Unofficial Comment Form
Project 2013-03 Geomagnetic Disturbance Mitigation

Please DO NOT use this form for submitting comments. Please use the electronic form to submit comments on the Standard. The electronic comment form must be completed by May 21, 2014.

If you have questions please contact Mark Olson at mark.olson@nerc.net or by telephone at 404-446-9760.

All documents for this project are available on the project page.

Background Information
On May 16, 2013 FERC issued Order No. 779, directing NERC to develop Standards that address risks to reliability caused by geomagnetic disturbances in two stages:

- Stage 1 standard(s) that require applicable entities to develop and implement Operating Procedures were filed in November, 2013.
- Stage 2 standard(s) that require applicable entities to conduct assessments of the potential impact of benchmark GMD events on their systems. If the assessments identify potential impacts, the standard(s) will require the applicable entity to develop and implement a plan to mitigate the risk of instability, uncontrolled separation, or Cascading. Stage 2 standards must be filed by January 2015.

This posting is soliciting informal comments on the draft standard, TPL-007-1 – Transmission System Planned Performance During Geomagnetic Disturbances, being developed to address the stage 2 directives. TPL-007-1 includes requirements for Planning Coordinators, Transmission Planners, Transmission Owners, and Generation Owners with planning areas or transformers connected at 200 kV or higher.

Paragraph numbers in the following questions refer to Order No. 779.

You do not have to answer all questions. Enter comments in simple text format. Bullets, numbers, and special formatting will not be retained.
Questions on Draft 1 of TPL-007-1

1. **Applicability.** The draft TPL-007-1 standard applies to Planning Cooperators, Transmission Planners, Transmission Owners, and Generator Owners with a high-side, wye-grounded winding connected at 200 kV or greater. The drafting team believes these are the correct functional entities to meet the directives in Order No. 779 to evaluate the effects of GICs on Bulk-Power System transformers and other equipment (P.67), consider wide-area effects and coordinate across regions (P.67), and develop plans to address potential impacts (P. 79). Justification for the 200 kV voltage threshold may be found in the whitepaper that was developed by the drafting team for the stage 1 standard, EOP-010-1 – Geomagnetic Disturbance Operations. Do you agree that these are the correct functional entities to perform the functions required in the draft standard? If you do not agree, or you agree in general but feel that alternative language would be more appropriate, please provide specific suggestions in your comments.

   [ ] Yes
   [x] No

Comments: Once a PC or TP is chosen as an applicable functional entity, it is not specified on which facilities of the system the modeling Requirement R1 and the study requirements (R2, R3 and R7) shall apply. Not all facilities should be included in the studies; only those having a significant impact.

2. **Technical basis.** Directives in Order No. 779 specify that the assessments required by the stage 2 standard should account for several parameters including the use of studies and simulations to evaluate the effects of GIC on the Bulk-Power System transformers (P. 59). The drafting team believes that the studies and analysis required by the standard meet the assessment parameters directed by FERC and are supported by the technical guides referenced in the standard. Do you agree that the requirements in TPL-007-1 address the Order No. 779 directives for GMD Vulnerability Assessment and are supported by the technical guidance? If you do not agree, or you recommend alternative language in these requirements or additional technical material, please provide specific suggestions in your comments.

   [ ] Yes
   [x] No

Comments: The P8 event in Table 1 doesn't offer enough clarity. We would expect that the "GMD event" is not an initial condition, but is part of the event. It would be needed to explain the nature of this event: is it the increase of dc current on the system and the transformer saturation? How is an entity going to simulate this event that leads to the removal of compensating devices or
Transmission Facilities? These points need to be clarified before the standard can be approved.

The benchmark GMD Event is a new approach that needs to be well mastered before being adopted. Refer to our response to Question 4.

It is indicated in the Purpose that the requirements are within the Near-Term Transmission Planning Horizon. However, specific requirements (R1 to R8) refer to a Long-Term Planning Horizon. Delete the Time Horizon reference in the Purpose to avoid confusion.

3. **Benchmark GMD Event.** In Order No. 779, FERC directed that NERC specify the benchmark GMD event to be used by entities for assessing potential impact on the Bulk-Power System through the standards development process (P.54). Accordingly, the drafting team has posted the proposed Benchmark GMD Event Description whitepaper on the project page along with the standard for comment during this comment period. The drafting team believes the proposed benchmark GMD event is consistent with existing utility best practices, provides the consistent assessment criteria required by the FERC order, and supports assessment of the parameters specified by the directives.

Do you agree that the proposed benchmark GMD event is technically justified and provides the necessary basis for conducting the assessments directed in Order No. 779? If you do not agree, please provide specific technically justified alternatives or suggestions for the drafting team to consider.

☐ Yes
☒ No

Comments: GMDs cover large geographical areas, so it’s very important to have modelling data from neighboring regions, especially in the congested Northeast, in order to identify impacts from external equipment.

How does the Drafting Team envision ensuring that actions taken in one area do not negatively impact entities in adjacent areas? For example, PJM CAP negatively affecting NYISO entities. For example, a PJM CAP might result in GIC’s flowing on adjacent NYISO elements exacerbating the problem in New York. What recourse would an adjacent region have to prevent this negative impact from shifting GMD related costs to their region?

There is concern with the Benchmark GMD Event proposed in Attachment 1 and the high value of the geoelectric field of 8 V/km not being based on direct measurement, but on hypothesis to deduce electric field from magnetic field. For example, according to the proposed method and the field scale, the top value would be applied to a large portion of Québec, with much higher values
than those applied to most of the United States. Hydro-Québec did experience the March 1989 GMD, but the electric field deduced from that event was much less than the proposed value of 8 V/km. It should be considered that the direct reading of electric field should be in the methodology. Historical records are most representative of the risk that entities have to face. Also, it should be considered that this is a new method of analysis and it needs to be validated before requiring compliance based on those estimated values.

Parts 2.2 and 7.1 specify the Benchmark GMD event described in Attachment 1 be used in the GMD Vulnerability Assessment and assessment of thermal impact. During the Project 2013-03 Geomagnetic Disturbance Mitigation Industry Webinar on April 24, 2014 it was stated that the benchmark event does not need to be used, but if an entity used something different they had to provide an explanation/justification. Clarification is needed.

4. **Implementation.** Order No. 779 does not direct a specific Implementation Plan, but sets an expectation for a multi-phased approach and consideration for the availability of tools, models, and data that are necessary for responsible entities to perform the required GMD vulnerability assessments. The drafting team is proposing a phased implementation of TPL-007-1 over a 4-year period. The Implementation Plan provides 1) time for entities to develop the required models; 2) proper sequencing of assessments; and 3) time for development of viable Corrective Action Plans, which may require entities to develop, perform, and validate studies, assessments, and procedures. Do you support the approach taken by the drafting team in the proposed Implementation Plan, and if you are an applicable entity in the proposed standard is the proposed time frame and sequencing realistic?

☐ Yes
☒ No

Comments: Throughout the standard, the acronym for alternating current should be capitalized AC. As in other standards, acronyms for terms not used in the NERC Glossary are capitalized.

Geomagnetically induced current contains both AC and DC components. Are AC models adequate to capture the impact of a geomagnetic disturbance? The Rationale Box for R1 supports the importance of DC models. The Geomagnetic Disturbance Planning Guide, December 2013
discusses DC system models. If a DC model is needed, then requirement R1 should be made to read:

R1. Each Planning coordinator and Transmission Planner shall maintain alternating current (AC) and direct current (DC) System models....

Regarding the Table 1 footnotes, Footnote 1 simply repeats the initial condition statement, but should be expanded to provide examples.

Each category of the Implementation Plan allows a time delay of one year after completion of the preceding stage: 1) System modeling, 2) Vulnerability assessments to GMD events, 3) Assessment of thermal impact on power transformers, 4) Corrective action plan. This Implementation Plan is highly dependent on the availability of time study tools. Please make sure that sufficient delay for tool development is considered and that stages are postponed accordingly.

Given the newness of the science and assumptions, it is possible that more time than four years may be needed. If models or other factors change as the science develops, latitude should be offered with respect to the four year implementation plan.

The standard would be easier to understand if R5 were combined with R2. The PC/TP obligation for conducting the GMD Vulnerability Assessment and the responsibility of the PC to determine the split of responsibilities between the PC/TP for conducting the GMD Vulnerability Assessment should be in the same Requirement. As written, R2 requires each Planning Coordinator and Transmission Planner to complete a GMD Vulnerability Assessment of the Near Term Transmission Planning Horizon for its respective area once every 60 months. R5 states that “Each Planning Coordinator, in conjunction with each of its Transmission Planners, shall determine and identify the individual and joint responsibilities of entities in the Planning Coordinator’s area for performing the required studies for the GMD Vulnerability Assessment.”

The standard refers to the Corrective Action Plan in R1 and M1. However, the Corrective Action Plan is described in R3. We suggest revising the reference in R1 to “the Corrective Action Plan developed under R3.”

We think the benchmark GMD event is technically justified (but it must consider real life measurements [see response to Question 3]), and provides the necessary basis for conducting the assessments directed in Order No. 779.

Regarding R2, why does the standard categorize it as a “Long-term Planning” horizon? The Parts and sub-Parts state that the study conditions should include peak load “…for one year within the Near-term planning horizon”?
Requirement R4 may conflict with the requirements of other TPL standards. The Rationale for Requirement R4 refers to TPL-001 and, accordingly this should be explicitly referenced in the requirement.

Regarding R6 and M6, the distribution of results should be limited to other entities (TO/GO) only to the extent those TO/GOs need the specific study results. This approach limits distribution of CEII and focuses the release of study results to pertinent other parties. Recommend that distribution of the GMD Vulnerability Assessment be clarified and limited with wording such as “...shall distribute results to relevant TOs and GOs in its respective planning area and, as appropriate, adjacent PCs and TPs.” R6 requires distribution of results to “...any functional entity that has a reliability related need...” but does not specify what constitutes a reliability related need. The distribution of study results should be limited to protect CEII.

R6 does not indicate what the TOs, GOs and adjacent PCs and TPs should do with the GMD Vulnerability Assessment results.

Measure M6 should include reference to distribution of results to TOs and GOs.

Requirement R7 should refer to the GMD Vulnerability Assessment results that were distributed to the TO and GO as specified in R6.

Requirement R8 requires TOs and GOs to provide transformer assessments to PCs and TPs but does not specify what the PCs and TPs should do with the information. The SDT should consider including a requirement about what the PC and TP should do with this information.