FPL.

March 18, 2013
10 CFR 50.90
L-2013-086

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

Re: Turkey Point Nuclear Generating Station Units 3 and 4
Docket Nos. 50-250 and 50-251
Response to Request for Additional Information Regarding License Amendment Request No. 216 - Transition to 10 CFR 50.48(c) - NFPA 805 Performance-Based Standard for Fire Protection for Light Water Reactor Generating Plants (2001 Edition)

By Florida Power and Light Company (FPL) letter L-2012-092 dated June 28, 2012, in accordance with the provisions of 10 CFR 50.90, "Application of License or Construction Permit," FPL requested an amendment to the Renewed Facility Operating License (RFOL) for Turkey Point Nuclear Generating Station Units 3 and 4. The license Amendment Request (LAR) will enable FPL to adopt a new fire protection licensing basis which complies with the requirements in 10 CFR 50.48(a) and (c) and the guidance in Revision 1 of Regulatory Guide (RG) 1.205.

On September 5, 2012, the NRC Staff requested supplemental information regarding the LAR. By FPL letter L-2012-354 dated September 19, 2012, the supplemental information was provided.

On March 15, 2013, the NRC Staff requested additional information regarding the LAR. Based on discussions with the NRC Staff, the additional information requested was prioritized and the response to the request for additional information is to be provided in three separate submittals. The attachments to this letter provides the 60-day response to the request for additional information.

The supplemental information does not impact the 10 CFR 50.92 evaluation of "No Significant Hazards Consideration" previously provided in FPL letter L-2012-092.

This letter makes no new commitments or changes any existing commitments.

Florida Power & Light Company
9760 SW 344 St Homestead, FL 33035

A001
NRR

If you should have any questions regarding this application, please contact Robert Tomonto, Licensing Manager, at 305-246-7327.

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

Executed on March 18, 2013.

Michael Kiley
Vice President
Turkey Point Nuclear Generating Station

Attachments

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

L-2013-086 Attachment 1

Response to Request for Additional Information Regarding License Amendment Request No. 216

Florida Power and Light Company
Turkey Point Nuclear Generating Station Units 3 and 4
Transition to 10 CFR 50.48(c) - NFPA 805
Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants, 2001 Edition

Probabilistic Risk Assessment (PRA) RAI-01 – Fire Probabilistic Risk Assessment (FPRA) Request for Additional Information (RAI) Facts and Observations (F&Os)

Please clarify the following dispositions to FPRA F&Os and supporting requirements (SRs) assessment identified in Attachment V of the License Amendment Request (LAR), as amended by the letter dated September 19, 2012 (Agencywide Document Access and Management System Accession No. ML12278A106), that appear to have the potential to noticeably impact the FPRA results and do not seem fully resolved:

PRA RAI 01 b) - Fire PRA F&Os

F&O 1-18 against IGN-A7: Describe the scope of the supplemental walkdowns to identify missing ignition sources performed in response to this F&O, the results of those walkdowns, and where these results are documented.

RESPONSE:

Supplemental walkdowns were completed over the time frame from March 2010 through January 2011. The walkdowns reviewed the fire compartments with significant contributions to the total plant CDF/LERF as part of plant scenario refinement. These included the Cable Spreading Room (098), Switchgear Rooms (067, 068, 070, and 071), Load Center Rooms (093, 094, 095, and 096), Auxiliary Building Hallway (058), Reactor Control Rod Equipment Rooms (061 and 063), Computer Room (062), Instrument Air Equipment Areas (078 and 083), and DC Equipment Rooms (101, 104, 108A, and 108B). Updated component information was added to the fire scenario worksheet when identified in the field. For example in compartment 098, a scenario for transformer 3X033 was created. The original walkdown sheets in report PTN-PSA-7.01, Revision 3, were not revised thus retaining the original ignition source bin frequencies without diluting that value due to an increased number of associated components. The original walkdown sheets were only used to develop the initial information for fire ignition frequencies.

PRA RAI 01 c) - Fire PRA F&Os

F&O 1-25 against QU-D5 via FQ-E1: Describe the scope of the reasonableness review including the number of non-significant cutsets reviewed and the criteria used to determine the extent to review them.

RESPONSE:

The nature and results of this review are addressed in Section 4.0, p. 15, of the Summary Report (TURKEY POINT NUCLEAR PLANT FPRA SUMMARY REPORT NUREG/CR-6850 TASK 16, Revision 6, September 2012, 0493060006.005). The text of that discussion is reproduced below:

"A review of the cutsets generated from the quantification to confirm that non-significant cutsets were valid and that the use of screening Human Error Probabilities (HEPs) did not result in inappropriate combinations of these HEPs was performed and the non-significant cutsets were found to be valid."

PRA RAI 01 d) - Fire PRA F&Os

F&O 1-27 against LE-F1 via FQ-E1: Three sensitivity large early release frequency (LERF) cases are presented in the Fire PRA Quantification Methodology and Results report in Appendix D (page D-7): 1) decrease of truncation limit, 2) doubled Human Error Probability (HEP) values, and 3) doubled non-recovery probabilities for all human failure events (HFEs) with a multiplier greater than one. Provide the criteria for determining what sources of LERF modeling uncertainty were identified and documented, justification for those criteria, and explanation for how those criteria were used to select sensitivity studies.

RESPONSE:

The focus of the sensitivity analysis was those parameters for which conservative assumptions were made without a clear quantitative basis for the associated probability distribution. Those parameters with a quantitative basis for the associated probability distribution are addressed directly in the parametric uncertainty evaluation. The screening HEPs and HEP multipliers are not associated with a probability distribution and are therefore treated in the sensitivity analysis.

PRA RAI 01 f) - Fire PRA F&Os

The response to F&O 3-4 indicates that "Walkdowns that were performed did not observe any open fire doors." Confirm that active features, whether rated or unrated, were treated as active rather than passive features. (Just because a door or damper is closed at the time of a walkdown does not guarantee that state.)

RESPONSE:

The discussion regarding open fire doors is intended to pertain to doors which are normally open and require active systems, such as a detection system, to initiate closure. No such active barrier systems are used at Turkey Point. Normal doors and fire dampers are treated as passive features and are evaluated using the failure probabilities specified in NUREG/CR-6850 Task 11 Table 11-3. The Task 11 evaluation associated with multi-compartment impacts is provided in Section 3 of the Hot Gas layer and Multi-Compartment analysis report (TURKEY POINT HOT GAS LAYER AND MULTI-COMPARTMENT ANALYSIS, Revision 2, June 2012, 0493060006.003).

PRA RAI 01 g) - Fire PRA F&Os

F&O 1-38 against QU-F2 via FQ-F1 and UNC-A2: Clarify the process used to ensure computer codes used to perform quantification will yield correct results and how modeling result asymmetries were addressed.

RESPONSE:

The computer codes used to perform the Fire PRA quantification are the same computer codes used to perform the internal events PRA quantification. CAFTA and associated computer codes are used to define the fault tree and basic event data. Quantification engines used included FORTE and FTREX. The FRANC computer code does not perform quantification but provides flag settings, input data and output data tracking for the CAFTA quantification of individual fire scenarios. All of these codes, with the exception of FORTE and FTREX, are part of the EPRI Risk and Reliability (R&R) Workstation suite used by almost all U.S. utilities and many international utilities, and are fully verified and validated by EPRI. FORTE and FTREX were written by Dr. Woo Sik Jung of the Korean Atomic Energy Research Institute (KAERI), are also fully validated and verified, and are distributed through EPRI. Model asymmetries were addressed in the internal events model. Fire PRA model asymmetries are not evaluated since asymmetries exist between cable and component locations with respect to ignition sources which are expected to contribute to asymmetry in the Fire PRA results.

PRA RAI 01 n) - Fire PRA F&Os

F&O 8-10 against HRA-C1 and PRM-B11: Discuss the model anomaly cited here and clarify its impact on the total risk and Δ risk for a fire area. Include in the discussion what could potentially be masked by its use and whether "nominal" event values were adjusted to include potential adverse effects from fire.

RESPONSE:

The process for applying screening HFEs identified in the Turkey Point HFE Report (TURKEY POINT FPRA HFE REPORT , Revision 3, September 2012, 0493060006.002, Appendix B) is as follows. For events going into an AND gate, only one event was set to the screening HFE value and any other associated event was left as failed. For events going into an OR gate, one event was set to the screening HFE value and the remaining associated events were set to nominal. This eliminates potential non-minimal cutsets when using the screening HEPs. Therefore there is no model anomaly and the impact on the total risk and delta risk is zero.

PRA RAI 01 q) - Fire PRA F&Os

F&O 9-6 against FSS-D7: Describe the scope of the plant specific fire protection system availability data, how far back the data have been collected, and where this is documented.

RESPONSE:

The data reviewed was for the period March 2009 to January 2012. The data is tracked in the plant Fire Protection Impairment list which includes fire system impairments such as penetrations, doors, detection systems and suppression systems.

PRA RAI 01 s) - Fire PRA F&Os

F&O 10-2 against FSS-A1: Staff sees hydrogen scenarios in quantification tables in the Fire PRA Summary report related to the hydrogen seal skid and hydrogen panels of the Auxiliary Transformer area but not in the charging pump room fire areas. Identify quantification of the miscellaneous hydrogen fires cited in the F&O response that have been incorporated in the Fire PRA in the charging pump room areas.

RESPONSE:

The charging pump rooms are modeled in the quantification by base scenarios which apply the entire room ignition frequency to the total room damage CCDP. Rather than postulate individual hydrogen fire scenarios in the charging pump rooms, the miscellaneous hydrogen fire portion of the ignition frequency was added into the total room ignition frequency for the base scenario. The contribution to the total ignition frequency from hydrogen fires is found by taking the difference of what is in the Fire Ignition Frequency Workbook – Revision K and the total IGF found in the FRANC Database. To calculate this number a bin count of 7 is used in each of the charging pump rooms out of a total 48 bin 19 sources.

PRA RAI 01 u) - Fire PRA F&Os

F&O 10-4 against FSS-C8: Justify the qualification of the credited fire wrap cited in this F&O related to thermal resistance, flame impingement, and impact from HEAF. Include in this justification, beyond the informal hose-stream test described during the audit, discussion of any engineering assessment to support assumptions made about the functionality of this barrier. Alternatively, provide the impact on CDF/LERF and Δ CDF and LERF when credit for this wrap is removed.

RESPONSE:

Additional walkdowns and review of vendor documents is required to support the response to this RAI. The response to this RAI is deferred to the 90 day response RAIs.

PRA RAI 01 z) i. Fire PRA F&Os

F&O 10-18 against FSS A-1 and F&O 10-19 against FSS-H1: F&O 10-18 finds that exclusion of transients in some compartments could be contributing to a non-conservative estimate of CDF and LERF and recommends including transient scenarios in all compartments where fire modeling has been used. F&O 10-19 finds that lack of documentation on transient fires locations and boundaries presents a challenge for review and update. Note that the transient HRRs in locations where they could damage pinch points (specific locations where loss of targets could results in risk significant impacts), regardless of the "reasonableness" of this placement, should be addressed probabilistically, not precluded a priori unless physically impossible. Per Section 11.1.5.6 of NUREG/CR-6850, transient fires should at a minimum be placed in locations within the plant PAUs where critical targets are located, such as where CCDPs are highest for that PAU, i.e., at "pinch points." Pinch points include locations of redundant trains or the vicinity of other potentially risk-relevant equipment, including the cabling associated with each. Transient fires should be placed at all appropriate locations in a PAU where they can threaten pinch points. Hot work should be assumed to occur in locations where hot work is a possibility, even if improbable (but not impossible), keeping in mind the same philosophy. With this context, provide the following:

i. Describe how transient and hot work fires are distributed within the PAUs at TPN. In particular, identify the criteria at TPN which determine where an ignition source is placed within the PAUs. Also, if there are areas within a PAU where no transient or hot work fires are located since those areas are considered inaccessible, describe the criteria used to define "inaccessible." Note that an inaccessible area is not the same as a location where fire is simply unlikely, even if highly improbable.

RESPONSE:

Transient scenario walkdowns were completed using the HRR (Heat Release Rate) ZOI (Zone of Influence) appropriate for the compartment. Areas with strict combustible controls, "no transient" zones, used a ZOI relating to the 69 kW HRR assumed to account for smaller transient combustible quantities in zones where no combustibles were allowed. For further explanation on the use of a 69kW HRR, see the response to PTN RAI FMOD 01. The 317 kW ZOI was applied for transients in all other locations. The combustible package was placed anywhere within the compartment that could impact equipment or cables. If a transient scenario ZOI would not impact more than one piece of equipment or conduit, no transient scenario was developed. The floor area ratio (transient fire ZOI footprint/compartment floor area) was used to relate the likelihood of the transient fire being located in that location. Wall and Corner effects were also considered with the increased ZOI. Locations considered inaccessible were limited to areas that were physically inaccessible during plant operation (*Tank compartments are only accessible by removing a roof hatch plug, compartments 017, 023 & 024). The switchgear room scenarios referenced in the F&O are associated with small rooms where only switchgear cubicle non-severe fires and a base scenario fire (fire impacting all targets within the fire zone) were addressed. The base scenario fire included the transient frequency in the base scenario given the high probability of a hot gas layer due to a transient fire in that zone. The non-severe fire*

based on the use of panel factors is being eliminated from the analysis and a fire impacting up to the first target/cable tray is being defined as the non-severe fire.

PRA RAI 01 cc) - Fire PRA F&Os

F&O 10-15 against FSS-C7: There appears to be pre-action suppression systems in a number of areas (e.g., the charging pump and DG room). For pre-action suppression systems, dependency between detection and suppression functions exists. In light of the response to this F&O, explain how dependencies related to pre-action suppression systems and detection were treated in the MCA HGL analysis.

RESPONSE:

F&O 10-15 was concerned with crediting a single detection system for automatic suppression and manual suppression through brigade response. The resolution to F&O 10-15 is misleading when it states that "confirmed that no dependency exists between the suppression systems and detection systems." A more appropriate wording is "no dependency exists between the detection system credited for automatic suppression and the detection system credited for manual brigade response." The typical pre-action suppression system is actuated by a thermal detector while a separate ionization detection system provides for independent detection to initiate manual suppression.

PROPOSED REVISION TO LAR TABLE V-3 F&O 10-15:

This F&O is resolved.

A review of the credited suppression systems in the Multi-Compartment /Hot Gas Layer analysis has confirmed that no dependency exists between the detection system credited for automatic suppression and the detection system credited for manual brigade response. Detection in the zones with suppression systems is associated with an independent detection system. The typical pre-action suppression system is actuated by a thermal detector while a separate ionization detection system provides for independent detection to initiate manual suppression.

PRA RAI 01 ee) - Fire PRA F&Os

F&O 1-2 (against AS-B1, ES-A1, ES-A3, ES-A4, and FQ-A2), F&O 1-3 (against AS-B1, ES-A1, ES-A3, ES-A4, and FQ-A2), F&O 7-1 (against PRM-A3), and F&O 7-3 (against response models) are linked to appropriate fire scenarios or that the fire PRA accurately determines the CDF and LERF of fire-induced failures for plant transients more complicated than a reactor trip. Explain the modeling approach used and why internal event sequences do not need to be mapped to specific fire scenarios. Include in this explanation consideration of timing for operator actions and for fire-induced failures of Initiating Event Fault Tree elements.

RESPONSE:

A fire-related reactor trip initiating event (%ZZFIRE) was added to the model for use in the FPRA quantification. Where applicable, logic was added to the FPRA model to capture fire-related failures that could also result in an initiating event. This new logic was added to the FPRA fault tree at a level that would allow FPRA quantification to capture the impact of these fire-related initiating events.

The mapping of PRA components was performed on the basic-event-to-component level and not the basic event/component-to-initiating event level. Failure of components will thus propagate through the fault tree to the applicable initiating event logic.

Initiating event fault trees are included in the Level 1 internal events PRA model to quantify an initiating event frequency due to failure of certain support systems. The initiating event fault trees, as modeled in the level 1 PRA, would not be applicable for fire scenario quantification since they are calculating a frequency based on failure of a component/train with a 1 year exposure and failure to recover another component/train to prevent the initiating event (typically up to a 72 hour time frame). The potential impact on the FPRA results due to the initiating events addressed by these fault trees is captured by failing the support system components (and associated cables) in the applicable fire zones. This ensures that the impact of loss of the support system is captured. Since the FPRA quantification calculates a fire conditional core damage probability (CCDP) and the initiating event frequency for each zone is based on the fire ignition frequency, the initiating event fault trees are not required to be used for FPRA quantification.

PRA RAI 02 - Supporting Requirements Not Met or at Capability Category I

Several Supporting Requirements (SRs) indicated as not met or met at Capability Category I (CC-I) in Table V-1 of the LAR Attachment V and the Fire PRA peer review reports appear to be omitted from Table V-2 (i.e., FSS-C1, FSS-C2, FSS-C3, FSS-D9, FSS-G4, FSS-G5, FSS-G6, HRA-A3, and HRA-B4). Other apparent inconsistencies are that Table V-2 indicates that CC-I-III for SR PRM-C1 is not met while Table V-1 indicates that CC-I-III is met, and that CC-I, II, and II for HRA-C1 are not met, while Table V-2 indicates that only CC-I for HRA-C1 is not met. Reconcile these differences.

RESPONSE:

Table V-1 was updated to include all Supporting Requirements that were included in the Turkey Point Units 3 & 4 Fire PRA peer review and follow on focused scope peer review. The scope of the focused scope peer review included the elements FSS, PRM, HRA. PP-B1, PP-B2, PP-B3, PP-B4, PP-B5, PP-B6, PP-B7, PP-C1, PP-C3, ES-A1, ES-A2, ES-A3, ES-A4, ES-B3, ES-C1, ES-C2, ES-D1, CS-A8, CS-A9, IGN-A4, IGN-A5, IGN-A6, IGN-A10, IGN-B4, CF-A1, CF-A2, CF-B1, SF-A1, SF-A2, SF-A3, FQ-A2, FQ-C1, FQ-E1, FQ-F1, UNC-A1 and UNC-A2 were added.

Table V-2 was updated to add missing Supporting Requirements that were not met or met at Capability Category I (added FSS-C1, FSS-C2, FSS-C3, FSS-D7, FSS-D9, FSS-G4, FSS-G5, FSS-G6, HRA-A3, and HRA-B4).

SR PRM-C1 was deleted from Table V-2; its capability assessment is "Cat 1-3" is MET and should not have been included in Table V-2.

The capability assessment for SR HRA-C1 in Table V-2 was updated to "Cat 1 is MET".

The Revised tables are provided below.

Table V-1 PTN Fire PRA Quality Summary

Supporting Requirement	Peer Review Capability Assessment
PP-A1	Cat 1-3 is MET
PP-B1	Cat 1-3 is NOT Met
PP-B2	Cat 1 is NOT Met; Cat 2-3 is NOT Met
PP-B3	Cat 1 is NOT Met; Cat 2-3 is NOT Met
PP-B4	Cat 1-3 is MET
PP-B5	Cat 1 is NOT Met; Cat 2-3 is NOT Met
PP-B6	Cat 1-3 is MET

Table V-1 PTN Fire PRA Quality Summary

Supporting Requirement	Peer Review Capability Assessment
PP-B7	Cat 1-3 is NOT Met
PP-C1	Cat 1-3 is MET
PP-C2	Cat 1-3 is MET
PP-C3	Cat 1-3 is MET
PP-C4	Cat 1-3 is MET
ES-A1	Cat 1-3 is NOT Met
ES-A2	Cat 1-3 is MET
ES-A3	Cat 1-3 is NOT Met
ES-A4	Cat 1-2 is NOT Met; Cat 3 is Not Assessed
ES-A5	Cat 1 is MET; Cat 2 is MET; Cat 3 is Not Assessed
ES-A6	Cat 1 is MET; Cat 2 is MET; Cat 3 is Not Assessed
ES-B1	Cat 1 is MET; Cat 2 is MET; Cat 3 is Not Assessed
ES-B2	Cat 1 is MET; Cat 2 is MET; Cat 3 is Not Assessed
ES-B3	Cat 1-3 is MET
ES-B4	Cat 1-3 is MET
ES-C1	Cat 1-3 is NOT Met
ES-C2	Cat 1 is NOT Met; Cat 2 is NOT Met; Cat 3 is Not Assessed
ES-D1	Cat 1-3 is MET
CS-A1	Cat 1-3 is MET
CS-A2	Cat 1 is MET; Cat 2 is MET; Cat 3 is MET
CS-A3	Cat 1-3 is MET
CS-A4	Cat 1-3 is MET
CS-A5	Cat 1-3 is MET
CS-A6	Cat 1-3 is MET
CS-A7	Cat 1-3 is MET

Table V-1 PTN Fire PRA Quality Summary

Supporting Requirement	Peer Review Capability Assessment
CS-A8	Cat 1-3 is MET
CS-A9	Cat 1-3 is MET
CS-A10	Cat 1 is MET; Cat 2 is MET; Cat 3 is Not Assessed
CS-A11	Cat 1-3 is MET
CS-B1	Cat 1 is MET; Cat 2-3 is MET
CS-C1	Cat 1-3 is MET
CS-C2	Cat 1-3 is MET
CS-C3	Cat 1-3 is MET
CS-C4	Cat 1-3 is MET
QLS-A1	Cat 1-3 is MET
QLS-A2	Cat 1-3 is MET
QLS-A3	Cat 1-3 is MET
QLS-A4	N/A
QLS-B1	Cat 1-3 is MET
QLS-B2	Cat 1-3 is MET
QLS-B3	N/A
PRM-A1	Cat 1-3 is MET
PRM-A2	Cat 1-3 is MET
PRM-A3	Cat 1-3 is MET
PRM-A4	Cat 1-3 is MET
PRM-B1	Cat 1-3 is MET
PRM-B2	Cat 1-3 is NOT MET
PRM-B3	Cat 1-3 is MET
PRM-B4	N/A
PRM-B5	Cat 1-3 is MET

Table V-1 PTN Fire PRA Quality Summary

Supporting Requirement	Peer Review Capability Assessment
PRM-B6	N/A
PRM-B7	Cat 1-3 is NOT MET
PRM-B8	N/A
PRM-B9	Cat 1-3 MET
PRM-B10	Cat 1-3 is MET
PRM-B11	Cat 1-3 is NOT MET
PRM-B12	Cat 1-3 is MET
PRM-B13	N/A
PRM-B14	Cat 1-3 is NOT MET
PRM-B15	N/A
PRM-C1	Cat 1-3 is MET
FSS-A1	Cat 1-3 is MET
FSS-A2	Cat 1-3 is MET
FSS-A3	Cat 1-3 is MET
FSS-A4	Cat 1-3 is MET
FSS-A5	Cat 1-2 is MET
FSS-A6	Cat 1-2 is MET
FSS-B1	Cat 1-3 is MET
FSS-B2	Cat 2 is MET
FSS-C1	Cat 1 is MET
FSS-C2	Cat 1 is MET
FSS-C3	Cat 1 is MET
FSS-C4	Cat 1 is Not Met
FSS-C5	Cat 1-2 is MET
FSS-C6	Cat 1-2 is MET

Table V-1 PTN Fire PRA Quality Summary

Supporting Requirement	Peer Review Capability Assessment
FSS-C7	Cat 1-3 is NOT MET
FSS-C8	Cat 1-3 is NOT MET
FSS-D1	Cat 1-3 is MET
FSS-D2	Cat 1-3 is MET
FSS-D3	Cat 2 is MET
FSS-D4	Cat 1-3 is MET
FSS-D5	Cat 1-2 NOT MET
FSS-D6	Cat 1-3 is MET
FSS-D7	Cat 1 is MET
FSS-D8	Cat 1-3 is NOT MET
FSS-D9	Cat 1 is MET
FSS-D10	Cat 2-3 is MET
FSS-D11	Cat 1-3 is MET
FSS-E1	Cat 1-3 is MET
FSS-E2	Cat 1-3 is MET
FSS-E3	Cat 3 is MET
FSS-E4	Cat 1-3 is MET
FSS-F1	Cat 1-2 is MET
FSS-F2	N/A
FSS-F3	N/A
FSS-G1	Cat 1-3 is NOT MET
FSS-G2	Cat 1-3 is MET
FSS-G3	Cat 1-3 is NOT MET
FSS-G4	Cat 1 is MET
FSS-G5	Cat 1 is MET

Table V-1 PTN Fire PRA Quality Summary

Supporting Requirement	Peer Review Capability Assessment
FSS-G6	Cat 1 is MET
FSS-H1	Cat 1-3 is MET
FSS-H2	Cat 2-3 is MET
FSS-H3	Cat 1-3 is MET
FSS-H4	Cat 1-3 is MET
FSS-H5	Cat 2 is MET
FSS-H6	Cat 1-3 is MET
FSS-H7	Cat 1-3 is MET
FSS-H8	Cat 1-3 is MET
FSS-H9	Cat 1-3 is MET
FSS-H10	Cat 1-3 is MET
IGN-A1	Cat 1-3 is MET
IGN-A4	Cat 1 is MET; Cat 2 is NOT Met; Cat 3 is Not Assessed
IGN-A5	Cat 1-3 is MET
IGN-A6	Cat 1-3 is MET
IGN-A7	Cat 1-3 is MET
IGN-A8	Cat 1-2 is MET; Cat 3 is Not Assessed
IGN-A9	Cat 1-3 is MET
IGN-A10	Cat 1 is MET; Cat 2 is NOT Met; Cat 3 is Not Assessed
IGN-B1	Cat 1-3 is MET
IGN-B2	Cat 1-3 is MET
IGN-B3	Cat 1-3 is MET
IGN-B4	Cat 1-3 is MET
IGN-B5	Cat 1-3 is MET
CF-A1	Cat 1 is NOT Met; Cat 2-3 is NOT Met

Table V-1 PTN Fire PRA Quality Summary

Supporting Requirement	Peer Review Capability Assessment
CF-A2	Cat 1-3 is NOT Met
CF-B1	Cat 1-3 is NOT Met
QNS-B1	N/A
QNS-D2	N/A
HRA-A1	Cat 1-3 MET
HRA-A2	Cat 1-3 is NOT MET
HRA-A3	Cat 1 is MET
HRA-A4	Cat 1 is NOT MET
HRA-B1	Cat 1-2 is MET
HRA-B2	Cat 1-3 is NOT MET
HRA-B3	Cat 1 is NOT MET
HRA-B4	Cat 1 is MET
HRA-C1	Cat 1 is MET
HRA-D1	Cat 2 is MET
HRA-D2	Cat 1-3 is NOT MET
HRA-E1	Cat 1-3 is NOT MET
SF-A1	Cat 1-3 is NOT Met
SF-A2	Cat 1-3 is MET
SF-A3	Cat 1-3 is MET
SF-A4	Cat 1-3 is MET
SF-A5	Cat 1-3 is MET
SF-B1	Cat 1-3 is MET
FQ-A1	Cat 1-3 is MET
FQ-A2	Cat 1-3 is NOT Met
FQ-A3	Cat 1-3 is MET

Table V-1 PTN Fire PRA Quality Summary

Supporting Requirement	Peer Review Capability Assessment
FQ-A4	Cat 1-3 is MET
FQ-B1	Cat 1-3 is MET
FQ-C1	Cat 1-3 is NOT Met
FQ-D1	Cat 1-3 is MET
FQ-E1	Cat 1-3 is NOT Met
FQ-F1	Cat 1-3 is NOT Met
FQ-F2	N/A
FMU-A1	Cat 1-3 is MET
FMU-A2	Cat 1-3 is MET
FMU-B1	Cat 1-3 is MET
FMU-B2	Cat 1-3 is MET
FMU-B3	Cat 1-3 is MET
FMU-B4	Cat 1-3 is MET
FMU-C1	Cat 1-3 is MET
FMU-D1	Cat 1-3 is MET
FMU-E1	Cat 1-3 is MET
UNC-A1	Cat 1-3 is NOT Met
UNC-A2	Cat 1-3 is NOT Met

Note – Grey shading in the table above identifies and provides the results for those elements which were the subject of the March 2012 focused scope peer review.

Table V-2 PTN Supporting Requirements Not Met or Capability Category I

Supporting Requirement	PTN Final Capability Assessment	Comment
PP-B1	Cat 1-3 is NOT Met	The use of fire zone boundaries as PAU boundaries was of concern for the peer review team. However, the use of these boundaries was based on walkdowns of fire scenarios and inclusion of targets in adjacent zones where those targets are within a fire's zone of influence.
PP-B2	Cat 1 is NOT Met; Cat 2-3 is NOT Met	See discussion under SR PP-B1 above
PP-B3	Cat 1 is NOT Met; Cat 2-3 is NOT Met	See discussion under SR PP-B1 above
PP-B5	Cat 1 is NOT Met; Cat 2-3 is NOT Met	See discussion under SR PP-B1 above
PP-B7	Cat 1-3 is NOT Met	See discussion under SR PP-B1 above
ES-A1	Cat 1-3 is NOT Met	To address concerns identified by the peer review team with respect to the appropriateness of applying a reactor trip initiator for all fires a review of the mapping of components to individual component failure modes was performed to ensure that these failures were appropriately propagated in the fault tree for a reactor trip initiator
ES-A3	Cat 1-3 is NOT Met	See discussion under SR ES-A1
ES-A4	Cat 1-2 is NOT Met; Cat 3 is Not Assessed	See discussion under SR ES-A1
ES-C1	Cat 1-3 is NOT Met	Credit is taken for SSD instrumentation only as cues for HFEs. Guidance to operators to focus on these instruments during post fire shutdown supports this approach and eliminates the potential complexity of the shutdown that would result from attempting to credit all possible instrumentation cues.
ES-C2	Cat 1 is NOT Met; Cat 2 is NOT Met; Cat 3 is Not Assessed	See discussion under SR ES-C1
PRM-B2	Cat 1-3 is NOT Met	See discussion under associated F&Os
PRM-B7	Cat 1-3 is NOT Met	See discussion under associated F&Os
PRM-B11	Cat 1-3 is NOT Met	See discussion under associated F&Os
PRM-B14	Cat 1-3 is NOT Met	See discussion under associated F&Os
FSS-C1	Cat 1 is MET	See discussion under associated F&Os

Table V-2 PTN Supporting Requirements Not Met or Capability Category I

Supporting Requirement	PTN Final Capability Assessment	Comment
FSS-C2	Cat 1 is MET	See discussion under associated F&Os
FSS-C3	Cat 1 is MET	See discussion under associated F&Os
FSS-C4	Cat 1 is NOT Met	See discussion under associated F&Os
FSS-C7	Cat 1-3 is Not Met	See discussion under associated F&Os
FSS-C8	Cat 1-3 is Not Met	See discussion under associated F&Os
FSS-D5	Cat 1-2 Not Met	See discussion under associated F&Os
FSS-D7	Cat 1 is MET	See discussion under associated F&Os
FSS-D8	Cat 1-3 is Not Met	See discussion under associated F&Os
FSS-D9	Cat 1 is MET	See discussion under associated F&Os
FSS-G1	Cat 1-3 is NOT Met	See discussion under associated F&Os
FSS-G3	Cat 1-3 is NOT Met	See discussion under associated F&Os
FSS-G4	Cat 1 is MET	See discussion under associated F&Os
FSS-G5	Cat 1 is MET	See discussion under associated F&Os
FSS-G6	Cat 1 is MET	See discussion under associated F&Os
IGN-A4	Cat 1 is MET; Cat 2 is NOT Met; Cat 3 is Not Assessed	Fire events identified were found to be non-challenging. Therefore, no outlier experience was found. Therefore, Cat II is considered to have been met. Peer review conservatively considered the lack of detailed information with respect to certain fire events to be a basis for considering these events challenging.
IGN-A10	Cat 1 is MET; Cat 2 is NOT Met; Cat 3 is Not Assessed	A parametric uncertainty evaluation was generated subsequent to the peer review incorporating the IGN parametric uncertainty thereby meeting the requirements of Cat 2 for this SR.
CF-A1	Cat 1 is NOT Met; Cat 2-3 is NOT Met	The peer review considered the application of circuit failure probabilities to some cable failures to be inadequate. However, given that the circuit failure probabilities were applied to risk-significant contributors, this SR is considered to be MET at Cat II/III

Table V-2 PTN Supporting Requirements Not Met or Capability Category I

Supporting Requirement	PTN Final Capability Assessment	Comment
CF-A2	Cat 1-3 is NOT Met	A parametric uncertainty evaluation was generated subsequent to the peer review incorporating the CF parametric uncertainty thereby meeting the requirements of this SR.
CF-B1	Cat 1-3 is NOT Met	A more detailed basis for the circuit failure probabilities used was provided in the analysis to address this issue, therefore, this SR is now considered to be met at Cat 1-3.
HRA-A2	Cat 1-3 is NOT Met	See discussion under associated F&Os
HRA-A3	Cat 1 is MET	See discussion under associated F&Os
HRA-A4	Cat 1 is Not Met	See discussion under associated F&Os
HRA-B2	Cat 1-3 is Not Met	See discussion under associated F&Os
HRA-B3	Cat 1 is Not Met	See discussion under associated F&Os
HRA-B4	Cat 1 is MET	See discussion under associated F&Os
HRA-C1	Cat 1 is MET	See discussion under associated F&Os
HRA-D2	Cat 1-3 is NOT Met	See discussion under associated F&Os
HRA-E1	Cat 1-3 is NOT Met	See discussion under associated F&Os
SF-A1	Cat 1-3 is NOT Met	Credit is taken for IPEEE and other seismic assessments as a basis for meeting the seismic fire requirements of the standard. Seismic fire analyses are qualitative in nature and will not impact overall fire risk.
FQ-A2	Cat 1-3 is NOT Met	See discussion under SR ES-C1
FQ-C1	Cat 1-3 is NOT Met	The lack of dependency evaluation for HFEs represented by altered basic events was addressed by altering the recovery file to add multipliers to cutsets with multiple screening HFEs to increase the cutset probability to that associated with the application of only one screening HFE
FQ-E1	Cat 1-3 is NOT Met	Uncertainty analyses not available at the time of the peer review have been performed.
FQ-F1	Cat 1-3 is NOT Met	Uncertainty analyses not available at the time of the peer review have been performed. Importance results have been incorporated into the summary report.
UNC-A1	Cat 1-3 is NOT Met	See discussion under SR FQ-F1

Table V-2 PTN Supporting Requirements Not Met or Capability Category I

Supporting Requirement	PTN Final Capability Assessment	Comment
UNC-A2	Cat 1-3 is NOT Met	See discussion under SR FQ-F1

Note – Grey shading in the table above identifies those elements which were the subject of a subsequent focused scope peer review.

PRA RAI 03 - Bases for Total Report Plant CDF and LERF

Attachment W of the LAR presents the total CDF and LERF for Units 3 and 4 of TPN and breaks down the CDF from each of the following contributors: Internal Events, Internal Floods, "External Floods and Other Hazards", Seismic Events, and Fire Events. This estimate is stated to be based on a bounding estimate of "External Floods and other Hazards" and on a fire CDF and LERF before modifications for risk reduction is credited. The seismic CDF (1E-8/yr) used in this estimate appears to be low compared to the seismic CDF estimate (1.0E-5/yr) presented for the TPN in a memorandum from NRC staff dated September 2010 providing updated results for Generic Issue 199 (memo titled: "Safety/Risk Assessment Results for Generic Issue 199, Implication for Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United states on Existing Plants"). Also, the CDF provided for internal events (8.3E-7/yr) appears low and is much lower than the internal events CDF (1.6E-5/yr) reported in NUREG-1437, Supplement 5, dated 2002, for the TPN license renewal environmental report. The total CDF, if higher CDF values for internal and seismic events were used, approaches 1.0E-4/yr. In light of this provide the bases for the internal and seismic events CDFs and LERFs presented in the LAR. Describe the assessment and assessment scope of any analyses that contribute to these bases.

RESPONSE:

The seismic CDF estimate for Turkey Point was taken from the Turkey Point Units 3 and 4 Extended Power Uprate (EPU) submittal, FPL letter L-2010-113, License Amendment Request for Extended Power Uprate (LAR 205), dated October 21, 2010.

The specific excerpt from the EPU LAR is shown below.

"Seismic risk has not been quantified either for the current plant or for EPU implementation. However, in order to provide additional insight with respect to the effect of EPU on seismic risk, a focused seismic estimate was established. The primary purpose of the evaluation was to provide a risk estimate of the impact of operator actions following a characteristic seismic event. The analyzed event was a seismic-initiated LOOP that occurs during ground accelerations with a magnitude between the Operating Basis Earthquake (OBE) and the Design Basis Earthquake (DBE). For Turkey Point Units 3 and 4, the OBE is 0.05g and the DBE is assessed at 0.15g. Using NUREG-1488 (Reference 22), the frequency of a seismic event in the OBE to DBE range at the Turkey Point site is less than 1.0E-04 per year. Seismic hazards below the OBE should not be risk-significant as safety-related components have a higher likelihood of survival. During the seismic-induced LOOP, it is assumed that non-seismically-qualified SSCs are lost. For hazards with a magnitude above the DBE, events are expected to be dominated by low-potential equipment survival of safety equipment."

So, the seismic CDF reported in the Turkey Point EPU LAR submittal and repeated in the NFPA 805 submittal only addresses the seismic risk for an earthquake with a magnitude between the OBE and the DBE, and does not include an estimate of the CDF due to earthquakes with a magnitude above that of the DBE. In GI-199, approximate CDF estimates were developed by integrating the mean seismic hazard curve and the mean plant-level fragility curve for each NPP.

The seismic hazard curve is the annual frequency at which the site earthquake-induced vibratory ground motion exceeds a given value. The plant-level fragility is the probability of core damage as a function of the site earthquake-induced vibratory ground motion. No realistic plant-level fragility curve exists for Turkey Point, so in GI-199, the seismic core damage frequency was calculated using the HCLPF, which was assumed to be equivalent to the SSE, resulting in a conservative estimate of the seismic core damage frequency.

The Turkey Point EPU internal events model CDF is lower than that reported in the 2002 license renewal environmental report because of the many modifications made to the model during the last ten years, such as data updates, common cause failure modeling and data updates, human reliability analysis (HRA) updates, and modifications to the model to reflect the changing plant and procedural configuration.

PRA RAI 04 - Recovery Actions Credited

Tables W-6 and W-7 of the LAR identify a number of Fire Areas as having Recovery Actions associated with them that are not listed in Attachment G (U3-FF, U4-CC, U4-G, U4-I, U4-OD-047, and U4-QQ) and present risk estimate associated with these actions. Clarify this inconsistency.

RESPONSE:

Tables W-6 and W-7 of the LAR indicate that Fire Areas: U4-I and U4-QQ are deterministically compliant with NFPA 805 Section 4.2.3.2 and no recovery actions are required; therefore, Attachment G of the LAR does not include recovery actions for these areas. Fire Areas U3-FF, U4-CC, U4-G, and U4-OD-047 do have associated recovery actions and are listed below as extracted from Attachment G of the LAR. The additional risk presented by the use of actions is indicated below as extracted from Attachments W-6 and W-7 of the LAR.

Extraction from Tables W-6 and W-7

Unit-FA	Area Description	NFPA 805 Basis	Fire Area CDF/LERF	VFDR (Yes/No)	RAs (Yes/No)	Fire Risk Eval Δ CDF/LERF	Additional Risk of RAs Δ CDF/LERF
U3-FF	Unit 3 480V Load Centers A and B Room	4.2.4	3.00E-07 / 1.63E-08	Yes	Yes	4.74E-08 / 3.67E-09	4.74E-08 / 3.67E-09
U4-CC	Units 3 and 4 Auxiliary Building North-South Breezeway	4.2.4	4.61E-07 / 3.78E-09	Yes	Yes	4.61E-07 / 3.78E-09	4.61E-07 / 3.78E-09
U4-G	Units 3 and 4 Electrical Equipment Room and Spare Battery Room	4.2.4	6.53E-07 / 3.49E-08	Yes	Yes	2.89E-07 / 2.23E-09	2.89E-07 / 2.23E-09
U4-I	Unit 3 South Electrical Penetration Room	4.2.3.2	2.37E-07 / 9.29E-09	No	No	N/A	N/A
U4-OD-047	Unit 4 Component Cooling	4.2.4	5.62E-09 / 3.79E-11	Yes	Yes	5.62E-09 / 3.79E-11	5.62E-09 / 3.79E-11

Extraction from Tables W-6 and W-7

Unit-FA	Area Description	NFPA 805 Basis	Fire Area CDF/LERF	VFDR (Yes/No)	RAs (Yes/No)	Fire Risk Eval Δ CDF/LERF	Additional Risk of RAs Δ CDF/LERF
	Pump and Heat Exchanger						
U4-QQ	Unit 3 Battery Rack B Room	4.2.3.2	2.12E-08 / 2.07E-09	No	No	N/A	N/A

Extraction from Table G-1

Fire Area	Component	Component Description	Actions	Recovery Action (Risk / DID) / Primary Control Station
U3-FF	LCV-3-115C	VCT Outlet MOV to Charging	De-energize LCV-3-115C at 3B06 (MCC 3B), breaker 30669, located in Fire Zone 63. Manually close LCV-3-115C in Fire Zone 55 to establish VCT isolation.	Recovery Action (DID)
U4-CC	CV-4-2831, CV-4-2832, CV-4-2833	AFW Flow Control Valves	Valve in additional nitrogen bottle using valves 4-40-1673 and 4-40-1674 in fire zone 113. Replace nitrogen bottles as necessary.	Recovery Action (DID)
U4-CC	4AA03-FTO	4KV Supply Breaker for Steam Generator Feed Pump 4A (4P1A)	Isolate breaker 4AA03 control power by pulling the close control circuit fuses and locally open breaker 4AA03 at Switchgear 4A (4AA) in fire zone 68.	Recovery Action (DID)
U4-CC	4AC14	4KV Supply Breaker for SGFP 4B	Isolate breaker 4AC14 control power by pulling the close control circuit fuses and locally open breaker 4AC14 at Switchgear 4C (4AC) in fire zone 152.	Recovery Action (DID)
U4-CC	CV-4-2903; CV-4-2904; CV-4-2905	CCW to Emergency Containment Coolers 43V30B; 4V30A; and 4V30C	De-energize MOV-4-749A at 4B07, breaker 40721 in fire zone 58 and manually close MOV-4-749A in fire zone 30.	Recovery Action (DID)

Extraction from Table G-1

Fire Area	Component	Component Description	Actions	Recovery Action (Risk / DID) / Primary Control Station
U4-CC	LCV-4-115B	RWST Supply to Charging	Manually open 4-358 in fire zone 45.	Recovery Action (DID)
U4-CC	LCV-4-115C	VCT Outlet MOV to Charging	De-energize LCV-4-115C at 4B06 (MCC 4B), breaker 40669 in fire zone 61 and manually close LCV-4-115C in fire zone 45.	Recovery Action (DID)
U4-CC	MOV-4-860A	Containment Recirculation Sump Isolation Valve	De-energize MOV-4-860A at MCC 4B07, breaker 40711 in fire zone 58 and manually close MOV-4-860A in fire zone 14.	Recovery Action (DID)
U4-CC	MOV-4-860B	Containment Recirculation Sump Isolation Valve	De-energize MOV-4-860B at MCC 4B06, breaker 40604 in fire zone 61 and manually close MOV-4-860B in fire zone 14.	Recovery Action (DID)
U4-CC	V8A	Auxiliary Building Exhaust Fan	Place fan V8B transfer switch XS to the ISOLATE position in fire zone 63 and locally start Auxiliary Building Exhaust Fan V8B at local panel N8B in fire zone 28.	Recovery Action (DID)
U4-CC	MOV-4-381	RCP Seal Water Return Isolation Valve	De-energize MOV-4-381 at 4B06, breaker 40634 in fire zone 61 and manually close MOV-4-381 in fire zone 30.	Recovery Action (DID)

Extraction from Table G-1

Fire Area	Component	Component Description	Actions	Recovery Action (Risk / DID) / Primary Control Station
U4-CC	3K4B	Emergency Diesel Generator 3B	In fire zone 70, verify 3AB bus lockout relay has been reset and place the following Key Switches located at EDG 3B Sequencer Panel 3C23B-1 in the OFF position: Sequencer Enable; PLC Power Supply; I/O Power Supply. Place Master Control Switch located in EDG 3B Control Panel 3C12B in fire zone 72 to the LOCAL position. Verify Bus 3AB is de-energized and close breaker3AB20 in fire zone 72.	Recovery Action (DID)
U4-CC	4P203B	Boric Acid Transfer Pump	Place the component transfer switch XS to the ISOLATE position to isolate this cable from the control circuit, and locally operate the component from the Local Control Panel, 3/4N203B in fire zone 41.	Recovery Action (DID)
U4-CC	4P215A-FTROff	High Head Safety Injection Pump 4A	Isolate breaker 4AA13 control power by pulling the control circuit fuses and locally open breaker 4AA13 at Switchgear 4A in fire zone 68.	Recovery Action (DID)

Extraction from Table G-1

Fire Area	Component	Component Description	Actions	Recovery Action (Risk / DID) / Primary Control Station
U4-CC	SC-4-152A	Charging Pump Speed Controller (Main Control Room Electric)	Take manual control of 4P201B by taking HSC-4-152 in manual mode and adjusting the speed locally at the pump in fire zone 45.	Recovery Action (DID)
U4-CC	CV-4-204	Letdown Line Containment Isolation Valves (Outside Containment)	De-energize SV-4-204 at 4D01, breaker 31 in fire zone 101 and locally operate CV-4-204 with valve handwheel in fire zone 30.	Recovery Action (DID)
U4-CC	CV-4-310A-FTC; CV-4-310B-FTO; CV-4-311-FTO	Loop A Cold Leg Charging Valve; Loop C Hot Leg Charging Valve; Pressurizer Auxiliary Spray Valve	Close valves CV-4-310A and CV-4-310B and locally open valve CV-4-311 with the handwheel in fire zone 59.	Recovery Action (DID)
U4-CC	FC-4-605C	RHR Heat Exchanger Bypass Flow Control Valve Controller	Operate valves 4-40-1905, 4-40-1895, and 4-40-1896 in fire zone 14 to isolate and vent the air supply to fail FCV-4-605. Operate unit 4 RHR pump 4P210B from the Alternate Shutdown Panel in fire zone 67.	Recovery Action (DID)
U4-CC	FI-4-605	RHR Flow Indicator	Monitor RHR flow at FI-4-5119 in fire zone 14.	Recovery Action (DID)

Extraction from Table G-1

Fire Area	Component	Component Description	Actions	Recovery Action (Risk / DID) / Primary Control Station
U4-CC	HCV-4-142	RHR Letdown to CVCS X-connect Line Isolation Valve	Isolate instrument air to HCV-4-142 root valve, 40-1719 and bleed off instrument air to HCV-4-142. Unlock the handwheel and manually operate HCV-4142 in fire zone 30.	Recovery Action (DID)
U4-CC	HIC-105	Boric Acid Tank C Full Flow Recirculation Valve Hand Control Station	Locally close HCV-105 in fire zone 41.	Recovery Action (DID)
U4-CC	HIC-110	Boric Acid Tank C Full Flow Recirculation Valve Hand Control Station	Locally close HCV-110 in fire zone 41.	Recovery Action (DID)
U4-CC	MOV-4-1417	CCW to Normal Containment Coolers Supply Isolation Valvs	De-energize MOV-4-1417 at 4B08, breaker 40807 in fire zone 25 and verify/manually open MOV-4-1417 in fire zone 30.	Recovery Action (DID)
U4-CC	MOV-4-350	Boric Acid Injection Stop Valve (Active)	De-energize MOV-4-350 at 4B06 (MCC 4B), breaker 40633 in fire zone 61 and manually open MOV-4-350 in fire zone 45.	Recovery Action (DID)

Extraction from Table G-1				
Fire Area	**Component**	**Component Description**	**Actions**	**Recovery Action (Risk / DID) / Primary Control Station**
U4-CC	MOV-4-744B	RHR Low Head Safety Injection Isolation Valve	De-energize MOV-4-744B at 4B06 (MCC 4B), breaker 40613 in fire zone 61 and manually open MOV-4-744B in fire zone 59.	Recovery Action (DID)
U4-CC	MOV-4-749B	CCW to RHR Heat Exchanger Return Isolation Valve	De-energize MOV-4-749B at 4B06, breaker 40617 in fire zone 61 and manually open MOV-4-749B in fire zone 30.	Recovery Action (DID)
U4-CC	MOV-4-750	RCS Letdown to RHR Isolation Valve (Active)	Verify MOV-4-750 de-energized at 4B06, breaker 40615 in fire zone 61 and manually open MOV-4-750 in fire zone 59.	Recovery Action (DID)
U4-CC	MOV-4-862B	RWST to RHR Pump Isolation Valve	Verify MOV-4-862B de-energized at 4B06, breaker 40616 in fire zone 61 and manually close MOV-4-862B in fire zone 15.	Recovery Action (DID)
U4-CC	MOV-4-749A-FTRC	CCW to RHR Heat Exchanger Return Isolation Valve	De-energize MOV-4-749A at 4B07, breaker 40721 in fire zone 58 and manually close MOV-4-749A in fire zone 30.	Recovery Action (DID)

Extraction from Table G-1

Fire Area	Component	Component Description	Actions	Recovery Action (Risk / DID) / Primary Control Station
U4-CC	MOV-4-865A	Accumulator Injection Isolation Valve	Verify MOV-4-865A de-energized at 4B07 (MCC 4C), breaker 40733 in fire zone 58 and manually close MOV-4-865A in fire zone 59.	Recovery Action (DID)
U4-CC	MOV-4-865B	Accumulator Injection Isolation Valve	Verify MOV-4-865B de-energized at 4B05 (MCC 4A), breaker 40532 in fire zone 82 and manually close MOV-4-865B in fire zone 59.	Recovery Action (DID)
U4-CC	MOV-4-865C	Accumulator Injection Isolation Valve	Verify MOV-4-865C de-energized at 4B06 (MCC 4B), breaker 40631 in fire zone 61 and manually close MOV-4-865C in fire zone 59.	Recovery Action (DID)
U4-CC	PC-4-145B	Letdown Flashing Control Valve Controller	Isolate PCV-4-145 by closing manual inlet isolation valve 4-309A and manually operate valve 4-309C in fire zone 45.	Recovery Action (DID)
U4-CC	CV-3-2046B	Day Tank Fill Line Isolation Valve	Manually operate CV-3-2046B with backup nitrogen bottle and hand loader in fire zone 74.	Recovery Action (DID)

Extraction from Table G-1

Fire Area	Component	Component Description	Actions	Recovery Action (Risk / DID) / Primary Control Station
U4-CC	35001	480V Feeder Breaker from 480V Load Center 3D (3B04) via Breaker 30402	Place breaker 30402 transfer switch XS to the ISOLATE position and locally trip breaker 30402 at load center 3B04 in fire zone 96.	Recovery Action (DID)
U4-CC	CV-4-303A; CV-4-303B; CV-4-303C	Reactor Coolant Pump A, B, and C #1 Seal Leakoff Control Valve	De-energize SV-4-303A, B, and C at 4D01 breaker 14 in fire zone 101 to fail CV-4-303A, B, and C to the required open position.	Recovery Action (DID)
U4-CC	MOV-4-626	CCW to Reactor Coolant Pump Thermal Barriers Return Isolation Valves	Place the component transfer switch XS to the ISOLATE/LOCAL position and locally CLOSE MOV-4-626 from the Alternate Shutdown Panel, 4C264 in fire zone 67.	Recovery Action (DID)
U4-CC	MOV-6459A	AFW Turbine Trip and Throttle Valve (Pump K3-A)	Locally operate AFW trip and throttle valve in fire zone 84.	Recovery Action (DID)
U4-CC	40109	480V Supply Breaker to Containment Spray Pump 4A (4P214A)	Disable breaker 40109 charging spring motor and verify breaker tripped at 480V Load Center 4A in fire zone 93.	Recovery Action (DID)

Extraction from Table G-1

Fire Area	Component	Component Description	Actions	Recovery Action (Risk / DID) / Primary Control Station
U4-CC	40307	480V Supply Breaker to Pressurizer Heater Control Group 4 (4X09)	Disable the charging spring motor by placing the Spring Charging Motor Toggle Switch in the OFF position and manually trip breaker 40307 at 4B03 (load center 4C) in fire zone 94.	Recovery Action (DID)
U4-CC	40403	480V Supply Breaker to Containment Spray Pump 4B (4P214B)	Disable breaker 40403 charging spring motor and verify breaker tripped at 480V Load Center 4D in fire zone 94.	Recovery Action (DID)
U4-CC	4B12-FTROff	Pressurizer Heater Backup Group 4A	Disable the charging spring motor by placing the Spring Charging Motor Toggle Switch in the OFF position and manually trip breaker 40107 at 4B01 (load center 4A) in fire zone 93.	Recovery Action (DID)

Extraction from Table G-1

Fire Area	Component	Component Description	Actions	Recovery Action (Risk / DID) / Primary Control Station
U4-CC	4P201A-FTROff	Charging Pump 4A (Spurious)	Manually trip breaker for charging pump 4A (4P201A) by disabling the charging spring motor by placing the Spring Charging Motor Toggle Switch in the OFF position and manually trip breaker 40105 at 4B01 (load center 4A) in fire zone 93.	Recovery Action (DID)
U4-CC	3AB	4KV Switchgear 3B	Place the lockout relay transfer switch 186-3B/XS in the ISOLATE and manually reset the Bus lockout relay at panel 3C23B in fire zone 70.	Recovery Action (DID)
U4-CC	3AB02	4160V Feeder Breaker for Unit Auxiliary Transformer #3 (3X02)	Place the local breaker transfer switch XS to the ISOLATE/LOCAL and locally trip the breaker with test switch TS or control switch CS-2 (if equipped) at the ASP in fire zone 70.	Recovery Action (DID)
U4-CC	3AB05	4160V Feeder Breaker for Unit Auxiliary Transformer #3 (3X03)	Place the local breaker transfer switch XS to the ISOLATE/LOCAL and locally trip the breaker with test switch TS or control switch CS-2 (if equipped) at the ASP in fire zone 70.	Recovery Action (DID)

Extraction from Table G-1

Fire Area	Component	Component Description	Actions	Recovery Action (Risk / DID) / Primary Control Station
U4-CC	3AB11	4160V Supply Breaker for Turbine Plant Circulating Water Pump 3B (3P11B)	Place the local breaker transfer switch XS to the ISOLATE/LOCAL and locally trip the breaker with test switch TS or control switch CS-2 (if equipped) at the ASP in fire zone 70.	Recovery Action (DID)
U4-CC	3AB12	Safety Injection Pump 3B (3P215B)	Place the local breaker transfer switch XS to the ISOLATE/LOCAL and locally trip the breaker with test switch TS or control switch CS-2 (if equipped) at the ASP in fire zone 70.	Recovery Action (DID)
U4-CC	3AB13	4160V Supply Breaker for Component Cooling Water Pump 3B (3P211B)	Place the local breaker transfer switch XS to the ISOLATE/LOCAL and locally trip the breaker with test switch TS or control switch CS-2 (if equipped) at the ASP in fire zone 70.	Recovery Action (DID)

Extraction from Table G-1

Fire Area	Component	Component Description	Actions	Recovery Action (Risk / DID) / Primary Control Station
U4-CC	4P201B	Charging Pump 4B	Manually close either (4-287A, 4-288A, and 4-291A) or (4-293B and 4-293D) in fire zone 45 and verify pump suction path established. Place the component transfer switch XS to the ISOLATE/LOCAL position to isolate this cable from the control circuit, and locally operate the component from the Alternate Shutdown Panel, 4C264 in fire zone 67.	Recovery Action (DID)
U4-CC	3AB15	4160V Supply Breaker for RHR Pump 3B (3P210B)	Place the local breaker transfer switch XS to the ISOLATE/LOCAL and locally trip the breaker with test switch TS or control switch CS-2 (if equipped) at the ASP in fire zone 70.	Recovery Action (DID)
U4-CC	3AB16	4160V Supply Breaker for Circulating Water Pump 3B1 (3P7B)	Place the local breaker transfer switch XS to the ISOLATE/LOCAL and locally trip the breaker with test switch TS or control switch CS-2 (if equipped) at the ASP in fire zone 70.	Recovery Action (DID)

Extraction from Table G-1

Fire Area	Component	Component Description	Actions	Recovery Action (Risk / DID) / Primary Control Station
U4-CC	3AB17	4160V Supply Breaker for Intake Cooling Water Pump 3B (3P9B)	Place the local breaker transfer switch XS to the ISOLATE/LOCAL and locally trip the breaker with test switch TS or control switch CS-2 (if equipped) at the ASP in fire zone 70.	Recovery Action (DID)
U4-CC	3AB18	4160V Supply Breaker for Circulating Water Pump 3B2 (3P7D)	Place the local breaker transfer switch XS to the ISOLATE/LOCAL and locally trip the breaker with test switch TS or control switch CS-2 (if equipped) at the ASP in fire zone 70.	Recovery Action (DID)
U4-CC	3AB19	4160V Cross Connect Breaker with 4160V Switchgear 3D (3AD)	Place the local breaker transfer switch XS to the ISOLATE/LOCAL and locally trip the breaker with test switch TS or control switch CS-2 (if equipped) at the ASP in fire zone 70.	Recovery Action (DID)
U4-CC	POV-4-4882, POV-4-4883	ICW to TPCW Heat Exchanger Throttle Valve	Manual action to throttle ICW using 4-50-401 in fire zone 76.	Recovery Action (DID)
U4-CC	45001	480V Feeder Breaker from 480V Load Center 4D (4B04) via Breaker 40402	Place breaker 40402 transfer switch XS to the ISOLATE position and locally trip breaker 40402 in fire zone 94.	Recovery Action (DID)

Extraction from Table G-1

Fire Area	Component	Component Description	Actions	Recovery Action (Risk / DID) / Primary Control Station
U4-CC	3AB09	4160V Supply Breaker for Load Center Transformer 3X05 to 480V Load Center 3B (3B02)	Place the component breaker transfer switch XS, located at the breaker compartment or ASP, to the ISOLATE/LOCAL position to isolate this cable from the control circuit, and locally operate the breaker with test switch TS or control switch CS-2 (if equipped) at the ASP in fire zone 70.	Recovery Action (DID)
U4-CC	MOV-4-751	RCS Letdown to RHR Isolation Valve (Active)	Verify MOV-4-751 de-energized at 4B07, breaker 40731 in fire zone 58 and manually open MOV-4-751 in fire zone 59.	Recovery Action (DID)
U4-CC	3AB14	4160V Supply Breaker for Load Center Transformer 3X07 to 480V Load Center 3D (3B04)	Place the component breaker transfer switch XS, located at the breaker compartment or ASP, to the ISOLATE/LOCAL position to isolate this cable from the control circuit, and locally operate the breaker with test switch TS or control switch CS-2 (if equipped) at the ASP in fire zone 70.	Recovery Action (DID)

Extraction from Table G-1

Fire Area	Component	Component Description	Actions	Recovery Action (Risk / DID) / Primary Control Station
U4-CC	3AB10	4160V Supply Breaker for Heater Drain Pump 3B (3P3B)	Place the local breaker transfer switch XS to the ISOLATE/LOCAL and locally trip the breaker with test switch TS or control switch CS-2 (if equipped) at the ASP in fire zone 70.	Recovery Action (DID)
U4-CC	3AB21	4160V Supply Breaker for Condensate Pump 3B (3P6B)	Place the local breaker transfer switch XS to the ISOLATE/LOCAL and locally trip the breaker with test switch TS or control switch CS-2 (if equipped) at the ASP in fire zone 70.	Recovery Action (DID)
U4-CC	3C23B-UV	Emergency Load Sequencer 3B	Verify 3AB bus lockout relay has been reset; place the following Key Switches located at EDG 3B Sequencer Panel 3C23B-1 in the OFF position: Sequencer Enable; PLC Power Supply; I/O Power Supply in fire zone 70.	Recovery Action (DID)
U4-CC	4K4B	Emergency Diesel Generator 4B	Place Master Control Switch located in EDG 4B Control Panel 4C12B to the LOCAL position. Verify Bus 4AB side-energized and close breaker 4AB21 in fire zone 135.	Recovery Action (DID)

Extraction from Table G-1

Fire Area	Component	Component Description	Actions	Recovery Action (Risk / DID) / Primary Control Station
U4-CC	4B13	Pressurizer Heater Backup Group, 4B	Place Pressurizer Backup Heater 4B key switch at Load Center 4D (4B04) in Emergency position in fire zone 94. Place the component transfer switch XS to the ISOLATE/LOCAL position and locally operate the component for the Alternate Shutdown Panel, 4C264 in fire zone 67.	Recovery Action (DID)
U4-CC	4P201C-FTROff	Charging Pump 4C (Spurious)	Disable the charging spring motor for 4P201C at Load Center 4H (Breaker 45008) and manually open Breaker 45008 and discharge spring at Load Center 4H (4B50) in fire zone 25.	Recovery Action (DID)
U4-CC	CV-4-200A; CV-4-200B; CV-4-200C	Letdown Line Containment Isolation Valves (Inside Containment)	De-energize SV-4-200A, SV-4-200B, SV-4-200C, and SV-4-4882 at 4D23 breaker 07 in fire zone 108A to fail CV-4-200A, CV-4-200B, CV-4-200C, and POV-4-4882 closed position.	Recovery Action (DID)
U4-CC	FCV-4-113B	Borated Water Charging Pump Suction	De-energize SV-4-113B at 4D23 breaker 11 in fire zone 108A to fail FCV-4-113B to the required closed position.	Recovery Action (DID)

Extraction from Table G-1

Fire Area	Component	Component Description	Actions	Recovery Action (Risk / DID) / Primary Control Station
U4-CC	E16D	Battery/Inverter Room Air Handling Unit (Common)	Open doors D098-1 and D098-2 in the cable spreading room (FZ 98) and position fans in the doorways. Plug fan at D098-1 into receptacle R1 and open door D101-1 in the 4B DC Equipment Room (FZ 101). Plug fan at D098-2 into receptacle R2 in the 3A DC Equipment Room (FZ 104) to provide air flow to FZ 101. Obtain portable fan from Units 3 and 4 DC Equipment 3B Room (FZ 108B). Open doors D108A-3 and D108A-4 in the Units 3 and 4 DC Equipment 4A Room (FZ 108A) and position portable fan from FZ 108B in doorway D108A-3 and plug into receptacle R3 to provide air flow to FZ 108A	Recovery Action (DID)

Extraction from Table G-1

Fire Area	Component	Component Description	Actions	Recovery Action (Risk / DID) / Primary Control Station
U4-G	LT-4-112 and LT-4-115	Volume Control Tank (VCT) Level Transmitters	Manually open 4-358 in fire zone 45 to provide a flow path from the RWST to the charging pump suction. De-energize LCV-4-115C at 4B06 (MCC 4B), breaker 40669, located in Fire Zone 61. Manually close LCV-4-115C in Fire Zone 45 to establish VCT isolation.	Recovery Action (DID)
U4-G	HIC-4-121	Charging Flow Control Valve	Open bypass valve 4-333 and close inlet isolation valve 4-202B, both in fire zone 30, as necessary to establish a charging flow path and to initiate auxiliary spray to support RCS pressure and inventory control.	Recovery Action (DID)
U4-OD-047	LT-4-112 LT-4-115	Volume Control Tank (VCT) Level Transmitters	Manually open 4-358 in fire zone 45 to provide a flow path from the RWST to the charging pump suction. De-energize LCV-4-115C at 4B06 (MCC 4B), breaker 40669, located in Fire Zone 61. Manually close LCV-4-115C in Fire Zone 45 to establish VCT isolation.	Recovery Action (DID)

PRA RAI 05 - Use of Unreviewed Analysis Methods

Besides the method of applying conditional probabilities for propagation of fire from electrical cabinets, for which a sensitivity analysis was provided in the LAR supplement (dated September 19, 2012), were any other Unreviewed Analysis methods (UAMs) used? If so describe those methods and clarify whether guidance from the June 21, 2012, memo from Joseph Giitter to Biff Bradley was used in applying those methods ("Recent Fire PRA Methods review Panel Decisions and EPRI 1022993, 'Evaluation of Peak Heat Release Rates in Electrical Cabinets Fires'").

RESPONSE:

Other than the method of applying conditional probabilities for propagation of fire from electrical cabinets, for which a sensitivity analysis was provided in the LAR supplement (dated September 19, 2012), potential Unreviewed Analysis Methods were precluded by application of the guidance provided in the June 21, 2012 Joseph Giitter to Biff Bradley memo. The items addressed in this memo and their disposition with respect to the PTN Fire PRA is addressed below:

1. Frequencies for Cable Fires Initiated by Welding and Cutting – not used
2. Clarification for Transient Fires – methodology applied is consistent with the approach accepted by the methods review panel and the NRC
3. Alignment Factor for Pump Oil Fires – not used
4. Electrical Cabinet Fire Treatment Refinement Details – used in base Fire PRA with a sensitivity evaluation provided in the LAR supplemented dated 09/19/2012
5. EPRI 1022993 – "Evaluation of Peak Heat Release Rates (HRRs) in Electrical Cabinet Fires" – not used

PRA RAI 06 - Thermal and Radiant Heat Shields

Attachment S Table S-2 of the LAR commits to installing fire stops, heat shields, fire barriers, and other unspecified cable protection (e.g., in Items #1, #2, #16, #21, #24, #26, and #27). Table S-2 indicates this protection is credited in the fire PRA. Describe how these shields and barriers are being credited and provide the justification. Include in the description identification of any engineering evaluations used to support the assumptions made about the function of these shields and protective barriers.

RESPONSE:

The explanations of credit taken for Items #1, #2, #16, #21, #24, #26 and #27 of Table S-2 of the LAR are given below. Turkey Point document EC-276303, 'NFPA 805 Cable Tray Riser Cover and Manhole Upgrades', provides details on the materials, design and construction pertaining to modifications crediting heat shields and fire stops. The implementation of modifications will meet the requirements to achieve the level of protection being credited in the Fire PRA.

Item #	Proposed Modification	Credit Taken in Fire PRA
Item #1	Fire Area OD-086 – Install fire stops in the vertical tray (SECC01) and in horizontal control tray into which cables from SECC01 enter, on either side of SECC01. Provide a heat shield between control tray and power tray (trays 3WCD05 and 3WAM05) for a distance beyond the location of the above fire stops.	The two horizontal trays called out in Table S-2 Item #1 (3WCD05 and 3WAM05) are the control and power trays which carry control and power cables for the 4kV SWGR. Transient scenarios 086-T5-1 and 086-T4-2 fail cables in both trays potentially causing a fault on the 4kV SWGR with inability to clear the fault. The Fire PRA credits fire stops in the vertical tray to ensure that a transient fire near the vertical tray would not propagate up to the horizontal trays. The cover and fire stops in the control tray and heat shield between the power and control trays are credited as additional assurance for prevention of fire propagation via the vertical tray This credit ensures that no single scenario will impact cables in both trays, 3WCD05 and 3WAM05. The associated switchgear cables are excluded from fire impact based on the implementation of these modifications.
Item #2	Fire Area OD-086 – Install fire stops in the vertical tray (SECC01) and in horizontal control tray into which cables from SECC01 enter, on either side of SECC01. Provide a heat shield between control tray and power tray (trays 3WCD05 and 3WAN05) for a distance beyond the location of the above fire stops.	The two horizontal trays called out in Table S-2 Item #1 (3WCD05 and 3WAN05) are the control and power trays which carry control and power cables for the 4kV SWGR. Transient scenarios 086-T5-1 and 086-T4-2 fail cables in both trays potentially causing a fault on the 4kV SWGR with inability to clear the fault. The Fire PRA credits fire stops in the vertical tray to ensure that a transient fire near the vertical tray would not propagate up to the horizontal trays. The cover and fire stops in the control tray and heat shield between the power and control trays are credited as additional assurance for prevention of fire propagation via the vertical tray This credit ensures

Item #	Proposed Modification	Credit Taken in Fire PRA
		that no single scenario will impact cables in both trays, 3WCD05 and 3WAN05. The associated switchgear cables are excluded from fire impact based on the implementation of these modifications.
Item #16	Protect 3B MCC power cables in Fire Area X and 4B MCC power cables in Fire Area V.	The Fire PRA credits 3-hour fire barrier protection, 3-hour fire rated cable or reroute of cables out of the zone for the 3B MCC cables located in the opposite train 3A SWGR room by excluding its impacts in the quantification. The Fire PRA credits 3-hour fire barrier protection, 3-hour fire rated cable or reroute of cables out of the zone for the 4B MCC cables located in the opposite train 4A SWGR room by excluding its impacts in the quantification.
Item #21	Shield cable tray risers in Fire Area CC from floor to a height of 6 feet for risers 3JCT10, 3JDT10, 3JET10, 3JFT10, 3JGT10, 3JHT10, 3JJT10, 4JDT10, 4JET10, 4JFT10, 4JGT10, 4JHT10, and 4JJT10.	The Fire PRA credits shielding of the vertical risers in order to reduce potential for ignition of the trays and fire spread via these vertical risers. Per the drawings reference in EC-276303, 'NFPA 805 Cable Tray Riser Cover and Manhole Upgrades', the shielding will be sealed at the top, creating a fire stop. The radiant energy heat shielding along with the additional linear thermal detection, installed internal to the tray risers per modification #23, will preclude damage to the risers. This protection is provided via the actuation of the existing suppression system by the added linear thermal detectors. Damage to the cable tray risers would therefore only occur in the event of the failure of the suppression system.
Item #24	Protect cables in Fire Area CC and HH associated with RCPs to ensure control room trip capabilities of all RCPs: 3AA01/3AA01/3C03/002 3AB01/3AB01/3C03/002 3AB06/3AB06/3C03/002 4AA01/4AA01/4C03/002 4AA01/4AB06/4B07/001 4AB01/4AB01/4C03/002 4AB06/4AB06/4C03/002	The Fire PRA credits protection of the RCP cables in order to mitigate an RCP seal LOCA by ensuring MCR capabilities to trip all RCPs. Fire Areas CC and HH credit 1-hour fire barrier protection, 1-hour fire rated cable or reroute of cables out of the zones. (in conjunction with existing area wide detection and suppression). The impacts of the cables are removed from the Fire PRA quantification in Fire Area CC and HH.
Item #26	Protect the following cables for ZOI in Fire Area HH associated with components H/A-4-1606, H/A-4-1607, H/A-4-1608, 40307, 4B12, 4B13, PT-4-445, SV-4-455C, SV-4-456, SV-4-455D and SV-4-456A: 4P0608/4P06/4C01/001 4P0713/4C01/4P07/001 4P0807/4C01/4P08/001 4P0801/4P08/4QR8/001	The Fire PRA credits 1-hour fire barrier protection, 1-hour fire rated cable or reroute of these cables by removing the associated impacts from the Fire PRA quantification in Fire Area HH within the zone of influence of scenarios 098-AK and 098-AL.

Item #	Proposed Modification	Credit Taken in Fire PRA
	4P0913/4C02/4P09/001 4B0107/4C01/TB4140/001 4B0307/4C01/TB4140/002 4B0408/4C01/TB4140/003 4V455C/4C01/4QR47/007 4V455C/4C01/4QR47/011 4V456/4C01/4QR47/008 4V456/4C01/4QR47/012 4V456/4C01/T4C21/00B	
Item #27	A protective fire barrier in Fire Area OD/081 and OD/086 is required for the following cables associated with bus 3AA and sequencer 3C23A: 3P0710/3P07/3C23A/00P, 3P0710/3P07/3C23A/00Q, 3P0715/3P07/3C23A/00P, 3P0715/3P07/3C23A/00Q.	The Fire PRA credits protections of these cables, either by a 3-hour fire rated barrier or by 3-hour fire rated cables, by removing the associated impacts from the Fire PRA quantification in Fire Areas OD/81 and OD/86.

PRA RAI 07 - Bases for Identifying Closed Cabinets

Section 7.1.1 of the Fire Scenario report states that for "closed panels, damage is limited to the cabinet itself provided external cables are not in contact with the cabinet." This report does not provide the criteria for determining whether a cabinet can be considered a "closed" cabinet. Provide the basis for treating cabinets as "closed." Clarify whether consideration of cabinet door attachments and anchoring, per guidance in FAQ 08-0042, was included as part of these criteria, and clarify whether a walkdown was performed to determine "closed" cabinets.

RESPONSE:

During the scenario development process when an electrical panel was identified as potentially meeting the criteria of a 'closed' panel, the guidance from FAQ 08-0042 was followed. The electrical panel was examined to verify that there was no ventilation, all cables penetrating the electrical panel did so through sealed penetrations, the electrical panel was adequately secured to the ground, and all doors were anchored at multiple points. Closed panels were confirmed to meet this criteria during plant walkdowns.

PRA RAI 09 - Defense in Depth and Safety Margin

Describe the methodology that was used to evaluate defense-in-depth and that was used to evaluate safety margins. The description should include what was evaluated, how the evaluations were performed, and what, if any, actions or changes to the plant or procedures were taken to maintain the philosophy of defense-in-depth or sufficient safety margins.

RESPONSE:

The following information is extracted from PTN-BFJR-10-010, Turkey Point Nuclear Power Plant Fire Risk Evaluations, Revision 3:

Defense-in-Depth (DID)

Guidance

A review of the impact of the change on DID was performed, using the guidance below from NEI 04-02. NFPA 805 defines DID as:

- Preventing fires from starting
- Rapidly detecting fires and controlling and extinguishing promptly those fires that do occur, thereby limiting damage
- Providing adequate level of fire protection for structures, systems and components important to safety; so that a fire that is not promptly extinguished will not prevent essential plant safety functions from being performed.

In general, the DID requirement was considered satisfied if the proposed change does not result in a substantial imbalance among these elements (or echelons). The review of DID was qualitative and addressed each of the elements with respect to the proposed change. Fire protection features and systems relied upon to ensure DID were identified in the assessment (e.g., detection, suppression system).

Consistency with the DID philosophy is maintained if the following acceptance guidelines, or their equivalent, are met:

- A reasonable balance is preserved among 10 CFR 50.48(c) DID elements.
- Over-reliance and increased length of time or risk on performing programmatic activities to compensate for weaknesses in plant design is avoided.
- Pre-fire nuclear safety system redundancy, independence, and diversity are preserved commensurate with the expected frequency and consequences of challenges to the system and uncertainties (e.g., no risk outliers). (This should not be construed to mean that more than one NSCA train must be maintained free of fire damage.)
- Independence of DID elements is not degraded.
- Defenses against human errors are preserved.
- The intent of the General Design Criteria in Appendix A to 10 CFR Part 50 is maintained.

DID Process

Each Fire Area was evaluated for the adequacy of DID. In accordance with NFPA 805, Section 2.4.4, Plant Change Evaluation, "the evaluation process shall consist of an integrated assessment of the acceptability of risk, DID, and safety margins." NFPA 805, Section 4.2.4.2 refers to the acceptance criteria in this section. Therefore fire protection systems and features required to demonstrate an adequate balance of DID are required by NFPA 805 Chapter 4.

The VFDRs and the associated Fire Area risk (CDF) and scenario consequences (CCDP values) were evaluated to identify general DID echelon imbalances. Potential methods to balance the DID features were identified ensuring an adequate balance of DID features is maintained for the Fire Area. To aid in the consistency of the review of DID, the following guidance is provided in Table 1:

Table 1 - Considerations for Defense-in-Depth Determination

Method of Providing DID	Considerations
Echelon 1: Prevent fires from starting	
▪ Combustible Control ▪ Hot Work Control	Combustible and hot work controls are fundamental elements of DID and as such are always in place. The issue to be considered during the FREs is whether this element needs to be strengthened to offset a weakness in another echelon thereby providing a reasonable balance. Considerations include: ▪ Creating a new Transient Free Areas ▪ Modifying an existing Transient Free Area The fire scenarios involved in the FRE quantitative calculation should be reviewed to determine if additional controls should be added. Review the remaining elements of DID to ensure an over-reliance is not placed on programmatic activities to compensate for weaknesses on plant design.
Echelon 2: Rapidly detect, control and extinguish promptly those fires that do occur thereby limiting fire damage	

Table 1 - Considerations for Defense-in-Depth Determination

Method of Providing DID	Considerations
▪ Detection system ▪ Automatic fire suppression ▪ Portable fire extinguishers provided for the area ▪ Hose stations and hydrants provided for the area ▪ Fire Pre-Fire Plan	Automatic suppression and detection may or may not exist in the Fire Area of concern. The issue to be considered during the FRE is whether installed suppression and or detection is required for DID or whether suppression/detection needs to be strengthened to offset a weakness in another echelon thereby providing a reasonable balance. Example considerations for detection and suppression systems include: ▪ If a Fire Area contains both suppression and detection and fire fighting activities would be challenging, both detection and suppression may be required ▪ If a Fire Area contains both suppression and detection and fire fighting activities would not be challenging, require detection and manual fire fighting (consider enhancing the pre-plans) ▪ If a Fire Area contains detection and a recovery action is required, the detection system may be required. The fire scenarios involved in the FRE quantitative calculation should be reviewed to determine the types of fires and reliance on suppression should be evaluated in the area to best determine options for this element of DID.
Echelon 3: Provide adequate level of fire protection for systems and structures so that a fire will not prevent essential safety functions from being performed	
▪ Walls, floors ceilings and structural elements are rated or have been evaluated as adequate for the hazard. ▪ Penetrations in the Fire Area barrier are rated or have been evaluated as adequate for the hazard. ▪ Supplemental barriers (e.g., ERFBS, cable tray covers, combustible liquid dikes/drains, etc.) ▪ Fire rated cable ▪ Reactor coolant pump oil collection system (as applicable) ▪ Guidance provided to operations personnel detailing the required success path(s) including recovery actions to achieve nuclear safety performance criteria.	If fires occur and they are not rapidly detected and promptly extinguished, the third echelon of DID would be relied upon. The issue to be considered during the FRE is whether existing separation is adequate or whether additional measures (e.g., supplemental barriers, fire rated cable, or recovery actions) are required offset a weakness in another echelon thereby providing a reasonable balance. Considerations include: ▪ If the VFDR is never affected in the same fire scenario, internal Fire Area separation may be adequate and no additional reliance on recovery actions is necessary. ▪ If the VFDR is affected in the same fire scenario, internal Fire Area separation may not be adequate and reliance on a recovery action may be necessary. ▪ If the consequence associated with the VFDRs is high regardless of whether it is in the same scenario, a recovery action and / or reliance on

Table 1 - Considerations for Defense-in-Depth Determination

Method of Providing DID	Considerations
	supplemental barriers should be considered. ▪ There are known modeling differences between a Fire PRA and nuclear safety capability assessment due to different success criteria, end states, etc. Although a VFDR may be associated with a function that is not considered a significant contribution to CDF, the VFDR may be considered important enough to the NSCA to retain as a recovery action. The fire scenarios involved in the FRE quantitative calculation should be reviewed to determine the fires evaluated and the consequence in the area to best determine options for this element of DID.

Defense-in-Depth – Recovery Action Considerations

Reliance on Recovery Actions in lieu of protection is considered part of the third echelon of DID. Per NFPA 805, recovery actions are defined as: "Activities to achieve the nuclear safety performance criteria that take place outside of the main control room or outside of the primary control(s) station for the equipment being operated, including the replacement or modification of components."

If the VFDR is characterized as a 'Separation Issue', and the change in risk (ΔCDF and ΔLERF) is acceptable, a recovery action can be considered as a means to provide an adequate level of DID. Guidance on the need to establish/rely upon a recovery action is provided in Table 1. The 'additional risk presented by the use of the recovery action', if relied upon for DID, would be characterized as the calculated change in risk of the 'Separation Issue'.

Safety Margin Assessment

A review of the impact of the change on safety margin was performed. An acceptable set of guidelines for making that assessment are summarized below. Other equivalent acceptance guidelines may also be used.

- Codes and standards or their alternatives accepted for use by the NRC are met, and
- Safety analysis acceptance criteria in the licensing basis (e.g., FSAR, supporting analyses) are met, or provides sufficient margin to account for analysis and data uncertainty.

The requirements related to safety margins for the change analysis is described for each of the specific analysis types used in support of the FRE. These analyses can be grouped into two categories. These categories are:

- Fire Modeling

- Plant System Performance

The following guidance on these topics is provided. Additional information is contained in NEI 04-02 Section 5.3.5.3.

Fire Modeling

For fire modeling used in support of the FRE (i.e., as part of the Fire PRA), the results were documented as part of the qualitative safety margin review.

Plant System Performance

This review documented that the Safety Margin inherent in the analyses for the plant design basis events was preserved in the analysis for the fire event and satisfied the requirements of this section.

PRA RAI 10 - Maintaining Safe and Stable Conditions

The transition report does not appear to describe and justify an initial coping time, after which, additional actions are necessary to maintain safe and stable conditions. Provide a discussion of the actions necessary during and beyond the initial coping time to maintain safe and stable conditions such as refilling fluid tanks or re-aligning systems. Evaluate the risk associated with the failure of actions and equipment necessary to extend safe and stable conditions beyond the initial coping time given the post-fire scenarios during which they may be required.

RESPONSE:

The transition report defines safe and stable as follows:

Based on the report entitled "Primary Control Station and Safe & Stable Plant Mode" the NFPA 805 licensing basis for PTN for a safe and stable condition in the event of a fire starting with the reactor in Mode 1, 2, or 3 is to maintain safe and stable conditions in Mode 3 with the ability to cool down and place residual heat removal (RHR) system in service if necessary. The final end state for safe and stable will be determined by the extent of equipment damage, existing inventory in the condensate storage tank, and the ability to provide makeup to the condensate storage tank. If any of these conditions indicate it is advisable to place RHR system in service then the plant will have the capability to do so. As a result, the equipment required to initiate and maintain hot shutdown cooling including the initiation of RHR cooling remains part of the at-power analysis. Initiation of RHR cooling does not imply however, that the plant would proceed all the way to cold shutdown. The plant may remain on RHR cooling at other than cold shutdown conditions for an extended period of time. The ability to maintain this condition for extended periods will require additional actions such as replenishment of diesel fuel oil, etc. These actions are already part of the emergency response procedures. These are considered to be low risk (not adding to the total fire risk) due to being proceduralized and the time and resources required to perform such actions. Thus, the Nuclear Safety Performance Criteria needs to demonstrate:

- The ability to maintain the nuclear fuel in a safe and stable condition in Mode 3, and
- The ability to proceed to RHR cooling if so chosen given the plant configuration and equipment availability following a fire."

The actions to maintain safe and stable in mode 3 with the plant being cooled by auxiliary feedwater and a loss of instrument air is to valve in additional nitrogen backup bottles for the control valves. On loss of instrument air the nitrogen backup is automatically aligned but requires additional bottles to be valve in when the first set of bottles is exhausted (automatically aligned bottles will last 2 hours). Additionally, the AFW control valves can be manually controlled locally. Both these actions are modeled in the PRA and the risk associated with these actions is explicitly calculated. In addition, for certain fire areas this cooling will be accomplished by the standby steam generator feedwater pump. The actions required to put this pump in service and maintain its operation are modeled in the PRA. The limiting condition for decay heat removal using these methods is the availability of makeup water to either the CST

(for AFW) or demineralized water storage tank (for standby steam generator feedwater pump). Without the ability of makeup these tanks will last on the order of 16 hours. While additional sources of water are expected to be available they have not been credited for fire protection analysis. Should makeup be unavailable a decision would be made to initiate RHR cooling. As stated above RHR cooling remains part of the at power analysis. Therefore, the ability to proceed to RHR cooling and any associated VFDRs is captured in the risk analysis. The risk is considered much lower than other quantified risks due to the proceduralized nature of the action and the long time required before the action is required.

Once on RHR cooling the plant will be safe and stable at any temperature and pressure within the range of the RHR cooling system. The only actions required to maintain this condition are associated with the EDGs. The EDGs will require makeup to their lube oil system and the fuel oil storage tanks will require refill. The lube oil requirement is at least 7 days and the oil is reserved for that use. The EDG fuel storage tanks will require refill in 7 days. Turkey Point maintains contracts to supply fuel oil to the Turkey Point site when required. These actions are proceduralized and the risk is considered very low based on the long time period involved and the ability to accomplish the actions.

PRA RAI 11 - MCR Abandonment

Please describe how CDF, LERF, Δ CDF, and Δ LERF are estimated in main control room (MCR) abandonment scenarios. Do any fires outside of the MCR cause MCR abandonment because of loss of control and/or loss of control room habitability? It appears that "screening" values for post MCR abandonment of 0.1 and 0.2 were used (e.g., conditional core damage probability (CCDP), including human error, of failure to successfully switch control to the Primary Control Station and achieve safe shutdown) rather than detailed human error analyses having been completed for this activity. Please justify the screening values used. The justification should provide the results of the human failure event (HFE) quantification process, such as that described in Section 5 of NUREG-1921, which would include the following, or an analogous method:

a) The results of the feasibility assessment of the operator action(s) associated with the HFEs, specifically addressing each of the criteria discussed in Section 4.3 of NUREG-1921.

b) The results of the process in Section 5.2.7 of NUREG-1921 for assigning scoping human error probabilities (HEPs) to actions associated with switchover of control to an alternate location, specifically addressing the basis for the answers to each of the questions asked in the Figure 5-4 flowchart.

c) The results of the process in Section 5.2.8 of NUREG-1921 for assigning scoping HEPs to actions associated with the use of alternate shutdown, specifically addressing the basis for the answers to each of the questions asked in the Figure 5-5 flowchart.

d) The results of a detailed HRA quantification, per Section 5.3 of NUREG-1921, if the screening value is determined to not be bounding.

RESPONSE:

This RAI is related to RAI PRA 01-k (120 day) and RAI PRA 24 (90 day). All three RAIs are related to human reliability analysis and comparison of the PTN FPRA methods against NUREG 1921. The response for this RAI as well as RAI PRA-24 (90 day) is deferred to a 120 day RAI response to allow addressing these RAIs in conjunction with RAI 01-k.

PRA RAI 13 - Calculation of Variances from the Deterministic Requirements (VFDRs) Δ CDF and Δ LERF

Attachment W of the LAR provides the ΔCDF and ΔLERF for the variances from the deterministic requirements (VFDRs) for each of the fire areas, but the LAR does not describe either generically or specifically how ΔCDF and ΔLERF were calculated. Describe the method(s) used to determine the changes in risk reported in the Tables in Appendix W. The description should include:

a) A separate description specific to how the ΔCDF and ΔLERF were calculated for the MCR. Include in the description consideration of compliance via separation between MCR shutdown and shutdown from an alternate shutdown location (i.e., abandonment).
b) A summary of PRA model additions or modifications needed to determine the reported changes in risk. If any of these model additions used data or methods not included in the fire PRA Peer Review please describe the additions.
c) Identification of new operator actions (not including post MCR abandonment which are addressed elsewhere) that have been credited in the change in risk estimates.

RESPONSE:

a) Delta CDF and delta LERF for Main Control Room

The following discussion, from Section 5.7 of the PTN Fire Risk Evaluations, summarizes the process used for evaluating the ΔCDF and ΔLERF for the MCR

Fire risk evaluations for fire areas that utilized alternative shutdown (ASD) capability prior to NFPA 805 transition often utilized different approaches. This capability includes the potential for Main Control Room (MCR) evacuation. The Fire PRA treatment for ASD fire areas also utilizes different approaches than for other areas. For these reasons, the FRE approach utilized for these areas is different than for other fire areas. The VFDRs for the ASD fire areas are based on the definition of the PCS. The VFDRs for these areas reflect separation issues that are currently reflected as operator actions outside of the MCR that are implemented in procedure 0-ONOP-105, Control Room Evacuation.

Refer to the Attachments for Fire Areas U3/U4 CC, MM, HH for additional detail on the treatment of the alternative shutdown Fire Areas.

Loss of control room control due to fires outside the control room will result in the loss of specific control room control capabilities. The impact of this loss of control is mitigated by operator actions at the PCS or other locations in the plant. There are no outside control room fires which result in the loss of sufficient control room control capabilities to warrant control room abandonment. For a control room fire, control room abandonment results from habitability (temperature and visual impact of the fire).

Main Control Room Treatment

The FRE for the Main Control Room (MCR) (Fire Area MM) utilized Fire PRA methods and guidance for analyzing MCR fires that are different than other Fire Areas due to the unique nature of the MCR fires (NUREG/CR-6850, Vol. 2, Appendix L). The possibility of forced abandonment must be considered. MCR fire modeling was used to determine the time required to reach MCR abandonment environment conditions which would then force abandonment. As described in NUREG/CR-6850, Volume 2, Section 11.5.2.1, fire protection features, room ventilation, and room geometry were inputs to the Control Room abandonment scenario.

The MCR Fire PRA evaluates two scenarios for each ignition source (i.e., panel):

- A fire at a given panel does not result in MCR abandonment
- A fire at a given panel does result in MCR abandonment

The scenarios that do not result in abandonment were evaluated considering only equipment failures in the source panel. Scenarios that do not result in abandonment were evaluated in the Fire PRA and contribute to the calculated CDF and LERF contribution for the area, but were not considered as part of the delta risk calculations.

The scenarios that do result in abandonment were evaluated considering only a single success path using the equipment credited for the alternate shutdown capability (ASC). The variant case CCDP for the abandonment scenario is based on failure of all actions in the control room with actions at the primary control station (PCS) and where needed other actions beyond those allowed at the primary control station. Actions not available at the primary control station were assumed to be located at the primary control station for the compliant case.

A CCDP of 1.0 was utilized if a fault at a given panel creates the potential for a loss of coolant accident which the primary control station is not designed to mitigate.

In certain instances, recovery actions (actions outside of the PCS) were identified as necessary for DID.

The treatment of the compliant case requires the development of a CCDP associated with abandonment of the MCR. The parameters that would makeup this value are the random failure events associated with the 'compliant' single success path. To simplify the development of this CCDP, the CCDP is conservatively estimated by taking the sum of the following random events:

- EDG Failure to Start – 7.2E-3
- EDG Failure to Run – 2.6E-2
- EDG Unavailable due to Maintenance – 1E-2
- AFW Unavailable due to Maintenance – 1.3E-2

The sum of these is 5.6E-2. This value was used as the compliant case CCDP for control room abandonment. The variant case abandonment was calculated using the above value for the

compliant case as a point of reference. The following conservative basis was used for determining the variant CCDP based on the calculated CCDP associated with panel damage. The intent of this criteria is to ensure that the variant CCDP is an appropriate bounding value given the basis provided above of the compliant case CCDP. The following criteria is applied for each control room scenario:

FRANC Calculated CCDP	Bounding Abandonment CCDP used for risk quantification	Basis for CCDP used
< 1E-3	0.1	A CCDP of less than 1E-3 is consistent with a less challenging event that would not have time critical actions. A bounding CCDP of approximately double the compliant case CCDP of 0.056.
0.1 > CCDP≥ 1E-3	0.2	A CCDP of 1E-3 or greater but not greater than 0.1 indicates a more significant consequence associated with challenges caused by the fire. A CCDP of approximately four times the abandonment compliant case CCDP is used.
CCDP ≥ 0.1	1.0	A CCDP of 0.1 or greater indicates significant consequences with the potential for time critical action. The treatment of such events given abandonment of the MCR could also be expected to have large uncertainty. A conservative treatment assumes such events are not recoverable.

For LERF quantification, the same process used above was applied to the scenario CCDP value and this CCDP value was multiplied by the ratio of CLERP to CCDP (thus incorporating the extent to which containment isolation versus core damage contributes to the quantification of LERF).

b) Changes in PRA model to determine delta risk

Changes to the Fire PRA model to support quantification of delta risk for VFDRs was limited to incorporation of flags associated with power supply dependencies which allowed removal of these dependencies for the VFDR impacted components. This was necessary to allow the VFDR component power dependency to be eliminated without treating the power supply and all of its loads as a VFDR condition. Theses flags are set to 1.0 in the variant case and set to 0 in the compliant case. This change does not require a peer review as it is a mechanism for allowing for quantification of power supply impacted VFDR components. All other VFDR components were set to fail at their nominal value in the compliant case and allowed to be failed with a failure probability equal to the ignition frequency of the fire zone (except where hot short probabilities from NUREG/CR-6850 were applied) in the variant case.

c) Identification of recovery actions

Recovery actions credited are specified in LAR Attachment G. Included in Table G-1 of the LAR are a designation of whether the action is a recovery action required for risk, required for defense-in-depth, or an action at the primary control station. Recovery actions required for risk are included in the Fire PRA and included in the change in risk estimates.

PRA RAI 14 - RG 1.200 Rev 2 Clarifications

Did the peer reviews for both the internal events and fire PRAs consider the clarifications and qualifications from Regulatory Guide (RG) 1.200, Revision 2, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities," March 2009 (ADAMS Accession No. ML090410014) to the ASME/AMS PRA Standard? If not, provide a self-assessment of the PRA model for the RG 1.200 clarifications and qualifications and indicate how any identified gaps were dispositioned.

RESPONSE:

Both FPRA peer reviews addressed the requirements of RG 1.200, Revision 2.

The following text is taken from the Executive Summary of the February 22, 2010 peer review:

> The Turkey Point Nuclear Plant (PTN) Units 3 & 4 Fire Probabilistic Risk Assessment (FPRA) Peer Review was performed in February 2010 at the plant in Homestead, FL using the NEI 07-12 process, the ASME PRA Standard (ASME/ANS RA-Sa-2009) and Regulatory Guide 1.200, Rev. 2.

The following text is taken from Section 1.1 of the March 8, 2012 peer review:

> The purpose of this report is to document the final results of the Focused scope follow-on Peer Review of Turkey Point Nuclear Plant (PTN) Units 3 and 4 Fire Probabilistic Risk Assessment (FPRA) against the requirements of Section 4 of the American Society of Mechanical Engineers (ASME)/ American Nuclear Society (ANS) PRA Standard (Reference 1) and any Clarifications and Qualifications provided in the Nuclear Regulatory Commission (NRC) endorsement of the Standard contained in Revision 2 to Regulatory Guide (RG) 1.200 (Reference 2). This peer review was performed using the process defined in Nuclear Energy Institute (NEI) 07-12 (Reference 3).

The internal events focused-scope peer review addressed the requirements of RG 1.200, Revision 2. The following text is taken from Section 1.1 of the July 2011 peer review:

> The purpose of this report is to document the final results of the focused Peer Review of the Plant Turkey Point Nuclear (PTN) Probabilistic Risk Assessment (PRA) against the applicable requirements of Sections 2 and 3 of the ASME/American Nuclear Society (ANS) Combined PRA Standard (Reference 1) and any clarifications and qualifications provided in the Nuclear Regulatory Commission (NRC) endorsement of the Standard contained in Revision 2 to Regulatory Guide (RG) 1.200 (Reference 2). This focused peer review was performed using the process defined in Nuclear Energy Institute (NEI) 05-04 (Reference 3).

For any and all internal or external gap assessments performed for Turkey Point against the ASME PRA Standard requirements, the RG 1.200 clarifications and qualifications were considered fully in determining whether the requirements were met.

PRA RAI 15 - Wrapped or Embedded Cables

Identify if any variance from deterministic requirements (VFDRs) in the LAR involved performance-based evaluations of wrapped or embedded cables. If applicable, describe how wrapped or embedded cables were modeled in the Fire PRA including assumptions and insights on how the PRA modeling of these cables contributes to the VFDR delta-risk evaluations. (See also Questions 1.h and 1.aa.)

RESPONSE:

No VFDRs for the Turkey Point plant involved performance-based evaluations of wrapped or embedded cables. Engineering evaluations of all credited wraps, embedments, and other fire protection systems and features were used to justify their adequacy to protect cables from the effects of a fire. VFDRs associated with cables for which the wrap is no longer credited were considered. No credit for the associated wrap was taken in the variant case and the cables were assumed to be unaffected by fire in the compliant case. Most wrap that is not credited was associated with protection of raceways to create a 20 ft zone with negligible intervening combustibles in outdoor areas to meet deterministic separation criteria.

PRA RAI 16 - Implementation Item Impact on Risk Estimates

Identify any plant modifications or procedural changes (implementation items) in Attachment S of the LAR that have not been completed but which have been credited directly or indirectly in the risk estimates provided in Attachment W. When the effect of a plant modification has been included in the PRA before the modifications or procedural changes have been completed, the models and values used in the PRA are necessarily estimates based on current plans. The as-built facility after the modifications and procedural changes are completed may be different than the plans. Please add implementation items that, upon completion of all PRA credited implementation items, verify the validity of the reported risk and change-in-risk. These items should include your plan of action should the as-built change-in-risk exceed the estimates reported in the LAR.

RESPONSE:

Currently implementation item 18 in Table S-3 Implementation Items states "Update the Fire PRA Model, as necessary, after all modifications are complete and as-built."

This implementation item is revised to state "Update the Fire PRA Model after all modifications and procedural changes are complete and as-built and all implementation items affecting the fire PRA results are complete. Review the results of the fire PRA compared to the final updated version in the LAR after all RAIs have been responded and accepted. Any CDF increase greater than 1E-07/yr or LERF greater than 1E-08/yr shall generate a corrective action to determine the cause of the risk change and if that risk change impacts the conclusions in the LAR." The values above were chosen based on the fact that risk changes less than that magnitude can be self approved.

PRA RAI 17 - Model Changes and Focused Scope Reviews Since Full Peer Review

Identify any changes made to the IEPRA or FPRA since the last full-scope peer review of each of these PRA models that are consistent with the definition of a "PRA upgrade" in ASME/ANS-RA-Sa-2009, "Standard for Level 1/Large Early Release Frequency for Nuclear Power Plant Applications," as endorsed by Regulatory Guide 1.200.

Also, address the following:
a) Discuss the process used to review model modifications or revisions for consideration.
b) If any changes are characterized as a PRA upgrade, indicate if a focused-scope peer review was performed for these changes consistent with the guidance in ASME/ANS-RA- Sa-2009, as endorsed by Regulatory Guide 1.200, and describe any findings from that focused-scope peer review and the resolution of these findings. Staff notes that, for TPN, several "updates" to the IEPRA identified in Table U of the LAR qualify as PRA "upgrades", including changes to common-cause failure and ISLOCA methodologies as well as the Level 2 analysis. If so, they must be subjected to a focused scope peer review.
c) If a focused-scope peer review has not been performed for changes that have been or should have been characterized as a PRA upgrade, describe what actions will be implemented to address this review deficiency.

RESPONSE:

Significant changes to the Fire PRA model were made in the areas of Technical Elements PRM, FSS, and HRA. These Technical Elements defined the scope of the focused-scope peer review performed in March 2012. Changes to the PRA model subsequent to the focused scope peer review were associated with resolution of F&Os.

Changes to the internal events PRA models since the last full-scope peer review include: HRA (enhanced approach to dependency analysis), internal flooding (significant change in approach and level of detail), common cause failure (change from beta-factor to alpha-factor), Level 2 analysis (significant upgrade in approach and detail from original, taking advantage of recent research), and ISLOCA (also taking advantage of recent research and analysis methods).

Focused-scope peer reviews have been performed for the HRA and internal flooding analysis, the results of which were reviewed by the NRC audit team. Focused-scope peer reviews are planned for this year for common cause failure, Level 2, and ISLOCA. It should be noted that the common cause failure upgrade, changing from a beta-factor approach, is a straightforward, simplistic change, and that the Level 2 and ISLOCA upgrades were significant improvements to the PRA model. All of these upgrades received internal review and approval before being implemented.

Each modification to the PRA is reviewed as to whether it is an update or an upgrade. If a modification is an upgrade, a peer review is required per the procedure EN-AA-105-1000, PRA Configuration Control and Model Maintenance, Section 4.0, 12.

PRA RAI 18 - Transient Fire HRR

Section 8.1 of the Fire Scenario report explains that a ZOI associated with a 69 kW HRR for transient fires were used in areas where "strict transient combustible controls" were applicable, and that a ZOI associated with a 317 kW transient fire HRR was used otherwise. Provide further justification for the use of 69 kW transient fires in these fire zones. Specifically, the justification should address the attributes and considerations applicable to the location, type of combustible material, plant administrative controls, the results of a review of records related to violations of the transient combustible controls, and any other key factors for this reduced fire size. If the HRR cannot be justified using the guidance criteria, evaluate the impact on the analysis, e.g., via a sensitivity analysis, using more appropriate (e.g., higher) HRRs.

RESPONSE:

The justification for the 69 kW HRR comes from the significantly reduced fire size caused by the zero transient control and the mandatory administrative controls for any type of transient that must be in the zone. This type of transient control is a newly imposed criterion that will require a monitoring program to address future adherence to the requirements. Additional bases for the use of the 69 kW HRR are provided below:

- PTN is implementing additional administrative controls such as a fire watch for conditions in which transients are stored in these areas.
- Areas that have transient administrative controls will not have stock piles of paper, cardboard, scrap wood or trash stored in these areas.
- The transient fire heat release rate distribution specified in NUREG/CR 6850 as a 317 kW (300 Btu/s) 98th percentile peak heat release rate fire is considered to be generically applicable to nuclear power plants. The PTN plant does not differ in any significant manner with respect to its transient combustible controls to warrant a significant increase or decrease in the applicable heat release rate profile. However, for areas that have been designated as "no transient combustible areas", to address the potential for violation of these controls, a 69 kW (65 Btu/s) 98th percentile peak heat release rate fire was applied. This heat release rate is considered appropriate given the unlikely event that transients are stored in these areas contrary to the controls imposed. The 69 kW (65 Btu/s) heat release rate was defined based on the heat release rate specified in NUREG/CR-6850 for a motor fire given that the most likely transient fire in a zone with limited transients would be associated with temporary cabling since this configuration would provide both the ignition source (energized temporary cabling) and combustible (cable insulation). The motor configuration would resemble such a transient fire. Monitoring of the controls and evaluation of their effectiveness will provide a basis for assessing the appropriateness of this HRR as will the monitoring of other transient fires at PTN and industry wide with respect to the use of the nominal 317 kW (300 Btu/s) peak heat release rate transient fire.

- A letter dated September 27, 2011, from NEI to NRC, B. Bradley to D. Harrison, "Recent Fire PRA Methods Review Panel Decisions: Clarifications for Transient Fires and Alignment for Pump Oil Fires," Attachment 1, "Description of Treatment for Transient Fires," and Attachment 3, "Panel Decision," allows a lower heat release rate to be chosen for transient fires to screen for specific fire based on "the specific attributes and considerations applicable to that location." The letter suggests that "plant administrative controls should be considered in the appropriate HRR for a postulated transient fire" and that "a lower screening HRR can be used for individual plant specific locations if the 317 kW value is judged to be unrealistic given the specific attributes and considerations applicable to that location.". The use of this method was endorsed by the June 21, 2012 letter from the NRC to NEI (ML12171A583), with minor exceptions unrelated to the PTN treatment.

PRA RAI 19 - Fire Induced Instrument Failure

Describe how fire-induced instrument failure (including no readings, and incorrect or misleading readings) is addressed in the HRA.

RESPONSE:

The full power internal events PRA operator action list was reviewed for applicability to the FPRA risk model, and FPL personnel determined if the operator action took place in the Main Control Room and what cues/instrumentation could be used by the operator(s). The objective was to credit only actions that are known to be unaffected by credible fires and to not credit actions where reliance on equipment is no longer available as a result of a specific fire scenario. This includes not crediting actions on equipment for which insufficient information is known regarding its location or the location of its associated cables.

A simulator review was performed to identify instrumentation that are generally required to shutdown the plant or to perform credited operator actions. One of the items addressed by this review was:

- Identify any alarms or indications that would lead operators to take immediate control actions without further verification. – NONE IDENTIFIED, COMPARISON TO OTHER INDICATIONS IS REQUIRED PRIOR TO OPERATOR ACTION

For each level 1 PRA operator action credited in the FPRA, a list of instrumentation that could be used by the operators was developed to identify redundant and/or diverse Safe Shutdown (SSD) related instrumentation that might be available to the operators. SSD instrumentation is identified on the Master Equipment List (MEL) and thus the fire zones in which the instruments and associated cables are located are known. It is judged that, if there is redundant and/or diverse SSD instrumentation to assess the status of a system/function, there is reasonable assurance that at least one of the redundant instruments will be available based on the safe shutdown analysis. The safe shutdown analysis ensures one set of processing monitoring instruments is available for a fire impacting all SSD equipment/cables in a fire area. The more realistic fire sizes postulated in the Fire PRA will therefore retain the minimum set of instruments identified in the SSD analysis. The fire preplans provide guidance to the operators based on the SSD analysis with respect to instrumentation which may be impacted by the fire and instrumentation which will remain available after a worst case fire. This guidance will direct the operators to the instruments on which they can rely based on the SSD analysis ensuring that they are not impacted in the fire area of concern. This will ensure that the focus for the cues will be the instruments which have been analyzed via the SSD analysis to ensure their availability.

Safe Shutdown RAI 01

The review against the criteria in NEI 00-01 Section 3.2.1.2, Fire Damage to Mechanical Components, states that brazed components were assumed not to fail as a result of a fire in this analysis, which is contrary to the NEI 00-01 guidance. In the LAR Amendment submitted September 19, 2012, TPN responded by indicating walkdowns and evaluations were conducted to evaluate brazed tubing fire damage.

TPN responded by stating "there is no significance to the use of the assumption that brazed connections will not fail due to the effects of a fire. Therefore, the exclusion of the potential for an exposure fire to damage mechanical components at TPN does not affect the ability of the plant to safely shutdown."

Clarify the LAR by providing a revision or page markup to the alignment statement of LAR Attachment B Table B-2 Section 3.2.1.2 regarding fire damage to mechanical components and specifically indicate what the alignment statement should be, as well as the alignment basis (including a reference). If there are any implementation items for this effort, provide those as well.

RESPONSE:

Clarification of the alignment statement of LAR Attachment B Table B-2 Section 3.2.1.2 has been made. Attachment 2 provides the page markup.

Safe Shutdown RAI 02

LAR Section 4.2.1.2 "Safe and Stable Conditions for the Plant", presents the final end state of safe and stable as "Mode 3 with the ability to cool down and place RHR in service." NFPA 805 will require the licensee to ensure that safe and stable can be maintained indefinitely. The LAR states that "as a result, the equipment required to initiate and maintain hot shutdown cooling including the initiation of RHR cooling remains part of the at-power analysis. Initiation of RHR cooling does not imply however, that the plant would proceed all the way to cold shutdown. The plant may remain on RHR cooling at other than cold shutdown conditions for an extended period of time. The ability to maintain this condition for extended periods will require additional actions such as replenishment of diesel fuel oil, etc."

Provide a more detailed description of the systems, evolutions, and resources required to maintain this condition between hot standby and cold shutdown. This should include items such as:

a) Specific capabilities and required actions to maintain safe and stable for an extended duration including a qualitative description of the risk.

b) Capacity limitations are not specifically described for each applicable performance goal. The licensee should provide a description of capacity limitations and time-critical actions for other systems needed to maintain safe and stable conditions (e.g., nitrogen gas supply for AFW control valves, boron supply, DC battery power, diesel fuel, water resources).

c) Describe in more detail the resource (staffing) requirements, and timing of operator actions to recover NSCA equipment to sustain safe and stable conditions. Describe how soon "off-shift" personnel will be required to perform functions necessary to maintain safe and stable.

d) Provide more detailed description of the risk of failure of operator actions and equipment necessary to sustain safe and stable conditions.

RESPONSE:

The transition report defines safe and stable as follows:

Based on the report entitled "Primary Control Station and Safe & Stable Plant Mode" the NFPA 805 licensing basis for PTN for a safe and stable condition in the event of a fire starting with the reactor in Mode 1, 2, or 3 is to maintain safe and stable conditions in Mode 3 with the ability to cool down and place residual heat removal (RHR) system in service if necessary. The final end state for safe and stable will be determined by the extent of equipment damage, existing inventory in the condensate storage tank, and the ability to provide makeup to the condensate storage tank. If any of these conditions indicate it is advisable to place RHR system in service then the plant will have the capability to do so. As a result, the equipment required to initiate and maintain hot shutdown cooling including the initiation of RHR cooling remains part of the at-power analysis. Initiation of RHR cooling does not imply however, that the plant would proceed all the way to cold shutdown. The plant may remain on RHR cooling at other than cold

shutdown conditions for an extended period of time. The ability to maintain this condition for extended periods will require additional actions such as replenishment of diesel fuel oil, etc. These actions are already part of the emergency response procedures. These are considered to be low risk (not adding to the total fire risk) due to being proceduralized and the time and resources required to perform such actions. Thus, the Nuclear Safety Performance Criteria needs to demonstrate:

- The ability to maintain the nuclear fuel in a safe and stable condition in Mode 3, and
- The ability to proceed to RHR cooling if so chosen given the plant configuration and equipment availability following a fire.

The actions to maintain safe and stable in mode 3 with the plant being cooled by auxiliary feedwater and a loss of instrument air is to valve in additional nitrogen backup bottles for the control valves. On loss of instrument air the nitrogen backup is automatically aligned but requires additional bottles to be valve in when the first set of bottles is exhausted (automatically aligned bottles will last 2 hours). Additionally, the AFW control valves can be manually controlled locally. Both of these actions are modeled in the PRA and the risk associated with these actions is explicitly calculated. In addition, for certain fire areas this cooling will be accomplished by the standby steam generator feedwater pump. The actions required to put this pump in service and maintain its operation are modeled in the PRA. The limiting condition for decay heat removal using these methods is the availability of makeup water to either the CST (for AFW) or demineralized water storage tank (for standby steam generator feedwater pump). Without the ability of makeup these tanks will last on the order of 16 hours. While additional sources of water are expected to be available, they have not been credited in the fire analysis. Should makeup be unavailable a decision would be made to initiate RHR cooling. As stated above RHR cooling remains part of the at power analysis. Therefore, the ability to proceed to RHR cooling and any associated VFDRs is captured in the risk analysis. The risk is considered much lower than other quantified risks due to the proceduralized nature of the action and the long time required before the action is required.

Once on RHR cooling the plant will be safe and stable at any temperature and pressure within the range of the RHR cooling system. The only actions required to maintain this condition are associated with the EDGs. The EDGs will require makeup to their lube oil system and the fuel oil storage tanks will require refill. The lube oil requirement is at least 7 days and the oil is reserved for that use. The EDG fuel storage tanks will require refill in 7 days. Turkey Point maintains contracts to supply fuel oil to the Turkey Point site when required. These actions are proceduralized and the risk is considered very low based on the long time period involved and the ability to accomplish the actions.

a)

As stated above all the actions required to maintain safe and stable are directly modeled in the fire PRA and are part of the NSCA analysis by virtue of the fact that the equipment necessary to

proceed to RHR cooling including the ability to achieve and maintain cold shutdown is being maintained in the NSCA analysis. While the definition of safe and stable for NFPA 805 does not include the requirement for cold shutdown that ability has been preserved in the NSCA. As stated above the decision to proceed with initiation of RHR cooling depends on the availability of water for the condensate storage tank or demineralized water storage tank. On loss of instrument air the nitrogen backup is automatically aligned but requires additional bottles to be valve in when the first set of bottles is exhausted (automatically aligned bottles will last 2 hours). Additionally, the AFW control valves can be manually controlled locally. Both of these actions are modeled in the PRA and the risk associated with these actions is explicitly calculated. In addition, for certain fire areas this cooling will be accomplished by the standby steam generator feedwater pump. The actions required to put this pump in service and maintain its operation are modeled in the PRA. Should any of the above actions fail the plant can proceed to RHR cooling which does not rely on the above actions. As stated above, the risk of these actions is considered bounded by the short term actions.

b)

There are no time critical actions required to maintain safe and stable that are not part of the deterministic and performance based analysis. Safe and stable is defined as mode 3 with the ability to initiate RHR cooling if necessary. The decision to proceed with RHR cooling would be dependent on CST inventory. This action is required greater than 12 hours after the event and is not considered time critical. Additional long term actions that are not modeled directly in the PRA are associated with EDG operation. The EDG will require additional lubrication oil and fuel oil. The lubricating oil will be required after 7 days and fuel oil will be required after 7 days. These actions are not time critical and are part of the existing emergency plan

c)

The fire PRA HRA and the recovery action feasibility provides assurance that the actions can be accomplished. These analyses were done with just the minimum staffing with no requirements for off-shift personnel. The first action requiring off site assistance would be refill of the EDG fuel oil tanks at 7 days. While, the procedures and staffing requirements are adequate to achieve and maintain safe and stable conditions any fire of such significance would trigger an emergency declaration of at least an Alert level. This would result in staffing the emergency response organization. In addition, it is also recognized that the event may last more than a single shift and it is expected that a shift change could take place during such an event.

d)

The above responses show that the risk of the operator actions to achieve and maintain safe and stable conditions are either directly modeled in the PRA, providing a direct measure of risk, or the longer term actions are considered bounded by the short term actions. All the equipment required to maintain safe and stable conditions are part of the NSCA.

Safe Shutdown RAI 03 a)

LAR Section 4.3 identifies the overview of the evaluation and results of the Non-Power operations analysis and evaluation. Provide the following information:

a) Identify and describe the changes to outage management procedures, risk management tools, and any other document resulting from incorporation of KSF identified as part of NFPA 805 transition. Include changes to any administrative procedures such as "Control of Combustibles".

RESPONSE:

PTN is planning revisions to NextEra Energy fleet level shutdown risk management procedures and associated site specific procedures for managing risk during non-power operations. These documents will provide departments and organizations that plan outage related work and the Turkey Point Risk Assessment Team with shutdown risk management guidance to include:

- Definition and criteria for specifying HREs
- Identification of Key Safety Functions (KSFs) affected by fire area for each unit (Reference: PTN-FPER-08-008 NFPA 805 NPO Review Attachments 2 & 3)
- Proposed options to reduce fire risk in those locations where fire can result in loss of one or more KSFs during HREs. These would include:
  - Restriction of hot work in areas during periods of increased vulnerability,
  - Verification of functional detection and / or suppression in the vulnerable analysis areas,
  - Restriction of transient combustible materials in areas during periods of increased vulnerability,
  - Plant equipment configuration changes (e.g., removing power from equipment once it is placed in its desired position),
  - Provision of additional fire patrols at periodic intervals or other appropriate compensatory measures (such as surveillance cameras) during increased vulnerability, or
  - Reschedule the work to a period with lower risk or higher Defense-in-depth.

The following procedures currently implement shutdown risk and the essential work planning and implementing process. These and other procedures will be reviewed and revised as necessary to implement these changes and requirements:

- OM-AA-101-1000 Shutdown Risk Management (PTN Specific Information)
- WM-AA-200 Work Management Process Overview
- WM-AA-1000 Work Activity Risk Management
- 0-ADM-051 Outage Risk Assessment and Control
- 0-ADM-016.1 Transient Combustibles and Flammable Substances Program

- 0-ADM-701 Control of Plant Work Activities
- MA-AA-100-1008 Housekeeping and Material Control

Safe Shutdown RAI 03 b)

LAR Section 4.3 identifies the overview of the evaluation and results of the Non-Power operations analysis and evaluation. Provide the following information:

b) Provide a list of the additional components [for which cable selection was performed] and a list of those at-power components that have a different functional requirement for NPO. Describe the difference between the at-power safe shutdown function and the NPO function.

RESPONSE:

A listing of additional components for which cable selection was performed and a listing of "At Power" components that have a different functional requirement for NPO (including a description of the difference between the safe shutdown function and the NPO function) is provided below.

List of Additional Components for which Cable Selection was Performed

Component ID	Component Name	Purpose
3(4)P84	120V DISTRIBUTION PANEL	Power supply used solely for power to reactor vessel drain down level indications.
3(4)X03-NPO-3AA, 3X03-NPO-3AB, 3(4)X03-NPO-4AA, 4X03-NPO-4AB	UNIT 3(4) START-UP TRANSFORMER (SUT)	Required for NPO offsite power analysis only. Component includes cables that can prevent SUT from powering switchgear through 3(4)AA05 or 3(4)AB05 breakers. The first number identifies which Unit's SUT is being analyzed (e.g., 3X03 is the Unit 3 SUT). The last three characters in the suffix of the component identify which switchgear is analyzed to receive power. During Non-Power Operations it is possible for the Unit 3 SUT to power the 4A switchgear and for the Unit 4 SUT to power the 3A switchgear. The breakers which allow this (3AA22 and 4AA22) are normally racked out at power.
LIS-3(4)-6421, LT-3(4)-6421	REACTOR VESSEL DRAINDOWN LEVEL INDICATOR AND TRANSMITTER	Instrument loop for reactor vessel drain down level indications.
MOV-3(4)-866A, MOV-3(4)-866B,	HHSI LOOP A(B) HOT LEG INJECTION VALVE	MOV added for NPO to evaluate the hot leg injection path.
MOV-3(4)-872	RHR ALTERNATE LOW HEAD SI LINE VALVE	MOV required to support the RHR alternate cooldown lineup for the Non-Power Operation analysis.

List of "At power" Components with Different Functional Requirement for NPO

Component ID	Component Name	Description
3(4)AA02-FTRO, 3(4)AB02-FTRO	4160V BUS 3(4)AA FEEDER BKR FROM UNIT AUX XFMR #3(4) 3(4)X02, 4160V BUS 3(4)AB FEEDER BKR FROM UNIT AUX XFMR #3(4) 3(4)X02	Initial position of this breaker for NPO is open whereas the breaker is normally closed during at-power operations.
52-7AB-FTRO, 52-7B-FTRO, 52-9AB-FTRO, 52-9B-FTRO	MID-SWITCHYARD BREAKER TO UNIT 3 MAIN AND AUX XFMR (UNIT 3 GEN. OCB); EAST-SWITCHYARD BREAKER TO UNIT 3 MAIN AND AUX XFMR (UNIT 3 GEN. OCB); MID-SWITCHYARD BREAKER TO UNIT 4 MAIN AND AUX XFMR (UNIT 4 GEN. OCB); EAST-SWITCHYARD BREAKER TO UNIT 4 MAIN AND AUX XFMR (UNIT 4 GEN. OCB)	Created to delete the failure dependency on the Main Generator Lockout Relay (286/G3 for Unit 3 and 286/G4 for Unit 4).
FC-3(4)-605C-NPO	RHR HX BYPASS FLOW CONTROL VALVE CONTROLLER	At power, the component is required to be operable. Component is not required to remain operable to support NPO decay heat removal. Cables identified are only for spurious opening of FCV-3(4)-605, which could cause flow to bypass the RHR heat exchangers, resulting in a loss of decay heat removal.
FCV-3(4)-605-NPO	RHR HX BYPASS FLOW CONTROL VALVE	At power, the component is required to be operable. Instrument air is not relied upon for NPO analysis, component fails closed on loss of air or power to flow controller FC-3(4)-605, which does not fail the decay heat removal function.
HCV-3(4)-758-NPO	RHR HX OUTLET FLOW CONTROL VALVE	At power, the component is required to be operable. Instrument air is not included in NPO analysis because component fails open on loss of air. Failed position does not result in loss of decay heat removal.
HIC-3(4)-758-NPO	RHR HEAT EXCHANGER OUTLET FLOW CONTROLLER (HCV-3(4)-758)	At power, the component is required to be operable. Component is not required to remain operable to support NPO decay heat removal. Cable identified is only for spurious closing of HCV-3(4)-758, which would stop flow through the RHR heat exchanger and result in a loss of decay heat removal.

Component ID	Component Name	Description
LCV-3(4)-460-FTC	LETDOWN LINE STOP VALVE	At power, the component is required to be operable. For NPO, the valve is required closed to isolate letdown.
MOV-3(4)-744A-FTRO, MOV-3(4)-744B-FTRO	RHR LOW HEAD SAFETY INJECTION ISOLATION VALVE	Initial position of this valve for NPO is open whereas the valve is normally closed during at-power operations.
MOV-3(4)-749A-FTRO, MOV-3(4)-749B-FTRO	CCW TO RHR HX RETURN LINE ISOL VALVES	Initial position of this valve for NPO is open whereas the valve is normally closed during at-power operations.
MOV-3(4)-750-FTRO, MOV-3(4)-751-FTRO	RCS LETDOWN TO RHR ISOLATION VALVE	Initial position of this valve for NPO is open whereas the valve is normally closed during at-power operations.
SV-3(4)-460-FTE	SOLENOID FOR LCV-3(4)-460 (LETDOWN LINE STOP VALVE, NORMAL CONTROL AIR SUPPLY	At power, the component is required to be operable. For NPO, valve is required energized from Main Control Room to close LCV-3(4)-460.

Safe Shutdown RAI 03 c)

LAR Section 4.3 identifies the overview of the evaluation and results of the Non-Power operations analysis and evaluation. Provide the following information:

c) Provide a list of KSF pinch points by fire area that were identified in the NPO fire area reviews using FAQ 07-0040 guidance including a summary level identification of unavailable paths in each fire area. Describe how these locations will be identified to the plant staff for implementation.

RESPONSE:

The attached Table 7-1 from FPL evaluation PTN-FPER-08-008, NFPA 805 Non-Power Operations Review, Rev. 1, provides a summary level listing of unavailable Key Safety Function (KSF) paths for each fire area due to NPO pinch points on the specified equipment.

The process for identifying these locations to plant staff for implementation is discussed in the response to SSA-RAI-03a.

Unavailable Key Safety Function (KSF) Paths by Fire Area due to NPO Pinch Points

Table 7-1 Pinch Point Summary

Area	Unit 3 KSF / KSF Path(s)	Unit 4 KSF / KSF Path(s)
A	• Decay Heat Removal- CCW Pumps	• Decay Heat Removal- RHR Pumps • EDS- 4 KV SWGR • Inventory Control- CVCS Pumps
B	• Decay Heat Removal- RHR Pumps	• None
BBB	• EDS- 4 KV SWGR	• EDS- 4 KV SWGR
C	• None	• Decay Heat Removal- RHR Pumps
CC	• Decay Heat Removal- RHR Pumps, CCW Pumps • EDS- Offsite Sources, Onsite Sources, 4 KV SWGR, 480V Buses • Inventory Control- CVCS Pumps, RHR Draindown • Monitoring- CET A and B	• Decay Heat Removal- RHR Pumps, CCW Pumps • EDS- Offsite Sources, 4 KV SWGR, 480V Buses • Inventory Control- CVCS Pumps, RHR Draindown • Monitoring- CET A and B, Reactor Vessel Lvl
D	• None	• Decay Heat Removal- RHR Pumps • Inventory Control- CVCS Pumps
DD	• EDS- Offsite Sources	• EDS- Offsite Sources, Onsite Sources, 480V Buses
E	• Decay Heat Removal- RHR Pumps • Inventory Control- CVCS Pumps	• None
EE	• None	• EDS- Offsite Sources, Onsite Sources, 480V Buses

Unavailable Key Safety Function (KSF) Paths by Fire Area due to NPO Pinch Points

Table 7-1 Pinch Point Summary

Area	Unit 3 KSF / KSF Path(s)	Unit 4 KSF / KSF Path(s)
F	• Decay Heat Removal- RHR Pumps, CCW Pumps • EDS- 120V Vital Inverters-3Y04 ▪ Inventory Control- CVCS Pumps	• Decay Heat Removal- RHR Pumps • EDS- 120V Vital Inverters-3Y04 • Inventory Control- CVCS Pumps
FF	• EDS- Offsite Sources, Onsite Sources	• None
G	• None	• Decay Heat Removal- RHR Pumps • Inventory Control- CVCS Pumps • Monitoring- CET A and B, Reactor Vessel Lvl
GG	• EDS- Offsite Sources, Onsite Sources, 480V Buses	• None
H	• Decay Heat Removal- RHR Pumps • EDS- Offsite Sources, Onsite Sources, 4 KV SWGR • Monitoring-Reactor Vessel Lvl	• EDS- Offsite Sources
HH	• Decay Heat Removal- RHR Pumps, CCW Pumps, ICW Pumps • EDS- Offsite Sources, Onsite Sources, 4 KV SWGR, 480V Buses, 120V Vital Panels • Inventory Control- CVCS Pumps, RHR Draindown • Monitoring- CET A and B, Reactor Vessel Lvl	• Decay Heat Removal- RHR Pumps, CCW Pumps • EDS- Offsite Sources, Onsite Sources, 4 KV SWGR, 480V Buses, 120V Vital Panels • Inventory Control- CVCS Pumps, RHR Draindown • Monitoring- CET A and B, Reactor Vessel Lvl
I	• Decay Heat Removal- RHR Pumps • Monitoring-Reactor Vessel Lvl	• None
II	• Monitoring- CET A and B • EDS- 120V Vital Inverters-3Y04, 4Y04	• Monitoring- CET A and B • EDS- 120V Vital Inverters-3Y04, 4Y04

Unavailable Key Safety Function (KSF) Paths by Fire Area due to NPO Pinch Points

Table 7-1 Pinch Point Summary

Area	Unit 3 KSF / KSF Path(s)	Unit 4 KSF / KSF Path(s)
J	• None	• Monitoring-Reactor Vessel Lvl
K	• None	• Decay Heat Removal- RHR Pumps • Monitoring-Reactor Vessel Lvl
LL	• EDS- 120V Vital Inverters-3Y04, 4Y04	• EDS- 120V Vital Inverters-3Y04, 4Y04
MM	• Decay Heat Removal- RHR Pumps, CCW Pumps, ICW Pumps • EDS- Offsite Sources, Onsite Sources, 4 KV SWGR, 480V Buses • Inventory Control- CVCS Pumps, RHR Draindown • Monitoring- CET A and B, Reactor Vessel Lvl	• Decay Heat Removal- RHR Pumps, CCW Pumps, ICW Pumps • EDS- Offsite Sources, Onsite Sources, 4 KV SWGR, 480V Buses • Inventory Control- CVCS Pumps, RHR Draindown • Monitoring- CET A and B, Reactor Vessel Lvl
N	• None	• EDS- Onsite Sources • Inventory Control- CVCS Pumps
NN	• EDS- 120V Vital Inverters-3Y01, 3Y04, 3Y07, 4Y06	• EDS- 120V Vital Inverters-4Y01, 4Y06, 4Y07, 3Y04
O	• EDS- Onsite Sources • Inventory Control- CVCS Pumps	• None
OD-47	• None	• EDS- Onsite Sources
OD-79	• EDS- Offsite Sources, Onsite Sources	• Decay Heat Removal- RHR Pumps, ICW Pumps • EDS- Offsite Sources, Onsite Sources, 4 KV SWGR • Monitoring-Reactor Vessel Lvl
OD-81	• EDS- Offsite Sources	• EDS- Offsite Sources

Unavailable Key Safety Function (KSF) Paths by Fire Area due to NPO Pinch Points

Table 7-1 Pinch Point Summary

Area	Unit 3 KSF / KSF Path(s)	Unit 4 KSF / KSF Path(s)
OD-82	• None	• EDS- Offsite Sources
OD-84	• Decay Heat Removal- RHR Pumps • EDS- Offsite Sources, Onsite Sources, 4 KV SWGR • Inventory Control- CVCS Pumps • Monitoring- CET A and B, Reactor Vessel Lvl	• EDS- Offsite Sources, Onsite Sources, 4 KV SWGR
OD-85	• EDS- Offsite Sources	• EDS- Offsite Sources
OD-86	• EDS- Offsite Sources	• EDS- Offsite Sources
OD-87	• EDS- Offsite Sources	• EDS- Offsite Sources
OD-88	• EDS- Offsite Sources, 4 KV SWGR	• EDS- Offsite Sources
OD-89	• EDS- Offsite Sources	• EDS- Offsite Sources
OD-105	• EDS- Offsite Sources, 4 KV SWGR • Monitoring- Reactor Vessel Lvl	• EDS- Offsite Sources • Monitoring- Reactor Vessel Lvl
OD-117	• EDS- Offsite Sources	• EDS- Offsite Sources
OD-128	• EDS- Offsite Sources, Onsite Sources	• EDS- Offsite Sources, Onsite Sources
OD-999	• EDS- Offsite Sources, Onsite Sources	• EDS- Offsite Sources, Onsite Sources

Unavailable Key Safety Function (KSF) Paths by Fire Area due to NPO Pinch Points

Table 7-1 Pinch Point Summary

Area	Unit 3 KSF / KSF Path(s)	Unit 4 KSF / KSF Path(s)
OO	• EDS- 120V Vital Inverters-3Y02, 3Y04, 3Y05, 3Y06, 4Y04 • Monitoring- CET A and B	• EDS- 120V Vital Inverters-4Y02, 4Y04, 4Y05, 3Y04, 3Y06
P	• None	• Decay Heat Removal- RHR Pumps • Inventory Control- CVCS Pumps • Monitoring- CET A and B, Reactor Vessel Lvl
PP	• EDS- 120V Vital Inverters-3Y01	• None
Q	• Decay Heat Removal- RHR Pumps • Inventory Control- CVCS Pumps • Monitoring- CET A and B, Reactor Vessel Lvl	• None
QQ	• EDS- 120V Vital Inverters-3Y01	• None
R	• None	• Decay Heat Removal- RHR Pumps
S	• Monitoring- CET A and B, Reactor Vessel Lvl	• Monitoring- CET A and B, Reactor Vessel Lvl
T	• Decay Heat Removal- RHR Pumps	• None
U	• EDS- Offsite Sources	• EDS- Offsite Sources, Onsite Sources, 4 KV SWGR, 480V Buses • Inventory Control- CVCS Pumps • Monitoring- Reactor Vessel Lvl
V	• EDS- Offsite Sources	• EDS- Offsite Sources, Onsite Sources, 4 KV SWGR, 480V Buses

Unavailable Key Safety Function (KSF) Paths by Fire Area due to NPO Pinch Points

Table 7-1 Pinch Point Summary

Area	Unit 3 KSF / KSF Path(s)	Unit 4 KSF / KSF Path(s)
W	• EDS- Offsite Sources, Onsite Sources, 4 KV SWGR • Inventory Control- CVCS Pumps	• EDS- Offsite Sources
X	• EDS- Offsite Sources, Onsite Sources, 4 KV SWGR, 480V Buses	• EDS- Offsite Sources

Safe Shutdown RAI 03d)

LAR Section 4.3 identifies the overview of the evaluation and results of the Non-Power operations analysis and evaluation. Provide the following information:

d) Provide a description of any actions, including pre-fire staging actions, being credited to minimize the impact of fire-induced spurious actuations on power operated valves (e.g., air operated valves (AOVs) and motor operated valves (MOVs)) during NPO (e.g., pre-fire rack-out, "pinning" valves, or isolation of air supply).

RESPONSE:

There are no actions including pre-staging actions that are being credited to minimize the impact of fire induced spurious actuations. These approaches remain as available options, conditions and equipment alignments that may occur during an outage. These options would be in response to removing equipment from service.

Safe Shutdown RAI 03 e)

LAR Section 4.3 identifies the overview of the evaluation and results of the Non-Power operations analysis and evaluation. Provide the following information:

e) Describe the types of compensatory actions that will be used during [normal outage evolutions when certain NPO credited equipment will have to be removed from service].

RESPONSE:

Applicable Enclosures of FPL Administrative Procedure 0-ADM-051 Outage Risk Assessment and Control, which are completed prior to entry into Mode 5 and before each planned plant configuration change, provide the types of compensatory actions that will be used. Some of the actions to be taken are described below:

- Restriction or limitation of hot work in areas during periods of increased vulnerability.
- Verification of functional detection and / or suppression in the vulnerable analysis areas.
- Restriction or limitation of transient combustible materials in areas during periods of increased vulnerability.
- Plant equipment configuration changes (e.g., removing power from equipment once it is placed in its desired position)
- Provision of additional fire patrols at periodic intervals or other appropriate compensatory measures (such as surveillance cameras) during increased vulnerability
- Reschedule the work to a period with lower risk or higher Defense-in-depth.

See also the response to SSA-RAI-03a.

Safe Shutdown RAI 03 f)

LAR Section 4.3 identifies the overview of the evaluation and results of the Non-Power operations analysis and evaluation. Provide the following information:
f) Identify those recovery actions and instrumentation relied upon in NPO by physical analysis unit, and describe how recovery action feasibility is evaluated. Include in the description whether these have been or will be factored into operator procedures supporting these actions.

RESPONSE:

There are no recovery actions relied upon for the NPO analysis. However, recovery actions could provide an option to respond to plant conditions, equipment alignments, or equipment removed from service during an outage. Note that, because no recovery actions are inherently relied upon, there are no instruments relied upon to provide operator cues for recovery actions. Instruments which are part of the non-power operations analysis are there only because of PTN commitments associated with NRC Generic Letter 88-017 guidance implemented within Operating Procedure 3(4)-NOP-041.09 "Reduced Inventory Operations" and are not credited for initiation of any action.

Safe Shutdown RAI 03 g)

LAR Section 4.3 identifies the overview of the evaluation and results of the Non-Power operations analysis and evaluation. Provide the following information:

g) For those Reactor Vessel Level Indicators powered from non-vital power, describe the additional monitoring requirements associated with NPO.

RESPONSE:

Reactor Vessel Draindown Level indication is powered from non-vital power supplies. Additionally, because reactor vessel draindown level indication power supplies lack adequate evaluation for taking credit post-fire, PTN has made a commitment to always require the local reactor vessel level indication be monitored during draindown activities (either via video camera or by a person in containment in communication with the main control room). Any evolution which affects reactor vessel level will be immediately stopped if the method of monitoring the local reactor vessel level indication is lost until the monitoring is restored by immediately stationing a person in containment in communication with the main control room until the video monitoring is restored or until the high risk evolution is complete. These actions will be incorporated into technical and administrative procedures and documents related to NPO operations, as committed in LAR Attachment S, Table S-3, Item 14.

Safe Shutdown RAI 04

LAR Table B-1 Section 3.11.5 states that for ERFBS the licensee has two compliance strategies; 1) "Complies by Previous NRC Approval" and 2) "Complies by engineering evaluation."

For those fire zone/areas in the Turbine Building that are considered compliant by previous approval (fire zones 79, 80, 82, 84, 85, 88, 91, 92, 105, and 117), the licensee states reliance on an exemption for "Thermo-Lag™ rated one hour and less (25 minutes)" and that "there have been no modifications to the fire barrier that would invalidate this conclusion." The term "adequate for the hazard" must also consider the hazard to which the ERFBS is subjected.

Describe whether the hazard in the fire area has changed such that ERFBS is challenged differently than what was originally approved by the NRC staff in 1999. Provide a description of any hazard changes in the areas since prior approval that were considered in that evaluation.

RESPONSE:

Review of LAR Attachment C, Table C-2, "NFPA 805 Required Fire Protection Systems and Features", identified that ERFBS are not required for the fire zones (79, 80, 82, 84, 85, 88, 91, 92, 105, and 117) identified in LAR Table B-1 Section 3.11.5 "Complies via Previous Approval" Compliance Statement/Compliance Basis. Therefore Attachment A, Table B-1, Section 3.11.5 does not require the "Complies via Previous Approval" Compliance Statement, Compliance Basis and Reference and this compliance strategy should be removed from the LAR. The only compliance statement for Section 3.11.5 is the existing "Complies via Engineering Evaluation" Statement, Basis, and associated References.

This compliance statement was inadvertently left in Table B-1 prior to the finalization of the required systems and features (ERFBS).

Summary of Review:

FZ 79 - No ERFBS required per LAR Attachment C, Table C-2

FZ 80 - No ERFBS required per LAR Attachment C, Table C-2

FZ 82 - No ERFBS required per LAR Attachment C, Table C-2

FZ 84 - No ERFBS required per LAR Attachment C, Table C-2

FZ 85 - No ERFBS required per LAR Attachment C, Table C-2

FZ 88 - No ERFBS required per LAR Attachment C, Table C-2

FZ 91 - No ERFBS required per LAR Attachment C, Table C-2

FZ 92 - No ERFBS required per LAR Attachment C, Table C-2

FZ 105 - No ERFBS required per LAR Attachment C, Table C-2

FZ 117 - No ERFBS required per LAR Attachment C, Table C-2

Safe Shutdown RAI 05

LAR Attachment C Table B-3 indicates some fire areas (e.g., CC, HH) appear to be having new ERFBS being installed. For any new installations describe the criteria, design standard, and fire testing criteria that will be established. Describe how the compliance strategy of Table B-1 addresses these specific applications of ERFBS for the NFPA 805 transition.

RESPONSE:

New ERFBS, where installed, will be in accordance with approved configurations for the required fire resistance rating. The approved configurations will be tested in accordance with and will meet the acceptance criteria in NRC Generic Letter 86-10, Supplement 1. NFPA 805 Section 3.11.5 cites NRC Generic Letter 86-10, Supplement 1 as the test acceptance criteria. Table B-1 does not/will not address the Fire Areas CC and HH modifications (Attachment S, Table S-2, Items 24 and 26) with respect to ERFBS since the modifications to protect the cables have not been completed. Table B-1 represents the current plant configuration.

Safe Shutdown RAI 06

Table V-3 Disposition of 2010 TPN Fire PRA PEER Review "Finding" F&Os #10-4 identifies wrap as qualified for High Energy Arcing Fault (HEAF) protection because the "The hose stream test imposed on the fire barrier qualification subsequent to fire exposure is considered to provide a comparable level challenge to the Thermolag barrier as would the HEAF force applied at the onset of fire exposure." Provide more technical justification for this disposition. Describe the temperature and pressure parameters, design criteria, and installation standards that are being used to make this assumption.

RESPONSE:

Additional walkdowns and review of vendor documents is required to support the response to this RAI. The response to this RAI is deferred to the 90 day response RAIs.

Safe Shutdown RAI 07

For establishing compliance with common enclosure and common power supply design requirements established in NEI 00-01 Rev 2 Section 2.4.2.2.1, 3.3.1.7, 3.5.2.4 and 3.5.2.5, describe the process being used to ensure satisfactory breaker-fuse coordination has been established for portions of the electrical distribution system relied on to achieve Nuclear Safety Performance Criteria (NSPC). Clarify the LAR Table B-2 Sections (3.3.1.7, 3.5.2.4, and 3.5.2.5) regarding breaker fuse coordination in common power supply and common enclosure alignment entries. If necessary, identify any additional implementation items required to support the alignment statements.

RESPONSE:

Common Power Supply:

LAR Table B-2 Sections 3.3.1.7 and 3.5.2.4 identified the following relied on distribution panels as not demonstrating adequate breaker coordination:

DP412A

4DP86

4DP87

LAR Table S-2, Items 19 and 20 commit FPL to the resolution of these issues. Because of this commitment made in LAR Table B-2, coordination of the panels was assumed during the VFDR identification process for LAR Table B-3.

Common Enclosure:

LAR Table B-2 Section 3.5.2.5 stated that compliance with common enclosure design requirements was evaluated in PTN Drawing 5610-M-722A Rev. 0 [Attachment F] - Nuclear Safety Capability Fire Safe Shutdown Analysis Basis Document. Drawing 5610-M-722A identified the following 4KV switchgear breakers as susceptible to secondary fire concerns:

Switchgear 3AA

Breaker	Resolution	LAR Attachment S Item
3AA01	Re-locate cable 3AA01/3AA01/3C03/002 out of Area H	Table S-2, Item 15
3AA03	Seal manhole MH319	Table S-2, Item 18
3AA07	Seal manhole MH319 and modify breaker 3AA07 circuit	Table S-1, Item 5 and Table S-2, Item 18
3AA11	Seal manhole MH319	Table S-2, Item 18
3AA17	Modify SUT breaker 3AA05 and breaker 3AA17 circuits	Table S-1, Items 3 and 6

Switchgear 3AB

Breaker	Resolution	LAR Attachment S Item
3AB10	Modify SUT breaker 3AB05 and breaker 3AB10 circuits	Table S-1, Items 3 and 5
3AB11	Seal manhole MH319	Table S-2, Item 18

Switchgear 3AD

Breaker	Resolution	LAR Attachment S Item
3AD05	Modify SUT breaker 3AA05 and breaker 3AA17 circuits	Table S-1, Items 3 and 6

Switchgear 3AC

Breaker	Resolution	LAR Attachment S Item
3AC11	Perform risk evaluation (VFDR-3OD-086-43) and protect cables	Table S-2, Item 1
3AC12	Perform risk evaluations (VFDR-3OD-086-44, VFDR-3OD-088-66) and protect cables	Table S-2, Item 2
3AC14	Perform risk evaluations (VFDR-3OD-083-19, VFDR-3OD-086-46, VFDR-3OD-088-60) and protect cables	Table S-2, Item 2

Switchgear 4AA

Breaker	Resolution	LAR Attachment S Item
4AA01	Seal manhole MH403	Table S-2, Item 18
4AA03	Modify SUT breaker 4AA05 and seal manhole MH403	Table S-1, Item 5 and Table S-2, Item 18
4AA07	Modify breaker 4AA07 circuit and seal manholes MH403, MH404, MH420	Table S-2, Items 7, 17, and 18
4AA11	Seal manholes MH403, MH404	Table S-2, Items 17 and 18
4AA12	Seal manhole MH403	Table S-2, Item 18
4AA13	Seal manhole MH403	Table S-2, Item 18
4AA15	Seal manholes MH403, MH404	Table S-2, Items 17 and 18
4AA16	Seal manhole MH403	Table S-2, Item 18
4AA17	Perform risk evaluation (VFDR-4OD-079-150, VFDR-4OD-084-087) and modify breaker 4AA17 circuit	Table S-2, Item 8
4AA18	Seal manholes MH403, MH404	Table S-2, Items 17 and 18
4AA19	Seal manholes MH403, MH404	Table S-2, Items 17 and 18
4AA21	Seal manhole MH403	Table S-2, Item 18

Switchgear 4AB

Breaker	Resolution	LAR Attachment S Item
4AB10	Modify SUT breaker 4AB05 and breaker 4AB10 circuits	Table S-2, Items 5 and 7
4AB19	Modify breaker 4AB19 circuit	Table S-2, Item 8

Switchgear 4AD

Breaker	Resolution	LAR Attachment S Item
4AD04	Modify breaker 4AA17 circuits	Table S-2, Item 8
4AD05	Modify breaker 4AA17 circuits	Table S-2, Item 8

There are no additional implementation items (beyond those described above) required to support the alignment statements of the B-2 table.

Safe Shutdown RAI 09

LAR Attachment C Table B-3 in fire area MM - (Control Room) indicates the Diesel Fire Pump identified as the source to feed Condensate Storage Tank for Decay Heat Removal in Control Room fire (Cold Shutdown).

The diesel fire pump is identified in both sets of logic (U3 shutdown and U4 shutdown in CR evacuation) to supply Raw Water to U3 and U4 Condensate Storage Tanks for Decay Heat Removal. Describe whether the capacity of the diesel pump is sufficient to supply both tanks simultaneously as well as meet the fire demand. Describe any restrictions regarding this multipurpose use. For other areas the electric fire pump is also identified as a source for CST makeup. Provide responses to the same questions above for the electric fire pump.

RESPONSE:

The fire water system and use of the fire pumps is not required for simultaneous fire demands and Condensate Storage Tank (CST) refill. Per PTN RAI PRA 10, the CST tank volume will last approximately 16 hours. The fire event will have ended prior to the need for CST refill. NFPA 805 Section 3.5.1(b) requires sufficient water for a 2 hour duration. There will be sufficient water for CST refill after the fire event based on volume of the Raw Water Tanks (RWT).

Safe Shutdown RAI 10

LAR Attachment S Table S-2 identifies Item #1, modifications in fire area OD-86 as "Install fire stops in the vertical tray (SECC01) and in horizontal control tray into which cables from SECC01 enter on either side of SECC01. Provide a heat shield between control tray and power tray (trays 3WCD05 and 3WAM05) for a distance beyond the location of the above fire stops." Items #2, #21, #24, #26, and #27 are similar regarding this type of shielding, thermal barriers, and fire stops to protect cabling or equipment. Provide a description of the compliance strategy being used to credit these barriers. Describe whether these are being developed as barriers for NFPA 805 Chapter 4 Section 4.2.3, or are they being specified and built using NFPA 805 Chapter 4 Section 4.2.4.2 Fire Risk Evaluation. If fire barriers are being developed for NFPA 4.2.3, then NFPA 805 3.11.2 "Fire Barriers" states that "fire barriers required by Chapter 4 shall include a specific fire-resistance rating. Fire barriers shall be designed and installed to meet the specific fire resistance rating using assemblies qualified by fire tests." For new fire stops, shields, and thermal barriers provide the design specifications being used to install these items. Describe the fire test standards that are being used to satisfy these required features. If these modifications are being installed using NFPA 805 Section 4.2.4.2 Fire Risk Evaluation(s) as barriers to be "adequate for the hazard" then for new fire stops, shields, and thermal barriers provide the description and justification that demonstrate the materials, design, and construction of these alternative configurations are sufficient for the intended separation.

RESPONSE:

The modifications identified in LAR Attachment S Table S-2 which require heat shields, fire stops or cable protection are being developed to support the NFPA 805 Section 4.2.4, Fire Risk Evaluation. Turkey Point document EC-276303 'NFPA 805 Cable Tray Riser Cover and Manhole Upgrades' provides details regarding the materials, design and construction pertaining to modifications crediting heat shields and fire stops for Items 1, 2 and 21. Items 16, 24, 26 and 27 in LAR Table S-2 are associated with cable protection for equipment availability purposes and will require protection, or where applicable, cable reroute, to be outside the zone of influence of any transient or fixed ignition source. Modifications that require cable protection on an area wide basis are designed to meet the requirements of NFPA 805 Section 4.2.3, while modifications that require cable protection only within a zone of influence are designed to meet the requirements of NFPA 805 Section 4.2.4. Items 16, 24 and 27 are therefore considered to meet the requirements of NFPA 805 Section 4.2.3 while Item 26 (in which protection is limited to the zone of influence of specific ignition sources) is considered to meet the requirements of NFPA 805 Section 4.2.4. Cable protection is provided via rated fire wrap, rated cables or reroute of cables outside of the fire area/zone of influence. For cable protection purposes (excluding reroute), the required rating of the protection is based on whether the fire area is equipped with area wide detection and automatic suppression. Fire areas equipped with area wide detection and suppression systems, or for which the suppression and detection systems have been determined to be acceptable as "adequate for the hazard" engineering deterministic evaluations, require a 1-

hour rated fire barrier while fire areas without area wide detection and suppression require a 3-hour rated fire barrier. Item 16 credits area wide 3-hour fire rated barrier protection of power cables for MCCs 3B and 4B in Fire Areas X and V, respectively. Item 24 analysis credits area wide 1-hour fire rated barrier protection of cables associated with the RCPs in areas HH and CC. Item 26 analysis credits 1-hour fire rated barrier protection of cables for several components associated with ADV and PORV capabilities within the zone of influence of scenarios 098-AK and 098-AL. The analysis associated with Item 27 credits area wide 3-hour fire rated barrier protection of cables associated with the 3AA bus and Sequencer 3C23A in areas OD/081 and OD/086.

Safe Shutdown RAI 11

LAR Attachment G "Results of Step 1" indicates that NRC Safety Evaluation transmitted by letter dated April 16, 1984, reviewed and approved the alternative shutdown configuration of controls and indications provided at the Alternate Shutdown Panel..." and that "NRC Supplemental Safety Evaluation transmitted by letter dated September 26, 1991, reviewed and approved changes following the enhancement of the electrical distribution system by addition of 4B EDG controls and instrumentations."

Provide a detailed description of the changes that have been made (or proposed) to the U3 or U4 Alternate Shutdown Panels for transition to NFPA 805. Include in that description the reason for the change.

RESPONSE:

Attachment S, Plant Modifications and Items to be Completed During Implementation, provides list of modifications completed [Table S-1] or modifications that will be completed [Table S-2]. The following modifications from Table S-1 and S-2 are performed at the respective Unit's Alternate Shutdown Panel [ASP]. Information provided under "Proposed Modification" column in Table S is repeated below verbatim. Information provided under "Problem Statement" column in Table S is repeated below with clarification / additional information, as necessary.

Table S Item Number	Modification	Reason for Modification
Table S-1 Item 9 [Table S-2 Item 11]	Modify 3B [4B] Intake Cooling Water Pump breaker control circuit to remove an isolation switch contact.	Existing isolation switch [XS] used for transferring control to the Alternate Shutdown Panel [ASP] also isolates automatic protective features circuits for 3B [4B] ICW pumps. These automatic protective features circuits do not have cables in the areas which require control room evacuation. The isolation of these circuits does not prevent safe shutdown in the areas where the isolation switch is used, but the unnecessary isolation of these features is counter to good engineering practices. This modification requires wiring changes within respective Unit's Alternate Shutdown Panels to

Table S Item Number	Modification	Reason for Modification
		remove a specific XS contact from pump circuits.
Table S-1 Item 10 [Table S-2 Item 12]	Add isolation switch contact for Atmospheric Dump Valves at the Alternate Shutdown Panel (ASP) to provide circuit "double-break" to increase number of faults required to fail the circuit.	Existing Atmospheric Dump Valve circuit design can prevent remote control of the dump valves from the control room following a single fault for fires at the Alternate Shutdown Panels. This modification requires wiring an additional contact from an existing isolation switch XS to provide double-break. This change is within respective Unit's Alternate Shutdown Panels.
Table S-1 Item 11 [Table S-2 Item 13]	Add isolation switch contact for Charging Flow Control Valves at the Alternate Shutdown Panel (ASP) to provide circuit "double-break" to increase number of faults required to fail the circuit.	Existing Charging Flow Control Valve circuit design can prevent remote control of the valves from the control room following a single fault for fires at the Alternate Shutdown Panels. This modification requires wiring an additional contact from an existing isolation switch XS to provide double-break. This change is within respective Unit's Alternate Shutdown Panels.
Table S-1 Item 12 [Table S-2 Item 14]	Add isolation fuse in Auxiliary Feedwater Train 2 Flow Control Valve circuit.	Fire induced faults on Train 2 Auxiliary Feedwater Flow Control Solenoid Valves could prevent the valves from energizing for a fire in the Reactor Control Rod Equipment Room (Fire Area T [R]), resulting in the need to take local manual actions to restore a decay heat removal system. The modification adds isolation fuses at the respective Unit's Alternate Shutdown Panel to

Table S Item Number	Modification	Reason for Modification
		isolate a portion of a circuit routed in Fire Area T [R].

Safe Shutdown RAI 12

The failure mode(s) for control circuits of valves/tanks used to control water supply to the charging pumps from the Volume Control Tank or the Refueling Water Storage Tank have been identified in findings of previous inspection reports [05000250/2004007 and 05000251/2004007]. In light of multiple spurious failures for a given fire being implemented in the TPN NFPA 805 analysis, describe the protection methodology for these valves, including changes necessary to 0-ONOP-016.10, to prevent loss of charging pump suction.

RESPONSE:

NRC Triennial Fire Protection Inspection Reports [05000250/2004007 and 05000251/2004007] transmitted by NRC letter dated March 26, 2004 [Section 1R05.03 of Report Details] discusses failure to protect the control circuits for level control valves LCV-3/4-115B, RWST Supply to Charging Pump, to prevent spurious valve closure due to adverse fire effects to the control cables. This scenario was identified for Fire Area T/63 and U/67. This RAI requests details on the protection [analysis] methodology for these valves in light of multiple spurious operation [MSO] failures included in the NFPA 805 analyses. The RAI also requests changes necessary to procedure 0-ONOP-016.10 to prevent loss of charging pump suction.

The NFPA 805 transition project reviewed and evaluated PTN [Plant Turkey Nuclear] susceptibility for fire-induced multiple spurious operation [MSO] per the guidelines of NEI 04-02 and RG 1.205 as detailed further in NFPA 805 Transition Report, Section 4.2.1.4, Evaluation of Multiple Spurious Operations. Attachment F to NFPA 805 Transition Report discusses the process and the results of the review.

The following analysis methodology has been used to address the failure conditions addressed in the above Inspection Reports:

Fire Area T/63: Alternate suction source is established to the charging pump header using boric acid blender flow path. This alternate flow path is aligned by opening FCV-3-113A and FCV-3-113B, and by closing FCV-3-114B. Necessary components in this flow path are included in the analysis and remain available during a postulated fire in Fire Area T/63. This flow path provides enough RCS makeup for RCP seal leakage and to maintain Pressurizer level during hot standby. Cold shutdown defense-in-depth actions are performed to establish flow path from the RWST to the charging pump suction by isolating VCT and opening manual valve 3-358 to makeup for RCS coolant contraction during cool down. Multiple Charging Pumps (Pumps A and C) remain available following a fire in this area. Should one of these pumps be running at the time of a fire-induced spurious closure of the VCT isolation valve, the other pump would remain available if this spurious closure damaged the running pump.

Fire Area U/67: Alternate suction source is established to the charging pump header using boric acid blender flow path. This alternate flow path is aligned by opening FCV-4-113A and FCV-4-113B, and by closing manual valve 4-360. Necessary components in this flow path are included in the analysis and remain available during a postulated fire in Fire Area U/67. This flow path provides enough RCS makeup for RCP seal leakage and to maintain Pressurizer level during hot

standby. Cold shutdown defense-in-depth actions are performed to establish flow path from the RWST to the charging pump suction by isolating VCT and opening manual valve 4-358 to makeup for RCS coolant contraction during cool down. Fire damage in this area can only affect the power supply of the VCT Isolation Valve (LCV-4-115C) and not its control circuit cables. Spurious closure of the normally open valve is not a concern in this area. The actions identified above are taken for a failure of the valve to close due to fire-induced loss of power to LCV-4-115C.

Safe Shutdown RAI 14

LAR Attachment G provides in fire area CC recovery actions for risk reduction for the Emergency Diesel Generator 3B. They are described as "In fire zone 70, verify 3AB bus lockout relay has been reset and place the following Key Switches located at EDG 3B Sequencer Panel 3C23B - 1 in the OFF position: Sequencer Enable, PLC Power Supply, I/O Power Supply. Place Master Control Switch located in EDG 3B Control Panel 3C12B in fire zone 72 to the LOCAL position. Verify Bus 3AB is de-energized and close breaker 3AB20 in fire zone 72." Provide a more detailed description of this procedure including the operator locations and indications used for these actions (e.g.; describe the process to verify that the bus is deenergized before closing breaker 3AB20 in the diesel building).

RESPONSE:

The recovery actions for risk for a fire in fire area CC are performed by the Unit 3 Reactor Operator (RO) and the Unit Supervisor, using Off Normal Operating Procedure 0-ONOP-105 "Control Room Evacuation". High level actions performed to energize the 3B 4KV Bus is described below.

The actions of the Unit 3 RO are specified in Attachment 14 of the procedure. After evacuating the Control Room and performing required actions at the Alternate Shutdown Panel (ASP), the Unit 3 RO proceeds to the Unit 3B Switchgear Room to prevent spurious Unit 3B Emergency Diesel Generator (EDG) trips by disabling the 3B 4KV Bus Sequencer, stripping the 3B 4KV Bus, resetting the 3B 4KV Bus Lockout Relays, and transferring the 3B EDG to local control. These actions are performed as follows. At panel 3C23B-1 "3B EDG Sequencer" located in the Unit 3B switchgear room, key switches for the XS-1 SEQUENCER ENABLE, PLC Power Supply, and I/O Power Supply are placed in the OFF position. At panel 3C23B, a control fuse in the 3B EDG sequencer cubicle is removed to prevent spurious trip of the 3B EDG. The Unit 3 RO then ensures the required 3AB 4KV switchgear breakers are tripped and open at the breaker cubicles. The Unit 3 RO then places the XS-186-3B Lockout Reset Transfer Switch to LOCAL (located on panel 3C23B in the switchgear room) and ensures positive reset of the lockout relays has occurred by verifying the position of the lockout relay handles. At this time, the Unit 3 RO establishes contact with the Unit Supervisor in the 3B EDG room to transfer the 3B EDG to local control.

The actions of the Unit Supervisor are specified in Attachment 13 of the procedure. After evacuating the Control Room, de-energizing the 4AA and 3AA 4KV switchgears, and shutting down the 3A EDG, the Unit Supervisor is directed to the 3B EDG room to transfer the 3B EDG to local control. These actions are performed as follows. After receiving verbal confirmation from the Unit 3 RO that the 3B sequencer is OFF, the 3AB Bus is stripped of specified loads, and the 3B Bus Lockout Relay is RESET, the Unit Supervisor places the Master Control Switch at panel 3C12B to the LOCAL position. The Unit Supervisor will start the 3B EDG locally if it is not running and close 3B EDG output breaker 3AB20 at the EDG local panel 3C12B, after verifying the 3AB Bus is not energized. The Unit Supervisor has local indication of Bus voltage

at the 3B EDG local panel. Procedural guidance states that final confirmation of Bus voltage is provided by the Unit 3 RO in the 3AB Switchgear Room.

Safe Shutdown RAI 15

LAR Section 5.4 "Revision to the TPN (sic) UFSAR", indicates that "after the approval of the LAR, in accordance with 10 CFR 50.71(e), the TPN (sic) UFSAR will be revised. The format and content will be consistent with NEI 04-02. Describe whether it is your intention to make the changes as defined in FAQ 12-0062. If not, describe the elements and sections, and process intended to accomplish this change.

RESPONSE:

After the approval of the LAR, in accordance with 10 CFR 50.71(e), the PTN UFSAR will be revised. The format and content will be consistent with FAQ 12-0062, UFSAR Content, Revision 1, dated May 21, 2012 (ADAMS Accession No. ML121430035).

Safe Shutdown RAI 16

Information Notice 92-18 is an existing design basis for TPN for Appendix R. The issues were addressed according to the current TPN design basis; i.e., single spurious actuation due to fire. Multiple spurious operations however, must be considered. For NFPA 805 transition provide a description of the resolution strategy, including a list of the resolution methods now used to resolve potential IN 92-18 valve failure modes.

RESPONSE:

Information Notice 92-18 is an existing design basis for PTN and the Appendix R issues were addressed according to the PTN design basis; i.e., single spurious actuation due to fire. The analysis results were documented in Calculation PTN-BFJM-93-012 and Evaluation JPN-PTN-SEEP-93-011. The NFPA 805 transition review of these calculations identified that the Pressurizer PORV Block Valves, RHR Suction from ECCS Sump Isolation Valves, and Auxiliary Feedwater Steam Admission Valves applied the "single spurious actuation" consideration in their resolution.

Since the IN 92-18 initial evaluations, the regulatory environment has evolved in that combinations of multiple spurious operations must be considered. With transition to NFPA 805, deterministic considerations may be tempered by risk-informed (FPRA) insights. Accordingly, FPL Evaluation PTN-FPER-11-001 was prepared to address the new criteria and the following resolution strategy was applied to address the valves described above.

- Weak Link analyses were performed to determine the maximum stall thrust of the installed MOVs in the open and close directions. This was compared to the one time overtorque and overthrust limits of the valve actuator and the overthrust limits of the valve. If the one time limits of the valve and actuator are not exceeded by the maximum stall thrust, it was assumed the valve body integrity is maintained and the MOV could subsequently be repositioned manually using it handwheel.
- In cases where actual operating experience exists where the MOV was subjected to being stroked open or closed without limit/torque switch protection, with no damage to the pressure boundary and valve disc connection, the operating experience was used to conclude the valve integrity is maintained and the MOV could subsequently be repositioned manually using its handwheel.

Fire Protection Engineering RAI 02 a)

LAR Section 4.2.2 "Overview of the Process" identifies that for EEEEs, determinations will be made including "the EEEE is technically adequate" and "the basis for acceptability of the EEEE remains valid". For those fundamental elements of NFPA 805 Chapter 3 which are identified as "Complies via Engineering Evaluation" in LAR Attachment Table B-1 there is no positive statement of technical adequacy or continued validity. In LAR Section 4.2.2, "Results", there is no positive statement of technical adequacy or continued validity. EEEEs used to demonstrate compliance with Chapters 3 and 4 of NFPA 805 are referenced in the LAR Attachments A and C as appropriate however they lack positive statement of technical adequacy or continued validity.

Provide a positive statement regarding the EEEEs relied upon for compliance in fundamental elements of Chapter 3 compliance strategy or relied upon for Chapter 4 compliance with fire protection features deemed "adequate for the hazard".

RESPONSE:

PTN-FPER-08-006 is the NFPA 805 transition review of existing engineering equivalency evaluations (EEEE). This engineering report reviewed and summarized those engineering evaluations associated with fire protection systems and features. The results of the review documented the evaluations were the appropriate use of the process, the evaluations were technical adequate for transition, the evaluations are not based solely on quantitative risk evaluations, and the evaluations reflect the as-built plant configuration (bases still valid).

Based on the technical review and validation of bases performed as part of the EEEE review process, Section 4.2.2 should be enhanced as necessary to make the positive statement of technical adequacy and continued validity. Revised Section 4.2.2 wording as follows:

> Results
>
> The review results for EEEEs are documented in the report entitled, NFPA 805 Transition Review of Existing Engineering Equivalency Evaluations.
>
> In accordance with the guidance provided in RG 1.205, Regulatory Position 2.3.2, and NEI 04-02, as clarified by FAQ 07-0054, Demonstrating Compliance with Chapter 4 of NFPA 805, EEEEs used to demonstrate compliance with Chapters 3 and 4 of NFPA 805 are referenced in the Attachments A and C as appropriate. All EEEEs have been reviewed to determine the evaluation is technically adequate and the bases for acceptability are valid.
>
> In addition, none of the transitioning EEEEs require NRC approval.

Fire Protection Engineering RAI 02 b)

LAR Table B-1 Section 3.2.3(1), Inspection, Testing, and Maintenance, indicates "Complies" with a note that the current program may be modified by using the performance-based program of EPRI TR 1006756 for fire protection equipment surveillances in the future. The methodology of EPRI TR 1006756 needs to be presented as an alternative means of compliance to the NFPA 805 Chapter 3 deterministic requirements. If the licensee wishes to use EPRI TR 1006756 surveillance optimization to modify the current licensing basis then provide the evaluation which presents this control as a performance-based risk-informed alternative as required by 10 CFR 50.48 (C)(2)(vii) including the appropriate changes to Attachment L.

RESPONSE:

FPL submits the following approval request in accordance with 10 CFR 50.48(c)(2)(vii) for use of EPRI TR 1006756:

Approval Request 8

NFPA 805 Section 3.2.3(1)

In accordance with 10 CFR 50.48(c)(2)(vii), "Performance-based methods," the fire protection program elements and minimum design requirements of Chapter 3 may be subject to the performance-based methods permitted elsewhere in the standard.

In accordance with NFPA 805 Section 2.2.8, the performance-based approach to satisfy the nuclear safety, radiation release, life safety, and property damage/business interruption performance criteria requires engineering analyses to evaluate whether the performance criteria are satisfied.

In accordance with 10 CFR 50.48(c)(2)(vii), the engineering analysis performed shall determine that the performance-based approach utilized to evaluate a variance from the requirements of NFPA 805 Chapter 3:

A. Satisfies the performance goals, performance objectives, and performance criteria specified in NFPA 805 related to nuclear safety and radiological release;
B. Maintains safety margins; and
C. Maintains fire protection defense-in-depth (fire prevention, fire detection, fire suppression, mitigation, and post-fire nuclear safety capability).

FPL requests formal approval of performance-based exception to the requirements in Chapter 3 of NFPA 805 as follows:

NFPA 805, Section 3.2.3(1)

> *"Procedures shall be established for implementation of the fire protection program. In addition to procedures that could be required by other sections of the standard, the procedures to accomplish the following shall be established:*

Inspection, testing, and maintenance for fire protection systems and features credited by the fire protection program."

FPL requests the ability to utilize performance-based methods to establish the appropriate inspection, testing, and maintenance frequencies for fire protection systems and features required by NFPA 805. Performance-based inspection, testing, and maintenance frequencies will be established as described in Electric Power Research Institute (EPRI) Technical Report TR-1006756, "Fire Protection Surveillance Optimization and Maintenance Guide for Fire Protection", Final Report, July 2003.

Basis for Request:

NFPA 805 Section 2.6, "Monitoring," requires that

"A monitoring program shall be established to ensure that the availability and reliability of the fire protection systems and features are maintained and to assess the performance of the fire protection program in meeting the performance criteria. Monitoring shall ensure that the assumptions in the engineering analysis remain valid."

NFPA 805 Section 2.6.1, *"Availability, Reliability, and Performance Levels," requires that "Acceptable levels of availability, reliability, and performance shall be established."*

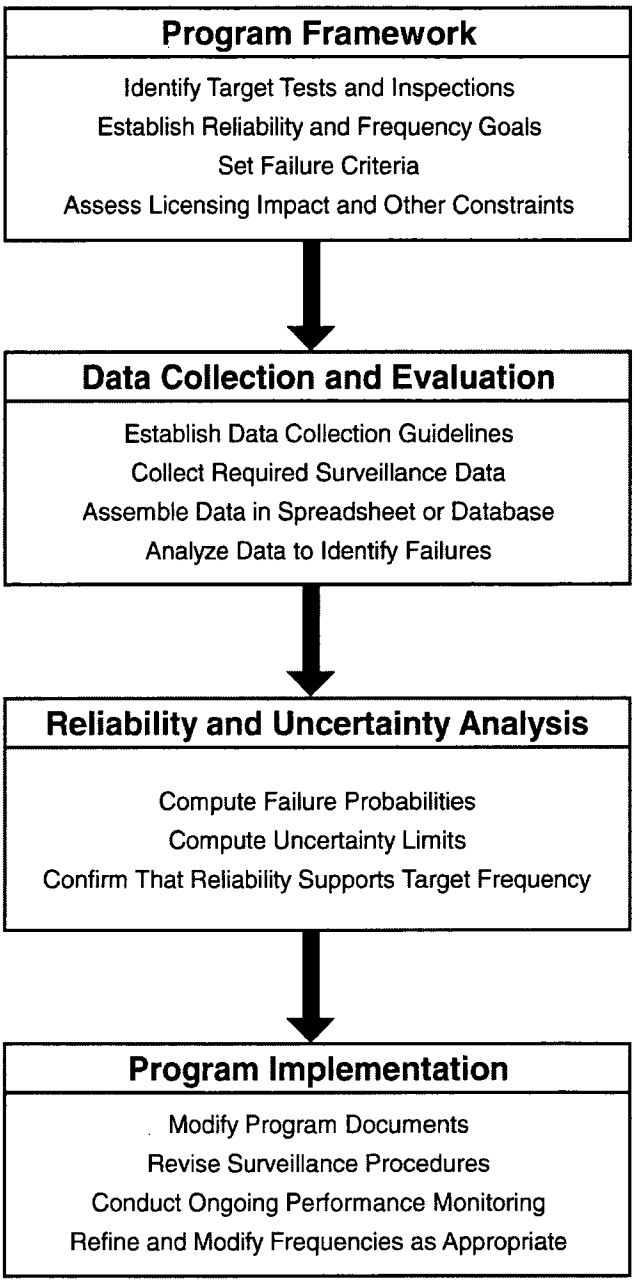
NFPA 805 Section 2.6.2, *"Monitoring Availability, Reliability, and Performance," requires that "Methods to monitor availability, reliability, and performance shall be established. The methods shall consider the plant operating experience and industry operating experience."*

The scope and frequency of the inspection, testing, and maintenance activities for fire protection systems and features required in the fire protection program have been established based on the previously approved Technical Specifications / License Controlled Documents and appropriate NFPA codes and standard. This request does not involve the use of the EPRI Technical Report TR-1006756 to establish the scope of those activities as that is determined by the required systems review identified in Table 4-3, "NFPA 805 Ch 4 Required FP Systems/Features."

This request is specific to the use of EPRI Technical Report TR-1006756 to establish the appropriate inspection, testing, and maintenance frequencies for fire protection systems and features credited by the fire protection program. As stated in EPRI Technical Report TR-1006756 Section 10.1, "The goal of a performance-based surveillance program is to adjust test and inspection frequencies commensurate with equipment performance and desired reliability." This goal is consistent with the stated requirements of NFPA 805 Section 2.6. The EPRI Technical Report TR-1006756 provides an accepted method to establish appropriate inspection, testing, and maintenance frequencies which ensure the required NFPA 805 availability, reliability, and performance goals are maintained.

The target tests, inspections, and maintenance will be those activities for the NFPA 805 required fire protection systems and features. The reliability and frequency goals will be established to ensure the assumptions in the NFPA 805 engineering analysis remain valid. The failure criterion will be established based on the required fire protection systems and features credited functions

and will ensure those functions are maintained. Data collection and analysis will follow the EPRI Technical Report TR-1006756 document guidance. The failure probability will be determined based on EPRI Technical Report TR-1006756 guidance and a 95% confidence level will be utilized. The performance monitoring will be performed in conjunction with the Monitoring Program required by NFPA 805 Section 2.6 and it will ensure site specific operating experience is considered in the monitoring process. The following is a flow chart that identifies the basic process that will be utilized.



EPRI TR-1006756 - Figure 10-1
Flowchart for Performance-Based Surveillance Program

FPL does not intend to revise any fire protection surveillance, test or inspection frequencies until after transitioning to NFPA 805. Existing fire protection surveillance, test and inspection will remain consistent with applicable station, Insurer, and NFPA Code requirements. PTN's intent is to obtain approval via the NFPA 805 Safety Evaluation to use EPRI Technical Report TR1006756 guideline in the future as opportunities arise. FPL reserves the ability to evaluate fire protection features with the intent of using the EPRI performance-based methods to provide evidence of equipment performance beyond that achievable under traditional prescriptive maintenance practices to ensure optimal use of resources while maintaining reliability.

Nuclear Safety and Radiological Release Performance Criteria:

Use of performance-based test frequencies established per EPRI Technical Report TR-1006756 methods combined with NFPA 805 Section 2.6, Monitoring Program, will ensure that the availability and reliability of the fire protection systems and features are maintained to the levels assumed in the NFPA 805 engineering analysis. Therefore, there is no adverse impact to Nuclear Safety Performance Criteria by the use of the performance-based methods in EPRI Technical Report TR-1006756.

The radiological release performance criteria are satisfied based on the determination of limiting radioactive release. Fire Protection Systems and Features may be credited as part of that evaluation. Use of performance-based test frequencies established per the EPRI Technical Report TR-1006756 methods combined with NFPA 805 Section 2.6, Monitoring Program, will ensure that the availability and reliability of the fire protection systems and features are maintained to the levels assumed in the NFPA 805 engineering analysis which includes those assumptions credited to meet the Radioactive Release performance criteria. Therefore, there is no adverse impact to Radioactive Release performance criteria.

Safety Margin and Defense-in-Depth:

Use of performance-based test frequencies established per EPRI Technical Report TR-1006756 methods combined with NFPA 805, Section 2.6, Monitoring Program, will ensure that the availability and reliability of the fire protection systems and features are maintained to the levels assumed in the NFPA 805 engineering analysis which includes those assumptions credited in the Fire Risk Evaluation safety margin discussions. In addition, the use of these methods in no way invalidates the inherent safety margins contained in the codes and standards used for design and maintenance of fire protection systems and features. Therefore, the safety margin inherent and credited in the analysis has been preserved.

The three echelons of defense-in-depth described in NFPA 805 Section 1.2 are 1) to prevent fires from starting (combustible/hot work controls), 2) rapidly detect, control and extinguish fires that do occur thereby limiting damage (fire detection systems, automatic fire suppression, manual fire suppression, pre-fire plans), and 3) provide adequate level of fire protection for systems and structures so that a fire will not prevent essential safety functions from being performed (fire barriers, fire rated cable, success path remains free of fire damage, recovery actions).

Echelon 1 is not affected by the use of the EPRI Technical Report TR-1006756 methods. Use of performance-based test frequencies established per EPRI Technical Report TR-1006756 methods combined with NFPA 805 Section 2.6, Monitoring Program, will ensure that the availability and reliability of the fire protection systems and features credited for defense-in-depth are maintained to the levels assumed in the NFPA 805 engineering analysis. Therefore, there is no adverse impact to echelons 2 and 3 for defense-in-depth.

Conclusion:

NRC approval is requested for use of the performance-based methods contained in the Electric Power Research Institute (EPRI) Technical Report TR-1006756, "Fire Protection Equipment Surveillance Optimization and Maintenance Guide", Final Report, July 2003 to establish the appropriate inspection, testing, and maintenance frequencies for fire protection systems and features required by NFPA 805. As described above, this approach is considered acceptable because it:

(a) Satisfies the performance goals, performance objectives, and performance criteria specified in NFPA 805 related to nuclear safety and radiological release;

(b) Maintains safety margins; and

(c) Maintains fire protection defense-in-depth (fire prevention, fire detection, fire suppression, mitigation, and post-fire safe shutdown capability).

Fire Protection Engineering RAI 02 c)

LAR Table B-1 Section 3.3.1.2, Flammable Gases, states that "TPN is not committed to any flammable gas standard in the current licensing basis." Flammable gases are controlled per 0-ADM-016 and 0-ADM- 016.1. The compliance strategy states that TPN complies with clarification, but the clarification states that no NFPA standard is part of the current licensing basis, therefore identify what controls and requirements will be in place for flammable gas after transition and provide the basis of those controls. If previous approval is being relied upon for the compliance strategy, then "Previous NRC Approval" should also be one of the compliance strategies

RESPONSE:

Flammable gases are programmatically controlled via station procedures. In particular, flammable gases are controlled via 0-ADM-016.1, Transient Combustible and Flammable Substance Program. This procedure outlines the fire prevention practices for compressed flammable gas cylinders. This procedure references the NFPA Fire Protection Handbook, NFPA 1, and OSHA guidelines. Previous approval is not being relied upon as a compliance strategy.

Fire Protection Engineering RAI 02 d)

3.3.3 Interior Finishes License Amendment Requested; In the Operating Experience review for Information Notice 2007-26 conducted under CR 2007-26298, it was determined that certain self-leveling floor coatings have a flame spread rating of 30 when applied at a thickness of 49 mils. The evaluation also found that the thickness was installed up to 62 mils. This does not meet the requirement from NFPA 101-2006 that requires a flame spread rating of 25 or less. LAR Attachment L Approval request 1 states that in some areas TPN utilizes epoxy floor coating systems. Provide a list of those fire areas/zones. The approval request identifies previous licensee evaluations of the combustibility of the epoxy floor coating system. Describe in detail the results of the evaluations of the combustibility. To identify how the hazards apply to each location, provide an identification of applicable thicknesses in each location. Include the applicable flame spread rating for each of these areas as there are multiple ratings being discussed. The flame spread rating for each of these areas is not clear.

The Approval Request 1 indicates "the ASTM E-84 flame spread value of the TPN epoxy coating system at the slightly larger thickness is anticipated to have a flame spread rating less than 50." Provide a technical basis for this extrapolation.

RESPONSE:

In response to Information Notice 2007-26, Combustibility of Epoxy Floor Coatings at Commercial Nuclear Power Plants, PTN addressed the response generically for the entire PTN plant in CR 2007-26298. Specific thickness tests of epoxy floor coatings at PTN have not been performed.

The condition report reviewed the multiple types of floor coatings used at PTN from construction to current. The maximum coating thickness outside containment up to 1996 was 52 mils (Carboguard 890), including surfacer. The maximum coating thickness inside containment up to 1996 was 62 mils (Carboguard 890N), including surfacer. Therefore the maximum thickness used at PTN was determined to be 62 mils. New maximum coating thicknesses outside and inside of containment are 12 mils as Carboguard 2011S surfacer is no longer manufactured.

The 62 mil thick coating system used at PTN consists of Carboguard 2011S surfacer and Carboguard 890N topcoats. Both surfacer and topcoat are epoxies and made by same manufacturer Carboline. Per Carboline letter and flame test report, the ASTM E-84 flame spread value for a 49 mils thick epoxy coating system similar to PTN coating system is 30. Using linear interpolation, the flame spread value for the 62 mils floor epoxy coating system at the PTN is (62/49) * 30 = 38. There is sufficient margin between the allowable ASTM E-84 flame spread value and the value calculated above for the worst PTN coating system (50 vs 38). Therefore, as concluded in CR 2007-26298, the combustibility of the PTN coating system is acceptable without additional analysis or laboratory testing.

Based on the evaluation, the maximum floor coating thickness used at PTN is 62 mils (less than 1/8") and the ASTM E-84 flame spread value of the applied coatings system is 38 (less than 50). Therefore, the coatings applied at PTN are not considered as a significant source of combustible

loading and meet the NFPA 805 definition of limited combustible material. Details regarding locations of coating thicknesses and applicable flame spread ratings are not identified based on the bounding evaluation in CR 2007-26298.

Fire Protection Engineering RAI 02 e)

LAR Section 3.3.4 "Insulation Materials", provide a combination of compliance strategies. The first cites two EEEEs to evaluate the requirement of pipe insulation and ArmaflexTM insulation to be noncombustible or limited combustible. The second indicates "complies". Describe whether this means that for any thermal insulation, radiation shielding materials, ventilation duct materials, and soundproofing materials not addressed in the EEEEs, TPN complies with the requirement of NFPA 805 Section 3.3.4 for all these materials.

RESPONSE:

Insulation materials at PTN either comply with the requirement of NFPA 805 Section 3.3.4 or have a specific engineering evaluation that demonstrate compliance with this requirement. The revised compliance basis for Section 3.3.4 associated with the "Complies" compliance statement should be replaced with the following:

> The Fire Protection Program Report Section 2.4, D.1(d) states "The facility is designed in accordance with Criterion 3, which requires that non-combustible and fire resistant materials be used throughout the facility. Non-combustible materials are used to the extent practicable. Except for Control Room carpeting and limited piping insulation, interior finishes generally exhibit flame spread, smoke developed, and fuel contributed values of 50 or less, as defined in ASTM E-84. The Control Room Carpet has been tested to NFPA 253 (Critical Radiant Flux) and ASTM E-662 (Smoke Development), and is NML-Approved. The piping insulation has been evaluated to be acceptable fire resistant materials based on the characteristics, (flame speed, ignition temperature, etc.) per Reference 29."
>
> Specification SPEC-M-068, Thermal Insulation Turkey Point Units 3 & 4, identifies the acceptable thermal insulation materials and applications for various piping and components at Turkey Point Units 3 and 4. Section 9.2 under Certification and Data states " Certification of 25 or less for flame spread, fuel consumption, and smoke generated when tested in accordance with ASTM-E-84."
>
> Item for Implementation:
>
> Update appropriate station documentation, as applicable, to include all insulation materials (thermal insulation, radiation shielding materials, ventilation duct materials, and soundproofing materials) shall be noncombustible or limited combustible.

The following implementation item will be added to Attachment S, Table S-3

> Update appropriate station documentation, as applicable, to include all insulation materials (thermal insulation, radiation shielding materials, ventilation duct materials, and soundproofing materials) shall be noncombustible or limited combustible.

Fire Protection Engineering RAI 02 f)

LAR Section 3.3.5.3 "Electrical Cable Flame Propagation Limits" identifies in the compliance basis that "Refer to FPER-05-001 for documentation of acceptable flame resistance standards for future cable installations." It appears that new cables will be purchased compliant with the FPER-05-001 instead of AHJ approved test standards.

Describe whether this means that new cable installation will not require electrical cable construction to comply with NFPA 805 Section 3.3.5.3 propagation test acceptable to the AHJ. If so, describe the flame propagation requirements that will be in place for the purchase of new cable.

RESPONSE:

New cable installations require compliance with NFPA 805 Section 3.3.5.3. PTN-FPER-05-001 documents that UL-910 or IEEE-383 qualified cables are acceptable (UL-910 subjects cables to more severe testing than IEEE-383). UL-910 was adopted to become NFPA 262. NFPA 262 was determined to be an acceptable flame propagation test via FAQ 06-0022. PTN-FPER-11-009 documents approved testing standards for cables which is Table 2 from FAQ 06-0022 (Revision 3).

The "Complies via Engineering Evaluation" compliance basis for Section 3.3.5.3 should be replaced with the following:

> Refer to PTN-FPER-05-001 and PTN-FPER-11-009 for documentation of acceptable flame resistance standards for future cable installations. These evaluations document acceptable alternative tests to IEEE-383 as approved by the AHJ, in this case the NRC.
>
> In addition, PTN/PSL Specification EN-2.09.1-2 for 600 Volt Power and Control Cable and EN-2.09.1-3 for Electrical Cables - Instrumentation require that each size and type of cable furnished under these specification shall be shown to have passed the flame resistance test per ICEA Standards, and a vertical flame test per IEEE 383-1974 and IEEE 422-1977.

Fire Protection Engineering RAI 02 g)

LAR Section 3.3.7.1 "Bulk Flammable Gas Location Requirements" states that "Discrepancies identified in TPN-FPER-07-050A will be dispositioned prior to program implementation. See Implementation Item 5 in Table S-3 of Attachment S." Provide a summary list of those discrepancies including proposed or planned resolutions.

RESPONSE:

The code compliance evaluation has 8 non-compliances. PTN-FPER-07-050A Table 1 provides a summary of non-compliances. These non-compliances and the status are as follows:

1) Provide physical protection as appropriate. [per AR 1725214 01 - complete 2/20/12]
2) Provide anchors/tie downs for securing tube trailer. Replace heavily corroded wheel chock. [per AR 1725214 02 - complete 5/14/12]
3) Isolation valves H-18 and H-19 need to be replaced or repaired (tagged as leaking). [per AR 1725214 03 - complete 9/20/12]
4) Remove safety can and store elsewhere provided it is greater than 25 ft from the hydrogen system. [per AR 1725214 04 - complete 2/7/12]
5) Replace or remove all electrical components not rated for Class I Division 2 locations that are located within 15 feet of the south tube trailer location and within 15 feet of the hydrogen processing facility. Walkdown, scoping, and planning activities are in progress. [AR 1725214 05]
6) Restrict parking of the tube trailer north of the Gas House due to exposure to high voltage power lines. [per AR 1725214 06 - complete 2/24/12]
7) Operating instructions that reflect the current hydrogen system configuration should be developed and provided at the operating locations (gas house). [Procedure 0-NOP-065.01 has been updated which closes this item]
8) Provide mechanism to have periodic inspection and maintenance of the hydrogen system and document activities performed by the hydrogen supplier or site staff. [per AR 1725214 07 - complete 3/27/12]

Fire Protection Engineering RAI 02 h)

LAR Attachment A, Section 3.5.16 indicates that "(t)he fire protection water supply system shall be dedicated for fire protection use only." The LAR Table B-3 for numerous fire areas indicate that the electric and/or diesel fire pumps are considered the source of water for refilling the Condensate Storage Tanks (CST) for post fire shutdown. Provide more detail regarding this non-dedicated use of the fire pumps. Because this is considered a deterministic requirement of NFPA 805 Chapter 3, provide a new compliance statement and compliance strategy that will satisfy the requirements of 10 CFR 50.48(c), NFPA 805 Section 3.5.16, or other appropriate justification. This should include a technical justification for the potential simultaneous use of the fire pump for fire suppression as well as refilling the CST for Unit 3 and Unit 4.

RESPONSE:

PTN complies with NFPA 805 Section 3.5.16 via Exception 1 and Exception 2. The fire water supply system, including the fire water storage tanks and fire pumps may be utilized for other purposes. The fire water system may be used for CST refill. The fire water capacity is from the Raw Water Tanks which is also used for plant service water.

The entry in Attachment A for Section 3.5.16 should be revised as follows:

Compliance Statement:

Complies

Compliance Basis:

Exception 1:

The fire water system and use of the fire pumps are not required for simultaneous fire demands and Condensate Storage Tank (CST) refill. As discussed in PTN RAI PRA 10, the CST tank volume will last approximately 16 hours. The fire event will have ended prior to the need for CST refill. NFPA 805 Section 3.5.1(b) requires sufficient water for a 2 hour duration. There will be sufficient water for CST refill after the fire event based on volume of the Raw Water Tanks (RWT). Therefore, PTN complies with Exception 1 for having sufficient water supply analyzed for fire protection and backup to nuclear safety.

Exception 2:

The Raw Water Tanks are used for the plant service water system in addition to fire protection. Each tank has a standpipe such that 340,000 gallons is maintained dedicated to fire water. The 340,000 gallons exceed the required 300,000 gallon minimum required fire water volume. Therefore, PTN complies with Exception 2 for having dedicated fire water storage.

Fire Protection Engineering RAI 02 i)

LAR Section 3.11.1 "Building Separation", states that "in general, buildings are separated by 3-hour fire resistance rated barriers or 50 feet of open space." This is referenced to the UFSAR Appendix 9.6A Section 3.11.2. Describe whether this section of the UFSAR is being deleted in the NFPA 805 Transition.

LAR Section 3.11.2 Fire Barriers, states that "walls, floors and ceilings separating Fire Areas shall be fire barriers with a minimum rating of three hours as defined by ASTM E-119 (e.g. six inch solid concrete or greater, 8 inch concrete filled concrete block or greater, unless the barrier is subject to an engineering equivalency evaluation." This is also referenced to a section of the UFSAR that may be deleted following the transition.

Describe where these requirements will continue to reside post transition.

RESPONSE:

UFSAR Appendix 9.6A is the Fire Protection Program Report. This document will be replaced by the new Fire Protection Design Basis Document (FP DBD) required by NFPA 805 (LAR Implementation Item #16). The future reference will be the FP DBD where these requirements will reside post transition. Any reference to the UFSAR for a NFPA 805 Chapter 3 compliance statement will be captured in the FP DBD to ensure the details necessary to support the compliance bases for the Chapter 3 element are retained post transition.

Fire Protection Engineering RAI 03

LAR Attachment I – Definition of Power Block identifies structures included in the Fire Protection Program in accordance with 10 CFR 50.48(c) and NFPA 805. Specific structures in Outdoor and Yard areas not identified. The LAR in Table I-1 in the column titled "Power Block Structures" identified "Outdoor Area East of Turbine Building". Provide more detail regarding the power block structures in this area.

RESPONSE:

Due to the nature of PTN many portions of the plant are located outside. LAR Table I-1 identified the following Fire Areas/Zones to be part of the "Outdoor Area East of Turbine Building" - CC/79A; OD/79, 84, 88-89, 113-116. Below are additional details regarding the structures as discussed in UFSAR Appendix 9.6A, Section 4, Fire Hazards Analysis.

Fire Area / Fire Zone	Description	Discussion
CC/79A	Units 3 and 4 Auxiliary Building North-South Breezeway	Fire Zone 79A is bounded on the ceiling and East and West walls by a 3-hour rated fire barrier. The North and South side of this zone is open to the atmosphere.
OD/79	Outdoor Area West of Unit 4 Containment	Fire Zone 79 is the outdoor grade elevation 18.00' zone located West of the Unit 4 Containment, between the Containment and the Turbine Building and extending to the west side of the Control Building. This area is partially covered by the Unit 4 Main Steam Platform, approximately 53'-6" above grade.
OD/84	Units 3 and 4 Auxiliary Feedwater Pump Area	Fire Zone 84 is the Unit 3 and 4 Auxiliary Feed Water Pump zone located on the 18.00' elevation north and east of the Unit 3 Steam Generator Feed Pump Room. This area is partially covered by the Unit 4 Main Steam Platform, approximately 53'-6" above grade.
OD/88	Unit 3 Switchgear / DG Building Vestibule	Fire Zone 88 is the Unit 3 ground floor vestibule area located northwest of the Unit 3 Condensate Storage Tank at elevation 18.00' and to the west of the Emergency Diesel Generator Building.
OD/89	Unit 3 Condensate Storage Tank Area	Fire Zone 89 is the Unit 3 Condensate Storage Tank area located on the 18.00'

Fire Area / Fire Zone	Description	Discussion
		elevation northwest of the Unit 3 Containment.
OD/113	Unit 4 Feedwater Platform	Fire Zone 113 is the Unit 4 Feedwater zone located on the 18.00' level and the platform located at the 38.00' elevation near the southwest of Unit 4 Containment.
OD/114	Unit 4 Main Steam Header Platform	Fire Zone 114 is the Unit 4 Main Steam Header zone located on the 53'-6" elevation immediately to the west of the containment.
OD/115	Unit 3 Main Steam Header Platform	Fire Zone 115 is the Unit 3 Main Steam Header zone located on the 53'-6" elevation immediately to the west of the Containment.
OD/116	Unit 3 Feedwater Platform	Fire Zone 116 is the Unit 3 Feedwater zone located on the 18.00' level and platforms located at 39.75' and 41.25' elevations near the Unit 3 Containment and on the northwest end of the Unit 3 Turbine Deck.

Fire Protection Engineering RAI 04

LAR Attachment I Table I-1 does not include the Switchyard as an area to be considered in the Power Block, however the Fire Ignition Frequency Development analysis TPN-PSA-7.01, Revision 3, Section 2.1.2, and Table 2-1 indicate the switchyard meets the criteria for inclusion. Clarify this issue. If the switchyard is in fact excluded from the power block, provide a detailed justification for this conclusion.

RESPONSE:

The switchyard is excluded from the PTN power block definition. PTN-FPER-10-007, Definition of Power Block for PTN, Revision 1, Section 5.7 states "Although Fire Zone 128 (Switchyard) may be considered in the Fire Probability Risk Assessment (FPRA), it is not located inside the Protected Area, does not contain circuits or equipment essential to safe shutdown capability (per Assumption 4.6), is not essential to power plant operation, and is not essential to radioactive release mitigation, and therefore is not included in the power block." Assumption 4.6, as referenced in Section 5.7, states "Assumption: Implementation of DCPs 242502 and 242503 effectively removes redundant circuits from the switchyard by installing interposing relays to isolate switchyard circuits that interface with startup breakers located inside the power block." These modifications have been implemented.

Fire Protection Engineering RAI 05

LAR Attachment L, Request 2 states "NFPA 805 FAQ 06-0022 identified acceptable electrical cable construction tests. Plenum rated cable is tested to NFPA 262. The FAQ concluded that the NFPA 262 test is equivalent to the IEEE-383 test. Therefore, IEEE cable is inherently equivalent to plenum rated cable and acceptable to be routed above suspended ceilings." This final statement is, in fact, contrary to the conclusion of FAQ 06-0022. The request should be revised to eliminate reliance upon this equivalence.

RESPONSE:

The ancillary discussion regarding NFPA 262 equivalency to IEEE-383 will be removed. The revised approval request is as follows:

Approval Request 2

NFPA 805 Section 3.3.5.1

NFPA 805 Section 3.3.5.1 states:

> *"Wiring above suspended ceiling shall be kept to a minimum. Where installed, electrical wiring shall be listed for plenum use, routed in armored cable, routed in metallic conduit, or routed in cable trays with solid metal top and bottom covers."*

PTN has identified wiring above suspended ceilings that may not comply with the requirements of this code section. This wiring may be non-listed video/communication/data cables.

Historically, Appendix A to BTP 9.5-1 Guidance Section D.1 (f) has the requirement "Suspended ceilings and their supports should be of noncombustible construction. Concealed spaces should be devoid of combustibles." PTN's response was that "Suspended ceilings and their supports are non-combustible to the extent possible. No significant combustibles are located in concealed spaces."

The areas at PTN currently with suspended ceilings inside the NFPA 805 defined power block include:

- Auxiliary Building office areas (Counting Room, Hot Lab)
- Control Room/associated offices

These areas are not risk significant with the exception of the Control Room. Current PTN cable construction for power and control cables are IEEE-383 (or equivalent) or routed in metal conduit. Original power and control cables may not have been IEEE-383 or equivalent. Where non IEEE-383 cables are used in cable trays, the use of fire retardant coatings was applied in certain areas. Field walkdowns and review of design drawings confirmed that there are no power/control cables above the ceiling in the Auxiliary Building Office areas but there are cable trays with power and control cables above the Control Room ceiling. The power cables are 120VAC or 125VDC. The cable trays are either sprayed with a fire retardant coating (Flamemastic) or are new trays with IEEE-383 cables. In addition, those cables sprayed with a

flame retardant coating do not pose a risk as the combustible element of the cable jacketing has been nullified by the coating.

Therefore, the cables in question are video/communication/data cables which have been field routed above suspended ceilings. These cables may not be plenum rated. Video/communication/data cables are low voltage. These low voltage cables are not generally susceptible to shorts which would result in a fire.

The basis for the approval request of this deviation is:

- The wiring above ceilings in offices, laboratories, etc. do not pose a hazard:
  - Low voltage cables are not susceptible to shorts causing a fire.
  - Power and control cables are IEEE-383 qualified (or equivalent) or sprayed with a flame retardant coating.
  - By eliminating cables with the potential shorts, this eliminates ignition sources, and therefore, the jacketing of cable is not relevant.

Nuclear Safety and Radiological Release Performance Criteria:

The location of wiring above suspended ceilings does not affect nuclear safety. Power and control cables comply, or comply with the intent of this section. Other wiring, while it may not be in armored cable, in metallic conduit, coated in a flame retardant material, or plenum rated, is low voltage cable not susceptible to shorts that would result in a fire. Therefore there is no impact on the nuclear safety performance criteria.

The location of cables above suspended ceilings has no impact on the radiological release performance criteria. The radiological review was performed based on the potential location of radiological concerns and is not dependent on the type of cables or locations of suspended ceilings. The cables do not change the results of the radiological release evaluation performed that concluded that potentially contaminated water is contained and smoke is monitored. The cables do not add additional radiological materials to the area or challenge systems boundaries.

Safety Margin and Defense-in-Depth:

Power and control cables meet the requirements or the intent of this requirement. Other wiring, while it may not be in armored cable, in metallic conduit, coated in a flame retardant material, or plenum rated, is low voltage cable not susceptible to shorts that would result in a fire. These areas with video/communication/data cables have been analyzed in their current configuration. Therefore, the inherent safety margin and conservatisms in these analyses remain unchanged.

The three echelons of defense-in-depth are 1) to prevent fires from starting (combustible/hot work controls), 2) rapidly detect, control and extinguish fires that do occur thereby limiting damage (fire detection systems, automatic fire suppression, manual fire suppression, pre-fire plans), and 3) provide adequate level of fire protection for systems and structures so that a fire will not prevent essential safety functions from being performed (fire barriers, fire rated cable, success path remains free of fire damage, recovery actions). The prior introduction of non-listed

video/communication/data cables routed above suspended ceilings does not impact fire protection defense-in-depth. Echelon 1 is maintained by the cable installation procedures documenting the requirements of NFPA 805 Section 3.3.5.1. The introduction of cables above suspended ceilings does not affect echelons 2 and 3. The video/communication/data cables routed above suspended ceilings does not directly result in compromising automatic fire suppression functions, manual fire suppression functions, or post-fire safe shutdown capability.

Conclusion:

NRC approval is requested for the use of non-listed video/communication/data cables routed above suspended ceilings.

The engineering analysis performed determined that the performance-based approach utilized to evaluate a variance from the requirements of NFPA 805 Chapter 3:

(A) Satisfies the performance goals, performance objectives, and performance criteria specified in NFPA 805 related to nuclear safety and radiological release;
(B) Maintains safety margins; and
(C) Maintains fire protection defense-in-depth (fire prevention, fire detection, fire suppression, mitigation, and post-fire safe shutdown capability).

Fire Protection Engineering RAI 07

Fire Area OD-84 in Table C-2 "NFPA 805 Required Fire Protection Systems and Features" identifies "transient combustible restrictions" as a fire protection feature to reduce risk. Provide more detail regarding this feature. Describe whether this is in addition to the combustible loading controls identified in Table B-1 Section 3.3 and 0-ADM-016. Describe how these will be managed.

RESPONSE:

Table B-1, Section 3.3 references 0-ADM-016, Fire Protection Program, which contains the following steps:

- Jobs that involve transient combustible and flammable substances shall comply with the requirements of procedure 0-ADM-016.1, Transient Combustible and Flammable Substance Program.
- The Fire Protection Program Manager shall ensure that fire protection equipment and measures are adequate to accommodate the introduction of excess transient material in areas containing safety related equipment.
- 0-ADM-016.1, Transient Combustible and Flammable Substances Program, lists the plant areas which have additional controls on transient combustibles. This procedure contains the following note and steps:
  - 4.1.1. B In some areas, the fire loading shall be further restricted to prevent the possibility of a fire from interfering with proper operation of systems required for safe shutdown.
  - Based on risk-informed considerations, more restrictive measures as indicated in Section 4.1 Step 2.A(1) and Section 4.1 Step 2.B(1) shall be enforced for the following HIGH RISK fire zones:
    - Radioactive Pipeway (10)
    - Auxiliary Building Hallway (58)
    - Rod Equipment Rooms (61,63)
    - Switchgear Rooms (67, 68, 70, 71)
    - North-South Breezeway (79A)
    - Aux Feed Cage (84)
    - Cable Spreading Room (98)
    - DC Equipment Rooms (101,104,108A, 108B)

To comply with 4.2.4 Performance-Based Approach, additional fire protection features shall be provided in Fire Area OD-84 to balance the risk. OD-84 is considered a High Risk fire zone requiring a transient combustible permit to introduce any amount of combustible materials into the area (other than incidental quantities maintained in direct possession).

Fire Protection Engineering RAI 08

In Table C-2 "NFPA 805 Required Fire Protection Systems and Features", floor drains are credited in the engineering evaluations as fire protection features in certain fire areas (e.g.; OD-79, OD-80, OD-81, OD-82, and OD-84). Provide more detail regarding the particular aspect or nature of the credit. Describe whether this attribute is currently identified in surveillance, testing, inspection, or maintenance. If not, describe how it will be addressed, and what specifically will be the functional criteria being maintained.

RESPONSE:

A detailed review of LAR Attachment C, Table C-2, Required Fire Protection Systems and Features, identified 18 fire zones which credit drains. The engineering evaluations identified in Attachment C, Table C-1 NFPA 805 Ch 4 Compliance (NEI 04-02 Table B-3) associated with these fire zones were reviewed to identify which evaluations require drains. None of the engineering evaluations identified in Table B-3 require drains. Further research identified that PTN-FPER-97-013, which is an outdoor Thermo-Lag engineering evaluation, required drains. Final analysis did not credit the outdoor Thermo-Lag in the final LAR. The associated systems and features with PTN-FPER-97-013 were originally input into Table C-2 but not removed when the evaluation was not credited resulting in the drains identified as a required feature in the LAR. Based on this review, floor drains are not a required fire protection feature in any fire zones at PTN. In addition when determining which systems and features were associated with PTN-FPER-97-013, it was noted that curbs should not be required features in some fire zones. Any fire protection system and feature that was required solely by PTN-FPER-97-013 was removed.

Attachment 3 of this letter is the revised Attachment C, Table C-2 NFPA 805 Required Fire Protection Systems and Features.

Fire Protection Engineering RAI 09

Attachment L Fire Pump Separation: The NFPA 805 Section 3.5.5 requirement identifies separation of the fire pumps from each other but, it also addresses the separation of the fire pumps from the remainder of the plant. The approval request #5 does not fully address the lack of fire barrier separation from the rest of the plant. Provide the additional information and justification regarding this separation. Ensure that the description also addresses the separation of circuits for remote and automatic pump start.

RESPONSE:

Transition Report Attachment L, "NFPA 805 Chapter 3 Requirements for Approval (10 CFR 50.48(c)(2)(vii))," Approval Request 5 has been revised to address lack fire barrier separation from the remainder of the plant and to discuss separation of circuits.

The lack of barrier separation from the rest of the plant was inherent in the original discussion that the location of the fire pumps are a significant distance (greater than 100 feet) from the next nearest power block structure, the Intake Structure. This discussion was enhanced.

Cables or circuits for the electric fire pump or the diesel fire pump are not protected. Portions of the electric fire pump cables are underground but also exposed in several fire zones. The intent of Attachment L, Approval Request 5 is that the diesel fire pump will be used if the electric fire pump is adversely affected by a fire in any plant area. The diesel fire pump circuits are self contained at the pump. There are no remote start circuits for the diesel fire pump, the fire pump auto starts on system pressure or is locally manually started.

The revised Attachment L Approval Request 5 is documented below.

Approval Request 5

NFPA 805 Sections 3.5.5 and 3.9.4

NFPA 805 Section 3.5.5 states:

> *"Each pump and its driver and controls shall be separated from the remaining fire pumps and from the rest of the plant by rated fire barriers."*

NFPA 805 Section 3.9.4 states:

> *"Diesel-driven fire pumps shall be protected by automatic sprinklers."*

There are no rated fire barriers separating the electric and the diesel-driven fire pumps or respective controllers at PTN. In addition, the diesel-driven fire pump (DDFP) is not provided with automatic sprinkler protection.

The electric fire pump, diesel driven fire pump, and associated controllers are located in the northeast corner of the protected area near the Raw Water Tanks and water treatment area. The diesel driven fire pump is located in an enclosed structure for weather protection while the electric fire pump is located outside. The electric fire pump is located approximately 50 feet to the west of the diesel driven fire pump. The fire pump controllers are located outside adjacent to

the respective fire pumps. The controllers are separated by more than 20 feet. This area of the yard has the Raw Water Tanks, the jockey pumps between the two fire pumps and miscellaneous other service water pumps to the west of the electric fire pump. There are no significant intervening combustibles between the pumps/controllers. These areas are a significant distance (greater than 100 feet) from the next nearest power block structure, the Intake Structure, but not separated from the rest of the plant by fire barriers. Portions of the electric fire pump cables are underground but also exposed in several fire zones. While the cables or circuits for the electric fire pump or the diesel fire pump are not protected, the diesel fire pump circuits are self contained at the pump. There are no remote start circuits for the diesel fire pump. The fire pump auto starts on system pressure or is locally manually started. Therefore, the ability to affect both pumps simultaneously is not possible.

Each fire pump is individually capable of providing the required capacity of the fire protection water system. The diesel driven fire pump has a nominal 500 gallon fuel tank located outside but adjacent to the diesel driven fire pump house within a containment area in the event of a spill or rupture. This tank provides over eight hours of operational time. The electric fire pump is powered via the plant vital power system and can be powered by the emergency diesel generator system.

The basis for the approval request of this deviation is:

- The diesel driven and electric fire pumps are spatially separated
- There are no credible fire scenarios that would impact both fire pumps
- Loss of one fire pump would not impact the ability to provide 100% of the required fire water demand.
- Reliable backup power supply is available to the electric fire pump in the event of a loss of offsite power and the diesel driven fire pump is impaired.

Nuclear Safety and Radiological Release Performance Criteria:

The lack of fire rated separation between fire pumps and from the rest of the plant and lack of automatic suppression over the diesel-driven fire pump does not affect nuclear safety as only one fire pump is required. Each fire pump individually has the ability to supply the required fire water. The fire water system may be used for refill to the Condensate Storage Tank but alternative measures are available if the fire water system is not available. Therefore there is no impact on the nuclear safety performance criteria.

The lack of fire rated separation between fire pumps and from the rest of the plant and lack of automatic suppression over the diesel-driven fire pump has no impact on the radiological release performance criteria. The radiological release review was performed based on the manual fire suppression activities in areas containing or potentially containing radioactive materials and is not dependent on the location of the fire pumps. The location of the fire pumps does not change the radiological release evaluation performed that concluded that potentially contaminated water

is contained and smoke is monitored. The configuration of the fire pumps does not add additional radiological materials to the area or challenge systems boundaries.

Safety Margin and Defense-in-Depth:

The lack of fire rated separation between fire pumps and from the rest of the plant and lack of automatic suppression over the diesel-driven fire pump does not negate the ability to supply the required fire water in a fire event. The nuclear safety analysis does not credit both of the fire pumps simultaneously, nor required suppression over the diesel fire pump. The use of these systems has been defined by the limitations of the analysis of the fire event. Therefore, the inherent safety margin and conservatisms in these analysis methods remain unchanged.

The three echelons of defense-in-depth are 1) to prevent fires from starting (combustible/hot work controls), 2) rapidly detect, control and extinguish fires that do occur thereby limiting damage (fire detection systems, automatic fire suppression, manual fire suppression, pre-fire plans), and 3) provide adequate level of fire protection for systems and structures so that a fire will not prevent essential safety functions from being performed (fire barriers, fire rated cable, success path remains free of fire damage, recovery actions). Echelon 3 is maintained by adequate separation of the fire pumps to ensure one fire pump is operable if a fire affects another pump. The location of the fire pumps does not affect echelons 1 and 2. The lack of fire rated separation between fire pumps and from the rest of the plant and lack of automatic suppression over the diesel-driven fire pump does not result in compromising automatic fire suppression functions, manual fire suppression functions, or post-fire safe shutdown capability.

Conclusion:

NRC approval is requested for the lack of fire rated separation between fire pumps and from the rest of the plant and lack of automatic suppression over the diesel-driven fire pump.

The engineering analysis performed determined that the performance-based approach utilized to evaluate a variance from the requirements of NFPA 805 Chapter 3:

(A) Satisfies the performance goals, performance objectives, and performance criteria specified in NFPA 805 related to nuclear safety and radiological release;

(B) Maintains safety margins; and

(C) Maintains fire protection defense-in-depth (fire prevention, fire detection, fire suppression, mitigation, and post-fire safe shutdown capability).

Fire Protection Engineering RAI 10

Fire protection systems and features that require NFPA code compliance are reflected in NFPA 805 Chapter 3. Code Compliance Evaluations, Fire Protection Program Manual, and System Descriptions referenced in Table B-1, appear to identify the NFPA codes of record for the plant, but it is unclear as to which codes will apply post NFPA 805 transition, and which appear in the current licensing basis from Appendix A of Branch Technical Position 9.5.1. Provide a complete list of committed NFPA codes with editions identified that will be in place post transition. For those codes with numerous editions, identify which plant areas and systems apply to which editions

RESPONSE:

PTN will include a table of the codes of records associated with fire protection systems and features identified in Table B-1 in the fire protection design basis document developed as part of implementation (Table S-3, Implementation Item # 16).

Each code conformance evaluation performed and referenced in Table B-1 includes a determination of the code of record that will apply post NFPA 805 transition. Below is a table of the applicable codes of record and the associated fire protection engineering report. For codes with reference to multiple editions, one report contains the evaluations for all systems and it is clearly identified in the evaluation which code edition applies to which systems.

NFPA Code of Record	Fire Protection Engineering Report
NFPA 10 - 1975	PTN-FPER-07-010
NFPA 12A - 1980	PTN-FPER-07-012A
NFPA 13 - 1983, 1987, 1996	PTN-FPER-07-013 (Attachments A, B, and C are individual evaluations for each code year)
NFPA 14 - 1974	PTN-FPER-07-014
NFPA 15 - 1969, 1982	PTN-FPER-07-15 (Attachment A and B are individual Evaluations for each code year)
NFPA 20 - 1978	PTN-FPER-07-020
NFPA 24 - 1973	PTN-FPER-07-024
NFPA 30 - 1976	PTN-FPER-07-030
NFPA 50A - 1969	PTN-FPER-07-050A

NFPA Code of Record	Fire Protection Engineering Report
NFPA 51B - 1976	PTN-FPER-07-051B
NFPA 72D - 1979	PTN-FPER-07-072D
NFPA 72E - 1978, 1984	PTN-FPER-07-072E (Attachment A and B are individual evaluations for each code year)
NFPA 80 - 1983	PTN-FPER-07-080
NFPA 90A - 1981	PTN-FPER-07-090A
NFPA 600 - 2005	PTN-FPER-07-600

The following codes are referenced in specific NFPA 805 Chapter 3 elements but do not have code compliance reviews, primarily because the codes are cited for definition only or are not applicable to PTN:

- NFPA 701 is for definition only
- NFPA 241 is N/A to PTN
- NFPA 220 is for definition only
- NFPA 101 is for definition only; does not impact NFPA 80 or 90A
- NFPA 256 is for definition only
- NFPA 1500 and 1582 are N/A to PTN
- NFPA 22 is N/A to PTN
- NFPA 16 and 750 are N/A to PTN
- NFPA 12 and 2001 are N/A to PTN
- NFPA 80A is N/A to PTN
- NFPA 251 is for definition only

Fire Protection Engineering RAI 11

LAR Attachment A Table B-1 Section 3.4.1(a) On-site Fire-Fighting Capability requires a fully staffed, trained, and equipped fire-fighting force to be available at all times. The compliance strategy in the Table B-1 is "Complies via Previous Approval". FAQ 12-0063 provided additional guidance regarding fire brigade staffing supporting the Emergency Preparedness Rule (10 CFR Part 50, Appendix E). Describe whether it is the intention to use the guidance provided in FAQ 12-0063 to comply with this element. If so, provide a revised compliance entry for this element.

RESPONSE:

The "Complies via Previous Approval" compliance strategy is based on FAQ 12-0063. FAQ 12-0063 was in development at the time of the PTN NFPA 805 LAR and therefore not explicitly referenced in the submittal.

The revised compliance basis for Section 3.4.1(a) should be replaced with the following:

> The requirement states that a fire brigade is available "at all times". The PTN program allows the minimum complement to drop for a maximum of two hours to account for unexpected absences due to illness, family emergencies, etc.
>
> The NRC approved the reduced fire brigade complement in an SER for Technical Specification revisions dated April 19, 1982. The approved Technical Specification for Fire Brigade states:
>
> > "A site Fire Brigade of at least 5 members shall be maintained onsite at all times*. The Fire Brigade shall not include 2 members of the minimum shift crew necessary for safe shutdown of the unit and any personnel required for other essential functions during a fire emergency."
> >
> > "*Fire Brigade composition may be less than the minimum requirements for a period of time not to exceed 2 hours in order to accommodate unexpected absence of Fire Brigade members provided immediate action is taken to restore the Fire Brigade to within the minimum requirements."
>
> The fire brigade requirements have not been altered from the approved technical specification requirements. This reflects the current PTN fire brigade organization. This position is in accordance with FAQ 12-0063.

Fire Modeling RAI 01

National Fire Protection Association Standard 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants," 2001 Edition, (NFPA 805), Section 2.4.3.3, states: "The PSA [probabilistic safety assessment] approach, methods, and data shall be acceptable to the AHJ [authority having authority]...." The NRC staff noted that fire modeling comprised the following:

- The Consolidated Fire Growth and Smoke Transport (CFAST) model was used to calculate control room abandonment times.

- The Generic Fire Modeling Treatments approach was used to determine the ZOI in all fire areas throughout plant.

Section 4.5.1.2, "Fire PRA" of the Transition Report states that fire modeling was performed as part of the Fire PRA development (NFPA 805 Section 4.2.4.2). Reference is made to Attachment J, "Fire Modeling V&V," for a discussion of the acceptability of the fire models that were used.

Specifically regarding the acceptability of CFAST for the control room abandonment time study:

a) Explain why the purge mode ventilation was not considered in the MCR abandonment study. In addition, explain how the ratios of fresh versus recirculated air were determined for the different parts of the control room complex.

b) Provide the basis for the assumption that the fire brigade is expected to arrive within 15 minutes. Describe the uncertainty associated with this assumption, discuss possible adverse effects of not meeting this assumption on the results of the Fire PRA and explain how possible adverse effects will be mitigated.

c) Section 3.2.2 of the abandonment report describes the selection of transient HRR and fire growth rate. It is stated that a medium fire growth rate is utilized since no guidance exists in NUREG 6850. Justify not using the guidance provided in FAQ-52, which specifies the time to peak HRR, based on the type of transient fire.

d) Provide a justification for using average upper bound heat of combustion values (as opposed to the most conservative values) for the cable mix that is present in MCR panels.

e) With respect to the sensitivity analysis in Appendix B of the Main Control Room Abandonment Report:

i. Explain how the results of the sensitivity analysis in Appendix B of the Main Control Room Abandonment Times report were used in the Fire PRA.

ii. In Section B.1, sensitivity results are shown for a 2-room model, as opposed to the base case of a 1-room model. It is agreed that the results are similar, however, the abandonment times for the sensitivity case are all lower than the base case. Describe the metrics that were used to determine whether the decrease in abandonment time in a sensitivity case was significant.

f) In the case where the cabinet venting was within the minimum distance prescribed in the Generic Fire Modeling Treatments (2-ft), describe the location factor that was used in the Main Control Room analysis. Describe how the Generic Fire Modeling Treatments approach was applied and implemented in CFAST.

g) No intervening/secondary combustibles were considered in the MCR. Provide justification for this assumption and explain if this is consistent with the actual configuration of the MCR.

Specifically regarding the acceptability of the Generic Fire Modeling Treatments approach:

h) Explain how the modification to the critical heat flux for a target that is immersed in a thermal plume described in Section 2.4 of the Generic Fire Modeling Treatments document was used in the ZOI determination at PTN.

i) Describe the purpose of the supplements to the Generic Fire Modeling Treatments that were developed and explain how these supplements were used in the analyses at PTN.

l) Describe how transient combustibles in an actual plant setting are characterized in terms of the three fuel package groupings in the GFMT Supplement 3 (Transient Ignition Source Strength). Identify areas, if any, where the NUREG/CR-6850 transient combustible HRR characterization (probability distribution and test data) may not encompass typical plant configurations. Finally, explain if any administrative action will be used to control the type of transient in a fire area.

RESPONSE:

Note: this RAI response addresses those portions or RAI FMOD 01 that are due for completion on March 18, 2013 (60 day responses). This consists of RAI FMOD 01 Parts a – i and Part l. RAI FMOD 01 Parts j, k, and o – v are 90 day responses and will be addressed in a separate submittal.

Part a.

The PTN Main Control Room is not provided with a smoke purge system. The only modes available are normal, filtered pressurization, and recirculation. The normal HVAC mode provides 0.47 m^3/s (1,000 cfm) outside air whereas the recirculation and pressurization modes do not inject any outside air into the control room ventilation system.

The fresh air to recirculated air ratio is assumed to be constant within the HVAC system due to mixing within the ductwork. The flow rate of fresh air available to different parts of the control complex is thus equal to the product of the fresh air ratio and the total volumetric supply for the particular area considered. The volumetric supply rates for each area are determined from the HVAC flow diagram and the duct flow drawing.

Part b

The fire brigade response time of fifteen minutes is cited in the Main Control Room Abandonment calculation as a potential reason for the status of the boundary doors to change during a fire within the control room. The boundary door status is a parameter that is treated as variable and results are provided for configurations in which the doors remain closed at all times, the doors remain open at all times, and the doors open at fifteen minutes. The solutions for the different door configurations provide an indication of the model sensitivity to the boundary openings. Because the results are tabulated for each door configuration, the most appropriate door configuration may be selected based on the appropriate information regarding the plant procedures, fire brigade drill times, and any other relevant factor.

Overall, it is shown that the results are insensitive to the boundary door status both when the forced ventilation system is operating normally and when it is inoperative. The most conservative scenarios involve those with the boundary doors remaining open for the entire duration considered. The abandonment times for cases in which the doors are open at fifteen minutes and the doors remaining closed for the entire fire duration are both about one minute longer or less than the abandonment times predicted when the doors remain open.

A simple means of quantifying the model sensitivity to the door configuration is by comparing an effective probability of control room abandonment for each case. The probability of control room abandonment is essentially an average non-suppression probability and is computed using the following equation:

$$P_{ab} = \sum SF_i \cdot P_{ns,i} \qquad \text{(FMOD 01–1)}$$

where P_{ab} is the probability of control room abandonment, SF is the severity factor for the ignition source heat release rate bin, i is the ignition source heat release rate bin number, and $P_{ns,i}$ is the probability that the fire associated with the ith ignition source heat release rate bin

will not be suppressed before abandonment occurs. The probability that the fire associated with the ith ignition source heat release rate bin will not be suppressed before abandonment is given by the following equation:

$$P_{ras,i} = \mathbf{MAX}\left(0.001, \exp(-\lambda t_i)\right) \qquad \text{(FMOD 01–2)}$$

where λ is an empirical constant equal to 0.33 min^{-1} for control rooms and t is the abandonment time (min). Table FMOD 01-1 summarizes the probability of abandonment for each case tabulated in the Main Control Room abandonment calculation in which the forced ventilation is operational and Table FMOD 01-2 summarizes the probability of abandonment for each case tabulated in the Main Control Room abandonment calculation in which the forced ventilation is inoperative.

Table FMOD 01-1 – Probability of Control Room Abandonment for Various Fire Scenarios when the Forced Ventilation System is Operational.

Door Status	NUREG/CR-6850 Discretized Distribution Case			
	Case 3 (Single Bundle Panel)	Case 4 (Multiple Bundle Panel)	Case 5 (Open Panel)	Case 8 (Transient)
Closed	0.001022	0.002193	0.006277	0.011267
Open at 15 minutes	0.001027	0.002268	0.006361	0.011267
Open	0.001029	0.002334	0.006353	0.011362

Table FMOD 01-2 – Probability of Control Room Abandonment for Various Fire Scenarios when the Forced Ventilation System is Inoperative.

Door Status	NUREG/CR-6850 Discretized Distribution Case			
	Case 3 (Single Bundle Panel)	Case 4 (Multiple Bundle Panel)	Case 5 (Open Panel)	Case 8 (Transient)
Closed	0.001036	0.002528	0.006890	0.01192
Open at 15 minutes	0.001036	0.002528	0.007006	0.01192
Open	0.001039	0.002739	0.007158	0.012229

The tables indicate that the variation in the probability of abandonment is lower than one order of magnitude among all cases when the door status is changed from closed to open. Further, the variation in the probability of abandonment is typically two orders of magnitude or lower (i.e., zero) when comparing the two most applicable configurations (closed door and door open at fifteen minutes).

The fire PRA uses the door closed case to characterize the control room abandonment scenarios. Although this is not the most conservative scenario, the variation between this case and the case

in which the door is open at fifteen minutes is minor and is not expected to have a significant effect on the overall plant risk calculation. Further, plant fire brigade response drill times performed under 0-ADM-016.2 indicate that the fire brigade is ready to engage between 12 – 23 minutes for fires on the Unit 3 turbine deck, which would be indicative of the response times at the control room entry. This suggests that the most appropriate door status is either closed or open at fifteen minutes.

Although the door status cases selected for use in the fire PRA may not represent the most conservative configuration, the variation in the effective probability of abandonment is shown to be low when summed over all heat release rate conditional probability bins. The actual differential in abandonment times is less than two minutes for any single fire scenario and is typical less than one minute. The results are computed using the NUREG/CR-6850 abandonment criteria coupled with a more conservative occupant immersion criterion of 50°C (122°F). When this criterion is removed, the abandonment times for each case will increase by up to five minutes based on the results shown in Appendix A of the Main Control Room abandonment calculation as the cause for abandonment shifts to the optical density threshold. This increase exceeds the variation in the abandonment times among the door configurations and fire scenarios listed in Tables FMOD 01-1 and FMOD 01-2. Consequently, it may be concluded that abandonment times used in the fire PRA are conservative relative to a calculation performed using the NUREG/CR-6850 abandonment criteria when considering the potential variations in the fire brigade arrival time (i.e., the boundary door status).

Part c

The heat release rate growth rate for transient fuel package fires were evaluated in the Main Control Room abandonment calculation as 'Medium' t^2 fires based on data provided in the SFPE Handbook of Fire Protection Engineering, Section 3–1. The heat release rate during the growth stage is defined by the following equation:

$$\dot{Q}(t) = \alpha t^2 \quad t < \sqrt{\dot{Q}_p / \alpha} \qquad \text{(FMOD 01–3)}$$

where $\dot{Q}(t)$ is the heat release rate (kW [Btu/s]) at time t (s), α is the growth constant (0.0117 kW/s^2 [0.0111 Btu/s^3]), and $\dot{Q}_p$ is the peak heat release rate for the fire scenario (kW [Btu/s]). The duration of the growth stage for transient fuel packages with heat release rates ranging from 22 – 578 kW (21.2 – 548 Btu/s) is 0.7 – 3.7 minutes. By contrast, recent guidance in NUREG/CR-6850, Supplement 1 indicates a constant growth time should be assumed: two minutes for loose or unconfined transient material and eight minutes for transient material located within containers or bins. Because the growth rate varies with the NUREG/CR-6850,

Supplement 1 approach, the method assumed in the Main Control Room abandonment calculation can be more or less conservative depending on the particular NUREG/CR-6850 heat release rate bin considered. The threshold heat release rate at which the NUREG/CR-6850, Supplement 1 approach is conservative may be estimated using Equation FMOD 01–3 and the recommended two minute (120 second) growth time. The resulting fire size is 168 kW (159 Btu/s), which corresponds to the NUREG/CR-6850 transient heat release rate Bin 5. As such, the transient results for heat release rate Bins 1 through 5 assume a faster heat release rate growth rate than NUREG/CR-6850, Supplement 1 and Bins 6 through 15 assume a slower heat release rate growth rate.

Two test cases are used to assess the sensitivity of the predicted abandonment times to assumed transient growth rate. One test case involves a transient fuel package fire in the control room under normal forced ventilation conditions and one test case involves a transient fuel package fire in the control room when the forced ventilation system is inoperative. In both test cases, the HVAC is aligned to the normal mode and one boundary door is open. Three NUREG/CR-6850 transient heat release rate bins are used for each test case: Bin 4, Bin 8, and Bin 12. The baseline abandonment times for these test cases as reported in the Main Control Room abandonment calculation are shown in Table FMOD 01-3. Table FMOD 01-3 also lists the predicted abandonment times when the transient is modeled with a constant two minute growth rate.

Table FMOD 01-3 – Sensitivity of Predicted MCR Abandonment Times to the Transient Heat Release Rate Growth Rate.

Fire Scenario	Ventilation Condition	Bin 4 Heat Release Rate	Bin 8 Heat Release Rate	Bin 12 Heat Release Rate
Baseline	**Normal**	**Over 25**	**5.7**	**3.8**
NUREG/CR-6850, Supplement 1 Growth Rate	Normal	Over 25	4.0	3.5
Baseline	**Inoperative**	**Over 25**	**4.8**	**4.0**
NUREG/CR-6850, Supplement 1 Growth Rate	Inoperative	Over 25	4.8	2.7

The table indicates that the results are somewhat sensitive to the growth rate profile for fires and results in a maximum 1.7 minute differential in the predicted abandonment time. In terms of the probability of abandonment, the difference between the baseline scenarios and the NUREG/CR-6850, Supplement 1 scenarios for an individual fire scenario and heat release rate bin may be used to quantify the potential effect on the results. The probability of abandonment for an individual scenario and heat release rate bin may be computed using Equations FMOD 01-1 and FMOD 01-2 as follows:

$$\Delta P_{ab,i} = SF_i \cdot \left(\mathbf{MAX}\left(0.001, \exp\left(-\lambda t_{i,bs}\right)\right) - \mathbf{MAX}\left(0.001, \exp\left(-\lambda t_{i,sb}\right)\right)\right) \qquad \text{(FMOD 01–4)}$$

where $\Delta P_{ab,i}$ is the difference in the probability of abandonment for heat release rate bin *i*, the subscript *s* indicates a sensitivity value, and subscript *b* indicates a baseline value. The difference in the probability of abandonment $(\Delta P_{ab,i})$ for normal forced ventilation conditions listed in Table FMOD 01-3 is as follows:

- Bin 4: 0.0
- Bin 8: 2.29 X 10-3
- Bin 12: 5.9 X 10-5

The cumulative effect for the normal forced ventilation conditions is expected to be ~ 15 X (1/3) X (0.0 + 2.29 X 10-3 + 5.9 X 10-5), or 0.01177. Given a cumulative baseline probability of abandonment of 0.011362 per Table FMOD 01-1, it is seen that the potential effect is relatively significant when the forced ventilation system is operating normally.

Similarly, the difference in the probability of abandonment for inoperative forced ventilation conditions listed in Table FMOD 01-3 is computed using Equation FMOD 01–4 as follows:

- Bin 4: 0.0
- Bin 8: 0.0
- Bin 12: 2.9 X 10-4

The cumulative effect for the inoperative forced ventilation conditions is expected to be ~ 15 X (1/3) X (0.0 +0.0 + 2.9 X 10-4), or 1.43 X 10-3. Given a cumulative baseline probability of abandonment of 0.012229 per Table FMOD 01-2, it is seen that the potential effect is relatively small when the forced ventilation system is inoperative.

Because the abandonment is predicted to be caused by a temperature threshold of 50°C (122°F), the sensitivity and thus the effect on the probability of abandonment would decrease to zero if the less conservative NUREG/CR-6850 temperature threshold of 95°C (200°F) is assumed. This is shown in Table FMOD 01-4.

Table FMOD 01-4 – Sensitivity of Predicted MCR Abandonment Times to the Transient Heat Release Rate Growth Rate when Assessed against the NUREG/CR-6850 Abandonment Criteria.

Fire Scenario	Ventilation Condition	Bin 4 Heat Release Rate	Bin 8 Heat Release Rate	Bin 12 Heat Release Rate
Baseline	**Normal**	**Over 25**	**5.7**	**3.8**
NUREG/CR-6850, Supplement 1 Growth Rate and NUREG/CR-6850 Abandonment Criteria	Normal	Over 25	Over 25	Over 25
Baseline	**Inoperative**	**Over 25**	**4.8**	**4.0**
NUREG/CR-6850, Supplement 1	Inoperative	Over 25	Over 25	Over 25

Growth Rate and NUREG/CR-6850 Abandonment Criteria				

Although the sensitivity of the predicted abandonment times is low and is not expected to affect the calculation results, the Main Control Room abandonment calculation will be updated as part of the response to RAI FMOD 06. The heat release rate growth time for the transient fuel package fires will be set to two minutes during the expected revision of the Main Control Room abandonment calculation.

Part d

The selection of the cable properties in the Main Control Room abandonment calculation is deduced from an assumed equal mix of polyethylene (PE) and polyvinyl chloride (PVC) cables. The cables within the control room panels consist of a mix of PVC/PE PVC/and cross-linked polyethylene (XLPE), with a significant fraction (~fifty percent) of the cable PVC jackets removed. When determining the heat of combustion, the average upper bound value for PE and PE/PVC cables is assumed. However, the mass of soot generated is maximized with a lower bound heat of combustion, as implied by the RAI.

In order to assess the effect of selecting a lower bound heat of combustion, two test cases are used to assess the sensitivity of the predicted abandonment times to alternate combustion properties. One test case uses the NUREG/CR-6850 closed electronic cabinet with multiple thermoplastic cable bundles. The second test case uses the NUREG/CR-6850 open electronic cabinet with multiple thermoplastic cable bundles fuel package in the Main Control Room. In both cases, three heat release rate bins are selected to provide an overall sense of the effect considered: Bin 4, Bin 8, and Bin 12. In addition, a normal forced ventilation condition and an inoperative forced ventilation condition are considered. A total of twelve individual scenarios are thus considered (2 ignitions sources X 3 heat release rate bins X 2 ventilation conditions) The baseline abandonment times for the baseline test cases is caused by a temperature increase of 50°C (122°F).

The cable fuel properties for PE, PE/PVC, and a mix of PE and PE/PVC are listed in Table FMOD 01-5. These are the properties used to model the cables in the Main Control Room abandonment calculation. Table FMOD 01-6 list the cable properties for PE, PE/PVC, and a mix of PE and PE/PVC using the lower bound heat of combustion as reported in the SFPE Handbook of Fire Protection Engineering, Section 3-4.

The focus of this sensitivity assessment is therefore to compare the results obtained using the original baseline properties and the properties obtained using the lower bound heat of combustion.

Table FMOD 01-5 – Baseline Cable Fuel Properties.				
Cable Jacket Type	**H/C Ratio (kg/kg [lb/lb])**	**CO/CO_2 Yield (kg/kg [lb/lb])**	**C/CO_2 Yield (kg/kg [lb/lb])**	**Heat of Combustion (kJ/kg [Btu/lb])**
PE	0.17 (0.17)	0.0087 (0.0087)	0.022 (0.022)	43,600 (18,800)
PE/PVC cables	0.15 (0.15)	0.11 (0.11)	0.11 (0.11)	31,800 (13,700)
PE-PE/PVC Mix (Baseline)†	**0.16 (0.16)**	**0.061 (0.061)**	**0.064 (0.064)**	**37,700 (16,200)**

†Note that the baseline yield properties are deduced from the average of the individual yields rather than the yield ratios.

Table FMOD 01-6 –Cable Fuel Properties Based on Minimum Heat of Combustion.				
Cable Jacket Type	**H/C Ratio (kg/kg [lb/lb])**	**CO/CO_2 Yield (kg/kg [lb/lb])**	**C/CO_2 Yield (kg/kg [lb/lb])**	**Heat of Combustion (kJ/kg [Btu/lb])**
PE	0.17 (0.17)	0.0087 (0.0087)	0.022 (0.022)	43,600 (18,800)
PE/PVC cables	0.15 (0.15)	0.147 (0.147)	0.136 (0.136)	20,000 (9,590)
PE-PE/PVC Mix (Low Heat of Combustion)†	**0.16 (0.16)**	**0.0421 (0.0421)**	**0.0483 (0.0483)**	**31,800 (13,700)**

†Note that the PE-PE/PVC mix yield properties are deduced from the average of the individual yields rather than the yield ratios.

The predicted abandonment times for each cable type are summarized in Tables FMOD 01-7 and FMOD 01-8 for the three bins within the two test cases.

Table FMOD 01-7 – Sensitivity of Predicted MCR Abandonment Times to the Heat of Combustion - NUREG/CR-6850 Appendix E Case 4.				
Fire Scenario	**Ventilation Condition**	**Bin 4 Heat Release Rate**	**Bin 8 Heat Release Rate**	**Bin 12 Heat Release Rate**
Baseline	**Normal**	**Over 25**	**13.0**	**10.0**
Low Heat of Combustion	Normal	Over 25	13.0	10.3
Baseline	**Inoperative**	**24.0**	**12.0**	**10.0**
Low Heat of Combustion	Inoperative	25.0	12.5	10.2

Table FMOD 01-8 – Sensitivity of Predicted MCR Abandonment Times to the Heat of Combustion - NUREG/CR-6850 Appendix E Case 5.				
Fire Scenario	**Ventilation Condition**	**Bin 4 Heat Release Rate**	**Bin 8 Heat Release Rate**	**Bin 12 Heat Release Rate**
Baseline	**Normal**	**12.0**	**8.2**	**6.7**
Low Heat of Combustion	Normal	11.4	8.0	6.6
Baseline	**Inoperative**	**11.0**	**8.0**	**6.5**
Low Heat of Combustion	Inoperative	11.3	7.9	6.5

The tables indicate that the results are minimally sensitive to the growth rate profile for fires and results in a maximum 0.6 minute differential in the predicted abandonment time. The tables also indicate that the most conservative mix of cable properties varies from scenario to scenario. This is due to the differences in the fuel description (CO and CO_2 yields), which can have a slight effect on the rate of the hot gas layer descent time and the mass/energy balance. In terms of the probability of abandonment, the difference between the baseline scenarios and the low heat of combustion (sensitivity) scenarios for the NUREG/CR-6850 Case 4 electrical panels as computed using Equation FMOD 01–4 is as follows for normal forced ventilation conditions:

- Bin 4: 0.0 (normal forced ventilation)
- Bin 8: 0.0 (normal forced ventilation)
- Bin 12: –6.95 X 10-6 (normal forced ventilation)
- Bin 4: 0.0 (inoperative forced ventilation)
- Bin 8: –7.83 X 10-5 (inoperative forced ventilation)
- Bin 12: –4.71 X 10-6 (inoperative forced ventilation)

Note the differences are negative indicating that the baseline case is more conservative than the sensitivity case. The difference between the baseline scenarios and the low heat of combustion (sensitivity) scenarios for the NUREG/CR-6850 Case 5 electrical panels as computed using Equation FMOD 01–4 is as follows for inoperative forced ventilation conditions:

- Bin 4: 2.0 X 10-4 (normal forced ventilation)
- Bin 8: 3.2 X 10-5 (normal forced ventilation)
- Bin 12: 3.7 X 10-5 (normal forced ventilation)
- Bin 4: –1.17 X 10-4 (inoperative forced ventilation)
- Bin 8: 1.7 X 10-5 (inoperative forced ventilation)

- Bin 12: 0.0 (inoperative forced ventilation)

The cumulative effect for the normal forced ventilation conditions is expected to be ~ 15 X (1/3) X (2.0 X 10-4 + 3.2 X 10-5 + 3.7 X 10-5), or 1.16 X 10-3. Given a cumulative baseline probability of abandonment of 0.006353 per Table FMOD 01-1, it is seen that the potential effect is moderate (~ fifteen percent). Similarly, the cumulative effect for the inoperative forced ventilation conditions is expected to be ~ 15 X (1/3) X (–1.17 X 10-4 + 1.7 X 10-5 + 0.0), or – 5.04 X 10-4. This indicates that the baseline case is more conservative than the sensitivity case when the contributions from each heat release rate bin are summed.

The sensitivity analysis provided in Tables FMOD 01-7 and FMOD 01-8 are based on the original abandonment criteria listed in Main Control Room abandonment calculation, which includes a conservative 50°C (122°F) occupant immersion threshold. If the results are viewed using only the NUREG/CR-6850 abandonment criteria, it can be shown that the baseline results are conservative relative to all sensitivity cases. This is shown in Tables FMOD 01-9 and FMOD 01-10. This means that the conservatism in the Main Control Room abandonment calculation bounds the results uncertainty associated with the potential differences in the heat of combustion for the cable materials. This is caused by the very conservative low temperature abandonment threshold that is assumed in the Main Control Room abandonment calculation.

Table FMOD 01-9 – Sensitivity of Predicted MCR Abandonment Times to the Heat of Combustion - NUREG/CR-6850 Appendix E Case 4 (NUREG/CR-6850 Abandonment Criteria).

Fire Scenario	Ventilation Condition	Bin 4 Heat Release Rate	Bin 8 Heat Release Rate	Bin 12 Heat Release Rate
Baseline	**Normal**	**Over 25**	**13.0**	**10.0**
Low Heat of Combustion - NUREG/CR 6850 Abandonment Criteria	Normal	Over 25	18.5	14.5
Baseline	**Inoperative**	**24.0**	**12.0**	**10.0**
Low Heat of Combustion - NUREG/CR 6850 Abandonment Criteria	Inoperative	25.0	17.1	13.9

Table FMOD 01-10 – Sensitivity of Predicted MCR Abandonment Times to the Heat of Combustion - NUREG/CR-6850 Appendix E Case 5 (NUREG/CR-6850 Abandonment Criteria).

Fire Scenario	Ventilation Condition	Bin 4 Heat Release Rate	Bin 8 Heat Release Rate	Bin 12 Heat Release Rate
Baseline	**Normal**	**12.0**	**8.2**	**6.7**
Low Heat of Combustion - NUREG/CR 6850	Normal	19.6	13.2	11.3

Abandonment Criteria				
Baseline	**Inoperative**	**11.0**	**8.0**	**6.5**
Low Heat of Combustion - NUREG/CR 6850 Abandonment Criteria	Inoperative	18.0	12.8	11.1

Part e

Subpart i

The results of the sensitivity analysis in Appendix B of the Main Control Room abandonment calculation were not directly used in the fire PRA. The intent of the sensitivity analysis is to identify parameters for which a variation can lead to a non-conservative result. The baseline parameters were selected to be representative of the actual conditions. The appendix identifies which parameters could affect the results in a significant way and would normally be used to identify the need for a revised calculation should a different parameter input be justified.

The Main Control Room abandonment calculation will be updated as part of the response to RAI FMOD 06, which is related to the sensitivity analysis. As part of the update, the purpose of the sensitivity analysis in Appendix B of the Main Control Room abandonment calculation will be revised such that it will be used to demonstrate that the parameter selection is either conservative or does not have a significant effect on the overall probability of abandonment as calculated using Equations FMOD 01–1 and FMOD 01–2.

Subpart ii

The metrics used to determine whether a parameter has a significant effect were qualitative and based on the total change in abandonment time. Typically, changes of one to two minutes or a variation in the results of less than fifteen percent variation were considered small, changes of two to five minutes or a variation in the results of fifteen to thirty percent were considered moderate, and changes of five minutes or more or a variation in the results of thirty percent or more were considered significant.

As previously noted, the Main Control Room abandonment calculation will be updated as part of the response to RAI FMOD 06, which is related to the sensitivity analysis. As part of the update, the purpose of the sensitivity analysis in Appendix B of the Main Control Room abandonment calculation will be revised such that it will be used to demonstrate that the parameter selection is either conservative or does not have a significant effect on the overall probability of abandonment as calculated using Equations FMOD 01-1 and FMOD 01-2. The baseline parameter selections will be revised in the Main Control Room abandonment calculation to yield conservative results if the parameter variations can have a significant non-conservative effect on the probability of abandonment and the variation range can be justified.

Part f

Additional walkdowns are planned to assess the proximity of electrical panel ignition sources to wall boundaries as part of the response to Part p of this RAI, which has a ninety-day response. The scope of the additional walkdowns will include the Main Control Room. Additional fire scenarios will be included in a revised control room abandonment calculation based on the findings of these walkdowns.

The "Generic Fire Modeling Treatments" report is not applied in the main control room. The goal of the "Generic Fire Modeling Treatments" report is to provide zone of influence and hot gas layer information applicable to target and component damage. The Main Control Room Abandonment calculation is focused on habitability and uses a different set of performance criteria. In addition, the control room abandonment calculation considers the effects of multiple ignition source heat release rate bins.

Part g

The Main Control Room abandonment calculation only considered the initial ignition sources and did not include secondary combustibles. A review of the raceway drawings for the control room area indicates that this is true in the control room operator area and above the main control boards, but there is a single 0.6 m (2 ft) wide cable tray or a stack of two single 0.6 m (2 ft) cable trays routed above several closed electrical panels located along and near the control room north, south, and west boundaries.

A single test case is used to assess the sensitivity of the predicted abandonment times to presence of secondary combustibles above the closed electrical panels. The test case involves the closed panel containing multiple bundles of non-IEEE-383 qualified/thermoplastic cables (NUREG/CR-6850 Appendix E Case 4). The forced ventilation system is assumed to be inoperative and the boundary door is assumed to be open. Three heat release rate bins are selected to provide an overall sense of the effect considered: Bin 4, Bin 8, and Bin 12. The baseline abandonment times for these test cases as reported in the Main Control Room abandonment calculation are shown in Table FMOD 01-11. Table FMOD 01-11 also lists the predicted abandonment times when the electrical panel fire is evaluated in combination with a stack of two 0.6 m (2 ft) wide cable trays. The heat release rate for the cable trays is developed using the guidelines provided in NUREG/CR-6850 and NUREG/CR-7010, Volume 1. The lowest cable tray is assumed to ignite one minute after the ignition source per NUREG/CR-6850 Appendix H. The initial ignition length is 0.6 m (2 ft), which corresponds to the characteristic dimension parallel to the cable trays for the closed electrical panels. The heat release rate per unit area of 250 kW/m^2 (22 Btu/s-ft^2) and the flame spread rate of 0.9 mm/s (0.35 in/s) for non-IEEE-383 qualified/thermoplastic cables is assumed for the cable trays. The lowest cable tray in the stack is elevated about 3.9 m (12.8 ft) above the floor slab or about 3.6 m (11.8 ft) above the elevated floor.

Table FMOD 01-11 – Sensitivity of Predicted MCR Abandonment Times to the Transient Heat Release Rate Growth Rate – NUREG/CR-6850 Appendix E Case 4.				
Fire Scenario	**Ventilation Condition**	**Bin 4 Heat Release Rate**	**Bin 8 Heat Release Rate**	**Bin 12 Heat Release Rate**
Baseline	**Inoperative**	**24**	**12**	**10**
Baseline with Secondary Combustibles	Inoperative	12	9.8	8.7

The table indicates that the results are sensitive to the presence of secondary combustibles, especially for the lower heat release rate bins. In terms of the probability of abandonment, the difference between the baseline scenarios and the scenarios with secondary combustibles as computed using Equation FMOD 01–4 is as follows:

- Bin 4: 3.2 X 10-3
- Bin 8: 5.5 X 10-4
- Bin 12: 4.0 X 10-5

The cumulative effect is expected to be ~ 15 X (1/3) X (2.2 X 10-3 + 5.5 X 10-4 + 4.0 X 10-5), or 0.0189. Given a cumulative baseline probability of abandonment of 0.002739 per Table FMOD 01-2, it is seen that the potential effect is significant.

The abandonment times for both the baseline and sensitivity (secondary combustible) case are caused by reaching a temperature threshold of 50°C (122°F), which is a more conservative abandonment criterion than required by NUREG/CR-6850. In addition, the base height for the fire is set at the floor, which is more conservative than recommended in NUREG/CR-6850, Supplement 1 for closed electrical panels. Table FMOD 01-12 compares the baseline abandonment times reported in the Main Control Room abandonment calculation are compared against the predicted abandonment time with secondary combustibles using only the NUREG/CR-6850 abandonment criteria in and the fire position guidance provided in NUREG/CR-6850, Supplement 1.

Table FMOD 01-12 – Sensitivity of Predicted MCR Abandonment Times to the Transient Heat Release Rate Growth Rate when Assessed against the NUREG/CR-6850 Abandonment Criteria – NUREG/CR-6850 Appendix E Case 4.				
Fire Scenario	**Ventilation Condition**	**Bin 4 Heat Release Rate**	**Bin 8 Heat Release Rate**	**Bin 12 Heat Release Rate**
Baseline	**Inoperative**	**24**	**12**	**10**
Baseline with Secondary Combustibles and Elevated Ignition Source	**Inoperative**	21.6	17.7	17.5

The table indicates that the results are still sensitive to the presence secondary combustibles at low heat release rate bins even when the conservative temperature threshold of 50°C (122°F) is not applied and the fire base height is elevated per NUREG/CR-6850, Supplement 1 recommendations. However, the abandonment time predicted by the baseline is more conservative for the high heat release rate bins. The difference between the baseline scenarios and the scenarios with secondary combustibles as computed using Equation FMOD 01–4 is as follows:

- Bin 3: 0.0
- Bin 8: –4.36 X 10-4
- Bin 12: –6.76 X 10-5

The cumulative effect is expected to be ~ 15 X (1/3) X (0.0 – 1.8 X 10-4 – 3.69 X 10-5), or – 2.52 X 10-3, which is comparable in magnitude to the baseline probability of abandonment of 0.002739, but indicates that the baseline configuration is more conservative.

Although the overall effect of the secondary combustibles when compared against scenarios evaluated using the NUREG/CR-6850 and NUREG/CR-6850, Supplement 1 abandonment fire location guidance is small, the control room abandonment calculation will updated to include closed panel scenarios that involve secondary combustibles. The Main Control Room abandonment calculation update will be provided as part of the response to RAI FMOD 06.

Part h

The modified critical heat flux concept was applied at the PTN plant using a bin-type approach analogous to a two point treatment of the heat release rate conditional probability distribution. The modified critical heat flux is depicted in Figure 2-1 of the "Generic Fire Modeling Treatments" document as a continuous function of the ambient or target immersion temperature. In the case of an IEEE-383 qualified/thermoset cable target, this function is defined over a range between 20°C (68°F) (where there is no external heat flux contribution from the surroundings) to 329°C (625°F) (where the external heat flux from the surroundings is by itself sufficient to cause the target to fail). In the case of a non-IEEE-383 qualified/thermoplastic cable target, this function is defined over a range between 20°C (68°F) (no external heat flux contribution from the surroundings) to 204°C (400°F) (external heat flux from the surroundings is by itself sufficient to cause the target to fail).

The application in the PTN FPRA essentially divides the continuous modified critical heat flux functions into two Zone of Influence (ZOI) bins and a full room burnout bin. The first bin which is applicable to both IEEE-383 qualified/thermoset and non-IEEE-383 qualified/thermoplastic cable targets corresponds to the applicability range of ambient temperature ZOI, which is between a temperature of 20 – 80°C (68 – 176°F). Within this range, the ZOIs for the IEEE-383

qualified cable target are applicable because the heat flux contribution from the surroundings is relatively small (~0.5 – 1 kW/m² [0.045 - 0.088 Btu/s-ft²]).

If the hot gas layer temperature is predicted to be greater than 80°C (176°F), the heat flux contribution from the surroundings can be evaluated relative to its effect on the ZOI dimensions under a steady state exposure assumption. In the case of a non-IEEE-383 qualified/thermoplastic cable target, the second ZOI bin is defined through the use of the ZOI for the solid state control component (i.e., sensitive component) targets as listed in "Supplemental Generic Fire Modeling Treatments: Hot Gas Layer Tables". The effective temperature range for this ZOI bin is 80 – 131.6°C (176 – 269°F).

If the surrounding temperature exceeds 131.6°C (269°F) for non-IEEE-383 qualified/thermoplastic cable targets, then a full room burnout is assumed. This is because the ZOI dimensions increase rapidly to the room dimensions as the enclosure (ambient) temperature approaches the steady state temperature threshold of 329°C (625°F) for IEEE-383 qualified/thermoset cable targets or 204°C (400°F) for non-IEEE-383 qualified/thermoplastic cable targets.

Part i

There are five supplements to the original "Generic Fire Modeling Treatments" report 1SPH02902.030, Revision 0, three of which are used by the PTN FPRA. The three supplements are as follows:

- Supplement 1: "Supplemental Generic Fire Modeling Treatments: Closed Electrical Panels";
- Supplement 2: "Supplemental Generic Fire Modeling Treatments: Hot Gas Layer Tables"; and
- Supplement 3: "Supplemental Generic Fire Modeling Treatments: Transient Fuel Package Ignition Source Characteristics".

Supplement 1. Supplement 1 to the "Generic Fire Modeling Treatments" report was developed to provide an estimate of the maximum potential fire size that can develop in electrical panels that are closed but vented or otherwise unsealed. The supplement consists of a theoretical model development (energy and mass balance on a control volume) and a parametric sensitivity analysis. The supplement consists of two parts: the first part provides the maximum heat release rate that can be supported by a vented metal box and the second part uses this heat release rate information as input into the same calculation process used by the "Generic Fire Modeling Treatments" report to generate the ZOI dimensions. The calculation method is validated against available fire test data for either electrical panel fire tests or tests in metal enclosures having dimensions comparable to electrical panels.

The supplement is applied at PTN to estimate the peak heat release rate, which is assigned the 98th percentile heat release rate bin, and its associated zone of influence for a limited number of electrical panels in various plant areas.

Supplement 2. Supplement 2 to the "Generic Fire Modeling Treatments" report was developed to provide additional information to the results provided in the "Generic Fire Modeling Treatments" report based on needs that arose when implementing the results of the "Generic Fire Modeling Treatments" report. Specifically, Supplement 2 provides additional hot gas layer tables for transient and electrical panel ignition sources having a time-dependent growth rate and for electrical panel ignition sources with secondary combustible (cable tray) configurations. Hot gas layer tables are also provided for alternate temperature thresholds that correspond to different points on the modified heat flux curve described in 1SPH02902.030, Revision 0. Finally, ZOI and hot gas layer tables are provided for solid state control components, which are used at PTN to extend the ZOI dimensions in enclosures that are hotter than 80°C (176°F) as described in the response to Part h of this RAI. The ZOI dimensions and hot gas layer calculations for the solid state control components are generated using the same methods described in the Generic Fire Modeling Treatments" report except that the threshold heat flux for damage is 3 kW/m^2 (0.26 Btu/s-ft^2) as recommended in NUREG/CR-6850. The tables for ignition source – secondary fuel package combinations are developed for a two tray secondary cable tray configuration. The cable trays that are ignited are each 0.45 m (1.5 ft) wide, positioned adjacent to one another, and are assumed to ignite at a single point above an ignition source. The lateral fire spread progresses as recommended in NUREG/CR-7010, Volume 1. Additional details on this calculation method are provided in the response to Parts l and k of this RAI response.

The hot gas layer tables and ZOI dimensions for the ignition sources with time-dependent growth rates are calculated using the calculation procedures developed for the original "Generic Fire Modeling Treatments" report but with different input parameters and solution planes. The basis for the input parameter changes is NUREG/CR-6850 for the electrical panel growth rate and NUREG/CR-6850, Supplement 1 for the transient ignition source growth rate. Appendix B of 1SPH02902.030, Revision 0 documents the generic CFAST fire model approach that is used including the basis for the enclosure, fuel, and ventilation input parameters.

Supplement 2 to the "Generic Fire Modeling Treatments" report is applied in a limited number of plant areas at PTN primarily to estimate the hot gas layer effects for ignition sources that involve secondary combustible materials. Additional details on this are provided in the response to Parts l and k of this RAI. Supplement 2 to the "Generic Fire Modeling Treatments" report is also used in areas where the extended non-IEEE-383 qualified/thermoplastic cable ZOI is used as described in the response to Part h of this RAI.

Supplement 3. The purpose of Supplement 3 to the "Generic Fire Modeling Treatments" report is to provide a basis for the transient ignition source heat release rate per unit area, fire duration,

and flame height. The report uses the transient fire test data referenced in NUREG/CR-6850 to estimate the transient ignition source characteristics of interest in order to provide a narrower range of input parameters for the ZOI calculations.

Supplement 3 to the "Generic Fire Modeling Treatments" report is primarily an analysis of test data; however, several revised ZOI tables using the results of the analysis are provided for transient fuel packages in the open, wall, and corner configuration. The ZOI tables were developed using the calculation procedures developed for the original "Generic Fire Modeling Treatments" report. The basis for the input parameter changes as well as the application limits are provided by the analysis summarized in Supplement 3 to the "Generic Fire Modeling Treatments" report. The original "Generic Fire Modeling Treatments Report 1SPH02902.030, Revision 0 documents the basis for the overall ZOI calculation approach. The wall and corner configurations are assessed using the 'Image' method as described in NIST-GCR-90-580.

The ZOI dimensions for the transient fuel package fire as reported in Supplement 3 to the "Generic Fire Modeling Treatments" report are used in a limited number of plant areas at PTN such as the Cable Spreading Room (CSR).

Part 1

The transient fuel packages are categorized as miscellaneous materials (trash configurations) that do not contain acetone or other combustible liquids. This corresponds to the Group 3 and Group 4 transient fuel packages described in Supplement 2 of the "Generic Fire Modeling Treatments" report. The 98th percentile transient fuel packages are considered a special case of the Group 3 and Group 4 transient fuel packages with a specific heat release rate per unit area as described in the Supplement 2 of the "Generic Fire Modeling Treatments" report.

The transient fire heat release rate distribution specified in NUREG/CR 6850 as a 317 kW (300 Btu/s) 98th percentile peak heat release rate fire is considered to be generically applicable to nuclear power plants. The PTN plant does not differ in any significant manner with respect to its transient combustible controls to warrant a significant increase or decrease in the applicable heat release rate profile. However, for areas that have been designated as "no transient combustible areas", to address the potential for violation of these controls, a 69 kW (65 Btu/s) 98th percentile peak heat release rate fire was applied. This heat release rate is considered appropriate given the unlikely event that transients are stored in these areas contrary to the controls imposed. The 69 kW (65 Btu/s) heat release rate was defined based on the heat release rate specified in NUREG/CR-6850 for a motor fire given that the most likely transient fire in a zone with limited transients would be associated with temporary cabling since this configuration would provide both the ignition source (energized temporary cabling) and combustible (cable insulation). The motor configuration would resemble such a transient fire. Monitoring of the controls and evaluation of their effectiveness will provide a basis for assessing the appropriateness of this HRR as will the monitoring of other transient fires at PTN and industry wide with respect to the use of the nominal 317 kW (300 Btu/s) peak heat release rate transient fire.

Fire Modeling RAI 02 a)

NFPA 805, Section 2.5, requires damage thresholds be established to support the performance based approach. Thermal impact(s) must be considered in determining the potential for thermal damage of structures, systems, or components. Appropriate temperature and critical heat flux criteria must be used in the analysis. Section 6.1 on page 6-1 of the Fire Scenarios Report states that, "Since the cables used at Turkey Point are, for the most part, non-IEEE-383 qualified cables, the damage threshold for these cables specified in NUREG/CR-6850 is used in this evaluation." Provide the following information:

Describe how the installed cabling in the power block was characterized, specifically with regard to the critical damage threshold temperatures and critical heat flux for thermoset and thermoplastic cables as described in NUREG/CR-6850.

RESPONSE:

All cables at the Turkey Point plant were treated as thermoplastic non-qualified IEEE-383 cables. Although some newer cables at PTN may be thermoset IEEE-383 cables, the majority of cables are thermoplastic non-qualified IEEE-383 cables. The applied critical damage threshold temperature and critical heat flux was 205 degree Celsius and 6 kW/m^2, respectively. These critical damage thresholds come directly from NUREG/CR-6850 [1] Appendix H Table H-1. The HRR distributions applied correspond to the NUREG/CR-6850 [1] Appendix E Table E-1 heat release rate distribution cases for unqualified cables.

Fire Modeling RAI 02 b)

NFPA 805, Section 2.5, requires damage thresholds be established to support the performance based approach. Thermal impact(s) must be considered in determining the potential for thermal damage of structures, systems, or components. Appropriate temperature and critical heat flux criteria must be used in the analysis. Section 6.1 on page 6-1 of the Fire Scenarios Report states that, "Since the cables used at Turkey Point are, for the most part, non-IEEE-383 qualified cables, the damage threshold for these cables specified in NUREG/CR-6850 is used in this evaluation." Provide the following information:

If present, explain how raceways with a mixture of thermoset and thermoplastic cables were treated in terms of damage thresholds.

RESPONSE:

All cables at the Turkey Point plant were treated as thermoplastic non-qualified IEEE-383 cables. Although some newer cables at PTN may be thermoset IEEE-383 cables, the majority of cables are thermoplastic non-qualified IEEE-383 cables. The applied critical damage threshold temperature and critical heat flux was 205 degrees Celsius and 6 kW/m^2, respectively. These critical damage thresholds come directly from NUREG/CR-6850 [1] Appendix H Table H-1. The HRR distributions applied correspond to the NUREG/CR-6850 [1] Appendix E Table E-1 heat release rate distribution cases for unqualified cables.

Fire Modeling RAI 02 c)

NFPA 805, Section 2.5, requires damage thresholds be established to support the performance based approach. Thermal impact(s) must be considered in determining the potential for thermal damage of structures, systems, or components. Appropriate temperature and critical heat flux criteria must be used in the analysis. Section 6.1 on page 6-1 of the Fire Scenarios Report states that, "Since the cables used at Turkey Point are, for the most part, non-IEEE-383 qualified cables, the damage threshold for these cables specified in NUREG/CR-6850 is used in this evaluation." Provide the following information:

Section 2.0 of the Generic Fire Modeling Treatments document provides a discussion of damage criteria for different types of targets. Section 2.1 of the Generic Fire Modeling Treatments document states: "Damage to IEEE-383 qualified cables is quantified as either an imposed incident heat flux of 11.4 kW/m2 (1 Btu/s-ft2) or an immersion temperature of 329°C (625°F) per Nuclear Regulatory Guidance [NRC, 2005, NUREG 6850, 2005]." Section 2.2 of the Generic Fire Modeling Treatments document states: "Damage to non-IEEE-383 qualified cables is quantified as either an imposed incident heat flux of 5.7 kW/m2 (0.5 Btu/s-ft2) or an immersion temperature of 204 °C (400 °F) per Nuclear Regulatory Guidance [NRC, 2005, NUREG 6850, 2005]." The above statements from Generic Fire Modeling Treatments document imply that in the Generic Fire Modeling Treatments document, IEEE-383 qualified cables are assumed to be equivalent in terms of damage thresholds to "thermoset" cables as defined in Table 8-2 of NUREG/CR-6850. In addition, non-IEEE-383 qualified cables are assumed to be equivalent to "thermoplastic" cables as defined in Table 8-2 of NUREG/CR 6850. These assumptions may or may not be correct. An IEEE-383-qualified cable may or may not meet the criteria for a "thermoset cable" as defined in NUREG/CR-6850. It is also possible that a non-IEEE-383 qualified cable actually meets the NUREG/CR-6850 criteria for a "thermoset" cable. For those areas that are assumed to have thermoset damage criteria, confirm that the cables are actually thermoset and that the potential confusion about IEEE-383/thermoset is not applicable.

RESPONSE:

All cables at the Turkey Point plant were treated as thermoplastic non-qualified IEEE-383 cables. Although some newer cables at PTN may be thermoset IEEE-383 cables, the majority of cables are thermoplastic non-qualified IEEE-383 cables. The applied critical damage threshold temperature and critical heat flux was 205 degree Celsius and 6 kW/m^2, respectively. These critical damage thresholds come directly from NUREG/CR-6850 [1] Appendix H Table H-1. The HRR distributions applied correspond to the NUREG/CR-6850 [1] Appendix E Table E-1 heat release rate distribution cases for unqualified cables.

Fire Modeling RAI 02 d)

NFPA 805, Section 2.5, requires damage thresholds be established to support the performance based approach. Thermal impact(s) must be considered in determining the potential for thermal damage of structures, systems, or components. Appropriate temperature and critical heat flux criteria must be used in the analysis. Section 6.1 on page 6-1 of the Fire Scenarios Report states that, "Since the cables used at Turkey Point are, for the most part, non-IEEE-383 qualified cables, the damage threshold for these cables specified in NUREG/CR-6850 is used in this evaluation." Provide the following information:

Explain how the damage thresholds for non-cable components (i.e., pumps, valves, electrical cabinets, etc.) were determined. Identify any non-cable components that were assigned damage thresholds different from those for thermoset and thermoplastic cables.

RESPONSE:

Thermoplastic, non-IEEE-383 cable damage temperatures were applied to non-cable components (i.e., pumps, valves, electrical cabinets, etc.) as specified in NURGE/CR-6850, Section H.2.

Fire Modeling RAI 03

NFPA 805, Section 2.7.3.2, "Verification and Validation," states, "Each calculational model or numerical method used shall be verified and validated through comparison to test results or comparison to other acceptable models." Section 4.5.1.2, "Fire FPRA" of the Transition Report states that fire modeling was performed as part of the Fire PRA development (NFPA 805 Section 4.2.4.2). Reference is made to Attachment J, "Fire Modeling V&V," for a discussion of the verification and validation (V&V) of the fire models that were used. Furthermore Section 4.7.3 "Compliance with Quality requirements in Section 2.7.3 of NFPA 805" of the Transition Report states, "Calculational models and numerical methods used in support of compliance with 10 CFR 50.48(c) were verified and validated as required by Section 2.7.3.2 of NFPA 805."
Regarding the V&V of fire models:

a) Equation J-1 in the LAR has the same lower and upper bound for the range of applicability of a flame height correlation. This range is -5 to 5 in Table J-2 and 5 to 5 in Equation J-1. Provide clarification on the correct range of applicability for this correlation.

b) It is stated on page J-9 that "CFAST does not use a fire diameter, therefore, it is possible to specify a fire that falls within the range of Froude numbers considered in the NUREG-1824 validation documentation." How CFAST models the fire (in this case as a point source) is not critical. The question is whether the Froude number based on the heat release rate and diameter of the fire being modeled is within the validated range. Provide clarification/confirmation that this is true for all the CFAST model calculations. If not, justify why CFAST could be used for Froude numbers outside the validated range.

RESPONSE:

Part a

The minus sign was inadvertently left off the lower bound of Equation J-1 in LAR Attachment J. The correct equation is as follows:

$$-5 \leq \log_{10}\left[\left(\frac{c_p T_\infty}{g\rho_\infty\left(\Delta H_c/r\right)^3}\right)\frac{\dot{Q}^2}{D^5}\right] \leq 5$$

where c_p is the heat capacity of ambient air (kJ/kg-K [Btu/lb-°R]), T_∞ is the ambient temperature (K [°R]), g is the acceleration of gravity (m/s² [ft/s²]), ρ_∞ is the ambient air density (kg/m³ [lb/ft³]), $\dot{Q}$ is the fire heat release rate (kW [Btu/s]), r is the stoichiometric fuel to air mass ratio, D is the fire diameter (m [ft]), and ΔH_c is the heat of combustion of the fuel (kJ/kg [Btu/lb]).

Note that the Equation in Table J-2 is correct.

Part b

The zone computer model permits the selection of two plume models: McCaffrey and Heskestad. The McCaffrey plume is selected in all PTN CFAST modeling since this is the plume model that was used in the NUREG-1824, Volume 5 validation of CFAST. When the McCaffrey plume is selected, the zone computer model CFAST does not use a fire diameter; thus, the determination of the appropriate fire Froude Number is based on the application of the CFAST results rather than on the fire model inputs. The fire scenarios evaluated in the Main Control Room abandonment calculation using CFAST include electrical panels and transient ignition sources that are typical of nuclear power plants and comparable to the types of fire scenarios envisioned in the NUREG-1824, Volumes 1 and 5 V&V effort. The application of the fire modeling results is for ignition sources that fall within the NUREG/CR-6850 conditional probability distribution for transient and electrical panel ignition sources and are thus considered to be typical of those source fires used in NUREG-1824, Volumes 1 and 5 to validate the CFAST fire model.

The fire scenarios evaluated in the "Generic Fire Modeling Treatments" report and Supplement 2 to the "Generic Fire Modeling Treatments" report include electrical panels, transient ignition sources, and cable trays. The electrical panel and transient ignition source fires are typical of nuclear power plants and comparable to the types of fire scenarios envisioned in the NUREG-1824, Volumes 1 and 5 V&V effort. The cable tray fires are also typical of nuclear power plants but were not specifically examined in the NUREG-1824, Volumes 1 and 5 V&V effort. However, it may be shown that the treatment in CFAST yields a conservative result relative to the output parameters that are applied. Additional discussion for each ignition source class is provided in the sections that follow.

Closed Electrical Panels

There is no simple or obvious way to compute a meaningful fire Froude Number for closed electrical panels (i.e., NUREG/CR-6850, Appendix E, Cases 1, 2, 3, and 4). This is because the combustion primarily occurs within the panel and the transfer of heat and mass to the surrounding enclosure occurs across the panel vents and any gaps that may exist or form during the fire. The current method for evaluating closed electrical panel fires per NUREG/CR-6850 and NUREG/CR-6850, Supplement 1 is to assume an open configuration source fire with a base height equal to the panel height or 0.3 m (1 ft) below the panel top, depending on the panel configuration. This is a conservative alternative to modeling the fire conditions within the panel and the mass and energy flows between the panel and the surroundings. When using this method to bound the mass and energy transfer across the panel boundaries and thus into the thermal plume, it is assumed that the open configuration is such that the fire diameter produces a fire Froude Number within the NUREG-1824, Volume 1 validation range. Essentially, the method for modeling closed electrical panel fires is to treat them as an open source fire that has a fire Froude Number that falls within the range considered by NUREG-1824, Volume 1.

Open Electrical Panels

Open electrical panels (NUREG/CR-6850, Appendix E Case 5 are located in the Main Control Room. In this case, the treatment of a fire as in an open burn configuration is reasonable with regard to the availability of air and oxygen to the fire and the flow of combustion products and heat from the fire to the control room enclosure. This means the recommended treatment is not explicitly more conservative than the expected burning configuration. In this case, the determination of the fire Froude Number can provide a meaningful assessment of the applicability of the fire model results to the open panels using the NUREG-1824, Volume 1 validation range, which is 0.4 – 2.4.

The fire Froude Number is calculated using the following equation:

$$\mathbf{Fr} = \frac{\dot{Q}}{\rho_\infty c_p T_\infty D^2 \sqrt{gD}} \qquad \text{(FMOD 03–1)}$$

where $\mathbf{Fr}$ is the fire Froude Number, $\dot{Q}$ is the fire heat release rate modeled (kW [Btu/s]), ρ_∞ is the density of the ambient air (kg/m³ [lb/ft³]), c_p is the heat capacity of the ambient air (kJ/kg-K [Btu/lb-°R]), T_∞ is the ambient air temperature (K [°R]), and g is the acceleration of gravity (9.81 m/s² [32.2 ft/s²]).

The density is inversely proportional to the temperature via the following equation:

$$\rho = \frac{352}{T} \qquad \text{(FMOD 03–2)}$$

where ρ is the density (kg/m³ [lb/ft³]) and T is the temperature (K [°R]). In addition, the heat capacity is nearly constant over the temperature ranges applicable to the target exposure, equal to 1 kJ/kg-K (0.24 Btu/lb-°R). Consequently, Equation FMOD 03–1 may be simplified to the following:

$$\mathbf{Fr} = \frac{\dot{Q}}{1102 D^{2.5}} \qquad \text{(FMOD 03–3)}$$

where all terms have been defined. In order to define a diameter for use in Equation FMOD 03–1, a reasonable approximation of the area involved is necessary. Given that the panels are open, and consist of non-IEEE-383 qualified/thermoplastic cables, a fire that involves these materials is expected to pool at the base of the panel.

The heat release rate per unit area for PE/PVC cables, the primary cable material in the open control room panels ranges from 312 – 589 kW/m² (27.7 – 52.4 Btu/s-ft²) under typical fire conditions per Section 3–1 of the SFPE Handbook of Fire Protection Engineering. Similarly, the heat release rate per unit area for polyethylene cables, which represents about half of the panel contents due to the removal of the PVC jacket, is 1,071 kW/m² (94 Btu/s-ft²). The effective heat

release rate per unit area for the control room open panels is thus expected to range from 692 – 830 kW/m² (61 – 73.1 Btu/s-ft²). An approximate fire area may then be computed as follows:

$$A = \dot{Q}/(\dot{q}'')$$ (FMOD 03–4)

where A is the plan burning area of the open panel ignition source (m² [ft²]), $\dot{Q}$ is the fire heat release rate modeled (kW [Btu/s]), and $\dot{q}''$ is the heat release rate per unit area of the burning material (kW/m² [Btu/s-ft²]). The effective fire diameter may then be computed assuming an axisymmetric source:

$$D = \sqrt{\frac{4A}{\pi}}$$ (FMOD 03–5)

where D is the effective fire diameter (m [ft]). The area determined by Equation FMOD 03–4 is subject to a maximum value that corresponds to the panel plan area. In the control room, the plan area per open panel is about 2.32 m² (25 ft²).

The approximate fire Froude Number for the fifteen bins listed in NUREG/CR-6850, Appendix E Case 5 for open panel fires involving non-IEEE-383 qualified/thermoplastic cables is listed in Table FMOD 03-1 for an effective heat release rate per unit area of 692 kW/m² (61 Btu/s-ft²) and Table FMOD 03-2 for an effective heat release rate per unit area of 830 kW/m² (73.1 Btu/s-ft²).

Table FMOD 03-1 – Approximate Fire Froude Number for NUREG/CR-6850, Appendix E Case 5 Panel Fires (Open Panels with non-IEEE-383 Qualified/Thermoplastic Cables) - 692 kW/m² (61 Btu/s-ft²) Effective Heat Release Rate Per Unit Area.

NUREG/CR-6850 Heat Release Rate Bin	Heat Release Rate (kW [Btu/s])	Area (m² [ft²])	Diameter (m [ft])	Fire Froude Number
1	42 (40)	0.061 (0.66)	0.28 (0.91)	0.94
2	197 (187)	0.29 (3.1)	0.60 (1.97)	0.64
3	337 (319)	0.49 (5.2)	0.79 (2.58)	0.56
4	475 (450)	0.69 (7.4)	0.93 (3.07)	0.51
5	612 (580)	0.88 (9.5)	1.06 (3.48)	0.48
6	749 (710)	1.08 (11.6)	1.17 (3.85)	0.46
7	886 (840)	1.28 (13.8)	1.28 (4.19)	0.44
8	1,024 (971)	1.48 (15.9)	1.37 (4.50)	0.42
9	1,162 (1,101)	1.68 (18.1)	1.46 (4.80)	0.41
10	1,299 (1,231)	1.88 (20.2)	1.55 (5.07)	0.40
11	1,436 (1,361)	2.08 (22.3)	1.63 (5.33)	**0.39**
12	1,573 (1,491)	2.27 (24.5)	1.70 (5.58)	**0.38**

Table FMOD 03-1 – Approximate Fire Froude Number for NUREG/CR-6850, Appendix E Case 5 Panel Fires (Open Panels with non-IEEE-383 Qualified/Thermoplastic Cables) - 692 kW/m² (61 Btu/s-ft²) Effective Heat Release Rate Per Unit Area.

NUREG/CR-6850 Heat Release Rate Bin	Heat Release Rate (kW [Btu/s])	Area (m² [ft²])	Diameter (m [ft])	Fire Froude Number
13	1,710 (1,621)	2.32 (25)	1.72 (5.64)	0.40
14	1,847 (1,751)	2.32 (25)	1.72 (5.64)	0.43
15	2,276 (2,157)	2.32 (25)	1.72 (5.64)	0.53

Table FMOD 03-2 – Approximate Fire Froude Number for NUREG/CR-6850, Appendix E Case 5 Panel Fires (Open Panels with non-IEEE-383 Qualified/Thermoplastic Cables) - 830 kW/m² (73.1 Btu/s-ft²) Effective Heat Release Rate Per Unit Area.

NUREG/CR-6850 Heat Release Rate Bin	Heat Release Rate (kW [Btu/s])	Area (m² [ft²])	Diameter (m [ft])	Fire Froude Number
1	42 (40)	0.051 (0.54)	0.25 (0.83)	1.17
2	197 (187)	0.55 (2.55)	0.55 (1.8)	0.80
3	337 (319)	0.72 (4.37)	0.72 (2.36)	0.70
4	475 (450)	0.85 (6.16)	0.85 (2.8)	0.64
5	612 (580)	0.97 (7.93)	0.97 (3.18)	0.60
6	749 (710)	1.07 (9.71)	1.07 (3.52)	0.57
7	886 (840)	1.17 (11.5)	1.17 (3.82)	0.55
8	1,024 (971)	1.25 (13.3)	1.25 (4.11)	0.53
9	1,162 (1,101)	1.34 (15.1)	1.34 (4.38)	0.51
10	1,299 (1,231)	1.41 (16.8)	1.41 (4.63)	0.50
11	1,436 (1,361)	1.48 (18.6)	1.48 (4.87)	0.49
12	1,573 (1,491)	1.55 (20.4)	1.55 (5.10)	0.47
13	1,710 (1,621)	1.62 (22.2)	1.62 (5.31)	0.46
14	1,847 (1,751)	1.68 (23.9)	1.68 (5.52)	0.46
15	2,276 (2,157)	1.72 (25)	1.72 (5.64)	0.53

The table indicates that the fire Froude Number falls within the NUREG-1824, Volume 1 range of 0.4 – 2.4 for all heat release rate bins except for two (Bin 11 and Bin 12) as indicated in the Table FMOD 03-1. The severity factor for the two bins is 0.002 and 0.001 indicating that the maximum effect on the cumulative result is no greater than 0.3 percent. The applicability of the

results to the main control room may be further assessed by considering the results of the analysis. The minimum predicted abandonment time for the two bins that fall below the NUREG-1824, Volume 1 fire Froude Number range is 7 and 6.7 minutes, respectively (note that the minimum time is used in the Fire PRA). This means that the fire size, fire area, and fire diameter will be smaller than listed in Table FMOD 03-1 at the time abandonment is predicted. The CFAST results beyond this time are not used. A revised fire Froude Number may be developed for these two cases using the NUREG/CR-6850 recommended growth rate for electrical panel fires. These results are shown in Table FMOD 03-3.

Table FMOD 03-3 – Adjusted Fire Froude Number for NUREG/CR-6850, Appendix E Case 5 Panel Fires (Open Panels with non-IEEE-383 Qualified/Thermoplastic Cables) – Heat Release Rate at Predicted Abandonment Time.

Baseline Heat Release Rate (kW [Btu/s])	Abandonment Time (min)	Heat Release Rate at Abandonment (kW [Btu/s])	Modified Area (m^2 [ft^2])	Modified Diameter (m [ft])	Modified Fire Froude Number
1,436 (1,361)	7.0	488	0.71	0.95	0.51
1,573 (1,491)	6.7	490	0.71	0.95	0.51

Table FMOD 03-3 indicates that even though the fire Froude Number for the baseline fire scenario falls outside the NUREG-1824, Volume 1 fire Froude Number range, the application within the Main Control Room abandonment calculation still remains within the validation range.

The estimate of the fire Froude Number range using Equations FMOD 03–1 through FMOD 03–5 and summarized in Tables FMOD 03-1 through FMOD 03-3 is approximate since there is no explicit way in which to predict the fire diameter given a panel heat release rate. However, the calculation is expected to be conservative since there are a number of factors that will tend to increase the fire Froude Number (toward the range validated in the "Generic Fire Modeling Treatments" report) that are not explicitly addressed by the approximate calculation. These factors include the potential for burning to occur on bundles and vertical panel sections that will locally increase the heat release rate per unit area and decrease the effective fire diameter. When viewed from an overall application perspective, the types of open electrical panel fires that are expected in the control room are consistent with those investigated in NUREG-1824, Volume 1 and are not expected to fall outside the range of capabilities of the CFAST model.

Transient Ignition Sources

Transient ignition sources (NUREG/CR-6850, Appendix E Case 9) are located in the Main Control Room as well as in other areas of the plant. The analysis in the Main Control Room considers the entire transient ignition source conditional probability distribution whereas other

areas consider only the 98th percentile heat release rate bin. The latter bin may be either 317 kW (300 Btu/s) or 69 kW (65 Btu/s) as described in the response to Part 1 of RAI FMOD 01.

The fire Froude Number for a transient fuel package fire may be computed using Equations FMOD 03–1 through FMOD 03–5. The plan heat release rate per unit area range for the transient fuels varies considerably as described in Section 2–1 of the SFPE Handbook of Fire Protection Engineering given the large variation in the types and arrangement of the fuel packages. The heat release rate per unit area range is about 100 – 370 kW/m² (8.8 – 32.6 Btu/s) for transient materials that are loose or located in containers based on the test considered in NUREG/CR-6850, provided the material does not contain flammable or combustible liquids.. The heat release rate per unit area for loose material alone is closer 270 – 370 kW/m² (23.8 – 32.6 Btu/s-ft²) based on a sub-set of tests involving trash bags. The loose material tests are applicable in both the Main Control Room abandonment calculation and the "Generic Fire Modeling Treatments" report since explicit credit for the slower fire growth in a container is not credited.

The approximate fire Froude Number for the fifteen bins listed in NUREG/CR-6850, Appendix E Case 8 for transient ignition source fires is listed in Table FMOD 03-4 for transient fuel packages having a plan heat release rate per unit area of 270 kW/m² (23.8 Btu/s-ft²) and Table FMOD 03-5 for transient fuel packages having a plan heat release rate per unit area of 370 kW/m² (32.6 Btu/s-ft²).

Table FMOD 03-4 – Approximate Fire Froude Number for NUREG/CR-6850, Appendix E Case 8 (Transient Fires) - 270 kW/m² (23.8 Btu/s-ft²) Plan Heat Release Rate Per Unit Area.

NUREG/CR-6850 Heat Release Rate Bin	Heat Release Rate (kW [Btu/s])	Area (m² [ft²])	Diameter (m [ft])	Fire Froude Number
1	22 (21)	0.081 (0.88)	0.32 (1.06)	**0.34**
2	55 (52)	0.20 (2.2)	0.51 (1.67)	**0.27**
3	92 (87)	0.34 (3.7)	0.66 (2.16)	**0.24**
4	128 (121)	0.47 (5.1)	0.78 (2.55)	**0.22**
5	165 (156)	0.61 (6.6)	0.88 (2.89)	**0.20**
6	202 (191)	0.75 (8.0)	0.98 (3.20)	**0.19**
7	238 (226)	0.88 (9.5)	1.06 (3.47)	**0.19**
8	275 (261)	1.02 (11.0)	1.14 (3.73)	**0.18**
9	312 (296)	1.16 (12.4)	1.22 (3.98)	**0.17**
10	349 (331)	1.29 (13.9)	1.28 (4.21)	**0.17**
11	386 (366)	1.43 (15.4)	1.35 (4.43)	**0.17**
12	423 (401)	1.57 (16.9)	1.41 (4.63)	**0.16**
13	460 (436)	1.70 (18.3)	1.47 (4.83)	**0.16**
14	497 (471)	1.84 (19.8)	1.53 (5.02)	**0.16**

Table FMOD 03-4 – Approximate Fire Froude Number for NUREG/CR-6850, Appendix E Case 8 (Transient Fires) - 270 kW/m² (23.8 Btu/s-ft²) Plan Heat Release Rate Per Unit Area.

NUREG/CR-6850 Heat Release Rate Bin	Heat Release Rate (kW [Btu/s])	Area (m² [ft²])	Diameter (m [ft])	Fire Froude Number
15	578 (548)	2.14 (23.0)	1.65 (5.42)	**0.15**

Table FMOD 03-4 – Approximate Fire Froude Number for NUREG/CR-6850, Appendix E Case 8 (Transient Fires) - 370 kW/m² (32.6 Btu/s-ft²) Plan Heat Release Rate Per Unit Area.

NUREG/CR-6850 Heat Release Rate Bin	Heat Release Rate (kW [Btu/s])	Area (m² [ft²])	Diameter (m [ft])	Fire Froude Number
1	22 (21)	0.059 (0.64)	0.28 (0.90)	0.50
2	55 (52)	0.15 (1.60)	0.44 (1.43)	**0.40**
3	92 (87)	0.25 (2.67)	0.56 (1.85)	**0.35**
4	128 (121)	0.35 (3.72)	0.66 (2.18)	**0.32**
5	165 (156)	0.45 (4.80)	0.75 (2.47)	**0.30**
6	202 (191)	0.55 (5.87)	0.83 (2.73)	**0.29**
7	238 (226)	0.64 (6.92)	0.90 (2.97)	**0.28**
8	275 (261)	0.74 (8.0)	0.97 (3.19)	**0.27**
9	312 (296)	0.84 (9.07)	1.04 (3.40)	**0.26**
10	349 (331)	0.94 (10.1)	1.10 (3.59)	**0.25**
11	386 (366)	1.04 (11.2)	1.15 (3.78)	**0.25**
12	423 (401)	1.14 (12.3)	1.21 (3.96)	**0.24**
13	460 (436)	1.24 (13.4)	1.26 (4.13)	**0.24**
14	497 (471)	1.34 (14.5)	1.31 (4.29)	**0.23**
15	578 (548)	1.56 (16.8)	1.41 (4.63)	**0.22**

The tables indicates that the fire Froude Number falls below the NUREG-1824, Volume 1 fire Froude Number range of 0.4 – 2.4 in nearly all cases. This means that the thermal plume that is expected from the ignition source fire could be wider than the range evaluated NUREG-1824, Volume 1. A wider thermal plume will have a greater entrainment rate than one associated with a similar heat release rate fire that has a smaller diameter. This means that the conditions relative to a source fire that falls within the validation range will be less severe both in terms of the concentration of combustion products and the temperature. Conversely, the hot gas layer descent time will be faster. In the case of the "Generic Fire Modeling Treatments" report calculations, the position of the hot gas layer is not a factor in determining the potential for target damage, so

it may be asserted that conditions associated with low fire Froude Number scenarios that may arise among various transient ignition source configurations are bound by the calculation results in the "Generic Fire Modeling Treatments" report. In the case of the Main Control Room abandonment calculation, this would only be true if the hot gas layer descent time is not the limiting constraint. Appendix A shows that there are scenarios in which abandonment is determined at the time the hot gas layer height reaches a specific elevation.

However, the abandonment criteria applied in the Main Control Room abandonment calculation are inherently more conservative than the abandonment criteria listed in NUREG/CR-6850 due to the inclusion of an additional constraint of a 50°C (122°F) occupant immersion temperature. The cases in which the hot gas layer descent time is limiting are due to the low temperature criterion which is typically achieved rapidly. When the NUREG /CR-6850 abandonment criteria are considered without the additional occupant immersion temperature constraint of 50°C (122°F), the hot gas layer descent time is not the limiting constraint for any scenario. Thus, it is concluded that modeling low fire Froude Number transient ignition sources in the Main Control Room using CFAST yields a conservative result relative to an analysis conducted using the NUREG/CR-6850 abandonment criteria.

A number of conservative factors that would tend to increase the fire Froude Number (toward the range validated in NUREG-1824, Volume 5) for the transients are not explicitly accounted for in the approximate calculation presented in Table FMOD 03-3. These include the potential for the transient material to be consolidated or contained. As was the case for open electrical panel fire scenarios, when the results are viewed from an overall application perspective, the types of transient fuel package fires that are expected in the control room or other areas of the plan are consistent with those investigated in NUREG-1824, Volume 1 and are not expected to fall outside the range of capabilities of the CFAST model.

Cable Trays

The last type of source fire which CFAST is used to calculate the compartment conditions at PTN for involves cable tray fires (as secondary combustibles). These scenarios are addressed in Supplement 2 to the "Generic Fire Modeling Treatments" report. The treatment of secondary combustibles involves two 0.45 m (1.5 ft) wide cable horizontal trays over which fire propagates laterally for one hour. The flame spread rate is 0.9 mm/s (0.035 in/s) per NUREG/CR-6850 and NUREG/CR-7010, Volume 2 and occurs in two directions. The heat release rate per unit area is 250 kW/m^2 (22 Btu/s-ft^2) per NUREG/CR-7010, Volume 1. Over a one hour time interval, assuming sufficient length of cable trays available, the fire spreads approximately 3.2 m (10.6 ft) in either direction and has a heat release rate of about 1,460 kW (1,380 Btu/s). The fire Froude Number for the cable tray fire scenario such as postulated in Supplement 2 to the "Generic Fire Modeling Treatments" report is not readily computed using the methods described in NUREG-1934 due to the geometry and fire aspect ratio (i.e., the cable tray fire is a line type fire). Because a line type fire has more entrainment per unit length than an equivalent area source fire given the

plume perimeter is greater, the use of an axisymmetric plume model to approximate the conditions for a line type fire is expected to be conservative when computing the temperature and smoke density. As was the case with the transient, the converse is true for the hot gas layer descent. However, the position of the hot gas layer is not a factor in determining the potential for target damage, thus it may be asserted that conditions associated with an axisymmetric equivalent area fire bound those of the line type fire for the applications at PTN.

The fire Froude Number for the axisymmetric equivalent may be determined on a total heat release rate basis and a per unit length basis using Equations FMOD 03–1 through FMOD 03–5. The results are summarized in Table FMOD 03-6.

Table FMOD 03-6 – Approximate Fire Froude Number for Cable Tray Source Fires Described in Supplement 2 to the "Generic Fire Modeling Treatments" Report.

Configuration	Heat Release Rate (kW (Btu/s])	Fire Area (m^2 [ft^2])	Effective Fire Diameter (m [ft])	Fire Froude Number
Total Cable Tray	1,458 (1,382)	5.83 (62.7)	2.72 (8.98)	0.11
Cable Tray Unit Segment	225 (213)	0.9 (9.7)	1.07 (3.5)	0.17

The table indicates that the fire Froude Number falls below the NUREG-1824, Volume 1 fire Froude Number range of 0.4 – 2.4 for the cable tray fire scenarios, both when considered in total and on a per unit length basis. This means that the thermal plume that is expected from the ignition source fire could be wider than the range evaluated in NUREG-1824, Volume 1. A wider thermal plume will have a greater entrainment rate than one associated with a similar heat release rate fire that has a smaller diameter. This means that the conditions relative to a source fire that falls within the validation range will be less severe both in terms of the concentration of combustion products and the temperature. Conversely, the hot gas layer descent time will be faster. In the case of the "Generic Fire Modeling Treatments" report calculations, the position of the hot gas layer is not a factor in determining the potential for target damage, so it may be asserted that conditions associated with low fire Froude Number scenarios that may arise among various transient ignition source configurations are bound by the calculation results in the "Generic Fire Modeling Treatments" report.

A number of conservative factors that would tend to increase the fire Froude Number (toward the range validated in NUREG-1824, Volume 5) for the cable trays are not explicitly accounted for in the approximate calculation presented in Table FMOD 03-3. These include the potential for the cable trays to be stacked rather than adjacent, the potential for the propagation distance to be limited due the physical dimensions of the actual cable trays for which the CFAST results are applied, and that the scenarios involving cable trays are usually coupled with electrical panels or transient ignition source fires, which would increase the fire Froude Number when viewed as a

single heat source. Although CFAST does not have plume models that account for line-type fires and the fire Froude Numbers for an equivalent axisymmetric source fire are lower than the range evaluated NUREG-1824, Volume 1, the fires modeled and the temperature results predicted by CFAST are expected to bound those that would result from an actual PTN configuration since the hot gas layer height is not a factor in determining the conditions in the Generic Fire Modeling Treatments report and Supplement 2 to the "Generic Fire Modeling Treatments" report.

Fire Modeling RAI 05

NFPA 805, Section 2.7.3.4, "Qualification of Users," states: "Cognizant personnel who use and apply engineering analysis and numerical models (e.g., fire modeling techniques) shall be competent in that field and experienced in the application of these methods as they relate to nuclear power plants, nuclear power plant fire protection, and power plant operations." Section 4.5.1.2, "Fire PRA" of the Transition Report states that fire modeling was performed as part of the Fire PRA development (NFPA 805 Section 4.2.4.2). This requires that qualified fire modeling and PRA personnel work together. Furthermore, Section 4.7.3, "Compliance with Quality Requirements in Section 2.7.3 of NFPA 805," of the Transition Report states: Cognizant personnel who use and apply engineering analysis and numerical methods in support of compliance with 10 CFR 50.48(c) are competent and experienced as required by Section 2.7.3.4 of NFPA 805. During the transition to 10 CFR 50.48(c), work was performed in accordance with the quality requirements of Section 2.7.3 of NFPA 805. Personnel who used and applied engineering analysis and numerical methods (e.g. fire modeling) in support of compliance with 10 CFR 50.48(c) are competent and experienced as required by NFPA 805 Section 2.7.3.4. Post-transition, for personnel performing fire modeling or Fire PRA development and evaluation, FPL will develop and maintain qualification requirements for individuals assigned various tasks. Position Specific Guides will be developed to identify and document required training and mentoring to ensure individuals are appropriately qualified per the requirements of NFPA 805 Section 2.7.3.4 to perform assigned work. See Implementation Item 16 in Table S-3 of Attachment S.

Regarding qualifications of users of engineering analyses and numerical models:

a) Describe what constitutes the appropriate qualifications for the FPL staff and consulting engineers to use and apply the methods and fire modeling tools included in the engineering analyses and numerical models.

b) Describe the process/procedures for ensuring the adequacy of the appropriate qualifications of the engineers/personnel performing the fire analyses and modeling activities.

c) Describe who performed the walkdowns for the Main Control Room (abandonment based on damage and inhabitability) and the remaining fire areas in the plant. Describe whether these were the same people who performed the fire modeling analysis.

d) Explain the communication process between the fire modeling analysts and PRA personnel to exchange the necessary information and any measures taken to assure the fire modeling was performed adequately and will continue to be performed adequately during post-transition.

e) Explain the communication process between the consulting engineers and PTN personnel to exchange the necessary information and any measures taken to assure the fire modeling was performed adequately and will continue to be performed adequately during post-transition.

RESPONSE:

Part a

The development of a FPRA involves the integration of a variety of technologies. These technologies include both fire modeling analyses and probabilistic risk assessment techniques. The qualifications that are required for the staff and consulting engineers that use and apply these technologies depend in part on their specific assigned role on the project. In general, the qualification requirements for those that are technical leads in the preparation of technical tasks are consistent with and often exceed those articulated in NEI 07-12 for qualification of Peer Reviewers. Section 2.2 of NEI 07-12 describes the desired experience requirements for Peer Reviewers. Similar qualification was expected of technical leads involved in the performance of the PTN fire PRA. Given the magnitude of the technical activities being performed, the technical leads are sometimes assisted by support staff. There are no specific qualifications for those in a support role as the assigned technical lead would retain overall technical responsibility for the entire body of work. The overall acceptability of the resulting body of work is established through the review and approval process of the associated analysis documentation.

The term 'technical lead' is used in the context of those individuals experienced and qualified in the tasks that they supervise. ERIN Engineering ensures those that perform the role of technical lead for the fire PRA are qualified through several processes as described in the response to Part b of this RAI. The term 'support role' is used in the context of those individuals assisting in fire PRA tasks and are supervised by the technical lead. Support role activities include data entry and manipulation, as well as other routine fire PRA activities (e.g., PRA model quantification and compilation of results).

Specific fire modeling tasks (development of the "Generic Fire Modeling Treatments" report and its associated supplements and the preparation of the Main Control Room abandonment calculation) was carried out by fire protection engineers that meet the qualification standards described in R.G. 1.189, Section 1.6.1.a. Specifically, the primary developer of the "Generic Fire Modeling Treatments" report and the associated supplements is a graduate of an accepted engineering curriculum (Worcester Polytechnic Institute) with a B.S. degree in Civil Engineering and an M.S. degree in Fire Protection Engineering and is a member grade in the Society of Fire Protection Engineers (SFPE). The preparer of the Main Control Room abandonment calculation is a graduate of an accepted engineering curriculum (University of Maryland) with a B.S. and an M.S. degree in Fire Protection Engineering and is a member grade in the SFPE.

Part b

The process/procedure used for ensuring adequate qualification of the engineers/personnel performing the fire analysis and modeling activities varied. In the specific case of fire modeling, since the activity involved a skill set that was not inherently part of the capabilities for a risk assessment or a deterministic safe shutdown analyst, acknowledged industry experts were used exclusively for this task.

More specifically, training and qualification of personnel involved in technical analysis for the PTN NFPA 805 project is addressed in a "Project/Quality Plan" for transition of the PTN Fire Protection Program to a NFPA 805 licensing basis. Per this plan, technical leads are expected to be familiar with the "Project Instruction" document relating to the task or tasks for which they are responsible.

ERIN Engineering has an internal training and certification process in place to qualify those developing fire PRAs. ERIN Engineering certification guides SR-ES-F01 through SR-ES-F05 require that individuals are knowledgeable and experienced in performing the applicable fire PRA tasks. Additionally, ERIN Engineering routinely has internal seminars to keep those performing fire PRAs up to date on new and changing industry guidance for fire PRAs.

With respect to application of the Generic Fire Modeling Treatments and the fire PRA, the technical lead for the project supervised all tasks of the fire PRA including the integration of the Generic Fire Modeling Treatments into the fire PRA model. The technical lead is qualified to each ERIN Engineering certification guide.

Part c

The walkdown for the Main Control Room abandonment calculation was performed by Hughes Associates, Inc. staff meeting the qualification standards described in R.G. 1.189, Section 1.6.1.a. The staff performing the control room walkdown was directly involved in the preparation and/or review of the Main Control Room abandonment calculation.

The walkdowns associated with the documentation of fire scenarios in other areas of the plant were primarily conducted by ERIN Engineering staff under the direction of a technical lead with qualifications consistent with or exceeding those articulated in NEI 07-12 for the qualification of Peer Reviewers. The staff performing the fire scenario report walkdowns was directly involved in the preparation and/or review of the fire scenarios report.

Part d

The coordination of technical activities between the fire analysis individuals and the risk modeling individuals was facilitated by the availability of a detailed generic fire modeling analysis. Unlike an approach where individualized fire modeling analyses are prepared for each fire initiating event, the generic treatment serves to establish a standardized solution. In order to develop such a standardized solution, the fire modeling analyst established a prescriptive set of

boundary conditions for which the generic solution would apply. These boundary conditions are stipulated in a detailed technical report. This detailed technical report forms the foundation of the means for coordinating the technical activities. In addition, the fire modeling analyst and the risk modeling individuals were integrated into a single project team which further facilitated and streamlined the communication and exchange of information.

Note that no specific procedures or process were required for communication between the fire modeling group and the PRA group given the groups were integrated into a single project team. Informal communication was used throughout the project when clarification was required in applying the generic fire modeling treatments or addressing specific fire modeling concerns outside of the treatments.

Part e

The communication process between the consulting engineers and the PTN staff consisted of on-site and call-in project meetings that were held during the course of the NFPA 805 Fire PRA model transition and of reviews of draft deliverables, as applicable. The meetings and reviews included consideration of the technical adequacy of the fire modeling as applied at PTN.

Note that the use of the "Generic Fire Modeling Treatments" report facilitates the communication of the application of the fire modeling to specific plant ignition sources. The generic nature of the document provides the information necessary to apply it to any plant configuration. For the NFPA 805 transition Fire PRA model, application of the "Generic Fire Modeling Treatments" report to the development of fire scenarios and evaluation of the hot gas layer development was performed by ERIN Engineering. Frequent communications between ERIN Engineering and Hughes Associates, Inc. facilitated the implementation of the generic fire modeling treatments. The control room fire modeling was performed by Hughes Associates, Inc. personnel who were also directly involved in the control room walkdown effort. The use of the generic fire modeling treatments provides a useful tool for FPL staff in support of future modifications to the FPRA. Consultation with Hughes Associated, Inc. and ERIN Engineering where unique configurations are encountered would be expected.

Programmatic RAI 01

Describe the specific documents that will comprise the post transition NFPA 805 fire protection program licensing basis.

Describe whether documents, analyses, designs, and engineering reviews prepared to support the NFPA 805 fire protection program are managed as controlled documents under the TPN document control processes.

RESPONSE:

The PTN post transition licensing basis will consist of the following documents:

- NFPA 805 License Condition
- Revised UFSAR
- Fire Protection Program Design Basis Document

The Fire Protection Program Design Basis Document will contain or reference sub-tier documents that also form part of the fire protection program.

All the documents generated consist of drawings, design basis documents, engineering evaluations, and procedures. All these documents, analyses, designs, and engineering reviews are managed as controlled documents

Programmatic RAI 02

Describe the changes that are anticipated to the configuration control processes to incorporate the requirements of the NFPA 805 fire protection program.

RESPONSE:

Interim Process

- Existing Configuration Control
  - ENG-QI-1.0, Design Control
    - Will become EN-AA-100 Engineering Design Control
  - EN-AA-205-1100, Design Change Package
  - EN-AA-105-1000, PRA Configuration Control and Model Maintenance
- Process Modified to include NFPA 805 team review
  - EC Form 240 (Fire Protection Checklist) modified
  - Requires review of 5610-M-723A, 5610-E-2000A, and 5610-M-722B
    - These are the equivalent to essential equipment list, essential cable list, safe shutdown analysis containing PRA and NPO components and cables

Final Process

- FAQ 12-0061 upon approval will be used as input to revisions to existing programs
- Existing Configuration Control procedures will be revised as necessary
  - EN-AA-100, Engineering Design Control
  - EN-AA-205-1100, Design Change Package
  - EN-AA-105-1000 PRA Configuration Control and Model Maintenance
- New Procedure will be developed
  - EN-AA-104-1002, Fire Protection Configuration Control (New procedure)

Training and Qualification Cards will be developed

Programmatic RAI 03

Describe the changes that are anticipated to the Fire Protection Program, as a part of the NFPA 805 transition process, including associated training and identification of the recipients of any such training necessary to support the program changes.

RESPONSE:

The responses to RAI Programmatic 01 and RAI Programmatic 02 provided information on changes to documents and configuration control under an NFPA 805 Fire Protection Program. All current fire protection program documents such as 0-ADM-016.10 will be updated and the fire protection program design basis document will be issued that contain all the aspects of the fire protection program. This will result in multiple conforming changes in implementing documents for the fire protection program. The documents to be revised will be determined by the process that revises the primary fire protection program documents and issues the design basis document. All new procedures or procedure revisions require an assessment of training impact and completion of training prior to issuance – Procedure AD-AA-100-1004. The type of training and the recipients of such training are identified as part of that process. In addition to this, due to the complex nature of this change, a change management plan has been developed to support the transition to NFPA 805. That change management plan consists of two parts, the first is a fleet level plan (AR 1623193) and the second is a site level plan (AR 1670987). These plans also require review of training requirements.

Based on the current development of the transition process the following training is anticipated

Training Task	Module
1	NFPA 805 Overview Awareness for All Licensee Personnel CBT
2	NSCA/NPO Analyses Qualification Card
3	FPRA Qualification Card
4	NFPA 805 Process Changes for Site Personnel
5	Applicability Screening of Changes for Operations/Maintenance/Work Control etc.
6	Applicability Screening of Changes for Engineering
7	FP Modification Review Engineering Qualification Card
8	Monitoring Program Data Input for Operations/Work Controls/Maintenance/Corrective Action Program

Training Task	Module
9	Monitoring Program Engineering Data Review Qualification Card
10	Change Evaluation Qualification Card Development

Radioactive Release RAI 01

a) Describe the radiological criteria that were used to screen fire areas out of the review.

b) Describe the qualifications of the personnel conducting the screening and whether the screening was conducted by an expert panel or a limited number of individuals.

RESPONSE:

a) The overall PTN plant layout was reviewed for potential of radiological materials during any plant mode/operation. Identification of radiological areas was performed based on pre-fire plans, walkdowns, and interviews with radiation protection and other station personnel. Radiological areas were defined as locations of the plant which contain or may contain at any given time radioactive or contaminated materials. In addition, if an area was identified as a Radiologically Controlled Area (RCA), regardless if radioactive or contaminated materials were identified, the area was screened in.

b) The screening of radiological areas was initially performed by the radioactive release report preparer, who through the use of the Fire Plans, plant walkdowns, and interviews with station personnel, developed a list of areas that screened in or out of the radioactive release review. The list of areas was then reviewed by plant personnel, including radiation protection personnel, for accuracy. In addition, the radioactive release review report and the LAR were reviewed by multiple subject matter experts, which ensured a detailed review of the plant areas with the potential for containing radiological materials during any plant mode/operation.

Radioactive Release RAI 02

For areas where containment/confinement is relied upon:

a) Liquid
   i. Describe whether the assessment addresses capacities of all sumps, tanks, transfer pumps, etc., as appropriate and considers the consequences of overflowing the sumps that are credited in containing the liquid effluent.
   ii. Describe whether there are any plant design features (e.g., roll up doors, hatches, etc.) that could redirect flow of liquids from flowing into the sumps, collection tanks, etc.
   iii. Describe whether there are any operator actions credited to direct effluent flow or apply temporary measures, etc. If yes, describe whether these actions are addressed in pre-fire plans, and also describe the training the operators receive in conducting these actions.

b) Gaseous
   i. Walkdowns: Describe whether there are any plant features that can bypass the planned filtered/monitored ventilation pathways that have not been accounted for.

RESPONSE:

a) Liquid
   i. Waste holdup tank capacities were considered. If the tanks, sumps, or other containment vessel were to overflow, excess effluent would be restricted within the structure containing the feature. Overflow contained within the structure would be treated by radiation protection after the event ceased. Transfer pumps are not credited.
   ii. Plant design features do exist which could redirect the flow of liquids. Recommendations are in place to identify these locations in the event of a failure (Implementation Item #15). The analysis was performed based on walkdowns and review of plant design information (drawings). In addition, training is/will be provided for containment of liquid effluent within the radioactive release objectives (Implementation Item #15).
   iii. There are no operator actions other than those actions taken by the fire brigade and support members to contain radiological effluent. Fire brigade members are/will be trained with respect to radioactive release. Radiation protection personnel respond and can assist direction of activities to direct effluent to a controlled area. Pre-fire plans/standard operating procedures will address instructions for containment (Implementation Item #15).

b) Gaseous
   i. There are no plant features that can bypass the planned filtered/monitored ventilation pathways that have not been accounted for. In addition, training is provided for

containment of gaseous effluent within the radioactive release objectives (Implementation Item #15).

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(1 page)

Safe Shutdown RAI 01

License Amendment Request No. 216

Attachment B – NEI 04-02 Table B-2
Nuclear Safety Capability Assessment Methodology Review
Revised page 35

Attachment B
NEI 04-02 Table B-2 Nuclear Safety Capability Assessment Methodology Review

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.2.1.2 [Fire Damage to Mechanical Components (not electrically supervised)]

NEI 00-01 Guidance
3.2.1.2 Assume that exposure fire damage to manual valves and piping does not adversely impact their ability to perform their pressure boundary or safe shutdown function (heat sensitive piping materials, including tubing with brazed or soldered joints, are not included in this assumption). Fire damage should be evaluated with respect to the ability to manually open or close the valve should this be necessary as a part of the post-fire safe shutdown scenario.

Applicability
Not Applicable

Alignment Statement
Aligns

Alignment Basis
It is assumed in the analysis that mechanical components like those identified will not suffer fire damage to the extent that they will not be able to perform the credited safe shutdown function. The ability to manually operate valves within the fire area (when necessary) is evaluated as part of the manual action feasibility review. Brazed components were assumed not to fail as a result of a fire in this analysis.

There is no significance to the use of the assumption that brazed connections will not fail due to the effects of a fire. Therefore, the exclusion of the potential for an exposure fire to damage mechanical components at PTN does not affect the ability of the plant to safely shutdown.

Reference
5610-M-722A Rev. 0 [Attachment D section 4.6] - Nuclear Safety Capability Fire Safe Shutdown Analysis Basis Document
PTN-FPER-11-002 Rev. 0 - NFPA 805 Recovery Action Feasibility Evaluation

L-2013-086 Attachment 3

Fire Protection Engineering RAI 08

License Amendment Request No. 216 - Revised Attachment C

Table C-2 NFPA 805 Required Fire Protection Systems and Features (58 pages)

Attachment C

Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: A (Unit 3) - Unit 3 and 4 Auxiliary Building Basement
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
004	Unit 3 and 4 Hallway South of Holdup Tanks - Fire Area A	None	E, R, D	E	Combustible Loading: E Detection System, Alarm Point 8: E R D
005	Units 3 and 4 Chemical Drain, Laundry and Hot Shower Tank Room - Fire Area A	None	E, R, D	None	Detection System, Alarm Point 8: E R D
006	Units 3 and 4 Gas Compressor Room - Fire Area A	None	None	None	None
007	Units 3 and 4 Gas Compressor Room - Fire Area A	None	None	None	None
008	Units 3 and 4 Waste Holdup Tank Room - Fire Area A	None	None	None	None
009	Units 3 and 4 Waste Evaporator Feed Pump Room - Fire Area A	None	E, R, D	None	Detection System, Alarm Point 8: E R D
010	Units 3 and 4 Radioactive Pipeway - Fire Area A	None	E, R, D	None	Detection System, Alarm Point 8: E R D
017	Units 3 and 4 Spent Resin Storage Tank Room - Fire Area A	None	None	None	None
018	Units 3 and 4 Area Beneath Waste Evaporator Skid - Fire Area A	None	None	None	None

Fire Area ID: A (Unit 4) - Unit 3 and 4 Auxiliary Building Basement
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R, D	Procedures/Recovery Actions: R D
004	Unit 3 and 4 Hallway South of Holdup Tanks - Fire Area A	None	E, R, D	E	Combustible Loading: E Detection System, Alarm Point 8: E R D
005	Units 3 and 4 Chemical Drain, Laundry and Hot Shower Tank Room - Fire Area A	None	E, R, D	None	Detection System, Alarm Point 8: E R D
006	Units 3 and 4 Gas Compressor Room - Fire Area A	None	None	None	None
007	Units 3 and 4 Gas Compressor Room - Fire Area A	None	None	None	None
008	Units 3 and 4 Waste Holdup Tank Room - Fire Area A	None	None	None	None

Attachment C
Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: A (Unit 4) - Unit 3 and 4 Auxiliary Building Basement
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
009	Units 3 and 4 Waste Evaporator Feed Pump Room - Fire Area A	None	E, R, D	None	Detection System, Alarm Point 8: E R D
010	Units 3 and 4 Radioactive Pipeway - Fire Area A	None	E, R, D	None	Detection System, Alarm Point 8: E R D
017	Units 3 and 4 Spent Resin Storage Tank Room - Fire Area A	None	None	None	None
018	Units 3 and 4 Area Beneath Waste Evaporator Skid - Fire Area A	None	None	None	None

Fire Area ID: AA (Unit 3) - Unit 3 Train B Emergency Diesel Generator Day Tank Room
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
074	Unit 3 Train B Emergency Diesel Generator Day Tank Room - Fire Area AA	None	None	None	None

Fire Area ID: AA (Unit 4) - Unit 3 Train B Emergency Diesel Generator Day Tank Room
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
074	Unit 3 Train B Emergency Diesel Generator Day Tank Room - Fire Area AA	None	None	None	None

Attachment C

Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: AAA (Unit 3) - Unit 3 and 4 Miscellaneous Zones
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
001	Units 3 and 4 Holdup Tank A - Fire Area AAA	None	None	E	Combustible Loading: E
002	Units 3 and 4 Holdup Tank B - Fire Area AAA	None	None	E	Combustible Loading: E
003	Units 3 and 4 Holdup Tank C - Fire Area AAA	None	None	E	Combustible Loading: E
021	Units 3 and 4 Counting Room - Fire Area AAA	None	None	None	None
022	Units 3 and 4 Hot Lab - Fire Area AAA	None	None	None	None
023	Units 3 and 4 Gas Decay Tank - Fire Area AAA	None	None	None	None
024	Units 3 and 4 Gas Decay Tank Room - Fire Area AAA	None	None	E	Combustible Loading: E
029	Unit 4 Spent Fuel Pit - Fire Area AAA	None	None	E	Combustible Loading: E
042	Unit 3 Spent Fuel Pit - Fire Area AAA	None	None	E	Combustible Loading: E
043	Unit 4 Spent Fuel Pit Heat Exchanger Room - Fire Area AAA	None	None	None	None
044	Unit 4 New Fuel Storage Room - Fire Area AAA	None	None	None	None
046	Units 3 and 4 Laundry Room - Fire Area AAA	None	None	None	None
056	Unit 3 New Fuel Storage Room - Fire Area AAA	None	None	None	None
057	Unit 3 Spent Fuel Pit Heat Exchanger Room - Fire Area AAA	None	None	None	None
065	Units 3 and 4 QSPDS Inverter Area - Fire Area AAA	None	None	None	None
111	Unit 4 Volume Control Tank - Fire Area AAA	None	None	None	None
112	Unit 3 Volume Control Tank - Fire Area AAA	None	None	None	None
126A	Units 3 and 4 Radwaste Control Room and Equipment Room - Fire Area AAA	None	None	None	None
126B	Units 3 and 4 Radwaste Processing Area - Fire Area AAA	None	None	None	None

Attachment C
Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: AAA (Unit 3) - Unit 3 and 4 Miscellaneous Zones
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
126C	Units 3 and 4 Health Physics Storage Area - Fire Area AAA	None	None	None	None
126D	Units 3 and 4 Radwaste Building HVAC Equipment Room - Fire Area AAA	None	None	None	None
126E	Units 3 and 4 Maintenance Work Area - Fire Area AAA	None	None	None	None
129	Units 3 and 4 Nuclear Entrance Building - Fire Area AAA	None	None	None	None

Fire Area ID: AAA (Unit 4) - Unit 3 and 4 Miscellaneous Zones
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
001	Units 3 and 4 Holdup Tank A - Fire Area AAA	None	None	E	Combustible Loading: E
002	Units 3 and 4 Holdup Tank B - Fire Area AAA	None	None	E	Combustible Loading: E
003	Units 3 and 4 Holdup Tank C - Fire Area AAA	None	None	E	Combustible Loading: E
021	Units 3 and 4 Counting Room - Fire Area AAA	None	None	None	None
022	Units 3 and 4 Hot Lab - Fire Area AAA	None	None	None	None
023	Units 3 and 4 Gas Decay Tank - Fire Area AAA	None	None	None	None
024	Units 3 and 4 Gas Decay Tank Room - Fire Area AAA	None	None	E	Combustible Loading: E
029	Unit 4 Spent Fuel Pit - Fire Area AAA	None	None	E	Combustible Loading: E
042	Unit 3 Spent Fuel Pit - Fire Area AAA	None	None	E	Combustible Loading: E
043	Unit 4 Spent Fuel Pit Heat Exchanger Room - Fire Area AAA	None	None	None	None
044	Unit 4 New Fuel Storage Room - Fire Area AAA	None	None	None	None

Attachment C
Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: AAA (Unit 4) - Unit 3 and 4 Miscellaneous Zones
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
046	Units 3 and 4 Laundry Room - Fire Area AAA	None	None	None	None
056	Unit 3 New Fuel Storage Room - Fire Area AAA	None	None	None	None
057	Unit 3 Spent Fuel Pit Heat Exchanger Room - Fire Area AAA	None	None	None	None
065	Units 3 and 4 QSPDS Inverter Area - Fire Area AAA	None	None	None	None
111	Unit 4 Volume Control Tank - Fire Area AAA	None	None	None	None
112	Unit 3 Volume Control Tank - Fire Area AAA	None	None	None	None
126A	Units 3 and 4 Radwaste Control Room and Equipment Room - Fire Area AAA	None	None	None	None
126B	Units 3 and 4 Radwaste Processing Area - Fire Area AAA	None	None	None	None
126C	Units 3 and 4 Health Physics Storage Area - Fire Area AAA	None	None	None	None
126D	Units 3 and 4 Radwaste Building HVAC Equipment Room - Fire Area AAA	None	None	None	None
126E	Units 3 and 4 Maintenance Work Area - Fire Area AAA	None	None	None	None
129	Units 3 and 4 Nuclear Entrance Building - Fire Area AAA	None	None	None	None

Fire Area ID: B (Unit 3) - Unit 3 RHR
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
011	Unit 3 RHR Heat Exchanger Room - Fire Area B	None	R, D	E	Detection System, Alarm Point 21: R D Physical separation: E
012	Unit 3 RHR Pump A Room - Fire Area B	None	R, D	E	Combustible Loading: E Detection System, Alarm Point 21: R D
013	Unit 3 RHR Pump B Room - Fire Area B	None	R, D	None	Detection System, Alarm Point 21: R D

Attachment C
Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: B (Unit 4) - Unit 3 RHR
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
011	Unit 3 RHR Heat Exchanger Room - Fire Area B	None	R, D	E	Detection System, Alarm Point 21: R D Physical separation: E
012	Unit 3 RHR Pump A Room - Fire Area B	None	R, D	E	Combustible Loading: E Detection System, Alarm Point 21: R D
013	Unit 3 RHR Pump B Room - Fire Area B	None	R, D	None	Detection System, Alarm Point 21: R D

Fire Area ID: BB (Unit 3) - Unit 3 Train A Emergency Diesel Generator Day Tank Room
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
075	Unit 3 Train A Emergency Diesel Generator Day Tank Room - Fire Area BB	None	None	None	None

Fire Area ID: BB (Unit 4) - Unit 3 Train A Emergency Diesel Generator Day Tank Room
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
075	Unit 3 Train A Emergency Diesel Generator Day Tank Room - Fire Area BB	None	None	None	None

Attachment C
Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: BBB (Unit 3) - Units 3 and 4 Safety Injection Pump Rooms
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
052	Unit 4 Safety Injection Pump Room - Fire Area BBB	None	None	None	None
053	Unit 3 Safety Injection Pump Room - Fire Area BBB	None	None	None	None

Fire Area ID: BBB (Unit 4) - Units 3 and 4 Safety Injection Pump Rooms
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
052	Unit 4 Safety Injection Pump Room - Fire Area BBB	None	None	None	None
053	Unit 3 Safety Injection Pump Room - Fire Area BBB	None	None	None	None

Fire Area ID: C (Unit 3) - Unit 4 RHR
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
014	Unit 4 RHR Heat Exchanger Room - Fire Area C	None	R, D	E	Detection System, Alarm Point 22: R D Physical separation: E
015	Unit 4 RHR Pump A Room - Fire Area C	None	R, D	E	Combustible Loading: E Detection System, Alarm Point 22: R D
016	Unit 4 RHR Pump B Room - Fire Area C	None	R, D	None	Detection System, Alarm Point 22: R D

Attachment C
Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: C (Unit 4) - Unit 4 RHR
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
014	Unit 4 RHR Heat Exchanger Room - Fire Area C	None	R, D	E	Detection System, Alarm Point 22: R D Physical separation: E
015	Unit 4 RHR Pump A Room - Fire Area C	None	R, D	E	Combustible Loading: E Detection System, Alarm Point 22: R D
016	Unit 4 RHR Pump B Room - Fire Area C	None	R, D	None	Detection System, Alarm Point 22: R D

Fire Area ID: CC (Unit 3) - Units 3 and 4 Auxiliary Building North-South Breezeway
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R, D	Procedures/Recovery Actions: R D
079A	Units 3 and 4 Auxiliary Building North-South Breezeway - Fire Area CC	E, D	R, D	R	Combustible Control - Transient Restrictions: R Detection System, Alarm Point 39: D Detection System, Modification - CC U3: R ERFBS, Modification CC U3: R FireBarrier, MODIFICATION - CC U3: R Water Suppression, 10-850: E D

Fire Area ID: CC (Unit 4) - Units 3 and 4 Auxiliary Building North-South Breezeway
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	D	Procedures/Recovery Actions: D
079A	Units 3 and 4 Auxiliary Building North-South Breezeway - Fire Area CC	E, D	R, D	R	Combustible Control - Transient Restrictions: R Detection System, Alarm Point 39: D Detection System, Modification - CC U4: R ERFBS, Modification CC U4: R FireBarrier, MODIFICATION - CC U4: R Water Suppression, 10-850: E D

Attachment C
Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: CCC (Unit 3) - Units 3 and 4 Vestibule Elevator
Compliance Basis: NFPA 805, Section 4.2.3.3 (a), 3-hr rated ERFBS

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
064	Units 3 and 4 Vestibule Elevator - Fire Area CCC	None	None	S, N	ERFBS, 064-1: S N ERFBS, 064-2: S N ERFBS, 064-3: S N ERFBS, 064-4: S N

Fire Area ID: CCC (Unit 4) - Units 3 and 4 Vestibule Elevator
Compliance Basis: NFPA 805, Section 4.2.3.3 (a), 3-hr rated ERFBS

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
064	Units 3 and 4 Vestibule Elevator - Fire Area CCC	None	None	S, N	ERFBS, 064-1: S N ERFBS, 064-2: S N ERFBS, 064-3: S N ERFBS, 064-4: S N

Fire Area ID: D (Unit 3) - Unit 4 Pipe and Valve Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
030	Unit 4 Pipe and Valve Room - Fire Area D	None	R	E	Combustible Loading: E Detection System, Alarm Point 20: R Physical separation: E

Attachment C
Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: D (Unit 4) - Unit 4 Pipe and Valve Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
030	Unit 4 Pipe and Valve Room - Fire Area D	None	R	E	Combustible Loading: E Detection System, Alarm Point 20: R Physical separation: E

Fire Area ID: DD (Unit 3) - Unit 4 480V Load Centers A and B Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
093	Unit 4 480V Load Centers A and B Room - Fire Area DD	None	R, D	E	Combustible Loading: E Detection System, Alarm Point 2: R D

Fire Area ID: DD (Unit 4) - Unit 4 480V Load Centers A and B Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
093	Unit 4 480V Load Centers A and B Room - Fire Area DD	None	R	E	Combustible Loading: E Detection System, Alarm Point 2: R

Fire Area ID: DDD (Unit 3) - Unit 4 Steam Generator Feed Pump Area
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
066	Unit 4 Steam Generator Feed Pump Area - Fire Area DDD	None	None	None	None

Attachment C
Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: DDD (Unit 4) - Unit 4 Steam Generator Feed Pump Area
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
066	Unit 4 Steam Generator Feed Pump Area - Fire Area DDD	None	None	None	None

Fire Area ID: E (Unit 3) - Unit 3 Pipe and Valve Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
040	Unit 3 Pipe and Valve Room - Fire Area E	None	R, D	E	Combustible Loading: E Detection System, Alarm Point 23: R D Physical separation: E

Fire Area ID: E (Unit 4) - Unit 3 Pipe and Valve Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
040	Unit 3 Pipe and Valve Room - Fire Area E	None	R, D	E	Combustible Loading: E Detection System, Alarm Point 23: R D Physical separation: E

Fire Area ID: EE (Unit 3) - Unit 4 480V Load Centers C and D Room
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
094	Unit 4 480V Load Centers C and D Room - Fire Area EE	None	None	E	Combustible Loading: E

Attachment C
Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: EE (Unit 4) - Unit 4 480V Load Centers C and D Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	D	Procedures/Recovery Actions: D
094	Unit 4 480V Load Centers C and D Room - Fire Area EE	None	R, D	E, R, S, N	Combustible Loading: E Detection System, Alarm Point 2: R D ERFBS, 094-1: R S N ERFBS, 094-2: R S N ERFBS, 094-3: R S N ERFBS, 094-4: R S N ERFBS, 094-5: R S N ERFBS, 094-6: R S N ERFBS, 094-7: R S N ERFBS, 094-8: R S N

Fire Area ID: EEE (Unit 3) - Unit 3 Steam Generator Feed Pump Area
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
069	Unit 3 Steam Generator Feed Pump Area - Fire Area EEE	E	None	E	Combustible Loading: E Curbs: E Water Suppression, 3-10-1302: E Water Suppression, 3-10-1601: E

Fire Area ID: EEE (Unit 4) - Unit 3 Steam Generator Feed Pump Area
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
069	Unit 3 Steam Generator Feed Pump Area - Fire Area EEE	E	None	E	Combustible Loading: E Water Suppression, 3-10-1302: E Water Suppression, 3-10-1601: E

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: F (Unit 3) - Unit 3 and 4 Auxiliary Building Hallway (18'-0")
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R, D	Procedures/Recovery Actions: R D
031	Unit 4 Containment Spray Pump Room - Fire Area F	None	None	None	None
032	Unit 4 Sample Room - Fire Area F	None	None	None	None
033	Units 3 and 4 Post Accident Sampling System Room - Fire Area F	None	None	None	None
034	Unit 3 Boric Acid Evaporator Package Room	None	None	None	None
035	Units 3 and 4 Valve Room	None	None	None	None
036	Unit 3 Boric Acid Evaporator Package Room - Fire Area F	None	None	None	None
037	Unit 3 Sample Room and Gas Stripper Room - Fire Area F	None	None	None	None
038	Unit 3 Containment Spray Pump Room - Fire Area F	None	None	None	None
039	Unit 3 Concentrate Holding Tank Room - Fire Area F	None	None	None	None
048	Units 3 and 4 Deborating Demineralizer Tank Room - Fire Area F	None	None	E	Combustible Loading: E Physical separation: E
049	Units 3 and 4 Base and Cation Radwaste Demineralizers Room - Fire Area F	None	None	E	Combustible Loading: E Physical separation: E
050	Units 3 and 4 Purification Demineralizers Room - Fire Area F	None	None	E	Combustible Loading: E Physical separation: E
051	Units 3 and 4 Condensate Pump and Monitor Tank Room - Fire Area F	None	None	E	Combustible Loading: E Physical separation: E
058	Units 3 and 4 Auxiliary Building Hallway - Fire Area F	None	E, R, D	E, R	Combustible Control - Transient Restrictions: R Combustible Loading: E Detection System, Alarm Point 39: E R D Physical separation: E

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: F (Unit 4) - Unit 3 and 4 Auxiliary Building Hallway (18'-0")
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R, D	Procedures/Recovery Actions: R D
031	Unit 4 Containment Spray Pump Room - Fire Area F	None	None	None	None
032	Unit 4 Sample Room - Fire Area F	None	None	None	None
033	Units 3 and 4 Post Accident Sampling System Room - Fire Area F	None	None	None	None
034	Unit 3 Boric Acid Evaporator Package Room	None	None	None	None
035	Units 3 and 4 Valve Room	None	None	None	None
036	Unit 3 Boric Acid Evaporator Package Room - Fire Area F	None	None	None	None
037	Unit 3 Sample Room and Gas Stripper Room - Fire Area F	None	None	None	None
038	Unit 3 Containment Spray Pump Room - Fire Area F	None	None	None	None
039	Unit 3 Concentrate Holding Tank Room - Fire Area F	None	None	None	None
048	Units 3 and 4 Deborating Demineralizer Tank Room - Fire Area F	None	None	E	Combustible Loading: E Physical separation: E
049	Units 3 and 4 Base and Cation Radwaste Demineralizers Room - Fire Area F	None	None	E	Combustible Loading: E Physical separation: E
050	Units 3 and 4 Purification Demineralizers Room - Fire Area F	None	None	E	Combustible Loading: E Physical separation: E
051	Units 3 and 4 Condensate Pump and Monitor Tank Room - Fire Area F	None	None	E	Combustible Loading: E Physical separation: E
058	Units 3 and 4 Auxiliary Building Hallway - Fire Area F	None	E, R, D	E, R	Combustible Control - Transient Restrictions: R Combustible Loading: E Detection System, Alarm Point 39: E R D Physical separation: E

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: FF (Unit 3) - Unit 3 480V Load Centers A and B Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	D	Procedures/Recovery Actions: D
095	Unit 3 480V Load Centers A and B Room - Fire Area FF	None	R, D	None	Detection System, Alarm Point 1: R D

Fire Area ID: FF (Unit 4) - Unit 3 480V Load Centers A and B Room
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
095	Unit 3 480V Load Centers A and B Room - Fire Area FF	None	None	None	None

Fire Area ID: FFF (Unit 3) - Units 3 and 4 Purge Supply Fan Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
107	Units 3 and 4 Purge Supply Fan Room - Fire Area FFF	None	None	None	None

Fire Area ID: FFF (Unit 4) - Units 3 and 4 Purge Supply Fan Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
107	Units 3 and 4 Purge Supply Fan Room - Fire Area FFF	None	None	None	None

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: G (Unit 3) - Unit 3 and 4 Electrical Equipment Rooms
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
025	Units 3 and 4 Electrical Equipment Room - Fire Area G	None	R	E, R, S, N	Combustible Loading: E Detection System, Alarm Point 32: R ERFBS, 025-1: R S N ERFBS, 025-2: R S N ERFBS, 025-3: R S N Physical separation: E
025A	Units 3 and 4 Spare Battery Room - Fire Area G	None	R	None	Detection System, Alarm Point 32: R

Fire Area ID: G (Unit 4) - Unit 3 and 4 Electrical Equipment Rooms
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	D	Procedures/Recovery Actions: D
025	Units 3 and 4 Electrical Equipment Room - Fire Area G	None	R, D	E, R, S, N	Combustible Loading: E Detection System, Alarm Point 32: R D ERFBS, 025-1: R S N ERFBS, 025-2: R S N ERFBS, 025-3: R S N Physical separation: E
025A	Units 3 and 4 Spare Battery Room - Fire Area G	None	R, D	None	Detection System, Alarm Point 32: R D

Fire Area ID: GG (Unit 3) - Unit 3 480V Load Centers C and D Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R, D	Procedures/Recovery Actions: R D
096	Unit 3 480V Load Centers C and D Room - Fire Area GG	None	R, D	R, S, N	Detection System, Alarm Point 1: R D ERFBS, 096-1: R S N ERFBS, 096-2: R S N ERFBS, 096-3: R S N ERFBS, 096-4: R S N ERFBS, 096-5: R S N ERFBS, 096-6: R S N ERFBS, 096-7: R S N ERFBS, 096-8: R S N ERFBS, 096-9: R S N

Fire Area ID: GG (Unit 4) - Unit 3 480V Load Centers C and D Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
096	Unit 3 480V Load Centers C and D Room - Fire Area GG	None	R, D	None	Detection System, Alarm Point 1: R D

Fire Area ID: H (Unit 3) - Unit 3 West Electrical Penetration Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
019	Unit 3 West Electrical Penetration Room - Fire Area H	None	R, D	R, S, N	Detection System, Alarm Point 9: R D ERFBS, 019-1: R S N ERFBS, 019-2: R S N ERFBS, 019-3: R S N ERFBS, 019-4: R S N

Fire Area ID: H (Unit 4) - Unit 3 West Electrical Penetration Room
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
019	Unit 3 West Electrical Penetration Room - Fire Area H	None	None	None	None

Fire Area ID: HH (Unit 3) - Units 3 and 4 Cable Spreading Room and Chase
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R, D	Procedures/Recovery Actions: R D
098	Units 3 and 4 Cable Spreading Room - Fire Area HH	D	R, D	R	Combustible Control - Transient Restrictions: R Detection System, Alarm Point 6: D Detection System, Modification - HH U3: R ERFBS, Modification - HH U3: R Gaseous Suppression, CV-1450A&B CV-1451A&B: D
132	Units 3 and 4 Control Room Electrical Cable Chase - Fire Area HH	D	D	R	Combustible Control - Transient Restrictions: R Detection System, Alarm Point 5: D Gaseous Suppression, CV-1450A&B CV-1451A&B: D

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: HH (Unit 4) - Units 3 and 4 Cable Spreading Room and Chase
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R, D	Procedures/Recovery Actions: R D
098	Units 3 and 4 Cable Spreading Room - Fire Area HH	D	R, D	R	Combustible Control - Transient Restrictions: R Detection System, Alarm Point 6: D Detection System, Modification - HH U4: R ERFBS, Modification - HH U4: R Gaseous Suppression, CV-1450A&B CV-1451A&B: D
132	Units 3 and 4 Control Room Electrical Cable Chase - Fire Area HH	D	D	R	Combustible Control - Transient Restrictions: R Detection System, Alarm Point 5: D Gaseous Suppression, CV-1450A&B CV-1451A&B: D

Fire Area ID: I (Unit 3) - Unit 3 South Electrical Penetration Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
020	Unit 3 South Electrical Penetration Room - Fire Area I	None	R, D	None	Detection System, Alarm Point 9: R D

Fire Area ID: I (Unit 4) - Unit 3 South Electrical Penetration Room
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
020	Unit 3 South Electrical Penetration Room - Fire Area I	None	None	None	None

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: II (Unit 3) - Unit 4 B DC Equipment Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
101	Unit 4 B DC Equipment Room - Fire Area II	None	R, D	None	Detection System, Alarm Point 6: R D

Fire Area ID: II (Unit 4) - Unit 4 B DC Equipment Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	D	Procedures/Recovery Actions: D
101	Unit 4 B DC Equipment Room - Fire Area II	None	R, D	None	Detection System, Alarm Point 6: R D

Fire Area ID: J (Unit 3) - Unit 4 North Electrical Penetration Room
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
026	Unit 4 North Electrical Penetration Room - Fire Area J	None	None	None	None

Fire Area ID: J (Unit 4) - Unit 4 North Electrical Penetration Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
026	Unit 4 North Electrical Penetration Room - Fire Area J	None	R	None	Detection System, Alarm Point 10: R

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: JJ (Unit 3) - Unit 4 Battery Rack B Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
102	Unit 4 Battery Rack B Room - Fire Area JJ	None	R, D	None	Detection System, Alarm Point 6: R D

Fire Area ID: JJ (Unit 4) - Unit 4 Battery Rack B Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
102	Unit 4 Battery Rack B Room - Fire Area JJ	None	R, D	None	Detection System, Alarm Point 6: R D

Fire Area ID: K (Unit 3) - Unit 4 West Electrical Penetration Room
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
027	Unit 4 West Electrical Penetration Room - Fire Area K	None	None	None	None

Fire Area ID: K (Unit 4) - Unit 4 West Electrical Penetration Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
027	Unit 4 West Electrical Penetration Room - Fire Area K	None	R, D	None	Detection System, Alarm Point 10: R D

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: KK (Unit 3) - Unit 3 Battery Rack A Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
103	Unit 3 Battery Rack A Room - Fire Area KK	None	R	None	Detection System, Alarm Point 6: R

Fire Area ID: KK (Unit 4) - Unit 3 Battery Rack A Room
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
103	Unit 3 Battery Rack A Room - Fire Area KK	None	None	None	None

Fire Area ID: L (Unit 3) - Units 3 and 4 Auxiliary Building Fan Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
028	Units 3 and 4 Auxiliary Building Fan Room - Fire Area L	None	None	E	Combustible Loading: E Physical separation: E

Fire Area ID: L (Unit 4) - Units 3 and 4 Auxiliary Building Fan Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
028	Units 3 and 4 Auxiliary Building Fan Room - Fire Area L	None	None	E	Combustible Loading: E Physical separation: E

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: LL (Unit 3) - Unit 3 A DC Equipment Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
104	Unit 3 A DC Equipment Room - Fire Area LL	None	R, D	R, S, N	Detection System, Alarm Point 6: R D ERFBS, 104-1: R S N ERFBS, 104-2: R S N ERFBS, 104-3: R S N ERFBS, 104-4: R S N ERFBS, 104-5: R S N

Fire Area ID: LL (Unit 4) - Unit 3 A DC Equipment Room
Compliance Basis: NFPA 805, Section 4.2.3.3 (a), 3-hr rated ERFBS

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
104	Unit 3 A DC Equipment Room - Fire Area LL	None	None	S, N	ERFBS, 104-1: S N ERFBS, 104-2: S N ERFBS, 104-3: S N ERFBS, 104-4: S N ERFBS, 104-5: S N

Fire Area ID: MM (Unit 3) - Control Room Complex
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R, D	Procedures/Recovery Actions: R D
097	Units 3 and 4 Mechanical Equipment Room - Fire Area MM	None	D	D	Detection System, Alarm Point 5: D Extinguishers: D
106	Units 3 and 4 Control Room - Fire Area MM	None	R, D	D	Detection System, Alarm Point 5: D Detection System, Modification - MM: R Extinguishers: D
106R	Units 3 and 4 Control Room Roof - Fire Area MM	None	None	E, D	Combustible Loading: E Extinguishers: D

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: MM (Unit 4) - Control Room Complex
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R, D	Procedures/Recovery Actions: R D
097	Units 3 and 4 Mechanical Equipment Room - Fire Area MM	None	D	D	Detection System, Alarm Point 5: D Extinguishers: D
106	Units 3 and 4 Control Room - Fire Area MM	None	R, D	D	Detection System, Alarm Point 5: D Detection System, Modification - MM: R Extinguishers: D
106R	Units 3 and 4 Control Room Roof - Fire Area MM	None	None	E, D	Combustible Loading: E Extinguishers: D

Fire Area ID: N (Unit 3) - Unit 4 Charging Pump Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
045	Unit 4 Charging Pump Room - Fire Area N	E, D	E, D	None	Detection System, Alarm Point 7: E D Water Suppression, 4-10-830: E D

Fire Area ID: N (Unit 4) - Unit 4 Charging Pump Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
045	Unit 4 Charging Pump Room - Fire Area N	E	E, D	None	Detection System, Alarm Point 7: E D Water Suppression, 4-10-830: E

Attachment C
Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: NN (Unit 3) - Units 3 and 4 A DC Equipment Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
108A	Units 3 and 4 A DC Equipment Room - Fire Area NN	R, S, N	R, D, S, N	R, S, N	Detection System, Alarm Point 15: R D S N ERFBS, 108A-1: R S N ERFBS, 108A-2: R S N ERFBS, 108A-3: R S N ERFBS, 108A-4: R S N Gaseous Suppression, CV-1452 CV-1453: R S N

Fire Area ID: NN (Unit 4) - Units 3 and 4 A DC Equipment Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
108A	Units 3 and 4 A DC Equipment Room - Fire Area NN	R, S, N	R, D, S, N	R, S, N	Detection System, Alarm Point 15: R D S N ERFBS, 108A-1: R S N ERFBS, 108A-2: R S N ERFBS, 108A-3: R S N ERFBS, 108A-4: R S N Gaseous Suppression, CV-1452 CV-1453: R S N

Fire Area ID: O (Unit 3) - Unit 3 and 4 Boric Acid Tanks and Pumps Rooms
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
041	Units 3 and 4 Boric Acid Tanks and Pump Room - Fire Area O	None	None	E	Physical separation: E
055	Unit 3 Charging Pump Room - Fire Area O	E	E, D	None	Detection System, Alarm Point 7: E D Water Suppression, 3-10-841: E

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: O (Unit 4) - Unit 3 and 4 Boric Acid Tanks and Pumps Rooms
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
041	Units 3 and 4 Boric Acid Tanks and Pump Room - Fire Area O	None	None	E	Physical separation: E
055	Unit 3 Charging Pump Room - Fire Area O	E	E	None	Detection System, Alarm Point 7: E Water Suppression, 3-10-841: E

Fire Area ID: OD-047 (Unit 3) - Unit 4 Component Cooling Pump and Heat Exchanger
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
047	Unit 4 Component Cooling Pump and Heat Exchanger - Fire Area OD	E	None	E	Combustible Loading: E Water Suppression, 4-10-833: E Water Suppression, 4-10-835: E

Fire Area ID: OD-047 (Unit 4) - Unit 4 Component Cooling Pump and Heat Exchanger
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	D	Procedures/Recovery Actions: D
047	Unit 4 Component Cooling Pump and Heat Exchanger - Fire Area OD	E	D	E	Combustible Loading: E Detection System, Alarm Point 28: D Water Suppression, 4-10-833: E Water Suppression, 4-10-835: E

Attachment C
Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: OD-054 (Unit 3) - Unit 3 Component Cooling Pump and Heat Exchanger Area
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
054	Unit 3 Component Cooling Pump and Heat Exchanger Area - Fire Area OD	E	None	E	Combustible Loading: E Water Suppression, 3-10-837: E Water Suppression, 3-10-839: E

Fire Area ID: OD-054 (Unit 4) - Unit 3 Component Cooling Pump and Heat Exchanger Area
Compliance Basis: NFPA 805, Section 4.2.3.3 (b), 20ft horizontal separation

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
054	Unit 3 Component Cooling Pump and Heat Exchanger Area - Fire Area OD	E	None	E	Combustible Loading: E Water Suppression, 3-10-837: E Water Suppression, 3-10-839: E

Fire Area ID: OD-076 (Unit 3) - Unit 4 Lube Oil Reservoir Area
Compliance Basis: NFPA 805, Section 4.2.3.3 (b), 20ft horizontal separation

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
076	Unit 4 Lube Oil Reservoir Area - Fire Area OD	None	None	None	None

Fire Area ID: OD-076 (Unit 4) - Unit 4 Lube Oil Reservoir Area
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
076	Unit 4 Lube Oil Reservoir Area - Fire Area OD	None	D	None	Detection System, Alarm Point 12: D

Attachment C
Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: OD-077 (Unit 3) - Unit 4 Laydown Area, Instrument Air Compressors and Condensate Storage Area
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
077	Unit 4 Laydown Area, Instrument Air Compressors and Condensate Storage Area - Fire Area OD	None	None	None	None

Fire Area ID: OD-077 (Unit 4) - Unit 4 Laydown Area, Instrument Air Compressors and Condensate Storage Area
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
077	Unit 4 Laydown Area, Instrument Air Compressors and Condensate Storage Area - Fire Area OD	None	None	None	None

Fire Area ID: OD-078 (Unit 3) - Unit 4 Instrument Air Equipment Area
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
078	Unit 4 Instrument Air Equipment Area - Fire Area OD	D	D	D	Detection System, All available - OD-078: D Pre-fire Plan: D Water Suppression, 4-10-1302: D Water Suppression, 4-10-1590: D Water Suppression, 4-10-1601: D

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: OD-078 (Unit 4) - Unit 4 Instrument Air Equipment Area
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
078	Unit 4 Instrument Air Equipment Area - Fire Area OD	D	D	D	Detection System, All available - OD-078: D Pre-fire Plan: D Water Suppression, 4-10-1302: D Water Suppression, 4-10-1590: D Water Suppression, 4-10-1601: D

Fire Area ID: OD-079 (Unit 3) - Outdoor Area West of Unit 4 Containment
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
079	Outdoor Area West of Unit 4 Containment - Fire Area OD	None	None	E	Combustible Loading: E Curbs: E Extinguishers: E Physical separation: E

Fire Area ID: OD-079 (Unit 4) - Outdoor Area West of Unit 4 Containment
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R, D	Procedures/Recovery Actions: R D
079	Outdoor Area West of Unit 4 Containment - Fire Area OD	D	None	E, D	Combustible Control - Transient Restrictions: D Combustible Loading: E Curbs: E Extinguishers: E Physical separation: E Water Suppression, All available - OD-079: D

Attachment C
Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: OD-080 (Unit 3) - Unit 4 Main Condenser Area
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
080	Unit 4 Main Condenser Area - Fire Area OD	E	None	E	Combustible Loading: E Curbs: E Water Suppression, 4-10-1302: E Water Suppression, 4-10-1601: E

Fire Area ID: OD-080 (Unit 4) - Unit 4 Main Condenser Area
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
080	Unit 4 Main Condenser Area - Fire Area OD	E	None	E, D	Combustible Control - Transient Restrictions: D Combustible Loading: E Water Suppression, 4-10-1302: E Water Suppression, 4-10-1601: E

Fire Area ID: OD-081 (Unit 3) - Unit 4 Main and Start-up Transformer and Unit 3 Turbine Lube Oil Reservoir Area
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
081	Unit 4 Main and Start-Up Transformer and Unit 3 Turbine Lube Oil Reservoir Area - Fire Area OD	E, D	D	E	Combustible Loading: E Curbs: E Detection System, Alarm Point 11: D Water Suppression, 3-10-1590: E D Water Suppression, 4-10-1575: E D Water Suppression, 4-10-1611: E D

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: OD-081 (Unit 4) - Unit 4 Main and Start-up Transformer and Unit 3 Turbine Lube Oil Reservoir Area
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
081	Unit 4 Main and Start-Up Transformer and Unit 3 Turbine Lube Oil Reservoir Area - Fire Area OD	E, D	D	E	Combustible Loading: E Curbs: E Detection System, Alarm Point 11: D Water Suppression, 3-10-1590: E D Water Suppression, 4-10-1575: E D Water Suppression, 4-10-1611: E D

Fire Area ID: OD-082 (Unit 3) - Unit 4 Auxiliary Transformer Area
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
082	Unit 4 Auxiliary Transformer Area - Fire Area OD	E, D	D	E	Combustible Loading: E Curbs: E Detection System, Alarm Point 14: D Extinguishers: E Hose Stations: E Water Suppression, 3-10-1590: E D Water Suppression, 4-10-1302: E D Water Suppression, 4-10-1581: E D Water Suppression, 4-10-1601: E D

Fire Area ID: OD-082 (Unit 4) - Unit 4 Auxiliary Transformer Area
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
082	Unit 4 Auxiliary Transformer Area - Fire Area OD	E, D	D	E	Combustible Loading: E Curbs: E Detection System, Alarm Point 14: D Extinguishers: E Hose Stations: E Water Suppression, 3-10-1590: E D Water Suppression, 4-10-1302: E D Water Suppression, 4-10-1581: E D Water Suppression, 4-10-1601: E D

Attachment C
Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: OD-083 (Unit 3) - Unit 3 Instrument Air Equipment Area
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
083	Unit 3 Instrument Air Equipment Area - Fire Area OD	E, D	D	E	Combustible Loading: E Curbs: E Detection System, All available - OD-083: D Extinguishers: E Physical separation: E Water Suppression, 3-10-1302: E D Water Suppression, 3-10-1601: E D

Fire Area ID: OD-083 (Unit 4) - Unit 3 Instrument Air Equipment Area
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
083	Unit 3 Instrument Air Equipment Area - Fire Area OD	E, D	D	E	Combustible Loading: E Curbs: E Detection System, All available - OD-083: D Extinguishers: E Physical separation: E Water Suppression, 3-10-1302: E D Water Suppression, 3-10-1601: E D

Fire Area ID: OD-084 (Unit 3) - Units 3 and 4 Auxiliary Feedwater Pump Area
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R, D	Procedures/Recovery Actions: R D
084	Units 3 and 4 Auxiliary Feedwater Pump Area - Fire Area OD	E, D	None	E	Combustible Loading: E Curbs: E Extinguishers: E Water Suppression, 3-10-1601: E D

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: OD-084 (Unit 4) - Units 3 and 4 Auxiliary Feedwater Pump Area
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
084	Units 3 and 4 Auxiliary Feedwater Pump Area - Fire Area OD	E, D	None	E, R	Combustible Loading: E Curbs: E Extinguishers: E Transient Combustible Restrictions: R Water Suppression, 3-10-1601: E D

Fire Area ID: OD-085 (Unit 3) - Unit 3 Main Condenser Area
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
085	Unit 3 Main Condenser Area - Fire Area OD	E	None	E	Combustible Loading: E Curbs: E Water Suppression, 3-10-1302: E Water Suppression, 3-10-1601: E

Fire Area ID: OD-085 (Unit 4) - Unit 3 Main Condenser Area
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
085	Unit 3 Main Condenser Area - Fire Area OD	E	None	E	Combustible Loading: E Curbs: E Water Suppression, 3-10-1302: E Water Suppression, 3-10-1601: E

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: OD-086 (Unit 3) - Unit 3 Main Transformer and Startup Transformer
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
086	Unit 3 Main Transformer and Startup Transformer - Fire Area OD	E, D	D	E, R	Combustible Loading: E Detection System, All available - OD-086: D ERFBS, Modification - OD-86 U3: R Fire Stops and Radiant Energy Heat Shield: R Water Suppression, 3-10-1575: E D Water Suppression, 3-10-1611: E D

Fire Area ID: OD-086 (Unit 4) - Unit 3 Main Transformer and Startup Transformer
Compliance Basis: NFPA-805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
086	Unit 3 Main Transformer and Startup Transformer - Fire Area OD	E, D	D	E, R	Combustible Loading: E Detection System, All available - OD-086: D ERFBS, Modification - OD-86 U4: R Water Suppression, 3-10-1575: E D Water Suppression, 3-10-1611: E D

Fire Area ID: OD-087 (Unit 3) - Unit 3 Auxiliary Transformer Area
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
087	Unit 3 Auxiliary Transformer Area - Fire Area OD	E, D	D	None	Detection System, Alarm Point 13: D Water Suppression, 3-10-1302: E D Water Suppression, 3-10-1581: E D Water Suppression, 3-10-1601: E D

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: OD-087 (Unit 4) - Unit 3 Auxiliary Transformer Area
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
087	Unit 3 Auxiliary Transformer Area - Fire Area OD	E, D	D	None	Detection System, Alarm Point 13: D Water Suppression, 3-10-1302: E D Water Suppression, 3-10-1581: E D Water Suppression, 3-10-1601: E D

Fire Area ID: OD-088 (Unit 3) - Unit 3 Switchgear/D.G. Building Vestibule
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
088	Unit 3 Switchgear / DG Building Vestibule - Fire Area OD	None	None	E	Combustible Loading: E Physical separation: E

Fire Area ID: OD-088 (Unit 4) - Unit 3 Switchgear/D.G. Building Vestibule
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
088	Unit 3 Switchgear / DG Building Vestibule - Fire Area OD	None	None	E	Combustible Loading: E Physical separation: E

Fire Area ID: OD-089 (Unit 3) - Unit 3 Condensate Storage Tank Area
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
089	Unit 3 Condensate Storage Tank Area - Fire Area OD	None	None	E, D	Combustible Control - Transient Restrictions: D Combustible Loading: E

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: OD-089 (Unit 4) - Unit 3 Condensate Storage Tank Area
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
089	Unit 3 Condensate Storage Tank Area - Fire Area OD	None	None	E	Combustible Loading: E

Fire Area ID: OD-090 (Unit 3) - Unit 3 & 4 Emergency Diesel Generator Oil Storage Tank
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
090	Unit 3 & 4 Emergency Diesel Generator Oil Storage Tank Area - Fire Area OD	None	None	None	None

Fire Area ID: OD-090 (Unit 4) - Unit 3 & 4 Emergency Diesel Generator Oil Storage Tank
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
090	Unit 3 & 4 Emergency Diesel Generator Oil Storage Tank Area - Fire Area OD	None	None	None	None

Fire Area ID: OD-091 (Unit 3) - Unit 4 Condensate Pump Area
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
091	Unit 4 Condensate Pump Area - Fire Area OD	E, D	None	E	Combustible Loading: E Curbs: E Water Suppression, 4-10-1302: E D Water Suppression, 4-10-1601: E D

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: OD-091 (Unit 4) - Unit 4 Condensate Pump Area
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
091	Unit 4 Condensate Pump Area - Fire Area OD	E, D	None	E	Combustible Loading: E Curbs: E Water Suppression, 4-10-1302: E D Water Suppression, 4-10-1601: E D

Fire Area ID: OD-092 (Unit 3) - Unit 3 Condensate Pump Area
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
092	Unit 3 Condensate Pump Area - Fire Area OD	E	None	None	Water Suppression, 3-10-1302: E Water Suppression, 3-10-1601: E

Fire Area ID: OD-092 (Unit 4) - Unit 3 Condensate Pump Area
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
092	Unit 3 Condensate Pump Area - Fire Area OD	E	None	None	Water Suppression, 3-10-1302: E Water Suppression, 3-10-1601: E

Fire Area ID: OD-105 (Unit 3) - Units 3 and 4 Turbine Building Mezzanine Deck
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
105	Units 3 and 4 Turbine Building Mezzanine Deck - Fire Area OD	None	None	E	Combustible Loading: E

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: OD-105 (Unit 4) - Units 3 and 4 Turbine Building Mezzanine Deck
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
105	Units 3 and 4 Turbine Building Mezzanine Deck - Fire Area OD	None	None	E	Combustible Loading: E

Fire Area ID: OD-113 (Unit 3) - Unit 4 Feedwater Platform
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
113	Unit 4 Feedwater Platform - Fire Area OD	None	None	E	Combustible Loading: E

Fire Area ID: OD-113 (Unit 4) - Unit 4 Feedwater Platform
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
113	Unit 4 Feedwater Platform - Fire Area OD	None	D	E, R, D	Combustible Loading: E Detection System, Alarm Point 29: D Radiant Barrier: R D

Fire Area ID: OD-114 (Unit 3) - Unit 4 Main Steam Header Platform
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
114	Unit 4 Main Steam Header Platform - Fire Area OD	None	None	E	Combustible Loading: E

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: OD-114 (Unit 4) - Unit 4 Main Steam Header Platform
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
114	Unit 4 Main Steam Header Platform - Fire Area OD	None	None	E	Combustible Loading: E

Fire Area ID: OD-115 (Unit 3) - Unit 3 Main Steam Header Platform
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
115	Unit 3 Main Steam Header Platform - Fire Area OD	None	None	E	Combustible Loading: E

Fire Area ID: OD-115 (Unit 4) - Unit 3 Main Steam Header Platform
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
115	Unit 3 Main Steam Header Platform - Fire Area OD	None	None	E	Combustible Loading: E

Fire Area ID: OD-116 (Unit 3) - Unit 3 Feedwater Platform
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
116	Unit 3 Feedwater Platform - Fire Area OD	None	D	E, R, D	Combustible Control - Transient Restrictions: D Combustible Loading: E Detection System, Alarm Point 30: D Radiant Barrier: R D

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: OD-116 (Unit 4) - Unit 3 Feedwater Platform
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
116	Unit 3 Feedwater Platform - Fire Area OD	None	None	E, D	Combustible Control - Transient Restrictions: D Combustible Loading: E

Fire Area ID: OD-117 (Unit 3) - Units 3 and 4 Turbine Deck
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R, D	Procedures/Recovery Actions: R D
117	Units 3 and 4 Turbine Deck - Fire Area OD	None	None	E	Combustible Loading: E

Fire Area ID: OD-117 (Unit 4) - Units 3 and 4 Turbine Deck
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R, D	Procedures/Recovery Actions: R D
117	Units 3 and 4 Turbine Deck - Fire Area OD	None	None	E	Combustible Loading: E

Fire Area ID: OD-118 (Unit 3) - Units 3 and 4 Auxiliary Building Roof
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
118	Units 3 and 4 Auxiliary Building Roof - Fire Area OD	None	None	E, D	Combustible Control - Transient Restrictions: D Combustible Loading: E Hot Work Control: D Physical separation: E

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: OD-118 (Unit 4) - Units 3 and 4 Auxiliary Building Roof
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
118	Units 3 and 4 Auxiliary Building Roof - Fire Area OD	None	None	E, D	Combustible Control - Transient Restrictions: D Combustible Loading: E Hot Work Control: D Physical separation: E

Fire Area ID: OD-122 (Unit 3) - Units 3 and 4 Water Treatment Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
122	Units 3 and 4 Water Treatment Room - Fire Area OD	None	None	None	None

Fire Area ID: OD-122 (Unit 4) - Units 3 and 4 Water Treatment Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
122	Units 3 and 4 Water Treatment Room - Fire Area OD	None	None	None	None

Fire Area ID: OD-123 (Unit 3) - Units 3 and 4 Refueling Water Storage Tanks Area
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
123	Units 3 and 4 Refueling Water Storage Tanks Area - Fire Area OD	None	None	None	None

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: OD-123 (Unit 4) - Units 3 and 4 Refueling Water Storage Tanks Area
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
123	Units 3 and 4 Refueling Water Storage Tanks Area - Fire Area OD	None	None	None	None

Fire Area ID: OD-124 (Unit 3) - Outside Area NE of Unit 3 Containment
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
124	Outside Area NE of Unit 3 Containment - Fire Area OD	None	None	None	None

Fire Area ID: OD-124 (Unit 4) - Outside Area NE of Unit 3 Containment
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
124	Outside Area NE of Unit 3 Containment - Fire Area OD	None	None	None	None

Fire Area ID: OD-125 (Unit 3) - Units 3 and 4 Land Area South of Unit 4 Containment
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
125	Units 3 and 4 Land Area South of Unit 4 Containment - Fire Area OD	None	None	None	None

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: OD-125 (Unit 4) - Units 3 and 4 Land Area South of Unit 4 Containment
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
125	Units 3 and 4 Land Area South of Unit 4 Containment - Fire Area OD	None	None	None	None

Fire Area ID: OD-128 (Unit 3) - Units 3 and 4 Distribution Switchyard
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
128	Units 3 and 4 Distribution Switchyard - Fire Area OD	None	None	None	None

Fire Area ID: OD-128 (Unit 4) - Units 3 and 4 Distribution Switchyard
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
128	Units 3 and 4 Distribution Switchyard - Fire Area OD	None	None	None	None

Fire Area ID: OD-131 (Unit 3) - Units 3A and 3B Diesel Generator Radiator Rooms
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
131	Units 3A and 3B Diesel Generator Radiator Rooms - Fire Area OD	None	None	None	None

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: OD-131 (Unit 4) - Units 3A and 3B Diesel Generator Radiator Rooms
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
131	Units 3A and 3B Diesel Generator Radiator Rooms - Fire Area OD	None	None	None	None

Fire Area ID: OD-143 (Unit 3) - Unit 3 Emergency Diesel Generator Roof
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
143	Unit 3 Emergency Diesel Generator Roof - Fire Area OD-143	None	None	None	None

Fire Area ID: OD-143 (Unit 4) - Unit 3 Emergency Diesel Generator Roof
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
143	Unit 3 Emergency Diesel Generator Roof - Fire Area OD-143	None	None	None	None

Fire Area ID: OD-999 (Unit 3) - Miscellaneous Areas
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
999	Miscellaneous Areas - Fire Area OD	None	None	None	None

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: OD-999 (Unit 4) - Miscellaneous Areas
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
999	Miscellaneous Areas - Fire Area OD	None	None	None	None

Fire Area ID: OD-Intake (Unit 3) - Intake Structure
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
119	Unit 4 Circulating Water Intake Structure - Fire Area OD	None	None	E	Combustible Loading: E
120	Unit 3 Circulating Water Intake Structure - Fire Area OD	None	None	E	Combustible Loading: E
121	Units 3 and 4 Intake Laydown Area - Fire Area OD	None	None	None	None

Fire Area ID: OD-Intake (Unit 4) - Intake Structure
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
119	Unit 4 Circulating Water Intake Structure - Fire Area OD	None	D	E	Combustible Loading: E Detection System, Alarm Point 26: D
120	Unit 3 Circulating Water Intake Structure - Fire Area OD	None	D	E	Combustible Loading: E Detection System, Alarm Point 27: D
121	Units 3 and 4 Intake Laydown Area - Fire Area OD	None	None	None	None

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: OO (Unit 3) - Units 3 and 4 B DC Equipment Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
108B	Units 3 and 4 DC Equipment Room - Fire Area OO	S, N	R, D, S, N	R, S, N	Detection System, Alarm Point 15: R D S N ERFBS, 108B-1: R S N ERFBS, 108B-2: R S N Gaseous Suppression, CV-1454 CV-1455: S N

Fire Area ID: OO (Unit 4) - Units 3 and 4 B DC Equipment Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
108B	Units 3 and 4 DC Equipment Room - Fire Area OO	D, S, N	R, D, S, N	R, S, N	Detection System, Alarm Point 15: R D S N ERFBS, 108B-1: R S N ERFBS, 108B-2: R S N Gaseous Suppression, CV-1454 CV-1455: D S N

Fire Area ID: P (Unit 3) - Unit 4 Containment Building
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
059	Unit 4 Containment Building - Fire Area P	None	None	E	Combustible Loading: E

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: P (Unit 4) - Unit 4 Containment Building
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
059	Unit 4 Containment Building - Fire Area P	None	E, D	E, R, S, N	Combustible Loading: E S N Detection System, Alarm Point 43: E D ERFBS, 059-1: E S N ERFBS, 059-2: E S N ERFBS, 059-3: E S N ERFBS, 059-4: E S N ERFBS, 059-5: E S N ERFBS, 059-6: E S N Radiant Energy Heat Shield: E R S N

Fire Area ID: PP (Unit 3) - Unit 4 Battery Rack A Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
109	Unit 4 Battery Rack A Room - Fire Area PP	None	R	None	Detection System, Alarm Point 15: R

Fire Area ID: PP (Unit 4) - Unit 4 Battery Rack A Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
109	Unit 4 Battery Rack A Room - Fire Area PP	None	R	None	Detection System, Alarm Point 15: R

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: Q (Unit 3) - Unit 3 Containment Building
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
060	Unit 3 Containment Building - Fire Area Q	None	E, D	E, R, S, N	Combustible Loading: E S N Detection System, Alarm Point 3: E D Detection System, Alarm Point 4: E D ERFBS, 060-1: E S N ERFBS, 060-10: E S N ERFBS, 060-2: E S N ERFBS, 060-3: E S N ERFBS, 060-4: E S N ERFBS, 060-5: E S N ERFBS, 060-6: E S N ERFBS, 060-7: E S N ERFBS, 060-8: E S N ERFBS, 060-9: E S N Radiant Energy Heat Shield: E R S N

Fire Area ID: Q (Unit 4) - Unit 3 Containment Building
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
060	Unit 3 Containment Building - Fire Area Q	None	None	E	Combustible Loading: E

Fire Area ID: QQ (Unit 3) - Unit 3 Battery Rack B Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
110	Unit 3 Battery Rack B Room - Fire Area QQ	None	R	None	Detection System, Alarm Point 15: R

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: QQ (Unit 4) - Unit 3 Battery Rack B Room
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
110	Unit 3 Battery Rack B Room - Fire Area QQ	None	None	None	None

Fire Area ID: R (Unit 3) - Unit 4 Reactor Control Rod Equipment Room
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
061	Unit 4 Reactor Control Rod Equipment Room - Fire Area R	None	None	None	None

Fire Area ID: R (Unit 4) - Unit 4 Reactor Control Rod Equipment Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	D	Procedures/Recovery Actions: D
061	Unit 4 Reactor Control Rod Equipment Room - Fire Area R	None	D	None	Detection System, Alarm Point 6: D

Fire Area ID: RR (Unit 3) - Unit 4 Train A Emergency Diesel Generator Room
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
138	Unit 4 Train A Emergency Diesel Generator Room - Fire Area RR	E	None	None	Water Suppression, 4-10-1112: E

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: RR (Unit 4) - Unit 4 Train A Emergency Diesel Generator Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
138	Unit 4 Train A Emergency Diesel Generator Room - Fire Area RR	E, R, D	R, D	None	Detection System, All available - RR: R D Water Suppression, 4-10-1112: E R D

Fire Area ID: S (Unit 3) - Units 3 and 4 Computer Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
062	Units 3 and 4 Computer Room - Fire Area S	None	R, D	None	Detection System, Alarm Point 31: R D

Fire Area ID: S (Unit 4) - Units 3 and 4 Computer Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
062	Units 3 and 4 Computer Room - Fire Area S	None	R, D	None	Detection System, Alarm Point 31: R D

Fire Area ID: SS (Unit 3) - Unit 4 Train B Emergency Diesel Generator Room
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
133	Unit 4 Train B Emergency Diesel Generator Room - Fire Area SS	E	None	None	Water Suppression, 4-10-1113: E

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: SS (Unit 4) - Unit 4 Train B Emergency Diesel Generator Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
133	Unit 4 Train B Emergency Diesel Generator Room - Fire Area SS	E, R	R, D	None	Detection System, All available - SS: R D Water Suppression, 4-10-1113: E R

Fire Area ID: T (Unit 3) - Unit 3 Reactor Control Rod Equipment Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	D	Procedures/Recovery Actions: D
063	Unit 3 Reactor Control Rod Equipment Room - Fire Area T	None	D	None	Detection System, Alarm Point 6: D

Fire Area ID: T (Unit 4) - Unit 3 Reactor Control Rod Equipment Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
063	Unit 3 Reactor Control Rod Equipment Room - Fire Area T	None	None	None	None

Fire Area ID: TT (Unit 3) - Train A SD - Unit 3 Switchgear Room 3D
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
134	Unit 3 Switchgear Room 3D - Fire Area TT	None	None	E	Combustible Loading: E

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: TT (Unit 3) - Train B SD - Unit 3 Switchgear Room 3D
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
134	Unit 3 Switchgear Room 3D - Fire Area TT	None	None	E	Combustible Loading: E

Fire Area ID: TT (Unit 4) - Train A SD - Unit 3 Switchgear Room 3D
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
134	Unit 3 Switchgear Room 3D - Fire Area TT	None	None	E	Combustible Loading: E

Fire Area ID: TT (Unit 4) - Train B SD - Unit 3 Switchgear Room 3D
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
134	Unit 3 Switchgear Room 3D - Fire Area TT	None	None	E	Combustible Loading: E

Fire Area ID: U (Unit 3) - 4160V Switchgear 4B Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
067	4160V Switchgear 4B Room - Fire Area U	None	R, D	E	Combustible Loading: E Detection System, Alarm Point 2: R Detection System, Modification - U U3: D Physical separation: E

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: U (Unit 4) - 4160V Switchgear 4B Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R, D	Procedures/Recovery Actions: R D
067	4160V Switchgear 4B Room - Fire Area U	None	R, D	E, R	Combustible Loading: E Detection System, Alarm Point 2: R D Detection System, Modification - U U4: D ERFBS, Modification U U4: R Physical separation: E

Fire Area ID: UU (Unit 3) - Train A SD - Unit 4 Switchgear Room 4D
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
139	Unit 4 Switchgear Room 4D - Fire Area UU	None	None	E	Combustible Loading: E

Fire Area ID: UU (Unit 3) - Train B SD - Unit 4 Switchgear Room 4D
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
139	Unit 4 Switchgear Room 4D - Fire Area UU	None	None	E	Combustible Loading: E

Fire Area ID: UU (Unit 4) - Train A SD - Unit 4 Switchgear Room 4D
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
139	Unit 4 Switchgear Room 4D - Fire Area UU	None	None	E	Combustible Loading: E

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: UU (Unit 4) - Train B SD - Unit 4 Switchgear Room 4D
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
139	Unit 4 Switchgear Room 4D - Fire Area UU	None	None	E	Combustible Loading: E

Fire Area ID: V (Unit 3) - 4160V Switchgear 4A Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
068	4160V Switchgear 4A Room - Fire Area V	None	R, D	None	Detection System, Alarm Point 2: R Detection System, Modification - V U3: D

Fire Area ID: V (Unit 4) - 4160V Switchgear 4A Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
068	4160V Switchgear 4A Room - Fire Area V	None	R, D	R, S, N	Detection System, Alarm Point 2: R D Detection System, Modification - V U4: D ERFBS, 068-1: R S N ERFBS, 068-2: R S N ERFBS, 068-3: R S N ERFBS, 068-4: R S N

Fire Area ID: VV (Unit 3) - Unit 4 Train A Emergency Diesel Generator Control Room
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
140	Unit 4 Train A Emergency Diesel Generator Control Room - Fire Area VV	None	None	E	Combustible Loading: E

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: VV (Unit 4) - Unit 4 Train A Emergency Diesel Generator Control Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
140	Unit 4 Train A Emergency Diesel Generator Control Room - Fire Area VV	None	R, D	E	Combustible Loading: E Detection System, All available - VV: R D

Fire Area ID: W (Unit 3) - 4160V Switchgear 3B Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
070	4160V Switchgear 3B Room - Fire Area W	None	R, D	E, R, S, N	Detection System, Alarm Point 1: R D Detection System, Modification - W U3: D ERFBS, 070-1: R S N ERFBS, 070-2: R S N Physical separation: E

Fire Area ID: W (Unit 4) - 4160V Switchgear 3B Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
070	4160V Switchgear 3B Room - Fire Area W	None	R, D	E	Detection System, Alarm Point 1: R D Detection System, Modification - W U4: D Physical separation: E

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: WW (Unit 3) - Unit 4 Train A Diesel Fuel Oil Handling Areas
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
141	Unit 4 Train A Diesel Oil Transfer Pump Room - Fire Area WW	E	None	None	Water Suppression, 4-10-1122 (4A): E
142	Unit 4 Train A Diesel Oil Storage Tank - Fire Area WW	None	None	None	None

Fire Area ID: WW (Unit 4) - Unit 4 Train A Diesel Fuel Oil Handling Areas
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
141	Unit 4 Train A Diesel Oil Transfer Pump Room - Fire Area WW	E	None	None	Water Suppression, 4-10-1122 (4A): E
142	Unit 4 Train A Diesel Oil Storage Tank - Fire Area WW	None	None	None	None

Fire Area ID: X (Unit 3) - 4160V Switchgear 3A Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R, D	Procedures/Recovery Actions: R D
071	4160V Switchgear 3A Room - Fire Area X	None	D	R, S, N	Detection System, Alarm Point 1: D Detection System, Modification - X U3: D ERFBS, 071-1: R S N ERFBS, 071-2: R S N

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: X (Unit 4) - 4160V Switchgear 3A Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	R	Procedures/Recovery Actions: R
071	4160V Switchgear 3A Room - Fire Area X	None	R, D	None	Detection System, Alarm Point 1: R D Detection System, Modification - X U4: D

Fire Area ID: XX (Unit 3) - Unit 4 Train B Diesel Fuel Oil Handling Areas
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
136	Unit 4 Train B Diesel Oil Transfer Pump Room - Fire Area XX	E	None	None	Water Suppression, 4-10-1122 (4B): E
137	Unit 4 Train B Diesel Oil Storage Tank - Fire Area XX	None	None	None	None

Fire Area ID: XX (Unit 4) - Unit 4 Train B Diesel Fuel Oil Handling Areas
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
136	Unit 4 Train B Diesel Oil Transfer Pump Room - Fire Area XX	E	None	None	Water Suppression, 4-10-1122 (4B): E
137	Unit 4 Train B Diesel Oil Storage Tank - Fire Area XX	None	None	None	None

Fire Area ID: Y (Unit 3) - Unit 3 Train B Emergency Diesel Generator Building
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
072	Unit 3 Train B Emergency Diesel Generator Building - Fire Area Y	D	D	None	Detection System, Alarm Point 16: D Water Suppression, 3-10-844: D

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: Y (Unit 4) - Unit 3 Train B Emergency Diesel Generator Building
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
072	Unit 3 Train B Emergency Diesel Generator Building - Fire Area Y	None	None	None	None

Fire Area ID: YY (Unit 3) - Unit 4 Train B Emergency Diesel Generator Control Room
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
135	Unit 4 Train B Emergency Diesel Generator Control Room - Fire Area YY	None	None	E	Combustible Loading: E

Fire Area ID: YY (Unit 4) - Unit 4 Train B Emergency Diesel Generator Control Room
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
135	Unit 4 Train B Emergency Diesel Generator Control Room - Fire Area YY	None	R, D	E	Combustible Loading: E Detection System, All available - YY: R D

Fire Area ID: Z (Unit 3) - Unit 3 Train A Emergency Diesel Generator Building
Compliance Basis: NFPA 805, Section 4.2.4, Performance Based Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
073	Unit 3 Train A Emergency Diesel Generator Building - Fire Area Z	D	D	None	Detection System, Alarm Point 16: D Water Suppression, 3-10-847: D

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Table C-2 NFPA 805 Required Fire Protection Systems and Features

Fire Area ID: Z (Unit 4) - Unit 3 Train A Emergency Diesel Generator Building
Compliance Basis: NFPA 805, Section 4.2.3.2, Separate Fire Area

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
073	Unit 3 Train A Emergency Diesel Generator Building - Fire Area Z	None	None	None	None