

Consideration of Comments on Draft Standard MOD-026-1 for the Generator Verification Standard Drafting Team – Project 2007-09

The Generator Verification Standard Drafting Team (SDT) thanks all responders submitting comments on the proposed revision to the MOD-026-1 — Verification of Models and Data for Generator Excitation System Functions standard. This standard was posted for a 45-day public comment period from February 17, 2009 through April 2, 2009. The stakeholders were asked to provide feedback on the standards through a special Electronic Comment Form. There were 45 sets of comments, including comments from more than 100 different people from over 50 companies representing 8 of the 10 Industry Segments as shown in the Attachment on the following pages.

<http://www.nerc.com/filez/standards/Generator-Verification-Project-2007-09.html>

In the formation of the first draft of this excitation control system model verification standard, the SDT first considered the functional entity “applicability”. The SDT quickly recognized that assigning responsibility to appropriate entities for a continent-wide standard on verifying unit excitation system models would be difficult. The reason is that there are many business model variations regarding excitation model verification in place today. The SDT decided that a generation entity was the appropriate entity to assign ultimate responsibility, and posed this question to industry. The vast majority of respondents did not think the Transmission Planning entity was the correct entity to perform verification. There was a significant portion of industry that thought the Generator Owner should be responsible instead of the Generator Operator. The SDT consulted the Functional Model Working Group (FMWG), who rendered the opinion that the Generator Owner should be responsible for model verification, not the Generator Operator. Based on consultation with the FMWG, and supported by the majority of industry comments, the SDT has changed the applicability from the Generator Operator to the Generator Owner.

The SDT asked the industry several questions regarding applicability and frequency of excitation control system model verification. The industry responded that the proposed ten-year periodicity, the proxy unit concept, exemption for units that have a 5% or less capacity factor, and an applicability on an Interconnection basis corresponding to at least an 80% installed MVA generation capacity are all acceptable. Based on industry comments, the SDT is proposing that the proxy unit cutoff be raised from 250 MVA to 350 MVA (the other criteria remaining unchanged). Also based on industry responses, the SDT is proposing a modified applicability to additionally include a significant MVA percentage of all generation of all technologies, including Variable Energy Resources.

The SDT also asked industry about the role of generator model data, because the excitation control system model is a closed loop system that includes the generator data. Industry stakeholders indicated that the standard needed additional clarity about the exact expectations for generator data, but indicated that expanding the scope of the standard to include verification of generator models was not appropriate.

There was support for the SDT approach of the standard “stating what is required” without “stating how to accomplish what is required”. Specifically, the industry agreed that the generation entity (the Generator Owner) should be tasked with determining if the model’s predicted response and the actual equipment’s recorded response are sufficiently matched, and with the concept of the standard providing minimal specificity regarding the mechanics of performing excitation system verification.

The SDT asked the industry if there was a need to specify a process where additional critical units could be identified for excitation control system model verification. A majority of the industry respondents from all Regions indicated “yes”. Additionally, there were some minority concerns that the drafted applicability excluded some units that are covered by the NERC Registry Criteria. In response, the SDT developed a proposed process (details contained in Requirement R5) that requires technical justification but which allows the Planning Coordinator to identify additional units whose excitation control system performance requires scrutiny by the Generator Owner. In some instances, scrutiny by the Generator Owner could lead to corrected model data that could meet the needs of the Planning Coordinator. But unless the Generator Owner can determine that the existing model structure and data requires a correction and subsequently meets the needs of the Planning Coordinator, the model must be verified. The SDT originally considered letting the Transmission Planner identify critical units along with the Planning Coordinator. However, the SDT realized that Transmission Planners could bring model issues to the attention of their Planning Coordinator so that the Planning Coordinator could make a determination about whether the model issue warranted further review by the Generator Owner.

While stakeholders generally agreed with the proposed implementation plan concepts, they expressed some concerns about sufficient start up time. Thus, the SDT decided to propose extending the time after the standard is approved for the first required set of models to be verified from “2 years following regulatory approval, 10% its applicable units per Interconnection on a MVA basis” to “4 years following regulatory approval, 30% of its applicable units per Interconnection on a MVA basis”.

Finally, based in part on industry comments, the layout and the formatting of the standard have been significantly updated. Periodicity has been moved to a separate attachment, as the SDT determined that it is not a stand-alone reliability requirement. The standard no longer attempts to follow an expected chronological sequence, but instead is arranged to include the necessary results-based reliability requirements. The most visible modifications are that the numbers of Requirements have been drastically reduced.

If you feel that your comment has been overlooked, please let us know immediately. Our goal is to give every comment serious consideration in this process! If you feel there has been an error or omission, you can contact the Vice President and Director of Standards, Herb Schrayshuen, at 315-439-1390 or herb.schrayshuen@nerc.net. In addition, there is a NERC Reliability Standards Appeals Process.¹

¹ The appeals process is in the Reliability Standards Development Procedures: <http://www.nerc.com/standards/newstandardsprocess.html>.

Index to Questions, Comments, and Responses

1. The SDT recognized that a determination had to be made regarding which entity should be ultimately responsible for model verification. The SDT was of the opinion that the Generator Operator, instead of the Transmission Planner or Generator Owner, was the appropriate entity to be responsible for the model verification. The Generator Operator operates the equipment being verified, and has direct access to the equipment. The Transmission Planner has the simulation software, but does not typically have access to the equipment or have testing capabilities. It is recognized that Generator Operators typically do not have in-house expertise and would have to either hire consultants to perform model verification, or develop in-house expertise including acquiring simulation software. 12
2. The SDT recognizes that depending on the technology of the modeled equipment, the periodicity of model verification necessary to ensure accurate models could vary. Also, the team recognizes that the majority of the resulting reliability benefit will occur during the initial verification. The SDT determined that 10 years would be an appropriate period for re-verification in the absence of other activities listed in Requirement R12 that would require an earlier re-verification. 25
3. The SDT thought that it would be reasonable to apply a philosophy to allow maximization of limited resources required to perform excitation system model verification. The philosophy allows a single unit's actual excitation system verification to be a proxy for multiple units if the following conditions are met: a) the units have the same MVA rating, b) the units are rated at ≤ 250 MVA c) the units have identical applicable components and settings and d) the units are sited at the same physical location. For each recurring 10 year cycle, another unit must actually be verified. 34
4. The list of unit specific information in Requirement R4 to be provided to the Transmission Planner from the Generator Owner includes generator data used in the excitation system verification process. The reason is that the tests, ambient or staged, which are used to verify the excitation system model, are part of a closed loop system that includes the generator. However, the SDT stopped short of requiring verification of either all generator data, or a portion of the generator data which is most applicable to excitation system testing (Transient Open Circuit Time Constant, and for PSS model verification, rotational inertia). The SDT feels that it cannot develop draft Requirements for the verification of generator data without submitting a supplementary SAR to the NERC Standards Committee. 43
5. MOD-026 Requirement R8 requires the Generator Operator to provide documentation demonstrating that the provided model's response matches the recorded response. It does not specify criteria for evaluating the match. Requirement R8 assigns the task of evaluating the match to the Generator Operator. A peer review process for this documentation, detailed in Requirement R10, gives other involved parties an avenue to provide input and voice any concerns. 61
6. The team purposely provided minimal specificity regarding the mechanics of performing excitation system verification and the development of the documentation showing that the provided model response matches the recorded response. The team felt it was impractical to provide verification details in a mandatory Reliability Standard that needs to be applicable to all of the existing and future technologies. 70
7. The SDT believes that this standard should not be applicable to low capacity factor units. The SDT recognized that the excitation system models and model data are already collected through the processes identified in MOD-012 and

- MOD-013. These models and data should, with few exceptions, already accurately replicate actual equipment performance. By definition, low capacity factor units are expected to rarely be on-line, and even when they are, they would constitute a small portion of the interconnected MVA. As such, the SDT is of the opinion that verified excitation models for these units would not result in a substantial increase in Bulk Electric System reliability. Do you agree with this approach and the proposed 5% capacity factor?..... 76
8. The SDT is of the opinion, based upon sound engineering judgment, that verifying models for excitation systems of generators per the MVA thresholds specified in the Applicability section 4.1.1 will ensure satisfactory performance of Interconnection network simulation models. Do you agree with this approach? If yes, please provide any data in support of the proposed approach including supporting data that the MVA thresholds specified in the Applicability section 4.1.1 correspond to 80% of the Interconnection MVA. 91
9. Do you believe the SDT should develop a Requirement to allow the Transmission Planner or the Planning Coordinator to identify additional applicable units beyond those specified in section 4.1.1 due to their criticality to the reliability of the Bulk Electric System? If yes, please include the criteria that should be used by the Transmission Planner or Planning Coordinator to identify critical units with MVA rating less than listed in section 4.1.1 and any supporting data. 100
10. The SDT is proposing an implementation plan that requires certain percentages of applicable units to be verified two, six, and eleven years after the standard is approved. The SDT also thought it would be prudent to allow the verification of excitation systems per Regional Entity procedures and guidelines within 5 years of the approval date to be sufficient for demonstrating compliance with this new Reliability Standard. Do you agree with these approaches? 108
11. If you are aware of any regional variances that would be required as a result of this standard, please identify them here. 118
12. If you are aware of any conflicts between the proposed standard and any regulatory function, rule, order, tariff, rate schedule, legislative requirement, or agreement, please identify them here. 121
13. If you have any other questions or concerns with the proposed standard that have not been addressed in responding to the questions above, please provide them here. 123

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The Industry Segments are:

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

		Commenter	Organization	Industry Segment											
				1	2	3	4	5	6	7	8	9	10		
1.	Group	Robert W. Cummings	NERC Event Analysis & Information Exchange staff												
		Additional Member	Additional Organization	Region	Segment Selection										
		1. Dr. Eric Allen	NERC	NA - Not Applicable	NA										
2.	Group	Edmundo Toro	Southwest Power Pool Generation Working Group	X	X	X		X	X						
		Additional Member	Additional Organization	Region	Segment Selection										
		1. Mitchell Williams	Western Farmers Electric Cooperative	SPP	1, 3, 5, 6										
		2. Mike Sheriff	OG+E Electric Services	SPP	1, 3, 5, 6										
		3. Brock Ondayko	American Electric Power	SPP	1, 3, 5, 6										
		4. Andrew Lachowsky	Arkansas Electric Cooperative Corporation	SPP	1, 3, 5										
		5. Bryan Taggart	Westar Energy	SPP	1, 3, 5, 6										
		6. Jessica Collins	Xcel Energy	SPP	1, 3, 5, 6										
		7. Bill Valagura	Calpine Energy Services	SPP	5										
		8. Jim Fehr	Nebraska Public Power District	MRO	1, 3, 5, 6										

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			1	2	3	4	5	6	7	8	9	10	
	9. Blake Mertens	Empire District Electric Company	SPP	1, 3, 5, 6									
3.	Group	Guy Zito	Northeast Power Coordinating Council										X
	Additional Member	Additional Organization	Region	Segment Selection									
	1. Ralph Rufrano	New York Power Authority	NPCC	5									
	2. Roger Champagne	Hydro-Quebec TransEnergie	NPCC	2									
	3. David Kiguel	Hydro One Networks Inc.	NPCC	1									
	4. Chris de Graffenried	Consolidated Edison Company of New York, Inc.	NPCC	1									
	5. Bruce Metruck	New York Power Authority	NPCC	6									
	6. Mike Schiavone	National Grid	NPCC	1									
	7. Robert Pellegrini	The United Illuminating Company	NPCC	1									
	8. Sylvain Clermont	Hydro-Quebec TransEnergie	NPCC	1									
	9. Randy MacDonald	New Brunswick System Operator	NPCC	2									
	10. Greg Campoli	New York Independent System Operator	NPCC	2									
	11. Kathleen Goodman	ISO New England, Inc.	NPCC	2									
	12. Kurtis Chong	Independent Electricity System Operator	NPCC	2									
	13. Peter Yost	Consolidated Edison Co. of New York, Inc.	NPCC	3									
	14. Alan Adamson	New York State Reliability Council, LLC	NPCC	10									
4.	Group	Rick Foster	SERC Dynamics Review Subcommittee (DRS)										X
	Additional Member	Additional Organization	Region	Segment Selection									
	1. John Sullivan	Ameren Services Company	SERC	1									
	2. Anthony Williams	Duke Energy Carolinas	SERC	1									
	3. Sujit Mandal	Entergy	SERC	1									
	4. Venkat Kolluri	Entergy	SERC	1									
	5. John O'Connor	Progress Energy Carolinas	SERC	1									
	6. Herb Schrayshuen	SERC	SERC	10									
	7. Bob Jones	Southern Company Services, Inc. - Trans	SERC	1									
	8. Lee Taylor	Southern Company Services, Inc. - Trans	SERC	1									

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			1	2	3	4	5	6	7	8	9	10								
	9. Robbie Bottoms	Tennessee Valley Authority	SERC	9																
	10. Tom Cain	Tennessee Valley Authority	SERC	9																
5.	Group	Jalal Babik	Dominion		X		X		X	X										
	Additional Member Additional Organization Region Segment Selection																			
	1.	Kirit Doshi	Electric transmission	SERC	1															
	2.	Jack Kerr	Electric transmission	SERC	1															
	3.	Craig Crider	Electric transmission	SERC	1															
	4.	Angela Park	Electric transmission	SERC	1															
	5.	Solomon Yirga	Electric transmission	SERC	1															
	6.	Ronnie Bailey	Electric transmission	SERC	1															
	7.	Chip Humphrey	Generation	RFC	5															
	8.	Larry Whanger	Generation	SERC	5															
	9.	Lou Nunez	Nuclear	MRO	5															
	10.	Phillip Rott	Generation	SERC	5															
	11.	Tim Wiseman	Generation	SERC																
	12.	Louis Slade	Regulatory	SERC	6															
	13.	Mike Garton	Regulatory	NPCC	6															
6.	Group	Don Brown	Kansas City Power & Light		X		X		X	X										
	Additional Member Additional Organization Region Segment Selection																			
	1.	Michael Gammon	Kansas City Power & Light	SPP	1, 3, 5, 6															
	2.	Melinda Mangold	Kansas City Power & Light	SPP	1, 3, 5, 6															
	3.	Nick McCarty	Kansas City Power & Light	SPP	1, 3, 5, 6															
	4.	Harold Wyble	Kansas City Power & Light	SPP	1, 3, 5, 6															
	5.	Jerry Hatfield	Kansas City Power & Light	SPP	1, 3, 5, 6															
7.	Group	Michael Brytowski	MRO NERC Standards Review Subcommittee																	X
	Additional Member Additional Organization Region Segment Selection																			
	1.	Carol Gerou	MP	MRO	1, 3, 5, 6															

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			1	2	3	4	5	6	7	8	9	10								
	2. Neal Balu	WPS	MRO	3, 4, 5, 6																
	3. Terry Bilke	MISO	MRO	2																
	4. Joe DePoorter	MGE	MRO	3, 4, 5, 6																
	5. Ken Goldsmith	ALTW	MRO	4																
	6. Jim Haigh	WAPA	MRO	1, 6																
	7. Terry Harbour	MEC	MRO	1, 3, 5, 6																
	8. Joseph Knight	GRE	MRO	1, 3, 5, 6																
	9. Scott Nickels	RPU	MRO	3, 4, 5, 6																
	10. Dave Rudolph	BEPC	MRO	1, 3, 5, 6																
	11. Eric Ruskamp	LES	MRO	1, 3, 5, 6																
	12. Pam Sordet	XCEL	MRO	1, 3, 5, 6																
8.	Group	Sam Ciccone	FirstEnergy		X		X	X	X	X										
	Additional Member	Additional Organization	Region	Segment Selection																
	1. Doug Hohlbaugh	FE	RFC	1, 3, 4, 5, 6																
	2. Dave Folk	FE	RFC	1, 3, 4, 5, 6																
	3. Mike Williams	FE	RFC	5																
	4. Ed Baznik	FE	RFC	1																
	5. Ken Dresner	FE	RFC	5																
9.	Group	Richard Kafka	Pepco Holdings, Inc (PHI) — Affiliates		X		X		X	X										
	Additional Member	Additional Organization	Region	Segment Selection																
	1. Jim Dougherty	Conectiv Energy Supply, Inc.	RFC	5																
	2. Art Wolfe	Conectiv Energy Supply, Inc.	RFC	5																
	3. Kara Dundas	Conectiv Energy Supply, Inc.	RFC	5																
10.	Group	Stan Jaskot	Entergy Fossil Operations						X											
	Additional Member	Additional Organization	Region	Segment Selection																
	1. Jules Guillot	Entergy Fossil Operations	SERC	5																

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11.	Group	Ben Li	IRC Standards Review Committee		X																																																										
		<table border="1"> <thead> <tr> <th colspan="2">Additional Member</th> <th colspan="2">Additional Organization</th> <th>Region</th> <th>Segment</th> <th>Selection</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Patrick Brown</td> <td>PJM</td> <td>RFC</td> <td>2</td> <td></td> <td></td> </tr> <tr> <td>2.</td> <td>Steve Myers</td> <td>ERCOT</td> <td>ERCOT</td> <td>2</td> <td></td> <td></td> </tr> <tr> <td>3.</td> <td>James Castle</td> <td>NYISO</td> <td>NPCC</td> <td>2</td> <td></td> <td></td> </tr> <tr> <td>4.</td> <td>Matt Goldberg</td> <td>ISO-NE</td> <td>NPCC</td> <td>2</td> <td></td> <td></td> </tr> <tr> <td>5.</td> <td>Bill Phillips</td> <td>MISO</td> <td>MRO</td> <td>2</td> <td></td> <td></td> </tr> <tr> <td>6.</td> <td>Charles Yeung</td> <td>SPP</td> <td>SPP</td> <td>2</td> <td></td> <td></td> </tr> </tbody> </table>													Additional Member		Additional Organization		Region	Segment	Selection	1.	Patrick Brown	PJM	RFC	2			2.	Steve Myers	ERCOT	ERCOT	2			3.	James Castle	NYISO	NPCC	2			4.	Matt Goldberg	ISO-NE	NPCC	2			5.	Bill Phillips	MISO	MRO	2			6.	Charles Yeung	SPP	SPP	2		
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6.	Charles Yeung	SPP	SPP	2																																																											
12.	Individual	Clinton Jacobs	FEUS	X				X																																																							
13.	Individual	Rick Terrill	Luminant Power					X																																																							
14.	Individual	David Schooley	Exelon Corporation	X				X																																																							
15.	Individual	Scott Etnoyer	Constellation Power Generation & Constellation Nuclear					X																																																							
16.	Individual	Hugh Francis	Southern Company	X		X		X	X																																																						
17.	Individual	Russell A. Noble	Cowlitz County PUD			X																																																									
18.	Individual	Brent Ingebrigtsen	E.ON U.S.	X		X		X	X																																																						
19.	Individual	Jianmei Chai	Consumers Energy Company			X	X	X																																																							
20.	Individual	Ben Johnson	Wisconsin Public Service					X																																																							
21.	Individual	Ronnie C. Hoeinghaus	City of Garland, Garland Power & Light — GOP Registered Entity	X				X																																																							
22.	Individual	Brendan Kirby	AWEA									X																																																			

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23.	Individual	Michael Goggin	American Wind Energy Association									X		
24.	Individual	James H. Sorrels, Jr.	American Electric Power	X		X		X	X					
25.	Individual	Baj Agrawal	Arizona Public Service Co.	X		X		X						
26.	Individual	Dale Fredrickson	Wisconsin Electric			X	X	X						
27.	Individual	Kasia Mihalchuk	Manitoba Hydro	X		X		X	X					
28.	Individual	D. Bryan Guy	Progress Energy, Inc.	X		X		X						
29.	Individual	Greg Mason	Dynegy					X						
30.	Individual	Rick White	Northeast Utilities	X										
31.	Individual	Tom Bradish	Reliant Energy					X	X					
32.	Individual	Patrick Farrell	Southern California Edison	X		X			X					
33.	Individual	Scott Berry	Indiana Municipal Power Agency				X							
34.	Individual	Kathleen Goodman	ISO New England Inc.		X									
35.	Individual	Kirit Shah	Ameren	X		X		X	X					
36.	Individual	Armin Klusman	CenterPoint Energy	X										
37.	Individual	Mark Thompson	AESO		X									
38.	Individual	Greg Rowland	Duke Energy	X		X		X	X					
39.	Individual	Roger Champagne	Hydro-Québec TransEnergie (HQT)	X										

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				1	2	3	4	5	6	7	8	9	10	
40.	Individual	Alice Murdock	Xcel Energy	X		X		X	X					
41.	Individual	Dan Rochester	Independent Electricity System Operator		X									
42.	Individual	Tony Kroskey	Brazos Electric Power Cooperative	X										
43.	Individual	Jason Shaver	American Transmission Company	X										
44.	Individual	Jay Seitz	US Bureau of Reclamation					X						
45.	Individual	Daniel J. Hansen	Reliant Energy					X						

1. The SDT recognized that a determination had to be made regarding which entity should be ultimately responsible for model verification. The SDT was of the opinion that the Generator Operator, instead of the Transmission Planner or Generator Owner, was the appropriate entity to be responsible for the model verification. The Generator Operator operates the equipment being verified, and has direct access to the equipment. The Transmission Planner has the simulation software, but does not typically have access to the equipment or have testing capabilities. It is recognized that Generator Operators typically do not have in-house expertise and would have to either hire consultants to perform model verification, or develop in-house expertise including acquiring simulation software.

Do you agree that the Generator Operator should be responsible for model verification? If not, please explain.

Summary Consideration: The vast majority of respondents did not think the Transmission Planning entity was the correct entity to perform verification. There was a significant portion of the industry that thought the Generator Owner should be responsible, instead of the Generator Operator. The SDT consulted the Functional Model Working Group (FMWG), who rendered the opinion that the Generator Owner should be responsible for model verification instead of the Generator Operator. Based on consultation with the FMWG, and industry comments, the SDT changed the applicability from the Generator Operator to the Generator Owner.

Organization	Yes or No	Question 1 Comment
NERC Event Analysis & Information Exchange staff	No	Comments: Although verification (not validation) of generator equipment settings and testing should be the responsibility of the GO, validation of generator models response to actual system events should be done by the Reliability Coordinator. This offers independent oversight of the validation. Also, validation to system events should be done for multiple events. This provides better insight to generator excitation and control performance over a wider range of conditions than a single staged test.
<p>Response: Thank you for your comments. The SDT does agree that the Reliability Coordinator has a critical role in the process of model verification. However, it is expected that any concerns raised by the Reliability Coordinator will result in a formal request by the Transmission Planner to the Generator Owner. That is why the SDT drafted Requirement R11 (reference Requirement R3 in the revised standard), which allows the Transmission Planner the ability to ask the generator entity to perform a technical review of its current excitation system model. Any concern by the Reliability Coordinator would only occur after a post-mortem review of an actual system event where the observed response of the excitation system was not as expected and so while the Reliability Coordinator may provide feedback, the Transmission Planner is deemed the responsible entity for initiating and providing feedback for this review process. The SDT agrees that validation of multiple events by the Reliability Coordinator is desirable. It is hoped that the vast majority of the time, for the vast majority of excitation system responses reviewed by the Reliability Coordinator, the excitation system response would be as expected and as such, a technical review of the excitation system model by</p>		

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Organization	Yes or No	Question 1 Comment
the generator entity would not be necessary.		
Northeast Power Coordinating Council	No	The Generator Operator does not have direct access to the equipment. The Generator Owner is the correct Functional Model entity that has direct access to the equipment and the authority to perform testing of equipment. All responsibilities assigned to the Generator Operator in the proposed standard should be reassigned to the Generator Owner.
Response: Thank you for your comments. The SDT obtained guidance from the FMWG, and as a result of that guidance, your comments, and other industry comments, the draft standard has been modified to assign responsibilities to the Generator Owner instead of the Generator Operator.		
SERC Dynamics Review Subcommittee (DRS)	No	The Generator Owner is the correct entity for this responsibility. It should be the entity that would be able to obtain the attention of the manufacturer and have the means to accomplish the validation. The entity should have the financial incentives to perform the function and should be knowledgeable about the plant operation. The entity that would be the best resource to coordinate the testing should be required to verify the models. In our opinion the functional model specifies the Generator Owner as it requires a generator owner to "verify generating facility performance characteristics". For the foregoing reasons this responsibility should not be assigned to the Transmission Planner.
Response: Thank you for your comments. The SDT agrees that the Transmission Planner is not the appropriate entity to be responsible for model verification. Based on your comment, other comments from industry, and input from the FMWG, the SDT has assigned the Generator Owner as the responsible entity for model verification in the second draft standard posting.		
Dominion	No	In general, there should be collaborations between the Generator Owner, Transmission Planner, Generator Operator, and Transmission Operator to meet the intent of model and data verification. However, the requirements of this standard should apply to the Generator Owner and the Transmission Planner. We have reviewed the NERC Functional Model and believe that the Generation Owner should be responsible for those requirements assigned to the Generator Operator in this draft standard. We are concerned that Generator Owners may have to acquire outside sources or develop in-house skills in order to meet the requirements of this standard. However, we believe that the proposed effective date(s) allows adequate time to address these concerns.
Response: Thank you for your comments. The SDT agrees that collaboration from various entities is required to meet the intent of model and data verification. Based on your comment, other comments from industry, and input from the FMWG, the SDT has assigned the Generator Owner as the responsible entity for model verification in the second draft standard posting.		

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Organization	Yes or No	Question 1 Comment
MRO NERC Standards Review Subcommittee	No	To help differentiate the BES model from the unit specific excitation system model. The MRO NSRS suggests a change in R1 to read; "The Generator Operator shall verify their applicable excitation control system model?"
<p>Response: Thank you for your comment. After review of IEEE 421.1, the SDT agrees that the term "excitation control system model" is more appropriate than the term "excitation system model" used in the previous draft of the standard. The reason is that the term "excitation control system model" contains the entire closed loop system including the synchronous machine. The SDT has applied the appropriate wording revision in the second draft of the standard.</p>		
Pepco Holdings, Inc (PHI) - Affiliates	No	PHI believes that the Generator Owner should be responsible, but recognizes that the GO and GOP may be the same in most cases.
<p>Response: Thank you for your comment. Based on comments from the industry, your comment, and input from the FMWG, the SDT has assigned the Generator Owner as the responsible entity for model verification in the second draft standard posting.</p>		
Entergy Fossil Operations	No	Generator Owners are responsible for the maintenance of the units. This testing is not an on-line normal test. It is more of a maintenance/engineering task that would use 3rd parties to help perform. This would also require special budgeting and running a unit with off normal conditions which an owner would have to approve and sanction. Generator Owners are responsible for other Modeling standards, so why would they not be responsible here. This is also providing data that is of no use to the Generator Owner or Operator and they will not have any expertise with this work. Only the Transmission Planner needs this data and should understand it. In that aspect, they should take some responsibility for it.
<p>Response: Thank you for your comments. Based on comments from the industry, your comments, and on guidance from the FMWG, the SDT has assigned responsibility for model verification to the Generator Owner instead of the Generator Operator in the second draft of the standard. The current modeling standards address submission of models and model data, not verification of models and model data. Generator entities are also responsible for verification of MW and Mvars in the current and future draft versions of MOD-024 and MOD-025. Generator Owners have access to the equipment, along with access to the equipment's Original Equipment Manufacturer for assistance with technical issues. Historically, the Transmission Planner and Generator Owner entities used to work for the same company, but in today's functional model environment, Transmission Planners could easily work for a different company than the generation entity. As such, the stated access advantages for the generation entity do not transfer to the Transmission Planner.</p>		
IRC Standards Review Committee	No	This responsibility rests with the Generator Owner. As indicated in the Background Information Section, Generator Owners may be responsible for providing accurate generator data including the excitation data for system modeling. Although it does not operate the generator, verification does not need to be performed under operating conditions only. The input/output measurements of the excitation system could suffice to verify the excitation system model, which may be performed during commissioning testing or under other non-production conditions. If the generator must be run by the Generator Operator to enable testing, the Generator Owner can

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Organization	Yes or No	Question 1 Comment
		<p>make such an arrangement with the Generator under an agreement, as the Background Information so suggests. Further, we believe both the Transmission Planner and the Planning Coordinator are primary users of the model. We suggest that the Planning Coordinators be added to the Applicability Section, and at places where Transmission Planners are assigned a responsibility.</p>
<p>Response: Thank you for your comments. As suggested, the SDT has assigned model verification responsibility to the Generator Owner in the second draft of the standard. While the Planning Coordinator may be a user of the model, the SDT believes that the Transmission Planner is the appropriate entity to interface with the Generator (Owner/Operator) regarding necessary activities that are required to achieve excitation control system model verification. As such, the SDT believes that the Transmission Planning entity is the correct entity assigned. Also, it should be noted that the SDT did reference the Planning Coordinator in the Requirements as appropriate.</p>		
Luminant Power	No	<p>In ERCOT the Generation Owner should be responsible. This is a NERC Functional model issue, and I understand the GOP will be responsible in the majority of the country.</p>
<p>Response: Thank you for your comment. Based on comments from industry, your comment, and on guidance from the FMWG, the SDT has assigned responsibility for model verification to the Generator Owner instead of the Generator Operator in the second draft of the standard.</p>		
Exelon Corporation	No	<p>Exelon believes that model verification should be a coordinated effort between the generator owner and the transmission planner. Transmission planning organizations have the expertise to implement and test the models in software, while the generator owners have the necessary access to the equipment in the field. Most generator owners do not have the software and the necessary personnel with the expertise to perform the modeling and model testing required by this standard.</p>
<p>Response: Thank you for your comments. The SDT agrees that a cooperative effort is required among NERC functional model entities in order to develop a robust excitation system model. As mandated by Reliability Standard process, only one entity is assigned responsibility for excitation system model verification. The SDT believes it has incorporated into the draft standard all necessary interactions with other functional model entities required for ensuring model verification success.</p>		
Southern Company	No	<p>The Generator Owner appears to be the logical choice. GO has the access to the equipment records, GOP may not.</p>
<p>Response: Thank you for your comments. Based on guidance from the FMWG, comments from industry, and your comment, the SDT has assigned responsibility for model verification to the Generator Owner instead of the Generator Operator in the second draft of the standard.</p>		
Consumers Energy Company	No	<p>Generator Owners and Generator Operators do not need or use an excitation system model. This model is</p>

Organization	Yes or No	Question 1 Comment
		<p>properly owned by those who need and use it, i.e., the Transmission Planner or Transmission Owner. The Generator Owner should be responsible only for providing input data for the model. These data include such items as:- Manufacturer (and model, if available) and type of excitation system.- Rise times, reactances, time constants, gains, and saturation factors.- Rotational inertia- Reactive compensation settings, if any.- Power system stabilizer settings, if any.- Other stability schemes, if any.Given periodic verification of these data from the Generator Operator, it should be the responsibility of the Transmission Planner to create a model that meets the needs of the Transmission Planner. Since the Generator Operator doesn't need this model, requiring the Generator Operator to hire consultants to create a model needed by other entities is simply errant nonsense. Has the SDT verified that there are adequate consultants available to meet the 2-year time window for the myriad of Generator Operators who would be tasked with creating a model they do not need?</p>
<p>Response: Thank you for your comments. The SDT understands that no matter who is assigned responsibility in the proposed continent-wide standard, it would potentially change the current business model of the functional entity. The majority of the SDT believes that a generation entity should have both final excitation system model responsibility and authority; Based on the majority of industry comments and guidance from the FMWG, the second draft of the standard assigns responsibility to the Generator Owner. Generator Owners have access to the equipment, along with access to the equipment's Original Equipment Manufacturer for assistance with technical issues. Historically, the Transmission Planner and Generator Owner entities used to work for the same company, but in today's functional model environment, Transmission Planners could easily work for a different company than the generation entity. As such, the stated access advantages for the generation entity do not transfer to the Transmission Planner. Note that existing business practices that utilize Transmission Planners can still exist; the only difference is that the Generator Owner would be ultimately responsible for the excitation system model verification from a compliance perspective. Also, the SDT is proposing an Implementation Plan to allow the Generator Owner time to develop in-house expertise to perform model verification if they do not desire to hire consultants.</p>		
<p>City of Garland, Garland Power & Light - GOP Registered Entity</p>	<p>No</p>	<p>The Generator Owner (GO) should be responsible for model verification. The GO has direct access to the equipment - not the GOP. The GO can schedule any required operational testing with the GOP in the same way that the GO schedules any other operational testing requirement. In addition, the GOP and the GO can be two separate companies with their only relationship established by contract. In these situations this standard, as written, would place the burden on the GOP to try to renegotiate the contract with the GO to cover the expense and persuade the GO to perform the model verification when the real responsibility belongs to the GO.</p>
<p>Response: Thank you for your comments. As recommended, the SDT has assigned responsibility for model verification to the Generator Owner instead of the Generator Operator in the second draft of the standard.</p>		
<p>American Wind Energy Association</p>	<p>No</p>	<p>Because Generator Operators typically do not have in-house expertise and would have to either hire consultants to perform model verification, or develop in-house expertise including acquiring simulation software, I think it makes more sense for Transmission Planners to perform this activity.</p>

Organization	Yes or No	Question 1 Comment
<p>Response: Thank you for your comments. Generator Owners have access to the equipment, along with access to the equipment’s Original Equipment Manufacturer for assistance with technical issues. Historically, the Transmission Planner and Generator Owner entities used to work for the same company, but in today’s functional model environment, Transmission Planners could easily work for a different company than the generation entity. As such, the stated access advantages for the generation entity do not transfer to the Transmission Planner. Also, the Transmission Planner has expertise in overall power system simulation analysis but not necessarily expertise in specific excitation control system modeling. While the Transmission Planner can continue to participate in model verification to whatever extent agreements with the generator entity stipulates, the majority of the SDT (and industry, based upon comments received) does not believe the Transmission Planner should be responsible for this activity.</p>		
American Electric Power	No	AEP believes that It would be more appropriate to designate the Generator Owner for these responsibilities.
<p>Response: Thank you for your comment. The SDT has assigned responsibility for model verification to the Generator Owner instead of the Generator Operator in the second draft of the standard.</p>		
Wisconsin Electric	No	See response to Question 5. Providing model data and parameters is possible, but the requirement to validate the model for an actual switching event requires a cooperative effort between the GOP and the TP/TOP/TP. Since the stability and reliability of the overall transmission system is the goal, it is necessary for these entities to have more responsibility for proper excitation system modeling. As it stands this draft standard puts all the responsibility on the GOP.
<p>Response: Thank you for your comments. The SDT agrees that a cooperative effort is required among NERC functional model entities in order to develop a robust excitation system model. As mandated by Reliability Standard process, only one entity is assigned responsibility for excitation system model verification. The SDT believes it has incorporated into the draft standard all necessary interactions with other functional model entities required for ensuring model verification success. For the specific example referenced regarding verification of an event, the SDT believes the currently drafted standard would facilitate cooperation. Specifically, drafted Requirement R8 (reference Requirement R2 in the revised standard) does allow for the equipment’s recorder response to be the result of a measured system disturbance. However, it should be pointed out that a pure “switching event” may not result in a voltage deviation of sufficient magnitude at the terminals of the generator.</p>		
Progress Energy, Inc.	No	The Generator Owner is the correct entity for this responsibility. It must be the entity that would be the most able to obtain the attention of the manufacturer and have the means to accomplish the validation. The entity must have the financial incentives to perform the function and must be knowledgeable about the plant operation. The entity that would be the best source to coordinate the testing could be required to verify the models. In our opinion the functional model specifies Generator Owner as it requires a generator owner to "verify generating facility performance characteristics". For the foregoing reasons this responsibility should not be assigned to the Transmission Planner.

Organization	Yes or No	Question 1 Comment
<p>Response: Thank you for your comments. The SDT agrees that the Transmission Planner is not the appropriate entity to be responsible for model verification. Based on your comment, other comments from industry, and input from the FMWG, the SDT has assigned responsibility for model verification to the Generator Owner instead of the Generator Operator in the second draft of the standard.</p>		
Dynergy	No	<p>The Generator Owner does not need or use an excitation system model. The Transmission Planner is the entity that uses and needs this model to be accurate. The Generator Owner should be responsible for collecting and providing the generator related input data for the model to the Transmission Planner. The Transmission Planner should be responsible for running the simulations required for model verification and making the judgment if the model's response matches the actual response.</p>
<p>Response: Thank you for your comments. It is in the best interest of all parties, transmission and generation, to develop an accurate excitation system model as these models ultimately result in the determination of acceptable secure conditions for the generator to operate. The majority of the SDT believes that the generation entity should have both final excitation system model responsibility and authority. Generator Owners have access to the equipment, along with access to the equipment's Original Equipment Manufacturer for assistance with technical issues. Historically, the Transmission Planner and Generator Owner entities used to work for the same company, but in today's functional model environment, Transmission Planners could easily work for a different company than the generation entity. As such, the stated access advantages for the generation entity do not transfer to the Transmission Planner. This makes it prohibitive for the Transmission Planner to resolve issues regarding a mismatch between the predicted model response and the actual equipment's recorded response.</p>		
Northeast Utilities	No	<p>The Generator Owner is the correct Functional Model entity that has direct access to the equipment and the authority to perform testing of equipment. All responsibilities assigned to the Generator Operator in the proposed standard should be reassigned to the Generator Owner.</p>
<p>Response: Thank you for your comments. Based on your comment, other comments from industry, and input from the FMWG, the SDT has assigned responsibility for model verification to the Generator Owner instead of the Generator Operator in the second draft of the standard.</p>		
ISO New England Inc.	No	<p>The Generator Operator has the greatest ability to develop and/or provide accurate models and model parameters for its equipment. The Generator Owner should also be involved in the verification process as required. The process should ideally allow interactions between the GO and TO to allow for needed adjustments to model compatibility issues and settings with the GO, It should be field verified data not just a self certification of data without the field verification.</p>
<p>Response: Thank you for your comments. The SDT obtained guidance from the FMWG, and as a result of that guidance and other industry comments, the second draft standard assigns responsibilities to the Generator Owner instead of the Generator Operator. The SDT agrees there must be interaction between transmission and generation entities; and has attempted to capture these interactions in the Requirements.</p>		

Organization	Yes or No	Question 1 Comment
Ameren	No	<p>(1)Generator Operators and Generator Owners both should be included in this standard. The entitiy that would be the best source to coordinate the testing could be required to verify the models. It is possible that all functions can not be performed by the Generator Operator alone. Therefore it would be prudent to include the Generator Owners within MOD-026-1.</p> <p>(2) Additionally, the GO would be able to obtain the attention of the manufacuturermanufacturer than GOP. In our opinion the functional model specifies Generator Owner as it requires a generator owner to "verify generating facility performance characteristics". In any case, this responsibility should not be assigned to the Transmission Planner.</p> <p>(3) On the other hand, GO/GOP should not perform the function of modeling or verifying dynamic simulations on the Bulk Electric System which generally is done by Transmission Planners. Generator Operators/Generator Owners should provide the data needed for model simulation. Generator Operators/Generator Owners do not possess the expertise or have the resources to perform modeling simulations.</p>
<p>Response: Thank you for your comments. The SDT believes only one entity can be assigned responsible for model verification. Based on comments from industry, Item 2 of your comments, and input from the FMWG, the SDT has assigned responsibility for model verification to the Generator Owner instead of the Generator Operator in the second draft of the standard. It is anticipated that the Generator Owner could delegate model verification activities to the Generator Operator by contractual agreement as appropriate. The draft standard does not require the Generator entity to perform dynamic simulations to determine Bulk Electric System limits. The generator entity is responsible for ensuring that the excitation system model response matches the response from a recorded voltage excursion. This can be accomplished through software that is much simpler than full dynamic simulation software utilized by Transmission Planners for assessing BES limits.</p>		
AESO	No	The AESO agrees with the SRC ISO/RTO comments.
<p>Response: Thank you for your comment. Please see the response to the SRC IRO/RTO comments.</p>		
Duke Energy	No	Based on Responsibilities in the Functional Model, responsibility for determining maintenance and verification activities is clearly assigned to the Generator Owner. It should also be noted that in some cases the GO may be able to obtain additional expertise from their TP, RTO, or Region, which adds other resource options.
<p>Response: Thank you for your comments. We agree. With guidance received from the FMWG, the Generator Owner is considered the appropriate entity for assigning model responsibility and this change is reflected in the second posting of the draft standard. The SDT agrees that the Generator Owner can seek expertise from others including the entities listed in your observation.</p>		

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Organization	Yes or No	Question 1 Comment
Hydro-Québec TransÉnergie (HQT)	No	The Generator Operator does not have direct access to the equipment. The Generator Owner is the correct Functional Model entity that has direct access to the equipment and the authority to perform testing of equipment. All responsibilities assigned to the Generator Operator in the proposed standard should be reassigned to the Generator Owner.
<p>Response: Thank you for your comments. We agree. The SDT has assigned responsibility for model verification to the Generator Owner instead of the Generator Operator in the second draft of the standard.</p>		
Independent Electricity System Operator	No	This responsibility rests with the Generator Owner. As indicated in the Background Information Section, Generator Owners may be responsible for providing accurate generator data including the excitation data for system modeling. Although it does not operate the generator, verification testing does not need to be performed under operating conditions only. The input/output measurements of the excitation system could suffice to verify the excitation system model, which may be performed during commissioning testing or under other non-production conditions. If the generator must be run by the Generator Operator to enable testing, the Generator Owner can make such an arrangement with the Generator Operator under an agreement, as the Background Information so suggests.
<p>Response: Thank you for your comments. The SDT obtained guidance from the FMWG. Based on this guidance, your comments, and other industry comments, The SDT has assigned responsibility for model verification to the Generator Owner instead of the Generator Operator in the second draft of the standard.</p>		
Brazos Electric Power Cooperative	No	Even though a Generator Operator could possible supply and verify the information, it should be the Generator Owner who owns equipment design information that is responsible for it and be directly responsible for compliance with the requirements.
<p>Response: Thank you for your comments. The SDT has assigned responsibility for model verification to the Generator Owner instead of the Generator Operator in the second draft of the standard.</p>		
US Bureau of Reclamation	No	We believe the Generator Owner should be responsible for model verification. The existing NERC Standard, MOD-012-0 requires the Generator Owner to provide dynamic system modeling and simulation data to the RRO. In addition, MOD-013-0, RRO Dynamics Data Requirements and Reporting Procedures (not FERC approved), requires the RRO to coordinate with the Generator Owner to develop comprehensive dynamics data requirements and reporting procedures needed to model and analyze dynamic behavior. As such we believe this standard should be consistent and apply to Generator Owners. In addition, the NERC Reliability Functional Model - Version 4 describes the Generator Owner relationships with other entities including "Provides generator information to the Transmission Operator, Reliability Coordinator, Balancing Authority, Transmission Planner, and

Organization	Yes or No	Question 1 Comment
		Resource Planner."
<p>Response: Thank you for your comments. The SDT agrees with your reasoning and has assigned responsibility for model verification to the Generator Owner instead of the Generator Operator in the second draft of the standard.</p>		
Reliant Energy	No	Generator Operators should not have the sole responsibility alone. With the Generator Operators typically not having the in-house expertise for the model verification, they must not only pay the cost of hiring consultants, but will also carry the burden of significant costs for low capacity factor units when trying to schedule the consultants for unpredictable run times. WECC unit verification testing has resulted in very expensive startup costs for low capacity factor units just to perform a test. There is no cost recovery method for running a unit out of the money to perform this testing.
<p>Response: Thank you for your comments. The SDT is currently proposing an exemption for units with a 5% or less capacity factor. By considering exemption for units with low capacity factor, and the established rating threshold for each interconnection, and also the 10-year periodicity requirement defined, the SDT believes situations will not occur where units are dispatched only to perform an excitation control system verification test. As mandated by Reliability Standard process, only one entity is assigned responsibility for excitation system model verification. The SDT believes it has incorporated into the draft standard all necessary interactions with other functional model entities required for ensuring model verification success.</p>		
Wisconsin Public Service	Yes	The Generator Owners, instead of Transmission Planners, are the logical entities to verify the proper functioning of the excitation system functions, but not the verifications of hypothetical parameter values of a model used to emulate the exciters' function. The generator Owners should, for example, verify that the AVR holds set terminal voltages under normal operating system conditions, as well as response to system changes in conformance with the stated Response Ratios as designed. This does not mean, however, that it would be necessary to confirm forward gains, transducer time constants, excitation saturation constants, feedback-loop gains and time constants, etc. are indeed of the same value as used in a hypothetical model. This is due to two reasons: 1) the particular model chosen by the transmission planner is known to be an approximation of the facilities' functions, and therefore the parameters are not unique; 2) instrumentations necessary for verification of specific parameters are not generally available in the industry.
<p>Response: Thank you for your comments. Based on comments from industry, your comment, and guidance from the FMWG, the SDT has assigned responsibility for model verification to the Generator Owner instead of the Generator Operator in the second draft of the standard. The SDT believes that in most cases, the excitation system control model parameters in use accurately represent the equipment. The SDT also believes that instrumentation utilized for model verification is widely available.</p>		
FirstEnergy	Yes	Although we ultimately agree, we have the following comments:1. The Generator Operator should be responsible

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Organization	Yes or No	Question 1 Comment
		<p>to verify the dynamic data is accurate for the Generator, Turbine and Excitation system. The ultimate responsibility for the usability and accuracy of the dynamic models and how they perform in relation to the overall system model is the responsibility of the Transmission Planner.2. Genertor operators in a centrally located dispatch office would not have direct access to the equipment. They can only arrange an actual verification test. Details of the units response to a disturbance would need to be gleaned from the Generator Owner's data. It is not appropriate to burden one entity with a potential compliance violation when another entity controls the data. Relying on agreement coordination between the two entities may not be sufficient to ensure the entity with responsibility to comply is able to comply with an uncooperative entity with data control.</p>
<p>Response: Thank you for your comments. The SDT obtained guidance from the FMWG which recommends assigning this responsibility to the Generator Owner. Also, the majority of the industry agrees that the Generator Owner should be assigned responsibility for model verification. Therefore, the SDT has assigned responsibility for model verification to the Generator Owner instead of the Generator Operator in the second draft of the standard.</p>		
Cowlitz County PUD	Yes	<p>Did you mean to say above that Generator Owners typically do not have in-house expertise and would have to either hire...? YES - Cowlitz as a Generator Owner does not have the in house expertise. Delays result in our efforts to obtain modeling information as we try and find consultants willing to do the work. The Generator Operator is the entity which should be held responsible.</p>
<p>Response: Thank you for your comments. The SDT obtained guidance from the FMWG which recommends assigning this responsibility to the Generator Owner. Also, the majority of the industry agrees that the Generator Owner should be assigned responsibility for model verification. Therefore, the SDT has assigned responsibility for model verification to the Generator Owner instead of the Generator Operator in the second draft of the standard.</p>		
CenterPoint Energy	Yes	<p>CenterPoint Energy concurs with the SDT that this is a reasonable approach.</p>
<p>Response: Thank you for your comment. The SDT obtained guidance from the FMWG which recommends assigning this responsibility to the Generator Owner. Also, the majority of the industry agrees that the Generator Owner should be assigned responsibility for model verification. Therefore, the SDT has assigned responsibility for model verification to the Generator Owner instead of the Generator Operator in the second draft of the standard.</p>		
Reliant Energy	Yes	<p>Unit operation not unit ownership impacts the reliability of the grid.</p>
<p>Response: Thank you for your comment. The SDT obtained guidance from the FMWG which recommends assigning this responsibility to the Generator Owner. Also, the majority of the industry agrees that the Generator Owner should be assigned responsibility for model verification. Therefore, the SDT has assigned responsibility for model verification to the Generator Owner instead of the Generator Operator in the second draft of the standard.</p>		
Indiana Municipal Power Agency	Yes	<p>IMPA recognizes that the Generator Operator can work with the Transmission Planner when it comes to using</p>

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Organization	Yes or No	Question 1 Comment
		the verified data in a proper model or simulation software program. This assistance from the Transmission Planner might mean that the Generator Operator does not need to purchase modeling software.
<p>Response: Thank you for your comments. Based on comments from industry and guidance from the FMWG, the SDT has assigned responsibility for model verification to the Generator Owner instead of the Generator Operator in the second draft of the standard. The SDT agrees with your statement that agreements between the Transmission Planner and the Generator Owner can be arranged for the Transmission Planning entity to perform portions of the model verification process however responsibility for model verification remains with the Generator Owner.</p>		
Xcel Energy	Yes	
Southwest Power Pool Generation Working Group	Yes	
Kansas City Power & Light	Yes	
FEUS	Yes	
Constellation Power Generation & Constellation Nuclear	Yes	
E.ON U.S.	Yes	
AWEA	Yes	
Arizona Public Service Co.	Yes	
Manitoba Hydro	Yes	
Southern California Edison	Yes	
American Transmission Company	Yes	
<p>Response: Thank you for your comments. The SDT obtained guidance from the FMWG which recommends assigning this responsibility to the Generator Owner.</p>		

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Organization	Yes or No	Question 1 Comment
		Also, the majority of the industry agrees that the Generator Owner should be assigned responsibility for model verification. Therefore, the SDT has assigned responsibility for model verification to the Generator Owner instead of the Generator Operator in the second draft of the standard.

2. The SDT recognizes that depending on the technology of the modeled equipment, the periodicity of model verification necessary to ensure accurate models could vary. Also, the team recognizes that the majority of the resulting reliability benefit will occur during the initial verification. The SDT determined that 10 years would be an appropriate period for re-verification in the absence of other activities listed in Requirement R12 that would require an earlier re-verification.

Do you agree that 10 years is an appropriate period for re-verification? If you recommend a different period, please state your reasoning.

Summary Consideration:

The majority of industry agreed that the proposed 10 year periodicity verification cycle is appropriate. Therefore, the SDT will maintain the 10-year periodicity verification cycle proposed in the draft standard.

Organization	Yes or No	Question 2 Recommended Periodicity and Reasoning:
Kansas City Power & Light	No	<p>The Electric Power Research Institute has issued a report, "Power Plant Modeling and Parameter Derivation for Power System Studies", number 1015241, Final Report, June 2007; a reasonable interpretation of that work is that there may not be sufficient benefits from using a highly complex model to overcome the potential risks of the testing needed to verify the most complex models. Prototype test data obtained by manufacturers to provide the initial data, in many cases, simply can not be duplicated on operating / operational equipment. The 10 year re-verification requirement, as presently written, does not appear to allow generator owners the necessary flexibility to determine, similar to the regulatory model of 10 CFR 50.59 "Changes, Tests, and Experiments", how detailed the "re-verification" activities need to be. The requirement to re-perform the same bank of physical tests used to originally validate the generator model, absent a physical modification, does not allow sufficient flexibility to perform only those "re-verification" activities for those model parameters whose change due equipment aging has discernable effect on the outcome of the analysis using the generator model. Please note that the concern for performance of tests with little discernable analytical benefit was previously voiced in the "MAAC Position Paper on Generator Testing to Verify Data Required for System Modeling" in the Phase III-IV Planning Standards comments, which can be found on the NERC www site, where the issue of testing nuclear units in compliance with the regulatory requirements of 10 CFR 50.59 was also noted. As a result, it is recommended the SDT consider removing all references in the requirements for periodic testing when no physical changes have taken place and clarify R12 reflects to reverify the parts of the modeling affected by a change and not a reverification of</p>

Organization	Yes or No	Question 2 Recommended Periodicity and Reasoning:
		the entire model. In addition, although the reason to verify generator modeling is logical, it is requested the SDT consider the references stated above and consider the removal or modification of requirements involving testing that place an unnecessary risk of generator damage. As an example, allowing vendor simulations or other testing methods by the Vendor in a suitable testing environment to suffice for obtaining generator response characteristics.
<p>Response: Thank you for your comments. The SDT does not believe that there is undue risk to a plant for properly executed excitation system model verification. The validation can also be done using ambient monitoring with no additional tests. The 10-year requirement for re-verification is also overwhelmingly supported by the industry. In any event, there is no requirement to “re-perform the same bank of physical tests.”</p>		
FirstEnergy	No	10 years for digital excitation systems and 5 years for non-digital excitation systems.
<p>Response: Thank you for your comments. The SDT believes that re-verification every 5 years is unnecessary. This position is supported by an overwhelming majority of comments received from the industry. The revised Requirements R3 and R4 contain provisions for performing re-verification earlier if justified.</p>		
Entergy Fossil Operations	No	I am OK with 10 years for analog systems. Newer digital systems should not change over time, so they should be tested upon commissioning and that should be adequate for the life of the unit.
<p>Response: Thank you for your comments. The SDT believes that 10 years is a reasonable re-verification requirement even for digital systems, even if model verification is based on a sister unit. This position is supported by an overwhelming majority of comments received from the industry.</p>		
IRC Standards Review Committee	No	While a 10 year re-verification period may be adequate for those exciters whose settings do not tend to drift over time, a shorter period, say 5 years, should apply in general since there are analog and rotating type of exciters whose settings tend to drift from time to time.
<p>Response: Thank you for your comments. The SDT believes that re-verification every 5 years is unnecessary. This position is supported by an overwhelming majority of comments received from the industry. The revised Requirements R3 and R4 contain provisions for performing re-verification earlier if justified.</p>		
E.ON U.S.	No	E.ON U.S. believes that verification data and model results should not change over time. Therefore, a re-verification schedule is not necessary. E.ON U.S recommends that verification be required whenever new equipment is installed.
<p>Response: Thank you for your comments. The SDT believes that 10 years is a reasonable re-verification period. Re-verification does not necessarily require a re-test and in most instances, ambient monitoring can also be used. The proposed 10 year re-verification period is also supported by an overwhelming majority of comments received from the industry.</p>		

Organization	Yes or No	Question 2 Recommended Periodicity and Reasoning:
American Electric Power	No	AEP believes that the period should be longer. In fact, verification should only need to be done once on older units that do not now have good commissioning test documentation. Beyond that, it should only need to be done if there is an applicable equipment upgrade or an intentional readjustment of settings. We question predicating the periodicity on the expectation of a significant variation in equipment performance due to aging alone.
<p>Response: Thank you for your comments. The SDT believes that 10 years is a reasonable re-verification period. Re-verification does not necessarily require a re-test and in most instances, ambient monitoring can also be used. The proposed 10 year re-verification period is also supported by an overwhelming majority of comments received from the industry.</p>		
Reliant Energy	No	The period for re-verification should be based on observed performance, by activities that could result in an alteration of equipment performance or as listed in Requirement R11 which could trigger a review includes Plant Digital Control System (DCS) additions, replacements, or software alterations. Plant DCS activities would only be relevant to excitation system modifications if they involved the addition, deletion, or modification of an outer loop control (such as power factor or reactive power set point) that alters automatic voltage regulator action. If it ain't broke don't fix it!
<p>Response: Thank you for your comments. The SDT believes that 10 years is a reasonable re-verification period. Re-verification does not necessarily require a re-test and in most instances, ambient monitoring can also be used. The proposed 10 year re-verification period is also supported by an overwhelming majority of comments received from the industry. Also, several SDT team members have observed that DCS changes can affect excitation system performance within the timing cycle of the excitation system model..</p>		
ISO New England Inc.	No	We recommend validation on a 5 year scale. 10 years is too long if changes are made to settings during annual outages. The whole approach of the draft standard is a bit flawed because once the model and tuned parameters are verified, no control setting changes should be made to the physical equipment without consulting with the TO to determine their acceptability. Additionally, updates should be provided if the manufacturer or GO identify improvements to the model in regard to matching the actual equipment. Having a verification in addition to the preceding is acceptable and would provide the benefit of having a written documentation from the GO and better assure that accurate models are being used for planning the system.
<p>Response: Thank you for your comments. The SDT believes that re-verification every 5 years is unnecessary. This position is supported by an overwhelming majority of comments received from the industry. The revised Requirements R3 and R4 contain provisions for performing re-verification earlier if justified.</p>		

Organization	Yes or No	Question 2 Recommended Periodicity and Reasoning:
Ameren	No	<p>(1) Many generating units are now on six year outage cycles, therefore we recommend the interval is changed to 12 years or more.(2) Concerns regarding excitation equipment are that someone at the plant may inadvertently modify settings on dials/potentiometers at some point within a 10/12 year period (or other interval that would be considered appropriate) that would cause the performance of the exciter to vary from what was originally specified in the dynamic model representation. Also, it is possible that, through aging, electrical values of circuit components in the excitation equipment could drift, even with no external change to the settings. It is uncertain what the re-verification period should be to minimize these effects, so we support the caveats listed in Requirement 11 and 12. However, despite R12, some communication between the Generation Operator and the Transmission Operator within the 10/12 year period would be reassuring that nothing has changed. Because 10/12 years is a long time, the Generator Owner should be required to respond upon request of the Transmission Planner confirming that nothing has changed. Further, the second bullet of R11 might also note that the Generation Operator must verify for the model for the first time if the model was derived from a 'sister' unit or repeat the verification on one previously verified.</p>
<p>Response: Thank you for your comments. The SDT believes that 10 years is a reasonable re-verification period. Re-verification does not necessarily require a re-test and in most instances, ambient monitoring can also be used. The proposed 10 year re-verification period is also supported by an overwhelming majority of comments received from the industry. The SDT is not sure of the intent of the last sentence. The SDT does not believe that model verification of each unit is needed if the units satisfy the sister unit definition. The SDT also believes requiring communication for activity that does not change settings or create evidence indicating setting have changed is an unnecessary burden. However, if an activity is performed that could change settings or creates evidence of setting changes, then the revised Requirements R3 and R4 contain provisions for performing re-verification earlier if justified.</p>		
AESO	No	<p>The AESO agrees with the SRC ISO/RTO comments. We would also like to add: WECC requirements state every 5 years. 5 years seems more resonable than 10 years to ensure that the generating unit is still performing as intially sepceified and there has been no no component degradation causing the settings to drift.</p>
<p>Response: Thank you for your comments. The SDT believes that re-verification every 5 years is unnecessary. This position is supported by an overwhelming majority of comments received from the industry. The revised Requirements R3 and R4 contain provisions for performing re-verification earlier if justified.</p>		
Duke Energy	No	<p>It would seem that the need to revalidate is driven by technical issues (analog controls drift, digital doesn't). There is an EPRI guide (1004556) that specifies a 5 year frequency for analog AVR calibrations. The SDT should discuss different periods based upon different control technologies (e.g. digital versus analog).In addition to R12, some communication between the Generation Operator and the Transmission Operator within the 10 year period would be reassuring that nothing has changed.</p>
<p>Response: Thank you for your comments. The SDT believes that 10 years is a reasonable re-verification period. Re-verification does not necessarily require a</p>		

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Organization	Yes or No	Question 2 Recommended Periodicity and Reasoning:
<p>re-test and in most instances, ambient monitoring can also be used. The proposed 10 year re-verification period is also supported by an overwhelming majority of comments received from the industry. The SDT also believes requiring communication for activity that does not change settings or create evidence indicating setting have changed is an unnecessary burden. However, if an activity is performed that could change settings or creates evidence of setting changes, then the revised Requirements R3 and R4 contain provisions for performing re-verification earlier if justified.</p>		
American Transmission Company	No	The 10 year period is too long and should be changed to 5 years in order to ensure greater model accuracy.
<p>Response: Thank you for your comment. The SDT believes that re-verification every 5 years is unnecessary. This position is supported by an overwhelming majority of comments received from the industry. The revised Requirements R3 and R4 contain provisions for performing re-verification earlier if justified.</p>		
US Bureau of Reclamation	No	We believe the 10 year period is too long. It is hard to make the case for reliability-based need for this standard when 10 years are allowed to complete the modeling. Suggest changing the initial implementation period to 5 years which is the implementation period provided in the WECC regional policy. Ten years may then be appropriate for re-validation.
<p>Response: Thank you for your comments. The purpose of the initial 10-year implementation period is to give industry sufficient time to perform verification on required units with limited expertise available. The SDT believes that 10 years is a reasonable re-verification period. Re-verification does not necessarily require a re-test and in most instances, ambient monitoring can also be used. The proposed 10-year re-verification period is also supported by an overwhelming majority of comments received from the industry.</p>		
Independent Electricity System Operator	No	We believe a 10 year re-verification period is adequate for those exciters whose settings do not tend to drift over time. However, a shorter period, say 5 years, should apply to the analog or rotating type of exciters.
<p>Response: Thank you for your comments. The SDT believes that with Requirements R11 and R12 in the original posting (reference Requirements R3 and R4 in the revised standard) in place, a 5 year re-verification period is unnecessary, even for analog and rotating exciters. This position is also supported by an overwhelming majority of comments received from the industry. The revised requirement R4 (reference footnote) 1 contains provision for earlier re-verification if such a need is justified.</p>		
NERC Event Analysis & Information Exchange staff	Yes	Ten years is an adequate backstop for re-testing. However, it should additionally be tempered by performance differences observed during validation to actual or staged system events. Repeated matching of model performance to events should also make a ten year test unnecessary.
<p>Response: Thank you for your comments. The overwhelming majority of the comments received from industry support a 10-year re-verification period. The SDT agrees that the repeated matching of model performance to events can be acceptable verification however, the required data must be submitted every 10 years to</p>		

Organization	Yes or No	Question 2 Recommended Periodicity and Reasoning:
ensure that proper verification has been completed.		
Northeast Power Coordinating Council	Yes	A ten-year interval is acceptable given the conditions in Requirement R12.
Response: Thank you for your comment.		
SERC Dynamics Review Subcommittee (DRS)	Yes	We agree as long as there is a requirement such as R11. The second bullet of R11 might also note that the Generation Operator (Owner) must verify the model for the first time if the model was derived from a 'sister' unit or repeat the verification on one previously verified. Despite R12, some communication between the Generation Operator (Owner) and the Transmission Operator, within the 10 year period stating that nothing has changed would be reassuring. Because 10 years is a long time, the Generator Owner should be required to respond if requested by the Transmission Planner confirming that nothing has changed.
Response: Thank you for your comments. The SDT is not sure of the intent of the second sentence. The SDT does not believe that model verification of each unit is needed if the units satisfy the sister unit definition. The SDT also believes requiring communication for activity that does not change settings or create evidence indicating setting have changed is an unnecessary burden. However, if an activity is performed that could change settings or creates evidence of setting changes, then the revised Requirements R3 and R4 contain provisions for performing re-verification earlier if justified.		
Progress Energy, Inc.	Yes	As long as there is a requirement such as R11. The second bullet of R11 might also note that the Generation Operator must verify for the model for the first time if the model was derived from a 'sister' unit or repeat the verification on one previously verified. Despite R12, some communication between the Generation Operator and the Transmission Operator within the 10 year period would be reassuring that nothing has changed. Because ten years is a long time, the Generator Owner should be required to respond upon request of the Transmission Planner confirming that nothing has changed.
Response: Thank you for your comments. The SDT is not sure of the intent of the second sentence. The SDT does not believe that model verification of each unit is needed if the units satisfy the sister unit definition. The SDT also believes requiring communication for activity that does not change settings or create evidence indicating setting have changed is an unnecessary burden. However, if an activity is performed that could change settings or creates evidence of setting changes, then the revised Requirements R3 and R4 contain provisions for performing re-verification earlier if justified.		
Northeast Utilities	Yes	Consider the need to account for wind turbine generation that does not have mature models for this verification - therefore a shorter period may apply to accommodate improvements of those models.
Response: Thank you for your comments. The MVA thresholds in the Applicability section of the first posting of MOD-026 resulted in wind powered units not being		

Organization	Yes or No	Question 2 Recommended Periodicity and Reasoning:
<p>subject to this standard because no single wind unit is rated greater than 20 MVA. However, there is an increasing number of wind farms with significantly larger aggregate MVA. As such, their impact on the reliability of the Bulk Electric System cannot be ignored – otherwise, a reliability gap would be created.</p> <p>Therefore, based on your comments and other industry comments, the SDT discussed the possibility of requiring verification of dynamic models that represent the aggregate of numerous small units and any necessary auxiliary equipment as required due to the technology of the small units. This could include plant dynamic voltage control and reactive support of all the units and auxiliary equipment (such as individual WTG response, plant-wide volt/var controller response, and response from separate volt/var regulation devices contained in the plant, such as SVC/STATCOM/Synchronous Condenser) contained in any technology generation plant, including a wind farm (plant), that exceeds appropriate aggregate nameplate MVA threshold.</p> <p>There are dynamic models that adequately replicate wind unit performance for some wind units today. However, there are many existing wind units for which there are no publicly available models supplied by the Original Equipment Manufacturer. Generic wind models (i.e., type I, II, III and IV) are in various stages of development. Also, there are ongoing efforts involving Regional Entities and manufactures to close any large gaps that may exist in current generic models. Given that there will be significant time between now and the time that this standard could be approved by FERC, it is expected that generic wind farm (plant) models will reach an appropriate state of maturity for establishing boundary conditions in Bulk System Studies. In order to mitigate the reliability gap, the Applicability section will be expanded in the second posting of the standard to include significant MVA percentage of all generation for all technologies.</p>		
Exelon Corporation	Yes	It is difficult to determine whether or not 10 years is an appropriate period for re-verification without knowing the details of the required testing.
<p>Response: Thank you for your comment. The SDT believes that 10 years is a reasonable re-verification period. Re-verification does not necessarily require a re-test and in most instances, ambient monitoring can also be used. The proposed 10 year re-verification period is also supported by an overwhelming majority of comments received from the industry</p>		
Southern Company	Yes	Years of operating experience has shown that existing excitation systems that are properly maintained typically do not deteriorate to the point where performance is noticeably impacted in less than 10 years.
<p>Response: Thank you for your comment.</p>		
Hydro-Québec TransEnergie (HQT)	Yes	ten-year interval is acceptable given the conditions in Requirement R12.
<p>Response: Thank you for your comment.</p>		
CenterPoint Energy	Yes	CenterPoint Energy concurs periodic verification every ten years is appropriate.

Organization	Yes or No	Question 2 Recommended Periodicity and Reasoning:
Response: Thank you for your comment.		
Consumers Energy Company	Yes	Ten years is appropriate with the caveats listed in Requirement 12.
Response: Thank you for your comment.		
Manitoba Hydro	Yes	
Dynergy	Yes	
Xcel Energy	Yes	
Southern California Edison	Yes	
Indiana Municipal Power Agency	Yes	
Brazos Electric Power Cooperative	Yes	
Southwest Power Pool Generation Working Group	Yes	
Dominion	Yes	
MRO NERC Standards Review Subcommittee	Yes	
Pepco Holdings, Inc (PHI) - Affiliates	Yes	
FEUS	Yes	
Luminant Power	Yes	

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Organization	Yes or No	Question 2 Recommended Periodicity and Reasoning:
Constellation Power Generation & Constellation Nuclear	Yes	
Cowlitz County PUD	Yes	
Wisconsin Public Service	Yes	
City of Garland, Garland Power & Light - GOP Registered Entity	Yes	
AWEA	Yes	
American Wind Energy Association	Yes	
Arizona Public Service Co.	Yes	
Wisconsin Electric	Yes	
Reliant Energy	Yes	

3. The SDT thought that it would be reasonable to apply a philosophy to allow maximization of limited resources required to perform excitation system model verification. The philosophy allows a single unit’s actual excitation system verification to be a proxy for multiple units if the following conditions are met: a) the units have the same MVA rating, b) the units are rated at ≤ 250 MVA c) the units have identical applicable components and settings and d) the units are sited at the same physical location. For each recurring 10 year cycle, another unit must actually be verified.

Do you agree with the proxy unit approach as used in Requirement R1 Item 2? If not, please explain.

Summary Considerations:
 The majority of respondents agreed with using the proxy unit approach. There were several suggested adjustments to the proxy unit approach criteria proposed. The most requested adjustments was to increase the unit MVA size threshold from 250 MVA to 350 MVA. The SDT updated the second draft of the standard to reflect a unit MVA size threshold of 350 MVA; with language contained in the attached periodicity Attachment.

Organization	Yes or No	Question 3 Comment
Northeast Power Coordinating Council	No	Unit testing has in the past identified different responses from identical units with common settings. All units with identical design and settings should be tested unless records of actual system events demonstrate that all of the units respond the same.
<p>Response: Thank you for your comments. Previous experience is noted. However, given the limited resources available for industry to execute necessary test and analysis work, the SDT believes that it is not practical to require testing of all units described as proxy units. This conclusion is supported by the majority of comments received from the industry as indicated in the Summary Considerations section above. The SDT notes that Requirement R11 (reference Requirement R3 in the revised standard) requires any unit (including those considered as “proxy” units) to be fully tested/analyzed if unit performance during a system event does not match predicted response.</p>		
SERC Dynamics Review Subcommittee (DRS)	No	We encourage the proxy unit approach. However, we do not agree completely to the conditions illustrating the proxy unit approach. (1) "MVA rating" should be changed to say "MVA nameplate rating". We believe it would be prudent to specify that units of different manufacturers are not proxy units, even if they have the same nameplate rating, (2) If the units are identical, we believe the 250 MVA threshold criterion is too restrictive. We believe the threshold should be at least 350 MVA to cover combined cycle units using existing technology.
<p>Response: Thank you for your comments. The SDT notes the general agreement among industry with using the proxy unit approach. The SDT also accepts the</p>		

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Organization	Yes or No	Question 3 Comment
<p>recommendation to incorporate the term “MVA Nameplate Rating” in the second draft of the standard.</p> <p>With respect to the “different manufacturers” issue, the SDT believes the language, “and if they have identical applicable components and settings”, contained in the original Standard draft provides sufficient specificity on this point.</p> <p>We note both you and several industry responders, proposed increasing the MVA Nameplate Rating threshold to 350 MVA. The SDT agrees with the reasoning, “to cover the steam unit of multiple combined cycle plant sites using existing technology”, stated for this change and has modified the standard accordingly.</p>		
FirstEnergy	No	<p>1. While we agree with this approach, we do not agree it should be limited to 250 MVA units. It should allow it for any identical units of any size. Also, the requirement could be written more clearly by revising it to make it clear that verification is for similar units only and not all units owned. Based on these comments, we suggest re-wording R1 (2) to state: "For an existing unit, once in a ten calendar year period. If multiple units have identical applicable components and settings and are sited at the same physical location, verification of one unit is sufficient for all of these units. Verification shall be performed on a different unit each ten calendar year cycle."2. This is a lot like the "Sister Unit" concept developed in the recent RFC generator verification standards. It may be helpful if this term was defined and described in more detail in the standard to allow for ease of compliance verification.</p>
<p>Response: Thank you for your comments. The SDT notes the general agreement among industry with using the proxy unit approach. The SDT also notes the recommendation to make the MVA Nameplate Rating threshold limitless, and while this recommendation was received by several responders, the SDT does not believe this recommendation represents the majority opinion of Industry. The SDT is also of the opinion that significantly large units can have a substantial impact on BES security and therefore an unlimited MVA threshold is not appropriate. The SDT has increased the Nameplate MVA Rating threshold from 250 MVA to 350 MVA as requested by the majority of industry responders.</p> <p>The SDT has noted the recommendation to more clearly define the “proxy (or sister) unit” concept and points out that the actual standard does not use either of these terms and simply states the requirements; which have been moved to the attached Periodicity Attachment in the second standard draft.</p>		
Pepco Holdings, Inc (PHI) – Affiliates	No	A GOP (or GO) may have sister units (identical units) at different locations. This should not be restricted to one location.
<p>Response: Thank you for your comments. The SDT notes the general agreement among industry with using the proxy unit approach. The SDT respectfully maintains that the “same physical location” requirement is necessary since it provides a strong indication of similarity of equipment and settings (which could be verified by the same field personnel during a single site walk down). For example, a GO/GOP could own/operate otherwise similar equipment physically located in vastly different geographic locations with substantially different Reliability Coordinator or Transmission Operator requirements (e.g. requirement for PSS in-service). To ensure all GO/GOP equipment meets standard intent, the SDT maintains the “same physical location” requirement is necessary.</p>		
Exelon Corporation	No	Why there is a limitation of unit size of 250MVA or less. The proxy unit approach should be extended to identical units of any size for a two unit station as half of the capacity at that station has been verified as

Organization	Yes or No	Question 3 Comment
		compared to a multi unit site say having 6 250MVAs and verifying only one unit.
<p>Response: Thank you for your comments. The SDT notes the general agreement among industry with using the proxy unit approach. The SDT also notes the recommendation to make the MVA Nameplate Rating threshold limitless, and while this recommendation was received by several responders, the SDT does not believe this recommendation represents the majority opinion of Industry. The SDT is also of the opinion that significantly large units (> 250 MVA) can have a substantial impact on BES security and therefore an unlimited MVA threshold is not appropriate. The SDT has increased the Nameplate MVA Rating threshold from 250 MVA to 350 MVA as requested by the majority of industry responders.</p>		
Southern Company	No	Agree with all requirements except b and d. If the GO/GOP has duplicate units at multiple sites , a re-verification test of one unit should apply to all provided they meet items a and c. The size of the unit (b) nor the physical location (d) do not matter. The MVA rating of the machine should not be an excluding factor for units of the same vintage, rating, manufacturer, and with the same type of excitation system and settings.
<p>Response: Thank you for your comments. The SDT notes the general agreement among industry with using the proxy unit approach.</p> <p>The SDT also notes the recommendation to make the MVA Nameplate Rating threshold limitless, and while this recommendation was received by several responders, the SDT does not believe this recommendation represents the majority opinion of Industry. The SDT is also of the opinion that significantly large units (> 250 MVA) can have a substantial impact on BES security and therefore an unlimited MVA threshold is not appropriate. The SDT has increased the Nameplate MVA Rating threshold from 250 MVA to 350 MVA as requested by the majority of industry responders.</p> <p>The SDT respectfully maintains that the “same physical location” requirement is necessary since it provides a strong indication of similarity of equipment and settings (which could be verified by the same field personnel during a single site walk down). For example, a GO/GOP could own/operate otherwise similar equipment physically located in vastly different geographic locations with substantially different Reliability Coordinator or Transmission Operator requirements (e.g. requirement for PSS in-service). To ensure all GO/GOP equipment meets standard intent, the SDT maintains the “same physical location” requirement is necessary.</p>		
E.ON U.S.	No	E.ON U.S. does believe that the proxy process described is reasonable. As expressed in the response to question 2, E.ON U.S. believes that, absent installation of new equipment, a re-verification schedule is unnecessary.
<p>Response: Thank you for your comments. The SDT notes the general agreement among industry with using the proxy unit approach. The SDT maintains that the proposed re-verification schedule is appropriate to provide a means to capture changes in excitation system equipment due to component aging, calibration drift, etc.</p>		
Wisconsin Public Service	No	The sister unit philosophy should be applied to identical units within a generator operators fleet with identical settings, but not be limited to the same physical site.

Organization	Yes or No	Question 3 Comment
<p>Response: Thank you for your comment. The SDT notes the general agreement among industry with using the proxy unit approach. The SDT respectfully maintains that the “same physical location” requirement is necessary since it provides a strong indication of similarity of equipment and settings (which could be verified by the same field personnel during a single site walk down). For example, a GO/GOP could own/operate otherwise similar equipment physically located in vastly different geographic locations with substantially different Reliability Coordinator or Transmission Operator requirements (e.g. requirement for PSS in-service). To ensure all GO/GOP equipment meets standard intent, the SDT maintains the “same physical location” requirement is necessary.</p>		
Wisconsin Electric	No	We believe that units rated up to 850 MVA should be able to take advantage of this approach.
<p>Response: Thank you for your comment. The SDT notes the general agreement among industry with using the proxy unit approach. The SDT also notes the recommendation to increase the MVA Nameplate Rating threshold to 850 MVA, and while this recommendation was received by several responders, the SDT does not believe this recommendation represents the majority opinion of Industry or that the threshold should be this high. The SDT has increased the Nameplate MVA Rating threshold from 250 MVA to 350 MVA as requested by the majority of industry responders.</p>		
American Electric Power	No	While AEP agrees that the proxy approach to verify multiple, identical units based on system model verification for a single unit makes sense, it is unclear why criterion "b" (the units are rated at less than or equal to 250MVA) would apply, provided criteria "a", "c", and "d" are also met. It is suggested that criterion "b" as listed in the Comment Form and as referenced in Requirement R1.2 be removed from the Standard.
<p>Response: Thank you for your comments. The SDT notes the general agreement among industry with using the proxy unit approach. The SDT also notes the recommendation to remove the MVA Nameplate Rating threshold, and while this recommendation was received by several responders, the SDT does not believe this recommendation represents the majority opinion of Industry. However, based on industry comments, the SDT has increased the Nameplate MVA Rating threshold from 250 MVA to 350 MVA as requested by the majority of industry responders.</p>		
Progress Energy, Inc.	No	We encourage the proxy unit approach. However, we do not agree completely to the conditions illustrating proxy unit approach. (1) MVA rating should be expanded to say "MVA nameplate rating" . We believe it would be prudent to specify that units of different manufacturers, even if they have the same nameplate rating are not proxy units, (2) If the units are identical, we believe the 250 MVA threshold criterion is too restrictive. We believe the limit should be at least 350 MVA to cover combined cycle units of existing technology.
<p>Response: Thank you for your comments. The SDT notes the general agreement among industry with using the proxy unit approach. The SDT also accepts the recommendation to incorporate the term “MVA Nameplate Rating” in the second draft of the standard.</p> <p>With respect to the “different manufacturers” issue, the SDT believes the language, “and if they have identical applicable components and settings”, contained in the original Standard draft provides sufficient specificity on this point.</p> <p>We note both your comment and several industry responders propose increasing the MVA Nameplate Rating threshold to 350 MVA. The SDT agrees with the</p>		

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Organization	Yes or No	Question 3 Comment
		reasoning, “to cover the steam unit of multiple combined cycle plant sites using existing technology”, stated for this change and has modified the standard accordingly.
Northeast Utilities	No	Units testing has in the past identified different responses from identical units with common settings. All units with identical design and settings should be tested unless records of actual system events demonstrate that all of the units respond the same.
<p>Response: Thank you for your comments. Previous experience is noted. However, given the limited resources available for industry to execute necessary test and analysis work, the SDT believes that it is not practical to require testing of all units described as proxy units. This conclusion is supported by the majority of comments received from the industry as indicated in the Summary Considerations section above. The SDT notes that Requirement R11 (reference Requirement R3 in the revised standard) requires any unit (including those considered as “proxy” units) to be fully tested/analyzed if unit performance during a system event does not match predicted response.</p>		
Hydro-Québec TransEnergie (HQT)	No	Units testing has in the past identified different responses from identical units with common settings. All units with identical design and settings should be tested unless records of actual system events demonstrate that all of the units respond the same.
<p>Response: Thank you for your comments. Previous experience is noted. However, given the limited resources available for industry to execute necessary test and analysis work, the SDT believes that it is not practical to require testing of all units described as proxy units. This conclusion is supported by the majority of comments received from the industry as indicated in the Summary Considerations section above. The SDT notes that Requirement R11 (reference Requirement R3 in the revised standard) requires any unit (including those considered as “proxy” units) to be fully tested/analyzed if unit performance during a system event does not match predicted response.</p>		
AESO	No	The AESO believes that using a single unit’s actual excitation system verification to be a proxy for multiple units will not pick up errors in settings, component failures, alterations to units, etc. Each unit should be tested individually.
<p>Response: Thank you for your comments. Previous experience is noted. However, given the limited resources available for industry to execute necessary test and analysis work, the SDT believes that it is not practical to require testing of all units described as proxy units. This conclusion is supported by the majority of comments received from the industry as indicated in the Summary Considerations section above. The SDT notes that Requirement R11 (reference Requirement R3 in the revised standard) requires any unit (including those considered as “proxy” units) to be fully tested/analyzed if unit performance during a system event does not match predicted response.</p>		
NERC Event Analysis & Information Exchange staff	Yes	As long as no actual differences are observed during performance comparisons to actual system events, this is an acceptable shortcut.

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Organization	Yes or No	Question 3 Comment
<p>Response: Thank you for your comment. The SDT believes that the situation described will be satisfied by Requirement R2 in the revised standard.</p>		
Entergy Fossil Operations	Yes	<p>I agree with this except for the less than or equal to 250 MVA. It should apply to all units meeting the sister unit criteria regardless of MVA. If you want a limit, then make it something higher like 80% of the single largest generator in the system.</p>
<p>Response: Thank you for your comments. The SDT notes the general agreement among industry with using the proxy unit approach.</p> <p>The SDT also notes the recommendation to increase the MVA Nameplate Rating threshold 80% or higher of the largest system generator, and while this recommendation was received by several responders, the SDT does not believe this recommendation represents the majority opinion of Industry. The SDT is also of the opinion that significantly large units (> 250 MVA) can have a substantial impact on BES security and therefore an unlimited MVA threshold is not appropriate. The SDT has increased the Nameplate MVA Rating threshold from 250 MVA to 350 MVA as requested by the majority of industry responders.</p> <p>The SDT respectfully maintains that the “same physical location” requirement is necessary since it provides a strong indication of similarity of equipment and settings (which could be verified by the same field personnel during a single site walk down). For example, a GO/GOP could own/operate otherwise similar equipment physically located in vastly different geographic locations with substantially different Reliability Coordinator or Transmission Operator requirements (e.g. requirement for PSS in-service). To ensure all GO/GOP equipment meets standard intent, the SDT maintains the “same physical location” requirement is necessary.</p>		
Ameren	Yes	<p>We encourage the proxy unit approach. However, we do not agree completely to the conditions illustrating proxy unit approach. (1) MVA rating should be expanded to say "MVA nameplate rating" . We believe it would be prudent to specify that units of different manufacturers, even if they have the same nameplate rating are not proxy units. Further, turbine rating should also be considered as appropriate. (2) If the units are identical, we believe the 250 MVA threshold criterion is too restrictive. We believe the limit should be at least 350 MVA to cover combined cycle units of existing technology.</p>
<p>Response: Thank you for your comments. The SDT notes the general agreement among industry with using the proxy unit approach. The SDT also accepts the recommendation to incorporate the term “MVA Nameplate Rating” in the second draft of the standard.</p> <p>With respect to the “different manufacturers” issue, the SDT believes the language, “and if they have identical applicable components and settings”, contained in the original Standard draft provides sufficient specificity on this point.</p> <p>We note both your comment and several industry responders propose increasing the MVA Nameplate Rating threshold to 350 MVA. The SDT agrees with the reasoning, “to cover the steam unit of multiple combined cycle plant sites using existing technology”, stated for this change and has modified the standard accordingly.</p>		
Duke Energy	Yes	<p>If it could be verified that the Gains and TCs are exactly the same, but just reading dial settings on analog controls might not suffice. For digital, the gains are the number programmed in, so the proxy approach is</p>

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Organization	Yes or No	Question 3 Comment
		more reasonable. Also, recommend changing MVA rating to 350 MVA so that combined cycle steam units are included.
<p>Response: Thank you for your comments. Response: The SDT notes the general agreement among industry with using the proxy unit approach. The SDT accepts this recommendation and has increased the Nameplate MVA Rating threshold from 250 MVA to 350 MVA as requested by the majority of industry responders.</p>		
Independent Electricity System Operator	Yes	We agree with the proxy unit approach only if these units' excitation systems show identical performance based on the results of a limited number of tests. On the other hand, we do not agree with the 10-year cycle. Accurate excitation system data and verification that it performs as designed are critical to accurate modeling and simulation to support a wide range of reliability activities, including the determination of SOLs and IROLs. The 10 year recycle period is too long that risks changes to excitation system characteristics undetected. We suggests this period be shortened to 5 years.
<p>Response: Thank you for your comments. The SDT notes the general agreement among industry with using the proxy unit approach. The SDT maintains that the proposed re-verification schedule is appropriate to provide a means to capture changes in excitation system equipment due to component aging, calibration drift, etc. The SDT notes that Requirement R11 (reference Requirement R3 in the revised standard) requires any unit (including those considered as "proxy" units) to be fully tested/analyzed if unit performance during a system event does not match predicted response.</p>		
Reliant Energy	Yes	Proxy unit ratings should go up to 500 MVA.
<p>Response: Thank you for your comment. The SDT notes the general agreement among industry with using the proxy unit approach. The SDT also notes the recommendation to increase the MVA Nameplate Rating threshold to 500 MVA, and while this recommendation was received by several responders, the SDT does not believe this recommendation represents the majority opinion of Industry or that the threshold should be this high. The SDT has increased the Nameplate MVA Rating threshold from 250 MVA to 350 MVA as requested by the majority of industry responders.</p>		
Consumers Energy Company	Yes	This looks to be a "sister unit" type of proxy. If so, it should be introduced as a new definition.
<p>Response: Thank you for your comment. The SDT notes that the actual standard does not use either of these terms but simply states the requirements; which have been moved to the attachment Periodicity Attachment in the second draft of the revised standard.</p>		
Constellation Power Generation & Constellation Nuclear	Yes	The proxy unit approach is quite appropriate for excitation system verification for multiple units.
<p>Response: Thank you for your comment.</p>		

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Organization	Yes or No	Question 3 Comment
IRC Standards Review Committee	Yes	We agree with the proxy unit approach.
Response: Thank you for your comment.		
Reliant Energy	Yes	I can not see any reliability benefit to requiring the verification of sister units.
Response: Thank you for your comment. The SDT notes the general agreement among industry with using the proxy unit approach. The SDT maintains that the proposed re-verification schedule is appropriate to provide a means to capture changes in excitation system equipment due to component aging, calibration drift, etc.		
Southwest Power Pool Generation Working Group	Yes	
Dominion	Yes	
Kansas City Power & Light	Yes	
MRO NERC Standards Review Subcommittee	Yes	
FEUS	Yes	
Luminant Power	Yes	
Cowlitz County PUD	Yes	
City of Garland, Garland Power & Light - GOP Registered Entity	Yes	
AWEA	Yes	
American Wind Energy Association	Yes	
Arizona Public Service Co.	Yes	

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Organization	Yes or No	Question 3 Comment
Manitoba Hydro	Yes	
Dynergy	Yes	
Southern California Edison	Yes	
Indiana Municipal Power Agency	Yes	
ISO New England Inc.	Yes	
CenterPoint Energy	Yes	
Xcel Energy	Yes	
Brazos Electric Power Cooperative	Yes	

4. The list of unit specific information in Requirement R4 to be provided to the Transmission Planner from the Generator Owner includes generator data used in the excitation system verification process. The reason is that the tests, ambient or staged, which are used to verify the excitation system model, are part of a closed loop system that includes the generator. However, the SDT stopped short of requiring verification of either all generator data, or a portion of the generator data which is most applicable to excitation system testing (Transient Open Circuit Time Constant, and for PSS model verification, rotational inertia). The SDT feels that it cannot develop draft Requirements for the verification of generator data without submitting a supplementary SAR to the NERC Standards Committee.

Do you agree with the approach of requiring the Generator Owner to supply the generator data used in the excitation system model verification?

Summary Consideration:

Most responders agreed there is a need for clarity regarding the specific generator data used for exciter data verification, and that it was not necessary to separately verify the generator data. Most responders felt it was appropriate to require Generator Owners to provide the generator data. Clarifying language has been added to the standard in Requirement R2, including specifying that generator data used to verify the excitation control system also be provided with the other data obtained during model verification.

Organization	Yes or No	Question 4 Comment
Southwest Power Pool Generation Working Group	No	The proposed standard states Generator Operator, as opposed to Generator Owner. The Generator Owner should be the one providing the data.
Response: Thank you for your comment. The issue of whether the Generator Owner or Generator Operator is the responsible entity is addressed by Question 1.		
Entergy Fossil Operations	No	I may agree if it is reasonable and list exactly what data can be requested by the TP. Remember, the GO is dependent on contractors for doing this, it costs them money, and is of no benefit to the GO, so the listing need to be specific so it can be listed in the job scope of the work and reasonable.
Response: Thank you for your comments. The SDT respectfully disagrees that the generator/exciter model verification is of no benefit to the Generator Owner. Although the primary purpose for model verification is to provide accurate models, there are other significant benefits which the Generator Owner will realize such		

Organization	Yes or No	Question 4 Comment
<p>as:</p> <ul style="list-style-type: none"> Without the verification data and resulting system simulation results, transfer capabilities are uncertain and there is greater risk of generator tripping because of system issues. Generation power sales are dependent on the transmission system transfer capability. There have been several instances where verification efforts have discovered maintenance issues that, if not identified and corrected, would have resulted in unit tripping and possible equipment damage. <p>The SDT asserts the knowledge and generator data required is inherent to the verification process, and as such requires the expert responsible for providing verification results to specify the required parameter list since this list is dependent on the generator and exciter models selected. It is important that this verification work is performed by individuals familiar with specifying the required parameter list associated with the model selected to best match equipment performance. As such, the SDT believes providing a detailed parameter list in the standard will create confusion.</p>		
Luminant Power	No	Luminant does not disagree that the information needs to be provided. However, the generator model data is already required in NERC Standards MOD-012 and MOD-013 (R1.2). The Generation Owner should not be held doubly liable for the same information in two Standards. This requirement for the Generator data is already required elsewhere and is not needed in this standard.
<p>Response: Thank you for your comments. Regional requirements will be retired from the NERC standards. MOD-012 and MOD-013 standards do not require verification (unless the region requires it). The purpose of MOD-026 is to require verification. MOD-012 requires submission of both generator and exciter data with other dynamics data provided. Experience has shown that both excitation system data and generator data must be revised when performing the verification process. Even if revisions are not necessary, it is essential that unambiguous generator and exciter data is incorporated into the simulation tools. A simple way to ensure consistency is by requiring both generator data and exciter data be included in the verification report. Information must be updated with generator data included in the exciter verification report.</p>		
Southern Company	No	<p>Since the exciter model and the generator model are components of the closed loop system being verified, the process should ensure that the transmission planners dynamic database is updated with the generator data and the excitation system data utilized for model verification. Relying on generator data that was originally provided for MOD-012 to be the same data that was used for model verification would not be advisable. There are countless opportunities for generator data submitted for MOD-012 to be inconsistent with generator data used in the excitation system verification process. In order to close this loop, we suggest that R3 be slightly modified to read: "The Transmission Planner shall provide the Generator Operator with the unit specific data contained in the Transmission Planner's dynamic database from the current in-use excitation system and generator model, including the applicable generator model parameter's MVA base, within 30 calendar days of a request from the Generator Operator." AND R4 Item 2 should have an additional sentence at the end which reads: "This data only has to be provided in those instances where generator model data was updated during the process of obtaining a</p>

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Organization	Yes or No	Question 4 Comment
		verified excitation system model". These language modifications will help ensure that dynamic databases are populated with the correct data for both the excitation system and generator models that have been verified while minimizing burden on the generation entity responsible for model verification.
<p>Response: Thank you for your comments. The SDT agrees with this recommendation and has incorporated the concept into Requirement R3 (Reference Requirement R1 in the revised standard). However, the SDT did not adopt the recommendation for R4 item 2 (Reference Requirement R2, Part 2.1 in the revised standard). To ensure consistency, it is important that the generator model data is always provided with the exciter model data even if it the data has not changed. The SDT does not believe this is a burdensome requirement given the benefit realized by ensuring necessary data is clearly communicated.</p>		
Cowlitz County PUD	No	I think you meant for the Generator Operator to supply the generator data.
<p>Response: Thank you for your comment. The SDT has corrected the noted error. The issue of whether the Generator Owner or Generator Operator is the responsible entity is addressed by Question 1.</p>		
Indiana Municipal Power Agency	No	IMPA believes the generator data is important and that it is currently being provided per MOD-010 (static) and MOD-012 (dynamic). Another standard requiring this information would put the stakeholder at a double risk factor, and FERC does not believe in this double risk factor.
<p>Response: Thank you for your comments. Regional requirements will be retired from the NERC standards. MOD-012 and MOD-013 standards do not require verification (unless the region requires it). The purpose of MOD-026 is to require verification. MOD-012 requires submission of both generator and exciter data with other dynamics data provided. Experience has shown that both excitation system data and generator data must be revised when performing the verification process. Even if revisions are not necessary, it is essential that unambiguous generator and exciter data is incorporated into the simulation tools. A simple way to ensure consistency is by requiring both generator data and exciter data be included in the verification report. Information must be updated with generator data included in the exciter verification report.</p>		
NERC Event Analysis & Information Exchange staff	No	See below.
<p>Response: Thank you for your comment. Refer to the response provided to the other comment(s).</p>		
Northeast Power Coordinating Council	Yes	The entity specified in Question 4 does not agree with the entity specified in Requirement R4. As stated in our response to Question 1, we believe the Generator Owner is the correct entity to provide the data; not the Generator Operator. We agree with the approach subject to revising the responsible entity.
<p>Response: Thank you for your comments. The issue of whether the Generator Owner or Generator Operator is the responsible entity is addressed by Question</p>		

Organization	Yes or No	Question 4 Comment
1.		
SERC Dynamics Review Subcommittee (DRS)	Yes	<p>Since the exciter model and the generator model are components of the closed loop system being verified, the process should ensure that the transmission planners dynamic database is updated with the generator data and the excitation system data utilized for model verification. Relying on generator data that was originally provided for MOD-012 to be the same data that was used for model verification would not be advisable. There are countless opportunities for generator data submitted for MOD-012 to be inconsistent with generator data used in the excitation system verification process. In order to close this loop, we suggest that R3 be slightly modified to read: "The Transmission Planner shall provide the Generator Operator with the unit-specific data contained in the Transmission Planner's dynamic database from the current in-use excitation system and generator model, including the applicable generator model parameter's MVA base, within 30 calendar days of a request from the Generator Operator." AND R4 Item 2 should have an additional sentence at the end which reads: "This data only has to be provided in those instances where generator model data was changed in order to obtain a verified excitation system model". These language modifications will help ensure that dynamic databases are populated with the correct data for both the excitation system and generator models that have been verified while minimizing burden on the generation entity responsible for model verification.</p>
<p>Response: Thank you for your comments. The SDT agrees with this recommendation and has incorporated the concept into Requirement R3 (Reference Requirement R1 in the revised standard). However, the SDT did not adopt the recommendation for R4 item 2 (Reference Requirement R2, Part 2.1 in the revised standard). To ensure consistency, it is important that the generator model data is always provided with the exciter model data even if it the data has not changed. The SDT does not believe this is a burdensome requirement given the benefit realized by ensuring necessary data is clearly communicated.</p>		
Dominion	Yes	We believe that all requirements of this standard should apply to the Generator Owner, not the Generator Operator.
<p>Response: Thank you for your comment. The issue of whether the Generator Owner or Generator Operator is the responsible entity is addressed by Question 1.</p>		
FirstEnergy	Yes	The question above has a typographical error. We assume the team means "Generator Operator".
<p>Response: Thank you for your comment. The SDT has corrected the noted error. The issue of whether the Generator Owner or Generator Operator is the responsible entity is addressed by Question 1.</p>		
IRC Standards Review Committee	Yes	We agree with the approach of requiring the Generator Owner to supply the data listed. We also suggest that since this data is required 90 calendar days of completion of the excitation system model verification - the same condition for providing documentation demonstrating that the excitation system model's response matches the

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Organization	Yes or No	Question 4 Comment
		<p>recorded response for a voltage excursion at the generator as stipulated in R8, we suggest R8 be combined with R4. Note that "Generator Owner" instead of "Generator Operator" is used in this question. While we view this as a typo, as indicated in our comment under Q1 we think it is appropriate that the Generator Owners be held responsible for the majority of the requirements in this standard.</p>
<p>Response: Thank you for your comments. The SDT has corrected the noted error. The issue of whether the Generator Owner or Generator Operator is the responsible entity is addressed by Question 1. The SDT agrees with the recommendation to combine Requirement R8 with R4 (reference Requirement R2, Part 2.1 in the revised standard).</p>		
Consumers Energy Company	Yes	<p>We believe that generator data must be verified; however, the concept of staged tests is troubling as such testing can provide a local challenge to the integrity of the BES. Such testing should be required to be well coordinated with the Transmission Operator. Our experience shows start-up testing of new exciters has occasionally resulted in significant local impact to the transmission system, e.g., over-voltage on 345 kV systems.</p>
<p>Response: Thank you for your comments. There is risk associated with performing staged generation tests however, the SDT believes the benefits outweigh the risks. Exciter verification testing is essential for ensuring accurate dynamic simulations. To mitigate risk to the transmission system, the SDT recognizes that it is important to have testing personnel notify the Transmission Operator of scheduled tests, and interact as needed during the testing evolution.. System security must be maintained during the test. As example, system conditions may require the Transmission Operator to cancel planned testing. Also keep in mind verification requirements include alternatives to performing staged tests such as system performance monitoring under ambient conditions; which would be preferable to performing staged tests in some circumstances. Bench testing may be another viable option. A verification expert can evaluate available alternatives and assist with performing a situation specific risk/benefit assessment.</p>		
City of Garland, Garland Power & Light - GOP Registered Entity	Yes	<p>This same approach should be used for question #1. It is the Generator Owner (GO) that has this information and access to the equipment.</p>
<p>Response: Thank you for your comments. The SDT has corrected the noted error. The issue of whether the Generator Owner or Generator Operator is the responsible entity is addressed by Question 1.</p>		
Progress Energy, Inc.	Yes	<p>Since the exciter model and the generator model are components of the closed loop system being verified, the process must ensure that the Transmission Planners dynamic database is updated with the generator data and the excitation system data utilized for verification. Relying on generator data that was originally provided for MOD-012 to be the same data that was used for model verification would not be advisable. There are countless opportunities for generator data submitted for MOD-012 to be inconsistent with generator data used in models in the excitation system verification process. In order to close this loop, we suggest that R3 be slightly modified to read: "The Transmission Planner shall provide the Generator Operator the unit specific data contained in the</p>

Organization	Yes or No	Question 4 Comment
		<p>Transmission Planner's dynamic database from the current in-use excitation system and generator model, including the applicable generator model parameter's MVA base, within 30 calendar days of a request from the Generator Operator." AND R4 Item 2 should have an additional sentence at the end which reads: "This data only has to be provided in those instances where generator model data was changed in order to obtain a verified excitation system model". These language modifications ensure that dynamic databases are populated with the correct data for both the excitation system and generator models that have been verified while minimizing burden on the generation entity responsible for model verification.</p>
<p>Response: Thank you for your comments. The SDT agrees with this recommendation and has incorporated the concept into Requirement R3 (Reference Requirement R1 in the revised standard). However, the SDT did not adopt the recommendation for R4 item 2 (Reference Requirement R2, Part 2.1 in the revised standard). To ensure consistency, it is important that the generator model data is always provided with the exciter model data even if it the data has not changed. The SDT does not believe this is a burdensome requirement given the benefit realized by ensuring necessary data is clearly communicated.</p>		
Ameren	Yes	<p>(1) Generator Operators and Generator Owners should be included in this standard. It is possible that all functions can not be performed by the Generator Operator. Therefore it would be prudent to include the Generator Owners within MOD-026-1.</p> <p>(2) If the generator has not been modified, and the manufacturer's data is available, then there should be no need for retesting of the generator. However, if the generator has been modified since the last data set was established for the generator, (stator or rotor turns shorted, rotor replaced, etc.) then re-testing of the generator would be in order. If the turbine has been replaced, then an updated value for rotational inertia would be needed.</p> <p>(3) The concept of staged tests is troubling as such testing can provide a local challenge to the integrity of the BES. Such testing should be required to be well coordinated with the Transmission Operator.</p> <p>(4) Relying on generator data that was originally provided for MOD-012 to be the same data that was used for model verification would not be advisable. There are countless opportunities for generator data submitted for MOD-012 to be inconsistent with generator data used in models in the excitation system verification process. In order to close this loop, we suggest that R3 be slightly modified to read: "The Transmission Planner shall provide the Generator Operator the unit specific data contained in the Transmission Planner's dynamic database from the current in-use excitation system and generator model, including the applicable generator model parameter's MVA base, within 30 calendar days of a request from the Generator Operator." AND R4 Item 2 should have an additional sentence at the end which reads: "This data only has to be provided in those instances where generator model data was changed in order to obtain a verified excitation system model". These language modifications ensure that dynamic databases are populated with the correct data for both the excitation system and generator models that have been verified while minimizing burden on the generation entity responsible for model verification.</p>

Organization	Yes or No	Question 4 Comment
<p>Response: Thank you for your comments.</p> <p>1) The SDT has corrected the noted error. The issue of whether the Generator Owner or Generator Operator is the responsible entity is addressed by Question 1.</p> <p>2) The SDT agrees that exciter verification will also provide adequate verification of the generator model if test results match simulation results. The SDT also agrees additional effort is required to improve the generator model if results do not match. The SDT has decided that the MOD-026 standard scope is limited to the excitation system because standard development would be delay for SAR development if a generator verification standard is required.</p> <p>3) There is risk associated with performing staged generation tests however, the SDT believes the benefits outweigh the risks. Exciter verification testing is essential for ensuring accurate dynamic simulations. To mitigate risk to the transmission system, the SDT recognizes that it is important to have testing personnel notify the Transmission Operator of scheduled tests, and interact as needed during the testing evolution.. System security must be maintained during the test. As example, system conditions may require the Transmission Operator to cancel planned testing. Also keep in mind verification requirements include alternatives to performing staged tests such as system performance monitoring under ambient conditions; which would be preferable to performing staged tests in some circumstances. Bench testing may be another viable option. A verification expert can evaluate available alternatives and assist with performing a situation specific risk/benefit assessment.</p> <p>4) The SDT agrees with this recommendation and has incorporated the concept into Requirement R3 (Reference Requirement R1 in the revised standard). However, the SDT did not adopt the recommendation for R4 item 2 (Reference Requirement R2, Part 2.1 in the revised standard). To ensure consistency, it is important that the generator model data is always provided with the exciter model data even if it the data has not changed. The SDT does not believe this is a burdensome requirement given the benefit realized by ensuring necessary data is clearly communicated.</p>		
AESO	Yes	The AESO agrees with the SRC ISO/RTO comments.
<p>Response: Thank you for your comment. Please see the response to the comments provided by the SRC ISO/RTO.</p>		
Duke Energy	Yes	<p>Supplying the data itself is appropriate. Industry experience has shown that simply assuring the generator data in the model is the right data for the installed equipment is adequate for assuring the validity of the Generator Parameters, additional testing is not typically needed and any inappropriate data would show up in voltage bump test comparisons needed for AVR models validations. Also, R4.4, should say The GO shall provide the Compensation Function used on the unit (Droop, Reactive Line Drop or Resistive Line Drop) and the amount of compensation provided (% of generator voltage at rated MVA).</p>
<p>Response: Thank you for your comments. The SDT agrees inappropriate generator data would be identified during exciter verification. The SDT has revised Requirement R4.4 as follows:</p> <p>Old Requirement R4.4, “Reactive compensation settings (for example: reactive droop, line drop, differential compensation), if utilized.”</p>		

Organization	Yes or No	Question 4 Comment
New Requirement R2, Part 2.1.5 , “Compensation settings (such as droop, line drop, differential compensation), if used.”		
Northeast Utilities	Yes	The entity specified in Question 4 does not agree with the entity specified in Requirement R4. As stated in our response to Question 1, we believe the Generator Owner is the correct entity to provide the data; not the Generator Operator. We agree with the approach subject to revising the responsible entity.
Response: Thank you for your comments. The SDT has corrected the noted error. The issue of whether the Generator Owner or Generator Operator is the responsible entity is addressed by Question 1.		
Reliant Energy	Yes	But to be I think it should be the GOP not the GO.
Response: Thank you for your comment. The SDT has corrected the noted error. The issue of whether the Generator Owner or Generator Operator is the responsible entity is addressed by Question 1.		
Hydro-Québec TransEnergie (HQT)	Yes	The entity specified in Question 4 does not agree with the entity specified in Requirement R4. As stated in our response to Question 1, we believe the Generator Owner is the correct entity to provide the data; not the Generator Operator. We agree with the approach subject to revising the responsible entity to be the GO.
Response: Thank you for your comments. The SDT has corrected the noted error. The issue of whether the Generator Owner or Generator Operator is the responsible entity is addressed by Question 1.		
Independent Electricity System Operator	Yes	We agree with the approach of requiring the Generator Owner to supply the data listed. We also suggest that since this data is required within 90 calendar days of completion of the excitation system model verification - the same condition for providing documentation demonstrating that the excitation system model’s response matches the recorded response for a voltage excursion at the generator as stipulated in R8 - we suggest R8 be combined with R4. Note that "Generator Owner" instead of "Generator Operator" is used in this question. While we view this as a typo, as indicated in our comment under Q1 we think it is appropriate that the Generator Owners be held responsible for the majority of the requirements in this standard.
Response: Thank you for your comments. The SDT has corrected the noted error. The issue of whether the Generator Owner or Generator Operator is the responsible entity is addressed by Question 1. The SDT agrees with the recommendation to combine Requirement R8 with R4 (reference Requirement R2, Part 2.1 in the revised standard).		

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Organization	Yes or No	Question 4 Comment
American Transmission Company	Yes	It provides confirmation of whether the data being used to model the generator and the generator data used in the verification test are the same.
Response: Thank you for your comment.		
US Bureau of Reclamation	Yes	We agree the Generator Owner should provide the data and also be responsible for performing the model validation/verification.
Response: Thank you for your comment. The SDT has corrected the noted error. The issue of whether the Generator Owner or Generator Operator is the responsible entity is addressed by Question 1.		
Kansas City Power & Light	Yes	
MRO NERC Standards Review Subcommittee	Yes	
Pepco Holdings, Inc (PHI) - Affiliates	Yes	
FEUS	Yes	
Exelon Corporation	Yes	
Constellation Power Generation & Constellation Nuclear	Yes	
E.ON U.S.	Yes	
Wisconsin Public Service	Yes	
AWEA	Yes	
American Wind Energy	Yes	

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Organization	Yes or No	Question 4 Comment
Association		
American Electric Power	Yes	
Arizona Public Service Co.	Yes	
Wisconsin Electric	Yes	
Manitoba Hydro	Yes	
Dynergy	Yes	
Southern California Edison	Yes	
ISO New England Inc.	Yes	
Xcel Energy	Yes	
Brazos Electric Power Cooperative	Yes	
Reliant Energy	Yes	

4.1 Do you believe that the SDT should consider expanding the scope, through a supplementary SAR, to include verification of generator data? If yes, please provide the scope of generation verification the SDT should consider, along with any data that would support the reliability benefits from expansion of the existing scope which could be included in a supplementary SAR.

Summary Consideration:

Most responders indicated that it is generally not necessary to separately verify the generator data in order to verify the excitation control system model. Most responders believed that a separate SAR would be required for a generator model verification standard. As such, the SDT decided not to expand the scope of this standard to include verification of generator model data.

Organization	Yes or No	Question 4.1 Comments and/or Supporting Data
Progress Energy, Inc.	No	To include generator data verification beyond excitation system modeling data is a significant burden to the Generation Owner not supported by the benefits to be gained.
<p>Response: Thank you for your comment. The SDT agrees separate testing is generally not required to develop a generator model. In order for simulation and measured results to match, the generator and excitation control system models must accurately represent the equipment.</p>		
ISO New England Inc.	No	Manufacturer's estimates of generator characteristics appear to be generally accurate and relatively easy to obtain.
<p>Response: Thank you for your comment. The SDT agrees separate testing is generally not required to develop a generator model. In order for simulation and measured results to match, the generator and excitation control system models must accurately represent the equipment.</p>		
Northeast Power Coordinating Council	No	Expanding the scope to include verification of generator data will not provide a significant improvement in the overall modeling of excitation systems.
<p>Response: Thank you for your comment. The SDT agrees that separate verification of generator data is often unnecessary however, the SDT believes that a match between simulation and measured results for the excitation system model is required to indicate that the generator and excitation control system models accurately represent the equipment.</p>		
Dominion	No	MOD-024 and MOD-025 address a generator's real and reactive capability verification and MOD-026 addresses the excitation system verification. It seems desirable to have a MOD standard that address the verification of

Organization	Yes or No	Question 4.1 Comments and/or Supporting Data
		<p>generator data by the Generator Owner (not the Generator Operator). This can be handled by a new SAR since the scope change of the current SAR could delay the process. In scoping the verification of the generator dynamic data:a) If the existing generator dynamic model data is backed by documentation provided by the generator manufacturer or previous test(however old it is), no verification would be required. b) If there is no documentation (from manufacturer or previous test) supporting the existing generator dynamic model data, saturation, inertia & D-axis parameters (time constants and impedances) have to be verified at the minimum. If the measured D-axis parameters show reasonable agreement with the existing generator dynamic data, it is not required to verify the Q-axis parameters; otherwise the Q-axis parameters need to be verified as well.</p>
<p>Response: Thank you for your comments. The SDT has corrected the noted error. The issue of whether the Generator Owner or Generator Operator is the responsible entity is addressed by Question 1. The SDT agrees that concerns regarding generator model verification should not be allowed to delay implementation of the MOD-026 proposed standard. The SDT also agrees that appropriate generator parameters are required to develop an accurate excitation system model. A match between simulation and measured results for the excitation system model is required to indicate that the generator and excitation control system models accurately represent the equipment. Further testing should not be necessary if a match is obtained between simulation and measured results, Further testing may be necessary to verify the parameters listed in your comment if a match is not obtained.</p>		
Kansas City Power & Light	No	<p>There are clearly benefits to having as much verified operational characteristic data as possible, however, as previously noted in response to question #2, the equipment risks associated with obtaining those benefits should be a consideration. Considering an aging generation infrastructure, the risk of obtaining parts for equipment damaged in the pursuit of modeling verification can be extremely costly in extended downtime and the availability of parts is also a concern. Again, it is recommended the SDT consider the removal or modification of requirements involving testing that place an unnecessary risk of generator damage. As an example, allowing vendor simulations or other testing methods by the generator Vendor in a suitable testing environment to suffice for obtaining generator response characteristics.</p>
<p>Response: Thank you for your comments. The SDT believes the testing required to verify the generator and excitation system models imposes minimal risk on equipment, with testing routinely finding maintenance issues that could cause equipment damage if uncorrected. The MOD-026 standard has been designed to allow testing experts to determine appropriate verification methods for the equipment that minimizes risk associated with aged equipment. This includes ambient monitoring which results in no additional risk to the unit beyond normal operation.</p>		
IRC Standards Review Committee	No	<p>This standard should focus on the excitation system only. If the industry sees a need for such verification, the requirements could be added to another MOD standard or a separate standard be created through a separate SAR.</p>
<p>Response: Thank you for your comments. The SDT agrees that if a generator verification standard is necessary, then it should be proposed in a separate SAR in</p>		

Organization	Yes or No	Question 4.1 Comments and/or Supporting Data
order to prevent implementation delays for this standard.		
Exelon Corporation	No	Verification of the generator data will be useful, but needs to be considered at a later date.
Response: Thank you for your comment. The SDT agrees that if a generator verification standard is necessary, then it should be proposed in a separate SAR in order to prevent implementation delays for this standard.		
Constellation Power Generation & Constellation Nuclear	No	Expanding the scope to include verification of generator data will not provide any significant improvement in the modeling of excitation systems.
Response: Thank you for your comment. The SDT agrees separate testing is generally not required to develop a generator model. In order for simulation and measured results to match, the generator and excitation control system models must accurately represent the equipment.		
Southern Company	No	As a general rule the industry has not demonstrated a need to validate OEM supplied generator data.
Response: Thank you for your comment. The SDT agrees that separate validation of Original Equipment Manufacturer supplied generator data is generally not required however, the SDT believes a match between simulation and measured results for the excitation system model is required to indicate that the generator and excitation control system models accurately represent the equipment.		
E.ON U.S.	No	E.ON U.S. believes that entities have no incentive to use inaccurate data when conducting verifications studies. Strict data verification standards are in this instance an unproductive use of resources.
Response: Thank you for your comments. The SDT agrees that entities do not have incentive to use inaccurate data however experience indicates data representing generator and exciter models is often inaccurate, with simulation results predicting stable performance for situations where system performance was unstable. Experience has proven the need for model verification. A match between simulation and measured results for the excitation system model is required to indicate that the generator and excitation control system models accurately represent the equipment.		
Wisconsin Public Service	No	The model generally in use to simulate generator dynamic responses is a hypothetical model based on fictitious parameters. For instance, the direct-axis and quadratural-axis impedances are calculated design values, and not a measurable physical quantity, as are the transient and subtransient time constants. The inertial constant involve the whole rotor and prime-mover assembly, and cannot be easily quantified.
Response: Thank you for your comments. Generator parameters such as inertia are verified by testing, including ambient monitoring. For example, the inertia can be calculated using the dimensions of the rotor and prime mover assembly. A match between simulation and measured results for the excitation system model is required to indicate that the generator and excitation control system models accurately represent the equipment.		

Organization	Yes or No	Question 4.1 Comments and/or Supporting Data
Hydro-Québec TransÉnergie (HQT)	No	Expanding the scope to include verification of generator data will not provide a significant improvement in the overall modeling of excitation systems. However, these data should be provided as part of an existing Standards or from another Standards if not already existing.
<p>Response: Thank you for your comments. The SDT agrees separate verification of generator data is unnecessary however, the SDT believes that when a testing expert verifies the excitation system model data, the generator model data is also verified. A match between simulation and measured results for the excitation system model is required to indicate that the generator and excitation control system models accurately represent the equipment.</p>		
Consumers Energy Company	No	
Southwest Power Pool Generation Working Group	No	
SERC Dynamics Review Subcommittee (DRS)	No	
MRO NERC Standards Review Subcommittee	No	
FirstEnergy	No	
Pepco Holdings, Inc (PHI) - Affiliates	No	
Entergy Fossil Operations	No	
FEUS	No	
Luminant Power	No	
Cowlitz County PUD	No	
City of Garland, Garland Power &	No	

Organization	Yes or No	Question 4.1 Comments and/or Supporting Data
Light - GOP Registered Entity		
AWEA	No	
American Wind Energy Association	No	
Arizona Public Service Co.	No	
Wisconsin Electric	No	
Manitoba Hydro	No	
Dynergy	No	
Reliant Energy	No	
Southern California Edison	No	
Indiana Municipal Power Agency	No	
Reliant Energy	No	
Ameren	No	None
American Electric Power	Yes	Generator parameters are needed to support modeling. Later phases could pick-up unknowns identified by examining discrepancies between actual operation and modeling.
<p>Response: Thank you for your comments. The SDT agrees that appropriate generator parameters are essential for developing an accurate excitation system model. A match between simulation and measured results for the excitation system model is required to indicate that the generator and excitation control system models accurately represent the equipment.</p>		
Northeast Utilities	Yes	Consider model verification for rotational inertia, which can have a significant effect on modelling.

Organization	Yes or No	Question 4.1 Comments and/or Supporting Data
<p>Response: Thank you for your comment. The SDT agrees separate testing is generally not required to develop a generator model even though rotational inertia can have a significant effect. a match between simulation and measured results for the excitation system model is required to indicate that the generator (including the rotational inertia) and excitation control system models accurately represent the equipment.</p>		
AESO	Yes	<p>The exciter is only one component of the generator, testing all components (generator, exciter, PSS and governor/prime mover) is imperative so a complete picture of how the unit will react within the electrical system can be modeled. For the same reason units such as wind facilities and other types of generation that do not have an exciter must be modeled and verified.</p>
<p>Response: Thank you for your comments. A match between simulation and measured results for the excitation system model is required to indicate that the generator and excitation control system models accurately represent the equipment. The SDT agrees that in some circumstances it may not be necessary to perform further testing to establish appropriate models for the generator. The MOD-027 proposed standard will address modeling of the governor/prime mover. Generic models have recently been developed for wind facilities, which the SDT agrees additional work is needed to ensure appropriate models are established for wind facilities, solar facilities, etc. The standard has been modified to include verification requirements for these facilities.</p>		
Duke Energy	Yes	<p>Per the title, this is a standard applicable to the verification of excitation system models and the industry understands this to be different than the generator parameters. Requiring testing to specifically validate that generator data might require more than a bump test, which is currently thought to be adequate to address the issues currently in this standard. The generator reactances and time constants should not need verification as long as there is valid manufacturer supplied data and the generator has not been modified (rotor replacement, etc.) or condition has not degraded, such as the unit has been identified to have shorted rotor turns which would be expected to impact saturation curves and several of the reactance modeled. Additional testing might be appropriate when it is identified that a unit is operating with shorted turns, or if changes are made if a bump test cannot revalidate what is needed (such as a rotor replacement - do you need to verify saturation curves or when you remove a rotating exciter, do you need a load rejection test). NERC should consider establishing and documenting requirements for when model data validation should be re-verified and minimum tests needed for partial unit upgrades (e.g. what testing is required for a rotor replacement). Thus, it would seem a supplementary SAR to include generator parameter validation is needed. NERC should also consider developing a guide that provides input on these issues, especially if the responsibility is assigned to a GO/GOP without the technical background in models and validation. SERC developed a guide on this subject that could be leveraged for a NERC guide.</p>
<p>Response: Thank you for your comments. The SDT agrees separate verification of generator data is unnecessary however, the SDT believes that when a testing expert verifies the excitation system model data, the generator model data is also verified. A match between simulation and measured results for the excitation system model is required to indicate that the generator and excitation control system models accurately represent the equipment. Additional testing may be</p>		

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Organization	Yes or No	Question 4.1 Comments and/or Supporting Data
<p>necessary if new data needs to be added to the generator model. The SDT agrees that the concept of a supplemental SAR should be discussed to ensure identified issues are included when performing unit upgrades.</p>		
<p>NERC Event Analysis & Information Exchange staff</p>	<p>Yes</p>	<p>It seems that having an overall generator testing standard in place on the dynamic parameters listed in MOD-013 would be a prerequisite for an excitation testing standard.</p>
<p>Response: Thank you for your comment. The SDT agrees that an accurate representation of the generator system is essential to obtain a match between simulated and measured results however, the SDT believes that a match between simulation and measured results for the excitation system model is required to indicate that the generator and excitation control system models accurately represent the equipment. If the results do not match, then further testing may be required to develop appropriate generator parameters. To prevent further delays with developing the MOD-026 standard, the SDT will not consider a generator verification standard as part of the exciter verification standard development process.</p>		
<p>Independent Electricity System Operator</p>	<p>Yes</p>	<p>We think that at a minimum, the generator's basic characteristics such as inertia constant, damping coefficient, saturation parameters, and direct and quadrature axes reactances and time constants), voltage regulators, turbine-governor systems, etc. as stipulated in MOD-013 that support modeling for dynamic simulations should be verified. A good excitation system model without a valid generator model will not provide the assurance that the simulation results are valid, which may hurt reliability.</p>
<p>Response: Thank you for your comments. The SDT agrees that appropriate dynamic models are needed for generators, exciters, PSS, and governors. The SDT believes that when testing personnel verify the excitation system model data, they also provide verification of the generator model data. a match between simulation and measured results for the excitation system model is required to indicate that the generator and excitation control system models accurately represent the equipment. The governor model is not verified with the excitation system model since it requires a frequency excursion. Verification of the governor model will be addressed by the MOD-027 standard. Experience indicates verification required by the MOD-026 standard often results in discovery of significant changes to the representation of the generator and exciter, suggesting that model verification provides significant reliability improvement.</p>		
<p>US Bureau of Reclamation</p>	<p>Yes</p>	<p>Yes, we believe other accurate dynamic models (e.g. generator model, governor model) are needed for valid computer simulations and should be required. Existing standards, MOD-012-0 Dynamics Data for Transmission System Modeling and Simulation and MOD-013-0, RRO Dynamics Data Requirements and Reporting Procedures (not FERC approved) already require each reliability region to determine comprehensive dynamics data requirements and Generator Owners to provide such modeling data. If these standards are being performed it is questionable what additional reliability concern is served by draft PRC-026-1.</p>
<p>Response: Thank you for your comments. The SDT agrees that appropriate dynamic models are needed for generators, exciters, PSS, and governors. The SDT believes that verification of the excitation system model data also provides verification of the generator model data. A match between simulation and measured results for the excitation system model is required to indicate that the generator and excitation control system models accurately represent the equipment. The governor model is not verified with the excitation system model since it requires a frequency excursion. Verification of the governor model will be addressed by</p>		

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Organization	Yes or No	Question 4.1 Comments and/or Supporting Data
		<p>the MOD-027 standard. The MOD-026 standard requires verification, while the MOD-012 standard simply requires that the data be provided. Experience indicates verification required by the MOD-026 standard often results in discovery of significant changes to the representation of the generator and exciter, suggesting that model verification provides significant reliability improvement.</p>
Xcel Energy	Yes	
American Transmission Company	Yes	

5. MOD-026 Requirement R8 requires the Generator Operator to provide documentation demonstrating that the provided model’s response matches the recorded response. It does not specify criteria for evaluating the match. Requirement R8 assigns the task of evaluating the match to the Generator Operator. A peer review process for this documentation, detailed in Requirement R10(R1 in the second draft of the standard), gives other involved parties an avenue to provide input and voice any concerns.

Do you agree with the approach of the Generator Operator determining if the match is sufficient and the peer review process?

Summary Consideration:
 The majority of industry agrees with allowing the generator entity to evaluate how accurately the recorded equipment response matches the model predicted response; and with the peer review process. Based on industry feedback received, the Generator Owner (as discussed in Question 1) is the entity responsible for model verification in the second draft of the standard.

Organization	Yes or No	Question 5 Comments
NERC Event Analysis & Information Exchange staff	No	The peer review process in R10 assumes that since the GOP operates the equipment, they are a technical authority on its modeling and behavior. Historically, that has been not necessarily correct, even of the owners of the equipment. Changes to excitation system models should be peer reviewed. However, a dispute resolution process would be needed for disagreements between the owners/operators and the peer team.
<p>Response: Thank you for your comments. The SDT believes that the Generator Owner has the option of either developing in-house expertise, or entering into an agreement with a consultant, or entering into an agreement with its Transmission Planner. The SDT also believes that the Generator Owner, as owner of the model, has resolution authority for any model disagreement with the peer review team.</p>		
Southwest Power Pool Generation Working Group	No	It is understood and agreed that many differing types of units and testing exist. With that thought in mind, it is felt the standard needs to provide some guidelines of how to perform the test and what type of test results are to be reported.
<p>Response: Thank you for your comments. The SDT does not believe it is necessary to provide guidelines on how to perform the test or how to report results given established guidelines and procedures already exist within the industry including several available papers & publications on this issue. It is not practical to provide testing details in the standard that cover all types of excitation control system technologies. If an entity is not familiar with these testing methods and procedures, then the SDT recommends that they should develop in-house expertise (e.g. working with its Transmission Planner) or hire a consultant with expertise</p>		

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Organization	Yes or No	Question 5 Comments
testing generators.		
Northeast Power Coordinating Council	No	As stated in our response to Question 1, we believe that the Generator Owner is the correct entity to provide the data; not the Generator Operator. We agree with the approach subject to revising the responsible entity.
Response: Thank you for your comments. The SDT has assigned model verification responsibility to the Generator Owner in the next posting of the standard.		
Entergy Fossil Operations	No	This should be the Transmission planner's job. The GO or GOP does not use this data or the software or the expertise and may not be aware of disturbances on the system. The TP should compare this data and furnish it to the GO if there is an issue.
Response: Thank you for your comments. The SDT disagrees and believes that since the Generator Owner has physical access to the equipment and operates the equipment, it is the proper entity to be responsible for model testing and verification activities. If an entity is not familiar with these test methods and procedures or does not possess the necessary expertise, then the SDT recommends that the entity develop in-house expertise or hire a consultant who has generator testing expertise.		
IRC Standards Review Committee	No	As the facility owner, the Generator Owners should have the authority to confirm the accuracy of the model, which when supported by documentation, should suffice. A peer review is not necessary, and if "match" must be quantified, the industry may develop a set of criteria based on historical verification test data, and add this to the standard at a later stage.
Response: Thank you for your comments. The SDT agrees with your first comment. The SDT disagrees with the second comment that "peer review is not necessary". The SDT believes peer review is an essential part of the model verification process irrespective of criteria or guidelines available from industry since peer review provides the Transmission Planner an opportunity to review the data and identify problems or errors with information provided.		
FEUS	No	No, This allows for ambiguity in the interpretation of the standard by both the entity and the regulator.
Response: Thank you for your comments. The SDT considered ways to quantify a method for evaluating how well the equipment's measured response matches the model's predicted response. However, since a generally accepted technique or criteria for making this quantitative assessment does not exist, the SDT believes that the peer review process is necessary for ensuring quality. The SDT believes everyone involved in the peer review process has common motivation to develop an accurate excitation control system model.		
Exelon Corporation	No	Exelon feels that the standard should define the acceptance criteria. If the acceptance criteria is left up to the generator owners, then the TOs may have to deal with multiple acceptance criteria within a single region. At the same time, a single generator owner may have to work with multiple TOs, which will lead to inconsistency if the

Organization	Yes or No	Question 5 Comments
		definition of the acceptance criteria is left up to the TO.
<p>Response: Thank you for your comments. The SDT has researched this concern and cannot find uniform guidelines or criteria available to industry for addressing/defining this issue. Therefore, the SDT believes the Generator Owner should use engineering judgment when addressing this issue.</p>		
Consumers Energy Company	No	It is the Transmission Operator and the Transmission Planner's task to determine if the model matches. The Generator Operator is uniquely unsuited to monitor transmission lines and determine if the model works. If the Transmission Planner's model doesn't properly reflect reality, the Transmission Planner should be required to meet with the Generator Operator and discuss the issue. The Generator Operator should then be required to re-verify the data in question.
<p>Response: Thank you for your comments. The SDT disagrees with the first comment that the Transmission Operator and Transmission Planner should be responsible for determining if the model is accurate. The SDT believes that since the Generator Owner owns and has physical access to the equipment, it is the proper entity to be responsible for model testing and verification activities. If an entity is not familiar with these test methods and procedures or does not possess the necessary expertise, then the SDT recommends that the entity develop in-house expertise or hire a consultant who has generator testing expertise. Regarding the second part of the comment, reference Requirement R2 in the revised standard concerning "model matching" and "verification".</p>		
City of Garland, Garland Power & Light - GOP Registered Entity	No	This should be the role of the Generator Owner (GO) - the GO has the data, the GO has the equipment, and the GO can schedule any required operational testing through the GOP.
<p>Response: Thank you for your comments. The SDT agrees and has assigned this responsibility to the Generator Owner in the second draft of the standard.</p>		
American Electric Power	No	AEP does not agree that the Generator Operator should not be responsible to provide documentation that the system model matches the recorded response. That responsibility should lie with the Generator Owner to review and decide how to have that analysis performed and to what extent documentation will be prepared to provide the required verification.
<p>Response: Thank you for your comments. The SDT agrees and has assigned this responsibility to the Generator Owner in the second draft of the standard.</p>		
Wisconsin Electric	No	The requirements in R8 and R9 are not clear to us. The term "recorded response" needs to be defined, and the term "voltage excursion" needs to be quantified. These requirements infer that the GOP already has some documentation of what a "correct" response looks like, which is not the case. The requirement to validate the exciter model by monitoring its response to a real or staged event is not a simple matter. For a staged event such as switching a line, the TO or TOP will need to be actively involved in the process, and should have some responsibility assigned to it in the standard. Likewise, if an ambient switching event is used to validate the model,

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Organization	Yes or No	Question 5 Comments
		<p>the TO/TOP would be the only entities in a position to know about it, since such operations may not be known by the GOP. In summary, this validation depends on shared responsibilities among the entities, and the requirements in this standard should properly reflect this.</p>
<p>Response: Thank you for your comments. The difference between Requirements R8 and R9 is that Requirement R9 requires the Generator Owner to make the documentation of predicted versus recorded response developed in R8 available to interested parties upon request. In the revised standard (reference Requirement R2 in the revised standard).</p> <p>The SDT believes that “recorded response” and “voltage excursions” are understood industry terms and there is not a need for further clarification of these terms. The SDT agrees that in order to validate the model using “staged testing” or “ambient monitoring”, close coordination will be required between the Generator Owner and the TO/TP. Since the “Generator Owner” is the owner of this process, the Generator Owner has ultimate responsibility for testing and verifying the model. The SDT believes it is not practical to include a new requirement in the standard addressing shared model verification responsibilities.</p> <p>Also note that an “open circuit step in voltage” test is the most likely staged test that will be performed. This is a common test performed on a unit while it is at rated speed and voltage but not synchronized to the transmission system; and not a “staged test” by performing some sort of transmission system switching.</p>		
Dynergy	No	See response to Item #1.
<p>Response: Thank you for your comment. Please refer to the response provided to Dynergy’s comment in Question 1.</p>		
Northeast Utilities	No	As stated in our response to Question 1, we believe that the Generator Owner is the correct entity to provide the data; not the Generator Operator. We agree with the approach subject to revising the responsible entity. Agree that peer review by TP/PC is important for verifying the match.
<p>Response: Thank you for your comments. The SDT agrees and has assigned this responsibility to the Generator Owner in the second draft of the standard.</p>		
Reliant Energy	No	It should be the TP working with the GOP.
<p>Response: Thank you for your comment. Requirements in the second draft of the standard define collaboration and peer review process language requiring the Transmission Planner to work with the generation entity.</p>		
ISO New England Inc.	No	The generator should provide the data to Reliability Coordinators, Transmission Operators and Planning Coordinators for verification. Generator Owners should provide factory models for excitation systems to Reliability Coordinators, Transmission Operators and Planning Coordinators and these models should be verified with the field data.

Organization	Yes or No	Question 5 Comments
<p>Response: Thank you for your comments. The SDT does not understand the intent of this comment. If the comment questions who should perform model verification process tasks, the SDT believes that the Generator Owner is the appropriate entity to verify the model. Please refer to Question 1 for additional explanation.</p>		
Ameren	No	<p>(1) Generator Operators and Generator Owners should be included in this standard. It is possible that all functions can not be performed by the Generator Operator. Therefore it would be prudent to include the Generator Owners within MOD-026-1. The Generator Operator or Generator Owner should verify the model but should not be responsible for the model.(2) No issues with peer-to peer review, as this would help drive what are necessary and sufficient conditions for matching the responses.(3) The functional model entity responsible for the model's verification has to be given the responsibility of demonstrating that the provided model's response matches the recorded response. The "goodness of fit" between the model response and the equipment response should be left to the generator owner but subject to Transmission Planner review ref. R10.</p>
<p>Response: Thank you for your comments. Regarding Comment #1: Based on the majority of industry comments and guidance from the FMWG, the second draft of the standard assigns responsibility to the Generator Owner. As mandated by Reliability Standard process, only one entity is assigned responsibility for excitation system model verification. Generator Owners have access to the equipment, along with access to the equipment's Original Equipment Manufacturer for assistance with technical issues. Historically, the Transmission Planner and Generator Owner entities used to work for the same company, but in today's functional model environment, Transmission Planners could easily work for a different company than the generation entity. As such, the stated access advantages for the generation entity do not transfer to the Transmission Planner.</p> <p>The SDT agrees with comments #2 and #3 provided.</p>		
AESO	No	The AESO agrees with the SRC ISO/RTO comments.
<p>Response: Thank you for your comment. Please reference responses to SRC ISO/RTO comments.</p>		
Hydro-Québec TransEnergie (HQT)	No	As stated in our response to Question 1, we believe that the Generator Owner is the correct entity to provide the data; not the Generator Operator. We agree with the approach subject to revising the responsible entity.
<p>Response: Thank you for your comments. For the reasons stated in response to your comment in Question 1, the Generator Owner has been assigned responsibility for model verification in the second draft of the standard.</p>		
Independent Electricity System	No	We have difficulty with the concept since the GOP's determination of a "match" can be subjective and subsequent peer review is time consuming and unnecessary if some matching criteria is developed up front. While we are not

Organization	Yes or No	Question 5 Comments
Operator		<p>in a position to suggest what that criteria should be, we tend to think that a certain percentage of deviation in some output parameters may serve to provide this measure. Also, as indicated under Q4, we suggest R8 be combined with R4. It may be a moot point if some criteria are developed but if not, there are inconsistencies among R4, R8, R9 and R10 on the recipients of the documentation that the Generator Operator must provide and the feedback to be received. We suggest the SDT review the list of recipients, and if peer review is still required then the recipients/commenters should include Transmission Planners, Planning Coordinators, Transmission Operators and Reliability Coordinators since they all are users of the data and model.</p>
<p>Response: Thank you for your comments. The SDT has researched this concern and cannot find uniform guidelines or criteria available to industry for addressing/defining this issue. Therefore, the SDT believes the Generator Owner should use engineering judgment when addressing this issue. The SDT agrees with the recommendation to combine Requirement R8 with R4 (reference Requirement R2, Part 2.1 in the revised standard). The SDT will strive to ensure the proper functional model entities are included in the peer review process.</p>		
Brazos Electric Power Cooperative	No	The Generator Owner should be responsible.
<p>Response: Thank you for your comment. The SDT agrees and has assigned this responsibility to the Generator Owner in the second draft of the standard.</p>		
US Bureau of Reclamation	No	<p>Again we think the Generator Owner should be the responsible entity. This standard applies to only two entities, the Generator entity and the Transmission Planner; however actions by other entities, Reliability Coordinator and Transmission Operator, are required to accomplish the goals of the standard. The exact requirements of these entities should be described in the Standard.</p>
<p>Response: Thank you for your comments. The SDT has assigned responsibility of model verification to the Generator Owner in the second draft of the standard. Also, potential interactions with the Reliability Coordinator and the Transmission Planner are also specified in the draft standard.</p>		
Reliant Energy	No	<p>Peer review works well when performed by reasonable professional with the right motives. The only disagreement is that the Transmission Planner can arbitrarily reject the model and data without assuming any responsibility for the corrections or the cost.</p>
<p>Response: Thank you for your comments. The SDT believes that in a professional environment the peer review process will function properly given it is in the best interest of the Transmission Planner to resolve model issues with the Generator Owner in an expedient manner.</p>		

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Organization	Yes or No	Question 5 Comments
Constellation Power Generation & Constellation Nuclear	No	
SERC Dynamics Review Subcommittee (DRS)	Yes	The entity responsible for the model's verification has to be given the responsibility of demonstrating that the model's response matches the recorded response. The "goodness of fit" between the model response and the recorded response should be left to the generator owner but subject to Transmission Planner review ref. R10.
Response: Thank you for your comments. The SDT agrees with your comments.		
FirstEnergy	Yes	<ol style="list-style-type: none"> 1. For many GOP's, a testing contractor with experience in model fitting and selection will need be hired to do the verification. 2. The team may want to add an additional requirement for the Transmission Planner to review and confirm acceptability of the Generator Operator's excitation system model verification documentation within 90 days of submittal. This would precede the R10 requirement.
Response: Thank you for your comments. Regarding comment #1. If an entity is not familiar with these test methods and procedures or does not possess the necessary expertise, then the SDT recommends that the entity develop in-house expertise or hire a consultant who has generator testing expertise. Regarding comment #2. The SDT agrees. Reference Requirement R6.		
Manitoba Hydro	Yes	This should be done in consultation with planning/operating studies groups, since invariably these groups possess the necessary expertise and are in a better position to adjust/modify the model.
Response: Thank you for your comments. The SDT notes that existing arrangements or new arrangements for model verification can be established by the Generator Owner. However, even if the Generator Owner obtains assistance from its Transmission Planner or another entity (such as a consultant) for any step of the model verification process, the Generator Owner maintains responsibility for model verification as specified in the draft standard. It should also be noted that while the Transmission Planner may have expertise running the dynamic stability software, most Transmission Planners do not possess expertise with reviewing generator model dynamic data and modifying the model.		
Progress Energy, Inc.	Yes	The functional model entity responsible for the model's verification has to be given the responsibility of demonstrating that the provided model's response matches the recorded response. The "goodness of fit" between the model response and the equipment response should be left to the generator owner but subject to Transmission Planner review ref. R10.
Response: Thank you for your comments. The SDT agrees with your comments.		

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Organization	Yes or No	Question 5 Comments
Duke Energy	Yes	We agree the standard should not set criteria for evaluating the match, but industry guidance on acceptable criteria would be helpful.
<p>Response: Thank you for your comment. Since a generally accepted technique or criteria for making this quantitative assessment does not exist, the SDT believes that the peer review process is necessary for ensuring quality. The SDT believes everyone involved in the peer review process has common motivation to develop an accurate excitation control system model. Therefore the SDT does not recommend establishing quantitative criteria for evaluating the match.</p>		
Dominion	Yes	
Kansas City Power & Light	Yes	
MRO NERC Standards Review Subcommittee	Yes	
Pepco Holdings, Inc (PHI) – Affiliates	Yes	
Luminant Power	Yes	
Southern Company	Yes	
Cowlitz County PUD	Yes	
E.ON U.S.	Yes	
Wisconsin Public Service	Yes	
AWEA	Yes	
American Wind Energy Association	Yes	
Arizona Public Service Co.	Yes	

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Organization	Yes or No	Question 5 Comments
Southern California Edison	Yes	
Indiana Municipal Power Agency	Yes	
CenterPoint Energy	Yes	
Xcel Energy	Yes	
American Transmission Company	Yes	

6. The team purposely provided minimal specificity regarding the mechanics of performing excitation system verification and the development of the documentation showing that the provided model response matches the recorded response. The team felt it was impractical to provide verification details in a mandatory Reliability Standard that needs to be applicable to all of the existing and future technologies.

Do you agree with this approach? If no, please elaborate on the additional specificity that you feel is appropriate with specific examples and/or proposed Reliability Standard language.

Summary Consideration:

The majority of industry responders agree only minimal verification details should be provided in the standard. Industry response indicates additional modification to the second posting of the standard is not required for this comment.

Organization	Yes or No	Question 6 Comments
Southwest Power Pool Generation Working Group	No	It is understood and agreed that many differing types of units and testing exist. With that thought in mind, it is felt the standard needs to provide some guidelines on how to perform the test and what type of test results are to be reported.
Response: Thank you for your comments. The majority of industry agrees with the SDT that it is impractical to provide sufficient technical details that would apply to all types of technology.		
Entergy Fossil Operations	No	I do agree with not making the standard too large, but somewhere the GVS DT needs to provide this detailed data or training to the GO/GOP. You are requiring them to provide things that they do not have expertise in and this will lead to problems with getting this done correctly and for a reasonable price. I'm sure the contractors that do with work see a big opportunity to make money on this.
Response: Thank you for your comments. The majority of industry agrees with the SDT that minimal technical specificity is appropriate for this standard.		
FEUS	No	This leaves ambiguity in the standard that can be to misinterpretation by the entity or the agency. Some guidelines should be provided for standardization to avoid confusion.
Response: Thank you for your comments. The SDT believes it is impractical to add sufficient technical details that would apply to all types of technology, that doing so would be counter-productive and cumbersome, and that it is best to let the technical experts determine this information.		

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Organization	Yes or No	Question 6 Comments
E.ON U.S.	No	While E.ON U.S. appreciates that the concern over requirements applicable to both existing and future technologies, the lack of any specific guidance on process and verification methodologies invites differing interpretations of the standard. This lack of specificity makes compliance problematic.
<p>Response: Thank you for your comments. The SDT believes that the majority of industry agrees that if the equipment recorded response matches the models predicted response, verification of the model has been achieved. Also, the draft standard includes a peer review process intended to ensure verification process quality. The SDT has made substantial effort to ensure the Requirements can be clearly evaluated from a compliance perspective.</p>		
ISO New England Inc.	No	This may lead to "weak" submittals from certain entities.
<p>Response: Thank you for your comments. The SDT believes the interactions and checks listed in the Requirements of the draft standard along with the peer review process will mitigate model verification quality concerns.</p>		
American Transmission Company	No	Standard testing procedures should be provided as a minimum with the caveat "that the testing procedures include but are not limited to these procedures" to cover future technologies. An example would be a step response test for the exciter; swept frequency (0.1 to 10 Hz) response test for a PSS.
<p>Response: Thank you for your comments. The majority of industry responses indicate the technical details should be left to the experts performing testing and model verification.</p>		
Northeast Power Coordinating Council	Yes	Reliability Standards should focus on what is required and not how to meet the requirement. Further, it would be impractical to specify verification details universally applicable to all situations. The peer review process provides appropriate safeguards to ensure that appropriate methods are used for verification.
<p>Response: The SDT thanks you for your comment.</p>		
SERC Dynamics Review Subcommittee (DRS)	Yes	We agree with the SDT approach of not writing this standard like a technology specific procedural manual. The development of verification Requirements stating "what is required" and leaving the technical details up to the personnel performing the verification will result in improved dynamic models while affording sufficient technical latitude.
<p>Response: The SDT thanks you for your comment.</p>		
FirstEnergy	Yes	While we agree with the approach of staying away from being too prescriptive, it may add guidance if the term

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Organization	Yes or No	Question 6 Comments
		"verify" (i.e. in R1) was clarified. We ask the team to consider adding "such as operational tracking or testing" after verify.
<p>Response: Thank you for your comments. Language of Requirement R8 has been added to the list of items required for model verification (reference Requirement R2, Part 2.1). This includes a reference that either a test or ambient monitoring is an acceptable alternative to capture the actual response of the equipment.</p>		
Consumers Energy Company	Yes	Providing minimal specificity allows many approaches to meet the requirements. This accommodates the many present and future excitation technologies and monitoring techniques.
<p>Response: The SDT appreciates your response.</p>		
Wisconsin Public Service	Yes	I agree with the methodology of the SDT to leave the test methods required under R4 out of the standard. It is a good philosophy to not limit future advancements in testing because the standard specifically calls for a step voltage test or UEL / OEL bumps. I think the SDT should consider this methodology in future drafts as applicable.
<p>Response: The SDT appreciates your response.</p>		
American Electric Power	Yes	We are agreeable since there are different kinds of excitation systems.
<p>Response: The SDT appreciates your response.</p>		
Progress Energy, Inc.	Yes	We agree with the SDT approach of not developing this standard like a technology specific procedural manual. The development of verification Requirements stating "what is required" and leaving the technical details up to the personnel performing the verification will result in improved dynamic models while affording sufficient technical latitude.
<p>Response: The SDT appreciates your response.</p>		
Reliant Energy	Yes	I suggest that the SDT consider a white paper expounding how the verification can be performed.
<p>Response: Thank you for your comments. The SDT believes that there are many technical references available which document verification processes that have been successfully utilized. Please refer to the References section of the draft standard.</p>		

Organization	Yes or No	Question 6 Comments
Ameren	Yes	We agree with the SDT approach of not developing this standard like a technology specific procedural manual. The development of verification Requirements stating "what is required" and leaving the technical details up to the personnel performing the verification will result in improved dynamic models while affording sufficient technical latitude.
Response: The SDT appreciates your response.		
AESO	Yes	The AESO agrees with the SRC ISO/RTO.
Response: Thank you for your comment. Please see the response to the SRC ISO/RTO comment referenced.		
Duke Energy	Yes	We agree, but industry guidance on acceptable criteria would be helpful.
Response: Thank you for your comment. See the SDT response to this same issue under Question 6.		
Hydro-Québec TransEnergie (HQT)	Yes	Reliability Standards should focus on what is required and not how to meet the requirement. Further, it would be impractical to specify verification details universally applicable to all situations. The peer review process provides appropriate safeguards to ensure that appropriate methods are used for verification. As an alternative, a technical white paper could be developed for reference.
Response: Thank you for your comments. The SDT did not develop a white paper because many excellent subject matter references already exist. Please refer to the Reference section of the draft standard.		
Independent Electricity System Operator	Yes	The SAR could be expanded by making it more clear that it applied not only to the excitation systems on conventional synchronous generation units but also to the equipment that performs this role on non-conventional facilities such as wind-farm voltage management systems.
Response: Thank you for your comments. The Applicability section MVA thresholds provided in the first posting of the MOD-026 standard omitted wind powered units because wind unit are not rated greater than 20 MVA. There is an increasing number of wind farms with significantly larger aggregate MVA and as such, their impact on the reliability of the Bulk Electric System cannot be ignored; otherwise a reliability gap would exist. The SDT discussed the possibility of requiring verification of dynamic models that represent the aggregate of numerous small units and any necessary auxiliary equipment required of the technology. This could include plant dynamic voltage control and reactive support of all the units and auxiliary equipment (such as individual WTG response, plant-wide volt/var controller response, and response from separate volt/var regulation devices contained in the plant such as SVC/STATCOM/Synchronous Condenser) contained in any technology generation plant, including a wind farm (plant), that exceeds the appropriate aggregate nameplate MVA threshold. There are dynamic models that adequately replicate wind unit performance for some wind units today however, there are many existing wind units for which there are not publicly available models		

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Organization	Yes or No	Question 6 Comments
<p>supplied by the Original Equipment Manufacturer. Generic wind models (i.e., type I, II, III and IV) are in various stages of development. Also, there are ongoing efforts involving Regional Entities and manufactures to close any large gaps that may exist in current generic models. Given the timeframe expected to lapse while awaiting standard approval by FERC, it is expected that generic wind farm (plant) models will sufficiently mature for establishing boundary conditions in Bulk System Studies. To mitigate this reliability gap, the Applicability section will be expanded in the second posting of the standard to include a significant MVA percentage of generation regardless of technology.</p>		
NERC Event Analysis & Information Exchange staff	Yes	
Dominion	Yes	
Kansas City Power & Light	Yes	
MRO NERC Standards Review Subcommittee	Yes	
Pepco Holdings, Inc (PHI) - Affiliates	Yes	
IRC Standards Review Committee	Yes	
Luminant Power	Yes	
Exelon Corporation	Yes	
Constellation Power Generation & Constellation Nuclear	Yes	
Southern Company	Yes	
Cowlitz County PUD	Yes	
City of Garland, Garland Power & Light - GOP Registered Entity	Yes	

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Organization	Yes or No	Question 6 Comments
AWEA	Yes	
American Wind Energy Association	Yes	
Arizona Public Service Co.	Yes	
Wisconsin Electric	Yes	
Manitoba Hydro	Yes	
Dynergy	Yes	
Northeast Utilities	Yes	
Southern California Edison	Yes	
Indiana Municipal Power Agency	Yes	
CenterPoint Energy	Yes	
Xcel Energy	Yes	
Brazos Electric Power Cooperative	Yes	
US Bureau of Reclamation	Yes	
Reliant Energy	Yes	

7. The SDT believes that this standard should not be applicable to low capacity factor units. The SDT recognized that the excitation system models and model data are already collected through the processes identified in MOD-012 and MOD-013. These models and data should, with few exceptions, already accurately replicate actual equipment performance. By definition, low capacity factor units are expected to rarely be on-line, and even when they are, they would constitute a small portion of the interconnected MVA. As such, the SDT is of the opinion that verified excitation models for these units would not result in a substantial increase in Bulk Electric System reliability. Do you agree with this approach and the proposed 5% capacity factor?

Summary Consideration:

The majority of industry responders supported the 5% capacity factor criteria. In response to Industry comments for Question 9, the SDT has revised the standard to include a new Requirement that allows Planning Coordinators to specify, with technical justification, additional units to provide corrected model data or verify their excitation control system models. The SDT believes that this new Requirement will address the concerns expressed by several Industry responders.

Organization	Yes or No	Question 7 Comments and/or Supporting Data for Not Agreeing with a Capacity Factor Exemption:	Question 7 Supporting Data for the Proposed 5% Capacity Factor:
NERC Event Analysis & Information Exchange staff	No (disagree with approach)	Units with a low capacity factor may well still be frequently needed, albeit for short but crucial periods, to support the system during peak load. Further, they may often be used in shoulder periods when primary resources are out on maintenance.	
<p>Response: Thank you for your comments. The reason for choosing a 5% capacity factor as a threshold for exemption in conjunction with the proposed MVA-based exemption is by SDT collective experience. The increase in excitation control system model verification is expected to result in improved accuracy of stability based security assessments. The SDT does not believe un-verified data is necessarily inaccurate or that the overall stability of the system is sensitive to that data. The excitation information from the generating units with a 5% capacity factor or less, as provided per standards MOD-012 and MOD-013, is included in the models used to analyze the system under various conditions. Even if these low capacity factor generating units are verified, the accuracy of the simulation is not guaranteed because there are other significant assumptions involved in simulation results, such as load models. As such, the verified models do not provide absolute accuracy under operating conditions other than those conditions for which verification is performed.</p> <p>Additionally, the SDT has revised the draft standard to allow the Planning Coordinator to identify, through a process demonstrating technical justification, additional generating units that are critical for reliability beyond the applicability criteria established by section 4.2.</p>			

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Organization	Yes or No	Question 7 Comments and/or Supporting Data for Not Agreeing with a Capacity Factor Exemption:	Question 7 Supporting Data for the Proposed 5% Capacity Factor:
IRC Standards Review Committee	No (disagree with approach)	<p>a. The Term Capacity Factor is capitalized but this term is not defined. Suggest to use lower case, or define it.b. Capacity factor reflects a generating unit's real power generation frequency and duration, but does not provide the assurance that when the generator is on line, it's excitation system has been verified such that its model is accurately represented in simulations. There are also sizable "mothballed" units that, due to various reasons, were put off line for a long period but return to service when the need for capacity so dictates. Not having their data verified based on a low capacity factor and on the assumption that they constitute a small portion of the interconnection MVA may leave room for unreliability. Moreover, having to track a unit's capacity factor for the past 5 years to determine the need for verification is an unnecessary administrative burden.</p>	
<p>Response: Thank you for your comments. The reason for choosing a 5% capacity factor as a threshold for exemption in conjunction with the proposed MVA-based exemption is by SDT collective experience. The increase in excitation control system model verification is expected to result in improved accuracy of stability based security assessments. The SDT does not believe un-verified data is necessarily inaccurate or that the overall stability of the system is sensitive to that data. The excitation information from the generating units with a 5% capacity factor or less, as provided per standards MOD-012 and MOD-013, is included in the models used to analyze the system under various conditions. Even if these low capacity factor generating units are verified, the accuracy of the simulation is not guaranteed because there are other significant assumptions involved in simulation results, such as load models. As such, the verified models do not provide absolute accuracy under operating conditions other than those conditions for which verification is performed.</p> <p>Additionally, the SDT has revised the draft standard to allow the Planning Coordinator to identify, through a process demonstrating technical justification, additional generating units that are critical for reliability beyond the applicability criteria established by section 4.2.</p>			
SERC Dynamics Review Subcommittee (DRS)	No (disagree with approach)	<p>The 5% capacity factor is an inappropriate basis for an exemption criteria since it would allow significant blocks of generation (i.e. plants of several hundred MW) to be exempt. Units in this class of generation may have a significant impact on the stability of nearby generating units or may have stability issues that need to be understood via valid studies. Examples would be plants with multiple combustion turbine units (particularly simple cycle oil burners) that are rarely generating. However, when they are generating (i.e. during peak system</p>	<p>Based on the above discussion, the 5% capacity factor exemption should only be allowed when it would significantly impact the results of stability studies. Allowing the Transmission Planner to make this judgement is most appropriate since A) this entity is in the best position to make the determination of the impact on stability and B) this entity is responsible (via TPL standards) for ensuring the stability of the grid and connected</p>

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Organization	Yes or No	Question 7 Comments and/or Supporting Data for Not Agreeing with a Capacity Factor Exemption:	Question 7 Supporting Data for the Proposed 5% Capacity Factor:
		<p>load times), the grid may be already be stressed and operating with a reduced stability margin. The possibility also exists that while the exempted generation may have a historical capacity factor of less than 5%, this could quickly change due to unanticipated system conditions or the extended unavailability of other generation (due to severe damage for example). Therefore, the subject generating units could generate for a significant length of time without the benefit of having been properly analyzed by the Transmission Planning organization. The average over the last three calendar years methodology further contributes to this possibility, introducing a time lag in the process.</p>	<p>generating units. In lieu of the blanket 5% exemption, the following is proposed. 1. Delete and with an average Capacity Factor of greater than 5% over the last three calendar years in all places in 4.1.1.1, 4.1.1.2 and 4.1.1.32. Add a new section under Applicability 4.1.1.4 stating ?Generating facilities with capacity factors less than 5% over the last three calendar years may be exempted with written concurrence from the applicable Transmission Planning Authority. The written concurrence provided by the Transmission Planning Authority shall include the basis for any such exemptions. alternative to (2.) could be the reponse to Q9 below.</p>
<p>Response: Thank you for your comments. Each registered generating unit reports excitation control system model information per standards MOD-012-1 and MOD-013-1, which means the unit excitation control system model is provided to the Transmission Planners. Because of the requirements in standards MOD-012 and MOD-013, the SDT believes that units with excitation control system models that have not been verified do not necessarily lead to inaccurate results or that the overall stability of the system is sensitive to “unverified” data. The validity of simulation results depends upon many assumptions such as load and other system models. At the end of every 10 year periodicity window, if a generating unit exceeds the 5% capacity factor, it must be tested within the next year if the unit has not been tested within the previous 10 year period. This testing timeframe is similar to the effective date timeframe specified in the standard.</p> <p>Additionally, the SDT has revised the draft standard to allow the Planning Coordinator to identify, through a process demonstrating technical justification, additional generating units that are critical for reliability beyond the applicability criteria established by section 4.2. The SDT believes that defining a process where additional units could be identified for verification was a reasonable approach as opposed to defining a process where units with low capacity factor must apply for an exemption.</p>			
Consumers Energy Company	No (disagree with approach)	<p>We disagree with the approach. Some systems have very large peaking units which arguably are more likely to be in service on days when the BES would be challenged. Thus, modeling data should be collected for these units and model cases run including these data. Additionally, the requirement should only apply to peaking units which meet the applicability criteria (i.e. Capacity factor greater than 5% for the last 3 years and greater than the MVA indicated in 4.0)</p>	
<p>Response: Thank you for your comments. Each registered generating unit reports excitation model information per standards MOD-012 and MOD-013 and thus will be</p>			

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Organization	Yes or No	Question 7 Comments and/or Supporting Data for Not Agreeing with a Capacity Factor Exemption:	Question 7 Supporting Data for the Proposed 5% Capacity Factor:
<p>included in stability assessments performed with the model information included in the dynamics database. Also, modeling excitation control systems is most important for stability assessments, for which the most limiting scenario is almost always off peak conditions. Additionally, for the case where large units are exempt by size, interconnection voltage, or capacity factor, the SDT is proposing a new requirement that allows the Transmission Planner or the Planning Coordinator to identify additional generating units beyond the criteria established by section 4.2 that are needed for reliability.</p>			
Wisconsin Public Service	No (disagree with approach)	Threshold should be set around 20% to remove the requirements from those operators that may have a large fleet of small CT's that operate only in minimal peakng mode, but would qualify under the multiple units on the same site provision. These units have minimal impact on the dynamic model.	
<p>Response: Thank you for your comments. The SDT believes that the 5% Capacity Factor threshold functions to establish a balance between verifying modeling information for units that play an important role in the reliability of the BES and units that report information which is not verified because they are seldom online and have a relatively diminished reliability role. Also, note that the draft standard MOD-026 – Attachment 1 “Excitation Control System Model Verification Periodicity” provides conditions where the verification of one unit’s excitation control system model verification will satisfy multiple units.</p>			
American Electric Power	No (disagree with approach)	Seldom run units could end up being run at peak times in areas that may be stability limited. Applicability should be driven by need for verification which historically, has been tied to stability performance and constraints.	
<p>Response: Thank you for your comments. The SDT has revised the draft standard to allow the Planning Coordinator to identify, through a process demonstrating technical justification, additional generating units that are critical for reliability beyond the applicability criteria established by section 4.2.</p>			
Progress Energy, Inc.	No (disagree with approach)	The 5% capacity factor is an inappropriate basis for an exemption since it would allow significant blocks of generation (i.e. plants of several hundred MW) to be exempt. Such amounts of generation may have a significant impact on the stability of nearby generating units or such units may themselves have stability issues that need to be understood via valid studies. Examples would be plants with multiple combustion turbine units (particularly simple cycle oil burners) that are rarely run. However, when they are run (i.e. during peak system load times), the grid may be already be stressed and operating with reduced stability margin. The possibility also exists that while the exempted generation may have a capacity factor of less than	

Organization	Yes or No	Question 7 Comments and/or Supporting Data for Not Agreeing with a Capacity Factor Exemption:	Question 7 Supporting Data for the Proposed 5% Capacity Factor:
		<p>5%, this could quickly change due to unanticipated system conditions or the extended unavailability of other generation (due to severe damage for example). Therefore, the subject generating units could end up being run for a significant length of time without the benefit of having been properly analyzed by the Transmission Planning organization. The average over the last three calendar years methodology further contributes to this possibility, introducing a time lag in the process. Based on the above discussion, the 5% capacity factor exemption should only be allowed when it would not be expected to significantly impact the results of stability studies. Allowing the Transmission Planner to make this judgement is most appropriate since A) that organization is in the best position to make the determination of the impact on stability and B) that organization is responsible (via TPL standards) for ensuring the stability of the grid and connected generating units. In lieu of the blanket 5% exemption, the following is proposed. 1. Delete and with an average Capacity Factor of greater than 5% over the last three calendar years in all places in 4.1.1.1, 4.1.1.2 and 4.1.1.3. Add new Applicability 4.1.1.4 stating Generating facilities with capacity factors less than 5% over the last three calendar years may be exempted with written concurrence from the applicable Transmission Planning Authority. The written concurrence provided by the Transmission Planning Authority shall include the basis for any such exemptions. alternative to (2.) could be the response to Q9 below.</p>	
<p>Response: Thank you for your comments. The reason for choosing a 5% capacity factor threshold for exemption is similar to those for MVA-based exemption. This is to strike a balance between the costs and benefits. Because the excitation data of a unit has not been verified does not imply that the data is necessarily inaccurate or that the overall stability of the system is sensitive to that data. While the scenario contemplated in the comment is realistic, the SDT does not believe that the reliability of an entire interconnection will be significantly impacted by these isolated incidences. The validity of simulation results depends upon many assumptions, such as load and other system models. Even if all excitation system models were based on testing it would not guarantee absolute accuracy. Based upon the majority of responses received from the industry the SDT believes that the 5% exemption threshold is appropriate.</p> <p>Additionally, the SDT has revised the draft standard to allow the Planning Coordinator to identify, through a process demonstrating technical justification, additional generating units that are critical for reliability beyond the applicability criteria established by section 4.2. The SDT believes felt that defining a process where additional</p>			

Organization	Yes or No	Question 7 Comments and/or Supporting Data for Not Agreeing with a Capacity Factor Exemption:	Question 7 Supporting Data for the Proposed 5% Capacity Factor:
units could be identified for verification was a reasonable approach as opposed to defining a process where units with low capacity factor must apply for an exemption			
Independent Electricity System Operator	No (disagree with approach)	<p>a. The Term Capacity Factor is capitalized but this term is not defined. Suggest to use lower case, or define it.b. Capacity factor reflects a generating unit's real power generation frequency and duration, but does not provide the assurance that when the generator is on line, it's excitation system has been modeled accurately such that its expected performance matches simulation results. There are generating units that are often on line but do not generate at high capacity since they provide ancillary services including operating reserve and hence tend to have a low capacity factor. There are also sizable "mothballed" units or the entire plant of multiple sizable units that, due to various reasons, were put off line for a long period but return to service when the need for capacity so dictates. Not having their data verified based on a low capacity factor and on the assumption that they constitute a small portion of the interconnection MVA may leave room for unreliability. Further, low capacity factor is a historical value which may not be a good indicator of the future. If and when these low-capacity generators are put to high capacity usage, and particularly when the system is being stressed, the non-verified excitation systems can give rise to unpredictable system performance. Moreover, having to track a unit's capacity factor for the past 5 years to determine the need for verification is an unnecessary administrative burden.</p>	
<p>Response: Thank you for your comments. The term "capacity factor" is written lower case in the second draft of the standard. Units with a 5% or less capacity factor average over the last three years have relatively small likelihood of impacting the reliability of the BES. If the three-year average capacity factor of these units increases above 5%, then the unit will be required to have its excitation information verified. Generally, the tracking of a unit's capacity factor is performed yearly by the Generator Owner due to reporting requirements for environmental regulations which means this information is generally already calculated and available.</p> <p>Additionally, the SDT has revised the draft standard to allow the Planning Coordinator to identify, through a process demonstrating technical justification, additional generating units that are critical for reliability beyond the applicability criteria established by section 4.2.</p>			

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Organization	Yes or No	Question 7 Comments and/or Supporting Data for Not Agreeing with a Capacity Factor Exemption:	Question 7 Supporting Data for the Proposed 5% Capacity Factor:
ISO New England Inc.	No (disagree with approach)	<p>These low capacity factor units may be critical during peak conditions and are almost certain to be older units that have the least accurate factory excitation system models. It is felt that having accurate models for these older units is required. Generators under 100 MVA make up about 15% of capacity in New England. Excluding low capacity factor large units may exclude more than 20% of the generators from model verification.</p>	
<p>Response: Thank you for your comments. The SDT intended to write section 4.2 so that it applied to eighty percent of the generating units in each interconnection region. The SDT has revised the draft standard to allow Planning Coordinators to identify additional units for verification beyond section 4.2.</p>			
Ameren	No (disagree with approach)	<p>(1) Some systems have very large peaking units which arguably are more likely to be in service on days when the BES would be challenged. Thus, modeling data should be collected for these units and model cases run including these data.(2) The 5% capacity factor is an inappropriate basis for an exemption since it would allow significant blocks of generation (i.e. plants of several hundred MW) to be exempt. Such amounts of generation may have a significant impact on the stability of nearby generating units or such units may themselves have stability issues that need to be understood via valid studies. Examples would be plants with multiple combustion turbine units (particularly simple cycle oil burners) that are rarely run. However, when they are run (i.e. during peak system load times), the grid may be already be stressed and operating with reduced stability margin.(3) The possibility also exists that while the exempted generation may have a capacity factor of less than 5%, this could quickly change due to unanticipated system conditions or the extended unavailability of other generation (due to severe damage for example). Therefore, the subject generating units could end up being run for a significant length of time without the benefit of having been properly analyzed by the Transmission Planning organization. The average over the last three calendar years methodology further contributes to this</p>	

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Organization	Yes or No	Question 7 Comments and/or Supporting Data for Not Agreeing with a Capacity Factor Exemption:	Question 7 Supporting Data for the Proposed 5% Capacity Factor:
		<p>possibility, introducing a time lag in the process. Based on the above discussion, the 5% capacity factor exemption should only be allowed when it would not be expected to significantly impact the results of stability studies. Allowing the Transmission Planner to make this judgement is most appropriate since A) that organization is in the best position to make the determination of the impact on stability and B) that organization is responsible (via TPL standards) for ensuring the stability of the grid and connected generating units. (4) In lieu of the blanket 5% exemption, the following is proposed. (a) Delete and with an average Capacity Factor of greater than 5% over the last three calendar years? in all places in 4.1.1.1, 4.1.1.2 and 4.1.1.3(b) Add new Applicability 4.1.1.4 stating ?Generating facilities with capacity factors less than 5% over the last three calendar years may be exempted with written concurrence from the applicable Transmission Planning Authority. The written concurrence provided by the Transmission Planning Authority shall include the basis for any such exemptions. (5) alternative to (b) could be the response to Q9 below.</p>	
<p>Response: Thank you for your comments. The excitation system modeling data for all registered generating units is collected per standards MOD-012-1 and MOD-013-1 and used in models by Transmission Planners. The SDT is proposing a change to the standard to allow Transmission Planners or Planning Coordinators to identify, through a process demonstrating technical justification, additional generating units that are critical for reliability beyond the applicability criteria established by section 4.2. The 5% or less average capacity factor over the last three years does not force Generator Operators to spend money on testing of units that do not contribute to the reliability of the BES. At the end of every 10 year periodicity period, if a generating unit exceeds the 5% capacity factor, it must be tested within the next year if the unit has not been tested within the previous 10 year period. This testing timeframe is similar to the effective date timeframe specified in the standard.</p>			
AESO	No (disagree with approach)	The AESO agrees with the SRC ISO/RTO comments.	
<p>Response: Thank you for your comments. Please see the response to the entity comment which was referenced.</p>			
Duke Energy	No (disagree with approach)	Regarding Section 4 Applicability, drop the reference to Capacity Factor of 5% over the past 3 years. This makes no sense, because for a variety of reasons the unit's capacity factor in the very next year may be significantly higher, and having an	

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Organization	Yes or No	Question 7 Comments and/or Supporting Data for Not Agreeing with a Capacity Factor Exemption:	Question 7 Supporting Data for the Proposed 5% Capacity Factor:
		<p>accurate assessment of the unit's performance would be important. The units with low capacity factor would likely be on line during a peak load period when the system is most stressed and stability issues are most likely. Also, these units could be relevant to sensitivity studies. The larger units should have a model. Additionally, MMWG requires models for all units whether they are on or off in the case. Each one must have a model if the modeling criteria is satisfied. If the unit is a reasonable size and connected to the BES like others, we don't see how you can exclude testing.</p>	
<p>Response: Thank you for your comments.. The reason for choosing a 5% capacity factor threshold for exemption is similar to those for MVA-based exemption. This is to strike a balance between the costs and benefits. Because the excitation data of a unit has not been verified does not imply that the data is necessarily inaccurate or that the overall stability of the system is sensitive to that data. While the scenario contemplated in the comment is realistic, the SDT does not believe that the reliability of an entire interconnection will be significantly impacted by these isolated incidences. The validity of simulation results depends upon many assumptions, such as load and other system models. Even if all excitation system models were based on testing it would not guarantee absolute accuracy. Based upon the majority of responses received from the industry the SDT believes that the 5% exemption threshold is appropriate.</p> <p>Additionally, the SDT has revised the draft standard to allow the Planning Coordinator to identify, through a process demonstrating technical justification, additional generating units that are critical for reliability beyond the applicability criteria established by section 4.2.</p>			
US Bureau of Reclamation	No (disagree with approach)	<p>Capacity Factor (capitalized) is not defined in the standard nor is it defined in the NERC Glossary; we think we know what it means but if the term is used in the standard it should be defined. However we believe Capacity Factor, should not be used to exempt generators. Those times when generators of low Capacity Factor are in operation will most likely be those times when the power system is most stressed and the performance of the machines should be modeled in system studies.</p>	
<p>Response: Thank you for your comments. The use of the term "capacity factor" is written lower case in the second draft of the standard. It should be noted that infrequently operated units will still report unverified excitation information per standards MOD-012 and MOD-013 and the exciter information will be modeled in system studies.</p>			

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Organization	Yes or No	Question 7 Comments and/or Supporting Data for Not Agreeing with a Capacity Factor Exemption:	Question 7 Supporting Data for the Proposed 5% Capacity Factor:
Pepco Holdings, Inc (PHI) - Affiliates	Yes agree with the approach. But use another capacity factor (include supporting data):		PHI does not see a substantial difference in reliability if the capacity factor is increased to 10%
<p>Response: Thank you for your comments. The SDT believes the majority of industry supports the 5% capacity factor threshold to establish a balance between verifying modeling information for units that play an important role in the reliability of the BES and units that report information which is not verified due to relatively diminished role in reliability because they are seldom online.</p>			
Constellation Power Generation & Constellation Nuclear	Yes agree with the approach. But use another capacity factor (include supporting data):		
<p>Response: Thank you for your comments. Unfortunately, since another capacity factor proposal was not included, the SDT cannot make a specific reply. However, the SDT believes that industry supports the assertion that the 5% capacity factor threshold to establish the balance between verifying modeling information for units that play an important role in the reliability of the BES, and units that report information which is not verified due to having a relatively diminished role in reliability because they are seldom online.</p>			
City of Garland, Garland Power & Light - GOP Registered Entity	Yes agree with the approach. But use another capacity factor (include supporting data):	Not sure which box to comment in: Strongly agree with your approach & reasons but believe that 10% should be the exemption level	Not sure which box to comment in: Strongly agree with your approach & reasons but believe that 10% should be the exemption level
<p>Response: Thank you for your comments. The SDT appreciates your comments. The SDT believes that the majority of industry supports the assertion that the 5% capacity factor threshold to establish the balance between verifying modeling information for units that play an important role in the reliability of the BES, and units that report information which is not verified due to having a relatively diminished role in reliability because they are seldom online.</p>			
Reliant Energy	Yes agree with the approach. But use another capacity factor (include supporting data):	Capacity factor should be raised to 15%.	

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Organization	Yes or No	Question 7 Comments and/or Supporting Data for Not Agreeing with a Capacity Factor Exemption:	Question 7 Supporting Data for the Proposed 5% Capacity Factor:
	supporting data):		
<p>Response: Thank you for your comments.. The SDT believes that the 5% capacity factor threshold to establish the balance between verifying modeling information for units that play an important role in the reliability of the BES, and units that report information which is not verified due to having a relatively diminished role in reliability because they are seldom online.</p>			
Northeast Power Coordinating Council	Yes agree with approach and the 5% capacity factor	We agree with this approach to exclude units with low capacity factors provided that Planning Coordinators or Transmission Planners are allowed to identify additional applicable units beyond those specified in section 4.1.1 based on criticality to system reliability. Cases exist where large generating units with low capacity factors are operated only during the most stressed operating conditions. In such cases accurate modeling of these units may be critical to reliable operation of the bulk electric system.	
<p>Response: Thank you for your comments. The SDT has revised the draft standard to allow the Planning Coordinator to identify, through a process demonstrating technical justification, additional generating units that are critical for reliability beyond the applicability criteria established by section 4.2.</p>			
Southern Company	Yes agree with approach and the 5% capacity factor		The idea that this standard should not be applicable to low capacity factor seems preferable. However, 5% capacity factor may be too high. For instance, there are 8760 hours in a year. A 5% capacity factor could mean a unit running its at nameplate MW for 438 hours. Or, it could mean more than 438 hours if the unit is not running at its nameplate all the time when running. For Southern Company Generation, the current criteria would result in the standard applying to at least 80% of our generation capacity.
<p>Response: Thank you for your comments.. The SDT believes industry supports the 5% capacity factor threshold to establish a balance between verifying modeling information for units that play an important role in the reliability of the BES and units that report information which is not verified due to having a relatively diminished role in reliability because they are seldom online. Additionally, the SDT has revised the draft standard to allow the Planning Coordinator to identify, through a process demonstrating technical justification, additional</p>			

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Organization	Yes or No	Question 7 Comments and/or Supporting Data for Not Agreeing with a Capacity Factor Exemption:	Question 7 Supporting Data for the Proposed 5% Capacity Factor:
<p>generating units that are critical for reliability beyond the applicability criteria established by section 4.2. The SDT believes that defining a process where additional units could be identified for verification was a reasonable approach as opposed to defining a process where units with low capacity factor must apply for an exemption.</p>			
Manitoba Hydro	Yes agree with approach and the 5% capacity factor	Low capacity factor units such as wind turbines which could be part of a large MVA rated farm, should be in a separate category.	
<p>Response: Thank you for your comment. The Applicability section MVA thresholds provided in the first posting of the MOD-026 standard omitted wind powered units because wind unit are not rated greater than 20 MVA. There is an increasing number of wind farms with significantly larger aggregate MVA and as such, their impact on the reliability of the Bulk Electric System cannot be ignored; otherwise a reliability gap would exist. The SDT discussed the possibility of requiring verification of dynamic models that represent the aggregate of numerous small units and any necessary auxiliary equipment required of the technology. This could include plant dynamic voltage control and reactive support of all the units and auxiliary equipment (such as individual WTG response, plant-wide volt/var controller response, and response from separate volt/var regulation devices contained in the plant such as SVC/STATCOM/Synchronous Condenser) contained in any technology generation plant, including a wind farm (plant), that exceeds the appropriate aggregate nameplate MVA threshold. There are dynamic models that adequately replicate wind unit performance for some wind units today however, there are many existing wind units for which there are not publicly available models supplied by the Original Equipment Manufacturer. Generic wind models (i.e., type I, II, III and IV) are in various stages of development. Also, there are ongoing efforts involving Regional Entities and manufactures to close any large gaps that may exist in current generic models. Given the timeframe expected to lapse while awaiting standard approval by FERC, it is expected that generic wind farm (plant) models will sufficiently mature for establishing boundary conditions in Bulk System Studies. To mitigate this reliability gap, the Applicability section will be expanded in the second posting of the standard to include a significant MVA percentage of generation regardless of technology.</p>			
Indiana Municipal Power Agency	Yes agree with approach and the 5% capacity factor		<p>A small utility owns a GE 7EA Turbine/Generator with a nameplate rating of 101 MVA in the Eastern Interconnection. The utility uses it as a peaking unit and the capacity factor for the unit averages less than five percent over the last three years. Obviously, this unit does not play a vitale role in maintaining the reliability of the BES. Therefore, why make this utility spend thousands of dollars on testing a machine that is not important to reliability. By using a capacity factor of 5%, this unit will be exempt from this standard.</p>
<p>Response: Thank you for your comments. The SDT agrees that the proposed thresholds, including the 5% capacity factor, will result in verification of models that are necessary for the reliability of the BES.</p>			
Hydro-Québec	Yes agree with		We agree with this approach to exclude units with

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Organization	Yes or No	Question 7 Comments and/or Supporting Data for Not Agreeing with a Capacity Factor Exemption:	Question 7 Supporting Data for the Proposed 5% Capacity Factor:
TransEnergie (HQT)	approach and the 5% capacity factor		low capacity factors provided that Planning Coordinators or Transmission Planners are allowed to identify additional applicable units beyond those specified in section 4.1.1 based on criticality to system reliability. Cases exist where large generating units with low capacity factors are operated only during the most stressed operating conditions. In such cases accurate modeling of these units may be critical to reliable operation of the bulk electric system.
<p>Response: Thank you for your comments. The SDT has revised the draft standard to allow the Planning Coordinator to identify, through a process demonstrating technical justification, additional generating units that are critical for reliability beyond the applicability criteria established by section 4.2.</p>			
Southwest Power Pool Generation Working Group	Yes agree with approach and the 5% capacity factor		
Dominion	Yes agree with approach and the 5% capacity factor		
Kansas City Power & Light	Yes agree with approach and the 5% capacity factor		
MRO NERC Standards Review Subcommittee	Yes agree with approach and the 5% capacity factor		
Entergy Fossil Operations	Yes agree with approach and the 5% capacity factor		

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Organization	Yes or No	Question 7 Comments and/or Supporting Data for Not Agreeing with a Capacity Factor Exemption:	Question 7 Supporting Data for the Proposed 5% Capacity Factor:
FirstEnergy	Yes agree with approach and the 5% capacity factor		
FEUS	Yes agree with approach and the 5% capacity factor		
Luminant Power	Yes agree with approach and the 5% capacity factor		
Exelon Corporation	Yes agree with approach and the 5% capacity factor		
Cowlitz County PUD	Yes agree with approach and the 5% capacity factor		
E.ON U.S.	Yes agree with approach and the 5% capacity factor		
AWEA	Yes agree with approach and the 5% capacity factor		
American Wind Energy Association	Yes agree with approach and the 5% capacity factor		
Arizona Public Service Co.	Yes agree with approach and the		

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Organization	Yes or No	Question 7 Comments and/or Supporting Data for Not Agreeing with a Capacity Factor Exemption:	Question 7 Supporting Data for the Proposed 5% Capacity Factor:
	5% capacity factor		
Wisconsin Electric	Yes agree with approach and the 5% capacity factor		
Dynergy	Yes agree with approach and the 5% capacity factor		
Northeast Utilities	Yes agree with approach and the 5% capacity factor		
Reliant Energy	Yes agree with approach and the 5% capacity factor		
Southern California Edison	Yes agree with approach and the 5% capacity factor		
Xcel Energy	Yes agree with approach and the 5% capacity factor		
Brazos Electric Power Cooperative	Yes agree with approach and the 5% capacity factor		
American Transmission Company	Yes agree with approach and the 5% capacity factor		

8. The SDT is of the opinion, based upon sound engineering judgment, that verifying models for excitation systems of generators per the MVA thresholds specified in the Applicability section 4.1.1 will ensure satisfactory performance of Interconnection network simulation models. Do you agree with this approach? If yes, please provide any data in support of the proposed approach including supporting data that the MVA thresholds specified in the Applicability section 4.1.1 correspond to 80% of the Interconnection MVA.

Summary Consideration:

The majority of responder comments support the concept of requiring excitation control system model verifications for units based on unique MVA thresholds for each Interconnection that correspond to 80% of the Interconnected MVA. Some of the affirmative comments were qualified by a desire to allow a transmission entity to identify additional units for verification. This potential is addressed as a new draft process that allows the Planning Coordinator to identify additional units with excitation control system performance that affects a stability limit and/or does not match measured unit response (refer to Question 9 responses for additional details). Based on industry comments received, the SDT is proposing a modification to the Applicability section to additionally include a significant MVA percentage of all generation of all technologies, including Variable Energy Resources.

Organization	Yes or No	Question 8 Supporting Data or Alternate Approach
NERC Event Analysis & Information Exchange staff	No, instead use the approach below:	There are a number of units that, through switching, can operate in multiple interconnections, making it hard to decide where they belong. To reduce complexity in administration, avoid confusion, and to have a more level playing field in North America, the standard registration thresholds of units ? 20 MVA per machine and ? 75 MVA per plant should be applied.
<p>Response: Thank you for your comments. Although Field Test results did confirm that verification of excitation system models does result in higher quality dynamics data, it was also noted that verification of excitation system is expensive both from a monetary and human resource viewpoint. Therefore, the SDT believes that these applicability thresholds will result in substantial accuracy improvements to the excitation models and associated Reliability, while not unduly mandating costly and time-consuming verification efforts. The SDT agrees there may be a small number of units that can be switched between two interconnections. These units will follow the more stringent of the two associated requirements. The SDT believes that applicability as written would cover the bulk of installed generators to adequately provide higher quality dynamic data.</p>		
FirstEnergy	No, instead use the approach below:	We feel that 80% of the Interconnection MVA is not high enough. The issue might be not including many of the CC/CT units that have a low capacity factor (above 5%). The team may want to consider 90% or further validate the 80% value.
<p>Response: Thank you for your comments. The 80% threshold has been overwhelmingly accepted by the industry. Also, based on industry responses and the SDT's concerns about a potential reliability gap, the SDT is proposing a modified Applicability section to include a significant MVA percentage of all generation of all technologies, which will additionally include approximately 80% of Variable Energy Resource plants. The SDT has developed a new draft requirement that</p>		

Organization	Yes or No	Question 8 Supporting Data or Alternate Approach
<p>outlines a process that requires technical justification but which allows the Planning Coordinator to identify additional units whose excitation control system performance affects a stability limit, and/or does not match measured unit response.</p>		
FEUS	No, instead use the approach below:	<p>If the modeling methods are approved and are valid, why do entities have to prove they are right? Test the models on several units of different sizes and configurations to determine their accuracy. If modeling methods aren't accurate, fix them instead of requiring the industry go through the huge expense of testing hundreds of units that have been previously modeled. I also don't see the rationale for the differences in MVA testing requirements between RRCs. The 200 MVA rating for facilities (as specified for the eastern systems) should be the same if this standard is adopted.</p>
<p>Response: Thank you for your comments. The SDT strongly believes that re-occurring validation of the excitation system is necessary to validate system performance for dynamic conditions. This process will also validate any changes and modifications to the excitation system. The SDT has also provided opportunity for an alternative method of ambient monitoring. Generator Owners are permitted to utilize operating data for validation purposes.</p>		
Wisconsin Public Service	No, instead use the approach below:	<p>The provisions of multiple generators at one location requiring testing of units above 20MVA rating puts too much ownerous on operators at CT sites with multiple small CT's that would act differently during an event and have minimal effect on the dynamic models.</p>
<p>Response: Thank you for your comments. The SDT has included in a Periodicity Attachment of the draft standard, a provision for testing multiple similar units. Verification of one unit from a group of units equal to and less than 350 MVA with identical applicable components and settings at the same physical location is sufficient. One of the key conclusions from this draft standard's Field Test is that excitation system verification results in an improvement of the accuracy of the exciter models used in dynamic simulations. If there are multiple CTs at a plant site such that the plant threshold in the Applicability section of the draft standard is exceeded, then the interconnected MVA at that plant site is likely to be a significant influence of the dynamic behavior of the local area. Thus, in order to allow for proper quantification of reliability limits, the SDT believes that excitation model verifications for such a plant site is appropriate. Typically, some of these CTs fall under the criteria specified in the Periodicity Attachment of the draft standard, which could minimize verification activities.</p>		
American Electric Power	No, instead use the approach below:	<p>The need for excitation data and model verification has been driven by plant and system stability needs. We believe that the applicability in the standard should be driven by the same. We would go so far as to suggest that identification of applicable units should be determined by the TP and PC through a process that includes planning study results and operating experience, and that the standard should not specify a blanket applicability unrelated to the stability driven need.</p>
<p>Response: Thanks you for your comment. The 80% threshold has been overwhelmingly accepted by the industry. The SDT has developed a new draft requirement that outlines a process that requires technical justification but which allows the Planning Coordinator to identify additional units with excitation control</p>		

Organization	Yes or No	Question 8 Supporting Data or Alternate Approach
system performance that affects a stability limit, and/or does not match measured unit response.		
Wisconsin Electric	No, instead use the approach below:	In light of the size and density of the Eastern Interconnection, we are of the opinion that the MVA threshold for units should be raised to 150 MVA or higher.
Response: Thank you for your comments The SDT believes that the MVA thresholds provided in the draft standard will adequately addresses BES system reliability needs. The SDT will be glad to review any technical data provided to support your position.		
AESO	No, instead use the approach below:	Section 4.1.1.2 directly references the Western Interconnection but then uses equipment sizes as a base that far exceeds the ones used by WECC in the Generating Unit Model Validation Policy.75 MVA units vs 10MVA by WECC20 MVA units in a 150 MVA facility vs. 20 MVA facility by WECC 100 kV interconnection vs. 60 kV by WECCPerhaps the standard can reference the WECC guidelines.
Response: Thank you for your comments. Field Test has confirmed that verification of excitation system models does result in higher quality dynamics data. The Field Test also noted that verification of the excitation system is expensive both from a monetary and human resource viewpoint. Therefore, the SDT believes that these applicability thresholds will result in substantial accuracy improvements to the excitation models and associated Reliability- based limits determined by dynamic simulations, while not unduly mandating costly and time-consuming verification efforts.		
American Transmission Company	No, instead use the approach below:	The threshold should be based on NERC registration criteria for Generator Owners/Operators. See Appendix 5 Organization Registration and Certification Manual. (Version 3.3) This criteria should apply across NERC. Item 2 in Requirement 1 should be set to the same level used by NERC's registration criteria for plants.
Response: Thank you for your comments. Field Testing has confirmed that verification of excitation system models does result in higher quality dynamics data. The Field Test also noted that verification of the excitation system is expensive both from a monetary and human resource viewpoint. Therefore, the SDT believes that these applicability thresholds will result in substantial accuracy improvements to the excitation models and associated Reliability-based limits determined by dynamic simulations, while not unduly mandating costly and time-consuming verification efforts.		
US Bureau of Reclamation	No, instead use the approach below:	We believe the NERC Compliance Registry Criteria should be used as the threshold.

Organization	Yes or No	Question 8 Supporting Data or Alternate Approach
<p>Response: Thank you for your comments. The SDT does not agree with the view that the Compliance Registry should be the sole basis for determining applicability of Reliability Standards. The SDT has made an ongoing effort to refine the applicability section of the standard in line with one of the guiding principles of NERC’s Reliability Standards development process which is the principle that the obligations or requirements of a standard must be material to the Bulk Electric System reliability and measurable. Field Testing has confirmed that verification of excitation system models result in higher quality dynamics data. The Field Test also noted that verification of the excitation system is expensive both from a monetary and human resource viewpoint. Therefore, the SDT believes that these applicability thresholds will result in substantial accuracy improvements to the excitation models and associated Reliability -based limits determined by dynamic simulations, while not unduly mandating costly and time-consuming verification efforts. The vast majority of industry comments indicate agreement.</p>		
Reliant Energy	No, instead use the approach below:	Each unit (including synchronous condensers) 100 MVA, connected at the point of interconnection at 100 kV or above and with an average Capacity Factor greater than 15% over the last three calendar years. Each unit (including synchronous condensers) 50 MVA within a plant 250 MVA, connected at the point of interconnection at 100 kV or above and with an average Capacity Factor greater than 15%
<p>Response: Thank you for your comments. Field Testing has confirmed that verification of excitation system models does result in higher quality dynamics data. The Field Test also noted that verification of excitation system is expensive both from a monetary and human resource viewpoint. Therefore, the SDT believes that these applicability thresholds will result in substantial accuracy improvements to the excitation models and associated Reliability- based limits determined by dynamic simulations, while not unduly mandating costly and time-consuming verification efforts.</p>		
Northeast Power Coordinating Council	Yes	We agree with the general approach to base the number and size of applicable generating units on the objective of validating models for 80 percent of the installed capacity on an Interconnection provided that Planning Coordinators or Transmission Planners are allowed to identify additional applicable units beyond those specified in section 4.1.1 based on criticality to system reliability. In the event the Planning Coordinator or Transmission Planner is not permitted to identify additional units, the objective should be changed to validate models for a greater percentage of the installed capacity. We do not have data to verify whether the unit size thresholds specified in Requirement R4.1.1 correspond to 80 percent of the installed capacity on an interconnection, and respectfully suggest that it is the responsibility of the SDT to provide such verification.
<p>Response: Thank you for your comments. The 80% threshold has been overwhelmingly accepted by the industry. Also, based on industry responses and concerns about a potential reliability gap, the SDT is proposing a modified Applicability section to include a significant MVA percentage of all generation of all technologies, which will additionally include approximately 80% of Variable Energy Resource plants. The SDT has developed a new draft requirement that outlines a process that requires technical justification but which allows the Planning Coordinator to identify additional units with excitation control system performance that affects a stability limit and/or does not match measured unit response.</p>		

Organization	Yes or No	Question 8 Supporting Data or Alternate Approach
SERC Dynamics Review Subcommittee (DRS)	Yes	<p>The MVA values should be coordinated with the MVA thresholds in MOD-10 to MOD-12 and in proposed TPL-001 standards. Supporting data (circa 2003) can be found from the link below which provides a spreadsheet titled Existing Generating Units in the United States by State, Company and Plant, 2003.http://www.eia.doe.gov/cneaf/electricity/page/at_a_glance/gu_tabs.html This spreadsheet can be sorted and summed to get an estimate of the percentage generation that would be included. A preliminary look by the DRS suggests that 80% or more would be included.</p>
<p>Response: Thank you for your comments. The SDT appreciates the supporting data reference you have provided. NERC’s work plan for the MOD standards will be addressed by Project 2010-03. It is acknowledged that the MVA thresholds must be considered when the MOD standards are revised, including the current SDT work on the TPL-001 through TPL-004 standards. The GV SDT believes that each standard has its unique reliability purpose. The applicability section of the standard for the listed entities should be established according to its purpose and the risk associated with individual requirements. For example, standards MOD-010 and MOD-012 deal with the provision of data for dynamic modeling so the applicability of these standards to smaller units and facilities is quite appropriate. On the other hand, standard MOD-026 deals with mandatory periodic verification of models and data, which is a different exercise, driven by different needs. Based on these needs, the SDT continues to advocate the 80% threshold.</p>		
Dominion	Yes	The proposed threshold captures at least 80.5% of the generators owned by Dominion.
<p>Response: Thank you for your comment. The SDT acknowledges your affirmation for the MVA thresholds corresponding to 80% or great of the interconnected MVA owned by Dominion.</p>		
Constellation Power Generation & Constellation Nuclear	Yes	<p>We agree with the general approach to base the number and size of applicable generating units on the objective of validating models for 80 percent of the installed capacity on an Interconnection provided that Planning Coordinators or Transmission Planners are allowed to identify additional applicable units beyond those specified in section 4.1.1 based on criticality to system reliability. In the event the Planning Coordinator or Transmission Planner is not permitted to identify additional units, the objective should be changed to validate models for a greater percentage of the installed capacity. We do not have data to verify whether the unit size thresholds specified in Requirement R4.1.1 correspond to 80 percent of the installed capacity on an interconnection, and respectfully suggest that it is the responsibility of the SDT to provide such verification.</p>
<p>Response: Thank you for your comments. The 80% threshold has been overwhelmingly accepted by the industry. Also, based on industry responses and concerns about a potential reliability gap, the SDT is proposing a modified Applicability section to include a significant MVA percentage of all generation of all technologies, which will additionally include approximately 80% of Variable Energy Resource plants. The SDT has developed a new draft requirement that outlines a process that requires technical justification but which allows the Planning Coordinator to identify additional units with excitation control system performance that</p>		

Organization	Yes or No	Question 8 Supporting Data or Alternate Approach
affects a stability limit and/or does not match measured unit response.		
Progress Energy, Inc.	Yes	However, the MVA values MUST be coordinated with the MVA thresholds in MOD-010 to 012 and in proposed TPL-001 standards. Supporting data (circa 2003) can be found from the link below which provides a spread sheet titled Existing Generating Units in the United States by State, Company and Plant, 2003. http://www.eia.doe.gov/cneaf/electricity/page/at_a_glance/gu_tabs.html
<p>Response: Thank you for your comments. The SDT appreciates the reference to the statistical data. NERC’s work plan for MOD standards will be addressed by Project 2010-03. It is acknowledged that the MVA thresholds must be considered when the MOD standards are revised, including current SDT work on the TPL-001 through TPL-004 standards. The GV SDT believes that each standard has its unique reliability purpose. The applicability section of the standard for the listed entities should be established according to its purpose and the risk associated with individual requirements. For example, standards MOD-010 and MOD-012 deal with the provision of data for dynamic modeling so the applicability section of these standards to smaller units and facilities is quite appropriate. On the other hand, the standard MOD-026 deals with mandatory periodic verification of models and data, which is a different exercise, driven by different needs. Based on these needs, the SDT continues to advocate the 80% threshold.</p>		
Dynergy	Yes	We support SDT's approach to include aggregate MVA values. We also would like to suggest minor wording changes for SDT consideration to revise the language in the draft standard to better reflect an aggregate MVA approach. The word "same" is added to draft standard language as following: " Each unit (including synchronous generators) => 100 MVA, connected at the SAME point of interconnection at 100 Kv or above and with an".
<p>Response: Thank you for your comments. The draft standard has been revised based on your comments and the word, “same” was added in the applicability section of the standard.</p>		
Reliant Energy	Yes	The SDT at least has done an engineering analysis in developing the MVA thresholds. I am not sure that registration criteria was done in the same manner.
<p>Response: Thank you for your comments. The SDT appreciates your comment..</p>		
ISO New England Inc.	Yes	Currently generators over 100 MVA make up about 85% of the installed generator capacity in New England. Concentration on these units should provide an accurate representation of the system. Efforts to verify lower MVA capacity units would provide limited benefit for the work involved.
<p>Response: Thank you for your comments. The SDT appreciates your comment..</p>		

Organization	Yes or No	Question 8 Supporting Data or Alternate Approach
Ameren	Yes	<p>(1) We believe the MVA thresholds are appropriate and pick up the vast majority of interconnection (MVA). However, the MVA values MUST be consistent with the MVA thresholds in other stanadrds, such as MOD-10 to 12. and in proposed TPL-001 standards.</p> <p>(2) Supporting data (circa 2003) can be found from the link below which provides a spread sheet titled Existing Generating Units in the United States by State, Company and Plant, 2003. http://www.eia.doe.gov/cneaf/electricity/page/at_a_glance/gu_tabs.htmlThe spreadsheet can be sorted and summed to get an estimate of the percentage generation that would be included. A preliminary look suggests that 80% or more would be included.</p>
<p>Response: Thank you for your comments. The SDT appreciates the reference to the statistical data. NERC’s work plan for the MOD standards will be addressed by Project 2010-03. It is acknowledged that the MVA thresholds must be considered when any standard is developed or revised, as each standard has its unique reliability purpose. The applicability of the standard for the listed entities should be established according to its purpose and the risk associated with individual requirements. For example, standards MOD-010 and MOD-012 deal with the provision of data for dynamic modeling so the applicability of these standards to smaller units and facilities is quite appropriate. On the other hand, the standard MOD 026 deals with mandatory periodic verification of models and data, which is a different exercise, driven by different needs. Based on these needs, the SDT continues to advocate the 80% threshold.</p>		
Duke Energy	Yes	<p>We agree with the approach, but would also caution the team to consider the future composition of the Interconnection MVA. Possibly the team already considered newer types of generation and the benefit of a verified model rather than just estimated or typical manufacturers dynamics data (MOD-013). The team should consider clarifying the relationship between the terms in MOD-013 and MOD-026. Is unit-specific dynamics data equivalent to a verified model? Even in the case of a sister unit? If a unit does not meet the applicability for MOD-026 would they then follow MOD-013 to determine the applicable model to provide?</p>
<p>Response: Thank you for your comments. Unit-specific data, referenced in standard MOD-013, is not the same as a verified model. It is possible for a new unit to be installed at a site where another unit has already been installed and that all units meet the criteria in standard MOD-026 – Attachment 1 “Excitation Control System Model Verification Periodicity” Scenario 3 where one verification would meet the requirements of the draft standard. However, it is also recognized that Interconnection Agreements may often result in the verification of models as a condition of being able to interconnect to a transmission provider’s system. Finally, if a new unit does not meet the applicability of standard MOD-026, then at a minimum they would be required to follow standard MOD-013 requirements to determine the applicable model to provide.</p>		
Hydro-Québec TransEnergie (HQT)	Yes	<p>We agree with the general approach to base the number and size of applicable generating units on the objective of validating models for 80 percent of the installed capacity on an Interconnection provided that Planning Coordinators or Transmission Planners are allowed to identify additional applicable units beyond those specified in section 4.1.1 based on criticality to system reliability. In the event the Planning Coordinator or Transmission Planner is not</p>

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Organization	Yes or No	Question 8 Supporting Data or Alternate Approach
		permitted to identify additional units, the objective should be changed to validate models for a greater percentage of the installed capacity. We do not have data to verify whether the unit size thresholds specified in Requirement R4.1.1 correspond to 80 percent of the installed capacity on an interconnection, and respectfully suggest that it is the responsibility of the SDT to provide such verification.
Response: Thank you for your comments. The SDT has developed a new draft requirement that outlines a process that requires technical justification but which allows the Planning Coordinator to identify additional units with excitation control system performance that affects a stability limit and/or does not match measured unit response.		
IRC Standards Review Committee	Yes	We do not have any technically sound alternatives to suggest.
Response: Thank you for your comment.		
Independent Electricity System Operator	Yes	We do not have any technically sound alternatives to suggest.
Response: Thank you for your comment.		
Consumers Energy Company	Yes	We believe the MVA thresholds are appropriate and pick up the vast majority of interconnection (MVA).
Response: Thank you for your comments. The SDT appreciates your comment.		
Southern Company	Yes	See comment on 7 above.
Response: Thanks you for your comment. The SDT has referred to the comment referenced.		
Kansas City Power & Light	Yes	
MRO NERC Standards Review Subcommittee	Yes	
Pepco Holdings, Inc (PHI) - Affiliates	Yes	

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Organization	Yes or No	Question 8 Supporting Data or Alternate Approach
Entergy Fossil Operations	Yes	
Luminant Power	Yes	
Exelon Corporation	Yes	
Cowlitz County PUD	Yes	
E.ON U.S.	Yes	
AWEA	Yes	
American Wind Energy Association	Yes	
Arizona Public Service Co.	Yes	
Manitoba Hydro	Yes	
Northeast Utilities	Yes	
Southern California Edison	Yes	
Indiana Municipal Power Agency	Yes	
Xcel Energy	Yes	

9. Do you believe the SDT should develop a Requirement to allow the Transmission Planner or the Planning Coordinator to identify additional applicable units beyond those specified in section 4.1.1 due to their criticality to the reliability of the Bulk Electric System? If yes, please include the criteria that should be used by the Transmission Planner or Planning Coordinator to identify critical units with MVA rating less than listed in section 4.1.1 and any supporting data.

Summary Consideration:

More than half of the industry respondents representing all regions recommend inclusion of units identified by either the Transmission Planner or Planning Coordinator based on clear technical study results documenting the impact on the BES. In response, the SDT has drafted a process in the 2nd draft of the standard (reference Requirement R5) that requires technical justification but which allows the Planning Coordinator to identify additional units whose excitation control system performance requires scrutiny by the Generator Owner. In some instances, scrutiny by the Generator Owner could lead to corrected model data that could meet the needs of the Planning Coordinator. But unless the Generator Owner can determine that the existing model structure and data requires a correction and that meets the needs of the Planning Coordinator, the model must be verified. The SDT originally considered letting the Transmission Planner identify critical units along with the Planning Coordinator. However, the SDT realized that the Transmission Planner could bring model issues to the attention of its Planning Coordinator; then the Planning Coordinator could make a determination if the model issue warranted further review by the Generator Owner, thus adding another inherent “check” in the process.

Organization	Yes or No	Question 9 Comment or Supporting Data
SERC Dynamics Review Subcommittee (DRS)	No	Add a new section under Applicability 4.1.1.5 stating Generating facilities that do not meet the applicability requirements of 4.1.1.1 - .4 may be included when their performance is found to reduce the reliability of the BES by the applicable Transmission Planning Authority. A written request provided by the Transmission Planning Authority shall include the technical basis for any such inclusion (e.g. must run, reliability, voltage, or stability needs).
<p>Response: Thank you for your comments. The SDT does agree with the basic concept, including the need for the transmission entity to provide a technical basis to support the identification of additional units required to provide a corrected model or perform excitation control system verification. The SDT has developed a new draft process that outlines a process that requires technical documentation but which allows the Planning Coordinator to identify additional units as supported by technical justification.</p>		
Luminant Power	No	The SDT is tasked with developing requirements for applicability across North America. Regions have the ability to develop more stringent requirements based on regional needs, and through various regional requirements development processes. Allowing the Transmission Planner or Planning Coordinator to expand the applicability

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Organization	Yes or No	Question 9 Comment or Supporting Data
		of the NERC Standard on an individual resource basis (without industry input, balloting, etc.) would circumvent the FERC approved procedures for development of reliability standards.
<p>Response: Thank you for your comments. The SDT believes that the reliability of the BES could be put at risk if there is no mechanism to allow for the correction of models that do not accurately represent expected equipment performance. However, the new process (reference Requirement R5 in the revised standard) that has been drafted by the SDT requires technical justification for a limited number of scenarios.</p>		
E.ON U.S.	No	The generation owner/operator is in the best position to identify those facilities that require verification studies. Transmission providers should not be allowed to independently impose compliance obligations upon other parties. Any process to allow imposition of additional compliance responsibilities should be overseen by the appropriate regional reliability organization.
<p>Response: Thank you for your comments. The SDT believes that the reliability of the BES could be put at risk if there is no mechanism to allow for the correction of models that do not accurately represent expected equipment performance. However, the new process (reference Requirement R5 in the revised standard) that has been drafted by the SDT requires technical justification for a limited number of scenarios.</p>		
AWEA	No	There would have to be very clear technical justification for such a designation or it could be perceived as discriminatory and/or preferential
<p>Response: Thank you for your comment. The SDT believes that the reliability of the BES could be put at risk if there is no mechanism to allow for the correction of models that do not accurately represent expected equipment performance. However, the new process (reference Requirement R5 in the revised standard) that has been drafted by the SDT requires technical justification for a limited number of scenarios.</p>		
Ameren	No	However, add 4.1.1.5 stating Generating facilities that do not meet the applicability requirements 4.1.1.1 - .3 may be included when their performance is found to create or contribute to reduced reliability of the BES when requested by the applicable Transmission Planner. The written request provided by the Transmission Planner shall include the technical basis for any such inclusion (e.g. must run for reliability, voltage, or stability needs).
<p>Response: Thank you for your comments. The SDT agrees with the concept and has developed a process (reference Requirement R2) in the second draft that should address your concern.</p>		
American Transmission Company	No	This standard should apply to all registered GO's and GOP's. A requirement as suggested puts the TP or PA in the position of telling NERC who should be registered. This responsibility that clearly falls to NERC and the Regional Entities and should not be expanded to any registered entity.

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Organization	Yes or No	Question 9 Comment or Supporting Data
<p>Response: Thank you for your comments. The SDT believes that the reliability of the BES could be put at risk if there is no mechanism to allow for the correction of models that do not accurately represent expected equipment performance. However, the new process (reference Requirement R5 in the revised standard) that has been drafted by the SDT requires technical justification for a limited number of scenarios.</p>		
Consumers Energy Company	No	
Southern Company	No	
Cowlitz County PUD	No	
FEUS	No	
Southwest Power Pool Generation Working Group	No	
MRO NERC Standards Review Subcommittee	No	
FirstEnergy	No	
Pepco Holdings, Inc (PHI) – Affiliates	No	
Entergy Fossil Operations	No	
Arizona Public Service Co.	No	
Wisconsin Electric	No	
Manitoba Hydro	No	
Dynergy	No	

Organization	Yes or No	Question 9 Comment or Supporting Data
Southern California Edison	No	
Indiana Municipal Power Agency	No	
Brazos Electric Power Cooperative	No	
Reliant Energy	No	
NERC Event Analysis & Information Exchange staff	Yes	<p>It is essential that the Planning Coordinator and Reliability Coordinator be allowed to designate other critical units. In some cases, despite their size, the aggregation of a number of small units can have a significant impact on the dynamics of an area. One example is the transfer capability across the state of Maine, which is influenced by the dynamics of the multiple small hydro units in the state. Similarly, the dynamic performance of small units may be critical to reliability in some local areas such as New Brunswick and Nova Scotia.</p>
<p>Response: Thank you for your comments. More than half of the industry respondents representing all NERC regions recommend inclusion of units by the Transmission Planner or Planning Coordinator based on clear technical justification. The SDT has developed a new draft process (reference Requirement R5) that outlines a process that requires technical justification but which allows the Planning Coordinator to identify additional units with excitation control system performance that affects a stability limit and/or does not match measured unit response. Once identified, the Generator Owner can provide corrected excitation control system data or verify the model.</p>		
Northeast Power Coordinating Council	Yes	<p>The Planning Coordinator or Transmission Planner should be permitted to identify additional units for applicability of the Standard based on the results of generator interconnection studies or other studies that demonstrate the criticality of correct settings on system reliability, e.g. studies demonstrating sensitivity of a stability-based System Operating Limit to correct equipment settings and functionality.</p>
<p>Response: Thank you for your comment. Your comment is very similar to a great number of other industry comments in recommending the inclusion of units by the Transmission Planner or Planning Coordinator based on clear technical study results documenting the impact on the BES. In response to these comments the SDT has drafted a new process (reference Requirement R5) that outlines a process that requires technical justification but which allows the Planning Coordinator to identify additional units with excitation control system performance requiring scrutiny by the Generator Owner. Unless the Generator Owner can determine that the existing model structure and data requires a correction, the model must be verified.</p>		
Dominion	Yes	<p>If a unit exhibits transient or dynamic instability for an event but the simulation did not show the same then the excitation system shall be tested for units beyond those specified in section 4.1.1.</p>

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Organization	Yes or No	Question 9 Comment or Supporting Data
<p>Response: Thank you for your comments. The SDT has developed a new process (reference Requirement R5) which outlines a process that requires technical documentation, including identification of units which do not perform as predicted by the current excitation control system model, that allows the Planning Coordinator to identify additional units that the Generator Owner would either provide a corrected or a verified model.</p>		
IRC Standards Review Committee	Yes	In some areas on the interconnection, such as those that are sparsely populated, performance of generating units at less than 100 MVA might be critical to reliability.
<p>Response: Thank you for your comments. The SDT agrees with this and other comments that there are situations where the verification of excitation control system is necessary to ensure the accuracy of BES security limits. In response to these comments, the SDT has drafted a new process (reference Requirement R5). This process allows the Planning Coordinator to identify through technical justification additional units with excitation control system model requiring correction or verification. The development of technical documentation is required to ensure this request is warranted.</p>		
AESO		The AESO agrees with the SRC ISO/RTO comments.
<p>Response: Thank you for your comment. The SDT was unable to identify the SRC ISO/RTO comment referenced. Please refer to the intended comment for the SDT response provided..</p>		
Exelon Corporation	Yes	Exelon is concerned about the use of the term "critical" in this context because it implies the same level of criticality that would be used to put a station on the critical asset list. A small generating station may be sufficiently close to another station that it affects the dynamic behavior of the generators at the second station. The Transmission Planner should be able to identify the units at the smaller station as applicable to the standard without calling them critical units. Exelon does appreciate the need for guidelines regarding the units that can be indentified as applicable to MOD-026.
<p>Response: Thank you for your comments. The SDT has developed a new process (reference Requirement R5) that outlines a process that requires technical justification but which allows the Planning Coordinator to identify additional units with excitation control system performance that affects a stability limit and/or does not match measured unit response. Once identified, the Generator Owner can provide corrected excitation control system data or verify the model. The term "critical" is not used in the new draft requirement.</p>		
Constellation Power Generation & Constellation Nuclear	Yes	The Planning Coordinator or Transmission Planner should be permitted to identify additional units for applicability of the Standard based on the results of generator interconnection studies or other studies that demonstrate the criticality of correct settings on system reliability, e.g. studies demonstrating sensitivity of stability based System Operating Limit to correct equipment settings and functionality.
<p>Response: Thank you for your comments. The SDT agrees this type of requirement is needed and has included process (reference Requirement Rr) in the</p>		

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Organization	Yes or No	Question 9 Comment or Supporting Data
second draft.		
Wisconsin Public Service	Yes	Determined critical in the model or in a constrained area of the system.
Response: Thank you for your comments. The SDT agrees and has drafted a new process (reference Requirement R2) to address this concern.		
American Electric Power	Yes	Criteria should be units or plants whose operation is limited by transient or small-signal instability or that are located in areas that may be subject to stability constraints. Why not rather impose the applicability in the fashion of what is being asked here, that the TP and PC identify through a process which units should be verified, not blanket applicability as is in the current draft.
Response: Thank you for your comments. More than half of the industry respondents representing all NERC regions recommend inclusion of units by the Transmission Planner or Planning Coordinator based on clear technical justification. The SDT has developed a new draft requirement that outlines a process that requires technical justification but which allows the Planning Coordinator to identify additional units with excitation control system performance that affects a stability limit and/or does not match measured unit response. Once identified, the Generator Owner can provide corrected excitation control system data or verify the model.		
Progress Energy, Inc.	Yes	Add to Applicability a 4.1.1.4 stating Generating facilities that do not meet the applicability requirements 4.1.1.1 - .3 may be included when their performance is found to create or contribute to reduced reliability of the BES when requested by the applicable Transmission Planning Authority. The written request provided by the Transmission Planning Authority shall include the technical basis for any such inclusion (e.g. must run for reliability, voltage, or stability needs).
Response: Thank you for your comments. The SDT agrees and has developed a new process (reference Requirement R5) in the second draft that should address this concern.		
Reliant Energy	Yes	Units that have an RMR. If they do not have an RMR (in unorganized markets) then how can they be called critical?
Response: Thank you for your comments. More than half of the industry respondents representing all NERC regions recommend inclusion of units by the Transmission Planner or Planning Coordinator based on clear technical justification. The SDT has developed a new process (reference Requirement R5) which outlines a process that requires technical justification but which allows the Planning Coordinator to identify additional units for certain scenarios. Once identified, the Generator Owner can provide corrected excitation control system data or verify the model.		
Duke Energy	Yes	Add a similar requirement to R11 that allows the TO or RC to add a generator that does not meet the applicability

Organization	Yes or No	Question 9 Comment or Supporting Data
		<p>criteria when their performance is found to create or contribute to reduced reliability. No one can foresee all future system configurations and operating conditions. This type of requirement is fundamental to analyzing and resolving issues. Additional Comment on R11 and R12. When system or plant events occur impacting transient voltage response, the GOP should evaluate actual unit/plant performance against expected performance. This is especially important when taking credit for sister units to avoid testing of similar units at the same site. With the long time between verification testing (10 years) and even longer time frame when allowing for claiming sister units, it is important to assess actual versus predicted performance. It is not sufficient to have only the TO or RC identify potential issues because they would normally only recognize issues that negatively impact the entire system and only for the specific event. Individual generating stations may have not behaved as modeled due to protection/control problems but the overall system met requirements.</p>
<p>Response: Thank you for your comments. The SDT has developed a new process (reference Requirement R5) that requires technical documentation but which allows the Planning Coordinator to identify additional units as supported by technical justification. This includes the scenario when the simulated unit response does not match measured unit response. There are currently no provisions for the Generator Owner to evaluate actual performance during a transient voltage response type of event, unless it is through observation of performance. The SDT believes that while your suggestion represents good utility practice, it is beyond the scope of this standard.</p>		
Hydro-Québec TransEnergie (HQT)	Yes	<p>The Planning Coordinator or Transmission Planner should be permitted to identify additional units for applicability of the Standard based on the results of generator interconnection studies or other studies that demonstrate the criticality of correct settings on system reliability, e.g. studies demonstrating sensitivity of a stability based System Operating Limit to correct equipment settings and functionality.</p>
<p>Response: Thank you for your comments. The SDT agrees and has drafted a new process (reference Requirement R5) to address your comment.</p>		
Xcel Energy	Yes	<p>Yes, we agree, however the SDT needs to give consideration to whether the Generator Owner has any rights to dispute such designation from its TP or PC.</p>
<p>Response: Thank you for your comments. The SDT agrees that the reliability of the BES could be put at risk if there is no mechanism to allow for the correction of models that do not accurately represent expected equipment performance. In order to ensure that the mechanism is not misused, a new requirement has been drafted by the SDT that requires technical justification for a limited number of scenarios.</p>		
Independent Electricity System Operator	Yes	<p>In some areas on the interconnection, such as those that are sparsely populated, performance of generating units at less than 100 MVA might be critical to reliability. The criteria to allow the TP and PC to identify these units could include: a. A 5% or 10% deviation of any or several of the excitation system's parameters/settings could make an otherwise stable simulation to be unstable; b. Use of generic models for the excitation system or</p>

Organization	Yes or No	Question 9 Comment or Supporting Data
		generator would make an otherwise stable simulation to be unstable. c. Other changes or incorrect assumptions for the excitation system or generator would make an otherwise stable simulation to be unstable.
<p>Response: Thank you for your comments. After reviewing provided details, the SDT encourages you to review the new process draft (reference Requirement R2) and provide additional comments as appropriate.</p>		
US Bureau of Reclamation	Yes	If a unit or facility is critical to reliability and the Transmission Planner, Planning Coordinator, Reliability Coordinator, or Transmission Operator can present convincing evidence, the plant should be included. The criteria to use should be developed by the above entities.
<p>Response: Thank you for your comments. The SDT agrees and has drafted a new requirement that outlines a process requiring technical justification but which allows the Planning Coordinator to identify additional units with excitation control system performance requiring scrutiny by the Generator Owner. Unless the Generator Owner can determine that the existing model structure and data requires a correction, the model must be verified.</p>		
Kansas City Power & Light	Yes	
American Wind Energy Association	Yes	
Northeast Utilities	Yes	

10. The SDT is proposing an implementation plan that requires certain percentages of applicable units to be verified two, six, and eleven years after the standard is approved. The SDT also thought it would be prudent to allow the verification of excitation systems per Regional Entity procedures and guidelines within 5 years of the approval date to be sufficient for demonstrating compliance with this new Reliability Standard.

Do you agree with these approaches?

Summary Consideration:

While industry is in general agreement with the principles of the proposed implementation plan, concern was expressed regarding development time for processes this standard would require. The SDT decided to extend the initial timeframe following standard approval for model verification from “2 years following regulatory approval, 10% of its applicable units per Interconnection on a MVA basis” to “4 years following regulatory approval, 30% of its applicable units per Interconnection on a MVA basis”.

Organization	Yes or no	Question 10 Additional Comments or Recommendations:
American Electric Power	No, instead of allowing credit for verification of excitation systems within the last 5 years of the Standard's approval date, instead would recommend (please specify below)	that the areas with the greatest instability be addressed first.
Response: Thank you for your comment. The SDT was not able to interpret your comment and therefore could not provide a response.		
Northeast Power Coordinating Council	No, the phase in period for unit excitation system verification should be (please specify below)	The proposed implementation plan is too long. We recommend a five-year implementation with a requirement that units representing 20 percent of installed capacity be tested each year. We are concerned that an eleven-year implementation plan does not adequately promote system reliability, and that having only three milestones will place a burden on system operators to schedule testing because Genator Owners may wait until years two, six, and eleven to schedule testing instead of spreading the tests out over the implementation period. The form will not accept more than one box checked above, but "Yes, agree with allowing credit for verification of excitation systems within the last 5 years of the Standard's approval date" should be checked.

Organization	Yes or no	Question 10 Additional Comments or Recommendations:
<p>Response: Thank you for your comments. The SDT believes, and the majority of industry responders agreed, that the current implementation plan provides proper balance between the need to verify excitation control system models and the fact that there are Generator Owners that currently do not have the expertise to perform model verification required. It may not be feasible to rely entirely on consultants to assist the industry with performing unit verification within a short timeframe such as a 5 year period; possibly leading to compliance violations by unfortunate Generator Owners. The 10 year implementation timeframe will provide the industry adequate time to verify the models and data for the excitation control systems and also develop expertise for performing these verifications.</p> <p>System operators are not necessarily required nor expected to be involved in scheduling model verification. The Generator Owner will determine the verification method and most likely related testing will be done with the unit off line as part of a scheduled maintenance outage; which will result in testing being satisfactorily distributed over the 11 year phase-in period.</p> <p>The SDT notes your concurrence with allowing credit for model verification occurring within the last 5 years of the Standard approval date.</p>		
SERC Dynamics Review Subcommittee (DRS)	No, the phase in period for unit excitation system verification should be (please specify below)	The first time period should be 3 years (10%). It is anticipated that testing of the first units will take significantly longer than subsequent testing. Although this factor may have been considered in the proposed time periods, other factors such as the potential shortage of testing services at the beginning of the testing window may not have been considered.
<p>Response: Thank you for your comments. The second draft of the standard extends the initial timeframe following standard approval for compliance to 4 years (which includes a one year allowance to allow entities time to put processes in place) for verifying 30% of required units. The SDT believes this additional time will better position the Generator Owners to leverage the planned outage schedule.</p>		
IRC Standards Review Committee	No, the phase in period for unit excitation system verification should be (please specify below)	We suggest that the usual implementation language be used. Requirement R1 sets the schedule for verification even for the first time based on a 10-year cycle (we suggest to be shortened to 5 years, especially for the analog and rotating type exciters). We agree with allowing credits for verification of excitation systems within the last 5 years of Standard's approval date.
<p>Response: Thank you for your comments. The SDT believes, and the majority of industry responders agreed, that the current implementation plan provides proper balance between the need to verify excitation control system models and the fact that there are Generator Owners that currently do not have the expertise to perform model verification required. It may not be feasible to rely entirely on consultants to assist the industry with performing unit verification within a short timeframe such as a 5 year period; possibly leading to compliance violations by unfortunate Generator Owners. The 10 year implementation timeframe will provide the industry adequate time to verify the models and data for the excitation control systems and also develop expertise for performing these verifications.</p>		
Consumers Energy	No, the phase in period for unit excitation system	The phase-in period of 2 years is likely to be insufficient unless there are significantly more consultants available than we think there are, as many Generator

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Organization	Yes or no	Question 10 Additional Comments or Recommendations:
Company	verification should be (please specify below)	Operators may need to hire a severely constricted resource.
<p>Response: Thank you for your comment. The second draft of the standard extends the initial timeframe following standard approval for compliance to 4 years (which includes a one year allowance to allow entities time to put processes in place) for verifying 30% of required units. The SDT believes this additional time will better position the Generator Owners to leverage the planned outage schedule.</p>		
Dynergy	No, the phase in period for unit excitation system verification should be (please specify below)	If the Generator Owner is assigned the responsibility for model verification, there will not be enough consultants to handle the resulting workload placed on Generator Owners.
<p>Response: Thank you for your comment. The SDT recognizes the issue with assigning responsibility for model verification and has extensively discussion the issue. The collective industry response to Question 1 did not indicate significant issue with the Generator Owner being responsible for model verification. Nevertheless, in response to a number of industry responders regarding the transition period, The second draft of the standard extends the initial timeframe following standard approval for compliance to 4 years (which includes a one year allowance to allow entities time to put processes in place) for verifying 30% of required units. The SDT believes this additional time will better position the Generator Owners to leverage the planned outage schedule.</p>		
Northeast Utilities	No, the phase in period for unit excitation system verification should be (please specify below)	We recommend a five or ten-year implementation with a requirement that units representing 20 or 10 percent, respectively, of installed capacity be tested each year. We are concerned that having only three milestones will place a burden on system operators to schedule testing because Genator Owners may wait until years two, six, and eleven to schedule testing instead of spreading the tests out over the implementation period.
<p>Response: Thank you for your comments. Your response indicates that you are not necessarily opposed to a 10 year implementation plan however you are concerned that the scheduling flexibility afforded by not having yearly milestones would allow Generator Owners to procrastinate and perform model verification activities at the last minute. Keep in mind the majority of industry appears to agree with the SDT that the milestones specified are appropriate because a) the first milestone provides Generator Owners preparation time for performing model verification, including the potential to develop in-house expertise; and b) the milestones specified allow model verification activities to be performed during scheduled maintenance outages, especially when electing to perform staged tests. The SDT expects the Generator Owner to manage model verification scheduling in a responsible manner to remain compliant.</p>		
ISO New England Inc.	No, the phase in period for unit excitation system verification should be (please specify below)	2-1/2 years with a 5 year overall renewal of verification.
<p>Response: Thank you for your comments. The SDT believes, and the majority of industry responders agreed, that the current implementation plan provides proper balance between the need to verify excitation control system models and the fact that there are Generator Owners that currently do not have the expertise to perform model verification required. It may not be feasible to rely entirely on consultants to assist the industry with performing unit verification within a short timeframe such as a</p>		

Organization	Yes or no	Question 10 Additional Comments or Recommendations:
<p>5 year period; possibly leading to compliance violations by unfortunate Generator Owners. The 10 year implementation timeframe will provide the industry adequate time to verify the models and data for the excitation control systems and also develop expertise for performing these verifications.</p> <p>Regarding your recommendation to shorten the re-verification cycle to 5 years, the SDT did not find evidence indicating a shorter cycle would materially improve model quality.</p>		
Ameren	No, the phase in period for unit excitation system verification should be (please specify below)	<p>(1) The term "verification" should be defined. Defining "verification" would give Generator Operators/Generator Owners a clearer understanding of what data should be verified in the model.(2) The first time period should be 3 years (10%). It is anticipated that the first units will take significantly longer than subsequent testing. Although this factor is already being considered in proposed time periods, there will probably be a significant shortage of testing services at the beginning of the testing window. (3) The last period for 100% of applicable units should be 12 years to match with 12 years of outage cycle.</p>
<p>Response: Thank you for your comments. The second draft of the standard lists unit-specific information required to be documented following completion of excitation system model verification. This information should resolve any confusion of the term "verification."</p> <p>Regarding your second comment, the second draft of the standard extends the initial timeframe following standard approval for compliance to 4 years (which includes a one year allowance to allow entities time to put processes in place) for verifying 30% of required units. The SDT believes this additional time will better position the Generator Owners to leverage the planned outage schedule.</p> <p>Your third comment is unique in terms of specifying a 12 year outage cycle. The SDT, support by industry comments, believes that the 10 year implementation timeframe will provide the industry adequate time to verify excitation control system model and data and also develop expertise to perform verification in-house.</p>		
Hydro-Québec TransEnergie (HQT)	No, the phase in period for unit excitation system verification should be (please specify below)	<p>The proposed impmentation plan is too long. We recommend a five-year implementation with a requirement that units representing 20 percent of installed capacity be tested each year. We are concerned that an eleven-year implementation plan does not adequately promote system reliability, and that having only three milestones will place a burden on system operators to schedule testing because Genator Owners may wait until years two, six, and eleven to schedule testing instead of spreading the tests out over the implementation period.Credit could be allowed for verification of excitation systems within the last five years of the Standards approval date.</p>
<p>Response: Thank you for your comments. The SDT believes, and the majority of industry responders agreed, that the current implementation plan provides proper balance between the need to verify excitation control system models and the fact that there are Generator Owners that currently do not have the expertise to perform model verification required. It may not be feasible to rely entirely on consultants to assist the industry with performing unit verification within a short timeframe such as a</p>		

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Organization	Yes or no	Question 10 Additional Comments or Recommendations:
<p>5 year period; possibly leading to compliance violations by unfortunate Generator Owners. The 10 year implementation timeframe will provide the industry adequate time to verify the models and data for the excitation control systems and also develop expertise for performing these verifications.</p> <p>The Generator Owner will determine the verification method and most likely related testing will be done with the unit off line as part of a scheduled maintenance outage; which will result in testing being satisfactorily distributed over the 10 year phase-in period.</p> <p>Regarding your concern that the scheduling flexibility afforded by not having yearly milestones would allow Generator Owners to procrastinate and perform model verification activities at the last minute. Keep in mind the majority of industry appears to agree with the SDT that the milestones specified are appropriate because a) the first milestone provides Generator Owners preparation time for performing model verification, including the potential to develop in-house expertise; and b) the milestones specified allow model verification activities to be performed during scheduled maintenance outages, especially when electing to perform staged tests. The SDT expects the Generator Owner to manage model verification scheduling in a responsible manner to remain compliant.</p> <p>The SDT notes your concurrence with allowing credit for verification occurring within the last 5 years of the Standard approval date.</p>		
Independent Electricity System Operator	No, the phase in period for unit excitation system verification should be (please specify below)	10 years is too long a period to phase in full compliance with this standard. We recommend this be shortened to no more than 5 years so that the continent can have a fully verified set of excitation system data by that time to support modeling and simulation. This has been long overdue, and allowing the 10-year phase in period prolongs achieving the desirable reliability objectives. We also suggest the SDT to consider shortening the re-verification cycle to 5 years.
<p>Response: Thank you for your comments. The SDT does agree that implementation of an enforceable excitation control system model verification standard is overdue. The SDT believes, and the majority of industry responders agreed, that the current implementation plan provides proper balance between the need to verify excitation control system models and the fact that there are Generator Owners that currently do not have the expertise to perform model verification required. It may not be feasible to rely entirely on consultants to assist the industry with performing unit verification within a short timeframe such as a 5 year period; possibly leading to compliance violations by unfortunate Generator Owners. The 10 year implementation timeframe will provide the industry adequate time to verify the models and data for the excitation control systems and also develop expertise for performing these verifications.</p> <p>The Generator Owner will determine the verification method and most likely related testing will be done with the unit off line as part of a scheduled maintenance outage; which will result in testing being satisfactorily distributed over the 10 year phase-in period.</p> <p>Also note that through the requirements of standards MOD-012 and MOD-013, the current dynamics database should already be reasonably representative of actual equipment performance.</p>		
American Transmission Company	No, the phase in period for unit excitation system verification should be (please specify below)	20% per year for the next 5 years.
<p>Response: Thank you for your comment. The SDT believes, and the majority of industry responders agreed, that the current implementation plan provides proper balance between the need to verify excitation control system models and the fact that there are Generator Owners that currently do not have the expertise to perform</p>		

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Organization	Yes or no	Question 10 Additional Comments or Recommendations:
<p>model verification required. It may not be feasible to rely entirely on consultants to assist the industry with performing unit verification within a short timeframe such as a 5 year period; possibly leading to compliance violations by unfortunate Generator Owners. The 10 year implementation timeframe will provide the industry adequate time to verify the models and data for the excitation control systems and also develop expertise for performing these verifications.</p>		
US Bureau of Reclamation	No, the phase in period for unit excitation system verification should be (please specify below)	We recommend a 5-year phase in period.
<p>Response: Thank you for your comments. The SDT believes, and the majority of industry responders agreed, that the current implementation plan provides proper balance between the need to verify excitation control system models and the fact that there are Generator Owners that currently do not have the expertise to perform model verification required. It may not be feasible to rely entirely on consultants to assist the industry with performing unit verification within a short timeframe such as a 5 year period; possibly leading to compliance violations by unfortunate Generator Owners. The 10 year implementation timeframe will provide the industry adequate time to verify the models and data for the excitation control systems and also develop expertise for performing these verifications.</p>		
Energy Fossil Operations	Yes, agree with allowing credit for verification of excitation systems within the last 5 years of the Standard's approval date	I vote yes on both of the questions.
<p>Response: Thank you for your comment. The SDT appreciates your comment.</p>		
AESO	Yes, agree with allowing credit for verification of excitation systems within the last 5 years of the Standard's approval date	The AESO agrees with the SRC ISO/RTO comments.
<p>Response: Thank you for your comment. The SDT was unable to identify the other commenter mentioned – but if their comments are included, please reference the response.</p>		
Wisconsin Public Service	Yes, agree with allowing credit for verification of excitation systems within the last 5 years of the Standard's approval date	At the Web-ex I thought the phase in was 10% per year with 100% by end of yr 11. This makes it sound like a different phase in will be used but no details on % at the 2, 6, and 11 year windows.
<p>Response: Thank you for your comments. For details please see the proposed effective dates in the second draft of the Standard.</p>		
AWEA	Yes, agree with allowing credit for verification of excitation systems within the last 5 years of the Standard's approval date	I agree with both the phase in period and allowing credit for units verified within the last 5 years via regional standards

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Organization	Yes or no	Question 10 Additional Comments or Recommendations:
<p>Response: Thank you for your comment. The SDT appreciates your comment.</p>		
Progress Energy, Inc.	Yes, agree with allowing credit for verification of excitation systems within the last 5 years of the Standard's approval date	The first time period should be 3 years (10%). It is anticipated that the first units will take significantly longer than subsequent testing. Although this factor is already being considered in proposed time periods, there will probably be a significant shortage of testing services at the beginning of the testing window.
<p>Response: Thank you for your comments. The second draft of the standard extends the initial timeframe following standard approval for compliance to 4 years (which includes a one year allowance to allow entities time to put processes in place) for verifying 30% of required units. The SDT believes this additional time will better position the Generator Owners to leverage the planned outage schedule.</p>		
Indiana Municipal Power Agency	Yes, agree with allowing credit for verification of excitation systems within the last 5 years of the Standard's approval date	IMPA is concerned about the implementation plan. The 10 percent in two years seems feasible, but what if companies decide to test all their units to save on travel cost of a contractor. Has the SDT looked at the total number of units that are covered by this standard and how many contractors can do this work? For example, if a company owns five or more peaking units in one location or in close proximity, they may decide to test all their units at the same time and pay for only one trip by the contractor. Then the next Generator Operator does the same with its units and this continues to occur throughout the two year time period. This type of mentality may hurt the Generator Operator who owns only one unit and has to wait on an available contractor to perform the test. If the Generator Operator does not get that one unit tested within the first two years, it will be non-compliant with this standard (the Generator Operator only owns one unit that this standard applies).
<p>Response: Thank you for your comments. The second draft of the standard extends the initial timeframe following standard approval for compliance to 4 years (which includes a one year allowance to allow entities time to put processes in place) for verifying 30% of required units. The SDT believes this additional time will better position the Generator Owners to leverage the planned outage schedule.</p>		
NERC Event Analysis & Information Exchange staff	Yes, agree with allowing credit for verification of excitation systems within the last 5 years of the Standard's approval date	
Dominion	Yes, agree with allowing credit for verification of excitation systems within the last 5 years of the Standard's approval date	

Consideration of Comments on Draft Standard MOD-026-1 — Project 2007-09

Organization	Yes or no	Question 10 Additional Comments or Recommendations:
Kansas City Power & Light	Yes, agree with allowing credit for verification of excitation systems within the last 5 years of the Standard's approval date	
MRO NERC Standards Review Subcommittee	Yes, agree with allowing credit for verification of excitation systems within the last 5 years of the Standard's approval date	
FirstEnergy	Yes, agree with allowing credit for verification of excitation systems within the last 5 years of the Standard's approval date	
Constellation Power Generation & Constellation Nuclear	Yes, agree with allowing credit for verification of excitation systems within the last 5 years of the Standard's approval date	
E.ON U.S.	Yes, agree with allowing credit for verification of excitation systems within the last 5 years of the Standard's approval date	
Arizona Public Service Co.	Yes, agree with allowing credit for verification of excitation systems within the last 5 years of the Standard's approval date	
Wisconsin Electric	Yes, agree with allowing credit for verification of excitation systems within the last 5 years of the Standard's approval date	
Reliant Energy	Yes, agree with allowing credit for verification of excitation systems within the last 5 years of the Standard's approval date	
Reliant Energy	Yes, agree with allowing credit for verification of excitation systems within the last 5 years of the Standard's approval date	

Consideration of Comments on Draft Standard MOD-026-1 — Project 2007-09

Organization	Yes or no	Question 10 Additional Comments or Recommendations:
Luminant Power	Yes, agree with proposed phase in period for unit excitation system verification	Note that I also agree with allowing credit for verification of excitation systems within the last 5 years of the Standard's approval. The form would not let me select both yes answers.
Response: Thank you for your comment. The SDT appreciates your comment.		
Southern Company	Yes, agree with proposed phase in period for unit excitation system verification	We agree with both Yes statements above. The software will only allow one to be marked.
Response: Thank you for your comment. The SDT appreciates your comment.		
City of Garland, Garland Power & Light - GOP Registered Entity	Yes, agree with proposed phase in period for unit excitation system verification	Agree with both "Yes" statements - form will only allow one to be selected - if the 2 "Yes" statements are mutually exclusive, then I must not understand your statements & will go with the 1st "Yes"
Response: Thank you for your comment. The SDT appreciates your comment.		
Duke Energy	Yes, agree with proposed phase in period for unit excitation system verification	We wanted to also check "YES" on allowing credit for verification of excitation systems within the last 5 years of the Standard's approval date, but this electronic form wouldn't allow us to do that.
Response: Thank you for your comment. The SDT appreciates your comment.		
Pepco Holdings, Inc (PHI) - Affiliates	Yes, agree with proposed phase in period for unit excitation system verification	
Southwest Power Pool Generation Working Group	Yes, agree with proposed phase in period for unit excitation system verification	
FEUS	Yes, agree with proposed phase in period for unit excitation system verification	
Cowlitz County PUD	Yes, agree with proposed phase in period for unit excitation system verification	

Consideration of Comments on Draft Standard MOD-026-1 — Project 2007-09

Organization	Yes or no	Question 10 Additional Comments or Recommendations:
Exelon Corporation	Yes, agree with proposed phase in period for unit excitation system verification	
American Wind Energy Association	Yes, agree with proposed phase in period for unit excitation system verification	
Manitoba Hydro	Yes, agree with proposed phase in period for unit excitation system verification	
Southern California Edison	Yes, agree with proposed phase in period for unit excitation system verification	
Xcel Energy	Yes, agree with proposed phase in period for unit excitation system verification	

11. If you are aware of any regional variances that would be required as a result of this standard, please identify them here.

Summary Consideration:

No regional variances were identified by industry.

Organization	Yes or No	Question 11 Regional Variance and Comment
Northeast Power Coordinating Council		None.
Dominion		SERC - supplement requires members to validate the excitation system model parameters of their generating units within 7 years (dated 2007).MRO draft guideline in field test, not currently in effect.
Response: Thank you for your comment. The SERC DRS has been notified by the SDT. The SERC DRS indicates they do not have plans to pursue a Regional Variance.		
Kansas City Power & Light		Not aware of any regional differences.
Response: Thank you for your comment.		
MRO NERC Standards Review Subcommittee		No
IRC Standards Review Committee		None
Luminant Power		Possible regional variance on applicability with GOP vs. GO in ERCOT.
Response: Thank you for your comment. Based on guidance provided by the FMWG, the SDT has designated the Generator Operator as the applicable entity in the second posting of the standard.		
Constellation Power Generation & Constellation Nuclear		None.

Organization	Yes or No	Question 11 Regional Variance and Comment
Consumers Energy Company		N/A
American Electric Power		No known need for regional variances
Response: Thank you for your comment.		
Manitoba Hydro		none
Progress Energy, Inc.		No.
Dynergy		None at this time.
Ameren		None
AESO		The ones we are aware of have been noted in the responses previous questions.
Response: Thank you for your comments..		
Duke Energy		None
Hydro-Québec TransEnergie (HQT)		Yes, we have a modification to propose to the Applicability section which list different value for different Region or Interconnection. We propose that the two paragraphs in Applicability 4.1.1.1 be modified to: Each unit (including synchronous condensers) 50 MVA, connected at the point of interconnection at 100 kV or above and with an average Capacity Factor greater than 5% over the last three calendar years. Each unit (including synchronous condensers) 20 MVA within a plant 100 MVA, connected at the point of interconnection at 100 kV or above and with an average Capacity Factor greater than 5% over the last three calendar years.
Response: Thank you for your comments. The SDT believes that the industry has overwhelmingly accepted the model verification 80% threshold which would result based on the draft language of the Applicability section.		
Independent Electricity System Operator		Variances are already provided in the Applicability Section (for the 3 Interconnections).

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Organization	Yes or No	Question 11 Regional Variance and Comment
Response: Thank you for your comment.		
US Bureau of Reclamation		WECC has developed a comprehensive regional machine testing and model validation policy that includes dynamic models for all the major generation components and the applicability thresholds are much more strict than those proposed in the draft MOD-026-1.
Response: Thank you for your comments. The SDT understands WECC is not planning to submit a regional variance at this time.		

12. If you are aware of any conflicts between the proposed standard and any regulatory function, rule, order, tariff, rate schedule, legislative requirement, or agreement, please identify them here.

Summary Consideration:

No substantial conflicts were identified by industry.

Organization	Yes or No	Question 12 Conflict
Northeast Power Coordinating Council		None.
Kansas City Power & Light		Not aware of any conflicts.
MRO NERC Standards Review Subcommittee		No
IRC Standards Review Committee		None
Luminant Power		NA
Constellation Power Generation & Constellation Nuclear		None.
Consumers Energy Company		N/A
American Electric Power		CONFLICT: The added expense posed by the requirements of this standard must be sought through tariff changes with applicable regulatory authorities. COMMENTS: A strong cost-benefit analysis is required to receive the necessary cost recovery.
<p>Response: Thank you for your comment. The SDT believes that the Applicability section has been structured so that industry cost is minimized, which the majority of industry responders agree.</p>		
Manitoba Hydro		none
Progress Energy, Inc.		No.
Dynergy		None at this time.

Consideration of Comments on Draft Standard MOD-026-1 — Project 2007-09

Organization	Yes or No	Question 12 Conflict
Ameren		None
Duke Energy		None
Independent Electricity System Operator		None

13. If you have any other questions or concerns with the proposed standard that have not been addressed in responding to the questions above, please provide them here.

Summary Consideration:

Based in part on industry comments received to this question, the following modifications to the proposed standard have been made by the SDT. (note: some of these issues and listed modifications are addressed by other consideration of comments questions):

- 1) Use the term “excitation control system” as appropriate to be consistent with terminology used in IEEE 421.1 (includes the voltage regulator, exciter, and generator).
- 2) Clarify the new Applicability section (including footnotes) to indicate that only units with 5% or less capacity factor are exempt with status reaffirmed every ten years. including new requirement (reference Requirement R5 in the revised standard) providing a mechanism for low capacity factor units identified by the Planning Coordinator to require model verification.
- 3) Modify the Applicability section to include “same point of interconnection” language.
- 4) Clarify the SDT position regarding the potential reliability gap with wind generation. Based on industry comments and concerns expressed by NERC staff, the SDT has expanded the Applicability section to include a large percentage of small units which would include variable energy resources such as wind generation.
- 5) Requirements have been restructured for clarity in the second posting of the standard.

Organization	Question 13 Comments
NERC Event Analysis & Information Exchange staff	It seems that having an overall generator testing standard in place on the dynamic parameters listed in MOD-013 would be a prerequisite for an excitation testing standard.
<p>Response: Thank you for your comment. The SDT agrees an accurate representation of the generator system is essential for obtaining a match between simulated and measured results however, the SDT believes that a match between simulation and measured results for the excitation system model validation indicates that the generator and excitation control system models are both representative of the equipment. If the results do not match, then the SDT agrees further testing may be required to obtain appropriate generator parameters. To prevent further delays with developing the MOD-026 standard, the SDT will not consider a generator verification standard as part of the exciter verification standard development process.</p>	
Southwest Power Pool Generation Working	The SPP Generation Working Group members have several concerns related to this standard. The skill-set required to perform these tests do not currently exist among Generator Owners and there is a great concern that the limited subset of consultants that will be able to perform this

Organization	Question 13 Comments
Group	<p>verification will not be able to complete these tasks within the suggested ten year period. Given the limited subset of parties that will perform these tests, the cost will be onerous on the Generator Owners while not providing significant benefits. SPP Generation Working Group members do not know of any issue that these enhanced requirements would have helped avoid and therefore see little value, given the potentially high cost, to these expanded requirements. SPP Generation Working Group members generally oppose the current version of this standard.</p>
<p>Response: Thank you for your comments. Field testing confirmed that verification of excitation system models does result in higher quality dynamics data that will result in more accurate dynamic simulations that can define security limits so the SDT believes that these requirements positively contribute to BES reliability. Field test also indicated there is a cost to perform excitation system model verification so the SDT believes that the NERC Compliance Registry should not be referenced in the Applicability section. Instead, the Applicability section will identify a subset of units defined by the Compliance Registry which are expected to have significant impact on BES reliability.</p>	
SERC Dynamics Review Subcommittee (DRS)	<p>Requirement 1 says testing should occur "for new or existing units within 180 days of commercial operation". We believe the testing should be done before commercial operation.</p>
<p>Response: Thank you for your comments. The SDT notes some areas have existing grid code that require excitation control system model verification before commercial operation occurs. The SDT recognizes transmission entities can adopt more stringent requirements.</p>	
Dominion	<p>The SDT should define exactly what the "excitation model" means. At a minimum it should include the AVR, exciter, PSS (if installed) and voltage compensator (if installed). The current document appears to imply that the minimum and maximum excitation limiters (if installed) are not part of the "excitation model." 2. We are concerned that, in order to meet this standard, applicable entities may have to share data and software that may be proprietary and which may vary depending upon vendor(s) selected by the Transmission Planner. R2 states that models cannot be confidential or proprietary. 3. We believe that applicability section should be modified so that it only includes entity(ies) defined in the NERC Functional Model. At 4.1.1 it states Generator Operators of generating facilities: We believe it should state Generator Owner (the term used in functional model). a. We can support 4.1.1.1 if the language is revised to read With generators that are connected to Eastern or Quebec Interconnections with the following characteristics 4. The requirement R2 should be restated to read: The Transmission Planner shall provide the Generator Owner a set of model data sheets for the standard (as opposed to acceptable) excitation system models for use in dynamic simulation software, with each data sheet including the excitation system model block diagram structure and data requirements, within 30 calendar days of a request from the Generator Owner. If the excitation system characteristic is such that it cannot be represented by one of the Standard models, the Generator Owner shall be obligated to have a user-written model developed and made it available to Transmission Planner for use in the dynamic simulation software used by the Transmission Planner.</p>
<p>Response: Thank you for your comments. After reviewing IEEE 421.1, the SDT believes that the term "excitation control system model" is more appropriate to use in the standard than "excitation system model." This is because the term "excitation control system model" references the entire closed loop system including the synchronous machine. The SDT has adopted this language in the second draft of the standard; which also includes excitation system limiters that are part of the exciter. This language does not include excitation protective devices that are independent of the excitation system. Independent protective devices will be addressed in the initial</p>	

Organization	Question 13 Comments
	<p>posting of the draft standard PRC-019. Regarding your second comment, the SDT believes proprietary models cannot be allowed and that the static block diagram must be selected from the list of models provided by the Transmission Planner. Regarding your third comment on the Applicability section, the SDT believes that the combination of the Functional Model entity and the criteria statement of unit size per interconnection is appropriate. The SDT recognizes that user written models are sometimes necessary however this is not desirable. The SDT purposely changed Requirement language such that the Generator Owner would have to propose a user written model to its Transmission Planner for incorporation on the acceptable list of model data sheets.</p>
<p>Kansas City Power & Light</p>	<p>Where specific codes and standards are referenced as either the technical basis for, or an acceptable means to comply with the NERC requirements, such as IEEE 421 referenced directly in Draft 1 of MOD-026-1, or IEEE 1110 and IEEE 415, please clarify these are references only and the content of these references in no way add to the requirements proposed here.</p>
<p>Response: Thank you for your comments. Please note that the References section contains the disclaimer: “The following documents contain technical information beyond the scope of this Standard on excitation control system functionality, modeling, and testing.”.</p>	
<p>FirstEnergy</p>	<p>1. In R1.4 it should be clear that the unit is achieving the 5% capacity factor for the first time over the last three calendar years.2. R9 states that the Generator Operator shall make documentation demonstrating the excitation system model's response is appropriate available for inspection and technical review 'to' the RC, TOP, and PC. The term "make available" is vague and should be revised to provide more specifics as to how this information is to be made available for inspection and technical review 'by' the RC, TOP, and PC.3. The term "Capacity Factor" is not NERC defined and is shown as capitalized in the standard. We suggest the team develop either a standard-specific or NERC Glossary definition. The following is a suggestion: "Capacity Factor (expressed as a percent) - The net actual energy generation (MW-hours) divided by the product of the period (hours) and the net maximum nameplate rating (MW)."4. Sec. 4 Applicability - We do not agree with the criteria proposed for the Eastern Interconnection and believe it may leave out some important or critical units. Also, it may be better to just have one criteria throughout the interconnections. We recommend the SDT consider using the NERC Registry Criteria for all units based on plant aggregate of 75 MVA or greater and unit size of 20 MVA or greater.5. Per Question 10 above, why wouldn't the Regional Entity procedures or guidelines be allowable for compliance after the first 5 years? [Note: It is assumed that the SDT intended to say "first" 5 years, not "last" five years in the description after Box 3 of that question]</p>
<p>Response: Thank you for your comments. Based on industry comments, the second draft of the standard has been modified to make clear in the Applicability section (including related footnote) that only the capacity factor three year average must be checked once every 10 years . Note that there are other mechanisms in the standard that could result in low capacity factor units being verified (refer to Requirement R6, reference Requirement R2 in the revised standard). Regarding the term “make ...available”, the SDT has reworded the language, now contained in Requirement R2 that does away with the term “make...available”. The SDT agrees that the term “capacity factor” was incorrectly capitalized in the draft standard and has been corrected in the second draft. The SDT did consider using the NERC Registry Criteria, but the SDT recognized that the excitation system models and model data are already collected through the processes identified in standards MOD-012 and MOD-013 and, with few exceptions, already establish a quality dynamics database. Therefore, based in part on recent entity experience with verifying excitation system models, the SDT is proposing to require verification of excitation systems associated with 80% or greater of the connected MVA per Interconnection. The vast majority of industry responders agree with t this approach (reference Question 8). Also note that the second draft of the standard includes a process for selecting additional units for excitation control system model verification. Regarding the implementation plan, the SDT has clarified the language for models already verified by Regional Procedures</p>	

Organization	Question 13 Comments
through year 5.	
Entergy Fossil Operations	<p>In Requirement R5 in the event that a model is determined to be unusable and is returned to the Generator Owner for further action the transmission operator should be required to also provide the steps he has taken to exercise due diligence in the integration of the exciter system model into the over all model. This should take the form of review of data inserted against data provided, model name reviewed against model provided, etc.The transmission operator should also provide the Generator operator with text copy of the actual exciter and generator portion of the overall model.</p>
<p>Response: Thank you for your comments. The SDT believes that both parties have a vested interest in resolving issues leading to unusable models. As such, the SDT does not believe that specific details regarding the exchange of information during entity collaboration needs to be specified in the Requirements.</p>	
IRC Standards Review Committee	<p>We offer the following comments: a. The proposed standard lacks clarity needed for implementation as a mandatory standard. Specifically, there are different views in the industry as to what exactly is a model data sheet. Is it the block diagram of the excitation system's control system and parameters, or is it the simulation software's model sheet such as, for example, a vendor's data sheet for a specific type of exciters which it is capable of modeling in its simulation software, say, IEEEEST, EXST1, or whatever name it may be, etc. We suggest clearer language be used to more specifically describe what a model data sheet means. Also, verification is subject to interpretation: is it a comparison of the expected input/output response of the excitation system versus actual response, or the expected performance of the generators when a computer simulation is conducted? b. A number of points/bullets in several requirements need to be performed to meet the intent of the main requirements, even though some of them are mutually exclusive (i.e. either/or). As such, they should be labeled sub-requirements. These include:- R1: Points number 1 and 2- R4: Points number 1 to 5- R11: All bullets- R10: Both bullets- R12: The last 2 bulletsc. R5: The condition that "if the excitation system model is usable" needs further elaboration. Evidence showing either Conditions (1) or (2) may suggest that either the model incorrectly reflects the excitation system or the excitation system itself, despite being modeled correctly, gives rise to the observed condition. The word "usable" thus needs to be expanded to more properly indicate whether the data is not usable or the excitation system is no useable. d. R6: The above comment on R5 also applies to R6.</p>
<p>Response: Thank you for your comments. The SDT has modified the language (reference Requirement R1 in the revised standard) to contain the phrase “software manufacturer’s dynamic excitation control system or plant volt/var control function system model library block diagrams and/or data sheets”. Verification specified in Requirement R8 (reference Requirement R2 of the revised standard), is achieved when it is shown that the excitation system model’s response (i.e., predicted response utilizing the model in a dynamic simulation) matches the recorded response for a voltage excursion at the generator terminals. The structure of Requirements in the first draft was envisioned to make it easier to construct Measures, Violation Severity Levels etc.. Requirement number and bullet lists conform with standard development protocol. Specifically, a number list indicates all requirement list actions must be performed by the entity whereas the bullet list indicates the entity selects which of the requirement list actions is appropriate to perform. Action for determining if the model is useable or not should not be confused with model verification for ensuring the model response matches the actual equipment response. A model is considered “useable” if it does not cause angle drift during a no-disturbance simulation or does not causes poor or undamped oscillations in a dynamic simulation of a mild system fault disturbance. Requirement R5 (reference Requirement R6 in the revised standard) does not reference the ability of the model to accurately predict the expected actual response of the equipment.</p>	

Organization	Question 13 Comments
FEUS	The excitation models as currently required are comprised of testing and data collection to determine the variables for the model parameters. How does additional testing, over and above what was done to construct the model, accomplish anything and how would it be any different than original testing to complete the model?
<p>Response: Thank you for your comments. The SDT assumes your comments refer to the periodicity for verification. The SDT believes that a 10 year timeframe is a reasonable re-verification requirement. This timeframe is supported by an overwhelming majority of industry comments.</p>	
Exelon Corporation	The proposed standard and comment form presuppose the generator owners have the expertise necessary to model and simulate the excitation systems on the units they own. They do not in most cases. Software requirements need to be considered. Not all transmission planners use the same software for dynamic simulations. A single generation owner may have units in multiple regions involving different transmission planners and would have to provide models for more than one simulation program. The standard needs to allow the Transmission Planner/Operator/Owner to provide expertise to the generator owner. The comment form and the WebEx meetings are more specific regarding software simulations than what is specified in the draft standard. The software simulations should be specified in more detail in the standard.
<p>Response: Thank you for your comments. The SDT agrees that a cooperative effort is required among NERC functional model entities in order to develop a robust excitation system model. As mandated by Reliability Standard process, only one entity is assigned responsibility for excitation system model verification. The SDT believes it has incorporated into the draft standard all necessary interactions with other functional model entities required for ensuring model verification success. The Generator Owner is responsible for model verification. It is anticipated that the Generator Owner could delegate model verification activities to other entities by contractual agreement as appropriate. The draft standard does not require the Generator entity to perform dynamic simulations to determine Bulk Electric System limits. The generator entity is responsible for ensuring that the excitation system model response matches the response from a recorded voltage excursion. This can be accomplished through software that is much simpler than full dynamic simulation software utilized by Transmission Planners for assessing BES limits. The standard cannot list specific commercial software options.</p>	
Constellation Power Generation & Constellation Nuclear	The standard needs to clarify what verification of excitation system model entails; does this involve testing of excitation parameters? Online or offline. On line testing of excitation parameters will present an unacceptable tripping risk to nuclear units. Recommend nuclear units be exempt from excitation system model verification if it involves online testing.
<p>Response: Thank you for your comments. Online testing is not required. The SDT believes it is best to leave the technical details of model verification to the experts. The draft standard simply requires demonstration that a recorded excitation control system response matches the model predicted response. The recorded excitation control system response could be obtained by ambient monitoring or an open circuit step in voltage test, neither of which is an online test. In part because online testing is not required, the SDT does not foresee a reliability need to exempt nuclear units from model verification.</p>	
Southern Company	<p>Paragraph 4.1.1.1 3rd Section: The plant criteria should be assessed on a switchyard basis instead of all inclusive. For example: 5 unit station with 4 units > 100 MVA each connected at 500 kV and one unit <50 MVA connected at 115 kV. Why do I need to do the small unit?</p> <p>Paragraph R1.2: See discussion in question 3 above regarding the criterion of 'sited at the same physical location and MVA ratings.' We see</p>

Organization	Question 13 Comments
	<p>no need for these restrictions. Paragraph R7: A third option is to do more testing/technical assessment with a longer time allowed (>90 days) should be included. Paragraph R8: The last part of this requirement is unclear: 'within 90 calendar days. verification.' Change the wording from 90 calendar days of completion to 90 calendar days after completion. The requirement will then read, " The Generator Operator shall provide to the Transmission Planner documentation demonstrating that the excitation's system model's response matches the recorded response for a voltage excursion at the generator from either a staged test or a measured system disturbance (i.e., an ambient event) within 90 calendar days after completion of the excitation system model verification ." Paragraph R12: The second and third bullets should be combined to cover any DCS/AVR inter-actions.</p>
<p>Response: Thank you for your comments. The concern expressed in your first comment has been addressed in the 2nd draft of the standard by modifying the language in the Applicability section to make it clear that the thresholds identified are for units interconnected to the same transmission voltage level bus. For your second comment, please reference Question 3. Regarding your third comment, the second draft of the standard allows for the verified model and documentation to be provided to the Transmission Planner within one year from the date that the recorded voltage excursion used for model verification was collected (reference Requirement R2 in the draft standard, and the Periodicity Attachment). The SDT agrees with recommended modifications to Requirement R8 (reference Requirement R2, Part 2.1 in the revised standard) language and has made the modification. Regarding the last comment, the two DCS activities referenced could be combined however the SDT thought maintaining these as separate activities improved clarity.</p>	
E.ON U.S.	<p>E.ON U.S. believes that the staggered implementation time tables for the various standard requirements could needlessly complicate initial compliance efforts. E ON U.S. requests that the SDT review these deadlines and standardize using the most lenient implementation period set forth in the second draft. E.ON U.S. recommends that the standard explicitly state in the purpose statement that voltage regulators be included in excitation system models. Voltage regulators are explicitly mentioned in R4.3 and R12. E.ON U.S. recommends that study data inputs and results only be made publicly available pursuant to Requirement 2. Depending on arrangements with vendors, actual model configuration may be proprietary and require confidential disclosure arrangements</p>
<p>Response: Thank you for your comments. Not requiring excitation control system model verification for 10 years is not considered acceptable by the SDT. Note that Requirement R2 (reference Requirement R2, Part 2.1 in the revised standard) indicates only models on the list of acceptable excitation control system models can be utilized and it is not expected that any of these acceptable models will be confidential or proprietary given this would unduly disrupt the dynamic data base process which is necessary for Interconnection wide security analysis. After reviewing IEEE 421.1, the SDT believes that the term "excitation control system model" is more appropriate to use in the standard than "excitation system model." This is because the term "excitation control system model" references the entire closed loop system including the synchronous machine. The SDT has adopted this language in the second draft of the standard; which also includes excitation system limiters that are part of the exciter.</p>	
Consumers Energy Company	<p>It is our opinion that the SDT made a fundamental error in assigning the modeling to an entity that doesn't need the results of the model. To correct this error, this Standard needs very significant revision. As it stands, the Draft Standard imposes irrational requirements upon the Generator Operator.</p>
<p>Response: Thank you for your comments. The SDT understands that no matter who is assigned responsibility in the proposed continent-wide standard, it would potentially change the current business model of the functional entity. The majority of the SDT believes that a generation entity should have both final excitation system model responsibility and authority, Based on the majority of industry comments and guidance from the FMWG, the second draft of the standard assigns responsibility to</p>	

Organization	Question 13 Comments
	<p>the Generator Owner. Generator Owners have access to the equipment, along with access to the equipment's Original Equipment Manufacturer for assistance with technical issues. Historically, the Transmission Planner and Generator Owner entities used to work for the same company, but in today's functional model environment, Transmission Planners could easily work for a different company than the generation entity. As such, the stated access advantages for the generation entity do not transfer to the Transmission Planner. Note that existing business practices that utilize Transmission Planners can still exist; the only difference is that the Generator Owner would be ultimately responsible for the excitation system model verification from a compliance perspective. Also, the SDT is proposing an Implementation Plan to allow the Generator Owner time to develop in-house expertise to perform model verification if they do not desire to hire consultants.</p>
<p>Wisconsin Public Service</p>	<p>At plants with 200MW or higher capacity, it is unreasonable to assume multiple units of 20MW to malfunction simultaneously. Therefore, applying the standard to each unit of ≥ 20 MW if these are at the same contiguous plant of combined capacity of 200MW is placing unreasonable burden on owners of small generators. One must reason that, in the context of the whole eastern interconnect, comprising a total capacity of 600,000MVA and higher, individual generators of less than 100MVA would not impact the system to any significant degree except for very localized regions.</p>
<p>Response: Thank you for your comments. Please note that the Applicability section is based on MVA instead of MW. The MVA threshold specified are less stringent than the NERC Compliance Registry and appears to represent an appropriate threshold based on industry responses received.</p>	
<p>American Electric Power</p>	<p>(1) The added expense to fulfill the requirements of this standard where such model verification is not generally being done could be high. Since this is a new imposition on the industry in that required excitation model verification has never before been imposed in many areas, this leads to the question of cost versus reliability benefit of what is being proposed. We request that the SDT please comment more on the cost vs. reliability benefits.</p> <p>(2) With respect to R2, we suggest that it be revised and expanded as follows: "The Transmission Planner shall provide the Generator Operator a set of model data sheets for the acceptable excitation system models (models cannot be confidential or proprietary) for use in dynamic simulation software, with each data sheet including the excitation system model block diagram structure and data requirements and a system dynamics model, within 30 calendar days of a request from the Generator Operator."</p> <p>(3) With respect to R6, revise and expand the last sentence as follows: "If the TP determines the excitation system model is not useable, the TP shall provide the Generator Operator with a description of the problem and any relevant details, including the system dynamics case used in the evaluation."</p> <p>(4) With respect to last sentence in R9, revise and expand as follows, "?". after the receipt of a request that includes the measured data following a system disturbance and a suitable system dynamics case associated with the system disturbance.</p>
<p>Response: Thank you for your comments. Note that excitation control system model verification is part of the original NERC Planning Standards. Also, a major conclusion of the standard MOD-026 field testing performed for Phase III-IV is that verification of excitation models did provide a reliability benefit. Since the software used by a Generator Owner to perform model verification activities does not have to be a full dynamic simulation software package, the SDT does not see a need to add additional requirements for the Transmission Planner to provide system dynamic cases to the Generator Owner. However, if such cases are needed to resolve a model verification issues, then it would be beneficial and in the best interest of the Transmission Planner to provide dynamic cases to the Generator Owner.</p>	

Consideration of Comments on Draft Standard MOD-026-1 — Project 2007-09

Organization	Question 13 Comments
Arizona Public Service Co.	<p>The standard appears to be too unnecessary complicated. We have the following suggestion for simplification. 1)Requirements R1, R4, R11 and R12 are the only reliability related requirements and should be kept.</p> <p>2)R8 is part of providing data and should be a part of R4</p> <p>3)All other requirements are simply indicate process and do not belong in the standard. They should be part of a white paper on the subject or in an appendix.</p>
<p>Response: Thank you for your comments. The SDT combined several requirements in an effort to simplify the standard and improve clarity.</p>	
Wisconsin Electric	<p>Please consider the use of offline measurement of generator excitation response as a possible means to comply.</p>
<p>Response: Thank you for your comment. An open circuit step in voltage test, which is a test that is performed before the generator is synchronized to the transmission system, is acceptable. Also, note that the SDT drafted a Standard that concentrates on “stating what is required” but not “stating how to accomplish what is required”. Any technique that shows the excitation system model’s response matches the recorded response for a voltage excursion at the generator from either a staged test or a measured system disturbance (i.e., an ambient event) is acceptable.</p>	
Manitoba Hydro	<p>The MOD-026 Standard uses different terminology in two different places. In requirement 4, the fourth bullet uses the term Reactive compensation and in Requirement 12, the fourth bullet uses impedance compensator. Either term is fine to use, but should be consistent throughout the standard.</p>
<p>Response: Thank you for your comments. The SDT believes it has revised the standard such that the use of the term “compensation” is appropriate where utilized. The SDT would appreciate your feedback verifying that this has been accomplished.</p>	
Progress Energy, Inc.	<p>Requirement 1 Item 1) should be clarified to state that "new equipment commissioning date" applies to modifications of existing units. Requirement numbering for R1, R4, R5, R7-12 needs to be revised to conform to proper format.</p>
<p>Response: Thank you for your comments. Formatting for the second draft of the standard has been modified significantly to minimize confusion. The periodicity requirements have been transferred into a separate Attachment to avoid confusion over verification timing requirements.</p>	
Ameren	<p>(1) Requirement 1 states that testing should occur "for new or existing units within 180 days of commercial operation". We believe the testing for the new units should be done before commercial operation.</p> <p>(2) In Requirement R2, the Transmission Planner would not necessarily have any idea which model would best fit the installed equipment. The only workable way to comply with this requirement is for the Transmission Planner to give the Generator Operator the data sheets for the entire library of available exciter models. The Generator Operator would then need to determine which of these models would provide the best fit for the excitation system equipment to be modeled. We believe that this requirement should recognize that deriving "acceptable" model</p>

Organization	Question 13 Comments
	<p>for a specific excitation system is a cooperative effort between manufacturer, GO/GOP, and TP.</p> <p>(3) While wind generators would generally fall below the unit size thresholds as specified in Requirement 4.1.1, it would be very helpful in conducting dynamic simulations involving wind generators if their dynamic representations would be fit into one of the standard library models.</p> <p>(4) There are several 90 day periods mentioned in the Requirements. It might be helpful to be more specific as to which 90 day interval is meant. For example, Requirement R8 should read something like "?within 90 days of completion of the excitation system model verification as specified in Rx."</p> <p>(5) This comment is in reference to MOD-026-1, R.12. We believe that Digital Control Systems do not effect excitation systems models. Therefore we suggest removing requirements associated with Digital Control Systems.</p>
	<p>Response: Thank you for your comments. The SDT notes some areas have existing grid code that require excitation control system model verification before commercial operation occurs. The SDT recognizes transmission entities can adopt more stringent requirements. The SDT believes that the process described in Item 2 is desirable and expects involved entities to follow this process.</p> <p>Regarding Item 3: The MVA thresholds in the Applicability section of the first posting of MOD-026 resulted in wind powered units not being subject to this standard because no single wind unit is rated greater than 20 MVA. However, there is an increasing number of wind farms with significantly larger aggregate MVA. As such, their impact on the reliability of the Bulk Electric System cannot be ignored – otherwise, a reliability gap would be created.</p> <p>Therefore, based on your comments and other industry comments, the SDT discussed the possibility of requiring verification of dynamic models that represent the aggregate of numerous small units and any necessary auxiliary equipment as required due to the technology of the small units. This could include plant dynamic voltage control and reactive support of all the units and auxiliary equipment (such as individual WTG response, plant-wide volt/var controller response, and response from separate volt/var regulation devices contained in the plant, such as SVC/STATCOM/Synchronous Condenser) contained in any technology generation plant, including a wind farm (plant), that exceeds appropriate aggregate nameplate MVA threshold.</p> <p>There are dynamic models that adequately replicate wind unit performance for some wind units today. However, there are many existing wind units for which there are no publicly available models supplied by the Original Equipment Manufacturer. Generic wind models (i.e., type I, II, III and IV) are in various stages of development. Also, there are ongoing efforts involving Regional Entities and manufactures to close any large gaps that may exist in current generic models. Given that there will be significant time between now and the time that this standard could be approved by FERC, it is expected that generic wind farm (plant) models will reach an appropriate state of maturity for establishing boundary conditions in Bulk System Studies. In order to mitigate the reliability gap, the Applicability section will be expanded in the second posting of the standard to include significant MVA percentage of all generation for all technologies.</p> <p>Regarding the comment indicating that the 90 day periods referenced in the previous posting of the standard did not always clearly communicate schedule expectations, the SDT has moved required model verification periodicity information into a stand-alone Attachment attached to the standard for making it clear that model verification periodicity would occur at least every 10 years. The SDT has also ensured that other timing references in the second draft of the standard are clearly understood.</p> <p>Finally, several SDT team members have observed that DCS changes can affect excitation system performance within the timing cycle of the excitation system model...</p>

Organization	Question 13 Comments
AESO	<p>The AESO agrees with the SRC ISO/RTO comments. We would also like to emphasize the importance of complete unit testing as noted in our response to Question 4.</p>
<p>Response: Thank you for your comments. The SDT was unable to identify the other comment mentioned in Question 4. Please refer to that comment to review the SDT response provided.</p>	
Duke Energy	<p>Section 4.1 Should the standard be revised to include small units that are part of an aggregate 200 MW facility? For example : wind farms with many 1.5 MW turbines</p> <p>Recommend changing R5.1) to read The model initializes properly and a no-disturbance simulation contains no transients The second bullet of R7 allows an unusable model to not be corrected. Unless the point is that the unit would be out of compliance, this seems to negate requiring verification. Recommend the team to consider that all units that meet the applicability have usable models.</p> <p>For R12, rather than only listing the high level components, we recommend the team also note that other generator components such as a new excitation system power transformer (not a like-for-like changeout) can have an impact on aspects of the model.</p>
<p>Response: The MVA thresholds in the Applicability section of the first posting of MOD-026 resulted in wind powered units not being subject to this standard because no single wind unit is rated greater than 20 MVA. However, there is an increasing number of wind farms with significantly larger aggregate MVA. As such, their impact on the reliability of the Bulk Electric System cannot be ignored – otherwise, a reliability gap would be created.</p> <p>Therefore, based on your comments and other industry comments, the SDT discussed the possibility of requiring verification of dynamic models that represent the aggregate of numerous small units and any necessary auxiliary equipment as required due to the technology of the small units. This could include plant dynamic voltage control and reactive support of all the units and auxiliary equipment (such as individual WTG response, plant-wide volt/var controller response, and response from separate volt/var regulation devices contained in the plant, such as SVC/STATCOM/Synchronous Condenser) contained in any technology generation plant, including a wind farm (plant), that exceeds appropriate aggregate nameplate MVA threshold.</p> <p>There are dynamic models that adequately replicate wind unit performance for some wind units today. However, there are many existing wind units for which there are no publicly available models supplied by the Original Equipment Manufacturer. Generic wind models (i.e., type I, II, III and IV) are in various stages of development. Also, there are ongoing efforts involving Regional Entities and manufactures to close any large gaps that may exist in current generic models. Given that there will be significant time between now and the time that this standard could be approved by FERC, it is expected that generic wind farm (plant) models will reach an appropriate state of maturity for establishing boundary conditions in Bulk System Studies. In order to mitigate the reliability gap, the Applicability section will be expanded in the second posting of the standard to include significant MVA percentage of all generation for all technologies.</p> <p>The SDT agrees with the comment to add the phrase “model initializes properly” and has included this language in the second draft of the standard.</p> <p>Regarding Requirement R12 (reference Requirement R2 in the revised standard), the bullet point examples are not-inclusive (given the main requirement includes the phrase: “includes but are not limited to”). The SDT aimed to include examples likely to occur and while the example provided is valid, the SDT does not believe it is one of the most likely scenarios to occur.</p>	

Organization	Question 13 Comments
Xcel Energy	Capacity Factor needs to be defined.
<p>Response: Thank you for your comments. In the second draft standard, capacity factor is not capitalized and has been clarified in the Applicability section (also refer to the footnote).</p>	
Independent Electricity System Operator	<p>We offer the following comments:</p> <p>a. A number of points/bullets in several requirements need to be performed to meet the intent of the main requirements, even though some of them are mutually exclusive (i.e. either/or). As such, they should be labeled subrequirements. These include:- R1: Points number 1 and 2- R4: Points number 1 to 5- R11: All bullets- R10: Both bullets- R12: The last 2 bullets</p> <p>b. R5: The condition that "if the excitation system model is useable" needs further elaboration. Evidence showing either Conditions (1) or (2) may suggest that either the model incorrectly reflects the excitation system or the excitation system itself, despite being modeled correctly, gives rise to the observed condition. The word "useable" thus needs to be expanded to more properly indicate whether the data is not useable or the excitation system is not useable.</p> <p>c. R6: The above comment on R5 also applies to R6.</p>
<p>Response: Thank you for your comments. Regarding the organization recommendations provided, Requirement R1 details have been moved to a stand alone periodicity Attachment attached to the standard and the SDT significantly re-formatted the standard to reduce and simplify requirements so that entities will have a clear understanding of how to be compliant. The Violation Severity Levels will define treatment of these requirements for compliance. Additionally, there has been significant effort to streamline the draft standard. The SDT believes the new format is robust, fair, and will result in reasonable VRF and VSL determination. Regarding the use of the term "usability", the second draft of the standard identifies benchmarks which determine if the model is useable or not. As recommended by industry, the requirement that the model must initialize properly has been added to the standard. The SDT believes that the criteria defining model usability has been adequately specified.</p>	
American Transmission Company	<p>ATC disagrees with portions of Requirement 2 which stipulates that the TP shall provide the excitation system model block diagram (block diagram) structure and data requirements. Many manufactures currently make their block diagrams and data requirements available to the GO/GOP. In addition, IEEE Standard Definitions for Excitation System for Synchronous Machines allows a GO/GOP to identify the type of exciter and/or PSS installed on their units along with the corresponding block diagrams and data requirements. Recommend that the words following "dynamic simulation software." be deleted.</p>
<p>Response: Thank you for your comments. The SDT believes that it is critical for the Transmission Planner to provide the Generator Operator block diagram structures and data requirements that can be represented in the Transmission Planner dynamic simulation software package. Otherwise, the Generator Operator could perform verification with a model that would not run in the Transmission Planner dynamic simulation software package.</p>	
US Bureau of Reclamation	<p>We see a blurring of the requirements between Standards MOD-012-0-Dynamics Data for Transmission System Modeling and Simulation; MOD-013-0- RRO Dynamics Data Requirements and Reporting Procedures; and the draft of MOD-026-1 - Verification of Models and Data for Generator Excitation System Functions. If entities are in compliance with MOD-012-0 and MOD-013 we see no additional enhancement to</p>

Organization	Question 13 Comments
	reliability by the addition of this draft standard.
<p>Response: Thank you for your comments. Standards MOD-012 and MOD-013 state requirements for submission of data, including excitation control system model data. Standard MOD-026 state requirements for the verification of that data (i.e., that model and the model data adequately predict the expected actual performance of the equipment).</p>	
Luminant Power	NA
Dynergy	None at this time.
Northeast Power Coordinating Council	No.