

Record of Review

Dispositions to Browns Ferry Nuclear Plant, Units 1, 2, and 3

Internal Events PRA and Fire PRA Facts and Observations

By letter dated March 27, 2013 (Reference 1), Tennessee Valley Authority (TVA, licensee) submitted a license amendment request (LAR) for Browns Ferry Nuclear Plant (BFN), Units 1, 2, and 3, to transition to National Fire Protection Association Standard (NFPA) 805.

Table U-1 in Attachment U of the LAR provides the licensee's dispositions to 125 Facts and Observations (F&Os) from the internal events (including internal flooding) probabilistic risk assessment (PRA) peer review, all of which are characterized in LAR Attachment U as findings per Nuclear Energy Institute (NEI) 05-04 (Reference 2) peer review guidelines. The Nuclear Regulatory Commission (NRC) staff evaluated each F&O and the licensee's disposition in Attachment U to determine whether the F&O had any significant impact for the application. The NRC staff's review and conclusion for the licensee's resolution of each F&O associated with the internal events PRA and basis of acceptability of Supporting Requirements (SRs) that are "not met" or only meet Capability Category (CC) I are summarized in Attachment A of this document.

Table V-7 in Attachment V of the LAR provides the licensee's dispositions to all 77 F&Os from the fire PRA peer review that were written against SRs of Part 4 of the ASME/ANS RA-Sa-2009 PRA standard (Reference 3) as clarified by Regulatory Guide 1.200, Revision 2 (Reference 4) and left unresolved by the follow-on focused-scope peer review. The NRC staff evaluated each F&O as well as the licensee's disposition in LAR Attachment V to determine whether the issue had any significant impact for the application. The NRC staff's review and conclusion for the licensee's resolution of each F&O and unreviewed SR associated with the fire PRA is summarized in Attachment B of this document.

References:

1. Letter from TVA to NRC, "License Amendment Request to Adopt NFPA 805 Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants (2001 Edition) (Technical Specification Change TS-480)," dated March 27, 2013 (ADAMS Accession No. ML13092A393).
2. NEI 05-04, "Process for Performing Internal Events PRA Peer Reviews Using the ASME/ANS PRA Standard," Revision 2, Nuclear Energy Institute (NEI), Washington, DC, November 2008.
3. American Society of Mechanical Engineers (ASME) and American Nuclear Society (ANS), ASME/ANS RA-Sa-2009, "Addenda to ASME/ANS RA-S-2008, Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications," ASME, New York, NY. February 2, 2009.

4. Regulatory Guide 1.200, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities," Revision 2, U. S. Nuclear Regulatory Commission, Washington, DC, March 2009 (ADAMS Accession No. ML090410014).

ATTACHMENT A

Record of Review Dispositions to Browns Ferry Nuclear Plant, Internal Events PRA Facts and Observations

Record of Review
Dispositions to Browns Ferry Nuclear Plant (BFN) Internal Events PRA (IEPRA)
Facts and Observations (F&Os)

FINDING/SUGGESTION (F&O) ID OR SUPPORTING REQUIREMENT (SR)	ACCEPTABLE TO STAFF VIA		
	Review of Plant Disposition (A/B/C)	RAI Response	
		Not Discussed in SE	Discussed in SE
1-6	A		
1-12		See PRA RAI 23.a. Acceptable to the NRC staff because the licensee stated that (i) HVAC dependencies were eliminated based on transient thermal models constructed in GOTHIC to estimate the temperature response following a transient that initiates safety-related loads and a loss of room cooling; (ii) the keep-fill system is considered reliable because it is a passive system maintained by a head tank and any significant loss of pressure is easily identified due to routine monitoring; and (iii) the upgraded booster pumps will be water cooled using the Raw Cooling Water (RCW) system and will no longer require HVAC support.	
1-14	A		
1-15	A		
1-17	B/C		
1-22	A		
1-26	A		
1-33	A		
1-34	A		
2-2	A		
2-4	A		
2-6	A/C		
2-13	A		
2-14	B		
2-17	A		
2-23		See PRA RAI 23.b Acceptable to the NRC staff because the licensee confirmed that HVAC System operation in the fire compartment where the fire is located was not assumed in the FPRA to protect equipment from smoke damage or sensitive electronics from thermal damage.	
2-31	B/C		

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FINDING/SUGGESTION (F&O) ID OR SUPPORTING REQUIREMENT (SR)	ACCEPTABLE TO STAFF VIA		
	Review of Plant Disposition (A/B/C)	RAI Response	
		Not Discussed in SE	Discussed in SE
2-35		See PRA RAI 23.c. Acceptable to the NRC staff because the licensee clarified that unit differences related to the RHR system and other systems were explicitly modeled in the IEPRA to determine LERF.	
2-38	A		
2-39	A		
2-41			See PRA RAI 23.d.
3-7	A/C		
3-10		See PRA RAI 23.e. Acceptable to the NRC staff because the licensee clarified that identified sources of uncertainty from the Internal Event PRA propagate directly into the FPRA, as applicable, and their effect is either assessed directly in the FPRA parametric uncertainty analysis or by sensitivity analyses.	
3-12		See SSA RAI 05. Acceptable to the NRC staff because the licensee described system or component capacity limitations and time-limited actions needed to replenish systems, make repairs, or otherwise maintain safe and stable conditions. Actions beyond 24 hours are qualitatively determined to be very low risk based upon the nature of the activities and the amount of time available.	
3-22	A		
3-28	A		
3-31		See PRA RAI 23.f. Acceptable to the NRC staff because the licensee clarified that cutsets that contribute at least one percent of the IEPRA CDF and LERF are characterized as significant accident sequences and significant accident progression sequences. Reasonableness reviews are re-performed for the FPRA.	
3-32	A		
3-34	A		
4-4		See PRA RAI 23.g. Acceptable to the NRC staff because the licensee clarified that for instruments adversely affected by sense line fire exposure,	

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Facts and Observations (F&Os)

FINDING/SUGGESTION (F&O) ID OR SUPPORTING REQUIREMENT (SR)	ACCEPTABLE TO STAFF VIA		
	Review of Plant Disposition (A/B/C)	RAI Response	
		Not Discussed in SE	Discussed in SE
		the FPRA model assumes failure of the instrument signal by including the associated instrument sense lines in the fault trees along with the instruments. The instrument was assumed to fail in a fire scenario if the associated sense lines were targets.	
4-5	A/C		
4-7	B		
4-8	A/C		
4-10	A/C		
4-11	A/C		
4-12	B/C		
4-17	A		
4-18	C		
4-21	C		
4-23	A		
4-25	C		
4-27	A		
4-28	A/C		
4-29	B		
4-31	A		
4-32		See PRA RAI 23.h. Acceptable to the NRC staff because the licensee clarified that the fire effects on cables associated with the associated protection scheme and interlocks located or extending outside of the cabinet where the circuit breaker is housed that could fail the function of the circuit breaker were encompassed in the FPRA.	
4-33	B		
4-36	A		
4-40	C		
4-41	B		
4-42	B		
4-43	C		
4-45		See PRA RAI 23.i. Acceptable to the NRC staff because the licensee stated that repair is not credited in the FPRA.	
4-46	B		
4-47	A		
4-48	A		
4-50	B		
4-51	A		

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FINDING/SUGGESTION (F&O) ID OR SUPPORTING REQUIREMENT (SR)	ACCEPTABLE TO STAFF VIA		
	Review of Plant Disposition (A/B/C)	RAI Response	
		Not Discussed in SE	Discussed in SE
4-53	A		
4-54	A		
5-1	B		
5-3		See PRA RAI 23.j. Acceptable to the NRC staff because licensee stated that a review of plant-specific raw data for outlier components was performed and that the review of plant specific failure data did not reveal any statistically dissimilar results for grouped components.	
5-5	A		
5-7	B		
5-30		See PRA RAI 23.k. Acceptable to the NRC staff because the licensee stated that the effect of differences in Technical Specifications for shared systems is addressed by existing plant processes designed to identify high risk configurations involving multi-unit systems.	
6-1	A		
6-2		See PRA RAI 07. Acceptable to the NRC staff because the licensee stated that the FPRA model considered the effects of fire for the credited HVAC components and that cables for the credited components were traced and subject to failure due to fire. For those rooms where HVAC is credited, operator actions are credited in the FPRA, in accordance with fire response procedures, to start alternate air cooling should normal HVAC fails.	
6-5	B		
6-6	A/C		
6-7	B		
6-8	A/C		
6-10	A/C		
6-11	B		
6-13	A/C		
6-16	A/C		
6-17	A		
6-19	B		

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FINDING/SUGGESTION (F&O) ID OR SUPPORTING REQUIREMENT (SR)	ACCEPTABLE TO STAFF VIA		
	Review of Plant Disposition (A/B/C)	RAI Response	
		Not Discussed in SE	Discussed in SE
6-20	B		
6-22	A		
6-25	A		
6-26	B		
6-28	C		
6-30	C		
6-34	A		
6-35	A		
6-36	A/C		
6-41		See PRA RAI 23.l. Acceptable to the NRC staff because guidance from NUREG/CR-6928 indicates that the fuel oil system is included as part of the emergency diesel generator (EDG) boundary. Additionally, the licensee clarified that the fuel oil transfer pumps and lines are collocated within the room of the associated EDG and that in the FPRA, the fuel oil system, up to the fuel oil day tank and including the fuel oil transfer pumps, has been included within the EDG boundary.	
6-44	A		
6-46	A		
6-47	A		
6-48	B/C		
6-49	B		
6-50	A		
7-5	A		
7-6	B		
7-7	A		
IFEV-A5-03		See PRA RAI 01.m. Acceptable to the NRC staff because the licensee clarified that in addition to the ISLOCA scenarios, several plant-specific scenarios that could result in fire-induced flooding were identified by the MSO expert panel and evaluated, both qualitatively and quantitatively, by the FPRA.	
IFEV-A6-01	C		
IFEV-A6-02	C		
IFEV-A7-01	C		
IFEV-B2-01	C		
IFEV-B3-01	C		
IFQU-A5-01	C		
IFQU-A6-01	C		

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FINDING/SUGGESTION (F&O) ID OR SUPPORTING REQUIREMENT (SR)	ACCEPTABLE TO STAFF VIA		
	Review of Plant Disposition (A/B/C)	RAI Response	
		Not Discussed in SE	Discussed in SE
IFQU-A7-01	C		
IFQU-B1-01	C		
IFQU-B2-01	C		
IFQU-B3-01	C		
IFSN-A10-01	C		
IFSN-A10-02	C		
IFSN-A10-03	C		
IFSN-A10-04	C		
IFSN-A12-01	C		
IFSN-A12-02	C		
IFSN-A12-03	C		
IFSN-A12-04	C		
IFSN-A15-01	C		
IFSN-A5-01	C		
IFSN-A6-01	C		
IFSN-A6-02	C		
IFSN-A8-01	C		
IFSN-A9-01	C		
IFSN-A9-02	C		
IFSN-B2-03	C		
IFSO-A1-01	C		

A: For F&Os, the NRC staff finds that the disposition of the F&O as described by the licensee in the LAR provides confidence that the issues raised by the F&O have been addressed and, if needed, the PRA has been modified, and therefore the resolution of the F&O is acceptable for this application. For Not Met or met at CC-I SRs, the NRC staff finds that the acceptability basis for the capability category of the SR as described by the licensee in the LAR provides confidence that the requirements of the SR have been addressed and, if needed, the PRA has been modified, and therefore the PRA quality with respect to the SR is acceptable for this application. Examples of acceptable Not Met and CC-I SRs are modeling methods that yield conservative FRE and change evaluation results.

B: For F&Os, the NRC staff finds that the disposition of the F&O as described by the licensee in the LAR and further clarified during the audit provides confidence that the issues raised by the F&O have been addressed and, if needed, the PRA has been modified, and therefore the resolution of the F&O is acceptable for this application. For Not Met or met at CC-I SRs, the NRC staff finds that the acceptability basis for the capability category of the SR as described by the licensee in the LAR and further clarified during the audit provides confidence that requirements of the SR have been addressed and, if needed, the PRA has been modified, and therefore the PRA quality with respect to the SR is acceptable for this application. Examples of acceptable Not Met and CC-I SRs are modeling methods that yield conservative FRE and change evaluation results.

C: For F&Os, the NRC staff finds that the resolution of the F&O, as described by the licensee in the LAR, would have a negligible effect on the evaluations relied upon to support fire risk evaluations and has no impact on the conclusions of the risk assessment and therefore the resolution of the F&O is

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Facts and Observations (F&Os)

acceptable for this application. Examples of such F&Os may be suggestions, as well as those F&Os that don't affect the FPRA. Documentation issues may fall into this category as well. For Not Met or met at CC-I SRs, the NRC staff finds that the acceptability basis for the capability category of the SR, as described by the licensee in the LAR, would have a negligible effect on the evaluations relied upon to support fire risk evaluations and has no impact on the conclusions of the risk assessment and therefore the PRA quality with respect to the SR is acceptable for this application. Examples are those SRs that don't affect the FPRA.

ATTACHMENT B

Record of Review Dispositions to Browns Ferry Nuclear Plant, Fire PRA Facts and Observations

Record of Review
Dispositions to Browns Ferry Nuclear Plant (BFN) Fire PRA (FPRA)
Facts and Observations (F&Os)

FINDING/SUGGESTION (F&O) ID OR SUPPORTING REQUIREMENT (SR)	ACCEPTABLE TO STAFF VIA		
	Review of Plant Disposition (A/B/C)	RAI Response	
		Not Discussed in SE	Discussed in SE
1-6	A		
1-7		See PRA RAI 01.c. Acceptable to the NRC staff because the licensee stated that the associated panels in the Units 1, 2 and 3 MCR meet the criteria provided in Appendix L to NUREG/CR-6850 and Supplement 1 to NUREG/CR-6850 for inclusion as part of the main control board.	
2-2	A		
2-3	B		
2-20	A		
2-22	A		
2-38			See PRA RAIs 01.d regarding completion of post-transition, non-SISBO fire response procedures and 11 regarding performing a focused-scope peer review on the FPRA HRA.
2-39		See PRA RAI 01.e. Acceptable to the NRC staff because the licensee stated that all level 1 HFES, including both recovery actions and internal event actions credited for the FPRA, were re-evaluated to consider fire conditions. The licensee added that performance shaping factors attributable to fires and dependencies between HFES were considered and implemented in the EPRI HRA Calculator and that timing was obtained through operator interviews, and thermal-hydraulic analysis data.	See PRA RAIs 01.d regarding completion of post-transition, non-SISBO fire response procedures; 04, 04.01, 04.c.01, 04.k.01, and 04.l.01 regarding the MCR abandonment HRA; and 11 regarding performing a focused-scope peer review on the FPRA HRA.
2-46			See PRA RAI 22.
2-47		See PRA RAI 01.a. Acceptable to the NRC staff because the licensee explained that conditional failure probabilities were assigned to risk-significant spurious operations identified by review of the top 50 fire scenarios, which accounted for between 83-95% of the total Fire CDF and LERF. The licensee further stated that the review included all scenarios that contributed greater than 1% and many that contributed greater than 0.5% to the total Fire	

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Facts and Observations (F&Os)

FINDING/SUGGESTION (F&O) ID OR SUPPORTING REQUIREMENT (SR)	ACCEPTABLE TO STAFF VIA		
	Review of Plant Disposition (A/B/C)	RAI Response	
		Not Discussed in SE	Discussed in SE
		CDF and LERF.	
2-50		See PRA RAIs 06 and 11.a. Acceptable to the NRC staff because the licensee clarified that treatment of fire-induced instrument failure is addressed in accordance with guidance in NUREG/CR-6850 and NUREG-1921. The licensee stated that Emergency Operating Instructions (EOIs), Alarm Response Procedures (ARPs), Abnormal Operating Instructions (AOIs), and applicable normal operating procedures were reviewed to determine the instruments needed for successful implementation of each action and whether there were any spurious alarms or indications that could cause an undesired operator action. Additionally, the licensee added that credited instruments are cable routed and directly modeled in the FPRA model to logically fail if they are affected by the fire; that NSCA-credited instrumentation trains that are known to be free of fire effects are to be identified in the fire safe shutdown procedures; and that spurious indications from a single instrument that could cause an undesired operator action were assumed to be failed in the FPRA.	See PRA RAIs 01.d regarding completion of post-transition, non-SISBO fire response procedures and 11 regarding performing a focused-scope peer review on the FPRA HRA.
2-53	A		
2-54			See PRA RAI 01.f.
2-55		See PRA RAI 01.g and FM RAI 06.a. Acceptable to the NRC staff because the licensee stated that both quantitative and qualitative assessments were performed to provide sufficient insight into the conservatism of the fire modeling analyses as well as the effect of input parameter uncertainty on the results of the FPRA. Providing several examples, the licensee explained that conservative values for parameters were selected during the	

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Facts and Observations (F&Os)

FINDING/SUGGESTION (F&O) ID OR SUPPORTING REQUIREMENT (SR)	ACCEPTABLE TO STAFF VIA		
	Review of Plant Disposition (A/B/C)	RAI Response	
		Not Discussed in SE	Discussed in SE
		fire modeling task to sufficiently bound the uncertainty within a particular calculation or application and that these conservatisms outweigh the variability in results due to parametric data uncertainty.	
2-56			See PRA RAI 01.h.
2-57		See PRA RAI 01.i. Acceptable to the NRC staff because the licensee stated that in-panel incipient detection is credited in accordance with Supplement 1 to NUREG/CR-6850 for panels within the Unit 1, 2 and 3 auxiliary instrumentation rooms and that suppression is credited by initiating a response activity to stage appropriately trained personnel at the location of the panel. The licensee further confirmed that suppression is not credited to limit damage inside the cabinet in which the detection is installed.	
3-2	A		
3-5	A		
3-7	A		
3-13		See PRA RAI 01.j. Acceptable to the NRC staff because the licensee stated that in general, the time to detection and suppression system activation for both the scoping and detailed fire modeling was determined using NUREG-1805. Additionally, the licensee explained that the minimum HRR required to activate the suppression/detection device included consideration of the ignition source, propagation to adjacent cabinet vertical sections and spread/propagation to secondary cable trays, as appropriate; that walkdowns and plant drawings were utilized to confirm the location of the individual detectors and sprinklers with relation to the fire scenario in which activation is credited; and that suppression timing and target	

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Facts and Observations (F&Os)

FINDING/SUGGESTION (F&O) ID OR SUPPORTING REQUIREMENT (SR)	ACCEPTABLE TO STAFF VIA		
	Review of Plant Disposition (A/B/C)	RAI Response	
		Not Discussed in SE	Discussed in SE
		damage sets for suppression success and failure for each damage state are documented as individual fire scenarios. For the transient analysis within the Reactor Building, the licensee further clarified that automatic suppression credit was only applied to damage states after the first fire sprinkler had been qualitatively assumed to actuate.	
3-15			See PRA RAI 04, 04.01, 04.c.01, 04.k.01, and 04.l.01 regarding the MCR abandonment HRA.
3-25			See PRA RAIs 10 and 10.c.01.
4-1	A		
4-2		See PRA RAI 01.b. Acceptable to the NRC staff because the licensee stated the targets within the ZOI of secondary fires were included in the target set for those scenarios that could generate a secondary fire. The licensee clarified that the ZOI assumed for secondary fires conservatively bounds that associated with the largest 98th heat release rate for cabinets listed in Appendix G to NUREG/CR-6850. The licensee also clarified that secondary fires would not adversely impact the feasibility of recovery actions.	
4-3		See PRA RAI 01.k. Acceptable to the NRC staff because the licensee provided a qualitative assessment to address MSO scenario 1a, which could affect SCRAM capabilities, concluding that the scenario represents a condition with a low likelihood of occurrence, with low safety significance and with multiple layers of defense-in-depth in place, each with the capability to either prevent the condition from occurring or to effectively mitigate the effects of the occurrence without consequence.	
4-7		See PRA RAI 01.e. Acceptable to the NRC staff because the licensee	See PRA RAIs 01.d regarding completion of post-transition, non-

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FINDING/SUGGESTION (F&O) ID OR SUPPORTING REQUIREMENT (SR)	ACCEPTABLE TO STAFF VIA		
	Review of Plant Disposition (A/B/C)	RAI Response	
		Not Discussed in SE	Discussed in SE
		stated that all level 1 HFEs, including both recovery actions and internal event actions credited for the FPRA, were re-evaluated to consider fire conditions. The licensee added that performance shaping factors attributable to fires and dependencies between HFEs were considered and implemented in the EPRI HRA Calculator and that timing was obtained through operator interviews, and thermal-hydraulic analysis data.	SISBO fire response procedures and 11 regarding performing a focused-scope peer review on the FPRA HRA.
4-9	A		
4-12			See PRA RAI 01.d.
4-15	A		
4-17		See PRA RAI 01.l. Acceptable to the NRC staff because the licensee reviewed screened initiating events from the internal events PRA (IEPRA) model documentation as well as an evaluation of generic and plant specific MSO scenarios. The licensee clarified that any new timing considerations from MSOs and other fire induced effects, including those associated with the FPRA HRA, were also taken into account in the FPRA model and stated that no new FPRA accident sequences beyond those modeled in the IEPRA were identified.	See PRA RAIs 01.d regarding completion of post-transition, non-SISBO fire response procedures and 11 regarding performing a focused-scope peer review on the FPRA HRA.
4-18		See PRA RAI 01.m. Acceptable to the NRC staff because the licensee stated that in addition to the ISLOCA scenarios addressed in the disposition to F&O 4-18, several other plant-specific scenarios that could result in fire-induced flooding were identified by the MSO expert panel and were evaluated, both qualitatively and quantitatively, by the FPRA.	
4-21		See PRA RAIs 06 and 11.a. Acceptable to the NRC staff because the licensee clarified that treatment of fire-induced instrument failure is addressed in accordance with	See PRA RAIs 01.d regarding completion of post-transition, non-SISBO fire response procedures and 11 regarding performing a focused-scope peer review on the

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FINDING/SUGGESTION (F&O) ID OR SUPPORTING REQUIREMENT (SR)	ACCEPTABLE TO STAFF VIA		
	Review of Plant Disposition (A/B/C)	RAI Response	
		Not Discussed in SE	Discussed in SE
		guidance in NUREG/CR-6850 and NUREG-1921. The licensee stated that Emergency Operating Instructions (EOIs), Alarm Response Procedures (ARPs), Abnormal Operating Instructions (AOIs), and applicable normal operating procedures were reviewed to determine the instruments needed for successful implementation of each action and whether there were any spurious alarms or indications that could cause an undesired operator action. Additionally, the licensee added that credited instruments are cable routed and directly modeled in the FPRA model to logically fail if they are affected by the fire; that NSCA-credited instrumentation trains that are known to be free of fire effects are to be identified in the fire safe shutdown procedures; and that spurious indications from a single instrument that could cause an undesired operator action were assumed to be failed in the FPRA.	FPRA HRA.
4-28		See PRA RAI 01.n. Acceptable to the NRC staff because the licensee described the LERF-reducing refinements made to the FPRA in response to F&O FQ-D1, including those changes that originally assumed consequential containment failure. The licensee clarified that the refinements included: modeling of Modification 93 from Table S-2 of LAR Attachment S; application of circuit failure probabilities that result in spurious opening of containment isolation valves; and modeling the availability of the Electro-Hydraulic Control system to mitigate a stuck-open MSIV event.	
4-30			See PRA RAI 01.o.
5-1	A		
5-2	A		
5-3	A		

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FINDING/SUGGESTION (F&O) ID OR SUPPORTING REQUIREMENT (SR)	ACCEPTABLE TO STAFF VIA		
	Review of Plant Disposition (A/B/C)	RAI Response	
		Not Discussed in SE	Discussed in SE
5-6		See PRA RAI 01.p. Acceptable to the NRC staff because the licensee performed a review and examination of plant-specific fires at BFN, considering the criteria in Appendix C to NUREG/CR-6850 and the classification given to fire events in EPRI 1025284. Consistent with guidance in Section 6.5.2 of NUREG/CR-6850, the licensee stated that no plant-specific updates to the generic fire ignition frequencies are necessary given that there are no unusual fire occurrence patterns or ignition source vulnerabilities at BFN.	
5-7	A		
5-10		See PRA RAI 01.q. Acceptable to the NRC staff because the licensee stated that HEAF scenarios are postulated for MCCs consistent with counting guidance in NUREG/CR-6850 and Supplement 1 to NUREG/CR-6850 (i.e., FAQ 06-0017).	
5-11			See PRA RAIs 01.r, 01.r.01 and 01.r.01.01.
5-12		See PRA RAI 03. Acceptable to the NRC staff because the licensee stated that influencing factors were developed consistent with NUREG/CR-6850. The licensee clarified that an influencing factor of 50 was not applied because a BFN expert panel concluded that areas to which 50 may have been applicable were not significantly higher in maintenance relative to other areas.	
5-13	A		
5-14	B		
5-16	A		
5-18			See PRA RAI 01.s.
5-24		See PRA RAI 01.t. Acceptable to the NRC staff because the licensee revised the disposition to F&O 5-24, stating that targets were manually validated using drawings, the electronic database, and other	

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FINDING/SUGGESTION (F&O) ID OR SUPPORTING REQUIREMENT (SR)	ACCEPTABLE TO STAFF VIA		
	Review of Plant Disposition (A/B/C)	RAI Response	
		Not Discussed in SE	Discussed in SE
		resources to ensure the walkdown data was converted to the same format as each raceway in the electronic database. Additionally, the licensee added that the analysis documentation was updated to discuss in more detail the raceway identification issues encountered and their resolution.	
5-26		See PRA RAI 01.u. Acceptable to the NRC staff because the licensee stated that conduit damage was considered for all transient fire scenarios.	
7-1	A		
8-3		See PRA RAI 01.j. Acceptable to the NRC staff because the licensee stated that in general, the time to detection and suppression system activation for both the scoping and detailed fire modeling was determined using NUREG-1805. Additionally, the licensee explained that the minimum HRR required to activate the suppression/detection device included consideration of the ignition source, propagation to adjacent cabinet vertical sections and spread/propagation to secondary cable trays, as appropriate; that walkdowns and plant drawings were utilized to confirm the location of the individual detectors and sprinklers with relation to the fire scenario in which activation is credited; and that suppression timing and target damage sets for suppression success and failure for each damage state are documented as individual fire scenarios. For the transient analysis within the Reactor Building, the licensee further clarified that automatic suppression credit was only applied to damage states after the first fire sprinkler had been qualitatively assumed to actuate.	See PRA RAI 01.s regarding the quantitative screening of non-propagating fire scenarios.
9-1	B		

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Dispositions to Browns Ferry Nuclear Plant (BFN) Fire PRA (FPRA)
Facts and Observations (F&Os)

FINDING/SUGGESTION (F&O) ID OR SUPPORTING REQUIREMENT (SR)	ACCEPTABLE TO STAFF VIA		
	Review of Plant Disposition (A/B/C)	RAI Response	
		Not Discussed in SE	Discussed in SE
9-2		See PRA RAI 21.d. Acceptable to the NRC staff because the licensee stated that system design information was developed to support the PRA modeling of the proposed emergency high pressure makeup system. A system fault tree logic model was developed that considered timing considerations, defined success criteria, system dependencies, random failure probabilities, and test and maintenance unavailability.	
9-4	B		See PRA RAIs 01.d regarding completion of post-transition, non-SISBO fire response procedures; 01.o regarding dependency analysis; and 11 regarding performing a focused-scope peer review on the FPRA HRA.
9-5	A		
10-1			See PRA RAIs 01.d regarding completion of post-transition, non-SISBO fire response procedures; 01.v regarding minimum joint HEP values; and 11 regarding performing a focused-scope peer review on the FPRA HRA.
3-14	A		
2-8	A		
2-23	A		
2-36	A		
2-41		See PRA RAIs 06 and 11.a. Acceptable to the NRC staff because the licensee clarified that treatment of fire-induced instrument failure is addressed in accordance with guidance in NUREG/CR-6850 and NUREG-1921. The licensee stated that Emergency Operating Instructions (EOIs), Alarm Response Procedures (ARPs), Abnormal Operating Instructions (AOIs), and applicable normal operating procedures were reviewed to determine the instruments needed	See PRA RAIs 01.d regarding completion of post-transition, non-SISBO fire response procedures and 11 regarding performing a focused-scope peer review on the FPRA HRA.

Record of Review
Dispositions to Browns Ferry Nuclear Plant (BFN) Fire PRA (FPRA)
Facts and Observations (F&Os)

FINDING/SUGGESTION (F&O) ID OR SUPPORTING REQUIREMENT (SR)	ACCEPTABLE TO STAFF VIA		
	Review of Plant Disposition (A/B/C)	RAI Response	
		Not Discussed in SE	Discussed in SE
		for successful implementation of each action and whether there were any spurious alarms or indications that could cause an undesired operator action. Additionally, the licensee added that credited instruments are cable routed and directly modeled in the FPRA model to logically fail if they are affected by the fire; that NSCA-credited instrumentation trains that are known to be free of fire effects are to be identified in the fire safe shutdown procedures; and that spurious indications from a single instrument that could cause an undesired operator action were assumed to be failed in the FPRA.	
2-45	A		
2-48	A		
2-52	A		
3-4	A		
3-8	A		
3-9	A		
3-17	A		
4-13	A		
4-25	C		
5-4	A		
5-5	A		
5-8	A		
5-9	A		
5-23	A		
6-1	A		
7-18	A		
4-10	A		

A: For F&Os, the NRC staff finds that the disposition of the F&O as described by the licensee in the LAR provides confidence that the issues raised by the F&O have been addressed and, if needed, the PRA has been modified, and therefore the resolution of the F&O is acceptable for this application. For Not Met or met at CC-I SRs, the NRC staff finds that the acceptability basis for the capability category of the SR as described by the licensee in the LAR provides confidence that the requirements of the SR have been addressed and, if needed, the PRA has been modified, and therefore the PRA quality with respect to the SR is acceptable for this application. Examples of acceptable Not Met and CC-I SRs are modeling methods that yield conservative FRE and change evaluation results.

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Dispositions to Browns Ferry Nuclear Plant (BFN) Fire PRA (FPRA)
Facts and Observations (F&Os)

- B: For F&Os, the NRC staff finds that the disposition of the F&O as described by the licensee in the LAR and further clarified during the audit provides confidence that the issues raised by the F&O have been addressed and, if needed, the PRA has been modified, and therefore the resolution of the F&O is acceptable for this application. For Not Met or met at CC-I SRs, the NRC staff finds that the acceptability basis for the capability category of the SR as described by the licensee in the LAR and further clarified during the audit provides confidence that requirements of the SR have been addressed and, if needed, the PRA has been modified, and therefore the PRA quality with respect to the SR is acceptable for this application. Examples of acceptable Not Met and CC-I SRs are modeling methods that yield conservative FRE and change evaluation results.
- C: For F&Os, the NRC staff finds that the resolution of the F&O, as described by the licensee in the LAR, would have a negligible effect on the evaluations relied upon to support fire risk evaluations and has no impact on the conclusions of the risk assessment and therefore the resolution of the F&O is acceptable for this application. Examples of such F&Os may be suggestions, as well as those F&Os that don't affect the FPRA. Documentation issues may fall into this category as well. For Not Met or met at CC-I SRs, the NRC staff finds that the acceptability basis for the capability category of the SR, as described by the licensee in the LAR, would have a negligible effect on the evaluations relied upon to support fire risk evaluations and has no impact on the conclusions of the risk assessment and therefore the PRA quality with respect to the SR is acceptable for this application. Examples are those SRs that don't affect the FPRA.