UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

February 10, 2014

Mr. Mano Nazar
Executive Vice President and
Chief Nuclear Officer
NextEra Energy
P. O. Box 14000
700 Universe Boulevard
Juno Beach, FL 33408-0420

SUBJECT: TURKEY POINT NUCLEAR GENERATING UNIT NOS. 3 AND 4 - REQUEST FOR ADDITIONAL INFORMATION ON LICENSE AMENDMENT REQUEST TO ADOPT NATIONAL FIRE PROTECTION ASSOCIATION STANDARD 805 PERFORMANCE-BASED STANDARD FOR FIRE PROTECTION (TAC NOS. ME8990 AND ME8991)

Dear Mr. Nazar:

By letter dated June 28, 2012, as supplemented by letters dated September 19, 2012, March 18, April 16, and May 15, 2013, and January 7, 2014, Florida Power & Light Company (the licensee) submitted a license amendment request for the Turkey Point Nuclear Generating Unit Nos. 3 and 4 (Turkey Point 3 and 4). The proposed amendment requested approval to transition the fire protection licensing basis from Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.48(b) to 10 CFR 50.48(c), National Fire Protection Association Standard 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants."

The U.S. Nuclear Regulatory Commission (NRC or the Commission) staff reviewed the information provided by the licensee and participated in an audit at Turkey Point 3 and 4 the week of December 10, 2012. By correspondence dated September 11, 2012, March 15, 2013, and November 7, 2013, the NRC staff requested additional information. By letters dated September 19, 2012, March 18, April 16, and May 15, 2013, and January 7, 2014, the licensee responded to those requests.

The NRC staff determined that it needs additional information to complete the review. The enclosure to this letter contains the NRC staff's request for additional information (RAI). As previously discussed with Mr. Bill Cross of the licensee's staff, the NRC is requesting responses to the RAI by April 4, 2014.

If you have any questions, please contact me at (301) 415-0489.

Sincerely,

Audrey L. Klett, Project Manager
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Enclosure:
Request for Additional Information

Docket Nos. 50-250 and 50-251

cc w/encl.: Distribution via Listserv

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

REQUEST FOR ADDITIONAL INFORMATION

LICENSE AMENDMENT REQUEST TO ADOPT

NATIONAL FIRE PROTECTION ASSOCIATION STANDARD 805

PERFORMANCE-BASED STANDARD FOR FIRE PROTECTION

FOR LIGHT WATER REACTOR GENERATING PLANTS

FLORIDA POWER & LIGHT COMPANY

TURKEY POINT NUCLEAR GENERATION UNIT NOS. 3 AND 4

DOCKET NOS. 50-250 AND 50-251

BACKGROUND

By letter dated June 28, 2012 (Agencywide Documents and Management System (ADAMS) Accession No. ML12191A048), as supplemented by letters dated September 19, 2012, March 18, April 16, and May 15, 2013, and January 7, 2014 (ADAMS Accession Nos. ML12278A106, ML13099A441, ML13109A008, ML13157A011, and ML14030A114, respectively), Florida Power & Light Company (the licensee) submitted a license amendment request (LAR) for the Turkey Point Nuclear Generating Unit Nos. 3 and 4 (Turkey Point 3 and 4). The proposed amendment requested approval to transition the fire protection licensing basis from Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.48(b) to 10 CFR 50.48(c), National Fire Protection Association Standard 805 (NFPA 805), "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants."

The U.S. Nuclear Regulatory Commission (NRC or the Commission) staff reviewed the information provided by the licensee and participated in an audit at Turkey Point 3 and 4 the week of December 10, 2012. By correspondence dated September 11, 2012, March 15, 2013, and November 7, 2013 (ADAMS Accession Nos. ML12256A935, ML13038A310, and ML13312A230, respectively), the NRC staff requested additional information. By letters dated September 19, 2012, March 18, April 16, and May 15, 2013, and January 7, 2014, the licensee responded to those requests.

The NRC staff determined that it needs the following additional information to complete the review. As previously discussed with Mr. Bill Cross of the licensee's staff, the NRC is requesting responses to its request for additional information (RAI) by April 4, 2014.

REQUEST FOR ADDITIONAL INFORMATION

Probabilistic Risk Assessment (PRA) RAI 01.a.01

In letter dated May 15, 2013, the licensee responded to PRA RAI 01.a and indicated that the use of guidance specified in the frequently asked question (FAQ) 12-0064, "Hot Work/Transient Fire

Frequency: Influence Factors," results in an increase in Unit 3 large early release frequency (LERF); however, a decrease in LERF is reported for Unit 4. Provide an explanation for this asymmetry.

In addition, the Unit 3 and 4 Fire Risk Evaluations for Fire Area HH indicate that a factor of 0.01 was applied to transient fire scenarios to credit the additional administrative controls (e.g., "physical barriers") to reduce the probability of a transient fire. If additional credit for administrative controls to reduce the likelihood of a transient fire is taken beyond that specified in FAQ 12-0064, then provide updated risk results as part of the aggregate change-in-risk analysis requested in PRA RAI 29, using FAQ 12-0064 or other accepted methods, and identify the methods used.

PRA RAI 01.d.01

In letter dated March 18, 2013, the licensee responded to PRA RAI 01.d and discussed parameter uncertainty rather than addressing sources of LERF modeling uncertainty. Identify and characterize the LERF sources of model uncertainty and related assumptions.

PRA RAI 01.e.01

In letter dated April 16, 2013, the licensee responded to PRA RAI 01.e.iii and stated that "a walkdown was conducted of all accessible fire zones to ensure that all barriers credited are of substantial build and capable of confining heat and products of combustion" and that inaccessible zones were verified using fire barrier drawings; however, the criteria utilized and the basis that each fire area meets these criteria are not provided. Provide a table of all the nonrated barriers credited in the PRA and justification for this credit. Alternatively, describe the specific criteria utilized during walkdowns and review of plant drawings to arrive at the conclusion that barriers were "substantial," and provide justification for each physical analysis unit (PAU) that describes how these criteria were met.

PRA RAI 01.i.01

In letter dated May 15, 2013, the licensee responded to PRA RAI 01.i and stated that a subset of circuit failure probabilities within the fire PRA (FPRA) lacks a circuit analysis basis and that "[a]ll components that were not subject to a circuit analysis will have corresponding hot short-induced spurious operation credit removed in a future revision of the Fire PRA documentation." Provide updated risk results as part of the current aggregate change-in-risk analysis requested in PRA RAI 29 after removing hot-short-induced spurious operation credit from components without a documented basis substantiated by circuit analysis (i.e., by setting the failure probabilities to 1.0).

PRA RAI 01.j.01

Regulatory Guide (RG) 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," provides change in risk guidelines that are to be applied to the mean estimates of the change in risk associated with a proposed change. In letter dated May 15, 2013, the licensee responded to PRA RAI 01.j but did not provide the requested confirmation that the values in LAR Attachment W are mean values, and the licensee seemed to imply that the values are point estimates but that some sensitivity

study has been done. Nor does the response include the requested information about which types of parameters were considered correlated. Clarify which types of parameters were considered correlated. Additionally, as part of the aggregate change-in-risk analysis requested in PRA RAI 29, provide updated risk results that can be characterized as mean values for comparison with the RG 1.174 acceptance guidelines, and explain how those estimates are developed.

PRA RAI 01.I.01

In letter dated May 15, 2013, the licensee responded to PRA RAI 01.I and provided a summary of a method to assign screening values to human error probabilities (HEPs) that is described as "similar" to the method in NUREG-1921, "EPRI/NRC-RES [Electrical Power Research Institute/NRC Office of Research] Fire Human Reliability Analysis Guidelines," to assign screening values. As noted in the part of the RAI response, when the two methods are compared, there are substantive differences between the "PTN ["PTN" is the licensee's acronym for Turkey Point 3 and 4] HRA [human reliability analysis] method" and "that specified in NUREG-1921." For example:

- The PTN HRA method is inherently less conservative than the NUREG-1921 screening approach given that values below 0.1 and multipliers below 10 are applied.
- The PTN HRA method does not address recommended screening criteria for Sets 1, 2, and 3 outlined by NUREG-1921. For example, the PTN HRA method does not explicitly consider possible damage to safe shutdown equipment as indicated in NUREG-1921 for Set 1 screening values.
- While some modifications were made to account for the general categories of time available, accessibility, and complexity through multipliers, the performance shaping factors (PSFs) explicitly addressed through the flowcharts documented in the Human Failure Evaluation report do not encompass all of those PSFs that the NUREG-1921 scoping approach characterizes as capable of inducing "significant variability in crew performance and response times."
- The NUREG-1921 scoping approach is predicated on the performance of a feasibility assessment, which, according to the RAI response," is not explicitly prescribed" by the PTN HRA method.
- The PTN HRA method considers the time available to perform an action; however, it does not appear to consider the time required to perform the action (i.e., the concept of time margin).
- Multipliers are directly applied to detailed HEPs from the internal events PRA (IEPRA), whereas NUREG-1921 sets an HEP value of 1E-3 for the base fire scenario in which the conditions represent the best possible for the fire context. In this manner, NUREG-1921 deems 1E-3 to be the best achievable HEP in the scoping fire HRA approach.

Furthermore, the response to the RAI failed to provide the requested sensitivity study where the new method is replaced by an acceptable method. Use an accepted method, such as NUREG-1921, to estimate HEP values, and use the method in the aggregate change-in-risk analysis requested in PRA RAI 29, or provide the following response in order for the staff to continue its review of the new method:

a. Provide a complete description of this new method and its associated assumptions, addressing, at a minimum, the above differences.

b. Detail the steps performed to support the implementation of this new method.

c. Provide the results of a sensitivity analysis (i.e., core damage frequency (CDF), LERF, ΔCDF and ΔLERF) using screening/scoping approaches in NUREG/CR-6850, "EPRI/NRC-RES Fire PRA Methodology for Nuclear Power Facilities," and/or NUREG-1921 to quantify HEPs or use the acceptable methods in the aggregate change-in-risk assessment requested in PRA RAI 29.

PRA RAI 01.m.01

In letter dated May 15, 2013, the licensee responded to PRA RAI 01.m and stated that the FPRA HRA assumes complete dependency amongst screening/scoping HEPs. While this treatment is conservative for the post-transition plant, it may produce nonconservative results for ΔCDF and ΔLERF when applied to the compliant case (e.g., in cases where an HEP is associated with initiation of a mitigating system made available in the compliant plant due to resolution of variances from deterministic requirements (VFDRs)). Explain whether this treatment is conservative considering the fact that conservative estimates of the compliant plant risk lead to underestimates of the change in risk when subtracted from realistic estimates of the variant plant risk. If the change-in-risk evaluation is underestimated, provide updated risk results as part of the aggregate change-in-risk analysis requested in PRA RAI 29, removing this conservatism from the compliant case, and explain how these estimates are developed.

PRA RAI 01.m.02

In letter dated May 15, 2013, the licensee responded to PRA RAI 01.m and indicated that dependency between multiplier-adjusted HEPs (i.e., those for which dependency was addressed using the EPRI calculator) and screening-based HEPs was not considered. Discuss how dependency between these two types of human failure events (HFEs) was addressed. If not considered, provide updated risk results as part of the aggregate change-in-risk analysis requested in PRA RAI 29, evaluating these dependencies.

PRA RAI 01.p.01

In letter dated May 15, 2013, the licensee responded to PRA RAI 01.p but did not clarify whether a delay to damage or combustible ignition, as discussed in the disposition to LAR Attachment V, Table V-3, Fact and Observation (F&O) 9-5, is assumed for targets impacted by a high-energy arcing fault (HEAF). If such a delay is credited, provide updated risk results as part of the aggregate change-in-risk analysis requested in PRA RAI 29, treating targets within the zone of influence (ZOI) for HEAF scenarios as damaged and/or ignited at time 0 per Appendix M of NUREG/CR-6850.

PRA RAI 01.q.01

Justify that the collection period for fire protection system reliability and availability data for only the last 3 years is representative of plant-specific operating experience, and provide a basis for

excluding past data. In addition, confirm that credited fire detection and suppression systems have not experienced outlier behavior relative to system unavailability that would indicate that actual systems are unavailable more frequently than would be indicated by the generic values utilized. If generic values are not representative of plant-specific operating experience, provide updated risk results as part of the aggregate change-in-risk analysis requested in PRA RAI 29.

PRA RAI 01.r.01

Given that the approach in Appendix L was not originally employed and that the responses to PRA RAI 01.r in letter dated May 15, 2013, and PRA RAI 08 in letter dated May 15, 2013, do not describe the fire scenarios postulated for the main control board (MCB) in detail, discuss the fire scenarios postulated for the MCB, and provide their quantified results. Additionally, discuss whether the Bin 4 frequency is further apportioned by panel or scenario as Attachment H of the Fire Scenario report and the response to PRA RAI 08 appear to indicate. If so, provide updated risk results as part of the aggregate change-in-risk analysis requested in PRA RAI 29, applying the full Bin 4 frequency to each MCB scenario postulated per Appendix L of NUREG/CR-6850. Alternatively, provide justification that the overall approach for evaluating MCB fires bounds the results (i.e., CDF, LERF, ΔCDF and ΔLERF) that would be obtained had an approved method (e.g., Appendix L of NUREG/CR-6850) been employed.

PRA RAI 01.r.02

In letter dated May 15, 2013, the licensee responded to PRA RAI 01.r and PRA RAI 08 and indicated that a 0.19 nonsuppression probability (NSP) credit is applied to MCB and non-MCB fire scenarios for panels with in-cabinet smoke detection in lieu of credit for incipient detection. Address the following:

a. Given that the MCB and some main control room (MCR) electrical panels have open backs, provide technical justification to support the conclusion that an additional 5 minutes of advanced warning is available for each panel to which the 0.19 NSP credit is applied.

b. The 0.19 NSP credit does not address the availability and reliability of the in-cabinet smoke detectors. Provide updated risk results as part of the aggregate change-in-risk analysis requested in PRA RAI 29, accounting for detector availability and reliability, and justify the estimate used.

c. Propagation between electrical (non-MCB) panels within the MCR was excluded from the original analysis and is not addressed as requested in PRA RAI 01.r. Explain and justify how propagation (including between open-back panels) is addressed. If propagation was not considered, provide updated risk results as part of the aggregate change-in-risk analysis requested in PRA RAI 29, considering propagation between non-MCB panels within the MCR.

d. The response to PRA RAI 01.r appears to indicate that smoke detectors are credited to limit the extent of internal fire damage within electrical (non-MCB) panels they monitor; however, per Appendix P of NUREG/CR-6850, the 0.19 NSP credit may only be applied to targets beyond the ignition source (e.g., adjacent panels, cables trays, etc.). If smoke detectors are credited to prevent damage to non-MCB panels, provide updated risk results

as part of the aggregate change-in-risk analysis requested in PRA RAI 29, only applying the 0.19 NSP credit to targets beyond the ignition source (e.g., adjacent panels, cable trays, etc.).

PRA RAI 01.t.01

In eliminating the use of panel factors, a new fire scenario development methodology discussed in the responses to PRA RAI 01.t in letter dated May 15, 2013, and PRA RAI 01.z.i in letter dated March 18, 2013, is implemented that differs from the ZOI-based approach originally used in the FPRA to support the LAR submittal. Provide a description of how this method, including its associated assumptions, impacts FPRA scenario development, including any effects on the previous quantification (these may be provided as part of the response to PRA RAI 29). In particular, address the following:

a. Describe and justify the method used for converting target damage times presented in Appendix H of NUREG/CR-6850 to percent damage as a function of heat flux, referred to here as the damage accrual function. The NRC staff has concerns with the use of this function because it makes assumptions about how damage occurs that do not appear to be connected to physical phenomena. Provide updated risk results removing credit for the damage accrual function. If any alternate treatment is used, provide similar description and justification.

b. Describe and justify how the method accounts for preheating of targets that occurs at heat fluxes prior to reaching the peak heat flux for the fire being analyzed, including those below the target damage threshold. Note that in Section H.1.5.2 of NUREG/CR-6850, the failure times reported in Table H-8 assume steady-state fire exposure conditions and are, therefore, not well suited for cases where exposure conditions evolve over time. Provide updated risk results that appropriately account for preheating or that conservatively do not credit the time delay associated with the preheating period.

c. Describe and justify how the overall manual nonsuppression probabilities developed for scenarios that employ this method are calculated to ensure any dependencies between fire scenario development branch points are appropriately taken into account. Specifically, where multiple NSPs (e.g., those associated with time to target damage and time to hot gas layer) are being applied to fire scenarios associated with a particular ignition source, justify why these NSPs are considered to be independent. If not independent, provide updated risk results that appropriately account for the dependency. Also, confirm that, for any scenario, the resulting NSP applied is no less than 0.001, the NUREG/CR-6850-recommended lower bound.

d. Describe and justify how automatic detection and suppression systems, including treatment of system reliability and unavailability, are credited by scenarios that employ this method. If not included in the analysis, provide updated risk results that appropriately account for both reliability and unavailability where these systems are credited.

e. For the response, provide a complete example of how the method was applied on a specific fire ignition source, addressing parts (a) through (d).

PRA RAI 01.v.01

In letter dated May 15, 2013, the licensee responded to PRA RAI 01.v and stated that nonsuppression credit for automatic suppression systems was only credited in PAUs where automatic suppression systems are actuated by smoke detection. However, the responses to PRA RAI 01.bb from letter dated May 15, 2013 and PRA RAI 01.cc from letter dated March 18, 2013, state that modes of actuation include thermal detectors and fusible links. Clarify this discrepancy, and summarize how the fire suppression system activation times for each PAU with a nonsmoke-detector-actuated system are estimated and credited.

PRA RAI 01.y.01

In letter dated May 15, 2013, the licensee responded to PRA RAI 01.y and indicated that the ZOI of an ignition source was not treated as being impacted by secondary combustibles when evaluating target damage distances; however, this response and the response to Fire Modeling RAI 01.j in letter dated May 15, 2013, state that the impact of this nonconservatism is still being evaluated. Provide a summary and the results of the identified evaluation. Include an estimate of the impact of not including secondary combustibles on the risk results (i.e., CDF, LERF, ΔCDF and ΔLERF), or provide updated risk results using acceptable methods as part of the aggregate change-in-risk analysis requested in PRA RAI 29.

PRA RAI 01.z.i.01

In letter dated March 18, 2013, the licensee responded to PRA RAI 01.z.i and stated that "if a transient scenario ZOI would not impact more than one piece of equipment or conduit, no transient scenario was developed." There is no basis to categorically exclude such scenarios. Clarify this statement, and explain how transient scenarios that may impact risk-relevant targets (e.g., those with high conditional core damage probabilities (CCDPs), pinch points, etc.) are appropriately reflected in the results. Provide updated risk results as part of the aggregate change-in-risk analysis requested in PRA RAI 29, appropriately reflecting the contribution of transient fires that would impact only one piece of equipment.

PRA RAI 01.z.ii.01

In letter dated May 15, 2013, the licensee responded to PRA RAI 01.z.ii and stated that transient fire scenarios were postulated behind open-back MCBs; however, it is unclear whether transient fire scenarios were postulated behind open-back back panels. If transient scenarios were not postulated behind all open-back panels, describe how this is consistent with acceptable methods; if not consistent, provide an estimate of the impact of not including secondary combustibles on the risk results (i.e., CDF, LERF, ΔCDF and ΔLERF). Alternatively, provide updated risk results as part of the aggregate change-in-risk analysis requested in PRA RAI 29, including the placement of transient fires behind all open-backed panels in the MCR.

PRA RAI 01.dd.01

In letter dated May 15, 2013, the licensee responded to Fire Modeling RAI 01.r and defined a larger ZOI for enclosures where hot gas layer effects are of concern; however, in letter dated

April 16, 2013, the licensee responded to PRA RAI 01.dd and indicated that while the provisions for a larger ZOI exist, the current analysis does not employ them.

a. Provide clarification on the statement that "a larger ZOI [is] used in order to allow credit for a longer time to hot gas layer."

b. Clarify why the risk analysis does not use the larger ZOIs and describe how this is consistent with acceptable methods or provide updated risk results as part of the aggregate change-in-risk analysis requested in PRA RAI 29, addressing this apparent nonconservatism.

PRA RAI 03.01

In letter dated March 18, 2013, the licensee responded to PRA RAI 03 and stated that the seismic CDF estimate of 1E-8/yr provided in the response "only addresses the seismic risk for an earthquake with a magnitude between the operating-basis earthquake and the design-basis earthquake (DBE), and does not include an estimate of the CDF due to earthquakes with a magnitude above that of the DBE." This makes use of frequencies obtained from the 1994 Lawrence Livermore National Laboratory seismic hazard curves (i.e., NUREG 1488, "Revised Livermore Seismic Hazard Estimates for 69 Nuclear Power Plant Sites East of the Rocky Mountains") in lieu of the higher frequencies of the 2008 U.S. Geological Survey (USGS) seismic hazard curves reported in the September 2010 NRC staff memorandum as referenced in PRA RAI 03. In addition, it was noted that the response to PRA RAI 01.h states in a recently performed seismic adequacy assessment that "[a]t plant HCLPF [high confidence in low probability of failure] levels of 0.3g and even 0.25g, the SCDF [seismic core damage frequency] is barely in the 10^{-6} range," implying at least a two order-of-magnitude difference. An estimate of the total seismic risk is needed because the requested increase in risk is greater than "very small" in RG 1.174, and the total estimated risk without the seismic contribution is very close to the guideline that would indicate risk increase greater than "very small" may not be acceptable. Provide an estimate of the current seismic risk for all hazard magnitudes and summarize how that estimate was developed. Discuss whether the 2008 USGS seismic hazard curves reported in the September 2010 NRC staff memorandum were considered and, if not, why not.

PRA RAI 07.01

Relative to the counting and treatment of Bin 15 electrical cabinets, address the following:

a. Per Section 6.5.6 of NUREG/CR-6850, fires originating from within "well-sealed electrical cabinets that have robustly secured doors (and/or access panels) and that house only circuits below 440V" do not meet the definition of potentially challenging fires and, therefore, should be excluded from the counting process for Bin 15. By counting these cabinets as ignition sources within Bin 15 the frequencies applied to other cabinets are inappropriately diluted. Clarify that this guidance is being applied at Turkey Point 3 and 4.

b. In addition, all cabinets having circuits of 440V or greater should be counted for purposes of Bin 15 frequency apportionment based on the guidance in Section 6.5.6 of NUREG/CR-6850. Clarify that this guidance is being applied at Turkey Point 3 and 4.

c. Per NUREG/CR-6850, cabinets below 440V that are not well sealed and robustly secured as well all cabinets above 440V are considered "potentially challenging" and should be assumed to propagate outside the cabinet. Clarify that this guidance is being applied at Turkey Point 3 and 4.

d. If the above guidance is not being followed, provide justification for deviating from the acceptable guidance and provide the results of a sensitivity analysis (i.e., CDF, LERF, ΔCDF and ΔLERF), or provide updated risk results as part of the aggregate change-in-risk analysis requested in PRA RAI 29, following the acceptable guidance.

PRA RAI 08.01

In letter dated May 15, 2013, the licensee responded to PRA RAI 08 and did not provide the requested information to (1) justify the assumption that one half of MCR panels contain single cable bundles and the other half contains multiple cable bundles, (2) provide a quantitative basis that the assumption regarding heating, ventilation, air conditioning (HVAC) being unavailable for 10% of all MCR scenarios is conservative, or (3) address the use of NSP values less than 0.001 in the MCR abandonment analysis. Provide updated risk results as part of the aggregate change-in-risk analysis requested in PRA RAI 29: (1) modeling all panels in the MCR as containing multiple cable bundles, (2) failing the MCR HVAC control system only for those fire scenarios that will impact its operation, and (3) applying a minimum NSP of 0.001 per NUREG/CR-6850.

PRA RAI 11.01

In letter dated May 15, 2013, the licensee responded to PRA RAI 11 and did not provide the requested results of an HFE quantification process, such as that described in Section 5 of NUREG-1921, or an analogous method to justify CCDP and conditional large early release frequency screening values used. Instead, the response provided a general description of a method to estimate the CCDP after MCR abandonment. The described method indicates that only one value (i.e., 0.056) is used as a CCDP for all MCR abandonment scenarios for the compliant case. For the variant case, three values (i.e., 0.1, 0.2, and 1.0) of CCDP are used representing limited, moderate, and severe fire damage scenarios respectively. In the Table in the response, the "Basis for the CCDP used" column states that the bounding CCDPs (other than 1.0) are derived by assuming they are approximately double or four times the compliant case CCDP of 0.056. While this is mathematically correct, it is not a basis.

a. The method implies that the risk from every ignition source in the compliant case will be less than the risk from that ignition source in the variant case source because the compliant CCDP (i.e., 0.056) is always less than the variant CCDP (i.e., 0.1, 0.2, and 1.0), and the frequencies remain the same. Is this correct? If not, why not?

b. The response states that the variant case evaluation begins with a "calculated CCDP associated with the fire impacts ... [from] ... the fire event." The first entry in the Table states that some calculated CCDPs are less than 10^{-3}. This implies that there are scenarios for which much more equipment is available than the minimal set assumed in the compliant case. Is this equipment being made available due to plant modification(s)?

If not, clarify why the much larger compliant plant CCDP of 0.056 does not overestimate the compliant case risk and thereby underestimate the change in risk.

c. Provide the frequency (i.e., before applying the CCDPs) for the fire-induced main control room abandonment scenario bins. These would include the total abandonment frequency for the compliant case, and one total frequency for each of the three variant case bins. Presumably, the three variant case ignition frequencies will sum to the total variant case abandonment frequency. If not, please provide the total variant case abandonment frequency and explain why the sum differs from the total.

d. Summarize how the probability of the operators failing to shut down the plant is reflected in both the variant and the compliant MCR abandonment CCDPs.

e. In general, conservative evaluations to reduce unnecessary analytic effort are acceptable. In the change in risk calculation, overestimating the variant case risk and/or underestimating the compliant case risk yields a conservative result. If the value of 0.056 assumed for the compliant case is overestimated because alternative shutdown pathways that are available are not modeled, a nonconservative (underestimated) change in risk will result. Evaluate the change in risk calculations for the MCR to identify conservative and nonconservative assumptions, and discuss whether the net effect is conservative or nonconservative. Recognize the availability of a bounding approach where the delta-risk is equated to the total risk in lieu of detailed estimates.

PRA RAI 13.01

In letter dated March 18, 2013, the licensee responded to PRA RAI 13 but did not provide a description of the methods used to calculate the changes in fire area risk reported in Appendix W, in exception for Fire Area MM (i.e., the main control room). For instance, for Fire Areas CC and HH, Section 5.7 of the Fire Risk Evaluation report, as referenced in response to PRA RAI 11 from letter dated March 18, 2013, includes a discussion of two additional methods of determining delta risk not identified in response to PRA RAI 13; for other fire areas, it remains unclear how delta risk values were calculated. Given that the LAR does not describe either generically or specifically how delta risk values were calculated:

a. Provide a description of the methods utilized to determine ΔCDF and ΔLERF for each fire area, including Fire Areas CC and HH, within the response to this RAI.

b. Discuss those cases for which the PRA model lacks sufficient resolution to model a VFDR, including any VFDRs not specifically modeled in the FPRA.

c. Elaborate whether methods utilized to determine ΔCDF and ΔLERF effectively bound ΔCDF and ΔLERF.

PRA RAI 13.02

In letter dated March 18, 2013, the licensee responded to PRA RAI 13 and stated that components associated with VFDRs were "allowed to be failed with a failure probability equal to the ignition frequency of the fire zone...in the variant case." Clarify this statement, elaborating on

the failure probability utilized within the FPRA model for components associated with VFDRs. If the probabilities other than 1.0 (or TRUE) for fire-affected equipment were used to calculate scenario CCDPs, then provide updated risk results as part of the aggregate change-in-risk analysis requested in PRA RAI 29, assigning failure probabilities of 1.0 (or TRUE).

PRA RAI 16.01

LAR Attachment S, Table S-3, Item 18 does not provide a plan of action should the change in risk exceed risk acceptance guidelines. Revise this implementation item to include a plan of action to notify the NRC if risk acceptance guidelines are exceeded subsequent to completion of PRA-credited modifications and implementation items.

PRA RAI 18.01

In letter dated March 18, 2013, the licensee responded to PRA RAI 18 and did not address location-specific attributes and considerations (e.g., physical congestion, radiological restrictions, limited floor space, etc.) and did not provide a sufficient basis for why postulated transient combustible fires have an heat release rate (HRR) distribution similar to that of an electrical motor fire. Further, the response does not indicate that a review of plant records was performed. As a result, address the following per the guidance endorsed by the memorandum dated June 21, 2012 (ADAMS Accession No. ML12171A583), from Joseph Giitter to Biff Bradley ("Recent Fire PRA Methods Review Panel Decisions and EPRI 1022993, 'Evaluation of Peak Heat Release Rates in Electrical Cabinets Fires'"):

a. Provide a discussion of location-specific attributes and considerations applicable to each individual fire area/zone that supports use of a 69 kilowatt (kW) transient fire HRR.

b. Provide justification that the 69 kW HRR distribution for electrical motor fires bounds the postulated transient fires in fire areas/zones with administrative controls. In the response, address the full range of types and quantities of combustibles that are expected to be in each location and how administrative controls will enforce this range to preclude a greater than 69 kW transient fire.

c. Perform and document a review of past transient fire experience at Turkey Point as well as a review of records related to any violations of the transient combustible controls that may include both internal plant records (e.g., condition reports) and NRC inspection records (e.g., by residents or during triennials) to inform the development of the administrative controls.

Note that FAQ 12-0064 provides guidance on adjusting influence factors to reflect possible reductions in the likelihood of certain transients being located in particular areas; as a result, this guidance (and not a surrogate reduction in the HRR of such transients) is the appropriate way to account for any potential reductions in likelihood.

PRA RAI 19.01

In letter dated March 18, 2013, the licensee responded to PRA RAI 19 and indicated that the availability of instrumentation for operator actions credited in the FPRA is predicated on the safe

shutdown analysis. Describe how fire-induced instrument failure (including no readings as well as incorrect or misleading readings) is addressed in the FPRA HRA for systems, functions and/or equipment that are credited within the PRA but that were not addressed by the safe shutdown analysis.

PRA RAI 22.01

In letter dated April 16, 2013, the licensee responded to PRA RAI 22 and provided neither the documentation of gap assessments performed nor their summarized results. In addition, it is unclear from the response whether the most recent gap assessment considers the clarifications and qualifications of RG 1.200, Revision 2, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities." Describe whether the internal events PRA gap analyses discussed in response to PRA RAI 22 utilized the Nuclear Energy Institute (NEI) document, NEI 00-02, "Probabilistic Risk Assessment (PRA) Peer Review Process Guidance," self-assessment process as supplemented by clarifications and qualifications contained in Appendix B to RG 1.200, Revision 2. If the aforementioned process was implemented, provide the summarized results of the latest gap assessment in a manner analogous to the format in which F&Os are presented and dispositioned in Attachments U and V of the LAR, including an assessment of each identified gap's impact on the FPRA. If not, perform and provide the similarly summarized results of a self-assessment of the internal events PRA model that addresses the clarifications and qualifications in Appendix B of RG 1.200 on the use of NEI 00-02 peer review process guidance.

PRA RAI 23.01

In letter dated April 16, 2013, the licensee responded to PRA RAI 23 and simply states that the HRA reviewers' resumes did not refer to the proper experience and therefore did not provide sufficient information to demonstrate that, contrary to the available information, the reviewers were qualified. Explicitly summarize how the HRA reviewers meet the qualification requirements in the American Society of Mechanical Engineers/American Nuclear Society PRA Standard, as provided in Section 1-6.2, with particular emphasis on the following (below) as related to a focused-scope peer review (termed a "review for a PRA upgrade" in the Standard):

> The peer review team members individually shall be ... experienced in performing the activities related to the PRA Elements for which the reviewer is assigned.
>
> When a peer review is being performed on a PRA upgrade, reviewers shall have knowledge and experience appropriate for the specific PRA Elements being reviewed. However, the other requirements of this Section shall also apply.
>
> The peer reviewer shall also be knowledgeable (by direct experience) of the specific methodology, code, tool, or approach (e.g., accident sequence support state approach, MAAP code, THERP method) that was used in the PRA Element assigned for review. Understanding and competence in the assigned area shall be demonstrated by the range of the individual's experience in the number of different, independent activities performed in the assigned area, as well as the different levels of complexity of these activities.

Include in this discussion actual experience and any publications or other activities that demonstrate the individuals' qualifications as experts for the review element.

PRA RAI 27.e.01

In letter dated May 15, 2013, the licensee responded to PRA RAI 27.e and clarified that sources of model uncertainty and related assumptions associated with the internal events PRA were identified, documented, and characterized; however, the response does not indicate that these sources were reviewed to identify those relevant to the FPRA application. Using guidance provided in NUREG 1855, "Guidance on the Treatment of Uncertainties Associated with PRAs in Risk-Informed Decision Making," assess the importance of candidate IEPRA sources of uncertainty identified as relevant to the FPRA, and include a discussion of the criteria utilized to assess their importance. For those determined to be key sources of uncertainty for the FPRA, evaluate their impact on FPRA CDF, LERF, ΔCDF and ΔLERF.

PRA RAI 28

The responses to Fire Modeling RAI 01.e from letter dated March 18, 2013, and Fire Modeling RAI 06 from letter dated April 16, 2013, state that the sensitivity analysis provided in Appendix B of the MCR abandonment calculation will be updated to demonstrate that modeling assumptions and parameter selections are either conservative or do not have a significant effect on the overall probability of abandonment. The responses further note that the baseline parameter selections used to support the FPRA MCR abandonment calculation will be revised if the parameters are shown to have a significant nonconservative effect on the probability of abandonment. Describe the results of this revised MCR sensitivity analysis, and if baseline parameter selections have changed as a result, provide updated risk results as part of the aggregate change-in-risk analysis requested in PRA RAI 29.

PRA RAI 29

Section 2.4.3.3 of the NFPA 805 standard incorporated by reference into 50.48(c) states that the probabilistic safety assessment (PSA) (PSA is also referred to as PRA) approach, methods, and data shall be acceptable to the authority having jurisdiction (AHJ), which is the NRC. RG 1.205, "Risk-Informed, Performance-Based Fire Protection for Existing Light-Water Nuclear Power Plants," identifies NUREG/CR-6850, NEI 04-02, Revision 2, "Guidance for Implementing a Risk-Informed, Performance-Based Fire Protection Program Under 10 CFR 50.48(c)," and the ongoing FAQ process as documenting acceptable to the staff for adopting a fire protection program consistent with NFPA 805.

The NRC staff identified several methods and weaknesses that were used in the FPRA that have not been accepted by the staff. RAIs were provided about these methods and weaknesses and the responses have been reviewed. The staff has concluded that some of these methods and weaknesses are unacceptable in that justification does not seem to be complete (e.g., credit for control power transformers is not supported by experiments).

Unacceptable methods and weaknesses:

- PRA RAI 01.k regarding the use of a minimum joint HEP probability below 1.0E-05
- PRA RAI 01.o regarding the removal of screening criteria in the multicompartment analysis
- PRA RAI 01.p regarding the delay to damage or ignition of targets impact by HEAF scenarios
- PRA RAIs 01.r and 08 regarding the removal of the FAQ 08-0050, "Manual Non-Suppression Probability," credit for incipient detection in the MCR
- PRA RAI 01.t regarding the elimination of conditional probabilities for propagation of fire from electrical cabinets (i.e., panel factors)
- PRA RAI 01.u regarding removal of credit given to Thermolag for preventing cable damage in HEAF scenarios
- PRA RAI 01.x and Fire Modeling RAI 04 regarding resolution to limitations in the application of the Generic Fire Modeling Treatments
- PRA RAI 01.z.i (as clarified in RAI 01.z.i-01) regarding excluding the risk impact of transient scenarios that would impact only one piece of equipment
- PRA RAI 08 (as clarified in RAI 08-01) regarding the cable loading of MCR panels, the availability of the MCR HVAC control system, and the use of NSP values less than 0.001 in the MCR abandonment analysis
- PRA RAI 12 regarding elimination of CPT credit
- PRA RAI 13 (as clarified in RAI 13-02) regarding use of non-1.0 failure probabilities for fire-affected VFDR components
- The following Fire Modeling RAIs appear to have caused changes that may impact the fire affected components for a variety of fires. The aggregate change in risk evaluation should include the potential impact of changes in:
  - Fire Modeling RAI 01.c regarding growth times for transient fires in the MCR
  - Fire Modeling RAI 01.f regarding MCR panel vent locations
  - Fire Modeling RAI 01.g regarding secondary combustibles in the MCR
  - Fire Modeling RAI 01.k regarding evaluation of impact of fire propagation
  - Fire Modeling RAI 01.p regarding wall and corner effects on panel fires
  - Fire Modeling RAI 01.q regarding the growth rate of transient fires involving secondary combustibles
  - Fire Modeling RAI 01.u regarding corner and wall effects on cable spreading room scenarios

The following methods and weaknesses have been identified, but the NRC Staff review is continuing with additional RAIs and further supporting information has been requested. Alternatively, the licensee may replace any of these methods and weaknesses with a method or model previously accepted by the NRC by modifying the FPRA.

Methods and weaknesses still under review:

- PRA RAIs 01.a (as clarified by PRA RAI 01.a-01) regarding revisions to transient influencing factors to address FAQ 12-0064 guidance
- PRA RAI 01.i-01 regarding the use of circuit failure probabilities not substantiated by circuit analysis
- PRA RAI 01.j (as clarified by PRA RAI 01.j-01) regarding providing mean values reflecting propagation of parametric uncertainty, accounting for the state of knowledge correlation

- PRA RAI 01.l-01(a) regarding HEP screening and/or scoping values
- PRA RAI 01.m-01 regarding assumptions that may produce non-conservative ΔCDF and ΔLERF results
- PRA RAI 01.m-02 regarding dependencies between multiplier-adjusted and screening-based HEPs
- PRA RAI 01.q-01 regarding use of fire protection system reliabilities and availabilities representative of plant-specific operating experience
- PRA RAI 01.r-01 regarding the application of the Bin 4 MCB frequency
- PRA RAI 01.r-02 regarding (a) removal of the 0.19 NSP credit for those panels that are not fully enclosed; (b) detector availability and reliability; (c) propagation between electrical (non-MCB) panels within the MCR; and (d) removal of credit given to smoke detectors to limit the extent of internal fire damage within electrical (non-MCB) panels they monitor
- PRA RAI 01.t-01 regarding replacement of panel factors with a new fire scenario development methodology instead of acceptable methods
- PRA RAI 01.v-01 regarding time to actuation of automatic suppression systems
- PRA RAI 01.y-01 and Fire Modeling RAI 01.j regarding the impact of secondary combustibles on the zone of influence of ignition sources
- PRA RAI 01.z.i-01 regarding including the risk impact of transient scenarios that would impact only one piece of equipment
- PRA RAI 01.z.ii-01 regarding placement of transient fires behind all open-back MCR panels
- PRA RAI 01.dd-01 regarding hot gas layer impacts on ZOIs
- PRA RAI 07-01 regarding counting and treatment of Bin 15 electrical cabinets
- PRA RAI 11-01 regarding CCDPs and compliant plant risk associated with MCR abandonment
- PRA RAI 13-01 regarding change in risk calculations
- PRA RAI 28 regarding changes to baseline parameter selections in the MCR abandonment calculation

a. For each method (i.e., each bullet) above, indicate how the issue will be addressed in: (i) the final composite analysis results provided in support of the LAR and (ii) the PRA that will be used at the beginning of the self-approval of post-transition changes. In addition, provide confidence (e.g., with a proposed implementation item) that all changes will be made and that a focused-scope peer review will be performed on changes that are PRA upgrades as defined in the PRA standard, and that any findings will be resolved before self-approval of post-transition changes. Note that continued use of unacceptable methods may prohibit the staff from completing its review for self-approval.

b. Describe any new modifications or operator actions with respect to those identified in the original LAR (e.g., the Flo-Serve reactor coolant pump seal package), and summarize how these modifications have been modeled in the PRA, how they will be included in the final change in risk estimates in support of the LAR, and if an implementation item confirming the as-built change in risk estimates will also include confirmation of these models. Indicate the expected reduction in risk from the modifications. Discuss the associated impacts to the fire protection program.

If you have any questions, please contact me at (301) 415-0489.

Sincerely,

/RA/

Audrey L. Klett, Project Manager
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Enclosure:
Request for Additional Information

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