Attachment 1: Revisions to the Transition Report Main Body

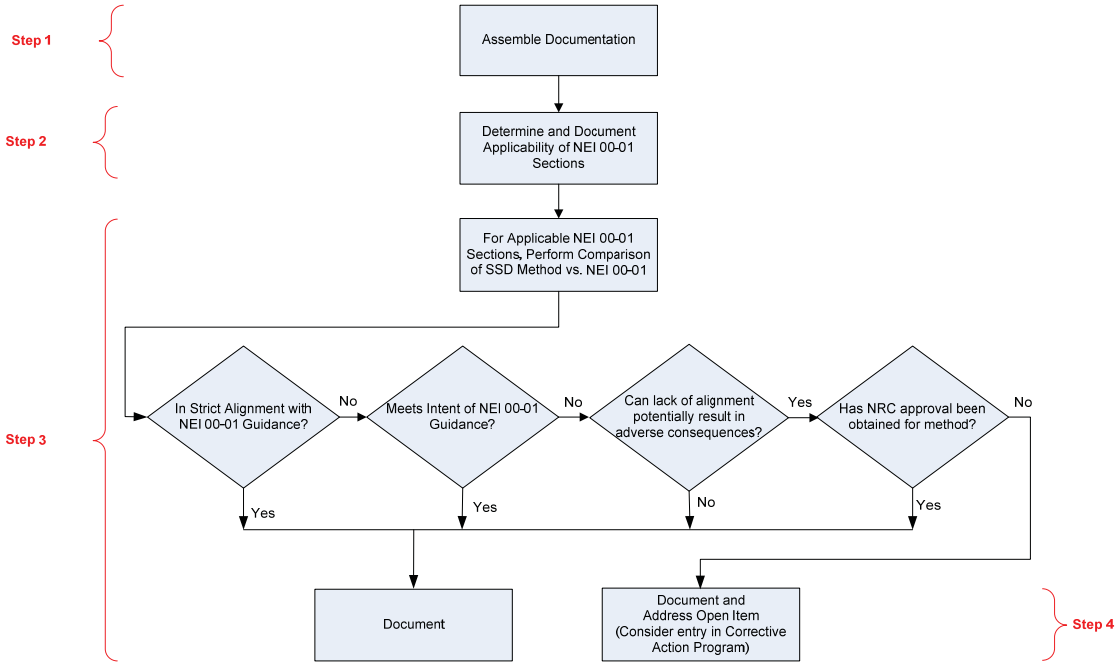

Figure 4-2 – Summary of Nuclear Safety Methodology Review Process (FAQ 07-0039 Revision 2)

4.2.1.2 Safe and Stable Conditions for the Plant

Overview of Process

The nuclear safety goals, objectives and performance criteria of NFPA 805 are different than the previous deterministic regulations and guidance documented in 10 CFR 50 Appendix R; NUREG-0800, Section 9.5-1; and NEI 00-01, Revision 1, "Guidance for Post Fire Safe Shutdown Circuit Analysis," Chapter 3. NFPA 805 requires the licensee to maintain the reactor fuel in a Safe and Stable condition rather than to achieve and maintain cold shutdown.

Safe and Stable Conditions

Per NFPA 805 the definition of "Safe and Stable" is (Ref. NFPA 805, definition 1.6.56):

> *"For fuel in the reactor vessel, head on and tensioned, safe and stable conditions are defined as the ability to maintain Keff < 0.99, with a reactor coolant temperature at or below the requirements for hot shutdown for a boiling water reactor and hot standby for a pressurized water reactor. For all other configurations, safe and stable conditions are defined as maintaining Keff < 0.99 and fuel coolant temperature below boiling."*

The nuclear safety goal of NFPA 805 (Ref. NFPA 805, Section 1.3.1) requires "...reasonable assurance that a fire during any operational mode and plant configuration will not prevent the plant from achieving and maintaining the fuel in a Safe and Stable condition" without a specific reference to a minimum event coping duration.

For the plant to be in a Safe and Stable condition, it may not be necessary to perform a transition to cold shutdown as currently required under 10 CFR 50, Appendix R. This is consistent with the existing analysis documented in the Callaway Plant updated Final Safety

Analysis Report (FSAR) Appendix 5.4A "Safe Shutdown." Therefore, the unit may remain at or below the temperature defined by a Hot Standby plant operating state.

Results

Coping Time

The NFPA 805 Nuclear Safety Performance Criteria (NSPC) Analysis for Callaway Plant has been developed to ensure that the plant can achieve and maintain the reactor fuel in a Safe and Stable condition assuming that a fire event occurs during Callaway Plant Mode 1 (Power Operation), Mode 2 (Startup), Mode 3 (Hot Standby), and Mode 4 (Hot Shutdown), up to the point at which the MCC breakers for the Residual Heat Removal Loop Suction Isolation Valves, BBPV8702A, BBPV8702B, EJHV8701A, and EJHV8701B, are unlocked and closed. Refer to Attachment C (Table B-3) for the Systems and Components credited with supporting Safe and Stable plant conditions by fire area.

The NFPA 805 Nuclear Safety Capability Assessment (NSCA) has demonstrated that Callaway Plant can achieve and maintain Safe and Stable conditions for at least 10 hours with the minimum shift operating staff before having to take action to recharge the nitrogen accumulators. This initial 10 hours provides sufficient time for the Emergency Response Organization (ERO) to respond and be available to support Safe and Stable actions to extend Hot Standby conditions.

Coping Time Bases

The minimum 10 hour coping duration is based on the normal operating pressure band of the nitrogen accumulators that support emergency operation of the Steam Generator Atmospheric Steam Dump (ASD) valves and the Turbine Driven Auxiliary Feedwater (TDAFW) Pump to Steam Generator flow control valves. Actions required to sustain Mode 3 (Hot Standby) beyond 10 hours includes an action to recharge the backup nitrogen accumulator tanks for the ASD valves and the TDAFW Pump to Steam Generator flow control valves. Recharging the tanks requires an operator to open a manual valve in Auxiliary Building fire area A-29. Opening this manual valve is addressed in plant procedures and has been demonstrated to be feasible. Additionally, the backup nitrogen accumulator tanks may need recharging every 10 hours thereafter based on valve cycling demands. Components and/or cables associated with this action are included within the NSCA equipment list.

The ASD valves and TDAFW Pump to Steam Generator flow control valves are air operated with a backup nitrogen gas supply tank. On loss of Instrument Air, which is conservatively assumed for NSCA, the backup nitrogen supply is relied on to maintain valve function from the MCR. The tank capacity is based on an assumed number of valve cycles and initial normal operating pressure. The 10 hour recharge time is based on the number of valve cycles assumed for a Station Black Out plus the available margin from the lower range of the normal accumulator operating pressure band. Operator action to refill the accumulators can extend the period in which these components can be used. Operator action to refill the valve accumulators is not explicitly quantified in the PRA scenarios because of the uncertainty in the T_{sw} (required time for action). Deterministic analysis has shown this to be a minimum of 10 hours, but the actual time is dependent on the number of valve cycles for the scenario under consideration and could be substantially greater than 10 hours. However, even at the minimum time frame of 10 hours, these actions would be expected to be minimal contributors to risk.

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Impact to Plant if Recharge Time is Exceeded

Should the nitrogen accumulator tanks lose adequate pressure inventory the valve function from the MCR would be lost. No damage to the valves would occur and they would retain their

capability for full MCR function once the nitrogen tanks are recharged or instrument air recovered. Loss of the ASD function would eventually result in cycling of the steam generator code safety valves. Loss of nitrogen pressure would result in the TDAFW Pump to Steam Generator flow control valves failing open. Flow through these valves can be throttled by a manual valve. Operation in this manner is procedurally controlled and is feasible.

Methods to Maintain Safe and Stable and Extend Hot Standby Conditions

The following describes methods to maintain the Safe and Stable condition and related support actions:

1. Callaway Plant has design features and procedures to ensure that an adequate source of inventory is provided for decay heat removal in sustained Mode 3 (Hot Standby) conditions. If the Condensate Storage Tank inventory is depleted the TDAFW pump suction will automatically transfer to the ESW supply from the Ultimate Heat Sink. Transfer can be automatic or manual from the Main Control Room. These actions are explicitly included and quantified in the PRA.
2. RCS Pressure control is maintained by a combination of ASDs, Pressurizer Heaters, and/or Reactor Pressure Vessel Head Vent valves or PORVs. PRA does not require RCS subcooling or pressurizer water level control. PRA success criteria are based on maintaining core coverage and core cooling. Requirements to provide core cooling are RCS isolation capability, AFW supply to the SG's and heat removal from the SG's. These can be maintained for greater than 24 hours.
3. Core decay heat in Mode 3 (Hot Standby) will be rejected to the secondary plant through one or more of the Steam Generators, and then to atmosphere through the Atmospheric Steam Dump valves.
4. The Callaway Plant reactor core design ensures that Keff is maintained <0.99 while the plant is in sustained Mode 3 (Hot Standby). Gravity insertion of the control rods into the reactor core will ensure reactivity control is achieved for Mode 3 (Hot Standby) for the first 24 hours. Subsequently, maintaining Keff <0.99 for Safe and Stable conditions will require boration of the RCS as described in FSAR Appendix 5.4A. PRA success criteria require gravity insertion of the control rods into the core.
5. Inventory makeup to the RCS may only be required to account for expected RCS leakage and minimal RCS shrinkage as well as RCP seal injection. Callaway Plant has design features and procedures to ensure that an adequate source of borated inventory is provided for RCS inventory control in sustained Mode 3 (Hot Standby) (i.e., RCS inventory makeup from the RWST) utilizing the CVCS system. Callaway Plant has design features and procedures to ensure that an adequate method is provided for RCS inventory control in sustained Mode 3 (Hot Standby) utilizing the Reactor Pressure Vessel Head Vent valves. If RWST inventory is depleted it will be refilled using a combination of Reactor Make Up Water Storage Tank and Boric Acid Storage Tank inventories. If RCP seal cooling is provided, and RCS boundary isolation is achieved (i.e., isolation of letdown, head vents, excess letdown, and pressurizer PORVs), RCS inventory makeup is not required in the PRA. For failure of seal cooling or loss of RCS boundary isolation, one charging pump is required. The PRA does not model refill of the RWST, but does model recirculation from the containment recirculation sump when RWST is depleted.
6. Callaway Plant has design features and procedures to ensure that an adequate source of heat input is maintained for RCS pressure control in sustained Mode 3 (Hot Standby) (i.e., a minimum of 150kW of pressurizer heater input to maintain the RCS sub-cooled)

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utilizing available combinations of the backup pressurizer heaters (Group A and Group B are 150kW each). The backup pressurizer heaters are capable of being energized from emergency diesel generator power. The PRA does not require subcooling, so the pressurizer heaters are not modeled.

7. Each emergency diesel generator (EDG) is provided with a storage tank having a fuel oil capacity sufficient to operate that diesel for a period of 7 days while the EDG is supplying maximum post LOCA load demand discussed in the FSAR, Section 9.5.4.2. The maximum load demand is calculated based on the fuel consumption by one EDG for operation at continuous rating for 7 days. This onsite fuel oil capacity is sufficient to operate the DGs for longer than the time to replenish the onsite supply from outside sources. The PRA does not model replenishment of the onsite DG fuel oil supply. The 7 day supply is sufficient for all PRA sequences.

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Qualitative Assessment of Risk

The fire brigade will respond to fire events within the Protected Area boundary in accordance with the guidance of EIP-ZZ-00226, “Fire Response Procedure For Callaway Plant.” If the fire (non-hostile) meets the criteria of EIP-ZZ-00101, “Classification of Emergencies,” an emergency declaration would be initiated. In the event of an Alert declaration or higher the Shift Emergency Response Organization (ERO) will be supplemented by the On-Site ERO within 30 minutes during normal working hours and within 90 minutes during off-normal hours. The On-Site ERO will assist the Control Room personnel with implementation of the longer term actions necessary to maintain the fuel in a safe and stable configuration.

Following stabilization at Hot Standby, assessment and repair activities would commence to restore plant equipment needed to support RCS cool down in a safe and controlled manner. ERO resources will be available to assist the MCR in fire damage assessment and restoration of multiple success paths. Note that the Alternate Emergency Power supply (AEPS) is available but not credited in the NSCA.

- The actions required to maintain Safe and Stable conditions are limited.
- Procedures are in place for the Safe and Stable actions identified above.
- The 10 hour coping period provides reasonable assurance that adequate time is provided for the ERO to be available to augment the minimum plant staffing to support the longer term Safe and Stable actions.

For the most limiting fire scenarios, it is anticipated that the end state of the cool down would be an RCS temperature of approximately 350 F with a long term strategy for reactivity, decay heat removal, and inventory control. Long term subcooled natural circulation decay heat removal is provided by supplying ESW to the Steam Generators and steaming to atmosphere. The extended coping period at these conditions is based on the significant volume of water available for decay heat removal and reduced need for primary make up to match the RCS system losses.

The ERO provides sufficient resources for assessment of fire damage and completion of repairs to equipment necessary to maintain hot standby for an extended period, transition to cold shutdown, or return to power operations as dictated by the plant fire event.

Conclusions

The initial coping time is sufficient to allow the ERO to activate. Limited actions are required and procedures are in place for those actions to maintain extended hot standby conditions. The ERO provides adequate capability to extend initial Hot Standby conditions, to transition to cold

shutdown, or return to power operations as dictated by the plant fire event. The approach described above has demonstrated the capability to achieve and maintain the reactor fuel in a Safe and Stable condition for an indefinite period following a fire. A qualitative risk assessment has been performed for this scenario which demonstrated that the risk of not being able to maintain the defined safe and stable conditions is acceptably low beyond the defined coping time limit.

Safe and Stable Conditions / Non-Power Operations Assessment interface

The Callaway Plant NFPA 805 Non-Power Operations Assessment provides reasonable assurance the reactor fuel is maintained in a safe and stable condition for fires which may occur in Mode 4 (Hot Shutdown) from the point at which the Motor Control Center (MCC) breakers for the Residual Heat Removal Loop Suction Isolation Valves, BBPV8702A, BBPV8702B, EJHV8701A, and EJHV8701B, are unlocked and closed, Mode 5 (Cold Shutdown) and Mode 6 (Refueling). Refer to Section 4.3 for a description of the Callaway Plant Non-Power Operations Assessment for fires that occur in the non-power operational modes.

documents will remain unchanged. Ameren Missouri specifically requires that the calculations and evaluations in support of the NFPA 805 LAR, exclusive of the Fire PRA, be performed within the scope of the QA program which requires independent review as defined by Ameren Missouri procedures.

As recommended by NUREG/CR-6850, the sources of uncertainty in the Fire PRA were identified and specific parameters were analyzed for sensitivity in support of the NFPA 805 Fire Risk Evaluation process. Specifically with regard to uncertainty, an uncertainty and sensitivity matrix was developed and included with Callaway Plant Fire PRA Uncertainty and Sensitivity Analyses report, 17671-014. In addition, sensitivity to uncertainty associated with specific Fire PRA parameters was quantitatively addressed in this report.

While the removal of conservatism inherent in the Fire PRA is a long-term goal, the Fire PRA results were deemed sufficient for evaluating the risk associated with this application. While Ameren Missouri continues to strive toward a more "realistic" estimate of fire risk, use of mean values continues to be the best estimate of fire risk. During the Fire Risk Evaluation process, the uncertainty and sensitivity associated with specific Fire PRA parameters were considerations in the evaluation of the change in risk relative to the applicable acceptance thresholds.

Specific Requirements of NFPA 805 Section 2.7.3

NFPA 805 Section 2.7.3.1 – Review

Analyses, calculations, and evaluations performed in support of compliance with 10 CFR 50.48(c) have been and will be performed in accordance with Ameren Missouri's procedures that require independent review. Prog RAI 1

NFPA 805 Section 2.7.3.2 – Verification and Validation

Calculational models and numerical methods used in support of compliance with 10 CFR 50.48(c) have been and will be verified and validated as required by Section 2.7.3.2 of NFPA 805. Prog RAI 1

NFPA 805 Section 2.7.3.3 – Limitations of Use

Engineering methods and numerical models used in support of compliance with 10 CFR 50.48(c) are used and have been and will be used appropriately as required by Section 2.7.3.3 of NFPA 805. Prog RAI 1

NFPA 805 Section 2.7.3.4 – Qualification of Users

Cognizant personnel who use and apply engineering analysis and numerical methods in support of compliance with 10 CFR 50.48(c) have been and will be competent and experienced as required by Section 2.7.3.4 of NFPA 805. Prog RAI 1

For personnel performing fire modeling or Fire PRA development and evaluation, Ameren Missouri will develop and maintain qualification requirements for individuals assigned various tasks. Qualification Standards will be developed to identify and document required training and mentoring to ensure individuals are appropriately qualified per the requirements of NFPA 805 Section 2.7.3.4 to perform assigned work. These qualification requirements and guides will be developed as described in the associated implementation item in Attachment S.

NFPA 805 Section 2.7.3.5 – Uncertainty Analysis

Uncertainty analyses have been and will be performed as required by 2.7.3.5 of NFPA 805 and the results were considered in the context of the application. This is of particular interest in fire modeling and Fire PRA development. Prog RAI 1

4.8 Summary of Results

4.8.1 Results of the Fire Area Review

A summary of the NFPA 805 compliance basis and the required fire protection systems and features is provided in Table 4-3. The table provides the following information from the NEI 04-02 Table B-3:

- Fire Area / Fire Zone: Fire Area / Zone Identifier.
- Description: Fire Area / Zone Description.
- NFPA 805 Regulatory Basis: Post-transition NFPA 805 Chapter 4 compliance basis (Note: Compliance is determined on a Fire Area basis therefore a compliance basis is not provided for individual fire zones.)
- Required Fire Protection System / Feature: Detection / suppression required in the Fire Area based on NFPA 805 Chapter 4 compliance. Other Required Features may include Electrical Raceway Fire Barrier Systems, fire barriers, etc. The documentation of required fire protection systems and features does not include the documentation of the fire area boundaries. Fire area boundaries are required and documentation of the fire area boundaries has been performed as part of reviews of engineering evaluations, licensing actions, or as part of the reviews of the NEI 04-02 Table B-1 process. The information is provided on a fire zone basis. The basis for the requirement of the fire protection system / feature is designated as follows:
    - S – Separation Criteria: Systems/Features required for Chapter 4 Separation Criteria in Section 4.2.3
    - L – Licensing Action Criteria: Systems/Features required for acceptability of NRC approved Licensing Actions (i.e., Exemptions/Deviation/Safety Evaluations) (Section 2.2.7)
    - E – EEEE Criteria: Systems/Features required for acceptability of Existing Engineering Equivalency Evaluations (Section 2.2.7)
    - R – Risk Criteria: Systems/Features required to meet the Risk Criteria for the Performance-Based Approach (Section 4.2.4)
    - D – Defense-in-depth Criteria: Systems/Features required to maintain adequate balance of Defense-in-Depth for a Performance-Based Approach (Section 4.2.4)

Attachment W contains the results of the Fire Risk Evaluations, additional risk of recovery actions, and the change in risk on a fire area basis.

Attachment A: Revisions to Transition Report Attachment A – NEI 04-02 Table B-1 – Transition of Fundamental Fire Protection Program and Design Elements

Attachment A. NEI 04-02 Table B-1 - Transition of Fundamental FP Program and Design Elements (NFPA 805 Chapter 3)
Table B-1 - NFPA 805 Ch. 3 Transition

NFPA 805 Ch. 3 Ref.	Requirements/Guidance	Compliance Statement	Compliance Basis	Reference Document
3.3.5.1	Wiring above suspended ceiling shall be kept to a minimum. Where installed, electrical wiring shall be listed for plenum use, routed in armored cable, routed in metallic conduit, or routed in cable trays with solid metal top and bottom covers.	Complies by Previous NRC Approval	Wiring exists above the ceilings in the Control Room, Control Room Foyer, and Shift Manager's Office (Fire Area C-27); and above the ceilings in all zones in Fire Areas C-5 and C-6. The fire protection for the area above the ceilings in these areas was approved in NUREG-0830 as identified below. This fire protection was considered acceptable considering the hazards in the area. Per Page 28 of NUREG-0830, "The automatic sprinkler systems (wet pipe sprinkler systems, pre-action sprinkler systems, and water spray systems) will be designed to meet the recommendations of NFPA Standards 13, 'Standard for the Installation of Sprinkler Systems,' and No. 15, 'Standard for Water Spray Fixed Systems.' "The areas that are equipped with automatic water suppression systems include the following: "Cable area above access control area… "…the staff concludes that the sprinkler and standpipe systems are adequate, meet the guidelines of Appendix A, Sections C.3.a and C.3.d, and are, therefore acceptable." Per Page 31 of NUREG-0830,	Letter ULNRC-00189 from Bryan (UE) to Rusche (NRC) dated April 15, 1977 / Section 9.5.1.1 NUREG-0830, "Safety Evaluation Report Related to the Operation of Callaway Plant, Unit No. 1," dated October 1981 / Pages 28 and 31

Attachment A. NEI 04-02 Table B-1 - Transition of Fundamental FP Program and Design Elements (NFPA 805 Chapter 3)
Table B-1 - NFPA 805 Ch. 3 Transition

NFPA 805 Ch. 3 Ref.	Requirements/Guidance	Compliance Statement	Compliance Basis	Reference Document
			"Automatic smoke detectors are provided in the ceiling of the control room… "…the staff concludes, that the fire protection-for the control room meets the guidelines of Appendix A to BTP ASB 9.5-1 and is, therefore, acceptable." The configuration of these areas, as approved in the referenced SER, is still in the same configuration as that which was approved. There have been no plant modifications or other changes that would invalidate the basis for approval.	

Attachment A. NEI 04-02 Table B-1 - Transition of Fundamental FP Program and Design Elements (NFPA 805 Chapter 3)
Table B-1 - NFPA 805 Ch. 3 Transition

NFPA 805 Ch. 3 Ref.	Requirements/Guidance	Compliance Statement	Compliance Basis	Reference Document
		Complies, with Required Action	See implementation item identified below.	CAR 201101832, "Track Implementation Items for NFPA-805 Project" / All FAQ 06-0022, "Acceptable Electrical Cable Construction Tests," Rev. 3 / All NRC Memorandum from Klein to AFPB File, "Close-Out of National Fire Protection Association Standard 805 Frequently Asked Question 06-0222 Electrical Cable Flame Propagation Tests," dated May 5, 2009 Drawing E-2R8900, "Raceway Notes, Symbols and Details," Rev. 99 / All Procedure EDP-ZZ-04044, "Fire Protection Reviews," Rev. 9 / All

IMPLEMENTATION ITEMS:

11-805-050 Drawing E-2R8900 and procedure EDP-ZZ-04044 will be revised to require that, where wiring must be installed above a suspended ceiling, it shall comply with NFPA 805 Section 3.3.5.1.

FPE RAI 17

Attachment A. NEI 04-02 Table B-1 - Transition of Fundamental FP Program and Design Elements (NFPA 805 Chapter 3)
Table B-1 - NFPA 805 Ch. 3 Transition

NFPA 805 Ch. 3 Ref.	Requirements/Guidance	Compliance Statement	Compliance Basis	Reference Document	
		Submit for NRC Approval	Wiring exists above the suspended ceilings in the following locations: Turbine Building (Fire Area TB-1): Turbine Building 1984 Elev. Fire Zone 3225 Access Corridors Turbine Building 1984 Elev. Fire Zone 3227 Vestibule 3 Turbine Building 1984 Elev. Fire Zones 3226, 3228, Hot Lab Areas (Detection) Turbine Building 2000 Elev. Fire Zones 4317, 4323, Chemistry Cold Lab Turbine Building 2047 Elev. Fire Zone 3611, Access Corridor Turbine Building 2047 Elev. Fire Zone 3612, Operations Field Office Turbine Building 2047 Elev. Fire Zones 3613, 3613A, 3613B, Operations Misc. Areas Turbine Building 2047 Elev. Fire Zone 3614, Access Corridor Radwaste Building (Fire Area RW-1): Radwaste Building Elev. 2000 Fire Zone 7209, Radwaste Control Room Radwaste Building Elev. 2000 Fire Zone 7211, Radwaste Lab Approval of this wiring is being requested in Attachment L.	RFR 201103242, "NFPA 805 Evaluate Cable Above Suspended Ceilings/ 3.3.5.1" / All	FPE RAI 17

Attachment E: Revisions to Transition Report Attachment E – NEI 04-02 Radioactive Release Transition

NEI 04-02 Table E-2 Radioactive Release Transition - Engineered Controls Review

Fire Area	FPP Manual Attachment(s)	Screened In	Liquid Effluents	Gaseous Effluents	Required Revisions	Conclusions	
			Fire Pre-plan steps provide reasonable assurance liquids are contained within the fire area.	Fire Pre-plan steps provide reasonable assurance gaseous products are contained within the Control Building and fire area.		performance requirements of NFPA 805 for Radiation Release.	
C-5	Control Building Attachment 7	Y	Floor drains in this portion of the Control Building (RCA) go to monitored tanks. Fire Pre-plan steps provide reasonable assurance liquids are contained within the fire area.	In the Control Building for C-5 fire area the HVAC systems are provided with filtered monitored elevated release paths. If found contaminated the smoke will be removed using Access Control Exhaust that is a filtered monitored elevated release path that exhausts via the plant unit vent. Fire Pre-plan steps provide reasonable assurance gaseous products are contained within the Control Building and fire area.	Implementation Item 11-805-076	The Fire Pre-plan steps to limit radiation release to unrestricted areas due to the direct effects of fire suppression activities, in addition to compliance with NFPA 805 sections 4.2.3 or 4.4.4 satisfies the performance requirements of NFPA 805 for Radiation Release.	Rad Rel RAI 4
C-6	Control Building Attachment 8	Y	Floor drains in this portion of the Control Building (RCA) go to monitored tanks. Fire Pre-plan steps provide reasonable assurance liquids are contained within the fire area.	In the Control Building for C-6 fire area the HVAC systems are provided with filtered monitored elevated release paths. If found contaminated the smoke will be removed using Access Control Exhaust that is a filtered monitored elevated release path that exhausts via the plant unit vent. Fire Pre-plan steps provide reasonable assurance gaseous products are contained within the Control Building and fire area.	Implementation Item 11-805-076	The Fire Pre-plan steps to limit radiation release to unrestricted areas due to the direct effects of fire suppression activities, in addition to compliance with NFPA 805 sections 4.2.3 or 4.4.4 satisfies the performance requirements of NFPA 805 for Radiation Release.	Rad Rel RAI 4
C-7	Control Building Attachment 9	Y	Floor drains in this portion of the Control Building	In the Control Building for C-7 fire area the HVAC systems are provided with filtered	Implementation Item 11-805-076	The Fire Pre-plan steps to limit radiation release to unrestricted areas due to the direct effects of fire suppression activities, in	Rad Rel RAI 4

NEI 04-02 Table E-2 Radioactive Release Transition - Engineered Controls Review

Fire Area	FPP Manual Attachment(s)	Screened In	Liquid Effluents	Gaseous Effluents	Required Revisions	Conclusions	
			(RCA) go to monitored tanks. Fire Pre-plan steps provide reasonable assurance liquids are contained within the fire area.	monitored elevated release paths. If found contaminated the smoke will be removed using Access Control Exhaust that is a filtered monitored elevated release path that exhausts via the plant unit vent. Fire Pre-plan steps provide reasonable assurance gaseous products are contained within the Control Building and fire area.		addition to compliance with NFPA 805 sections 4.2.3 or 4.4.4 satisfies the performance requirements of NFPA 805 for Radiation Release.	Rad Rel RAI 4
C-8	Control Building Attachment 10	Y	Floor drains in this portion of the Control Building (RCA) go to monitored tanks. Fire Pre-plan steps provide reasonable assurance liquids are contained within the fire area.	In the Control Building for C-8 fire area the HVAC systems are provided with filtered monitored elevated release paths. If found contaminated the smoke will be removed using Access Control Exhaust that is a filtered monitored elevated release path that exhausts via the plant unit vent. Fire Pre-plan steps provide reasonable assurance gaseous products are contained within the Control Building and fire area.	Implementation Item 11-805-076	The Fire Pre-plan steps to limit radiation release to unrestricted areas due to the direct effects of fire suppression activities, in addition to compliance with NFPA 805 sections 4.2.3 or 4.4.4 satisfies the performance requirements of NFPA 805 for Radiation Release.	Rad Rel RAI 4
C-9	Control Building Attachment 11	N	N/A	N/A	N/A	C-9 is located outside the permanent RCA and is not a storage location for contaminated or radioactive materials therefore there is reasonable assurance a fire in this area will not result in any radiation release.	
C-10	Control Building Attachment 12	N	N/A	N/A	N/A	C-10 is located outside the permanent RCA and is not a storage location for contaminated or radioactive materials therefore there is reasonable assurance a fire in this area will not result in any radiation release.	

Attachment G: Revisions to Transition Report Attachment G – Recovery Actions Transition

Table G-1 – Recovery Actions and Activities Occurring at the Primary Control Station(s)

Fire Area	Component	Component Description	Actions	VFDR	RA/PCS
RB-1	BGHV8149A	Chemical Volume Control System Letdown Orifice A Isolation Valve	Action to isolate potentially spuriously open Chemical Volume Control System Letdown Orifice A Isolation Valve, BGHV8149A. Fail BGHV8149A closed by opening 125VDC breaker PK5117.	RB-01-001, RB-02-002	RA
RB-1	BGHV8149B	Chemical Volume Control System Letdown Orifice B Isolation Valve	Action to isolate potentially spuriously open Chemical Volume Control System Letdown Orifice B Isolation Valve, BGHV8149B. Fail BGHV8149B closed by opening 125VDC breaker PK5117.	RB-01-002	RA
RB-1	BGHV8149B	Chemical Volume Control System Letdown Orifice B Isolation Valve	Action to isolate potentially spuriously open Chemical Volume Control System Letdown Orifice B Isolation Valve, BGHV8149B. Fail BGHV8149B closed by opening 125VDC breaker PK5117.	RB-02-003	RA
RB-1	BGHV8149B	Chemical Volume Control System Letdown Orifice B Isolation Valve	Action to isolate potentially spuriously open Chemical Volume Control System Letdown Orifice B Isolation Valve, BGHV8149B. Fail BGHV8149B closed by opening 125VDC breaker PK5117.	RB-03-003	RA
RB-1	BGHV8149C	Chemical Volume Control System Letdown Orifice C Isolation Valve	Action to isolate potentially spuriously open Chemical Volume Control System Letdown Orifice C Isolation Valve, BGHV8149C. Fail BGHV8149C closed by opening 125VDC breaker PK5117.	RB-01-003	RA
RB-1	BGHV8149C	Chemical Volume Control System Letdown Orifice C Isolation Valve	Action to isolate potentially spuriously open Chemical Volume Control System Letdown Orifice C Isolation Valve, BGHV8149C. Fail BGHV8149C closed by opening 125VDC breaker PK5117.	RB-02-004	RA
RB-1	BGHV8149C	Chemical Volume Control System Letdown Orifice C Isolation Valve	Action to isolate potentially spuriously open Chemical Volume Control System Letdown Orifice C Isolation Valve, BGHV8149C. Fail BGHV8149C closed by opening 125VDC breaker PK5117.	RB-03-004	RA

LIC-20

Attachment I: Revisions to Transition Report Attachment I – Definition of Power Block

I. Definition of Power Block

2 Pages Attached

Where used in NFPA 805 Chapter 3, “power block” and “plant” refers to structures that have equipment required for nuclear plant operations, such as Containment, auxiliary building, service building, control building, fuel building, radiological waste, water treatment, turbine building, and intake structure, or structures that are identified in the facility’s current license basis (CLB).

Callaway Plant evaluated all site structures in the Owner Controlled Area (approximately 90) for possible inclusion as meeting the definition of power block structure. The evaluation included consideration of all the example structures listed in Frequently Asked Question (FAQ) 06-0019 (ADAMS Accession No. ML080510224), and NEI 04-02, "Guidance for Implementing a Risk-Informed, Performance Based Fire Protection program Under 10 CFR50.48(c)" including the Containment, the Auxiliary Building, the Service Building, the Control Building, the Fuel Building, the Radwaste Building, the Water Treatment building, the Turbine Building, and the various intake structures. Callaway Plant does not have a structure, fire area, or fire zone designated as a Hot Machine Shop.

FPE RAI 16

Structures located within the boundary of the YARD fire area YD-1 were bounded by the evaluation described above. The Radwaste Building, the ESW Pump House, and the UHS Cooling Tower are stand-alone structures within the YD-1 boundary that are included in the definition of power block. The Fire Pump House structure is excluded because it is not included within the current Fire Protection Program licensing basis. Note that the NFPA 805 Chapter 3 Section 3.5 requirements specific to the fire pumps are addressed in Transition Report Attachment A, Table B-1. Additionally, within the YD-1 fire area, stand-alone components such as above ground tanks, transformers and underground fuel storage tanks or features such as underground cable duct banks and switch yards are not considered to meet the definition of a structure that NFPA 805 Chapter 3 requirements in Sections 3.3.1.2, 3.5, 3.6, and 3.11.1 are applicable to.

For the purposes of establishing the structures included in the Callaway Plant Fire Protection Program in accordance with 10 CFR 50.48(c) and NFPA 805, the structures listed in the following table are considered to be the power block.

Table I-1 – Power Block Definition

Power Block Structures	Fire Area(s)
Auxiliary Building	A-1, A-2, A-3, A-4, A-5, A-6, A-7, A-8, A-9, A-10, A-11, A-12, A-13, A-14, A-15, A-16, A-17, A-18, A-19, A-20, A-21, A-22, A-23, A-24, A-25, A-26, A-27, A-28, A-29, A-30, A-33
Auxiliary Boiler Room	AB-1
Control Building	C-1, C-2, C-3, C-4, C-5, C-6, C-7, C-8, C-9, C-10, C-11, C-12, C-13, C-14, C-15, C-16, C-17, C-18, C-19, C-20, C-21, C-22, C-23, C-24, C-25, C-26, C-27, C-28, C-29, C-30, C-31, C-32, C-33, C-34, C-35, C-36, C-37

Table I-1 – Power Block Definition

Power Block Structures	Fire Area(s)
Diesel Generator Building	D-1, D-2
ESW Pump House	UNPH, USPH
Fuel Building	FB-1
Radwaste Building	RW-1
Reactor Building	RB-1
Turbine Building (including communication corridor)	TB-1
UHS Cooling Tower	UNCT, USCT

Attachment L: Revisions to Transition Report Attachment L – NFPA 805 Chapter 3 Requirements for Approval (10 CFR 50.48(c)(2)(vii))

Approval Request 2

NFPA 805 Section 3.3.5.1

NFPA 805 Section 3.3.5.1 states:

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

An inspection of the spaces above the suspended ceiling in the following areas was conducted. The inspection revealed the existence of limited quantities of wiring (cables) which do not meet the criteria of NFPA 805 Section 3.3.5.1.

Turbine Building (Fire Area TB-1)

Turbine Building 1984 Elev. Fire Zone 3225 Access Corridors
Turbine Building 1984 Elev. Fire Zone 3227 Vestibule 3
Turbine Building 1984 Elev. Fire Zones 3226, 3228, Hot Lab Areas (Detection)
Turbine Building 2000 Elev. Fire Zones 4317, 4323, Chemistry Cold Lab
Turbine Building 2047 Elev. Fire Zone 3611, Access Corridor
Turbine Building 2047 Elev. Fire Zone 3612, Operations Field Office
Turbine Building 2047 Elev. Fire Zones 3613, 3613A, 3613B, Operations Misc. Areas
Turbine Building 2047 Elev. Fire Zone 3614, Access Corridor

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Radwaste Building (Fire Area RW-1)

Radwaste Building Elev. 2000 Fire Zone 7209, Radwaste Control Room
Radwaste Building Elev. 2000 Fire Zone 7211, Radwaste Lab

(Note that wiring also exists above the suspended ceilings in the Control Room, Control Room Foyer, and Shift Manager's Office (Fire Area C-27); and above the ceilings in all zones in Fire Areas C-5 and C-6. The fire protection for the area above the ceilings in these areas was approved in NUREG-0830 as discussed in Section 3.3.5.1 of Attachment A; therefore, these areas are not discussed further in this approval request).

Compliance with NFPA 805 Section 3.3.5.1 requires the cables either be plenum rated or in metallic conduit, armored cable or covered tray. The inspections performed revealed that each area currently has a limited amount of cabling which does not meet the criteria of NFPA 805 Section 3.3.5.1.

Nearly all cables that are exposed are communication type cables associated with computers, telephones, televisions, or projectors that are located within the fire zone. There are no exposed power cables (480 VAC or larger) or control cables related to plant equipment in the ceiling areas. The majority of exposed cables meet one of the acceptable cable qualifications listed within FAQ 06-0022 Rev. 3.

Basis for Request:

The basis for the approval request of this deviation is:

- The affected fire zones are located in non-safety related power block structures. Fire Area TB-1 is a performance based area, however, none of the equipment or cables associated with the 3 applicable fire areas VFDR's are located within the fire zones applicable in this request. Fire Area RW-1 is transitioned as deterministically compliant.

- Only a limited amount of the cable installed above the suspended ceilings in these areas is not rated for plenum use or in conduit.
- The affected fire zones are high traffic locations such as labs, office areas, and corridors therefore quick manual detection of fires is probable.
- The cable is low voltage (less than 480V) and therefore less susceptible to self-ignition and electrical shorts that could result in a fire in the enclosed space.
- Plant design and installation requirements for electrical cable require separation compliance with IEEE Standard 384. The cables are separated by voltage level so power cables and control cables are located in separate raceway and separation is required for safety related and non-safety related raceways. For lighting and general electrical loads (outlets) the cable is located in conduit that meets the separation criteria of IEEE Standard 384. The plant design and installation criteria provides reasonable assurance the non-plenum rated cables maintain adequate separation from important cables.
- There are no additional ignition sources in the listed areas above the suspended ceilings.
- Manual suppression is available in all of the affected fire zones using installed standpipes. If fire water is being used for non-fire protection related uses available hose stream water supplies are not adversely affected because that water use is halted when a plant fire is announced and the fire brigade is called.
- For the cables that do meet the NFPA 805 section 3.3.5.1 criteria, the majority meet one of the cable qualifications listed within FAQ 06-0022 Rev.3.
- Plant procedures will be revised to ensure future exposed cables installed above the suspended ceilings meet NFPA 805 section 3.3.5.1.

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Acceptance Criteria Evaluation:

Nuclear Safety and Radiological Release Performance Criteria:

The presence of non-plenum rated cables above the identified suspended ceiling locations does not adversely affect the nuclear safety capability goals, objectives, and performance criteria. The quantities of non-plenum rated cable which do not meet NFPA 805 code required metal conduit, armored cable, or enclosed metal cable trays, are limited. In addition, there are no additional ignition sources above the suspended ceilings. There is no adverse impact on the nuclear safety goals, objectives, and performance criteria due to the non-plenum rated cabling in these areas. This performance-based method does not change the assumptions and limitations of the analytical methods used in the development of the nuclear safety capability assessment.

The location of non-plenum rated wiring above suspended ceilings also has no impact on the radiological release goals, objectives, and performance criteria. The radiological review was performed based on the potential location of radiological concerns and is not dependent on the types of wiring used or the locations of suspended ceilings. Of the fire zones applicable to this request, the following are located in a radiological controlled area: Fire Zone 3227 Vestibule 3; Fire Zones 3226 and 3228, Hot Lab Areas; Fire Zone 7209, Radwaste Control Room; and Fire Zone 7211, Radwaste Lab. This performance-based method does not change the assumptions and limitations of the analytical methods used in the development of the radiological release goals, objectives, and performance criteria.

Safety Margin and Defense-in-Depth:

The quantity of non-plenum rated cables above the identified suspended ceiling locations is not significant. The safety margin inherent in the analysis for the fire event has been preserved. This performance-based method does not change the assumptions and limitations of the analytical methods used in the development of the fire protection program. The introduction of the non-plenum rated cable routed above the suspended ceilings does not impact fire protection defense-in-depth. Such cabling does not compromise automatic or manual fire suppression functions, fire suppression for systems and structures, or the Nuclear Safety Capability Assessment.

Conclusion:

NRC approval is requested to approve the presence of cable located above the suspended ceilings located in the fire area/zones listed below which do not meet the requirements of NFPA 805 section 3.3.5.1. The cabling is not in metal conduit, it is not armored cable, it is not enclosed in metal cable trays and it is not plenum rated cable.

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Turbine Building (Fire Area TB-1)

- Turbine Building 1984 Elev. Fire Zone 3225 Access Corridors
- Turbine Building 1984 Elev. Fire Zone 3227 Vestibule 3
- Turbine Building 1984 Elev. Fire Zones 3226, 3228, Hot Lab Areas (Detection)
- Turbine Building 2000 Elev. Fire Zones 4317, 4323, Chemistry Cold Lab
- Turbine Building 2047 Elev. Fire Zone 3611, Access Corridor
- Turbine Building 2047 Elev. Fire Zone 3612, Operations Field Office
- Turbine Building 2047 Elev. Fire Zones 3613, 3613A, 3613B, Operations Misc. Areas
- Turbine Building 2047 Elev. Fire Zone 3614, Access Corridor

Radwaste Building (Fire Area RW-1)

- Radwaste Building Elev. 2000 Fire Zone 7209, Radwaste Control Room
- Radwaste Building Elev. 2000 Fire Zone 7211, Radwaste Lab

Attachment S: Revisions to Transition Report Attachment S – Plant Modifications and Items to be completed during Implementation

Table S-3 Implementation Items

Item	Unit	Description	LAR Section / Source	
12-805-004	1	APA-ZZ-00741, “Control of Combustible Materials,” will be revised to implement "No Storage" and "No Hotwork" controls for Fire Areas A-1, A-11, A-12, A-27, C-1, C-2, C-3, C-7, C-8, C-9, C-10, C-11, C-12, C-17, C-18, C-19, C-20, C-21, C-22, C-23, C-24, C-25, C-26, C-30, C-31, C-32, C-33, C-34, C-36, and C-37.	Attachment V	FM RAI 03.01 a.ii, a.iii, a.iv
12-805-005	1	Upon completion of all Fire PRA credited implementation items in Transition Report Table S-2, verify the validity of the change-in-risk provided in Attachment W. This includes consideration of the following plant modifications: 05-3029, 07-0151 and 09-0025. If this verification determines that the risk metrics have changed such that the RG 1.205 acceptance guidelines are not met, the new Implementation Item 12-805-005 will require implementation of additional analytical efforts, and/or procedure changes, and/or plant modifications to assure the RG 1.205 risk acceptance criteria are met.	Attachment W	PRA RAI 30