Standard Authorization Request Form

Title of Proposed Standard	Determine Facility Ratings System Operating Limits and Transfer Capability
Request Date	March 20, 2002

SAR Requestor Information

Name	Jim Byrd (Wally Johnson as substitute)	**SAR Type** (Check box for one of these selections.)	
Company	Pepco	☒	New Standard
Telephone	301-469-5252	☐	Revision to Existing Standard
Fax		☐	Withdrawal of Existing Standard [1]
E-mail	wajohnson@pepco.com	☐	Emergency Action

Purpose/Industry Need (Provide one or two sentences.)

Determine facility ratings, system operating limits, and transfer capabilities necessary to plan and operate the bulk electric system such that cascading outages, uncontrolled system separation, and voltage and transient instability are avoided.

Brief Description

Facility Ratings:

Requirements shall be established for requiring the determination of facility ratings (including component equipment) needed to determine system operating limits and transfer capabilities that are applied to avoid cascading outages, uncontrolled separation and voltage and transient instability. Facilities included in the standard shall be those that affect bulk electric system reliability such as substation, generation, and transmission equipment. The facility ratings to be addressed in the standard shall include thermal limits, voltage limits, and other limits as applicable to the equipment.

System Operating Limits and Transfer Capabilities:

Requirements shall be established for determining system operating limits and transfer capabilities that shall respect facility ratings and predefined system reliability performance criteria such as voltage limits, frequency limits, power transfer limits (both thermal and stability).

[1]Requests to withdraw an existing Organization Standard only require that this page be completed.

Reliability Functions

The Standard will Apply to the Following Functions *(Check box for each one that applies.)*		
☒	Reliability Authority	Ensures the reliability of the bulk transmission system within its Reliability Authority area. This is the highest reliability authority.
☐	Balancing Authority	Integrates resource plans ahead of time, and maintains load-interchange-resource balance within its metered boundary and supports system frequency in real time
☐	Interchange Authority	Authorizes valid and balanced Interchange Schedules
☒	Planning Authority	Plans the bulk electric system
☐	Transmission Service Provider	Provides transmission services to qualified market participants under applicable transmission service agreements
☒	Transmission Owner	Owns transmission facilities
☒	Transmission Operator	Operates and maintains the transmission facilities, and executes switching orders
☐	Distribution Provider	Provides and operates the “wires” between the transmission system and the customer
☒	Generator	Owns and operates generation unit(s) or runs a market for generation products that performs the functions of supplying energy and Interconnected Operations Services
☐	Purchasing-Selling Entity	The function of purchasing or selling energy, capacity and all necessary Interconnected Operations Services as required
☐	Load-Serving Entity	Secures energy and transmission (and related generation services) to serve the end user

Reliability and Market Interface Principles

Applicable Reliability Principles *(Check box for all that apply.)*	
☒	1. Interconnected bulk electric systems shall be planned and operated in a coordinated manner to perform reliably under normal and abnormal conditions as defined in the NERC Standards.
☒	2. The frequency and voltage of interconnected bulk electric systems shall be controlled within defined limits through the balancing of real and reactive power supply and demand.
☒	3. Information necessary for the planning and operation of interconnected bulk electric systems shall be made available to those entities responsible for planning and operating the systems reliably.
☐	4. Plans for emergency operation and system restoration of interconnected bulk electric systems shall be developed, coordinated, maintained and implemented.
☐	5. Facilities for communication, monitoring and control shall be provided, used and maintained for the reliability of interconnected bulk electric systems.
☐	6. Personnel responsible for planning and operating interconnected bulk electric systems shall be trained, qualified and have the responsibility and authority to implement actions.
☐	7. The security of the interconnected bulk electric systems shall be assessed, monitored and maintained on a wide area basis.
Does the proposed Standard comply with all of the following Market Interface Principles? *(Select 'yes' or 'no' from the drop-down box.)*	
1. The planning and operation of bulk electric systems shall recognize that reliability is an essential requirement of a robust North American economy. Yes	
2. An Organization Standard shall not give any market participant an unfair competitive advantage. Yes	
3. An Organization Standard shall neither mandate nor prohibit any specific market structure. Yes	
4. An Organization Standard shall not preclude market solutions to achieving compliance with that Standard. Yes	
5. An Organization Standard shall not require the public disclosure of commercially sensitive information. All market participants shall have equal opportunity to access commercially non-sensitive information that is required for compliance with reliability standards. Yes	

Detailed Description

This standard will apply to all transmission and generation facilities in the bulk electric system. This standard will require that reliability margins be considered in the determination of transfer capability and system operating limits where appropriate.

This standard does not address operating reserve requirements or the control of unscheduled flows; these issues are addressed in other standards.

Reliable operation of the bulk power system requires quantification of the ability of the bulk power system to safely and reliably transmit electric power. Therefore, detailed knowledge of equipment ratings and facility ratings for all of the components in the power system is required to determine the maximum permissible power flows through a facility (or set of facilities), and to determine the limits to power transfers while operating according to applicable reliability criteria. Appropriate equipment ratings, system operating limits and transfer capabilities form the basis for the proper planning of the system to ensure its reliable operation.

In developing this SAR the following understanding of terms was used:

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

- Facility – a set of electrical equipment that operate as a single bulk power system element (e.g., a line, a generating unit, a shunt compensator)

- Facility Rating – the maximum voltage, current, real or reactive power flow through a facility that would not violate an applicable rating of any equipment comprising the facility

- System Operating Limit – the maximum or minimum permissible loading on a facility or a limited group of facilities (interface) without violating applicable facility ratings and reliability criteria, as determined through system studies and/or operational experience. (Stability and voltage limits will be reflected as a permissible loading level).

- Transfer Capability – measure of the ability of the interconnected electric system to reliably move or transfer electric power from one area to another over all transmission lines (or paths) between those areas under specified system conditions. (The determination of transfer capability must respect all applicable system operating limits).

This Standard requires that limits be determined to ensure the reliable planning and operation of the bulk electric system.

This standard shall include requirements for the following:

Equipment Ratings

The ultimate liabilities and responsibilities for equipment ratings remain with the owners of the equipment (i.e. transmission owners and generation owners). Individual pieces of equipment will have ratings established by the owners. In establishing the ratings, owners should consider items such as: other industry standards (e.g., IEEE, ANSI, CSA), equipment warranties, the age of equipment, the economic lifetime of the equipment, the climatic conditions, prior problems with the equipment and maintenance condition. Each equipment rating must be applied consistently in reliability studies and system operations. Reliability authorities, transmission operators and planning authorities must respect equipment ratings determined by generator and transmission owners in planning and operating the bulk electric system.

Facility Ratings

Facility Ratings shall respect the equipment ratings of each piece of equipment that forms the facility (for example in the case of a transmission line: transformer, bus conductor, CTs, PTs, protection, risers, line, conductor, wave traps, filters, reactors, breakers, and line disconnects).

The standard will state that equipment owners must make applicable facility ratings (including steady-state and transient) public in a pre-defined form (including the conditions under which the ratings apply). These ratings will be respected in the development of transfer capabilities and system operating limits.

Transmission owners and generator owners determine their respective facility ratings and must ensure that this information is supplied to reliability authorities, transmission operators and planning authorities in a timely manner.

This Standard does not require the development of a standard methodology for the calculation of equipment or facility ratings, nor does it require that the methodology used by the facility owner be documented. Documentation of the methodology used to develop each rating may be of benefit to the owners and those using the ratings for model development but such documentation need not be written or shared because it does not materially impact system reliability.

System Operating Limits

System operating limits must be established by reliability authorities and planning authorities to define the maximum reliable loadings for facilities within the bulk power system. System operating limits must be provided to those responsible for the reliable operation of the system in a timely manner (as determined by the reliability authority). Such limits will be monitored and respected by those responsible for system operation See SAR: Operate Within Transmission System Limits - Monitor and Assess Short-term Reliability.

The determination of system operating limits must address:

- all applicable (such as seasonal, normal, emergency, short term etc) equipment ratings and facility ratings
- the applicable Contingency Criteria
- accuracy of system models and tolerances in system protection
- special protection systems or remedial action plans (see SAR “Assess Transmission Future Needs and Develop Transmission Plans”)
- Transmission system configuration, generation dispatch and load level
- assumptions implicit in the limits developed,

System operating limits, which will be applicable to flows through a specific transmission facility or interface in the system, must then ensure that the following do not occur:

- uncontrolled separation within the system
- cascading outages
- voltage and transient instability
- violation of applicable reliability performance criteria (as specified in Table 1: Transmission System Standards – Normal and Contingency Conditions, page 13 of the current NERC Planning

Standards. ftp://www.nerc.com/pub/sys/all_updl/pc/pss/ps9709.pdf)

Depending upon local system conditions, a system operating limit may be a relatively static quantity (indicating relative independence of the conditions on other facilities) or may be expressed in nomograms indicating dependencies on other interfaces or transmission facilities, prior-outage conditions and other system conditions.

Transfer Capability

The determination of transfer capability must respect system operating limits. Planned use of the system shall not exceed the transfer capability.

This standard does not specifically address available transfer capability (ATC), or its margins. (Please see comment form issued with this revised SAR, which solicits industry input on this assumption).

The reliability authority, planning authority, and the transmission owner may calculate transfer capabilities in the fulfillment of their respective responsibilities. The determination of transfer capability must consider transmission owner and third party system topology, system demand, generation dispatch, current and projected transmission uses, and system limitations.

This standard will address:

- the need for timely supply of accurate and complete equipment and facility rating information to the users of this information,
- the documentation of and application of procedures for the development of system models,
- the determination and delivery of system operating limits to system operators
- documentation of the determination of transfer capability values, including risk evaluations, and margin evaluations
- the responsibilities of the various entities involved, for each measure developed.

Measures might include:

- Response times or delivery dates relative to need (raw data, model development, study conduct).
- Existence of procedures for model development
- Existence of documentation of a process for determining and delivering system operating limits and transfer capability to system operators

Related Standards

Standard No.	Explanation

Related SARs

SAR ID	Explanation
OPER_WITHN_LMTS_01_02	The Operate Within Transmission System Limits - Monitor and Assess

	Short-term Reliability SAR is developed on the assumption that facility ratings and operating limits have been established.
TRNS_NDS_&_PLNS_01_01	The Assess Transmission Future Needs and Develop Transmission Plans SAR will use some of the data collected within this SAR.
COORD_OPERATONS_01_01	The Coordinate Operations SAR will include requirements that Transmission Operators share operating limits with other Transmission Operators.

Regional Differences

Region	Explanation
ECAR	
ERCOT	
FRCC	
MAAC	
MAIN	
MAPP	
NPCC	
SERC	
SPP	
WSCC	

Implementation Plan

Description *(Provide plans for the implementation of the proposed standard, including any known systems or training requirements.)*
(To be developed)
Proposed Implementation: *(To be developed)*

SAR Drafting Team	
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