NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Meeting Notes
Project 2013-03 Geomagnetic Disturbance Mitigation Standard Drafting Team Meeting

February 16, 2017 | 2:30 - 3:45 p.m. Eastern

Webex Meeting Number 731 660 682

Administrative

1. **Introductions**

   The meeting was brought to order by the Vice Chair at 2:30 p.m. eastern on February 16, 2017. Participants were:

First Name	Last Name	Company	Member/ Observer	In-person (Y/N)	Webex
Kal	Ayoub	FERC	O		X
Emanuel	Bernabeu	PJM Interconnection LLC	M		X
Regis	Binder	FERC	O		X
Louis	Gibson	Hydro-Quebec	M		X
Justin	Kelly	FERC	O		X
Per-Anders	Lof	National Grid	M		X
Luis	Marti	Hydro One	M		X
Mark	Olson	NERC	O		X
Jow	Ortiz	FPL	M		X
Ralph	Painter	Tampa Electric Co.	M		X
Lauren	Perotti	NERC	O		X
Antti	Pulkkinen	NASA Goddard	M		X

First Name	Last Name	Company	Member/ Observer	In-person (Y/N)	Webex
Qun	Qiu	AEP	M		X
Mike	Steckelberg	Great River Energy	M		X
Rui	Sun	Dominion Virginia Power	M		X
Berhanu	Tesema	Bonneville Power Administration	M		X
Various Web Participants (See attached)					

2. **Determination of Quorum**
   The rule for NERC Standard Drafting Team (SDT or team) states that a quorum requires two-thirds of the voting members of the SDT. Quorum was achieved as 10 of 13 members were present.
3. **NERC Antitrust Compliance Guidelines and Public Announcement**

   NERC Antitrust Compliance Guidelines and public announcement were reviewed by Mark Olson. There were no questions raised.
4. **Standards Authorization Request (SAR) comments, proposed responses, and revisions to project SAR were reviewed.** Participants discussed each comment. The SDT developed responses and agreed on the attached Consideration of Comments document for posting. Participants discussed changes to the SAR as suggested by stakeholders. The SDT agreed on clarifying changes to the SAR as shown in the attached redline SAR. Mark Olson will submit the revised SAR to the Standards Committee for acceptance.
5. **Draft TPL-007-2 Requirement R7 addressing Corrective Action Plan (Order No. 830 P 101-103) was reviewed.** Participants discussed proposed wording. SDT agreed that the proposed revision addressed the directive. The SDT will consider clarifications to part(s) of the requirement that specify what actions are needed when deadlines cannot be met.
6. The SDT discussed objectives and administrative details for the upcoming in-person meeting.
7. **Future meeting(s)**
   a. February 21-22 (GMD Task Force) | EPRI, Charlotte North Carolina
   b. February 27 - March 1 | ERCOT, Austin Texas
8. The meeting adjourned at 2:30 p.m. eastern on February 16, 2017

Participant	Name	Email
1	Gary Kobet	glkobet@tva.gov
2	Antti Pulkkinen	antti.a.pulkkinen@nasa.gov
3	Kal Ayoub	kal.ayoub@ferc.gov
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5	Mark Olson	mark.olson@nerc.net
6	Per-Anders Lof	per-anders.lof@nationalgrid.com
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8	Qun Qiu	qqiu@aep.com
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12	Patti Metro	patti.metro@nreca.coop
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14	Walter Simmons	walter.simmons@oncor.com
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38	David Boteler	david.boteler@canada.ca
39	Lauren Perotti	lauren.perotti@nerc.net

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Consideration of Comments

Project Name:	2013-03 Geomagnetic Disturbance Mitigation SAR
Comment Period Start Date:	12/16/2016
Comment Period End Date:	1/20/2017

There were 21 sets of responses, including comments from approximately 21 different people from approximately 19 companies representing 8 of the Industry Segments as shown in the table on the following pages.

All comments submitted can be reviewed in their original format on the project page.

If you feel that your comment has been overlooked, please let us know immediately. Our goal is to give every comment serious consideration in this process. If you feel there has been an error or omission, you can contact the Director of Standards Development, Steve Noess (via email) or at (404) 446-9691.

Questions

1. Do you agree with the proposed scope for Project 2013-03 as described in the SAR? If you do not agree, or if you agree but have comments or suggestions for the project scope please provide your recommendation and explanation.

2. Provide any additional comments for the Standards Drafting Team (SDT) to consider, if desired.

The Industry Segments are:

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

Organization Name	Name	Segment(s)	Region	Group Name	Group Member Name	Group Member Organization	Group Member Segment(s)	Group Member Region
ACES Power Marketing	Brian Van Gheem	6	NA - Not Applicable	ACES Standards Collaborators	Bob Solomon	Hoosier Energy Rural Electric Cooperative, Inc.	1	RF
					Karl Kohlrus	Prairie Power, Inc.	1,3	SERC
					Shari Heino	Brazos Electric Power Cooperative, Inc.	1,5	Texas RE
					Tara Lightner	Sunflower Electric Power Corporation	1	SPP RE
					Mark Ringhausen	Old Dominion Electric Cooperative	3,4	SERC
					John Shaver	Arizona Electric Power Cooperative, Inc.	1	WECC
					Bill Hutchison	Southern Illinois Power Cooperative	1	SERC

					Scott Brame	North Carolina Electric Membership Corporation	3,4,5	SERC
					Bill Hutchison	Southern Illinois Power Cooperative	1,4	RF
					Bill Hutchison	Southern Illinois Power Cooperative	1,4	RF
Duke Energy	Colby Bellville	1,3,5,6	FRCC,RF,SERC	Duke Energy	Doug Hils	Duke Energy	1	RF
					Lee Schuster	Duke Energy	3	FRCC
					Dale Goodwine	Duke Energy	5	SERC
					Greg Cecil	Duke Energy	6	RF
Seattle City Light	Ginette Lacasse	1,3,4,5,6	WECC	Seattle City Light Ballot Body	Pawel Krupa	Seattle City Light	1	WECC
					Hao Li	Seattle City Light	4	WECC
					Bud (Charles) Freeman	Seattle City Light	6	WECC
					Mike Haynes	Seattle City Light	5	WECC
					Michael Watkins	Seattle City Light	1,4	WECC
					Faz Kasraie	Seattle City Light	5	WECC

					John Clark	Seattle City Light	6	WECC
					Tuan Tran	Seattle City Light	3	WECC
					Laurrie Hammack	Seattle City Light	3	WECC
Southern Company - Southern Company Services, Inc.	Marsha Morgan	1,3,5,6	SERC	Southern Company	Katherine Prewitt	Southern Company Services, Inc	1	SERC
					Jennifer Sykes	Southern Company Generation and Energy Marketing	6	SERC
					R Scott Moore	Alabama Power Company	3	SERC
					William Shultz	Southern Company Generation	5	SERC
Lower Colorado River Authority	Michael Shaw	1,5,6		LCRA Compliance	Teresa Cantwell	LCRA	1	Texas RE
					Dixie Wells	LCRA	5	Texas RE
					Michael Shaw	LCRA	6	Texas RE
Northeast Power Coordinating Council	Ruida Shu	1,2,3,4,5,6,7,10	NPCC	RSC no Dominion and OPG	Paul Malozewski	Hydro One.	1	NPCC
					Guy Zito	Northeast Power	NA - Not Applicable	NPCC

	Coordinating Council		
Randy MacDonald	New Brunswick Power	2	NPCC
Wayne Sipperly	New York Power Authority	4	NPCC
Glen Smith	Entergy Services	4	NPCC
Brian Robinson	Utility Services	5	NPCC
Bruce Metruck	New York Power Authority	6	NPCC
Alan Adamson	New York State Reliability Council	7	NPCC
Edward Bedder	Orange & Rockland Utilities	1	NPCC
David Burke	UI	3	NPCC
Michele Tondalo	UI	1	NPCC
Sylvain Clermont	Hydro Quebec	1	NPCC
Si Truc Phan	Hydro Quebec	2	NPCC

					Helen Lainis	IESO	2	NPCC
					Laura Mcleod	NB Power	1	NPCC
					MIchael Forte	Con Edison	1	NPCC
					Quintin Lee	Eversource Energy	1	NPCC
					Kelly Silver	Con Edison	3	NPCC
					Peter Yost	Con Edison	4	NPCC
					Brian O'Boyle	Con Edison	5	NPCC
					Greg Campoli	NY-ISO	2	NPCC
					Kathleen Goodman	ISO-NE	2	NPCC
					Silvia Parada Mitchell	NextEra Energy, LLC	4	NPCC
					Michael Schiavone	National Grid	1	NPCC
					Michael Jones	National Grid	3	NPCC
Midwest Reliability Organization	Russel Mountjoy	10		MRO NSRF	Joseph DePoorter	Madison Gas & Electric	3,4,5,6	MRO
					Larry Heckert	Alliant Energy	4	MRO
					Amy Casucelli	Xcel Energy	1,3,5,6	MRO
					Chuck Lawrence	American Transmission Company	1	MRO
					Michael Brytowski	Great River Energy	1,3,5,6	MRO

					Jodi Jensen	Western Area Power Administratino	1,6	MRO
					Kayleigh Wilkerson	Lincoln Electric System	1,3,5,6	MRO
					Mahmood Safi	Omaha Public Power District	1,3,5,6	MRO
					Brad Parret	Minnesota Power	1,5	MRO
					Terry Harbour	MidAmerican Energy Company	1,3	MRO
					Tom Breene	Wisconsin Public Service	3,5,6	MRO
					Jeremy Volls	Basin Electric Power Coop	1	MRO
					Kevin Lyons	Central Iowa Power Cooperative	1	MRO
					Mike Morrow	Midcontinent Independent System Operator	2	MRO
Southwest Power Pool, Inc. (RTO)	Shannon Mickens	2	SPP RE	SPP Standards	Shannon Mickens	Southwest Power Pool Inc.	2	SPP RE

				Review Group	James Nail	Independence Power and Light	3	SPP RE
					Allan George	Sunflower Electric Power Corp	1	SPP RE
					Jonathan Hayes	Southwest Power Pool Inc.	2	SPP RE

1. Do you agree with the proposed scope for Project 2013-03 as described in the SAR? If you do not agree, or if you agree but have comments or suggestions for the project scope please provide your recommendation and explanation.	
David Jendras - Ameren - Ameren Services - 1,3,6	
Answer	No
Document Name	
Comment	

The proposed revision to standard TPL-007-1 to address localized peaks in GMD events and not rely solely on the spatially-averaged data has the potential to impact much more of the transmission system and many more EHV Y-connected transformers than we had previously estimated. It is unknown at this time how the SDT will modify the standard to include this FERC mandated revision, but this would be a major concern for TOs.

It appears that Ameren as a TO will be required to install GIC monitoring equipment and magnetometers, collect data from these devices, and make the data available to those that have a need for the information. Details are still to be determined by the SDT, with the cost to install such equipment and maintain data is unknown.

Although the FERC directive allows for TOs to apply for an exemption to collect necessary GIC monitoring data, exemption criteria has not been proposed to determine if the exemption would or would not be allowed in a particular case. Regardless, because of our location in the Midwest and because of the number of 345 kV lines and EHV Y-connected transformers connected to the Ameren system, it is unlikely that Ameren would be allowed an exemption from installing monitoring equipment and collecting the GIC data, regardless of our southerly location in relation to the geomagnetic north pole.

Due to the fact that FERC is mandating these modifications, we are concerned that input from industry on the drafting of the revised standard would be given minimal consideration.

Likes 0	
Dislikes 0	

Response. Thank you for your comments. In order to address the FERC Order No. 830 directives, the SDT will consider ways to incorporate localized peak events into the existing GMD benchmark. -It is too soon to know how the benchmark will change and what the impact on the industry will be. Regarding the installation of GIC monitors and magnetometers the SDT intends to coordinate technical details with the NERC GMD Task Force. There is significant industry experience on the SDT, so any requirements that are added to the standard will be thoroughly discussed within the SDT and with the NERC GMD Task Force. Stakeholder input will be considered by the SDT throughout the standard development process.

Russel Mountjoy - Midwest Reliability Organization - 10, Group Name MRO NSRF	
Answer	Yes
Document Name	
Comment	

The NSRF agrees with the proposed scope for Project 2013-03 SAR but would like to make several suggestions that will benefit the reliable operation of the BES. If the standard drafting team plans to incorporate real-time reliability monitoring and analysis to satisfy the GMD monitoring requirements, we suggest the SDT add Transmission Operator (TOP) as an applicable Reliability Function in the SAR.

Rationale

FERC gives NERC the option to incorporate the GMD monitoring data collection in another reliability standard. The TOP is the responsible entity to complete real-time reliability monitoring.

"NERC may also propose to incorporate the GIC monitoring and magnetometer data collection requirements in a different Reliability Standard (e.g., real-time reliability monitoring and analysis capabilities as part of the TOP Reliability Standards)." (FERC Order 830, P.91) .

Likes 0	
Dislikes 0	

Response. Thank you for your comments. Order No. 830 directs NERC to address the collection of data from GIC detectors and magnetometers for the purpose of aiding in the validation of models used to facilitate the calculations required in TPL-007. It does not require real time data collection, but that doesn't limit entities from collecting real time data in support of system operations. If an entity's

operating procedure requires real time data collection, then that process would be documented in procedures under EOP-010 and the TOP would be an applicable entity. [add about 'other standard']	
Aaron Cavanaugh - Bonneville Power Administration - 1,3,5,6 - WECC	
Answer	Yes
Document Name	
Comment	
BPA would like to know if the model validation encompasses equipment and system models for accurate GIC current determination (like transformer behavior). BPA would also like to know if the model validation encompass hysteresis curves for VAR consumption determination? BPA believes the model should contain both.	
Likes 0	
Dislikes 0	
Response. Thank you for your comments. Order No. 830 is not prescriptive regarding what kind of models would be validated using GIC and/or geomagnetic field measurements. The SDT believes the requirements should be application-neutral.	
Ginette Lacasse - Seattle City Light - 1,3,4,5,6 - WECC, Group Name Seattle City Light Ballot Body	
Answer	Yes
Document Name	
Comment	
Our subject matter experts do not believe that collected data should be available to the public. Or clearly define what is meant by "publicly available" and what specifically can be available.	
Likes 0	
Dislikes 0	

Response. Thank you for your comment. Order No. 830 is clear in directing NERC to require entities to collect GIC and magnetometer data, and for NERC to make the data publically available. The details of such a program are yet to be worked out, but will include discussions among the SDT, the NERC GMD Task Force, and NERC. In Order No. 830, FERC indicated that they were not persuaded by arguments in the record for TPL-007-1 that this data should be treated as confidential, but that entities could seek confidential treatment of their data from NERC (P 94-95). Accordingly, NERC's data collection process developed to meet Order No. 830 is expected to provide entities with the means for identifying some or all data that the entity believes should be treated as confidential.

Brian Van Gheem - ACES Power Marketing - 6 - NA - Not Applicable, Group Name ACES Standards Collaborators	
Answer	Yes
Document Name	
Comment	

(1) We believe the proposed scope captures the directives identified in FERC Order No. 830. However, we believe several references to the FERC Order are taken out of context, and should be removed from the SAR's Detailed Description Section. The Commission wants GIC monitoring and magnetometer data to be gathered through collaboration with academia and government agencies. The reference to include "…any device that must be added…"could misdirect the SDT from the Commission's intentions. We recommend the removal of this particular reference to limit the scope of data collection.

(2) We feel the FERC directive references should be mapped to existing requirements to identify proposed changes. For example, we recommend adding a reference to Requirement R3 when listing the directives associated with Benchmark Events. Likewise, when listing directives for Transformer Thermal Impact Assessment or Corrective Action Plans, Requirement R6 and Requirement R7 should be included as references, respectively.

(3) We question the addition of a reference to move the data collection of GIC monitoring and magnetometer data to a different Reliability Standard. We feel this inclusion opens the door to a Commission suggestion to incorporate data collection as part of real-time reliability monitoring and analysis and relocated to the TOP Reliability Standards. We feel that if such data was required for real-time operations, it likely would have been incorporated in NERC Reliability Standard EOP-010-1, as part of emergency Geomagnetic Disturbance Operations. We recommend the removal of this reference to focus the scope of this project on TPL-007.

(4) The SAR briefly lists the development of an implementation plan, although does not elaborate on what may change within the SAR's Detailed Description Section. While the current five year implementation plan takes effect starting July 2017, we feel a significant portion of

the implementation plan will pass by the time the Commission approves the work of this SDT. We recommend the addition of a reference within the SAR's Detailed Description Section to incorporate modifications to the implementation plan that accounts for the transition away from the current implementation plane. We believe the transition period should not be less than 18 months to accommodate an impacted entity's effort to implement modeling and software changes, additional resource procurements, and quality assurance of assessments.	
Likes 0	
Dislikes 0	

Response. Thank you for your comments.

(1) The FERC order discusses the option of collaborating with academia and government agencies for the collection of data, but that is not the only option provided in the order. It is understood that additional GIC detectors and magnetometers may be required and the SAR accounts for this additional option.

(2) References to the existing standard requirements will be added to the SAR as minor editorial ~~remarks~~changes.

(3) The SAR statement on the possibility of placing data collection requirements in another standard is from the FERC order. (paragraph 91)

(4) It is too soon to know what additional requirements may be placed on applicable entities as a result of modifications to the existing standard. Accordingly, any statements about changes to the implementation plan are premature. The SDT believes the SAR as written provides the necessary project scope for developing an implementation plan.

Ruida Shu - Northeast Power Coordinating Council - 1,2,3,4,5,6,7,10 - NPCC, Group Name RSC no Dominion and OPG	
Answer	Yes
Document Name	
Comment	
NPCC RSC support the proposed scope for Project 2013-03.	
Likes 0	
Dislikes 0	

Response. Thank you for your comment.	
Karie Barczak - DTE Energy - Detroit Edison Company - 3,4,5	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Jeffrey DePriest - DTE Energy - Detroit Edison Company - 3,4,5	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Tho Tran - Oncor Electric Delivery - 1 - Texas RE	
Answer	Yes
Document Name	
Comment	

Likes 0	
Dislikes 0	
Response	
Sean Bodkin - Dominion - Dominion Resources, Inc. - 3,5,6	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
RoLynda Shumpert - SCANA - South Carolina Electric and Gas Co. - 1,3,5,6 - SERC	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thomas Foltz - AEP - 3,5	

Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Laura Nelson - IDACORP - Idaho Power Company - 1	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
John Merrell - Tacoma Public Utilities (Tacoma, WA) - 1,3,4,5,6	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	

Response	
Colby Bellville - Duke Energy - 1,3,5,6 - FRCC,SERC,RF, Group Name Duke Energy	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Shannon Mickens - Southwest Power Pool, Inc. (RTO) - 2 - SPP RE, Group Name SPP Standards Review Group	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Rachel Coyne - Texas Reliability Entity, Inc. - 10	
Answer	Yes
Document Name	
Comment	

Likes 0	
Dislikes 0	
Response	
Teresa Cantwell - Lower Colorado River Authority - 1,5,6	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Michael Shaw - Lower Colorado River Authority - 1,5,6, Group Name LCRA Compliance	
Answer	
Document Name	~~2013-03_GMD_SAR_Unofficial_Comment_Form_121516.docx~~
Comment	
Likes 0	
Dislikes 0	
Response	

2. Provide any additional comments for the Standards Drafting Team (SDT) to consider, if desired.	
Brian Van Gheem - ACES Power Marketing - 6 - NA - Not Applicable, Group Name ACES Standards Collaborators	
Answer	
Document Name	
Comment	
(1) We believe the SDT should collaborate its activities with existing industry technical groups, including the NERC Geomagnetic Disturbance Task Force, when designing GIC monitoring and magnetometer data collection criteria. We propose limiting the focus of this SAR to GIC monitoring and magnetometer data collection, and allow NERC and these other groups to address how such data will be shared publicly. We fear the SDT's involvement with the distribution of data could lead to unnecessary development of new Reliability Standards for currently unregistered entities and functions. (2) We thank you for this opportunity to provide these comments.	
Likes 0	
Dislikes 0	
Response. Thank you for your comment. The SDT intends to collaborate its standards development activities with the NERC GMD Task Force, and where appropriate other industry technical groups. The SDT agrees that NERC and other technical groups ~~such as the NERC GMD Task Force and the Planning Committee~~ should address issues with the public availability of collected data. The SDT is focused on developing requirements for the collection of data as specified in Order No. 830 P 88 and P 91. The SDT has clarified this in the project SAR. The process for the distribution of that data will likely be addressed outside of the revised standard.	
Teresa Cantwell - Lower Colorado River Authority - 1,5,6	
Answer	
Document Name	

Comment
The approach related to the GMD benchmark definition and transformer thermal impact assessment needs to balance ease of implementation with the quality of results. A methodology similar to that employed in PRC-002 should be utilized to limit the required number of installations of monitoring data (e.g. based on short circuit MVA or some other parameter). Not every TO should be required to install monitoring data. This may be better accomplished by rolling the monitoring requirement into another standard (e.g. PRC-002). NERC should consider extensions of time for CAPs and/or hardware installation on a case-by-case basis.

Likes 0	
Dislikes 0	

Response. Thank you for your comment. The SDT will consider these inputs during standard development. The SDT believes that that there is a balance between ease of implementation and a conservative approach to potential transformer impact by means of the transformer thermal screening criteria.

The SDT will work in conjunction with the NERC GMD Task Force and other industry technical groups in the development of criteria for number and/or location of monitoring equipment.

Rachel Coyne - Texas Reliability Entity, Inc. - 10	
Answer	
Document Name	

Comment
Texas RE made the following observations: • Paragraph 91 in Order No. 830 discusses the ability for a Transmission Owner to apply for an exemption. Texas RE is concerned if the responsible entity determined in R1 is allowed to grant exemptions, many entities that are registered as a TP and TO will be able to

grant itself an exemption. Texas RE recommends determining who is responsible for granting exemptions, since Order No. 830 does not specify.

- The "Industry Need" section includes details about NERC making GMD-related data publicly available, but "Detailed Description" section does not.
- In the "Collection of GMD Data" section, the SAR states that "Each responsible entity that is a transmission owner should be required to collect necessary GIC monitoring data." However, TPL-007-1 R1 currently defines a "responsible entity" as either a TP or a PC. When updating the Standard, the SDT should avoid using "responsible entity" when referencing a TO.
- Texas RE recommends emphasizing sufficient and appropriate compliance documentation, regarding an "equally efficient and effective alternative". An entity would be required to demonstrate efficiency and effectiveness. For the data submittal portion, there needs to be care in addressing timing as the directive included historical and new data. There is no discussion of data requirements, per se, and the content, format, or timing associated with the data.

Likes 0	
Dislikes 0	

Response. Thank you for your comments.

Order No. 830 states that entities should be able to apply for exemption from data collection requirements if an entity "demonstrates that no or little value would be added to planning and operations." The order provides flexibility for the SDT to establish the process and criteria for requesting and approving such exemptions. The SDT will be discussing the exemption process as part of its work on the revised standard.

The detailed description section of the SAR contains excerpts from the FERC order with a reference to the applicable paragraph in the order. The SDT believes that it is sufficiently clear that the intent is to make the data publically available

The SDT will make every attempt to provide clarity as to the applicability of the requirements of the standard and will minimize the use of the term "responsible entity".

The requirements for the collection and distribution of GIC detector and magnetometer data will be developed by the SDT. The FERC order does require both historical and new data to be provided, however historical data will be collected by NERC via a Rules of Procedure Section

1600 data request (not in scope for the standards project). The SDT does not view the Order No. 830 phrase "equally efficient and effective" to apply to compliance documentation.	
Shannon Mickens - Southwest Power Pool, Inc. (RTO) - 2 - SPP RE, Group Name SPP Standards Review Group	
Answer	
Document Name	
Comment	
After reviewing the transcript associated with the Level 2 Appeal of Foundation For Resilient Societies, INC. in reference to TPL-007-1, we suggest the drafting team review and use this document as guidance throughout their modification process to the Standard. In our review, we found some similarities of concerns shared by both **The Foundation** f**or Resilient Societies, INC** and **FERC Order 830** such as, transformer thermal impact assessments as well as data collection and how that information would be made publicly available**.**	
Likes 0	
Dislikes 0	
Response. Thank you for your comments. The SDT is aware of Level 2 Appeal transcript. The SDT responded to comments raised by the Foundation for Resilient Societies during development of TPL-007-1.	
Ginette Lacasse - Seattle City Light - 1,3,4,5,6 - WECC, Group Name Seattle City Light Ballot Body	
Answer	
Document Name	
Comment	
Thank you for seeking our input in advance.	
Likes 0	
Dislikes 0	

Response	
Marsha Morgan - Southern Company - Southern Company Services, Inc. - 1,3,5,6 - SERC, Group Name Southern Company	
Answer	
Document Name	
Comment	

Because commercially available models and tools do not currently exist for performing transformer thermal impact assessments, we ask the SDT to continue considering suitable alternates (e.g., look up tables, development of flowcharts or processes).

Also, we ask the SDT to provide clarification of the event included in Table 1 - Steady State Planning Events. In particular, with regards to protection system misoperation due to harmonics during a GMD event, please provide clarification as to what is expected. Will this require that large scale harmonic penetration studies be performed in order to analyze potential impact of half-cycle saturation generated harmonics on system protection and/or equipment controls? Or will engineering assessments that identify credible scenarios be sufficient?

SDT to consider that the procurement and installation of instrument transformers for the collection of GIC monitoring and magnetometer data takes months to implement. SDT to consider realistic timelines for implementation, as well as providing technical guidance for implementation of GIC measurement devices.

We ask the SDT to provide additional clarification on R2. In particular, SDT to elaborate on "maintaining System models and GIC System Models." Is R2 referring to gathering and maintaining dc and ac models (e.g., substation dc resistances, dc network data) of the system under study? Does it require having to complete a GIC analysis by R2 deadline, so that GIC system models can be produced and maintained? Please provide clarification.

Likes 0	
Dislikes 0	

Response. Thank you for your comments. The SDT has provided alternatives for conducting the transformer thermal impact assessments in the original standard and intends to continue in that mode for any modifications that may be necessary to address the FERC directives.

The SDT recognizes that detailed harmonic analyses may be beyond the capability of many applicable entities. As stated in the development of TPL-007-1, reasonable engineering judgment can be exercised to identify protection equipment that may be vulnerable to misoperation in the Benchmark GMD event and therefore, should be placed out of service ~~outaged~~ in the power flow analysis. (See Project 2013-03 Consideration of Comments dated December 5, 2014, P. 16, P. 48) To the degree that additional GIC detectors and/or magnetometers are necessary to be installed, the SDT will address the timeframe to install such devices in the implementation plan. The intent of requirement R2 in TPL-007-1 is to require entities to maintain models necessary to perform the required analysis (both ac models for the network analysis and dc models for the GIC calculation). Requirement R2 does not specify that GIC calculations must be completed. The SDT will consider providing clarification to the wording of R2.[MO1]	
David Jendras - Ameren - Ameren Services - 1,3,6	
Answer	
Document Name	
Comment	
The change in deadlines for mitigation of GMD events would not be a concern in Ameren's case. Ameren is not interested in installing blocking devices to Y-connected EHV transformers. Therefore, operational solutions will provide the likely mitigations.	
Likes 0	
Dislikes 0	
Response Thank you for the comment.	
Aaron Cavanaugh - Bonneville Power Administration - 1,3,5,6 - WECC	
Answer	
Document Name	

Comment
BPA would like to know how the Standard Drafting Team envisions collecting the data to perform the studies. If there is no regional data collection effort similar to MOD-032, then how is it envisioned that accurate GIC studies to determine DC currents will be run? BPA believes a documented process needs to be created WECC wide (or nationally). BPA envisions the data collection included with MOD-032 to be collected every 5 years (or according to study schedule with version 2 of TPL-007). BPA's experience is that most entities are not willing to take on extra work if they do not have to.

Likes 0	
Dislikes 0	

Response
Response. Thank you for your comment. As noted in development of TPL-007-1, the standard provides flexibility for various approaches to collecting the necessary data for GMD Vulnerability Assessments, including the use of regional planning groups. (See Project 2013-03 Consideration of Comments dated October 28, 2014, P. 23). The whitepapers associated with the development of TPL-007-1 address the process of performing the GIC calculations.

Russel Mountjoy - Midwest Reliability Organization - 10, Group Name MRO NSRF	
Answer	
Document Name	

Comment
None

Likes 0	
Dislikes 0	

Response

Sandra Shaffer - Berkshire Hathaway - PacifiCorp - 6	
Answer	
Document Name	
Comment	
PacifiCorp supports the proposal to incorporate the GIC monitoring and magnetometer data collection requirements in a different Reliability Standard. This separation would allow more attention to the specific upgrades already outlined in the SAR.	
Likes 0	
Dislikes 0	
Response. Thank you for your comment. The SDT will develop the GIC monitoring and magnetometer data collection requirements and determine the most appropriate location for those requirements. [TPL-007 is appropriate place to address the GMD data collection directive]	

Jeffrey DePriest - DTE Energy - Detroit Edison Company - 3,4,5	
Answer	
Document Name	
Comment	
Please consider an approach where GIC monitor locations are determined on a regional basis in order to obtain the most value from each installation and insure that all areas are covered appropriately. An individual GO/TO may not have the information needed to properly place equipment. Also, providing monitoring equipment specifications would insure that manufacturers would design, and entities would install, capable monitors that will provide reliable data.	
Likes 0	
Dislikes 0	
Response. The SDT will develop the GIC monitoring and magnetometer data collection requirements and determine the most appropriate location for those requirements. The SDT will work with the NERC GMD Task Force on the issue of equipment specifications.	

Karie Barczak - DTE Energy - Detroit Edison Company - 3,4,5	
Answer	
Document Name	
Comment	
Please consider an approach where GIC monitor locations are determined on a regional basis in order to obtain the most value from each installation and insure that all areas are covered appropriately. An individual GO/TO may not have the information needed to properly place equipment. Also, providing monitoring equipment specifications would insure that manufacturers would design, and entities would install, capable monitors that will provide reliable data.	
Likes 0	
Dislikes 0	
Response. The SDT will develop the GIC monitoring and magnetometer data collection requirements and determine the most appropriate location for those requirements. The SDT will work with the NERC GMD Task Force on the issue of equipment specifications	
Michael Shaw - Lower Colorado River Authority - 1,5,6, Group Name LCRA Compliance	
Answer	
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Standards Authorization Request Form

When completed, email this form to:
sarcomm@nerc.com

NERC welcomes suggestions to improve the reliability of the bulk power system through improved reliability standards. Please use this form to submit your request to propose a new or a revision to a NERC's Reliability Standard.

Request to propose a new or a revision to a Reliability Standard			
Title of Proposed Standard(s):	Modifications to Geomagnetic Disturbance Standards		
Date Submitted:	~~December~~ February ~~1~~23, ~~2016~~2017		
SAR Requester Information			
Name:	Frank Koza		
Organization:	PJM Interconnection / Project 2013-03 SDT Chair		
Telephone:	610-666-4228	E-mail:	frank.koza@pjm.com
SAR Type (Check as many as applicable)			
☒ New Standard		☐ Withdrawal of existing Standard	
☒ Revision to existing Standard		☐ Urgent Action	

SAR Information
Purpose (Describe what the standard action will achieve in support of Bulk Electric System reliability.):
The goal of this project is to address the Federal Energy Regulatory Commission (Commission) directives contained in Order No. 830 by modifying **TPL-007-1 - Transmission System Planned Performance for Geomagnetic Disturbance Events** and the benchmark GMD event used in GMD Vulnerability Assessments or by developing an equally efficient and effective alternative.
Industry Need (What is the industry problem this request is trying to solve?):
On September 22, 2016, the Commission issued Order No. 830 approving TPL-007-1. In the order, the Commission directed NERC to develop certain modifications to the Standard, including: • Modify the benchmark GMD event definition used for GMD Vulnerability Assessments; • Make related modifications to requirements pertaining to transformer thermal impact assessments;

SAR Information
• Require collection of GMD-related data, which ~~and for~~ NERC should~~to~~ make ~~it~~ available to the publicly ~~available~~; and • Require deadlines for Corrective Action Plans (CAPs) and GMD mitigating actions. The Commission established a deadline of 18 months from the effective date of Order No. 830 for completing the revisions, which is May 29, 2018.
Brief Description (Provide a paragraph that describes the scope of this standard action.)
The Standards Drafting Team (SDT) shall develop modifications to TPL-007-1 and the benchmark GMD event that address Commission directives from Order No. 830. The work will include development of Violation Risk Factors, Violation Severity Levels, and an Implementation Plan for the modified standards within the deadline established by the Commission in Order No. 830.
Detailed Description (Provide a description of the proposed project with sufficient details for the standard drafting team to execute the SAR. Also provide a justification for the development or revision of the standard, including an assessment of the reliability and market interface impacts of implementing or not implementing the standard action.)
The SDT shall address each of the Order No. 830 directives by developing modifications to requirements in TPL-007-1 and related material, or the SDT shall develop an equally efficient and effective alternative. To address concerns identified in Order No. 830, the Commission directed the following: **Benchmark GMD Event (TPL-007-1 Attachment 1 and related requirements)** • *[T]he Commission, as proposed in the NOPR, directs NERC to develop revisions to the benchmark GMD event definition so that the reference peak geoelectric field amplitude component is not based solely on spatially-averaged data.(P.44)* • *Without prejudging how NERC proposes to address the Commission's directive, NERC's response to this directive should satisfy the NOPR's concern that reliance on spatially-averaged data alone does not address localized peaks that could potentially affect the reliable operation of the Bulk-Power System. (P.47)* **Transformer Thermal Impact Assessment (TPL-007-1 Requirement R6)** • *Consistent with our determination above regarding the reference peak geoelectric field amplitude value, the Commission directs NERC to revise Requirement R6 to require registered entities to apply spatially averaged and non-spatially averaged peak geoelectric field values, or some equally efficient and effective alternative, when conducting thermal impact assessments. (P.65)* **Collection of GMD Data** • *The Commission … adopts the NOPR proposal in relevant part and directs NERC to develop revisions to Reliability Standard TPL-007-1 to require responsible entities to collect GIC monitoring and magnetometer data as necessary to enable model validation and situational awareness, including from any devices that must be added to meet this need. The NERC standard*

SAR Information

drafting team should address the criteria for collecting GIC monitoring and magnetometer data... and provide registered entities with sufficient guidance in terms of defining the data that must be collected.... (P.88)

- *Each responsible entity that is a transmission owner should be required to collect necessary GIC monitoring data. However, a transmission owner should be able to apply for an exemption from the GIC monitoring data collection requirement if it demonstrates that little or no value would be added to planning and operations. (P.91)*
- *NERC may also propose to incorporate the GIC monitoring and magnetometer data collection requirements in a different Reliability Standard....(P.91)*

Deadlines for Corrective Action Plans and Mitigations (TPL-007-1 Requirement R7)

- *The Commission directs NERC to modify Reliability Standard TPL-007-1 to include a deadline of one year from the completion of the GMD Vulnerability Assessments to complete the development of corrective action plans. (P.101)*
- *The Commission also directs NERC to modify Reliability Standard TPL-007-1 to include a two-year deadline after the development of the corrective action plan to complete the implementation of non-hardware mitigation and four-year deadline to complete hardware mitigation…. The Commission agrees that NERC should consider extensions of time on a case-by-case basis. (P.102)*

Reliability Functions

The Standard will Apply to the Following Functions (Check each one that applies.)

☐ Regional Reliability Organization	Conducts the regional activities related to planning and operations, and coordinates activities of Responsible Entities to secure the reliability of the Bulk Electric System within the region and adjacent regions.
☐ Reliability Coordinator	Responsible for the real-time operating reliability of its Reliability Coordinator Area in coordination with its neighboring Reliability Coordinator's wide area view.
☐ Balancing Authority	Integrates resource plans ahead of time, and maintains load-interchange-resource balance within a Balancing Authority Area and supports Interconnection frequency in real time.
☐ Interchange Authority	Ensures communication of interchange transactions for reliability evaluation purposes and coordinates implementation of valid and balanced interchange schedules between Balancing Authority Areas.

Reliability Functions		
☒	Planning Coordinator	Assesses the longer-term reliability of its Planning Coordinator Area.
☐	Resource Planner	Develops a >one year plan for the resource adequacy of its specific loads within a Planning Coordinator area.
☒	Transmission Planner	Develops a >one year plan for the reliability of the interconnected Bulk Electric System within its portion of the Planning Coordinator area.
☐	Transmission Service Provider	Administers the transmission tariff and provides transmission services under applicable transmission service agreements (e.g., the pro forma tariff).
☒	Transmission Owner	Owns and maintains transmission facilities.
☐	Transmission Operator	Ensures the real-time operating reliability of the transmission assets within a Transmission Operator Area.
☐	Distribution Provider	Delivers electrical energy to the End-use customer.
☒	Generator Owner	Owns and maintains generation facilities.
☐	Generator Operator	Operates generation unit(s) to provide real and Reactive Power.
☐	Purchasing-Selling Entity	Purchases or sells energy, capacity, and necessary reliability-related services as required.
☐	Market Operator	Interface point for reliability functions with commercial functions.
☐	Load-Serving Entity	Secures energy and transmission service (and reliability-related services) to serve the End-use Customer.

Reliability and Market Interface Principles	
Applicable Reliability Principles (Check all that apply).	
☒	1. Interconnected bulk power systems shall be planned and operated in a coordinated manner to perform reliably under normal and abnormal conditions as defined in the NERC Standards.
☐	2. The frequency and voltage of interconnected bulk power systems shall be controlled within defined limits through the balancing of real and Reactive Power supply and demand.
☒	3. Information necessary for the planning and operation of interconnected bulk power systems shall be made available to those entities responsible for planning and operating the systems reliably.
☐	4. Plans for emergency operation and system restoration of interconnected bulk power systems shall be developed, coordinated, maintained and implemented.

Reliability and Market Interface Principles	
☐	5. Facilities for communication, monitoring and control shall be provided, used and maintained for the reliability of interconnected bulk power systems.
☐	6. Personnel responsible for planning and operating interconnected bulk power systems shall be trained, qualified, and have the responsibility and authority to implement actions.
☒	7. The security of the interconnected bulk power systems shall be assessed, monitored and maintained on a wide area basis.
☐	8. Bulk power systems shall be protected from malicious physical or cyber attacks.

Does the proposed Standard comply with all of the following Market Interface Principles?	Enter (yes/no)
1. A reliability standard shall not give any market participant an unfair competitive advantage.	YES
2. A reliability standard shall neither mandate nor prohibit any specific market structure.	YES
3. A reliability standard shall not preclude market solutions to achieving compliance with that standard.	YES
4. A reliability standard shall not require the public disclosure of commercially sensitive information. All market participants shall have equal opportunity to access commercially non-sensitive information that is required for compliance with reliability standards.	YES

Related Standards	
Standard No.	Explanation

Related SARs	
SAR ID	Explanation

Regional Variances	
Region	Explanation
FRCC	
MRO	
NPCC	
RF	
SERC	
SPP RE	
Texas RE	
WECC	