

## **SPP Fact Sheet: Unit Testing**

0800QREF00119

*Public: Intended for public consumption and/or released to the public; SPP Policy 0176"*

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## **OVERVIEW**

### **Purpose**

This document describes the steps to perform unit testing as it relates to MOD-025, MOD-026, MOD-027, and MOD-032. The actions in this document are being executed by the Generator Operator (GOP), Transmission Operator (TO), Transmission Planner (TP), testing company, and Generator owner (GO) of the generation unit(s). It includes SPP Planning Engineers and SPP Operations (Functional Coordinators and Shift Supervisors). This document is not all inclusive of the activities needed, it is an overview of the coordination/communication as they relate to SPP.

### **Additional Information**

The standards can be found on the NERC website, [www.nerc.com](http://www.nerc.com).

- [SPP MDWG Documents](#) (hyper link)

## **COORDINATION WITH SPP PLANNING ENGINEERS**

### **Governors and Exciter Testing**

Based on SPP's interpretation of the Standards MOD-026 & MOD-027, the testing of the governors and exciters should be performed as follows:

1. The GO will inform the TP of an upcoming test(s) to meet MOD-026 & MOD-027 for a specific generation Unit(s).
2. TP will supply the GO the following specific data for said unit(s):
  - a. A list of acceptable excitation/governor system models that are acceptable to the TP and Instructions on how to obtain the dynamic excitation control system or plant volt/VAR or dynamic turbine/governor and load control or active power/frequency control function and model library block diagrams and/or data sheets for models that are acceptable to the TP.
  - b. Or, Model data for any of the Generator Owner's existing applicable unit specific excitation control system or plant volt/VAR or dynamic turbine/governor and load control or active power/frequency control function contained in the Transmission Planner's dynamic database from the current (in-use) models, including generator MVA base.
3. Each GO shall provide for each applicable unit, a verified
  - Generator excitation control system or plant volt/VAR control function control model, including documentation and data as specified in Requirement R2 of MOD-026 to its TP.

or

- Generator dynamic turbine/governor and load control model or active power/frequency control model, including documentation and data as specified in Requirement R2 of MOD-027 to its TP.
4. The TP will verify the data submitted by the GO to be valid by performing step response testing for the excitation system or governor by validating the data supplied against typical acceptable industry values. The TP will respond to the GO that the data is acceptable or with any follow-up request for additional data or clarification.
  5. GO will respond with any revised data from TP's follow-up request for additional data or clarification.
  6. TP will provide a written response to the GO that the excitation or governor data is usable or not usable.

SPP and the GO will work together in processing your MOD-026 & MOD-027 requests. It is SPP's and the GO's intention to supply data specific to your generating station(s) to greatly reduce the amount of data that needs to be sent by us and then parsed by the GO entities who do not normally use Siemens-PTI software. Additionally we understand that there may need to be further discussions regarding the Siemens-PTI software based upon the knowledge the testing company that you employ of that software.

## **Annual Power Flow and Dynamics Case**

SPP performs an annual Power Flow and Dynamics Case set build. The SPP MDWG Model Development Procedure Manual that SPP and its Modeling contacts use as a guideline to compile the case sets along with a schedule for this activity can be found on the SPP Website. A link to these documents can be found at the end of the e-mail. The GO data that supports MOD-032 can be found in Attachment 1 of the standard and is in the [Appendix](#).

Please coordinate any submission of data for existing facilities with the GO. SPP's current power flow and dynamics models contain data that was submitted by the GO through either the TO/TP or SPP GI process. The GO should also have knowledge of this data for its records and know of any substantive changes going forward. Please let SPP know if you have any questions about the power flow or dynamics data requirements.

SPP also urges entities applicable to NERC Standards to review the Standards to ensure that all parties involved understand them.

## **COORDINATION WITH SPP OPERATIONS**

Operations becomes part of the Unit Testing process as a downstream part of work between the unit's GO, TO, TP, testing company, and Generator owner, and SPP Planning Engineering groups (specifically Modeling Engineers). The actions are tracked based on compliance with several MOD standards but typically should include directing units to deviate MVAR output and voltage schedules to test the unit's exciter, governor, and PSS performance and modeling characteristics.

1. The Modeling department works with the GO to develop test plans and proposed schedules.
2. As units need to be tested, the Modeling department contacts the Ops Functional Coordinators (FC) ([opsfuncCOORD@spp.org](mailto:opsfuncCOORD@spp.org)), Manager of Operations Analysis Engineering and Support, Supervisor of Ops Planning, and Manager of Real Time Operations, providing unit and testing information.

For example,

Lea Power Partners, LLC (LPP) – Hobbs Generating Station and Kestrel Power Engineering have a plan to test the LPP generators, excitation systems, turbine- governor and perform reactive capability testing on the two Mitsubishi gas turbines and one GE steam turbine on October 15, 2015, reference NERC MOD-025, MOD-026, MOD-027 and MOD-032.

3. A conference call time is determined and call in information is provided to SPP Operations. In addition to the GO, Modeling Engineers, and Ops FCs, the Manager of Day Ahead Market and Supervisor of Ops Planning should be included in the planning and notifications.
  - a. Test Date, units, schedule, and items to be tested should be captured during the meeting.
  - b. Specifics for unit commit status, CROW, or other preliminary discussions will be discussed in the conference call. This includes, but is not limited to the following:
    - i. Submit Self-commit status for Testing Operating Hours.
    - ii. Submit EconMin and EconMax equivalent to testing output profiles.
    - iii. If range of output needed for testing, MP submits limits of range in EconMin/EconMax and utilizes Control Mode 3.
4. As the test date approaches Ops Functional Coordinator's will notify the Lead Shift Supervisor and the Shift Supervisor (SS) on duty. The SS notifies the crew.

**NOTE:** Min and Max information for the unit(s) being testing will be provided through the Market System and will be incorporated into the Day Ahead Market, Current/Next Day Planning process, and real time studies.

5. The day prior to the test, a go/no-go call is set up by the GO.
  - a. If SPP Operations has any concerns about the test based on real time or day ahead operating conditions, the concerns will be discussed during the call, and if necessary, the test rescheduled.
  - b. Otherwise, assume SPP Operations has no concerns if the group is not represented on the call.
6. As a real time go/no-go decision the GO needs to contact the SPP RC. The RC will communicate any changes to the Ops Functional Coordinators.
7. A quick conference call, with information provided by the GO, can be requested at any time during the test. It is for the applicable Operators, FC's, GO, TO, TOP, testing company, and Engineers to call into if problems or questions arise. Based on real time conditions and possible effects of the test on the SPP Reliability Coordinator Area, the test may be cancelled at any time during the test.

8. During the test timeframe:
  - a. The crew monitors for effects, such as VAR, in the footprint during the test.
  - b. Operators log the test and any applicable information in the Electronic Log.

**NOTE:** SPP Operations does not have any responsibility for the test results, analysis or follow-up actions. Their only responsibility is the effect on the Bulk Electric System. Operator logs and other information will be made available to the SPP Engineers as additional information as needed.

## **APPENDIX**

### **GO Data Supporting MOD-032**

The GO data that supports MOD-032 can be found in Attachment 1 of the standard and is as follows:

#### **Power Flow Data for Generating Units**

- real power capabilities - gross maximum and minimum values
- reactive power capabilities - maximum and minimum values at real power capabilities in 3a above
- station service auxiliary load for normal plant configuration (provide data in the same manner as that required for aggregate Demand under item 2, above).
- regulated bus\* and voltage set point\* (as typically provided by the TOP)
- machine MVA base
- generator step up transformer data (provide same data as that required for transformer under item 6, below)
- generator type (hydro, wind, fossil, solar, nuclear, etc..)
- in-service status\*

#### **Dynamic Data for Generating Units**

- Generator [GO, RP (for future planned resources only)]
- Excitation System [GO, RP(for future planned resources only)]
- Governor [GO, RP(for future planned resources only)]
- Power System Stabilizer [GO, RP(for future planned resources only)]
- Wind Turbine Data [GO]
- Photovoltaic systems [GO]
- Static VAR Systems and FACTS [GO, TO, LSE]
- DC system models [TO]
- Other information requested by the Planning
- Coordinator or Transmission Planner necessary
- for modeling purposes. [BA, GO, LSE, TO, TSP]

**REVISION CHART**

Version	Revised By	Description of Modifications	Revision Date
1.0	Kathy Myhand	Initial document creation	9/17/2015
2.0	Scott Jordan	Edited verbiage in <b>“Governors and Exciter Testing”</b> to better reflect that it a software model and not the systems in the field.	4/25/2016
3.0	Mitch Jackson	Updated MDWG Documents link	3/27/2017

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# THE POWER RELATIONSHIPS

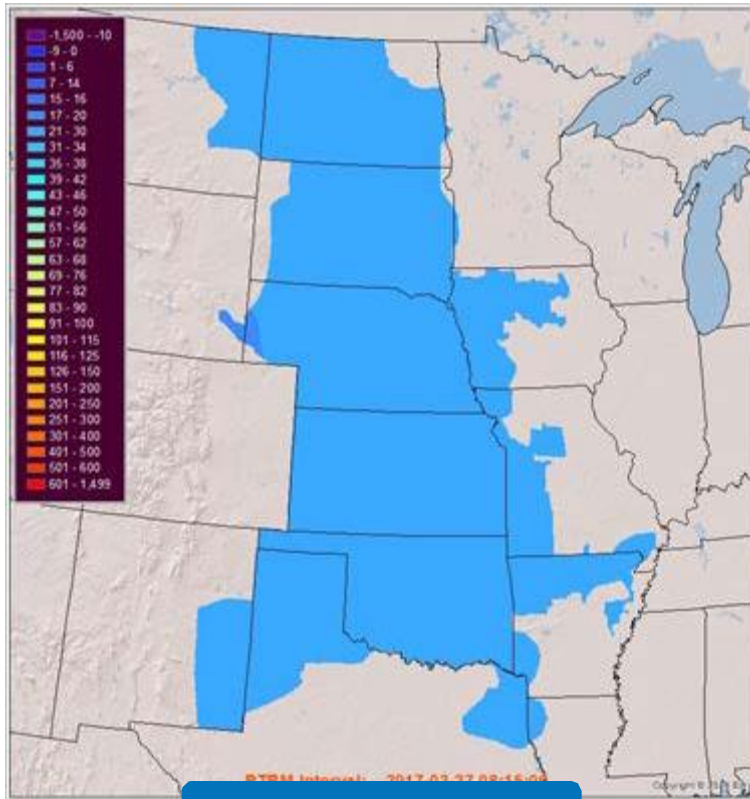
Celebrating 75 years of  
reliability through  
relationships

WATCH THE VIDEO

*Helping our members work together to keep the lights on... today and in the future.*

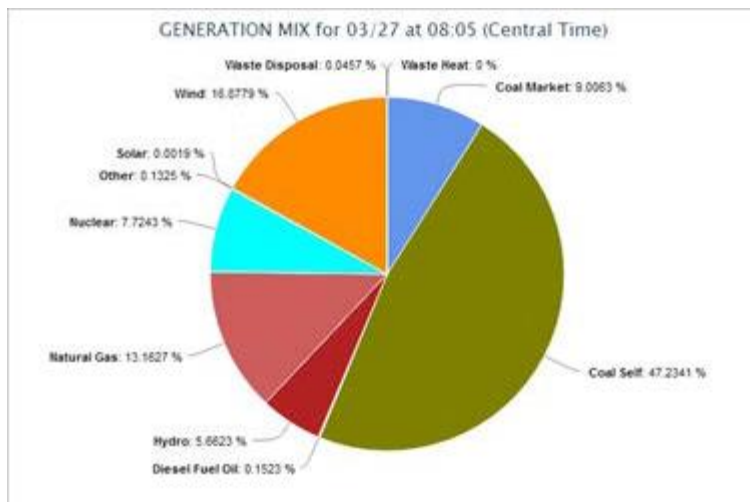
## Price Contour Map





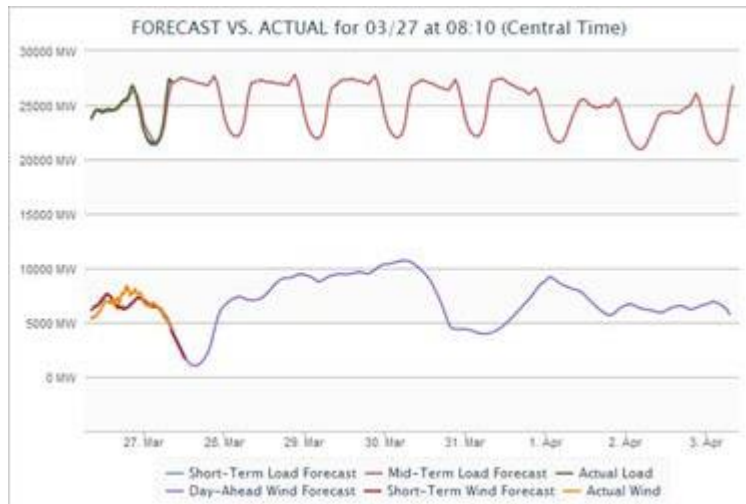
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## Generation Mix



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## Forecast vs. Actual



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## CALENDAR of EVENTS

Title	Date	Location	
<b>Billing Determinants Task Force Net Conference 20170327</b>	March 27, 2017	WebEx/Tele	<a href="#">MORE</a>
<b>CTPTF Mtg</b>	March 27, 2017	Net Conference, None	<a href="#">MORE</a>
<b>Project 2016-04 Modifications to PRC-025-1 (Generator Relay Loadability)</b>	March 27, 2017	WebEx/Tele	<a href="#">MORE</a>
<b>Spring SPP RE Workshop</b>	March 28-29, 2017	Little Rock, Arkansas	<a href="#">MORE</a>
<b>RTO Forum 20170329</b>	March 29, 2017	Little Rock, Arkansas	<a href="#">MORE</a>
<b>SAWG Face to Face</b>	March 29, 2017	Dallas , Texas	<a href="#">MORE</a>

<b>SST Net Conference</b>	March 30, 2017	WebEx/Tele	<a href="#">MORE</a>
<b>Org Group Chair Conf</b>	March 30-31, 2017	Little Rock, Arkansas	<a href="#">MORE</a>
<b>GIITF Face to Face</b>	March 30, 2017	Dallas, Texas	<a href="#">MORE</a>
<b>RCWG Meeting 20170330</b>	March 30, 2017	Little Rock, Arkansas	<a href="#">MORE</a>

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