

## Standard Development Timeline

This section is maintained by the drafting team during the development of the standard and will be removed when the standard is adopted by the NERC Board of Trustees (Board).

### Description of Current Draft

TPL-008-1 is posted for a 45-day formal comment and initial ballot.

Completed Actions	Date
Standards Committee approved Standard Authorization Request (SAR) for posting	July 19, 2023
SAR posted for comment	August 8 – September 27, 2023

Anticipated Actions	Date
45-day formal comment period with initial ballot	March 20 – May 3, 2024
45-day formal comment period with additional ballot	June 2024
45-day formal comment period with additional ballot	September 2024
10-day final ballot	November 2024
Board adoption	December 2024

## **New or Modified Term(s) Used in NERC Reliability Standards**

This section includes all new or modified terms used in the proposed standard that will be included in the *Glossary of Terms Used in NERC Reliability Standards* upon applicable regulatory approval. Terms used in the proposed standard that are already defined and are not being modified can be found in the *Glossary of Terms Used in NERC Reliability Standards*. The new or revised terms listed below will be presented for approval with the proposed standard. Upon Board adoption, this section will be removed.

### **Term(s):**

**Extreme Temperature Assessment** – Documented evaluation of future Transmission System performance for extreme heat and extreme cold temperature benchmark events.

## A. Introduction

1. **Title:** Transmission System Planning Performance Requirements for Extreme Temperature Events
2. **Number:** TPL-008-1
3. **Purpose:** Establish requirements for Transmission system planning performance for extreme heat and extreme cold temperature events
4. **Applicability:**
  - 4.1. **Functional Entities:**
    - 4.1.1. Transmission Planner
    - 4.1.2. Planning Coordinator
5. **Effective Date:** See Implementation Plan for Project 2023-07.

## B. Requirements and Measures

- R1.** Each Planning Coordinator, in conjunction with its Transmission Planner(s), shall determine and identify each entity’s individual and joint responsibilities for performing the studies needed to complete the Extreme Temperature Assessment. *[Violation Risk Factor: Lower] [Time Horizon: Long-term Planning]*
- M1.** Each Planning Coordinator, in conjunction with its Transmission Planner(s), shall provide documentation of each entity’s individual and joint responsibilities, such as meeting minutes, agreements, copies of procedures or protocols in effect between entities or between departments of a vertically integrated system, or email correspondence that identifies an agreement has been reached on individual and joint responsibilities for performing the studies needed to complete the Extreme Temperature Assessment.
- R2.** Each responsible entity, as identified in Requirement R1, shall select one extreme heat benchmark event and one extreme cold benchmark event, from the approved benchmark library maintained by the Electric Reliability Organization (ERO), for performing the Extreme Temperature Assessment. *[Violation Risk Factor: High] [Time Horizon: Long-term Planning]*
- M2.** Each responsible entity, as identified in Requirement R1, shall have evidence in either electronic or hard copy format of its selected extreme heat benchmark event and extreme cold benchmark event for performing the Extreme Temperature Assessment.
- R3.** Each Planning Coordinator shall develop and implement a process for coordinating the development of benchmark planning cases among impacted Planning Coordinator(s), Transmission Planner(s), and other designated study entities based on the selected benchmark events as identified in Requirement R2. This process shall: *[Violation Risk Factor: Medium] [Time Horizon: Long-term Planning]*
- 3.1.** Define the planning study area boundary based on the selected benchmark events.
- 3.2.** Modify the benchmark planning cases to include seasonal and temperature dependent adjustment for Load, generation, Transmission, and transfers which represents the selected benchmark events.
- M3.** Each Planning Coordinator shall provide dated evidence of a process for coordinating the development of benchmark planning cases among impacted Planning Coordinators, and Transmission Planner(s) as specified in Requirement R3. Acceptable evidence may include, but is not limited to, the following dated documentation (electronic or hardcopy format): records defining the planning study area boundary based on the selected benchmark events and modifications to the benchmark planning cases that include seasonal and temperature dependent adjustment for Load, generation, Transmission, and transfers which represent the selected benchmark events.

- R4.** Each responsible entity, as identified in Requirement R1, shall develop and maintain System models within its planning area for performing the Extreme Temperature Assessment. The System models shall use data consistent with that provided in accordance with the MOD-032 standard, supplemented by other sources as needed, and shall represent projected System conditions based on the selected benchmark events as identified in Requirement R2. *[Violation Risk Factor: High] [Time Horizon: Long-term Planning]*
- M4.** Each responsible entity, as identified in Requirement R1, shall have evidence in either electronic or hard copy format that it developed and maintained System models of the responsible entity’s planning area for performing the Extreme Temperature Assessment.
- R5.** Each responsible entity, as identified in Requirement R1, shall have criteria for acceptable System steady state voltage limits and post-Contingency voltage deviations for performing the Extreme Temperature Assessment in accordance with Requirement R3. *[Violation Risk Factor: High] [Time Horizon: Long-term Planning]*
- M5.** Each responsible entity, as identified in Requirement R1, shall provide dated evidence such as electronic or hard copies of the documentation specifying the criteria for acceptable System steady state voltage limits and post-Contingency voltage deviations for performing the Extreme Temperature Assessment in accordance with Requirement R5.
- R6.** Each responsible entity, as identified in Requirement R1, shall define and document the criteria or methodology used in the Extreme Temperature Assessment analysis to identify instability, uncontrolled separation, or Cascading. *[Violation Risk Factor: High] [Time Horizon: Long-term Planning]*
- M6.** Each responsible entity, as identified in Requirement R1, shall provide dated evidence such as electronic or hard copy documentation of the defined and documented criteria or methodology used to identify instability, uncontrolled separation, or Cascading used in the Extreme Temperature Assessment analysis in accordance with Requirement R6.
- R7.** Each responsible entity, as identified in Requirement R1, shall identify Contingencies used in performing the Extreme Temperature Assessment for each of the event categories in Table 1 that are expected to produce more severe System impacts within its planning area. The rationale for those Contingencies selected for evaluation shall be available as supporting information. *[Violation Risk Factor: High] [Time Horizon: Long-term Planning]*
- M7.** Each responsible entity, as identified in Requirement R1, shall provide dated evidence such as electronic or hard copy documentation that it has identified Contingencies for performing the Extreme Temperature Assessment for each of the event categories in Table 1 that are expected to produce more severe System impacts within its planning

area and the supporting rationale, in accordance with Requirement R7, such as electronic or hard copies of documents identifying the Contingencies with supporting rationale.

- R8.** Each responsible entity, as identified in Requirement R1, shall complete an Extreme Temperature Assessment of the Long-Term Transmission Planning Horizon at least once every five calendar years, using the benchmark planning cases and the System models identified in Requirement R3 and R4, and the Contingencies identified in Requirement R7 for each of the event categories in Table 1, and document assumptions and results of the steady state and stability analyses. The Extreme Temperature Assessment shall include the following. *[Violation Risk Factor: High]*  
*[Time Horizon: Long-term Planning]*
- 8.1.** Assessment of the benchmark planning cases developed under Requirement R4, for one of the years in the Long-Term Transmission Planning Horizon. The rationale for the year selected for evaluation shall be available as supporting information.
- 8.2.** Sensitivity analysis to demonstrate the impact of changes to the basic assumptions used in the model. To accomplish this, the sensitivity analysis in the Extreme Temperature Assessment shall include, at a minimum, changes to one of the following conditions:
- Generation;
  - Real and reactive forecasted Load; or
  - Transfers
- M8.** Each responsible entity, as identified in Requirement R1, shall provide dated evidence that it performed an Extreme Temperature Assessment, such as electronic or hard copies of the assessment, meeting all the requirements in Requirement R8.
- R9.** Each responsible entity, as identified in Requirement R1, shall develop a Corrective Action Plan(s) (CAPs) when the benchmark planning case study results indicate the System is unable to meet performance requirements for Table 1 P0 or P1 Contingencies. The responsible entities shall share their CAPs with, and solicit feedback from, applicable regulatory authorities or governing bodies responsible for retail electric service issues. In addition, where Load shed is allowed as an element of a CAP for the Table 1 P1 Contingency, the responsible entity shall document the alternative(s) considered, as mentioned in Requirement R10, and notify the applicable regulatory authorities or governing bodies responsible for retail electric service issues. Revisions to the CAP(s) are allowed in subsequent Extreme Temperature Assessments, but the planned System shall continue to meet the performance requirements.  
*[Violation Risk Factor: High]* *[Time Horizon: Long-term Planning]*

- M9.** Each responsible entity, as identified in Requirement R1, shall provide dated evidence such as electronic or hard copy documentation of a CAP, including any revision history, when the benchmark planning case study results indicate the System is unable to meet performance requirements for the Table 1 P0 or P1 Contingencies in accordance with Requirement R9.
- R10.** Each responsible entity, as identified in Requirement R1, shall evaluate and document possible actions designed to reduce the likelihood or mitigate the consequences and adverse impacts when the benchmark planning case study results indicate the System could result in instability, uncontrolled separation, or Cascading for the Table 1 P2, P4, P5, and P7 Contingencies. *[Violation Risk Factor: Lower] [Time Horizon: Long-term Planning]*
- M10.** Each responsible entity, as identified in Requirement R1, shall provide the dated evidence that it evaluated and documented possible actions designed to reduce the likelihood or mitigate the consequences and adverse impacts when the benchmark planning case study results indicate the System could result in instability, uncontrolled separation, or Cascading for the Table 1 P2, P4, P5, and P7 Contingencies in accordance with Requirement R10, such as electronic or hard copies of the assessment detailing such actions.
- R11.** Each responsible entity, as identified in Requirement R1, shall provide its Extreme Temperature Assessment results within 60 calendar days of a request to any functional entity that has a reliability related need and submits a written request for the information. *[Violation Risk Factor: Medium] [Time Horizon: Long-term Planning]*
- M11.** Each responsible entity, as identified in Requirement R1, shall provide dated evidence, such as email notices, documentation of updated web pages, postal receipts showing recipient; or a demonstration of a public posting that it provided its Extreme Temperature Assessment to any functional entity who has a reliability need within 60 calendar days of a written request.

## C. Compliance

### 1. Compliance Monitoring Process

**1.1. Compliance Enforcement Authority:** “Compliance Enforcement Authority” means NERC or the Regional Entity, or any entity as otherwise designated by an Applicable Governmental Authority, in their respective roles of monitoring and/or enforcing compliance with mandatory and enforceable Reliability Standards in their respective jurisdictions.

**1.2. Evidence Retention:** The following evidence retention period(s) identify the period of time an entity is required to retain specific evidence to demonstrate compliance. For instances where the evidence retention period specified below is shorter than the time since the last audit, the Compliance Enforcement Authority may ask an entity to provide other evidence to show that it was compliant for the full-time period since the last audit.

The applicable entity shall keep data or evidence to show compliance as identified below unless directed by its Compliance Enforcement Authority to retain specific evidence for a longer period of time as part of an investigation.

- Each responsible entity shall retain evidence of compliance with each requirement in this standard for five calendar years or one complete Extreme Temperature Assessment cycle, whichever is longer.

**1.3. Compliance Monitoring and Enforcement Program:** As defined in the NERC Rules of Procedure, “Compliance Monitoring and Enforcement Program” refers to the identification of the processes that will be used to evaluate data or information for the purpose of assessing performance or outcomes with the associated Reliability Standard.



**Table 1: Contingencies and Performance Criteria**

Event	P0	P1	P2	P4	P5	P7
Facility Voltage Level of Contingency	Applicable to: <ul style="list-style-type: none"> <li>BES level 200 kV and above</li> <li>Any common structure that includes a Facility 200kV and above</li> </ul> Reference Voltages: <ul style="list-style-type: none"> <li>Non-generator step up transformer outage events, the reference voltage applies to the low-side winding.</li> <li>Generator and generator step-up transformer outage events, the reference voltage applies to the BES connected voltage (high-side of the step-up transformer).</li> </ul>					
Steady State Performance Criteria	<ul style="list-style-type: none"> <li>Applicable Facility Ratings shall not be exceeded.</li> <li>System steady state voltages shall be within acceptable limits as defined in Requirement R5.</li> </ul>	<ul style="list-style-type: none"> <li>Applicable Facility ratings shall not be exceeded</li> <li>System steady state voltages shall be within acceptable limits as defined in Requirement R5.</li> </ul>	Evaluation for uncontrolled separation or Cascading, as defined in Requirement R6.			
Stability Performance Criteria	Initialization without oscillation	Instability, uncontrolled separation, or Cascading, as defined in Requirement R6, shall not occur.	Evaluation for instability, uncontrolled separation, or Cascading, as defined in Requirement R6.			
Corrective Action Plan Required	Yes (See Requirement R9)	Yes (See Requirement R9)	No (See Requirement R10)			
Non-Consequential Load Loss Allowed	No (See Requirement R9)	Yes (See Requirement R9)	Yes			

**Table 1: Contingencies and Performance Criteria**

Category	Initial Condition	Event	Fault Type <sup>1</sup>
<b>P0</b> No Contingency	Normal System	None	N/A
<b>P1</b> Single Contingency	Normal System	Loss of one of the following: 1. Generator 2. Transmission Circuit 3. Transformer 4. Shunt Device <sup>2</sup>	3∅
		5. Single Pole of a DC line	SLG
<b>P2</b> Single Contingency	Normal System	1. Opening of a line section w/o a fault <sup>3</sup>	N/A
		2. Bus Section Fault	SLG
		3. Internal Breaker Fault <sup>4</sup> (non-Bus-tie Breaker)	SLG
		4. Internal Breaker Fault (Bus-tie Breaker) <sup>4</sup>	SLG

**Table 1: Contingencies and Performance Criteria**

Category	Initial Condition	Event	Fault Type <sup>1</sup>
<b>P4</b> Multiple Contingency <i>(Fault plus stuck breaker<sup>10</sup>)</i>	Normal System	Loss of multiple elements caused by a stuck breaker <sup>5</sup> (non-Bus-tie Breaker) attempting to clear a Fault on one of the following: <ol style="list-style-type: none"> <li>1. Generator</li> <li>2. Transmission Circuit</li> <li>3. Transformer</li> <li>4. Shunt Device<sup>2</sup></li> <li>5. Bus Section</li> </ol>	SLG
		6. Loss of multiple elements caused by a stuck breaker <sup>5</sup> (Bus-tie Breaker) attempting to clear a Fault on the associated bus	SLG
<b>P5</b> Multiple Contingency <i>(Fault plus non-redundant component of a Protection System failure to operate)</i>	Normal System	Delayed Fault Clearing due to the failure of a non-redundant component of a Protection System <sup>7</sup> protecting the Faulted element to operate as designed, for one of the following: <ol style="list-style-type: none"> <li>1. Generator</li> <li>2. Transmission Circuit</li> <li>3. Transformer</li> <li>4. Shunt Device<sup>2</sup></li> <li>5. Bus Section</li> </ol>	
<b>P7</b> Multiple Contingency <i>(Common Structure)</i>	Normal System	The loss of: <ol style="list-style-type: none"> <li>1. Any two adjacent (vertically or horizontally) circuits on common structure <sup>6</sup></li> <li>2. Loss of a bipolar DC line</li> </ol>	SLG

**Table 1 – Steady State & Stability Performance Footnotes  
(Planning Events and Extreme Events)**

1. Unless specified otherwise, simulate Normal Clearing of faults. Single line to ground (SLG) or three-phase (3 $\emptyset$ ) are the fault types that must be evaluated in Stability simulations for the event described. A 3 $\emptyset$  or a double line to ground fault study indicating the criteria are being met is sufficient evidence that a SLG condition would also meet the criteria.
2. Requirements which are applicable to shunt devices also apply to FACTS devices that are connected to ground.
3. Opening one end of a line section without a fault on a normally networked Transmission circuit such that the line is possibly serving Load radial from a single source point.
4. An internal breaker fault means a breaker failing internally, thus creating a System fault which must be cleared by protection on both sides of the breaker.
5. A stuck breaker means that for a gang-operated breaker, all three phases of the breaker have remained closed. For an independent pole operated (IPO) or an independent pole tripping (IPT) breaker, only one pole is assumed to remain closed. A stuck breaker results in Delayed Fault Clearing.
6. Excludes circuits that share a common structure (Planning event P7) for one mile or less.
7. For purposes of this standard, non-redundant components of a Protection System to consider are as follows:
  - a. A single protective relay which responds to electrical quantities, without an alternative (which may or may not respond to electrical quantities) that provides comparable Normal Clearing times;
  - b. A single communications system associated with protective functions, necessary for correct operation of a communication-aided protection scheme required for Normal Clearing (an exception is a single communications system that is both monitored and reported at a Control Center);
  - c. A single station dc supply associated with protective functions required for Normal Clearing (an exception is a single station dc supply that is both monitored and reported at a Control Center for both low voltage and open circuit);
  - d. A single control circuitry (including auxiliary relays and lockout relays) associated with protective functions, from the dc supply through and including the trip coil(s) of the circuit breakers or other interrupting devices, required for Normal Clearing (the trip coil may be excluded if it is both monitored and reported at a Control Center).

### Violation Severity Levels

R #	Violation Severity Levels			
	Lower VSL	Moderate VSL	High VSL	Severe VSL
<b>R1.</b>	N/A	N/A	N/A	The Planning Coordinator, in conjunction with its Transmission Planner(s), failed to determine and identify individual and joint responsibilities for performing the required studies for the Extreme Temperature Assessment.
<b>R2.</b>	N/A	N/A	The responsible entity did not select an extreme heat benchmark event or extreme cold benchmark event from the ERO approved benchmark library.	The responsible entity did not select an extreme heat benchmark event and extreme cold benchmark event from the ERO approved benchmark library.
<b>R3.</b>	N/A	N/A	N/A	The Planning Coordinator did not develop or implement a process for coordinating the development of benchmark planning cases among impacted Planning Coordinator(s), Transmission Planner(s), and other designated study entities.  OR

R #	Violation Severity Levels			
	Lower VSL	Moderate VSL	High VSL	Severe VSL
				<p>The Planning Coordinator developed and implemented a process for coordinating the development of benchmark planning cases among impacted Planning Coordinator(s), Transmission Planner(s), and other designated study entities, but this process did not define the planning study area boundary based off the selected benchmark events.</p> <p>OR</p> <p>The Planning Coordinator developed and implemented a process for coordinating the development of benchmark planning cases among impacted Planning Coordinator(s), Transmission Planner(s), and other designated study entities, but this process did not modify the benchmark planning cases to include seasonal and temperature dependent adjustments load, generation, Transmission, and transfers.</p>

R #	Violation Severity Levels			
	Lower VSL	Moderate VSL	High VSL	Severe VSL
R4.	N/A	N/A	N/A	<p>The responsible entity did not develop or maintain System models of the responsible entity’s planning area for performing Extreme Temperature Assessment.</p> <p>OR</p> <p>The responsible entity developed and maintained System models for performing Extreme Temperature Assessment, but the System model did not use data consistent with that provided in accordance with the MOD-032 standard supplemented by other sources as needed.</p>
R5.	N/A	N/A	N/A	<p>The responsible entity, as determined in Requirement R1, did not have criteria for acceptable System steady state voltage limits and post-Contingency voltage deviations for performing Extreme Temperature Assessment.</p>

R #	Violation Severity Levels			
	Lower VSL	Moderate VSL	High VSL	Severe VSL
<b>R6.</b>	N/A	N/A	N/A	The responsible entity failed to define and document, the criteria or methodology used in the analysis to identify System instability, uncontrolled separation, or Cascading.
<b>R7.</b>	N/A	N/A	The responsible entity, as determined in Requirement R1, identified Contingencies for performing Extreme Temperature Assessment for each of the event categories in Table 1 that are expected to produce more severe System impacts within its planning area, but did not include the rationale for those Contingencies selected for evaluation as supporting documentation.	The responsible entity, as determined in Requirement R1, did not identify Contingencies for performing Extreme Temperature Assessment for each of the event categories in Table 1 that are expected to produce more severe System impacts within its planning area.
<b>R8.</b>	The responsible entity, as determined in Requirement R1, completed an Extreme Temperature Assessment, but it was completed less than or equal to six months late.	The responsible entity, as determined in Requirement R1, completed an Extreme Temperature Assessment, but it was completed more than six months but less than or equal to 12 months late.	The responsible entity, as determined in Requirement R1, completed an Extreme Temperature Assessment, but it was completed more than 12 months but less than or equal to than 18 months late.	The responsible entity, as determined in Requirement R1, completed an Extreme Temperature Assessment, but it was more than 18 months late.



R #	Violation Severity Levels			
	Lower VSL	Moderate VSL	High VSL	Severe VSL
				<p>OR</p> <p>The responsible entity, as determined in Requirement R1, did not complete an Extreme Temperature Assessment.</p> <p>OR</p> <p>The responsible entity, as determined in Requirement R1, completed an Extreme Temperature Assessment, but it was missing one or more of the required elements in Requirement R8.</p>
<b>R9.</b>	N/A	N/A	The responsible entity, as determined in Requirement R1, developed a CAP, but failed to solicit feedback from, applicable regulatory authorities or governing bodies responsible for retail electric service issues.	The responsible entity, as determined in Requirement R1, failed to develop a Corrective Action Plan when the benchmark planning case study results indicate the System is unable to meet performance requirements for the Table 1 P0 or P1 Contingencies.
<b>R10.</b>	N/A	N/A	N/A	Each responsible entity, as determined in Requirement

R #	Violation Severity Levels			
	Lower VSL	Moderate VSL	High VSL	Severe VSL
				R1, failed to evaluate and document possible actions designed to reduce the likelihood or mitigate the consequences and adverse impacts when the benchmark planning case study results indicate the System could result in instability, uncontrolled separation, or Cascading for the Table 1 P2, P4, P5, and P7 Contingencies.
<b>R11.</b>	The responsible entity, as determined in Requirement R1, distributed its Extreme Temperature Assessment results to functional entities having a reliability related need who requested the information in writing, but it was more than 60 days but less than or equal to 80 days following the request.	The responsible entity, as determined in Requirement R1, distributed its Extreme Temperature Assessment results to functional entities having a reliability related need who requested the information in writing, but it was more than 80 days but less than or equal to 100 days following the request.	The responsible entity, as determined in Requirement R1, distributed its Extreme Temperature Assessment results to functional entities having a reliability related need who requested the information in writing, but it was more than 100 days but less than or equal to 120 days following the request.	The responsible entity, as determined in Requirement R1, distributed its Extreme Temperature Assessment results to functional entities having a reliability related need who requested the information in writing, but it was more than 120 days following the request.  OR  The responsible entity, as determined in Requirement R1, did not distribute its Extreme Temperature Assessment results to functional entities having a

R #	Violation Severity Levels			
	Lower VSL	Moderate VSL	High VSL	Severe VSL
				reliability related need who requested the information in writing.

**D. Regional Variances**

None.

**E. Associated Documents**

- Implementation Plan for 2023-07
- Technical Rationale Document
- Consideration of Issues and Directives for FERC Order 896.

## Version History

Version	Date	Action	Change Tracking
1	TBD	Addressing FERC Order 896	New Standard