



Memorandum from the Office of the Inspector General

February 6, 2013

Preston D. Swafford, LP 3R-C

FINAL REPORT – AUDIT 2011-13895 – REVIEW OF BROWNS FERRY NUCLEAR
PLANT FIRE PROTECTION

Attached is our final report on our review of Browns Ferry Fire Protection. This report is for information purposes only; therefore, no response is necessary.

Recipients of this report are responsible for safeguarding it to prevent publication or other improper disclosure. Because information contained in this report may be subject to public disclosure once the report is finalized, 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 findings, please contact me at (865) 633-7450 or Lisa H. Hammer, Director, Operational Audits, at (865) 633-7342. We appreciate the courtesy and cooperation received from your staff during the review.

Robert E. Martin

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OIG File No. 2011-13895



Office of the Inspector General

Audit Report

To the Executive Vice President
and Chief Nuclear Officer,
Nuclear Power Group

REVIEW OF BROWNS FERRY NUCLEAR PLANT FIRE PROTECTION

Auditor
Jamie M. Wykle

Audit 2011-13895
February 6, 2013

ABBREVIATIONS

BFN	Browns Ferry Nuclear Plant
CO	Confirmatory Order
ERM	Enterprise Risk Management
FPRA	Fire Probabilistic Risk Assessment
LAR	License Amendment Request
MSO	Multiple Spurious Operations
NFPA	National Fire Protection Association
NPG	Nuclear Power Group
NRC	Nuclear Regulatory Commission
OMA	Operator Manual Actions
RCA	Root Cause Analysis
TVA	Tennessee Valley Authority
VP	Vice President

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MEMORANDUM DATED JANUARY 15, 2013, FROM PRESTON SWAFFORD
TO ROBERT E. MARTIN



Audit 2011-13895 – Review of Browns Ferry Nuclear Plant Fire Protection

EXECUTIVE SUMMARY

In May 2004, the Nuclear Regulatory Commission (NRC) incorporated the National Fire Protection Association's (NFPA) Standard 805 as a voluntary alternative to the existing fire protection standards as published in Section 50.48, "Fire Protection," and Appendix R of the 10 Code of Federal Regulations (10 CFR 50). On March 4, 2009, the Tennessee Valley Authority (TVA) committed to the NRC to transition Browns Ferry Nuclear Plant (BFN) to NFPA 805 by a license amendment dateⁱ of March 4, 2012.

TVA has included the BFN NFPA 805 transition project as part of fire protection risk in its Enterprise Risk Management process. We reviewed the BFN transition to the NFPA 805 program. Our audit objective was to evaluate BFN's performance in transitioning to the NFPA 805 program requirements by the license amendment date.

TVA did not meet the NFPA 805 transition date for License Amendment Request Submittal of March 2012 and has revised its commitment date to March 2013. We determined the Nuclear Power Group's delays in transitioning to NFPA 805 adversely impacted BFN's ability to meet the 2012 commitment date. Specifically, historical indecisiveness coupled with a lack of due diligence and inadequate attention to emerging industry fire protection regulations contributed to revising the commitment date. In addition, the Nuclear Power Group's mitigation strategy as provided in the Enterprise Risk Management does not include consideration of the consequences of not meeting the March 2013 deadline, which would include NRC-assessed penalties.

We recommend the Executive Vice President and Chief Nuclear Officer develop contingency plans in case of unsuccessful risk mitigation and continue monitoring the project activities related to meeting the new commitment date.

In response to a draft of our report, TVA management agreed with our recommendation and has taken action to address this recommendation. See the Appendix for management's complete response.

ⁱ Plants transitioning to NFPA 805 are required to change their existing licensing basis from 10 CFR 50, Appendix R, to 10 CFR 50.48(c).

BACKGROUND

On March 22, 1975, after commercial operation began on Browns Ferry Nuclear Plant (BFN) Units 1 and 2, a fire at BFN led to the shutdown of both operating units. Subsequently, the Nuclear Regulatory Commission (NRC) published Section 50.48, "Fire Protection," and Appendix R of the 10 Code of Federal Regulations (10 CFR 50). Section 50.48 applies to all licensed nuclear power electric generating stations in operation, whereas Appendix R applies only to those plants like BFN operating prior to January 1, 1979, with some exceptions. In general, different fire protection requirements are applicable to licensed units that began commercial operations before 1979 and those that began commercial operations after 1979. These fire protection rules are included as part of a nuclear plant's licensing basis.

In May 2004, the NRC made additional changes with regard to fire protection regulations by approving the incorporation of the National Fire Protection Association (NFPA) Standard 805 into 10 CFR 50.48(c). NFPA 805 was a voluntary alternative to the fire protection rules set forth in Appendix R. NFPA 805's methodology includes establishing fire protection (1) systems and features with design elements for all modes of reactor operation and (2) procedures, systems, and features for those nuclear power plants that are either decommissioning or permanently shut down.

On March 4, 2009, TVA committed to the NRC to transition BFN to the NFPA Standard 805 by a License Amendment Request (LAR)¹ date of March 4, 2012. However, TVA notified the NRC in October 2011 the transition date would not be met. TVA subsequently committed to an LAR date of March 2013.

TVA has included the Fire Protection Risk in its Enterprise Risk Management (ERM) catalog since fiscal year 2010. Specifically, the current fire protection risk includes the ". . . risk of not meeting the License Amendment Request date of March 29, 2013 (BFN) for transitioning to National Fire Protection Association (NFPA) 805 requirements . . ." According to NRC guidance, if TVA fails to meet the submittal date, or if the LAR is unacceptable, the NRC would take traditional enforcement action. This action would consist of a Notice of Violation and the use of Enforcement Policy discretion to allow for possible civil penalties, up to and including daily civil penalties, depending on the specifics of the situation.

¹ Plants transitioning to NFPA 805 are required to change their existing licensing basis from 10 CFR 50, Appendix R, to 10 CFR 50.48(c).

OBJECTIVE, SCOPE, AND METHODOLOGY

TVA has included the BFN NFPA 805 transition project as part of fire protection risk in its ERM process. We reviewed the BFN transition to the NFPA 805 program. Our audit objective was to evaluate BFN's performance in transitioning to the NFPA 805 program requirements by the license amendment date. To achieve our objective, we:

- Identified and reviewed relevant TVA policies, BFN procedures, and NRC regulations related to the NFPA 805 transition project.
- Reviewed documentation related to the NRC's inspections, TVA's RCA report, and TVA's NFPA 805 transition plan and corresponding schedule.
- Attended (1) NRC public meetings and (2) a BFN monthly face-to-face NFPA 805 transition meeting.
- Interviewed TVA Nuclear Power Group (NPG) corporate and BFN personnel to gain an understanding of the history of the transition.
- Interviewed NRC personnel onsite at BFN regarding actions to be taken by the NRC.
- Obtained ERM documentation to determine risks and mitigation plans for BFN's NFPA 805 transition project.

We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

FINDINGS

TVA did not meet the NFPA 805 transition date of March 2012 and has now committed to an LAR date of March 2013. As described below, we determined NPG's delays in transitioning to NFPA 805 adversely impacted BFN's ability to meet the 2012 commitment date. In addition, NPG did not have a contingency plan in place in the event the commitment date became unattainable.

Delays Impacted BFN's Ability to Meet the 2012 Commitment Date

Although NFPA 805 was approved for use as a voluntary alternative to Appendix R in May 2004, TVA did not commit to transitioning until March 2009. A TVA root cause analysis (RCA), issued in March 2010 in response to three noncompliances with fire protection regulations, stated that disagreement over Appendix R compliance alternatives existed between 2006 and 2008. According to the RCA, site groups advocated transitioning to NFPA 805 while NPG

corporate management supported submitting operator manual actions² (OMA) exemption requests. The RCA further states:

The Appendix R compliance strategy was decided sometime in 2008 by the CNO, who elected to adopt a 'wait and see' posture with regard to NFPA 805 because of the large cost and difficulties experienced by the pilot plants. The BFN Licensing Manager discussed the option with the former CNO twice but when presented with an emphatic response from the former CNO, did not clearly point out the potential regulatory risks of not committing to NFPA 805.³

TVA's RCA self-identified the root causes of its noncompliances as a combination of an entrenched Appendix R compliance position, lack of rigorous review and resolution of regulatory documents, passive management of the BFN Appendix R program, and failure to aggressively implement identified actions. According to the RCA:

As the NRC Fire Protection requirements and the NRC/Industry 'Fire Protection dialog' evolved over time, TVA failed to acknowledge certain non-compliant aspects of the Browns Ferry Fire Protection program. As a result, the September/October 2009 NRC Triennial Fire Protection Inspection identified three 'Greater Than Green' findings, two of which were symptomatic of the disconnect between the TVA and NRC understandings of the Browns Ferry Fire Protection Licensing Basis.

As described in the March 2010 RCA, TVA did not immediately transition to NFPA 805 but instead took more of a 'wait and see' approach.

In March 2009, TVA added a Vice President (VP) of Nuclear Engineering who made the decision to make significant risk reduction modifications and procedure changes to reduce OMAs at BFN in parallel with the development of NFPA 805 analysis and application. Although TVA made progress toward transitioning to NFPA 805, TVA informed the NRC in October 2011 that the March 2012 transition date would not be met. According to the VP, Nuclear Engineering, failure to meet the March 2012 transition date was primarily due to the following:

- In November 2009, the NRC released Multiple Spurious Operations (MSO) guidance. The MSO scope was much larger than originally anticipated requiring further analysis and documentation. This expanded the scope of the NFPA 805 transition project.

² A proceduralized activity carried out by plant personnel outside the control room to respond to a fire and bring the plant to a safe and stable condition.

³ The Chief Nuclear Officer discussed in the RCA is no longer with TVA.

- The decision to make modifications and procedure improvements for risk reduction parallel with the development of NFPA 805 analysis and application made the plant safer and faster but impacted the schedule. According to the VP, Nuclear Engineering, most utilities perform engineering, safety cable routing, and modification identification necessary to apply for the NFPA 805 license and perform plant modifications after the license approval. These parallel modifications were a faster way to make the plant safer but negatively impacted the NFPA 805 transition schedule.
- BFN is a 3-unit plant, and completing modifications and procedures to the plant in parallel have created a challenge. According to NPG personnel, the cable routing data for BFN required reconstitution to meet the MSO requirements and reduce OMAs.

While the above reasons for failing to meet the commitment date are valid, we believe other factors also impacted the timeframe for commitment. Specifically:

- As an element of the NFPA 805 project plan, BFN had to complete a Fire Probabilistic Risk Assessment (FPRA), which included an FPRA peer review of the risks assessed. On September 8, 2011, an assessment on BFN's FPRA Peer Review readiness was conducted by an independent expert. The expert recommended TVA delay the peer review that was scheduled for the week of October 24, 2011, due to the fact BFN was not ready for the peer review. TVA decided to take the expert's recommendation and delayed the FPRA until the week of January 23, 2012, but the delay in conducting the peer review contributed to BFN not meeting its transition date of March 4, 2012.
- According to the former NRC resident inspector, in 2009, the NRC asked plants to delay NFPA 805 implementation schedules because the NRC was overwhelmed with too many LAR submittals. Delaying the schedule could have extended the commitment date for approximately 1 year without having to apply for enforcement discretion extension. TVA opted not to delay because they had committed to meeting the original submittal date in response to the RIS 2006-10.

As pointed out above, TVA's delays in making the decision to transition negatively impacted the project. On January 13, 2012, TVA informed the NRC the new commitment date would be March 29, 2013. On February 17, 2012, TVA submitted the additional planned fire risk reduction modifications for BFN Units 1, 2, and 3. The NRC subsequently extended TVA's enforcement discretion until March 29, 2013, by a confirmatory order (CO)⁴ issued May 16, 2012. As previously stated, according to NRC guidance, if TVA " . . . fails to meet the submittal date established by the CO, or if the LAR is unacceptable, the

⁴ A CO is an order that confirms the commitments made by a licensee or individual to take certain actions. Before issuance of the CO, the licensee or individual and the NRC mutually agree on the terms of the order.

licensee would be in violation of the CO and the NRC would take traditional enforcement action. Enforcement would consist of a Notice of Violation and the use of Enforcement Policy discretion to allow for possible civil penalties, up to and including daily civil penalties, depending on the specifics of the situation.” NPG personnel stated TVA’s internal schedule currently shows TVA remains on track to complete the submittal in accordance with the confirmatory order due date.

Mitigation Strategy to Reduce Consequences Needs Improvement

TVA has recognized the Fire Protection Risk in its ERM catalog since fiscal year 2010 and rated it as one of the top five risks in the compliance with laws and regulations category on the July 13, 2011, ERM risk map. In March 2012, the risk was defined as a three-fold risk which included the “. . . risk of not meeting the License Amendment Request date of March 29, 2013, (BFN) for transitioning to National Fire Protection Association (NFPA) 805 requirements.”⁵ According to the risk summary, NPG believed the risk of not meeting the March 29, 2013, date was “low” but recognized increased regulatory scrutiny had resulted from the extension of the LAR submittal date.

NPG’s mitigation strategy to meet the commitment date was to closely monitor the project activities, which included performing evaluations, developing transition programs, performing the probabilistic risk assessment, and preparing and submitting the LAR. NPG’s contingency actions to reduce the consequences of not meeting the deadline included monthly management briefings and weekly team meetings, maintaining project milestones, weekly status meetings to closely track all open issues/actions, and licensing involvement in monitoring schedule progress.

However, in our opinion, additional actions are needed to adequately reduce the potential consequences of the risk, which include civil penalties as well as damage to TVA’s reputation. Current actions do not address funds necessary to cover possible civil penalties nor potential steps to be taken to repair reputational damage if the risk occurs. Although, according to the VP, Nuclear Engineering, TVA is on track to meet the March 29, 2013, LAR date, past experience has proven the potential exists for not meeting the required date.

RECOMMENDATIONS

We recommend the Executive Vice President and Chief Nuclear Officer develop contingency plans in case of unsuccessful risk mitigation and continue monitoring the project activities related to meeting the new commitment date.

⁵ The remaining two risks were not related to BFN.

MANAGEMENT'S RESPONSE

NPG management responded to a draft of this report. To address our recommendation, management stated a risk and mitigation dashboard indicator has been implemented. This dashboard is used in the regular senior leadership updates. Further, “the technical work for the project is essentially complete, and detailed reviews required for the submittal package are in progress. TVA remains on track to complete the submittal in accordance with the confirmatory order due date.”

We agree with the actions taken by NPG management.

January 15, 2013

Robert E. Martin, ET 3C-K

REQUEST FOR COMMENTS – DRAFT AUDIT 2011-13895 – REVIEW OF BROWNS FERRY
NUCLEAR PLANT FIRE PROTECTION

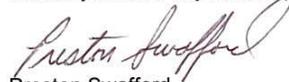
Nuclear Power Group has reviewed the subject draft report and provides the following comments:

The submittal date for the License Amendment Request (LAR), as referenced on page 5 of the draft report has been revised to March 2013. This date will meet our commitment to the Nuclear Regulatory Commission (NRC).

The following is offered as our response to the recommendation in the report:

The project management team has implemented a risk and mitigation strategy dashboard indicator which greatly improved the analysis of risk factors and documentation of mitigation strategy. This tool is used at regular senior leadership updates. Also, weekly update meetings with senior management have continued. A resourced logic driven schedule is used. A formal public pre-submittal meeting was held at NRC headquarters, where project status was reviewed with the NRC. At this meeting, TVA confirmed that comments regarding submittals from other utilities' submittals have been diligently addressed. Completion of cable routing documentation did consume significant additional time and effort. At this time, the technical work for the project is essentially complete and detailed reviews required for the submittal package are in progress. TVA remains on track to complete the submittal in accordance with the confirmatory order due date.

Should you have any further questions, please feel free to contact me.


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