From: Karla Smith IRIV
To: Art Howell; Dwight Chamberlain; Eric Weiss; Geary Mizuno; John Hannon; Karla Smith; Ken Brockman; Michael Vasquez; Phil Qualls; Rebecca Nease; Robert Gramm
Date: 10/24/01 10:13AM
Subject: ANO Backfit Panel--Revised Background Attachment

Please note that the **first** background **attachment** that I sent you in my e-mail message on 10/22/01 has been revised. I am referring to the **first attachment** of the five attachments. The **first attachment dated 10/22/01** should be replaced with the attachment to this e-mail dated 10/24/01. The other four attachments remain applicable. If you have any questions, please let me know. If anyone else should receive this document, please forward it to them. We will talk at the panel on Friday.
Thank you.

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10/24/01

BACKFIT PANEL
ANO Triennial Fire Protection Inspection

STATEMENT OF CONSIDERATIONS FOR 10CFR50.48 AND 10CFR PART 50, APPENDIX R

FR 76606, Vol. 45 No. 225, November 19, 1980:

"*G. Protection of Safe Shutdown Capability Technical Basis.* The objective for the protection of safe shutdown capability is to ensure that at least one means of achieving and maintaining safe shutdown conditions will remain available during and after any postulated fire in the plant. Because it is not possible to predict the specific conditions under which fires may occur and propagate, the design basis protective features are specified rather than the design basis fire. Three different means for protecting the safe shutdown capability outside of containment are acceptable. The first means is separation of redundant safe shutdown trains and associated circuits by means of 3-hour fire rated barriers. The second means is a combination of separation of redundant safe shutdown trains and associated circuits by a 1-hour fire rated barrier and automatic fire suppression and detection capability for both redundant trains. The third means, which may be used only when redundant trains and associated circuits are separated by 20 feet or more of clear space, requires automatic fire suppression and detection systems in the area. An alternative or dedicated safe shutdown capability independent of the fire area is required if fire protection for safe shutdown capability cannot be provided as outlined above. ... "

FIRE PROTECTION REGULATIONS

10 CFR 50.48, *Fire protection*.

(b) Appendix R to this part establishes fire protection features required to satisfy Criterion 3 of Appendix A to this part with respect to certain generic issues for nuclear power plants licensed to operate before January 1, 1979.

(2) With respect to all other fire protection features covered by Appendix R, all nuclear power plants licensed to operate before January 1, 1979, must satisfy the applicable requirements of Appendix R to this part, including specifically the requirements of Sections III.G, III.J, and III.O.

10 CFR Part 50, Appendix R, Paragraph III.G, *Fire protection of safe shutdown capability*.

1. Fire protection features shall be provided for structures, systems, and components important to safe shutdown. These features shall be capable of limiting fire damage so that:

   a. One train of systems necessary to achieve and maintain hot shutdown conditions from either the control room or emergency control station(s) is free of fire damage; and

   b. Systems necessary to achieve and maintain cold shutdown from either the control room or emergency control station(s) can be repaired within 72 hours.

2. Except as provided for in paragraph G.3 of this section, where cables or equipment, including associated non-safety circuits that could prevent operation or cause maloperation due to hot shorts, open circuits, or shorts to ground, of redundant trains of systems necessary to achieve and maintain hot shutdown conditions are located within the same fire area outside of primary containment, one of the following means of ensuring that one of the redundant trains is free of fire damage shall be provided:

   a. Separation of cables and equipment and associated non-safety circuits of redundant trains by a fire barrier having a 3-hour rating. Structural steel forming a part of or supporting such fire barriers shall be protected to provide fire resistance equivalent to that required of the barrier;

   b. Separation of cables and equipment and associated non-safety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustible or fire hazards. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area; or

   c. Enclosure of cable and equipment and associated non-safety circuits of one redundant train in a fire barrier having a 1-hour rating. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area;

FINDING

Contrary to the above, in two fire zones in Unit 1, the licensee failed to ensure that cables (including associated non-safety circuits) that could prevent operation or cause maloperation of redundant trains of systems necessary to achieve and maintain hot shutdown conditions were free of fire damage by one of the means specified in 10 CFR Part 50, Appendix R, Paragraph III.G.2.

[redacted]

EX 5

[redacted] Ex 5

CLARIFICATION OF GENERIC LETTER 81-12, dated March 22, 1982

SAFE SHUTDOWN CAPABILITY: *"Using the requirements of Sections III.G and III.L of Appendix R, the capability to achieve hot shutdown must exist given a fire in any area of the plant in conjunction with a loss of offsite power for 72 hours. Section III.G of Appendix R provides four methods for ensuring that the hot shutdown capability is protected from fires. The first three options as defied in Section III.G.2 provides methods for protection from fires of equipment needed for hot shutdown:*

1. *Redundant systems including cables, equipment, and associated circuits may be separated by a three-hour fire rated barrier; or,*

2. *Redundant systems including cables, equipment and associated circuits may be separated by a horizontal distance of more than 10 feet with no intervening combustibles. In addition, fire detection and an automatic fire suppression system are required; or*

3. *Redundant systems including cables, equipment and associated circuits may be enclosed by a one-hour fire rated barrier. In addition, fire detectors and an automatic fire suppression system are required.*

The last option as defined by Section III.G.3 provides an alternative shutdown capability to the redundant trains damaged by a fire.

4. *Alternative shutdown must be independent of the cables, equipment and associated circuits of the redundant systems damage by the fire."*

LICENSING BASIS - SERs

ANO-1 was licensed prior to January 1, 1979; therefore the licensee is required to meet 10 CFR Part 50, Appendix R, Section III.G.

<u>NRC SAFETY EVALUATION REPORTS</u>

- Exemption and SER dated March 22, 1983:

  Exemption, Section II: *"Section III.G of Appendix R requires fire protection for equipment important to safe shutdown. Such fire protection is achieved by various combinations of fire barriers, fire suppression systems, fire detectors, and separation of safety trains (III.G.2) or alternative safe shutdown equipment free of the fire area (III.G.3). The objective of this protection is to assure that one train of equipment needed*

for hot shutdown would be undamaged by fire, and that systems needed for cold shutdown could be repaired within 72 hours."

SER, Section 1.0: *"Section III.G.2 requires that one train of cables and equipment necessary to achieve and maintain safe shutdown be maintained free of fire damage by one of the following means:*

a. *Separation of cables and equipment and associated non-safety circuits of redundant trains by a fire barrier having a 3-hour rating. Structural steel forming a part of or supporting such fire barriers shall be protected to provide fire resistance equivalent to that required of the barrier;*

b. *Separation of cables and equipment and associated non-safety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustible or fire hazards. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area; or*

c. *Enclosure of cable and equipment and associated non-safety circuits of one redundant train in a fire barrier having a 1-hour rating. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area.*

If these conditions are not met, Section III.G.3 requires alternative shutdown capability independent of the fire area of concern. It also requires a fixed suppression system installed in the fire area of concern if it contains a large concentration of cables or other combustibles.

These alternative requirements are not deemed to be equivalent for all configurations; however, they provide equivalent protection for those configurations in which they are accepted.

Because it is not possible to predict the specific conditions under which fires may occur and propagate, the design basis protective features are specified in the rule rather than the design basis fire. Plant specific features may require protection different than the measures specified in Section III.G. In such a case, the licensee must demonstrate, by means of a detailed fire hazards analysis, that existing protection or existing protection in conjunction with proposed modifications will provide a level of safety equivalent to the technical requirements of Section III.G of Appendix R.

In summary, Section III.G is related to fire protection features for ensuring that systems and associated circuits used to achieve and maintain safe shutdown are free of fire damage. Fire protection configurations must either meet the specific requirements of Section III.G or an alternative fire protection configuration must be justified by a fire hazards analysis."

- Exemption and SER dated October 26, 1988:

Exemption: *"Section III.G of Appendix R requires fire protection for equipment important to post-fire shutdown. Such fire protection is achieved by various combinations of fire barriers, fire suppression systems, fire detectors, and separation of safety trains (III.G.2)*

or alternate post-fire shutdown equipment free of the fire area (III.G.3). The objective of this protection is to assure that one train of equipment needed for hot shutdown would be undamaged by fire, and that systems needed for cold shutdown could be repaired within 72 hours (III.G.1)."

SER, Section 1.0: *"Section III.G.2 requires that one train of cables and equipment necessary to achieve and maintain safe shutdown be maintained free of fire damage by one of the following means:*

a. *Separation of cables and equipment and associated non-safety circuits of redundant trains by a fire barrier having a 3-hour rating. Structural steel forming a part of or supporting such fire barriers shall be protected to provide fire resistance equivalent to that required of the barrier;*

b. *Separation of cables and equipment and associated non-safety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustible or fire hazards. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area; or*

c. *Enclosure of cable and equipment and associated non-safety circuits of one redundant train in a fire barrier having a 1-hour rating. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area.*

If these conditions are not met, Section III.G.3 requires an alternative shutdown capability independent of the fire area of concern. It also requires a fixed fire suppression system be installed in the fire area of concern if it contains a large concentration of cables or other combustibles. These alternative requirements are not deemed to be equivalent; however, they provide equivalent protection for those configurations in which they are accepted.

Because it is not possible to predict the specific conditions under which fires may occur and propagate, the design basis protective features are specified in the rule rather than a design basis fire. Plant specific features may require protection different than the measures specified in Section III.G. In such a case, the licensee must demonstrate, by fire hazards analysis, that existing protection or existing protection in conjunction with proposed modifications will provide a level of safety equivalent to the technical requirements of Section III.G of Appendix R.

In summary, Section III.G is related to fire protection features for ensuring that systems and associated circuits used to achieve and maintain safe shutdown are free of fire damage. Fire protection configurations must either meet the specific requirements of Section III.G or another fire protection configuration must be justified by a fire hazards analysis."

Fire Zone 98J (emergency diesel generator corridor)

- Exemption and SER dated March 22, 1983:

  Cover letter: *"The Commission has issued the enclosed Exemptions to certain requirements of Appendix R to 10 CFR 50 in response to your letter of July 1, 1982, as supplemented and amended by your letter of November 11, 1982."*

  Exemption: *"The licensee has indicated that enclosure of the corridor A-train conduits in a one-hour rated fire barrier and separation of the DC equipment room from the corridor by three-hour rated fire barriers will be provided. With these modifications, the area will comply with Section III.G of Appendix R, and no exemption is needed."*

  SER: *"... The corridor contains primarily B-train cables, however there is one A-train conduit in the corridor. ... By letter dated November 11, 1982, the licensee proposed to enclose the single A-train conduit in the corridor in a one-hour rated barrier."*

  "The level of protection provided for the corridor area and D.C. equipment room meets Section III.G; therefore, and exemption is not needed."

- SER dated May 13, 1983:

  "All other areas of the plant not required to have alternate safe shutdown will comply with the requirements of Section III.G.2 of Appendix R, unless an exemption request has been approved by the staff."

Fire Zone 99M (north electrical switchgear room train)

- SER dated May 13, 1983:

  Regarding areas of the plant not requiring an alternative shutdown capability: *"All other areas of the plant not required to have alternative safe shutdown will comply with the requirements of Section III.G.2 of Appendix R, unless an exemption request has been approved by the staff."*

LICENSING BASIS - Licensee Submittals

General methodology

- Licensee letter dated July 1, 1982:

  " 6. In certain cases, credit for manual operation of equipment was taken if controls (and power for valves) could possibl[y] be damaged by a fire. Such credit was taken only if:

  a. the component to be operated is not located in the affected fire zone, although the cable may be damaged by fire;

b. sufficient time is available to perform the required manual actions; and

c. personnel are available, beyond the fire brigade and minimum operations shift crew limitations, to perform the manual actions.

7. For redundancies that were still identified as potential safe shutdown concerns following the above review, specific physical separation, barriers, intervening combustibles, and suppression systems were evaluated to determine compliance with Section III.G of Appendix R."

"The evaluations described above were performed in accordance with the criteria of appendix R, including: consideration of cable insulation as combustible; taking no credit for cable coatings to act as a thermal or radiant barrier to protect cables; and diverting primary reliance from administrative controls to preclude fires or damage due to fires."

- Licensee letter dated August 15, 1984:

  Section III.B: *"The reanalysis of ANO-1 and 2 was performed under the initial conditions defined by Appendix R to 10CFR50. Those conditions area consistent with those utilized in AP&L's original Appendix R compliance submittal dated July 1, 1982 (0CAN078202), and subsequent correspondence dated November 11, 1982 (0CAN118210). The following briefly summarize the conditions assumed."*

  "Where adequate time is available, and the valve is not physically located in the vicinity of the postulated fire, credit is taken for manual operation of manually operable valves."

  Section III.F: *"All systems necessary for achieving hot and/or cold shutdown must be operable given a fire in any single fire area of the plant. The method of assuring operablity of any component in a given system is to determine whether it is sufficiently protected or separated from the postulated fire. The separation criteria to be used are specified in Appendix R to 10CFR50, Section III.G and in clarification of that regulation presented in Generic Letter No. 83-33, IE Information Notice No. 84-09."*

<u>Fire Zone 98J (emergency diesel generator corridor)</u>

- Licensee letter dated July 1, 1982:

  Regarding exemption details for Fire Zone 98J: *"This zone is predominantly of the "green" or "B" safety division, although certain cables associated with the "red" or "A" division are also located in the corridor portion of the zone. The "A" cables in this zone are routed in conduit and are predominately associated with the "red" D.C. equipment room."*

  "The "red" division cabling located in the corridor that is required for safe shutdown will be wrapped in a 1-hour fire barrier. The circuits involved are the power supplies to the RS panels [120V ac to vital instrumentation] which are located in the control room. With the suppression system in this area and the addition of the 1-hour fire barrier, the corridor portion of this zone will comply with Appendix R."

- Licensee letter dated November 11, 1982:

  Regarding Fire Zone 98J: *"Modifications to this zone will be made as stated in our July submittal except for those designed to "separate" the corridor area from the "red" D.C. equipment room. This separation will be accomplished by the addition of a 3-hour rated fire door and fire dampers in the ventilation ducts. ... With this modification, no exemptions are required for zone 98J."*

Fire Zone 99M (north electrical switchgear room - "green train")

- Licensee letter dated July 1, 1982:

  Regarding Unit 1 modifications in Fire Zones 99M (north switchgear room) and 100N (south switchgear room):

  "1. For the service water pumps, install breakers outside of zones 100-M and 99-M so the B service water pump may be powered from either the red or the green bus. This pump can therefore be assured of power from the unaffected switchgear room, and be able to isolate from faults in the switchgear room where the fire occurs. ... Outside of zones 99M and 100-N, the new service water pump B circuit breakers will be located in different zones from the pump A and pump C cabling.

  2. For the makeup pumps, similar modifications as those described above for the service water pumps will be made to assure that a fire in either switchgear room will not cause loss of all makeup pump capability.

  With these modifications this zone will comply with Appendix R."

- Licensee letter dated August 15, 1984:

  In discussing Fire Area I which contains Fire Zone 99M: *"Zone 99M, after completion of the 1R6 modifications mentioned below, will contain no redundant circuits."*

  "Modifications are being made to both switchgear rooms to ensure the "swing" Makeup and Service Water pumps can be operated from either the "red" or "green" power. With this modification, a fire in this area will not eliminate the capability to supply Makeup and/or Service Water to ANO-1."

LICENSING BASIS - Conclusions

[redacted]

EX5

[redacted]

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