NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Draft TPL-007-1

Project 2013-03 Geomagnetic Disturbance (GMD) Mitigation

Standard Drafting Team
Industry Webinar
June 26, 2014

RELIABILITY | ACCOUNTABILITY




Agenda

- Summary of changes to TPL-007-1
- Comments on benchmark GMD event
- Overview of GMD assessment process
- Next steps
- Question and answer

Presentation posted on the project page:
http://www.nerc.com/pa/Stand/Pages/Geomagnetic-Disturbance-Resource.aspx

NERC Antitrust Guidelines

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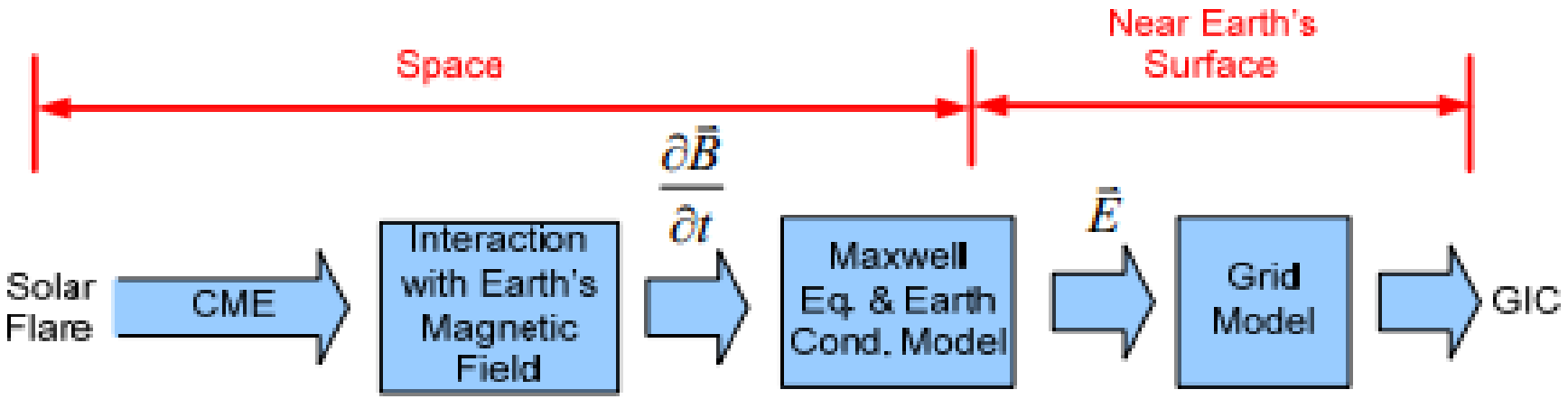
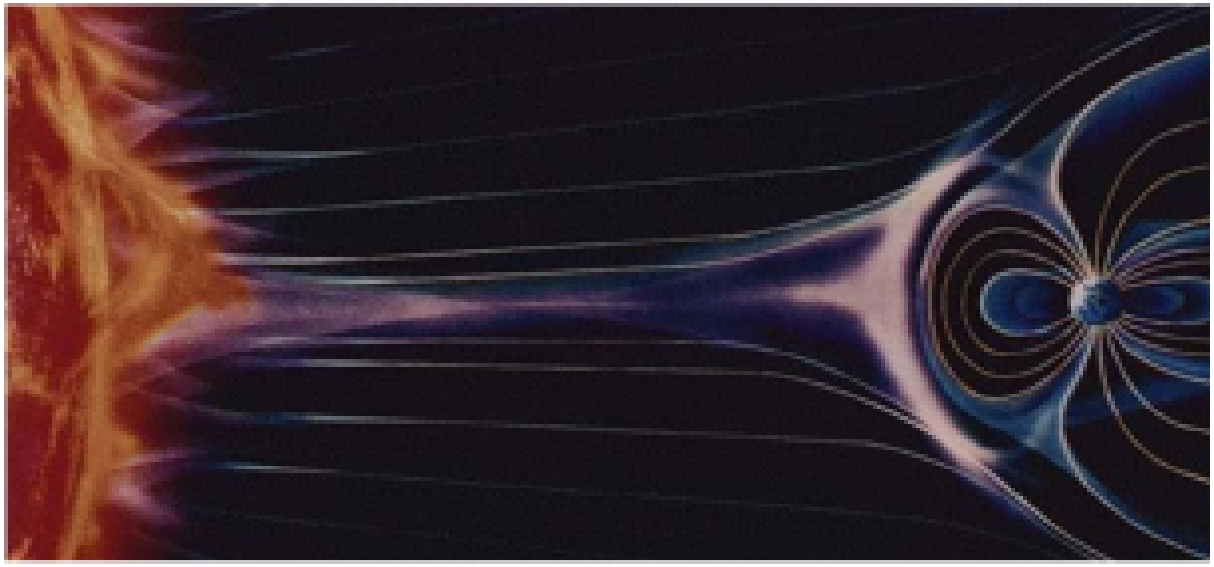
- It is the responsibility of every NERC participant and employee who may in any way affect NERC's compliance with the antitrust laws to carry out this commitment.

Public Meeting Guidelines

- Participants are reminded that this meeting is public. Notice of the meeting was posted on the NERC website and widely distributed. Participants should keep in mind that the audience may include members of the press and representatives of various governmental authorities, in addition to the expected participation by industry stakeholders.

Potential Impacts on the Power System





<u>Geomagnetically-induced currents (GIC) can cause</u>:

- Increased reactive power consumption
- Transformer heating
- Protection System misoperation

TPL-007 Summary

- Requires a **GMD Vulnerability Assessment** of the system for its ability to withstand a Benchmark GMD Event without causing a wide area blackout, voltage collapse, or damage to transformers, once every five years.
  - Applicability: Planning Coordinators, Transmission Planners
- Requires a **Transformer thermal impact assessment** to ensure that all high-side, wye grounded transformers connected at 200kV or higher will not overheat based on the Benchmark GMD Event
  - Applicability: Generator Owners, Transmission Owners

Changes Made to the Draft Standard

- Reordered the requirements
  - Comments indicated some confusion as to the order in which the requirements would be executed
- Established a floor of 15 Amperes (A) for Transformer Thermal Assessment
  - If calculated GIC is 15A or less, no further transformer thermal analysis is required
  - Technical justification: Continuous 15A exposure does not result in temperatures of concern, based on transformer testing
- Revised Implementation Plan
  - Moved earlier implementation steps (determine responsibilities, build models)
  - Maintained 4 year timeline to develop Corrective Action Plan

Suggested Changes NOT Included

- Include Reliability Coordinators (RC) as an applicable entity
  - But, RCs included as a recipient of the analyses for information and for situational awareness
- Establish an exemption for lower latitude systems
  - Benchmark definition includes adjustment factors for earth conductivity and geomagnetic latitude, but assessment is required
  - Technical justification not available at this point
- Change the benchmark GMD event geoelectric field magnitude

Comments on the GMD Benchmark

- Benchmark geoelectric field is too low
  - Earlier work by GMD Task Force had peak fields of 20 V/km or more
  - “Spatial averaging” technique is not documented in peer-reviewed technical papers
- Benchmark geoelectric field is too high
  - Statistical analysis calculates to a field of 5.8 V/km
  - Visual extrapolation implies a field of 3-8 V/km (why not 3 V/km or 5.8 V/km?)

GMD Benchmark Geoelectric Field

$$E_{peak} = E_{benchmark} \times \alpha \times \beta \text{ (in V/km)}$$

where,

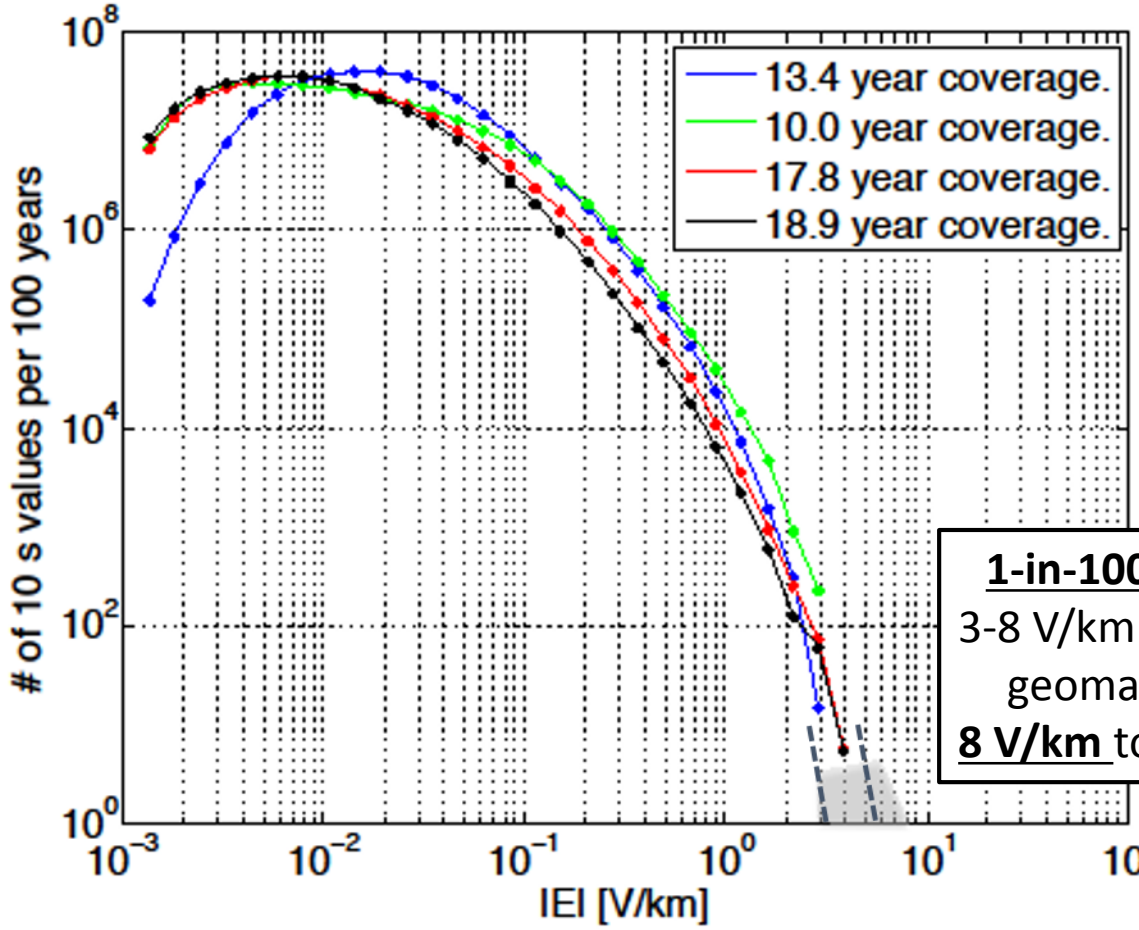
E_{peak} = Benchmark geoelectric field magnitude at System location

$E_{benchmark}$ = Benchmark geoelectric field magnitude at reference location (60° N geomagnetic latitude, resistive ground model)

α = Factor adjustment for geomagnetic latitude

β = Factor adjustment for regional earth conductivity model

Reference Geoelectric Field Amplitude



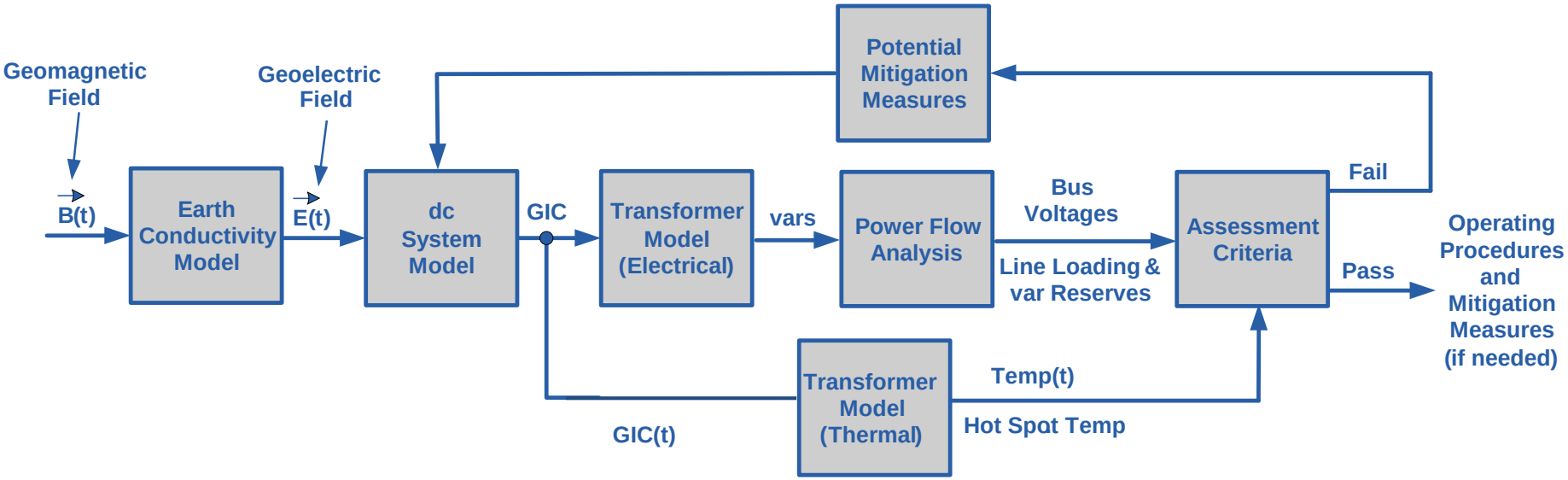
1-in-100 Year Occurrence
3-8 V/km at 60° N geomagnetic latitude
8 V/km to be conservative

Statistical occurrence of spatially averaged high-latitude geoelectric field amplitudes from IMAGE magnetometer data (1993 – 2013)

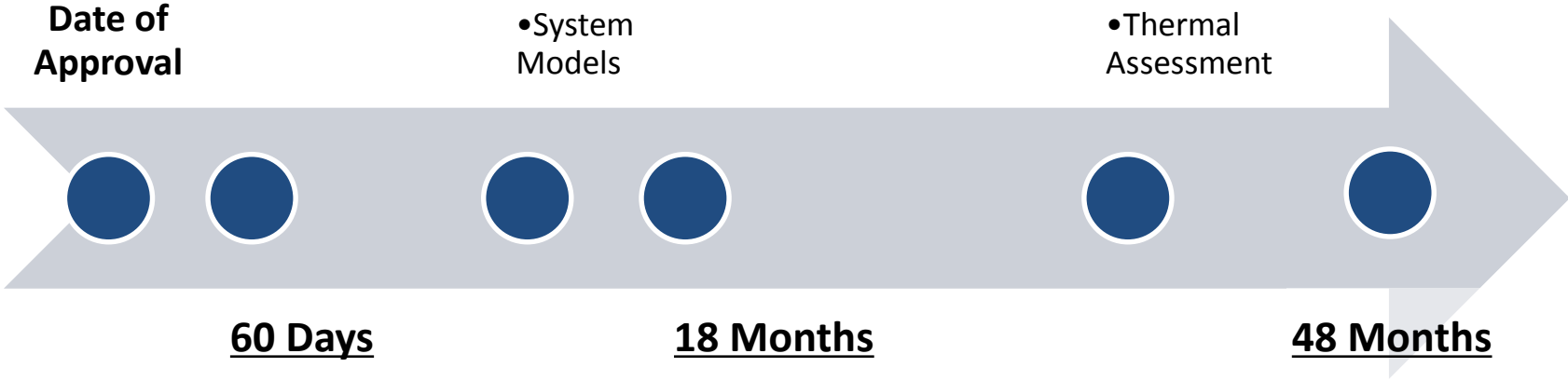
Response to the Benchmark Comments

- Statistical analyses (GMD Task Force and standards project) are based on the same data
- Spatial averaging of geomagnetic observation data is a appropriate for assessing wide-area impacts
- Benchmark is conservatively “high” to provide for margin, given the uncertainties associated with these types of calculations

Integrated View of the GMD Assessment Process



Implementation Plan

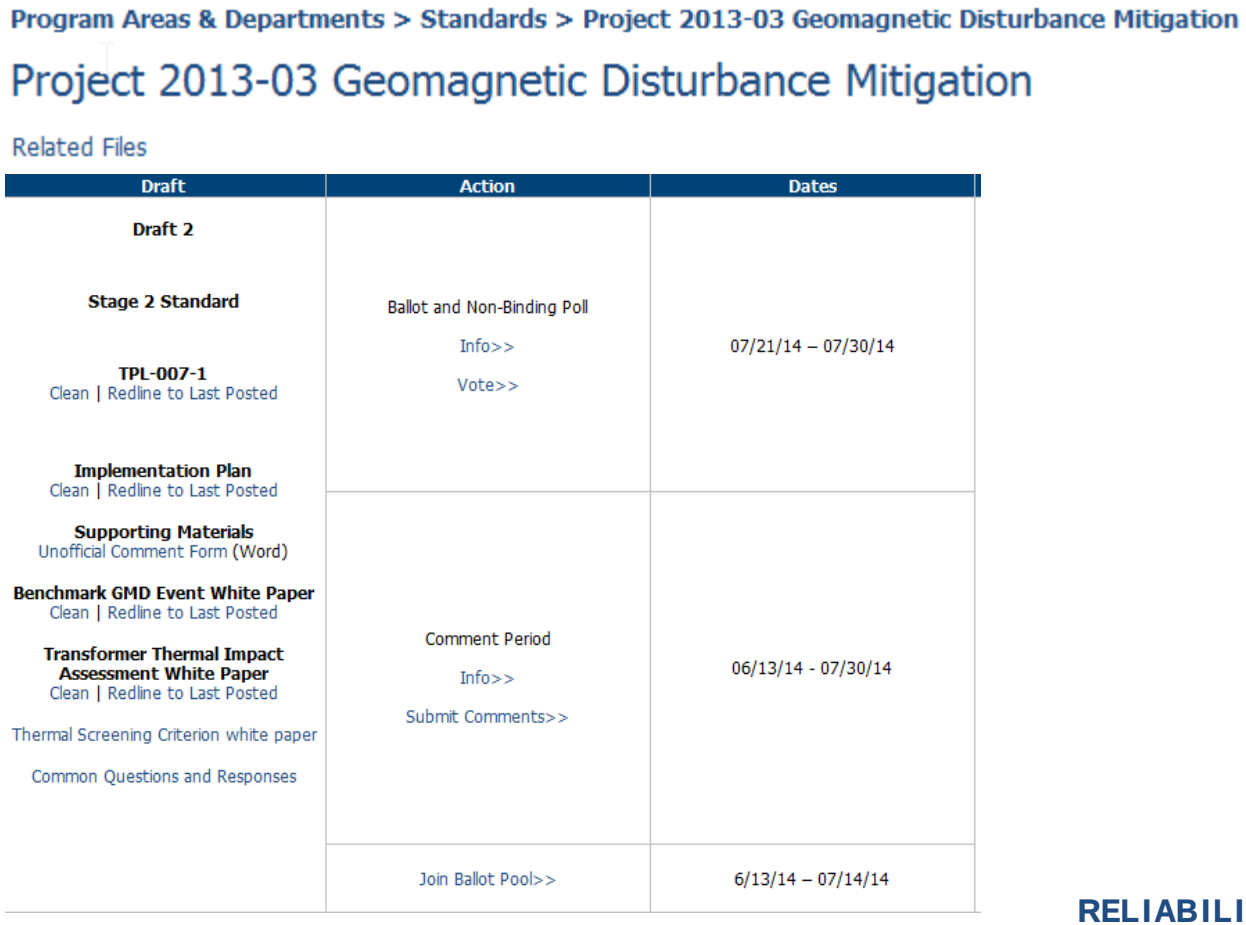


Next Steps

- Formal Comment and Initial Ballot— June 13 – July 30, 2014
  - Technical Conference July 17, 2014
- SDT reviews ballot results and comments—August, 2014
- Post for a second ballot—August, 2014
- Seek NERC Board adoption at November meeting
- File with FERC by January 2015

Resources

- Project page: http://www.nerc.com/pa/Stand/Pages/Project-2013-03-Geomagnetic-Disturbance-Mitigation.aspx



Program Areas & Departments > Standards > Project 2013-03 Geomagnetic Disturbance Mitigation

Project 2013-03 Geomagnetic Disturbance Mitigation

Related Files

Draft	Action	Dates
Draft 2 **Stage 2 Standard** **TPL-007-1** Clean | Redline to Last Posted **Implementation Plan** Clean | Redline to Last Posted **Supporting Materials** Unofficial Comment Form (Word) **Benchmark GMD Event White Paper** Clean | Redline to Last Posted **Transformer Thermal Impact Assessment White Paper** Clean | Redline to Last Posted Thermal Screening Criterion white paper Common Questions and Responses	Ballot and Non-Binding Poll Info>> Vote>>	07/21/14 – 07/30/14
	Comment Period Info>> Submit Comments>>	06/13/14 - 07/30/14
	Join Ballot Pool>>	6/13/14 – 07/14/14

Questions and Answers

Send questions by chat