TPL-007-1
Transmission System Planned Performance for Geomagnetic Disturbance Events

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Transmission Planning
Planning Committee
July 13, 2017
• **Purpose:**
  – Establish requirements for Transmission system planned performance during geomagnetic disturbance (GMD) events.

• **Applicable to:**
  – Planning Coordinator
  – Transmission Planner
  – Transmission Owner
  – Generator Owner

With Facilities that include power transformer(s) with a high side, wye-grounded winding with terminal voltage greater than 200 kV
R1: Identify individual and joint responsibilities
07/01/2017

R2: Maintain System models and GIC System models
07/01/2018

R3: Develop criteria for System steady state performance
01/01/2022

R4: Complete GMD Vulnerability Assessment
01/01/2022

R5: Provide GIC flows for transformer thermal assessment
01/01/2019

R6: Conduct thermal impact assessment
01/01/2021

R7: Develop a Corrective Action Plan (if necessary)
01/01/2022
• Transmission Owners
  – Data request sent May 10th
  – Modeling information to be submitted via Excel spreadsheet
  – Only responsible for providing the requested information for the equipment that they own
  – It would be helpful (but not required) to assist with GO mapping where possible (substation/bus)
  – Spreadsheet contains both TO & GO information
    • Not easy to separate who owns what in loadflow case
• Generator Owners
  – Data request sent July 6th
  – Modeling information to be submitted through Gen Model
  – Generator Owners are only responsible for providing the requested information for the equipment that they own
R2: Maintain System models and GIC System models
07/01/2018

- 2016 RTEP (2021 5-year case) is the data source
  - Only known data is being requested at the present time (i.e. substations and equipment already in service)
  - PJM will request future updates as data becomes available (i.e. when new substations and equipment are placed into service)
- TO & GO data to be returned by October 1, 2017
- TO data to be submitted to NERC.Transmission.Planner@pjm.com
- GO data to be submitted through Gen Model
• Guidance for developing the GIC System model is provided in NERC’s GIC Application Guide:
  – GIC Application Guide 2013 approved – NERC
  – Provides good coverage on each network component
  – Identifies most appropriate data for accurate modeling
  – Identifies best alternative estimate when data is not available
  – Identifies sources for the data
PJM is requesting this level of accuracy.

If not possible, PJM is requesting specifics on what model data is being provided.

Table 2: Summary of network component and associated resistive data for a one-phase GIC network model

<table>
<thead>
<tr>
<th>Network Component</th>
<th>Most Appropriate Data For Accurate Modeling</th>
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</thead>
<tbody>
<tr>
<td>Grounded wye winding of conventional transformer</td>
<td>Measured dc resistance of the winding at nominal tap and adjusted to 75 °C and divided by 3 (see note)</td>
</tr>
<tr>
<td>Autotransformer series windings</td>
<td>Measured dc resistance of each winding at nominal tap and adjusted to 75 °C and divided by 3 (see note)</td>
</tr>
<tr>
<td>Autotransformer common winding</td>
<td>Measured dc resistance of each winding at nominal tap and adjusted to 75 °C and divided by 3 (see note)</td>
</tr>
</tbody>
</table>
Questions?