

## Standard Development Roadmap

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### Development Steps Completed:

1. SAC approves SAR for posting (March 20, 2002).
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3. SAC approves development of standard (February 27, 2003).
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6. Drafting team posts Implementation Plan for comment (June 1, 2003–July 15, 2005).

### Description of Current Draft:

The drafting team is posting draft 5 for a 30-day pre-ballot review.

### Future Development Plan:

#### Anticipated Actions

1. Final versions of standards, V0 retirements/revisions and implementation plan posted for 30-day pre-ballot review.
2. First ballot.
3. Drafting Team considers comments and makes any revisions indicated.
4. Recirculation ballot .
5. Thirty-day posting before board adoption.
6. Board adopts standard.
7. Effective date.

#### Anticipated Date

September 1–30, 2005  
October 1–10, 2005  
October 11–October 20, 2005  
October 21–October 31, 2005  
October 1–30, 2005  
November 1, 2005  
May 1, 2006

### Definitions of Terms Used in Standard

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**Equipment Rating:** The maximum and minimum voltage, current, frequency, real and reactive power flows on individual equipment under steady state, short-circuit and transient conditions, as permitted or assigned by the equipment owner.

**Facility:** A set of electrical equipment that operates as a single Bulk Electric System Element (e.g., a line, a generator, a shunt compensator, transformer, etc.)

**Performance-Reset Period:** The time period that the entity being assessed must operate without any violations to reset the level of non compliance to zero.

## A. Introduction

1. **Title:** Facility Ratings Methodology
2. **Number:** FAC-008-1
3. **Purpose:** To ensure that Facility Ratings used in the reliable planning and operation of the Bulk Electric System (BES) are determined based on an established methodology or methodologies.
4. **Applicability**
  - 4.1. Transmission Owner
  - 4.2. Generator Owner
5. **Proposed Effective Date:** May 1, 2006

## B. Requirements

- R1. The Transmission Owner and Generator Owner shall each document its current methodology used for developing Facility Ratings (Facility Ratings Methodology) of its solely and jointly owned Facilities. The methodology shall include all of the following:
  - R1.1. A statement that a Facility Rating shall equal the most limiting applicable Equipment Rating of the individual equipment that comprises that Facility.
  - R1.2. The method by which the Rating (of major BES equipment that comprises a Facility) is determined.
    - R1.2.1. The scope of equipment addressed shall include, but not be limited to, generators, transmission conductors, transformers, relay protective devices, terminal equipment, and series and shunt compensation devices.
    - R1.2.2. The scope of Ratings addressed shall include, as a minimum, both Normal and Emergency Ratings.
  - R1.3. Consideration of the following:
    - R1.3.1. Ratings provided by equipment manufacturers.
    - R1.3.2. Design criteria (e.g., including applicable references to industry Rating practices such as manufacturer's warranty, IEEE, ANSI or other standards).
    - R1.3.3. Ambient conditions.
    - R1.3.4. Operating limitations.
    - R1.3.5. Other assumptions.
- R2. The Transmission Owner and Generator Owner shall each make its Facility Ratings Methodology available for inspection and technical review by those Reliability Coordinators, Transmission Operators, Transmission Planners, and Planning Authorities that have responsibility for the area in which the associated Facilities are located, within 15 business days of receipt of a request.
- R3. If a Reliability Coordinator, Transmission Operator, Transmission Planner, or Planning Authority provides written comments on its technical review of a Transmission Owner's or Generator Owner's Facility Ratings Methodology, the Transmission Owner or Generator Owner shall provide a written response to that commenting entity within 45 calendar days of receipt of those comments. The response shall indicate whether a change will be made to the

Facility Ratings Methodology and, if no change will be made to that Facility Ratings Methodology, the reason why.

### **C. Measures**

- M1.** The Transmission Owner and Generator Owner shall each have a documented Facility Ratings Methodology that includes all of the items identified in FAC-008 Requirement 1.1 through FAC-008 Requirement 1.3.5.
- M2.** The Transmission Owner and Generator Owner shall each have evidence it made its Facility Ratings Methodology available for inspection within 15 business days of a request as follows:
  - M2.1** The Reliability Coordinator shall have access to the Facility Ratings Methodologies used for Rating Facilities in its Reliability Coordinator Area.
  - M2.2** The Transmission Operator shall have access to the Facility Ratings Methodologies used for Rating Facilities in its portion of the Reliability Coordinator Area.
  - M2.3** The Transmission Planner shall have access to the Facility Ratings Methodologies used for Rating Facilities in its Transmission Planning Area.
  - M2.4** The Planning Authority shall have access to the Facility Ratings Methodologies used for Rating Facilities in its Planning Authority Area.
- M3.** If the Reliability Coordinator, Transmission Operator, Transmission Planner, or Planning Authority provides documented comments on its technical review of a Transmission Owner's or Generator Owner's Facility Ratings Methodology, the Transmission Owner or Generator Owner shall have evidence that it provided a written response to that commenting entity within 45 calendar days of receipt of those comments. The response shall indicate whether a change will be made to the Facility Ratings Methodology and, if no change will be made to that Facility Ratings Methodology, the reason why.

### **D. Compliance**

#### **1. Compliance Monitoring Process**

##### **1.1. Compliance Monitoring Responsibility**

Regional Reliability Organization

##### **1.2. Compliance Monitoring Period and Reset Time Frame**

Each Transmission Owner and Generator Owner shall self-certify its compliance to the Compliance Monitor at least once every three years. New Transmission Owners and Generator Owners shall each demonstrate compliance through an on-site audit conducted by the Compliance Monitor within the first year that it commences operation. The Compliance Monitor shall also conduct an on-site audit once every nine years and an investigation upon complaint to assess performance.

The Performance-Reset Period shall be 12 months from the last finding of non-compliance.

##### **1.3. Data Retention**

The Transmission Owner and Generator Owner shall each keep all superseded portions of its Facility Ratings Methodology for 12 months beyond the date of the change in that methodology and shall keep all documented comments on the Facility Ratings Methodology and associated responses for three years. In addition, entities found non-compliant shall keep information related to the non-compliance until found compliant.

The Compliance Monitor shall keep the last audit and all subsequent compliance records.

**1.4. Additional Compliance Information**

The Transmission Owner and Generator Owner shall each make the following available for inspection during an on-site audit by the Compliance Monitor or within 15 business days of a request as part of an investigation upon complaint:

- 1.4.1 Facility Ratings Methodology
- 1.4.2 Superseded portions of its Facility Ratings Methodology that had been replaced, changed or revised within the past 12 months
- 1.4.3 Documented comments provided by a Reliability Coordinator, Transmission Operator, Transmission Planner or Planning Authority on its technical review of a Transmission Owner’s or Generator Owner’s Facility Ratings methodology, and the associated responses

**2. Levels of Non-Compliance**

**2.1. Level 1:** There shall be a level one non-compliance if any of the following conditions exists:

- 2.1.1 The Facility Ratings Methodology does not contain a statement that a Facility Rating shall equal the most limiting applicable Equipment Rating of the individual equipment that comprises that Facility.
- 2.1.2 The Facility Ratings Methodology does not address one of the required equipment types identified in FAC-008 R1.2.1.
- 2.1.3 No evidence of responses to a Reliability Coordinator’s, Transmission Operator, Transmission Planner, or Planning Authority’s comments on the Facility Ratings Methodology.

**2.2. Level 2:** The Facility Ratings Methodology is missing the assumptions used to determine Facility Ratings or does not address two of the required equipment types identified in FAC-008 R1.2.1.

**2.3. Level 3:** The Facility Ratings Methodology does not address three of the required equipment types identified in FAC-008-1 R1.2.1.

**2.4. Level 4:** The Facility Ratings Methodology does not address both Normal and Emergency Ratings or the Facility Ratings Methodology was not made available for inspection within 15 business days of receipt of a request.

**E. Regional Differences**

None Identified

**Version History**

Version	Date	Action	Change Tracking
1	01/01/05	1. Lower cased the word “draft” and “drafting team” where appropriate. 2. Changed incorrect use of certain hyphens (-) to “en dash” (–) and “em dash (—).” 3. Changed “Timeframe” to “Time	01/20/05

		Frame” and “twelve” to “12” in item D, 1.2.	
		4. Added periods and removed extra spaces where appropriate.	

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July 1, 2006

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**No new terms introduced in this standard.**



## A. Introduction

1. **Title:** Establish and Communicate Facility Ratings
2. **Number:** FAC-009-1
3. **Purpose:** To ensure that Facility Ratings used in the reliable planning and operation of the Bulk Electric System (BES) are determined based on an established methodology or methodologies.
4. **Applicability**
  - 4.1. Transmission Owner
  - 4.2. Generator Owner
5. **Proposed Effective Date:** July 1, 2006

## B. Requirements

- R1. The Transmission Owner and Generator Owner shall each establish Facility Ratings for its solely and jointly owned Facilities that are consistent with the associated Facility Ratings Methodology.
- R2. The Transmission Owner and Generator Owner shall each provide Facility Ratings for its solely and jointly owned Facilities that are existing Facilities, new Facilities, modifications to existing Facilities and re-ratings of existing Facilities to its associated Reliability Coordinator(s), Planning Authority(ies), Transmission Planner(s), and Transmission Operator(s) as scheduled by such requesting entities.

## C. Measures

- M1. The Transmission Owner and Generator Owner shall each be able to demonstrate that it developed its Facility Ratings consistent with its Facility Ratings Methodology.
  - M1.1 The Transmission Owner's and Generator Owner's Facility Ratings shall each include ratings for its solely and jointly owned Facilities including new Facilities, existing Facilities, modifications to existing Facilities and re-ratings of existing Facilities.
- M2. The Transmission Owner and Generator Owner shall each have evidence that it provided its Facility Ratings to its associated Reliability Coordinator(s), Planning Authority(ies), Transmission Planner(s), and Transmission Operator(s) as scheduled by such requesting entities.

## D. Compliance

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

Regional Reliability Organization
  - 1.2. **Compliance Monitoring Period and Reset Time Frame**

Each Transmission Owner and Generator Owner shall self-certify its compliance to the Compliance Monitor annually. The Compliance Monitor may conduct a targeted audit once in each calendar year (January–December) and an investigation upon complaint to assess performance.

The Performance-Reset Period shall be 12 months from the last finding of non-compliance.

**1.3. Data Retention**

The Transmission Owner and Generator Owner shall each keep documentation for 12 months. In addition, entities found non-compliant shall keep information related to the non-compliance until found compliant.

The Compliance Monitor shall retain audit data for three years.

**1.4. Additional Compliance Information**

The Transmission Owner and Generator Owner shall each make the following available for inspection during a targeted audit by the Compliance Monitor or within 15 business days of a request as part of an investigation upon complaint:

**1.4.1** Facility Ratings Methodology

**1.4.2** Facility Ratings

**1.4.3** Evidence that Facility Ratings were distributed

**1.4.4** Distribution schedules provided by entities that requested Facility Ratings

**2. Levels of Non-Compliance**

**2.1. Level 1:** Not all requested Facility Ratings associated with existing Facilities were provided to the Reliability Coordinator(s), Planning Authority(ies), Transmission Planner(s), and Transmission Operator(s) in accordance with their respective schedules.

**2.2. Level 2:** Not all Facility Ratings associated with new Facilities, modifications to existing Facilities, and re-ratings of existing Facilities were provided to the Reliability Coordinator(s), Planning Authority(ies), Transmission Planner(s), and Transmission Operator(s) in accordance with their respective schedules.

**2.3. Level 3:** Facility Ratings provided were not developed consistent with the Facility Ratings Methodology.

**2.4. Level 4:** No Facility Ratings were provided to the Reliability Coordinator(s), Planning Authority(ies), Transmission Planner(s), or Transmission Operator(s) in accordance with their respective schedules.

**E. Regional Differences**

None Identified.

**Version History**

Version	Date	Action	Change Tracking
1	08/01/05	<ol style="list-style-type: none"> <li>1. Lower cased the word “draft” and “drafting team” where appropriate.</li> <li>2. Changed incorrect use of certain hyphens (-) to “en dash” (–) and “em dash (—).”</li> <li>3. Changed “Timeframe” to “Time Frame” in item D, 1.2.</li> <li>4. Added periods and removed extra spaces where appropriate</li> </ol>	01/20/06


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**Cascading Outages:** The uncontrolled successive loss of Bulk Electric System Facilities triggered by an incident (or condition) at any location resulting in the interruption of electric service that cannot be restrained from spreading beyond a pre-determined area.

**Contingency:** The unexpected loss of one or more Bulk Electric System Facilities caused by a single initiating event.

**Delayed Fault Clearing:** Fault clearing consistent with correct operation of a breaker failure protection system and its associated breakers, or of a backup protection system with an intentional time delay.

**Interconnection Reliability Operating Limit (IROL):** A System Operating Limit that, if violated, could lead to instability, uncontrolled separation, or Cascading Outages that adversely impact the reliability of the Bulk Electric System.

**Interconnection Reliability Operating Limit  $T_v$  (IROL  $T_v$ ):** The maximum time that an Interconnection Reliability Operating Limit can be violated before the risk to the interconnection or other Reliability Coordinator Area(s) becomes greater than acceptable. Each Interconnection Reliability Operating Limit's  $T_v$  shall be less than or equal to 30 minutes.

**Normal Clearing:** A protection system operates as designed and the fault is cleared in the time normally expected with proper functioning of the installed protection systems.

## A. Introduction

1. **Title:** System Operating Limits Methodology
2. **Number:** FAC-010-1
3. **Purpose:** To ensure that System Operating Limits (SOLs) used in the reliable planning and operation of the Bulk Electric System (BES) are determined based on an established methodology or methodologies.
4. **Applicability**
  - 4.1. Reliability Coordinator
  - 4.2. Planning Authority
5. **Proposed Effective Date:** May 1, 2006

## B. Requirements

- R1. The Reliability Coordinator shall have a documented methodology for use in developing SOLs (SOL Methodology) within its Reliability Coordinator Area. This SOL Methodology shall:
  - R1.1. Be applicable for developing SOLs used in the operations horizon.
  - R1.2. State that SOLs shall not exceed associated Facility Ratings.
  - R1.3. Include a description of how to identify the subset of SOLs that qualify as IROLs.
- R2. The Planning Authority shall have a documented SOL Methodology for use in developing SOLs within its Planning Authority Area. This SOL Methodology shall:
  - R2.1. Be applicable for developing SOLs used in the planning horizon.
  - R2.2. State that SOLs shall not exceed associated Facility Ratings.
  - R2.3. Include a description of how to identify the subset of SOLs that qualify as IROLs.
- R3. The Reliability Coordinator and Planning Authority shall, by mutual agreement<sup>1</sup>, identify and document in their respective SOL Methodologies the planning and operating time horizons addressed in one another's SOL Methodologies.
  - R3.1. The combined horizons shall cover real-time through the end of the planning horizon.
- R4. The Reliability Coordinator's SOL Methodology and the Planning Authority's SOL Methodology shall each include a requirement that SOLs provide BES performance consistent with the following:
  - R4.1. In the pre-contingency state, the BES shall demonstrate transient, dynamic and voltage stability; all Facilities shall be within their Facility Ratings and within their thermal, voltage and stability limits. In the determination of SOLs, the BES condition used shall reflect current or expected system conditions and shall reflect changes to system topology such as Facility outages.

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<sup>1</sup> If mutual agreement cannot be reached, the planning horizon shall be one year and beyond and the operating horizon shall be real-time up to one year.

- R4.2.** Following the single Contingencies<sup>2</sup> identified in FAC-010 Requirement 4.2.1 through Requirement 4.2.3, the system shall demonstrate transient, dynamic and voltage stability; all Facilities shall be operating within their Facility Ratings and within their thermal, voltage and stability limits; and Cascading Outages or uncontrolled separation shall not occur.
  - R4.2.1.** Single line to ground or 3-phase Fault (whichever is more severe), with Normal Clearing, on any Faulted generator, line, transformer, or shunt device.
  - R4.2.2.** Loss of any generator, line, transformer, or shunt device without a Fault.
  - R4.2.3.** Single pole block, with Normal Clearing, in a monopolar or bipolar high voltage direct current system.
- R4.3.** In determining the system's response to a single Contingency, the following shall be acceptable:
  - R4.3.1.** Planned or controlled interruption of electric supply to radial customers or some local network customers connected to or supplied by the Faulted Facility or by the affected area.
  - R4.3.2.** Interruption of other network customers, only if the system has already been adjusted, or is being adjusted, following at least one prior outage<sup>3</sup>, or, if the real-time operating conditions are more adverse than anticipated in the corresponding studies, e.g., load greater than studied.
  - R4.3.3.** System reconfiguration through manual or automatic control or protection actions.
- R4.4.** To prepare for the next Contingency, system adjustments may be made, including changes to generation, uses of the transmission system, and the transmission system topology.
- R4.5.** Following a Regional Reliability Organization identified credible multiple Contingency, the system shall meet criteria established by the Region for that Contingency.
- R5.** The Reliability Coordinator's methodology and the Planning Authority's methodology for determining SOLs, shall include, as a minimum, a description of the following, along with any reliability margins applied for each:
  - R5.1.** Area of study (must include at least the entire Reliability Coordinator Area as well as the critical modeling details from other Reliability Coordinator Areas that would impact the Facility or Facilities under study).
  - R5.2.** Selection of applicable Contingencies
  - R5.3.** Level of detail of system models used to determine SOLs

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<sup>2</sup> The Contingencies identified in FAC-010 R4.2.1 through R4.2.3 are the minimum contingencies that must be studied but are not necessarily the only Contingencies that should be studied.

<sup>3</sup> An intact system must be able to supply all network customers other than those identified in FAC-010 Requirement 4.3.1 after any single Contingency identified in FAC-010 R4.2. Thus, interruption of such network customers as a response to any single Contingency is not acceptable for a SOL, as developed by a Reliability Coordinator for a system intact condition in the operating horizon or a SOL, as developed by a Planning Authority, or a system intact condition in the planning horizon.

- R5.4.** Allowed uses of Special Protection Systems or Remedial Action Plans
- R5.5.** Anticipated transmission system configuration, generation dispatch and Load level
- R5.6.** Criteria for determining when violating a SOL qualifies as an Interconnection Reliability Operating Limit (IROL) and criteria for developing any associated IROL  $T_v$ .
- R6.** The Reliability Coordinator shall issue its SOL Methodology and any changes to that methodology, to all of the following:
  - R6.1.** Each adjacent Reliability Coordinator and each Reliability Coordinator that indicated it has a reliability-related need for the methodology.
  - R6.2.** Each Planning Authority and Transmission Planner that models any portion of the Reliability Coordinator's Reliability Coordinator Area.
  - R6.3.** Each Transmission Operator that operates in the Reliability Coordinator Area.
- R7.** The Planning Authority shall issue its SOL Methodology, and any change to that methodology, to all of the following:
  - R7.1.** Each adjacent Planning Authority and each Planning Authority that indicated it has a reliability-related need for the methodology.
  - R7.2.** Each Reliability Coordinator and Transmission Operator that operates any portion of the Planning Authority's Planning Authority Area.
  - R7.3.** Each Transmission Planner that works in the Planning Authority's Planning Authority Area.
- R8.** The Reliability Coordinator and Planning Authority shall each issue its SOL Methodology and any changes to that methodology to required entities prior to the effectiveness of the change.
- R9.** If a recipient of the SOL Methodology provides documented technical comments on the methodology, the Reliability Coordinator or Planning Authority shall provide a documented response to that recipient within 45 calendar days of receipt of those comments. The response shall indicate whether a change will be made to the SOL Methodology and, if no change will be made to that SOL Methodology, the reason why.

### **C. Measures**

- M1.** The Reliability Coordinator and the Planning Authority's SOL Methodology shall each include a statement that Facility Ratings shall not be exceeded and shall address all of the items listed in FAC-010 Requirement 3 through Requirement 5.
- M2.** The Reliability Coordinator shall have evidence it issued its SOL Methodology, and any changes to that methodology, including the date they were issued, in accordance with FAC-010 Requirement 6.
- M3.** The Planning Authority shall have evidence it issued its SOL Methodology and any changes to that methodology, including the date they were issued, in accordance with FAC-010 Requirement 7.
- M4.** If the recipient of the SOL Methodology provides documented comments on its technical review of that SOL methodology, the Reliability Coordinator or Planning Authority that distributed that SOL Methodology shall have evidence that it provided a written response to that commenter within 45 calendar days of receipt of those comments. The response shall indicate whether a change will be made to the SOL Methodology and, if no change will be made to that SOL Methodology, the reason why.



## D. Compliance

### 1. Compliance Monitoring Process

#### 1.1. Compliance Monitoring Responsibility

Regional Reliability Organization

#### 1.2. Compliance Monitoring Period and Reset Timeframe

Each Planning Authority and Reliability Coordinator shall self-certify its compliance to the Compliance Monitor at least once every three years. New Planning Authorities and Reliability Authorities shall each demonstrate compliance through an on-site audit conducted by the Compliance Monitor within the first year that it commences operation. The Compliance Monitor shall also conduct an on-site audit once every nine years and an investigation upon complaint to assess performance.

The Performance-Reset Period shall be twelve months from the last non-compliance.

#### 1.3. Data Retention

The Planning Authority and Reliability Coordinator shall each keep all superseded portions to its SOL Methodology for 12 months beyond the date of the change in that methodology and shall keep all documented comments on its SOL Methodology and associated responses for three years. In addition, entities found non-compliant shall keep information related to the non-compliance until found compliant.

The Compliance Monitor shall keep the last audit and all subsequent compliance records.

#### 1.4. Additional Compliance Information

The Planning Authority and Reliability Coordinator shall each make the following available for inspection during an on-site audit by the Compliance Monitor or within 15 business days of a request as part of an investigation upon complaint:

**1.4.1** SOL Methodology.

**1.4.2** Documented comments provided by a recipient of the SOL Methodology on its technical review of a SOL Methodology, and the associated responses.

**1.4.3** Superseded portions of its SOL Methodology that had been made within the past 12 months.

**1.4.4** Evidence that the SOL Methodology and any changes to the methodology that occurred within the past 12 months were issued to all required entities.

### 2. Levels of Non-Compliance (Does not apply to the Western Interconnection)

**2.1. Level 1:** There shall be a level one non-compliance if either of the following conditions exists:

**2.1.1** The SOL Methodology did not include a statement indicating that Facility Ratings shall not be exceeded.

**2.1.2** No evidence of responses to a recipient's comments on the SOL Methodology.

**2.2. Level 2:** The SOL Methodology did not include a requirement to address all of the elements in FAC-010 R4.

**2.3. Level 3:** There shall be a level three non-compliance if either of the following conditions exists:

**2.3.1** The SOL Methodology did not include a statement indicating that Facility Ratings shall not be exceeded **and** the methodology did not include a requirement for evaluation of system response to one of the three types of single Contingencies identified in FAC-010 R4.2.

**2.3.2** The SOL Methodology did not include a statement indicating that Facility Ratings shall not be exceeded **and** the methodology did not address two of the six required topics in FAC-010 R5.

**2.4. Level 4:** The SOL Methodology was not issued to all required entities.

**3. Levels of Non-Compliance for Western Interconnection:**

**3.1. Level 1:** The SOL Methodology did not include a statement indicating that Facility Ratings shall not be exceeded.

**3.2. Level 2:** The SOL Methodology did not include a requirement to address all of the elements in FAC-010 R4 and FAC-010 E1.

**3.3. Level 3:** There shall be a level three non-compliance if any of the following conditions exists:

**3.3.1** The SOL Methodology did not include a statement indicating that Facility Ratings shall not be exceeded and the methodology did not include evaluation of system response to one of the three types of single Contingencies identified in FAC-010 R4.2.

**3.3.2** The SOL Methodology did not include a statement indicating that Facility Ratings shall not be exceeded and the methodology did not include evaluation of system response to two of the seven types of multiple Contingencies identified in FAC-010 E1.1.

**3.3.3** The System Operating Limits Methodology did not include a statement indicating that Facility Ratings shall not be exceeded and the methodology did not address two of the six required topics in FAC-010 R5.

**3.4. Level 4:** The SOL Methodology was not issued to all required entities.

**E. Regional Differences**

**1.** The following Interconnection – Wide Regional Difference shall be applicable in the Western Interconnection:

**1.1.** As governed by the requirements of FAC-010, R4.5 shall require the evaluation of the following multiple Facility Contingencies when establishing SOLs:

**1.1.1** Simultaneous permanent phase to ground Faults on different phases of each of two adjacent transmission circuits on a multiple circuit tower, with Normal Clearing. If multiple circuit towers are used only for station entrance and exit purposes, and if they do not exceed five towers at each station, then this condition is an acceptable risk and therefore can be excluded.

**1.1.2** A permanent phase to ground Fault on any generator, transmission circuit, transformer, or bus section with Delayed Fault Clearing except for bus sectionalizing breakers or bus-tie breakers addressed in FAC-010 E1.1.7

**1.1.3** Simultaneous permanent loss of both poles of a direct current bipolar Facility without an alternating current Fault.

- 1.1.4 The failure of a circuit breaker associated with a Special Protection System to operate when required following: the loss of any element without a Fault; or a permanent phase to ground Fault, with Normal Clearing, on any transmission circuit, transformer or bus section.
- 1.1.5 A non-three phase Fault with Normal Clearing on common mode Contingency of two adjacent circuits on separate towers unless the event frequency is determined to be less than one in thirty years.
- 1.1.6 A common mode outage of two generating units connected to the same switchyard, not otherwise addressed by FAC-008.
- 1.1.7 The loss of multiple bus sections as a result of failure or delayed clearing of a bus tie or bus sectionalizing breaker to clear a permanent Phase to Ground Fault.
- 1.2. SOLs shall be established such that for multiple Facility Contingencies in FAC-010 E1.1.1 through FAC-010 E1.1.5 operation within the SOL shall provide system performance consistent with the following:
  - 1.2.1 All Facilities are operating within their applicable Post-Contingency thermal, frequency and voltage limits.
  - 1.2.2 Cascading Outages do not occur.
  - 1.2.3 Uncontrolled separation of the system does not occur.
  - 1.2.4 The system demonstrates transient, dynamic and voltage stability.
  - 1.2.5 Depending on system design and expected system impacts, the controlled interruption of electric supply to customers (Load shedding), the planned removal from service of certain generators, and/or the curtailment of contracted firm (non-recallable reserved) electric power transfers may be necessary to maintain the overall security of the interconnected transmission systems.
  - 1.2.6 Interruption of firm transfer, Load or system reconfiguration is permitted through manual or automatic control or protection actions.
  - 1.2.7 To prepare for the next Contingency, system adjustments are permitted, including changes to generation, Load and the transmission system topology when determining limits.
- 1.3. SOLs shall be established such that for multiple Facility Contingencies in FAC-010 E1.1.6 through FAC-010 E1.1.7 operation within the SOL shall provide system performance consistent with the following with respect to impacts on other systems:
  - 1.3.1 Cascading Outages do not occur.
- 1.4. The Western Interconnection may make changes (performance category adjustments) to the Contingencies required to be studied and/or the required responses to Contingencies for specific facilities based on actual system performance and robust design. Such changes will apply in determining SOLs.

**Version History**

Version	Date	Action	Change Tracking

*This section is maintained by the drafting team during the development of the standard and will be removed when the standard becomes effective.*

**Development Steps Completed:**

1. SAC approves SAR for posting (March 20, 2002)
2. Drafting Team posts Draft SAR for comment periods (April 2, 2002 – May 3, 2002) (September 24, 2002 – October 25, 2002) (December 13, 2002 – January 31, 2003)
3. SAC approves development of standard (February 27, 2003)
4. JIC assigns development of standard to NERC (March 21, 2003)
5. Drafting Team posts Drafts for comment (July 1, 2003 – August 29, 2003) (December 1, 2003 – January 21, 2004) (February 18, 2005 – April 3, 2005)
6. Drafting Team posts Implementation Plan for comment (June 1, 2005 – July 15, 2005)

**Description of Current Draft:**

The Drafting Team is posting Draft 5 for a 30-day pre-ballot review.

**Future Development Plan:**

**Anticipated Actions**

**Anticipated Date**

- |  |                               |
|--|-------------------------------|
| 1. Final versions of standards, V0 retirements/revisions and implementation plan posted for 30 day pre-ballot review | September 1- 30, 2005         |
| 2. First ballot  | October 1– 10, 2005           |
| 3. Drafting Team considers comments and makes any revisions indicated  | October 11 – October 20, 2005 |
| 4. Recirculation ballot  | October 21 – October 31, 2005 |
| 5. 30-day posting before board adoption  | October 1-30, 2005            |
| 6. Board adopts standard   | November 1, 2005              |
| 7. Effective date  | July 1, 2006                  |

### **Definitions of Terms Used in Standard**

*This section includes all newly defined or revised terms used in the proposed standard. Terms already defined in the Reliability Standards Glossary of Terms are not repeated here. New or revised definitions listed below become approved when the proposed standard is approved. When the standard becomes effective, these defined terms will be removed from the individual standard and added to the Glossary.*

**None introduced in this standard.**

## A. Introduction

1. **Title:** Establish and Communicate System Operating Limits
2. **Number:** FAC-011-1
3. **Purpose:** To ensure that System Operating Limits (SOLs) used in the reliable planning and operation of the Bulk Electric System (BES) are determined based on an established methodology or methodologies.
4. **Applicability**
  - 4.1. Reliability Coordinator
  - 4.2. Planning Authority
  - 4.3. Transmission Planner
  - 4.4. Transmission Operator
5. **Proposed Effective Date:** July 1, 2006

## B. Requirements

- R1. The Reliability Coordinator shall ensure that SOLs, including Interconnection Reliability Operating Limits (IROLs), for its Reliability Coordinator Area are established and that the SOLs (including Interconnection Reliability Operating Limits) are consistent with its SOL Methodology.
- R2. The Transmission Operator shall establish SOLs (as directed by its Reliability Coordinator) for its portion of the Reliability Coordinator Area that are consistent with its Reliability Coordinator's SOL Methodology.
- R3. The Planning Authority shall establish SOLs, including IROLs, for its Planning Authority Area that are consistent with its SOL Methodology.
- R4. The Transmission Planner shall establish SOLs, including IROLs, for its Transmission Planning Area that are consistent with its Planning Authority's SOL Methodology.
- R5. The Reliability Coordinator, Planning Authority and Transmission Planner shall each provide its SOLs and IROLs to those entities that have a reliability-related need for those limits and provide a written request that includes a schedule for delivery of those limits as follows:
  - R5.1 The Reliability Coordinator shall provide its SOLs (including the subset of SOLs that are IROLs) to adjacent Reliability Coordinators and Reliability Coordinators who indicate a reliability-related need for those limits, and to the Transmission Operators, Transmission Planners, Transmission Service Providers, and Planning Authorities within its Reliability Coordinator Area. For each IROL, the Reliability Coordinator shall provide the following supporting information:
    - R5.1.1 Identification and status of the associated Facility (or group of Facilities) that is (are) critical to the derivation of the IROL.
    - R5.1.2 The value of the IROL and its associated  $T_v$ .
    - R5.1.3 The associated Contingency(ies).
    - R5.1.4 The type of limitation represented by the IROL (e.g., voltage collapse, angular stability).

- R5.2** The Transmission Operator shall provide any SOLs it developed to its Reliability Coordinator and to the Transmission Service Providers that share its portion of the Reliability Coordinator Area.
- R5.3** The Planning Authority shall provide its SOLs (including the subset of SOLs that are IROLs) to adjacent Planning Authorities, and to Transmission Planners, Transmission Service Providers, Transmission Operators and Reliability Coordinators that work within its Planning Authority Area.
- R5.4** The Transmission Planner shall provide its SOLs (including the subset of SOLs that are IROLs) to its Planning Authority, Reliability Coordinators, Transmission Operators, and Transmission Service Providers that work within its Transmission Planning Area and to adjacent Transmission Planners.

### **C. Measures**

- M1.** The Reliability Coordinator, Planning Authority, Transmission Operator, and Transmission Planner shall each be able to demonstrate that it developed its SOLs (including the subset of SOLs that are IROLs) consistent with the applicable SOL Methodology.
- M2.** The Reliability Coordinator, Planning Authority, Transmission Operator, and Transmission Planner shall each have evidence that its SOLs (including the subset of SOLs that are IROLs) were supplied in accordance with schedules supplied by the requestors of such SOLs.

### **D. Compliance**

#### **1. Compliance Monitoring Process**

##### **1.1. Compliance Monitoring Responsibility**

Regional Reliability Organization

##### **1.2. Compliance Monitoring Period and Reset Timeframe**

The Reliability Coordinator, Planning Authority, Transmission Operator, and Transmission Planner shall each verify compliance through self-certification submitted to its Compliance Monitor annually. The Compliance Monitor may conduct a targeted audit once in each calendar year (January – December) and an investigation upon a complaint to assess performance.

The Performance-Reset Period shall be twelve months from the last finding of non-compliance.

##### **1.3. Data Retention**

The Reliability Coordinator, Planning Authority, Transmission Operator, and Transmission Planner shall each keep documentation for 12 months. In addition, entities found non-compliant shall keep information related to non-compliance until found compliant.

The Compliance Monitor shall keep the last audit and all subsequent compliance records.

##### **1.4. Additional Compliance Information**

The Reliability Coordinator, Planning Authority, Transmission Operator, and Transmission Planner shall each make the following available for inspection during a targeted audit by the Compliance Monitor or within 15 business days of a request as part of an investigation upon complaint:

###### **1.4.1 SOL Methodology(ies)**

1.4.2 SOLs, including the subset of SOLs that are IROLs and the IROL’s supporting information

1.4.3 Evidence that SOLs were distributed

1.4.4 Distribution schedules provided by entities that requested SOLs

**2. Levels of Non-Compliance**

2.1. Level 1: Not Applicable

2.2. Level 2: Not all SOLs were provided in accordance with their respective schedules.

2.3. Level 3: SOLs provided were not developed consistent with the SOL Methodology.

2.4. Level 4: No SOLs were provided in accordance with their respective schedules.

**E. Regional Differences**

None identified

**Version History**

Version	Date	Action	Change Tracking



## Standard Development Roadmap

*This section is maintained by the drafting team during the development of the standard and will be removed when the standard becomes effective.*

### Development Steps Completed:

1. SAC approves SAR for posting (March 20, 2002).
2. Drafting team posts draft SAR for comment periods (April 2, 2002–May 3, 2002) (September 24, 2002–October 25, 2002) (December 13, 2002–January 31, 2003).
3. SAC approves development of standard (February 27, 2003).
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6. Drafting team posts Implementation Plan for comment (June 1, 2005–July 15, 2005).

### Description of Current Draft:

The drafting team is posting draft 5 for a 30-day pre-ballot review.

### Future Development Plan:

#### Anticipated Actions

1. Final versions of standards, V0 retirements/revisions and implementation plan posted for 30-day pre-ballot review.
2. First ballot.
3. Drafting team considers comments and makes any revisions indicated.
4. Recirculation ballot.
5. Thirty-day posting before board adoption.
6. Board adopts standard.
7. Effective date.

#### Anticipated Date

September 1–30, 2005  
October 1–10, 2005  
October 11–October 20, 2005  
October 21–October 31, 2005  
October 1–30, 2005  
November 1, 2005  
May 1, 2006

### **Definitions of Terms Used in Standard**

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**No new terms introduced in this standard.**

## A. Introduction

1. **Title:** **Transfer Capability Methodology**
2. **Number:** FAC-012-1
3. **Purpose:** To ensure that Transfer Capabilities used in the reliable planning and operation of the Bulk Electric System (BES) are determined based on an established methodology or methodologies.
4. **Applicability**
  - 4.1. Reliability Coordinator required by its Regional Reliability Organization to establish inter-regional and intra-regional Transfer Capabilities
  - 4.2. Planning Authority required by its Regional Reliability Organization to establish inter-regional and intra-regional Transfer Capabilities
5. **Proposed Effective Date:** May 1, 2006

## B. Requirements

- R1. The Reliability Coordinator and Planning Authority shall each document its current methodology used for developing its inter-regional and intra-regional Transfer Capabilities (Transfer Capability Methodology). The Transfer Capability Methodology shall include all of the following:
  - R1.1. A statement that Transfer Capabilities shall respect all applicable System Operating Limits (SOLs).
  - R1.2. A definition stating whether the methodology is applicable to the planning horizon or the operating horizon.
  - R1.3. A description of how each of the following is addressed, including any reliability margins applied to reflect uncertainty with projected BES conditions:
    - R1.3.1. Transmission system topology
    - R1.3.2. System demand
    - R1.3.3. Generation dispatch
    - R1.3.4. Current and projected transmission uses
- R2. The Reliability Coordinator shall issue its Transfer Capability Methodology, and any changes to that methodology, prior to the effectiveness of such changes, to all of the following:
  - R2.1. Each Adjacent Reliability Coordinator and each Reliability Coordinator that indicated a reliability-related need for the methodology.
  - R2.2. Each Planning Authority and Transmission Planner that models any portion of the Reliability Coordinator's Reliability Coordinator Area.
  - R2.3. Each Transmission Operator that operates in the Reliability Coordinator Area.
- R3. The Planning Authority shall issue its Transfer Capability Methodology, and any changes to that methodology, prior to the effectiveness of such changes, to all of the following:
  - R3.1. Each Transmission Planner that works in the Planning Authority's Planning Authority Area.
  - R3.2. Each Adjacent Planning Authority and each Planning Authority that indicated a reliability-related need for the methodology.

**R3.3.** Each Reliability Coordinator and Transmission Operator that operates any portion of the Planning Authority's Planning Authority Area.

**R4.** If a recipient of the Transfer Capability Methodology provides documented technical comments on the methodology, the Reliability Coordinator or Planning Authority shall provide a documented response to that recipient within 45 calendar days of receipt of those comments. The response shall indicate whether a change will be made to the Transfer Capability Methodology and, if no change will be made to that Transfer Capability Methodology, the reason why.

### **C. Measures**

**M1.** The Planning Authority and Reliability Coordinator's methodology for determining Transfer Capabilities shall each include all of the items identified in FAC-012 Requirement 1.1 through Requirement 1.3.4.

**M2.** The Reliability Coordinator shall have evidence it issued its Transfer Capability Methodology in accordance with FAC-012 Requirement 2 through Requirement R2.3.

**M3.** The Planning Authority shall have evidence it issued its Transfer Capability Methodology in accordance with FAC-012 Requirement 3 through Requirement 3.3.

**M4.** If the recipient of the Transfer Capability Methodology provides documented comments on its technical review of that Transfer Capability Methodology, the Reliability Coordinator or Planning Authority that distributed that Transfer Capability Methodology shall have evidence that it provided a written response to that commenter in accordance with FAC-012 Requirement 4.

### **D. Compliance**

#### **1. Compliance Monitoring Process**

##### **1.1. Compliance Monitoring Responsibility**

Regional Reliability Organization

##### **1.2. Compliance Monitoring Period and Reset Timeframe**

Each Planning Authority and Reliability Coordinator shall self-certify its compliance to the Compliance Monitor at least once every three years. New Planning Authorities and Reliability Coordinators shall each demonstrate compliance through an on-site audit conducted by the Compliance Monitor within the first year that it commences operation. The Compliance Monitor shall also conduct an on-site audit once every nine years and an investigation upon complaint to assess performance.

The Performance-Reset Period shall be twelve months from the last finding of non-compliance.

##### **1.3. Data Retention**

The Planning Authority and Reliability Coordinator shall each keep all superseded portions to its Transfer Capability Methodology for 12 months beyond the date of the change in that methodology and shall keep all documented comments on the Transfer Capability Methodology and associated responses for three years. In addition, entities found non-compliant shall keep information related to the non-compliance until found compliant.

The Compliance Monitor shall keep the last audit and all subsequent compliance records.

**1.4. Additional Compliance Information**

The Planning Authority and Reliability Coordinator shall each make the following available for inspection during an on-site audit by the Compliance Monitor or within 15 business days of a request as part of an investigation upon complaint:

- 1.4.1** Transfer Capability Methodology.
- 1.4.2** Superseded portions of its Transfer Capability Methodology that have been made within the past 12 months.
- 1.4.3** Documented comments provided by a recipient of the Transfer Capability Methodology on its technical review of the Transfer Capability Methodology, and the associated responses.

**2. Levels of Non-Compliance**

- 2.1. Level 1:** There shall be a level one non-compliance if either of the following conditions exists:
  - 2.1.1** The Transfer Capability Methodology is missing any one of the required statements or descriptions identified in FAC-012 R1.1 through R1.3.4.
  - 2.1.2** No evidence of responses to a recipient’s comments on the Transfer Capability Methodology.
- 2.2. Level 2:** The Transfer Capability Methodology is missing a combination of two of the required statements or descriptions identified in FAC-012 R1.1 through R1.3.4, or a combination thereof.
- 2.3. Level 3:** The Transfer Capability Methodology is missing a combination of three or more of the required statements or descriptions identified in FAC-012 R1.1 through R1.3.4.
- 2.4. Level 4:** The Transfer Capability Methodology was not issued to all of the required entities.

**E. Regional Differences**

None identified

**Version History**

Version	Date	Action	Change Tracking
1	08/01/05	1. Lower cased the word “draft” and “drafting team” where appropriate. 2. Changed incorrect use of certain hyphens (-) to “en dash” (–) and “em dash (—).” 3. Changed “Timeframe” to “Time Frame” in item D, 1.2. 4. Added periods and removed extra spaces where appropriate.	01/20/06

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## Standard Development Roadmap

*This section is maintained by the drafting team during the development of the standard and will be removed when the standard becomes effective.*

### Development Steps Completed:

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2. Drafting team posts draft SAR for comment periods (April 2, 2002–May 3, 2002) (September 24, 2002–October 25, 2002) (December 13, 2002–January 31, 2003).
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6. Drafting team posts Implementation Plan for comment (June 1–July 15, 2005).

### Description of Current Draft:

The drafting team is posting draft 5 for a 30-day pre-ballot review.

### Future Development Plan:

#### Anticipated Actions

1. Final versions of standards, V0 retirements/revisions and implementation plan posted for 30 day pre-ballot review.
2. First ballot.
3. Drafting Team considers comments and makes any revisions indicated.
4. Recirculation ballot.
5. Thirty-day posting before board adoption.
6. Board adopts standard.
7. Effective date.

#### Anticipated Date

September 1–30, 2005  
October 1–10, 2005  
October 11–October 20, 2005  
October 21–October 31, 2005  
October 1–30, 2005  
November 1, 2005  
July 1, 2006

### **Definitions of Terms Used in Standard**

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**No new terms introduced in this standard.**



## A. Introduction

1. **Title:** Establish and Communicate Transfer Capabilities
2. **Number:** FAC-013-1
3. **Purpose:** To ensure that Transfer Capabilities used in the reliable planning and operation of the Bulk Electric System (BES) are determined based on an established methodology or methodologies.
4. **Applicability**
  - 4.1. Reliability Coordinator required by its Regional Reliability Organization to establish inter-regional and intra-regional Transfer Capabilities.
  - 4.2. Planning Authority required by its Regional Reliability Organization to establish inter-regional and intra-regional Transfer Capabilities.
5. **Proposed Effective Date:** July 1, 2006

## B. Requirements

- R1. The Reliability Coordinator and Planning Authority shall each establish a set of inter-regional and intra-regional Transfer Capabilities that is consistent with its current Transfer Capability Methodology.
- R2. The Reliability Coordinator and Planning Authority shall each provide its inter-regional and intra-regional Transfer Capabilities to those entities that have a reliability-related need for such Transfer Capabilities and make a written request that includes a schedule for delivery of such Transfer Capabilities as follows:
  - R2.1. The Reliability Coordinator shall provide its Transfer Capabilities to its associated Regional Reliability Organization(s), to its adjacent Reliability Coordinators, and to the Transmission Operators, Transmission Service Providers and Planning Authorities that work in its Reliability Coordinator Area.
  - R2.2. The Planning Authority shall provide its Transfer Capabilities to its associated Reliability Coordinator(s) and Regional Reliability Organization(s), and to the Transmission Planners and Transmission Service Provider(s) that work in its Planning Authority Area.

## C. Measures

- M1. The Reliability Coordinator and Planning Authority shall each be able to demonstrate that it developed its Transfer Capabilities consistent with its Transfer Capability Methodology.
- M2. The Reliability Coordinator and Planning Authority shall each have evidence that it provided its Transfer Capabilities in accordance with schedules supplied by the requestors of such Transfer Capabilities.

## D. Compliance

1. **Compliance Monitoring Process**
  - 1.1. **Compliance Monitoring Responsibility**  
Regional Reliability Organization
  - 1.2. **Compliance Monitoring Period and Reset Time Frame**

The Reliability Coordinator and Planning Authority shall each verify compliance through self-certification submitted to the Compliance Monitor annually. The Compliance

Monitor may conduct a targeted audit once in each calendar year (January – December) and an investigation upon a complaint to assess compliance.

The Performance-Reset Period shall be twelve months from the last finding of non-compliance.

**1.3. Data Retention**

The Planning Authority and Reliability Coordinator shall each keep documentation for 12 months. In addition, entities found non-compliant shall keep information related to the non-compliance until found compliant.

The Compliance Monitor shall keep the last audit and all subsequent compliance records.

**1.4. Additional Compliance Information**

The Planning Authority and Reliability Coordinator shall each make the following available for inspection during a targeted audit by the Compliance Monitor or within 15 business days of a request as part of an investigation upon complaint:

**1.4.1** Transfer Capability Methodology.

**1.4.2** Inter-regional and Intra-regional Transfer Capabilities.

**1.4.3** Evidence that Transfer Capabilities were distributed.

**1.4.4** Distribution schedules provided by entities that requested Transfer Capabilities.

**2. Levels of Non-Compliance**

**2.1. Level 1:** Not applicable.

**2.2. Level 2:** Not all requested Transfer Capabilities were provided in accordance with their respective schedules.

**2.3. Level 3:** Transfer Capabilities were not developed consistent with the Transfer Capability Methodology.

**2.4. Level 4:** No requested Transfer Capabilities were provided in accordance with their respective schedules.

**E. Regional Differences**

None identified.

**Version History**

Version	Date	Action	Change Tracking
1	08/01/05	1. Changed incorrect use of certain hyphens (-) to “en dash (–).” 2. Lower cased the word “draft” and “drafting team” where appropriate. 3. Changed Anticipated Action #5, page 1, from “30-day” to “Thirty-day.” 4. Added periods or removed extra spaces where appropriate.	01/20/05
