



Memorandum from the Office of the Inspector General

January 23, 2013

Andrew D. Kosnaski, WT 9C-K

FINAL REPORT – EVALUATION 2012-14577 – REVIEW OF TVA’S OUTAGE SCHEDULING RISK

As part of a series of reviews to evaluate Tennessee Valley Authority’s (TVA) actions to address key risks, we evaluated TVA’s outage scheduling risk. Outage Scheduling was identified as a top five strategic business unit (SBU) risk in the Internal Process and Procedures Risk category in fiscal year (FY) 2011. The results of our review are shown in the table below.

Risk: Outage Scheduling Risk		
Risk Information	Mitigation	Our Assessment
<p><u>Definition:</u> Failure in coordination of the outage schedule for TVA.</p> <p><u>Probability:</u> Remote.*</p> <p><u>Consequences:</u> Minor.</p> <p><u>Risk Owner:</u> Manager, Resource Planning.</p>	<ul style="list-style-type: none"> Following Standard Programs and Processes (SPP) 33.4, Outage and Derate¹ Concurrence Process (Outage Concurrence Process), will ensure that a formal outage change request process is followed by asset organizations requesting outage changes and that the concurrence with outage schedules is given by all impacted organizations. This mitigation is currently ongoing. 	<p>The mitigation strategy for addressing TVA’s outage scheduling risk is designed appropriately and has reduced the risk. However, opportunities exist to improve the outage scheduling process. We found (1) the control overseeing the Outage Concurrence Process is manual and time consuming, (2) the control in place over quality checks is not being completed, and (3) the Outage Concurrence Process does not align with SPP-30.004, TVA Chief Operating Officer Approved Method to Optimize TVA Asset Availability (Asset Availability Optimization Process) in regard to the use of Asset Availability in entering outages.</p>
<p>*The rating in the chart is current as of Q4 2012, but as discussed later in the report, the rating was at “even odds” for probability and “severe” for consequences in Q2 2010. The reduction in the risk rating occurred after the Outage Concurrence Process was put in place.</p>		

¹ A derate condition exists and starts when a unit is not capable of reaching 100 percent of its seasonal capacity.

Recommendations

We recommend the Vice President, System Planning, (1) work in conjunction with the Asset Availability owners to determine if a control can be added to Asset Availability to prevent outages from being entered without first completing the Outage Concurrence Process, (2) take steps to make sure that quality checks are performed as prescribed in the Outage Concurrence Process, and (3) work in conjunction with the owner for the Asset Availability Optimization Process to address conflict between the Outage Concurrence Process and the Asset Availability Optimization Process to align the process of entering outages into Asset Availability.

TVA management agreed with our recommendations and plans to take actions. Prior to submitting their formal response, TVA management provided informal comments and additional information. We revised sections of the report based on the informal comments and provided the revised version of the report to TVA management to use in preparing their formal response. See the Appendix for TVA's complete response.

BACKGROUND

Outage Scheduling is a risk identified by TVA's Enterprise Risk Management (ERM) Program. TVA defines ERM as a systematic process to facilitate business unit identification of risk, consistency in their analysis and communication throughout TVA, such that the company can determine whether or not the risks should be avoided, accepted, or mitigated with a risk management plan. TVA also states ERM is an ongoing and evolving process to protect the value of the enterprise and realize opportunities for stakeholders by promoting the efficient and effective management of risk.

Outage Scheduling was identified as a top five SBU risk in the Internal Process and Procedures Risk category in FY 2011. The risk refers to failure in coordination of the outage schedule for TVA. Uncoordinated generator outages could cause threats to transmission reliability, negative impacts to operation flexibility, and missed opportunities to minimize financial impacts of outages. Outage schedules are coordinated for the business planning time period, which is typically 5 years. Generator and transmission outages impacting net power delivery to the grid should be scheduled to combine the transmission and generator work into one outage where possible, meeting North American Electric Reliability Corporation compliance, operational flexibility, labor constraints, and total financial impacts through minimizing both replacement power costs and impacts to SBU budgets. Currently, TVA's risk map² lists outage scheduling risk's probability of occurrence as "remote," and the consequences of such risk were considered "minor."

In order to mitigate this risk, TVA follows the Outage Concurrence Process that was issued in September 2010. TVA's current mitigation strategy is to follow the Outage Concurrence Process. According to the risk map, following the Outage Concurrence Process will ensure that a formal outage change request process is followed by asset organizations requesting outage changes and that the concurrence with outage schedules is given by all impacted organizations. The main objectives of the Outage Concurrence Process are to accurately capture outage and derate schedules in Transmission

² A risk map is a two-dimensional graphical tool used to illustrate point estimates of risk. Each mention of the risk map throughout this report refers to the draft version.

Reliability and Operations' (TRO) Asset Availability³ interface, resource plans, facilitate outage and derate schedule optimization, and ensure system reliability. The Outage Concurrence Process specifies the required analysis, concurrence process, and approval timeline to ensure accurate communication and efficient coordination. The procedure includes the scheduling of generating assets including nuclear, coal, gas,⁴ and the Raccoon Mountain Pumped-Storage Plant. Outage requests include planned outages, maintenance outages, derates, fuel blend changes, and other business cases reducing the capacity or net power to the grid positions. The planning horizon of the Outage Concurrence Process is between 11 days and 5 years prior to the outage occurring. This aligns with TVA's business planning process. Outages arising within a 10-day window are planned through TRO and are not required to complete the Outage Concurrence Process.

OBJECTIVE, SCOPE, AND METHODOLOGY

As part of a series of reviews to evaluate TVA's actions to address key risks, we evaluated TVA's outage scheduling risk. The objective of our review was to evaluate TVA's outage scheduling risk to identify opportunities to improve mitigation strategies and assess whether mitigation strategies are designed appropriately to address the identified risk. The scope of this review includes the outage scheduling risk and the mitigation plans for this risk. We considered ongoing activities and efforts to mitigate the outage scheduling risk from 2010 through the end of FY 2012.

To achieve our objective, we:

- Interviewed applicable TVA personnel including the Senior Specialist, Resource Planning, risk owners,⁵ and participants in the Outage Concurrence Process to determine what steps are being taken to mitigate TVA's outage scheduling risk, the results of the mitigations, and any concerns they have with the process.
- Identified and reviewed applicable policies related to outage scheduling risk to determine the process for coordinating outages.
- Reviewed historical outage scheduling risk maps to determine if the risk rating has changed.
- Reviewed a judgmentally selected sample of 12 outages to determine if the appropriate concurrence and approvals are being obtained as required by the Outage Concurrence Process.

This review was conducted in accordance with the *Quality Standards for Inspection and Evaluation*.

³ Asset Availability is a Web-based application, owned by TRO, and is the primary tool for scheduling outages, maintenance, or tests that shall have an effect on the generation mission of each generating unit in TVA.

⁴ Combined cycle gas plants were included in the process since its initial issue date, but combustion turbine gas plants were only added to the process during calendar year 2012.

⁵ The risk owner for TVA's outage scheduling risk is the Manager, Resource Planning.

FINDINGS

We found the mitigation strategy for addressing TVA's outage scheduling risk is designed appropriately and has reduced the risk. However, opportunities exist to improve the outage scheduling process. During our review, we found (1) the control overseeing the Outage Concurrence Process is manual and time consuming, (2) the control in place over quality checks is not being completed, and (3) the Outage Concurrence Process does not align with the Asset Availability Optimization Process⁶ in regard to the use of Asset Availability in entering outages.

Mitigation Strategy Is Designed Appropriately and Has Reduced the Risk Rating

The mitigation strategy is designed appropriately and is addressing the risk, which has reduced the risk rating. Since the issuance of the Outage Concurrence Process, TVA's outage scheduling risk has seen a decrease from "high" to "low" as seen in the chart below. The first reduction in the risk rating occurred around the same time as the issuance of the Outage Concurrence Process. The second reduction in the risk rating occurred after the process had been in place for about 2 years. According to System Planning, since implementing the Outage Concurrence Process, System Planning has reduced the consequences rating of this risk as awareness of the risk increased through communication and collaboration with other TVA business functions. Outage coordination in the System Planning window seeks to ensure reliability while minimizing economic impact of scheduled outages. TRO manages outage schedules within a 10-day window; therefore, risks of the Outage Concurrence Process from a reliability perspective are minimal.

Table 1: TVA's Outage Scheduling Risk Rating

Date	Risk Rating	Probability of Occurrence	Consequences
Quarter 2 2010	High	Even Odds	Severe
Quarter 4 2010	Medium	Even Odds	Moderate
Quarter 2 2011	Medium	Even Odds	Minor
Quarter 4 2012	Low	Remote	Minor

The most recent risk map lists the probability of occurrence as "remote" because lack of outage coordination is deemed to have a less than 10-percent likelihood of occurring, given the TVA SPP governance and collaboration with the affected operating groups.

To determine if the concurrence process is being followed, we judgmentally selected a sample of 12 planned and maintenance outages that occurred between July 1, 2011, and June 30, 2012, that were scheduled at least 10 days in advance. We found one of the 12 outages, or 8 percent, did not properly follow the Outage Concurrence Process. The Senior Specialist, Resource Planning, who is responsible for coordinating the concurrence and approval process for outage and derate requests, and other TVA personnel were aware before the outage occurred that it was not properly approved but made the decision to remind the involved personnel of expectations and not run the outage through the

⁶ SPP-30.004 is the TVA Chief Operating Officer Approved Method to Optimize TVA Asset Availability. The procedure provides consistent methodology for continuously communicating and classifying outages, derates, and other activities to ensure Asset Availability optimization for TVA-owned and -contracted assets.

outage concurrence process at that time. While this was not scheduled through the concurrence process, it was scheduled through TRO and according to TVA, it did not have a material impact. The 8 percent of outages in our sample that did not properly follow the concurrence process falls within the estimated percentage of occurrence of under 10 percent; therefore, the new rating of “low” is appropriate.

Opportunities for Improvement Exist in the Outage Scheduling Process

TVA’s mitigation strategy for outage scheduling has reduced the risk; however, opportunities exist to improve the outage scheduling process. The control overseeing the Outage Concurrence Process is manual and time consuming. Also, the control over quality checks is not being performed. Additionally, the Outage Concurrence Process does not align with the Asset Availability Optimization Process in regard to the use of Asset Availability in entering outages.

Control Over Outage Concurrence Process Is Manual and Time Consuming

We found the control overseeing the Outage Concurrence Process is manual and time consuming. Currently, Asset Availability allows outages to be entered into the system without proper approval. In order to make sure outages were not put into Asset Availability without first following the outage concurrence process, the Senior Specialist, Resource Planning, checks Asset Availability daily. TRO and the Asset Owners Business representative also check Asset Availability for outages that were not sent through the Outage Concurrence Process. The Asset Availability system does not send users an alert when a new outage is placed in it, so it is a daily responsibility. The risk owner stated it is an ongoing process to ensure the SPP is being strictly followed, and outages are not being scheduled without first having gone through the concurrence process. Having a control that is manual and a daily responsibility to check Asset Availability for outages entered without proper approval is time consuming and takes away time that could be used to focus on optimizing the outage schedule.

System Planning stated the process could be improved by having the Asset Availability and Consolidated Outage Portal software communicate with each other. This would link generator outages with transmission outages to leverage the two by reducing redundant outages as much as possible. This would greatly reduce or eliminate the manual work of linking generator and transmission outages for their impacts on each other. These tools would provide additional risk mitigation beyond the Outage Concurrence Process.

Control in Place Over Quality Checks Is Not Being Completed

We also found the control in place over quality checks is not being completed. The Outage Concurrence Process states the Near Term Resource Planning Manager⁷ is to provide oversight and direction to the Near Term Resource Planning Specialist⁸ and ensure that all Near Term Resource Planning outputs are timely, accurate within acceptable uncertainties, and checks are in place to maintain quality results. The

⁷ Since the reorganization, there is no longer a distinction between near term and long term from an organizational standpoint. The Near Term Resource Planning Manager referred to in the Outage Concurrence Process is being covered by the Resource Planning Manager. The organization titles will be revised in the process during the next update.

⁸ The Senior Specialist, Resource Planning, fills the role of the Near Term Resource Planning Specialist as referred to in the Outage Concurrence Process.

Resource Planning Manager stated that a review of the analyses is not regularly performed. Without a double check on the analyses performed, there is a risk the outage could be scheduled at a time that could affect system reliability.

The Outage Concurrence and Asset Availability Optimization Processes Are Misaligned

We found two processes that are not aligned on the instructions for the use of entering outages into Asset Availability. The Outage Concurrence Process, the procedure relating to this review, states approved outages are supposed to be entered into Asset Availability, and the Senior Specialist, Resource Planning, confirmed that an outage must not be indicated in Asset Availability until approval. The Asset Availability Optimization Process states that outages are supposed to be entered into Asset Availability as soon as the work required for the outage is known. TVA personnel related to both processes believe their respective process takes care of the problem. The risk owner was aware of the disagreement and stated the issue could possibly be resolved in the new version of Asset Availability.

Additional Information

When testing the sample of outages, we found Asset Availability does not have the ability to track changes to entries. In looking at one of the outages, the concurrence and approval documentation existed but were recorded for the incorrect unit. While the outage itself followed the concurrence process and had the proper concurrence and approvals, the entries into Asset Availability did not match up exactly; therefore, we were unable to track the error because Asset Availability does not leave an audit trail of changes to entries.

RECOMMENDATIONS

We recommend the Vice President, System Planning:

- Work in conjunction with the Asset Availability owners to determine if a control can be added to Asset Availability to prevent outages from being entered without first completing the outage concurrence process.
- Take steps to make sure that quality checks are performed as prescribed in the Outage Concurrence Process.
- Work in conjunction with the owner for the Asset Availability Optimization Process to address conflict between the Outage Concurrence Process and the Asset Availability Optimization Process to align the process of entering outages into Asset Availability.

TVA Management's Comments – TVA management agreed with our recommendations and plans to take actions. Prior to submitting their formal response, TVA management provided informal comments and additional information. We revised sections of the report based on the informal comments and provided the revised version of the report to TVA management to use in preparing their formal response. In response to our recommendations, the Vice President, System Planning, has agreed to (1) work in conjunction with TRO to modify Asset Availability to include an audit trail capability and automated notification for entries and record modification; (2) implement routine outage

scheduling update meetings for the Senior Specialist, Resource Planning, to brief the Manager, Resource Planning, on outage activity; and (3) work with TRO to correct the misalignment between the Outage Concurrence Process and the Asset Availability Optimization Process. See the Appendix for TVA's complete response.

Auditor's Response – The Office of the Inspector General concurs with planned actions.

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Please notify us within one year from the date of this memorandum when final action is complete. Information contained in this report may be subject to public disclosure. Please advise us of any sensitive information in this report that you recommend be withheld.

If you have any questions or wish to discuss our observations, please contact Janell B. Cunio, Senior Auditor, at (423) 785-4811 or Greg Stinson, Director, Evaluations, at (865) 633-7367. We appreciate the courtesy and cooperation received from your staff during the evaluation.



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Assistant Inspector General
(Audits and Evaluations)
ET 3C-K

JC:FAJ
Attachment

cc (Attachment):

Peyton T. Hairston, Jr., WT 7B-K
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OIG File No. 2012-14577

January 14, 2013

Robert E. Martin, ET 3C-K
Assistant Inspector General
(Audits and Inspections)

EVALUATION 2012-14577 - REVIEW OF TVA'S OUTAGE SCHEDULING RISK

TVA would like to take this opportunity to express its appreciation for the efforts your office made in evaluating the outage scheduling process, as well as the many recommendations for improvement that were made as part of that assessment. As recognized in your evaluation report, the outage scheduling process is an ongoing and evolving process, and we welcome the input of OIG in helping us to make continuous improvements to that process. Secondly, TVA appreciates the recognition that our mitigation strategy for managing outage scheduling risk was identified as designed appropriately and has helped reduce TVA's enterprise risk. System Planning (SP) staff has worked diligently to both implement this process, and then make continuous, incremental improvements to that process, so it is encouraging that those efforts are recognized as having contributed to a reduction in risk. We appreciate your efforts in making recommendations to further improve the outage scheduling process and would like to take this opportunity to communicate our action plans in response to your recommendations.

TVA agrees to take the following actions to address the provided recommendations.

Recommendations:

1. OIG recommendation 1 stated:

"Work in conjunction with the Asset Availability owners to determine if a control can be added to Asset Availability to prevent outages from being entered without first completing the outage concurrence process."

Action:

TVA agrees with this recommendation and this action is in progress. Prior to the advent of OIG's evaluation of TVA's outage scheduling risk, System Planning became part of the Asset Availability improvement project. In the course of its involvement, SP has requested the inclusion of audit trail capability and automated notification for entries and record modification for the enhanced Asset Availability system. Transmission Reliability Organization (TRO), as "owner" of the Asset Availability system has agreed the modification makes business sense and will work towards implementing this functionality.

Due Date: September 30, 2013. Owner: Jerry Wynne.

2. OIG recommendation 2 stated:

"Take steps to make sure that quality checks are performed as prescribed in the Outage Concurrence Process"

Action:

TVA agrees there are opportunities to increase oversight of the process, and will implement routine (weekly) outage scheduling update meetings between the Manager, Resource Planning and SR Specialist, Resource Planning. At these meetings the SR Specialist, Resource Planning will brief the Manager, Resource

Planning regarding outage activity including highlights; hardspots; resource adequacy; and economics.

Due Date: Complete. Owner: Forrest Forster.

3. OIG recommendation 5 stated:

“Work in conjunction with the owner for the Asset Availability Optimization Process to address conflict between the Outage Concurrence Process and the Asset Availability Optimization Process to align the process of entering outages into Asset Availability.”

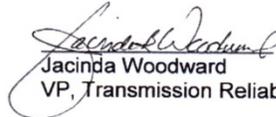
Action:

SP agrees that there is room for improving the interrelationship between the two SPPs. TRO and SP are currently working together to resolve the appearance of conflicting guidance, which is a result of the two distinct scheduling time horizons (TRO's ten-day and SP's eleven-day forward) being addressed in the SPPs. The preferred outcome will add language around TRO's ten-day time horizon to TVA SPP-30.004 TVA Chief Operating Officer Approved Method to Optimize TVA Asset Availability and refer to TVA SPP-33.4 Outage and Derate Concurrence Process for the eleven-day forward Asset Availability entry process.

Due Date: September 30, 2013. Owner: Robert Brower and Jerry Wynne.



Andrew Kosnaski
VP, System Planning



Jacinda Woodward
VP, Transmission Reliability & Operations