

Supporting Statement  
**FERC-725S, Mandatory Reliability Standards: EOP-010-1**  
(Reliability Standard for Geomagnetic Disturbance Operations),  
Final Rule in RM14-1-000

In Docket RM14-1 the Commission approves Reliability Standard EOP-010-1. The North American Electric Reliability Corporation (NERC), the Commission-certified Electric Reliability Organization (ERO), submitted the proposed Reliability Standard for Commission approval in response to a Commission directive in Order No. 779.<sup>1</sup> The Reliability Standard is designed to mitigate the effects of geomagnetic disturbances (GMDs) on the Bulk-Power System by requiring responsible entities to implement Operating Plans and Operating Procedures or Processes.

**1. CIRCUMSTANCES THAT MAKE THE COLLECTION OF INFORMATION NECESSARY**

On August 8, 2005, The Electricity Modernization Act of 2005, which is Title XII of the Energy Policy Act of 2005 (EPAcT 2005), was enacted into law.<sup>2</sup> EPAcT 2005 added a new section 215 to the Federal Power Act (FPA), which requires a Commission-certified Electric Reliability Organization (ERO) to develop mandatory and enforceable Reliability Standards, which are subject to Commission review and approval. Once approved, the Reliability Standards must be enforced by the ERO, subject to Commission oversight. The Commission implements section 215 in 18 CFR 40.

In Order No. 779, the Commission directed NERC, pursuant to FPA section 215(d)(5), to develop and submit for approval proposed Reliability Standards that address the impact of GMDs on the reliable operation of the Bulk-Power System. The Commission based its directive on the potentially severe, wide-spread impact on the reliable operation of the Bulk-Power System that can be caused by GMD events and the absence of existing Reliability Standards to address GMD events.<sup>3</sup>

The Commission directed NERC to implement the directive in two stages. In the first stage, the Commission directed NERC to submit, within six months of the effective date of Order No. 779, one or more Reliability Standards (First Stage GMD Reliability Standards) that require owners and operators of the Bulk-Power System to develop and implement operational procedures to mitigate the effects of GMDs consistent with the reliable operation of the Bulk-Power System.<sup>4</sup>

On November 13, 2013, NERC petitioned the Commission to approve proposed Reliability Standard EOP-010-1 and its associated violation risk factors and violation severity levels,

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<sup>1</sup> *Reliability Standards for Geomagnetic Disturbances*, Order No. 779, 78 FR 30,747, 143 FERC ¶ 61,147, *reh'g denied*, 144 FERC ¶ 61,113 (2013).

<sup>2</sup> The Energy Policy Act of 2005, Pub. L. No 109-58, Title XII, Subtitle A, 119 Stat. 594, 941 (2005), codified at 16 U.S.C. 824o (2000).

<sup>3</sup> Order No. 779, 143 FERC ¶ 61,147 at P 3.

<sup>4</sup> *Id.* P 2.

implementation plan, and effective dates. NERC states that the proposed Reliability Standard is just, reasonable, not unduly discriminatory or preferential, and in the public interest. Further, NERC maintains that the proposed Reliability Standard satisfies the Commission's directive in Order No. 779 corresponding to the development and submission of the First Stage GMD Reliability Standards.

## **2. HOW, BY WHOM, AND FOR WHAT PURPOSE THE INFORMATION IS TO BE USED AND THE CONSEQUENCES OF NOT COLLECTING THE INFORMATION**

NERC states that, consistent with Order No. 779 and the NERC Functional Model, Reliability Standard EOP-010-1 applies to reliability coordinators and to transmission operators with a "Transmission Operator Area that includes a power transformer with a high side wye-grounded winding with terminal voltage greater than 200 kV."<sup>5</sup> NERC explains that the proposed Reliability Standard has three requirements: (1) Requirement R1 addresses coordination by reliability coordinators within their areas; (2) Requirement R2 addresses the dissemination of space weather information by reliability coordinators to ensure that entities within a reliability coordinator area have the appropriate information necessary to take action and that the same information is available to all entities; and (3) Requirement R3 requires transmission operators to develop GMD Operating Procedures or Processes.

NERC states that Requirement R1 requires reliability coordinators to develop, maintain, and implement a GMD Operating Plan that coordinates the GMD Operating Procedures or Operating Processes within the reliability coordinator area.<sup>6</sup> NERC explains that reliability coordinators are required to ensure that GMD Operating Procedures and Operating Processes in a reliability coordinator area are not in conflict, but reliability coordinators will not review the technical aspects of the GMD Operating Procedures and Operating Processes. NERC explains that "if Company A submitted an Operating Procedure proposing to take Line X out of service under specified GMD conditions, and Company B submitted an Operating Procedure that relies on Line X remaining in service in the event of a GMD – it is the responsibility of the Reliability Coordinator to *identify* this conflict."<sup>7</sup> Beyond identifying a conflict and requiring its resolution by Company A and Company B, NERC states that the review is "not intended to be a review by the Reliability Coordinator of the technical aspects of the GMD Operating Procedures or Processes."<sup>8</sup> Instead, NERC points out that transmission operators will be responsible for the technical aspects of their Operating Procedures and Operating Processes. NERC further states that Requirement R1 requires reliability coordinators to describe the activities that must be undertaken in order to mitigate the effects of a GMD event. NERC explains that, pursuant to Reliability Standard IRO-001-1.1, reliability coordinators have decision-making authority to act and to direct actions to be taken by transmission operators, balancing authorities, generator

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<sup>5</sup> NERC Petition at 8 ("A power transformer with a 'high side wye-grounded winding' refers to a power transformer with windings on the high voltage side that are connected in a wye configuration and have a grounded neutral connection.").

<sup>6</sup> Operating Plan, Operating Procedure, and Operating Process are existing terms defined in the Glossary of Terms Used in NERC Reliability Standards. See Glossary of Terms Used in NERC Reliability Standards (effective November 21, 2013) at 49-50.

<sup>7</sup> NERC Petition at 11-12 (emphasis in original)

<sup>8</sup> NERC Petition at 11-12 (emphasis in original)

operators, transmission service providers, load-serving entities, and purchasing-selling entities within their reliability coordinator area to preserve the reliability of the bulk electric system. NERC states that Requirement R2 requires reliability coordinators to disseminate space weather information to ensure coordination and consistent awareness in its reliability coordinator area. NERC maintains that entrusting this responsibility to reliability coordinators is appropriate given the reliability coordinator's wide-area view. NERC also explains that Requirement R2 replaces existing Requirement R3 of Reliability Standard IRO-005-3.1a, which currently addresses dissemination of information regarding GMD forecasts.<sup>9</sup>

NERC states that Requirement R3 requires transmission operators to develop GMD Operating Procedures or Operating Processes to address GMD events. NERC explains that Requirement R3 is not prescriptive and allows entities to tailor their Operating Procedures or Operating Processes based on the responsible entity's assessment of entity-specific factors, such as geography, geology, and system topology. According to NERC, Requirement R3 requires each transmission operator to specify: (1) steps or tasks that must be conducted to receive space weather information; (2) what actions must be taken under what conditions, and such conditions must be predetermined; and (3) when and under what conditions the Operating Procedure or Operating Process is exited.<sup>10</sup> NERC maintains that Reliability Standard EOP-010-1 does not prescribe specific actions that must be taken by responsible entities because "a 'one-size fits all' approach to crafting GMD Reliability Standards would fail to recognize the important role of locational differences."<sup>11</sup>

Entities would implement their Operating Procedures or Operating Processes in such a manner as to mitigate any effects of a GMD event. The intent is that entities are able to avoid any power outages at all by implementing their procedures prior to a GMD event actually occurring.

### **3. DESCRIBE ANY CONSIDERATION OF THE USE OF IMPROVED INFORMATION TECHNOLOGY TO REDUCE THE BURDEN AND TECHNICAL OR LEGAL OBSTACLES TO REDUCING BURDEN**

The use of current or improved technology is not covered in Reliability Standards, and is therefore left to the discretion of each entity. It should be noted that this standard (EOP-010-1) does not require any information or documentation to be submitted to FERC. The Reliability Standards do not address how documents are submitted to compliance authorities; it only requires respondents to maintain evidence of their compliance with the requirements. For example, when a Regional Entity (not FERC) audits a respondent for compliance with this Reliability Standard, it may view the respondents' Operating Procedures. The Reliability Standard does not address how or whether the Operating Procedure document would be transmitted from the respondent to the Regional Entity. As a practical matter, the auditor would probably conduct an on-site visit to review the evidence.

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<sup>9</sup> According to NERC, Reliability Standard IRO-005-3.1a will be retired once the Commission approves proposed Reliability Standard IRO-005-4, which is currently pending before the Commission. NERC Petition at 13.

<sup>10</sup> NERC Petition at 13-15.

<sup>11</sup> NERC Petition at 14.

**4. DESCRIBE EFFORTS TO IDENTIFY DUPLICATION AND SHOW SPECIFICALLY WHY ANY SIMILAR INFORMATION ALREADY AVAILABLE CANNOT BE USED OR MODIFIED FOR USE FOR THE PURPOSE(S) DESCRIBED IN INSTRUCTION NO. 2**

The information collection requirements are unique to this Reliability Standard and to this information collection. The Commission does not know of any duplication in the requirements.

The Commission contacted the Department of Energy's Office of Electricity Delivery and Electric Reliability and the Nuclear Regulatory Commission to inquire if either agency asks respondents to develop Operating Procedures or Operating Processes related to GMD events. Neither agency collects similar information.

**5. METHODS USED TO MINIMIZE THE BURDEN IN COLLECTION OF INFORMATION INVOLVING SMALL ENTITIES**

Reliability Standard EOP-010-1 minimizes or avoids burden on small entities. The standard only applies to certain transmission operators and reliability coordinators. The Commission does not expect any material burden change for smaller entities because the proposed standard only applies to transmission operators with a Transmission Operator Area that includes a power transformer with a high side, wye-grounded winding with terminal voltage greater than 200 kV. These types of arrangements typically only occur with large entities serving substantial geographical areas with significant energy output.

In general, small entities may reduce their burden by taking part in a joint registration organization or a coordinated functional registration. These options allow an entity to share its compliance burden with other entities. Detailed information regarding these options are available in NERC's Rules of Procedure at sections 507 and 508.<sup>12</sup>

**6. CONSEQUENCE TO FEDERAL PROGRAM IF COLLECTION WERE CONDUCTED LESS FREQUENTLY**

GMD events have the potential to cause severe, wide-spread impact on the reliable operation of the Bulk-Power System. The most recent major event was in 1989 that knocked out power for about 6 million people in Quebec. Currently there are no Reliability Standards to address GMD events. The new Reliability Standard requires transmission operators and reliability coordinators to develop, maintain, and implement a GMD Operating Procedure or Operating Process. The standard does not indicate how often respondents must review their procedures but respondents are required to have evidence that they reviewed their procedures. Respondents are required to keep evidence for three years. If respondents were to carry out these responsibilities on a less frequent basis there would be increased risk that GMD operating procedures and processes are out of date, leading to increased risk of black-outs due to GMD related events.

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<sup>12</sup> Available at [http://www.nerc.com/FilingsOrders/us/RuleOfProcedureDL/NERC\\_ROP\\_Effective\\_20140701\\_updated\\_20140602.pdf](http://www.nerc.com/FilingsOrders/us/RuleOfProcedureDL/NERC_ROP_Effective_20140701_updated_20140602.pdf).

## **7. EXPLAIN ANY SPECIAL CIRCUMSTANCES RELATING TO THE INFORMATION COLLECTION**

There are no special circumstances as described in 5 CFR 1320.5 pertaining to this collection.

## **8. DESCRIBE EFFORTS TO CONSULT OUTSIDE THE AGENCY: SUMMARIZE PUBLIC COMMENTS AND THE AGENCY'S RESPONSE**

The ERO process to establish Reliability Standards is a collaborative process with the ERO, Regional Entities and other stakeholders developing and reviewing drafts, and providing comments, with the final proposed standard submitted to the FERC for review and approval.<sup>13</sup> The Reliability Standard was approved during the industry vetting process (before it was submitted to FERC).<sup>14</sup> There were nearly 350 representatives from across industry and government that voted for approval to send the Reliability Standard to FERC for final approval. The development process is consistent with the attributes necessary for ANSI accreditation and is both open and balanced. In addition, each FERC rulemaking (both proposed and final rules) is published in the Federal Register, thereby providing public utilities and licensees, state commissions, Federal agencies, and other interested parties an opportunity to submit data, views, comments or suggestions concerning the proposed collection of data. The proposed rule was published in the Federal Register on January 22, 2014 (79 FR 3547).

In response to the proposed rule the Commission received 20 sets of comments. Eight commenters supported the Reliability Standard without modification and one commenter supported the Reliability Standard with the exception of the implementation period. These commenters were mostly utilities or utility organizations that would likely have to comply with the Reliability Standard. The remaining commenters were individuals, vendors, or interest groups that would not be subject to the Reliability Standard. The comments revolved around applicability of the standard, effectiveness of GMD operational procedures, implementation plan and effective dates, and a few other issues. The final rule addresses all the comments. Below are excerpts from the final rule related to the applicability of the Reliability Standard and the effectiveness of GMD operational procedures.

### **Applicability Section of Reliability Standard EOP-010-1**

#### **NERC Petition**

NERC submitted a white paper as part of its petition explaining the technical justification for applying Reliability Standard EOP-010-1 only to transmission operators that operate a power transformer with a high side wye-grounded winding with terminal voltage greater than 200 kV in their transmission operator areas.<sup>15</sup> In another white paper, NERC explains its proposal

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<sup>13</sup> Details of the current ERO Reliability Standard processes are available on the NERC website at [http://www.nerc.com/files/Appendix\\_3A\\_StandardsProcessesManual\\_20120131.pdf](http://www.nerc.com/files/Appendix_3A_StandardsProcessesManual_20120131.pdf)

<sup>14</sup> The Standard went through three ballots. It received a 62.74% approval rate on the first ballot and, after revisions, a 91.95% approval rate on the last ballot.

<sup>15</sup> NERC Petition, Exhibit D (White Paper Supporting Network Applicability) at 1.

regarding the applicability of the Reliability Standard to reliability coordinators and transmission operators only.<sup>16</sup> The White Paper Supporting Functional Entity Applicability explains that the reliability coordinator has “responsibility and authority for reliable operation within the Reliability Coordinator Area (RCA) ... and includes a wide-area view with situational awareness of neighboring RCAs.”<sup>17</sup> NERC states that including reliability coordinators as applicable entities “provides the necessary coordination for planning and real-time actions.”<sup>18</sup> With respect to transmission operators, NERC explains that “[l]ike the [reliability coordinator], the [transmission operator] has responsibility and authority for the reliable operation of the transmission system within a specified area.”<sup>19</sup> In addition, NERC justifies omitting balancing authorities and generator operators from the scope of the Reliability Standard. NERC explains that balancing authorities “can be expected to address GMD impacts through use of generation ... [but] the [balancing authority] would not initiate actions unilaterally during a GMD event and would instead respond to the direction of the [transmission operator] and [reliability coordinator].”<sup>20</sup> As for generator operators, NERC states that some generator operators “would not have the technical basis for taking steps [to mitigate GMDs] on [their] own and would instead take steps based on the [reliability coordinator’s] or [transmission operator’s] Operating Plans, Processes, or Procedures.”<sup>21</sup> NERC also notes that generator owners and generator operators will be considered for inclusion in the Second Stage GMD Reliability Standards, “which will require applicable entities to conduct vulnerability assessment and develop appropriate mitigation strategies . . . [and that] [s]uch mitigation strategies could include the development of Operating Procedures for applicable [generator owners] and [generator operators].”<sup>22</sup>

### **NOPR**

The NOPR stated that the applicability designations in Reliability Standard EOP-010-1 are appropriate, based on the justifications set forth in the white papers in Exhibits D and E of NERC’s petition.

### **Comments**

Foundation, SmartSense, AFS, and Baker maintain that Reliability Standard EOP-010-1 should be applicable to more entities than transmission operators having a power transformer with a high side wye-grounded winding with terminal voltage greater than 200 kV in the transmission operator area.

Foundation states that during the March 1989 solar storm discussed in Order No. 779, electric utilities reported effects on static VAR compensators and other reactive power equipment operating between 100 kV and 200 kV. Foundation notes that such equipment is “designed to provide reactive power and to stabilize transmission networks during GMD.”<sup>23</sup> Foundation states that Reliability Standard EOP-010-1 “would exempt Transmission Operators with equipment

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16 NERC Petition, Exhibit E (White Paper Supporting Functional Entity Applicability).

17 *Id.* at 2.

18 *Id.*

19 *Id.*

20 *Id.* at 3-4.

21 *Id.* at 4.

22 *Id.*

23 Foundation Comments at 10.

operating between 100 kV and 200 kV.”<sup>24</sup> Foundation requests that the Commission remand Reliability Standard EOP-010-1 to include “owners and operators of all stabilizing and reactive power equipment operating between 100 kV and 200 kV.”<sup>25</sup>

Foundation and SmartSense assert that the 200 kV threshold for transmission operators is inconsistent with the Commission-approved definition of bulk electric system, which generally includes assets operating at voltages of 100 kV and higher. SmartSense asserts that there is evidence that elements of the Bulk-Power System operating between 100 kV and 200kV would be substantially affected by a GMD event. In support, SmartSense cites to an Oak Ridge National Laboratory GMD Study and an article from the Idaho National Laboratory, which SmartSense states tested sub-200 kV transformers.<sup>26</sup> SmartSense further claims that NERC improperly relied on a cost-benefit analysis to exclude networks operating at 200 kV and below. Foundation, AFS, EMP Coalition, Kappenman, and Baker maintain that Reliability Standard EOP-010-1 should be applicable to generator operators and/or balancing authorities.

Foundation states that balancing authorities have real-time responsibilities that would be essential during a GMD event. Foundation asserts that excluding balancing authorities from the applicability section of Reliability Standard EOP-010-1 is “operationally unworkable” because it “assumes that the real time responsibilities of Balancing Authorities under fast-moving GMD conditions could be assumed by Reliability Coordinators.”<sup>27</sup> Foundation states that the NOAA Space Weather Prediction Center would only provide 15-60 minutes warning of a severe solar storm. Foundation asserts that, given the 15-60 minute limitation, there would be insufficient time for reliability coordinators to communicate with balancing authorities, transmission operators, and generator operators following a solar storm warning because the NERC Reliability Standards require three-part communications when engaging in oral, two-party communications.

Foundation and Kappenman also maintain that Reliability Standard EOP-010-1 does not address generator step up (GSU) transformers, which they assert are vulnerable to GMDs. Foundation contends that generator operators have been installing geomagnetically-induced currents (GIC) monitors for their GSU transformers and have taken actions to downrate their GSU transformers during solar storms. Foundation also notes that the NERC GMD Task Force developed an Operating Procedure Template for generator operators.

### **Commission Determination**

We determine that the applicability section of Reliability Standard EOP-010-1 is technically justified and consistent with Order No. 779, both in terms of using a 200 kV threshold for

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<sup>24</sup> *Id.*

<sup>25</sup> *Id.* at 13.

<sup>26</sup> SmartSense Comments at 10-11 (citing Oak Ridge National Laboratory, Electromagnetic Pulse: Effects on the U.S. Power Grid: Meta-R-319 at page 4-14 (January 2010), available at [http://www.ornl.gov/sci/ees/etsd/pes/pubs/ferc\\_Meta-R-319.pdf](http://www.ornl.gov/sci/ees/etsd/pes/pubs/ferc_Meta-R-319.pdf); Idaho National Laboratory, *INL Broadens Understanding of Solar Storms* (December 16, 2013), available at [https://inlportal.inl.gov/portal/server.pt/community/newsroom/257/feature\\_story\\_details/1269?featurestory=DA\\_615269](https://inlportal.inl.gov/portal/server.pt/community/newsroom/257/feature_story_details/1269?featurestory=DA_615269)).

<sup>27</sup> Foundation Comments at 14.

determining applicable transmission operators and not including balancing authorities and generator operators as applicable entities.

We reject the argument that the applicability threshold in Reliability Standard EOP-010-1 is inconsistent with the definition of bulk electric system because it excludes transmission operators with only 200 kV transformers and below. Instead, we determine that the applicability section of Reliability Standard EOP-010-1 complies with the directive in Order No. 779 that the First Stage GMD Reliability Standards should mitigate the effects of GMDs consistent with the reliable operation of the Bulk-Power System.<sup>28</sup> The NERC petition and White Paper Supporting Network Applicability provide an adequate technical basis to conclude that transformers operating at 200 kV and below are likely to have a limited impact on the Bulk-Power System during a GMD event. We are not persuaded by the Foundation comments, discussed above, which do not refute this conclusion, or the materials cited by SmartSense. SmartSense cites a table in the Oak Ridge Laboratory GMD Study identifying at-risk transformers operating at 345 kV, which fall within the applicability criteria.<sup>29</sup> Moreover, the Oak Ridge Laboratory GMD Study found that significantly higher GIC flows occur at higher operating voltages.<sup>30</sup>

The applicability criteria for Reliability Standard EOP-010-1 determine which transmission operators must comply with the Reliability Standard (i.e., those with a power transformer with a high side wye-grounded winding with terminal voltage greater than 200 kV in the transmission operator area). While this criterion excludes transmission operators operating transformers 200 kV and below, the 200 kV threshold does not mean that applicable transmission operators will ignore reactive power supplies operating at 200 kV or below on their systems when developing the required GMD Operating Procedures or Operating Processes. Reliability Standard EOP-010-1, Requirement R3 supports this conclusion because it directs each applicable transmission operator to “develop, maintain, and implement a GMD Operating Procedure or Operating Process to mitigate the effects of GMD events on the reliable operation of its respective system.” Accordingly, because Requirement R3 addresses an applicable transmission operator’s entire system, the requirement is not limited to transformers operating above 200 kV for the purposes of developing GMD Operating Procedures or Operating Processes by applicable transmission operators.<sup>31</sup>

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28 Order No. 779, 143 FERC ¶ 61,147 at P 29; *see also* 16 U.S.C. 824o(a)(3) (“The term ‘reliability standard’ means a requirement ... to provide for the reliable operation of the bulk-power system.”); *Mandatory Reliability Standards for the Bulk-Power System*, Order No. 693, FERC Stats. & Regs. ¶ 31,242, at PP 97-98, *order on reh’g*, Order No. 693-A, 120 FERC ¶ 61,053 (2007) (explaining that each Reliability Standard will identify the set of users, owners and operators that must comply with that standard and “NERC has indicated that in the future it may add to a Reliability Standard limitations on applicability based on electric facility characteristics such as generator nameplate ratings”).

29 SmartSense Comments at 10 n.31 (citing Oak Ridge National Laboratory, *Electromagnetic Pulse: Effects on the U.S. Power Grid: Meta-R-319* at page 4-14).

30 *Id.* at page 1-15 (“The operating voltage of the transmission network is an important factor in determining the level of GIC flow that will occur on each part of the U.S. power grid. At the higher operating voltages, there are pronounced trends that: the average length of each line increases and the average circuit resistance decreases. These trends result in larger GIC flows in the higher voltage portions of the network, given the same geo-electric field conditions.”).

31 *See* NERC Petition at 14 (“An Operating Procedure or Operating Process is maintained when it is kept relevant by taking into consideration system configuration, conditions or operating experiences, as needed to accomplish its



The Idaho National Laboratory article cited by SmartSense stated that a simulated solar event affected “a pair of 138kV core form, 2 winding substation transformers, which had been in-service at [Idaho National Laboratory] since the 1950s,” through increased losses and generation of harmonics that resulted in loss of excitation.<sup>32</sup> The Idaho National Laboratory article does not contradict NERC’s technical analysis, however. NERC does not contend that GMD events will have no effect on networks operating at 200 kV and below. Rather, the standard drafting team found that geomagnetically-induced currents generated on networks operated at 200 kV and below would be significantly less than those operated at higher voltages, a finding that is consistent with the Oak Ridge Laboratory GMD Study. Specifically, NERC’s modeling of a portion of the Eastern Interconnection showed only a small change in system impact from a GMD event when 115 kV and 161 kV circuits were excluded from the model.<sup>33</sup> The materials cited in the comments do not rebut NERC’s technical analysis. In sum, we determine that there is adequate technical justification for the 200 kV threshold for transmission operators.<sup>34</sup>

We also determine that NERC provided adequate justification not to include balancing authorities and generator operators in the applicability section of Reliability Standard EOP-010-1. We disagree with Foundation’s assertion that balancing authorities should be included in the applicability section because reliability coordinators are incapable of communicating quickly with transmission operators, generator operators, and balancing authorities due to the three-part communications requirement in Reliability Standard COM-002-2. We are not persuaded that GMD events pose unique communication problems for reliability coordinators because a reliability coordinator may only have 15-60 minutes warning of a severe solar storm. Reliability coordinators are responsible for real-time system reliability and often must respond quickly or even immediately to Bulk-Power System events with little or no warning.<sup>35</sup> Reliability Standard COM-002-2, Requirement R1 recognizes this responsibility by stating that “[e]ach Transmission Operator, Balancing Authority, and Generator Operator shall have communications (voice and data links) with appropriate Reliability Coordinators, Balancing Authorities, and Transmission Operators ... [and] [s]uch communications shall be staffed and available for addressing a real-time emergency condition.”

With respect to generator operators, there is no dispute that GSU transformers are susceptible to geomagnetically-induced currents. While generator operators are not listed as applicable entities in Reliability Standard EOP-010-1, NERC explains that generator operators will have to act during a GMD event when directed by a reliability coordinator, in accordance with its reliability

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purpose. Requirement R3 ... allows entities to tailor their Operational Procedures or Processes based on the responsible entity’s assessment of entity-specific factors, such as geography, geology, and system topology.”).

32 Idaho National Laboratory, *INL Broadens Understanding of Solar Storms* (December 16, 2013), available at [https://inlportal.inl.gov/portal/server.pt/community/newsroom/257/feature\\_story\\_details/1269?featurestory=DA\\_615269](https://inlportal.inl.gov/portal/server.pt/community/newsroom/257/feature_story_details/1269?featurestory=DA_615269).

33 NERC Petition, Exhibit D (White Paper Supporting Network Applicability) at 8 (Table A2).

34 As we conclude that NERC provided adequate technical justification for the 200 kV applicability threshold, we reject SmartSense’s assertion that NERC improperly based the 200 kV threshold on a cost-benefit analysis.

35 NERC, Reliability Functional Model Technical Document, Version 5, at 7 (Approved May 2010), available at [http://www.nerc.com/pa/Stand/Functional%20Model%20Archive%201/FM\\_Technical\\_Document\\_V5\\_2009Dec1.pdf](http://www.nerc.com/pa/Stand/Functional%20Model%20Archive%201/FM_Technical_Document_V5_2009Dec1.pdf).

coordinator's GMD Operating Plan, or by a transmission operator, in accordance with its transmission operator's GMD Operating Procedures or Operating Processes.<sup>36</sup> We are not persuaded that generator operators should be required to act independently under Reliability Standard EOP-010-1. While generator operators might be, as Foundation asserts, increasingly installing GIC monitoring equipment, there is no evidence in the record regarding the proportion of generator operators with GIC monitoring capabilities. Accordingly, we agree with NERC that at least some generator operators would not have the technical basis to address a GMD event and would instead need to rely on reliability coordinators and transmission operators for direction.<sup>37</sup>

We also note that the Geomagnetic Disturbance Operating Procedure Template for generator operators developed by the NERC GMD Task Force, which the Foundation's comments reference, conditions some of its suggested actions on the generator operator having adequate monitoring systems.<sup>38</sup> In sum, we are not persuaded by Foundation's comments and, rather, determine that there is adequate justification in the record for not including balancing authorities and generator operators in the applicability section of Reliability Standard EOP-010-1.<sup>39</sup>

### **Effectiveness of GMD Operational Procedures**

#### **NERC Petition**

NERC states, quoting Order No. 779, that "[o]perational procedures may help alleviate abnormal system conditions due to transformer absorption of reactive power during GMD events, helping to stabilize system voltage swings, and may potentially isolate some equipment from being damaged or misoperated."<sup>40</sup> NERC explains that Reliability Standard EOP-010-1 "is an important first step in addressing the issue of GMDs and can be implemented relatively quickly. While responsible entities will develop and implement Operational Procedures or Operational Processes, NERC will continue to support those efforts through the GMD Task Force, for example, by identifying and sharing Operating Plans, Processes, and Procedures found to be the most effective."<sup>41</sup>

#### **NOPR**

The NOPR stated that Reliability Standard EOP-010-1 satisfies the directive in Order No. 779 that NERC submit one or more Reliability Standards that require owners and operators of the Bulk-Power System to develop and implement operational procedures to mitigate the effects of GMDs consistent with the reliable operation of the Bulk-Power System. The NOPR also stated

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36 NERC Petition, Exhibit E (White Paper Supporting Functional Entity Applicability) at 2-4.

37 *Id.* at 4.

38 NERC, Geomagnetic Disturbance Operating Procedure Template Generator Operator, at 1, *available at* [http://www.nerc.com/docs/pc/gmdtf/Template\\_GOP.pdf](http://www.nerc.com/docs/pc/gmdtf/Template_GOP.pdf) ("Some actions listed below should only be undertaken if supported by an adequate GIC impact study and/or if adequate monitoring systems are available. Otherwise they can make matters worse.").

39 While not basing our determination on NERC's representation or pre-judging what NERC ultimately submits in the Second Stage GMD Reliability Standards, we note NERC's statement that the standard drafting team for the Second Stage GMD Reliability Standards is considering including generator owners and generator operators in the applicability section of that proposed Reliability Standard. NERC Petition, Exhibit E at 4.

40 NERC Petition at 3 (quoting Order No. 779, 143 FERC ¶ 61,147 at P 36).

41 *Id.* at 3-4.

that operational procedures, while not a complete solution, constitute an important first step to addressing the GMD reliability gap.

### **Comments**

SmartSense and Orquin state that GMD operational procedures depend on the limited ability to predict GMD events. SmartSense states that space weather information is the “default trigger” for implementing operating procedures under Reliability Standard EOP-010-1 but that space weather forecasts have a high error rate. SmartSense contends that relying on space weather forecasts alone will result in false alarms or missed GMD event forecasts. SmartSense maintains that real-time or near real-time monitoring data should be used in conjunction with space weather forecasts to trigger GMD operational procedures.

Baker states that operational procedures will be ineffective because: (1) grid operators will be reluctant to take action during a GMD event (e.g., shed load); (2) the warning period for solar storms does not allow enough time for grid operators to take action; (3) grid operators will not have enough situational awareness to know how to take action during a GMD event; (4) there is no capacity to address GMD events on a national scale; (5) operational procedures have been shown to be inadequate in other contexts; (6) equipment failure may undermine the grid operators’ ability to respond; (7) GMD events will disrupt communication networks used by grid operators; (8) the potential effects of a GMD event on the Bulk-Power System are too complex to anticipate; and (9) Regional Transmission Organizations and Independent System Operators do not have the authority to shut down the grid in neighboring Regions. Foundation states that grid operators will have to act blindly during a GMD event because Reliability Standard EOP-010-1 does not require GIC monitoring or mandatory sharing of GIC monitoring data. Foundation also states that Reliability Standard EOP-010-1 is ineffective because it does not require “quantified contingency planning.” Orquin maintains that operational procedures are of limited value and recommends using monitoring equipment and blocking devices at least as a back-up measure.

### **Commission Determination**

As the Commission stated in Order No. 779, operational procedures are not a complete solution to the risks posed by a GMD event to the Bulk-Power System. Order No. 779 directed NERC to develop Reliability Standards that require operational procedures because such Reliability Standards could be developed and implemented relatively quickly. While we recognize the concerns in the comments of Baker and others regarding the efficacy of operational procedures, Order No. 779 weighed those concerns in ultimately directing NERC to develop operational procedures in the First Stage GMD Reliability Standards and more comprehensive protections in the Second Stage GMD Reliability Standards.<sup>42</sup> We affirm the determination in Order No. 779 that operational procedures constitute “an important first step to addressing the GMD reliability gap because they can be implemented relatively quickly ... [and] may help alleviate abnormal system conditions due to transformer absorption of reactive power during GMD events, helping

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<sup>42</sup> In Order No. 779, the Commission noted that some entities have already implemented operational procedures that address GMD events. Order No. 779, 143 FERC ¶ 61,147 at P 37.

to stabilize system voltage swings, and may potentially isolate some equipment from being damaged or misoperated.”<sup>43</sup>

In Order No. 779, the Commission determined that mandatory operational procedures would be a good first step to addressing the threats of GMDs. Order No. 779 is a final agency action and was not challenged in court. Previously, some utilities already had such procedures, although they were voluntary. While not perfect, operational procedures can be effective in mitigating the risks posed by GMDs. NERC’s standard drafting team reached the same conclusion in developing the Reliability Standard. In addition, the Reliability Standard was approved during the industry vetting process as there were nearly 350 representatives from across industry and government that voted to approve the Reliability Standard. While some non-utility commenters objected to the Reliability Standard, the Reliability Standard was supported by the vast majority of NERC’s stakeholders and by all industry commenters.

With respect to the concerns raised by SmartSense regarding overreliance on space weather forecasts to trigger GMD operational procedures, Reliability Standard EOP-010-1 does not mandate the use of space weather to trigger the GMD operational procedures. While Requirement R2 requires reliability coordinators to disseminate current and forecasted space weather conditions to the appropriate functional entities, Requirement R3 requires transmission operators to develop Operating Procedures or Operating Processes that, at a minimum, include “System Operator actions to be initiated based on predetermined conditions.” Those “predetermined conditions” might include space weather information or other data, including GIC monitoring data, if available. Requirement R3 ultimately leaves it to the transmission operator to define the predetermined conditions in its Operating Procedure or Operating Process. Accordingly, we disagree that Reliability Standard EOP-010-1 requires that initiation of GMD operating procedures be based upon space weather only.

We are not persuaded that the First Stage GMD Reliability Standards should require all responsible entities to monitor GICs or mandate sharing GIC monitoring data with reliability coordinators, as Foundation contends. As explained above, we directed NERC to develop only operational procedures in the First Stage GMD Reliability Standards, and to develop more comprehensive protections in the Second Stage GMD Reliability Standards. The issue of monitoring requirements properly belongs in the Second Stage GMD Reliability Standards.<sup>44</sup> In terms of real-time sharing of GIC information with reliability coordinators, we note that Reliability Standard COM-002-2, Requirement R1.1 states that “[e]ach Balancing Authority and Transmission Operator shall notify its Reliability Coordinator, and all other potentially affected Balancing Authorities and Transmission Operators through predetermined communication paths of any condition that could threaten the reliability of its area or when firm load shedding is anticipated.” Accordingly, if a transmission operator monitors GIC levels that could threaten the reliability of its area of the Bulk-Power System, the transmission operator would have to communicate that information to its reliability coordinator.<sup>45</sup> With respect to Foundation’s

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<sup>43</sup> Order No. 779, 143 FERC ¶ 61,147 at P 36.

<sup>44</sup> We will also consider then the need for the Second Stage GMD Reliability Standard’s planning requirements to integrate appropriately with the First Stage GMD Reliability Standard’s operating requirements.

<sup>45</sup> We do not address here the issue of access to GMD monitoring data for other purposes, such as reassessing the

comment that Reliability Standard EOP-010-1 should include “quantified contingency planning,” Foundation does not explain the meaning of this term. In any case, we note that Reliability Standard EOP-010-1, Requirement R3 requires applicable transmission operators to “develop, maintain, and implement a GMD Operating Procedure or Operating Process to mitigate the effects of GMD events on the reliable operation of its respective system.”

## **9. EXPLAIN ANY PAYMENT OR GIFTS TO RESPONDENTS**

The Commission does not make payments or provide gifts for respondents related to this collection.

## **10. DESCRIBE ANY ASSURANCE OF CONFIDENTIALITY PROVIDED TO RESPONDENTS**

Reliability Standard EOP-010-1 does not require any information or data to be submitted to FERC. FERC regulations at 18 CFR 388.112 do allow entities submitting information to FERC to request privileged treatment of such information. There are no specific assurances of confidentiality mentioned to respondents in the Reliability Standard.

## **11. PROVIDE ADDITIONAL JUSTIFICATION FOR ANY QUESTIONS OF A SENSITIVE NATURE, SUCH AS SEXUAL BEHAVIOR AND ATTITUDES, RELIGIOUS BELIEFS, AND OTHER MATTERS THAT ARE COMMONLY CONSIDERED PRIVATE.**

This collection does not contain any questions of a sensitive nature.

## **12. ESTIMATED BURDEN OF COLLECTION OF INFORMATION**

Reliability Standard EOP-010-1 includes specific requirements for certain transmission operators and reliability coordinators to develop, maintain, and implement a GMD Operating Procedure or Operating Process to mitigate the effects of GMD events on the reliable operation of its respective system. Requirements R1 and R2 include specific requirements for reliability coordinators and Requirement R3 includes specific requirements for transmission operators.

The Commission based the number of applicable entities on the NERC compliance registry as of November 27, 2013. According to the registry, there are 16 reliability coordinators and 183 transmission operators.

The estimates below are an annual average of how many burden hours the new requirements will take to implement in the first year and maintain every year thereafter. Since both requirements have entities “develop and maintain” the documentation there will be a burden cost every year. The average burden hours per response are based on the assumption that the documentation will

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benchmark GMD event, since this issue too belongs properly in the Second Stage GMD Reliability Standards.

require two engineers approximately one day (at 10 hours per engineer) to develop (first year) or to review and modify (subsequent years).

<b>Burden Estimate for Reliability Standard EOP-010-1 Implementation</b>						
<b>Reliability Standard Number</b>	<b>Type of Respondents</b>	<b>Number of Respondents<sup>46</sup> (1)</b>	<b>Number of Responses per Respondent (2)</b>	<b>Average Burden Hours Per Response (3)</b>	<b>Total Annual Burden Hours (1)x(2)x(3)</b>	<b>Total Annual Cost<sup>47</sup></b>
EOP-010-1 (R1)	Reliability Coordinator	16	1	20	320	\$19,200 (\$60/hr)
EOP-010-1 (R3)	Transmission Operator	183	1	20	3,660	\$219,600 (\$60/hr)
<b>TOTAL</b>					<b>3,980</b>	<b>\$238,800</b>

The above chart does not include Reliability Standard EOP-010-1, Requirement R2 because, as NERC states, that requirement replaces IRO-005-3.1a, Requirement R3 and has no change in overall burden. In addition, while our burden estimate with respect to Reliability Standard EOP-010-1, Requirement R3 assumes that all 183 transmission operators are subject to that requirement, we note that not all 183 transmission operators are likely to be subject to Requirement R3 because that requirement only applies to transmission operators with a Transmission Operator Area that includes a power transformer with a high side, wye-grounded winding with terminal voltage greater than 200 kV.

### 13. ESTIMATE OF THE TOTAL ANNUAL COST BURDEN TO RESPONDENTS

The total annual cost burden to respondents due to this collection is estimated at \$238,800 as detailed in the table above. There are no start-up or other non-labor hour costs associated with this rule.

### 14. ESTIMATED ANNUALIZED COST TO FEDERAL GOVERNMENT

The Regional Entities and NERC do most of the data processing, monitoring and compliance work for Reliability Standards. Any involvement by the Commission is covered under the FERC-725 collection (1902-0225) and is not part of this request or package.

<sup>46</sup> This number was calculated by adding all the applicable entities while removing double counting caused by entities registered under multiple functions.

<sup>47</sup> The estimated hourly loaded cost (salary plus benefits) for an engineer is assumed to be \$60/hour, based on salaries as reported by the Bureau of Labor Statistics (BLS) ([http://bls.gov/oes/current/naics2\\_22.htm](http://bls.gov/oes/current/naics2_22.htm)). Loaded costs are BLS rates divided by 0.703 and rounded to the nearest dollar (<http://www.bls.gov/news.release/ecec.nr0.htm>).

FERC-725S	Number of Employees (FTEs)	Estimated Annual Federal Cost
Analysis and Processing of filings	0	\$0
Paperwork Reduction Act Administrative Cost <sup>48</sup>		\$5,092

## 15. REASONS FOR CHANGES IN BURDEN INCLUDING THE NEED FOR ANY INCREASE

The new burden is the result of the requirements to develop and maintain GMD operating procedures and processes. The Commission finds these requirements necessary to ensure that responsible entities have Operating Plans and Operating Procedures or Processes in place to mitigate the effects of geomagnetic disturbances on the Bulk-Power System.

The following table shows burden inventory for the new FERC-725S because of the new information collection requirements.

FERC-725S	Total Request	Previously Approved	Change due to Adjustment in Estimate	Change Due to Agency Discretion
Annual Number of Responses	199	-	-	199
Annual Time Burden (Hr)	3,980	-	-	3,980
Annual Cost Burden (\$)	-	-	-	-

## 16. TIME SCHEDULE FOR PUBLICATION OF DATA

There are no data publications as part of this collection. FERC does not plan to publish data related to this collection. The Electric Reliability Organization, NERC in this instance, is appointed by FERC to receive any data related to this collection and is responsible for the inspection of the information. The Reliability Standard in question requires entities to develop GMD Procedures/Processes but not to submit data to FERC. The entity must only retain evidence of its compliance for three years.

## 17. DISPLAY OF EXPIRATION DATE

<sup>48</sup> The PRA Administrative Cost is a Federal Cost associated with preparing, issuing, and submitting materials necessary to comply with the Paperwork Reduction Act (PRA) for rulemakings, orders, or any other vehicle used to create, modify, extend, or discontinue an information collection. This average annual cost includes requests for extensions, all associated rulemakings (not just NOPR in Docket No. RM14-14), and other changes to the collection.

FERC-725S (OMB Control No.: 1902-0270)  
Docket No. RM14-1 Final Rule, issued June 19, 2014  
RIN: 1902-AE80, Updated 10/30/2014

The expiration date is displayed in a table posted on [ferc.gov](http://www.ferc.gov) at <http://www.ferc.gov/docs-filing/info-collections.asp>.

## **18. EXCEPTIONS TO THE CERTIFICATION STATEMENT**

The Commission does not expect to use statistical methods to analyze the information collected under this control number.