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2CAN071202

July 10, 2012

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

SUBJECT: Supplemental to License Amendment Request to Adopt NFPA-805 Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants (2001 Edition)
Arkansas Nuclear One – Unit 2
Docket No. 50-368
License No. NPF-6

- References:**
1. Entergy letter dated March 27, 2012, "License Amendment Request to Adopt NFPA-805 Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants (2001 Edition)" (2CAN031201) (ML 12087A113)
 2. NRC letter dated May 25, 2012, "Supplemental Information needed for Acceptance of Requested Licensing Action Re: License Amendment Request to Adopt National Fire Protection Association Standard 805" (TAC No. ME8282) (ML 121380395)

Dear Sir or Madam:

By letter dated March 27, 2012 (Reference 1), Entergy Operations, Inc. (Entergy) proposed to amend Renewed Facility Operating License No. NPF-6 for Arkansas Nuclear One, Unit 2 (ANO-2). This letter requested Nuclear Regulatory Commission (NRC) review and approval for adoption of a new fire protection licensing basis which complies with the requirements in 10 CFR 50.48(a), 10 CFR 50.48(c), and the guidance in Regulatory Guide (RG) 1.205, "Risk-Informed Performance-Based Fire Protection for Existing Light-Water Nuclear Power Plants." The letter described the methodology used to demonstrate compliance with, and transition to, National Fire Protection Association (NFPA) 805, and includes regulatory evaluations, probabilistic risk assessment (PRA), change evaluations, proposed modifications for non-compliances, and supporting attachments.

By letter dated May 25, 2012 (Reference 2), the NRC informed Entergy that supplemental information would be required to support completion of the NRC's acceptance review. Attachment 1 contains a description of the information requested and Entergy responses. Revised affected pages associated with the Reference 1 letter are included in subsequent attachments to this letter.

A draft of the necessary supplemental information was presented to NRC staff members during public meetings held June 12 and 13, 2012, and June 29, 2012. A follow-up call with members of the NRC staff also occurred at 1300 EDT, July 2, 2012, where the NRC requested documentation of Entergy's intent to address fire modeling revisions that will further support the response to Question #4 in Attachment 1 of this letter. Based on the teleconference request, discussion related to future fire modeling revisions has been included in response to Question #4 (refer to Attachment 1) and a subsequent regulatory commitment added to the original list of regulatory commitments contained in the Reference 1 submittal (refer to Attachment 8).

In addition to the above, editorial corrections were identified during post-submittal reviews which Entergy desires to resolve in this supplemental letter. These corrections are also described in Attachment 1 of this letter. Attachment 1 also includes a matrix table describing the pages requiring replacement with respect to the Reference 1 submittal.

Based on the above, Entergy believes appropriate response has been provided that should fully support completion of the NRC acceptance review of the Reference 1 letter. The changes have no impact on the no significant hazards consideration evaluation provided in the Reference 1 letter.

Should you have any questions concerning this letter, or require additional information, please contact Stephenie Pyle at 479-858-4704.

I declare under penalty of perjury that the foregoing is true and correct.
Executed on July 10, 2012.

Sincerely,

ORIGINAL SIGNED BY CHRISTOPHER J. SCHWARZ

CJS/dbb

Attachments:

1. License Amendment Request to Adopt NFPA-805 Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants (2CAN031201) Supplemental Information
2. Revised Attachment A Pages
3. Revised Attachment G Pages
4. Revised Attachment O Page
5. Revised Attachment S Pages
6. Revised Attachment V Pages
7. Revised Attachment W Pages
8. Revised Enclosure 4 Page

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Attachment 1 to

2CAN071202

**License Amendment Request to Adopt NFPA-805 Performance-Based Standard for Fire
Protection for Light Water Reactor Electric Generating Plants (2CAN031201)
Supplemental Information**

**License Amendment Request to Adopt NFPA-805 Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants (2CAN031201)
Supplemental Information**

By letter dated May 25, 2012, "Supplemental Information Needed for Acceptance of Requested Licensing Action Re: License Amendment Request to Adopt National Fire Protection Association Standard 805" (TAC No. ME8282) (ML 121380395), the NRC informed Entergy that supplemental information would be required to support completion of the NRC's acceptance review of Entergy letter dated March 27, 2012, "License Amendment Request to Adopt NFPA-805 Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants (2001 Edition)" (2CAN031201) (ML 12087A113). A draft of this supplemental information was presented to NRC staff members during public meetings held June 12 and 13, 2012, and June 29, 2012. The following provides a description of the information requested and Entergy's formal responses. Revised affected pages associated with the March 27, 2012, Entergy letter are included in subsequent attachments to this letter.

In addition to the above, editorial corrections were identified during post-submittal reviews which Entergy desires to resolve in this supplemental letter. These corrections are described at the end of this attachment.

1. Significant analyses and evaluations are missing from the LAR because the plant modifications described in Appendix S are not developed beyond vague conceptualizations. Many of the modifications list two or more general modification options and make statements to the effect that "the final [modification]" to achieve compliance "will be determined during the scoping phase." Other modifications are described simply as general complex goals (e.g., "will resolve multiple issues"). Thus, it is apparent that the final plant configuration has not been determined.

The plant modifications need to be developed to the level of detail that can support an independent review of the efficacy of the proposed plant changes (e.g., re-route cables from specific fire areas; controls to be located on, and location of, local control panels; what equipment will be installed; etc.). Furthermore, almost every modification is credited in the probabilistic risk analysis (PRA) and these modifications are relied upon to yield an acceptable change in risk.

Therefore, the modifications for transition need to be described and, as appropriate, modeled in the PRA to properly estimate the change in risk associated with transition. The LAR needs to be supplemented with the descriptions of these modifications and provide adequate information to review the evaluations supporting these modifications.

Response

Entergy has significantly increased the level of detail and removed ambiguity, to the extent possible, related to proposed modifications necessary for the implementation of NFPA 805. The modifications were previously and continue to be modeled in the ANO-2 Fire PRA (i.e., the PRA model assumes modification configurations to support the PRA results). Table S1 of the original ANO-2 submittal (Reference 1) has been updated accordingly and included in Attachment 5 of this supplement. Although no changes were made to Table S2 of Reference 1, for simplicity Entergy requests that the NRC replace Attachment S, "Plant Modifications and Items to be Completed" in its entirety with the revised Attachment S provided in Attachment 5 of this supplemental letter.

2. For a number of fire areas, the LAR lacks the identity of all the required NFPA 805 operator recovery actions (RAs), along with analysis of the associated RA risk. For a number of risk-significant fire areas, risk-informed, performance based alternatives to the deterministic requirements are proposed. NFPA 805, *Section 4.2.4, Performance Based Approach*, states, in part, that "the additional risk presented by [the use of recovery action] shall be evaluated." In Table W-2 of the LAR, a column for the "Additional Risk of RAs (CDF/LERF [core damage frequency/large early release frequency])" is provided. For some fire areas, a quantitative risk result was provided. However, for about one third of the fire areas, it is reported that "the risk of the recoveries is dominated by the modifications and does not impact the overall delta risk for the area." In addition, Appendix G in the LAR confirms that; "[t]he performance-based evaluations resulted in the need for recovery actions to meet the risk acceptance criteria or maintain a sufficient level of defense-in-depth."

Therefore, the LAR needs to be supplemented with all of the quantitative RA risk estimates to demonstrate that the evaluations supporting the transition have been satisfactorily completed.

Response

Table W-2, included in Attachment W, "Fire PRA Insights," of the original submittal (Reference 1) has been revised to include information for all Fire Areas that contain recovery actions. The information provided is based upon a quantitative measure of the delta risk in relation to the post transition modification with and without recovery actions credited. Additionally, the information relating to the Fire Risk Evaluation (FRE) delta risk for CDF and LERF has been revised to include the actual calculated results.

Entergy requests that the NRC replace current Page W-3 and Table W-2 of Attachment W, "ANO-2 Fire Area Risk Summary" with revised Page W-2 and the revised Table W-2 provided in Attachment 7 of this supplemental letter.

3. The LAR contains insufficient information to support an unexpected risk estimate in Table W-2. Fire Area G, which includes the main control room (MCR) and other alternative shutdown areas has a relatively high fire-risk contribution. Table W-2 indicates that some Fire Area G variances from deterministic requirements (VFDRs) will remain in place and that RAs are credited for reducing the fire risk in this area. These entries indicate that the total change in risk in Fire Area G is "0.0" and the additional risk from RAs estimate is bounded by "0.0." Attachment G of the LAR states that ANO-2 has no primary control station, besides the MCR, yet only eight RAs are identified for Fire Area G. It is unclear how these few RAs can achieve and maintain a safe and stable state after abandonment of the MCR, and how both the total change in risk and the additional risk from RAs is bounded by a risk estimate of "0.0."

Therefore, the LAR needs to be supplemented with additional discussion about the planned modifications and RAs, and how these are modeled in the PRA in sufficient detail to explain the unexpected results. This information is needed to demonstrate that the evaluations supporting the requested transition have been satisfactorily completed.

Response

Where a "0" (zero) was entered in Table W-2 columns entitled "Fire Risk Eval. Δ CDF" and "Fire Risk Eval. Δ LERF", the actual change in risk has now been inserted. In addition, the description of modifications and their relation to the Fire PRA model is captured in response to Question #1 above. With regard to RAs, the following information is provided.

As stated in Attachment G, ANO-2 does not have a single location for remotely controlling the plant should a Control Room abandonment be required. The Alternate Shutdown procedure provides guidelines that are necessary to assure a safe shutdown of the unit in the event of a significant fire in which both trains of safe shutdown equipment could be rendered inoperable from the Control Room.

Safe shutdown, as defined by 10 CFR 50, Appendix R, applies to both hot and cold shutdown functions. Initial actions taken in the Control Room and verified with follow-up actions taken outside the Control Room ensure the fuel in the reactor vessel is maintained in a safe and stable condition (i.e., hot standby, Mode 3, as defined by NFPA 805). Additional defense-in-depth (DID) actions are taken by Operations personnel to maintain the unit in Hot Standby and if necessary, place the unit in Cold Shutdown. Therefore, RAs as identified from the FREs and additional DID actions have been identified for ensuring that the plant is maintained in a safe and stable condition. Key plant parameters to accomplish a safe shutdown are monitored from the Technical Support Center (TSC) using the Safety Parameters Display System (SPDS).

Two analyses were developed to assist in calculating the delta risk for the ANO-2 Control Room: a compliant case and a post transition case. The following describes how the RAs and planned modifications were modeled in each case.

Compliant Case Analysis

In order to calculate the delta risk as part of the FRE, a compliant case was first developed. Because the primary safety functions are challenged for a fire in the Control Room followed by abandonment, the compliant case assumes that a single success train for plant control and mitigation is available to protect the primary safety functions. This approach is based on Note 2 of Regulatory Guide (RG) 1.205, Revision 2, which states:

The "deterministically compliant plant" has been referred to as "an ideal plant" that may not exist or be feasible in practice. Based on experience with the two NFPA 805 pilot plants, the risk of most variances from the deterministic requirements can readily be evaluated by postulating modifications, such as moving or protecting cables, which would meet the deterministic requirements. This provides the base case against which the added risk of the proposed alternative is evaluated. Because of the great similarity between the deterministic criteria of NFPA 805 and the requirements in Appendix R to 10 CFR Part 50, it should be clear, in most cases, what the compliant configuration would be. An exception might occur for fire scenarios where evacuation of the main control room is necessary. This has been addressed in the regulatory guide by defining the term "primary control station," which is used in the NFPA 805 definition of recovery action; see Regulatory Position 2.4.

For the ANO-2 Control Room compliant case, a successful train is assumed to be available for accident mitigation (i.e., Emergency Feedwater (EFW) Train A supplying inventory to Steam Generator (SG) B). In addition to the success path for ensuring that primary to secondary heat removal is available, the Reactor Coolant System (RCS) is assumed to remain intact by ensuring that fire failures will not impact RCS integrity. These assumptions ensure a conservative single success path is available with operator failures associated with a primary control station effectively set to zero. Only random failures of equipment associated with the single train success path are considered in the compliant case analysis; all other systems are considered failed due to the fire.

The compliant case does not include all plant modifications, nor does the compliant case consider fire related recoveries.

Post Transition Analysis

The Post Transition case (assuming the failures due to a fire in the Control Room) was also analyzed to determine the CDF. With the exception of credited recoveries and modifications identified as necessary to protect the plant from core damage, this analysis assumes all affected equipment in the Control Room fails due to the fire.

Table 1 provides a list of the recoveries that were modeled and credited to reduce risk in the PRA. These recoveries focus on the systems modeled in the Fire PRA and were deemed necessary to ensure that RCS integrity is maintained, SG pressure is maintained, and a source of SG inventory for primary-to-secondary heat removal is provided.

Table 1
Recoveries Credited in FRE

Component ID	Component Description	Event Description (Operator Action)	Notes
2CV-1016-1	SG-A Blowdown Isolation Motor Operated Valve (MOV)	Operator action to isolate blowdown with fire damage to valves	Eliminate loss of SG inventory and limit RCS cooldown
2CV-1066-1	SG-B Blowdown Isolation MOV	Operator action to isolate blowdown with fire damage to valves	Eliminate loss of SG inventory and limit RCS cooldown
2CV-4816	Chemical & Volume Control System Letdown (CVCS LD) Throttle Control Valve (CV)	Operator isolates Letdown flow outside the Main Control Room	Eliminate potential loss of RCS inventory
2CV-4817	CVCS LD Throttle CV	Operator isolates Letdown flow outside the Main Control Room	Eliminate potential loss of RCS inventory
2P-32A/2P-32B/ 2P32C/2P32D	Reactor Coolant Pumps (RCPs)	Operators trip RCPs at the switchgear	Minimize potential for loss of RCS inventory via RCP controlled bleed-off (CBO)
TBD	New Auxiliary Feedwater (AFW) Pump	Operator starts and aligns AFW pump	Establish Primary to Secondary Heat Removal

In addition to the recoveries identified in Table 1, recovery actions have been identified to provide defense-in-depth (DID). These additional recovery actions support the safety functions listed for Table 2, as well as protect equipment necessary for additional mitigating actions. The main focus of these DID actions is to ensure that a single train of components is available for plant control. The operator manual actions (OMAs) that are transitioning as RAs are listed in Table 2.

Table 2

DID Actions

Component ID	Component Description	Event Description (Operator Action)	Notes
2P-89B	High Pressure Safety Injection (HPSI) Pump	Locally open breakers for HPSI pump	Pump protection
2P-60B	Low Pressure Safety Injection (LPSI) Pump	Locally open breakers for LPSI pump	Pump protection
2P-35B	Containment Spray Pump	Locally open breakers for Containment Spray pump	Pump protection
2CV-5630-1/ 2CV-5631-2	Refueling Water Tank (RWT) Outlet Valves	Close both RWT Outlet valves locally	Prevent inventory transfer to Containment Sump
2CV-4920-1/ 2CV-4921-1	Boric Acid Makeup Tank (BAMT) Gravity Feed Valves	Open both BAMT Gravity Feed valves locally	Ensure borated water source to Charging Pumps
2CV-4873-1	CVCS Volume Control Tank (VCT) Outlet Valve	Close VCT outlet valve locally	Remove potential for loss of Charging
2T-1	Pressurizer Heaters	Turn OFF and operate pressurizer heaters as necessary	RCS pressure control
2P-36A/B/C	Charging Pumps	Stop and operate Charging pumps locally, as needed	Operator action to prevent RCS overfill and control Pressurizer level
2K-4B	#2 Emergency Diesel Generator (EDG)	Place #2 EDG in LOCKOUT locally	Protect EDG
2A-4	4160V Vital Power Switchgear	De-energize/energize 2A-4	Establish manual control over power supplies
2B-6	480V Vital Power Load Center	De-energize/energize 2B-6 locally	Establish manual control over power supplies
2D24-2,4,6,8,9, and 10	DC Power to various equipment	Open breakers to remove DC power to various equipment	Establish manual control over power supplies
2CV-4840-2	Charging Header Isolation	Verify open Charging header isolation	Ensure availability of Charging

Component ID	Component Description	Event Description (Operator Action)	Notes
2CV-1504-2	#2 EDG Service Water (SW) Outlet	Verify open #2 EDG SW outlet	Support #2 EDG
2CV-4950-2	RWT Suction Valve	Verify RWT suction valve open for Charging capability if necessary	Backup borated water source to Charging Pumps
2P-4C	SW Pump	Align Loop 2 SW header locally	Ensure cooling source to Emergency Core Cooling System (ECCS) components and Vital Auxiliaries
2CV-0795-2	EFW pump 2P-7A suction MOV	Verify open 2P-7A Condensate suction MOV (2CV-0795-2) locally	Ensure EFW availability for RCS Heat Removal

In addition to the recoveries identified in Tables 1 and 2, modifications have been identified in the FREs that ensure the safety functions necessary to maintain the plant in a safe and stable condition will be protected. The modifications listed in Table 3 were credited in the PRA.

Table 3

Proposed Modifications Necessary for Safe and Stable Condition

Comp ID	Component Description	Notes
2CV-1002	2CV-1002 Upstream Atmospheric Dump Valve (ADV) Isolation MOV TRANSFERS OPEN	Credit modification to eliminate potential spurious operation (see Table S-1, Item S1-9).
2CV-1052	2CV-1052 Upstream ADV Isolation TRANSFERS OPEN	Credit modification to eliminate potential spurious operation (see Table S-1, Item S1-9).
2CV-4698-1	RCS Pressurizer Emergency Core Cooling Vent TRANSFERS OPEN	Credit modification to eliminate potential spurious operation (see Table S-1, Item S1-9).
TBD	AFW Pump MODIFICATION	Provides independent source of SG inventory (see Table S-1, Item S1-11).

The following table provides the results of the quantification of the compliant and post transition base case, along with the delta CDF for the control room analysis.

Table 4
Fire Area G ΔCDF and ΔLERF Evaluation Summary

Zone	Scenario Description	IGF2 (/rx-yr)	NSP	SF	CCDP	CDF (/rx-yr)	CLERP	LERF (/rx-yr)
2199-G	Deterministically Compliant Case	3.79E-05	1.00E+00	1.00E+00	1.40E-01	5.29E-06	3.50E-03	1.33E-07
2199-G	Post Transition Baseline Case	3.79E-05	1.00E+00	1.00E+00	6.97E-02	2.64E-06	9.29E-04	3.52E-08
Results					delta CDF	-2.65E-06	delta LERF	-9.78E-08

In light of the above, Attachment G is revised to include DID information. Specific line items have been inserted into Table G and denoted with an asterisk, designating these items as DID related. Entergy requests that the NRC replace Attachment G "Recovery Actions Transition" Pages G-5 through G-7 with Pages G-5 through G-9 provided in Attachment 3 of this supplemental letter. Note that the only changes to Attachment G are those associated with Fire Area G; additional pages are included due to text roll-over.

- Appropriate regulatory guidance was not followed because two sensitivity studies compare the results based on one "unaccepted method" to results based on another "unaccepted method," instead of comparing an "unaccepted method" with an "accepted method." NFPA 805, Section 2.4.3.3, Fire Risk Evaluations, requires, in part, that PRA methods "shall be acceptable to the [NRC]." Section V.2 of the LAR identifies two deviations from the compilation of acceptable methods in NUREG/CR-6850, "EPRI/NRC-RES Fire PRA Methodology for Nuclear Power Facilities" (NUREG-6850), and provides the results of sensitivity analyses for (1) non-suppression probability for long-term fires and (2) adjustment factor for electrical cabinet ignition frequency. The sensitivity analyses did not use NUREG/CR-6850 methods or methods accepted by the staff in the Frequently Asked Question process.

Therefore, the LAR needs to be supplemented with the risk results calculated using an acceptable analysis method. This information is needed to demonstrate the affect of using the unaccepted method instead of one on the accepted methods.

Response

Entergy has revised the subject sensitivity analysis to remove the adjustment factors for electrical cabinet ignition frequency from the Hot Gas Layer (HGL) and Multi-Compartment Analysis (MCA), and from the Core Damage Frequency (CDF)/Large Early Release Frequency (LERF) calculations. This new sensitivity was also performed with the manual non-suppression probability for all fire scenarios with a fire response time ≥ 60 minutes set to 1E-3 for the HGL and MCA. The NUREG/CR-6850 guidance for manual non-suppression probabilities recommends a minimum default value of 1E-3 (NUREG/CR-6850, Appendix P, Table P-3). Frequently Asked Question (FAQ) 08-0050 (NUREG/CR-6850,

Supplement 1, Section 14) provides clarification and revised guidance for calculating manual non-suppression probabilities, but maintains the minimum default value of 1E-3. Thus, the new sensitivity analysis used methods accepted by the staff during the FAQ process and compares the results based on the "unaccepted method" to results based on an "accepted method."

The new sensitivity analysis is documented in PRA-A2-05-008, Revision 0, "ANO-2 Fire PRA Sensitivity Evaluation – Remove Panel Sensitivity Factors." The majority of the more than 1,900 fire scenarios continued to screen without use of the adjustment factors for electrical cabinet ignition frequency and while using the non-suppression probability factor of 1E-3. For those scenarios that did not screen (see Table 6 below), further evaluation is being performed to accurately reflect the risk and minimize the need for unnecessary plant modifications. The follow-up evaluation is being performed in accordance with NUREG/CR-6850 methods or methods accepted by the staff in the FAQ process. The follow-up evaluation entails walkdowns of the scenarios, refinement of the target lists, and CFAST Version 6.0.10.61027 modeling of the scenarios to determine the probability of a HGL or MCA impact. The modeling will also undergo a focused scope peer review. The results of this effort will be provided to the NRC following completion and is considered an additional regulatory commitment (refer to Attachment 8) with respect to the original ANO-2 submittal (Reference 1). See Attachment J, of the original ANO-2 submittal (Reference 1) for Fire Modeling Verification and Validation details.

The CDF/LERF calculations in the new sensitivity analysis were performed by removing the adjustment factors for electrical cabinet ignition frequency from quantification of the post-transition model, which includes plant modifications. The results are compared to those in Table W-2, *ANO-2 Fire Area Risk Summary*, (see Attachment 7) which were obtained from the same model with the adjustment factors. Table 5 below shows the risk results calculated using an acceptable analysis method for the seven areas impacted by the adjustment factors. The risk results for the other areas in Table W-2 are not impacted.

As illustrated, by replacing the CDF/LERF values in Table W-2 with the sensitivity results in Table 5 below and summing, the new sensitivity analysis increased the total post-transition CDF from 4.30E-05/yr to 6.03E-05/yr, and the total LERF from 8.34E-07/yr to 1.28E-06/yr. Thus, the sensitivity Δ CDF = 1.73E-5/yr and Δ LERF = 4.46E-7/yr.

Area	Area Description	Base Analysis Results (/yr) (LAR Table W-2)		Sensitivity Results (/yr)		Difference in Results (/yr)	
		Fire Area CDF	Fire Area LERF	Fire Area CDF	Fire Area LERF	Δ CDF	Δ LERF
B-3	Fire Zones 2091-BB, 2112-BB and 2183-J (electrical penetration rooms)	4.13E-07	1.32E-08	6.68E-07	2.14E-08	2.55E-07	8.20E-09
B-4	Fire Zone 2154-E (CEDM equipment room)	3.26E-06	3.61E-08	5.63E-06	6.22E-08	2.37E-06	2.61E-08

Table 5 Comparison of LAR Table W-2 Results with Sensitivity Analysis Results							
Area	Area Description	Base Analysis Results (/yr) (LAR Table W-2)		Sensitivity Results (/yr)		Difference in Results (/yr)	
		Fire Area CDF	Fire Area LERF	Fire Area CDF	Fire Area LERF	ΔCDF	ΔLERF
HH	Fire Zones 2063-DD, 2072-R, 2073-DD, 2096-M, 2106-R, and 2107-N (sample room, VCT room, 2B-62 room, 2B-63 room, degasifier vacuum pump room, and corridor)	3.11E-06	4.65E-08	3.11E-06	4.66E-08	0.00E+00	1.00E-10
II	Fire Zone 2101-AA (north switchgear 2A-3 room)	2.90E-06	9.31E-08	4.10E-06	1.32E-07	1.20E-06	3.89E-08
JJ	Fire Zone 2109-U (corridor)	2.70E-06	7.97E-08	1.06E-05	3.11E-07	7.90E-06	2.31E-07
MM	Fire Zones 2099-W and 2103-V (west DC equipment room and west battery room)	3.28E-06	7.85E-08	7.36E-06	1.76E-07	4.08E-06	9.75E-08
SS	Fire Zones 2097-X, 2100-Z and 2102-Y (east DC equipment room, south switchgear room and east battery room)	2.81E-06	7.43E-08	4.36E-06	1.10E-07	1.55E-06	3.57E-08

The scenarios that require further evaluation are listed in Table 6.

Table 6 Scenarios that Require Further Evaluation in Sensitivity Analysis		
Zone	Scenario Description	Area
2007-LL	Base scenario	AA
2014-LL	Base scenario	B-6
2033-K	Base scenario	NN-North
2073-DD-D	2C115	HH
2097-X	Base scenario - Severe Fire	SS
2099-W	Base scenario - Severe Fire	MM

Table 6		
Scenarios that Require Further Evaluation in Sensitivity Analysis		
Zone	Scenario Description	Area
2108-S	Base scenario	TT
2109-U-D	2Y-1	JJ
2109-U-E	2Y-2	JJ
2111-T-C	2C410	EE-U
2136-I-B	2C330	G
2136-I-F	2B-64	G
2137-I-B	2B-61	G
2137-I-C	2C333	G
2137-I-D	2C181	G
2150-C	Base scenario - Severe Fire	G
2151-A	Base scenario	B-2
2153-A	Base scenario	B-2
2154-E-B	2C71, 2C70; 2C73, 2C72	B-4
2154-E-C	2C80, 2C409	B-4
2172-ZZ	Base scenario	B-2
2177-YY	Base scenario	B-2
2183-J-B	2C384	B-3
2183-J-C	2C183	B-3
2200-MM-AH	2C27A, 2C27B	B-2
2200-MM-AI	2C301	B-2
2200-MM-BA	2B-25	B-2
2200-MM-BP	Service Air Compressor 2C-3	B-2
2200-MM-C	2A-1	B-2
2200-MM-D	2A-2	B-2
2200-MM-F	2B-22	B-2
2200-MM-G	2B-32	B-2
2200-MM-H	2B-42	B-2
2200-MM-K	2H-1, 2H-2	B-2
2200-MM-L	2P-2A, 2P-2B, 2P-2C, 2P-2D	B-2

Table 6		
Scenarios that Require Further Evaluation in Sensitivity Analysis		
Zone	Scenario Description	Area
2200-MM-Q	2B-26	B-2
2200-MM-R	2B-35	B-2
2200-MM-S	2X-23, 2B-3, 2X-24, 2B-4	B-2
2200-MM-T	2B-11	B-2
2200-MM-U	2B-12	B-2
2200-MM-V	2B-21	B-2
2201-B	Base scenario	B-2
2223-KK	Base scenario	B-2
2225-WW	Base scenario	B-2
2231-TT	Base scenario	B-2
2242-OO	Base scenario	B-2
2243-NN	Base scenario	B-2

To reflect the new sensitivity information, Section V.2 of the original LAR has been revised and included in Attachment 6 of this supplement. Entergy requests that the NRC replace Attachment V “ANO-2 Fire Area Risk Summary” Pages V-2 and V-3 with Pages V-2 and V-3 provided in Attachment 6 of this supplemental letter.

In addition to the above, editorial corrections were identified during post-LAR reviews which Entergy desires to resolve in this supplemental letter:

1. The last row, 4th column on Page A-1 of Attachment A, “NEI 04-02 Table B-1 – Transition of Fundamental FP Program & Design Elements,” refers to “EC-DC-330”, but should have referred to “EN-DC-330” (as illustrated in the last column). Therefore, Entergy requests that the NRC replace Page A-1 of Attachment A with Page A-1 provided in Attachment 2 of this supplemental letter.
2. The second entry (row) on Page A-40 of Attachment A, “NEI 04-02 Table B-1 – Transition of Fundamental FP Program & Design Elements,” references the 1974 Edition of NFPA 13 as “Rev. 1.” This should have referenced “Rev. 0” of NFPA 13, 1974 Edition. Therefore, Entergy requests that the NRC replace Page A-40 of Attachment A with Page A-40 provided in Attachment 2 of this supplemental letter.

3. NEI template NRC correspondence TAC numbers were inadvertently left in the last paragraph on Page O-1 of Attachment O, "Orders and Exemptions." These TAC numbers are replaced with the letter dates that correspond to the ANO mitigation strategies required by Section B.5.b of Commission Order EA-02-026. Therefore, Entergy requests that the NRC replace Page O-1 of Attachment O with Page O-1 provided in Attachment 4 of this supplemental letter.
4. Page V-1 of Attachment V, "Fire PRA Quality," describes the focused peer review reference as LTR-RAM-II-11-064 (two places on the page). This reference should be LTR-RAM-I-11-064. Therefore, Entergy requests that the NRC replace Page V-1 of Attachment V with Page V-1 provided in Attachment 6 of this supplemental letter.
5. The last page of Attachment V, "Fire PRA Quality," associated with "References" contains an incorrect heading/footer (labeled as Page W-1). In correcting this to be labeled Page V-27, the first four pages of Attachment W are also affected. In addition, Page W-2 of Attachment W (now Page W-1), referenced a PRA Human Reliability Analysis Notebook as PRA-A2-05-007, Revision 2. No revision number is associated with this analysis; therefore, the revision number is removed. Based on the above, Entergy requests that the NRC replace the last page of Attachment V with Page V-27 provided in Attachment 6 of this supplemental letter and replace the first three pages of Attachment W "Fire PRA insights" with Pages W-1, W-2, and W-3 provided in Attachment 7 of this supplemental letter.

The following table provides an overall description of pages to be replaced with regard to the original LAR.

<u>Remove Original LAR Pages</u>	<u>Insert Pages</u>
Pages A-1 and A-40	Pages A-1 and A-40 (Attachment 2 of this letter)
Pages G-5, G-6, G-7	Pages G-5 through G-9 (Attachment 3 of this letter)
Page O-1	Page O-1 (Attachment 4 of this letter)
Attachment S – ALL	Attachment S – ALL (Attachment 5 of this letter)
Pages V-1, V-2, V-3, V-27	Pages V-1, V-2, V-3, V-27 (Attachment 6 of this letter)
First three pages of Attachment W and all of Table W-2	Pages W-1, W-2, and W-3 and all of Table W-2 (Attachment 7 of this letter)
Enclosure 4 – Page 1	Enclosure 4 – Page 1 (Attachment 8 of this letter)

References

1. Entergy letter dated March 27, 2012, "License Amendment Request to Adopt NFPA-805 Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants (2001 Edition)" (2CAN031201) (ML 12087A113)
2. NRC letter dated May 25, 2012, "Supplemental Information Needed for Acceptance of Requested Licensing Action Re: License Amendment Request to Adopt National Fire Protection Association Standard 805" (TAC No. ME8282) (ML 121380395)

Attachment 2 to

2CAN071202

Revised Attachment A Pages

A. NEI 04-02 Table B-1 – Transition of Fundamental FP Program & Design Elements

<u>NFPA 805 Chapter 3 Section</u>	<u>Requirements / Guidance</u>	<u>Compliance Statement</u>	<u>Compliance Basis</u>	<u>Reference Document</u>
3.1* General	This chapter contains the fundamental elements of the fire protection program and specifies the minimum design requirements for fire protection systems and features. These fire protection program elements and minimum design requirements shall not be subject to the performance-based methods permitted elsewhere in this standard. Previously approved alternatives from the fundamental protection program attributes of this chapter by the authority having jurisdiction (AHJ) take precedence over the requirements contained herein.	N/A	General statement, no technical requirements. See sub-sections for specific compliance statements and references.	
3.2 Fire Protection Plan	N/A	N/A	Section header, no technical requirements. See sub-sections for specific compliance statements and references.	
3.2.1 Intent	A site-wide fire protection plan shall be established. This plan shall document management policy and program direction and shall define the responsibilities of those individuals responsible for the plan's implementation. This section establishes the criteria for an integrated combination of components, procedures, and personnel to implement all fire protection program activities.	Complies	The site-wide fire protection plan is delineated in EN-DC-330 and OP-1003.014. The Fire Protection Program identifies the plant and corporate management positions responsible for implementing the Fire Protection Program and assigns their responsibilities and authorities.	EN-DC-330, Fire Protection Program, Rev. 1 OP-1003.014, ANO Fire Protection Program, Rev. 6, Section 2.0 provides scope
3.2.2* Management Policy Direction and Responsibility	A policy document shall be prepared that defines management authority and responsibilities and establishes the general policy for the site fire protection program.	Complies	Management responsibilities and authorities are delineated in EN-DC-330 and OP-1003.014.	EN-DC-330, Fire Protection Program, Rev. 1 OP-1003.014, ANO Fire Protection Program, Rev. 6, Section 5.0 - Responsibilities
3.2.2.1* Management Policy on Senior Management	The policy document shall designate the senior management position with immediate authority and responsibility for the fire protection program.	Complies	EN-DC-330 delineates responsibilities and authorities to plant and corporate management positions for implementing the Fire Protection Program and assigns ultimate responsibility of the ANO Fire Protection Program to the Site Vice President.	EN-DC-330, Fire Protection Program, Rev. 1 OP-1003.014, ANO Fire Protection Program, Rev. 6, Section 5.0 - Responsibilities

<u>NFPA 805 Chapter 3 Section</u>	<u>Requirements / Guidance</u>	<u>Compliance Statement</u>	<u>Compliance Basis</u>	<u>Reference Document</u>
3.9.1* Fire Suppression System Code Requirements	If an automatic or manual water-based fire suppression system is required to meet the performance or deterministic requirements of Chapter 4, then the system shall be installed in accordance with the appropriate NFPA standards including the following:	Complies with use of EEEEs	This requirement was evaluated by NFPA 13 Code Compliance Evaluation and NFPA 15 Code Compliance Evaluation. Compliance is addressed below.	
3.9.1 Fire Suppression System Code Requirements (1)	NFPA 13, Standard for the Installation of Sprinkler Systems.	Complies with use of EEEEs	This requirement was evaluated by NFPA 13 Code Compliance Evaluation. See Implementation Item in Attachment S.	CALC-ANO2-FP-09-00005, ANO Code Compliance Report for NFPA 13 1974 Edition, Rev. 0 CALC-ANO2-FP-09-00006, ANO Code Compliance Report for NFPA 13 1975 Edition, Rev. 1 CALC-ANO2-FP-09-00007, ANO Code Compliance Report for NFPA 13 1980 Edition, Rev. 1 CALC-ANO2-FP-09-00008, ANO Code Compliance Report for NFPA 13 1983 Edition, Rev. 1 CALC-ANOC-FP-08-00013, ANO Code Compliance Report for NFPA 13 1994 Edition, Rev. 1
3.9.1 Fire Suppression System Code Requirements (2)	NFPA 15, Standard for Water Spray Fixed Systems for Fire Protection.	Complies with use of EEEEs	This requirement was evaluated by NFPA 15 Code Compliance Evaluation. See Implementation Item in Attachment S.	CALC-ANO2-FP-09-00004, ANO Code Compliance Report for NFPA 15 1977 Edition, Rev. 0 CALC-ANO2-FP-09-00020, ANO Code Compliance Report for NFPA 15 1982 Edition, Rev. 0

Attachment 3 to

2CAN071202

Revised Attachment G Pages

Table G-1 – Recovery Actions and Activities

Fire Area	Component	Component Description	Actions	VFDR	RA/PCS
G	2CV-1016-1	SG-A TO BLOWDOWN TANK 2T-67 MOV	Manually trip 2CV-1016-1 at breaker 2D-2301 and 2D-2401, local panel 2D-23 and 2D-24 in Fire Area JJ Fire Zone 2109-U, to isolate blowdown.	G-01	RA
G	2CV-1066-1	SG-B TO BLOWDOWN TANK 2T-67 MOV	Manually trip 2CV-1066-1 at breaker 2D-2301 and 2D-2401, local panel 2D-23 and 2D-24 in Fire Area JJ Fire Zone 2109-U, to isolate blowdown.	G-01	RA
G	2CV-4816	LETDOWN THROTTLE CV	Locally vent air from the actuator for 2CV-4816 to fail the valve closed in Fire Area EE, Fire Zone 2084-DD.	G-01	RA
G	2CV-4817	LETDOWN THROTTLE CV	Locally vent air from the actuator for 2CV-4817 to fail the valve closed in Fire Area EE, Fire Zone 2084-DD.	G-01	RA
G	2P-32A	REACTOR COOLANT PUMP	De-energize DC Control Power to 2P-32A at 2H-11 located in Fire Area B-2, Fire Zone 2200-MM. Then verify tripped/ manually trip 2H-11 in Fire Area B-2, Fire Zone 2200-MM.	G-01	RA
G	2P-32B	REACTOR COOLANT PUMP	De-energize DC Control Power to 2P-32B at 2H-21 located in Fire Area B-2, Fire Zone 2200-MM. Then verify tripped/ manually trip 2H-21 in Fire Area B-2, Fire Zone 2200-MM.	G-01	RA
G	2P-32C	REACTOR COOLANT PUMP	De-energize DC Control Power to 2P-32C at 2H-22 located in Fire Area B-2, Fire Zone 2200-MM. Then verify tripped/ manually trip 2H-22 in Fire Area B-2, Fire Zone 2200-MM.	G-01	RA
G	2P-32D	REACTOR COOLANT PUMP	De-energize DC Control Power to 2P-32D at 2H-12 located in Fire Area B-2, Fire Zone 2200-MM. Then verify tripped/ manually trip 2H-12 in Fire Area B-2, Fire Zone 2200-MM.	G-01	RA
G	2P-89B*	HIGH PRESSURE SAFETY INJECTION (HPSI) PUMP	Locally operate breaker 2A-406 to prevent start of HPSI pump	G-01	RA
G	2P-60B*	LOW PRESSURE SAFETY INJECTION (LPSI) PUMP	Locally operate breaker 2A-405 to prevent start of LPSI pump	G-01	RA
G	2P-35B*	CONTAINMENT SPRAY PUMP	Locally operate breaker 2A-404 to prevent start of Containment Spray Pump	G-01	RA
G	2CV-5630-1 2CV-5631-2*	RWT OUTLET VALVES	Close both RWT outlet valves locally	G-01	RA

Table G-1 – Recovery Actions and Activities

Fire Area	Component	Component Description	Actions	VFDR	RA/PCS
G	2CV-4920-1 2CV-4921-1*	BORIC ACID MAKEUP TANK (BAMT) GRAVITY FEED VALVES	Open both BAMT Gravity Feed valves locally	G-01	RA
G	2CV-4873-1*	VOLUME CONTROL TANK (VCT) OUTLET VALVE	Close VCT outlet valve locally	G-01	RA
G	2T-1*	PRESSURIZER HEATERS	Turn OFF and operate pressurizer heaters as necessary	G-01	RA
G	2P-36A/B/C*	CHARGING PUMPS	Stop and operate Charging pumps locally	G-01	RA
G	2K-4B*	EMERGENCY DIESEL GENERATOR #2 (EDG #2)	Place EDG #2 in LOCKOUT locally	G-01	RA
G	2A-4*	4160V VITAL POWER SWITCHGEAR	De-energize 2A-4 locally to prevent spurious operation/energize 2A-4 to restore power to vital equipment	G-01	RA
G	2B-6*	480V VITAL POWER LOAD CENTER	De-energize 2B-6 locally to prevent spurious operation / energize 2B-6 to restore power to vital equipment	G-01	RA
G	2D-24*	125V DC VITAL POWER (2C-108 / EDG #2 ENGINE START SOLENOIDS & EXCITATION CABINET, 4160V VITAL POWER SWITCHGEAR, 480V VITAL POWER, AND RCS HIGH POINT VENT VALVES)	De-energize DC control power (2D-24 breakers 2, 4, 6, 8, 9, 10) to support EDG #2 (2SV-2829-2, 2SV-2830-2, 2SV-2831, and 2E-21), 2A-4, and 2B-6 local control, and de-energize DC control power to fail close RCS high point vent valves (2SV-4636-2, 2SV-4668-2, 2SV-4670-2)	G-01	RA
G	2CV-4840-2*	CHARGING HEADER ISOLATION	Locally verify open Charging header isolation	G-01	RA
G	2CV-1504-2*	EDG #2 SERVICE WATER OUTLET	Locally verify open EDG #2 Service Water outlet	G-01	RA
G	2CV-4950-2*	RWT SUCTION VALVE	Verify RWT suction valve open for Charging capability if necessary	G-01	RA
G	2P-4C*	SERVICE WATER PUMP	Align Loop 2 Service Water header locally	G-01	RA
G	2CV-0795-2*	EFW PUMP 2P-7A SUCTION MOV	Verify open 2P-7A Condensate suction MOV locally	G-01	RA

Table G-1 – Recovery Actions and Activities

Fire Area	Component	Component Description	Actions	VFDR	RA/PCS
G	TBD	NEW AUXILIARY FEEDWATER (AFW) PUMP	Start and align AFW pump	G-01	RA
GG	2CV-0789-1	EFW PUMP 2P-7B CONDENSATE SUCTION	De-energize 2CV-0789-1 at panel 2B-53, breaker 2B-53D2, located in Fire Area B-3, Fire Zone 2091-BB. Verify open/manually open 2CV-0789-1 in Fire Area FF, Fire Zone 2025-JJ.	N/A	RA
JJ	2A-113	2A-1 SUPPLY BREAKER	De-energize DC Control Power to 2A-113 at 2A-1 located in Fire Area B-2, Fire Zone 2200-MM. Verify closed/manually close 2A-113 in Fire Area B-2, Fire Zone 2200-MM.	JJ-04	RA
JJ	2A-309	2A-3 SUPPLY BREAKER	De-energize DC Control Power to 2A-309 at 2A-3 located in Fire Area II, Fire Zone 2101-AA. Verify closed/manually close 2A-309 in Fire Area II, Fire Zone 2101-AA.	JJ-04	RA
JJ	2CV-1036-2 2CV-1075-1	2P-7B DISCHARGE TO SG-B	Locally open EFW discharge valve following power failure. 2CV-1075-1 and 2CV-1036-2 located in Fire Area GG, Fire Zone 2081-HH.	JJ-01	RA
JJ	2CV-5649-1	CONTAINMENT SUMP SUCTION ISOLATION	De-energize 2CV-5649-1 at panel 2B-52, breaker 2B-52G3, located in Fire Area DD, Fire Zone 2040-JJ. Verify open/manually open 2CV-5649-1 in Fire Area AA, Fire Zone 2007-LL (action performed in conjunction with 2CV-5650-2).	N/A	RA
JJ	2CV-5650-2	CONTAINMENT SUMP SUCTION ISOLATION	De-energize 2CV-5650-2 at panel 2B-62, breaker 2B-62G3, located in Fire Area HH, Fire Zone 2073-DD. Verify open/manually open 2CV-5650-2 in Fire Area AA, Fire Zone 2007-LL (action performed in conjunction with 2CV-5649-1).	N/A	RA
JJ	2PIS-0789	EFW PUMP 2P-7B CONDENSATE SUCTION	De-energize and manually open 2CV-0789-1 prior to starting an EFW pump.	N/A	RA
JJ	2P-7B	EFW PUMP	Manually start 2P-7B at switchgear, breaker 2A-311 located in Fire Area II, Fire Zone 2101-AA.	JJ-01	RA
JJ	2P-89	HPSI PUMP	Locally close minimum flow recirculation valve for the HPSI pumps 2CV-5628-2 in Fire Area DD, Fire Zone 2040-JJ.	JJ-02	RA
MM	2A-113 2A-213	4.16KV SWITCHGEAR	Align offsite power to bus 2A-1 and 2A-2.	N/A	RA

Table G-1 – Recovery Actions and Activities

Fire Area	Component	Component Description	Actions	VFDR	RA/PCS
MM	2CV-1025-1 2CV-1036-2 2CV-1075-1 2CV-1038-2	EFW VALVE	Locally open EFW discharge valves following fire induced control and power failure. 2CV-1025-1 and 2CV-1038-2 located in Fire Area EE-L, Fire Zone 2084-DD. 2CV-1075-1 and 2CV-1036-2 located in Fire Area GG, Fire Zone 2081-HH.	N/A	RA
OO	2CV-1470-1	SERVICE WATER (SW) TO 2P-4A	De-energize 2CV-1470-1 at panel 2B-54, breaker 2B-54E4, located in Fire Area II, Fire Zone 2101-AA. Verify open/ manually open 2CV-1470-1 in Fire Area OO, Fire Zone INTAKE. Note: Valve operator is installed external to the intake structure and not in the impacted area.	OO-1	RA
OO	2CV-1474-2	SW TO 2P-4C	De-energize 2CV-1474-2 at panel 2B-62, breaker 2B-62H3, located in Fire Area HH, Fire Zone 2073-DD. Verify open/ manually open 2CV-1474-2 in Fire Area OO, Fire Zone INTAKE. Note: Valve operator is installed external to the intake structure and not in the impacted area.	OO-1	RA
SS	2CV-1038-2	EFW FROM 2P-7B TO SG-A ISOLATION	De-energize 2CV-1038-2 at panel 2B-63, breaker 2B-63H3, located in Fire Area HH, Fire Zone 2096-M. Verify open/ manually open 2CV-1038-2 in Fire Area EE, Fire Zone 2084-DD.	SS-01	RA
SS	2CV-1425-1	AUXILIARY COOLING WATER (ACW) ISOLATION	De-energize 2CV-1425-1 at panel 2B-54, breaker 2B-54D5, located in Fire Area II, Fire Zone 2101-AA. Verify closed/ manually close 2CV-1425-1 in Fire Area OO, Fire Zone INTAKE.	SS-05	RA
SS	2CV-1470-1	SW TO 2P-4A	De-energize 2CV-1470-1 at panel 2B-54, breaker 2B-54E4, located in Fire Area II, Fire Zone 2101-AA. Verify open/ manually open 2CV-1470-1 in Fire Area OO, Fire Zone INTAKE.	SS-05	RA
SS	2EFW-802	2P-7A/B SUCTION FROM 2T-41A/B	Align EFW/AFW suction to QCST T-41B on low-low level in CST aligned to EFW/AFW (2T-41A or 2T-41B).	N/A	RA
SS	2CV-1026-2 2CV-1037-1 2CV-1039-1 2CV-1076-2	EFW VALVE	Align DC operated valves prior to battery discharge. 2CV-1037-1 and 2CV-1026-2 located in Fire Area EE-L, Fire Zone 2084-DD. 2CV-1039-1 and 2CV-1076-2 located in Fire Area GG, Fire Zone 2081-HH.	N/A	RA

Table G-1 – Recovery Actions and Activities

Fire Area	Component	Component Description	Actions	VFDR	RA/PCS
TT	2A-309	2A-3 SUPPLY BREAKER	De-energize DC Control Power to 2A-309 at 2A-3 located in Fire Area II, Fire Zone 2101-AA. Verify closed/manually close 2A-309 in Fire Area II, Fire Zone 2101-AA.	N/A	RA
TT	2CV-1036-2	EFW FROM 2P-7B TO SG-B ISOLATION	De-energize 2CV-1036-2 at panel 2B-63, breaker 2B-63H1, located in Fire Area HH, Fire Zone 2096-M. Verify open/manually open 2CV-1036-2 in Fire Area GG, Fire Zone 2081-HH.	TT-01	RA
TT	2CV-1075-1	EFW FROM 2P-7B TO SG-B FLOW CONTROL VALVE	De-energize 2CV-1075-1 at panel 2B-53, breaker 2B-53J2, located in Fire Area B-3, Fire Zone 2091-BB. Verify open/manually open 2CV-1075-1 in Fire Area GG, Fire Zone 2081-HH.	TT-01	RA

RA – Recovery Action

PCS – Primary Control Station

* – Defense in Depth Measure

Attachment 4 to

2CAN071202

Revised Attachment O Page

O. Orders and ExemptionsExemptions

Attachment K includes a detailed listing of exemptions granted against 10 CFR 50, Appendix R. Only two exemptions are being retained:

- 1) Appendix R Exemption 17, FA - NN, RCP Oil Collection, Not Meeting III.O Criteria
- 2) Appendix R Exemption 19, FA - NN, RCP Oil Fill Line, Not Meeting III.O Criteria

Attachment K provides the basis for rescinding or retaining exemptions, as applicable.

Orders

No Orders need to be superseded or revised.

ANO-2 implemented the following process for making this determination:

- A review of the ANO-2 docketed correspondence was performed by the site Licensing staff and the NFPA 805 Transition Team. The review was performed by performing electronic searches of the docketed correspondence files by using the Entergy Licensing Research System (Autonomy). The system contains site licensing documents, including documents pertaining to the operating license, the Technical Specifications, the fire protection program, the SAR, correspondence sent to the NRC, and correspondence received from the NRC. The correspondence sent to the NRC includes any outstanding license amendment request submittals.
- A specific review was performed of the license amendment that incorporated the mitigation strategies required by Section B.5.b of Commission Order EA-02-026 (TAC No. MD4495) to ensure that any changes being made to ensure compliance with 10 CFR 50.48(c) do not invalidate existing commitments applicable to the plant. The review of this order demonstrated that changes to the fire protection program will not affect measures required by B.5.b.

Attachment 5 to

2CAN071202

Revised Attachment S Pages

S. Plant Modifications and Items to be Completed During Implementation

Table S-1, Plant Modifications, provided below includes a description of the modifications along with the following information:

- A problem statement,
- Risk ranking of the modification,
- An indication if the modification is currently included in the FPRA,
- Compensatory measure in place, and
- A risk-informed characterization of the modification and compensatory measure.

The following ranking legend should be used when reviewing the table:

- High = Modification which would have an impact on FPRA and affect multiple Fire Areas.
- Med = Modification which would have an impact on FPRA and affect individual Fire Areas, or include IN 92-18 modifications.
- Low = Modification which would have no or insignificant impact on risk.

Table S-1 Plant Modifications

Item	Rank	Unit	Problem Statement	Proposed Modification	In FPRA	Comp Measure	Risk Informed Characterization
S1-1	Med (PRA)	2	In Fire Area HH, a separation issue was identified on the EFW valves 2CV-1026-2 and 2CV-1076-2. During a fire induced circuit failure the feedwater valves may be impacted by a fire in Fire Zone 2096-M. LAR Source: Attachment C (NEI-04-02 Table B-3) Section for EFW Valves 2CV-1026-2 and 2CV-1076-2 in Fire Area HH Risk Summary	ANO plans to relocate interposing relays and affected cables associated with 2CV-1026-2 and 2CV-1076-2 from Fire Area HH, Fire Zone 2096-M, to the adjacent room in Fire Area G, Fire Zone 2098-C. Circuits for 2CV-1026-2 and 2CV-1076-2 are currently routed through Fire Area G and no new impacts will be generated by this modification.	Yes	Yes	This modification is specifically credited from a PRA perspective. Modification reduces the risk in Fire Area HH of a fire induced circuit failure for EFW valves 2CV-1026-2 and 2CV-1076-2 in Fire Zone 2096-M. In accordance with station directives, compensatory measures per OP-1003.014 have been established as appropriate.

Table S-1 Plant Modifications

Item	Rank	Unit	Problem Statement	Proposed Modification	In FPRA	Comp Measure	Risk Informed Characterization
S1-2	High (PRA)	2	In Fire Area JJ, a separation issue was identified that impacts the DC power cables control wiring on both trains. If a fire event occurred, this could result in the loss of equipment that would otherwise be available. Additional considerations are potential spurious operations at switchgear 2A-3 that may result in a loss of power to the safety bus.	ANO plans to modify the circuits as described to eliminate impacts in Fire Area JJ associated with these components. <u>2A-3, 2A-308, 2A-309, and 2A-310</u> – The red train 125V DC panel 2D-23 that supplies control power for 2A-3 and 2B-5 is planned for relocation to Fire Area MM from Fire Area JJ. Control power cables are planned to be rerouted using embedded conduits from Fire Area MM to Fire Area II to avoid Fire Areas JJ and SS. This allows post-fire control of 2A-3 bus from the control room. <u>2CV-1036-2</u> – Auxiliary relays 2CR1036A, B, C, and D are currently installed in MCC 2B-61 and are planned to be relocated to MCC 2B-63. This would eliminate cables that are routed through Fire Area JJ associated with this valve. This eliminates a loss of 2CV-1036-2 due to a fire in Fire Area JJ.	Yes	Yes	This modification is specifically credited from a PRA perspective and affects multiple fire areas. The modification limits the risk of a potential spurious operation and a loss of DC power to safety bus for switchgear 2A-3 due to a fire induced circuit failure. In accordance with station directives, compensatory measures per OP-1003.014 have been established as appropriate.
			<p>LAR Source: Attachment C (NEI-04-02 Table B-3)</p> <p><u>Switchgear/ EFW Valves</u> 2A-3 2A-308 2A-309 2CV-1036-2 2CV-1075-1</p> <p><u>VFDR(s)</u> JJ-04 JJ-04 JJ-04 JJ-01 JJ-01</p> <p>Attachment C (NEI-04-02 Table B-3) Fire Area JJ Risk Summary components: 2A-3, 2A-308, 2A-309, 2A-310, 2B-6, 2CV-1036-2, 2CV-1075-1, 2CV-4816, and 2CV-4817.</p>				

(continued)

Table S-1 Plant Modifications

Item	Rank	Unit	Problem Statement	Proposed Modification	In FPRA	Comp Measure	Risk Informed Characterization
S1-2				<p><u>2CV-1075-1</u> – The reroute of DC control power to bus 2A-3 and load-center 2B-5 listed above assures MCC 2B-53 remains available to power this valve. Control cables from 2C-17 to MCC 2B-53 are planned to be rerouted using an embedded conduit between Fire Area G and II to avoid Fire Areas JJ, SS, and TT. New dedicated fuses are planned to be installed in 2C-17 for 2CV-1075-1 control relays so that failure of cables in scheme 2S113 will not impact 2CV-1075-1.</p> <p><u>2B-6</u> – Cables are planned to be rerouted to control room panel 2C33-2 from 2B-6 using an embedded conduit between Fire Zone 2100-Z to the cable spreading room Fire Area G. This eliminates an impact in Fire Area JJ.</p> <p><u>2CV-4816 & 2CV-4817</u> – A reroute of cable 2I016N is planned by using embedded conduit C4080 that is located between Fire Area G (cable spreading room) to Fire Area EE-L. Cable 2I016N is also planned to be separately fused in panel C-09 to prevent failure due to a loss of cable 2I016P. This eliminates circuit impacts in Fire Areas TT, JJ, and EE-U.</p>			

Table S-1 Plant Modifications

Item	Rank	Unit	Problem Statement	Proposed Modification	In FPRA	Comp Measure	Risk Informed Characterization								
S1-3	High (PRA)	2	<p>In Fire Area MM, fire induced circuit failure could impact DC power cables feeding circuit breakers at switchgear 2A-1, 2A-2, 2H-1, and 2H-2. The failure of 2A-1 and 2A-2 could prevent alignment to an offsite power source. The failure of 2H-1 and 2H-2 could prevent tripping the reactor coolant pumps (RCPs) from the control room.</p> <p>LAR Source: Attachment C (NEI-04-02 Table B-3)</p> <table border="0"> <tr> <td><u>Switchgear</u></td> <td><u>VFDR(s)</u></td> </tr> <tr> <td>2A-1</td> <td>JJ-04</td> </tr> <tr> <td>2H-1</td> <td>JJ-03, MM -04, SS-03</td> </tr> <tr> <td>2H-2</td> <td>JJ-03, MM -04, SS-03</td> </tr> </table> <p>Attachment C (NEI-04-02 Table B-3) globally credits DC power modification to 2A-1, 2A-2, 2H-1, and 2H-2 in the performance based Risk Summary for all fire areas.</p>	<u>Switchgear</u>	<u>VFDR(s)</u>	2A-1	JJ-04	2H-1	JJ-03, MM -04, SS-03	2H-2	JJ-03, MM -04, SS-03	<p>ANO plans to install backup DC control power to switchgear 2A-1, 2A-2, 2H-1 and 2H-2 with automatic transfer capability in the event the normal DC control power source is lost.</p> <p>The new backup DC power source will be located completely within Fire Area B-2 in proximity to the switchgear either on elevation 372' or below at elevation 354'. This eliminates impacts to switchgear DC control power due to a fire in any other ANO-2 fire area and allows tripping of the RCPs in those areas.</p> <p>Inclusive in this modification will be changes to the control power circuits for switchgear 2H-1 and 2H-2 to allow tripping the RCPs in a scenario where a fire originates internally to a switchgear cubicle. This design will prevent fire damage to a load cubicle from disabling the ability to trip the line breakers and remove power to the RCPs. The opposite scenario where fire damages the line breakers would not prevent the RCP load breakers from being tripped. This modification will require the line and load breakers to be separately fused and fed as described:</p>	Yes	Yes	<p>This modification is specifically credited from a PRA perspective and affects multiple fire areas.</p> <p>Modification to install an alternate DC power source reduces the risk of a fire induced circuit failure to the DC power cables feeding RCP circuit breakers 2H-1 and 2H-2 which could prevent tripping the RCPs from the control room.</p> <p>In accordance with station directives, compensatory measures per OP-1003.014 have been established as appropriate.</p>
<u>Switchgear</u>	<u>VFDR(s)</u>														
2A-1	JJ-04														
2H-1	JJ-03, MM -04, SS-03														
2H-2	JJ-03, MM -04, SS-03														

(continued)

Table S-1 Plant Modifications

Item	Rank	Unit	Problem Statement	Proposed Modification	In FPRA	Comp Measure	Risk Informed Characterization
S1-3				<p><u>2H-1</u> – Internal DC control wiring jumpers will be removed to isolate the line and load cubicles. The DC control power for line breakers 2H-13, 2H-14, and 2H-15 will be isolated from the DC control power for the load breakers 2H-10, 2H-11, and 2H-12.</p> <p><u>2H-2</u> – Internal DC control wiring jumpers will be removed to isolate the line and load cubicles. The DC control power for line breakers 2H-23, 2H-24, and 2H-25 will be isolated from the DC control power for the load breakers 2H-20, 2H-21, and 2H-22.</p>			

Table S-1 Plant Modifications

Item	Rank	Unit	Problem Statement	Proposed Modification	In FPRA	Comp Measure	Risk Informed Characterization
S1-4	High (PRA)	2	In Fire Area TT, a separation issue was identified that impacts the power cables for EFW, chemical and volume control system (CVCS), and service water (SW) components 2B-5, 2CV-0789-1, 2CV-1036-2, 2CV-1075-1, 2CV-4816, 2CV-4817, and 2P-7B in the fire PRA model.	ANO plans to modify the circuits as described to eliminate impacts in Fire Area TT associated with these components. 2CV-1036-2 – Auxiliary relays 2CR1036A, B, C, and D are currently installed in MCC 2B-61 and are planned to be relocated to MCC 2B-63. This would also eliminate cables that are routed through Fire Area TT associated with this valve. This eliminates a loss of 2CV-1036-2 due to a fire in Fire Area TT. 2CV-1075-1 – Cables for this valve between panels 2C-39 to 2C-17 that are currently routed through Fire Area TT are planned to be rerouted to remain exclusively in the cable spreading room. Control cables from 2C-17 to MCC 2B-53 are planned to be rerouted using an embedded conduit between Fire Area G and II to avoid Fire Areas JJ, SS, and TT. New dedicated fuses are planned for installation in 2C-17 for 2CV-1075-1 control relays so that failure of cables in scheme 2S113 will not impact 2CV-1075-1.	Yes	Yes	This modification is specifically credited from a PRA perspective and affects multiple fire areas. The modification reduces the risk of a fire induced circuit failure for EFW/CVCS/SW components and power cables (2B-5, 2CV-0789-1, 2CV-1036-2, 2CV-1075-1, 2CV-4816, 2CV-4817, and 2P-7B) in Fire Area TT. In accordance with station directives, compensatory measures per OP-1003.014 have been established as appropriate.
			EFW/ CVCS/SW Components	LAR Source: Attachment C (NEI-04-02 Table B-3) VFDR(s)			
			2CV-1036-2	TT-01			
			2CV-1075-1	TT-01			
			2P-7B	TT-01			
			2CV-0789-1	TT-01			
			2CV-4816	TT-02			
			2CV-4817	TT-02			
			2B-5	TT-03			
			Note: This modification is also discussed in Item S1-2 for Fire Area JJ. Modification resolves impacts in both fire areas.				

(continued)

Table S-1 Plant Modifications

Item	Rank	Unit	Problem Statement	Proposed Modification	In FPRA	Comp Measure	Risk Informed Characterization
S1-4				<p><u>2P-7B</u> – Cables for this pump between panels 2C-39 to 2C-17 that are currently routed through Fire Area TT are planned to be rerouted to remain exclusively in the cable spreading room. New conduits are also planned to be installed.</p> <p><u>2CV-0789-1</u> – Cables for this valve between panels 2C-39 to 2C-17 that are currently routed through Fire Area TT are planned to be rerouted to remain exclusively in the cable spreading room. Control cables from 2C-17 to MCC 2B-53 are planned to be rerouted using an embedded conduit between Fire Area G and II to avoid Fire Areas JJ and SS.</p> <p><u>2CV-4816 & 2CV-4817</u> – A reroute of cable 2I016N is planned by using embedded conduit C4080 that goes between Fire Area G (cable spreading room) to Fire Area EE-L. Cable 2I016N is also planned to be separately fused in panel C-09 to prevent failure due to a loss of cable 2I016P of cable. This eliminates circuit impacts in Fire Areas TT, JJ, and EE-U.</p> <p style="text-align: right;"><i>(continued)</i></p>			<p><u>2B-5</u> – Cables for this load center between panels 2C-39 to 2C-33-1 that are currently routed through Fire Area TT are planned to be rerouted to remain exclusively in the cable spreading room.</p>

Table S-1 Plant Modifications

Item	Rank	Unit	Problem Statement	Proposed Modification	In FPRA	Comp Measure	Risk Informed Characterization
S1-4				<u>2B-5</u> – Cables for this load center between panels 2C-39 to 2C-33-1 that are currently routed through Fire Area TT are planned to be rerouted to remain exclusively in the cable spreading room.			
S1-5	High (PRA)	2	In Fire Area SS, a fire induced circuit failure could impact the DC power on both trains resulting in the loss of the following components. LAR Source: Attachment C (NEI-04-02 Table B-3) <u>Switchgear</u> 2A-3 Attachment C (NEI-04-02 Table B-3) Fire Area SS Risk Summary components 2A-4, 2A-409, 2B-6, 2A-308, 2A-309, 2A-310, 2CV-0789-1, 2CV-1040-1, 2D-27, 2K-4A, 2P-16A, 2P-36A, 2PIS-0789-1, 2SV-0724-1, 2SV-2809-1, 2SV-2810-1, and 2SV-2811.	ANO plans to modify the circuits as described to eliminate impacts in Fire Area SS associated with these components. <u>2A-3 and 2A-310</u> – The red train 125V DC panel 2D-23 that supplies control power for 2A-3 and 2B-5 is planned to be relocated from Fire Area JJ to Fire Area MM. Control power cables are planned to be rerouted using embedded conduits from Fire Area MM to Fire Area II to avoid Fire Areas JJ and SS. This allows post-fire control of 2A-3 bus from the control room. <u>2A-4, 2A-409, & 2B-6</u> – Cables are planned to be rerouted to control room panel 2C33-2 from 2A-4 and 2B-6 using an embedded conduit between Fire Zone 2100-Z to the cable spreading room Fire Area G. This eliminates an impact in Fire Zone 2097-X and Fire Area JJ.	Yes	Yes	This modification is specifically credited from a PRA perspective and affects multiple fire areas. The modification reduces the risk of a fire induced circuit failure that could result in the loss of DC power for both trains. In accordance with station directives, compensatory measures per OP-1003.014 have been established as appropriate.

(continued)

Table S-1 Plant Modifications

Item	Rank	Unit	Problem Statement	Proposed Modification	In FPRA	Comp Measure	Risk Informed Characterization
S1-5				<p>The 125V DC control power from 2D-24 to 2A-4 is planned to be rerouted using a new conduit to avoid an impact against cables G2D2404A and B in Fire Zone 2097-X.</p> <p><u>2CV-0789-1 & 2PIS-0789-1</u> – The power cable for 2PIS-0789-1 (for 2CV-0789-1) is planned to be re-routed using an embedded conduit from Fire Area G to Fire Area II to avoid Fire Area SS.</p> <p><u>2CV-1040-1</u> – This valve is not directly impacted but is failed due to a loss of AC. The red train 125V DC panel 2D-23 that supplies control power for 2A-3 and 2B-5 is planned to be relocated from Fire Area JJ to Fire Area MM. Control power cables are planned to be routed using embedded conduits from Fire Area MM to Fire Area II to avoid Fire Areas JJ and SS. This assures 2CV-1040-1 will have a source of power and eliminates an impact in Fire Area SS.</p> <p style="text-align: right;"><i>(continued)</i></p>			

Table S-1 Plant Modifications

Item	Rank	Unit	Problem Statement	Proposed Modification	In FPRA	Comp Measure	Risk Informed Characterization
S1-5				<p><u>2A-308, 2A-309, 2D-27, 2K-4A, 2P-16A, 2P-36A, 2SV-0724-1, 2SV-2809-1, 2SV-2810-1, and 2SV-2811</u> – The cables associated with these components are planned to be re-routed to avoid Fire Area SS by using embedded conduits and as required the installation of a new raceway in Fire Area B-2 directly under Fire Area SS on elevation 372'. The new raceway in Fire Area B-2 is planned to be installed above the vertical zone of influence for any postulated fire source. This eliminates impacts for 2A-308, 2A-309, 2D-27, 2K-4A, 2P-16A, 2P-36A, 2SV-0724-1, 2SV-2809-1, 2SV-2810-1, and 2SV-2811 in Fire Area SS.</p>			
S1-6	Med (92-18)	2	<p>Motor Operated Valves (MOV) listed below will be modified to meet requirements per IN 92-18. The NPO assessment determined that any one of the RCS drop line valves can fail in a closed and unrecoverable position resulting in a loss of SDC.</p>	<p>ANO plans to modify the control circuit for 2CV-5038-1 to prevent spurious closure. This is planned to be similar to the inhibit circuit modification on CV-1275 for ANO-1. Procedural controls to secure power by opening breakers are planned to be implemented for 2CV-5084-1 and 2CV-5086-2.</p>	No	Yes	<p>The NPO modification reduces the risk of fire induced MOV circuit failures (hot shorts, open circuits and short to ground). This MOV modification can prevent a non-recoverable position failure resulting in the loss of shutdown cooling.</p> <p>In accordance with station directives, compensatory measures per OP-1003.014 have been established as appropriate.</p>
			<p>MOV (IN 92-18)</p>	<p>LAR Source: Attachment D (NEI-04-02 Table F-1) VFDR(s)</p>			
			2CV-5038-1	NPO-RCS-SDC			
			2CV-5084-1	NPO-RCS-SDC			
			2CV-5086-2	NPO-RCS-SDC			

Table S-1 Plant Modifications

Item	Rank	Unit	Problem Statement	Proposed Modification	In FPRA	Comp Measure	Risk Informed Characterization
S1-7	Med (PRA)	2	<p>MOV's listed below will be modified to meet requirements per IN 92-18. The four EFW discharge valves and two EFW pump steam supply valves can fail in a closed and unrecoverable position.</p> <p>LAR Source: Attachment C (NEI-04-02 Table B-3) Section for EFW MOVs 2CV-1075-1, 2CV-1076-2, 2CV-1036-2, 2CV-1039-1, 2CV-0340-2, and 2CV-0205-2 in Fire Area G Risk Summary</p>	<p>ANO plans to modify the control circuit for MOVs 2CV-1075-1, 2CV-1076-2, 2CV-1036-2, 2CV-1039-1, 2CV-0340-2, and 2CV-0205-2 to prevent fire induced spurious closing from the main control room, Fire Area G. This will be accomplished by separating the cable conductors, inclusive of internal panel wiring, that can cause spurious valve closing and protecting them with grounded metallic raceway and the use of grounded metallic barriers. This will prevent contact with potentially energized conductors from both intracable and intercable hot shorts.</p> <p>MOV 2CV-1075-1 control cables R2B53J2C and R2B53J2N that enter panel 2C-17 or 2C-39 from floor penetrations have been identified as the cables of concern applicable to this modification.</p> <p>MOV 2CV-1076-2 control cables G2D26C1D, G2D26C1E, and G2D26C1L that enter panel 2C-16 or 2C-40 from floor penetrations have been identified as the cables of concern applicable to this modification.</p>	Yes	Yes	<p>This modification is specifically credited from a PRA perspective.</p> <p>The modification reduces the risk of fire induced MOV circuit failures (hot shorts, open circuits and short to ground). This MOV modification can prevent a non-recoverable position failure.</p> <p>In accordance with station directives, compensatory measures per OP-1003.014 have been established as appropriate.</p>

(continued)

Table S-1 Plant Modifications

Item	Rank	Unit	Problem Statement	Proposed Modification	In FPRA	Comp Measure	Risk Informed Characterization
S1-7				<p>MOV 2CV-1036-2 control cable G2B63H1E that enters panel 2C-40 from a floor penetration has been identified as the cable of concern applicable to this modification.</p> <p>MOV 2CV-1039-1 control cable R2D27B2E that enters panel 2C-39 from a floor penetration has been identified as the cable of concern applicable to this modification.</p> <p>MOV 2CV-0340-2 control cable G2D26B1E that enters panel 2C-16 from a floor penetration has been identified as the cable of concern applicable to this modification.</p> <p>MOV 2CV-0205-2 control cables G2D26C2C, G2D26C2E, and G2D26C2F that enter panel 2C-16 or 2C-18 from floor penetrations have been identified as the cables of concern applicable to this modification.</p>			

Table S-1 Plant Modifications

Item	Rank	Unit	Problem Statement	Proposed Modification	In FPRA	Comp Measure	Risk Informed Characterization
S1-8	Med (PRA)	2	In Fire Area B-3, spurious opening of MOV 2CV-4698-1 pressurizer low temperature – overpressure (LTOP) relief can result from a fire in motor control center (MCC) 2D-27. LAR Source: Attachment C (NEI-04-02 Table B-3) Section for Fire Area B-3 Risk Summary	ANO plans to modify the control circuit for 2CV-4698-1 to prevent fire induced spurious opening in Fire Area B-3. This will be accomplished by separating the cable conductors, inclusive of internal panel wiring, that can cause spurious opening and protecting the conductors with a grounded metallic raceway and the use of grounded metallic barriers. This will prevent contact with potentially energized conductors from both intracable and intercable hot shorts. Control cable R2D27A3J that enters MCC 2D-27 from a floor penetration has been identified as the cable of concern applicable to this modification.	Yes	Yes	This modification is specifically credited from a PRA perspective. The modification in Fire Area B-3 to install flexible metallic conduit protects the valve control cable in MCC 2D-27 which reduces the risk of fire induced circuit failures (such as spurious opening). This modification can prevent a non-recoverable position failure. In accordance with station directives, compensatory measures per OP-1003.014 have been established as appropriate.
S1-9	Med (PRA)	2	In Fire Area G, spurious opening of valves 2CV-1002 (in cabinet 2C02), 2CV-1052 (in cabinet 2C02), 2CV-0714-1 (in cabinet 2C17), and 2CV-4698-1 (in cabinet 2C09) can result from a fire in the control room. LAR Source: Attachment C (NEI-04-02 Table B-3) Section for MOVs 2CV-1002, 2CV-1052, 2CV-0714-1, and 2CV-4698-1 in Fire Area G Risk Summary	ANO plans to modify the control circuit for MOVs 2CV-1002, 2CV-1052, 2CV-0714-1, and 2CV-4698-1 to prevent fire induced spurious opening in the main control room, Fire Area G. This will be accomplished by separating the cable conductors, inclusive of internal panel wiring, that can cause spurious valve opening and protecting the conductors with a grounded metallic raceway and the use of grounded metallic barriers.	Yes	Yes	This modification is specifically credited from a PRA perspective. The modification in Fire Area G to install flexible metallic conduit protects the valves control cable which reduces the risk of fire induced circuit failures (such as spurious opening). This modification can prevent a non-recoverable position failure. In accordance with station directives, compensatory measures per OP-1003.014 have been established as appropriate.

(continued)

Table S-1 Plant Modifications

Item	Rank	Unit	Problem Statement	Proposed Modification	In FPRA	Comp Measure	Risk Informed Characterization
S1-9				<p>This will prevent contact with potentially energized conductors from both intracable and intercable hot shorts.</p> <p>MOV 2CV-1002 control cable G2B63A3D that enters panel 2C-02 from a floor penetration has been identified as the cable of concern applicable to this modification.</p> <p>MOV 2CV-1052 control cable R2B53D3D that enters panel 2C-02 from a floor penetration has been identified as the cable of concern applicable to this modification.</p> <p>Valve 2CV-0714-1(2SV-0714-1) control cable R2S066E that enters panel 2C-17 from a floor penetration has been identified as the cable of concern applicable to this modification.</p> <p>MOV 2CV-4698-1 control cable R2D27A3J that enters panel 2C-09 from a floor penetration has been identified as the cable of concern applicable to this modification.</p>			

Table S-1 Plant Modifications

Item	Rank	Unit	Problem Statement	Proposed Modification	In FPRA	Comp Measure	Risk Informed Characterization
S1-10	Med (PRA)	2	<p>In Fire Area B-4 an incipient fire detection system is not installed in control element drive mechanism (CEDM) room panels 2C-70, 2C-71, 2C-72, 2C-73, and 2C-80.</p> <p>However an early warning fire detection system in accordance with NFPA 72, Fire Alarm Detection Code, is required by the PRA in accordance with FRE CALC-09-E-0008-05.</p> <p>LAR Source: Attachment C (NEI-04-02 Table B-3) Section for CEDM Room Panels 2C-70, 2C-71, 2C-72, 2C-73, and 2C-80 in Fire Area B-4 Risk Summary</p>	<p>ANO plans to provide a modification in the CEDM room in Fire Area B-4 to install incipient detection in cabinets 2C-70, 2C-71, 2C-72, 2C-73, 2C-80, and 2C-409.</p> <p>Fire detection signal cable is planned to be routed from each air sampling detector to the control room fire panel 2C-343-3.</p>	Yes	Yes	<p>This modification is specifically credited from a PRA perspective.</p> <p>The early warning fire detection system modification in Fire Area B-4 reduces the risk of a fire induced circuit and equipment failures that could result in the loss of CEDM room panels 2C-70, 2C-71, 2C-72, 2C-73, 2C-80, and 2C-409.</p> <p>In accordance with station directives, compensatory measures per OP-1003.014 have been established as appropriate.</p>
S1-11	High (PRA)	2	<p>At ANO the availability of feedwater to ANO-2 SGs was identified as an issue by PRA.</p> <p>Also identified by PRA was ANO's inability to perform high risk and time sensitive actions, such as control of auxiliary feedwater (AFW), outside of the ANO-2 Control Room.</p> <p>LAR Source: Attachment C (NEI-04-02 Table B-3) Fire Area G Risk Summary and VFDR G-01</p>	<p>ANO plans to install a new AFW pump in ANO-1 capable of feeding one of the ANO-2 SGs.</p> <p>The AFW would be designed to meet or exceed the flow requirements of ANO-2 Emergency Feedwater (EFW) Pump 2P-7B (380 gpm @ 1100 psig).</p> <p>The new pump, controls and motor operated valves would be designed to be installed in ANO-1. The preferred source of suction for the new pump is planned to be from ANO-1.</p>	Yes	Yes	<p>The AFW modification is specifically credited from a PRA perspective to provide a reliable additional source of feedwater.</p> <p>The local control panel modification is specifically credited from a PRA perspective to provide an alternate means to perform required actions outside the ANO-2 Control Room.</p> <p>This modification reduces the risk of not being able to perform necessary operator actions to shutdown the plant, if either Control Room can't be manned.</p>

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Table S-1 Plant Modifications

Item	Rank	Unit	Problem Statement	Proposed Modification	In FPRA	Comp Measure	Risk Informed Characterization
S1-11				<p>The discharge piping is planned to be routed through the ANO-1 and ANO-2 Turbine Buildings to ANO-2 Auxiliary Building Rooms 2081 and 2084 for the tie-ins to the EFW System piping. The AFW tie-ins are planned to discharge into the ANO-2 EFW downstream of all EFW injection valves to ensure a single area fire does not disable AFW.</p> <p>The AFW pump would be designed to have the capability to be operated from the ANO-2 Control Room and locally in ANO-1. The design will ensure electrical isolation from Control Room functions to prevent a fire in the ANO-2 Control Room from affecting local control of AFW components.</p> <p>The AFW pump and associated motor operated valves would be designed to be powered by diverse ANO-1 non-safety related power sources to prevent a single failure from disabling equipment operation.</p> <p>The AFW pump would be designed to include controls and monitoring instrumentation to ensure proper water flow to the SGs. The local controls and monitoring instrumentation are planned to be located in ANO-1, powered from ANO-1 sources and have backup DC power.</p>			<p>Also, the local control panel modification reduces the risk of availability issue with of feedwater supply to the ANO-2 SGs.</p> <p>Manual actions are credited in fire areas that contain redundant safe shutdown equipment. These actions have been demonstrated feasible and are therefore considered adequate compensatory measures until compliance can be achieved by transitioning to a 10CFR50.48(c) licensing basis.</p>

Table S-1 Plant Modifications

Item	Rank	Unit	Problem Statement	Proposed Modification	In FPRA	Comp Measure	Risk Informed Characterization
S1-12	Med (PRA)	2	In Fire Area B-3, excessive temperatures have been identified in Fire Zone 2091-BB following a loss of ventilation. LAR Source: Attachment C (NEI-04-02 Table B-3) Fire Area B-3	ANO plans to modify the control wiring for fans 2VEF-63 and 2VEF-64 to isolate the control room and allow the local controls to override a “stop” signal generated from within Fire Area G, either from handswitch positioning or fire-induced circuit damage. This eliminates fire impacts in Fire Area G and assures either 2VEF-63 or 2VEF-64 will remain available except for a fire in Fire Area B-3, Fire Zone 2091-BB.	Yes	No	This modification supports a basic assumption from a PRA perspective.
S1-13	Med (PRA)	2	In Fire Area MM, excessive temperatures have been identified in Fire Zone 2099-W following a loss of ventilation. LAR Source: Attachment C (NEI-04-02 Table B-3) Fire Area MM	ANO plans to provide a modification to fire door DR 265 to allow normally open positioning with automatic closure features in the event of a fire. This allows natural circulation to prevent long term room overheating impact on equipment located in Fire Zone 2099-W, West DC Equipment Room, by allowing an opening to Fire Zone 2109-U, Corridor, in Fire Area JJ.	Yes	No	This modification supports a basic assumption from a PRA perspective.

Table S-1 Plant Modifications

Item	Rank	Unit	Problem Statement	Proposed Modification	In FPRA	Comp Measure	Risk Informed Characterization
S1-14	Low (Code)	C	<p>With regard to NFPA 50A, Gaseous Hydrogen Systems, code non-compliance issues were identified in the Hydrogen Gas Bottle Storage Room related to inadequate vent piping and room ventilation. The hydrogen storage room light switch was identified as not meeting Article 501 for Class I, Division II locations of the National Electric Code (NEC).</p> <p>LAR Source: Attachment A (NEI-04-02 Table B-1) Section 3.3.7.1</p>	<p>ANO plans to provide a modification to move the hydrogen bottles and manifold from the Hydrogen Gas Bottle Storage Room to a concrete slab located outside this room and open to atmosphere. This addresses hydrogen ventilation concerns and eliminates the need for electrical upgrades.</p>	No	No	<p>The subject hydrogen gas system bottle storage area is not credited by the PRA.</p> <p>This modification will be completed to meet NFPA 805 code requirements.</p>

Table S-1 Plant Modifications

Item	Rank	Unit	Problem Statement	Proposed Modification	In FPRA	Comp Measure	Risk Informed Characterization
S1-15	Med (PRA)	C	<p>NFPA 805 non-compliance issues were encountered when smaller fire areas were defined such that multiple walls, dampers, penetration seals, and doors were credited and used in the PRA model as rated fire barriers in the NRC regulatory basis for NFPA 805.</p> <p>Multiple walls and doors barriers will require upgrading to comply with NFPA 805.</p> <p>LAR Source: Attachment A (NEI-04-02 Table B-1) Section 3.11.2</p>	<p>ANO plans to provide an adequate-for-the-hazard evaluation and if necessary a modification to upgrade fire barrier walls, dampers, penetration seals, and doors to rated barriers for those barriers credited for deterministic compliance and subsequently credited in the Fire PRA analysis.</p> <p>These barriers have been previously identified as NRC regulatory basis to ensure compliance with NFPA 805 and have compensatory measures established. The barriers to be addressed as identified by EC-1956 are 2005-2, 2005-3, 2067-4, 2082-3, 2091-1, 2091-2, 2091-3, 2091-4, 2107-4, 2110-2, 2110-4, 2110-7, 2112-2, 2112-8, 2112-10, 2133-5, 2133-6, 2147-8, 2148-4, 2148-5, 2149-5, 2152-2, 2154-2, 2154-3, 2154-5, 2158-10, 2224-2, 2224-3, 2228-10, 2239-4, 2239-5, 2256-4, 2256-5, 2256-6, 2256-8, 2134-1, and 2155-1.</p>	Yes	Yes	<p>This modification will be completed to meet NFPA 805 code requirements.</p> <p>In accordance with station directives, compensatory measures per OP-1003.014 have been established as appropriate.</p>

Table S-1 Plant Modifications

Item	Rank	Unit	Problem Statement	Proposed Modification	In FPRA	Comp Measure	Risk Informed Characterization
S1-16	Low (Code)	C	<p>NFPA 10 non-compliance issues (such as incorrect number of fire extinguishers for travel distance, incorrect type and size for the hazard area) were identified with ANO portable fire extinguishers.</p> <p>LAR Source: Attachment A (NEI-04-02 Table B-1) Section 3.7</p>	<p>ANO plans to provide a modification to resolve the NFPA 10 code deficiencies identified in CALC-ANOC-FP-09-00009.</p> <p>In general, this modification would involve portable fire extinguisher physical relocation, substitution of existing extinguishers, and documentation updates to reflect these plant changes. The results will ensure the proper number of fire extinguishers to meet travel distance requirements in coverage areas, adequately sized fire extinguishers, and the correct type of extinguisher that is rated for the fire hazard in each area.</p>	No	No	<p>The subject fire extinguishers are not credited in the FPRA.</p> <p>This modification will be completed to meet NFPA 805 code requirements.</p>

Table S-2 items provided below are those items (procedure changes, process updates, and training to affected plant personnel) that will be completed prior to the implementation of new NFPA 805 fire protection program.

Table S-2 Implementation Items			
Item	Unit	Description	LAR Section / Source
S2-1	C	Develop a monitoring program required by NFPA 805 that will include a process to monitor and trend the fire protection program based on specific goals established to measure effectiveness.	LAR Section 4.6 and Attachment A (NEI-04-02 B-1 Table) Section 3.2.3 (3)
S2-2	2	Revise or develop fire protection flushing activity to perform fixed water spray system flushing and drainage of underground lead-in connections in accordance with NFPA 15, 1977 Edition Code.	Attachment A (NEI-04-02 B-1 Table) Section 3.9.1 (2)
S2-3	2	Perform an evaluation for NFPA 14, 1983 Edition Code non-compliance for standpipe manual hose station 2HR-75 horizontal water header to determine if additional hangers are required, since hose station water header wall hangers were found not secured.	Attachment A (NEI-04-02 B-1 Table) Section 3.6.1
S2-4	C	Revise fire protection administrative procedure EN-DC-161, Control of Combustible, to include the following: <ul style="list-style-type: none"> • In accordance with NFPA 30, applicable NFPA Standards are considered to be equivalent to those NFPA Standards identified in the current license basis (CLB) for procedures and systems in the fire protection program that are transitioning to NFPA 805. • Terminology for zero transient combustibles and changes needed to support FPRA assumptions. 	Attachment A (NEI-04-02 B-1 Table) Sections 3.3.1.2 (5)
S2-5	2	Revise existing procedure(s) or develop a new procedure(s) for NPO required to transition to NFPA 805 based upon insights gained from ANO-2 NPO calculation.	Attachment D (NEI-04-02 Non-Power Operational Modes) VFDR NPO-Procedure
S2-6	2	Revise OMA procedures/documents to include feasibility criteria in FAQ 07-0030 for the recovery actions listed in Table G-1 of Attachment G, Recovery Action Transition.	Attachment G (NEI-04-02 OMA) Step 4
S2-7	C	Develop or revise technical documents and procedures that relate to new FP design and licensing basis (e.g., ANO Fire Protection Program, OP-1003.014, Technical Requirements Manual, Design Basis Document, Pre-Fire Plans, Maintenance and Surveillance Procedures, Configuration Control Program, Training and Qualification Guidelines, etc.) as required for implementation of NFPA 805.	LAR Sections 4.7.1, 4.7.2, and 4.7.3
S2-8	2	Revise technical documents for NFPA 13 for acceptance of the partial area sprinkler system in Fire Area G for NFPA 805. The existing partial area sprinkler system for Fire Area G has been previously approved by the NRC in an exemption under Appendix R. As transitioned to NFPA 805, the previously approved exemption is being withdrawn, so documentation updates will be needed to remove the reference to an exemption and provide an independent basis.	Attachment A (NEI-04-02 B-1 Table) Section 3.9.1 (1)

Attachment 6 to

2CAN071202

Revised Attachment V Pages

V. Fire PRA Quality

V.1 ANO-2 Fire PRA Quality Review

In accordance with RG 1.205 position 4.3:

“The licensee should submit the documentation described in Section 4.2 of Regulatory Guide 1.200 to address the baseline PRA and application-specific analyses. For PRA Standard “supporting requirements” important to the NFPA 805 risk assessments, the NRC position is that Capability Category II is generally acceptable. Licensees should justify use of Capability Category I for specific supporting requirements in their NFPA 805 risk assessments, if they contend that it is adequate for the application. Licensees should also evaluate whether portions of the PRA need to meet Capability Category III, as described in the PRA Standard.”

The ANO-2 Fire PRA has undergone a RG 1.200, Revision 1, Peer Review against the ASME PRA Supporting Requirements (SRs) by a team of knowledgeable industry (vendor and utility) personnel. The review was conducted by the Westinghouse Owners Group in June 2009 under LTR-RAM-II-09-046, “Fire PRA Peer Review against the Fire PRA Standard Supporting Requirements from Section 4 of the ASME/ANS Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessments for Nuclear Power Plant Applications for the Arkansas Nuclear One, Unit 2 Fire Probabilistic Risk Assessment.” The conclusion of the review was that the ANO-2 FPRA methodologies being used were appropriate and sufficient to satisfy the ASME/ANS PRA Standard RA-Sa-2009. The review team also noted that the staff appeared to be applying the NUREG/CR-6850 methodologies correctly.

At the time of the peer review, the ANO-2 fire CDF was higher than Entergy believed to be reflective of the actual risk. Based on changes to the fire scenario methodologies to refine the CDF, ANO-2 performed a focused-scope peer review of the associated elements. This focused-scope peer review was conducted by the Westinghouse Owners Group in October 2011 under LTR-RAM-I-11-064, “Focused Scope Fire PRA Peer Review for Arkansas Nuclear One Unit 2.” None of the other FPRA SRs involved changes in the Probabilistic Safety Assessment (PSA) Methodology as defined in ASME/ANS RA-Sa-2009.

The summary of the peer review findings exhibited the following statistics for the evaluation of elements to the combined PRA Standard. For the ANO-2 Fire PRA, 81.3% of the SRs were assessed at Capability Category II or higher, including 7.6% of the SRs being assessed at Capability Category III. The ANO-2 FPRA had an additional 3.5% of the applicable SRs assessed at the Capability Category I (CC-1) level. The FPRA was found to not meet 15.3% of the applicable SRs.

The Westinghouse Peer Group concluded that the ANO-2 FPRA is consistent with the ASME/ANS PRA Standard and supports risk-informed applications.

This attachment provides a detailed assessment of each of the findings identified by the Peer Review team. Table V-1 lists each finding and provides the ANO-2 disposition of the finding. Table V-2 lists each finding and provides the ANO-2 disposition of the focused-scope peer review. Table V-3 lists those SRs that were assessed as CC-I and provides the disposition for CC-I acceptability in the NFPA application.

The Peer Review Reports (LTR-RAM-II-09-046 and LTR-RAM-I-11-064) will be available for NRC review via the CERTREC portal.

V.2 Alternate Analysis Methods to NUREG/CR-6850

During the development of the ANO-2 FPRA, Entergy applied an alternate analysis method to NUREG/CR-6850. Entergy determined that the approach taken by this alternate method provides a more realistic representation in the ANO-2 FPRA model. However, since these methods differ from that provided in NUREG/CR-6850, Entergy has performed a sensitivity analysis for each method to determine the impact against the accepted methods of NUREG/CR-6850. The ANO-2 sensitivity analysis is documented in PRA-A2-05-008, Revision 0, “ANO-2 Fire PRA Sensitivity Evaluation – Remove Panel Severity Factors.” This alternate method and its associated sensitivity analysis are provided below. Given the associated actions being taken, these alternate methods continue to meet the acceptable criteria provided in RG 1.174 and RG 1.205.

V.2.1 Non Suppression Probability for Long Term Fires

The application of the NUREG/CR-6850 guidance for the treatment of non-suppression probabilities recommends a minimum default value of 1E-3 (NUREG/CR-6850, Appendix P, Table P-3). NFPA 805, FAQ 08-0050, reviewed the non-suppression probabilities, but maintained the minimum default value of 1E-3.

ANO-2 Application

A non-suppression probability of 0 was applied for Hot Gas Layer (HGL) analysis of the impact on the fire zone of influence and Multi-Compartment Analysis (MCA) for manual suppression times greater than 60 minutes. This probability was based on the formula used to calculate the probability of non-suppression in FAQ 08-0050. The formula for non-suppression probability is $P(t)_{NS} = \exp[-\lambda(t * C_s)]$, where λ is the corresponding mean suppression rate (1/time) and C_s is a scenario-specific adjustment factor which is generally close to 1.

ANO-2 Sensitivity Analysis

See ANO-2 Sensitivity Analysis in Section V.2.2.

V.2.2 Adjustment Factor for Electrical Cabinet Ignition Frequency

The application of the NUREG/CR-6850 guidance for the treatment of electrical cabinet fires for the HGL analysis of impact on fire zone of influence and the MCA includes a non-suppression probability. The electrical cabinet non-suppression probability is taken from NFPA 805, FAQ 08-0050, Table 1.

ANO-2 Application

The electrical panel severity factors developed by ERIN and reviewed by the EPRI-led Fire PRA Methods Review Panel (i.e., Treatment of Electrical Cabinets, Project #689) evaluate actual fire events in determining the fraction of fires impacting the source panel only, versus those impacting targets outside of the source panel. This item only affects electrical panel calculations in the HGL and MCA.

ANO-2 Sensitivity Analysis

A sensitivity analysis was performed in which the adjustment factors for electrical cabinet ignition frequency were removed from the HGL and MCA and from the CDF/LERF calculations. This sensitivity was also performed with the manual non-suppression probability for all fire

scenarios with a fire response time ≥ 60 minutes changed to $1E-3$ in the HGL and MCA. Thus, the sensitivity analysis used methods accepted by the staff during the FAQ process and compares the results based on the "unaccepted method" to results based on an "accepted method."

The CDF/LERF calculations in the new sensitivity analysis were performed by removing the adjustment factors for electrical cabinet ignition frequency from quantification of the post-transition model, which includes plant modifications. The results are compared to those in Table W-2, *ANO-2 Fire Area Risk Summary*, which were obtained from the same model with the adjustment factors. Table 1 below includes the risk results calculated using an acceptable analysis method for the seven areas impacted by the adjustment factors. The risk results for other areas contained in Table W-2 are not impacted.

As illustrated, by replacing the CDF/LERF values in Table W-2 with the sensitivity results in Table 1 below and summing, the new sensitivity analysis increased the total post-transition CDF from $4.30E-05/\text{yr}$ to $6.03E-05/\text{yr}$, and the total LERF from $8.34E-07/\text{yr}$ to $1.28E-06/\text{yr}$. Thus, the sensitivity $\Delta\text{CDF} = 1.73E-5/\text{yr}$ and $\Delta\text{LERF} = 4.46E-7/\text{yr}$.

Area	Area Description	Base Analysis Results (/yr) (LAR Table W-2)		Sensitivity Results (/yr)		Difference in Results (/yr)	
		Fire Area CDF	Fire Area LERF	Fire Area CDF	Fire Area LERF	ΔCDF	ΔLERF
B-3	Fire Zones 2091-BB, 2112-BB and 2183-J (electrical penetration rooms)	4.13E-07	1.32E-08	6.68E-07	2.14E-08	2.55E-07	8.20E-09
B-4	Fire Zone 2154-E (CEDM equipment room)	3.26E-06	3.61E-08	5.63E-06	6.22E-08	2.37E-06	2.61E-08
HH	Fire Zones 2063-DD, 2072-R, 2073-DD, 2096-M, 2106-R, and 2107-N (sample room, VCT room, 2B-62 room, 2B-63 room, degasifier vacuum pump room, and corridor)	3.11E-06	4.65E-08	3.11E-06	4.66E-08	0.00E+00	1.00E-10
II	Fire Zone 2101-AA (north switchgear 2A-3 room)	2.90E-06	9.31E-08	4.10E-06	1.32E-07	1.20E-06	3.89E-08
JJ	Fire Zone 2109-U (corridor)	2.70E-06	7.97E-08	1.06E-05	3.11E-07	7.90E-06	2.31E-07
MM	Fire Zones 2099-W and 2103-V (west DC equipment room and west battery room)	3.28E-06	7.85E-08	7.36E-06	1.76E-07	4.08E-06	9.75E-08
SS	Fire Zones 2097-X, 2100-Z and 2102-Y (east DC equipment room, south switchgear room and east battery room)	2.81E-06	7.43E-08	4.36E-06	1.10E-07	1.55E-06	3.57E-08

References

1. LTR-RAM-II-09-046, "Fire PRA Peer Review against the Fire PRA Standard Supporting Requirements from Section 4 of the ASME/ANS Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessments for Nuclear Power Plant Applications for the Arkansas Nuclear One, Unit 2 Fire Probabilistic Risk Assessment," September 2009.
2. LTR-RAM-I-11-064, "Focused Scope Fire PRA Peer Review for Arkansas Nuclear One Unit 2," December 2011.
3. Echelon Calculation PRA-A2-05-003, "Fire Scenarios Report NUREG/CR-6850 Tasks 8 and 11," January 2012.
4. Entergy Engineering Change EC13540, "ANO2 Cable Routing Exclusions to Support Fire PRA for NFPA-805."
5. Echelon Calculation PRA-A2-05-005, "ANO-2 Fire Probabilistic Risk Assessment Component and Cable Selection Report,"
6. ANO Calculation CALC-ANOC-FP-09-00019, Rev. 0, "Safe Shutdown Cable Jacket Insulation Types at ANO," July 2009.
7. ANO Calculation CALC-85-E-0087-24, Rev. 1, "Safe Shutdown Cable Analysis," April 2006.
8. Echelon Calculation PRA-A2-05-002, "ANO-2 Fire PRA New Human Failure Events."
9. Echelon Calculation PRA-A2-05-007, Rev. 2, "ANO-2 Fire Probabilistic Risk Assessment Human Reliability Analysis (HRA) Notebook," November 2011.
10. ANO Calculation CALC-08-E-0016-01, "Fire Probabilistic Risk Assessment Plant Partitioning and Fire Ignition Frequency Development," March 2011.
11. ANO Calculation ANO2-FP-09-00013, Rev. 0, "Evaluation of Unit 2 Control Room Abandonment Times at ANO Facility."
12. ANO Calculation CALC-09-E-0008-010, "ANO-2 Fire Area G Risk Evaluations," November 2011.
13. Echelon Calculation PRA-ES-05-004, "Multi-Compartment / Hot Gas Layer Analysis."
14. Echelon Calculation PR-A2-05-004, Rev. 0, "Fire Probabilistic Risk Assessment Summary Report, NUREG/CR-6850 Task 16," January 2012.
15. Echelon Calculation PR-A2-05-006, Rev. 0, "ANO-2 Fire PRA Uncertainty / Sensitivity Analysis," January 2012.
16. Nuclear Management Manual Procedure EN-DC-151, Rev. 2, "PSA Maintenance and Update," January 2011.
17. Nuclear Management Manual Procedure EN-DC-161, Rev. 6, "Control of Combustibles," January 2012.
18. ASME/ANS RASa-2009 - ASME and ANS combined PRA Standard "Standard for Level 1/ Large Early Release Frequency Probabilistic Risk Assessment."

Attachment 7 to

2CAN071202

Revised Attachment W Pages

W. Fire PRA Insights

W.1 Fire PRA Overall Risk Insights

Risk insights were documented as part of the development of the FPRA. The total plant fire CDF/LERF was derived using the NUREG/CR-6850 methodology as guidance for FPRA development and is useful in identifying the areas of the plant where fire risk is greatest. The risk insights generated were useful in identifying areas where specific contributors might be mitigated via modification. A detailed description of significant risk sequences associated with the fire initiating events that represent a 1% contribution of the calculated fire risk for the plant was prepared for the purposes of gaining these insights and an understanding of the risk significance of MSO combinations. These insights are provided in Table W-1.

Fire Scenario Selection

Fire scenarios were selected based on the definition of 'significant accident sequence' from RG 1.200, Revision 2:

Significant accident sequence: A significant sequence is one of the set of sequences, defined at the functional or systemic level that, when ranked, compose 95% of the CDF or the LERF/LRF, or that individually contribute more than ~1% to the CDF or LERF/LRF.

There are 81 fire scenarios comprising 90% of the cumulative fire CDF. Of these, 32 scenarios contribute 1% or greater on an individual basis. These 32 scenarios (all scenarios contributing 1% or greater on an individual basis) are presented in Table W-1. There is a strong correlation between CDF and LERF. The top 32 CDF scenarios presented in W-1 include twenty-six of the top LERF scenarios, and all but two of the LERF scenarios contributing 1% or greater on an individual basis. The two remaining LERF scenarios that account for 1% or more of the total have also been added to Table W-1.

Modifications

Several modifications were identified in the FREs that contributed to the reduction in plant cumulative delta CDF and delta LERF within the acceptable criteria. The risk benefits of these proposed modifications are reflected in the delta risk values presented in Table W-2.

See Attachment S for a complete list of all modifications including additional details of each.

Recovery Actions

Recovery actions were reviewed for adverse impact on the FPRA. Each human action credited in the FPRA model was evaluated in the ANO-2 Fire PRA Human Reliability Analysis Notebook (PRA-A2-05-007). None of the modeled actions were found to have an adverse impact on the FPRA. This includes several new actions added to the model during application of the NUREG/CR-6850 methodology.

Safe Shutdown Analysis actions were also reviewed for potential actions adverse to risk. All recovery action equipment and components needed to support the action were identified with VFDRs. The risk associated with each VFDR was evaluated in the FRE process. The potential risk of each recovery action is bounded by the delta risk of the FRE. For the main control room, recovery actions were not credited given a fire in a panel needed to complete the action. Given a fire that results in main control room abandonment due to environmental conditions, the risk of recovery actions associated with remote shutdown is always beneficial.

W.2 Risk Change Due to NFPA 805 Transition

The risk change due to the NFPA 805 transition meets the acceptance guidelines of RG 1.205. RG 1.205 requires that the total risk increase should be consistent with the acceptance guidelines in RG 1.174 in accordance with the guidance in Regulatory Position 2.2.4.2 of RG 1.205, Revision 1.

Increase in CDF and LERF

The total change in CDF for this application is calculated to be $-3.70E-04/\text{yr}$ (the sum of the calculated delta risk from Table W-2) and the total change in LERF is calculated to be $-1.26E-5/\text{yr}$. These values include credited recovery actions and plant modifications (documented in Attachments G and S, respectively). These changes in the plant CDF and LERF meet the RG 1.174 criteria as the total change in risk associated with the transition to NFPA 805 results in a risk decrease and the total plant fire risk is below $1E-04/\text{yr}$ for CDF and $1E-05/\text{yr}$ for LERF.

Site Risk from Internal Events

Although RG 1.174 does not require calculation of total CDF and LERF, if the increases are below the delta CDF and delta LERF of $1E-06/\text{yr}$ and $1E-07/\text{yr}$ respectively, it does recommend that if there is an indication that the CDF is 'considerably higher' than $1E-04/\text{yr}$ or if LERF is 'considerably higher' than $1E-05/\text{yr}$, then the focus should be on finding ways to decrease CDF or LERF.

The total CDF including Fire and Internal events has a value of $6.6E-05/\text{yr}$ (Internal Events CDF ($9.5E-7/\text{year}$) + Internal Floods $8.0E-07/\text{yr}$) + Fire CDF ($6.4E-05$)), and the total LERF has a value of $1.5E-06/\text{yr}$ (Internal Events LERF ($1.1E-07/\text{year}$) + Internal Floods ($5.6E-08/\text{yr}$) + Fire LERF ($1.4E-06/\text{yr}$)). Both values are below the RG 1.174 criteria of $1E-04/\text{yr}$ (CDF) and $1E-05/\text{yr}$ (LERF).

The aforementioned total CDF and LERF values do not include contribution from external events. Therefore, the contribution to risk from external events is captured below.

Site Risk from External Events

Seismic – The Operating Basis Earthquake for ANO is 0.1g and the Design Basis Earthquake for ANO is 0.2g. As part of the IPEEE submittal, ANO-2 performed a Seismic Margin Analysis (SMA). The results of the walkdowns that were performed as part of the SMA verified that the equipment, tanks, distribution systems, structures, and relays are able to withstand the 0.3g Review Level Earthquake at the plant and still provide for its safe shutdown. Based on the updated seismic hazard curve provided by EPRI, the likelihood of a seismic event exceeding 0.3 g peak ground acceleration is $9.28\text{E-}06/\text{yr}$. Given the low seismic frequency with no seismic design outliers, the seismic CDF is estimated to be well below $1\text{E-}5/\text{yr}$ and LERF is estimated to be well below $1\text{E-}6/\text{yr}$.

Flooding and other External Events – High winds, floods, or off-site industry facility accidents do not contribute significantly to ANO-2 site risk. For the external events the CDF is also estimated to be less than $1\text{E-}6/\text{yr}$. This is consistent with the discussions of the events in Sections 2.3 through 2.11 of NUREG-1407.

A bounding estimate of the overall CDF risk due to external events (including seismic, external flooding, and off-site industry facility accidents) is estimated to be less than $1\text{E-}5/\text{yr}$. A total bounding estimate for LERF external events is assumed to be 0.1 of the total CDF, which is less than $1\text{E-}6/\text{yr}$.

Table W-2 ANO-2 Fire Area Risk Summary

Fire Area	Area Description	NFPA 805 Basis	Fire Area CDF	Fire Area LERF	VFDR (Yes/No)	RAs	Fire Risk Eval. Δ CDF	Fire Risk Eval. Δ LERF	Additional Risk of RAs (CDF/LERF)
2MH01E	concrete manhole east	4.2.4.2	4.89E-09	4.93E-11	yes	no	4.89E-09	4.93E-11	n/a
2MH02E	concrete manhole east	4.2.4.2	5.09E-09	5.13E-11	yes	no	5.09E-09	5.13E-11	n/a
2MH03E	concrete manhole east	4.2.4.2	9.99E-08	2.65E-09	yes	no	-5.66E-06	-1.89E-07	n/a
2MH01W	concrete manhole west	4.2.3.2	8.10E-09	1.67E-10	no	n/a	n/a	n/a	n/a
2MH02W	concrete manhole west	4.2.3.2	8.10E-09	1.67E-10	no	n/a	n/a	n/a	n/a
2MH03W	concrete manhole west	4.2.3.2	9.23E-09	1.90E-10	no	n/a	n/a	n/a	n/a
AA	Fire Zone 2007-LL (“B” HPSI, LPSI, and Containment Spray Pump room and gallery)	4.2.4.2	1.52E-06	1.67E-8	yes	no	-9.70E-07	-3.22E-08	n/a
AAC	Fire Zones SBOD and 2MH12 (alternate AC diesel and nearby manhole)	4.2.3.2	5.12E-08	1.06E-9	no	n/a	n/a	n/a	n/a
Admin	administration building	4.2.3.2	n/a	n/a	no	n/a	n/a	n/a	n/a
B-2	miscellaneous turbine building fire compartments	4.2.4.2	5.41E-06	1.23E-07	yes	yes	-1.19E-04	-3.98E-06	1.22E-04/ 1.56E-06
B-3	Fire Zones 2091-BB, 2112-BB and 2183-J (electrical penetration rooms)	4.2.4.2	4.13E-07	1.32E-08	yes	yes	-1.96E-06	-6.49E-08	7.90E-09/ 1.90E-10
B-4	Fire Zone 2154-E (CEDM equipment room)	4.2.4.2	3.26E-06	3.61E-08	yes	yes	2.60E-07	-5.17E-08	4.86E-05/ 5.26E-07
B-5	Fire Zones 2149-B and 2158-F (stairwells 2001 and 2055)	4.2.3.2	4.06E-09	1.21E-10	no	n/a	n/a	n/a	n/a

Table W-2 ANO-2 Fire Area Risk Summary

Fire Area	Area Description	NFPA 805 Basis	Fire Area CDF	Fire Area LERF	VFDR (Yes/No)	RAs	Fire Risk Eval. Δ CDF	Fire Risk Eval. Δ LERF	Additional Risk of RAs (CDF/LERF)
B-6	Fire Zones 2006-LL, 2010-LL, 2011-LL, and 2014-LL (general access, C HPSI pump room, tendon gallery access, and A HPSI, LPSI and Containment Spray Pump room)	4.2.4.2	1.56E-06	1.70E-08	yes	no	3.00E-08	3.00E-10	n/a
CC	Fire Zone 2024-JJ (turbine-driven emergency feedwater pump room)	4.2.3.2	1.49E-09	3.85E-11	no	n/a	n/a	n/a	n/a
DD	Fire Zones 2019-JJ, 2032-JJ, 2040-JJ, and 2068-DD (boric acid condensate tank room, spent resin storage tank room, corridor, and hot machine shop)	4.2.4.2	2.45E-06	2.76E-08	yes	no	-2.85E-06	-9.64E-08	n/a
EE-L	Fire Zones 2055-JJ and 2084-DD (piping penetration rooms)	4.2.4.2	3.81E-07	7.53E-09	yes	yes	-7.89E-07	-2.64E-08	9.56E-07/ 3.12E-08
EE-U	Fire Zone 2111-T (lower south electrical penetration room)	4.2.4.2	2.03E-06	4.81E-08	yes	yes	-5.77E-06	-1.94E-07	1.54E-05/ 4.59E-07
FF	Fire Zone 2025-JJ (motor-driven emergency feedwater pump room)	4.2.3.2	1.15E-08	3.66E-10	no	n/a	n/a	n/a	n/a
G	Fire Zones 2199-G, 2119-H, 2136-I, 2137-I, 2150-C, 2098-C, and 2098-L (control room and other alternate shutdown areas)	4.2.4.2	2.64E-06	3.52E-08	yes	yes	-2.65E-06	-9.78E-08	7.42E-05/ 1.64E-06
GG	Fire Zones 2076-HH and 2081-HH (electrical equipment room and upper north and lower north piping penetration room)	4.2.4.2	1.03E-06	2.17E-08	yes	yes	-1.12E-05	-3.82E-07	2.93E-05/ 9.51E-07

Table W-2 ANO-2 Fire Area Risk Summary

Fire Area	Area Description	NFPA 805 Basis	Fire Area CDF	Fire Area LERF	VFDR (Yes/No)	RAs	Fire Risk Eval. Δ CDF	Fire Risk Eval. Δ LERF	Additional Risk of RAs (CDF/LERF)
HH	Fire Zones 2063-DD, 2072-R, 2073-DD, 2096-M, 2106-R, and 2107-N (sample room, VCT room, 2B-62 room, 2B-63 room, degasifier vacuum pump room, and corridor)	4.2.4.2	3.11E-06	4.65E-08	yes	no	-5.80E-07	-2.18E-08	n/a
II	Fire Zone 2101-AA (north switchgear 2A-3 room)	4.2.4.2	2.90E-06	9.31E-08	yes	no	-1.33E-04	-4.52E-06	n/a
JJ	Fire Zone 2109-U (corridor)	4.2.4.2	2.70E-06	7.97E-08	yes	yes	-3.78E-06	-1.21E-07	2.82E-04/ 3.27E-06
K	Fire Zones 16-Y and 2020-JJ (clean waste receiver tank room and boron holdup tank vault)	4.2.3.2	6.47E-10	1.44E-11	no	n/a	n/a	n/a	n/a
KK	Fire Zones 2093-P, 2114-I and 2115-I (south EDG room, EDG air intake room, and boric acid makeup tank room)	4.2.4.2	1.72E-07	5.22E-09	yes	no	ϵ	ϵ	n/a
L	Fire Zone TKVLT (diesel fuel storage vault)	4.2.3.2	1.86E-08	4.32E-10	no	n/a	n/a	n/a	n/a
MM	Fire Zones 2099-W and 2103-V (west DC equipment room and west battery room)	4.2.4.2	3.28E-06	7.85E-08	yes	yes	-2.06E-05	-7.94E-07	6.36E-05/ 1.81E-06
NN	Fire Zones 2032-K and 2033-K (containment building south side and containment building north side)	4.2.4.2	3.04E-06	7.76E-08	yes	no	ϵ	ϵ	n/a
OO	Intake Structure	4.2.4.2	1.62E-07	1.84E-09	yes	yes	1.62E-07	1.84E-09	1.72E-06/ 1.60E-08

Table W-2 ANO-2 Fire Area Risk Summary

Fire Area	Area Description	NFPA 805 Basis	Fire Area CDF	Fire Area LERF	VFDR (Yes/No)	RAs	Fire Risk Eval. Δ CDF	Fire Risk Eval. Δ LERF	Additional Risk of RAs (CDF/LERF)
QQ	Fire Zones 2094-Q and 2114-I (north EDG room and EDG air intake room)	4.2.3.2	3.98E-07	1.26E-08	no	n/a	n/a	n/a	n/a
SS	Fire Zones 2097-X, 2100-Z and 2102-Y (east DC equipment room, south switchgear room and east battery room)	4.2.4.2	2.81E-06	7.43E-08	yes	yes	-3.75E-05	-1.28E-06	2.48E-05/ 6.95E-07
TT	Fire Zone 2108-S (electrical equipment room)	4.2.4.2	2.86E-06	4.47E-08	yes	yes	-2.37E-05	-7.95E-07	1.16E-05/ 3.83E-07
YD	YARD	4.2.3.2	6.73E-07	1.28E-08	no	n/a	n/a	n/a	n/a
TOTAL			4.30E-05	8.34E-07			-3.70E-04	-1.26E-05	6.74E-04/ 1.13E-05

ε Indicative of an immeasurable change in risk from the impact of the VFDR on Fire PRA model.

Attachment 8 to

2CAN071202

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LIST OF REGULATORY COMMITMENTS

The following table identifies those actions committed to by Entergy in this document. Any other statements in this submittal are provided for information purposes and are not considered to be regulatory commitments.

COMMITMENT	TYPE (Check one)		SCHEDULED COMPLETION DATE
	ONE-TIME ACTION	CONTINUING COMPLIANCE	
Entergy will complete implementation of the modifications identified in Table S-1 of Attachment S	✓		Prior to startup from the second ANO-2 refueling outage following SER issuance
Entergy will complete implementation of procedure changes, process updates, and training of affected plant personnel identified in Table S-2 of Attachment S	✓		Within six months following SER issuance
Entergy will complete and submit results of scenario evaluations that did not screen in the sensitivity analysis performed using approved methods. In addition, the results of a focused scope peer review of fire modeling used in this evaluation will be included.	✓		November 2, 2012