

Technical Review of TIA 2013-02

I. Discussion**A. The TIA Should Not Contain Generic Information that is Unnecessary to Answering the Specific Question Regarding Braidwood and Byron**

The purpose of the TIA was to address a specific question regarding whether the Braidwood and Byron licensing bases allow a single spurious actuation assumption to evaluate post-fire safe shutdown capabilities. The Office of Nuclear Reactor Regulation (NRR) properly concluded that assuming a single spurious actuation is acceptable under the licensing bases for these plants. NEI agrees with NRR's conclusion; as the TIA states, the NRC approved the single spurious actuation assumption through specific language in the Braidwood and Byron licensing bases. But the TIA goes beyond answering the specific question posed by NRC Region III staff. Instead, it discusses generally the 10 C.F.R. § 50.48 requirements, which is unnecessary for responding to the Region's inquiry.

For example, "Question 2" in the TIA addresses the generic issue of whether reliance on a single spurious operation assumption will satisfy Section 50.48(a). The Braidwood and Byron licensing bases already implicitly addressed this issue and suggest that the assumption can meet the requirements. Nonetheless, the response to Question 2 describes the regulatory requirement and associated technical considerations, and states that the answer to the question is "no." Adding to the confusion, the response further states that "the reasoning differs, depending upon whether one is looking from the standpoint of the requirements of the regulations, versus consideration of the matter from a technical standpoint."¹ This construct is confusing, unnecessary, and erroneous.

First, it is not logical to consider separate "regulatory" and "technical" answers to the question of whether a regulatory requirement is met. Doing so implies that it would be possible to have two conflicting answers to the question. Certainly, this is not the case. With respect to a particular plant, there can only be one answer to the question of whether a regulatory requirement is met.

Second, there is no reason to include this generic question in the TIA. The TIA should – and does – examine the Braidwood and Byron licensing bases. But the Question 2 discussion is not relevant to Braidwood and Byron, and adds nothing to the analysis of those plants' licensing bases. It serves no purpose other than to confuse the issue with extraneous (and inaccurate) information.

Including extraneous information in the TIA is problematic because that information may be used generically for purposes beyond which the TIA was intended. In fact, this is already occurring. A May 12, 2014 NRC response to a disputed violation for the River Bend Station cites the TIA to support the staff's conclusion that River Bend is required to consider multiple spurious actuations: "[t]herefore, there is a regulatory requirement for River Bend Station to consider multiple spurious actuations, as

¹ TIA-2013-02 at 5.

supported by [TIA 2013-02].”² The NRC response then quotes the TIA’s conclusion that plants licensed both pre- and post-1979 “must consider...multiple spurious actions in order to satisfy the requirements of 10 C.F.R. § 50.48(a).”³ As discussed further below, this conclusion is inaccurate. The erroneous statement will only be perpetuated and applied generically at other plants if the NRC does not revise the TIA appropriately.

The Braidwood and Byron examples demonstrate that resolution of these issues often can only be achieved by examining a plant’s specific licensing basis. TIAs should not be used to establish generic positions. Internal NRC guidance makes clear that “[w]hile the NRR staff should answer as many of the issues raised in a TIA as are answerable given plant-specific concerns and existing technical positions, the NRR staff should not circumvent the generic issue or issues for resolution processes by establishing new staff positions in responses to TIAs.”⁴

B. Contrary to the TIA, the NRC Has Not Always Required Consideration of Multiple Spurious Actuations

a. Regulatory and Licensing History

The TIA incorrectly states that “consideration of associated circuits, including multiple spurious operations, has always been considered to be required analyses in order to demonstrate compliance with the rule.”⁵ The regulatory and licensing histories show that the NRC has not taken a consistent position with respect to requiring consideration of multiple spurious actuations.

The Commission itself has recognized the inconsistent staff positions on this issue. In 2006, the NRC staff submitted to the Commission SECY-06-0196, “Issuance of Generic Letter 2006-xx, ‘Post-Fire Safe-Shutdown Circuits Analysis Spurious Actuations.’” In that paper, the staff proposed issuing a Generic Letter (GL) requesting licensees to submit a description of their licensing basis regarding multiple spurious post-fire safe shutdown circuit analyses and the basis for their compliance with the fire protection regulations. The proposed GL stated that the NRC was “reaffirming” its position that multiple spurious actuations must be considered under Section 50.48 and General Design Criterion 3. The backfit discussion in the proposed GL stated that the NRC’s position “has been” that all multiple spurious actuations must be considered.

² Letter from J. Clark, NRC, to E. Olson, Entergy Operations, Inc., “Response to River Bend Station Disputed Violation and Errata to NRC Triennial Fire Protection Inspection Report 05000458/2013007.”

³ *Id.*

⁴ NRR Office Instruction COM-106, Rev. 3, “Control of Task Interface Agreements,” at 9 (March 24, 2008).

⁵ TIA-2013-02 at 7 n.2.

The Commission rejected the proposed GL, stating that “the staff has not made a compelling case for its backfit position.”⁶ In their vote sheets, several Commissioners acknowledged the complex history of this issue and objected to the staff’s characterization that consideration of multiple spurious actuations had always been required:

- Commissioner McGaffigan stated that “it is absolutely clear that the staff has taken multiple positions on this issue in the past two decades. Choosing one of those positions, and claiming that it was the enduring staff position and that this Generic Letter therefore meets the compliance backfit exception, simply does not pass the laugh test.”
- Commissioner Merrifield stated that he was “not persuaded by the staff’s argument that multiple simultaneous spurious actuations were always included as part of the licensing basis.”
- Commissioner Lyons stated that the historical documents “are not definitive regarding the number of spurious actuations that must be analyzed.”

In disapproving the proposed GL, the Commission clearly found that the staff has not taken a consistent position on this very issue. It is untenable for the staff to simply ignore this regulatory history in the TIA.

In addition, the TIA’s statement on the consistency of the staff’s position is contrary to the licensing history for several plants. NEI has identified at least ten examples where a plant’s licensing basis reflects reliance on the assumption of a single spurious actuation: Three Mile Island, Susquehanna, Peach Bottom, Comanche Peak, Hope Creek, Palo Verde, Columbia, Dresden, Byron, and Braidwood.⁷ In each of these cases, the NRC approved the licensee’s safe shutdown methodology, including single spurious actuations. Had the NRC always interpreted its rules to require consideration of multiple spurious actuations, approval of the single actuation approach would have involved an exemption or deviation request.

For example, in a letter dated December 6, 1996, the Pennsylvania Power and Light Company (PP&L) explained the spurious operations criteria for the Susquehanna station as follows:

Fire induced hot shorts although unlikely can cause the spurious operation of equipment capable of affecting safe shutdown systems. Due to the lower probability of these types of cable faults, simultaneous spurious operation of all potentially affected equipment is not required for

⁶ Staff Requirements – SECY-06-0196 – Issuance of Generic Letter 2006-XX, “Post-Fire Safe-Shutdown Circuits Analysis Spurious Actuations,” Dec. 15, 2006.

⁷ See, e.g., Three Mile Island Safety Evaluation Report (Sept. 9, 1988); Susquehanna Safety Evaluation Report (Oct. 21, 1997); Palo Verde Safety Evaluation Report, Supplement No. 6 (Oct. 16, 1984); Columbia Safety Evaluation Report (Nov. 11, 1987); Dresden Safety Evaluation Report (July 6, 1989); Comanche Peak Steam Electric Station Safety Evaluation Report, NUREG-0797, Supplement No. 23 (Feb. 2, 1993); Peach Bottom Atomic Power Station Safety Evaluation Report (Sept 19, 1993)

cases other than the case of two valves in a Hi/Lo Pressure interface line. For spurious operation of equipment, other than Hi/Lo pressure interface components, spurious operations are to be mitigated on a one-at-a-time basis.⁸

These spurious operations criteria were submitted for NRC approval as part of PP&L's Appendix R Safe Shutdown Analysis. The NRC's Safety Evaluation Report explicitly recognized the licensee's single spurious assumption, stating:

During this evaluation all circuits which could cause undesirable spurious operations were identified and evaluated for potential fire damage. With the exception of components which comprise a high/low pressure interface boundary the licensee's evaluation considered any and all spurious operations that may occur as a result of a single fire, on a one-at-a-time basis (i.e., non-concurrent). That is, for each fire area all potential spurious operations that may occur as a result of a postulated fire were identified, and corrective actions were implemented as needed on a one-at-a-time basis.⁹

The SER concluded that the "licensee's method of identifying and resolving potential associated circuit concerns conforms to the requirements of Section III.G and III.L of Appendix R to 10 CFR 50 and staff guidance provided in Generic Letter 81-12 for the protection of safe shutdown capability and is, therefore, acceptable."¹⁰

As another example, in a submittal dated 10/2/87, the Comanche Peak Steam Electric Station (CPSES) (Docket nos. 50-445 and 50-446) provided the NRC with its Fire Protection Report. The submittal states:

The "worst case" fire-induced plant transient considers the following for a fire in any single CPSES fire area:

- a. One spurious actuation or signal;
- b. The loss of all automatic function (signal, logic) from the circuits located in the fire area in conjunction with one worst case spurious actuation or signal; and
- c. Spurious actuation of the redundant valves in any one high/low pressure interface line.

In response to the CPSES submittal, the NRC issued NUREG-0797, Supplement No. 23, Safety Evaluation Report, dated Feb. 2, 1993. The SER states:

⁸ Letter from R.G. Byram (Senior Vice President-Nuclear, PP&L) to U.S. NRC Document Control Desk, *Susquehanna Steam Electric Station Appendix R, Section III.G and III.L Spurious Operations Criteria*, December 6, 1996, at Attach. 1, pg. 5.

⁹ *Evaluation of Fire Protection Program Issues, Safe Shutdown Methodology and Analysis of Associated Circuits*, Susquehanna Steam Electric Station (SSES), Units 1 and 2 (TAC Nos. M90600 and M90601), at Enclosure, pg. 17.

¹⁰ *Id.* at pg. 28.

SSER 21 contained a review of the applicant's fire protection program described in the FSAR through Amendment 71 and in Revision 1 of the Fire Protection Report (FPR) submitted by the applicant in a letter dated April 29, 1988. The applicant has since revised its fire protection program in Amendments 75, 76, and 78 to the FSAR and by submitting Revisions 2 and 3 to the FPR in letters dated July 19, 1989 and September 22, 1989, respectively.

In the case of Hope Creek Generating Station, "On July 25, 1986, PSEG received the licenses to operate Hope Creek at 100% power that included a condition that allows PSEG to make changes to the approved fire protection program without prior approval of the NRC only if those changes would not adversely affect the ability to achieve and maintain shutdown in the event of a fire." Within the approved fire protection program, the following statements are made:

Section 9A.1.5 of the submitted Fire Protection Program states in part: In evaluating the effects of postulated transient and/or in situ exposure fires on safe shutdown equipment and raceways, the following set of assumptions are used:

1. Spurious operation caused by hot shorts, open circuits or shorts to ground is considered, unless it can be shown in the analysis that such spurious operation will not occur.
2. The safe shutdown capability should not be adversely affected by any one spurious actuation or signal resulting from a fire in any plant area; and
3. The safe shutdown capability should not be adversely affected by a fire in any plant area which results in the loss of all automatic function (signals, logic) from the circuits located in the area in conjunction with one worst case spurious actuation or signal resulting from the fire; and
4. The safe shutdown capability should not be adversely affected by a fire in any plant area which results in simultaneous spurious actuation of all valves in high-low pressure interface lines.

Further, in a Sept 30, 1986, letter to the NRC PECO submitted Rev. 0 of the Peach Bottom Atomic Power Station Fire Protection Program. This submittal contained the Appendix R safe shutdown analysis and provided confirmation that the fire program had been developed, as required by CAL 86-07.

Section 5.1 of the submittal states:

The potential consequences of fire-caused damage to electrical cabling are assumed to include circuit failures such as open circuits, short circuits, hot shorts, and shorts to ground. The evaluation of spurious component operation that may result from circuit failures is limited by the following assumptions:

1. Only one circuit failure per system resulting in spurious operation of a component other than a high/low pressure interface valve may occur per system due to a postulated fire in any given area.

2. Two or more circuit failures resulting in spurious operation of two or more valves in series at a high/low pressure interface may occur due to a postulated fire in any given area.”

On September 16, 1993, the NRC issued a Safety Evaluation Report, which approved the Sept 30, 1986 submittal (as updated by various updates). Specifically, the SER concludes “that the safe shutdown capability at Peach Bottom, as described in the PBAPS Fire Protection Program, with approved exemptions, satisfies the requirements of Section III.G and III.L of Appendix R to 10 CFR Part 50.”¹¹ More specifically, the staff described its review of the licensee’s treatment of spurious operations in Section 2.5.3 of the SER. That discussion did not take exception to the licensee’s assumption regarding single spurious operation described in its September 30, 1986 letter.

Thus, contrary to the TIA, these NRC approvals demonstrate that the staff has not consistently required the consideration of multiple spurious actuations, nor has the staff required exemptions from Appendix R for stations that did not consider multiple spurious actuations.

b. Textual Interpretation of the Regulation

The TIA attempts to justify the staff’s position on multiple spurious actuations by relying on a textual reading of Appendix R (Paragraph III.G.b.), which refers to “circuits,” “hot shorts,” and “shorts to ground” in plural.¹² Although this may be one reasonable interpretation of the regulation, it is not the only reasonable interpretation. Considering these terms in the context of the regulation, it is possible that they are plural only because they relate to the “cables or equipment” and “non-safety circuits” referenced at the beginning of the sentence. The plural form is simply a byproduct of sentence structure. There is no indication on the face of the regulation that the plural form mandates licensees to assume multiple spurious actuations for their safe-shutdown analyses.

The regulatory language is simply not specific enough to dictate precisely how a licensee must perform its safe shutdown analysis. Therefore, implementation of this requirement has often been resolved through the plant-specific licensing process. As reflected in the Commission’s voting record on SECY-06-0196, it is untenable for the staff to rely on this language – which is ambiguous at best – to impose a retroactive interpretation that is inconsistent with the licensing history on this issue.

c. Generic Letters

¹¹ *Safety Evaluation Report by the Office of Nuclear Reactor Regulation of the Peach Bottom Atomic Power Station Fire Protection Program, Peach Bottom Atomic Power Station, Units 2 and 3 Docket Nos. 50-277 and 50-278, September 16, 1993, at cover letter pg. 1.*

¹² The regulation reads, “[e]xcept as provided for in paragraph G.3 of this section, where cables or equipment, including associated non-safety circuits that could prevent operation or cause maloperation due to hot shorts, open circuits, or shorts to ground, of redundant trains of systems necessary to achieve and maintain hot shutdown conditions are located within the same fire area outside of primary containment, one of the following means of ensuring that one of the redundant trains is free of fire damage shall be provided...”

Aside from the textual interpretation discussed above, in a footnote the staff seems to argue that a generic position requiring consideration of multiple spurious actuations was established in a letter clarifying an information request contained in Generic Letter 81-12, *Fire Protection Rule (45 FR 76602, November 19, 1980)*, February 20, 1981.¹³ Specifically, the staff reasons that because Generic Letter 81-12 was issued prior to the Standard Review Plan used to guide the licensing review of Byron and Braidwood, "it can be inferred that the staff had established its position on the associated circuits matter prior to its review . . . and never intended a lesser standard or practice to be applied based on whether a licensee had received a license before or after January 1, 1979."¹⁴

But this reasoning is seriously flawed for several reasons. First, the Clarification Memorandum referenced by the staff does not directly address the question of whether a single or multiple spurious assumption is valid in performing a safe shutdown analysis. Second, even if the clarification letter provided such definitive guidance, it explicitly states:

The guidelines for protecting the safe shutdown capability from the fire-induced failures of associated circuits are not requirements. These guidelines should be used only as guidance when needed. These guidelines do not limit the alternatives available to the licensee for protecting the shutdown capability. All proposed methods for protection of the shutdown capability from fire-induced failures will be evaluated by the staff for acceptability.¹⁵

Contrary to the position taken by the staff, a proper inference from the text quoted above is that the NRC never considered the approaches suggested in the Clarification Memorandum to be required in order to comply with Appendix R to Part 50. This inference is consistent with the Commission's conclusion in SRM-SECY-06-0196, the licensing examples provided above, and subsequent Generic Letters issued close in time to the Clarification Memorandum. On this last point, the question and answer section of Generic Letter 86-10, *Implementation of Fire Protection Requirements*, states:

5.3.10 Design Basis Plant Transients

QUESTION

What plant transients should be considered in the design of the alternative or dedicated shutdown systems?

RESPONSE

¹³ See TIA-2013-002 at 7 n.2. The footnote discusses a memorandum To: Darrell G. Eisenhut, Director, Division of Licensing, NRR, From: R.J. Mattson, Director, Division of Systems Integration, NRR, *Fire Protection Rule – Appendix R*, March 22, 1982 ("Clarification Memorandum").

¹⁴ TIA-2013-002 at 7 n.2.

¹⁵ Clarification Memorandum, at Enclosure 2, pg. 2 (emphasis in original).

Per the criteria of Section III.L of Appendix R a loss of offsite power shall be assumed for a fire in any fire area concurrent with the following assumptions:

- a. The safe shutdown capability should not be adversely affected by any one spurious actuation or signal resulting from a fire in any plant area; and
- b. The safe shutdown capability should not be adversely affected by a fire in any plant area which results in the loss of all automatic function (signals, logic) from the circuits located in the area in conjunction with one worst case spurious actuation or signal resulting from the fire; and
- c. The safe shutdown capability should not be adversely affected by a fire in any plant area which results in spurious actuation of the redundant valves in any one high-low pressure interface line.¹⁶

The NRC inspection procedure describing the guidance provided in Generic Letter 86-10, stated:

The three assumptions of Appendix R Question and Answer 5.3.10 are meant for independent use (that is, only one assumption applies for any given configuration in a reactor plant). These assumptions are therefore consistent with the established NRR review practice of requiring licensees to analyze for any and all spurious actuations or failures where no such spurious actuations or failures occur simultaneously.¹⁷

These Generic Letters undermine, rather than support the staff's position that the agency has taken a consistent, longstanding position requiring an assumption of multiple spurious actuations in order to comply with Appendix R or 10 C.F.R. § 50.48.

d. Backfit Standard

The consistency of the NRC's regulatory interpretation is an essential element of the agency's backfit determinations on this issue. Under 10 C.F.R. § 50.109(a)(1), a backfit includes, in part, "the imposition of a regulatory staff position interpreting the Commission's regulations that is either new or different from a previously applicable staff position" (emphasis added). As described above, the position in the TIA that NRC regulations require consideration of multiple spurious actuations differs from positions the staff has taken previously.

Additionally, the TIA states that plants must consider multiple spurious actions unless "the NRC had reviewed and approved the consideration of a single spurious actuation, and there exists a cognizable

¹⁶ Generic Letter 86-10, at pg. 33-34, April 24, 1986 (emphasis added).

¹⁷ Postfire Safe Shutdown, Emergency Lighting and Oil Collection Capability at Operating and Near-Term Operating Reactor Facilities, Inspection Procedure 64100, at ¶ e.2(f)(emphasis added).

and technically-defensible NRC safety basis for the NRC's approval."¹⁸ This notion is inconsistent with NUREG-1409, "Backfitting Guidelines." NUREG-1409 states that "once the SER is issued signifying staff acceptance of the programs described in the SAR, the licensee should be able to conclude that his commitments in the SAR satisfy the NRC requirements for a particular area. If the staff was to subsequently require that the licensee commit to additional action other than that specified in the SAR for a particular area, such action would constitute a backfit."¹⁹ The NUREG says nothing about also requiring a "cognizable and technically-defensible" safety basis. The TIA attempts to create a new standard for backfitting, which shifts the burden of proof from the NRC staff (to justify a backfit) to the licensee (to demonstrate, again, the validity of its licensing basis). As discussed above, this portion of the TIA (*e.g.*, the "Question 2" discussion) is unnecessary and should be deleted.

II. Conclusion

NEI agrees with the TIA's analysis and outcome regarding the acceptability of the single spurious actuation assumption for Braidwood and Byron. But, the TIA unnecessarily muddies the waters by including extraneous, incorrect generic information on the need to consider multiple spurious actions. The NRC should revise the TIA to remove this information. NEI would welcome the opportunity to discuss specific revisions with the staff, or to discuss this issue generally.

¹⁸ TIA-2013-02 at 6.

¹⁹ NUREG-1409, App. D at 19.