that these transformers should be set similar to the large auto transformers.