

*your energy partner®*



~~Security Related Information - Withhold From Public Disclosure Under 10 CFR 2.390~~  
Enclosure, Attachments S and W contain security-related information.  
Upon removal of Enclosure, Attachments S and W, this letter is Decontrolled.

LIC-16-0012  
April 4, 2016

10 CFR 50.90

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

Fort Calhoun Station (FCS), Unit 1  
Renewed Facility Operating License No. DPR-40  
NRC Docket No. 50-285

Subject: License Amendment Request (LAR) 16-01; Revised Commitment to Modify FCS Plant Systems as Part of the Implementation of NFPA 805

- References:
1. Letter from OPPD (L. P. Cortopassi) to NRC (Document Control Desk (DCD)), "Supplement to License Amendment Request 10-07, Proposed Changes to Adopt NFPA 805, Performance-Based Standard for Fire Protection for Light Water Reactor Generating Plants (2001 Edition) at Fort Calhoun Station," dated April 10, 2014 (ML14115A296) (LIC-14-0042)
  2. Letter from NRC (J. K. Rankin) to OPPD (L. P. Cortopassi) Fort Calhoun Station - Issuance of Amendment Regarding Transition to a Risk-Informed, Performance-Based Fire Protection Program in Accordance With 10 CFR 50.48(c) (TAC NO. ME7244)," dated June 16, 2014 (ML14098A092) (NRC-14-0072)
  3. Letter from OPPD (S. M. Marik) to NRC (DCD), "Notification of Alternate Implementation of REC-111 and REC-137 from the Original License Condition," Dated April 4, 2016 (LIC-16-0011)
  4. Letter from OPPD (J. A. Reinhart) to NRC (DCD), License Amendment Request 10-07, Proposed Changes to Adopt NFPA 805, Performance- Based Standard for Fire Protection for Light Water Reactor Generating Plants (2001 Edition) at Fort Calhoun Station, dated September 28, 2011 (ML 112760660) (LIC-11-0099)
  5. Letter from NRC (A. Boland and J. Giitter) to NEI (M. Tschiltz), Recommended Content for License Amendment Requests That Seek Changes to License Conditions That Were Established in Amendments to Adopt National Fire Protection Association Standard 805 But Have Yet to be Fully Implemented, dated March 2, 2016 (ML16015A416)

In accordance with the provisions of 10 CFR 50.90, the Omaha Public Power District (OPPD), is submitting a request for an amendment to the Technical Specifications (TS) for Fort Calhoun Station (FCS), Unit No. 1.

~~Security Related Information - Withhold From Public Disclosure Under 10 CFR 2.390~~  
Enclosure, Attachments S and W contain security-related information.  
Upon removal of Enclosure, Attachments S and W, this letter is Decontrolled.

A006  
NR2

*Certified original copy*  
*CFJyon, FCS PM*  
*(X2296)*

~~Security Related Information - Withhold From Public Disclosure Under 10 CFR 2.390~~

Enclosure, Attachments S and W contain security-related information.

Upon removal of Enclosure, Attachments S and W, this letter is Decontrolled.

The proposed amendment would modify License Condition D, Fire Protection. Amendment Number 275 to Renewed Operating License DPR-40 implemented OPPD's transition to a risk-informed, performance-based fire protection program based on National Fire Protection Association (NFPA) 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants, 2001 Edition" (NFPA 805), in accordance with 10 CFR 50.48(c). As part of the Transition License Conditions included in Amendment 275, OPPD committed to implement plant modifications listed in Table S-2, "Plant Modifications Committed," of OPPD letter LIC-14-0042, dated April 10, 2014, as stated in section 3.D.(3)(b) of DPR-40. Further consideration of the committed modifications subsequent to the approval of Amendment 275 has resulted in the conclusion that two of the proposed modifications are not appropriate solutions to the original concern and were based on fire modeling assumptions that were excessively conservative. Consequently, OPPD is proposing to withdraw the commitments in REC-119 and REC-120 due to the fact that they are not necessary to meet the performance requirements of NFPA 805 and have potentially adverse impact on the performance of the station batteries.

As requested in Reference 5, Option A, this LAR contains the following information:

- i. A summary of all changes to the modifications (Enclosure Section 2.0);
- ii. A summary of all changes to the probabilistic risk assessment (PRA) models and explanation for each change (Enclosure Section 3.3);
- iii. New, updated versions in their entirety of: the License Condition (Attachment M), list of plant modifications (Attachment S), and the summarizing area wide change-in-risk result tables (Attachment W) (Enclosure Attachments M, S and W); and
- iv. A statement that the defense-in-depth (DID) and safety margin evaluations associated with the original LAR have been completed on the proposed changes (Enclosure Sections 3.4 and 3.5).

The list of plant modifications (Attachment S) includes the changes to REC-119 and REC-120 but has also been updated to include the changes identified in reference 3 for REC-111 and REC-137. A complete copy of table S-2 "Plant Modifications Committed" is included in the Enclosure.

The proposed changes have been reviewed and approved by the Fort Calhoun Station Plant Operations Review Committee (PORC) and by the Nuclear Safety Review Board (NSRB).

OPPD requests approval of the proposed license amendment by October 1, 2016, with the amendment to be implemented within 90 days of issuance.

~~Security Related Information - Withhold From Public Disclosure Under 10 CFR 2.390~~

Enclosure, Attachments S and W contain security-related information.

Upon removal of Enclosure, Attachments S and W, this letter is Decontrolled.

~~Security Related Information - Withhold From Public Disclosure Under 10 CFR 2.390~~

Enclosure, Attachments S and W contain security-related information.

Upon removal of Enclosure, Attachments S and W, this letter is Decontrolled.

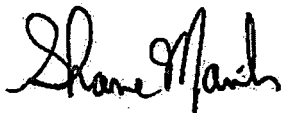
In accordance with 10 CFR 50.91, a copy of this application, with attachments, is being provided to the designated State of Nebraska official

There are no regulatory commitments contained within this letter.

If you should have any questions regarding this submittal or require additional information, please contact Mr. Bradley Blome at (402) 533-7270.

I declare under penalty of perjury that the foregoing is true and correct. Executed on April 4, 2016.

Respectfully,



Shane M. Marik  
Site Vice President and CNO

SMM/epm

Enclosure, License Amendment Request (LAR) 16-01; Revised Commitment to Modify FCS Plant Systems as Part of the Implementation of NFPA 805

- c: M. L. Dapas, NRC Regional Administrator, Region IV  
C. F. Lyon, NRC Senior Project Manager  
S. M. Schneider, NRC Senior Resident Inspector  
Director of Consumer Health Services, Department of Regulation and Licensure,  
Nebraska Health and Human Services, State of Nebraska

~~Security Related Information - Withhold From Public Disclosure Under 10 CFR 2.390~~

Enclosure, Attachments S and W contain security-related information.

Upon removal of Enclosure, Attachments S and W, this letter is Decontrolled.

**OPPD's Evaluation of Proposed Change**

License Amendment Request 16-01:

Revised Commitment to Modify FCS Plant Systems as Part of the Implementation of NFPA 805

- 1.0 SUMMARY DESCRIPTION
- 2.0 DETAILED DESCRIPTION
- 3.0 TECHNICAL EVALUATION
- 4.0 REGULATORY EVALUATION
  - 4.1 Applicable Regulatory Requirements
  - 4.2 Precedent
  - 4.3 No Significant Hazards Consideration
  - 4.4 Conclusions
- 5.0 ENVIRONMENTAL CONSIDERATION
- 6.0 REFERENCES

FIGURE 1 FCS 125 VDC Distribution System

Attachments:

- Attachment M – License Condition Changes
- Attachment S – Plant Modifications and Items to be Completed During Implementation
- Attachment W – Fire PRA Insights

## 1.0 SUMMARY DESCRIPTION

This evaluation supports a license amendment request (LAR) to amend Renewed Facility Operating License DPR-40 for Fort Calhoun Station (FCS) Unit No. 1, operated by the Omaha Public Power District (OPPD).

Amendment No. 275 to Renewed Operating License DPR-40 implemented OPPD's transition to a risk-informed, performance-based fire protection program based on National Fire Protection Association (NFPA) 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants, 2001 Edition" (NFPA 805), in accordance with 10 CFR 50.48(c). As part of the Transition License Conditions included in Amendment No. 275, OPPD committed to implement thirty plant modifications listed in Table S-2 of OPPD letter LIC-14-0042, dated April 10, 2014, as stated in section 3.D.(3)(b) of DPR-40. Further consideration of the committed modifications subsequent to the approval of Amendment No. 275 has resulted in the conclusion that two of the original proposed modifications are not appropriate solutions to the original concern and were based on fire modeling assumptions that were excessively conservative. Consequently, OPPD is proposing to revise the commitment regarding these two modifications by providing justification for withdrawing the commitment. The modifications of concern are:

1. Additional Electrical Isolation between Battery No. 1 and DC-Bus-1 (REC-119)
2. Additional Electrical Isolation between Battery No. 2 and DC-Bus-2 (REC-120)

Commitments to implement REC-119 and REC-120 are proposed to be withdrawn due to the fact that they are not necessary to meet the performance requirements of NFPA 805 and have potentially adverse impact on the performance of the station batteries. After the elimination of REC-119 and REC-120, the remaining commitments (including alternative implementation of items REC-111 and REC-137 as discussed in Reference 6.5) continue to ensure that the fire protection program:

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

## 2.0 DETAILED DESCRIPTION

The following discussion provides the original basis for the committed modifications as well as the potentially adverse effects and justification for the proposed withdrawal of the commitment.

### 2.1 Additional Electrical Isolation between Battery No.1 and DC-Bus-1 (REC-119)

OPPD letter LIC-14-0042, Table S-2, Line Item REC-119 committed to additional electrical isolation between station battery No. 1 (EE-8A) and DC distribution panel EE-8F (also designated as DC-Bus-1). It was recommended that additional fuses be provided to eliminate the adverse impact of a fire in the battery room, i.e. fire area 37, in which a postulated cable failure diverts output current from the associated battery charger, normally Battery Charger No.1, to a fire-induced fault. In this scenario, the associated DC bus voltage would be reduced to the point that DC loads powered from DC-Bus-1 may not function properly, if at all. Appropriately sized isolation fuses installed between the battery and the bus were proposed to isolate the fault automatically, thus maintaining the operation of DC-Bus-1 from Battery Charger No.1 without reliance on Battery No.1.

The proposed modification was originally credited to reduce overall risk as determined by the fire Probabilistic Risk Assessment (PRA) by eliminating the possibility of a loss of offsite power (LOOP) which was conservatively assumed to occur as a result of the battery room fire. The loss of offsite power was modeled to occur due to an assumed actuation of degraded-voltage relays powered by instrument buses that are normally supplied from the DC bus via inverters. The degraded-voltage relays actuate if a loss of power occurs on the instrument bus. Actuation of the relays causes the plant AC electrical distribution system to be isolated from offsite power sources, resulting in a LOOP. The proposed modification was intended to prevent a LOOP from occurring as a result of a battery room fire.

During consideration of the proposed modification, it was determined that the loss of voltage on the DC bus would not result in the loss of power at the instrument buses due to a design feature built into the inverters that supply the instrument buses. If DC power is lost to the inverters, i.e. if DC voltage drops below a required minimum voltage, the instrument buses are automatically switched to bypass transformers that do not rely on DC power. The automatic transfer of instrument buses to bypass power would not be affected by a fire in a battery room, and therefore, the battery room fire would not result in actuation of degraded-voltage relays or the loss of offsite power. The fire PRA model has subsequently been revised to credit this plant design feature. With this modeling change, risk associated with a fire in fire area 37 is lower than previously indicated. As a result, the fire risk in fire area 37 is acceptable, without the need to provide additional electrical isolation. The results of the revised fire PRA model are discussed in detail in Technical Evaluation Section 3.3.

The battery room fire area compliance strategy for NFPA 805, Chapter 4 had originally credited the proposed modifications for additional electrical isolation to enhance the available success paths. FCS has since demonstrated that the battery room fire areas are deterministically compliant for the NFPA 805 Nuclear Safety Performance Criteria (NSPC) without the proposed modifications. This conclusion is explained in detail in Technical Evaluation Section 3.2.

As discussed above, the REC-119 proposed modification is not needed to reduce overall risk or to meet deterministic requirements. Nevertheless, consideration was given to whether this modification remains desirable as an enhancement. It was concluded that the proposed isolation fuses have a potential negative impact, and therefore are not desirable. Specifically, in order to serve their intended function during battery room fires, the fuses would need to be sized such that they would have the potential to open in certain non-fire scenarios in which it would not be desirable for the fuses to open. This could adversely affect the response to these non-fire scenarios.

Installation of isolation fuses as originally proposed would also require the addition of diodes to prevent the fuses from opening during normal DC bus operation. The addition of diodes would result in increased voltage drop from the batteries to associated DC loads, on the order of 1 to 2 volts. Under the most adverse conditions anticipated for battery operation, there is currently little design margin for any additional voltage drop. Consequently, it is possible for the proposed modification to cause an unacceptable voltage drop during design basis battery operating conditions.

Alternative means of providing additional electrical isolation were considered, but no options were identified that would automatically clear a fault without compromising normal battery reliability. In addition, revised analysis demonstrates that NFPA 805 performance goals are achieved without any additional electrical isolation.

The committed modification is concluded to be unnecessary and potentially adverse. Therefore, REC-119 is proposed to be eliminated. The detailed justification for these changes is discussed in the Technical Evaluation section.

## 2.2 Additional Electrical Isolation between Battery No. 2 and DC-Bus-2 (REC-120)

OPPD letter LIC-14-0042, Table S-2, Line Item REC-120 committed to additional electrical isolation between station battery No. 2 (EE-8B) and DC distribution panel EE-8G (also designated as DC-Bus-2). This modification has the same basis as REC-119 discussed in the previous section except that the evaluated scenario is a fire in the room housing Battery No. 2, designated as fire area 38. The same argument applied to REC-119 in regard to potentially adverse effects is also applicable to REC-120. Therefore, REC-120 is also proposed to be eliminated.

### **3.0 TECHNICAL EVALUATION**

#### **3.1 Background – System Description**

The FCS 125 VDC distribution system consists of two separate trains each of which has its own DC distribution bus, a battery which is connected directly to the bus and a battery charger powered from the associated 480 VAC train, also connected to the bus. The battery charger carries the DC load during normal plant operation while the battery is maintained in a standby condition ready to supply the bus in the event of a loss of battery charger operation or to supplement the battery charger during DC load transients. The system also includes a third battery charger that can be used to supply either DC bus from either train of 480 VAC power. The third charger is not normally in operation but can be manually placed in service during maintenance of train dependent chargers or in the event of charger failure.

Refer to Figure 1 for additional information regarding the DC system arrangement.

Each battery is located in a dedicated battery room which contains no DC related equipment other than the battery, battery rack, fuses, cables and connectors. Further, the battery rooms contain no other safe shutdown components or cables. Battery No.1 is located in fire area 37 while Battery No. 2 is located in fire area 38. Other than the batteries, there are no in-situ fire ignition sources located in these rooms.

Each battery is connected to its associated DC distribution panel via a non-automatic circuit breaker (i.e. a manually operated switch) located at the DC distribution panel which is mounted in the associated train-dependent switchgear room.

Each DC bus normally provides power to three instrument inverters, two safety related and one non-safety related. Instrument inverters provide 120 VAC power to instrument buses for plant instrumentation and protective circuit components, including degraded-voltage relays. The instrument buses all have backup power capability from bypass transformers powered by the 480 VAC system. Each bypass transformer is placed in service by the operation of an automatic static switch in the event of associated inverter failure or loss of DC power to the inverter.

The DC buses also supply numerous other loads including control power for 480 and 4160 VAC circuit breakers, control room DC distribution panels and diesel generator starting and field flash circuits. Power to these loads is routed through manually-operated transfer switches that permit power to be supplied from either DC train. The transfer switches and the procedural direction for their use were both part of the original plant design. The transfer switches for control room DC distribution panels are located in the control room while other transfer switches are located near the associated loads. Power to DC controlled valves is provided from the main control room DC distribution panels, designated as AI-41A and AI-41B, associated with DC-Bus-1 and DC-Bus-2, respectively.



### 3.2 NFPA 805 Compliance Strategy for Fire Areas 37 and 38

In regard to the compliance strategy for fires in the various plant fire areas, USAR Section 9.11.4.4 (Reference 6.4), states:

*"The plant has been divided into fire areas for evaluation against NFPA 805 criteria. Redundant nuclear safety capability equipment, components and systems are provided with adequate spatial separation or are separated by fire resistive barriers as described in the NFPA 805 Nuclear Safety Capability Assessment (NSCA)."*

The NFPA 805 NSCA is documented in EA10-036 (Reference 6.6). The regulatory basis for the compliance strategy for individual fire areas is documented in EA10-044 (Reference 6.9). These references originally concluded that fire areas 37 and 38 are deterministically compliant assuming the implementation of the proposed modifications (i.e., the installation of additional fuses that would isolate a fire-induced battery room fault from the DC bus). A fire in either of these areas can result in a degradation of the associated DC bus. The proposed automatic isolation of the fault was intended to eliminate the bus degradation and to allow the normally-connected battery charger to continue to power the bus.

The NFPA 805 NSCA and other relevant analyses have now been revised to demonstrate that a fire in either of the battery rooms is deterministically compliant with NFPA 805 Chapter 4, Section 4.2.3.3 without reliance on the committed modifications and without crediting any manual actions outside the main control room (i.e., with no Variances from Deterministic Requirements (VFDRs)). The revised analyses credit an action performed in the control room to maintain power to important loads that may be impacted by a battery room fire. The following discussion provides the basis for a conclusion that the proposed modification is not necessary to demonstrate deterministic compliance for the impact of a fire in fire areas 37 or 38.

First, it is important to note that, given the limited number and type of components in fire areas 37 and 38, a fire event in either battery room can be no more severe, in regard to the impact on the operating plant, than a single random failure of one DC bus, either DC-Bus-1 or DC-Bus-2. The plant is designed for a complete loss of one train of DC power without losing the capability to support all required safety functions.

In the case of a battery room fire, normal DC power may be restored to the impacted bus by locally opening the battery supply breaker which is located in the train-associated switchgear room, not in the battery room fire area. After manual isolation of the faulted battery from the bus, operators would verify normal DC bus voltage which would be restored to the bus by the operating battery charger. Steps to manually isolate the faulted battery from the distribution bus and to verify proper bus operation are currently specified in the plant fire procedure AOP-06-02 (Reference 6.12).

Given a single random failure of a DC bus, DC power can also be restored to select loads by the manual operation of the DC transfer switches. These switches allow DC power to be restored to some portions of the DC loads, specifically, to 480 and 4160 VAC breaker control circuits, to diesel generator starting circuits, and to control room DC distribution panels all from the unaffected DC bus. Restoration of power to the control room distribution panels can be accomplished in the control room. The updated NSCA demonstrates that fire areas 37 and 38 are deterministically compliant with NFPA 805 with credit for the control room action to operate the manual transfer switch associated with the impacted DC distribution panel, either AI-41A or AI-41B. The updated NSCA contains no reliance on any action outside the control room and does not credit the original proposed modifications to install additional electrical isolation for the station batteries.

The procedural direction for restoration of power to control room panels AI-41A or AI-41B can come from either of two operational directions. A fire in either battery room would require operators to reference plant fire procedure AOP-06-02 which instructs the control room operator to direct an equipment operator to isolate the faulted battery from the bus. As a contingency to this step, i.e. if the affected bus is not returned to normal operation, control room operators are directed to procedure AOP-16, Loss of Instrument Bus Power (Reference 6.13), which provides instruction for restoring power to the control room DC distribution panel using the manual transfer switch. Alternatively, control room operators can reference AOP-16 directly upon the recognition that DC power has been lost to one train. An enhancement will be made to AOP-06-02 to specifically require operators to verify that AI-41A and AI-41B have been returned to service after a battery room fire impacting DC bus functionality.

#### Summary

A revision to the compliance analysis no longer credits the original proposed modifications to install additional electrical isolation for the station batteries but now relies on an action performed in the control room to maintain power to important loads that may be impacted by a battery room fire. The action involves restoration of power to a main control room DC distribution panel by the manual operation of the panel transfer switch. Aside from this control room action, it is recognized that the action to manually isolate the battery from the bus in the field is likely to occur; however, this action will not be credited for NFPA 805 nor will it have any adverse impact on safe shutdown. If the field action to isolate the faulted battery from the bus is completed and the DC bus remains energized (i.e. the battery charger continues to supply bus loads), it will preclude the need for control room operators to use the AI-41A or AI-41B transfer switches located in the control room.

Revisions to the NFPA 805 NSCA (Reference 6.6) and the Non-Power Operations (NPO) Assessments (Reference 6.8) for Fire Areas 37 and 38 have been prepared to confirm that the areas are deterministically compliant for the NSCA and have no pinch points for the NPO Assessment. Acceptable Safety Margin and Defense-in-Depth are maintained for these two fire areas as discussed in sections 3.4 and 3.5, respectively.

3.3 Fire PRA Modeling and Risk Analysis for Fire Areas 37 and 38

Table 1 contains a summary of all changes to the probabilistic risk assessment (PRA) models made after the Safety Evaluation (SE) documented in Reference 6.1. An explanation for each change is also provided.

**Table 1: Summary of PRA Model Changes**

	<b>Change to PRA Models</b>	<b>Explanation</b>
1	Updated human reliability analysis (HRA) to NUREG-1921	Required per PRA RAI 23.01. Required a focused-scope peer review, which was conducted in February 2015.
2	Incorporated miscellaneous refinements to the fire PRA	Changes were made to the infrastructure of the fire PRA model. These changes have no impact on the methods used (no new methods are used from those included in the RAI process). These changes were implemented to reduce extraneous data and structure, improve transparency, and improve the accuracy of the model.
3	Incorporated response to PRA RAI 25	These changes include method improvements committed to be implemented prior to use of the self-approval model.
4	Incorporated Revision 13 of the internal events PRA model into the fire PRA model (whereas the LAR 10-07 version of the fire PRA model had used Revision 11 of the internal events PRA)	The changes to the internal events PRA model did not involve methods upgrades and did not require a peer review.
5	Incorporated recent plant design changes relevant to the fire PRA model	These plant changes were incorporated to reflect the as-built plant.
6	Improved accuracy of the source-target data	Response to NRC feedback from the 2015 Triennial Fire Protection Inspection.
7	Removed conservatisms from battery room fire scenarios	Includes credit for existing design features involving bypass power to AC instrument buses and credit for availability of main feedwater.
8	Removed credit for originally proposed HEAF barrier modification	An alternative modification and administrative controls were identified that would limit risk to an acceptable level without the originally proposed HEAF barriers.
9	Incorporated credit for alternative modification	Alternative modification proposed to limit risk to an acceptable level without

	<b>Change to PRA Models</b>	<b>Explanation</b>
	involving cable reroute and associated operator actions that would support recovery of offsite power following certain switchgear room fire scenarios	the originally proposed HEAF barrier modification.
10	Incorporated credit for proposed Room 71 administrative controls	Administrative controls proposed to limit risk to an acceptable level without the originally proposed HEAF barrier modification.
11	Removed credit for originally proposed REC-119 and REC-120 modifications	Crediting existing plant design features to remove conservatisms from battery room fire scenarios was sufficient to show that risk is limited to an acceptable level without the originally proposed modifications.

OPPD Notification Letter LIC 16-0011 (Reference 6.5) previously communicated most of the changes listed above. (Note that changes to REC-111 and REC-137 as discussed in Reference 6.5 are reflected in the update to LIC-14-0042 Table S-2 that is included as an attachment to this LAR.) Changes 1 through 10 above summarize the cumulative changes to the fire PRA since the SE fire PRA, up to and including changes related to alternative implementation of Item REC-111 as communicated in Reference 6.5. The fire PRA with these changes represents the changes to the PRA "Before REC-119/120 Changes," (i.e., before withdrawal of the proposed modifications for REC-119/120 per LAR 16-01). LAR 16-01 specifically relates to Change 11 which removed credit for the proposed modifications for REC-119 and REC-120. Incorporation of this change, along with the prior cumulative changes represents the PRA "After REC-119/120 Changes." The following discussion demonstrates that the modifications originally proposed for REC-119 and REC-120 are not needed to meet applicable PRA risk thresholds identified in RG 1.174 (Reference 6.14). Results have been generated for fire PRA cases in order to show that the applicable thresholds are met, and to illustrate the relative impact of applicable PRA modeling changes on PRA results. An overview of these PRA cases is provided below:

- Case 1 – "Before REC-119/120 Changes" – This case represents the latest PRA results "BEFORE" the withdrawal of the proposed modifications for REC-119 and REC-120 per this LAR. This case is equivalent to a case referred to as "Case 2" in LIC-16-0011 (Reference 6.5) which addressed alternative implementation of REC-111. The changes to REC-111 are not directly related to REC-119 and REC-120.
- Case 2 – "After REC-119/120 Changes" – This is a revision to Case 1 to remove credit for the proposed modifications (Table 1, change 11) associated with REC-119 and REC-120 per this LAR. This case can be compared to Case 1 to assess the impact of not performing the REC-119 and REC-120 modifications.

Note that modeling conservatisms for the Battery No. 1 and Battery No. 2 battery rooms (Fire Areas 37 and 38, respectively) have been removed from the fire PRA (as indicated in Table 1 above). This change credits an existing plant design feature in order to more accurately reflect the FCS fire risk profile associated with battery room fires. Table 2 provides the total plant CDF, total plant LERF, net VFDR  $\Delta$ CDF, and net VFDR  $\Delta$ LERF for the two cases described above. Table 2 illustrates that applicable values remain within R.G. 1.174 (Reference 6.14) Region II guidelines for total CDF ( $<1E-4$ ), total LERF ( $<1E-5$ ), VFDR  $\Delta$ CDF ( $<1E-5$ ), and VFDR  $\Delta$ LERF ( $<1E-6$ ) in both the modeled cases.

**Table 2: Summary of Results**

	Case 1	Case 2
	Before REC-119/120 Changes	After REC-119/120 Changes
Net VFDR $\Delta$ CDF for NFPA 805 Transition (/yr)	6.40E-06	6.40E-06
Net VFDR $\Delta$ LERF for NFPA 805 Transition (/yr)	7.74E-07	7.74E-07
Total CDF* (internal events, internal flood, fire, seismic) (/yr)	8.45E-05	8.46E-05
Total LERF* (internal events, internal flood, fire) (/yr)	7.60E-06	7.61E-06

\*The reported Total CDF includes 1.30E-05/yr of seismic CDF, taken from the August 2010 NRC Generic Issue 199 Safety/Risk Assessment (Reference 6.15). The reported Total LERF does not include seismic LERF as there is no corresponding estimate for seismic LERF available. Using a bounding approach, a seismic LERF contribution of up to 2.39E-06/yr, when combined with the report Case 2 value of 7.61E-06, yields a value of 1E-5 (i.e., R.G. 1.174 Total LERF guideline). This bounding seismic LERF value corresponds to 18% of the seismic CDF value (i.e., 2.39E-06/1.30E-05). Seismic LERF contribution is expected to be lower than this bounding value, based in part on Reference 6.17.

Table 2 illustrates that PRA risk thresholds for total CDF, total LERF, VFDR  $\Delta$ CDF, and VFDR  $\Delta$ LERF remain within R.G. 1.174 (Reference 6.14) Region II in both the modeled cases. Specifically with respect to Case 2, this indicates that withdrawal of the proposed modifications associated with REC-119 and REC-120 per this LAR is acceptable with respect to these guidelines.

### 3.4 Safety Margin

In accordance with NEI 04-02, 5.3.5.3 (Reference 6.16) guidance, safety margins are considered to be maintained if Codes and Standards or their alternatives accepted for use by the NRC are met, and safety analyses acceptance criteria in the licensing basis (e.g., FSAR, supporting analyses) are met, or provide sufficient margin to account for analysis and data uncertainty.

Fire PRA and Deterministic Analysis methodologies and modeling approaches used to support the conclusions contained in this evaluation are unchanged from those used to support the approved Safety Evaluation for the FCS implementation of NFPA 805 as documented in NRC Letter NRC-14-0072 (Reference 6.1). The Safety Evaluation includes consideration of RAI responses associated with the NFPA 805 License Amendment Request as originally submitted in OPPD letter LIC-11-0099 (Reference 6.2).

The following summarizes the bases for ensuring the maintenance of safety margins:

- The risk-informed, performance based processes utilized are based upon NFPA 805, 2001 edition, endorsed by the NRC in 10 CFR 50.48(c).
- The fire risk evaluation process is in accordance with NEI 04-02, Revision 2, which is endorsed by the NRC in Regulatory Guide 1.205, Revision 1.
- The Fire PRA is developed in accordance with NUREG/CR-6850, which was developed jointly between the NRC and EPRI.
- The FCS FPRA is built upon the internal events model, which has undergone several peer reviews and self-assessments since 1999.
- Fire protection systems and features determined to be required by NFPA 805 Chapter 4 have been confirmed to meet the requirements of NFPA 805 Chapter 3 and their associated referenced codes and listings, or provided with acceptable alternatives using processes accepted for use by the NRC (i.e., FAQ 06-0008, FAQ 06-0004, 07-0033).
- The compliance strategy for the battery rooms has identified no additional VFDRs requiring a Risk-informed, Performance-based evaluation.

In consideration of this discussion, it is concluded that adequate safety margin continues to be maintained.

### 3.5 Defense in Depth

The changes proposed in this evaluation continue to maintain adequate defense in depth as supported by the following characteristics of the FCS fire protection program:

- Battery rooms contain limited fire ignition sources and combustibles. The rooms house only batteries, battery racks, connecting cables, and fuses.
- Reported fire events involving lead acid station batteries are non-challenging from the perspective of fire growth and fire brigade response.
- There are no NFPA 805 or Fire PRA cables or components in the battery rooms other than train-dependent batteries, battery cables and fuses.
- Assuming a full area burn, fire damage in a battery room will be limited to the loss of one DC train, leaving the redundant DC train unaffected.

- The loss of a DC train will be immediately apparent to Main Control Room operators given the number and type of indications and alarms displayed on the Main Control Boards.
- Existing station procedures and training mitigate the impact of both fire and non-fire events which result in the loss of one train of DC power.
- An orderly plant shutdown to NFPA 805 Safe and Stable conditions can be achieved entirely from within the Main Control Room for a fire in either battery room.

#### 4.0 REGULATORY EVALUATION

##### 4.1 Applicable Regulatory Requirements

The proposed amendment is intended to modify a commitment to install modifications required as part of OPPD's transition to NFPA 805 approved under Amendment No. 275 to Renewed Operating License DPR-40. Since the modifications proposed for elimination under this request were originally identified as necessary to meet the performance requirements as specified under NFPA Section 4.2.3.2, the relevant regulatory requirements are 10 CFR 50 Appendix A, GDC Criterion 3 and 10 CFR 50.48(c)(3)(ii):

- 10 CFR 50 Appendix A, GDC Criterion 3 – Fire Protection

*Fire detection and fighting systems of appropriate capacity and capability shall be provided and designed to minimize the adverse effects of fires on structures, systems, and components important to safety.*

- 10 CFR 50.48(c)(3)(ii)

*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.*

The proposed change was evaluated with respect to a possible impact on compliance with these requirements. The evaluation concluded that the FCS fire protection program will continue to be compliant with these regulatory requirements and with NFPA 805.

##### 4.2 Precedent

No precedents have been identified for the proposed license amendment.

##### 4.3 No Significant Hazards Consideration

The proposed change would permit Fort Calhoun Station (FCS) to revise a commitment to install battery isolation fuses originally proposed to support the transition to a new fire protection licensing basis which complies with the requirements of 10 CFR 50.48(a) and (c) and the guidance in Regulatory Guide (RG) 1.205, Revision 1. The revised commitment would not adversely impact compliance with regulatory requirements.

The Omaha Public Power District (OPPD) has evaluated whether or not a significant hazards consideration is involved with the proposed amendment(s) by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

**1. Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?**

Response: No.

The Updated Safety Analysis Report (USAR) documents the analyses of design basis accidents (DBA) at FCS. The proposed amendment does not adversely affect accident initiators nor alter design assumptions, conditions, or configurations of the facility and does not adversely affect the ability of structures, systems, or components (SSCs) to perform their design functions. SSCs required to safely shutdown the reactor and to maintain it in a safe shutdown condition will remain capable of performing their design functions.

The proposed amendment makes no physical changes to the plant and does not change the manner in which plant systems are controlled. Therefore, the implementation of the proposed amendment does not increase the probability of any accident previously evaluated.

Equipment required to mitigate an accident remains capable of performing the assumed function. The proposed amendment will not affect the source term, containment isolation, or radiological release assumptions used in evaluating the radiological consequences of any accident previously evaluated. The applicable radiological dose criteria will continue to be met. Therefore, the consequences of any accident previously evaluated are not increased with the implementation of the proposed amendment.

**2. Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?**

Response: No.

Operation of FCS in accordance with the proposed amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated. Any scenario or previously analyzed accident with off-site dose was included in the evaluation of DBAs documented in the USAR. The proposed change does not alter the requirements or function for systems required during accident conditions. Implementation of the proposed amendment will not change the previous conclusion that the fire protection licensing basis which complies with the requirements of 10 CFR 50.48(a) and (c) and the guidance in RG 1.205, Revision 0, will not result in new or different accidents.

The proposed amendment does not adversely affect accident initiators nor alter design assumptions, conditions, or configurations of the facility. The proposed amendment does not adversely affect the ability of SSCs to perform their design function. SSCs required to safely shutdown the reactor and maintain it in a safe shutdown condition remain capable of performing their design functions.



The purpose of the proposed amendment is to modify a commitment made as a licensing condition under Amendment No. 275 which implemented OPPD's transition to NFPA 805. The proposed amendment is not intended to reduce or, in any way, adversely affect compliance with NFPA 805 and is supported by engineering analyses that continue to demonstrate compliance with 10 CFR 50.48(a) and (c) and the guidance in RG 1.205, Revision 0.

The requirements of NFPA 805 address only fire protection and the impacts of fire on the plant that have previously been evaluated. Based on this, the implementation of the proposed amendment does not create the possibility of a new or different kind of accident from any kind of accident previously evaluated. No new accident scenarios, transient precursors, failure mechanisms, or limiting single failures will be introduced as a result of this amendment. There will be no adverse effect or challenges imposed on any safety related system as a result of this amendment. Therefore, the possibility of a new or different kind of accident from any kind of accident previously evaluated is not created with the implementation of this amendment.

**3. Does the proposed change involve a significant reduction in a margin of safety?**

Response: No.

Operation of FCS in accordance with the proposed amendment does not involve a significant reduction in the margin of safety. The proposed amendment does not alter the manner in which safety limits, limiting safety system settings, or limiting conditions for operation are determined. The safety analysis acceptance criteria are not affected by this change. The proposed amendment does not adversely affect existing plant safety margins or the reliability of equipment assumed to mitigate accidents in the USAR. This amendment does not adversely affect the ability of SSCs to perform their design function. SSCs required to safely shutdown the reactor and to maintain it in a safe shutdown condition remain capable of performing their design functions.

Based on the above, OPPD concludes that the proposed amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

**4.4 Conclusions**

Based on the considerations above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

## 5.0 ENVIRONMENTAL CONSIDERATION

The purpose of the proposed amendment is to modify a commitment made as a licensing condition under Amendment No. 275 which implemented OPPD's transition to NFPA 805. The proposed amendment is not intended to reduce or, in any way, adversely affect compliance with NFPA 805 and is supported by engineering analyses that continue to demonstrate compliance with 10 CFR 50.48(a) and (c) and the guidance in RG 1.205, Revision 0.

OPPD has evaluated the proposed amendment against the criteria for identification of licensing and regulatory actions requiring environmental assessment in accordance with 10 CFR 51.21. The proposed amendment does not involve:

1. A significant hazards consideration.

As stated in section 4.0 above, the proposed amendment does not involve a significant hazards consideration.

2. A significant change in the types or significant increase in the amounts of any effluents that may be released offsite.

Compliance with NFPA 805 explicitly requires the attainment of performance criteria, objectives, and goals for radioactive releases to the environment. This radioactive release goal is to provide reasonable assurance that a fire will not result in a radiological release that affects the public, plant personnel, or the environment. The NFPA 805 transition has evaluated the potential for a radioactive release due to fire events and/or fire suppression activities, but not involving fuel damage. These fire events and/or fire suppression activities do not create any new source terms. The proposed amendment does not change this conclusion. Therefore, the proposed amendment will not change the types or amounts of any effluents that may be released offsite.

3. A significant increase in the individual or cumulative occupational radiation exposure.

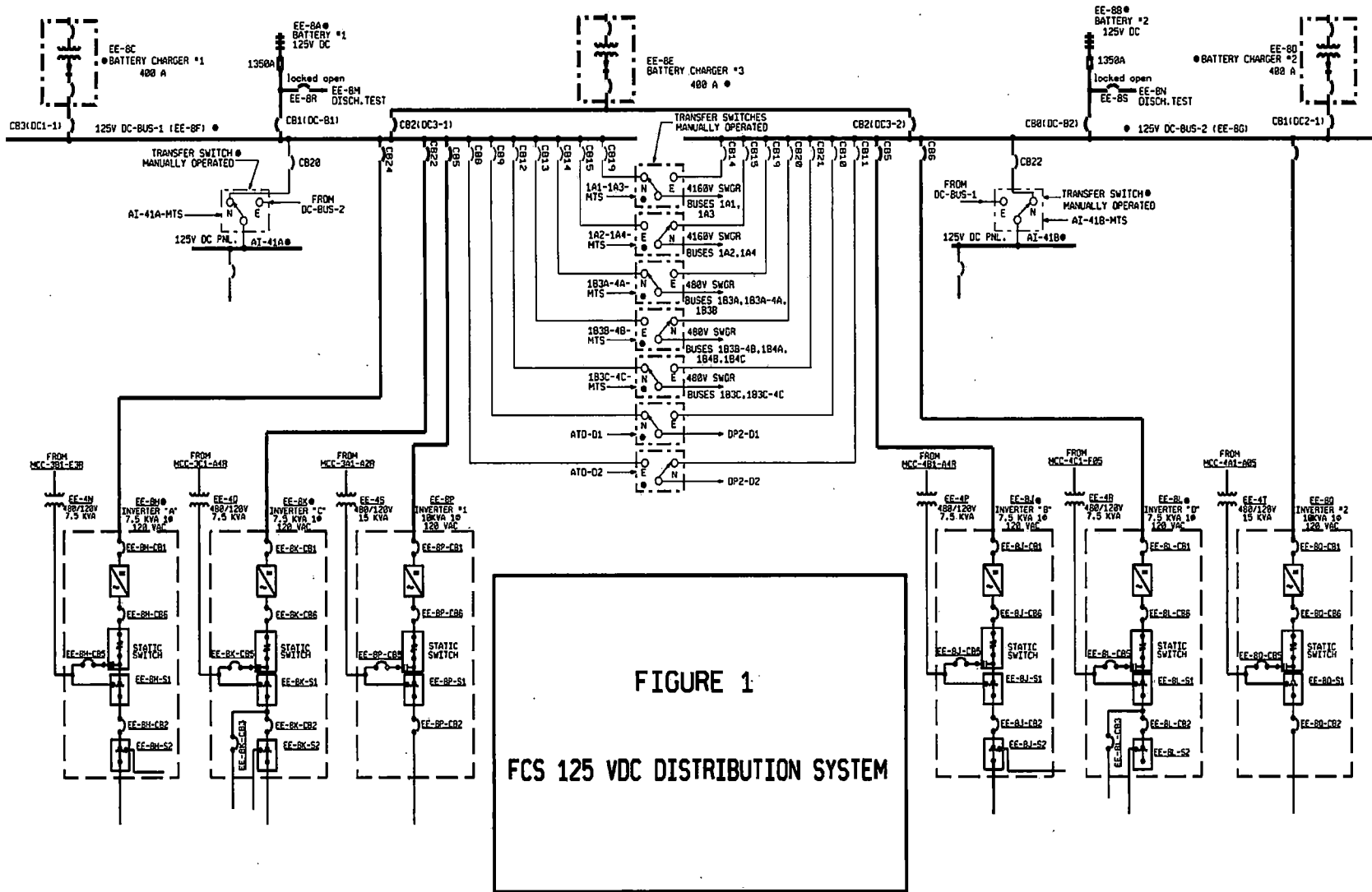
Compliance with NFPA 805 explicitly requires the attainment of performance criteria, objectives and goals for occupational exposures. Therefore, the proposed amendment will not change the types or amounts of occupational exposures based on the results of the analysis.

In conclusion, the review determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

## 6.0 REFERENCES

- 6.1 Letter from NRC (J K. Rankin) to OPPD (L. P. Cortopassi) Fort Calhoun Station -Issuance of Amendment Regarding Transition to a Risk-Informed, Performance-Based Fire Protection Program in Accordance With 10 CFR 50.48(c) (TAC NO. ME7244) (ML14098A092)(NRC-14-0072)
- 6.2 Letter from OPPD (J. A. Reinhart) to NRC (Document Control Desk), License Amendment Request 10-07, Proposed Changes to Adopt NFPA 805, Performance- Based Standard for Fire Protection for Light Water Reactor Generating Plants (2001 Edition) at Fort Calhoun Station, dated September 28, 2011 (ML 112760660) (LIC-11-0099)
- 6.3 Letter from OPPD (L. P. Cortopassi) to NRC (Document Control Desk), "Supplement to License Amendment Request 10-07, Proposed Changes to Adopt NFPA 805, Performance-Based Standard for Fire Protection for Light Water Reactor Generating Plants (2001 Edition) at Fort Calhoun Station," dated April 10, 2014 (ML14115A296)) (LIC-14-0042)
- 6.4 Fort Calhoun Station Updated Safety Analysis Report, Section 9.11, Fire Protection System, Revision 28
- 6.5 Letter from OPPD (S. M. Marik) to NRC (Document Control Desk), "Notification of Alternative Implementation of REC-111 and REC-137 from the Original License Condition," Dated April 4, 2016 (LIC-16-0011)
- 6.6 Engineering Analysis EA10-036, NFPA 805 Deterministic Safe Shutdown Separation Analysis, Revision 1
- 6.7 Engineering Analysis EA10-041, NFPA 805 Recovery Action Feasibility Assessment, Revision 1
- 6.8 Engineering Analysis EA10-042, Non-Power Operations Mode Transition Review, Revision 1
- 6.9 Engineering Analysis EA10-044, Fort Calhoun Station Fire Area Review / Licensing Action Review, Revision 1
- 6.10 Engineering Analysis EA97-001, Updated Fire Hazards Analysis, Revision 20
- 6.11 Westinghouse Electric Company Letter LTR-RAM-15-81, Application Specific Evaluation of Fort Calhoun Station NFPA 805 REC-111, REC-119, and REC-120, Revision 1
- 6.12 FCS Abnormal Operating Procedure, AOP-06-02, Fire Emergency – Uncontrolled Areas of Auxiliary Building, Sections IX and X, Revision 6

- 6.13 FCS Abnormal Operating Procedure, AOP-16, Loss of Instrument Bus Power, Revision 20
- 6.14 Regulatory Guide 1.174, An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis, Revision 1 – November 2002
- 6.15 October 6, 2010 Public Meeting Presentation “Generic Issue 199: Implications of Updated Probabilistic Seismic Hazard Estimates in the Central and Eastern United States on Existing Plants – Safety/Risk Assessment,” USNRC (ML102770655)
- 6.16 NEI 04-02, Guidance for Implementing a Risk-Informed, Performance-Based Fire Protection Program Under 10 CFR 50.48(c), Revision 2
- 6.17 Letter from OPPD (T. L. Patterson) to NRC (Document Control Desk), Phase II Response to Generic Letter 88-20, Supplement 4 Individual Plant Examination of External Events (IPEEE), dated June 30, 1995 (LIC-95-0130), Enclosure, Section 3.1.5, Analysis of Containment Performance



LIC-16-0012  
Enclosure 1  
Attachment 2  
Page 1

**M. License Condition Changes**

3 Pages Attached

Supersede the current FCS fire protection license condition 3.D with the standard license condition in Regulatory Position 3.1 of RG 1.205, modified as shown below.

---

- D. Omaha Public Power District shall implement and maintain in effect all provisions of the approved fire protection program that comply with 10 CFR 50.48(a) and 10 CFR 50.48(c), as specified in the licensee amendment request dated September 28, 2011 (and supplements dated December 19, 2011, December 22, 2011, March 20, 2012, July 24, 2012, August 24, 2012, September 27, 2012, April 23, 2013, May 21, 2013, July 29, 2013, September 12, 2013, October 11, 2013, November 4, 2013, November 11, 2013, December 18, 2013, January 24, 2014, February 28, 2014, April 10, and June 11, 2014) and as modified by license amendment request dated April 4, 2016, and as approved in the safety evaluations dated June 16, 2014 and \_\_\_\_\_, 2016. Except where NRC approval for changes or deviations is required by 10 CFR 50.48(c), and provided no other regulation, technical specification, license condition or requirement would require prior NRC approval, the licensee may make changes to the fire protection program without prior approval of the Commission if those changes satisfy the provisions set forth in 10 CFR 50.48(a) and 10 CFR 50.48(c), the change does not require a change to a technical specification or a license condition, and the criteria listed below are satisfied.

(1) Risk-Informed Changes that May Be Made Without Prior NRC Approval

A risk assessment of the change must demonstrate that the acceptance criteria below are met. The risk assessment approach, methods, and data shall be acceptable to the NRC and shall be appropriate for the nature and scope of the change being evaluated; be based on the asbuilt, as-operated, and maintained plant; and reflect the operating experience at the plant. Acceptable methods to assess the risk of the change may include methods that have been used in the peer-reviewed fire PRA model, methods that have been approved by NRC through a plant-specific license amendment or NRC approval of generic methods specifically for use in NFPA 805 risk assessments, or methods that have been demonstrated to bound the risk impact.

- (a) Prior NRC review and approval is not required for changes that clearly result in a decrease in risk. The proposed change must also be consistent with the defense-in-depth philosophy and must maintain sufficient safety margins. The change may be implemented following completion of the plant change evaluation.
- (b) Prior NRC review and approval is not required for individual changes that result in a risk increase less than  $1 \times 10^{-7}$ /year (yr) for core damage frequency (CDF) and less than  $1 \times 10^{-8}$ /yr for large early release frequency (LERF). The proposed change must also be consistent with the defense-in-depth philosophy and must maintain sufficient safety margins. The change may be implemented following completion of the plant change evaluation.

(2) Other Changes that May Be Made Without Prior NRC Approval

(a) Changes to NFPA 805, Chapter 3, Fundamental Fire Protection Program

Prior NRC review and approval are not required for changes to the NFPA 805, Chapter 3, fundamental fire protection program elements and design requirements for which an engineering evaluation demonstrates that the alternative to the Chapter 3 element is functionally equivalent or adequate for the hazard. The licensee may use an engineering evaluation to demonstrate that a change to an NFPA 805, Chapter 3, element is functionally equivalent to the corresponding technical requirement. A qualified fire protection engineer shall perform the engineering evaluation and conclude that the change has not affected the functionality of the component, system, procedure, or physical arrangement, using a relevant technical requirement or standard.

The licensee may use an engineering evaluation to demonstrate that changes to certain NFPA 805, Chapter 3, elements are acceptable because the alternative is "adequate for the hazard." Prior NRC review and approval would not be required for alternatives to four specific sections of NFPA 805, Chapter 3, for which an engineering evaluation demonstrates that the alternative to the Chapter 3 element is adequate for the hazard. A qualified fire protection engineer shall perform the engineering evaluation and conclude that the change has not affected the functionality of the component, system, procedure, or physical arrangement, using a relevant technical requirement or standard. The four specific sections of NFPA 805, Chapter 3, are as follows:

- "Fire Alarm and Detection Systems" (Section 3.8);
- "Automatic and Manual Water-Based Fire Suppression Systems" (Section 3.9);
- "Gaseous Fire Suppression Systems" (Section 3.10); and,
- "Passive Fire Protection Features" (Section 3.11).

This License Condition does not apply to any demonstration of equivalency under Section 1.7 of NFPA 805.

(b) Fire Protection Program Changes that Have No More than Minimal Risk Impact

Prior NRC review and approval are not required for changes to the licensee's fire protection program that have been demonstrated to have no more than a minimal risk impact. The licensee may use its screening process as approved in the NRC safety evaluation dated June 16, 2014 and \_\_\_\_\_, 2016, to determine that certain fire protection program changes meet the minimal criterion. The licensee shall ensure that fire protection defense-in-depth and safety margins are maintained when changes are made to the fire protection program.



(3) Transition License Conditions

- (a) Before achieving full compliance with 10 CFR 50.48(c), as specified by D.(3)(b) and D.(3)(c) below, risk-informed changes to the licensee's fire protection program may not be made without prior NRC review and approval unless the change has been demonstrated to have no more than a minimal risk impact, as described in D.(2)(b) above.
- (b) The licensee shall implement the modifications to its facility, as described in Enclosure 1, Attachment S, Table S-2, "Plant Modifications Committed," of OPPD letter LIC-16-0012 dated April 4, 2016 to complete the transition to full compliance with 10 CFR 50.48(c) by the end of the second refueling outage following issuance of the license amendment. The licensee shall maintain appropriate compensatory measures in place until completion of these modifications.
- (c) The licensee shall implement the items listed in Enclosure 1, Attachment S, Table S-3, "Implementation Items," of OPPD letter LIC-14-0042, dated April 10, 2014, no later than 12 months after issuance of the license amendment.

License Condition 3.D shall be superseded in its entirety.