

# Functional Entity Applicability

Project 2013-03 (Geomagnetic Disturbance Mitigation)  
EOP-010-1 (Geomagnetic Disturbance Operations)

## Summary Determination

The purpose of EOP-010-1 (Geomagnetic Disturbance Operations) is to mitigate the reliability impacts of geomagnetic disturbance (GMD) events by implementing Operating Plans, Processes, and Procedures. The proposed standard is applicable to Reliability Coordinators (RC) and Transmission Operators (TOP) with networks that contain power transformers with high side grounded wye windings above 200 kV. This applicability is consistent with the NERC Functional Model and existing standards where both entities are described as having responsibility and authority for reliable transmission operations within their scope. The drafting team determined that Balancing Authorities (BA) should not be among the applicable functional entities because there were no additional steps or tasks for a BA to perform beyond their normal balancing functions to mitigate GMD events. The drafting team also determined that Generator Operators (GOP) should not be among the applicable functional entities because any Operating Procedures to mitigate the effects of GMD would need to be supported by an equipment-specific study and is expected to require GMD monitoring equipment. Consistent with FERC Order No. 779, vulnerability assessments and mitigation plans will be addressed in stage 2 of Project 2013-03 and applicability of stage 2 standards will be considered separately.

## Background

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. Stage 1 Standard(s) must be filed by January 2014. An implementation period of six-months was recommended in the FERC Order.
- 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. A specific implementation period for Stage 2 was not addressed in Order 779.

EOP-010-1 is a new standard to specifically address the stage 1 directives in Order No. 779. While the applicability of the proposed stage 1 standard is limited to RCs and TOPs, other entities will be considered for stage 2 as outlined in the Standards Authorization Request.

## Justification for Applicable Functional Entities

### Reliability Coordinator

The RC has responsibility and authority for reliable operation within the Reliability Coordinator Area (RCA). The RC's scope includes a wide-area view with situational awareness of neighboring RCAs. The NERC Functional Model states:

The Reliability Coordinator maintains the Real-time operating reliability of its Reliability Coordinator Area and in coordination with its neighboring Reliability Coordinator's wide-area view. The wide-area view includes situational awareness of its neighboring Reliability Coordinator Areas. Its scope includes both transmission and balancing operations, and it has the authority to direct other functional entities to take certain actions to ensure that its Reliability Coordinator Area operates reliably.

The RC's authority is codified in IRO-001-1a which states:

**R3.** The Reliability Coordinator shall have clear decision-making authority to act and to direct actions to be taken by Transmission Operators, Balancing Authorities, Generator Operators, Transmission Service Providers, Load-Serving Entities, and Purchasing-Selling Entities within its Reliability Coordinator Area to preserve the integrity and reliability of the Bulk Electric System. These actions shall be taken without delay, but no longer than 30 minutes.

**R8.** Transmission Operators, Balancing Authorities, Generator Operators, Transmission Service Providers, Load-Serving Entities, and Purchasing-Selling Entities shall comply with Reliability Coordinator directives unless such actions would violate safety, equipment, or regulatory or statutory requirements. Under these circumstances, the Transmission Operator, Balancing Authority, Generator Operator, Transmission Service Provider, Load-Serving Entity, or Purchasing-Selling Entity shall immediately inform the Reliability Coordinator of the inability to perform the directive so that the Reliability Coordinator may implement alternate remedial actions.

Including the RC as an applicable entity in EOP-010-1 provides the necessary coordination for planning and real-time actions that is envisioned by the Functional Model and addresses Order No. 779 directives to consider the coordination of Operating Procedures across regions by a functional entity with a wide-area view.

### Transmission Operator

Like the RC, the TOP has responsibility and authority for the reliable operation of the transmission system within a specified area. According to the NERC Functional Model:

The Transmission Operator is responsible for the Real-time operating reliability of the transmission assets under its purview, which is referred to as the Transmission Operator Area. The Transmission Operator has the authority to take certain actions to ensure that its Transmission Operator Area operates reliably.

The TOP's authority is established in TOP-001-1a as follows:

**R1.** Each Transmission Operator shall have the responsibility and clear decision-making authority to take whatever actions are needed to ensure the reliability of its area and shall exercise specific authority to alleviate operating emergencies.

**R3.** Each Transmission Operator, Balancing Authority, and Generator Operator shall comply with reliability directives issued by the Reliability Coordinator, and each Balancing Authority and Generator Operator shall comply with reliability directives issued by the Transmission Operator, unless such actions would violate safety, equipment, regulatory or statutory requirements. Under these circumstances the Transmission Operator, Balancing Authority or Generator Operator shall immediately inform the Reliability Coordinator or Transmission Operator of the inability to perform the directive so that the Reliability Coordinator or Transmission Operator can implement alternate remedial actions.

The [2012 GMD Report](#) contains web links for some TOP Operating Procedures to mitigate the effects of GMD events. Recently the GMD Task Force developed [Operating Procedure templates](#) that provide a technical resource for TOPs to use in developing procedures based on industry best practices. Included in the templates are actions that could be employed to mitigate the effects of GMD, such as reduction of equipment loading, increasing reactive reserves, reconfiguration of the system, recalling outages, and Load shedding. The templates also describe indicators of GMD conditions that could be used as trigger conditions for steps or tasks in an entity's Operating Procedures. Detailed study of system and equipment impacts can improve Operating Procedures. However, some procedures can be put in place without system studies to increase situational awareness and posture the system when a GMD event is forecasted.

## Justification for Omitting Functional Entities

### Balancing Authority

BAs are responsible for the Real-time balancing of the system. In order to carry out that responsibility, BAs will dispatch generation, use regulation and other ancillary services, to keep Area Control Error (ACE) within reasonable limits while maintaining system frequency. BAs will work with the TOP to adjust voltage schedules or redispatch generation at the request of the TOP to ensure that the transmission system is operated within thermal, voltage, and stability limits.

The BA can be expected to address GMD impacts through use of generation. However, the BA would not initiate actions unilaterally during a GMD event and would instead respond to the direction of the TOP

and RC. As such, the independent actions that the BA would take are very limited, if any. For example, if redispatch of generation or adjustment of voltage schedules were needed, the BA would not take those actions without a request and the concurrence of the TOP and/or RC.

The RC and TOP will be preparing GMD Operating Plans, Operating Processes, and/or Operating Procedures to address steps that each will be taken to address GMD impacts. Some of those steps will require the BA to take action. As outlined above, the requirement for the BA to execute actions at the request of the TOP or RC is clear. Given that the BA would only take action at the request of the TOP or RC and that the required actions would be the same actions BAs take for other system events, the SDT concludes that the BA should not be included as an applicable entity in EOP-010-1.

## Generator Operator

GOPs are the functional entity that operate generating unit(s) and perform the functions of supplying energy and reliability related services. They may be responsible for operating generator step up (GSU) transformers that connect the generator to the transmission system. Some GSU transformers are susceptible to geomagnetically-induced currents (GICs) during a GMD event, and operating actions are used by some GOPs to mitigate system or equipment impacts.

An effective GOP GMD Operating Procedure to mitigate the effects of GMD would require:

1. GSU transformer study to determine expected GIC on the GSU high side neutral level at their site (GIC/thermal rating study)
2. Ability to monitor GIC at the GSU high voltage wye-grounded winding neutral

Absent the above information, the GOP would not have the technical basis for taking steps on its own and would instead take steps based on the RC or TOP's Operating Plans, Processes, or Procedures. Therefore, the SDT concludes that GOPs should be excluded as applicable entities in EOP-010-1.

Some GOPs already have GMD Operating Procedures for their equipment based on prior studies and/or monitoring equipment. EOP-010-1 will not prohibit or interfere with a GOP's established procedure. Furthermore, the RC and TOP will be preparing GMD Operating Plans and Operating Processes or Procedures, respectively. Those will address steps that each will be taking to address GMD impacts, which may include requiring one or more GOPs to take action. Existing standards provide obligations for the GOP to execute actions when requested by the TOP or RC as described above.

Generator Owners (GOs) and GOPs are included in the Project 2013-03 Standards Authorization Request. They will be considered for inclusion in Stage 2 standards, which will require applicable entities to conduct vulnerability assessments and develop appropriate mitigation strategies. Such mitigation strategies could include the development of Operating Procedures for applicable GOs and GOPs.