Metzger, Brian

From: Sullivan, Kenneth [ks@bnl.gov] BNL
Sent: Friday, October 02, 2009 9:00 AM
To: Metzger, Brian NRR
Cc: Frumkin, Daniel; Higgins, James C
Subject: RE: RAIs

Hi Brian!

Have moved on to Oyster Creek Phase 2 submittal - After I complete this - Plan is to do IP2, IP3, and then Wolf Creek last - This is certainly not cast in concrete - let me know if you would like me to alter it.

Note that for licensee's that have more than one submittal (i.e., OC and IP) I am preparing a separate RAI for each, So although there are only three licensee's, in Task 1, there will be a total of five RAIs

Admittedly, I spent more time than anticipated on OC Ph 1 but still on track for submittal of all five RAIs by the agreed upon date (10/30)

Received internal (BNL) review comments on OC Ph 1 RAI this am - as soon as I receive your comments I will develop the "final" version and submit it to you and Dan (with cc to Bernie Grenier).

Didn't consider the need for this additional review step (staff review of draft RAI) when we were developing the SOW - but I appreciate having staff comments on the draft version before issuing the final.

Have a great weekend

Ken

-----Original Message-----
From: Metzger, Brian [mailto:Brian.Metzger@nrc.gov] NRR
Sent: Thursday, October 01, 2009 4:49 PM
To: Sullivan, Kenneth
Subject: RAIs

Ken,

Dan provided me your draft RAIs for Oyster Creek and we will review them as soon as possible but I was wondering which request you were going to be reviewing next. I am revising some schedules and just wanted to know where to "slot" the requests that we have you working on. Please let me know if you have any questions.

Regards,

Brian Metzger
Fire Protection Engineer, NRR/DRA/AFPB,
Phone: 301-415-3972
Location: O-10G13
Mail Stop: O-10C15

BROOKHAVEN
NATIONAL LABORATORY

managed by Brookhaven Science Associates
for the U.S. Department of Energy www.bnl.gov

Energy Sciences and Technology Department
Building 130 P.O. Box 5000
Upton, NY 11973-5000
Phone 631 344-7915
ks@bnl.gov

October 13, 2009

Mr. Daniel Frumkin
U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Division of Risk Assessment, Fire Protection Branch (NRR/DRA / AFPB)
Washington, DC 20555-0001

Reference: JCN No. J-4242, Task Order No. 1, Exelon Generation Company, Oyster Creek Nuclear Generating Station TAC No. ME0756.

Dear Mr. Frumkin :

By letter to the Nuclear Regulatory Commission (NRC) dated March 3, 2009, Exelon Generation Company, LLC (the licensee), submitted a Request for Exemption from Title 10 of the Code of Federal Regulations, Part 50, Section III.G, "Fire Protection of Safe Shutdown Capability," for Oyster Creek Nuclear Generating station. In accordance with the scope of work described in Task 1 of Project J-4242, I have reviewed the request submitted by the licensee and identified a need for additional information, as set forth in the Enclosure.

It should be noted that the RAIs described in this report resulted from a review of the technical merits of the March 3, 2009 submittal. As a result, the review was limited to an assessment of the feasibility of the OMAs and adequacy of defense-in-depth provided for fire areas which credit the performance of OMAs as a means of achieving and maintaining hot shutdown conditions. A determination of the validity of prior staff approval of the requested OMAs is considered to be the purview of the NRC staff and, therefore, beyond the scope of this review. In performing this review, it was assumed that the all of the requested OMAs were previously approved by the staff and are appropriately documented in the SERs referenced by the licensee in its submittal.

If you have any questions, please contact me at the phone number or e-mail address indicated above.

Sincerely,

Kenneth Sullivan,
Systems Engineering and Safety Analysis Group

cc: B. Grenier, NRC
D. Diamond
J. Higgins
Project File J4242., Task 1

Enclosure

REQUEST FOR ADDITIONAL INFORMATION
REGARDING REQUEST FOR EXEMPTION FROM
10 CFR 50 APPENDIX R. SECTION III.G
OYSTER CREEK NUCLEAR GENERATING STATION
DOCKET NO. 50-219

Background

By letter to the Nuclear Regulatory Commission (NRC) dated March 3, 2009 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML090630132), Exelon Generation Company, LLC (the licensee), submitted a Request for Exemption from Title 10 of the Code of Federal Regulations, Part 50, Section III.G, "Fire Protection of Safe Shutdown Capability," for Oyster Creek Nuclear Generating Station (OCNGS). The NRC staff has reviewed the request for exemption the licensee provided in the March 3, 2009 submittal.

As described in Regulatory Issue Summary 2006-10, "Regulatory Expectations with Appendix R Paragraph III.G.2 Operator Manual Actions," for plants licensed before January 1, 1979, an approved exemption is required for all operator manual actions (OMAs) used to achieve compliance with 10 CFR Part 50, Appendix R Section III.G.2, even those that were accepted in a previously-issued NRC SER. Accordingly, the licensee is requesting that the NRC approve an exemption request to allow the use of manual actions for demonstrating compliance with Section III.G.2 of Appendix R, which, it asserts were previously approved in Fire Protection Safety Evaluation Reports (SER) dated March 24, 1986 and June 25,1990. The specific manual actions related to this request are listed in Attachment 2 of the licensee's March 3, 2009 submittal.

The requests for additional information (RAIs) described below resulted from a review performed by Brookhaven National Laboratory of the technical merits of the March 3, 2009 submittal. As a result, the review was limited to an assessment of the feasibility of the OMAs and adequacy of defense-in-depth provided for fire areas which credit the performance of OMAs as a means of achieving and maintaining hot shutdown conditions. A determination of the validity of prior staff approval of the requested OMAs is considered to be the purview of the NRC staff and, therefore, beyond the scope of this review. In performing this review, it was assumed that the all of the requested OMAs were previously approved by the staff and are appropriately documented in the SERs referenced by the licensee in its submittal.

To verify the feasibility of the OMAs and adequacy of defense-in-depth provided for fire areas crediting the performance of an OMA to achieve and/or maintain hot shutdown conditions, a response to the following RAIs is requested:

Requests for Additional Information

RAI-01 Circumstances for Review

Section 2.0 of Attachment 1 cites the basis for the exemption request as modifications needed to achieve compliance with Section III.G.2 of Appendix R, represent an unwarranted burden because they are not necessary to meet the underlying purpose of the rule.

Provide the following relevant details to support this position:

- A technical justification of how the proposed arrangement achieves the underlying purpose of the rule.

- The specific requirements of III.G.2 that are not met for each of the requested exemptions, for example, a lack of fire barriers, spatial separation, automatic suppression, etc.

- A summary of the plant specific features that compensate for this lack of III.G.2-required features for each of the requested exemptions. For example, note any enhanced defense-in-depth measures such as a lack of ignition sources and/or combustibles, more robust and/or supplemental detection and suppression systems and the availability of the requested manual action(s).

- A technical explanation that justifies how the proposed methods will result in a level of protection that is commensurate with that intended by III.G.2.

The response should demonstrate that defense-in-depth is provided such that operators are able to safely and reliably achieve and maintain hot shut down capability from the control room. Note that it is the Nuclear Regulatory Commission (NRC) staff's position that operator manual actions alone, regardless of their feasibility and reliability, do not meet the underlying purpose of the rule without specific consideration of the overall concept of defense-in-depth that is being applied in a particular fire area.

RAI-02 Ensuring That One of the Redundant Trains Is Free of Fire Damage

Section IV-A of Attachment 1 identifies 34 fire areas/zones that are not in compliance with Appendix R, Section III.G.2 because hot shut down OMAs would be required to align redundant train systems to achieve safe shutdown. Section IV- C also states that the Fire Support Procedure (FSP) makes provision for a worst-case fire affecting all of the fire zones

Section III.G.2 of Appendix R provides three options for ensuring that one of the redundant trains of equipment remains free of fire damage. The use of Operator Manual Actions (OMAs), in lieu of the three options provided in III.G.2, is not explicitly included as a means of

demonstrating compliance with Section III.G.2. Thus, systems and equipment that are not provided with a level of fire protection commensurate with Section III.G.2 must be assumed to be lost or damaged as a result of fire.

Confirm whether all redundant equipment located within a particular fire area, that is not provided with fire protection features specified in Section III.G.2 is assumed lost or damaged during a fire event and also confirm the time at which this equipment is assumed to be lost or damaged.

RAI-03 Other Evaluations

Fire areas may have other exemptions or engineering evaluations that affect fire protection systems or safe shutdown capabilities.

Provide a discussion of any other exemptions or evaluations that impact this request in any way and a justification for why such impact should be considered acceptable.

RAI-04 Fire Protection System and Fire Barrier Design Criteria

Attachment 1 notes that several areas are equipped with various fire detection and suppression systems. However, the request does not state whether the systems have been designed and installed in accordance with applicable design standards or requirements.

For example: Attachment 1 states that the Fire Zones DG-FA-15 and OB-FZ-6A are separated from other plant areas by rated fire barriers. For areas such as these which credit fire barriers for providing separation from other plant areas, state what the fire rating is for the barriers as well as any penetrations and whether they are designed and installed in accordance with a particular standard or listing. Also, Attachment 1 states that areas such as, Fire Zone OB-FZ-6A, are equipped with smoke detectors and that an enhancement is being made to OB-FZ-8B to install area-wide smoke detection. For areas such as these that rely on smoke detectors, state whether the detectors have been installed and maintained in accordance with a particular design standard or basis, e.g. National Fire Protection Association 72: National Fire Alarm Code, 1985 Edition.

Where fire protection features such as detection and suppression systems and fire rated assemblies are installed, describe the technical basis for such installations including the applicable codes, standards and listings. In addition, provide a technical justification for any deviations from codes, standards and listings by independent testing laboratories in the fire areas that could impact this evaluation. Lastly, provide a technical justification for any non-rated fire protection assemblies.

Additionally, Section B.(5) of Attachment 1 states that a water curtain located in openings between the 23' to 51' elevations and 51' to 75' elevations will provide reasonable assurance of

extinguishing any postulated fire. Where the erection of physical barriers between redundant shutdown systems is precluded, the staff has accepted, in concept, the use of an automatic fire suppression system which discharges a "water curtain" across the boundary areas separating the redundant systems. A water curtain may aid in the extinguishment of fires. However, as discussed in Generic Letter (GL) 83-33, the design objective of a "water curtain" is to reduce the spread of hot gases and products of combustion between adjoining areas, not fire extinguishment. Provide a technical basis to support your reliance on water curtains for fire extinguishment.

RAI-05 Time and Sequence Assumptions

Attachment 1 states that the shutdown methodology incorporates both "symptom based" and "prompt" (prescriptive) OMAs.

For each of the 34 OMAs contained in this request, identify the type of action being performed (prompt or symptom based) and provide a discussion of the required time verses the observed and/or calculated completion time. The response should describe the methodology and all assumptions used to determine each time.

For "symptom based" OMAs, provide a justification to support the time assumed to be available to perform the actions, including confirmation that there is adequate time for the operators to diagnose the need for the actions, travel to action location(s), perform the actions, and confirm the expected response before an undesired consequence occurs. For OMAs identified as "Prompt Actions, " provide a justification for: (a) selecting 45 minutes for classifying OMAs as "Prompt Actions" and (b) clarification and justification of when this 45 minute time period is assumed to start.

The request also lacks a detailed description of the series of events that may occur prior to initiating the OMA procedures. Specifically, the request does not describe the conditions that must be satisfied in order for operators to enter the procedure (i.e., procedure entry conditions). In addition the request does not describe whether the procedures are initiated immediately upon activation of the smoke detection system, upon confirmation of fires of a certain size or type or upon some other fire confirmation criteria.

Describe the circumstances and criteria needed to enter the OMA procedure. In addition, describe the amount of time, and the technical basis, that has been assumed for detection and assessment of a postulated fire as well as the expected plant response to a postulated fire. Additionally, provide either: (1) an analysis and/or technical justification that demonstrates that the detection capability is sufficient to provide notification of a postulated event coincident to or before damage to the redundant trains of equipment occurs; or (2) provide an analysis and/or technical justification for scenarios where the redundant components are damaged before a fire has been confirmed.

RAI-06 Ignition Sources and Combustible Fuel Load

Attachment 1 uses terms such as "low" or "moderate" to describe the combustible fuel loading in the fire areas included in the request.

Provide critical details and/or assumptions regarding the fire hazards for each fire area included in the request. This information may include, but is not limited to:

- The number, type and location of potential ignition sources,
- The number and types of equipment that may exhibit high energy arcing faults, and the relationship between this equipment and any secondary combustibles,
- The quantity of cables and other secondary combustibles and their relationship to potential ignition sources,
- The cable type, e.g., thermoplastic or thermoset. If thermoplastic cables are used, provide a discussion of self-ignited cable fires,
- Ratings for cables, e.g., IEEE-383, etc. If not rated, justify why fire spread would be assumed to be slow,
- Controls on hot work and transient combustibles in the area, and the proximity of secondary combustibles that could be impacted by a transient fire, and
- Dimensions of the rooms including ceiling heights.

RAI-07 Fire Zone Proximity and Access

Attachment 1 states that the performance of certain OMAs may require the use of a SCBA. The submittal includes a discussion of circumstances and features that may preclude the need for SCBAs. However, the submittal does not definitively state whether operators are procedurally directed to don SCBAs or if the time needed to don the SCBAs was included in the analysis of time available to perform line. For example, Section B(6) states that for a fire in OB-FZ-8C actions 17 and 18 may require the use of SCBAs for either traveling to the "C" or "D" 4160V Switchgear Rooms, or if CO2 is present in the area. However, the discussion then provides your rationale for why operators would not be expected to need SCBAs to perform these actions. As a result, it is not clear if the discussion of the use of SCBAs is intended to portray environmental conditions operators may be reasonably expected to encounter or if the request is seeking staff approval of the rationale provided so the need for SCBAs may be eliminated.

In addition to clarifying the discussions presented in Attachment 1 regarding the use of SCBAs, for each fire area / zone included in the request, provide a technical justification that demonstrates that a fire in the fire area of fire origin would not impact the performance of the OMA. The response should address effects of fire such as heat, smoke, ventilation and any other fire effects that could have an impact on the OMAs.

RAI-08 Fire Scenarios

Attachment 1 Section A, Fire Area / Zone Descriptions and Attachment 2, Appendix R III.G.2 Manual Operator Actions, identify the OMAs needed in each fire area / zone, but do not describe the fire scenarios that have been considered for the postulated events.

For example, in the event of fire in Fire Zones TB-FA-26, TB-FZ-11B, TB-FZ-11C, TB-FZ-11D, TB-FZ-11E , OMAs may be required to isolate damaged cables and reestablish control locally for 4160V Switchgear 1D. However, no information is provided to describe the separation between the redundant train cables. It is also not clear where the cables are located relative to floor, walls and other trains or whether any spatial separation exists between the two trains.

For each OMA included in this request, describe the in situ and transient fire hazards (ignition potential and combustibles) in the fire area that have the potential to affect the redundant trains. Provide a description of the proximity of the redundant train equipment to in situ hazards and the spatial relationship between the redundant trains in the fire area such that if they are damaged, manual actions would be necessary. Note, that this question is distinct from the RAI addressing Ignition Sources and Combustible Loading, which is generally focused on the combustibles in an area, whereas, this RAI addresses the specific relationship between ignition sources and combustibles and the redundant trains.

RAI-09 Fire Area of Origin Re-entry

The March 3, 2009, request states that operators are required to re-enter certain fire areas, including RB-FZ-1E and RB-FZ-1F to perform an action following a fire event. Since the request also indicates that all unprotected equipment located in a fire affected area / zone is assumed lost or damaged as a result of the fire, additional clarification is needed to confirm the accessibility, availability and operability of the credited equipment.

Provide a tabular cross reference between all fire areas / zones that credit operator re-entry to perform OMAs and the equipment to be operated. For each piece of equipment and /or component, provide a justification of why the assumption that all equipment located in the fire area of origin is lost during a fire does not apply. Additionally, provide critical details and/or assumptions of the analysis which demonstrate that the required safe shut down equipment and/or component located within the area is maintained free of fire damage and remains operable following the fire event.

RAI-10 Feedwater Regulating Valve Leakage Rate

The description of OMA Item No. 15 provided in Attachment 1 states that the action is needed to stop the pumps at the switchgear since air leakage may cause the feedwater regulating valves to drift back open. Based on an assumed "minor" leakage rate, the analysis further states that there will be 180 minutes to perform this action.

Quantify the assumed "minor" leakage rate and provide a technical justification to support its application for determining the time available to perform the OMA and describe how the potentially adverse effects of fire on valve leakage rate were considered.

RAI-11 Diagnostic Instrumentation

Several sections of Attachment 1 state that the need for an operator to perform a required OMA can be *"readily diagnosed from the Control Room due to the numerous indications and symptoms available."* In addition, for Fire Area OB-FZ-8C Attachment 1 states that any delay in the entry into the appropriate FSP or delay in suppression of the fire would not significantly affect the performance of the operator actions, *since the EOPs would direct the same actions to be performed, based on system status* (emphasis added).

The staff has defined diagnostic instrumentation in it's response to Question 5.3.9 of Generic Letter 86-10, as follows:

> *"Diagnostic instrumentation is instrumentation, beyond that previously identified in Attachment 1 to I&E Information Notice 84-09, that is needed to assure proper actuation and functioning of safe shutdown equipment and support equipment (e.g., flow rate, pump discharge pressure).*

Therefore, it may not be sufficient to protect only the instrumentation needed to show conformance to IN 84-09 and GL 81-12.

Diagnostic instrumentation beyond that needed to detect and diagnose the location of the fire, may not be required if the OMA is taken immediately in response to fire and has been properly integrated into fire response procedures. However, appropriate diagnostic indications are necessary if the fire response procedures direct operator actions in response to observed changes in plant conditions or other unexpected symptoms of fire damage.

For each OMA that relies on control room indications to detect the need for the action, provide information which demonstrates that suitable diagnostic instrumentation has been identified and that the credited indications are: (a) known to remain unaffected by a postulated fire, (b) identified in the safe shutdown equipment list and fire response procedures, (c) capable of promptly identifying the need for the action without forcing operators to enter complex diagnosis procedures and (d) that the action, once completed, has achieved its objective.

RAI -12 Hot Shutdown Repairs

Operator manual actions (OMAs) are defined as actions performed by operators to manipulate components and equipment from outside the MCR to achieve and maintain postfire hot shutdown, but do not include "repairs." Provide confirmation that the OMAs described in your March 3, 2009 submittal meet this definition.

RAI-13 Operator Re-entry Time

Attachment 1 states that the assessment of OMAs in fire-affected areas assumes that the area can be reentered within 90 minutes.

Provide a technical justification to support this assumption including why a 90 minute period of time is suitable for all fire areas / zones requiring re-entry.