



TRO Standard
Processes and
Procedures

TITLE
Load Flow Model Development

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Rev. 0002
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Prepared by: Armando M. Rodriguez

Concurred by: Armando M. Rodriguez 07/24/2008
Armando M. Rodriguez, Manager, AFC Engineering Date

Concurred by: Clay DeLoach 7/24/08
Clay DeLoach, Manager, Network Modeling Date

Approved by: Douglas H. Bailey 7/28/08
Douglas H. Bailey, Manager, Operations Engineering Date

Revision Log

Revision or Change Number	Effective Date	Affected Page Numbers	Description of Revision/Change
0000			Initial issue.
0001	08/18/2008	TOC, 5, 6	Revised to correct spelling of Energy to Entergy on TOC, 3.3, and 3.4.
0002	07/28/2008	Various	Updated the model revision process in Section 4.1, revised the case conditioning process in Section 4.2, the list of models uses and frequency of model runs in Section 4.3, added acronyms in Section 7.0, and replaced all instances of VST and VAST with LTSG and NTSG, respectively.

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1.0 PURPOSE

This document outlines the load-flow model development process.

2.0 SCOPE

Load-flow models are developed for use in next-day reliability analyses, available transfer capacity (ATC) studies, transmission and generation outage approvals, seasonal reliability assessments, off-line system analysis, and on-line network analysis tools. Model development ranges from hourly models beginning next hour to monthly models ending 18 months in the future.

3.0 REGIONAL MODEL COORDINATION

The models used as the base cases in the model development process are coordinated through the following processes:

3.1 North American Electric Reliability Council (NERC) Multi-Area Modeling Working Group (MMWG)

The models used by TVA are derived from the NERC MMWG models. The MMWG includes direct representation from each NERC Region in the Eastern Interconnect). MMWG models are updated each fall and are intended to provide a detailed representation of the bulk electric grid, for voltages 100kV and above. Lower voltage representation may not be as detailed due to program limitations.

3.2 Southeastern Electric Reliability Council (SERC) Long-Term Study Group (LTSG)

The SERC LTSG study group compiles required data for integration into the MMWG models each year during the summer timeframe. Representation for the LTSG study group consists of planning engineers from each member organization. The yearly update, known as the yearly Data Bank Update (DBU), is used to ensure the most up-to-date load forecasts, bulk power facility plans, facility characteristics, voltage levels, reactive interchange between systems, and other system conditions are accurately represented.

3.3 SERC Near-Term Study Group (NTSG)

The SERC NTSG study group uses the LTSG/MMWG models as the starting point for their near-term seasonal reliability models. The NTSG models are updated quarterly by the members of the NTSG study group, consisting of planning and operational engineers from each organization. The updates to the NTSG models are done in a similar manner as to the LTSG updates. The resulting seasonal models, covering the next five seasons, are used for near-term seasonal reliability studies, Open Access Same-Time Information System (OASIS) support studies and special studies as assigned by the LTSG Steering Committee. The NTSG group also uses these seasonal models to identify necessary operating procedures to improve transfer capabilities.

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3.4 SERC ENERGENCY-SOUTHERN-TVA (EST)

The SERC EST study group uses the NTSG quarterly updated models as the starting point for their 13-month model coordination. The EST working group exchanges transmission/generation outages, load forecasts, case interchange, generation dispatch, and topology/rating changes. This information is provided by each entity during the first week of each month.

3.5 MISO/PJM Joint Reliability Coordination Agreement (JRCA)

TVA participates in a Joint Reliability Coordination Agreement (JRCA) with MISO and PJM under which data is exchanged which benefits the modeling process. System Data Exchange (SDX) data is enhanced between the participants to include more load forecast data in the hourly, daily and monthly horizons. Generation merit order is also exchanged to better represent dispatch on external systems. Monthly load flow models are also made available to validate external areas as required.

4.0 PROCESS

4.1 Configuration Management

The models used by TVA for load flow model development are made available to each of the TVA RC Member Companies (Members) via the TVA File Transfer Protocol (FTP) site. Each Member is responsible for reviewing the models used to ensure accurate system representation and updated system information. Additionally, each Member is responsible for submitting change requests to TVA such as:

- Facility Ratings
- Unit Capabilities
- Topology Modifications or In-Service Date changes

These requests should be made via the TVA CTR Portal in the SEAL (State Estimator Action Item List) section. Members should also update Facility Ratings requests in the Flowgate page if the rating change impacts a flowgate within their respective Available Flowgate Capacity (AFC) process. All requests are documented within the CTR Portal database.

The model changes are maintained within the model revision directory located [\\rgoctrgfs\reliability\Cases\Base Cases\v30 Cases\season](#), where "season" will include all revisions and change idevs used to update the models. At the beginning of each new quarter, the new models are reviewed against the previous revisions, such as ratings, status and configuration changes. If previous changes are not reflected in the new seasonal models, or if the new models contain projects that have been rescheduled, these revisions will be included in the initial revision for use in the model development process. A notification will be sent to each Member indicating the availability of new models on the TVA FTP site for their review once updated.

4.2 Case Conditioning

The NTSG/MMWG seasonal base cases are conditioned in order to align with other processes such as SDX.

The following are steps taken in the conditioning process:

- Merge the PJM Reliability control areas into one control area representation.
- Merge the MECT and ICT control areas into one control area.
- Change the model swing from Browns Ferry to an external unit.
- Update various generators/transmission lines statuses (such as normally open lines).

4.3 Automated Model Builder (AMB) Application

The Automated Model Builder (AMB) application is the tool used to create the appropriate models for:

- AFC used for Transmission Service Request (TSR) evaluations
- 48 Hour and Next-Day Reliability Analyses
- Transmission and Generation Outage Approvals
- Reliability Assessments.

The updated seasonal models are the starting point base cases for AMB application. This process runs every hour and various times throughout the day to ensure adequate models to cover the required time periods for the processes listed above. The following are the run times and the resulting models for each run type:

Run Type	Frequency	Models
Hourly48	Every hour	Next Hour to Next Hour + 47
Hourly	Every 6 hours	Next Hour + 45 to Next Hour + 191
Daily	Every 6 hours	Next Day to Next Day + 34
Monthly	Once per day	Next Month to Next Month + 17

In addition to the LTSG seasonal models, inputs to the AMB process include:

- Return all transmission lines to service unless normally opened
- Return all generators to service Fossil, Nuclear and Hydro – rated maximum output 40MW or greater.
- SDX Data

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4.3 Automated Model Builder (AMB) Application (continued)

Transmission/Generation Outages

Load Forecasts

Updated and posted to NERC by 1200 CST

- Coordinated Control Area subsystem files

Block Dispatch

Load Profiles

Non-Conforming Loads

- NERC Tagdump Schedules

Hourly48 models in the scheduling horizon

Updated every hour

- Transmission Reservation profiles

NTSG models may contain long-term firm reservations

- SDX Type Data

Direct Generation dispatch

Direct Load dispatch

Pumped-Storage Facility profiles (optional)

4.4 Data Retention

All inputs to the model creation process are archived for at least the past 12 months. This allows any model to be recreated by reprocessing the data through the AMB application.

5.0 ADVANCED NETWORK APPLICATIONS MANAGEMENT

The seasonal base-cases are used as input to the TVA network model used in the on-line network analysis tools. An internal process is used to validate the model against the network model currently in use and resolve discrepancies.

6.0 RECORDS

6.1 QA Records

None.

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6.2 Non-QA Records

None.

7.0 DEFINITIONS AND ACRONYMS

AECI - Associated Electric Cooperative Incorporated

AFC - Available Flowgate Capability

ANA - Advanced Network Applications

ATC - Available Transfer Capability

BREC - Big Rivers Electric Cooperative

CA - Control Area

DBU - Database Update Bank

EST - ENTERGY-SOUTHERN-TVA

FTP - File Transfer Protocol

ISD - In Service Date

JRCA - Joint Reliability Coordination Agreement

LTSG - Long-Term Study Group

MISO - Midwest Independent System Operator

MMWG - Multi-Area Modeling Working Group

NERC - North American Electric Reliability Council

NTSG - Near-Term Study Group

OASIS - Open Access Same-Time Information System

SDX - System Data eXchange

SERC - Southeastern Electric Reliability Council

TRAIL - Transmission Reliability Action Item List

TVA - Tennessee Valley Authority