

Metzger, Brian

From: Sullivan, Kenneth [ks@bnl.gov], BNL
Sent: Tuesday, October 20, 2009 6:00 PM
To: Frumkin, Daniel; Metzger, Brian, BNL
Cc: Higgins, James C
Subject: DRAFT RAI OCNGS Ph 2 102009
Attachments: DRAFT RAI OCNGS Ph 2 102009.doc

Dan / Brian

Attached is a draft version of the RAIs related to the review of the Oyster Creek Phase 2 dated March 4, 2009

Would appreciate any comments or suggestions you may have so they can be incorporated into the final version

Thanks

Ken Sullivan
BNL

BSK

October 20, 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, Phase 2 Request, TAC No.
ME0780

Dear Mr. Frumkin :

By letter to the Nuclear Regulatory Commission (NRC) dated March 4, 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 (designated by the licensee as the "Phase 2" submittal). 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 licensee's March 4, 2009 submittal. Specifically, the review was limited to an assessment of the feasibility and reliability of the OMAs and the 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. Issues related to the licensee's interpretation of its fire protection licensing basis, were beyond the scope of this review.

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

Sincerely,

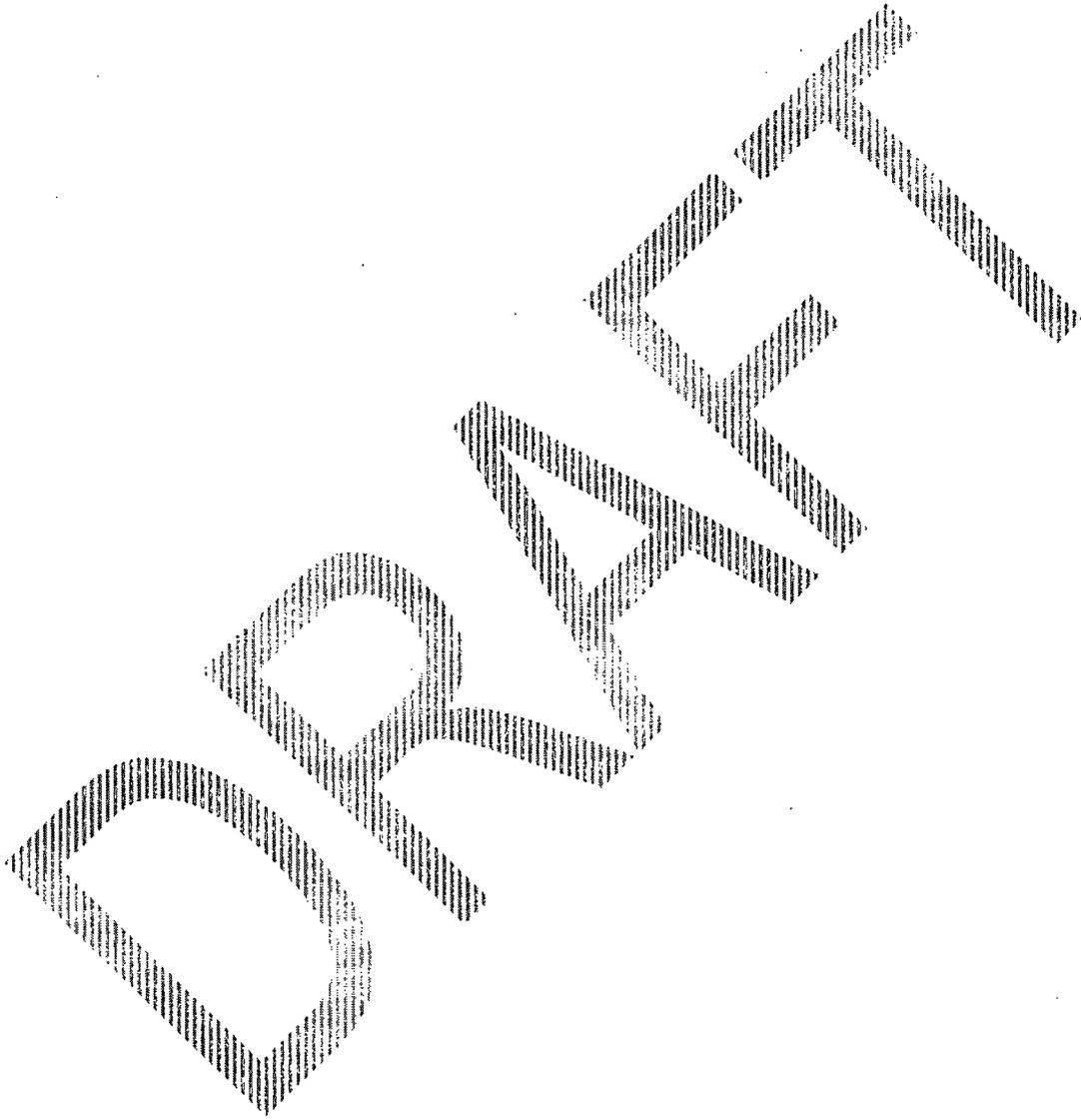
Kenneth Sullivan,
Systems Engineering and Safety Analysis Group

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**

OCNGS Phase 2 Request, NRC TAC No. ME0780

Background

By letter to the Nuclear Regulatory Commission (NRC) dated March 4, 2009 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML090640225), 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).

In this submittal, Exelon is requesting that the Nuclear Regulatory Commission (NRC) approve an exemption request to allow the use of operator manual actions (OMAs) as a means of satisfying the technical requirements of Section III.G.2 of Appendix R to 10 CFR 50 in certain locations (i.e., fire areas or fire zones) of the OCNGS. None of the OMAs identified in the March 4, 2009 request were previously reviewed by the staff. Paragraph III.G.2 of Appendix R does not identify OMAs as a means of ensuring that one of the redundant trains of equipment remains free of fire damage. However, plants which credit manual actions for Section III.G.2 compliance may obtain specific NRC approval for the manual action via the exemption process in accordance with the requirements of 10 CFR 50.12.

This exemption request describes operator manual actions that were not identified in a previous exemption request or reviewed by the staff in a Safety Evaluation Report. The specific manual actions related to this request are listed in Attachment 2 of the licensee's March 3, 2009 submittal.

The licensee's stated basis for this request is the special circumstances of 10 CFR 50.12 (a)(2)(ii), which states: "Application of the regulation in the particular circumstance would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule" as the basis for this request.

Under contract to the NRC, Mr. K. Sullivan, of Brookhaven National Laboratory, has been assisting the staff in reviewing the submittal and has determined that additional information is needed to complete his review. The requests for additional information (RAIs) described below resulted from a review of the technical merits of the March 4, 2009 submittal.

Requests for Additional Information

RAI-01 Circumstances for Review

The basis for this exemption request is described in Section 2.0 of Attachment 1 as follows: Modifications needed to achieve compliance with Section III.G.2 of Appendix R, (e.g., adding fire suppression and detection systems, installing fire barriers and/or rerouting cables) 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 conclusion:

- 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.

Section III of Attachment 1 states that the existing level of defense in depth is considered acceptable for the majority of OMAs contained in the request. Section III.A of Attachment 1 identifies the defense-in-depth elements (detection, suppression, combustible loading, etc) available in each of the 35 fire areas / zones. However, the request does not provide a sufficiently clear explanation to confirm that the existing level of defense in depth is adequate to support the use of OMAs as a means of satisfying Section III.G.2 of Appendix R.

As described in Section 1.8.2 of Regulatory Guide 1.189 (RG 1.189), requests to permit the use of an alternative approach (i.e., use of OMAs as a means of satisfying Section III.G.2 criteria) should include a sound technical basis clearly demonstrating that the fire protection defense-in-depth philosophy is appropriately maintained and that the exemption is technically justified.

For each fire area/zone identified in the March 4, 2009 request, provide a justification which clearly demonstrates that the existing defense-in-depth elements (i.e., administrative controls,

fire protection systems and features, and safe-shutdown capability) are adequate to support the use of the requested OMAs as a means of satisfying Section III.G.2 of Appendix R. Identify all areas where you do not propose to install or improve the automatic suppression and/or detection capabilities, and/or do not intend to implement other more restrictive fire prevention, detection, or suppression measures. For each of these areas, provide a technical justification to support the use of OMAs as a means of satisfying Section III.G.2 in areas.

In addition, it is not clear how existing exemptions were considered in the evaluation of the level of defense-in-depth provided for each fire area / zone identified in the March 4, 2009 submittal. For example, Section III-A of Attachment 1 states that SER dated June 25, 1990 provided an exemption for a lack of automatic fire detection in Fire Zone TB-FZ-11B but the potential impact of a lack of detection on the feasibility and reliability of OMAs is not specifically addressed in the submittal

The requested responses should clearly 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 III-A of Attachment 1 identifies 35 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 III-B also states that the analysis assumed worst-case conditions of fire damage requiring all of the manual actions for a particular fire area/zone to be performed.

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.

Section III-A of Attachment 1 states that the staff's approval of an exemption for a lack of automatic fire detection in Fire Zone TB-FZ-11B was based on the following:

- the fire will not be of significant magnitude or duration,
- it will be promptly extinguished by one of the two automatic sprinkler systems installed in this fire zone, and
- the flow alarms will promptly alert the fire brigade who will respond to manually fight the fire.

As described in Section 6.2 of the June 25, 1990 SER, however, this list of considerations is not complete, as it does not include fire protection features provided for the credited train of hot shutdown cables (i.e., a 1-hour rated fire wrap or relocating cables).

For each of the fire areas/zones identified in the March 4, 2009 submittal, provide a cross reference between the fire area/zone and any approved exemptions being credited. For each exemption provide a concise, but accurate, listing of fire protection features identified by the staff in the associated SER, and identify any cases where the level of fire protection described by in the SER is no longer valid. For example, the staff's evaluation may have been based, in part, on the provision of a 1-hour rated fire barrier wrap for all hot shutdown cables but the barrier may no longer be credited (i.e., removed or abandoned in place). For any cases where the level of fire protection has changed from that which was approved by the staff, provide a justification which clearly demonstrates that the current level of fire safety is equivalent to that which was approved by the staff in the associated SER.

In addition, Attachment 1, Section III states that the manual operator actions identified in the March 4, 2009 submittal are required as a result of:

- a) changes to the original safe shutdown analysis, or
- b) were implied in the original safe shutdown analysis but for which an SER does not exist.

For each fire area / zone identified in the request, identify which manual actions are required as a result of (a) or (b) above.

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

Section III of 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: Section III of Attachment 1 states that Fire Zone OB-FA-9 is protected by a fixed, total flooding, automatic Halon 1301 extinguishing system but the request does not state whether the Halon system was installed and maintained in accordance with a particular design standard or basis, e.g. National Fire Protection Association Standard 12A.

Section III of Attachment 1 also states that OB-FZ-6A is 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.

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 C.3(4) 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

An action is considered feasible if it is shown that it is possible to be performed within the available time (considering relevant uncertainties in estimating the time available). The tables provided in Section III.B of Attachment 1 do not provide a clear link to NUREG 1852 criteria for determining feasibility. For example, the notes accompanying the table state that the "allowable time limit" was obtained from safe shutdown calculations. Since these calculations were likely developed prior to the issuance of NUREG-1852, the criteria and assumptions used to establish these times may not be consistent with those contained in the NUREG.

For each of the OMAs contained in this request, identify:

- 1) **Action classification** (prompt or symptom based)
- 2) **Time available** - defined as the period of time from a presentation of a cue for an action to the time of adverse consequences if the action is not taken
- 3) **Diagnosis time**, defined as: The time required for an operator to examine and evaluate data to determine the need for, and to make the decision to implement, an action ()
- 4) **Implementation time**; defined as: The time required by the operator(s) to successfully perform the manipulative aspects of an action (i.e., not the diagnosis aspects themselves, but typically as a result of the diagnosis aspects); including obtaining any necessary equipment, procedures, or other aids or devices; traveling to the necessary location; implementing the action; and checking that the action has had its desired effect

In addition describe the amount of time, that has been assumed for detection and assessment of a postulated fire and provide a technical basis for this time.

The response should describe the methodology and all assumptions used to determine each time. For example, it is not clear if the analysis assumed an initiating time (i.e., Time 0) as the time at which the fire is detected, the time at which the fire is determined to pose a threat to safe shutdown equipment, the time the reactor is scrammed, the time that a spurious signal or actuation is observed in the control room, or some other point in the fire scenario.

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. Include a justification for assuming that 30 minutes would be available to diagnose all actions .

RAI-06 Ignition Sources and Combustible Fuel Load

The information provided in Attachment 1 of the request is generally too vague to determine the adequacy of methods established to control the handling and use of combustibles and ignition sources. For example, for each fire area identified in the March 4, 2009 request, Attachment 1 identifies the principal types of combustibles (e.g., fuel oil, cable insulation, lube oil, paper, furnishings, etc.) but does not quantify the amount, room size, or location of combustibles with respect to the cables and / or equipment of concern (i.e., those for which the exemption is being requested). In addition, the Attachment does not include any discussion of ignition sources in these areas.

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 Use of SCBAs

Clarify the use of SCBAs. For example, although Actions 10 & 12 may require the use of a self-contained breathing apparatus SCBA, Section III B implies that 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.

RAI-08 Fire Scenarios

Attachment 1 Section III B and Attachment 2, identify the OMAs that may be needed as a result of fire in each fire area / zone, but do not contain a suitably detailed description of the specific fire scenarios that have been considered. Although OMAs are identified to isolate damaged cables and reestablish control locally, no information is provided to describe the separation between the redundant trains of cables. For example, the scenario described for Action 14 in Attachment 2 states:

This action is being performed because there is the potential that the normal ventilation system would not be available due to cable damage.

The scenario does not provide any further information regarding the specific circuits of concern, such as, cable type, location / separation, location of potential sources of fire damage, etc.. 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

Section III.B. of the March 3, 2009, request states that, depending on the fire scenario, operators may be required to re-enter certain fire areas, including Fire Zone TB-FZ-11C and TB-FA-26 to perform an action following a fire event. However, Sections III.C.3 and III.C.4 state: *"all operator manual actions addressed in this exemption request are performed in separate fire zones from the initiating fire area (no re-entry required)"*. Clarify the apparent contradiction between Sections III.B and III.C.

For areas where operator re-entry post-fire may be required (as described in Section III.B):

- (a) Provide a justification of the accessibility, availability and operability of the equipment to be operated, given the assumption stated in the request that all unprotected equipment located in a fire affected area / zone is lost or damaged as a result of the fire.
- (b) Provide a tabular cross reference between all fire areas / zones that credit operator re-entry to perform OMAs and the specific 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.
- (c) Provide information which demonstrates that the required shutdown equipment located within the area is maintained free of fire damage and remains operable following the fire event.

RAI-10 Information Request

Reference 4 of the March 4, 2004 request (SP-1302-06-013, Fire Protection Specification for Post-Fire Safe Shutdown Program Requirements at Oyster Creek) states that detailed

information regarding manual actions for each fire area/zone and their associated time line studies is contained in calculations identified in Reference 3.3.1.1. Provide the calculations identified in Reference 3.3.1.1 of SP-1302-06-013 and describe their applicability to the current request.

RAI-11 Spurious Actuation of Containment Spray Pump

Attachment 2 states that the purpose of Action 10 (trip two breakers at USS 1B2 and remove the close fuses) is to prevent spurious start of the Containment Spray Pumps. The Attachment states further that this action has no upper time limit and is only performed to *"ensure their availability for use later in the event"* (i.e., cold shutdown). Confirm that spurious operation of the containment spray pumps would have no impact on the stated OMA times, expected performance of other shutdown systems (e.g., cause an electrical overload) or the operator's ability to achieve and maintain hot shutdown conditions.

RAI-12 OMA Reliability

As stated in Section II of the request, "reliable action" is a feasible action that is analyzed and demonstrated as being dependably repeatable within an available time, so as to avoid a defined adverse consequence, while considering varying conditions that could affect the available time and/or the time to perform the action.

The results of an expert elicitation process presented in Appendix B of NUREG-1852, conclude that a time margin factor of at least 2 (i.e., 100 percent of the demonstrated time should be shown to be additionally available) would allow for a "high confidence of a low probability of failure" for local operator manual actions in response to fire. As clearly stated in the NUREG, this discussion is provided for guidance and is not meant to imply that a factor of 2 should always be shown, or that analysts should always use such an approach. However, the available margin must be adequate to ensure that the requested OMAs are reliable.

In Section III.B the request states the evaluation will demonstrate that "sufficient margin" exists to perform the individual operator manual action. The specific time margin available for each action is provided in Attachment 2. Attachment 2 also provides an apparently qualitative judgment with regard to the adequacy of the stated time margins, stating, for example, that "adequate margin" or "sufficient margin" is available. However, the submittal does not provide sufficient detail to determine the technical basis for the time margins provided in the submittal.

Provide information which demonstrates that the uncertainties described in Section 4.2.2 of NUREG-1852 are accounted for in the analysis of the time margins presented in Attachment 2 of the March 4, 2009 request, and that the margins are sufficient to ensure that they would be successful a very high percentage of the time (i.e., they provide adequate time to cover potential variations in plant conditions and human performance). This information should clearly show that the demonstrated time (or estimated time to complete the action based on the demonstration), along with the extra time (i.e. margin) needed to account for factors not

included in the demonstration, can be enveloped by the estimate of the time available, then it can be argued that the actions may also be performed reliably.

In addition, the March 4, 2009 request indicates that a sequential set of MOAs must be executed in a specified order. For example,

RAI-13 Use of MOAs in Lieu of Approved Fire Protection Features

Identify any fire areas/ zones where MOAs were used to supplant fire protection features (e.g., 1-hr rated fire barrier wrap) described by the staff in the 1986 and 1990 SERs. For each affected fire area/zone:

- a) Identify the applicable exemption(s) and related SER(s)
- b) Indicate if the exemption is still being credited in the March 4, 2009 request.
- c) Provide a technical justification which clearly demonstrates that reliance on MOAs will not result in a reduction of the safety margin established in the original SER.

RAI-14 Equipment Operator Locations

As discussed in NUREG-1852, the location or activities of needed plant personnel when the fire starts could delay their participation in executing the operator manual actions (e.g., they may be in a location that is on the opposite side of the plant from the main control room and/or may need to restore certain equipment before being able to participate).

The tables provided in Section III.B of the request indicate that the 2 field / equipment operators were assumed to be located in the main control room at the start of the fire event. Provide a justification for this assumption.

RAI-15 Validity of Timeline Assumptions

Section III.C states that the timeline for operator actions for the specific fire area assumes that all potential fire damage identified for that fire area occurs instantaneously at the point of plant shutdown. This section also states that the procedural direction in ABN-29, "Plant Fires," requires that the FSPs be entered as soon as the existence of a fire is confirmed. These statements appear to be contradictory and require clarification. Procedural direction to implement ABN-29 upon confirmation of fire is consistent with NUREG-1850 (which describes the fire itself as the only criterion for initiating these types of actions) and recognizes the need to complete prompt actions well before "the point of plant shutdown" which could be considerably later than the time the fire was first confirmed. The stated timeline assumption that fire damage will not occur prior to the decision is made to trip the plant, is not consistent with NUREG-1850 or ABN-29 entry conditions and, therefore, is not valid. Provide a technical justification to support the validity of a time line that uses a different entry condition than that stated in

NUREG-1852 or the plant procedures (i.e., “the point of plant shutdown” vs. “time of fire confirmation).

In addition, Attachment 2 states that the indicated performance time of prompt actions includes the time for operators to verify equipment response to the action (e.g. verify valve is closed). However, it is not clear how the additional time needed to take actions if the expected / desired response is not obtained was incorporated into the timeline. Section III.C states that in cases where confirmation is required from the operator in the field to the Control Room, additional time has been added to the estimated time to perform the operator manual action. However, the amount of time allotted for confirmation and the basis for that time is not readily discernable.

Also, Section III.B of the request states that a generic time of 10 minutes was allotted for diagnosing prompt actions. Demonstrate that the additional uncertainties listed in Section 4.2.2 of NUREG-1852 are enveloped by the 10 minute estimate allotted for diagnosing prompt operator actions.

Also, Section III.B states: *“since the Control Room staff will be in a state of continual diagnosis in parallel with the safe shutdown operators performing their actions, no additional diagnosis time was allotted for subsequent actions for the same operator.”* Provide additional clarification of this statement, including specific examples of its application.

Also, Provide a clear description of how the time needed to perform potential corrective / reactive actions in the event the prompt action did not accomplish the desired result (i.e., “response not obtained”) was factored into the OMA performance time and provide the technical basis for the time allotted for each reactive action.

RAI-16 Time to Fire Damage

The specific location of potential “targets” (i.e., cables and equipment important to post-fire safe shutdown) within each of the fire areas is not included or discussed in the request. As discussed in NUREG-1852, it should, therefore, be assumed that the fire could start exactly in the area where the equipment of concern would be affected at the earliest possible time. As a result, in the absence of a detailed evaluation of each fire zone which demonstrates that the prompt actions could be completed before serious equipment damage could occur, or information which shows that “reactive” OMAs have been appropriately incorporated into the shutdown procedures to mitigate the potential effects of fire damage, it is not clear how the prompt actions specified in the March 4, 2009 request can be credited for ensuring that one train of systems and equipment required to achieve and maintain hot shutdown conditions remains free of fire damage, as specified in Section III.G.2 of the regulation.

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-17 Simulator Demonstrations

Section III.C.4(11) describes simulator exercises performed to demonstrate that the operator manual actions can be performed reliably within the times allotted by the fire safe shutdown calculations. This section states further that Fire zones TB-FZ-11D and OB-FZ-8C were selected because they include manual actions that are prompt actions in other fire areas and include a number of common operator manual actions to perform within the first 45 minutes.

Since a prompt action is defined as an action that must be performed within 45 minutes, the stated basis for selecting Fire zones TB-FZ-11D and OB-FZ-8C requires clarification

Also, provide a detailed justification which clearly demonstrates that the simulator exercises performed for fires in fire zones TB-FZ-11D and OB-FZ-8C adequately bound all other fire scenarios.

In addition, provide information to demonstrate that the simulator exercises described in Section III.C.4 (11) of the request provide a realistic simulation (to the extent practicable) of the entire fire-induced accident scenario, including all the expected MCR activities. In your response, provide documentation to confirm that all actions associated with detecting and diagnosing the presence of the fire and diagnosing the need for and executing the relevant manual actions were timed during the demonstration. If an aspect of the fire scenario could not be simulated, identify it and describe how its potential impact on time was predicted.

RAI-18 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."*

Section III.C.1 states that the Fire Support Procedures (FSPs) provide a symptom-based approach to achieving safe shutdown and provide the operators with information as to the available equipment (including instrumentation) that can be relied upon following a fire. Because the operator remains within the symptom-based EOP procedure framework, the operator retains the ability to use any mitigating system that is unaffected by the fire.

Section III.C.5 states that the diagnostic instruments that are available are listed at the beginning of each FSP and that the available indications are consistent with the guidance in Generic Letter 81-12, "Fire Protection Rule (45 FR 76602, November 19, 1980)," and Information Notice 84-09, "Lessons Learned from NRC Inspections of Fire Protection Safe Shutdown Systems (10 CFR 50, Appendix R)."

The staff has defined diagnostic instrumentation in its 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; especially for symptom based procedures such as the FSPs, which incorporate the EOP procedure framework for diagnosing the effects of fire since EOPs typically include instruments that are not evaluated for fire damage.

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-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.