Entergy Operations, Inc.
17265 River Road
Killona, LA 70057-3093
Tel 504-739-6660
Fax 504-739-6698
djacob2@entergy.com

Donna Jacobs
Vice President - Operations
Waterford 3

W3F1-2013-0022

May 16, 2013

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

SUBJECT: Response to 2nd Round Request for Additional Information Regarding Adoption of National Fire Protection Association Standard NFPA 805
Waterford Steam Electric Station, Unit 3
Docket No. 50-382
License No. NPF-38

REFERENCES:

1. Entergy letter W3F1-2011-0074 "License Amendment Request to Adopt NFPA 805 Performance-Based Standard for Fire Protection for Light Water Reactor Generating Plants (2001 Edition)", Waterford Steam Electric Station, Unit 3 dated November 17, 2011
2. Entergy letter W3F1-2012-0005 "Supplemental Information in Support of the NRC Acceptance Review of Waterford 3 License Amendment Request to Adopt NFPA 805 Waterford Steam Electric Station, Unit 3" dated January 26, 2012
3. Entergy letter W3F1-2012-0064 "Response to Request for Additional Information Regarding Adoption of National Fire Protection Association Standard NFPA 805 License Amendment Request Waterford Steam Electric Station, Unit 3" dated September 27, 2012
4. Entergy letter W3F1-2012-0083 "90 Day Response to Request for Additional Information Regarding Adoption of National Fire Protection Association Standard NFPA 805 License Amendment Request Waterford Steam Electric Station, Unit 3" dated October 16, 2012
5. NRC Transmittal to Entergy dated March 22, 2013, "Request for Additional Information Regarding Adoption of National Fire Protection Association Standard NFPA 805 (TAC No. ME7602)"

Dear Sir or Madam:

By letter dated November 17, 2011, as supplemented by letters dated January 26, September 27, and October 16, 2012 (References 1, 2, 3 and 4, respectively), Entergy Operations, Inc. (Entergy), submitted a license amendment request (LAR) to transition its fire protection licensing basis at the Waterford Steam Electric Station, Unit 3, from paragraph 50.48(b) of Title 10 of the *Code of Federal Regulations* (10 CFR) to 10 CFR 50.48(c), "National Fire Protection Association Standard NFPA 805" (NFPA 805).

In letter dated March 22, 2013 (Reference 5), the NRC staff made a Request for Additional Information (RAI) needed to complete its review with responses due in 60 calendar days. Attachment 1 provides the responses to those questions. Attachment 2 provides an updated LAR Table S-2 showing updates from our responses in RAIs FPE 15, SS 01.01, SS 02.01, SS 08.01 and SS12.

It is important to note that many of the analyses have been updated since the submittal of Reference 1 to remove any reliance on Unreviewed Analysis Methods (UAMs) and be aligned with the NRC-accepted Fire PRA methods. The method sensitivity analysis performed indicates that the results of the original analysis are generally bounding. The beneficial results of the re-analyses include a reduction in the number of Variance from Deterministic Requirements (VFDRs), and an anticipated reduction in the calculated Total Core Damage Frequency (CDF) of approximately 29%. Details of these ongoing re-analyses are provided in the RAI responses presented in Attachment 1.

There are no new regulatory commitments contained in this submittal.

If you require additional information, please contact the acting Licensing Manager, Bryan Pellegrin, at 504.739.6203.

I declare under penalty of perjury that the foregoing is true and correct. Executed on May 16, 2013.

Sincerely,

DJ/AJH

Attachments:

1. Additional information in Support of NRC Review for Waterford 3 NFPA 805 License Amendment Application
2. Revised Table S-2, Implementation Items, Waterford 3 NFPA 805 License Amendment Application

cc: Mr. Arthur Howell III
Regional Administrator
U. S. Nuclear Regulatory Commission
Region IV
1600 E. Lamar Blvd.
Arlington, TX 76011-4511
RidsRgn4MailCenter@nrc.gov

NRC Senior Resident Inspector
Waterford Steam Electric Station Unit 3
P.O. Box 822
Killona, LA 70066-0751
Marlone.Davis@nrc.gov

U. S. Nuclear Regulatory Commission
Attn: Mr. N. Kalyanam
Mail Stop O-07D1
Washington, DC 20555-0001
Kaly.Kalyanam@nrc.gov

Louisiana Department of Environmental Quality
Office of Environmental Compliance
Surveillance Division
P.O. Box 4312
Baton Rouge, LA 70821-4312
Ji.Wiley@LA.gov

Attachment 1 to

W3F1-2013-0022

Additional Information in Support of NRC Review for Waterford 3 NFPA 805 License Amendment Application

Additional Information in Support of NRC Review for Waterford 3 NFPA 805 License Amendment Application

Additional information was requested by the NRC Staff on March 22, 2013 in support of the Review for Waterford Steam Electric Station, Unit 3 (Waterford 3) License Amendment Request (LAR) dated November 17, 2011. The following provides the Entergy additional information requested by the NRC staff.

Fire Modeling RAI 01.01

By letter dated October 16, 2012, the licensee responded to Fire Modeling (FM) RAI 01.n and described the purpose of the three supplements to the Generic Fire Modeling Treatments that were used in the Fire Probabilistic Risk Assessment (FPRA). The NRC staff has determined it is unclear whether secondary combustibles or panel fire propagation were considered in all of them. For example, the responses discuss whether secondary combustibles were considered in Supplement 2, but not for Supplement 5.

Please state whether detailed fire modeling was required or performed at Waterford 3 to account for secondary combustibles or panel fire propagation and provide the results of such additional analysis. If such detailed fire modeling was not performed, provide a technical justification for why it was not necessary.

Waterford 3 Response

Detailed fire modeling was conducted in Waterford 3 Physical Analysis Units (PAUs) to address ignition of secondary combustibles and fire propagation between adjacent electrical panels.

As part of the transition to a more aligned NUREG/CR-6850 Fire PRA, a re-evaluation of all fire ignition sources in Waterford 3 PAUs was performed. This included additional walkdowns to examine the placement and extent of secondary combustible sources in the PAUs and a re-evaluation of ignition sources to determine if secondary ignition and associated fire expansion could occur (Reference 1).

The fire development within cable trays is assessed using the methods presented in NUREG/CR-6850 (Reference 4). Heat release rates were selected from NUREG/CR-6850 and NUREG/CR-7010 (Reference 5) as appropriate. The PAUs where secondary ignition was significant were found to involve oil fires or electrical panel ignition sources (Reference 6).

Walkdowns (References 1 and 8) were also performed to gather information related to fire propagation between adjacent electrical panels including the panels in the Main Control Room (MCR). The review considered whether panels between cabinets were solid or had cut outs and if air spaces existed between panels. Using this information, panel propagation was reexamined during a comprehensive update to the fixed fire sources using guidance provided in NUREG/CR-6850 Appendix S (Reference 6), Supplement 1 to NUREG/CR 6850 (Reference 7) and information from accepted Fire PRA FAQs (Frequently Asked Questions). The response to RAI FM07 reflects the impact of the additional assessments on the CDF and LERF estimates.

Detailed fire modeling was performed as a part of the fire PRA revision. The use of detailed fire modeling by implementing FDT and limited CFAST modeling provided two benefits. First, the use of more detailed fire modeling based on plant specific spatial information allowed for the fire impacts from ignition sources to be reduced. This resulted in lower frequency contributions from individual fire sources which offset the frequency increases caused by the removal of UAMs

present in the prior evaluation. Second, it provided more plant-specific insights into the risk significant PAUs.

As a part of the modeling impacts the potential for secondary combustibles ignition and/or panel fire propagation was considered. The inclusion of these aspects identified that specific transient combustible scenarios could result in secondary combustion of fixed combustible loads in RAB 27. Additional secondary combustible scenarios were also found for PAUs RAB 5, RAB 6, RAB 8A, RAB 1E and the TGB (References 2, 3 and 6). Panel fire propagation was limited to those panels without intervening gaps and/or solid panels. Heat and flame effects on adjacent panels were considered along with the potential for hot gas layer generation which was identified for cabinets in RAB 7.

References

1. Logan, B., et al, Waterford Steam Electric Station 3 Fire PRA Walkdown Notebook, Rev. 0, Reliability and Safety Consulting (RSC) Engineers, Inc., RSC 13-13, April 2013.
2. Stephens, P., et al, Waterford Steam Electric Station 3 Transient Fire Summary Report, Rev. 2, RSC Engineers, Inc., RSC 12-22, April 2013.
3. RSC Calculation RSC-CALKNX-2012-0827, Rev. 1, Resolution of RAI Based on Secondary Ignition, October 2012.
4. Fire Probabilistic Risk Assessment Methods Enhancements, USNRC and EPRI, NUREG/CR-6850 Supplement 1, September 2010.
5. Cable Heat Release, Ignition, and Spread in Tray Installations During Fire (CHRISTIFIRE), United States Nuclear Regulatory Commission (USNRC), NUREG/CR-7010, July 2012.
6. Miller, J., et al, Waterford Steam Electric Station 3 Fixed Ignition Source Assessment, Rev. 2, RSC Engineers, Inc., RSC 13-04, April 2013.
7. EPRI/NRC-RES Fire PRA Methodology for Nuclear Power Facilities, Volume 2, USNRC and EPRI, NUREG/CR-6850, September 2005.
8. Shehane, M., et al, Waterford Steam Electric Station 3 Fire PRA Main Control Room Analysis Notebook, Rev. 0, RSC Engineers, Inc., RSC 12-51, December 2012.

Fire Modeling RAI 02.01

By letter dated October 16, 2012, the licensee responded to FM RAI 02.e and stated that “Holes in closed/sealed raceways were not considered in the FPRA.”

Please state whether there are no closed or sealed raceways with holes or the effect of holes in closed/sealed raceways on thermal exposure of cables was ignored and provide justification if such holes were not considered in the FPRA.

<u>Waterford 3 Response</u>

Subsequent to providing the October 16, 2012 response, a decision was made to revise the Waterford 3 Fire PRA to be more aligned with NUREG/CR-6850 compliant without dependence on UAMs. As a result, most of the task areas identified in NUREG/CR-6850 Figure 1 were

revised and new work performed to be in accordance with the guidance of the NUREG/CR-6850. This included a more plant-specific assessment of the Waterford 3 site including a reassessment of cable tray characteristics.

Detailed walkdowns were performed for all PAUs during this process (Reference 1). One aspect of these walkdowns was to confirm the existence or absence of tray covers (above and below) for cable trays and the potential for holes or penetrations in cable tray covers. Particular attention was paid for cable trays potentially exposed to direct flame impingement.

The walkdowns identified areas where top covers were not present primarily due to cables entering the tray from (in many cases) a closed conduit. In some locations non-safety cables (such as the SW corner of RAB 8A) were not covered to the ceiling prior to transitioning through the ceiling or floor. A few locations were found with vented covers such as the 4Kv bus duct tray. Although coverage was absent at some locations as noted above, no holes were found in the cable tray covers examined. For safety-related trays the absence of covers was small (judged to be less than 5% of the surface area with the exception of RAB 1E). RAB 1E has many open topped cable trays, but also has a tray-based suppression which would not be possible if covers were present.

In order to determine the status of cable trays covered with HEMYC, cable tray drawings were reviewed to determine if they provided information concerning cable tray covers involving trays wrapped in HEMYC fire wrap. Additionally, plant walkdowns were performed with fire protection staff to visually examine the locations of concern. The location was then discussed with plant fire protection staff to provide their insight into the status of tray covers based on the observed condition. For the cases examined there appeared to be two main uses for the HEMYC wrap.

The first was to provide a fire barrier between cable trays of close proximity. If only partial HEMYC coverage was observed, then it was generally possible to determine the presence of cable tray covers. If the HEMYC wrap completely covered the cable tray the status was not as clear. However if there were no conduit penetrations associated with the location and the cable tray was covered before and after the HEMYC wrap it was assumed that the tray under the wrap was also covered.

The second usage observed was to provide a barrier at a point on the cable tray where cables either entered or exited the tray. In those cases the HEMYC was centered at the entry/exit point and conduits and/or cable trays would be visible exiting the HEYMC. Based on observation of non-HEMYC covered locations of a similar nature it was assumed that the covers were removed where the cables entered/exited the cable tray.

The walkdown findings were reflected in the updated PAU fire assessment with regard to flame impingement and heat loading when assessing the potential for cable fault performance and when considering cable tray propagation. Cables contained in vented trays or those without bottoms were considered susceptible to direct flame and subsequent secondary ignition. Cables in trays with only bottoms were susceptible to heat loading from below and if ignited were allowed to propagate upward if ignition temperatures were reached. Cables contained in trays with both bottoms and tops (most safety cables) were treated in a manner similar to cables contained in conduits. They were considered failed if temperature criterion was reached, but would not result in a secondary combustion expanding the fire ZOI.

As presented, no default assumption as to raceway covers or holes was carried forward in the revised assessment.

References

1. Stephens, P., et al, Waterford Steam Electric Station 3 Fire PRA Walkdown Notebook, Rev. 0, Reliability and Safety Consulting (RSC) Engineers, Inc., RSC 13-13, April 2013.

Fire Modeling RAI 06

By letter dated September 27, 2012, the licensee responded to Programmatic RAI 03. In the response, the discussion regarding the qualifications of users of engineering analyses and numerical models was insufficient regarding to fire modeling analyses that were performed during transition.

NFPA 805 Section 2.7.3.4, "Qualification of Users," states: "Cognizant personnel who use and apply engineering analysis and numerical models (e.g., fire modeling techniques) shall be competent in that field and experienced in the application of these methods as they relate to nuclear power plants, nuclear power plant fire protection, and power plant operations."

Please describe what constitutes appropriate qualifications for your staff and consulting engineers that performed the fire modeling analyses during transition and the processes for ensuring their adequate qualification. In addition, please describe how the exchange of information between fire modeling analysts and FPRA personnel was accomplished (e.g., whether the engineers and personnel who performed the fire modeling analyses walked down the fire areas that they analyzed).

<u>Waterford 3 Response</u>

The team performing fire modeling assessments and Fire PRA assessments are qualified through the contractor's qualification card program (Reference 1) which is in compliance with guidance of the National Academy for Nuclear Training. Beyond qualification training in the use of PRA and the performance of fire walkdowns, the individuals have been trained by a recognized industry expert in the use and limitations of the Fire Dynamics Tools (FDT) suite of tools, the use of Fire Dynamic Simulation (FDS), and Consolidated Model of Fire and Smoke Transport (CFAST) results as a part of their overall Fire PRA qualification.

Exchange of information between fire model analysts and Fire PRA personnel was accomplished because the same engineers that performed the fire modeling were involved in the revised Fire PRA plant walkdowns conducted to examine transients, fixed sources, and potential for multi-compartment impacts.

These engineers are also the Fire PRA staff responsible for implementing the fire analysis and PRA impacts involved for the Waterford 3 Fire PRA re-analysis. As PRA analysts, all have been qualified through the contractor qualification card program.

The qualification program is based on an understanding of NUREG/CR 6850 methods and is consistent with the supporting requirements of the ASME PRA standard (References 2 and 3).

The process by which Entergy accepts the qualification of the consultants performing the fire modeling analysis is within the contract process and is set forth in EN-DC-156 "Technical and Quality Requirements for Engineering Contracted Services." (Reference 4)

References

1. Qualification Card Program for Employees and Contractors, Rev. 4, Reliability and Safety Consulting Engineers, Inc., RSC 00-01QX, January 2009.

2. Addenda to ASME/ANS RA-S–2008 Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications, American Society of Mechanical Engineers, ASME/ANS RA-Sa-2009, February 2009.
3. An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities, United States Regulatory Commission, Regulatory Guide 1.200, Revision 2, March 2009.
4. Technical and Quality Requirements for Engineering Contracted Services, EN-DC-156

Fire Modeling RAI 07

Several of the first round FM RAI responses make reference to 'forthcoming work.' For this reason, a final review of these RAI responses to determine their adequacy for use by reference in the safety evaluation is not possible. A list of FM RAIs that are affected by this reference to 'forthcoming work' is provided below.

- Re-analysis of hot gas layer (HGL) assessments for areas where secondary ignition is deemed plausible (RAI 01.m and FM RAI 01.n)
- Use of 317 kiloWatts (kW) instead of 69 kW for the heat release rate (HRR) of transient fires (FM RAI 01.o)
- Refinement of the probabilistic risk assessment (PRA) to include scenarios with non-cable intervening combustibles that were overlooked (FM RAI 01.p)
- Additional analysis to identify thermoplastic cable targets (FM RAI 02.b)
- Additional analysis to assess the effect on the ZOI from increased HRR and flame spread of thermoplastic cables (FM RAI 02.c)
- Impact of self-ignited cables in the turbine building, cable spreading room, and RAB 27 (FM RAI 02.d)
- Risk impact of thermoplastic cables (FM RAI 02.f)
- Re-analysis of solid state equipment in vented cabinets (FM RAI 02.g)

Most of these topics also pertain to FM RAI 04, Limitations of Use, as well as several PRA RAIs.

Please provide the results of this 'forthcoming work' to the NRC staff for final review and describe if any of the final conclusions regarding core damage frequency (CDF), delta (Δ) CDF, large early release frequency (LERF), and ΔLERF are changed.

<u>Waterford 3 Response</u>

The WF3 Fire PRA has been revised to include the resolutions presented for the listed RAIs. Specific revisions include:

- Documented walkdowns to include identification of potential secondary combustible sources and a reanalysis of all physical analysis units (PAUs) with respect to Hot Gas Layer (HGL) generation, potential for secondary combustion and fire propagation to other PAUs. This is documented in References 1 and 2. As a result of this activity several MCA scenarios were identified based mainly on sensitive electronics failure criterion. The highest contributions from HGL impacts in MCA scenarios are for RAB 7A, 7B, 7C and 7D and represent new scenarios from the prior study. Other scenarios which have been incorporated into the updated plant Fire PRA do not provide for significant frequency contributions. The MCA scenarios result in risk significance when potential mitigation features consistent with the guidance of NUREG/CR-6850 were considered. The increase in CDF and LERF due to the MCA scenarios was offset by the improved plant-specific fire modeling of these areas for other fire sources such as transient combustibles. These two factors combined such that , the overall contribution for these PAUs is similar to the contribution identified in the LAR.

- Documented walkdowns (Reference 1) were conducted for all PAUs to characterize the potential for transient combustibles within the PAU. Using this information, new ZOI information which assumed a 317 Kw fire was used to define fire related impacts from direct flame impingement, radiant heat effects and consideration for secondary ignition.

- The re-evaluation of non-cable intervening combustibles resulted in defining several new scenarios, with the most significant being a transient fire in RAB 27 leading to secondary combustion of fixed combustion sources and significant cable damage. Additional smaller secondary combustions were defined for RAB 8A also involving fixed combustion sources. The results of the transient assessment including hot work are found in Reference 3.

- A review of cable qualification was completed after walkdowns confirmed the presence of a limited amount of potentially thermoplastic cable. Using the cable engineering package and the cable database the extent of the cables in question was determined. The cables were related to a specific plant modification package installing cables for the Plant Monitoring Computer Multiplexor (MUX) cabinets located in RAB 27. The review included identification of the cable tray and PAU locations and quantities of these thermoplastic cables grouped in the raceways. The cables are fiber optic and are not subject to self-ignition but conservatively this potential was retained in the ignition frequency for cable tray fires. The lower ignition point was also considered with regard to secondary ignition as a result of other fire sources.

  Additional walkdowns were performed to confirm the existence of the cable in the identified locations. Using the insights gained from these sources, the potential for self-ignition, secondary ignition and resulting cable tray fire expansion was evaluated. Overall the results of the analyses identified only limited damage since for most areas the cables are predominantly single cable strands found in a limited number of non-safety cable trays. The exceptions are RAB 27 (cables concentrated in the cable tray leading to the MUX cabinets) and RAB1E (cables concentrated at Control Room entry locations) Quantification of the risk from these cables is negligible for most location due to the low concentration of thermoplastic cables. For the highest concentration of cables the risk is also low due to the presence of raceway suppression in RAB 1E and the lack of risk significant targets with in the ZOI for RAB 27. Due to separation the fires at the location in RAB 27 is not capable of resulting in secondary ignition of the fixed sources postulated for the transient sources.

- Self-ignited cable frequency is addressed in the analysis as a conservative assessment for cable tray fires. The potential for self-ignition is treated in the cable tray hot work assessment. The assessment of cable tray fires involves consideration for area

detection and suppression capabilities along with tray covers for most areas. The contribution to PAU ignition frequency is addressed in Reference 5.

Consideration is included based on walkdown findings for a limited number of areas where cable covers are not completed to accommodate cable entry and exit to the trays or when not present due to geometry issues. Based on finding from the transient fire assessment, RAB 27 was examined at a tray level to determine potential for fire propagation given a cable fire or hot work fire. The detailed tray level assessment confirmed that although hot work fires or self-ignited tray fires are possible, the impacts are typically of low consequence due to a combination of the presence of cable tray covers, manual fire suppression and the distances involved between key targets. Note that automatic suppression was not considered.

For RAB 1E hot work and cable ignition was also considered. The damage was limited although a complete loss of the PAU was possible when automatic suppression located at the tray level and manual suppression failed. In those cases, the operators were still able to utilize the Alternate Shutdown Panel as a means to maintain plant operability.

Tray level assessments were also performed for RAB 8A RAB 8B, RAB 31 and RAB 39. The assessments for these PAUs indicated only limited damage to the impacted cable tray and cables within the cable tray with successful suppression.

The impact of self-ignited cables in the TGB was not explicitly addressed based on a modeling boundary condition that assumes a loss of equipment in the TGB. A summary of the cable selection is found in Reference 4.

For the remaining PAUs, no detailed assessment was required and conservatively assuming complete loss of the PAU did not result in significant contributions to CDF or LERF. This was due to factors such as automatic suppression, manual suppression and/or low scenario frequency.

- As described above, only a limited number of cables were identified that exhibited thermoplastic characteristics. Due to the limited number of cables in any specific location except RAB 27 and RAB 1E and their presence in non-safety cable trays their overall impact on core damage or fire progression was low. For RAB 27 and specific locations in RAB 1E their impact and contribution to core damage was similarly low due to a lack of targets in RAB 27 and the presence of automatic suppression in RAB 1E.

- The change in solid state criterion to be in alignment with NUREG/CR-6850 did increase the size of the ZOI for fires related to solid state equipment. Additionally, a large portion of the cabinets located in areas other than RAB 7A, 7B, 7C and 7D were reclassified from “closed” to being ”vented” cabinets and more susceptible to fire effects.

  Although there was more potential for a fire induced failure, the overall impact of the lower solid state criterion for failure was actually small. This was due to the findings of a review with the Waterford 3 electrical staff to review the key PRA-related cabinets with regard to the presence or absence of solid state equipment. On the basis if this review most important electrical panels such as those in PAUs 8A, 8B and 8C were reclassified as not containing sensitive electronics and insensitive to this failure mode. The findings reduced the impact of the revised failure temperature criterion to panels in the Main Control Room (MCR) and the 7A, 7B, 7C and 7D PAUs. The MCA scenario defined earlier for RAB 7 involves the formation of a hot gas layer sufficient to cause panel failure due to sensitive electronics. The fixed ignition source impacts are provided in Reference 6.

Frequency contributions (CDF and LERF) for the important PAUs and Total Fire CDF from the LAR (Reference 7) along with the updated values for the same PAUs (Reference 8) are provided in the following table.

	LAR Presented (Reference 7)		Updated (Reference 8)	
PAU	CDF (/yr)	LERF (/yr)	CDF (/yr)	LERF (/yr)
RAB 8C	1.12E-05	2.98E-07	2.69E-07	2.75E-09
RAB 7A	2.82E-06	2.57E-08	3.31E-06	7.09E-07
TGB	1.33E-06	1.35E-08	1.33E-06	1.02E-08
RAB 1A (excludes control room abandonment)	1.03E-06	1.27E-08	1.13E-06	8.77E-07
RAB 2 (sum of individual sequences)	2.01E-06	5.41E-08	1.96E-08	3.10E-10
RAB 8B	7.46E-07	1.92E-08	7.08E-06	7.84E-08
Total Fire CDF	3.40E-05	7.36E-07	2.40E-05	4.45E-06

There is an approximately 29% decrease in total fire core damage frequency (CDF) from the LAR submittal value. Due to an increase in the frequency of accident sequence related to fires occurring in the main control room and the MCA scenarios for PAUs 7A, 7B, 7C, and 7D the LERF frequency increased over the prior LAR submittal.

Several factors are responsible for the change in PAU contribution and overall CDF reduction. The RAB 8C contribution decrease results from the re-evaluation of failure modes due to the loss the 4 KV essential AB bus in relation to the likelihood of propagating faults to the 4 KV essential A and the 4KV essential B buses. The ability to maintain power to the connected bus by crediting the overcurrent protection/circuit breaker coordination has been considered and this significantly reduced the contribution from this PAU.

Refinements in the turbine building impacts based on additional walkdown information resulted in some reduction for turbine building scenarios. A re-evaluation of the turbine building oil fire scenarios did result in some secondary combustion sequences leading to larger fires but none of these impact the adjoining reactor building structure or equipment. It should be noted that boundary conditions carried from the prior study on assumptions related to equipment availability negated most of the refinements due an assumed loss of most equipment in the turbine building for any fire initiator.

An update to the base internal events PRA performed in conjunction with the revision to the Fire PRA resulted in a substantial reduction for RAB 2 based on a reevaluation of HVAC requirements for safety equipment.

The reanalysis of multi-compartment analysis utilizing the NUREG/CR-6850 approach and fire modeling hot gas layer formation resulted in the identification and inclusion of additional multi-compartment scenarios. For RAB 7A – 7D this combined with the lower sensitive electronics

criterion increased the frequency contribution from these 4 PAUs due to formation of hot gas layer involving all of these areas.

The increase in the transient heat release rate and revisions to hot work model development increased the contributions for most PAUs modestly with the exception of hot work for PAU 8B. The increase did not dominate the PAU contributions due to detailed evaluations of impacted equipment for preferential storage locations within a PAU. The inclusion of MCR HVAC for long term cooling did not substantially increase the importance of the HVAC system.

Overall the removal of UAMs involving adjustment factor methods for diesel generator fires, switchgear fire adjustment, hot work and oil fire split fraction and the subsequent re-evaluation of fire scenarios based on plant-specific characteristic did result in additional scenarios. The total CDF based on the new analysis is lower than the prior assessment with a significant net change in CDF mainly due to reductions in contributions from RAB8C and RAB 2 as explained above. Detailed fire modeling on a source basis identified source-specific impacts that refined the prior submittal values and resulted in the reduction. The top PAU contributions are generally consistent between the updated PRA and the prior LAR submittal as a result of this expanded plant-specific assessment approach, with exception of risk reductions in PAUs RAB 8C and RAB 2, as explained above.

For the LERF results, the revised model indicates a somewhat higher LERF frequency. The change in LERF frequency is due mainly to the impact of the RAB 7 MCA scenarios and revised MCR (RAB 1A) analyses leading to conditional isolation failure.

References

1. Stephens, P., et al, Waterford Steam Electric Station 3 Fire PRA Walkdown Notebook, Rev. 0, Reliability and Safety Consulting (RSC) Engineers, Inc., RSC 13-13, April 2013.
2. Dudley, D. and J. Miller, Waterford Steam Electric Station 3 Fire PRA Multi-Compartment Analysis and Hot Gas Layer Impact Evaluation Results, Rev. 0, RSC Engineers, Inc., RSC 12-27, April 2013.
3. Eddy, C., et al, Waterford Steam Electric Station 3 Transient Fire Summary Report, Rev. 2, RSC Engineers, Inc., RSC 12-22, April 2013.
4. Eddy, C. and V. Young, Waterford Steam Electric Station 3 Fire PRA Equipment and Cable Selection Notebook, Rev. 0, RSC Engineers, Inc., RSC 12-37, April 2013.
5. Young, V., Waterford Steam Electric Station 3 Plant Partitioning, Qualitative Screening, and Ignition Frequency Development Notebook, Rev. 0, RSC Engineers, Inc., RSC 12-34, April 2013.
6. Miller, J., et al, Waterford Steam Electric Station 3 Fixed Ignition Source Zone of Influence Methods, Rev. 1, RSC Engineers, Inc., RSC 13-04, March 2013.
7. WSES3 Fire PRA Summary Report, PRA-W3-05-007, June 2011.
8. Eddy, C., et al, Waterford Steam Electric Station 3 Fire PRA Summary Report, Rev. 0, RSC Engineers, Inc., RSC 13-12, April 2013.

Fire Protection Engineering RAI 01.01

By letter dated September 27, 2012, the license responded to Fire Protection Engineering (FPE) RAI 01. In that response, the licensee committed to Section 3.3.4 of NFPA Standard 220, “Standard on Types of Building Construction,” 1999 edition. However, Section 3.3.4 does not

exist in the 1999 edition of this standard. Please discuss the apparent error regarding the reference to this section and correct as applicable.

In the same response, the licensee identified a code of record for NFPA Standards 101, "Life Safety Code," and 241, "Standard for Safeguarding Construction, Alteration, and Demolition Operations," that they comply with, but identified complying with only a few selective sections in each standard. However, the licensee may have missed many sections that pertain to the requirements in the NFPA 805 standard. Please explain if it is accurate to state globally, that the licensee is committed to those editions of NFPA 101, 220, and 241, identified in the response to FPE RAI 01, but only to those sections that pertain to the 2001 edition of the NFPA 805 standard. If not, please provide a justification explaining why not.

Waterford 3 Response

Waterford 3's review confirms that the reference to Section 3.3.4 of NFPA Standard 220, 1999 edition is in error. The correct applicable section number of NFPA Standard 220, 1999 edition is Section 2-1 "Noncombustible Material".

Waterford 3 is committed to those sections of NFPA 101, 220, and 241 that pertain to the 2001 edition of the NFPA 805 standard. Waterford 3's review determined the only applicable sections of NFPA 101, 220, and 241 that pertain to the 2001 edition of NFPA 805 are as specified in the following table:

NFPA Code Number	Committed Sections	Applicable NFPA 805 Section
101	10.2.3 and 10.2.7	3.3.3
101	8.2.3.2.1(a) and 9.2.1	3.11.3(3)
220	2-1 Definition of "Noncombustible Material"	3.3.2
241	5.1	3.3.1.3.1

Fire Protection Engineering RAI 13.01

By letter dated September 27, 2012, the licensee responded to FPE RAI 13 and made several references to NFPA 805, Section 3.3.5.1. However, the RAI concerns NFPA 805, Section 3.3.5.3. Please clarify the response with regard to the correct NFPA 805 section.

Waterford 3 Response

Waterford 3's review confirms that the two references to NFPA 805, Section 3.3.5.1, found in Waterford 3 response dated September 27, 2012, to FPE RAI 13 are in error. In both cases, the correct reference is NFPA 805, Section 3.3.5.3.

Fire Protection Engineering RAI 14

Table B-3 Suppression System Clarifications

1. LAR Attachment C (Table B-3), Fire Area RAB 21 (Component Cooling Water Pump B, page C-453), section "Fire Suppression Activities Effect on Nuclear Performance Criteria," states that "This area has a pre-action system." However, LAR Table 4-3,

FSAR (Revision 11) page 9.5-60, and the remainder of LAR Table B-3 for Fire Area RAB 21, indicate there is no fire suppression system.

a. Please clarify what type of fixed fire suppression system(s) is installed in Fire Area RAB 21.

b. Please clarify which fixed fire suppression system(s) is credited for NFPA 805 in Fire Area RAB 21.

2. LAR Table B-3, Fire Area RAB 37 (Emergency Feedwater Pump A, page C-594) states that "no" suppression installed but contradicts with "a pre-action automatic sprinkler system is provided…". Final Safety Analysis Report (FSAR), Revision 11, page 9.5-60, and LAR Table 4-3 both indicate Fire Area RAB 37 contains a fire suppression system.

a. Please clarify what type of fixed fire suppression system(s) is installed in Fire Area RAB 37.

b. Please clarify which fixed fire suppression system(s) is/are credited for NFPA 805 in Fire Area RAB 37.

3. LAR Table B-3, Fire Area RCB (Reactor Containment Building, page C-624) states that a "manually actuated water spray system is provided." Under section "Fire Suppression Activities Effect on Nuclear Performance Criteria," it states "no automatic suppression is credited…". This wording is not consistent with other fire areas and appears to indicate there is an automatic system installed.

a. Please clarify what type of fixed fire suppression system(s) is installed in Fire Area RCB.

b. Please clarify which fixed fire suppression system(s) is credited for NFPA 805 in Fire Area RCB.

Waterford 3 Response:

1. a Please clarify what type of fixed fire suppression system(s) is installed in Fire Area RAB 21.

Waterford 3's review confirms LAR Attachment C (Table B-3), Fire Area RAB 21 (Component Cooling Water Pump B, page C-453), section "Fire Suppression Activities Effect on Nuclear Performance Criteria," statement that "This area has a pre-action system" is in error. Fire Area RAB 21 has no fixed fire suppression system.

1. b Please clarify which fixed fire suppression system(s) is credited for NFPA 805 in Fire Area RAB 21

No fixed fire suppression system(s) is credited for NFPA 805 in Fire Area RAB 21.

2. a Please clarify what type of fixed fire suppression system(s) is installed in Fire Area RAB 37.

Waterford 3's review confirms LAR Table B-3, Fire Area RAB 37 (Emergency Feedwater Pump A, page C-594) stating that "no" suppression installed is in error. Fire Area RAB 37 has an area wide automatic fixed pre-action sprinkler system (Sprinkler System FPM-23).

2. b Please clarify which fixed fire suppression system(s) is/are credited for NFPA 805 in Fire Area RAB 37.

No fixed fire suppression system(s) is credited for NFPA 805 in Fire Area RAB 37.

3. a Please clarify what type of fixed fire suppression system(s) is installed in Fire Area RCB

There are no automatic fixed fire suppression system(s) installed within Fire Area RCB. Manually actuated fixed fire suppression systems installed within Fire Area RCB are as follows:

1, Sprinkler System No. FPM-31: This is a manually actuated, open head deluge sprinkler system protecting the Charcoal Filter in Containment Airborne Radioactivity Removal System "A".
2. Sprinkler System No. FPM-32: This is a manually actuated, open head deluge sprinkler system protecting the Charcoal Filter in Containment Airborne Radioactivity Removal System "B".
3. Sprinkler System No. FPM-1: This is a manually actuated, closed head pre-action sprinkler system protecting Reactor Coolant Pumps 1A and 1B. For specific details on this sprinkler system refer to LAR Attachment L, Approval Request No. 5 and response to FPE RAI 09 (Waterford 3 RAI response letter dated September 27, 2012).
4. Sprinkler System No. FPM-2: This is a manually actuated, closed head pre-action sprinkler system protecting Reactor Coolant Pumps 2A and 2B. For specific details on this sprinkler system refer to LAR Attachment L, Approval Request No. 5 and response to FPE RAI 09 (Waterford 3 RAI response letter dated September 27, 2012).

3. b Please clarify which fixed fire suppression system(s) is credited for NFPA 805 in Fire Area RCB

No fixed fire suppression system(s) is credited for NFPA 805 in Fire Area RCB.

Fire Protection Engineering RAI 15

Table B-3 Suppression Activities' Adverse Effect

In several fire areas, it was not clear whether the adverse effects from all applicable fire suppression activities were considered.

For each fire area within Table B-3, please clarify that the statement "…fire suppression activities will not adversely affect the ability to achieve the nuclear safety performance criteria" accounts for all manual suppression activities including fire brigade, any installed fixed manual suppression system(s), and any installed automatic suppression system(s).

Waterford 3 Response

Only fire areas that contain redundant safe shutdown equipment susceptible to water damage are evaluated for potential adverse effects due to fire suppression activities. An example is fire area RAB 2 where redundant chilled water units are located. The fire suppression effects analysis evaluation performed to substantiate the Table B-3 statement "... fire suppression activities will not adversely affect the ability to achieve the nuclear safety performance criteria" did consider all manual suppression activities including fire brigade use of fire hose streams, installed fixed manual suppression system(s), and installed automatic suppression system(s). This is supported by the following:

1. Electrical cabling at Waterford 3 associated with safe shutdown components is not subject to water damage because the cables were purchased and installed for use in both dry and wet locations. Electrical equipment excluding cables (motors, cabinets, controls, transmitters, relays, etc.) is considered susceptible to water damage.
2. Cable tray and conduit entrances into equipment are equipped with a water seal(s).
3. Flooding calculations have evaluated that the equipment is adequately protected from area flooding (rising water) due to postulated piping cracks, breaks, and/or postulated actuation of fire suppression systems (fixed manual/automatic suppression systems, including use of fire hose streams).
4. Fire pre-plans and fire brigade training ensure fire brigade members are aware of and capable of applying judicious use of fire hose streams to limit water damage to redundant safe shutdown equipment in the same area.

   However, fire pre-plans and fire brigade training plans need to be enhanced for areas containing redundant safe shutdown equipment susceptible to water damage to ensure fire brigade members are aware of and capable of applying judicious use of fire hose streams to limit water damage to redundant safe shutdown equipment in the same area. LAR Attachment S, Item S2-5 has been revised as follows: "Update Pre-Fire Strategies and necessary plant documents to: 1) Include a description of areas for flooding (currently in S2-5). 2) Identify areas containing redundant safe shutdown equipment susceptible to water damage from fire brigade fire suppression activities. 3) Revise fire brigade training plans to address judicious use of fire hose streams to limit water damage to redundant safe shutdown equipment. See Attachment 2 to W3F1-2013-0022.

Safe Shutdown RAI 01.01

1. By letter dated September 27, 2012, the licensee responded to Safe Shutdown Analysis (SSA) RAI-01(a) and stated, "Updating of the SSA is occurring as each engineering package on each subject is generated." Analyses for transition to NFPA 805 should be essentially complete at the time the LAR is submitted. It is unclear from the RAI response if all analyses are complete or some are still ongoing. Please provide the following information:

   a. A concise description of the state of completion of the analyses that support compliance with the Nuclear Safety Capability Assessment (NSCA) requirements of NFPA 805, Section 2.4.2, with the exception of the Multiple Spurious Operation (MSO) and Non-Power Operation (NPO) analyses, which were stated as completed in the RAI response. If any analyses necessary to support compliance with NFPA 805 Section 2.4.2 are not complete, please include a

description of the remaining work, schedule for completion, and impacts on the information and analyses contained within the LAR and RAI responses. If no impact is expected, please provide a statement and justification for this expectation.

b. Please provide the status of the latest post-fire SSA. Revision 3 of the SSA was in draft at the time of the audit. If the latest revision is in draft, please provide the estimated completion date and describe the work that remains to be done.

2. By letter dated September 27, 2012, the licensee responded to SSA RAI-01(b), and stated, "Waterford 3 will also be transitioning the Fire Protection Analysis to utilize ARC software." At the time of the audit, licensee staff associated with the NSCA development indicated that the SSA would remain the governing analysis documentation for demonstrating compliance and there was no specific commitment to use the ARC software. Please provide the following information:

a. A discussion of the use of the ARC software in demonstrating compliance with NFPA 805, the continuing role of the SSA and the integration of the two.

b. A discussion of the databases and software that integrate fire protection program structure, system, and component data; fire modeling results, and PRA analyses (e.g., EPM-SAFE-PB and ARC) having a range of uses applicable to NFPA 805 implementation. These uses are subject to several NFPA 805 requirements including those that address determination of success paths; completion of the NSCA; the quality, configuration control, documentation, and verification and validation of analyses; and limitations of use. In addition, these databases and software can be used to facilitate integration of several aspects of NFPA 805 compliance. Specific applicable NFPA 805 requirements include:

NFPA 805 Section 2.2.9, "Plant Change Evaluation," states that: "In the event of a change to a previously approved fire protection program element, a risk informed plant change evaluation shall be performed and the results used as described in 2.4.4 to ensure that the public risk associated with fire-induced nuclear fuel damage accidents is low and that adequate defense-in-depth and safety margins are maintained."

NFPA 805, Section 2.2.11, "Documentation and Design Configuration Control," requires that: "The fire protection program documentation shall be developed and maintained in such a manner that facility design and procedural changes that could affect the fire protection engineering analysis assumptions can be identified and analyzed."

NFPA 805 Section 2.4.1, "Fire Modeling Calculations," requires: (2.4.1.1) "The fire modeling process shall be permitted to be used to examine the impact of the different fire scenarios against the performance criteria under consideration." (2.4.1.2.1) "Only fire models that are acceptable to the authority having jurisdiction shall be used in fire modeling calculations." (2.4.1.2.2) "Fire models shall only be applied within the limitations of that fire model." (2.4.1.2.3) "The fire models shall be verified and validated."

NFPA 805 Section 2.4.3.3 regarding fire risk evaluations states: "The PSA [probabilistic safety assessment] approach, methods, and data shall

be acceptable to the AHJ [authority having jurisdiction]. They shall be appropriate for the nature and scope of the change being evaluated, be based on the as-built and as-operated and maintained plant, and reflect the operating experience at the plant."

NFPA 805 Section 2.4.4, "Plant Change Evaluation," states: "A plant change evaluation shall be performed to ensure that a change to a previously approved fire protection program element is acceptable. The evaluation process shall consist of an integrated assessment of the acceptability of risk, defense-in-depth, and safety margins. The impact of the proposed change shall be monitored."

NFPA 805 content requirements include:

(2.7.1.1) "The analyses performed to demonstrate compliance with this standard shall be documented for each nuclear power plant (NPP). The intent of the documentation is that the assumptions be clearly defined and that the results be easily understood, that results be clearly and consistently described, and that sufficient detail be provided to allow future review of the entire analyses. Documentation shall be maintained for the life of the plant and be organized carefully so that it can be checked for adequacy and accuracy either by an independent reviewer or by the AHJ."

(2.7.1.2) "A fire protection program design basis document shall be established based on those documents, analyses, engineering evaluations, calculations, and so forth that define the fire protection design basis for the plant. As a minimum, this document shall include fire hazards identification and nuclear safety capability assessment, on a fire area basis, for all fire areas that could affect the nuclear safety or radioactive release performance criteria defined in Chapter 1."

(2.7.1.3) "Detailed information used to develop and support the principal document shall be referenced as separate documents if not included in the principal document."

NFPA 805 configuration control requirements include:

(2.7.2.1) "The design basis document shall be maintained up-to-date as a controlled document. Changes affecting the design, operation, or maintenance of the plant shall be reviewed to determine if these changes impact the fire protection program documentation."

(2.7.2.2) "Detailed supporting information shall be retrievable records. Records shall be revised as needed to maintain the principal documentation up-to-date."

Finally, NFPA 805 quality requirements apply to use of integration databases and software:

(2.7.3.1) "Each analysis, calculation, or evaluation performed shall be independently reviewed."

(2.7.3.2) “Each calculational model or numerical method used shall be verified and validated through comparison to test results or comparison to other acceptable models.”

(2.7.3.3) “Acceptable engineering methods and numerical models shall only be used for applications to the extent these methods have been subject to verification and validation. These engineering methods shall only be applied within the scope, limitations, and assumptions prescribed for that method.”

(2.7.3.4) “Cognizant personnel who use and apply engineering analysis and numerical models (e.g., fire modeling techniques) shall be competent in that field and experienced in the application of these methods as they relate to nuclear power plants, nuclear power plant fire protection, and power plant operations.” “An uncertainty analysis shall be performed to provide reasonable assurance that the performance criteria have been met.”

The NRC staff notes that, given the broad range of requirements applicable to use of integration databases and software, the Transition Report provided insufficient details for the staff to complete its review of the various areas affected by this software and is requesting that the following additional information be provided.

1) A description of how the post transition change evaluation process will ensure that the potential interfaces between integration databases and software and other databases and analyses (e.g., the cable and raceway database, the NSCA, the FPRA, and fire modeling) are evaluated and updated, as appropriate.

2) A description of the process that will be employed to ensure that integration databases and software are maintained in accordance with documentation and design configuration control processes and procedures.

3) A description of the process and procedures that will be used to ensure that integration databases and software analyses are conducted and/or updated by persons properly trained and experienced in its use.

4) A description of the processes and procedures that will be used to ensure that integration databases and software analyses comply with NFPA 805 fire modeling, content, and quality control requirements.

c. The SSA RAI-01(b) response further states, “Attachment S, item S2-13, implements the actions above.” This item describes development of new procedures and processes based on the NSCA analyses, but does not appear to address either the specific update of the SSA, or the transition to the use of the ARC software as described in the response.

Please provide a new implementation item in Attachment S or revise the existing implementation items in Attachment S that specifically address the work to be completed as part of transition, as your response to this RAI or the previous SSA RAI-01.

Waterford 3 Response:

1. Please provide the following information:

a. **A concise description of the state of completion of the analyses that support compliance with the Nuclear Safety Capability Assessment (NSCA) requirements of NFPA 805, Section 2.4.2, with the exception of the Multiple Spurious Operation (MSO) and Non-Power Operation (NPO) analyses, which were stated as completed in the RAI response. If any analyses necessary to support compliance with NFPA 805 Section 2.4.2 are not complete, please include a description of the remaining work, schedule for completion, and impacts on the information and analyses contained within the LAR and RAI responses. If no impact is expected, please provide a statement and justification for this expectation.**

NFPA 805 Section 2.4.2 states the following steps shall be performed:
(1) Selection of systems and equipment and their inter relationships necessary to achieve the nuclear safety performance criteria in Chapter 1.
(2) Selection of cables necessary to achieve the nuclear safety performance criteria in Chapter 1.
(3) Identification of the location of nuclear safety equipment and cables.
(4) Assessment of the ability to achieve the nuclear safety performance criteria given a fire in each fire area.

Waterford 3 analyses complied with all of the steps given in NFPA 805 Step 2.4.2. LAR Table B-3 provides the systems and equipment and their inter-relationships necessary to achieve the nuclear safety performance criteria. Table B-3 also provides the assessment of the ability to achieve the nuclear safety performance criteria given a fire in each fire area. The cables and their location that support the systems and equipment to achieve the nuclear safety performance criteria are documented in Calculation EC-F00-026, “Post Fire Safe Shutdown Analysis”. Because Waterford 3 documented compliance with NFPA 805 2.4.2 in their current Appendix R Safe Shutdown Analysis (EC-F00-026), the remaining work stated that needed to be performed was to update this analysis to only document NFPA 805 compliance when transitioned. This is typically managed through Waterford 3’s configuration control procedure EN-DC-115, “Engineering Changes”.

It is important to note that the nuclear safety performance criteria results currently given in Table B-3 are affected by the NUREG/CR-6850 sensitivity work being performed. Consequently, all of the Fire Risk Evaluations are being revised and will be incorporated into the NSCA and Table B-3.

See Response to RAI FM.07 for the details on the results of the NUREG/CR-6850 sensitivity work performed.

b. Please provide the status of the latest post-fire SSA. Revision 3 of the SSA was in draft at the time of the audit. If the latest revision is in draft, please provide the estimated completion date and describe the work that remains to be done.

Calculation EC-F00-026 (Post Fire Safe Shutdown Analysis) revision 3 was completed on 11/12/12 which included the MSO and NPO analysis.

2. … Please provide the following information:

a. **A discussion of the use of the ARC software in demonstrating compliance with NFPA 805, the continuing role of the SSA and the integration of the two**.

Changes to the plants approved NSCA will be governed by the site's configuration control procedures. Currently, Waterford 3 is updating its Post Fire Safe Shutdown Analysis Calculation to be specific for NFPA 805, therefore procedure EN-DC-126, "Engineering Calculation Process" and its reference procedures are the governing process that would require compliance with NFPA 805. These governing processes are planned to be revised for compliance to NFPA 805 and are being tracked by implementation item S2-12.

The ARC software being proposed for use to assist in administering the NFPA 805 Fire Protection Program will be governed by procedure EN-IT-104, "Software Quality Assurance Program". The ARC software will contain NSCA information and will be used as a tool following NFPA 805 transition to initially evaluate plant changes (i.e., "What-If") that may potentially impact Waterford 3's approved NSCA.

b. The Transition Report provided insufficient details for the staff to complete its review of the various areas affected by this software and is requesting that the following additional information be provided.

1. **A description of how the post transition change evaluation process will ensure that the potential interfaces between integration databases and software and other databases and analyses (e.g., the cable and raceway database, the NSCA, the FPRA, and fire modeling) are evaluated and updated, as appropriate.**

2. **A description of the process that will be employed to ensure that integration databases and software are maintained in accordance with documentation and design configuration control processes and procedures.**

3. **A description of the process and procedures that will be used to ensure that integration databases and software analyses are conducted and/or updated by persons properly trained and experienced in its use.**

4. **A description of the processes and procedures that will be used to ensure that integration databases and software analyses comply with NFPA 805 fire modeling, content, and quality control requirements.**

PRA Calculations and databases are administered through the PRA governing procedure EN-DC-151 "PSA Maintenance and Update" which specifies how the PRA model, including Fire PRA model, are maintained and updated. The software being used is being maintained using the EN-IT-104 "Software Quality Assurance Program" procedure. The implementation of new software as well as updates/revisions of software must be administered via this procedure. Quality assurance of Fire PRA software (FRANX, CAFTA) is documented in code document packages (CDPs). The level of quality of these programs is equal to that of other Regulatory Commitment software.

Any changes to plant documents are governed by the site's configuration process through a series of fleet procedures as listed below. These procedures detail how the quality of both the inputs to the software and integration databases (e.g., ARC, cable and raceway database (PDMS), the NSCA, Fire PRA, Fire Modeling) will be maintained.

a. EN-IT-104 Software Quality Assurance Program
b. EN-DC-105 Configuration Management
c. EN-DC-115 Engineering Change Process
d. EN-DC-126 Engineering Calculation Process
e. EN-DC-128 Fire Protection Impact Reviews
f. EN-DC-132 Control of Engineering Documents
g. EN-DC-134 Design Verification
h. EN-DC-141 Design Inputs
i. EN-DC-151 PSA Maintenance and Update
j. EN-DC-179 Preparation of Fire Protection Engineering Evaluations

These procedures have and/or will be updated as necessary to comply with any NFPA-805 requirements (e.g., fire modeling, content, and quality control requirements) and are being tracked by implementation item S2-12. Procedure EN-TQ-212, "Conduct of Training and Qualification" ensures that personnel are properly qualified in the design configuration control processes above.

c. The SSA RAI-01(b) response further states, "Attachment S, item S2-13, implements the actions above." This item describes development of new procedures and processes based on the NSCA analyses, but does not appear to address either the specific update of the SSA, or the transition to the use of the ARC software as described in the response. Please provide a new implementation item in Attachment S or revise the existing implementation items in Attachment S that specifically address the work to be completed as part of transition, as your response to this RAI or the previous SSA RAI-01.

Attachment S, item S2-13 stated, "Several NFPA 805 document types such as: NSCA Supporting Information, Non-Power Mode NSCA Treatment, etc., generally require new control procedures and processes to be developed since they are new documents and databases created as a result of the transition to NFPA 805. The new procedures will be modeled after the existing processes for similar types of documents and databases. System level design basis documents will be revised to reflect the NFPA 805 role that the system components now play."

Attachment S, item S2-13 has been clarified to include safe shutdown analysis. See Attachment 2 to W3F1-2013-0022.

Safe Shutdown RAI 02.01

By letter dated September 27, 2012, the licensee responded to SSA RAI-02, and identified specific gaps between Revision 1 and Revision 2 of Nuclear Energy Institute (NEI) 00-01 as applicable to Waterford 3. NRC staff review of the response has identified the following concerns requiring additional information:

a. The bulleted responses identify a number of commitments to perform additional work but there is no discussion on how this work may impact the existing analyses, including those analyses that have been reviewed by the staff and may be relied on for approval in the safety evaluation. Please discuss the expected impact of the additional work on the conclusions of the existing analyses (i.e., the nuclear safety capability assessment (NSCA) and Fire PRA, as reviewed by the staff during the audit).

b. The second bullet addresses the categorization of safe shutdown components as required for safe shutdown and important to safe shutdown. This equipment categorization aspect of NEI 00-01, "Guidance for Post Fire Safe Shutdown Circuit Analysis, Rev. 2, is not applicable under NFPA 805. As described in NEI 00-01, Rev. 2, the categorization or segregation of components as "required for" or "important to" safe shutdown is associated with the multiple spurious operation (MSO) methods there-in. The MSO methods applicable to NFPA 805, as implemented in the LAR, are those associated with the expert panel process as described in NEI 04-02, "Guidance for Implementing a Risk-Informed, Performance-Based Fire Protection Program Under 10 CFR 50.48(c)", Rev. 2, (ADAMS Accession No. ML081130188), as endorsed by Section 3.3 of Regulatory Guide 1.205, "Risk-Informed, Performance-Based Fire Protection for Existing Light-Water Nuclear Power Plants," Rev. 1, 2009 (ADAMS Accession No. ML092730314), and supplemented by NRC FAQ 07-0038, Lessons Learned on Multiple Spurious Operations, (ADAMS Accession No. ML110140242). Please clarify how Waterford 3 intends to use the equipment categorization of NEI 00-01, Rev. 2, and identify the impact on the submitted safe shutdown analyses.

c. Related to Item a. above, the last paragraph of the response states, "An implementation item has been added to Attachment S to cover the updating of the NSCA to cover the transition to Revision 2, Section 3.0 of NEI 00-01." Provide the new Attachment S showing the implementation item.

<u>Waterford 3 Response</u>:

a) Please discuss the expected impact of the additional work on the conclusions of the existing analyses (i.e., the nuclear safety capability assessment (NSCA) and FPRA, as reviewed by the staff during the audit).

There is no expected impact to the documents reviewed by the NRC staff during their audit as a result of Waterford 3 alignment with NEI 00-01, Section 3.0 Rev 2. The following items i) through vi) address the bulleted responses provided to SSA RAI02.

i) Fire exposure impact on manually operated rising stem valves (EC 42377)

Engineering Change (EC) 42377 has been initiated to evaluate the rising stem valves installed in Fire Areas which require a manual action for the valves in that Fire Area. The results of the evaluation to date indicate that there is insufficient combustible loading / fire severity in the areas in which the valves are located such that an exposure fire could cause damage which would prevent the valves from fulfilling their safe shutdown function.

ii) Required for Hot Shutdown versus Important to Hot Shutdown guidance incorporated into NSCA (EC 40610)

During development of the Waterford 3 Safe Shutdown Analysis (ECF00-026, Rev 3) there was no distinction made between the components that were determined to be "Required for Hot Shutdown Components" and components which could be classified as "Important to Safe Shutdown Components" as detailed in NEI 00-01, Rev 2, Section 3.4. During development of the Waterford 3 Nuclear Safety Capability Assessment (NSCA), which will be finalized in EC 40610, the same methodology of analyzing each safe shutdown component as being a "Required for Hot Shutdown Component" is being implemented. Therefore, no impact is expected to the NSCA.

iii) Information Notice (IN) 92-18 valve assessment (EC 40636 & WF3-FP-13-00001)

As stated in the previous response to Safe Shutdown RAI 02, the IN 92-18 valve assessment was completed and required modifications are provided in Attachment S, items S1-1 and S1-2.

iv) Inter-cable hot short for proper polarity DC circuits (EC 41765)

EC 41765 has been initiated to perform the evaluation to determine if two concurrent hot shorts of the proper polarity, e.g. plus-to-plus and minus-to-minus, within the same multi-conductor cable for DC circuits for credited post-fire safe shutdown components could have negative consequences in the ability to achieve safe shutdown. This evaluation is being performed in every fire area through which the cable is routed. The preliminary results of the evaluation indicate no new adverse situations.

v) Circuit breaker coordination for internal breaker tripping devices

Circuit breaker coordination calculations ECE91-055, ECE91-056 and ECE91-253 document Waterford 3's ability to ensure that the protective device nearest the fault will operate prior to the operation of any "upstream" protective devices, thereby limiting the interruption of electrical supply. The above referenced calculations indicate that adequate coordination exists for the credited AC buses at all voltage levels.

For non-safe shutdown loads that require 125 VDC power to ensure the breaker trip capabilities, control power is available to isolate faults on power cables to non-safe shutdown loads.

Based on these determinations, the existing analyses (i.e. NSCA and Fire PRA as reviewed by the staff during the audit) remain valid.

vi) Impact on PRA due to Revision 2 of NEI 00-01

There is no expected impact on the Waterford 3 PRA due to Rev 2 of NEI 00-01.

NEI 00-01 addresses the assessment of circuit analysis post fire. There are two areas where the PRA is involved. The first involves the development of the assessment list as defined in Appendix F utilizing PRA risk ranking measures. The process of identification utilizing the internal events model would not be impacted by the revisions to NEI 00-01. The second area involves the implementation of the findings from the circuit assessment into the fire PRA model to reflect the potential for circuit failure due to fire effects such as multiple spurious operations. The current fire PRA model addresses those failures identified by the existing circuit failure analysis.

Documentation of the reviews and evaluations for the bulleted responses are being prepared in accordance with the Entergy Engineering Change (EC) Evaluation process (procedure EN-DC-115). In the event that a change does occur to a document that was critical in establishing the Waterford 3 NFPA 805 fire protection program and was previously reviewed by the NRC staff, the revised document will be submitted to NRC by means of the Licensing Basis Document Change Process (EN-LI-113). Attachment S has been revised to update engineering and PRA documentation to specifically address items i) through vi) above to indicate that the plant fire protection analysis meets the criteria in NEI 00-01, Rev 2.

Based on the extent of the evaluation to date, Waterford 3 does not expect or anticipate that the results of the evaluations identified above will alter the conclusions of the existing analysis as reviewed by the staff during the audit.

b) Please clarify how Waterford 3 intends to use the equipment categorization of NEI 00-01, Rev. 2, and identify the impact on the submitted safe shutdown analyses.

See response to RAI 02.01 a(ii) above.

c) Provide the new Attachment S showing the implementation item.

Implementation item S2-19 has been added to the S-2 Implementation table to cover the updating of the NSCA to address the transition to NEI 00-01, Revision 2 Section 3. See Attachment 2 to W3F1-2013-0022.

Safe Shutdown RAI 03.01

By letter dated September 27, 2012, the licensee responded to SSA RAI-03 and stated, "Since the submittal of the LAR, the instrument air compressors have been added to the SSEL [Safe Shutdown Equipment List] and the circuits routed." Please provide an explanation of the basis for this change, including a detailed discussion of the impact of this change on the NFPA 805-related analyses (e.g., NSCA, FPRA, and NPO) and the information previously submitted in the LAR. In addition, should Waterford 3 intend to credit the availability of instrument air, please provide the analysis or justification that the associated instrument air piping and tubing, which may have brazed or soldered joints, will remain free of fire damage.

Waterford 3 Response

The Instrument Air (IA) Compressors were added to the Appendix R CSD SSEL for valves SI-129A(B). The NSCA analysis credits the Nitrogen Gas Backup Air System for air operated valves. No credit is taken in the NSCA analysis for Instrument Air or the Instrument Air Compressors.

Since Waterford 3 is not taking credit for Instrument Air supply to NSCA valves, no analysis is required for the instrument air piping and tubing.

Safe Shutdown RAI 08.01

1. By letter dated September 27, 2012, the licensee responded to SSA RAI-08(a) and described how each of the 11 feasibility criteria in FAQ 07-0030, "Establishing Recovery Actions" (ADAMS Accession No. ML110070485), is addressed. It appears that the basis is for compliance with Appendix R and does not yet incorporate the FAQ criteria for demonstrating feasibility to meet NFPA 805. Please provide the following additional information:

    a. FAQ 07-0030, Criterion 2, addresses consideration of the availability of systems and indications essential to performing recovery actions (RAs). The letter dated September 27, 2012, references the conclusions of the SSA for plant monitoring instrumentation. The response does not address the availability of systems and indications with respect to the feasibility of performing the RAs identified in the LAR. Please provide a confirmation that the selected plant monitoring instrumentation bounded those systems and indications essential to performing RAs, or provide additional discussion of how Criteria 2 of FAQ 07-0030 is met with regard to determining the availability of those systems and indications necessary to perform the RAs in LAR Attachment G.

b. FAQ 07-0030, Criterion 4, addresses emergency lighting. The letter dated September 27, 2012, states that sufficient emergency lighting is installed to support access/egress to local equipment for required hot standby manual actions. LAR Attachment G and Attachment S, however, state a modification is necessary to install emergency lights. Please clarify the apparent discrepancy between the feasibility analysis as described in the RAI response and the LAR statements that additional lighting is needed. Also, please clarify if emergency lighting is provided at the local equipment to support the performance of the RAs.

c. FAQ 07-0030, Criterion 5, addresses the availability of tools, equipment, and keys required for the RA. The letter dated September 27, 2012, only addresses cold shutdown repairs. Please provide additional discussion of tools, equipment, keys, or any other similar operator aids necessary to achieve the RAs in LAR Attachment G.

d. Please discuss any ongoing or completed actions to incorporate the FAQ 07-0030 criteria in the licensee's documentation for compliance with NFPA 805.

2. By letter dated September 27, 2012, the licensee responded to SSA RAI-08(b) and stated that the actions covered in the its feasibility analysis include RAs to meet NFPA 805 Safe and Stable Hot Shutdown. However, based on the NRC staff's review of RAs described in LAR Attachment G for Fire Area RAB-1, there are RAs that do not appear to have been addressed in the feasibility analysis as stated.

a. Please justify the differences between the list of RAs in LAR Attachment G and those listed in the feasibility analysis.

b. Please justify not performing the feasibility analysis on any NFPA 805 RA identified in LAR Attachment G, utilizing the 11 criteria of FAQ 07-0030, if applicable.

c. Please update the SSA if new RAs have been added to meet NFPA 805 Safe and Stable Hot Shutdown.

<u>Waterford 3 Response</u>

Because of the extensive Fire PRA reanalysis summarized in response to RAI FM 07, an updated list of Recovery Actions is expected. As an example, RAB27 was identified as a higher risk area than originally determined, which may result in new Recovery Actions. However, the total number of Recovery Actions is expected to be reduced. Any change to the list of Recovery Actions will require an evaluation for feasibility, both individually and in the aggregate considering all of the Recovery Actions. This feasibility evaluation will be performed following the 11 criteria in FAQ 07-030 and the updated list of Recovery Actions will be provided in a revised Attachment G to the LAR.

Implementation item S2-20 has been added to the S-2 Implementation table to reflect the above actions following completion of the updated FREs. See Attachment 2 to W3F1-2013-0022.

Safe Shutdown RAI 10.01

By letter dated September 27, 2012, the licensee responded to SSA RAI-10 and stated, "Should a recovery action be utilized as a means of reducing fire risk during a NPO High Risk Evolution (HRE), the action would be evaluated for feasibility. This feasibility evaluation is not required to be in accordance with FAQ 07-0030, but would ensure the equipment is functional and that operators are available to perform the action with the time frame required."

Since the licensee is not performing the feasibility criteria per FAQ 07-0030, please describe how the equipment is ensured to be functional and how the operators will be able to feasibly perform the actions within the required timeframe using the criteria of NEI 04-02. Please describe and provide a justification for each of the feasibility criteria in NEI 04-02 that are not applied to NPO RAs, and describe any additional assumptions and criteria that are not prescribed in NEI 04-02 (if there are any).

Waterford 3 Response

Waterford 3 does not expect to have any recovery actions used as a means of reducing fire risk during a NPO higher risk evolution. However, in the unlikely event that NPO recovery actions become desirable, then the endorsed feasibility criteria at that time (FAQ 07-030, NEI 04-02, etc) will be used to ensure equipment is functional and the operator actions can be feasibly performed within the necessary timeframe.

> In conjunction with response to RAI SS 12, Implementation Item S2-17 is revised to ensure that all feasibility criteria are addressed for all Recovery Actions. See Attachment 2 to W3F1-2013-0022.

Safe Shutdown RAI 12

By letter dated September 27, 2012, the licensee responded to SSA RAI-06 and stated that when new RAs are implemented (Attachment S, Line Item S1-6), FAQ-07-0030 Revision 5 (11 feasibility criteria) will again be reviewed to verify that the RAs are feasible. The RAI response to SSA RAI 07(c) also states that additional actions determined to be RAs as a result of the updated fire risk evaluation will also be evaluated for risk and feasibility.

Based on the responses provided to SSA RAI-06 and SSA RAI-07(c), please provide a new LAR Attachment S reflecting the commitments to perform the cited feasibility analyses, reviews, and include these actions within the scope of Implementation Item S2-17.

Waterford 3 Response

> Item S2-17 in Attachment S has been revised to ensure that all feasibility criteria in FAQ 07-0030 are addressed for NSCA recovery actions. See Attachment 2 to W3F1-2013-0022.

Safe Shutdown RAI 13

By letter dated September 27, 2012, the licensee responded to PRA RAI 57. The NRC staff's review of that response and efforts associated with development of the draft safety evaluation has identified a need for additional information regarding the treatment of RAs:

a. The response to PRA RAI 57, Item c.i, states, "There is a separation issue in the area and fires impacting both A and B charging pumps are possible. The train B pump variance from deterministic requirement (VFDR) is based solely on a credited SSA RA (one that is not included in LAR Attachment G)." If an RA is "credited" to address a separation issue and resolve a VFDR, it should be included in LAR Attachment C, Attachment G, and the additional risk of the action provided in Attachment W. Please provide additional explanation of the credited SSA RA and why this action is not included in the LAR.

b. Attachment G, Step 2, "Results," states, "The results in Table G-1 identify four RAs (Fire Areas RAB 5 and RAB 6) necessary to meet the risk acceptance criteria. The remaining RAs (Fire Area RAB 1) are required to maintain a sufficient level of defense-in-depth [(DID)]." Contrary to the statements in Attachment G, the Table B-3 summary for Fire Areas RAB 5 and RAB 6 state that, "The fire risk evaluation determined that the applicable risk, defense-in-depth, and safety margin criteria were satisfied without further action." The summary further states under "DID Maintained" that "recovery actions are required for this area to meet defense-in-depth criteria." Please provide the following information:

    1) Clarify if the RAs in RAB 5 and RAB 6 are required to meet risk acceptance criteria as stated in Attachment G or defense-in-depth (DID) as stated in Attachment C of the LAR.

    2) VFDR 5-13 is listed in Attachment G with the action in RAB 5, but the VFDR disposition (in Attachment C) does not identify that an RA is necessary.

    3) VFDRs 6-09 and 6-10 are listed in Attachment G with an action in RAB 6, but the VFDR dispositions (in Attachment C) do not identify that an RA is necessary.

    4) Attachment G states that RAB 1 RAs are DID. VFDR 1-054 states, "This variance is identified as an RA action in Attachment G." Is this action required or DID?

    5) Attachment W reports the additional risk of RAs for RAB 1, 5, and 6. If all RAs are DID, how was the risk of the actions calculated?

c. Attachment C contains a "Fire Risk Summary" for each performance-based area, and each summary includes the following statement: "The fire risk evaluation determined that the applicable risk, defense-in-depth, and safety margin criteria were satisfied without further action" [emphasis added]. However, under the "DID Maintained" heading for several fire areas (e.g., RAB 1, RAB 2, RAB 5, RAB 6, RAB 7A, RAB 7B, RAB 8A-C, RAB 23, and RAB 25) modifications or DID

RAs are identified. These modifications and actions are tied to VFDR resolutions associated with these fire areas. Please provide additional explanation to rectify the apparent contradiction of the summary statement that criteria were satisfied without further actions and the identification of RAs or modifications that apply to these areas.

d. Similar to Item 3 above, VFDR dispositions state that risk, DID, and safety margin criteria are met without further action [emphasis added] and then list modifications or DID RAs. Please confirm that the modifications and RAs listed in the VFDR dispositions are necessary to satisfy the risk, DID, or safety margin criteria.

Waterford 3 Response

a. Please provide additional explanation of the credited SSA RA and why this action is not included in the LAR.

Variances were identified to support the operation of the pumps as it related to Multiple Spurious Operations. A recovery action is credited for a fire occurring in RAB 7A in the current Waterford Appendix R Safe Shutdown Analysis. The recovery action is not credited for a fire occurring in RAB 7A for NFPA 805. As a result, a recovery action is not included in Attachment C, Attachment G or Attachment W.

b.1.) Clarify if the RAs in RAB 5 and RAB 6 are required to meet risk acceptance criteria as stated in Attachment G or defense-in-depth (DID) as stated in Attachment C of the LAR.

RAB-5. Recovery actions identified in Attachment C and Attachment G are credited for DID, Defense in Depth. No RAB-5 RAs are required to meet risk acceptance criteria.

RAB-6. Recovery actions identified in Attachment C and Attachment G are credited for DID, Defense in Depth. No RAB-6 RAs are required to meet risk acceptance criteria.

b.2.) VFDR 5-13 is listed in Attachment G with the action in RAB 5, but the VFDR disposition (in Attachment C) does not identify that an RA is necessary.

The RA associated with VFDR 5-13 is maintained for DID. This action is not required for risk but is being retained to support DID.

b. 3.) VFDRs 6-09 and 6-10 are listed in Attachment G with an action in RAB 6, but the VFDR dispositions (in Attachment C) do not identify that an RA is necessary

The RAs associated with VFDR 6-09 and 6-10 are maintained for Defense in Depth. These actions are not required to meet risk acceptance criteria.

b. 4.) Attachment G states that RAB 1 RAs are DID. VFDR 1-054 states, "This variance is identified as an RA action in Attachment G." Is this action required or DID?

The RA associated with VFDR 1-054 is being maintained for DID.

b. 5.) Attachment W reports the additional risk of RAs for RAB 1, 5, and 6. If all RAs are DID, how was the risk of the actions calculated?

Attachment W, table W-2 answers the requirements for identifying and displaying the risk associated with taking the recovery actions, regardless of the action type (e.g., risk or DID).

The values listed in the 'risk of recovery action' column in W-2 are equal to the delta risk values for the fire area. The risk associated with the RAs are bounded by the total calculated delta risk. The risk of the recovery action would be equal to the delta risk associated with the VFDR (the variance tied to the component necessary for the action). The compliant case evaluates that the VFDR component is protected from fire and thus, is available). The non-complaint case evaluates scenarios with potential fire damage to the variant components (in these cases the action would not be available). Individual risk evaluations on single VFDRs were not performed. The risk associated with all VFDRs (i.e. the total compartment delta risk), bounds the risk associated with any individual VFDR. Additionally, as stated in LAR Attachment G (Step 3), "All of the operator manual actions and recovery actions were reviewed for adverse impact. None of the actions were found to have an adverse impact on the Fire PRA."

c & d) Please provide additional explanation to rectify the apparent contradiction of the summary statement that criteria were satisfied without further actions and the identification of RAs or modifications that apply to these areas.
Please confirm that the modifications and RAs listed in the VFDR dispositions are necessary to satisfy the risk, DID, or safety margin criteria.

The Fire Risk summary pages present a brief overview of the Risk Informed, Performance-Based qualities related to the fire area. The statement that "The fire risk evaluation determined that the applicable risk, defense-in-depth, and safety margin criteria were satisfied without further action" was intended to describe the results of the risk-informed evaluation. Based on a review of those areas identified as part of RAI SS 13(c), a summary statement was intended to indicate acceptable risk performance for a Fire Area without additional actions. In some circumstances it was prudent to further improve Defense in Depth with additional actions.

Waterford 3 is in the process of finalizing the Internal Events and Fire PRA models to capture changes resulting from Post-LAR RAI submittals related to the NFPA 805 transition program. These changes necessitate an update of the Fire Risk Calculations which require changes in the associated tables supportive of the LAR.

Attachments C, G, S and W will be updated to reflect the appropriate modifications and Recovery Actions as found through the updates of the Fire PRA models and as documented in the RAI responses. See Item S2-20 of Attachment 2 to W3F1-2013-0022.

Safe Shutdown RAI 14

The disposition statement in LAR Attachment C, VFDR 8C-30 is incomplete. Please provide the corrected statement.

Waterford 3 Response

The disposition for 8C-30 should have read as:

Variance: 8C-30 – Decay Heat Removal (HSB)

Disposition: This condition was evaluated for compliance using the performance-based approach of NFPA 805, Section 4.2.4. A fire risk evaluation determined that applicable risk, defense-in-depth, and safety margin criteria were satisfied without further action.

Safe Shutdown RAI 15

Under the "Basis" heading in LAR Attachment K, Deviation-42, Item (d) states, "The section of ductwork between the two valves will be provided with a 1-hour fire resistant barrier." This commitment was contained in the original approval request dated September 9, 1983. Please confirm that this 1-hour barrier is installed and remains intact.

Waterford 3 Response

The fire barrier discussed in LAR Attachment K, Deviation 42, Item (d) is installed and remains intact.

Attachment 2 to

W3F1-2013-0022

Revised Table S-2, Implementation Items
Waterford 3 NFPA 805 License Amendment Application

Table S-2, Items provided below are those items (procedure changes, process updates, and training to affected plant personnel) that will be completed prior to the implementation of new NFPA 805 fire protection program.

Table S-2 Implementation Items

Item	Description	LAR Section / Source
S2-1	Replace Fire Brigade Personal Alert Safety System devices with units that meet Fire Code NFPA 600 - 2000 Edition and NFPA 1982.	Attachment A (NEI-04-02 B-1 Table) VFDR 3.4.1(a)(1)-1
S2-2	Revise plant documents to include clear guidance that conduits used for electrical raceways shall be metal and thin walled metallic tubing shall not be used in accordance with the requirements of this section. Appropriate station electrical specifications will be updated to specify only metal tray and metal conduits shall be used for electrical raceways. Thin wall metallic tubing shall not be used for power, instrumentation, or control cables.	Attachment A (NEI-04-02 B-1 Table) VFDR 3.3.5.2
S2-3	Revise Bulk Hydrogen System vendor/plant documentation and perform periodic inspections and preventive maintenance in accordance with NFPA 50A.	Attachment A (NEI-04-02 B-1 Table) VFDR 3.3.7.1-1
S2-4	Provide appropriate means to alert personnel for NFPA 50A Bulk Hydrogen System for all personnel on hazards of hydrogen flames.	Attachment A (NEI-04-02 B-1 Table) VFDR 3.3.7.1-3
S2-5	Update Pre-Fire Strategies and necessary plant documents to: 1) Include a description of areas for flooding (currently in S2-5). 2) Identify areas containing redundant safe shutdown equipment susceptible to water damage from fire brigade fire suppression activities. 3) Revise fire brigade training plans to address judicious use of fire hose streams to limit water damage to redundant safe shutdown equipment.	Attachment A (NEI-04-02 B-1 Table) VFDR 3.4.2.1 RAI FPE 15
S2-6	Revise plant test procedures to perform air flow tests on deluge sprinkler systems where it is not practical to perform full flow tests and document trip time for deluge system actuation.	Attachment A (NEI-04-02 B-1 Table) VFDR 3.9.1(2)-2
S2-7	Revise plant documents to address concerns associated with equipment being taken out of service during NPO modes. This procedure revision will provide guidelines for actions to be taken in specific fire areas when components or system trains are taken out of service. For those fire areas where the credited KSF system or equipment has been taken out of service the following guidelines will be included in plant procedures. • Prohibition or limitation of hot work. • Prohibition or limitation of combustible materials, and/or • Establishment of additional fire watches as appropriate. Utilizing the above outlined approaches to alleviate the identified "pinch points," the credited KSFs can be maintained.	Attachment D
S2-8	Revise Entergy Procedure EN-DC-127, Control of Hot Work and Ignition Sources, to provide controls to limit the likelihood of a cable fire or a transient fire caused by hot work in RAB 5 and RAB 6.	Attachment V Section V.2 (Alternate Analysis Methods to NUREG/CR-6850)

Table S-2 Implementation Items

Item	Description	LAR Section / Source
S2-9	An additional barrier (beyond current procedural controls) will be provided by adding floor markings under the cable trays to limit the placement of transient combustibles associated with certain scenarios in the turbine building.	Attachment V Section V.2 (Alternate Analysis Methods to NUREG/CR-6850)
S2-10	Develop and implement the NFPA 805 monitoring program per NFPA 805 Section 2.6.	LAR Section 4.6
S2-11	Develop Fire Protection Design Basis Document as described in NFPA 805, Section 2.7.1.2 and necessary supporting documentation as described in NFPA 805, Section 2.7.1.3. This is part of transition to 10 CFR 50.48(c) to ensure program implementation. A cross-reference to supporting documents will also be established.	LAR Section 4.7.1
S2-12	Revise the Configuration Control Procedures to reflect NFPA 805 licensing basis requirements.	LAR Section 4.7.2
S2-13	Several NFPA 805 document types such as: NSCA Supporting Information, Non-Power Mode NSCA Treatment, etc., generally require new control procedures and processes to be developed since they are new documents and databases created as a result of the transition to NFPA 805. The new procedures will be modeled after the existing processes for similar types of documents and databases. System level design basis documents will be revised to reflect the NFPA 805 role that the system components now play. This includes update of the Safe Shutdown Analysis.	LAR Section 4.7.2 RAI SS 01.01
S2-14	Revise Entergy Procedure, EN-DC-330,Fire Protection Program to reflect the applicable Quality Assurance requirements of NFPA 805, section 2.7.3.	LAR Section 4.7.3
S2-15	Post-transition, for personnel performing fire modeling or Fire PRA development and evaluation, Waterford 3 will develop and maintain qualification requirements for individuals assigned various tasks. Position Specific Guides 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.	LAR Section 4.7.3
S2-16	Revise plant administrative procedures/documents to require periodic inspection of transformer oil collection basins and drain paths to ensure that they are free of debris and capable of performing their design function.	Attachment A (NEI-04-02 B-1 Table) VFDR 3.3.9-1
S2-17	Update the recovery action feasibility process against the criteria of FAQ 07-0030 including the incorporation of drills into the fire protection program to ensure all feasibility criteria in FAQ 07-0030 are addressed for NSCA and NPO recovery actions	Attachment G, Step 4 Results RAIs SS 08.01, SS 12
S2-18	Develop or revise necessary plant procedures/documents to address requirements of NFPA 241, Section 5.1 for Thermit Welding and revise Engineering Report WF3-FP-10-00021 "WF3 Code Compliance Report for NFPA 51B" to include compliance with NFPA 241 "Safeguarding Construction, Alteration, and Demolition Operations" - 2000 Edition.	Attachment A (NEI-04-02 B-1 Table) VFDR 3.3.1.3.1
S2-19	Update the NSCA, engineering and PRA documentation to address transition to additional criteria in NEI 00-01, Revision 2.	RAI SS 02.01
S2-20	Following completion of updated FREs, evaluate revised list of Recovery Actions for feasibility using the criteria of FAQ-07-0030 and revise Attachments C, G, S and W.	RAIs SS 08.01, SS 13