Please **DO NOT** use this form to submit comments. Please use the electronic comment form located at the link below to submit comments on the Second Posting of PRC-024-1 Generator Performance During Voltage and Frequency Excursions (Project 2007-09). The electronic comment form must be completed by **August 1, 2011**.

**Project 2007-09 Generator Verification**

If you have questions please contact Stephen Crutchfield at Stephen.Crutchfield@nerc.net or by telephone at 609-651-9455.

**Background Information**

The purpose of Project 2007-09 Generator Verification is:

- To ensure that generators will not trip off-line during specified voltage and frequency excursions or as a result of improper coordination between generator protective relays and generator voltage regulator controls and limit functions (such coordination will include the generating unit’s capabilities).

- To ensure that generator models accurately reflect the generator’s capabilities and operating characteristics.

The standard drafting team (SDT) for Project 2007-09 Generator Verification based its work on two existing NERC Board approved standards:

- MOD-024-1 — Verification of Generator Gross and Net Real Power Capability.

- MOD-025-1 — Verification of Generator Gross and Net Reactive Power Capability.

And four draft standards developed by the Phase III & IV SDT that were fielded tested by four Regions from mid 2006 through mid 2007.

- PRC-019-1 — Coordination of Generator Voltage Regulator Controls with Unit Capabilities and Protection

- PRC-024-1 — Generator Performance During Frequency and Voltage Excursions

- MOD-026-1 — Verification of Models and Data for Generator Excitation Control System Functions

- MOD-027-1 — Verification of Generator Unit Frequency Response

The second posting of standard PRC-024-1 Generator Performance During Voltage and Frequency Excursions was developed with consideration of industry response to questions that were posed as part of the Comment Form accompanying the first posting.

One of the major issues that the SDT presented to industry during the first posting was the consideration of a relay setting standard versus a performance standard. Based on comments from the first posting, the SDT has again carefully reviewed the original SAR and FERC Order 693, and has modified the standard to reflect requirements for relay settings.
and performance. For existing generators, the requirements for frequency and voltage are centered around relay settings and on communicating to the planning entities the anticipated performance of a generator during a voltage or frequency excursion. The FERC Order stated that generators should either ride through the events, or be modeled as tripping. For new generators, the SDT has modified the standard to include performance requirements.

After considering comments the SDT has kept the applicability to Generator Owners as described in the NERC Compliance Registry Criteria.

The SDT also considered including synchronous condensers as applicable facilities for this standard. We determined that it is not necessary to include synchronous condensers because frequency transients within the scope of this standard are not a serious concern for synchronous condensers, and most synchronous condensers do not have the auxiliary systems that would cause a condenser to trip under the voltage transients defined in this standard.

The requirements for frequency relay settings were based upon reviews of manufacturers’ information, existing regional requirements and coordination with the Under Frequency Load Shedding SDT.

The drafting team intends Requirement R5 to address parameters that the generating unit(s) or plant/facility ride through during Frequency/Voltage Excursions. The SDT does not intend the standard to address dynamic instability, transient instability or any form of loss of synchronism.
You do not have to answer all questions. Enter All Comments in Simple Text Format.

Insert a "check” mark in the appropriate boxes by double-clicking the gray areas.

1. There are two new terms proposed in this standard. “Frequency Excursion” and “Voltage Excursion”. The former defined as an exceedance of system frequency beyond a continuous operating band; 60±0.5 Hertz. The latter defined as an exceedance of system voltage beyond a continuous operating band; ±5% of scheduled voltage. Do you agree with these new terms and their definitions? If not, please explain.

☐ Yes
☐ No

Comments: Any requirement that requires reporting based on a deviation greater than a specified threshold, that threshold should be included in that requirement, refer to R5 as an example. With those stipulations, those new terms are not needed.

2. Requirements R1 and R2 detail the required frequency and voltage protective relaying settings for both new and existing units or generating plant/facilities that opt to activate these relays. Does the current draft of these two requirements, including footnote 1, clarify that a Generator Owner is not required to have protective relaying installed or set for these functions? If you do not believe the requirement is clear, please provide alternative language to clarify the intent.

☐ Yes
☐ No

Comments:

3. Requirement R4 has been added for owners of existing units or generating plant/facilities to provide an estimate of the performance of the units during frequency and voltage excursions. This information is intended to provide Transmission Planners with information useful in performing planning studies. Do you agree with this approach? If not please explain and provide alternative language.

☐ Yes
☐ No

Comments: The reference to “R4” in this question should be R5.

4. Requirement R5 requires a Generator Owner's new unit or generating plant/facility to be able to stay on line when exposed to point-of-interconnection frequency or voltage excursions depicted in the curves of Attachment 1 and Attachment 2. Do you believe this requirement is technically achievable for new units or generating plant/facilities? Please provide comments supporting your answer.

Please provide along with your comment, what you believe the timeframe is needed to implement this requirement.

☐ Yes
☐ No

Comments: The reference to “R5” in this question should be R6.
5. The voltage ride-through Tables HVRT and LVRT Duration in Attachment 2, specify time
duration of up to 600 seconds that a unit or a generating plant/facility should ride
through a voltage excursion. Do you agree with this time duration value? If not, please
provide an alternative value and supporting information in the comments.

☐ Yes
☐ No

Comments:

6. Do you have any other questions or concerns with the proposed standard that have not
been addressed? If yes, please explain.

☐ Yes
☐ No

Comments:

In R3, the SDT should review that generators are not required to provide a
remedial plan for an equipment limitation.

For the SDT’s consideration is the work done by and for the NPCC UFLS RSDT. It
was recommended to retain the more conservative NPCC Frequency Capability
Curve for setting generator protection as opposed to the proposed Frequency
Capability Curve in PRC-024-1 for the following reasons:

1. Some portions of the NPCC Region have additional stages of UFLS set at
lower frequency thresholds below 58 Hz. Adopting the curve in Attachment 1
may impact the effectiveness of the UFLS program from arresting frequency
decline in these depressed frequency ranges.

2. As the numbers of distributed generators connected to the system increase, it
is expected that overall generator frequency response is expected to be
reduced. The distributed generation may also not need to comply with the
generation trip thresholds as they may not meet the existing thresholds
applicable to Generator Owners in NERC’s Statement of Compliance Registry
Criteria. Adopting the proposed PRC-024-1 curve would jeopardize the
survival of islands that may contain increasingly larger portions of distributed
generation should the frequency decline below 58 Hz.

3. Adopting the proposed PRC-024-1 curve reduces the probability that the UFLS
program will successfully arrest declining frequency for system conditions that
are not addressed in NPCC’s 2006 UFLS Assessment.

4. Adopting the proposed PRC-024-1 curve would decrease the ability of an
island to survive more severe conditions than those considered in the UFLS
design (for example, islands with a generation deficiency greater than 25
percent).