February 15, 2018

L-2018-001

10 CFR 50.90

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555-0001

Re: Turkey Point Nuclear Plant, Units 3 and 4
Docket Nos. 50-250 and 50-251

Supplement to Response to Fourth Request for Additional Information Regarding License Amendment Request 236, Revision to the Technical Specifications to Adopt Risk Informed Completion Times TSTF-505, Revision 1, "Provide Risk-Informed Extended Completion Times – RITSTF Initiative 4b"

References:

1. Florida Power & Light Company letter L-2014-369, "License Amendment Request No. 236 Revision to the Technical Specifications to Adopt Risk Informed Completion Times TSTF-505, Revision 1, 'Provide Risk-Informed Extended Completion Times – RITSTF Initiative 4B'," December 23, 2014 (ML15029A297)
2. NRC E-mail "Request for Additional Information re. Turkey Point 3 & 4 LAR-236 (CACs MF5455 & MF5456)," April 14, 2016 (ML16105A459)
3. NRC E-mail "Request for Additional Information - Turkey Point 3 & 4 LAR-236 (CACs MF5455 & MF5456)," April 18, 2016 (ML16110A004)
4. NRC E-mail "Request for Additional Information re. Turkey Point 3 & 4 LAR-236 (CACs MF54555 & MF5456)," June 1, 2016 (ML16154A339)
5. Florida Power & Light Company letter L-2016-116, "Response to Request for Additional Information Regarding License Amendment Request 236, Revision to the Technical Specifications to Adopt Risk Informed Completion Times TSTF-505, Revision 1, 'Provide Risk-Informed Extended Completion Times- RITSTF Initiative 4b'," June 16, 2016 (ML16180A178)
6. Florida Power & Light Company letter L-2016-136, "Second Response to Request for Additional Information Regarding License Amendment Request 236, Revision to the Technical Specifications to Adopt Risk Informed Completion Times TSTF-505, Revision 1, 'Provide Risk-Informed Extended Completion Times - RITSTF Initiative 4b'," August 11, 2016 (ML16243A104)

7. Florida Power & Light Company letter L-2017-006, "Supplement to License Amendment Request 236, Revision to the Technical Specifications to Adopt Risk Informed Completion Times TSTF-505, Revision 1, 'Provide Risk-Informed Extended Completion Times – RITSTF Initiative 4b'," February 9, 2017 (ML17060A249)
8. NRC E-mail "Request for Additional Information Re. Turkey Point TSTF-505 LAR 236 (CACs MF5455 and MF5456)" March 30, 2017
9. Florida Power & Light Company letter L 2017-063, "Response to Third Request for Additional Information Regarding License Amendment Request 236, Revision to the Technical Specifications to Adopt Risk Informed Completion Times TSTF-505, Revision 1, 'Provide Risk-Informed Extended Completion Times –RITSTF Initiative 4b'," April 27, 2017 (ML17117A618)
10. NRC E-mail "Request for Additional Information - Turkey Point 3 & 4 LAR-236 (CACs MF5455 & MF5456)," August 10, 2017 (ML17223A061)
11. Florida Power & Light Company letter 2017-168 "Response to Fourth Request for Additional Information Regarding License Amendment Request 236, Revision to the Technical Specifications to Adopt Risk Informed Completion Times TSTF-505, Revision 1, "Provide Risk-Informed Extended Completion Times – RITSTF Initiative 4b," October 30, 2017

In Reference 1, as supplemented by References 5, 6, 7, 9, and 11, Florida Power & Light Company (FPL) submitted license amendment request (LAR) 236 for Turkey Point Units 3 and 4. The proposed amendment would revise the Technical Specifications (TS) to implement TSTF-505, Revision 1, "Provide Risk-Informed Extended Completion Times RITSTF [Risk Informed TSTF] Initiative 4b."

During a conference call on November 21, 2017, the NRC staff requested supplemental information to clarify the responses in Reference 11. The Enclosure to this letter provides FPL's response to the request for supplemental information.

Attachment 1 to the Enclosure provides markups of the operating licenses for Turkey Point Units 3 and 4 that add a license condition regarding PRA methods used in the Risk Informed Completion Time Program. These markups supersede the markups of the operating licenses in Reference 11. Attachment 2 provides a markup of TS 6.8.4.n, Risk Informed Completion Time. This markup supersedes the markup of proposed TS 6.8.4.n, Risk Informed Completion Time, in Reference 11. Attachment 3 contains a table showing disposition and resolution of open peer review findings and self-assessment open items.

This supplemental information does not alter the conclusions in Reference 1 that the changes do not involve a significant hazards consideration pursuant to 10 CFR 50.92, and there are no significant environmental impacts associated with the changes.

No new or revised commitments are included in this letter.

Should you have any questions regarding this submittal, please contact Robert Hess, Licensing Manager, at (305) 246-4112.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on February 15, 2018

Sincerely,

Robert Coffey
Regional Vice President - Southern Region
Florida Power & Light Company

Enclosure

cc: NRC Regional Administrator, Region II
NRC Senior Resident Inspector
NRC Project Manager
Ms. Cindy Becker, Florida Department of Health

Response to Request for Supplemental Information

The NRC staff requested Florida Power & Light (FPL) provide supplemental information for several answers included in the response to the request for additional information (RAI) submitted on October 30, 2017. This enclosure contains the relevant RAI questions and original FPL responses followed by additional information that supplements the original responses.

APLA RAI-2.01 Fire PRA

In response to APLA RAI 02, the licensee stated that the fire PRA that will be used to support the risk-informed completion times (RICT) calculations will be the same fire PRA that was determined to be acceptable for the NFPA 805 transition and future self-approval. In a related response to APLA RAI 09, FPL states that "[a]t the time of implementation of the RICT program, core damage frequency (CDF), and large early release frequency (LERF) will be estimated based on modifications completed for NFPA 805 as well as other changes in the model. The RICT program will only be implemented if it satisfies the limitations and conditions in Section 4, item 6 of the NEI 06-09 [safety evaluation]."

As discussed in the May 28, 2015, safety evaluation on the amendment to transition the fire protection program to Section 50.48(c) of Title 10 of the *Code of Federal Regulations* (10 CFR), FPL used the guidance in frequently asked question (FAQ) 08-0046, "Closure of National Fire Protection Association 805 Frequently Asked Question 08-0046 Incipient Fire Detection Systems" to incorporate its very early warning fire detection system (VEWFDS) into the fire PRA. When FAQ 08-0046 was released, there was limited test data and PRA experience available for in-cabinet applications. In December 2016, the NRC staff published new guidance on modeling VEWFDS in NUREG-2180, "Determining the Effectiveness, Limitations, and Operator Response for Very Early Warning Fire Detection Systems in Nuclear Facilities, (Delores-VEWFIRE)," which resulted from a confirmatory research program (including the evaluation of recent operating experience) to advance the state of knowledge for in-cabinet applications. The research program was unable to confirm several key assumptions from FAQ 08-0046 that were used in the calculation of risk. Upon further evaluation of operating experience and the results of recent testing, the program determined that the risk reduction available for cabinet fires that are monitored by a VEWFDS system using the new assumptions was significantly reduced. The method provided in NUREG-2180 is more robust and technically justifiable. The methodology in NUREG-2180 is currently the best available guidance and replaces the guidance in FAQ 08-0046, which has been retired.

By letter dated November 17, 2016 (ADAMS Accession No. ML16253A111), the NRC staff informed the industry that, "[i]f a licensee is performing a periodic or interim PRA update, performing a fire risk evaluation in support of self-approval, or submitting a future risk informed license amendment request, the staff's expectation is that they will assess the impact of new operating experience and information [e.g., NUREG-2180] on their PRA analyses and incorporate the change as appropriate per Regulatory Guide 1.200, Revision 2."

a) If FPL will use the methodology in NUREG-2180 please provide

1. An estimate of the current CDF and LERF for all quantified hazards using the NUREG-2180 methodology in the fire PRA.
2. If the current CDF and LERF estimates do not satisfy the limitations and conditions in Section 4, item 6 of the NEI 06-09 safety evaluation explain how these guidelines will be met before implementation of the RICT program.
3. If the methodology (e.g., approach, methods, data, and assumptions) has not been incorporated into the fire PRA (i.e., PRA model changes and documentation completed and the upgrade peer reviewed), explain when it will be incorporated into the PRA model of record that will be used to estimate RICTs (response may reference the response to APLA RAI 15 which requests a list of implementation items).

b) If FPL proposes not to use the methodology in NUREG-2180 please provide:

1. Confirmation that the methodology in the retired FAQ 08-0046 is not the proposed methodology.
2. A description of the proposed methodology (e.g., approach, methods, data, and assumptions) that will be used in the fire PRA. The description should include a detailed comparison of that proposed methodology with the methodology in NUREG-2180.
3. Justification of the proposed methodology including comparison with available experimental results. Development and use of a proposed alternative may result in additional RAIs and significantly extend the time and resources required to complete the review.
4. An estimate of the current CDF and LERF for each quantified hazard with fire PRA results: (1) without credit for VEWFDS, (2) that would be obtained had the guidance in NUREG-2180 been applied, and (3) obtained using the proposed methodology.
5. If the current CDF and LERF estimates do not satisfy the limitations and conditions in Section 4, item 6 of the NEI 06-09 safety evaluation, explain how these guidelines will be met before implementation of the RICT program.
6. An evaluation on how using the proposed methodology instead of the NUREG-2180 methodology could impact the RICT estimates.
7. If the methodology (e.g., approach, methods, data, and assumptions) has not been incorporated into the fire PRA (i.e., PRA model changes and documentation completed and the upgrade peer reviewed), explain when it will be incorporated into the PRA model of record that will be used to calculate the RICTs (response may reference the response to APLA RAI 15 which requests list a of implementation items).

FPL Response

a) FPL will follow the methodology in NUREG 2180 or the latest approved operating experience (OE).

1. A sensitivity study performed with NUREG 2180 for all quantified hazards indicate the result is slightly over the threshold for CDF. However, these results do not include credit for mitigating strategies. For example, there is currently no credit for local

operation of the auxiliary feedwater pumps due to assumed loss of indication in Fire PRA. Additionally Flex mitigating strategy is not included in fire PRA. Considering these credits offsets any increase in risk due to incipient detection.

2. These guidelines will be met by continually incorporating operating experience and methodology enhancements into the fire PRA consistent with the maintenance and upgrade process.
3. The methodology in NUREG-2180 will be incorporated into the fire PRA model of record used to estimate RICTs as part of the next fire PRA model consistent with the maintenance and update process in Regulatory Guide 1.200, An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities.

b) Not applicable

Supplemental Information

The methodology in NUREG-2180 will be incorporated into the Turkey Point Fire PRA model. This update will include incorporation of the new event tree factors for the very early warning fire detection system (VEWFDS) as well as further refinements to the Fire PRA scenarios based on the conservatisms described below. These updates will be done using existing NRC approved Fire PRA methodologies.

The sensitivity evaluation for estimate of CDF and LERF for all quantified hazards with the NUREG-2180 methodology is as follows:

	U3 CDF	**U3 LERF**	**U4 CDF**	**U4 LERF**
IE	7.18E-07	1.87E-08	7.13E-07	1.81E-08
IE Flood	1.62E-07	8.36E-10	1.13E-07	4.11E-10
Seismic	6.98E-07	6.98E-08	6.98E-07	6.98E-08
Fire	8.66E-05	5.35E-06	7.69E-05	4.85E-06
2180 Increase	1.03E-04	1.20E-05	1.03E-04	1.31E-05
Total with new fire estimate	1.91E-04	1.74E-05	1.81E-04	1.80E-05

Note: Seismic risk was evaluated based on plant-level High Confidence of Low Probability of Failure (HCLPF) using plant-specific data developed by EPRI. The bounding plant-level Seismic CDF is calculated as shown and LERF value is conservatively estimated as 10% of CDF value. See RAI-APLA-17, External Events, response

As the current CDF and LERF estimates do not satisfy the limitations and conditions in Section 4, item 6 of the NEI 06-09 safety evaluation, additional refinements to the fire PRA are needed to meet these guidelines prior to implementation of the RICT program. These guidelines will be met by implementing the following published NUREGs and Fire PRA Frequently Asked Questions to the Fire PRA model:

- NUREG-2169, *Nuclear Power Plant Fire Ignition Frequency and Non-Suppression Probability Estimation Using the Updated Fire Events Database*,
- NUREG-2178, *Refining and Characterizing Heat Release Rates from Electrical Enclosures During Fire*
- FAQ 13-005, *Cable Fires Special Cases: Self Ignited and Caused by Welding and Cutting*, and
- FAQ 13-006, *Modeling Junction box Scenarios in a Fire PRA*

In addition to the above referenced standards, there are other known conservatisms in the current fire modeling used in the Turkey Point PRA. As an example, for cable spreading room panels, only two potential fire damage states are considered: (1) damage confined to the electrical panel, and (2) a more severe fire causing a hot gas layer to form resulting in full room damage. Another potential outcome would credit the installed Halon suppression system if a cabinet fire were to propagate externally. The Halon system would likely suppress the fire prior to bulk ignition of the cables and the resulting formation of a hot gas layer. Adding this intermediate fire damage state is an example of the changes that could be made to add realism to the PRA results (fire damages some fraction of cables in the vicinity but does not cause full room damage), reducing conservatism.

APLA RAI-12 Remaining Unresolved F&Os

In Table 1 in LAR Enclosure 2, the licensee identified eleven unresolved facts and observations (F&Os) from the 2013 focused scope peer review. For each F&O FPL stated, "[t]his will be resolved in the next model update to take place before implementation of 4b at [Turkey Point]. Expected to have little effect on 4b RICTs."

However, the NRC staff notes that it has not reviewed any proposed resolution to these F&Os during this 4b review and therefore has not accepted any of these resolutions as part of its review. The NRC staff can review proposed changes to the PRA during the review of the LAR. However, the anticipated license condition will limit future changes to the PRA to acceptable PRA methods.

a) Please provide the resolution to any of these F&Os, with supporting evaluation as appropriate, for the staff to accept the resolution during the completion of the LAR review.

b) Please provide an implementation item identifying all remaining unresolved F&Os and specifying that Turkey Point shall resolve them using NRC approved methods (response may reference the response to APLA RAI 15 which requests a list of implementation items).

FPL Response

The eleven findings listed as unresolved at the time of the LAR submittal have been resolved or closed in accordance with the NRC approved F&O closeout process.

As part of the process for F&O close out, some findings that were considered resolved in the submittal were determined to be not closed pending documentation update or additional justification. As part of the response to APLA RAI 15, these findings will be closed or a sensitivity case will be completed prior to implementation of the RICT Program.

Supplemental Information

A list of open F&Os is provided in Attachment 3 to this enclosure, Disposition and Resolution of Open Peer Review Findings and Self-Assessment Open Items.

APLA RAI-15 Implementation Items

Please provide a list of activities (i.e., implementation items) that are credited as part of the approval of the request to implement a RICT program that will not be completed before issuing the amendment but must be complete before implementation of the RICT program.

a) Propose a mechanism to require the changes to be made before implementation of the RICT program such as a reference to the table of implementation items in a license condition in the proposed amendment to the Operating License.

b) The NRC staff considers the following as potential implementation activities.

- Modelling VEWFDS according to NUREG-2180 in the fire PRA (RAI 2.01)
- Confirming that the all hazards CDF and LERF estimates will be less than 1E- 04/year and 1E-05/year respectively before implementing the RICT program (RAI 2)
- Implementing minimum joint HEP or sequence level justification into the internal events PRA (RAI 06.01.b)
- Resolving all of the eleven unresolved F&Os from the 2013 focused scope peer review identified in Table 1, LAR Enclosure 2. (RAI 12)

FPL Response

a) FPL proposes the following license condition for Turkey Point Units 3 and 4:

FPL will complete the items listed in the table of implementation items in the enclosure to FPL letter L-2017-168 dated October 30, 2017 prior to implementation of the Risk Informed Completion Time Program.

b) Table of implementation items:

Item	Implementation Date
1. Confirm that the all hazards CDF and LERF estimates will be less than 1E- 04 per year and 1E-05 per year, respectively.	Prior to implementation of the Risk Informed Completion Time Program
2. Close all open facts and observations findings or perform a sensitivity study case to determine the impact on the CDF and LERF results that could be adversely affected by each open finding.	
3. Implement a joint HEP floor of 1E-06 or a similarly technically justified floor value in the internal events model.	

Supplemental Information

FPL proposes the table of implementation items and the associated license condition as shown below.

Table of implementation items:

Item	Implementation Date
1. Confirm that the all hazards CDF and LERF estimates achieved using NRC accepted methods will be less than 1E- 04 per year and 1E-05 per year, respectively.	Prior to implementation of the Risk Informed Completion Time Program
2. All findings will be closed.	
3. Implement a joint HEP floor of 1E-06 in the internal events model. For future model updates, once the HFE combinations have been analyzed and the HEP floor of 1E-06 applied, individual HFE combination probabilities may be set below 1E-06 if a detailed analysis is performed and technical justification is provided.	

License Condition:

FPL will complete the items listed in the table of implementation items in the enclosure to FPL letter L-2018-001 dated February 15, 2018 prior to implementation of the Risk Informed Completion Time Program.

APLA RAI-16 License Condition

In Section 4.0, "Limitations and Conditions" of the NRC Staff safety evaluation to NEI 06-09, the staff stated:

> *As part of its review and approval of a licensee's application requesting to implement the [Risk Managed Technical Specifications] RMTS, the NRC staff intends to impose a license condition that will explicitly address the scope of the PRA and non-PRA methods approved by the NRC staff for use in the plant specific RMTS program. If a licensee wishes to change its methods, and the change is outside the bounds of the license condition, the licensee will need NRC approval, via a license amendment, of the implementation of the new method in its RMTS program.*

Please propose a license condition limiting the scope of the PRA and non-PRA methods to what is approved by the NRC staff for use in the plant-specific RMTS program. An example is provided below.

> The risk assessment approach, methods, and data shall be acceptable to the NRC, be based on the as-built, as-operated, and maintained plant; and reflect the operating experience at the plant. Acceptable methods to assess the risk from extending the completion times must be PRA methods accepted as part of this license amendment, or other methods currently approved by the NRC for generic use. If a licensee wishes to change its methods and the change is outside the bounds of this license condition, the licensee will need prior NRC approval, via a license amendment.

FPL Response

In lieu of a license condition, FPL proposes to add paragraphs f and g below to the Risk Informed Completion Time Program in Specification 6.8.4.n in the administrative section of the TS. This addition to the program limits the scope of the PRA and non-PRA methods to those approved by the NRC staff for use in the plant-specific RMTS program.

f. A RICT must be calculated using internal events, internal floods, and fire PRA. The PRA maintenance and upgrade process will validate that changes to the PRA models used in the RICT program follow the guidance in Appendix 1-A of ASME/ANS RA-Sa-2009, "Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications."

g. A report shall be submitted following each PRA upgrade and associated peer review, and prior to using the upgraded PRA to calculate a RICT. The report shall describe the scope of the upgrade.

Supplemental Information

FPL withdraws its proposed change to add items f and g to the Risk Informed Completion Time Program in Specification 6.8.4.n. Instead, FPL proposes the following license condition, which is the same as that approved for Vogtle Units 1 and 2 in License Amendments 188 and 171, respectively, on August 8, 2017 (ML15127A669):

> The risk assessment approach and methods, shall be acceptable to the NRC, be based on the as-built, as-operated, and maintained plant, and reflect the operating experience of the plant as specified in RG 1.200. Methods to assess the risk from extending the completion times must be PRA methods accepted as part of this license amendment, or other methods approved by the NRC for generic use. If the licensee wishes to change its methods, and the change is outside the bounds of this license condition, the licensee will seek prior NRC approval via a license amendment.

ATTACHMENT 1

Markup of the Unit 3 and Unit 4 Operating Licenses

INSERT OL

I. FPL is authorized to implement the Risk Informed Completion Time Program as approved in License Amendment No. XXX subject to the following conditions:

1. FPL will complete the items listed in the table of implementation items in the enclosure to FPL letter L-2018-001 dated February 15, 2018 prior to implementation of the Risk Informed Completion Time Program.

2. The risk assessment approach and methods, shall be acceptable to the NRC, be based on the as-built, as-operated, and maintained plant, and reflect the operating experience of the plant as specified in RG 1.200. Methods to assess the risk from extending the completion times must be PRA methods accepted as part of this license amendment, or other methods approved by the NRC for generic use. If the licensee wishes to change its methods, and the change is outside the bounds of this license condition, the licensee will seek prior NRC approval via a license amendment.

H. PAD TCD Safety Analyses

1. PAD 4.0 TCD has been specifically approved for use for the Turkey Point licensing basis analyses. Upon NRC's approval of a revised generic version of PAD that accounts for Thermal Conductivity Degradation (TCD), FPL will within six months:

   a. Demonstrate that PAD 4.0 TCD remains conservatively bounding in licensing basis analyses when compared to the new generically approved version of PAD w/TCD, or
   b. Provide a schedule for the re-analysis using the new generically approved version of PAD w/TCD for any of the affected licensing basis analyses.

INSERT OL

4. This renewed license is effective as of the date of issuance, and shall expire at midnight July 19, 2032.

FOR THE NUCLEAR REGULATORY COMMISSION

Signed by
Samuel J. Collins, Director
Office of Nuclear Reactor Regulation

Attachments:
Appendix A – Technical Specifications for Unit 3
Appendix B – Environmental Protection Plan

Date of Issuance: June 6, 2002

H. PAD TCD Safety Analyses

1. PAD 4.0 TCD has been specifically approved for use for the Turkey Point licensing basis analyses. Upon NRC's approval of a revised generic version of PAD that accounts for Thermal Conductivity Degradation (TCD), FPL will within six months:

   a. Demonstrate that PAD 4.0 TCD remains conservatively bounding in licensing basis analyses when compared to the new generically approved version of PAD w/TCD, or

   b. Provide a schedule for the re-analysis using the new generically approved version of PAD w/TCD for any of the affected licensing basis analyses.

INSERT OL

4. This renewed license is effective as of the date of issuance, and shall expire at midnight April 10, 2033.

FOR THE NUCLEAR REGULATORY COMMISSION

Signed by
Samuel J. Collins, Director
Office of Nuclear Reactor Regulation

Attachments:
Appendix A – Technical Specifications for Unit 4
Appendix B – Environmental Protection Plan

Date of Issuance: June 6, 2002

ATTACHMENT 2

Markup of the Technical Specifications

INSERT RICT PROGRAM

n. Risk Informed Completion Time Program

This program provides controls to calculate a Risk Informed Completion Time (RICT) and must be implemented in accordance with NEI 06-09, "Risk-Informed Technical Specifications Initiative 4b: Risk-Managed Technical Specifications (RMTS) Guidelines," Revision 0-A, November 2006. The program shall include the following:

a. The RICT may not exceed 30 days;

b. A RICT may only be utilized in MODES 1 and 2;

c. When a RICT is being used, any plant configuration change within the scope of the Risk Informed Completion Time Program must be considered for the effect on the RICT.

1. For planned changes, the revised RICT must be determined prior to implementation of the change in configuration.

2. For emergent conditions, the revised RICT must be determined within the time limits of the Required Action Completion Time (i.e., not the RICT) or 12 hours after the plant configuration change, whichever is less.

3. Revising the RICT is not required if the plant configuration change would lower plant risk and would result in a longer RICT.

d. Use of a RICT is not permitted for entry into a configuration which represents a loss of a specified safety function or inoperability of all required trains of a system required to be OPERABLE.

e. If the extent of condition evaluation for inoperable structures, systems, or components (SSCs) is not complete prior to exceeding the Completion Time, the RICT shall account for the increased possibility of common cause failure (CCF) by either:

1. Numerically accounting for the increased possibility of CCF in the RICT calculation, or

2. Risk Management Actions (RMAs) not already credited in the RICT calculation shall be implemented that support redundant or diverse SSCs that perform the function(s) of the inoperable SSCs, and, if practicable, reduce the frequency of initiating events that challenge the function(s) performed by the inoperable SSCs.

PROCEDURES AND PROGRAMS (Continued)

l. Surveillance Frequency Control Program

This program provides controls for Surveillance Frequencies. The program shall ensure that Surveillance Requirements specified in the Technical Specifications are performed at intervals sufficient to assure the associated Limiting Conditions for Operations are met:

a. The Surveillance Frequency Control Program shall contain a list of frequencies of those Surveillance Requirements for which the frequency is controlled by the program.

b. Changes to the frequencies listed in the Surveillance Frequency Control Program shall be made in accordance with NEI 04-10, " Risk-Informed Method for Control of Surveillance Frequencies," Revision 1.

c. The provisions of Surveillance Requirements 4.0.2 and 4.0.3 are applicable to the frequencies established in the Surveillance Frequency Control Program.

m. Snubber Testing Program

This program conforms to the examination, testing and service life monitoring for dynamic restraints (snubbers) in accordance with 10 CFR 50.55a inservice inspection (ISI) requirements for supports. The program shall be in accordance with the following:

a. This program shall meet 10 CFR 50.55a(g) ISI requirements for supports.

b. The program shall meet the requirements for ISI of supports set forth in subsequent editions of the Code of Record and addenda of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (BPV) Code and the ASME Code for Operation and Maintenance of Nuclear Power Plants (OM Code) that are incorporated by reference in 10 CFR 50.55a(a) subject to the use and conditions on the use of standards listed in 10 CFR 50.55a(b) and subject to Commission approval.

c. The program shall, as required by 10 CFR 50.55a(b)(3)(v), meet Subsection ISTA, "General Requirements" and Subsection ISTD, "Preservice and Inservice Examination and Testing of Dynamic Restraints (Snubbers) in Light-Water Reactor Nuclear Power Plants".

INSERT RICT PROGRAM

d. The 120-month program updates shall be made in accordance with 10 CFR 50.55a(g)(4), 10 CFR 50.55a(g)(3)(v) and 10 CFR 50.55a(b) (including 10 CFR 50.55a(b)(3)(v)) subject to the conditions listed therein.

6.8.5 DELETED

ATTACHMENT 3

Disposition and Resolution of Open Peer Review Findings and Self-Assessment Open Items

ATTACHMENT 3

Disposition and Resolution of Open Peer Review Findings and Self-Assessment Open Items

Finding Number	Supporting Requirement(s)	Capability Category (CC)	Description	Resolution for Independent Review	Independent Review Comments	Disposition for RICT
Internal Events PRA Model Findings						
DA-2	DA-7	NOT MET	The test and maintenance probabilities used for individual components are based on actual outage time as collected by the plant. The component outage time was clearly collected over the period of time the plant was in Mode 1, 2, 3. The fault trees and event trees use several crossties from AC power, HHSI, and AFW. In the use of these crossties, the opposite unit components have T&M events. The opposite unit may be in Mode 4, 5, 6 at the time of demand and the desired equipment may have lesser Tech Specs than those assumed for power operation. The T&M event probabilities for the opposite unit components must consider unavailability over the total period of demand, not just during power operation. This can be done at the fault logic level (with house events for OOS) or in the data probabilities. Currently, neither is done. The most important case of this is the DG's. The DG T&M unavailability is about 6E-3 (55 hours per year). If the OOS time for major overhaul were considered, the unavailability would be .03 to .05. Consider revising the T & M event probabilities for the opposite unit components to account for unavailability over the total period of demand. As stated above, this can be done at the fault logic level or in the data probabilities.	Logic was introduced to the model to change the opposite-unit EDG test and maintenance probability during outage conditions through the use of flags representing the operating mode of the unit. These flags were also used to model the effect of the opposite unit's mode on the different system crossties.	The CAFTA model (ptnrev11.caf) was reviewed. The logic and basic events and associated BE values used to account for opposite unit cross-tie/EDG unavailability while in Modes 5/6 was reviewed and appears reasonable. It also appears that modeling of the opposite unit EDG crosstie in Modes 5/6 is handled solely by the fault tree logic and basic events. However, PTN-BJFR-02-026 states: "only T&M unavailability when the unit is in Mode 1 through 4 was considered." This is inconsistent with what appears to be in the model. In addition, the GDOC resolution refers to the use of flag files to model/capture the opposite unit crosstie/EDG unavailability. The flag files (if any) were not reviewed. Some additional information was provided concerning the specific unavailability values used, but this information is not contained in any of the PRA documentation. This F&O is considered to remain open pending revision of the documentation to reflect what is actually in the fault tree model.	Documentation updates are needed to close this finding. The documentation updates will not affect the results. No impact on RICT application.

Finding Number	Supporting Requirement(s)	Capability Category (CC)	Description	Resolution for Independent Review	Independent Review Comments	Disposition for RICT
HR-A2-01	HR-A2 HR-B1, HR-B2, HR-C3, HR-I2	NOT MET	This HR requires identification, through a review of procedures and practices, those calibration activities that if performed incorrectly can have an adverse impact on the automatic initiation of standby safety equipment. The system notebooks contain a detailed listing of testing and maintenance procedures that were identified for each system, but there is no discussion as to which procedures were determined to have the potential to result in equipment being left in a miscalibrated condition, and which were screened from consideration with the basis for screening. A review of the procedures listed in the system notebooks should be performed to identify those that could result in potential miscalibration events, and provide a justification for those that were excluded from further consideration. For miscalibrations that have the potential to impact multiple systems, ensure that they are treated consistently between both systems, and that appropriate HFEs are listed in all impacted system notebooks. Similar traceability needs to be provided for other test and maintenance procedures that have the ability to render a system/equipment unavailable as well.	An approach (see SR HR-D2) was used for the pre-initiators which assumed pre-initiators are always possible, and detailed evaluations of procedures were made only for risk-significant items. Screening values were used for the non-risk-significant pre-initiators. See PTN-BFJR-09-011, Rev. 1.	Pre-initiator HFE identification and modeling is described in the pre-initiator HFE notebook, PTN-BFJR-09-011. An alternative approach used to identify, screen and quantify pre-initiators from the assumed approach in the PRA Standard. Figure 3 in the notebook summarizes the process. All key modeled components are initially assigned a pre-initiator event, set to a "screening value" of 3E-3 for individual events and 3E-4 for events affecting multiple trains of equipment. If the initial quantification of the model shows the HFE to be significant, then detailed HRA evaluation is performed. If the event has low importance, it is left at its screening value. For those events that are potentially significant, a review of plant procedures is then performed to determine if these HFEs could occur. Those that are determined to be impossible or for which procedures do not exist are either deleted from the model or set to a low (1E-6) value. The remaining events are quantified using ASEP. This approach seems reasonable, and an ASME inquiry about the acceptability of this method is pending. Table 3 shows the initial results of the importance review for all of the HFEs. Table 4 lists those selected for detailed evaluation and Table 5 shows the final listing of all HFEs. The list includes both single and common cause pre-initiators as required by the Standard. However, a comparison of the tabulated BE values with those shown in the model shows differences. For example event HHFA3A106 is listed as having a probability of 3E-3 screening value; however, its value in the model is 1E-4.	Documentation updates are needed to close this finding. The documentation updates will not affect the results. No impact on RICT application.

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					Similarly, event AHFA0PUMPC is listed as having a 3E-3 value but is in the model as 1E-4. Information was provided to show that 1E-4 is the correct value for these events. This F&O is considered to remain open pending an update of the documentation to reflect the actual values used in the PRA model.	
HR-B2-01	HR-B2	NOT MET	This SR does not allow screening of activities that could simultaneously have an impact on multiple trains of a redundant system or diverse system. In the HHSI system notebook, the following valves are assumed not to be under maintenance while either unit is at power: MOV-*-¬864A, B; *-864C; *-845A, B, C, D; MOV-878A, B; MOV-* 856A, B; * 847C; * 882. Because these valves have the potential to impact BOTH Units, they cannot be screened in this manner. Based on this assumption, these valves would only be worked on while both Units are shutdown, which is probably not realistic. Review the actual test and maintenance procedures associated with these valves and determine when they can be subject to testing or maintenance. If they can be subject to testing or maintenance when either of the Units is shutdown, then a T&M needs to be added into the model as well as consideration for a pre-initiator mis-alignment of the valves, and a post-initiator HRA to re-align if necessary.	This F&O addressed the following valves, which were assumed not to be under maintenance while either unit is at power: MOV-*-¬864A, B; *-864C; *-845A, B, C, D; MOV-878A, B; MOV-* 856A, B; * 847C; * 882. For the 864 valves, the model has a T&M event for each RWST to account for the time the RWST contents are used to fill the refueling canal, which is the only time the 864 valves could be maintained. The 845 and 882 valves are locked-open manual valves, so no T&M or pre-initiator is needed there. The HHSI recirculation valves 856 and 874C, if closed for maintenance take out their related HHSI pumps. The 856 valves are stroke-tested during the associated unit refueling outages. Evaluated pre-initiators for the 856 valves and added these to the model. The 878A and 878B valves, if closed for maintenance, would prevent opposite-unit SI. Evaluated pre-initiators for the 878 valves and added these to the model.	The GDOC provides a discussion of the status of each of the valves noted in this F&O for pre-initiator inclusion. Verified RWST OOS in the model. Verified 845 & 882 are locked open manual valves in 0-OSP-205. Verified 856 A&B and 874C are HHSI recirc valves in 3-OSP-062.3 and 4-OSP-068.3. Several valves are noted as not requiring pre-initiator modeling (e.g., locked valves). For those for which HFEs were added in the model, it doesn't appear that these events have been added to the Pre-initiator HFE Notebook, PTN-BFJR-09-011. For example, the HFEs for 878B (GHFAMOV878B) and 856A (GHFAMOV4856A) are not shown in the notebook. This F&O is considered to remain open pending update of the pre-initiator HFE documentation to reflect the contents of the PRA model.	Documentation updates are needed to close this finding. The documentation updates will not affect the results. No impact on RICT application.

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HR-C2-01	HR-C2	NOT MET	There is no provided documentation of the plant-specific or applicable generic operating experience for equipment left unavailable for response in accident sequences. Provide documentation of the review of plant-specific or generic operating experience and confirm that no additional failure mode is required.	In the latest data update, condition reports were reviewed for the time period 1992-2006 for component failures. No failure modes outside the ones already modeled were found, including failure-to-restore events.	The GDOC indicates that a review of plant operating experience was performed; however, there is no documentation of such a review in the pre-initiator notebook. Another Data Update will be released soon (PTN BFJR 02-026, Revision 2) and will address this issue. This F&O is considered to remain open.	Documentation updates are needed to close this finding. The documentation updates will not affect the results. No impact on RICT application.
HR-D1-01	HR-D1	NOT MET	The human failure event probabilities appear to be evaluated with a systematic process that includes an initial screening value and the identification of risk-significant action for which a detailed analysis through ASEP method is used. Although there appear to be some inconsistencies in the values of the HEF, especially for HEF already existing in previous version of the model. For example, action AHFA0N2BK1 is indicated as a pre-existing action (i.e., not highlighted in Table 3, page 22) with an initial value of 1.10E-3. There is no further discussion of this action (i.e., the action is not indicated in Table 4 at page 27 as one of the action requiring further analysis). Still in Table 5 at page 31 the action has a value of 4.0E-5 (consistently with what is in the model). Another example of inconsistency between the documentation, the HRA Calculator file and the CAFTA model is post-initiator action AHFPAFWTHROT).	AHA0N2BK1, among others, had already been analyzed in detail, and the results from the detailed analysis used in the model, even though the event's risk importance was low. The probability of AHFPAFWTHROT in the HRA file does match that in the .rr file. The misread might be the result of looking at the seed optimization probability value given in the FACTOR field. The PROB field matches.	The response addresses only the two specific examples cited in the F&O text and fails to address the broader implication of inconsistency in documentation. The AHFA0N2BK1 event mentioned in the F&O now is consistent between the model and the pre-initiator notebook (PTN-BFJR-09-011) value. The AHFPAFWTHROT event is no longer used in the internal events model, but an event of the same name (with a different probability) now exists in the fire model (Revision 11). Given the fact that no evidence of a more comprehensive review of all HFEs was performed, this F&O is considered to remain open.	Documentation updates are needed to close this finding. The documentation updates will not affect the results. No impact on RICT application.
LE-D2-01	LE-D2	NOT MET	Electrical penetration assembly failure modes have been found to be important contributors to overall containment fragility at other large dry PWRs, and in at least 2 instances, tend to be the most limiting in terms of ultimate failure pressure. Additionally, early studies at Sandia National Laboratories have considered the potential impact of very high (beyond design basis) temperatures on elastomer seals (this latter issue is more critical for small volume containments such as BWR Mark I). Perform a scoping assessment of the potential impact of electrical penetration thermal mechanical response to severe accidents. Consider using some of the following References: NUREG/CR-4944, CR-5083, CR-5096, CR-5118, and CR-5334.	For containment isolation, the Level 2 update incorporated the existing containment isolation analysis; it did not revisit this issue directly. The place in the Level 2 model where this would have an effect would be the "Containment Failure at Vessel Breach" events, which were determined via NUREG sources to be minimal. It is not known whether these referenced NUREGs already factored such considerations into their containment strength estimates and failure	The current Level 2 Notebook (PTN-BFJR-00-010) does not discuss electrical penetration failures are potential contributors to LERF, nor explain why they are not included. The document does discuss the containment isolation system (CIS) which is used to isolate fluid systems. The GDOC notes that it is assumed that such failures would be a negligible contributor (since they are assumed to be only of concern following vessel breach), but that it is not known if these failures are addressed in the NUREGs used as the bases for the vessel breach effects	Documentation updates are needed to close this finding. The documentation updates will not affect the results. No impact on RICT application.

Finding Number	Supporting Requirement(s)	Capability Category (CC)	Description	Resolution for Independent Review	Independent Review Comments	Disposition for RICT
				probabilities, but it is not expected to have a significant effect.	evaluation. Since the specific failure mechanisms noted in this SR were not addressed, this F&O is considered to remain open.	
QU-3	QU-26 QU-19 HR-21	NOT MET	The quantification of a linked fault tree model involves the proper integration of several files which can affect the results. For example: a. The quantification flag file is used to set logic flag events true or false to represent normal system alignment. At PTN, this flag file is also used to set certain maintenance events false. b. The mutually exclusive file is used to remove cutsets from the results file which contain certain combinations of events representing disallowed maintenance or illogical event combinations (i.e., events for failure to open and spurious opening of the same valve in a single cutset). c. The recovery rule file is used to add recovery events to the cutset results based on the appearance of certain combinations of failure events. At PTN, this process is also used to apply human error factors to the quantification results. Since these files control vital processes during quantification, independent review and thorough documentation is needed to ensure that the quantification results do not exclude valid failure sequences. The current mutually exclusive events file (PTN2KMEE.TXT) was changed as a result of the addition of new T&M events for LC/SWGR HVAC AHUs and Sump Level Indicators. The calculation package includes a description of "add double maintenance events for these basic events to mutually exclusive events." However, no justification for making the events mutually exclusive or specifying the combinations that are mutually exclusive is provided. In addition, the review of the mutually exclusive events file indicates that some complimentary combinations related to AFW pump maintenance may not be included. While this would lead to conservative results due to failure to remove invalid cutsets, the addition of inappropriate mutually exclusive combinations would have the opposite result. Similar errors can be introduced through the recovery file through the inappropriate application of recovery events to	Changes to the mutually exclusive event combinations, flag file, circular logic breaks, and recovery rule file are documented in the change database and the model updates. Details of the quantification process are documented in the Quantification Notebook and the model updates. Truncation level is set as low as the hardware and software will allow, or until convergence is achieved. Uncertainty analysis input is documented in the model update calculations.	The quantification notebook and model update notebook for Turkey Point 3 and 4 were reviewed. There is no evidence of documentation of the recovery or the mutually exclusive files. The development and use of these files is discussed. These files need to be in the notebook so that there is a record of the justification for the mutually exclusive event and/or the reason for crediting recoveries. Also having the files documented in the notebook ensures a review by a qualified PRA engineer. Since there is no documentation of either of these files in the quantification notebook, this F&O is considered to remain open.	Documentation updates are needed to close this finding. The documentation updates will not affect the results. No impact on RICT application.

Finding Number	Supporting Requirement(s)	Capability Category (CC)	Description	Resolution for Independent Review	Independent Review Comments	Disposition for RICT
			sequences which do not represent the conditions assumed in the HRA analysis. Consider developing a documentation package for the flag file, mutually exclusive events file and the recovery rules which provides the basis of each item in the respective files. Cross-disciplinary review of the flag file and mutually exclusive events file by plant personnel may also be considered.			
QU-8	QU-31	NOT MET	The subtier criteria for a grade 3 on this element considers the following to be indicative of a good understanding of the dominant risk contributors: a. The accident sequence results by sequence, sequence types, and total should be reviewed and compared to similar plants to assure reasonableness and to identify any exceptions. b. A detailed description of the Top 10 to 100 accident cutsets (CAFTA or NUPRA) or accident sequences (RISKMAN) should be provided because they are be important in ensuring that the model results are well understood and that modeling assumption impacts are likewise well known. c. The dominant accident sequence groups or functional failure groups should also be discussed. These functional failure groups should be based on a scheme similar to that identified by NEI in NEI 91-04, Appendix B. There is no discussion of results in the calculation packages for updates provided to the review team to indicate that this type of evaluation is done of the quantification results. Also, the calculation packages provide no discussion of how the dominant cutsets or important systems were affected by the changes to the model when compared to the previous revision. Consider expanding the discussion of the quantification results in the calculation packages or developing a PSA Summary Document containing this type of evaluation for each revision.	a. A comparison of PTN CDF cutsets to Robinson's CDF cutset was made and is documented in the Quantification Notebook. Where differences in the cutsets occurred, they could be explained by design or data differences. b. A list of the top 50 cutsets is provided in the model updates. c. Initiating event pie charts, system importance charts, and a table listing the individual sequence contributions are included in each model update calculation.	Reviewed the quantification notebook and model update notebook. The quantification notebook provides a comparison and explanation of PTN CDF cutsets to Robinson's CDF cutsets. This provides interesting information but it is not clear how useful this is at the cutset level. Also it is not clear if the Robinson results are recent and if this information is updated periodically. The model update notebook also contains the latest PTN CDF results at the functional sequence level and at the cutset level but there is not a detailed discussion of the cutsets and why the results are reasonable. There is also a breakdown of initiating event contributions to CDF/LERF, system importance contributions and CDF/LERF uncertainty distributions, but there is not a discussion of these results as well. A comparison between U3 and U4 was conducted. While the documentation addresses some of the requirements noted in the F&O, a more comprehensive documentation of the results and their significance is needed. This F&O is considered to remain open.	Documentation updates are needed to close this finding. The documentation updates will not affect the results. No impact on RICT application.

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Internal Flood PRA Model Findings						
IFQU-A7-01	IFQU-A7 IFQU-A10 IFQU-B2	NOT MET	This SR states: PERFORM internal flood sequence quantification in accordance with the applicable requirements described in paragraph 4.5.8. The internal flooding analysis has been quantified in accordance with internal events quantification requirements; however, supporting documentation should be provided which describes the process. The quantification process should either be documented in the flooding analysis, or if the same process has been used elsewhere, the flooding analysis should point to that process. Additionally a review of the quantification should be documented.	The quantification is discussed now in the documentation of the internal flooding quantification. See PTN-BFJR-11-009, Rev. 1.	IFQU-A7 invokes all of the QU requirements for internal events and IFQU-A10 requires that an evaluation of the internal events LERF sequences to ensure they are not impacted by the flooding scenarios that are being evaluated. While Section 4.3 of the IF notebook provides some information concerning how the flooding quantification was performed and presents the scenario level results, the documentation does not meet the requirements of all of the QU SRs. Examples include lack of truncation studies, lack of discussion of dominant results and important basic events, require of non-significant cutsets, review of cutsets and dominant events to determine that the results make sense, etc.) Note that the QU notebook does not include flooding initiators, so all of this information would need to be included in the IF notebook. For IFQ-A10, there is no information presented that demonstrates that a review of internal events LERF sequences was performed to ensure that they are applicable to the flooding events. Therefore, this F&O is considered to remain open.	Documentation updates are needed to close this finding. The documentation updates will not affect the results. No impact on RICT application.
IFSN-A2-01	IFSN-A2	NOT MET	No identification of flood alarms or floor drains has been made in the flood analysis document. PTN should document and identify the presence of flood alarms and floor drains as related to their treatment in the analysis.	No credit taken for operator action to mitigate flood; therefore, there was no need to credit flood alarms. Documentation was updated to reflect the fact that drain lines were not credited in determining the impact of a flood in a particular room. Added to Section 3.1.3, "In looking at flood propagation by backflow through shared drain lines, no credit was taken for check	PTN-BFJR-11-009, revision 1, was reviewed. In this document, it is stated that a reasonable time for the flood to be terminated was based on alarms. However, as stated in section 3.2.1, no credit is assumed for operator actions to mitigate flooding consequences. The only alarms identified are high sump level alarms. The flood walk downs should have included identifying a room alarm (SR IFSN-A2). So even if the alarms are not credited (which does not agree with the	Documentation updates are needed to close this finding. The documentation updates will not affect the results. No impact on RICT application.

Finding Number	Supporting Requirement(s)	Capability Category (CC)	Description	Resolution for Independent Review	Independent Review Comments	Disposition for RICT
				valves." See PTN-BFJR-11-009, Rev. 1.	statement for termination), the alarms should be identified. The consequences of sump overflow are also not discussed. Based on information provided in Section 3.2, the smaller diameter (~4-inch) floor drain impact on flooding scenarios has been assessed. In general, the consequences of flooding considered the possibility that drains and sump pumps do not function unless the drain flow added to the consequences of the event. It is also noted that the flood scenario descriptions typically include mention of the floor drains and associated impacts, but relatively little detail is provided. This F&O is considered to remain open pending improvement of the documentation of the alarms and drains.	
IFSN-A4-01	IFSN-A4 IFSN-A9	NOT MET	No supporting information has been provided to justify the estimations regarding flood volumes and the subsequent flooding height. PTN should document the calculations performed in determining flood volumes in a given flood area as it relates to equipment in the room (the floor area the equipment takes up), the capacity of the system, the length of time the flood persists, etc.	A discussion of the flooding calculations has been added to Section 3.2. The software used for the flooding calculations and the output files are referenced and added to the calc folder. See PTN-BFJR-11-009, Rev. 1.	Report PTN-BFJR-11-009, Rev. 1, Internal Flooding Analysis, was reviewed. The capability of the flood calculation code (performed in C++) is summarized in Section 3.2. Obviously hydraulic calculations and room/equipment flood and propagation calculations were performed. However, the specific calculations performed for the scenarios are not referenced, and the calculational inputs used to characterize the flood scenarios were not readily available nor described in the documentation. It is unclear what this timing information is used for and what it justifies. Due to the lack of explanation for the timing information, this F&O is considered to still be open.	Documentation updates are needed to close this finding. The documentation updates will not affect the results. No impact on RICT application.
IFSN-A6-01	IFSN-A6	NOT MET	This SR States: For the SSCs identified in IF-C2c, IDENTIFY the susceptibility of each SSC in a flood area to flood-induced failure mechanisms. INCLUDE failure by submergence and spray in the identification process.	It is now documented in the internal flooding analysis documentation that spray and submergence damage were included in the scope of the evaluation.	Document PTN-BFJR-11-009, revision 1, was reviewed. Section 3.1.2 does address HELB in the auxiliary building. This does not address the environmental conditions	In the ASME PRA Standard, the quantitative analysis of environmental effects such as humidity and temperature is only required for Cat.

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			EITHER: a) ASSESS qualitatively the impact of flood-induced mechanisms that are not formally addressed (e.g., using the mechanisms listed under Capability Category III of this requirement), by using conservative assumptions; OR b) NOTE that these mechanisms are not included in the scope of the evaluation. No discussion has been provided for the impact due to the additional flood failure mechanisms. Analysis should be performed which includes failure by submergence or spray, and a qualitative assessment of other failure mechanisms needs to be provided (e.g. jet impingement, pipe whip, humidity, condensation, temperature concerns, and any other identified failure modes in the identification process.) Note that the qualitative assessment is a requirement of the NRC Clarification of this SR.	See PTN-BFJR-11-009, Rev. 1. Added to section 3.1.2, paragraph 5 end - "In light of this, it should be noted that only spray and submergence damage were included in the scope of this evaluation."	(humidity or temperature) in any of the other buildings. Also, there is no discussion of feedwater line break environmental effects in the turbine building. It should be noted that in the ASME roadmap IFSN-A6 is noted as an open item. This F&O is considered to still be open.	III for IFSN-A6. For Cat. II, a qualitative analysis or a note documenting that these effects were not considered is required. Documentation updates are needed to close this finding. The documentation updates will not affect the results. No impact on RICT application.
IFSN-A8-01	IFSN-A8	NOT MET	This SR states: IDENTIFY inter-area propagation through the normal flow path from one area to another via drain lines; and areas connected via back flow through drain lines involving failed check valves, pipe and cable penetrations (including cable trays), doors, stairwells, hatchways, and HVAC ducts. INCLUDE potential for structural failure (e.g., of doors or walls) due to flooding loads. Although the obvious propagation pathways (e.g. doors, stairwells, grating) were identified, a good discussion associated with less obvious pathways (e.g. failed backflow check valves, cable penetrations, cable trays, etc.) for individual zones was not found. Documentation of less obvious possible propagation pathways needs to be addressed.	Inter-area propagation is discussed in Appendix B of the internal flooding analysis documentation. Added to Section 3.1.3, "These pathways are listed in Appendix B under the "Drainage" section of each zone." See PTN-BFJR-11-009, Rev. 1.	Document PTN-BFJR-11-009, revision 1, was reviewed. The propagation through alternate paths such as drain lines, or overflowing sumps is noted in the walkdown documentation. There is no discussion in the propagation section on possible propagation through drain lines to other flood zones. The documentation of identified "less obvious" pathways, in particular, is lacking. This does not meet the intent of the F&O. This F&O is considered to still be open.	Drains, wall penetrations, and floor penetrations are examined for each flood scenario and are documented in Appendix B of PTN-BFJR-11-009. Enhancement of this documentation may be necessary to satisfy the concerns of the F&O closure reviewer. The documentation updates will not affect the results. No impact on RICT application.
IFSO-A1-01	IFSO-A1	NOT MET	Based on a confirmatory walkdown performed the Peer Review Team, the locations/impacts of some pipes containing water may have been overlooked in the analysis. It is recommended that the analyst ensure that spatial information be captured appropriately for spray concerns. Equipment has been identified in walkdown sheets for elevation, but not spatial location. Additionally the analyst should ensure that all potential fluid sources in a given flood area are identified, and all potentially impacted equipment is	The findings involved the chilled water system. The chilled water system operates at very low pressure and the lines are insulated, precluding the possibility of a spray. This information was added to the scenario descriptions.	Document PTN-BFJR-11-009, revision 1, was reviewed. The GDOC response indicates that this F&O pertains only to the Chilled Water system, but the F&O appears to be more broadly worded. Concerning the chilled water system, it is analyzed. It is stated that it is unlikely that a rupture of the chilled water line will result in strong spray. There is no	The documentation states that “the chilled water system operates at very low pressure and the lines are insulated” which is justification for the low likelihood of strong spray from a rupture. Any documentation updates needed to close this finding will not affect the results.

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			identified the impact of it failing is evaluated.		justification for this statement. Also, it is stated in the switchgear room that a rain shield on top of the cabinets will protect the cabinets. This is reasonable and does not require further explanation. Due to the lack of documentation of how this F&O was fully addressed, this F&O is considered to still be open.	No impact on RICT application.
IFSO-A4-01	IFSO-A4 IFEV-A7	NOT MET	No human-induced mechanisms have been included in the analysis, and additionally, no process which justifies their exclusion was provided. it is recommended that specific instances be discussed as it relates specifically to operator induced failures. Additionally, a process or program should be identified which prevents human-induced floods from occur, thereby justifying their exclusion from the analysis.	Human-induced mechanisms are already taken into account in the general failure data.	Report PTN-BFJR-11-009, Rev. 1, Internal Flooding Analysis, was reviewed. While there is mention of a possible human-induced flood associated with charging pump and RCP seal water filters during maintenance, there is no assessment of human-induced or maintenance induced flooding events documented. In fact, Section 2. states "In this analysis, all causes of flooding were considered except plant-specific maintenance activities". Section 3.1.2 Flood Sources, states that, "By considering the guillotine rupture of lines, we ensure that we address the fact that catastrophic failures might result from operator error (e.g., maintenance-induced floods)....". Finally, both Table D1 of the flooding document and the PTN GDOC misinterpret the scope of the EPRI flood event data, which includes human or maintenance-type events only if these events had resulted in a metallic breach (pipe break). Otherwise, maintenance and human induced flooding events are not accounted for in the generic data. A thorough assessment of maintenance or human induced flooding events has not been documented. This F&O is considered to remain open.	Maintenance-induced flood events are not included in the failure rates. Based on Figure 7-1 of EPRI report 3002000079, Pipe Rupture Frequencies for Internal Flooding Probabilistic Risk Assessments, Revision 3, 30% of the internal flooding initiating events are maintenance-induced. The internal flooding CDF is currently is 1.6E-07 per year. If the lack of inclusion of maintenance-induced floods is approximated by increasing the internal flooding CDF by 30%, the internal flooding CDF is 2.1E-07 per year. The increase of 5E-08 per year is much smaller than the combined CDF from internal events and fire and is orders of magnitude smaller than the NUREG-2180 sensitivity risk increase.

Finding Number	Supporting Requirement(s)	Capability Category (CC)	Description	Resolution for Independent Review	Independent Review Comments	Disposition for RICT
IFSO-A5-01	IFSO-A5	NOT MET	No summary or characterization of flood sources included in the analysis has been provided. It is difficult to tell what the decisions making up the source characterization were. Characterize flood sources in terms of capacity, flow rate, pressure, temperature, etc. Additionally, document the justification for a given flow rate. PTN should also document the process used to identify potential flood sources.	Flooding calculations and discussion of flood sources has been added to the documentation of the internal flooding analysis. See Section 3.2 of PTN-BFJR-11-009, Rev. 1.	Document PTN-BFJR-11-009, revision 1, was reviewed. Section 4.2, Flooding Scenarios, identify tank capacities and makeup flow for the tanks and piping in the flood zone. There is no discussion of temperature or pressure. There is also no discussion of drains and the possibility of sump overflow. There is no consideration for systems to be emptied into the plant. Only the surge/makeup tanks were considered. If the pipe break were on the outlet of the pump, the system would empty all its water in the flood plus any makeup flow. This was not considered. Without these conditions being discussed the flooding analysis may be non-conservative. This F&O is considered to remain open.	Drains, wall penetrations, and floor penetrations are examined for each flood scenario and are documented in Appendix B of PTN-BFJR-11-009. Enhancement of the documentation may be necessary to satisfy the concerns of the F&O closure reviewer. The documentation updates will not affect the results. No impact on RICT application.

Finding Number	Supporting Requirement(s)	Capability Category (CC)	Description	Resolution for Independent Review	Independent Review Comments	Disposition for RICT
Fire PRA Model Findings						
1-3	AS-B1 ES-A1 ES-A3 ES-A4 FQ-A2	NOT MET	The PRA Assumes a reactor trip rather than mapping the components to all of the previously modeled internal events Initiating events. As a result, the equipment that can cause the various initiating events are not mapped to individual initiating events. The internal events PRA model has numerous locations in the model where the specific initiating event results in a model impact. For example, under gate U3QT07; initiating events that can cause a PORV or SRV to lift are ANDed with the failure to reclose the PORV or SRV. In this case, special initiator %ZZIP6U3 is identified as an initiating event that will cause a PORV lift, along with %ZZT2U3. Equipment that can cause each are not mapped or modeled in the Fire PRA. As a result of a previous review, the modeling of Feed-and-Bleed was changed to assume a loss of feedwater (low SG level) occurred. The shorter time results in a higher HEP for feed-and-bleed in all scenarios, regardless of whether a loss of FW occurred. However, numerous other modeling impacts can occur, that are not modeled. Under gate I62115, logic for HVAC unit 3S230 failure to start is included when a Loss of offsite power would occur. This logic is applicable only for when a LOOP occurs, and not applicable for non-LOOP events. This type of logic is contained throughout the internal events PRA modeling. Another example is under gate E1104A, where loss of DC power results in lockout relay failures. There are many other examples throughout the PRA. Additionally, the identification of the specific initiating event for quantification was not performed per the requirements of FQ-A2. For quantification, the modeled initiating event is assumed to be a reactor trip in all cases. This treatment does not meet the intent of SR FQ-A2, where the quantified model should encompass the risk contribution from all applicable initiating events. Map all identified internal events	This F&O has been resolved. The issues and concerns identified in the F&O related to the fire-induced initiating events were reviewed. The review found several instances where a change to the modeling was required to allow the existing treatment methodology to be retained. The review did not identify any instances where specific fire initiating event logic beyond that already in the model was needed.	The Component and Cable Selection Report (PTN-BFJR-16-004) and the fire PRA fault tree was reviewed to address how the assumed reactor trip due to fire is modeled in the fire PRA. The fire related impacts are assigned to the logic as defined in Table 4.1-2 of the notebook. However a disposition of the items identified in the F&O was not found. Therefore this F&O is considered to remain open. The following was noted in a review of the model logic documented in the F&O. The logic noted under gate I62115 does not have fire induced failures associated with it, either in the fault tree model directly or in the FRANX impacts. The logic under gate E1104A does have a propagation of the risk impacts due to fire via the DC bus mapping in FRANX.	Documentation updates are needed to close this finding. The documentation updates will not affect the results. No impact on RICT application.

Finding Number	Supporting Requirement(s)	Capability Category (CC)	Description	Resolution for Independent Review	Independent Review Comments	Disposition for RICT
			initiating events to the specific components that can cause the event, and modify the FPRA to determine the CCDP based on the fire-induced initiating event that results.			
1-10	IGN-A9	NOT MET	Transient Fires are postulated in all fire compartments, as listed in Appendix B and Table 3-6 of the Ignition Frequency Report. All factors affecting the fire frequency were assessed based upon a slightly modified NUREG/CR-6850 approach. However, the rankings that were provided do not appear to be consistent with the methods in NUREG/CR-6850, result in an underestimate for fire frequencies in some areas, and an over estimate in other areas. One F&O is provided on this SR. In particular: a) Areas were ranked as zero in maintenance, occupancy, or storage even though entrance to the areas is physically possible, b) Areas were ranked as 1, even though activities were not prohibited by plant procedure. In areas where the room is sealed during operation (roof plugs), transients could have been left in the room prior to sealing, so the ranking on this factor should not be zero - per the 6850 guidance. During the walkdown, Compartments 70 and 71 both had permanently stored breaker grounding devices, with poly-covers, and 71 had a temporary transformer for the polar crane (operating). Both should be ranked as 'medium' for storage. Similarly, the cable room had storage of 3 temporary fans, cables and blankets and should be marked as medium for storage. This room also appears to include numerous components that will likely be worked on during power, (ranking moderate for non-hot work), and numerous people were present during our limited walkdown. Compartment 88, an open area in front of the switchgear room, had numerous combustibles stored and located, and should probably be marked as medium or high (presently marked as low). Both area 85 and 88 have frequent foot traffic, and should be marked as medium for occupancy. 85 appears as if it should be moderate for storage (no controls). Similarly; no controls appear to be in place for 116. The above are samples of identified issues, based on our limited walkdown. It appears there will be similar issues with other areas	This F&O has been resolved. A sensitivity evaluation was performed that involved increasing the weighting factor for occupancy and storage from 'low' to 'medium' for all instances where such a condition could reasonably be expected to occur. The results of this sensitivity found that the impact on the calculated CDF for each unit was less than 1E-7. Given this small impact, the existing analysis is adequate for the application.	While the transient influence factors for the PRA might have been updated, as discussed in the RAI responses, the current documentation still alludes to the use of a sensitivity study on the overall PRA as a justification for not updating the factors. As this is still the basis for potentially inaccurate values this finding is considered open.	Documentation updates are needed to close this finding. The documentation updates will not affect the results. No impact on RICT application.

Finding Number	Supporting Requirement(s)	Capability Category (CC)	Description	Resolution for Independent Review	Independent Review Comments	Disposition for RICT
			in the plant. We looked at other areas adjacent to the areas we were in (compartments 87, 84, etc), and expect similar problems with the present rankings. (This F&O originated from SR IGN-A9) Re-assess the transient fire rankings per the Guidance in NUREG/CR-6850. Confirm the rankings by walkdown of each area, taking into account the actual condition.			
1-17	IGN-A10 QU-E3 UNC-A1 UNC-A2	NOT MET	Table 3-2 includes uncertainty values (EF) for prior and posterior values. However, Error Factors are not propagated to the compartment specific ignition frequencies. The other parameters, such as conditional failure probabilities for circuit failures, do not have uncertainty intervals. The lack of uncertainty intervals would not generate meaningful uncertainty interval of the CDF/LERF results. (This F&O originated from SR IGN-A10) Estimate EFs for significant fire compartments. ESTIMATE the uncertainty interval of the CDF results. ESTIMATE the uncertainty intervals associated with parameter uncertainties (DA-D3, HR-D6, HR-G8, IE-C15), taking into account the state-of-knowledge correlation.	This F&O has been resolved. The quantitative uncertainty analysis was prepared subsequent to the peer review. A parametric uncertainty evaluation that considers fire ignition frequency as well as other variables was performed that uses a Monte Carlo sampling process. The results of the analysis showed a mean that was slighter higher than the calculated results which was expected.	The Summary Report (PTN-BFJR-16-057) was reviewed for the disposition of uncertainties associated with the error factors for the events in the cutsets. The methodology for propagating uncertainties in the model is documented in Section 3.14; however that section points to Appendices J – M as the location of the uncertainty results. These sections are identified as "Will be added in follow up revision." This F&O is considered to remain open	Documentation updates are needed to close this finding. The documentation updates will not affect the results. No impact on RICT application.
1-18	IGN-A7	NOT MET	During walkdowns, several key areas appeared to have ignition sources not included on the ISDS. For example, in the cable spreading room, 2 transformers were in the compartment (3X033 - 75KVA, 3X130 - 45KVA), both within the screening distance of targets. Also in the compartment is CP-600 spectralink cabinet, an open cabinet, the RCP Vibration Monitoring Cabinet, 4P21 and 4P09 instrument AC panel. Note; we did not do a 100% review of the CS room, so additional cabinets may be missing. See also F&O 1-19. (This F&O originated from SR IGN-A7) Perform a re-verification of the ISDS for significant fire areas in the FPRA. Add missing components to each ISDS, where applicable.	This F&O has been resolved. The specific instances identified in the F&O were reviewed and the analysis updated accordingly. In addition, the supplemental walkdowns that were performed as part of ongoing analysis refinements efforts for the significant fire areas did not identify any other omissions.	The fire PRA model was reviewed and only some of these ignition sources were dispositioned; however there are still missing ignition sources. This F&O is considered to remain open.	A model change is required to add the new ignition sources in the cable spreading room. The impact of these new ignition sources is bounded by the NUREG-2180 sensitivity risk increase.

Finding Number	Supporting Requirement(s)	Capability Category (CC)	Description	Resolution for Independent Review	Independent Review Comments	Disposition for RICT
1-19	IGN-A7	NOT MET	It appears the Ignition Source Counting did not count Lighting Panels or other similar panels. For example, there were at least 8 lighting panels in the cable spreading room that were not on the ISDS. Additional similar panels are located in most electrical rooms we walked down, such as the switchgear rooms and other electrical rooms. Based on our walkdowns, many of the lighting panels should be included in the ISDS, based on guidance in 6850 and the subsequent FAQ on sealed cabinets. A review of the generic guidance provided for ignition counting did list the screening of small, wall mounted cabinets (sealed). However, the lighting panels do not appear to meet the criteria listed in the procedure (not sealed, numerous switches/breakers), etc. Many of the cabinets are located close to cable trays or other intervening combustibles, so a small fire could result in a larger fire due to spreading. (This F&O originated from SR IGN-A7) Include unsealed lighting panels and similar electrical cabinets in the ISDS as potential ignition sources.	This F&O has been resolved. A re-assessment of the lighting panels was performed. The re-assessment focused on the need for treatment as a fire initiating event. No effort was undertaken to alter the population of electrical cabinets considered in the fire frequency development. Therefore, the existing values potentially have a conservative bias. The assessment did not identify any instances were explicit treatment as a fire initiating event was needed.	The lighting panels that were identified in the finding are still screened out from the fire analysis; however there is no disposition or basis for making this determination. This finding is considered open.	Documentation updates are needed to close this finding. The documentation updates will not affect the results. No impact on RICT application.
1-25	FQ-E1 QU-D5	NOT MET	There does not appear to be a review of non-significant cutsets in the PRA documentation. (This F&O originated from SR QU-D5) Perform a review of non-significant cutsets and accident sequences, as discussed in QU-D5 for the FPRA.	This F&O has been resolved. Review of non-significant cutsets performed and documented.	Section 4.0 of the Summary Notebook (PTN-BFJR-16-057) notes that "A review of the cutsets generated from the quantification to confirm that nonsignificant cutsets were valid was performed," however there is no actual documentation of this review to support the conclusion that this review was done. This F&O is considered to remain open.	Documentation updates are needed to close this finding. The documentation updates will not affect the results. No impact on RICT application.
1-27	FQ-E1 LE-F1 LE-F2 LE-F3 UNC-A1	NOT MET	Significant fire compartment contributors to LERF are documented in Appendix C of the summary report. However, the contribution from plant damage states is not provided or the contributors from LE-B SRs. Sources of uncertainty, including sensitivity analysis performed, are not evaluated for LERF. (This F&O originated from SR LE-F1) Document the contributors to LERF based on the requirements of LE-F1 of the internal events section of the standard, as required by FE-Q1. Document the Sources of uncertainty, including sensitivity analysis performed for CDF in	This F&O has been resolved. Added LERF top cutsets and importances run as well as sensitivity analysis in Summary Report. Also performed and documented the uncertainty evaluation for LERF.	The Summary Report (PTN-BFJR-16-057) does document the risk results based on LERF; however there is no disposition of the plant damage states as alluded to by the finding; therefore this finding remains open.	Documentation updates are needed to close this finding. The documentation updates will not affect the results. No impact on RICT application.

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			Appendix D of the Summary Report.			
1-38	FQ-F1 QU-F2 UNC-A2	NOT MET	Results of the Fire PRA did not include the following: (e) the total plant CDF and contributions from the different initiating events and accident classes (i) the uncertainty distribution for the total CDF (j) importance measure results (l) asymmetries in quantitative modeling to provide application users the necessary understanding of the reasons such asymmetries are present in the model (m) the process used to illustrate the computer code(s) used to perform the quantification will yield correct results process. Some of these issues are listed in other F&Os. However, item e (accident classes), l (asymmetries) and m (validation of computer codes) is not covered elsewhere. (This F&O originated from SR QU-F2) Provide required documentation per QU-F2 and FQ-F1.	This F&O has been resolved. The documentation of the analysis results has been expanded to include the information noted in the F&O. These results were also reviewed for reasonableness and no issues or concerns were identified.	The Summary notebook (PTN-BFJR-16-057) was reviewed for the items identified in the finding. Only the discussion of importance measures related to CDF and LERF have been added to the notebook, the remainder of the items identified have not be dispositioned.	Documentation updates are needed to close this finding. The documentation updates will not affect the results. No impact on RICT application.
3-3	PP-B1 PP-B3	NOT MET	A few cases of special separation are credited in the PB&P. Most notable are separation of Fire Compartments 058 and 037 and 004 and 010. The FHA notes in the write-up for fire zone 004: 'There is a partial height concrete wall on the South side of this room with a full height opening to Fire Zone 10'. No justification is provided for this separation, hence it is not clear that the credited separation may be expected to contain the effects of a fire. Accordingly the effect of a fire beyond the identified fire compartment boundary may occur. While this effect would be expected to be identified through performance of the multicompartment analysis the level of documentation provided in support of the PB&P does not satisfy the standard requirements. □ (This F&O originated from SR PP-B)	This F&O has been resolved. Openings between fire zones were addressed with respect to targets on the other side of an opening which are within the zone of influence of an ignition source. Targets were evaluated for fire damage regardless of the zone in which they were located. The multi-compartment analysis considered the volume associated with adjacent zones with openings between the zones in evaluating the potential for hot gas layer formation.	The Plant Partitioning and Fire Ignition Frequency notebook (PTN-BFJR-16-027) was reviewed for a discussion of fire barriers that might credit spatial separation, and no text discussing this position was identified. The Hot Gas Layer and Multi-Compartment Analysis (PTN-BJFR-16-056) and the Fire PRA Scenario Report (PTN-BFJR-16-034) were also reviewed to see if there is any discussion about the zones identified in the F&O and there was no mention of how these items were dispositioned in the fire PRA model; therefore this finding remains open.	Documentation updates are needed to close this finding. The documentation updates will not affect the results. No impact on RICT application..

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3-5	SF-A1	NOT MET	According to the Section 3.13 of the PTN FPRA Summary Report the effect of an earthquake on ignition source scenarios is discussed in the IPEEE and Potential Fire Related Vulnerabilities self assessment. Review of the Potential Fire Related Vulnerabilities self assessment did not reveal an analysis that specifically addresses generation of fire ignition source scenarios which could result from an earthquake, nor does this assessment address the potential risk significance of these scenarios. This assessment does identify fire vulnerabilities in terms of fuels, ignition sources, and oxidizers however these discussions are not specific to seismic events nor do they include evaluation of special ignition scenarios that may arise from an earthquake. (This F&O originated from SR SF-A1)	This F&O has been resolved. The low seismic spectra applicable to the Turkey Point site have been validated via the IPEEE with respect to the potential for causing unique fire scenarios. Their potential for causing damage to pipes or tanks containing combustible gases or liquids or to initiation of electrical fires is considered negligible.	The Fire PRA Summary notebook (PTN-BFJR-16-057) was reviewed for a discussion the seismic fire interaction. The assessment of the seismic interaction is that there is not potential for a seismic event at Turkey Point; however beyond this there is no discussion about the unlikely nature for a seismic event causing damage to the suppression systems or causing new ignition sources. This F&O is considered to remain open.	Documentation updates are needed to close this finding. The documentation updates will not affect the results. No impact on RICT application.
5-13	FQ-A3	NOT MET	Turkey Point FPRA Summary Report NUREG/CR-6850 Task 16 Report No. 049306006.005 Rev. 1 Tables A-1, A-2, B-1 and B-2 documented the Units 3 & 4 Fire PRA quantification Results for both CDF and LERF for all fire scenarios that were quantified. Scenario 096-A was randomly picked review for both Units 3 & 4. The CDF/LERF results are consistent between the Summary Report and ZoneScenarios in database files, Unit 3 CDF "PTNFIRE_W_LERF_MH_ESF.mdb", Unit 3 LERF "PTNFIRE_W_LERF_MH_ESF.mdb", Unit 4 CDF "U4PTNFIRE_W_LERF_MH_ESF.mdb", and Unit 4 LERF "U4PTNFIRE_W_LERF_MH_ESF.mdb". However, reviewing the AlteredEvents table in each database files shows inconsistent basic events impacted between Unit 3 and 4. Unit 3 have no basic event impacted, while Unit 4 have 9 basic events listed. (This F&O originated from SR FQ-A3)	This F&O has been resolved. The identified data differences were reviewed and confirmed to be reflective of the design and layout of the units. Additional comparison of the quantification results between the two units was also performed to ensure that any significant differences in results are consistent with the actual unit differences. Various asymmetries in the plant layout were identified.	The Fire PRA Summary Report (PTN-BFJR-16-057) in Appendix I states that the asymmetry was discussed with the site and that the configuration is consistent with plant design. As noted in the current FRANX models the additional altered events that only impact Unit 4 are still present; however in the quantification of these scenarios FRANX provides a warning message that the assumed altered events cannot be added to the fire scenario because the nominal basic events are not damaged by the fire. There is no discussion of the asymmetry in the document or others that are alluded to in the F&O resolution. This F&O is considered to remain open.	Documentation updates are needed to close this finding. The documentation updates will not affect the results. No impact on RICT application.

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6-9	FQ-A4 QU-A3	NOT MET	The parametric uncertainty analysis as discussed in QU-E3 (estimate of uncertainty intervals, etc.) is not performed. Also, the "state-of- knowledge" correlation between fire-specific event probabilities (e.g., suppression system unavailabilities, fire ignition frequencies, hot short conditional probabilities, etc.) hasn't yet been applied. (This F&O originated from SR QU-A3)	This F&O has been resolved., Parametric uncertainty has been performed for CDF and LERF for each unit's FPRA.	The Summary Report (PTN-BFJR-16-057) was reviewed for the disposition of uncertainties associated with the error factors for the events in the cutsets. The methodology for propagating uncertainties in the model is documented in Section 3.14; however that section points to Appendices J – M as the location of the uncertainty results. These sections are identified as "Will be added in follow up revision." This F&O is considered to remain open.	Documentation updates are needed to close this finding. The documentation updates will not affect the results. No impact on RICT application.
6-20	CF-A2 UNC-A2	NOT MET	The parametric uncertainty associated with conditional circuit failure probabilities are not evaluated and are not incorporated into the model. (This F&O originated from SR CF-A2) Develop uncertainty intervals for applied hot short probabilities and include them in the model.	This F&O has been resolved., Parametric uncertainty has been performed for CDF and LERF for each unit's FPRA.	The PRA database (.RR file) did not contain error factors (EFs) for events such as fire-induced valve failures or spurious actuations of components due to fire, both of which would be typical circuit failure events. Altered basic event probabilities as listed in Appendix A of the fire scenario report (16-034) would have EF data supplied by the type code data but no discussion of uncertainty is presented in this report. Additionally, nearly all fire-related HFEs do not have EFs in the .RR file. The Turkey Point Nuclear Plant FPRA Summary report, revision 12, was reviewed. The methodology used to perform the uncertainty analysis was described. However, the results of the uncertainty analysis was not included in this report. Appendices J – M are noted as the location of the uncertainty results. These sections are identified as "Will be added in follow up revision". This F&O is considered to remain open.	Documentation updates are needed to close this finding. The documentation updates will not affect the results. No impact on RICT application.

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7-3	PRM-14	NOT MET	The current model uses the LERF model for the PTN revision 9 model (PTN-BJFR-99-010, Rev. 1) and maps appropriate equipment impacts into the system models used to model LERF. No new accident progressions beyond the onset of core damage were identified for the fire PRA. However, there is no documentation that a specific review of the accident progressions leading to LERF was conducted to identify whether new considerations should be addressed in the fire PRA. In addition, effects on PDS mapping due to fire-induced failures may not be appropriately captured. For example, RWST diversion of the RWST to the containment sump is modeled as a failure of HHSI which would normally go to a dry containment PDS. However, the actual PDS should be one for wet containment. While this is a late containment failure concern rather than a concern for LERF, there may be similar fire induced failures that could affect the mapping of LERF accident progressions. (This F&O originated from SR PRM-B14)	This F&O has been resolved. A review of the mapping of Level 1 sequences to the plant damage states in the LERF model was reviewed. No new accident progressions that required E146modification of the LERF model were identified.	The Component and Cable Selection notebook (PTN-BFJR-16-057) was reviewed for a discussion on the impacts from fire to LERF. There is no disposition of the events associated with LERF impacts; containment spray, containment heat removal, or containment isolation. It was noted in the Fire Scenario Report (PTN-BFJR-16-034) that there are numerous items that are assumed failed and among them are the containment spray pumps and containment heat removal fans. This F&O is considered to remain open.	Documentation updates are needed to close this finding. The documentation updates will not affect the results. No impact on RICT application.
8-3	PRM-B2	NOT MET	Attachment U – Internal Events PRA Quality (DRAFT), document applicability of Internal Events F&Os to internal events PRA, but not to Fire PRA. There was no evidence that the review of F&O disposition status addressed the question of whether the disposition that was taken would adversely affect the development of the fire PRA. This F&O is derived from 2010 Fire PRA peer review F&O 4-4. (This F&O originated from SR PRM-B2)	This F&O has been resolved. The internal events PRA model F&Os that have not been resolved/closed have been reviewed and found to have no negative impact on Fire PRA results or this application.	The current FPRA documentation was reviewed. No discussion regarding the disposition of the Internal Events F&Os related to their impacts on FPRA could be found. This F&O is considered to remain open.	Documentation updates are needed to close this finding. The documentation updates will not affect the results. No impact on RICT application.
9-6	FSS-D7	NOT MET	The system unavailability records for the plant have not been reviewed in crediting fire detection and suppression systems. This F&O supersedes 2010 FPRA peer review F&O 2-26 (This F&O originated from SR FSS-D7)	This F&O has been resolved. The fire protection system availability data for PTN has been reviewed and no outlier behavior has been identified.	As documented in the Fire PRA Summary Report (PTN-BFJR-16-057), a review of the plant specific unavailability was done and compensatory measures were in place for all instances. As noted in the RAI response documented in ML13038A310, this review was from March 2009 to January 2012 and that review would meet the requirements to close this F&O. However, as is further noted in the Summary Report, the documentation of this review has not been incorporated into	Documentation updates are needed to close this finding. The documentation updates will not affect the results. No impact on RICT application.

Finding Number	Supporting Requirement(s)	Capability Category (CC)	Description	Resolution for Independent Review	Independent Review Comments	Disposition for RICT
					the fire PRA and this finding is considered to remain open.	
10-1	FSS-C1 FSS-G1	NOT MET	The 2010 peer review identified that "Fire modeling was conducted via generic fire modeling from which Zones-Of-Influence (ZOI) for specific initiator types was generated. The ZOIs were used to define bounding fire characteristics for each fire scenario. Characteristics that are used to bound potentially risk contributing fire events are identified in Attachment B of the Fire Scenario Report, (Report 0493060006.004). Based on the use of a bounding approach this SR is judged to be met at CC I. Significant fire scenarios should be developed with 2-point fire modeling." Since this review, FP&L has stated that "The use of a panel split fraction to differentiate between fires impacting the panel and components with cables terminating at the panel versus panel fires impacting cables outside of the panel provides an equivalent and more useful two point fire model." The Panel Split fraction is developed from a supplemental report (ERIN report, Supplemental Fire PRA Methods, dated February 2010). This document was submitted to the EPRI Fire PRA Methods Review Panel. This review is not complete as of the date of this peer review. Use of the split fraction method is based on industry events rather than site specific fire ignition sources and target configurations and therefore, could result in nonconservative frequency estimates of target damage. (This F&O originated from SR FSS-C1) Perform 2-point fire modeling, when applicable, for risk significant fire scenarios.	This F&O has been resolved. The recommended resolution action in the F&O was assessed in the context of the dominant fire risk contributors. This assessment concluded that further refinements such as that described in the F&O would not substantively change the results of the analysis. The existing treatment retains some conservatism which results in this SR meeting CC I. This is adequate for the NFPA 805 application, as this conservative bias would tend to overestimate the risk metric that is used to judge the acceptability of this application. The issue regarding the ERIN panel split fraction is addressed in the disposition for F&O 10-3.	Two-point fire modeling is not used in the Fire Scenario Report. This makes for a more conservative identification fire damage but is only consistent with a Category I analysis. For the panel fraction, Section 8 of the Fire Scenario report gives the basis of FAQ 14-0009 which was 'current' at that time. However, this FAQ was revised to include various cable insulation materials which lead to differing SFs. Section 5 of the Fire Scenario report notes that PTN is assumed to have only thermoplastic cables. From the revised FAQ notes a SF of 0.104 for non-qualified (thermoplastic) source and target combinations. Therefore the use of the 0.1 assumption is slightly non-conservative and the discussion included in the Fire Scenario report is now outdated compared to the FAQ wording. This F&O should remain open due to the panel fraction non-conservatism and the retained Category I SR.	The existing treatment retains some conservatism which results in this SR meeting CC I. This is adequate for the RICT application, as this conservative bias would tend to overestimate the risk metric that is used to judge the acceptability of this application.
10-2	FSS-A1	NOT MET	The 2010 review of PTN Tasks 8 and 11 Report 0493060006.004, identified that 'no hydrogen fires other than turbine/generator have been postulated.'(Previously F&O 5- 16) Since this Finding was identified, FP&L has determined that 'Miscellaneous Hydrogen piping at PTN is limited to hydrogen supply to the VCT tanks. The associated piping is located in the charging pump rooms (Fire Zones 45 and 55). Fires in these fire zones are assumed to impact all components in the fire zone. The associated risk is low given the availability of thermal barrier cooling for RCP seals and HHSI pumps. Allocation of the IGF	This F&O has been resolved. Miscellaneous hydrogen fires have been incorporated in the Fire PRA in the charging pump room fire areas where the hydrogen lines associated with VCT cover gas are routed.	The Fire PRA Scenario report (PTN-BFJR-16-034) was for hydrogen fires and their associated impacts in the fire areas that were noted in the F&O (045, 055, 082, and 087). As discussed in Appendix I of the fire PRA Summary report (PTN-BFJR-16-057) the scenarios for each of these zones are base scenarios and the entire fire ignition frequency is apportioned to these scenarios. Reviewing the Plant Partitioning and Fire	Documentation updates are needed to close this finding. The documentation updates will not affect the results. No impact on RICT application.

Finding Number	Supporting Requirement(s)	Capability Category (CC)	Description	Resolution for Independent Review	Independent Review Comments	Disposition for RICT
			associated with miscellaneous hydrogen fires to these fire zones would result in an increase in the ignition frequency for these zones by less than a factor of 3. Given the low risk significance of these zones this will have a negligible impact on overall plant risk and the charging pump rooms will remain low risk contribution fire zones. Incorporation of this ignition frequency into the associated documentation will be incorporated in a future revision to the documentation.' Hydrogen fires are also being developed for H2 piping and valves in Compartments 82 and 87 (scenarios 82-P and 87-P). However, since these do not appear yet in the Fire Scenario Report, action is required. This finding is currently being addressed and appears to be resolved once the new H2 fires are included in the model and documentation is updated. (This F&O originated from SR FSS-A1) Incorporate the hydrogen fire scenarios being developed into the model, and update documentation as necessary.		Ignition Frequency report (PTN-BFJR-16-027) for the development of the ignition frequency for these areas showed that the charging pump rooms (045 and 055) do not have any fire contribution from hydrogen fires (Bin 19). Additionally the review of the other fire areas (082 and 087) showed that the contribution to Bin 19 for both zones was based on an assumed factor, i.e. 0.5 per zone and not on the actual plant configuration. This F&O is considered to remain open.	
10-4	FSS-C8	NOT MET	One situation was identified for which credit of fire wrap is taken in Compartment 96 for ignition source 3B04, which is a 480V load center. This fire wrap protects PB3319, PB3813, PB7022, and PB7521. The wrap appears as being credited in a HEAF scenario. No justification for crediting this wrap assuming mechanical damage and direct flame impingement from the HEAF is provided. Similar issue for 3B03 also in Compartment 96. Thermo-lag is also seen as credited in some scenarios, which would require justification due to issues with this particular type of cable barrier. (This F&O originated from SR FSS-C8)	This F&O has been resolved. A qualitative assessment has been performed to assess the potential impact of this F&O. The hose stream test imposed on the fire barrier qualification subsequent to fire exposure is considered to provide a comparable level challenge to the thermolag barrier as would the HEAF force applied at the onset of fire exposure.	PTN-BFJR-16-034, Fire PRA Scenario Report, was reviewed. Currently the only credited wrap documented in the report is in scenario 096-E-PTB, Transient Fire Located next to riser 3ATF10, to protect 3A1301. This wrap is credited in the current FRANX model. However, no discussion could be found in the documentation regarding the acceptability of this wrap. This finding is considered to remain open.	Documentation updates are needed to close this finding. The documentation updates will not affect the results. No impact on RICT application.
10-8	FSS-D4 FSS-H4	NOT MET	Ambient conditions are assumed in the Generic Fire Modeling Treatment Report (prepared by Hughes). Ambient temperature is assumed to be 68°F for all calculations. No technical discussion or justification is provided in the Fire Scenario Report to substantiate that this is a reasonable value for the compartments where this was applied. (This F&O originated from SR FSS-D4) Assess areas where elevated ambient temperatures could be experienced and justify the acceptability of the models used. Otherwise, incorporate elevated ambient temperatures into the	This F&O has been resolved. A qualitative assessment has been performed to assess the potential impact of this F&O. The sensitivity of the ZOI dimensions to the ambient temperature is relatively low as described in the original Hughes Generic Fire Modeling treatments report, in particular for IEEE-383	An evaluation of the impact of higher ambient temperatures was completed as part of PTN-BFJR-16-013, Generic Fire Modeling Treatments. The evaluation shows that the critical heat flux is diminished by ~17% for an increase in ambient temperature of 60 appear to have been used in developing the target damage in the BFJR-16-034 Fire PRA Scenario Report and no explanation provided	Documentation updates are needed to close this finding. The documentation updates will not affect the results. No impact on RICT application.

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			zone of influence calculations.	qualified/Thermoset cables. In the case of an initial ambient temperature of 35°C, the expected affect on the ZOI dimensions is within the measurement uncertainty in the field.	for not using the lower critical heat flux. The noted F&O closure uncertainty assessment could not be located, but is only stated as valid up to 95F. Is there any documentation that all areas of PTN are not greater than this temperature? A typical higher ambient temperature assessment for NPPs will have 105F or higher depending on site-specific information. This F&O is considered to remain open.	
10-11	FSS-C2 FSS-C3 FSS-G1	NOT MET	The 2010 peer review identified that "fire scenario evaluation tools were developed based on the Generic Fire Modeling Treatments. These walkdown/evaluation tools are based on bounding fires that are assumed to cause target damage at a height above the base fire with the fire burning at peak intensity and without burnout times. Because these tools assume a fire burning at peak intensity and without burnout, this SR is considered met at CC I." Since the review, FP&L has stated that "The use of a panel split fraction to differentiate between fires impacting the panel and components with cables terminating at the panel versus panel fires impacting cables outside of the panel provides an equivalent and more useful two point fire model... The application of the two point treatment to individual fire scenarios is carried through to the MCA/HGL evaluation which addresses the impact of each scenario on MCA." The Panel Split fraction is developed from a supplemental report (ERIN report, Supplemental Fire PRA Methods, dated February 2010). This document was submitted to the EPRI Fire PRA Methods Review Panel. This review is not complete as of the date of this peer review. Use of the split fraction method is based on industry events rather than site specific fire ignition sources and target configurations and therefore, could result in nonconservative frequency estimates of target damage. (This F&O originated from SR FSS-C2) Include fire growth and decay for risk significant fire scenarios.	This F&O has been resolved. The recommended resolution involves the crediting of growth and decay in the modeling of the postulated fire. The existing analysis does not take credit for these variables. A review of the dominant fire scenarios found that the risk benefit that might be gained is minimal. Therefore, this refinement was not performed. The resulting categorization of the related SR is CC 1. Since the approach results in some conservatism being retained in the results, this CC is judged to be adequate for the NFPA 805 applications as the conservative bias would tend to result in the overestimation of the risk metrics used for this application.	F&O should remain open since the SR is remaining at Category I (explanation as to why PTN is accepting this is given in the F&O closure document).	The resulting categorization of the related SR is CC 1. Since the approach results in some conservatism being retained in the results, this CC is judged to be adequate for the RICT applications as the conservative bias would tend to result in the overestimation of the risk metrics used for this application.

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10-14	FSS-A5	NOT MET	Beyond the Generic Fire Modeling Treatments, the Fire PRA did not include additional detailed fire modeling for most fire compartments. Note 4 (under FSS-A5 of the ASME Standard) states that "once a fire scenario has been 'selected,' this implies that the scenario will eventually be evaluated and/or quantified at a level of detail commensurate with the risk significance of the scenario." (This F&O originated from SR FSS-A5) Consider performing additional detailed fire modeling to provide "reasonable assurance that the fire risk contribution of each unscreened physical analysis unit can be characterized."	This F&O has been resolved. The current analysis is consistent with a Capability Category I analysis. This provides a degree of conservatism in the analysis which would also tend to overestimate the change in risk which is reported for the NFPA 805 application. A review of the results of the application analyses indicates more rigorous analyses consistent with CC II or CC III would not alter the conclusions of the analyses.	Resolution listed as consistent with Category I. PTN fire PRA uses mainly scoping or conservative modeling which is generally the early stages of a graded modeling approach. F&O should remain open since the SR is remaining at Category I (explanation as to why PTN is accepting this is given in the F&O closure document).	The current analysis is consistent with a Capability Category I analysis. This provides a degree of conservatism in the analysis which would also tend to overestimate the change in risk which is reported for the RICT application. A review of the results of the application analyses indicates more rigorous analyses consistent with CC II or CC III would not alter the conclusions of the analyses.
10-15	FSS-C7 FSS-G1 FSS-H7	NOT MET	PTN credits multiple suppression paths for MCA/HGL evaluation. However, the dependencies have not been evaluated and modeled. For example, fixed suppression and fire brigade response may both rely on a single detection system. (This F&O originated from SR FSS-C7) When multiple suppression paths are credited, perform a review and address any dependencies between suppression and detection systems credited in the MCA/HGL calculation.	This F&O is resolved. A review of the credited suppression systems in the Multi-Compartment /Hot Gas Layer analysis has confirmed that no dependency exists between the suppression systems and detection systems. Detection in the zones with suppression systems is associated with an independent detection system.	PTN-BFJR-16-008, FPRA Hot Gas Layer and Multi-Compartment Analysis states that the detection systems credited for notifying the fire brigade need to be independent of the detection system that actuates the suppression system but never documents the results of the closure document's verification that the detection and suppression are on independent systems. The documentation to show that only manual or automatic suppression is credited is not discernable from the tables in the MCA report. This documentation for independence of detection and suppression needs to be added to the MCA report. This F&O is considered to remain open	Documentation updates are needed to close this finding. The documentation updates will not affect the results. No impact on RICT application.
10-18	FSS-A1	NOT MET	In at least two cases, transient fire scenarios have not been included in the fire modeling for some compartments (e.g., fire compartments 67 and 68). Per discussion with FP&L the transients may have been excluded based on the dominance of the frequency of fixed scenarios. However, transients should only be excluded when precluded by design. Based on the size of these rooms, and the presence of secondary combustibles, transient fires could lead to fire growth and eventually HGL, and therefore	This F&O has been resolved. Supplemental walkdowns were performed to re-assess the treatment of transient fires. These walkdowns focused on two key attributes - the appropriateness of the selected HRR characterization and the location of the postulated fire scenarios. The postulated	The noted zones are no longer listed as screened. However, several zones use a reduced transient HRR of 69 kW rather than the normal 98th-percentile value of 317 kW. Update of the zones with the reduced transient HRR has typically been done for other plants using this treatment of reduced transient HRRs. Typical updates could	Documentation updates are needed to close this finding. The documentation updates will not affect the results. No impact on RICT application.

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			should be analyzed. (This F&O originated from SR FSS-A1) Include transient scenarios in all compartments where fire modeling has been employed.	location for the treatment of transient fires was based on where a transient ignition source might reasonably occur. The results of these walkdowns were incorporated into the FPRA analysis.	include ZOI assessments using a HRR of 317 kW but lower transient ignition frequency distribution factors if plant-specific combustible control procedures are applicable. In addition, the Fire PRA Scenario Report (PTN-BFJR-16-034) includes transient fires as scenarios for the two specific fire compartments mentioned. However, not all fire compartments have transient ignition source scenarios. This F&O is considered to remain open, given the need to justify any rooms that do not have transient ignition source scenarios – typically based on physical inaccessibility only.	
10-19	FSS-H1	NOT MET	For fire modeling analysis of transient fires, FP&L implements a floor area weighting factor. However, the documentation does not include a graphical representation of the assumed transient locations and boundaries. It is therefore not possible to review (or update) transient fires. Also during review of transient weighting factors it appears to have been double counted in some compartments (e.g., compartment 63). Based on discussion with FP&L this was due to an error in the Excel based spreadsheet tool for transient frequency quantification. This appears to be an isolated case and will be corrected. (This F&O originated from SR FSS-H1) Update documentation to include a graphical representation of transient fire locations and boundaries.	This F&O has been resolved. The specific instance noted in the F&O was corrected. In addition, supplemental walkdowns were performed to re-assess the overall treatment of transient fires. These walkdowns focused on two key attributes - the appropriateness of the selected HRR characterization and the location of the postulated fire scenarios. However, the documentation that was generated did not specifically produce graphical representations. Instead, the information was incrementally enhanced to provide a spatial reference to a location with in the space. The need for special depiction of transient fire scenario locations will be addressed in conjunction with the development of procedures for post transition configuration control.	The explanation for not having physical layout drawings showing the transient ignition sources is acceptable. There is no requirement to have drawings showing the footprint of the ignition sources. However, there still appears to be to identical scenarios J-PTB and J-FRE in Fire Compartment 063. Both scenarios are identified as "Transient fire located in front of C-281-A due to cutting& welding and general transients." The data in each appears to be the same, so it is unclear why they are identified as 2 scenarios. This F&O is considered to remain open.	Documentation updates are needed to close this finding. The documentation updates will not affect the results. No impact on RICT application.

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10-20	FSS-A1	NOT MET	The fire modeling analysis of the Turbine Generator (T/G) fires is performed in accordance with Appendix O to NUREG/CR-6850. However, there is no discussion regarding the lack of analysis of the catastrophic T/G fire event, which should consider blade ejection, oil line rupture, and hydrogen explosion. Per discussion with FP&L, the catastrophic fire was discounted since the T/G is located outdoors. While this may not result in hot gas layer formation and structural collapse, a review of the guidance is warranted, and inclusion of this event frequency should as a minimum map to the loss of the T/G and if suppression fails, all equipment within the T/G structure. (This F&O originated from SR FSS-A1) Perform a review of the catastrophic T/G fire in accordance with Appendix O to NUREG/CR-6850, or document the justification for excluding this event at PTN.	This F&O has been resolved. The analysis documentation has been updated to address catastrophic T/G fires that may lead to building collapse or other significant widespread damage. The results of this update did not identify any new risk significant contributors or insights.	Section 6 of the Fire Scenario report notes the methods used for the large turbine building fires, but no valid scenarios could be easily located in the report for those sources. Areas such as compartment 076 and 081 would be expected to have catastrophic impacts for this methodology. Compartment 117 does not seem to have counted turbine generator ignition sources such as Bin 34 or 35. This F&O is considered to remain open given the lack of the above noted ignition sources or a discussion as to why they are not of concern for PTN.	A model change is required to add new scenarios to address the Turbine Generator fires. Fires in the turbine building have low risk significance due to limited impacts on equipment related to safely shutting down the plant and as such, the new scenario risk is bounded by the NUREG-2180 sensitivity risk increase.
10-21	FSS-C3 FSS-G1 FSS-H2	NOT MET	The supplemental generic Fire Model Treatments: Transient Ignition Source Strength includes an assumption for transient burnout of 12 minutes. This burnout time is based on an assumed fire loading and the 317kW heat release rate, and appears to be optimistic given the uncertainty in transient fire loading. The burnout is then used to develop a zone of influence for thermoplastic targets, based on the thermal response tables in Appendix H to NUREG/CR-6850 for thermoplastic cable at 260°C. Since this resultant vertical zone of influence is used to screen transient scenarios from impacting secondary targets higher than 7.3 feet from the floor, additional justification is needed to demonstrate that a 12 minute fire, and subsequent use of 260°C damage threshold is appropriate for screening purposes. Also noted is that Attachment B to the Fire Scenario Report zone of influence does not reflect the same values recommended by the Generic Fire Model Treatment. As an example, the differentiation between transient Severe and Non-Severe categories is not based on a 317kW fire. This appears to be a documentation issue only. (This F&O originated from SR FSS-C3) Provide additional justification for the applied transient fire analysis as a screening approach. Consider increasing the burnout time and using the NUREG/CR-6850 recommended damage	This F&O has been resolved. Supplemental walkdowns were performed to re-assess the treatment of transient fires. These walkdowns did not identify any instances where an altering of the transient fire duration had any material impact on the HGL and MCA. The documentation has also been updated to address the criteria used for selecting the characteristic transient fire HRR. The approach is consistent with the recently issued guidance from the EPRI/NRC review panel. The results of these walkdowns were incorporated into the FPRA analysis. The twelve minute fire corresponds to the 317 kW fuel package only and represents ~ 35 lb. of Class A material. Additional discussion is provided in Rev. 0 of Supplement 3 of the Hughes Generic Fire Modeling treatments that examines the fire durations and test	Other NEE fire PRAs were updated to 205C or 330C depending on cable material type (see DAEC F-25), however, that was not done for PTN. PTN-FPJR-16-014 justifies the use of the 12 minute fire duration as noted in the F&O closure report, but the use of the higher 260F scoping modeling failure criteria is not appropriate. Duration of fire/hot gas exposure can be credited in detailed fire modeling for specific cases, but not as done here. This F&O is considered to remain open pending resolution of the items noted here.	Documentation updates are needed to close this finding. The documentation updates will not affect the results. No impact on RICT application.

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			threshold to 205°C to bound uncertainties in fuel loading for transient fires.	durations of all NUREG/CR 6850 tests. It is shown that the method used to determine a 12 minute fire predicts or overestimates the fire duration in all cases and is therefore a sound approach.		