ENCLOSURE 2 TO THIS LETTER CONTAINS SENSITIVE INFORMATION SUBMITTED UNDER 10 CFR 2.390(d)(1).

Progress Energy

Christopher L. Burton
Vice President
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OCT 09 2009

Serial: HNP-09-094
10 CFR 50.90

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

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1
DOCKET NO. 50-400/RENEWED LICENSE NO. NPF-63
THIRD RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION REGARDING LICENSE AMENDMENT REQUEST TO ADOPT NATIONAL FIRE PROTECTION ASSOCIATION STANDARD 805, "PERFORMANCE-BASED STANDARD FOR FIRE PROTECTION FOR LIGHT WATER REACTOR GENERATING PLANTS" (TAC NO. MD8807)

References:

1. Letter from R. J. Duncan to the Nuclear Regulatory Commission (Serial: HNP-08-061), "Request for License Amendment to Adopt NFPA 805 Performance-Based Standard for Fire Protection for Light Water Reactor Generating Plants (2001 Edition)," dated May 29, 2008

2. Letter from C. L. Burton to the Nuclear Regulatory Commission (Serial: HNP-08-113), "Supplement to Request for License Amendment to Adopt NFPA 805 Performance-Based Standards for Fire Protection for Light Water Reactor Generating Plants (2001 Edition)," dated November 14, 2008

3. Letter from K. A. Harshaw to the Nuclear Regulatory Commission (Serial: HNP-08-121), "Supplement 2 to Request for License Amendment to Adopt NFPA 805 Performance-Based Standard for Fire Protection for Light Water Reactor Generating Plants (2001 Edition)," dated December 11, 2008

4. Letter from M. Vaaler, Nuclear Regulatory Commission, to C. L. Burton, "Shearon Harris Nuclear Power Plant, Unit 1 – Request for Additional Information Regarding License Amendment Request to Adopt National Fire Protection Association Standard 805, 'Performance-Based Standard for Fire Protection for Light Water Reactor Generating Plants' (TAC NO MD8807)," dated August 6, 2009

5. Letter from C. L. Burton to the Nuclear Regulatory Commission (Serial: HNP-09-084), "Response to Request for Additional Information Regarding License Amendment Request to Adopt National Fire Protection Association Standard 805, 'Performance-Based Standard for Fire Protection for Light Water Reactor Generating Plants' (TAC NO MD8807)," dated August 13, 2009

6. Letter from C. L. Burton to the Nuclear Regulatory Commission (Serial: HNP-09-086), "Second Response to Request for Additional Information Regarding License Amendment Request to Adopt National Fire Protection Association

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Standard 805, 'Performance-Based Standard for Fire Protection for Light Water Reactor Generating Plants' (TAC NO MD8807)," dated August 28, 2009

Ladies and Gentlemen:

On August 6, 2009, the Harris Nuclear Plant (HNP) received a request from the NRC (Reference 4) for additional information needed to facilitate the review of the License Amendment Request to Adopt National Fire Protection Association Standard 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Generating Plants." HNP submitted this original request as Serial: HNP-08-061 (Reference 1) and supplemented via Serial: HNP-08-113 (Reference 2) and Serial: HNP-08-121 (Reference 3).

As per NRC staff agreement, HNP submitted responses to portions of these questions dated August 13, 2009 (Reference 5), and August 28, 2009 (Reference 6). Enclosed with this current letter are HNP's final set of responses. Please note that HNP's responses to RAIs 2-2, 2-5 and 2-9 contained in this current submittal replace the RAI 2-2, 2-5 and 2-9 responses in the submittal dated August 28, 2009 (Reference 5).

Enclosure 1 contains HNP's final set of responses to the NRC's requests for additional information (Reference 4).

Enclosure 2 to this letter provides an updated version of HNP's NFPA-805 License Amendment Request Transition Report, including all Attachments. This Transition Report, which reflects changes discussed in HNP's RAI response submittals dated August 13, 2009 (Reference 5), and August 28, 2009 (Reference 6), replaces the Transition Report(s) and Attachment(s) provided with previous submittals.

In accordance with 10 CFR 50.91(b), HNP is providing the state of North Carolina with a copy of this response.

This document contains no new or revised regulatory commitments.

Please refer any questions regarding this submittal to Mr. Dave Corlett, Supervisor – Licensing/Regulatory Programs, at (919) 362-3137.

I declare under penalty of perjury that the foregoing is true and correct. Executed on OCT 09 2009.

Sincerely,

Christopher L. Burton

Christopher L. Burton
Vice President
Harris Nuclear Plant

CLB/kms

Enclosures:
1. Third Response to Request for Additional Information Regarding License Amendment Request to Adopt NFPA 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Generating Plants"

2. Updated Transition Report, including Attachments A through Z – **Portions contain Security Related Information.**

Cc (via CD-ROM):
Mr. J. D. Austin, NRC Sr. Resident Inspector, HNP
Mr. L. A. Reyes, NRC Regional Administrator, Region II
Ms. M. G. Vaaler, NRC Project Manager, HNP
Acting Section Chief, N. C. Department of Environment and Natural Resources

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The U.S. Nuclear Regulatory Commission (NRC) staff has determined that it needs responses to requests for information in the following areas in order to continue its review of the subject request for the Shearon Harris Nuclear Power Plant, Unit 1 (HNP or Harris):

1. Programmatic Elements Related to the License Amendment Request (LAR)
2. Fundamental Fire Protection Program and Minimum Design Requirements
3. Meeting the Nuclear Safety Performance Criteria
4. Meeting the Radioactive Release Performance Criteria
5. Risk Assessments and Plant Change Evaluations
6. The NFPA 805 Monitoring Program
7. Program Documentation, Configuration Control and Quality Assurance

1. Please provide the following information relative to LAR programmatic elements:

HNP RAI 1-2

Title 10 of the Code of Federal Regulations (10 CFR), Part 50.48(c)(3)(ii) states:

> *The licensee shall complete its implementation of the methodology in Chapter 2 of NFPA 805 (including all required evaluations and analyses) and, upon completion, modify the fire protection plan required by paragraph (a) of this section to reflect the licensee's decision to comply with NFPA 805, before changing its fire protection program or nuclear power plant as permitted by NFPA 805.*

Section 4.2.2.3, "Results of the Fire Area-by-Fire Area Review," of the Harris Transition Report includes a bullet for "Open Items." The use of the term "Open Item" implies that further analyses are required. The NRC staff cannot approve a request for transition to a risk-informed, performance-based fire protection program if the analyses required have not been completed.

The licensee should provide a statement under oath and affirmation that all required engineering analyses have been completed and that compliance with the requirements of 10 CFR 50.48(c)(3)(ii) has been achieved.

Response: At the time the Harris Transition Report was originally submitted, the "Open Items" bullet, as used in Section 4.2.2.3, designated issues to be resolved as part of the EC/Change Evaluation process. Table B-3 Open Items are used to track VFDs and actions needed to transition to a risk-informed performance-based fire protection program. NRC NFPA 805 SER and revised license condition is required to address the issues.

As presented in the original Transition Report/License Amendment Request, the implementation of all modifications and finalization of all Change Evaluations will be completed prior to startup from RFO16, achieving compliance with the requirements of 10 CFR 50.48(c)(3)(ii).

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Analysis required for the LAR submittal has been completed. As previously noted in HNP's August 13, 2009, Response to Request for Additional Information, Attachment S, Plant Modifications, has been updated.

2. Please provide the following information regarding the fundamental fire protection program and the minimum design requirements:

HNP RAI 2-2

NFPA 805, Section 4.1, "Determination of Fire Protection Systems and Features – Methodology," states:

> *Once a determination has been made that a fire protection system or feature is required to achieve the performance criteria of Section 1.5, ["Performance Criteria,"] its design and qualification shall meet the applicable requirement of Chapter 3, ["Fundamental Fire Protection Program and Design Elements."]*

Section 4.8.1, "Results of the Fire Area-by-Fire Area Review," of the Harris Transition Report includes requirements to answer the questions "Suppression Required? (Yes/No)" and "Detection Required? (Yes/No)" for each fire area, the results of which are captured in Table 4-5, "Fire Area Compliance Summary."

a. *When either the "Suppression Required? (Yes/No)" or "Detection Required? (Yes/No)" question is answered "Yes," what requirements apply with respect to the design and qualification of the system(s) in that fire area?*

Response: When a suppression or detection system is determined to be required, then it is required to meet the requirements in NFPA Chapter 3. In the example of a sprinkler system, this means that the requirements in Section 3.9 of NFPA 805 would apply. The system would need to meet the applicable edition of NFPA 13, as well as the other applicable sections of 3.9. In the same manner, a detection system required for compliance with Chapter 4 would need to meet the requirements of Section 3.8 of NFPA 805. This system would need to be meet the applicable edition of NFPA 72 (NFPA 72, 72D, 72E, etc), as well as other applicable sections of 3.8.

b. *What quality requirements apply to a system that has been designated as requiring suppression and/or detection in Attachment C, "NEI 04-02 Table B-3 – Fire Area Transition," of the Harris Transition Report?*

Response: For existing systems that are currently in the scope of the FP QA program, the system was installed in accordance with the QA requirements as delineated in the response to RAI 7-3 (response dated August 13, 2009). If there are any systems that are required that were not within the scope of the Quality Assurance Program at the time of transition, any future modifications will be considered within the

scope of the program. The quality of the existing systems will be ensured to provide evidence the system will be able to meet its intended function.

c. *Section 4.8.1 of the Harris Transition Report includes a bullet under "Suppression Required? (Yes/No)" that states that systems required to meet NFPA 805 Chapter 4, "Determination of Fire Protection Systems and Features," performance-based compliance, including systems credited for defense-in-depth, are summarized in plant change evaluations. This statement implies that systems credited for defense-in-depth in plant change evaluations should be considered as required by NFPA 805 Chapter 4. If a system is required by NFPA 805 Chapter 4, its design and qualification would need to meet the applicable requirement(s) of NFPA 805 Chapter 3. Is this implication correct? If so, what design, qualification, and quality controls apply to fire detection and suppression systems that are credited for defense-in-depth in plant change evaluations?*

Response: It is not intended that a system classified as "defense-in-depth" in change evaluations are automatically required for Chapter 4 compliance. Systems required for Chapter 4 compliance are those that meet one of the following criteria:

- Required to meet deterministic separation requirements of 1-hr fire barrier/20 feet separation with suppression and detection. Only these systems are noted with a "Yes" in the "Suppression / Detection required" fields in the B-3 tables.
- Systems/features required to support a performance based evaluation. For example, fire detection may need to be credited in an area where a recovery action is needed.

The following types of systems would be classified as required to meet NFPA 805:

1. Required by NFPA 805 Chapter 3

   These are features/systems that are specifically required by Chapter 3. For example, Section 3.9.4 requires a sprinkler system to be installed in diesel driven fire pump rooms.

2. Systems Required to Enhance Defense-in-Depth

   Systems that are added or modified to improve the defense-in-depth features of an area in a change evaluation would be considered required systems. For example, addition of incipient detection in electrical cabinets that are considered to be risk significant ignition sources would be required systems. The design controls in place would provide assurance that any deviations from applicable codes would not prevent the systems from performing their intended function.

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3. Required by Existing Exemption/Deviation

   Where an existing exemption/deviation is being transitioned to the NFPA 805 program and a system/feature was an explicit basis for the NRC approval. Such systems/features would be considered as required.

4. Required to be monitored under the NFPA 805 Monitoring Program

   This would be a system/feature that has been determined by the NFPA 805 Expert Panel to require monitoring per the NFPA 805 Monitoring Program (refer to RAI 6-1 in RAI response dated August 13, 2009, and LAR Section 4.6). These systems would meet one of the following criteria:

   - Compartment CDF > 1.00E-08/yr
   - Compartment LERF > 1.00E-09/yr
   - A Risk Achievement Worth (RAW) >2
   - Other systems administratively identified as significant by the Expert Panel

5. Required by EEEE/GL 86-10 Evaluation

   These would be systems/features that are specifically credited as a basis for the acceptability of the engineering evaluation. For example, a water spray system installed at the fire barrier to protect against fire spread through an opening (i.e. labyrinth opening to a pump cubicle or an opening for cable trays). The design controls in place would provide assurance that any deviations from applicable codes would not prevent the systems from performing their intended function.

For those systems which meet one of the above five criteria, design, qualification and quality controls would be as described in the responses to RAI 2-2a and 2-2b above. They will all meet applicable requirements in NFPA 805 Chapter 3.

Systems/Features that do not meet one of the above criteria would not be considered to be a "required" system. A system that is included in the defense-in-depth discussion in a fire safety analysis would not be considered to be "required" if it does not meet one of the other requirements in Sections 1 through 5 above.

Table 1 shows the approach to address the term "Required" system per the NFPA 805 requirements:

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Category	Chapter 3 Required	Chapter 4 Required		Defense-in-Depth		NRC Approved Exemption / Deviation	EEEE (86-10) Identified	PM Monitoring Important (Post LAR Determination)
				FSA	CE			
Description	Prescriptive Requirement from Chapter 3	Classic application of Systems		Exists in Power Block	Added to Support CE	Where approval was explicitly based on the system	If explicitly a basis for acceptability or added to support the evaluation.	Compart. CDF > E-8 Compart. LERF > E-9 RAW > 2 Other*
		Separation B-3 (Supp / Det)	Recovery Actions (Det)					
Regulatory Required System	X	X	X		X	X	X	X

HNP RAI 2-5

Evaluations of HNP's compliance with several NFPA standards are referenced in a number of B-1 Table elements. A detailed summary of the results of each of these compliance evaluations should be provided in the LAR and appropriately referenced in the B-1 Table. These summaries may be compiled in a separate Attachment to the submittal, at the licensee's discretion.

At a minimum, each summary should include:

1. *A description of all evaluated conditions determined to be acceptable based on an engineering, compliance, or other type of evaluation, including:*

   - *A summary of each condition*
   - *A summary of the evaluation of each condition*
   - *A summary of the resolution of each condition*

2. *A description of all apparent code deviations, including:*

   - *A summary of each deviation*
   - *A summary of the evaluation of each deviation*
   - *A summary of the resolution of each deviation*

If the licensee wishes to treat these compliance evaluations in a similar fashion to EEEEs, the information submitted concerning the evaluations should be in alignment with HNP RAI 1-6.

Unless specifically limited by the NFPA 805 Chapter 3 element, compliance evaluations should be completed, at a minimum, for all power block areas. (Note that certain standards, such as NFPA 600, apply plant-wide by nature, and cannot be so limited.)

A partial list of the NFPA standards referenced in the LAR is:

- *NFPA 10 Standard for Portable Fire Extinguishers*
- *NFPA 13 Standard for the Installation of Sprinkler Systems*

- *NFPA 14 Standard for the Installation of Standpipe and Hose Systems*
- *NFPA 20 Standard for the Installation of Stationary Pumps for Fire Protection*
- *NFPA 24 Standard for the Installation of Private Fire Service Mains and Their Appurtenances*
- *NFPA 30 Flammable and Combustible Liquids Code*
- *NFPA 37 Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines*
- *NFPA 51B Standard for Fire Prevention During Welding, Cutting, and Other Hot Work*
- *NFPA 55 Standard for the Storage, Use, and Handling of Compressed Gases and Cryogenic Fluids in Portable and Stationary Containers, Cylinders and Tanks*
- *NFPA 600 Standard on Industrial Fire Brigades*
- *NFPA 72D&E National Fire Alarm Code & Standard on Automatic Fire Detectors*
- *NFPA 80 Standard for Fire Doors and Other Opening Protectives*
- *NFPA 90A Standard for the Installation of Air-Conditioning and Ventilating Systems*

Response: FAQ 06-0008, NFPA Fire Protection Engineering Evaluation, Revision 9, as endorsed by the NRC in the closure memo dated March 12, 2009 (ML073380976), provides guidance on treatment of engineering evaluations. FAQ 06-0008 concludes that functional equivalency evaluations for all section of NFPA 805 Chapter 3 and "adequate for the hazard" analyses for sections 3.8, 3.9, 3.10, and 3.11 of NFPA 805 are allowed and do not require NRC approval following transition to NFPA 805. Since NRC approval is not required for these types of evaluations following transition, it is proposed that these evaluations do not need to be summarized/included in the LAR. NFPA code compliance evaluations referenced by calculation number and the calculations (code compliance evaluations) will be available for NRC review.

HNP recognizes that unless specifically limited by a NFPA 805 Chapter 3 element, compliance evaluations should be completed, at a minimum, for all power block areas. However, certain NFPA codes are applicable to the entire plant by nature and cannot be so limited. The following NFPA codes are applicable plant-wide throughout HNP:

- NFPA 20
- NFPA 24
- NFPA 51B
- NFPA 600

HNP RAI 2-9

During its review of the B-1 Table in the Harris Transition Report, the NRC staff identified the following issues that are linked to specific B-1 Table elements. The licensee should review the LAR submittal and ensure that these and any similar conditions are resolved appropriately.

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B-1 Table: Element 3.3.1.1 – General Fire Prevention Activities

NFPA 805, Section 3.3.1.1, states: "The fire prevention activities shall include but not be limited to the following program elements..." Please provide a compliance statement that addresses how the "but not be limited to" aspect of the NFPA 805 requirement is incorporated at HNP.

B-1 Table: Element 3.3.1.2 – Control of Combustible Materials

NFPA 805, Section 3.3.1.2, states: "Procedures for the control of general housekeeping practices and the control of transient combustibles shall be developed and implemented. These procedures shall include but not be limited to the following program elements..." Please provide a compliance statement that addresses how the "but not be limited to" aspect of the NFPA 805 requirement is incorporated at HNP.

B-1 Table: Element 3.3.1.2.(5) – Regarding controls on the use and storage of flammable and combustible liquids

NFPA 805, Section 3.3.1.2(5), states: "Controls on use and storage of flammable and combustible liquids shall be in accordance with NFPA 30, "Flammable and Combustible Liquids Code," or other applicable NFPA standards." Please identify in the B-1 Table entry which other NFPA standards were determined to be applicable, and provide references to code compliance calculations for these other applicable standards.

B-1 Table: Element 3.3.1.2.(6) – Regarding controls on the use and storage of flammable gases

NFPA 805, Section 3.3.1.2(6), states: "Controls on use and storage of flammable gases shall be in accordance with applicable NFPA standards." Please identify in the B-1 Table entry which NFPA standards were determined to be applicable, and provide references to code compliance calculations for these applicable standards.

B-1 Table: Element 3.3.1.3.1 – Regarding the development of a hot work safety procedure

NFPA 805, Section 3.3.1.3.1, states: "A hot work safety procedure shall be developed, implemented, and periodically updated as necessary in accordance with NFPA 51B, "Standard for Fire Prevention During Welding, Cutting, and Other Hot Work", and NFPA 241, "Standard for Safeguarding Construction, Alteration, and Demolition Operations." Please provide a compliance statement that addresses HNP compliance with NFPA 241, as required by this section of NFPA 805.

B-1 Table: Element 3.3.8 – Bulk Storage of Flammable and Combustible Liquids

- *Please explain the relevance of including a statement regarding HNP's storage of flammable gases in the "Compliance Basis" field of this element, which deals with flammable and combustible liquids.*

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- *Please explain the relevance of the Safety Evaluation Report (SER) open item ("page 266 SER, open item 109") referenced in the "Document Detail" field of this element.*

B-1 Table: Element 3.4.1 – On-Site Fire-Fighting Capability

- *Please provide point-by-point compliance statements for the subsections of this element.*

- *Provide a positive statement concerning which NFPA standard(s) HNP follows, given that the "Compliance Basis" field asserts that NFPA 1500, "Standard on Fire Department Occupational Safety and Health Program," and NFPA 1582, "Standard on Medical Requirements for Fire Fighters and Information for Fire Department Physicians," are "not applicable to HNP as defined within their respective scope statements."*

B-1 Table: Element 3.4.2 – Pre-Fire Plans

How do the existing yard pre-fire plan(s) and the new outside yard fire pre-plan developed as a result of radiological release transition activities factor into the list of pre-fire plans described by this element? Please reconcile the apparent disparity in the HNP B-1 Table.

B-1 Table: Element 3.4.2.1 – Pre-Fire Plan Contents

The "Compliance Basis" field for this element only describes what the pre-fire plans should contain. What information do the HNP pre-fire plans actually contain?

B-1 Table: Element 3.4.2.4 – Pre-Fire Plan Coordination Needs

The two paragraphs in the "Compliance Basis" field for this element are unclear and partially redundant. Please clarify this entry in the HNP B-1 Table.

B-1 Table: Element 3.4.3.(a) – Regarding plant industrial fire brigade training

- *Section 4.1.1, "Overview of Evaluation Process," of the Harris Transition Report lists only five choices for compliance statements: "Complies", "Complies with Clarification", "Complies Via Previous NRC Approval", " Complies with Use of Existing Engineering Equivalency Evaluations", and "License Amendment Required." The statement in the "Compliance Statement" field of this element, "Complies with NFPA 600," is not one of the available choices. Please provide a correct compliance statement for this element.*
- *Provide point-by-point compliance statements and appropriate document references for the numbered subsections of this element. Compliance with all points is required.*

B-1 Table: Element 3.4.3.(c) – Regarding drills

Please provide point-by-point compliance statements and appropriate document references for the numbered subsections of this element. Compliance with all points is required.

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B-1 Table: Element 3.5.2 – Water Supply Tank Code Requirements

- *Please ensure that the "Compliance Statement" field for this element is correct (i.e., what is the necessary clarification for the "Complies with Clarification" statement?).*

- *Please supplement the HNP B-1 Table entry to address the requirement listed in this element for separate and separated suctions for the water supply tanks.*

B-1 Table: Element 3.5.8 – Water Supply Pressure Maintenance Limitations

Please explain the relevance of including the Shearon Harris SER in the "Reference Document" field of this element in light of its "Complies" compliance statement. Also, is the page number included in the "Document Detail" field correct given that it is identical to the HNP FSAR document reference? Finally, please attempt to provide a title for NUREG-1083 so that the NRC staff can be assured that it is not being confused with NUREG-1038, "Safety Evaluation Report related to the operation of the Shearon Harris Nuclear Power Plant, Unit No. 1."

B-1 Table: Element 3.5.10 – Water Supply Yard Main Code Requirements

Please ensure that the compliance strategy for this element is correct (i.e., how does the Code Compliance Evaluation for NFPA 24-1977, "Standards for Outside Protection," relate to the "Complies" compliance statement?).

B-1 Table: Element 3.5.13 – Water Supply Header Options

- *This element, in part, states that "headers fed from each end shall be permitted inside buildings to supply both sprinkler and standpipe systems, provided steel piping and fittings meeting the requirements of ANSI [American National Standards Institute] B31.1, "Code for Power Piping," are used for the headers (up to and including the first valve) supplying the sprinkler systems where such headers are part of the seismically analyzed hose standpipe system." Please address the seismic portion of this requirement and provide appropriate compliance information.*

- *Please clarify the relationship of the first paragraph in the "Compliance Basis" field to the remainder of the section.*

B-1 Table: Element 3.5.15 – Water Supply Hydrant Code Requirements

This element, in part, states that "a hose house equipped with hose and combination nozzle and other auxiliary equipment specified in NFPA 24, "Standard for the Installation of Private Fire Service Mains and Their Appurtenances," shall be provided at intervals of not more than 1000 feet (305 meters) along the yard main system." Please address the "hose house" requirements and provide appropriate compliance information.

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B-1 Table: Element 3.6.2 – Standpipe and Hose Station Capability Limitations

Please ensure that the compliance strategy for this element is correct (i.e., how does the Code Compliance Evaluation for NFPA 14-1976, "Standard for the Installation of Standpipes and Hose Systems," relate to the "Complies" compliance statement?).

B-1 Table: Element 3.6.3 – Standpipe and Hose Station Nozzle Restrictions

- *Please explain the "Reference Document" field entry for NFPA 14, or delete if in error.*
- *Please ensure that the compliance strategy for this element is correct (i.e., how does the Evaluation of NFPA 14 Deviations relate to the "Complies" compliance statement?).*

B-1 Table: Element 3.6.4 - Standpipe and Hose Station Earthquake Provisions

The excerpt from the background section of the deviation request included in the "Compliance Basis" field for this element references Section 9.5.15 of NUREG-1038; however, there is no such section contained in NUREG-1038. If this error is included as a part of the original submittal document for the deviation request, please provide an appropriate correction in the HNP B-1 Table entry. If not, correct the "Compliance Basis" entry accordingly.

B-1 Table: Element 3.7 – Fire Extinguishers

Please submit information related to the NFPA 10, "Standard for Portable Fire Extinguishers," code of record compliance evaluation, as described in HNP RAI 2-5, for all power block areas, including a justification for any unevaluated areas.

B-1 Table: Element 3.8.1 – Fire Alarm

- *The "Compliance Basis" field for this element states, in part, that "alarm initiating devices credited within [NFPA 805] Chapter 4 to meet the Nuclear Safety Performance Criteria are installed in accordance with..." The requirements of this section are not limited to those devices required by or credited within NFPA 805 Chapter 4. The licensee should ensure that alarm initiating devices are installed in accordance with the appropriate NFPA code of record in all plant areas, and update the "Compliance Basis" field for this element accordingly.*
- *Please ensure that the compliance strategy for this element is correct (i.e., how do the Code Compliance Evaluations for NFPA 72E, "Standard on Automatic Fire Detectors," and NFPA 72D, "Standard for Proprietary Protective Signaling Systems," relate to the "Complies" compliance statement?).*

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B-1 Table: Element 3.8.2 - Detection

Ensure that the compliance strategy for this element is correct (i.e., how do the Code Compliance Evaluations for NFPA 72E and NFPA 72D relate to the "Complies" compliance statement?).

B-1 Table: Element 3.9.1 – Fire Suppression System Code Requirements

The licensee states in the "Compliance Basis" field for this element that the suppression systems credited to meet the requirements of NFPA 805 Chapter 4 are identified in the individual Fire Safety Analysis calculations (FSAs). However, an NRC staff review of a sample of the FSAs indicates that there is no such differentiation between credited and non-credited suppression systems in the FSAs. HNP should reconcile this apparent discrepancy.

B-1 Table: Element 3.9.4 – Fire Suppression System Diesel Pump Sprinkler Protection

The licensee states in the "Compliance Basis" field for this element that the diesel driven fire pump is located outdoors. However, the provided previous approval excerpt states that the fire pumps are located in the emergency service water screening structure. In addition, the excerpt does not resolve the topic of this element, which is automatic sprinkler protection for diesel driven fire pumps. HNP should reconcile these apparent discrepancies.

B-1 Table: Element 3.11.1 – Building Separation

The exception to this element states that "where a performance-based analysis determines the adequacy of building separation, the requirements of 3.11.1 shall not apply." Does HNP utilize this exception? If so, please provide a detailed summary of the performance-based analysis.

B-1 Table: Element 3.11.2 – Fire Barriers

- *Please ensure that the compliance strategy for this element is correct (i.e., how does the NRC SER contained in NUREG-1038 relate to the "Complies" compliance statement?).*

- *Please ensure that the section listed for LAP-83-479, "Point by Point Comparison of HNP with NUREG-0800, ["Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants,"]" in the "Document Detail" field is correct.*

B-1 Table: Element 3.11.3 – Fire Barrier Penetrations

- *What is the relationship between LAP-83-479, "Point by Point Comparison of HNP with NUREG-0800," and NLS-86-137, "Point by Point Comparison of HNP to Requirements of NUREG-0800?" Both are listed in the "Reference Document" field for this element.*

- *The "Compliance Basis" field is incorrect in stating that conformance with NFPA 101,*

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"Life Safety Code," is not applicable for this element. The NRC did not take exception to the inclusion of this standard into the element when incorporating NFPA 805 into 10 CFR 50.48(c). Therefore, the provisions of NFPA 101 related to this element (i.e., the characteristics of passive fire barrier penetration protective devices [i.e., fire doors and dampers]) do apply. Please provide a compliance statement and strategy that address the requirements of NFPA 101 and correct the HNP B-1 table entry accordingly.

B-1 Table: Element 3.11.4 – Through Penetration Fire Stops

The compliance statement for this element is "Complies via Previous Approval." However, the licensee also states that the characteristics of the actual penetration seal installations (i.e., the combustibility of the seal materials) do not match the previously approved configuration. This situation is not appropriate to the "Complies via Previous Approval" category. Please reconcile the apparent differences between the approved and installed penetration seal configurations and correct the HNP B-1 Table entry accordingly.

B-1 Table: Element 3.11.5 – Electrical Raceway Fire Barrier Systems (ERFBS)

The compliance statement for this element is "Complies with Clarification." However, the licensee is requesting specific approval to include/consider Meggitt Safety Systems Cable as an ERFBS, and references an earlier licensing action on the use of fire resistive cable. Please ensure that the compliance strategy for the Meggitt cable portion of HNP's compliance with this element is correct and fully captures all aspects of the issue.

Response: The specified B-1 elements identified in the RAI will be addressed through clarification in Table B-1. Individual resolutions are described below in the summary table and will be reflected in a revised version Table B-1 to be submitted along with other LAR sections as described in the RAI response.

3.3.1.1	Item 1 has been expanded to include the minimum fire protection program elements as discussed in FAQ 06-0028.
3.3.1.2	Added statement "Compliance with procedures for the control of general housekeeping practices and the control of transient combustibles which are developed and implemented include but are not limited to the following:"
3.3.1.2(5)	No other NFPA standards were determined to be applicable based on the guidance in FAQ 06-0020.
3.3.1.2(6)	No other NFPA standards were determined to be applicable based on the guidance in FAQ 06-0020.
3.3.1.3.1	A compliance statement regarding NFPA 241 has been included in the Compliance Basis.

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3.3.8	The reference to the storage of flammable gases in the Compliance Basis field has been removed. The reference to the SER open item has been removed and correct document details have been provided.
3.4.1	Point-by-point compliance statements have been provided for the subsections of this element FAQ 06-0007 has been referenced to provide a positive statement concerning which NFPA standards are applicable to HNP.
3.4.2	The disparity in the B-1 Table between the existing outside yard and new outside yard pre-plans will be corrected during implementation at HNP. A new outside area pre-plan will be developed to address Transient Radioactive Materials. An Open Item exists to track initiation and approval of this fire pre-plan.
3.4.2.1	Correct documentation has been provided which outlines the information that the pre-plans actually contain.
3.4.2.4	This entry has been clarified to remove the redundancy.
3.4.3.(a)	Correct compliance statements have been provided for all points of the section.
3.4.3.(c)	Point-by-point compliance statements have been provided for the subsections of this element.
3.5.2	The compliance basis has been reworded to include the necessary clarification.
3.5.8	References to the FSAR and NUREG-1038 have been removed and correct document details have been provided.
3.5.10	The compliance statement has been changed to "Complies with use of EEEE"
3.5.13	The seismic portion of this requirement has been addressed. The first paragraph in the "Compliance Basis" has been removed.
3.5.15	Hose houses have been addressed in this section.
3.6.2	The compliance strategy has been corrected to refer to "Complies with the use of EEEE"
3.6.3	The NFPA 14 reference document has been deleted.
3.6.4	The error with "Section 9.1.15" has been removed and the compliance basis entry has been corrected accordingly.
3.7	The code of record compliance evaluation for NFPA 10 (calculation number HNP-M/BMRK-0005) is utilized to evaluate the following powerblock areas: Reactor Containment Building (RCB), Reactor Auxiliary Building (RAB), Diesel Generator Building (DGB), Diesel Fuel Oil Storage Building (DFOSB), and Emergency Service Water Intake Structure (ESWIS). An open item exists to update HNP-M/BMRK-0005 to evaluate the remaining powerblock areas.

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3.8.1	The reference to "Chapter 4" credited devices has been removed and the code evaluations have been referenced for all plant areas. The compliance strategy has been corrected for this element.
3.8.2	The compliance strategy has been corrected for this element.
3.9.1	The reference to individual FSA's for the identification of the suppression systems credited to meet the requirements of NFPA 805 Chapter 4 has been removed. The "Compliance Basis" field now references Section 4.8.4 of the Transition Report which identifies the suppression systems credited to meet the requirements of NFPA 805 Chapter 4.
3.9.4	HNP is utilizing "Complies via Previous NRC Approval" for the location and the configuration of the diesel driven fire pump. The configuration of the diesel driven fire pump without automatic sprinkler protection was previously approved by the Staff as shown in the NUREG 1038 excerpt listed in the "Compliance Basis". An excerpt from the HNP FSAR is now included in the "Compliance Basis" field to clarify that the location of the diesel driven fire pump is "outdoors at opposite ends of the Emergency Service Water Screening Structure". A clarification of prior approval has been issued to clarify that the pumps are outside the Emergency Service-Water Screening Structure in the SER.
3.11.1	HNP does not utilize the exception, which is noted in the Compliance Basis
3.11.2	The references to NUREG-1038 and LAP-83-479 have been removed from the element.
3.11.3	The references to LAP-83-479 and NLS-86-137 have been removed from the element. The NFPA 101 provisions which relate to this element are now addressed in the Compliance Basis field.
3.11.4	The compliance strategy has been corrected for this element.
3.11.5	The compliance strategy has been corrected for this element.

3. Please provide the following information concerning meeting the nuclear safety performance criteria:

HNP RAI 3-23

The NRC staff review of the calculations provided by the licensee during the onsite regulatory audit at HNP has identified specific issues which the licensee should disposition:

n. *In calculation HNP-M/MECH-1127, Revision 1, the delta-risk calculation results are presented in Table A2-1, "Fire Scenario Results [Core Damage Frequency] (CDF)," and Table A2-2, "Fire Scenario Results [Large Early Release Frequency] (LERF)," as zeros.*

However, the licensee has stated that no delta-risk evaluations were performed for alternate shutdown because it is consistent with the CLB. Therefore, the tables included in this calculation are misleading as they imply such delta-risk evaluations have been performed and are of very low risk (zero). The licensee should revise this and other similar calculations (if they exist) to clearly state how the delta-risks are developed (i.e., by actual calculation, screening, or by assuming no change in risk).

Response: HNP-M/MECH-1127 and other similar calculations will be revised prior to implementation of the NFPA 805 program to clearly state how the delta risks were determined.

HNP RAI 3-52

In Attachment G of the Harris Transition Report, on page G-2, there is a brief discussion on the use of defense-in-depth manual actions. The licensee appears to be distinguishing defense-in-depth actions from recovery actions, based apparently on whether credit is taken in the associated risk analyses for the actions.

However, if manual actions are required for adequate defense-in-depth, they are considered as recovery actions under the NFPA 805 requirements since the licensee is identifying them as necessary to meet the performance-based aspects of the rule (i.e., acceptable risk, safety margins, and defense-in-depth).

The licensee is requested to document which, if any, of its defense-in-depth actions are being relied upon to comply with maintaining adequate defense-in-depth per NFPA 805 requirements, and to confirm the final list of actions which constitute recovery actions under the regulation.

In addition, please explain how the use of/reliance on defense-in-depth actions that are not modeled in the Fire PRA meets the requirements of NFPA 805, Section 2.4.3.3, which requires the fire risk evaluation to "...be based on the as-built and as-operated and maintained plant, and reflect the operating experience at the plant."

Response: Table G-2 in Attachment G of the HNP Transition Report lists each pre-transition OMA and its characterization as:

- a recovery action (RA or RA-DID),
- an action that is no longer required (NR) due to a plant modification or due to analysis in a plant change evaluation, or
- an action requiring no further evaluation (NFA) since it occurs at a primary control station.

The Harris fire PRA was developed based on the most current guidance available and has been peer reviewed against the requirements of Regulatory Guide 1.200. The HRA methods employed were also presented to the NRC staff during the pre-LAR audit of the fire PRA with no significant findings provided.

Consistent with these methods, all of the OMAs were reviewed and the procedures revised as necessary to ensure that there were no adverse risk consequences to the fire PRA. The screening methods provided by NUREG/CR-6850 allow very little credit for human actions taken outside of the control room. Even more detailed analysis methods significantly limit the amount of quantitative credit given to many of these actions. However, since the actions have been reviewed and modified as necessary to remove any adverse impacts, it can be stated qualitatively that if the actions are successfully implemented they would have some beneficial impact. Since the quantification results of the fire PRA were sufficiently low without crediting these actions, any additional benefits from these actions can be assumed to provide some risk margin by providing for enhanced effectiveness of the safe shutdown process. There is very little current operating experience that fires in nuclear plants will fail entire areas such that these actions will be implemented. There is no operating experience at HNP suggesting that these actions will ever be implemented.

HNP RAI 3-53

NFPA 805 Section 4.2.3, "Deterministic Approach," asserts that the use of recovery actions automatically implies the use of the performance-based approach; and NFPA 805 Section 4.2.4, "Performance-Based Approach," states that "when the use of recovery actions has resulted in the use of this approach, the additional risk presented by their use shall be evaluated."

However, in Attachment G of the Harris Transition Report, page G-3 states that: "[Operator Manual Actions] OMAs that are allowed and/or have been previously reviewed and approved by the NRC (as documented in an approved exemption/deviation/SER) can be transitioned without using the change evaluation process."

As outlined above, NFPA 805 requires assessment of the additional risk presented by the use of recovery actions (which, according to the NRC staff position, are nominally identical to OMAs for the purposes of the rule). Accordingly, please address the following discrepancies in Attachment G to the Harris Transition Report:

a. *Attachment G lists 17 OMAs being transitioned as recovery actions. Please provide the evaluation(s) of the additional risk presented by the use of these 17 recovery actions.*

   Response: As discussed in the response to RAI 3-52 (this submittal), the risk of these actions was not quantified by the fire PRA. For alternate shutdown, HNP did not modify the actions to not have an adverse risk. Rather, those actions that were evaluated to be risk significant, such as stopping the CSIP until it has all its valves aligned properly, or restoration of seal cooling, were identified and eliminated with

modifications. Those actions that remain are those necessary to implement the Alternate Shutdown Strategy using the ACP. These actions include tripping the Main FW Pumps, RCPs, and Pressurizer Heaters, and isolating SG Blowdown and Chilled Water Cross Connect Valves since these components are not supported or controlled at the ACP. No credit was taken in the PRA for these actions except for the case where the control room was abandoned for environmental reasons. However, they can be qualitatively assumed to have some risk benefit and do not pose any additional risk.

b. *Page G-6 asserts that the alternative shutdown recovery actions are not explicitly modeled in the Fire PRA. However, NFPA 805, Section 4.2.4, requires that the additional risk of recovery actions be evaluated. Please explain how this requirement is being met if the recovery action is not modeled in the Fire PRA.*

Response: For Alternate Shutdown areas, the actions are only those specifically necessary to implement the Alternate Shutdown Strategy since the entire MCB is not transferred to the ACP. No credit was taken in the PRA for these actions except for the case where the control room was abandoned for environmental reasons. However, they can be qualitatively assumed to have some risk benefit, and do not pose any additional risk.

c. *Page G-8 states that "OMAs that can contribute significantly to the overall integrated decision-making process associated with the NFPA 805 transition should be identified." Please clarify whether or not this aspect was evaluated for HNP. If yes, what were the identified OMAs and what is the additional risk associated with their use?*

Response: No OMAs were specifically identified. However, because the actions have been determined not to have adverse risk impacts, they can be qualitatively assumed to have some risk benefit and do not pose any additional risk.

d. *Page G-9 states that "due to the low risk benefit of performance of defense-in-depth actions, the additional effort per NUREG-1852[, "Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire,"] does not add measurable benefit." However, NFPA 805, Section 2.4.2.1, "Nuclear Safety Capability Systems and Equipment Selection," states that the availability and reliability of equipment selected to meet the nuclear safety performance criteria shall be evaluated. The accomplishment (or failure) of defense-in-depth actions can directly impact that reliability. Please explain how this NFPA 805 requirement is being met if the defense-in-depth actions have not been evaluated for reliability.*

Response: The reliability and availability of equipment has more impact for determining the likelihood of successfully completing an operator action than the operator action has on determining the reliability or availability of equipment. DID actions can potentially make an otherwise unavailable or failed piece of equipment available only within the probability to diagnose and attempt to perform the action and

the reliability of the equipment to operate as needed to successfully complete the action. HRA Screening is conservative and consistent with the PRA guidance.

The fire PRA analysis identified the equipment required to be modeled consistent with the guidance of NUREG/CR-6850 task 2, Component Selection. The PRA includes the appropriate probabilities for the reliability and availability of modeled equipment, and has been reviewed by both the regulator in a pre-LAR audit and by an industry peer review to the requirements of Regulatory Guide 1.200 as discussed in Attachment X of the Harris LAR.

Based on the above discussion, the requirement to evaluate the reliability and availability of equipment is met.

HNP RAI 3-54

In Attachment G of the Harris Transition Report, on page G-6, the example cited in the third bullet states that an area without automatic detection and a high scenario conditional core damage probability (CCDP) may warrant a defense-in-depth action. Please clarify how the operator would know that he/she is required to take the defense-in-depth action if there is no detection in the area. In addition, explain how the defense-in-depth action could be accomplished if the operator does not know that there is a fire in the associated area.

Response: The example given in the third bullet of Section G.4.1.4, "OMA Transition Review Process," (p. G-6) does not apply at HNP and will be deleted from this item.

HNP RAI 3-67

Section G.5.3.1.2, "Non-Alternative Shutdown Actions – Other Actions," of the Harris Transition Report, states that "due to the low risk benefit of performance of defense-in-depth actions, the additional effort per NUREG-1852 does not add measurable benefit." Since NUREG-1852 addresses OMA feasibility and reliability criteria in a qualitative manner, and defense-in-depth actions are addressed qualitatively by HNP, please provide the basis for this statement (e.g., describe what constitutes the "additional effort" involved with an assessment of the associated defense-in-depth action and why it would not add a "measurable benefit").

In addition, please clarify whether the feasibility criteria listed in Table G-1, "Feasibility Criteria – Recovery Actions and Defense-in-Depth Actions," align with those from NUREG-1852. If there is misalignment, such that the G-1 Table criteria exclude or inadequately reflect any of the NUREG-1852 criteria, provide the basis for criterion inclusion/exclusion in the G-1 Table and discuss how assurance is provided that an important criterion is not overlooked.

Response: HNP did not model the non-ASD DID actions. The cables that prompt the actions are included as VFDs, with the exception of potential ESFAS and cold shutdown

actions. Therefore, the risk of the VFDs includes/bounds the risk of the actions. Based on the acceptably low risk of the VFDs without the actions, further reductions possible by calculating HEPs and modeling the actions would not be expected to change the conclusions of the LAR. ESFAS and cold shutdown actions are not considered as VFDs as they are not time critical and they are considered "allowable" per FAQ 12 (See also Appendix G). These actions were addressed per Attachment G process to review and disposition OMAs, including the step to ensure they do not result in an adverse risk impact.

The criteria detailed in NUREG-1852 applies to exemption requests submitted by plants that are not transitioning to NFPA 805 and thus does not apply to HNP. However, there appears to be general alignment of the criteria between NUREG-1852 and Table G-1. A high level comparison is shown below:

NUREG 1852	Table G-1
• Time Available to Perform the Actions (To Address Feasibility) • Time Available to Ensure Reliability • Environmental Factors • Equipment Functionality and Accessibility • Available Indications • Communications • Portable Equipment • Personnel Protection Equipment • Procedures and Training • Staffing • Demonstrations	• Demonstrations (includes environmental considerations) • Systems and Indications • Communications • Emergency Lighting • Tools-Equipment (includes personnel protection equipment) • Procedures • Staffing • Actions in the Fire Area • Time • Training • Drills

4. Please provide the following information concerning meeting the Radioactive Release Performance Criteria:

HNP RAI 4-1

The Radioactive Release Goal, as expressed through the Radioactive Release Objective and Performance Criteria, is one of the key public safety features of the NFPA 805 standard.

However, the material submitted regarding HNP's radioactive release transition, located in Section 4.4, "Radioactive Release Performance Criteria," and Attachment E, "NEI 04-02 Table G-1 – Radioactive Release Transition," of the Harris Transition Report, contains insufficient detail for the NRC staff to properly review this issue. Accordingly, the NRC staff requests the following information regarding the radioactive release transition process at HNP:

h. Describe the implications of the turbine building being open to the outside atmosphere.

Response: Elevation 240' houses the condensate polisher equipment which was the only identified radioactive potential in this building. This area is physically isolated from the outside with ventilation routed to the Turbine Building Vent stack for monitoring prior to release (ref. DBD-304, Radiation Monitoring System and Gross Failed Fuel Detector). Potential sources of radioactivity are generally contained within steel vessels and piping which are not expected to be breached as a result of firefighting activities. These details have been included in a revision to LAR Attachment E, Table G-1.

5. Please provide the following information concerning risk assessments and plant change evaluations:

HNP RAI 5-14

Section 5.2.5, "Transient Source Ignition Frequencies," of calculation HNP-F/PSA-0079, Revision 1, states that "transient fires due to cutting and welding have been determined to have a negligible contribution due to the presence of a continuous fire watch."

However, Bins 6, 24, and 36 in Table 6-1, "Fire Frequency Bins and Generic Frequencies," of NUREG/CR-6850, assign ignition frequencies to "transient fires caused by cutting or welding" that range from approximately 0.005 to 0.01 per reactor-year. In addition, the non-suppression probability for welding fires, based on historic fire event data which presumably incorporated the presence of a continuous fire watch for at least some, if not most, "hot work" activities, does not reach the lower limit of 0.001 per reactor-year until approximately 35 minutes have elapsed (reference Table P-2, "Probability Distribution for Rate of Fires Suppressed per Unit Time," of NUREG/CR-6850). Finally, if only five minutes is available for the manual suppression of a cutting or welding fire, the non-suppression probability is 0.38 per reactor-year

In accordance with the above discussion, provide the basis for this apparently a priori dismissal of transient fires due to cutting and welding, given the presence of a continuous fire watch, and provide a risk estimate for what would be the effect of not dismissing these types of fires.

Response: There are no significant plant impacts due to a transient cutting and welding fires (bins 6, 24, and 36) unless the fire damages equipment or cables. A review of the events applicable to this fire type supports the conclusion that the presence of a fire watch will prevent the transient fire from causing significant damage.

A Sensitivity analysis to estimate of the risk contribution of transient fires due to cutting and welding has been performed by applying the ignition frequencies for bins 6, 24, and 36 to the general transient source scenarios (bin 3, 7, 25, and 37), and assuming a continuous fire watch.

The results are provided below.

	CDF	VFD dCDF	LERF	VFD dLERF
Base Value without Bin 6, 24, and 36	3.06E-05	1.13E-06	3.48E-06	5.36E-08
Bin 6, 24, and 36 contribution	4.63E-08	2.10E-11	5.26E-09	9.11E-13
Total value	3.06E-05	1.13E-06	3.49E-06	5.36E-08

Based on these results, the conclusions provided in the LAR remain valid.

HNP RAI 5-15

Section 5.4.2.1, "[High Energy Arcing Fault] HEAF Fire Growth," of calculation HNP-F/PSA-0079, Revision 1, states that "after the HEAF, a source fire of 69 kilowatts (kW) is assumed to propagate to secondary combustibles."

Section M.6.1, "Risk Quantification of High-Arcing Fault Events," of NUREG/CR-6850 states that for the ensuing fire after the energetic phase, a generic frequency for HEAFs should be assigned as listed in Task 6, "Fire Ignition Frequencies," and apportioned using the location and ignition source weighting factors for the equipment under analysis.

Section G.7, "Supplemental Information: Examples of Determining Heat Release Rates (HRRs) for Typical Electrical Cabinets in Nuclear Power Plants," of NUREG/CR-6850, gives the following guidance for HEAF sources:

> *4160V Switchgear: ...Because of the single bundle control wiring and separation of the control and power cables in separate compartments, the fire in the switchgear will remain confined to a single bundle and the distribution with 65 kW and 200 kW as the 75th and 98th percentiles can be assumed if the cables are qualified.*
>
> *480V MCC: ...MCCs of this type with qualified cable are considered to satisfy the criteria established for a 65 kW HRR as the 75th percentile. In contrast, if the cabinet has unqualified cable, and assuming a closed door, a value of 220 kW would be assigned as the 75th percentile.*

In accordance with the above discussion, please provide the basis for the apparent a priori limiting of the propagation of a source fire from an HEAF to the 69 kW HRR (i.e, vs. 200 kW).

Response: 69 Kw was used as the HRR for the residual fire in order to maintain better consistency for the scenarios. Most of the HEAF scenarios originate in electrical switchgear cabinets. The non-HEAF fires in these cabinets at HNP are typically based on one or more

cable bundles with qualified cable. The 75th percentile HRR for these cabinets would be either 69kw or 211kw based on the guidance in NUREG/CR-6850. The guidance in the NUREG directs the HEAF to be of a high magnitude such that the cabinet doors are assumed to be blown open, and the metal is melted. This implies that the interior cable bundles are also substantially consumed by the initial fault which has a 3 foot horizontal and a 5 foot vertical zone of influence for damage. Because the initial combustible material is mostly consumed early, the residual fire is most likely smoldering cabinet material and secondary combustibles (trays) ignited by the HEAF. Applying 69kw as the residual source HRR may still be conservative but it is a more reasonable assumption than to apply a non-HEAF peak HRR which is based on the pre-HEAF cabinet loading.

HNP RAI 5-20

Attachment 4, "Main Control Room Analysis," to calculation HNP-F/PSA-0079, Revision 1, includes Table 3, "Main Control Board Fire Consequence Characterization – Successful Fire Suppression."

Based on the discussion presented in Table 3, as well as working the Table 3 analyses "forward" and "backward," the following minimum groupings appear to generate a CCDP equal to 1.0 (or close enough that the risk significance merits further analysis): (1) MCB - A1; (2) MCB - A2; and (3) MCB - D1. However, there are other "non-minimal" groupings contained in Table 3 (i.e., MCB - B1 and MCB - D2), each of which includes at least one cabinet that is also associated with the higher risk significance groupings.

Given the discussion above, please specify which groupings actually result from the analyses associated with Table 3.

Response: Section 5.3 of attachment 4 provides a more detailed assessment and scenario selection for panel sections AA, A1, A2, C, B1, B2, BB D1, and D2. Additional treatment is provided in section 5.4 for panel sections A1 and A2. The final CDF values are presented in table 10 by scenario for each panel.

It should be noted that this analysis does not credit the incipient detection modification which is currently planned for the MCB. This will significantly reduce the CDF of the MCB.

HNP RAI 5-21

Section 4, "Determine Environmental Conditions Given Fire," of Attachment 4 to calculation HNP-F/PSA-0079, Revision 1, states, in part, that combining the frequency terms for transient combustibles yields: 5.7E-4 x 1.0E-2 x 2.63E-2 = 1.50E-7 per year.

It appears that a transient ignition frequency of 5.7E-4 per year is assumed. However, this value is actually the conditional probability of damage given a fire event, per Figure L-1,

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"Likelihood of Target Damage Calculated as the Severity Factor Times the Probability of Nonsuppression for MCB Fires," of NUREG/CR-6850.

Bin 7 of Table 6-1,"Fire Frequency Bins and Generic Frequencies," in NUREG/CR-6850, gives the transient ignition frequency in the Control/Auxiliary/Reactor Building as 3.9E-3 per year.

Accordingly, please revise these calculations, if appropriate, using the correct NUREG/CR-6850 value, or provide the basis for the value currently assumed for transient ignition frequency.

Response: Calculation HNP-F/PSA-0071, Revision 2, provides the updated transient ignition frequency for the main control room as 2.51E-4/yr. Based on this, the results presented in attachment 4 are slightly conservative.

HNP RAI 5-22

Throughout Section 5.3, "Main Control Board Fire Initiating Events – Successful Fire Suppression," and Section 5.4, "Main Control Board Fire Initiating Events – Fire Suppression Failure Scenarios," of Attachment 4 to calculation HNP-F/PSA-0079, Revision 1, the ignition frequency calculations assume that the probability of spurious actuation is equal to 0.30.

The following tables in NUREG/CR-6850 provide failure mode probability estimates given cable damage for various cable types/configurations:

Table 10-1, "Thermoset Cable with Control Power Transformer (CPT)," gives a failure probability of 0.30 as the best estimate for a multi-conductor cable with an internally generated hot short in a cable tray.

Table 10-2, "Thermoset Cable without CPT," gives a failure probability of 0.60 as the best estimate for a multi-conductor cable with an internally generated hot short in a cable tray.

Table 10-3, "Thermoplastic Cable with CPT," gives a failure probability of 0.30 as the best estimate for a multi-conductor cable with an internally generated hot short in a cable tray.

Table 10-4, "Thermoplastic Cable without CPT," gives a failure probability of 0.60 as the best estimate for a multi-conductor cable with an internally generated hot short in a cable tray. Given the above discussion, please provide the basis for using a spurious actuation probability of 0.30 instead of 0.60 as the best estimate for failure mode probability in the ignition frequency calculations throughout Section 5.3 and Section 5.4 of Attachment 4 to calculation HNP-F/PSA-0079, Revision 1. (For example, was a CPT indeed assumed to protect all the circuits in the Main Control Room analysis?)

Response: The specific cases described in the MCR report involve three scenarios for spurious valve operation:

RWST draindown: The valves contributing to this scenario are motor operated valves. Based on the guidance in NUREG/CR-6805, a probability of 0.30 for spurious operation can be used for hot sorts involving multi-conductor cables with CPTs. This is applicable to the subject MOVs.

Letdown isolation: The letdown isolation valves are air operated valves with DC solenoid controllers. Based on the guidance in NUREG/CR-6805, a probability of 0.60 for spurious operation can be used for hot sorts involving multi-conductor cables without CPTs. The use of 0.30 for the HNP MCB analysis is non-conservative and will be corrected when this analysis is updated. However, the conclusions of the LAR are not expected to be adversely impacted due to other offsetting conservatisms, including no credit taken for the duration of the hot short, which is expected to be in the range of 10-20 minutes, and no credit applied for the installation of incipient detection in the MCB.

Spurious RCS PORV: The RCS PORV at HNP is an air/solenoid valve. A similar discussion as that given for the letdown valves would apply the PORV.

HNP RAI 5-27

Item 7 of Attachment 26, "HNP Transformer Yard – Transformer Fire Impact Evaluation," to calculation HNP-F/PSA-0079, Revision 1, states, in part, that iso-phase bus and non-segregated bus are used to connect the transformers to the main generator, switchgear, and control circuitry as necessary to support the design functions of the transformers.

Please discuss whether or not the possibility of a HEAF originating in either of these two types of bus was considered. If so, provide a summary of the impact/results of this consideration, and if not, explain why the possibility of a HEAF was not considered.

Response: Bus ducts were not included in the submitted fire PRA as the guidance was still in development at the time. A sensitivity analysis has been performed for the iso-phase bus duct at Harris based on the current guidance in FAQ-07-0035. The CDF, LERF, and VFD delta totals including iso-phase bus duct HEAF failures are provided below:

	CDF	**LERF**	**VFD delta CDF**	**VFD delta LERF**
Updated Risk w/iso-phase Bus duct treatment	3.07E-05/yr	3.50E-06/yr	1.13E-06/yr	5.36E-08/yr

Another sensitivity analysis has been performed for the iso-phase bus duct at Harris based on the current guidance in FAQ-07-0035 but using the generic ignition frequency for iso-phase bus duct HEAF from EPRI Report 1016735. The CDF, LERF, and VFD delta totals including iso-phase bus duct HEAF failures are provided below:

	CDF	LERF	VFD delta CDF	VFD delta LERF
Updated Risk w/iso-phase Bus duct treatment	3.06E-05/yr	3.49E-06/yr	1.13E-06/yr	5.36E-08/yr

The results support the conclusions provided in the LAR submittal.

HNP RAI 5-28

In Section 3.3.1, "Inputs," of calculation HNP-F/PSA-0071, "Harris Fire PRA – Fire Ignition Frequency Calculation," Revision 2, it appears that for bus duct fires, HNP has not incorporated the potential ignition sources and their associated frequencies listed into the Fire PRA.

Although not yet closed out when HNP-F/PSA-0071, Revision 2, was written, NFPA 805 FAQ 07-0035, "Bus Duct Counting Guidance for High Energy Arcing Faults," reached a consensus on ignition frequencies for bus duct fires.

Given that it appears HNP has not yet incorporated these consensus values for ignition frequencies of bus duct fires, please discuss how the licensee has assured that the potential effect from bus duct fires does not significantly impact the results from the current Fire PRA.

Response: Bus ducts were not included in the submitted fire PRA as the guidance was still in development at the time. An analysis has been performed for the bus duct HEAFs at Harris based on the current guidance in FAQ-07-0035. The increase in the baseline CDF and LERF for segmented bus duct HEAF failures are provided below:

	CDF	LERF
HNP-F/PSA-0079 rev 1 value	**3.06E-05**	**3.48E-06**
Change in Risk w/ Segmented Bus duct treatment	**3.15E-07**	**1.10E-08**
Total value including segmented bus duct treatment	**3.09E-05**	**3.49E-06**

Note: VFD impact is expected to have a negligible impact on the results.

The results support the conclusions provided in the LAR submittal.

The analysis was performed as outlined below:

- Bus Duct walkdowns were performed to determine scenario locations and target sets following ZOI treatment in FAQ 07-0035.
- Distribution of frequency was based on methodology described in "Counting Guidance #2" in FAQ 07-0035 (Segment locations are unknown except corners of bus ducts, i.e. 90 degree turns.)
- Bus Duct scenarios were quantified following quantification process described in HNP-F/PSA-0079
- Bus Duct fire frequency used EPRI report 1016735, "Fire PRA Methods and Enhancements", bin 16.1. This is a different fire frequency value than that provided in FAQ 07-0035.
- VFD, cable 1757A, a breaker control cable, is affected by two bus duct scenarios. The bus duct scenarios affecting this cable are not risk significant sources, i.e. less than 1E-8 in CDF/LERF.

HNP RAI 5-30

In Table 15.1 of Attachment 15 to calculation HNP-F/PSA-0081, Revision 1, assumptions 27 and 28, regarding the fire risk model, include the statement that these issues were "not reviewed in detail in the present calculation" as part of the basis for concluding that they are "not risk significant." However, in general, this is an insufficient level of detail for the NRC staff to adequately assess these assumptions. Accordingly, please provide a more detailed justification for concluding that Assumption 27 and Assumption 28 are not risk significant.

Response: The F&O relates to statistical uncertainties. The modeled basic events include a parameter for incorporating the error factors. Harris did not perform an overall statistical uncertainty analysis such as that typically performed for internal events due to software limitations with the methodology used to quantify the fire PRA. The impact of this is not expected to influence the decisions related to this application.

HNP RAI 5-32

Section 3.3.5.1, "Sensitivity Issue 4: Closed MCCs Do Not Produce Arcing Faults of Sufficient Energy to Open the MCC Cabinet Doors," of Attachment 16, "Impact Assessment of Key Sensitivity Issues," to calculation HNP-F/PSA-0081, Revision 1, implies that the sensitivity calculation that is performed only examines "one direction" (e.g., the difference between an unvarying case with and without VFDs). Specifically, for both the Nominal and Alternate Model for MCC arcing faults, only the difference with and without VFDs is examined.

Accordingly, please provide the "increased MCC ZOI" for the Alternate Model when damage outside the MCC cabinet is assumed to occur.

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In addition, estimate the difference between the Alternate and Nominal Models as the "second direction" sensitivity is more important than the "first direction" to the post-transition fire CDF for the case with VFDs (i.e., 1.42E-5 per reactor year for the deterministically compliant case).

Response: The baseline fire PRA treated MCCs as closed cabinets based on physical examination of the cabinet construction. Discussion in Chapter 6 of NUREG/CR-6850 notes the need to count all panels that house circuits with voltages of 440V or greater because of the potential for an arcing fault that could burn a hole in the panel, essentially creating a vent. An informal review of the data does identify arcing faults for MCCs, however they appear to be due to human interactions involving maintenance and troubleshooting events that do not result in the escalation of damage that would be predicted by modeling these events as random open cabinet fires. In addition, these events represent less than ten percent of the MCC fire events.

Based on the above information, a sensitivity analysis was performed to examine the impact of potential acing faults that could create vents in the MCCs capable of allowing the fires to propagate to external targets. For the analysis it was assumed that ten percent of the fires could create a vent that would lead to a 211kw 98th percentile fire located at the vent. The analysis results are given below:

	Baseline CDF	Baseline LERF	VFD delta CDF	VFD delta LERF
LAR	3.06E-05	3.48E-06	1.13E-06	5.36E-08
MCC Sensitivity	3.17E-05	3.53E-06	1.49E-06	6.59E-08

These results support the LAR conclusion that the risk is below the threshold for acceptance.

It should be noted that this sensitivity analysis still contains much conservatism and is expected to be lower with more detailed treatments of fire modeling and circuit analysis and by the continued improvements being made to the methodology for fire PRA through industry and government research.

HNP RAI 5-33

Section 3.3.5.2, "Sensitivity Issue 7: Incipient Fire Detection in Low Voltage Cabinets," of Attachment 16 to calculation HNP-F/PSA-0081, Revision 1, implies that the sensitivity calculation that is performed only examines "one direction;" specifically, the difference between an unvarying case with and without VFDs for three fire models based on IFDS unavailability.

Please provide a discussion of sensitivities in the "second direction," which could show that the variation in assumed IFDS reliability has a significant effect upon the fire CDF, as the "second direction" sensitivity is more important than the "first direction" to the post-transition fire CDF. This includes the sensitivity to any assumed delay time (e.g., 30 to 60 minutes) for this "second direction." (Note that Appendix P, "Detection and Suppression Analysis," of NUREG/CR-6850,

indicates that a 30 minute delay in manual suppression could significantly impact the non-suppression probability depending upon the category of fire that is assumed.)

Response: The Harris fire PRA was developed prior to EPRI report 1016735. FAQ-08-0046 was also initiated to document an NRC interim position on this subject. In the current Harris PRA, incipient detection was credited based on the implementation of procedures that will locate and take actions to prevent any significant fire growth based on specific low voltage ignition sources with in-cabinet VEWFDS installed. A detector reliability of 0.005 was used (supported by the data documented in EPRI 1016735). A one hour window was conservatively assumed to perform the actions.

A sensitivity analysis has been performed by applying the event tree treatments presented in the EPRI report and draft FAQ-08-0046. In order to address plant specific elements and some differences in the EPRI and NRC treatments, the following event tree is used. The top events are correlated to the reference documents and are described below:

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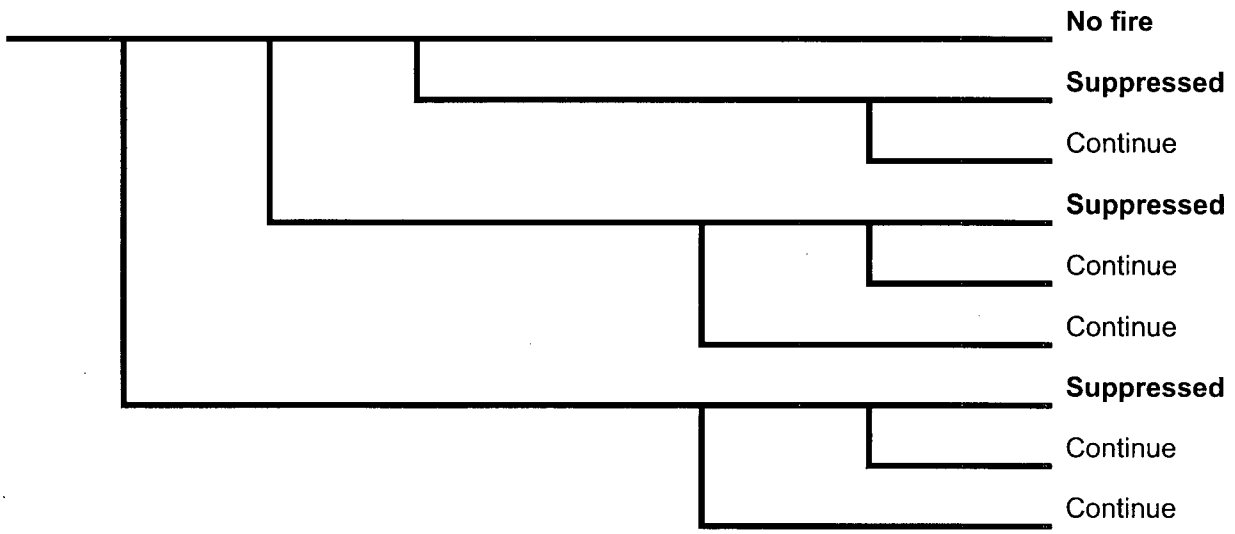
	Ignition Event	Incipient Condition Exists	VEWFDS Reliability	Plant Response to Event	Fire Ignition Occurs (6850)	Prompt Detection	Prompt Suppression	End State or continue with NUREG/CR
HNP Tops	SO	SI	ID	IP	FI	PD	PS	
EPRI Tops	**λω**	**μ**	R	P	-	*not specified*	*not specified*	
NRC Tops	**λ**	**α**	**b**	**δ**	-	*not specified*	**ε**	



Ignition Event (SO): This is the fire ignition frequency based on the absence of VEWFDS represented by the values developed using the methods and data in NUREG/CR-6850. For VEWFDS application, this is the pre-ignition event or condition expected to result in the ignition of a fire capable of "growing" if not mitigated. The treatment for HNP addresses this only at the ignition source level for in-cabinet detection configurations.

Incipient Condition Exists (SI): This is the fraction of ignition sites within the source that can be expected to exhibit incipient fire growth characteristics, thereby providing a long lead time to mitigate fire development. HNP only installed these systems in low voltage control cabinet applications. The internals of these cabinets were manually "inspected" to identify anomalies where incipient characteristics are not expected to apply. No anomalies were identified for the specific applications at HNP. A value of 0.01 was used for this event in the sensitivity analysis.

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VEWFDS Reliability (ID): This value represents the detection system reliability and availability. A value of 0.005 was applied for the sensitivity consistent with the information provided in the EPRI report.

Plant Response to Event (IP): Given VEWFDS indication of an incipient condition, plant operations personnel are expected to take action without delay. Due to the sensitivity of the detectors, additional equipment will be used as needed to pinpoint the exact cause (ignition event) of the indication. The area will be manned as a continuous fire watch until the cause of the VEWFDS indication is resolved such that the threat of a fire is removed. The NRC has proposed a value of 1.0 for this event. Based on the long lead time of actual fire ignition, it is simply not credible to assume that plant personnel will just wait for a fire to develop. Based on vendor discussions providing evidence that successful mitigation is very likely, a value of 0.05 has been used for the sensitivity analysis.

Fire Ignition Occurs (FI): This event is the traditional fire ignition as modeled in NUREG/CR-6850 and is the transfer point into the NUREG Detection-Suppression event tree.

Prompt Detection (PD): PD is only credited in areas that are continuously manned. Given a VEWFDS indication, the areas of concern are assumed to be manned until the cause of the VEWFDS indication is resolved such that the threat of a fire is removed. If the VEWFDS fails to provide indication of an event there is no change in the event tree from the baseline analysis.

Prompt Suppression (PS): If a fire ignites before VEWFDS mitigation efforts are successful, prompt suppression can be credited if the area is continuously occupied. HNP will be implementing procedures to ensure that ignition sources that cause VEWFDS indications will be continuously manned until the cause of the VEWFDS indication is resolved such that the threat of a fire is removed. Using the Control Room suppression curves prompt suppression is determined consistent with the baseline analysis.

Continue: If prompt suppression fails, the basic detection and suppression analysis will continue in the event tree from NUREG/CR-6850 consistent with the baseline analysis.

Solving the HNP fire PRA for various values for top events SI, ID and IP give the following results:

SI	ID	IP	CDF (yr)	VFD delta CDF (yr)
0.001	0.005	0.001	3.06E-05	1.13E-06
0.01	0.005	0.05	3.28E-05	1.25E-06
0.01	0.01	1.0	4.89E-05	2.59E-06

Although the last case is not considered credible per the discussions provided above, it is shown for completeness of the RAI. The delta CDFs for the VFDs can still be offset by the non-fire benefits due to planned modifications as stated in the LAR. Based on this analysis, the revised methods for treating VEWFDS will not impact the acceptability of the LAR conclusions.

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HNP RAI 5-40

In Table Y-3, "Fire Sources for CDF by Importance," of Attachment Y to the Harris Transition Report, HGL contributes to CDF for only a few fire sources. However, Table Y-4, "Fire Sources for LERF by Importance," HGL contributes to LERF for most of the fire sources. Please explain why there is such a difference in HGL contribution for these two tables.

Response: All of the sources with HGL contributions to CDF are also listed as LERF contributors. There are several additional sources that have HGL contributions to LERF that are not on the CDF list. Although all of these fire sources have a CDF contribution due to hot gas layer, they are all less than 0.2% of CDF and therefore not listed on table Y-3 for CDF contribution. All of these sources are in compartment FC03, which houses containment isolation control cabinets. A HGL in this compartment can lead to multiple spurious valve failures allowing a potential release. Most of these valves were given a probability opening due to a hot short of 0.6, consistent with the guidance of NURE/CR-6850. These higher probabilities can lead to overestimation of the results due to the limitations of the minimum cutset upper bound approximations employed by the software tools. This issue is also discussed in the response to RAI 5-1 (RAI response dated August 13, 2009). The overestimations are conservative, and are small enough such that the overall conclusions relative to the LAR are unaffected.