 California ISO Your Link to Power	Version No.	1.0
	Effective Date	7/6/07
System Operating Limits (SOL) Methodology Guideline for the Planning Horizon		Distribution Restriction: None

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Purpose

Provides the guidance for determining the System Operating Limits (SOL) for the Planning Horizon at the California ISO.

Applicable Reliability Standard(s)


This guideline is based on the requirements and measures outlined in NERC Standard FAC-010-1 titled “System Operating Limits Methodology for the Planning Horizon” and other industry best practices applicable to a Planning Authority. All the SOLs shall be within all applicable facility ratings.

Applicability to California ISO

The California ISO has registered with NERC as a Planning Authority. The P&ID department is responsible for planning authority related mandates for the California ISO.

The planning horizon is a time frame of at least one year into the future from the time of the SOL study. In the planning horizon, the primary focus is on major paths both internal and external to the California ISO, such as COI, Path 15, or Path 26. These SOL studies include both the determination of a new path or re-rate of an existing path.

Operating limits for the non-major paths are generally determined in the Operation Horizon, a timeframe shorter than one year.

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SOLs and IROLs

All operating limits, including path ratings and intertie Operating Transfer Capabilities (OTCs), are designated SOLs at the California ISO, in the planning horizon. A subset of the SOLs, which if exceeded, could cause severe impacts on the neighboring Balancing Authorities, is considered IROLs. These severe impacts include: instability, uncontrolled separation(s) or cascading outages.

Study Methodology

In the planning horizon, the determination of SOLs generally follows the process and methodology outlined in the WECC Path Rating Process as detailed in Section 4.0 of the WECC document entitled “Overview of Policies and Procedures for Regional Planning Project Review, Project Rating Review, and Progress Reports”. Section 4.0, “The WECC Procedure for Project Rating Review” requires the California ISO and other planning authorities in the Western Interconnection to perform studies in a way that conforms to the following requirements, steps and processes:

1. Applicable reliability performance standards/criteria:
 - a) System transiently and dynamically stable
 - b) System with adequate reactive margin to protect against voltage collapse
 - c) All transmission facilities within their thermal ratings
2. Required Studies: Power flow, transient stability and post-transient studies will be performed in accordance with the NERC/WECC Planning Standards, this document, WECC Post-Transient Study Methodology and local utility criteria and guidelines.
3. The single contingencies met and exceed requirements R2.2 and R2.3 of FAC-010-1.
4. The double contingencies met and exceeded the requirements R2.4, R2.5 and Regional Difference E1 of FAC-010-1.
5. Study Model: Select base cases from the most recent WECC cases available for the study time frame and conditions. Update the base cases to reflect the most accurate system line configuration, generation, and load representation for each appropriate individual balancing authority area for the study time period. The following are general guidelines for system representation in modeling:
 - Full loop representation is to be used with the entire WECC system modeled.
 - All system elements will be in service for the assumed initial conditions.
 - System transfer levels for major WECC paths should be agreed upon and listed. Additional transfer paths should be included as appropriate.

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- Voltage criteria should be applied in accordance with existing practice by the respective utilities or the operating agents.
- The phase shifter methodology to be followed for all applicable phase shifters should be identified.
- A list of the series compensation assumptions for the major EHV lines should be provided.
- A detailed system representation of the study area should be modeled when appropriate.

6. Power Flow:

Power flow studies should be performed utilizing the following guidelines:


- **Thermal Capacity Limits**
 No transmission element will be loaded above 100% of its continuous rating under normal conditions. Following a single contingency or a credible double contingency, no transmission element will be loaded above its emergency rating. A list of continuous and emergency ratings for applicable facilities should be developed by the Project Review Group and included in the study documentation.
- **System Voltage Limits**
 The NERC/WECC Planning Standards will govern voltage deviation for loss of a system element. All deviations from the WECC Reliability Criteria should be listed. Provide a list of bus voltages to be monitored. The Project Review Group should review and approve this list to ensure all meaningful buses are monitored.

7. Transient Stability:

Transient stability studies should be performed as needed to establish the stability transfer limit. These studies would facilitate the development of the dynamic voltage support requirements.

Following single contingencies or probable double contingencies, the system shall demonstrate transient, dynamic and voltage stability. Facility Ratings shall not be exceeded and uncontrolled separation shall not occur.

- System disturbances for stability studies should be initiated by a three-phase to ground fault on the EHV bus adjacent to the major interconnection point and/or power plant of interest. A single line-to-ground fault should be studied as sensitivity if requested by the Project Review Group.
- Faults on the transmission lines being evaluated will be cleared in accordance with guidelines provided by the appropriate members of Backup clearing time for stuck breaker operation will be provided by the appropriate members of the Project Review Group.
- The system will be considered stable if it met the WECC Planning Standards.

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8. Post-transient Governor Power Flow

Post-transient power flow analysis shall be done when requested by the Project Review Group. This analysis should be consistent with “Voltage Stability Assessment Methodology” and “Voltage Stability Criteria, Undervoltage Load Shedding and Reactive Reserve Monitoring Methodology” documents. The analysis should demonstrate conformance of the Plan of Service with the NERC/WECC Planning Standards

9. Remedial Actions

All remedial action schemes (RAS) required to obtain the Accepted Rating should be described in detail and modeled as they will be applied in operation.

10. Documentation

A Rating Report shall document the study results and conclusions and to demonstrate how a project affects the overall system performance as defined by NERC/WECC requirements. The report should demonstrate conformance with NERC/WECC Reliability Criteria. The report documenting the Accepted Rating should also provide a general background about the existing system or project. The background could include historical information, a general project description, project need and use, and project participation.

Supporting Information

RESPONSIBILITIES


P&ID	Planning & Infrastructure Development
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REFERENCES

<u>FAC-010-1</u>	NERC Standard - System Operating Limits Methodology for the Planning Horizon
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DEFINITIONS

Unless the context otherwise indicates, any word or expression defined in the Master Definitions Supplement to the California ISO Tariff shall have that meaning when capitalized in this Operating Procedure.

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VERSION HISTORY

Version	Change	By	Date
1.0	1 st Draft.		6/25/07

Technical Review

Reviewed By Content Expert	Signature	Date
Operations Support		6/26/07
Regional Transmission		6/26/07
Grid Ops		7/5/07
Market Ops		6/26/07
Scheduling		7/3/07

Approval

Approved By	Signature	Date
Director of Regional Transmission		6/27/07
Director of Grid Operations		7/5/07