NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

TPL-001-5

Transmission Planning - Transmission System Planning Performance Requirements

April 8, 2020

RELIABILITY | RESILIENCE | SECURITY




Agenda

- Presenters
  - Jonathan Hayes, SPP
  - Delyn Kilpack, LGE-KU
  - Latrice Harkness, NERC
- TPL-001-5
  - FERC Order No. 754
  - FERC Order No. 786
  - Modifications
  - Approval/Effective Date

FERC Orders

- The TPL-001-5 Modification addressed FERC Order 754
  - "we direct Commission staff to meet with NERC and its appropriate subject matter experts to explore this reliability concern, including where it can best be addressed, and identify any additional actions necessary to address the matter."
    - "the Commission believes that there is an issue concerning the study of the non-operation of non-redundant primary protection systems; e.g., the study of a single point of failure on protection systems."
- The TPL-001-5 Modification addressed FERC Order 786
  - "we direct NERC to modify Reliability Standard TPL-001-4 to address the concern that the six month threshold could exclude planned maintenance outages of significant facilities from future planning assessments." (Paragraph 40)
  - "directs NERC to consider a similar spare equipment strategy for stability analysis upon the next review cycle of Reliability Standard TPL-001-4." (Paragraph 89)

FERC Order No. 754

- Changes to TPL-001-5:
  - Revision to “Table 1 – Steady State and Stability Performance Planning Events”
  - Modified Category P5 event to include Single Point of Failure (SPF)
  - Modified “Steady State and Stability Performance Extreme Events”
  - Footnote 13 – describes the non-redundant Protection System components which are required to be considered for Category P5

FERC Order No. 754 (Single Point of Failure)

- Changes to TPL-001-5:
  - Modified Category P5 event to include SPF

Category	Initial Condition	Event [1]	Fault Type [2]	BES Level [3]	Interruption of Firm Transmission Service Allowed [4]	Non-Consequential Load Loss Allowed
P5 Multiple Contingency *(Fault plus ~~relay~~non-redundant component of a Protection System failure to operate)*	Normal System	Delayed Fault Clearing due to the failure of a non-redundant ~~relay[12]~~component of a Protection System[13] protecting the Faulted element to operate as designed, for one of the following: 1. Generator 2. Transmission Circuit 3. Transformer[5] 4. Shunt Device[6] 5. Bus Section	SLG	EHV	No[9]	No
				HV	Yes	Yes

FERC Order No. 754 (Single Point of Failure)

- Changes to TPL-001-5:
  - "Revision to Table 1 – Steady State and Stability Performance Extreme Events"

Steady State	Stability
1. Loss of a single generator, Transmission Circuit, single pole of a DC Line, shunt device, or transformer forced out of service followed by another single generator, Transmission Circuit, single pole of a different DC Line, shunt device, or transformer forced out of service prior to System adjustments. 2. Local area events affecting the Transmission System such as: a. Loss of a tower line with three or more circuits.[11] b. Loss of all Transmission lines on a common Right-of-Way[11]. c. Loss of a switching station or substation (loss of one voltage level plus transformers). d. Loss of all generating units at a generating station. e. Loss of a large Load or major Load center. 3. Wide area events affecting the Transmission System based on System topology such as: a. Loss of two generating stations resulting from conditions such as: i. Loss of a large gas pipeline into a region or multiple regions that have significant gas-fired generation.	1. With an initial condition of a single generator, Transmission circuit, single pole of a DC line, shunt device, or transformer forced out of service, apply a 3Ø fault on another single generator, Transmission circuit, single pole of a different DC line, shunt device, or transformer prior to System adjustments. 2. Local or wide area events affecting the Transmission System such as: a. 3Ø fault on generator with stuck breaker[10] ~~or a relay failure[13]~~ resulting in Delayed Fault Clearing. b. 3Ø fault on Transmission circuit with stuck breaker[10] ~~or a relay failure[13]~~ resulting in Delayed Fault Clearing. c. 3Ø fault on transformer with stuck breaker[10] ~~or a relay failure[13]~~ resulting in Delayed Fault Clearing. d. 3Ø fault on bus section with stuck breaker[10] ~~or a relay failure[13]~~ resulting in Delayed Fault Clearing. e. 3Ø fault on generator with failure of a non-redundant component of a Protection System[13] resulting in Delayed Fault Clearing. f. 3Ø fault on Transmission circuit with failure of a non-redundant component of a Protection System[13] resulting in Delayed Fault Clearing.

FERC Order No. 754 (Single Point of Failure)

- Changes to TPL-001-5:
  - "Revision to Table 1 – Steady State and Stability Performance Planning Events"

ii. Loss of the use of a large body of water as the cooling source for generation. iii. Wildfires. iv. Severe weather, e.g., hurricanes, tornadoes, etc. v. A successful cyber attack. vi. Shutdown of a nuclear power plant(s) and related facilities for a day or more for common causes such as problems with similarly designed plants. b. Other events based upon operating experience that may result in wide area disturbances.	g. 3Ø fault on transformer with failure of a non-redundant component of a Protection System[13] resulting in Delayed Fault Clearing. h. 3Ø fault on bus section with failure of a non-redundant component of a Protection System[13] resulting in Delayed Fault Clearing. ~~e.~~i. 3Ø internal breaker fault. ~~f.~~j. Other events based upon operating experience, such as consideration of initiating events that experience suggests may result in wide area disturbances

FERC Order No. 754 (Single Point of Failure)

Footnote 13. 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).

FERC Order 786 (Maintenance Outage)

- Moved known outages selection to Requirement R2
- Change to Requirement R2 is not a prescriptive, continent-wide procedure
- Entity must have a process and procedure that conform with a technical rationale which must be made available
  - Consistent with other requirements in TPL-001-4, such as Voltage Criteria, Low Voltage Ride Through, etc.
- Removed the six-month time horizon for significant outages occurring within the period of the Near-Term Assessment studies (Year 1 or 2 and Year 5)
- Proposed revisions to Requirement R2 also include stability studies for long lead equipment without a spare equipment strategy

Effective Date

- Standard approved by FERC January 23, 2020
- Standard becomes effective July 1, 2023
- July 1, 2025 - Phased-in Compliance Dates for Requirement R2, Part 2.7 for the revised Category P5 Planning Event: July 1, 2025: Entities are required to identify Corrective Action Plans, however they shall not be required to comply with Requirement R2, Part 2.7 for the Table 1 Category P5 planning event for the non-redundant components of a Protection System identified in footnote 13 items a, b, c, and d until 72 months after the effective date of Reliability Standard TPL-001-5.

Effective Date

- July 1, 2029: For CAPs developed to address failures to meet Table 1 performance requirements for the P5 planning event for the non-redundant components of a Protection System identified in footnote 13 items a, b, c, and d, entities shall not be required to comply until 72 months after the effective date of Reliability Standard TPL-001-5 with the bolded part of Requirement R2, Part 2.7 that states: "Revisions to the Corrective Action Plan(s) are allowed in subsequent Planning Assessments but the planned System shall continue to meet the performance requirements in Table 1."

Implementation Plan

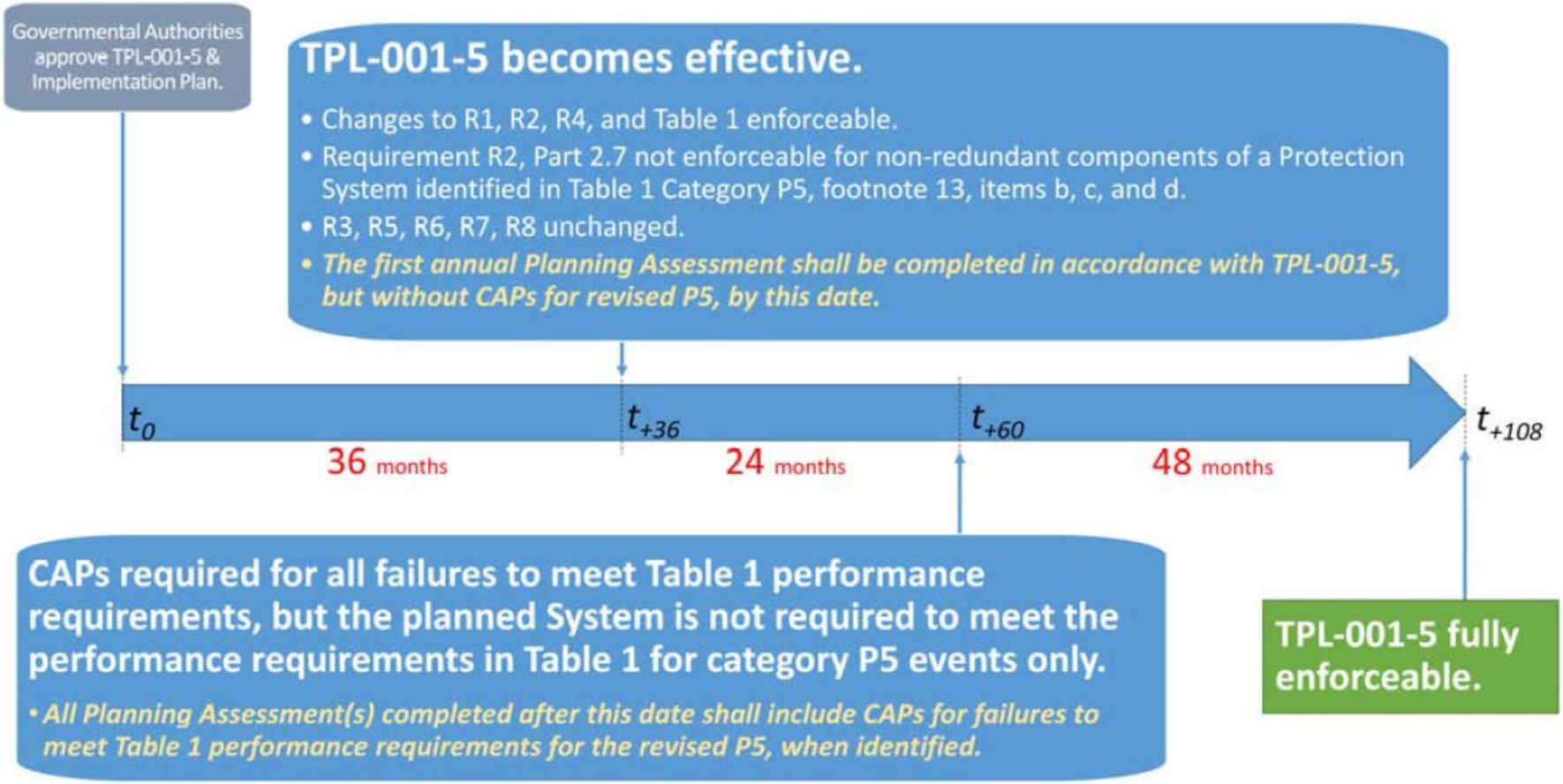
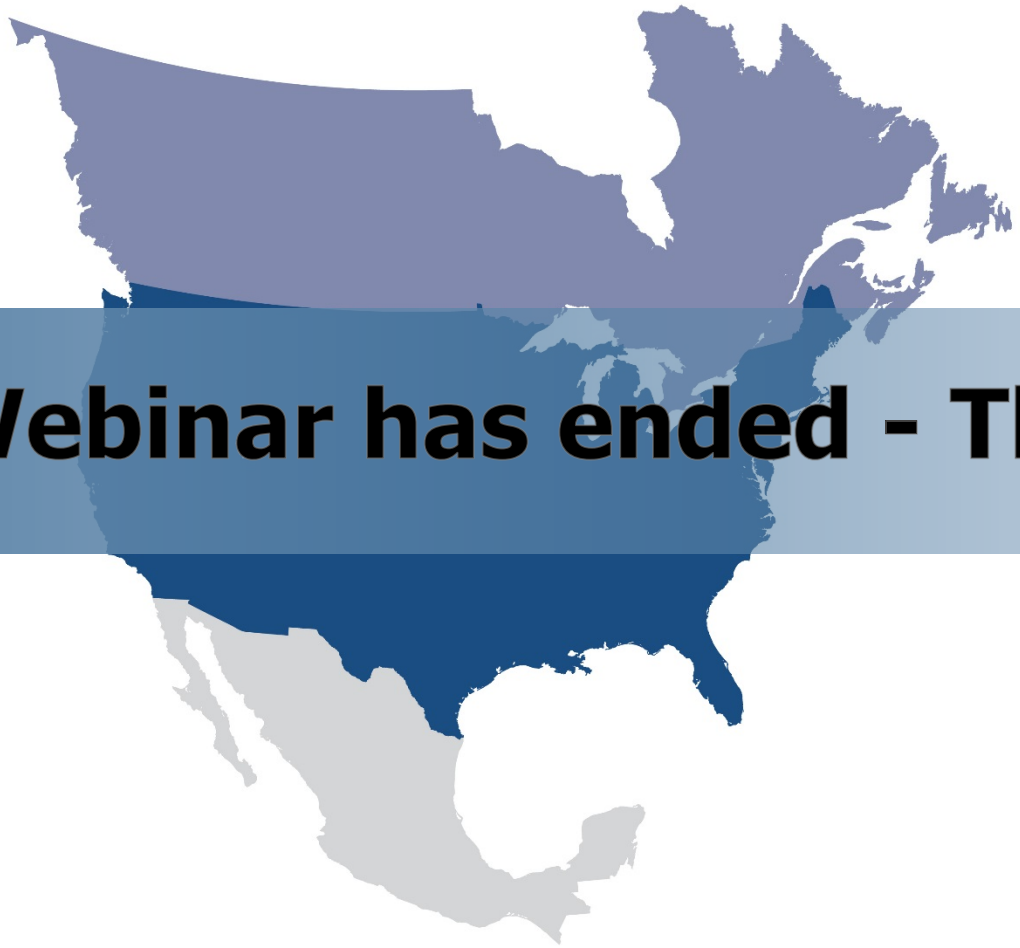


Figure 1 Implementation Plan Timeline

Project 2015-10 Information

- Project Page
- Point of Contact
  - Latrice Harkness, Senior Standards Developer
  - Latrice.Harkness@nerc.net or call 404-446-9728



Webinar has ended - Thank you