UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

North American Electric Reliability Corporation	**)** **)**	**Docket No. RM15-11-000**

REPLY COMMENTS OF THE NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

The North American Electric Reliability Corporation ("NERC") hereby provides reply comments[1] in response to comments submitted by John G. Kappenman, Storm Analysis Consultants and Curtis Birnbach, Advanced Fusion Systems (collectively, "Kappenman & Birnbach") during the comment period ended September 10, 2015.[2] NERC provides additional information in support of the benchmark GMD event developed for use in proposed Reliability Standard TPL-007-1 ("Benchmark GMD Event") and the Commission's proposal to approve the proposed standard as just, reasonable, not unduly discriminatory or preferential, and in the public interest, consistent with the Notice of Proposed Rulemaking.[3]

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[1] To the extent that the Commission's Rules of Practice and Procedure do not expressly authorize this response, NERC respectfully submits that the Commission should consider this response, as it will aid in the decision-making process. *See Midwest Indep. Transmission Sys. Operator, Inc.*, 122 FERC ¶ 61,198 at P 17 (2008) (answer to a protest permitted where it provided information that assisted the Commission's decision-making process).

[2] On August 17, 2015, NERC filed in this docket the decision of the "Level 2 Appeal" panel appointed to hear the Foundation for Resilient Societies' NERC standard process appeal related to the development of proposed Reliability Standard TPL-007-1. On August 20, 2015, the Commission issued a Notice Setting Comment Period, allowing interested parties 21 days to comment on the decision.

[3] *Reliability Standard for Transmission System Planned Performance for Geomagnetic Disturbance Events*, 151 FERC ¶ 61,134 at P 22 (2015) ("NOPR") ("Pursuant to section 215(d) of the [Federal Power Act] FPA, the Commission proposes to approve Reliability Standard TPL-007-1 as just, reasonable, not unduly discriminatory or preferential, and in the public interest.").

I. Comments of Kappenman & Birnbach

In their comments, Kappenman & Birnbach urge the Commission to remand the proposed standard.[4] Kappenman and Birnbach state that their prior comments have shown that there are a "number of serious problems in the reliability and accuracy of geo-electric field calculations" underlying the proposed standard; specifically, that "the geo-electric field simulation models are shown to vary widely and erratically for the same storm whether using 1 minute or faster cadence geomagnetic observatory data as an input to the simulation tool."[5] Kappenman & Birnbach also present their analysis of an April 2013 presentation made to the NERC GMD Task Force, from which they conclude that NERC's "claim of model validation" was "created under suspicious circumstances claiming to use 1 minute cadence data as model inputs in 2013 while it is now clear as of late July 2015 that 1 minute data inputs will systematically produce arbitrarily low geo-electric field outputs."[6]

II. NERC's Reply Comments

At the outset, NERC clarifies that the April 2013 NERC GMD Task Force presentation, which was presented before the Commission's Order No. 779[7] directing the development of the GMD Reliability Standards, was intended to do nothing more than demonstrate a technique that entities may use to validate (or to state more precisely, calibrate) their GIC models and input data.[8]

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4 *See* Comments of John G. Kappenman, Storm Analysis Consultants & Curtis Birnbach, Advanced Fusion Systems at 7 (Sep. 10, 2015) ("Kappenman & Birnbach Comments").

5 *Id.* at 2.

6 *Id.*at 7.

7 *Reliability Standards for Geomagnetic Disturbances*, Order No. 779, 143 FERC ¶ 61,147 (May 16, 2013).

8 As NERC noted in its NOPR comments, researchers at the U.S. Geological Survey partnered with a utility in 2013 to examine ground conductivity models using measured GIC data and calculated GIC values to demonstrate this capability to participants on the NERC GMD Task Force. The NERC GMD Task Force has and continues to provide an important forum for connecting researchers and utilities to expand the industry's knowledge of GMD

The Benchmark GMD Event developed for use with proposed Reliability Standard TPL-007-1 is based on 10 second magnetometer data.[9] The use of this high-resolution data ensures that peak geoelectric field strengths associated with the Benchmark GMD Event are correctly calculated so that the GMD Vulnerability Assessments required by proposed Reliability Standard TPL-007-1 reflect 1-in-100 year storm conditions. Using data from a lower sampling rate could result in underestimation of peak geoelectric fields.[10]

The commenters' concern with the reliability and accuracy of the geoelectric field calculations used in the development of proposed Reliability Standard TPL-007-1 appears to be based on their comparisons of 1 minute sampled magnetometer data with faster-sampled 10 second magnetometer data.[11] The commenters attempt to draw conclusions that the methods and approaches used to develop the proposed standard are flawed because calculated geoelectric fields are not consistent in these comparisons.

However, such conclusions are not appropriate. The influence of data sampling rates on geoelectric field calculations does not indicate an error in modeling. Due to the nature of data analysis and physical properties including the earth conductivity structure, geoelectric fields calculated from low sample rate (i.e. 1 minute) data are typically lower than with geoelectric fields calculated from high sample rate data.[12] The Benchmark GMD Event is based on 10

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issues relevant to reliability. *See* Comments of the North American Electric Reliability Corporation in Response to Notice of Proposed Rulemaking (Jul. 27, 2015) at 14.

[9] *See Petition of the N. Am. Elec. Reliability Corp. for Approval of Proposed Reliability Standard TPL-007-1 Transmission System Planned Performance for Geomagnetic Disturbance Events* at Ex. D (Benchmark Geomagnetic Disturbance Event Description white paper) (Jan. 21, 2015).

[10] *See* A. Pulkkinen et al., *Generation of 100-year Geomagnetically Induced Current Scenarios*, SPACE WEATHER (2012) and Antti Pulkkinen, Emanuel Bernabeu, Jan Eichner, Ari Viljanen, and Chigomezyo Ngwira, *Regional-Scale High-Latitude Extreme Geoelectric Fields pertaining to Geomagnetically Induced Currents*, EARTH, PLANETS AND SPACE 2015 67:93 (2015), *available at* http://www.earth-planets-space.com/content/67/1/93.

[11] *See* Kappenman & Birnbach Comments at 2.

[12] For a discussion of comparisons of peak geoelectric field values calculated from different sampling rates of magnetic data, *see* A. Pulkkinen, A. Viljanen, and R. Pirjola, *Estimation of Geomagnetically Induced Current Levels*

second magnetometer data because this data rate ensures that peak geoelectric fields are not artificially reduced by sampling.

III. CONCLUSION

NERC respectfully requests that the Commission consider these comments and approve proposed TPL-007-1 Reliability Standard as just, reasonable, not unduly discriminatory or preferential, and in the public interest.

Respectfully submitted,

/s/ Lauren A. Perotti

Charles A. Berardesco
Senior Vice President and General Counsel
Holly A. Hawkins
Associate General Counsel
Lauren A. Perotti
Counsel
North American Electric Reliability Corporation
1325 G Street, N.W., Suite 600
Washington, D.C. 20005
(202) 400-3000
(202) 644-8099 – facsimile
charles.berardesco@nerc.net
holly.hawkins@nerc.net
lauren.perotti@nerc.net

Counsel for the North American Electric Reliability Corporation

Date: September 23, 2015

from Different Input Data, SPACE WEATHER (2006) at 9 (finding that peak geoelectric fields calculated from 1 minute data can in some cases be "about 60%" from calculations derived from 1 second data).

CERTIFICATE OF SERVICE

I hereby certify that I have served a copy of the foregoing document upon all parties listed on the official service list compiled by the Secretary in this proceeding. Dated at Washington, D.C. this 23rd day of September, 2015.

/s/ Lauren A. Perotti

Lauren A. Perotti

Counsel for the North American Electric Reliability Corporation