

**NERC**

NORTH AMERICAN ELECTRIC  
RELIABILITY CORPORATION

# Draft TPL-007-1

Project 2013-03 Geomagnetic Disturbance (GMD) Mitigation

Standard Drafting Team

Industry Webinar

September 10, 2014

**RELIABILITY | ACCOUNTABILITY**



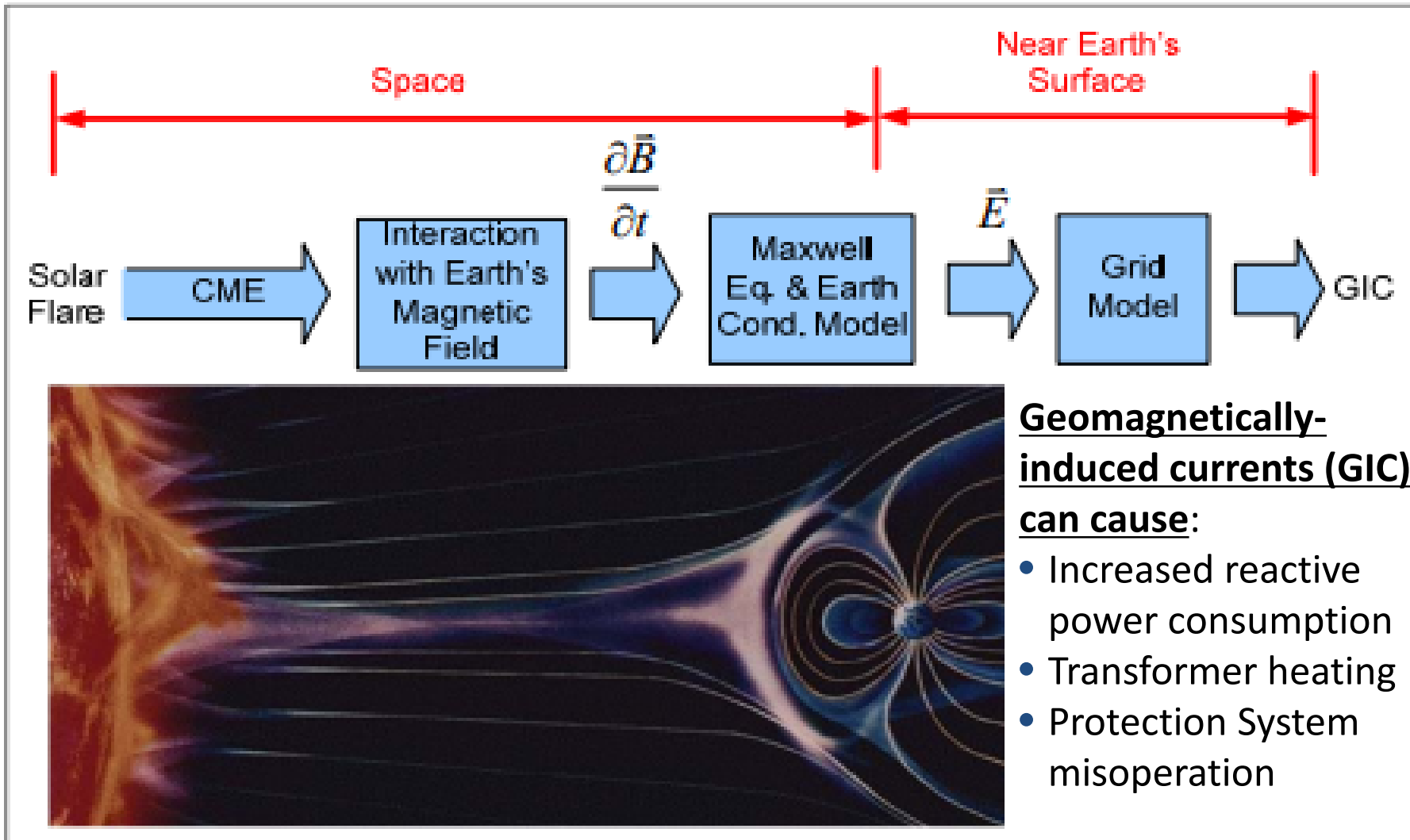
- Summary of revised Draft TPL-007-1
- Comment Responses
- Next steps
- Question and answer

Presentation posted on the project page:

<http://www.nerc.com/pa/Stand/Pages/Geomagnetic-Disturbance-Resource.aspx>

- It is NERC's policy and practice to obey the antitrust laws to avoid all conduct that unreasonably restrains competition. This policy requires the avoidance of any conduct that violates, or that might appear to violate, the antitrust laws. Among other things, the antitrust laws forbid any agreement between or among competitors regarding prices, availability of service, product design, terms of sale, division of markets, allocation of customers or any other activity that unreasonably restrains competition.
- 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.

- 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.



**Geomagnetically-induced currents (GIC) can cause:**

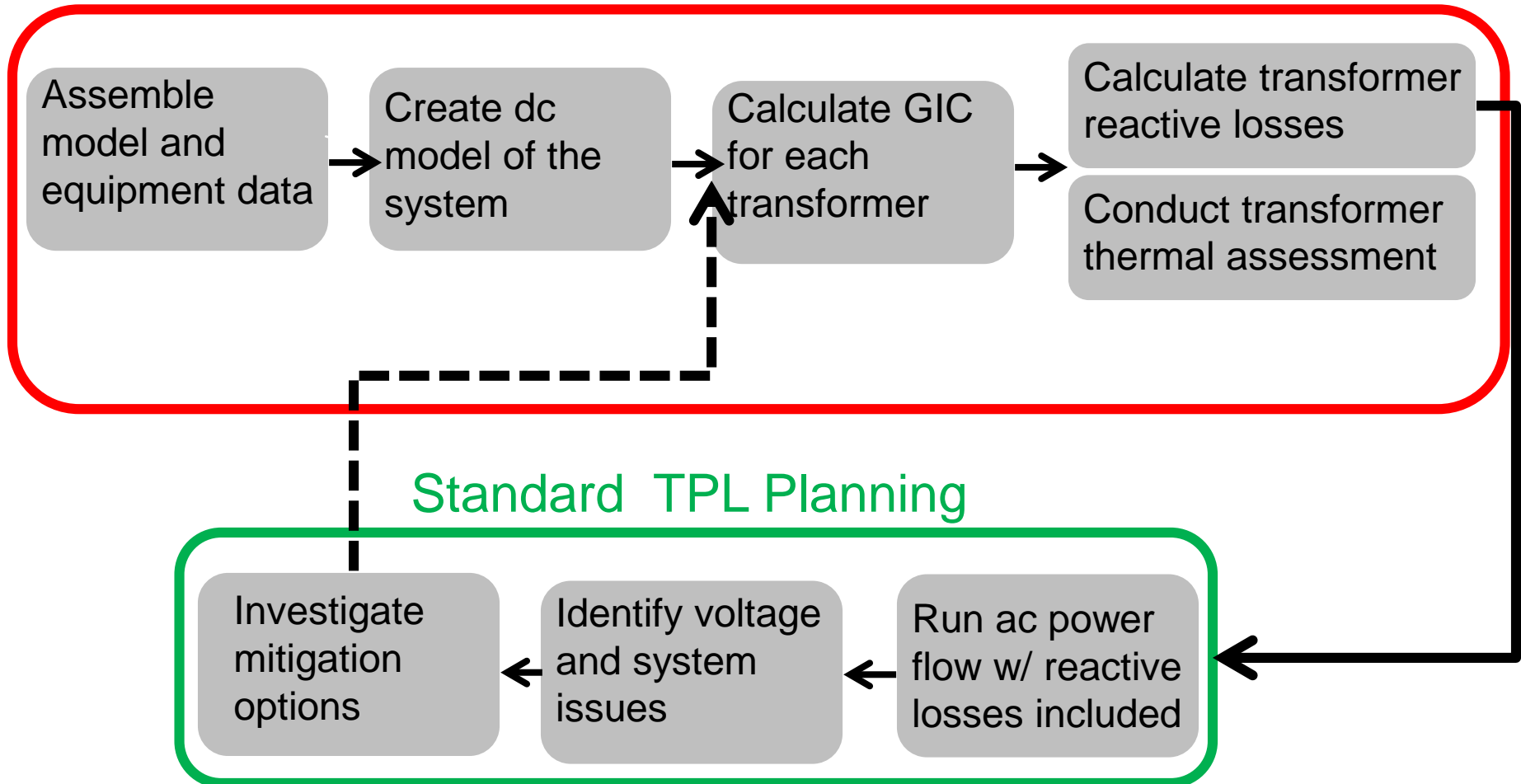
- Increased reactive power consumption
- Transformer heating
- Protection System misoperation

- Requires a Geomagnetic Disturbance (GMD) Vulnerability Assessment of the system to determine its ability to withstand a Benchmark GMD Event without causing voltage collapse
  - Assessment performed once every five years
  - Applicability: Planning Coordinators, Transmission Planners
- Requires a Transformer thermal impact assessment to ensure high-side, wye grounded Bulk Electric System (BES) transformers connected at 200kV or higher will not overheat based on the benchmark event
  - Applies to transformers where maximum GIC  $\geq 15$  A per phase
  - Performed once every five years with GMD Vulnerability Assessment
  - Applicability: Generator Owners, Transmission Owners

- The Benchmark GMD Event is described by:
  - Reference geoelectric field amplitude (**8V/km**)
    - 1-in-100 year amplitude determined statistically from geomagnetic field measurements for a reference earth model
    - Used for **GIC studies** and **load-flow simulations** that account for transformer Reactive Power absorption caused by half-cycle saturation
  - Reference geomagnetic field waveshape
    - March 13-14, 1989 GMD event selected from recorded GMD events
    - Used for **time-domain analysis** on equipment such as **transformer thermal impact assessment** and/or determine local geoelectric field if alternative earth model is available
- Scaling factors for geomagnetic latitude and earth conductivity can be used to adjust geoelectric field amplitude

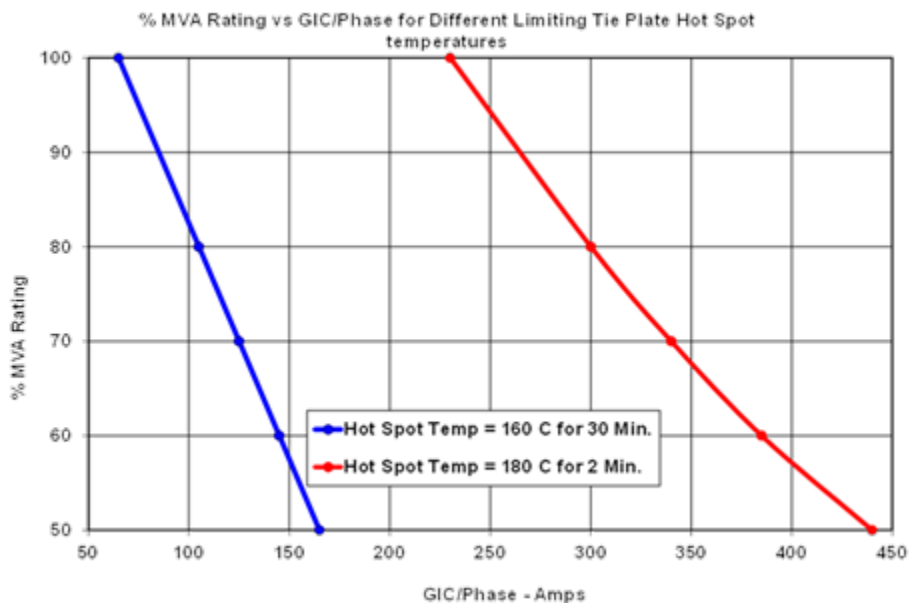
## GMD-specific Planning Steps

GIC calculation is now available on most power system analysis software

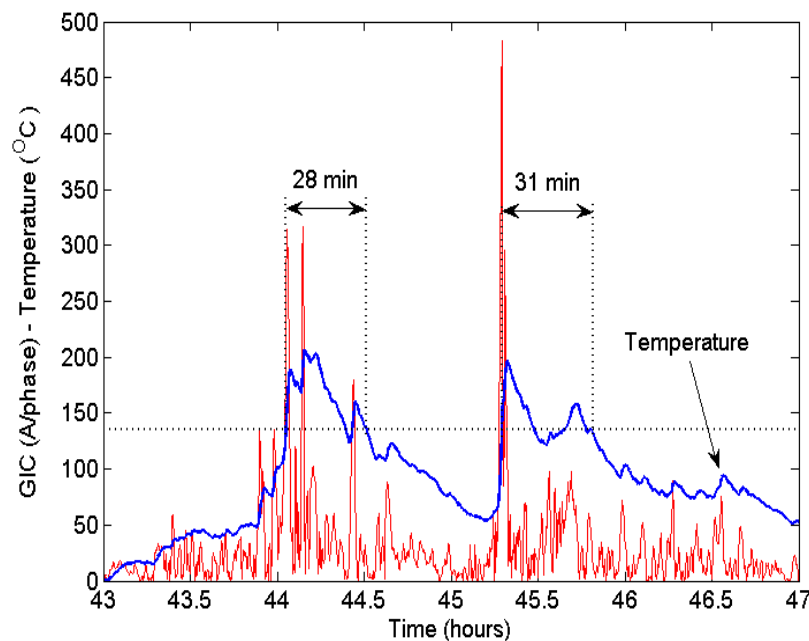




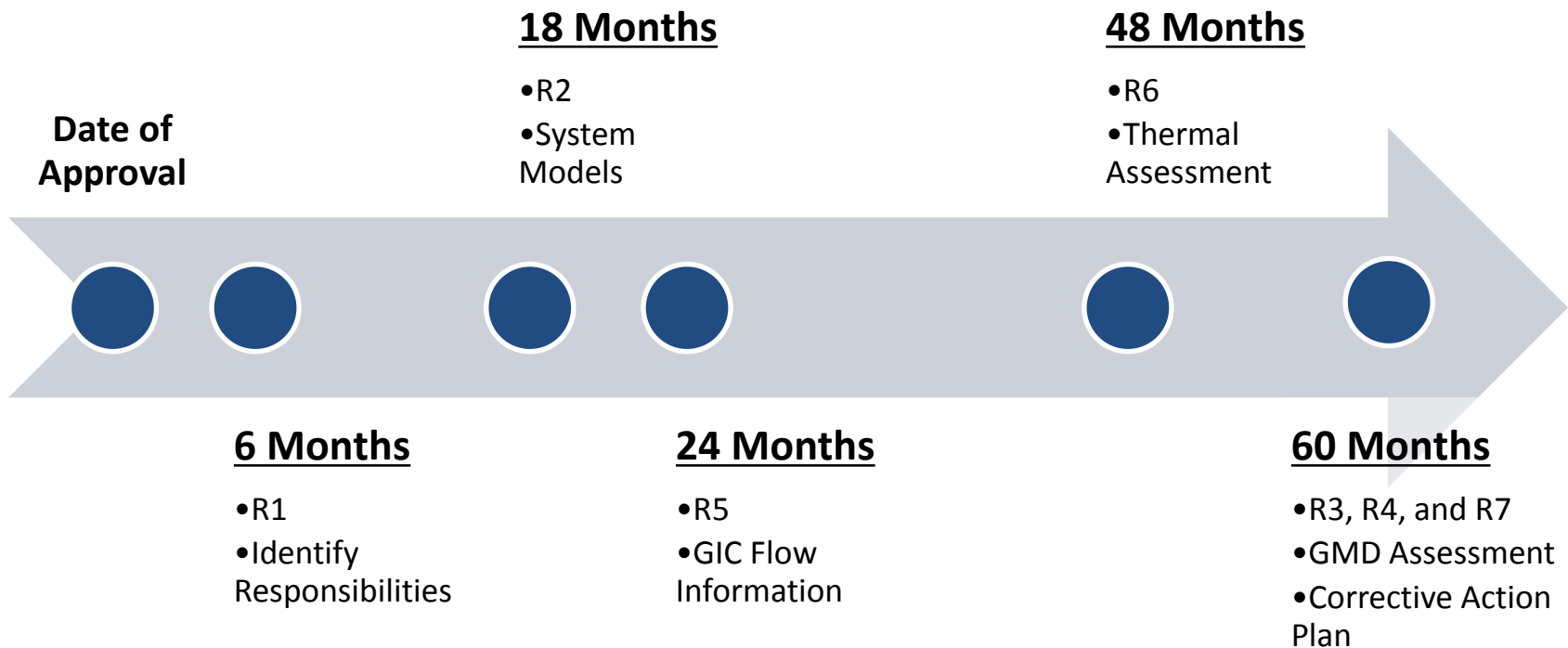
- Consult manufacturer or IEEE Std C57.91 for temperature limits
- Assessment approaches:



Transformer manufacturer capability curves



Thermal response simulation



- Table 1 revisions clarify use of load shedding to meet performance requirements
  - Objective is that voltage collapse, Cascading, and uncontrolled islanding shall not occur as a result of the benchmark GMD event
- Timeline for completing transformer thermal assessments was increased from 12 months to 24 months
- Attachment 1 includes ground model scaling factor for Florida and revised guidance in cases where a ground model is not known
  - Entities should use largest scaling factor of adjacent areas while researchers address gaps
  - Specific earth models can be used with documented justification

- General support for the 8 V/km benchmark and scaling factors
  - Minority opinions argue that the benchmark is either too high or too low
- Transformer thermal models are needed for impact assessment
  - Proposed standard gives owners latitude to select appropriate approach
    - Manufacturer information
    - General models (in development)
    - Other technically-justified means
  - Screening models are in scope of GMD Task Force project
  - Implementation Plan is extended (48 months for thermal assessment)

- Consider expanding the 15 A screening criterion
  - Draft standard provides floor of 15 A per phase effective GIC
  - Data is not currently available to establish an additional screening value for 3-phase 3 limb units
- Clarify corrective action responsibility
  - TPL-007 is consistent with approved TPL-001-4. Planners have the lead role in considering the range of options to achieve performance.
  - Planning Coordinator and Reliability Coordinator have wide area perspective
  - Planning processes account for implementation and cost considerations

<b>Project 2013-03 GMD (TPL-007-1) Initial Ballot</b>	
<b>Total Ballot Pool</b>	375
<b>Quorum</b>	82.67%
<b>Approval vote</b>	55.77%

- Formal comment and initial ballot ended July 30, 2014
- Revised standard posted for comment and additional ballot August 27 – October 10, 2014
- Seek NERC Board adoption at November meeting
- File with FERC by January 2015

- 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
<p><b>Draft 3</b></p> <p><b>Stage 2 Standard TPL-007-1</b> Clean   Redline to Last Posted</p> <p><b>Implementation Plan</b> Clean   Redline to Last Posted</p> <p><b>Supporting Materials</b> Unofficial Comment Form (Word)</p> <p><b>Benchmark GMD Event White Paper</b> Clean   Redline to Last Posted</p> <p><b>Transformer Thermal Impact Assessment White Paper</b> Clean   Redline to Last Posted</p> <p><b>Thermal Screening Criterion White Paper</b></p> <p><b>VRF/VSL Justification</b></p>	<p>Additional Ballot and Non-Binding Poll</p> <p>Info&gt;&gt;</p> <p>Vote&gt;&gt;</p> <p>Comment Period</p> <p>Info&gt;&gt;</p> <p>Submit Comments&gt;&gt;</p>	<p>10/01/14 - 10/10/14</p> <p>08/27/14 - 10/10/14</p>



# Questions and Answers

Send questions by chat