TRANS-TSO Standard Programs and Processes	**Tennessee Valley Authority (TVA) Reliability Coordinator (RC) Outage Coordination**	**TRANS-TSO-SPP-30.231 Rev. 0001**
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Revision Log

Revision or Change Number	Effective Date	Affected Page Numbers	Description of Revision/Change
0000	04/01/2019	All	Superseded TOPS-RC-SPP-30.231 Cadence Review Performed.
		Page 11	Update table 3.2.1 E Priority Assessment.
		Various	Minor updates that do not impact the intent of the document.
		Page 16	Updated references to NERC standards. Updated Source Notes.
0001	04-01-2021	All	Minor updates to improve consistency and accuracy but do not impact the intent of the document.
		Page 7	Added 3.2.A.2.f to reference work involving BES elements that are not expected to be out for more than one hour.
		Page 7	Update section 3.2.A.2 to consolidate information for elements >=100 kV and update the table to accurately reflect information described 3.2.A.2.a-e
		Page 11	Updated section 2.3.2.B.1.a to remove the statement that State Estimator models are used for supplemental analysis.
		Page 16	Update Source Notes section references.

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1.0 PURPOSE

The coordination of planned outages of transmission and generating equipment is essential for ensuring the reliability of the Bulk Electric System (BES). The Tennessee Valley Authority (TVA) Reliability Coordinator (RC) is contracted as the provider of reliability services to Member Companies in the TVA RC Area including the TVA Transmission Operator (TOp) and the TVA Balancing Authority (BA). The TVA RC has final authority to approve the scheduling of maintenance of all transmission facilities (100 kV and above) and generation facility maintenance outages owned by Member Companies in the TVA RC Area. Member Companies, excluding TVA, have also contracted for outage coordination services beyond the next day horizon. This service is performed by TVA Reliability Analysis (RA). TVA RA also has the responsibility for outage coordination services for TVA, beyond the next day horizon. TVA TOp's internal outage scheduling process is outlined in another procedure.

2.0 SCOPE

This procedure applies to TVA's Reliability Coordinator; TVA's RA; Member Company TOps and Member Company BAs. In this procedure the term Member Company includes the TVA TOp and TVA BA.

3.0 PROCESS

3.1 Roles and Responsibilities

3.1.1 Vice President, Transmission Operations & Power Supply (TOPS)

A. The Vice President of TOPS governs this procedure

B. The Vice President, TOPS, is the executive owner and approving authority for this procedure.

3.1.2 3.1.2 General Manager, Reliability Authority and Regional Operations (RARO)

A. The General Manager, RARO has oversight for this procedure

B. The General Manager, RARO serves as the functional lead for this procedure and has the overall responsibility for all aspects of implementation of this procedure.

3.1.3 Member Company TOp and BA

A. Responsible for timely entry and update of all planned and forced transmission and generation outages into the Coordinator of Transmission & Reliability (CTR) Portal. Forced transmission and generation outages should be verbally communicated to the TVA RC as soon as practical. For planned or forced transmission and generation outages that impact all other operational planning time horizons, submission to the CTR Portal will be sufficient. Communication of planned transmission outages is addressed in 3.1.3E. Communication of planned generation outages is satisfied through the CTR Portal submittal process.

B. Responsible for notifying the TVA RC of any abnormal configuration changes on the system that weren't approved as part of the normal outage analysis process. This would include, but is not limited to, normally open lines operated in a closed position or reconfiguring the system to mitigate an exceedance. Changes lasting greater than one hour must also be input into the CTR Portal.

C. Emergency and urgent requests, as well as changes to outages scheduled for next day or not returning as scheduled for next day (this includes both transmission and generation elements), shall be communicated directly to the TVA RC. This communication shall be verbal and entered into CTR portal with comments reflecting the emergent condition.

D. Responsible for any required notification to neighboring TOps or BAs concerning outage impacts for real-time and next-day horizon.

E. Responsible for contacting the TVA RC (verbally) on the day of the transmission outage (no later than 30 minutes) before the start of an outage on transmission elements 345 kV or higher (high side voltage will be used for transformer outages) and 100 kV or higher for tie lines with BA Areas external to the TVA RC Area to ensure that conditions of the BES will still allow the outage without jeopardizing reliability. This requirement for verbal communications on the day of the outage can be met via discussion during daily conference calls (as long as specific outage is discussed and communications occurs at least 30 minutes before the outage start time). This does not pertain to generation outages.

F. Responsible for notifying the TVA RC (verbally) when the AVR status of a generating unit changes **[IRO -017-1 R2].**

3.1.4 TVA Reliability Coordinator

A. The TVA RC executes this procedure.

B. Responsible for coordinating current day planned and forced outages with Member Company TOps and BAs, and neighboring RCs.

C. Ensures forced outages are properly communicated with neighboring RCs as necessary.

3.1.4 TVA Reliability Coordinator (continued)

D. Communicates to Member Company TOps and BAs when TVA RC Area is in Conservative Operations mode, see section 3.2E.

E. Has the authority to deny or cancel transmission and generation outages that fail to meet the requirements of this procedure or pose a threat to grid reliability.

F. Responsible for contacting the affected neighboring RC to communicate and coordinate on a day-ahead basis.

G. Has final authority to resolve any conflicts in planned outages.

H. Emergency and urgent requests, as well as changes to outages scheduled for next day or not returning as scheduled for next day, shall be communicated directly to RA as deemed necessary.

I. Responsible for resolving any scheduling of potential reliability conflicts. **[IRO-017-1 R1,part 1.4].**

3.2 Program Elements

A. Planned Outage Scheduling

NOTE
Reliability Analysis may approve outages outside the identified timelines based on system conditions and requirements.

1. Facilities:

   a. Member Company TOps and BAs are responsible for notifying the appropriate TVA RC/RA of all planned outages on transmission facilities above 100 kV (excluding radial lines). These facilities include transmission lines and line sections, substation buses, generators, transformers (secondary above 100 kV), breakers, voltage regulating equipment and remedial action schemes. This includes the unavailability of other transmission components that affect the capability of protection of facilities.

   b. Scheduling of outages on facilities less than 100 kV is required (NERC Arizona Blackout Recommendations) if the facilities are part of a network (or looped) system. Outages of these facilities will not be explicitly approved by the TVA RC or RA. Upon request, these outages can be studied depending on workload of approver.

3.2 Program Elements (continued)

2. Timing:

   a. All transmission line, transformer, and breaker outages, with **known firm generation impacts**, and a **duration greater than 1 day**, must be submitted a **minimum of 30 calendar days** prior to the scheduled start. TVA RA will provide a preliminary response at least 21 days prior to the scheduled start, and a firm response at least 3 days prior to the scheduled start.

   b. All transmission line, transformer, and breaker outages, with **known firm generation impacts**, and a **duration less than or equal to 1 day**, must be submitted a **minimum of 14 calendar days** prior to the scheduled start. TVA RA will provide a firm response at least 3 days prior to the scheduled start.

   c. All transmission line, transformer, and breaker outages greater than or equal to 100 kV, with no known firm generation impacts, and a **duration greater than or equal to 7 days**, must be submitted a **minimum of 14 calendar days** prior to the scheduled start. TVA RA will provide a preliminary response at least 7 days prior to the scheduled start, and a firm response at least 3 days prior to the scheduled start.

   d. All transmission line, transformer, and breaker outages with a **duration less than 7 days** must be submitted a **minimum of 7 calendar days** prior to the scheduled start. TVA RA will provide a response at least 3 days prior to the scheduled start.

   e. All transmission line, transformer, and breaker outages less than 100 kV, but part of a looped system, must be submitted a **minimum of 7 calendar days** in advance of the scheduled start. TVA RA will normally not provide an approval for these outages but will study a sub-set of non-BES elements that have known impacts on BES elements.

   f. Work scheduled for which BES elements are expected to be out less than one hour, which includes but is not limited to breaker trip checks and relay functional testing, will not be studied prior to the day of the work and therefore does not need to be submitted to the CTR Portal.

   g. Generating unit outage schedules should be submitted at least monthly for the next 12-month period.

   h. Transmission outages submitted prior to 1200 CPT will consider the day of submittal as day one. Transmission outages submitted after 1200 CPT will consider the next day as day one.

3.2 Program Elements (continued)

i. TVA RC/RA retains the right to deny all requests that do not meet the minimum outage submittal requirements unless the request is an emergency, urgent, or an exception is requested (i.e., a generator tripped and the TOp is taking advantage of a situation that was not available before the unit trip). Emergency and urgent requests will be evaluated as soon as practical, as specified in this procedure.

j. Preliminary notice of conditional approval for long-term scheduled transmission outages will be provided based upon automated outage studies using state estimator models. The final approval by TVA RA will occur using current state estimator models to perform more in-depth analysis as deemed necessary by the reviewer.

Known* firm generation impacts or Tie Lines	Planned duration >1 day(s)	Planned duration <= 1 day
> 100 kV	>= 30 day notice**	>= 14 day notice
	RA to study and provide prelim response >= 21 days prior to scheduled start and firm response >= 3 days prior to scheduled start	RA to study and provide firm response >= 3 days prior to scheduled start

No known firm generation impacts	Planned duration >= 7 days	Planned duration <7 days
>= 100 kV	>= 14 day notice	>= 7 day notice
	RA to study and provide prelim response >= 7 days prior to scheduled start and firm response >= 3 days prior to scheduled start	RA to study and provide response >= 3 days prior to scheduled start
< 100 kV***	>= 7 day notice	
	RA to study sub-set of non-BES elements that have known impacts on BES elements	

*List of lines known to impact firm generation to be maintained in CTR portal critical facilities

** 30 days is normal notice, if restriction is unit dependent and loss of unit allows outage to occur, 30 days may be waived

3.2 Program Elements (continued)

*** Networked non-BES elements

3. Submittal Requirements:

NOTE
All requests for urgent or emergency work submitted shall be communicated directly to the TVA RC.

a. For RC Member Companies excluding TVA: The CTR Portal will be the primary mechanism for submitting planned outages. The SDX entry section of the CTR Portal allows users to select the transmission facility element along with start and end times. The "Misc. Info." section of the entry should contain pertinent information about the outage including work to be performed as well as availability for returning nights and weekends.

b. For TVA TOP: The Consolidated Outage Portal (COP) application will be the primary mechanism for submitting planned outages.

4. Notification to Neighboring Systems:

a. Planned outages which have the potential to impact neighboring TOps or BAs should be scheduled as far in advance as possible. For all tie-lines above 100 kV, elements greater than 200 kV that impact a neighboring entity greater than 5% TDF or an element that is a contingent element for a coordinated flowgate, the element should be scheduled at least 14 days prior to the start date. It is the responsibility of the TOp or BA initiating the request to notify the affected TOp or BA for consideration before submitting the request to TVA RC/RA.

b. The TVA RC will notify neighboring RCs concerning outage impacts and coordinate as required.

5. Priority Assessment:

a. Where priority for conflicting outages cannot be resolved by the asset owners, or subsequently by the RCs, the outage with the earliest submission time shall have priority. If the outage time window changes (outside of the current day or original schedule period) or the outage elements change in part or whole then the submission time shall be adjusted to reflect the date/time of the outage revision. This includes outages in "External" areas (i.e., MISO, PJM, others) which conflict with internal area outages. Emergency/Urgent/Forced outages shall maintain priority over other outages regardless of submission times as outlined below:

3.2 Program Elements (continued)

Categories of Competing Request		
(1)	(2)	Priority Selection Criteria
Maintenance	Maintenance	Earliest submittal date
Maintenance	Urgent	Urgent
Maintenance	Emergency	Emergency
Maintenance	Forced	Forced
External Maintenance	Maintenance	Earliest submittal date
External Maintenance	Urgent	Urgent
External Maintenance	Emergency	Emergency
External Maintenance	Forced	Forced
External Urgent	Maintenance	External Urgent
External Urgent	Urgent	Earliest submittal date
External Urgent	Emergency	Emergency
External Urgent	Forced	Forced
External Emergency	Maintenance	External Emergency
External Emergency	Urgent	External Emergency
External Emergency	Emergency	RCs to work out a solution
External Emergency	Forced	RCs to work out a solution
External Forced	Maintenance	External Forced
External Forced	Urgent	External Forced
External Forced	Emergency	RCs to work out a solution
External Forced	Forced	RCs to work out a solution

B. Outage Analysis

3.2 Program Elements (continued)

1. Load Flow Analysis:

   a. RA evaluates outages utilizing models developed based on expected conditions for the outage period. Normally these models are created in the same manner as those used for the evaluation of transmission service. If different models need to be created in order to adequately represent expected system conditions, the same input assumptions are used. The models used in the evaluation of transmission service use ratings and assumptions no more limiting than those used in the planning of operations (outage analysis) for the corresponding time periods studied **[MOD-001-1a R6, R7]**.

   b. Outages are analyzed based solely on reliability impacts with no economic considerations. It is up to the member TOp and BA to cancel or reschedule an outage if the conditions cannot be met or result in unacceptable costs. Notification to the TVA RC/RA will be as stated in this procedure.

   c. Outages are evaluated for key contingencies and loading as follows:

      (1) Base case flows, with requested element out of service, on all monitored facilities compared against the normal rating.

      (2) Post-contingent flows for all monitored facilities are compared against their post-contingent continuous rating for all contingencies. Other thermal limits will be considered if a Member Company TOp and BA provide documentation of a lower or higher thermal limit.

      (3) Pre-contingent voltage of less than 1.0 per-unit or post-contingent voltage of less than 0.95 per-unit for substation buses and 0.92 per-unit for tap buses. Other voltage limits will be considered if a Member Company TOp and BA provide documentation of a lower or higher voltage limit.

   d. Outages that satisfy the above criteria and do not violate any SOL will be approved with no conditions and the CTR Portal SDX entry will be updated with an "Approved" (A) status.

   e. Outages that can be mitigated using a temperature based rating using the predicted temperature or short-term rating may be conditionally approved based on anticipated real-time operating conditions.

3.2 Program Elements (continued)

f. Outages that do not meet the above criteria will be analyzed for potential mitigation measures such as generation re-dispatch or transmission reconfiguration. If a successful mitigation is identified, the SDX status will be updated as "Conditional" (C) with the conditions listed in the approval comments. If the reconfiguration is complex, e.g. re-dispatch of multiple plants, coordination with other RC and TOp/BA's, or more than a single breaker or transmission element open, a temporary operating guide will be issued for conditional outages. In cases where the condition is a simple reconfiguration, system load limits or re-dispatch of a single generating plant, the conditions in Outage Review and Coordination Application (ORCA) / CTR Portal will serve as the operating guide.

g. Outages that create constraints that reach or exceed the IROL specifications in the Transmission Reliability Order of Curtailment will be denied.

C. Forced Outages

1. TVA RC coordinates with Member Company TOps and BAs to implement schedules for unplanned transmission or generator maintenance due to a forced outage. Approval for unplanned maintenance due to forced outages is not required. Member Company TOps and BAs shall contact the TVA RC to report forced outages as soon as practical after the occurrence of the outage or once it is anticipated that a forced outage is imminent. Member Company TOps are responsible for entering forced outages into the CTR Portal as soon as practical.

2. Reported information shall include the cause of the outage and expected return to service (if known).

D. Approval of Planned Outages with Known Impacts to Firm Generation

1. Outages (internal or external to TVA RC) that impact firm generation (TVA RC member company or neighboring RC / external TOp) should be scheduled as far in advance as possible, with the minimum times set in section 3.2A, subject to the Conservative Operations mode outlined in section 3.2E.1 of this procedure. These elements should be scheduled such that they coincide with scheduled generator outages or lower load periods to minimize the impact to delivered power. Outages that must occur while impacted generation is online should be worked in the shortest amount of time possible.

3.2 Program Elements (continued)

E. Conservative Operations

1. TVA RC Area may need to be operated in a conservative manner at times to maintain the reliability of the BES. Examples include, but are not limited to, extreme adverse weather or high system loads. The TVA RC shall communicate to all Member Company TOps and BAs when the TVA RC Area is operating in Conservative Operations mode. This shall include the reason and expected duration for the Conservative Operations. Member Company TOps and BAs shall contact the TVA RC no later than 30 minutes before the start of all planned outages while the TVA RC Area is in Conservative Operations mode.

4.0 RECORDS

4.1 QA Records

Not Applicable.

4.2 Non-QA Records

The TVA RC eSOMS log and Outage Review and Coordination Application (ORCA) database will be the official record of outage coordination issues for the TVA RC Area.

5.0 DEFINITIONS

COP (Consolidated Outage Portal) - TVA TOp and BA outage scheduling tool .

CTR (Coordinator of Transmission & Reliability) Portal - Web based application that allows Member BAs and TOps to input outage information for posting into SDX. The URL is https://ctr.tva.com/.

Emergency Outage - An outage that must take place immediately due to conditions that endanger the safety of employees or the public, or may result in immediate damage to electrical facilities or private property. Equipment will be removed from service as soon as possible to minimize risk to the BES and personal safety.

eSOMS (electronic Shift Operations Management System) - System Operator log application utilized by TVA RC and RA personnel.

Forced Outage - Outage of a transmission element due to relay action or other emergency action to protect public safety or prevent imminent equipment damage.

Member Company - The entities, including BAs and TOps, for which the TVA RC provides reliability coordination services.

Maintenance Outage - Scheduled outage according to guidelines in this document.

5.0 DEFINITIONS (continued)

ORCA - Outage Review and Coordination Application used by TVA RA to manage outages.

RCIS (Reliability Coordinator Information System) - NERC tool for sharing information between Reliability Coordinators, Balancing Authorities, and Transmission Operators.

SDX (System Data Exchange) - SDX is a central repository of all scheduled and on-going branch, generator, and transformer outages throughout the Eastern Interconnection.

TVA Reliability Coordinator Area - The collection of generation, transmission, and loads within the boundary of the TVA Reliability Coordinator.

Urgent Outage - Condition less than an Emergency. The basis for this classification is the determination that failure of equipment is imminent with an increased risk of forced outage. The equipment remains in service until maintenance crews are ready to perform the work.

Source Notes
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Requirements Statement	Source Document	Implementing Statement
R6. When calculating Total Transfer Capability (TTC) or Total Flowgate Capability (TFC) the Transmission Operator shall use assumptions no more limiting than those used in the planning of operations for the corresponding time period studied, providing such planning of operations has been performed for that time period. [Violation Risk Factor: Lower] [Time Horizon: Operations Planning]	MOD-001-1a R6	3.2 B.1.a
R7. When calculating ATC or AFC the Transmission Service Provider shall use assumptions no more limiting than those used in the planning of operations for the corresponding time period studied, providing such planning of operations has been performed for that time period. [Violation Risk Factor: Lower] [Time Horizon: Operations Planning]	MOD-001-1a R7	3.2 B.1.a
R1, Part 1.4. Define the process to coordinate the resolution of identified outage conflicts with its Transmission Operators and Balancing Authorities, and other Reliability Coordinators.	IRO-017-1 R1, Part 1.4	3.1.4 I
R2. Each Transmission Operator and Balancing Authority shall perform the functions specified in its Reliability Coordinator's outage coordination process.	IRO-017-1 R2	3.1.3 F