

A. Introduction

1. **Title:** Subsynchronous Resonance (SSR) Requirement

2. **Number:** MTPL-007-0

3. **Purpose:**

To ensure subsynchronous resonance does not occur in the Midwest Reliability Organization (MRO)

4. **Applicability**

4.1. Planning Authority

4.2. Transmission Planner

4.3. Generator Owner

4.4. Transmission Owner

5. **(Proposed) Effective Date:** January 1, 2007

B. Requirements

R1.1. The Planning Authority or Transmission Planner, as applicable, shall demonstrate through a valid subsynchronous resonance assessment that all series capacitors or other system additions or enhancements that are added to the Bulk Electric System that have significant potential to excite sustained subsynchronous oscillations are planned, designed, and constructed to avoid creating a subsynchronous resonance condition. To be valid, the Planning Authority or Transmission Planner assessment shall:

R1.1. Be performed prior to the in-service date of the series capacitor or other system additions or enhancements. Series capacitors or other system additions or enhancements that are potential SSR scenarios include the following:

R1.1.1. Transmission system equipment such as series capacitors, HVdc terminals, and SVC systems that are 100 kV or higher and that are electrically close to a turbine-generator.

R1.1.2. Large loads greater than 100 MW such as ac electric arc furnaces, rolling mills, cyclo-converters, and other industrial drives, that are electrically close to a turbine-generator.

R1.1.3. System operating practices such as high-speed reclosing and single-pole switching on transmission lines electrically close to a turbine-generator.

R1.2. Consist of initial studies (such as frequency scanning) that determine whether there is evidence of a potential subsynchronous resonance (SSR) condition for all turbine-generators that are electrically close to the series capacitor or other system additions or enhancements.

R1.3. Consist of detailed studies (such as frequency scanning, eigenvalue analysis or electromagnetic transient simulation) if results from MTPL-007-0_R1.2 indicate evidence of the potential for a SSR condition. Data available from the generator manufacturer and/or from field tests shall be used to confirm the condition.

R1.4. Consider the effect of contingency conditions defined in Categories B, C and D of Table I of NERC Reliability Standards TPL-002-0, TPL-003-0 and TPL-004-0.

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- R.2.** When assessments performed as prescribed in Reliability Standard MTPL-007-0_R1 confirm the potential for a SSR condition, the Planning Authority or Transmission Planner, as applicable, shall determine a corrective plan to mitigate the SSR condition, such as installing a SSR countermeasure.
- R.3.** When assessments performed as prescribed in Reliability Standard MTPL-007-0_R1 confirm the potential for a SSR condition, the Planning Authority or Transmission Planner shall, as applicable, within thirty (30) calendar days of a request, or within (30) days of completing the assessments, provide to the Midwest Reliability Organization and any MRO and/or neighboring impacted Transmission Owner(s) and Generator Owner(s) the results of its latest subsynchronous resonance assessments and corrective plans.
- R.4.** Each Transmission Owner and/or Generator Owner shall provide information to its Transmission Operator on the status of all SSR countermeasures, if they are critical to preventing subsynchronous resonance for any contingencies defined in Category B or Category C of Table I of NERC Reliability Standard TPL-002-0 and TPL-003-0.
- R.5.** The Generator Owner shall provide to the applicable Planning Authority and Transmission Planner generator manufacturer data, results from field tests or typical data when results from MTPL-007-0_R1.2 indicate evidence of the potential for a SSR condition. Field tests to verify the natural torsional mode frequencies shall be performed when a SSR countermeasure is determined necessary in Reliability Standard MTPL-007-0_R2. Field tests or estimated generator-manufacturer data may be used to verify torsional mode damping as a function of generator loading when a SSR countermeasure is determined necessary in Reliability Standard MTPL-007-0_R2.

The minimum data to be provided by the Generator Owner shall include:

- R.5.1.** Resistance and reactance as a function of frequency for the generator as viewed from the generator terminals. Armature and rotor circuits shall be included.
- R.5.2.** The inertia constant for each turbine element, generator and exciter.
- R.5.3.** The spring constants for each shaft connecting turbine elements, generator and exciter.
- R.5.4.** Fatigue life expenditure data for each shaft connecting the turbine elements, generator and exciter. Assumptions made in the preparation of this data shall also be provided.

C. Measures

- M1.** The Planning Authority or Transmission Planner, as applicable, shall have a valid SSR assessment and corrective plan as specified in MTPL-007-0_R1 and MTPL-007-0_R2.
- M2.** The Planning Authority or Transmission Planner, as applicable, shall have evidence it reported documentation of results of its SSR assessments and corrective plans to the MRO and any MRO and/or neighboring impacted Transmission Owner(s) and Generator Owner(s) per Reliability Standard MTPL-007-0_R3.
- M3.** The Transmission Owner and/or Generator Owner shall have evidence it reported the status of SSR countermeasures to its Transmission Operator per Reliability Standard MTPL-007-0_R4.
- M4.** The Generator Owner shall have evidence it provided generator manufacturer data, results from field tests or typical data to the Planning Authority or Transmission Planner, as applicable, per Reliability Standard MTPL-007-0_R5.

D. Compliance

1. Compliance Monitoring Process

1.1. Compliance Monitoring Responsibility

Midwest Reliability Organization

1.2. Compliance Monitoring Period and Reset Timeframe

The Performance-Reset period shall be one calendar year from the last finding of non-compliance.

1.3. Data Retention

The Planning Authority or Transmission Planner, as applicable, shall retain assessments for ten years.

The Generator Owner shall retain detailed manufacturer turbine-generator data for the life of the plant.

In addition, entities found non-compliant shall keep information related to the non-compliance until found compliant.

The Compliance Monitor shall retain any audit data for three years.

1.4. Additional Compliance Information

The Planning Authority, Transmission Planner and Generator Owner shall demonstrate compliance through the following methods, as determined by the compliance monitor: Self certification or Audit (periodic, as part of targeted monitoring or initiated by complaint or event).

2. Levels of Non-Compliance

2.1. Level 1: A SSR assessment and corrective plan was provided as requested, but was incomplete in one or more areas.

2.2. Level 2: A valid SSR assessment was performed and corrective plan was determined but was not provided to the MRO and any MRO and/or neighboring impacted Transmission Owner(s) and Generator Owner(s).

Generator manufacturer data, results from field tests or typical data were gathered and/or developed but were not provided to the applicable Planning Authority and Transmission Planner

A log of the status of SSR countermeasure was maintained but status was not reported.

2.3. Level 3: A valid SSR assessment was not performed or a corrective plan was not determined.

Generator manufacturer data, results from field tests or typical data were not gathered or developed

A log of the status of SSR countermeasure was not maintained.

2.4. Level 4: Corrective plan was not implemented where SSR assessment indicated a need for a corrective plan.

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Version History

Version	Date	Action	Change Tracking