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1CAN051501

May 19, 2015

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

SUBJECT: Response to Request for Additional Information
Adoption of National Fire Protection Association Standard NFPA-805
Arkansas Nuclear One, Unit 1
Docket No. 50-313
License No. DPR-51

REFERENCES:
1. Entergy letter dated January 29, 2014, *License Amendment Request to Adopt NFPA-805 Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants (2001 Edition)* (1CAN011401) (ML14029A438)

2. NRC letter dated May 5, 2015, *Arkansas Nuclear One, Unit 1 – Request for Additional Information Regarding License Amendment Request to Adopt National Fire Protection Association Standard 805* (TAC No. MF3419) (1CNA051501) (ML15091A431)

Dear Sir or Madam:

By letter dated May 5, 2015 (Reference 2), the NRC requested additional information associated with the Entergy Operations, Inc. (Entergy) request to amend the Arkansas Nuclear One, Unit 1 (ANO-1) Technical Specifications (TS) and licensing bases to comply with the requirements in 10 CFR 50.48(a), 10 CFR 50.48(c), and the guidance in Regulatory Guide (RG) 1.205, "Risk-Informed Performance-Based Fire Protection for Existing Light-Water Nuclear Power Plants." The amendment request followed Nuclear Energy Institute (NEI) 04-02, "Guidance for Implementing a Risk-Informed, Performance-Based Fire Protection Program under 10 CFR 50.48(c)." This submittal described the methodology used to demonstrate compliance with, and transition to, National Fire Protection Association (NFPA) 805, and included regulatory evaluations, probabilistic risk assessment (PRA), change evaluations, proposed modifications for non-compliances, and supporting attachments.

Based on the complexity of the questions included in the Reference 2 letter, the NRC established response due-dates of 30, 60, 90, or 120 days, from the date of the ANO-1 NFPA 805 Audit Exit Meeting, April 23, 2015. Enclosed are responses to all questions having a 30-day response requirement. In addition, one 60-day Safe Shutdown Analysis (SSA) RAI response is included in this letter.

Changes or additional information, as detailed in this letter, with respect to the original Entergy request (Reference 1) have been reviewed and Entergy has determined that the changes do not invalidate the no significant hazards consideration included in the Reference 1 letter.

In accordance with 10 CFR 50.91(b)(1), a copy of this application is being provided to the designated Arkansas state official.

No new commitments have been identified in this letter.

If you have any questions or require additional information, please contact Stephenie Pyle at 479-858-4704.

I declare under penalty of perjury that the foregoing is true and correct.
Executed on May 19, 2015.

Sincerely,

ORIGINAL SIGNED BY JEREMY G. BROWNING

JGB/dbb

Attachment: 30-day Responses to Request for Additional Information – ANO-1 Transition to NFPA-805

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Attachment 1 to

1CAN051501

30-day Responses to Request for Additional Information
ANO-1 Transition to NFPA-805

30-DAY RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
ANO-1 Transition to NFPA-805

By letter dated May 5, 2015 (Reference 2), the NRC requested additional information associated with the Entergy Operations, Inc. (Entergy) request (Reference 1) to transition the Arkansas Nuclear One, Unit 1 (ANO-1), fire protection licensing basis to National Fire Protection Association (NFPA) Standard NFPA 805, *Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants (2001 Edition)*. Included below are Entergy responses to all questions requiring a 30-day response with respect to the *request for additional information* (RAI) (Reference 2). In addition, one 60-day Safe Shutdown Analysis (SSA) RAI response is included in this letter. The respective question for each RAI is included for convenience.

Fire Protection Engineering (FPE)

Note: FPE RAIs 01, 04, and 06 are expected to be addressed in the 60-day RAI response and FPE RAI 07 in the 90-day RAI response.

FPE RAI 02

NFPA 805 Section 3.4.1 (c) requires that the fire brigade leader and at least two brigade members have sufficient training and knowledge of nuclear safety systems in order to understand the effects of fire and fire suppressants on nuclear safety performance criteria (NSPC). Section 1.6.4.1, "Qualifications," of RG 1.189, Revision 2, "Fire Protection for Nuclear Power Plants," September 2009 (ADAMS Accession No. ML092580550), provides one acceptable approach for implementing the requirements for qualification of the fire brigade leader:

> The brigade leader should be competent to assess the potential safety consequences of a fire and advise control room personnel. Such competence by the brigade leader may be evidenced by possession of an operator's license or equivalent knowledge of plant systems.

In LAR Attachment A, the licensee stated that it complies with the requirements of Section 3.4.1(c), and references station procedures, which state that the fire brigade chief and at least two fire brigade members shall be operations personnel who have sufficient knowledge of safety-related systems to understand the effects of a fire and fire suppressants on the safe shutdown of the unit.

Please provide additional detail regarding the training that is provided to the fire brigade leader and members that addresses their training on plant systems and ability to understand and assess the effects of fire and fire suppressants on NSPC.

Response

Procedure OP-1015.007, *Fire Brigade Organization and Responsibilities*, requires that the fire brigade leader and members are trained and qualified in accordance with procedure OP-1063.020, *Fire Brigade Training Program*. The Fire Brigade leader is from ANO-1 Operations (the fire affected unit), three fire brigade members are from ANO-2 Operations (the unaffected unit), and one fire brigade member is a Non-Licensed Operator (NLO) that may be from either ANO-1 or ANO-2. No individual can be placed on the fire brigade unless the individual has completed Initial fire brigade training. The fire brigade leader and the fire brigade members are required to maintain NLO qualifications.

As stated in procedure OP-1063.020, the fire brigade leader is qualified as a Waste Control Operator (WCO), the most qualified NLO. In addition, the fire brigade leader is required to complete fire brigade leader training and an associated practical examination prior to becoming the leader, and is required to maintain fire brigade member training requirements. The fire brigade training program ensures that the fire brigade leader is capable of taking charge at the scene of the fire affecting the respective unit to direct the fire brigade members and to coordinate fire brigade actions with the Control Room staff.

The scope of WCO training requirements is included in A1QC-WCO-QUAL, *Unit 1 Waste Control Operator Systems Qualification*. A WCO will have completed Auxiliary Operator training prior to the WCO training and thus upon completion of WCO training is knowledgeable of both primary and secondary systems, as well as emergency and abnormal operating procedures. Examples of ANO-1 plant systems included in WCO training are reactor coolant, core flood system, decay heat removal, emergency feedwater, chemical addition, high pressure injection, low pressure injection, ventilation, and radiation monitoring. The ANO approach meets the RG 1.189 guidance to comply with, "…or equivalent knowledge of plant systems."

Procedure EN-TQ-112, *Non-Licensed Operator Training*, requires completion of plant systems training as part of the qualification program designed to give the NLO an understanding of the integrated nature and design of plant systems and structures. Since both units are pressurized water reactors and the fire brigade members participate in drills on both units, the understanding of safe shutdown components is reinforced.

FPE RAI 03

NFPA 805 Section 3.3.12 states, in part:

> The oil collection system for each reactor coolant pump shall be capable of collecting lubricating oil from all potential pressurized and nonpressurized leakage sites in each reactor coolant pump oil system.

In short, it requires that any leakage from the reactor coolant pump oil collection system be safely contained for off-normal conditions. In LAR Attachment L, the licensee requested NRC approval for oil mist resulting from normal operation of the reactor coolant pump oil collection system.

Please provide additional technical justification addressing the following items:

a) Characterization of the misting in terms of oil quantity and location of deposition.

b) Discussion of the fire hazard associated with the oil misting and deposition locations, including proximity to equipment and ignition sources necessary to meet NSPC.

c) The actions taken, if any, to clean oil mist deposits from equipment surfaces (e.g., during maintenance outages).

d) The licensee stated that the three echelons of defense-in-depth are 1) to prevent fires from starting (combustible/hot work controls), 2) rapidly detect, control and extinguish fires that do occur thereby limiting damage (fire detection systems, automatic fire suppression, manual fire suppression, pre-fire plans), and 3) provide adequate level of fire protection for systems and structures so that a fire will not prevent essential safety functions from being performed (fire barriers, fire-rated cable, success path remains free of fire damage, recovery actions). Provide clear bases for concluding that the approval request does not adversely affect the nuclear safety performance criteria (for example, discuss how the location of the oil mist does not affect the function of equipment credited to meet each nuclear safety performance criteria).

   Provide clear bases for concluding that there is no impact on the three elements of defense-in-depth.

Response

a) In recent plant outages, the average amount of oil lost was considered insignificant. The total amount of oil lost includes the loss due to misting, but no distinction is possible between the amount lost due to misting and other losses. Should a significant quantity of oil difference be identified, then a Condition Report would be initiated to address any concerns. With regard to where misted oil may collect, the most common areas include structural steel near the motors, the outside of the motors, motor area insulation, etc. (in general anything near the motor with an apparent preference for cooler surfaces). In the past, this misting manifests itself as a thin film of oil on the aforementioned surfaces, sometimes including small droplets

b) Any oil mist from the Reactor Coolant Pump (RCP) motor lube oil system that is not collected by the oil collection system would be expected to accumulate on, or near, the RCP motor and pump assembly. For a fire to occur, oil would need to be exposed to an ignition source or come in contact with surfaces that have temperatures in excess of the ignition temperature of the oil. Attributes which would prevent ignition of any oil accumulation in the vicinity of the RCP motor and pump assemblies include:

   - The thermal design parameters of the Reactor Coolant System (RCS) insulation are based on a maximum pipe surface temperature of 650 °F. The piping surfaces in the vicinity of the RCP motors are insulated such that lube oil mist would only contact relatively cool surfaces (< 140 °F) of the insulation and not migrate into the fibrous insulation that could break down oil into components with an auto-ignition temperature lower than the surface temperature. The oil used in the RCP motors is Chevron GST 68 (Allis-Chalmers motors), having a flashpoint of > 190 °C (374 °F) and Mobil DTE Medium ISO 46 (Jeumont Industrie motor) having a flashpoint of > 200 °C (392 °F).

- There are few possible sources of potential electrical ignition in close proximity to the RCPs. Electrical junctions in the area are protected with junction/splice boxes and the use of these boxes is typically required for splicing and terminating power cables. The design of the RCPs limits the potential for the ignition of any oil drawn into the motor through the ventilation system. However, RCP motors do get some oil internal to the motor due to oil mist going down the standpipe. Improvements have been made to the motors during refurbishments/rewinds to minimize oil leaks during operation. The oil misting and internal oil leaks pose no threat to the RCP motor from a fire threat based on motor operating temperatures (150-200 °F) being below the ignition temperature of the oil.

- Due to the misting affect, there may be a fine film of oil on components in the area of the RCP motors, which will have no adverse impact of the subject components. No accumulation of oil is expected in the webbed areas of these components, collection pans, or dripping from any of the RCP components. If an abnormal accumulation of oil is found or the integrity of the collection system is determined to be deficient, a work order is initiated to clean surfaces and documented in procedure OP-1504.001, *Visual Inspection of the Unit 1 & 2 RCP Oil Collection System*. This inspection falls under the responsibility of System Engineering and ensures that anything more than a fine film of oil is documented, tracked by a Condition Report, and acceptable determined prior to unit startup.

c) With regard to cleaning the surfaces identified with an oil film deposition, the cleaning is performed every refueling outage as a Preventive Maintenance task for the motor per procedure OP-1412.066, *Unit 1 Allis-Chalmers Reactor Coolant Pump Motor Lube PM*, and Model Work Order (MWO) WO-50240566, *Unit 1 Jeumont Industrie Reactor Coolant Pump Motor Lube PM*, that includes cleaning all accessible areas of each motor. If the need for cleaning of surrounding structures is identified during the performance of procedure OP-1504.001, a Condition Report is initiated and a Work Order may be written for cleanup, as deemed necessary.

d) The three echelons of defense-in-depth are discussed in more detail below. The potential for oil mist from RCPs does not impact fire protection defense-in-depth.

Echelon 1: The Reactor Building Fire Zones are classified as Level 1 Combustible Control Zones which require a continuous fire watch for any combustibles left unattended in these fire zones. The control of hot work activities ensures that any hot work in the RCP areas will include a hot work fire watch and necessary controls for mitigating fires (i.e., local extinguisher). The oil collection system will capture any excess oil that is present on the RCP motor.

Echelon 2: The ability to detect and suppress a fire in the Reactor Building cavities is unchanged by potential oil misting. The type of fire anticipated in the Reactor Building cavities is unchanged given the existing lube oil quantities within the RCP motor reservoirs. The manual hose stations are located outside the reactor building cavities and are unaffected by the RCP oil misting. Fire extinguishers are installed in the Reactor Building during refueling outages to provide extra fire suppression capabilities during work activities. The Pre-Fire Plans are not affected by RCP oil misting.

Echelon 3: The potential for oil mist from the RCPs does not result in degradation of the level of fire protection for systems or structures. The Reactor Building outer wall is the 3-hour rated fire barrier for the Reactor Building. RCP oil mist does not affect fire barriers given the oil mist will not come into contact with the Reactor Building fire barrier. The Reactor Building has two analysis areas separated north to south by the primary shield wall. Ignition of condensed oil mist in either cavity will not result in the spread of fire from one cavity to the other cavity. The oil mist will not degrade fire rated cable or affect any success paths. There are no recovery actions in the area of the RCPs. The location of the RCPs and the location of the oil mist does not affect the function of equipment credited to meet any of the nuclear safety performance criteria.

FPE RAI 05

NFPA 805 Section 3.5.14 requires that all fire protection water supply and fire suppression system control valves be under a periodic inspection program and supervised. LAR Attachment A, Element 3.5.14 states that ANO-1 "Complies by previous NRC approval." The citation in the Compliance Basis that supports the previous approval determination refers to an NRC safety evaluation, which states that the plant Technical Specifications (TS) require the periodic inspection of fire water system valve position that are not locked, sealed, electronically supervised, or otherwise secured in position to assure that values are maintained in the open position.

Please confirm that this requirement remains in the TS or identify how this requirement is currently controlled and maintained.

Response

The plant TSs associated with the fire suppression control valves have been relocated to the plant Technical Requirements Manual (TRM). The requirement of NFPA 805, Section 3.5.14, that all fire protection water supply and fire suppression system control valves be under a periodic inspection program and supervised is implemented via TRM sections 3.7.8 and 3.7.9.

FPE RAI 08

In LAR Attachment A, Section 3.4.1, "Onsite Fire Fighting Capability," the licensee stated that the Fire Brigade Leader (Unit 1) and three other members (Unit 2) are from the Operations Department. Please discuss how the use of three members from Unit 2 will affect the minimum shift crew staffing contained in the TS and Emergency Plan for Unit 2.

Response

This response assumes a fire in the ANO-1 Control Room that results in Control Room abandonment and entry into Abnormal Operating Procedure (AOP) 1203.002, *Alternate Shutdown*, which includes in its assumption that ANO-2 will perform a remote shutdown simultaneously with the ANO-1 Alternate Shutdown. The following discussion demonstrates the staffing levels are sufficient to support fire brigade response and perform a remote shutdown on ANO-2.

Technical Specifications (TS)

ANO-1 Technical Specification (TS) 5.2.2 and ANO-2 TS 6.2.2, *Unit Staff*, include the following in terms of shift manning for licensed and non-licensed operators:

a. A non-licensed operator shall be on site when fuel is in the reactor and two additional non-licensed operators shall be on site when the reactor is in MODES 1, 2, 3, or 4.

b. The minimum shift crew composition for licensed operators shall meet the minimum staffing requirements of 10 CFR 50.54(m)(2)(i) for one unit, one control room.

Per 10 CFR 50.54(m)(2)(i), two senior reactor operators and two reactor operators are required to meet the staffing levels for one unit and one control room.

Emergency Response Organization

The minimum on-shift staffing requirements per the ANO Emergency Plan, Table B-1, are as follows:

Position	**ANO-1**	**ANO-2**
Manager, Shift Ops (SRO)	1	1
Supervisor, Control Room (SRO)	1	1
Control Room Operators (RO)	2	2
Auxiliary Operators	2	2
Shift Engineer	1	1
Waste Control Operator	1	1
Communicator	1	1

The current on-shift staffing requirements reflect those listed in Table B-1, with one additional NLO qualified as a fire brigade member assigned to either unit (resulting in nine NLOs between the two units). The two communicators, who are included in the nine, can have no collateral duties.

The fire brigade is comprised of NLOs. The fire affected unit provides the fire brigade leader, who is a qualified WCO, three of the members come from the unaffected unit with the fourth member coming from whichever unit has the additional NLO described above.

The ANO-2 Remote Shutdown procedure, OP-2203.030, states:

> If Unit 1 is performing an “Alternate Shutdown,” all Unit 2 Non Licensed Operators will be assigned to the Fire Brigade.

If the Alternate Shutdown were on ANO-2 and Remote Shutdown on ANO-1, the ANO-1 Remote Shutdown (1203.029) procedure includes a similar statement concerning the ANO-1 NLOs.

In order to perform an Alternate Shutdown and respond to the fire on ANO-1 and a Remote Shutdown on ANO-2, the following staff is needed:

Position	ANO-1 Alternate Shutdown	ANO-2 Remote Shutdown	ANO-1 Fire Brigade
Manager, Shift Ops (SRO)	1	1	
Supervisor, Control Room (SRO)	1	1	
Control Room Operators (ROs)	2	2	
Auxiliary Operators (NLOs)	2	0	2 from ANO-2
Shift Engineer	1	1	
Waste Control Operator (NLOs)	0	0	2 (both unit WCOs, with ANO-1 WCO as the leader)
Communicator (NLO)	1	1	
Additional NLO (can be from either unit)	0	0	1

Therefore, the use of on-shift personnel from ANO-2 for fire response does not affect the ability of the remaining staff to perform a Remote Shutdown or to support Emergency Plan response.

Since initial startup, the NRC has required the ANO units to maintain a five-member fire brigade. The sharing of members between units has long been documented through various correspondence over the years, including NRC inspection reports related to triennial fire inspections. The key to permitting the sharing of personnel is to ensure other functions required by each unit will continue to be met during a fire on either unit, including the ability to meet Emergency Operating Procedure (EOP) / AOP requirements and Emergency Plan requirements. On-shift staffing levels have been increased over the years to accommodate changes in EOP/AOP and Emergency Plan requirements. As discussed above, the current on-shift staffing level is sufficient to meet these requirements while simultaneously providing five individuals to support fire response activities.

Safe Shutdown Analysis (SSA)

Note: The response to 60-day SSA RAI 02 is included below. SSA RAIs 06 and 08 are expected to be addressed in the 60-day RAI response, SSA RAIs 07, 09, and 10 in the 90-day RAI response, and SSA RAI 11 in the 120-day RAI response.

SSA RAI 01

In LAR Section 4.2.1.2, the licensee described the methodology for establishing safe and stable conditions for the plant, which is based on the NFPA 805 Nuclear Safety Capability Assessment (NSCA) methodology described in LAR Attachment B. The licensee stated, in part, that

> The 'At Power' safe shutdown analysis postulates a single fire occurring at 100% power and provides a listing of conflicts that may impact the assured success path to meet a particular nuclear safety performance goal.

Please describe what is meant by "a listing of conflicts that may impact the assured success path to meet a particular nuclear safety performance goal" and how these conflicts were addressed in meeting the requirements of NFPA 805 Chapter 4.

Response

Conflicts are defined as the equipment in a success path that could be impacted by the fire such that the nuclear safety performance criteria within a given fire area is not met. The loss of equipment, documented in the safe shutdown analysis, can be due to fire impact of cables, the equipment being physically in the fire area, or loss of a support system. If analysis indicates the equipment remains in a desired post fire position or separation is achieved by means of NFPA 805, Section 4.2.3.3, it is documented. Any equipment that required a recovery action for establishing safe and stable operation is documented as a Variance from Deterministic Requirements (VFDR) and evaluated in fire risk evaluations using the risk informed performance base approach of NFPA 805, Section 4.2.4.

SSA RAI 02

NFPA 805, Section 2.4.2.2.1 states, in part:

> Circuits required for the nuclear safety functions shall be identified. This includes circuits that are required for operation, that could prevent the operation, or that result in the maloperation of the equipment identified in 2.4.2.1. This evaluation shall consider fire-induced failure modes such as hot shorts (external and internal), open circuits, and shorts to ground, to identify circuits that are required to support the proper operation of components required to achieve the nuclear safety performance criteria, including spurious operation and signals.

In LAR Section 4.2.1.4 and LAR Attachment F, the licensee described the process for reviewing and evaluating fire-induced multiple spurious operations (MSOs). Please provide the following additional information:

a) In Step 1 of the process, the licensee stated that a Pressurized-Water Reactor (PWR) Owners Group generic list of MSOs was not yet available at the time of the expert panel meeting in 2005, and that the list of PWR generic MSOs from Revision 2 of NEI 00-01, "Guidance for Post-Fire Safe Shutdown Circuit Analysis," May 2009 (ADAMS Accession No. ML091770265), was subsequently evaluated to ensure that applicable MSOs from this list were included in the NSCA and Fire Probabilistic Risk Assessment (FPRA) model. The licensee did not discuss how the list of PWR generic MSOs in Revision 2 of NEI 00-01 was evaluated, such as by reconvening the expert panel or licensee staff. Please describe the process and expertise used to perform the review the list of PWR generic MSOs.

b) In Step 2 of the process, the licensee stated that the Expert Panel "focused on identifying those spurious actuations and combinations thereof that could be risk significant," and that an initial screening was performed by the panel based on the

function affected, the potential consequences, and the time available to mitigate the potential transient, such that "spurious actuations and combinations of spurious actuations that did not require a mitigating action in the first hour after the reactor trip were identified." Please describe how spurious actuations required to be mitigated within the first hour after reactor trip, if any, were evaluated in the MSO review.

Response

a) Engineering Report No. CALC-ANO1-FP-09-00020, Rev. 0, *ANO-1 NFPA-805 Evaluation of Multiple Spurious Operations,* documents the results of the MSO Expert Panel review and disposition of the PWR generic MSOs from Revision 2 of NEI 00-01, May 2009. In addition, the report included verification that the guidance in FAQ 07-0038, *Lessons Learned on Multiple Spurious Operations*, Revision 1, July 24, 2008, was utilized. As noted in the report, the review of PWR generic MSOs identified in NEI 00-01, Revision 2, was not performed by the expert panel since the list was not available at the time. Instead, CALC-ANO1-FP-09-00020 documents that the PWR generic list of MSOs included in Revision 2 of NEI 00-01 was assessed by individuals qualified in PRA and Safe Shutdown, using the guidance in FAQ 07-0038. For each of the PWR MSOs an evaluation was performed, which includes separate discussions of how the MSO was treated in the FPRA model and in the NSCA. The FPRA model and NSCA include equipment and cables of concern identified during the 2005 expert panel review and those considered non-risk significant by the 2005 expert panel, as well as the applicable PWR generic MSOs. The Engineering Report was prepared, reviewed, and approved in accordance with Entergy procedures.

b) The expert panel focused on those fire-induced transients that would require operator action in the first hour after the fire and subsequent reactor trip, and those that could potentially damage equipment that may be required later, such as the credited Low Pressure Safety Injection (LPSI) pump used for Shutdown Cooling. The panel also considered whether the synergistic effects of concurrent spurious actuation in different systems serving different safe shutdown functions could adversely affect safe shutdown. CALC-ANO1-FP-09-00020, Appendix A, provides documentation of the disposition of each of the PWR generic MSOs from Revision 2 of NEI 00-01 and identifies the MSOs that have been included in the ANO-1 FPRA model and the NSCA. Where an MSO is concerned with the possibility that two different valves may spuriously operate, each fire scenario that impacts cables or components such that the fire-induced failure could result in spurious operation of both valves was evaluated with the basic events for both of the valves. Thus, the impact of the MSO was evaluated in all applicable scenarios. Timing for Operator actions is addressed for feasibility to ensure acceptability of actions.

SSA RAI 03

In LAR Attachment G, the licensee included the results of evaluating the feasibility of recovery actions (Step 4) and stated that implementation items resulting from the feasibility evaluation include development/revision of procedures and revisions to the training program to reflect the procedure changes.

LAR Attachment S, Table S-2, Implementation Item S2-5 involves revising operator manual action (OMA) procedures/documents to include feasibility criteria in Frequently Asked Question (FAQ) 07-0030, "Establishing Recovery Actions," dated February 4, 2011 (ADAMS Accession No. ML110070485) for recovery actions listed in LAR Attachment G, Table G-1, "Recovery Action Transition." This implementation item does not discuss the need to revise the training program to reflect procedure changes.

a) Please clarify if LAR Attachment S, Table S-2, Implementation Item S2-5 includes the post-transition action to revise the training program, or identify the correct implementation item for the training program revisions.

b) Please clarify whether or not the training program described in LAR Attachment G includes the performance of periodic drills as described in Table B-TBD in FAQ 07-0030.

Response

a) Implementation Item S2-5 states: “Revise operator manual action (OMA) procedures/documents to include feasibility criteria in FAQ 07-0030 for the recovery actions listed in Table G-1 of Attachment G, Recovery Action Transition.” Completion of this action ensures the feasibility criteria outlined in FAQ 07-0030 are included in a program document such that the criteria are reviewed when changes are made that may impact recovery actions.

   However, any revisions to the training program will be implemented under Item S2-6, which states: “Develop or revise technical documents and procedures that relate to new Fire Protection design and licensing basis (e.g., ANO Fire Protection Program, OP-1003.014, Technical Requirements Manual, Design Basis Document, Pre-Fire Plans, Maintenance and Surveillance Procedures, Configuration Control Program, Training and Qualification Guidelines, etc.) as required for implementation of NFPA 805.”

b) 10 CFR 55.59, *Requalification*, paragraph (c), *Requalification program requirements,* includes a requirement to provide training on abnormal operating procedures on a continuous basis not to exceed two years. The two procedures that include recovery actions (Alternate Shutdown and Fires in Areas Affecting Safe Shutdown) are abnormal operation procedures and fall into this training schedule. The training program currently allows classroom, simulator, or field training to meet this requirement and will be updated as required by Item S2-6 as discussed above. FAQ 07-0030, Criterion 11, states the following:

   Periodic drills that simulate the conditions to the extent practical (e.g., communications between the control room and field actions, the use of SCBAs if credited, the appropriate use of operator aids).

   Because Item S2-6 involves a broad range of changes, internal tracking item LAR-2014-00248, CA 50, has been previously issued to ensure the specific requirements of FAQ 07-0030, Criterion 11, are incorporated in the training program.

SSA RAI 04

NFPA 805 Section 2.4.2.2.1 states, in part:

> Circuits required for the nuclear safety functions shall be identified. This includes circuits that are required for operation, that could prevent the operation, or that result in the maloperation of the equipment identified in 2.4.2.1.

NFPA 805 Section 2.4.2, "Nuclear Safety Capability Assessment," requires licensees to perform an NSCA. RG 1.205 endorsed the guidance in NEI 00-01 Chapter 3 as one acceptable approach to perform an NSCA.

In LAR Attachment B, the licensee stated in its Alignment Basis for Attribute 3.3.3.1 that all cables including those from interlocks, instruments, and power supplies that could adversely impact the desired operation of a piece of safe shutdown equipment are listed as safe shutdown cables. This includes cables external to the component control circuit if any cable fault could adversely impact the required state of the component, unless the cable is included with another piece of safe shutdown equipment.

Please provide the following additional information:

a) The licensee stated that "in some special cases, the circuit analysis was completed based on components being skid mounted." Please clarify the intent of the statement.

b) The licensee stated that safe shutdown equipment (SSEs), which have support systems that are not modeled/credited in the analysis, do not have cables identified, so they are assumed to fail in every fire area such that an operator action is always required to perform their credited safe shutdown function. Please describe how these operator actions are evaluated in the NSCA (i.e., would they be evaluated in the performance-based analysis and credited for DID if not required for risk).

c) In the alignment bases for Attribute 3.3.1.2 regarding failure of a single cable that could impact more than one piece of safe shutdown equipment, the licensee stated that "where a cable may affect several SSEs, these cables are assigned to those SSE's circuit analysis." The methodology alignment for Attribute 3.3.1.2 appears to contradict the statement for Attribute 3.3.1.1 where the licensee states that "cables are listed as safe shutdown cables .... , unless the cable is included with another piece of safe shutdown equipment." Please provide an explanation of the intent of these two statements that appear to contradict each other.

Response

a) Skid mounted components are subassemblies of a larger piece of equipment within the same fire area. These skid mounted components are identified with the Safe Shutdown Equipment List (SSEL), but do not have separate circuit analysis as their failure is bounded by the associated equipment. An example is the Emergency Feedwater (EFW) turbine P-7A that is skid mounted along with its control panel C-531. Failure of C-531 bounds P-7A and any cables between C-531 and P-7A.

b) Air Operated Valves (AOVs) are the only ANO-1 equipment that have a support system, instrument air, that is not modeled/credited in the analysis. All AOVs are initially assumed to fail as the status of instrument air is unknown. If an AOV's control circuits can be shown to be free of fire damage in a given fire area and the AOV fails to the desired position on loss of air, then an allowable Control Room action is applied. Any AOV that required a recovery action outside the main Control Room (i.e., locally vent air) for a success path to achieve and maintain the nuclear safety performance criteria was documented as a VFDR and evaluated in fire risk evaluations using the risk informed performance based approach of NFPA 805, Section 4.2.4.

c) The alignment basis for Attribute 3.3.1.1 can be refined to note that cables that could cause adverse operation of SSE will be included unless those cable(s) are included with other SSE that can be logically associated in the fault tree to capture failure. Note, as reflected in the response to a) above, skid mounted equipment is an exception.

   The alignment bases for Attribute 3.3.1.2 addresses cables that are part of an interfacing circuit that can impact multiple pieces of equipment. In this instance, there is no separate basic event within the fault tree and the interfacing circuits become part of the circuit analysis for multiple pieces of equipment.

SSA RAI 05

NFPA 805 Section 2.4.2, "Nuclear Safety Capability Assessment," requires licensees to perform an NSCA. RG 1.205 endorsed the guidance in NEI 00-01 Chapter 3 as one acceptable approach to perform an NSCA.

In LAR Attachment B, the licensee stated in the Alignment Basis for Attribute 3.1.1.11 that ANO-1 and ANO-2 do not share resources required to meet performance goals for control of reactivity, inventory, pressure, and decay heat removal. However, in LAR Attachment C for fire area 1-2 North Switchgear Room, the licensee stated in the "Method of Accomplishment" for meeting the performance goals for Vital Auxiliaries (e.g., HVAC) that ANO-1 shares a common control room envelope with ANO-2. The licensee further stated that ANO-2 condensing units (2VE-1A and 2VE-1B), and the control room emergency recirculation units (2VUC-27A and 2VUC-278) are available. Also, in LAR Section 4.2.1.2, the licensee stated that safe and stable conditions in Mode 3 may continue long term by transferring water between the non-qualified Condensate Storage Tanks maintained in ANO-2 to ANO-1 by manipulation of valves and that fuel oil supplies can be cross-connected between ANO-1 and ANO-2, if needed.

Please clarify the discrepancy between the alignment bases for NEI 00-01 Attribute 3.1.1.11 and the Unit 2 equipment credited in LAR Attachment C for fire area 1-2.

Response

The Alignment Basis for Attribute 3.1.1.11 [Multiple Affected Units] is being clarified to better reflect where shared resources are credited (or not credited) in the ANO-1 safe shutdown analysis. Entergy requests the NRC replace the Alignment Basis for Attribute 3.1.1.11 in the original LAR (Reference 1) with the following:

ANO-1 and ANO-2 do not share systems required to meet performance goals for control of reactivity, inventory, pressure, or decay heat removal. Each unit has dedicated Service Water (SW) and electrical distribution vital auxiliaries physically separate from the opposite unit. No single fire results in simultaneous safe shutdown of both units for a fire outside the Control Room envelope. The ANO-1 and ANO-2 Control Rooms share a common envelope and staffing is adequate to perform an alternate shutdown on the fire-affected unit and remote shutdown on the opposite unit.

ANO-1 has the capability to share resources with ANO-2 where the resource is available and adequate to support both units. The following describes where shared resources are credited (or not credited) to achieve and maintain safe shutdown.

Condensate/Non-Borated Water

ANO-1 and ANO-2 share common sources of non-borated water from the Lake Dardanelle Reservoir, Emergency Cooling Pond (ECP), and Qualified Condensate Storage Tank (QCST); however, each unit maintains its own separate paths to these sources. Other onsite sources of condensate for Steam Generator feedwater are available via normally closed manual valves such as from non-qualified CSTs, but only the SW source (from Lake Dardanelle or the ECP) is credited for long term cooling once depletion of the QCST occurs.

Fuel Oil

Each unit at ANO has dedicated safety-related fuel oil tanks for the Emergency Diesel Generators (EDGs) that are filled from a common non-qualified bulk storage tank. The vaults for each respective unit's tanks are isolated from the other unit's tanks by 3-hour rated walls. Fuel from the ANO-2 safety-related fuel oil tanks can be transferred to ANO-1 via a temporary cross connect, but is not credited within the ANO-1 safe shutdown analysis.

Safety Parameter Display System (SPDS)

The SPDS computer provides backup instrumentation to safety-related instruments for both Control Rooms and is used for alternate shutdown. The SPDS computer is physically located in ANO-2 and is powered from an ANO-2 safety-related EDG and battery-backed inverter. SPDS room cooling can be powered from either ANO-1 or ANO-2 (reference procedure OP-2105.014, *Safety Parameter Display System Operation*). A fire in ANO-2 that impacts the SPDS does not require a safe or alternate shutdown of ANO-1.

Control Room Ventilation

ANO Control Rooms share a common envelope and the ANO-2 Control Room Emergency Ventilation System (CREVS) is designed to maintain ventilation for both units if either the ANO-1 (VSF-9) or the ANO-2 (2VSF-9) emergency supply fan fails due to fire in the respective unit outside of the Control Room. For a fire in ANO-1, the ANO-2 condensing units (2VE-1A and 2VE-1B) and recirculation units (2VUC-27A and 2VUC-27B) are available as part of the Control Room Emergency Air Conditioning System (CREACS). For a fire in ANO-2, the ANO-1 Control Room emergency unit cooler VUC-9 remains available.

Radioactive Release

Radioactive Release RAI 01

NFPA 805, Section 1.3.2, states, in part, that:

> The radioactive release goal is to provide reasonable assurance that a fire will not result in a radiological release that adversely affects the public, plant personnel, or the environment.

For areas where engineered containment is not provided to contain radioactive effluent, please describe manual actions or temporary measures that may be taken to contain or limit potential liquid and gaseous effluent releases (storm drain covers, dikes, eductors, etc.).

Response

At ANO radioactive material handling is procedurally controlled using EN-RP-121, *Radioactive Material Control*. This procedure provides a standard method for handling, controlling, storing, and accountability of radioactive material that is not contained in process streams such as tanks, pipes and other installed equipment. All radioactive material is required to be identified and monitored within the plant protected area.

Potentially contaminated water from fire suppression activities are controlled by EN-RP-113, *Response to Contaminated Spills / Leaks*, and OP-1052.030, *ANO Spill Prevention Control and Countermeasure Plan*. This is enforced through general Hazardous Material training (ASCBT-HZM-OSHA1 and ASCBT-HZM-OSHA2) in which containment of flowing material are considered such as using dikes or dams.

Radiation Protection (RP) personnel are involved when responding to fires in radiologically controlled areas, including areas where radioactive materials are stored. EN-TQ-125, *Fire Brigade Drills*, specifies fire brigade drills shall be conducted to include radiological control practices at least once per year [Section 5.3 [12](a)].

Fire Brigade members receive training in responding to fires in controlled access areas with the support of RP personnel (lesson plan ASLP-FP-CAFRS) and for fire-fighting strategy and tactics (lesson plan ASLP-FP-STRATEGY). Following each fire drill, the Fire Brigade Leader critiques the drill using response criteria that include consideration of radiological/chemical hazards during drills (EN-TQ-125, Attachment 9.3). OP-1015.007, *Fire Brigade Organization and Responsibilities*, which is utilized in drills and emergency response, includes a Fire Tactical Worksheet (Exhibit A) which addresses notification for additional assistance, if required, from RP or other personnel.

For these plant areas with limited engineering controls, ANO concludes that a combination of radiation monitoring and compensatory actions taken by the Fire Brigade and RP and/or Chemistry personnel will be adequate to contain a radioactive release to within the NFPA 805 radioactive release goals, objectives, and performance criteria.

Summary

This letter provides the requested 30-day responses to NRC RAIs (Reference 2) associated with the ANO-1 NFPA-805 LAR dated January 29, 2014 (Reference 1). In addition, one 60-day Safe Shutdown Analysis RAI response (SSA RAI 02) is included in this letter. Finally, Entergy requests the related information contained under Alignment Basis for Attribute 3.1.1.11 [Multiple Affected Units] in the original LAR (Reference 1), Attachment B, be replaced with the information contained in response to SSA RAI 05 above, as described previously in this letter.

REFERENCES

1. Entergy letter dated January 29, 2014, *License Amendment Request to Adopt NFPA-805 Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants (2001 Edition)* (1CAN011401) (ML14029A438)

2. NRC letter dated May 5, 2015, *Arkansas Nuclear One, Unit 1 – Request for Additional Information Regarding License Amendment Request to Adopt National Fire Protection Association Standard 805* (TAC No. MF3419) (1CNA051501) (ML15091A431)