

## A. Introduction

1. **Title: Power System Stabilizer (PSS)**
2. **Number:** VAR-501-WECC-2
3. **Purpose:** To ensure that Power System Stabilizers (PSS) on synchronous generators shall be kept in service.
4. **Applicability:**
  - 4.1. **Generator Operators**
5. **Effective Date:** On the first day of the first quarter, after applicable regulatory approval.

## B. Requirements

- R1. Generator Operators shall have PSS in service 98% of all operating hours for synchronous generators equipped with PSS. Generator Operators may exclude hours for R1.1 through R1.12 to achieve the 98% requirement.  
*[Violation Risk Factor: Medium] [Time Horizon: Operations Assessment]*
- R1.1. The synchronous generator operates for less than five percent of all hours during any calendar quarter.
- R1.2. Performing maintenance and testing up to a maximum of seven calendar days per calendar quarter.
- R1.3. PSS exhibits instability due to abnormal system configuration.
- R1.4. Unit is operating in the synchronous condenser mode (very near zero real power level).
- R1.5. Unit is generating less power than its design limit for effective PSS operation.
- R1.6. Unit is passing through a range of output that is a known “rough zone” (range in which a hydro unit is experiencing excessive vibration).
- R1.7. The generator AVR is not in service.
- R1.8. Due to component failure, the PSS may be out of service up to 60 consecutive days for repair per incident.

- R1.9.** Due to a component failure, the PSS may be out of service up to one year provided the Generator Operator submits documentation identifying the need for time to obtain replacement parts and if required to schedule an outage.
- R1.10.** Due to a component failure, the PSS may be out of service up to 24 months provided the Generator Operator submits documentation identifying the need for time for PSS replacement and to schedule an outage.
- R1.11.** The synchronous generator has not achieved Commercial Operation.
- R1.12.** The Transmission Operator directs the Generator Operator to operate the synchronous generator, and the PSS is unavailable for service.

## C. Measures

- M1.** Generators Operators shall provide quarterly reports to the compliance monitor and have evidence for each synchronous generator of the following:
  - M1.1** The number of hours the synchronous generator was on line.
  - M1.2** The number of hours the PSS was out of service with generator on line.
  - M1.3** The PSS in service percentage
  - M1.4** If excluding PSS out of service hours as allowed in R1.1 through R1.12, provide:
    - M1.4.1** The number of hours excluded,
    - M1.4.2** The adjusted PSS in-service percentage,
    - M1.4.3** Date of the outage.

## D. Compliance

- 1. Compliance Monitoring Process**
  - 1.1 Compliance Monitoring Responsibility**  
Compliance Enforcement Authority

## **1.2 Compliance Monitoring Period**

Compliance Enforcement Authority may use one or more of the following methods to assess compliance:

- Reports submitted quarterly
- Spot check audits conducted anytime with 30 days notice
- Periodic audit as scheduled by the Compliance Enforcement Authority
- Investigations
- Other methods as provided for in the Compliance Monitoring Enforcement Program

The Reset Time Frame shall be a calendar quarter.

## **1.3 Data Retention**

The Generator Operators shall keep evidence for Measures M1 for three years plus current year, or since the last audit, whichever is longer.

## **1.4 Additional Compliance Information**

**1.4.1** The sanctions shall be assessed on a calendar quarter basis.

**1.4.2** If any of R1.2 through R1.12 continues from one quarter to another, the number of days accumulated will be the contiguous calendar days from the beginning of the incident to the end of the incident. For example, in R1.8 if the 60 day repair period goes beyond the end of a quarter, the repair period does not reset at the beginning of the next quarter.

**1.4.3** When calculating the adjusted in-service percentage, the PSS out of service hours do not include the time associated with R1.1 through R1.12.

**1.4.4** The standard shall be applied on a generating unit by generating unit basis (a Generator Operator can be subject to a separate sanction for each non-compliant synchronous generating unit or to a single sanction for multiple machines

that operate as one unit).

**E. Regional Differences**

None

**Table of Compliance Elements**

R	Time Horizon	VRF	Violation Severity Levels			
			Lower VSL	Moderate VSL	High VSL	Severe VSL
R1	Operational Assessment	Medium	There shall be a Lower Level of non-compliance if PSS is in service less than 98% but at least 90% or more of all hours during which the synchronous generating unit is on line for each calendar quarter.	There shall be a Moderate Level of non-compliance if PSS is in service less than 90% but at least 80% or more of all hours during which the synchronous generating unit is on line for each calendar quarter.	There shall be a High Level of non-compliance if is in service less than 80% but at least 70% or more of all hours during which the synchronous generating unit is on line for each calendar quarter.	There shall be a Severe Level of non-compliance if PSS is in service less than 70% of all hours during which the synchronous generating unit is on line for each calendar quarter.

## Version History

Version	Date	Action	Change Tracking
1	April 16, 2008	Permanent Replacement Standard for VAR-STD-002b-1	
1	October 28, 2008	Adopted by NERC Board of Trustees	
1	April 21, 2011	FERC Order issued approving VAR-501-WECC-1 (FERC approval effective June 27, 2011; Effective Date July 1, 2011)	
2	November 13, 2014	Adopted by NERC Board of Trustees	