**Electric Reliability Council of Texas**

**Planning Geomagnetic Disturbance Task Force**

**ROS Approved: December 03, 2020**

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**Planning Geomagnetic Disturbance Task Force**

The Planning Geomagnetic Disturbance Task Force (PGDTF) is a task force reporting to the Reliability and Operations Subcommittee (ROS).

**Background**

Geomagnetic disturbances (GMDs) are caused by solar storms that result in distortions to the earth’s magnetic field. The interaction of the earth’s magnetic field and solar events can cause low frequency geomagnetically-induced currents (GICs) to flow along the surface of the earth and in the oceans. Reliability issues arise when GICs enter the power system from the earth. GMD Events have the potential to adversely impact the reliable operation of interconnected transmission systems. During a GMD Event, geomagnetically-induced currents (GIC) may cause transformer hot-spot heating or damage, loss of Reactive Power sources, increased Reactive Power demand, and Protection System Misoperation, the combination of which may result in voltage collapse and blackout. Specific impacts are dependent on geography, geology and topology.

FERC issued Order 7791 in May 2013 directing NERC to develop reliability standards to address the potential impact of GMDs on the reliability operation of the Bulk-Power System. In response to Order 779 NERC created a two-stage project, 2013-03, and assembled standard drafting teams. Stage one was focused on creating an emergency operations standard, EOP-010-1, which was approved by FERC in June 2014. Stage two was focused on creating a new transmission planning standard, TPL-007-1. On September 22, 2016 FERC issued Order No. 8302 approving NERC Reliability Standard TPL-007-1 that establishes requirements to assess the vulnerability of the applicable registered entities’ transmission systems to GMDs. Applicable entities that do not meet certain performance requirements, based on the results of their Vulnerability Assessments, must develop a Corrective Action Plan (CAP) to achieve the performance requirements of TPL-007-1. In addition, FERC directed NERC to develop modifications to Reliability Standard TPL-007-1, which include the following:

1. Modify the benchmark GMD Event definition set forth in Attachment 1 of Reliability Standard TPL-007-1, as it pertains to the required GMD Vulnerability Assessments and transformer thermal impact assessments, so that the definition is not based solely on spatially-averaged data;
2. To require the collection of necessary GIC monitoring and magnetometer data, and to make such data publicly available;
3. To include a one-year deadline for the development of CAPs; two-year deadlines to complete mitigation actions involving non-hardware mitigation and four-year deadlines to complete mitigation actions involving hardware mitigation.

On May 30, 2017 NERC filed the GMD Research Work Plan for FERC review, which was accepted by FERC on October 19, 2017. On January 22, 2018, NERC filed the proposed TPL-007-2 for approval by FERC. NERC filed a revised GMD Research Work Plan on April 19, 2018 and FERC issued the NOPR for TPL-007-2 on May 17, 2018. In the NOPR, FERC proposed to approve TPL-007-2 and directed NERC to develop modifications requiring CAPs to address supplemental GMD Event, where proposed TPL-007-2 requires entities to consider mitigation for the supplemental GMD Event but does not require CAP (Requirement R8 Part 8.3). NOPR also sought comments on a proposed directive that would require entities to obtain NERC approval when CAP deadlines for GMD Vulnerability Assessment cannot be met, where proposed TPL-007-2 requires entities to implement CAPs for the benchmark GMD Event and complete actions by prescribed deadlines, but deadlines can be extended by entities (Requirement R7). Also, to facilitate the “additional research and analysis” that is necessary to adequately address GMD threats, FERC directed NERC to develop, submit, and implement a GMD Research Work Plan that addresses specific research areas. On November 15th, 2018 Commission approved the revision to the Geomagnetic Disturbance Reliability Standard TPL-007-2 - Transmission System Planned Performance for GMD Events with effective date of July 1st, 20193 and issued an Order No. 851 to modify Reliability Standard TPL-007-2. NERC Project 2019-01 addressing the directives issued by FERC in Order No. 851 to modify reliability Standard TPL-007-3, which includes the following:

1. The development and implementation of CAPs to mitigate assessed Supplemental GMD Event Vulnerabilities (p 29 of Order No. 851)
2. The replacement of the Corrective Action Plan CAPs time-extension provision in Requirement R7.4 with a process through which extensions of time are considered on a case-by-case basis (P 54 of Order No. 851).

The second version of the standard added new Requirements R8, R9 and R10 which require responsible entity to assess the potential implications of a Supplemental GMD Event” on their equipment and systems in accordance with FERC’s directives in Order No. 830. On February 7, 2019 FERC adopted reliability standard TPL-007-3. The TPL-007-3 adds a Canadian variance for Canadian Registered Entities to leverage operating experiences. Under the terms of its implementation plan, reliability standard TPL-007-3 superseded TPL-007-2 prior to the TPL-007-2 ever becoming effective. TPL-007-4 incorporated the modifications mentioned above per Project 2019-01 which includes submitting the CAP request for time-extension to the Compliance Enforcement Authority (CEA) as well as adding a new requirement for the development and implementation of CAPs to mitigate assessed Supplemental GMD Event Vulnerabilities. TPL-007-4 becoming effective as of October 1st, 2020. All phased-in compliance dates from the TPL-007-3 implementation plan were carried forward unchanged in the TPL-007-4 implementation plan.

The newly approved implementation Plan directs PGDTF to continue its work per implementation schedule approved by PGDTF until TPL-007-4 retires.

Since establishing the PGDTF, the following sections of the ERCOT Planning Guide have been updated by the PGDTF through the Planning Guide Revision Request (PGRR) process to align the ERCOT Planning Guide with the newest versions of NERC Reliability Standard TPL-007:

1. Section 3.1.1.5 Geomagnetic Disturbance (GMD) Vulnerability Assessment.
2. Section 3.1.8 Planning Geomagnetic Disturbance (GMD) Activities.
3. Section 6.11 Process for Developing Geomagnetically-Induced Current (GIC) System Models

**Purpose & Scope**

The purpose of the ERCOT PGDTF is to formalize (through the initiation of appropriate Protocol and Guide changes after appropriate consideration of the technical basis and NERC requirements) the requirements and criteria for performing GMD Vulnerability Assessments. The PGDTF’s scope of work should include but not limited to consideration of the following:

* Review and comment to any proposed changes to the ERCOT binding documents needed to meet the requirements of NERC TPL-007-4.
* Update individual and joint responsibilities of ERCOT, Transmission Planners, TSPs and Resource Entities for maintaining models, performing the studies needed to complete benchmark and supplemental GMD Vulnerability Assessments, and implementing process(es) to obtain GMD measurement data for the ERCOT Region in compliance with R1.
* Update the GIC System models and establish the frequency of updating the models.
* Communicate information related to updates to the GIC system models during model builds via the PGDTF listserv(s).
* Identify the appropriate sources for the required data and tools to perform GMD Vulnerability Assessments through research and participation in the NERC GMDTF and technical conferences.
* Develop the acceptable steady state voltage performance criteria for the ERCOT System during the benchmark and supplemental GMD Events as described in Attachment 1 of the TPL-007-4 standard.
* Develop guidelines for CAP alternatives to meet the performance requirements of TPL-007-4, aligned with the industry’s knowledge and experience with GMD, which includes but not limited to the following:
	+ Operating Procedures
	+ Transmission Improvement
	+ Generation redispatch or recommitment.
* Refine a process for approving CAPs developed as a result of a GMD Vulnerability Assessment.
* Support the GMD Vulnerability Assessments
* Review and provide feedback on ERCOT’s method of collecting and aggregating the data from the applicable various stakeholders and owners of the data, after it is developed.
* Review and update the PGDTF Procedure Manual, GIC Modelling Expectations, and Methodology for Assessing GMD Impacts on ERCOT Power System as needed.
* Review and provide feedback on ERCOT process to obtain GMD measurement data from at least one GIC monitor and one magnetometer located in ERCOT in accordance with NERC TPL-007-4 Requirements R12 and R13.
* Monitor GMD-related activities at FERC, IEEE, NERC, and EPRI, discuss these activities at PGDTF, and discuss potential impacts of ERCOT and need for comments.

The PGDTF meetings will include both open and closed sessions. Participation in open sessions is not limited to particular types of individuals. The closed sessions are limited to Transmission Service Providers and are in-person only. WebEx capabilities will not be provided due to sensitivity of the GMD modeling data.

The PGDTF should prepare a report of its findings and recommended Nodal Protocol and Planning Guide revisions for ROS as needed. The PGDTF should report its progress to ROS as required.

**Membership**

PGDTF membership consists of representatives from each Transmission Service Provider in accordance with paragraph (1)(c) of Planning Guide Section 6.11, ERCOT, and other interested Qualified Scheduling Entities (QSEs) and Resource Entities. The open sessions of the PGDTF will be open to all interested parties.

**Chair and Vice-Chair**

The Chair and Vice-Chair positions shall be nominated by the PGDTF for approval by ROS to a 12 month term, on a one year, rolling basis and can serve consecutive terms. The Vice-Chair will act as Chair in the absence of the Chair.

**Meetings**

The PGDTF shall meet as often as necessary to perform their duties and functions. PGDTF should meet at a minimum on a quarterly basis.

All PGDTF meetings shall be called by the Chair and/or Vice-Chair and all such meeting notices shall be sent and posted to the ERCOT website at least one week prior to the meeting.

The Chair shall preside at all meetings and is responsible for preparation of agendas for such meetings which will be posted to the ERCOT website in advance of the meeting. In the absence of the Chair and the Vice-Chair, the group shall select another PGDTF member to preside at the meeting. The Chair, or the presiding member, shall be guided by input from the membership in the conduct of the meetings.

Notes of PGDTF meetings shall be recorded and distributed, along with other communications to all members of the PGDTF. Additionally, such information will be posted on the ERCOT website as authorized by the PGDTF and author of document.