February 2, 1990

Docket No. 50-346

Licensee: Toledo Edison Company

Facility: Davis-Besse Nuclear Power Station

SUBJECT: MEETING SUMMARY - JANUARY 9 and 10, 1990

On January 9 and 10, 1990 a meeting was held at the NRC office in Rockville, MD between representatives of Toledo Edison Company and the NRC. The meeting was held for the purpose of discussing the draft NRC safety evaluation of the fire protection program at Davis-Besse Nuclear Power Station. A copy of the draft safety evaluation used at the meeting is attached. The changes and comments are handwritten in the text. Attendees at the meeting were:

NRC	Toledo Edison Company
Dennis Kubicki	Craig Hengge
Thomas Wambach (part-time)	Larry Young
	Matt Murtha
	Doug Wood

/s/

Thomas V. Wambach
Project Directorate III-3
Division of Reactor Projects - III, IV, V and Special Projects

Attachment:
As stated

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Enclosure 1

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Plant Systems Branch Safety Evalution
Fire Protection Program - Davis Besse Nuclear Station
(TAC Nos. 60994, 60995, 61745 and 61923)

I. INTRODUCTION

The staff's initial assessment of the Davis Besse Fire Protection Program is documented in a safety evaluation (SE) dated July 26, 1979. Also, by letters dated June 2 and November 23, 1982 and August 30, 1984 the staff approved a number of exemptions from the technical requirements of Appendix R to 10 CFR 50. In July, 1983 the staff conducted an inspection to assess the licensee's efforts to comply with the requirements of Appendix R. The inspection revealed that a number of deficiencies existed with respect to meeting certain requirements of the rule. In subsequent meetings with the staff, the licensee committed to implement a plan for corrective action which would attempt to resolve staff concerns regarding the fire protection program. In the interim, the licensee adopted compensatory actions pending resolution of these issues. The staff evaluated and approved the licensee's interim measures by letter dated September 23, 1983. By letter dated March 6, 1986, the licensee submitted a revised Fire Hazards Analysis Report which includes a new comparison of the Davis Besse Fire Protection Program to the guidelines contained in Appendix A to Branch Technical Position (BTP) APCSB 9.5-1 (hereafter referred to as Appendix A to the BTP). On the same date, the Toledo Edison Company submitted requests for exemption from the technical requirements of Appendix R. By letter dated June 3, 1986, the licensee submitted Revision 1 of the Appendix R Compliance Assessment Report and by letter dated June 25, 1986 Toledo Edison Company submitted fire test reports to justify the adequacy of fire barrier penetration seals.

The staff reviewed this information and expressed a number of concerns that the licensee's fire protection program did not conform with NRC fire protection requirements and guidelines. These concerns and requests for

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additional information (RAI) were transmitted to the licensee by letter dated December 17, 1986. In a letter dated December 31, 1986 the staff transmitted the results of a preliminary review of the penetration seal fire tests.

The licensee responded to the RAI and provided additional information on the program by letters dated January 12, February 12, May 14, 22 and 27, and July 30, 1987. A meeting was convened with the staff on October 29 and 30, 1987. As a result of this meeting Toledo Edison Company submitted new and supplementary information on the fire protection program by letters dated January 6, February 8, May 23, June 6, August 9, 1988, January 18, March 15, June 5, July 31, (two letters), June 28, September 30 (two letters), October 11 and 26, 1989.

This evaluation supplements and amends the previous fire protection safety evaluations. The format is essentially the same as the July 26, 1979 SE.

Initially, in describing aspects of the Davis Basse Fire Protection Program in comparison with NRC fire protection criteria, the licensee specifically indicated where literal conformance with these criteria was achieved. Where this was not the case the licensee described the fire protection features and concluded that the existing design conformed with the "intent" of the criteria. The staff expressed concern that significant deviations may exist which may not have been adequately justified. Consequently, the licensee provided supplemental information which explicitly identified deviations from staff fire protection guidelines and the relevant National Fire Protection Association (NFPA) Standards and provided justification as to why these conditions were not safety significant. The staff considers these conditions to fall within two categories. The first are those conditions that represent minor variances. These, along with aspects of the Davis Besse Fire Protection Program which literally conform with NRC and NFPA criteria, are described comprehensively in the above listed documents and do not warrant a discussion in this safety evaluation. The second category are those conditions which are not considered minor variances and for which there was, initially, some concern or question about the adequacy of

the licensee's technical approach. The staff's basis for accepting these conditions is contained in the following evaluation.

II. FIRE PROTECTION SYSTEMS DESCRIPTION

Water Supply

The fire protection water supply consists of an electric fire pump which takes suction from a 250,000 gallon tank and a diesel pump which draws water from Lake Erie. The tank is not sized in accordance with Appendix A to the BTP, ~~APCSB 9.5-1(~~ Nor are the two pumps interconnected. The size of the tank is considered sufficient to deal with anticipated fires because the criteria used to determine water storage capacity includes 1,000 gallons per minute (GPM) for fire hose streams. This amount is considered conservative compared to the actual capability of the fire brigade to deliver water during a fire. With the five person brigade and existing 1½ and 2½ inch hose a more realistic total discharge rate of 250-500 GPM is expected. Nevertheless, if additional water is required an unlimited supply exists from the lake. Interconnection of the pumps is not considered significant because each supply is sufficiently reliable based on the periodic testing and maintenance performed and because any one pump is capable of satisfying water demand requirements. The staff therefore concludes that the fire protection water supply represents an acceptable deviation from NRC fire protection guidelines.

The staff expressed concern that there were locations in the plant where a single pipe break could result in the loss of the water supply to both automatic sprinkler systems and the standpipe system. The staff's concern was focused on areas other than the Turbine Building which has an acceptable design, based on the licensee's description. The licensee responded to this concern in a letter dated July 30, 1987. Twelve rooms were identified where a single break could result in such an occurrence. However, three of the rooms could still be protected from alternate hose stations which would be unaffected by the break. For the remaining nine rooms, the licensee committed in the letter to implement design changes to correct the problem. On this basis, this issue is considered resolved.

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The staff also expressed concern that above ground fire water supply control valves may not have been protected against tampering. However, all such valves are either electrically supervised or locked and sealed in the open position. This conforms with the relevant portions of the NFPA standards governing control valve supervision and is, therefore, acceptable.

By letters dated May 23, 1988 and July 31, 1989 the licensee submitted a comparison of the Davis Besse Fire Protection Program to the applicable NFPA standards. A number of conditions identified by this analysis have been targeted for correction. A summary of the proposed modifications and the implementing schedules have been reviewed by the staff and found to be acceptable. The licensee identified certain deviations associated with the water supply system relating to the absence of documentation which confirms the listing or approval of certain equipment. However, in light of the sustained serviceability of the water supply since installation, the cost associated with reproducing this information is not considered justifiable. The licensee also indicated that certain components did not literally conform with some of the construction specifications identified in these standards. The licensee affirmed that the construction materials and performance characteristics are at least equivalent to those that are stipulated in the standards. On this basis, these deviations are considered acceptable.

The staff initially expressed concern that the licensee's NFPA code compliance review for the fire protection water supply did not address sections of the relevant codes that were applicable. Specific concern centered on the electric fire pump controller. The license responded that the existing controller will be replaced in a future modification. The licensee identified the NFPA deviations associated with the existing controller in an October 11, 1989 letter. The licensee justified these conditions in the interim on the periodic surveillance testing which is performed in conjunction with the Plant Technical Specifications. The staff has reviewed the deviations and concludes that with the existing surveillance testing they are acceptable pending implementation of the modification to replace the controller.

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Automatic Sprinkler Systems

In their comparison of the fire protection program to Appendix A to the BTP the licensee identified deviations related to sprinkler and water spray system conformance with the criteria contained in NFPA Standard Nos. 13 and 15. Deviations were identified associated with design and acceptance test criteria for certain system components and for other guidelines, such as the lack of identification signs on valves, not directly related to system performance. The staff reviewed the licensee's justification for these deviations and agrees with the licensee that they lack safety significance.

The licensee also identified a number of deviations pertaining to the positioning of sprinkler heads and water spray nozzles in relation to structural elements and other plant features which could represent obstructions to the discharge of water from these systems. Other deviations were noted such as improper sprinkler type or temperature rating and painted heads. As delineated in the May 23, 1988 and July 31, 1989 letters the licensee has committed to correct most of these conditions such that the final configuration will be in conformance with the subject standards. The staff has reviewed the conditions which will not be corrected, along with the licensee's justification, and agrees that the existing condition represents an acceptable level of protection.

During the review of the licensee's NFPA code conformance comparison the staff requested clarification as to why several criteria were judged by the licensee to not be applicable to Davis Basse. The licensee provided a satisfactory response to these questions in a letter to the staff dated October 11, 1989. The staff also requested that the licensee clarify that a proposed modification, delineated in the NFPA code comparison, would conform with the criteria delineated in Section 2-1.2 of NFPA 15. The licensee affirmed in the above-referenced letter that the modification, which involves adding batteries with a charging system to the fire water spray release control system, will be in accordance with the relevant sections of NFPA 15.

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Standpipe and Hose System

As part of their comparison of the design of the standpipe and hose system to NRC fire protection guidelines and the criteria contained in NFPA Standard No. 14 the licensee identified several deviations in letters dated January 6, 1988 and July 31, 1989.

Several of these deviations pertain to the use of unlisted equipment, the use of materials which do not literally meet the construction specifications of the standard and the nature of acceptance testing. The staff reviewed these deviations, along with the licensee's justification and concludes that these conditions will not adversely affect system performance and are, therefore, considered acceptable.

A number of deviations related to the size of piping and system hydraulics which result in a number of locations where standpipe outlets are not able to deliver the quantity of water in sufficient pressure as stipulated by the standard. As previously stated in its evaluation of the plant water supply, the staff believes that the code requirements for water for manual fire fighting are conservative when consideration is given to the normal capabilities of the plant fire brigade to deploy hose lines under pressure. The licersee has confirmed that the undersized piping can still deliver at least 250 GPM per outlet. This equates to a fire flow from two 1½ inch or one 2½ inch hose lines. The staff considers this capability to be sufficient to surpress potential fires in the subject areas.

Another deviation pertains to the lack of pressure reducing devices at standpipe outlets where pressure exceeds 100 psi. Because warning signs are posted at these locations and the fire brigade is trained and skilled using the higher pressures, the staff considers this condition acceptable.

The staff also expressed concern that an insufficient quantity of hose existed to reach all areas of the Service Water/Turbine Building Tunnel. The licensee responded in the October 11, 1989 letter that additional lengths of hose are available to reach the most remote areas of the tunnel and that the location of the hose is detailed in pre-fire plans which form

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the basis of the fire brigade response to a fire in this area. Because of the availability of the hose and brigade training the staff considers this response to be acceptable.

Fire Detection and Alarm System

The staff requested information from the licensee regarding the design of the fire detection, alarm and signaling system in comparison to the criteria contained in NFPA Standard Nos. 72D and 72E. This information was provided to the staff in letters dated May 27, 1987, May 23, 1988, July 31, 1989 and October 11, 1989. The licensee identified a number of deviations from these standards. As delineated in the above-referenced correspondence, the licensee committed to correct a number of these deviations. The remainder represent conditions that the licensee has determined are not safety significant. A number of deviations pertain to the nature of acceptance testing, the use of unlisted equipment and the distinctiveness of alarms. The staff has evaluated these conditions and the licensee's justification and concludes that the existing condition assures an equivalent level of protection to that achieved by literal conformance with the codes.

The licensee identified several locations where the position of fire detectors is not in accordance with the code. The staff concludes, however, that these conditions would, at most, result in an insignificant time delay in alarm receipt. The staff therefore considers these conditions to be acceptable.

The licensee also noted deviations associated with the detectors installed in conjunction with the pre-action type sprinkler systems in the Turbine Building and Turbine Building Heater Bay. In lieu of correcting the detector deviations the licensee has proposed to convert the existing pre-action systems into conventional wet-pipe sprinkler systems as described in the May 23, 198[illegible] letter. The staff has evaluated this proposal and concludes that the licensee's proposed design will provide an equivalent level of safety and is, therefore, acceptable.

The licensee has concluded that the power supply for the fire detection, alarm and signaling system "complies with the intent" of the codes without

performing an explicit analysis of the criteria of the standards. The staff initially expressed concern about the reliability of the power supply. However, the system is powered from multiple redundant sources (off-site power, main generator output, emergency diesel generators, batteries) off of the in-plant electrical system. Since this capability supplies power to nuclear safety related equipment and systems and has been reviewed and approved by the staff, no further evaluation to NFPA criteria is considered necessary.

During its review of the licensee's fire alarm system, the staff requested clarification regarding visual and audible fire alarms that are transmitted to the control room. The licensee responded in a letter to the staff dated May 27, 1987, which supplements information provided in Table 4-1 of the FHAR. Alarms transmitted via the fire alarm and signaling system are received both visually and audibly in the control room. Thus, if one type is not functional or noticed, the other will assure proper response. The licensee noted that, at this time, certain alarms are received in the control room which indicated that a local fire detector panel is in alarm. Operators have to go to the panel to determine which fire detector zone is in alarm. The licensee committed in the above referenced letter to enhance the existing capability by modifying the system to feature fire detector zone annunciation in the control room. The staff finds this acceptable.

In the existing configuration, alarm conditions from individual detector zones would prevent receipt of subsequent alarms or trouble conditions from other operable detection zones controlled from the same panel. If this occurs, the licensee implements an hourly fire watch patrol to monitor the condition of the panel(s). Reliance upon an hourly patrol is consistent with Technical Specification action statements for inoperable detectors and is, therefore, considered acceptable.

The staff expressed concern that electric circuits associated with fire alarm and signaling system were not supervised in accordance with NFPA 72D. The licensee identified a number of deviations to the code relating to this issue. At present, a single break or ground fault condition on most circuits will be transmitted as a fire alarm. The licensee will respond to such alarms in accordance with established procedures. Several circuits are unsupervised. The licensee is presently assessing the scope and nature

of modifications to correct these deficiencies. Pending implementation of modifications which correct these conditions, this issue will remain open.

III. OTHER ITEMS RELATING TO THE STATION FIRE PROTECTION PROGRAM

Fire Barriers

In the original safety evaluation, the staff accepted the design of fire barriers at Davis Besse on the basis that "all floors, walls, and ceilings enclosing separate fire areas are rated at a minimum of 3-hour fire rating." Based on the revised post-fire safe shutdown assessment, the licensee has re-delineated fire areas in the plant. The new areas are described in the Fire Hazards Analysis Report and Appendix R Compliance Assessment Report. The staff was, initially, concerned that the licensee's Fire Protection Program would not include fire barriers necessary to satisfy the guidelines in Appendix A to the BTP. However, based on the staff's review of the above documents the Fire Protection Program appears to encompass these barriers. A related unresolved issue is the licensee's surveillance of the Appendix A barriers under the plant Technical Specifications. This issue will be addressed in a subsequent section of the safety evaluation.

The licensee has explicitly identified a number of instances where the fire rating of a structural assembly does not meet the 3-hour criteria. These conditions are evaluated below. The licensee has also assessed the adequacy of other barriers in accordance with the guidance issued in Generic Letter 86-10. Fire hazards analyses used to justify these conditions are kept on file. The conditions which have not been submitted to the staff for review will be the subject of future audits.

In the January 6, 1988 letter, the licensee indicated that some portions of stairwell and elevator shaft walls are 2-hour fire-rated, along with computer room walls and certain walls in non-safety related areas. The staff evaluated the fire hazards in the areas on either side of the walls as described in the FHAR and concludes that the rating of the walls is sufficient with conservative margin to withstand the effects of a fire until suppressed by the plant fire brigade. The staff concludes, therefore, that these conditions are acceptable.

In the same letter the licensee identified a number of locations where non-fire-rated heating, ventilation and air-conditioning (HVAC) penetrations exist in the auxiliary building and several other locations. Included with these features were several "blow-out" panels installed for post-accident pressure relief. The licensee's justification for the adequacy of the existing conditions included the presence of automatic sprinkler or water spray systems in the area or at the penetration; the limited combustibles on either side of the barrier; the substantial nature of the HVAC ducts; and the presence of fire doors or dampers in some HVAC penetrations. The staff evaluated these features along with the fire hazards analyses and concludes that the above-referenced penetrations will provide an equivalent level of protection to that achieved by 3-hour fire-rated penetrations.

During its review of fire barriers in the plant, the staff requested information from the licensee to substantiate the fire resistance of the existing cable tray and conduit fire wrap material. The licensee responded in the May 27, 1987 letter. The licensee committed to replace the existing wrap material with a type that has met all of the acceptance criteria of the standard fire test method of ASTM E-119. Replacement will encompass only those cables that are necessary to assure safe shutdown following a fire and are vulnerable to fire damage as delineated in the Appendix R Compliance Assessment Report. The existing cable wrap material MAY remain in place but will not be maintained. The new material will be installed in accordance with manufacturer's instructions, including cable tray and conduit supports. Any metal structural elements that are framed into the protected enclosure will be protected to assure that conductive heat will not damage cables within the enclosure. On this basis, this issue is considered closed.

Fire Doors

In their comparison of the fire protection program to the guidelines in Appendix A to the BTP the licensee identified a deviation associated with hollow metal-type equipment access doors. The doors are not equipped with [redacted] closing mechanisms. The doors are not used for personnel passage. When left open for equipment access, the action statements of the technical specifications and plant procedure would be implemented to

compensate for the opening. This would include the posting of a fire watch. On this basis, the lack of latch and closing mechanisms on these doors are considered an acceptable deviation.

During its evaluation of fire doors, the staff express concern that security-related modifications may have adversely affected the fire-rating of specific fire doors. The licensee responded to this concern in the May 27, 1987 letter. The licensee arranged for certain plant fire doors which are required to satisfy staff fire protection criteria to be assessed by a representative of Factory Mutual Research Corporation, an independent testing authority. The results of this assessment are contained in a report dated December 19, 1986. A number of recommendations were made for repairs and modifications. None concerned security related modifications. The report concluded that, subject to the implementation of the recommendations, the doors were judged to be capable of withstanding the effects of a fire. The licensee committed in the above letter to implement these recommendations. The staff, therefore, concludes that the subject fire doors are acceptable.

The licensee also compared plant fire doors to the criteria contained in NFPA Standard No. 80. The results of this analyses are contained in a letter to the staff dated July 31, 1989. The licensee identified a number of installation variances. The licensee committed to correct a number of these conditions by making appropriate modifications. Several variances pertain to door hardware and fusible link positioning which the staff has evaluated and concludes are not safety significant. The remaining deviations concern gaps between the edges of the doors and the door frame, wall or floor. The existing gaps exceed the maximum dimension stipulated in the code. The licensee committed to make repairs on doors where the gaps are excessive. Where they are not, the licensee has justified on the basis of the results of proprietary fire tests that these conditions will not adversely affect the performance of the doors under fire conditions. The staff has reviewed the above analyses and concludes that the licensee's technical approach to fire door deviations is acceptable.

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Fire Dampers

In the July 31, 1989, NFPA code conformance review, the licensee identified a number of deviations associated with fire dampers. One deviation pertained to the absence of fire doors to protect openings in fire walls. However, the licensee has installed fire rated dampers in lieu of fire doors, with some exceptions, which provide an equivalent level of protection. The lack of dampers at certain HVAC penetrations of fire barriers was discussed previously in this safety evaluation.

The staff expressed concern that curtain-type fire dampers, installed in HVAC penetrations of fire barriers, may not perform properly under high airflow conditions. This concern was based on a notification by a damper manufacturer under the requirements of 10 CFR Part 21. The licensee responded to this concern in a letter dated May 27, 1987. All dampers that are relied upon to satisfy staff fire protection criteria have been tested by the manufacturer and will be certified as capable of performing under the anticipated air flow conditions as determined and stipulated by the licensee. The licensee will drop test dampers initially and will, subsequently, conduct visual inspections per the plant Technical Specifications. In locations where high air flow conditions are anticipated the licensee has proposed to install dampers of a type that have not been subject to the concerns expressed in the 10 CFR Part 21 notification. On this basis, the staff's concerns regarding damper operability are considered resolved.

Fire Barrier Penetrations

During a regional audit of the fire protection program in 1985 inspectors identified concerns with regard to the adequacy of test documentation which the licensee relied upon to qualify fire barrier penetration seals (ref. Inspection Report No. 50-346/85028). By letter dated June 25, 1986 the licensee submitted a series of fire test reports to justify the adequacy of penetration seals found in the plant. The staff reviewed the reports and expressed concern regarding the adequacy of some of them. The staff also requested clarification on several issues. The results of the

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staff's initial review and request for information were transmitted to the licensee by letter dated December 17, 1986. The licensee responded to this letter with a submittal dated February 12, 1987. This submittal included additional test reports which support the licensee's conclusions regarding the adequacy of penetration seals.

The focus of the staff's review was on the following issues:

1. Were the tests conducted in accordance with standard fire test procedures?

2. Were the tests conducted by an independent testing laboratory?

3. Did the results of the tests confirm that the seal assemblies tested meet the guidelines contained in Appendix A to BTP APCSB 9.5-1?

4. Was adequate justification provided where deviations from the above guidelines existed?

5. Were the fire-tested seal assemblies similar to seals found in the plant?

With regard to the last issue, the in-plant configuration was established by the licensee on the basis of "typical" fire barrier penetration seal details which the staff compared to the tested configuration. The actual in-plant seal configuration will be confirmed in a future audit(s).

For a number of individual seal details the licensee was able to supply at least one acceptable fire test per detail report which adequately addressed all issues of concern to the staff. For the remaining seal details the licensee presented a number of reports which the licensee concluded collectively qualify the fire rating of the seal. The staff agrees with this approach with the understanding that the in-plant configuration does not significantly deviate from the test or tests which are relied upon to establish the fire rating. On the basis of the seal detail drawings supplied by the licensee the staff concludes that there is no significant difference.

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During its review of the penetration seals the staff noted that the licensee appeared to take credit for a fire test that was not performed by an independent testing laboratory. In the February 12, 1987 letter the licensee withdrew the subject test report and substituted others that were all performed independently. On this basis, the staff's concern is considered resolved.

The staff also noted that some of the tests on conduit penetrations of fire barriers featured internal conduit seals. The staff requested confirmation that conduits in the plant are sealed internally per the design details. The licensee provided information on this issue in a meeting with the staff on February 17, 1987 and in a letter to the staff dated May 27, 1987. For conduits which are greater than 4 inches in diameter, which penetrate barriers required to assure post-fire safe shutdown the interior of the conduit is sealed with a 3-hour fire rated seal. For conduits greater than 3/4 inch but less than or equal to 4 inches in diameter which penetrate required fire barriers, the licensee installs a 3-hour seal if the termination point is 5 feet or less from the barrier, or a seal will be provided at the termination point to sensitive electronic equipment if the termination point is 5 feet or less from the barrier. The licensee referenced seal details showing these configurations. For conduits less than 3/4 inch no seal is provided. This approach to internal seals has been found acceptable by the staff at other power plants on the basis that the sealed conduits will not experience internal fire spread and that no significant fire propagation will occur in the smaller unsealed configuration. This issue is considered closed.

The staff also noted that in a certain test "M-Board" was part of the tested assembly. The staff requested confirmation that where M-Board is credited in a seal assembly the in-plant configuration features the board. The licensee responded in the February 12, 1987 letter. Licensee seal inspection procedures confirm that in-plant configurations match the "typical" seal detail. Where inconsistencies are found, the seal is identified as a problem and appropriate corrective action is taken such as fire watches and repairs. With regard to the M-board, the fire rating is not dependent on its presence in an assembly in those tests the licensee is relying upon to qualify in plant seals. On this basis, this issue is considered closed.

at the barrier or at the termination point

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The staff also noted that in certain fire tests the "cold-side" temperatures exceeded the temperature limits in the acceptance criteria of ASTM-E-119. The staff's initial concern was that secondary fires could occur involving combustible material on the protected side of certain penetration seals. The licensee provided a detailed discussion of this issue in the above-referenced letter and in a supplemental response dated February 8, 1988. The staff agrees with the licensee's justification on the basis that intervention of the plant fire brigade to suppress a fire will occur well before excessive temperatures are reached on the protected side of fire barrier penetration seals sufficient to cause combustible materials, including cable jackets, to ignite.

Finally, the initial group of test reports included several which the staff concluded did not adequately qualify seal details. However, based on the licensee's current seal program, the test reports presently relied upon are considered acceptable. Based on the above evaluation and subject to verification of the seal detail drawings to in-plant conditions, the staff considers that the issues and concerns raised in the initial regional inspection are now resolved.

During its review of fire barrier penetration protection, the staff requested confirmation from the licensee that bus ducts, seismic gaps and spare conduit sleeves are sealed with fire rated material equivalent to the rating of the barrier in which they are located. The licensee described a seal program for these features in a letter to the staff dated May 27, 1987. The licensee did not commit to provide fire-rated seals equivalent to the rating of the barrier. Where equivalently rated seals cannot be installed, the licensee will assess seal adequacy on the basis of an evaluation conducted in accordance with the guidance issued in Generic Letter 86-10. The acceptability of the licensee's program for bus ducts, seismic gaps and spare conduit sleeves will be subject to future audit.

In their comparison of electric cables and cable penetrations of fire barriers to the guidelines found in Appendix A to the BTP the licensee identified several deviations. The first was that not all cable trays outside of the cable spreading room are protected by automatic water

sprinkler systems. However, based on the written description of the fire protection program the staff concludes that those cables necessary for safe shutdown following a fire and those areas containing a quantity of cables which represent a significant fire hazard are adequately protected by a combination of active (fire detection and suppression) and/or passive (fire barriers) fire protection features.

The licensee indicated that fire tests used to qualify electric cable initially installed on the plo did not conform with the methodology stipulated in IEEE Test Standard No. 383. An alternate fire test methodology was utilized. However, based on the levels of fire protection provided for safe shutdown systems and hazardous areas as described in the FHAR, the staff does not consider this deviation to be significant.

The licensee indicated that some exposed polyvinyl chloride (PVC) jacketed cables are used in the plant in limited quantities in computers and electronic cabinets. ~~On this basis,~~ The staff considers this deviation acceptable.

Finally, the licensee stated that cables are run above the ceiling in the control room and that this concealed space is not protected by a halon fire suppression system as stipulated in Appendix A to the BTP. Because the cables are installed in conduit and exist in limited quantities, the staff concludes that they pose no significant fire hazard. Therefore, the lack of a fixed fire suppression system is considered acceptable.

Lighting and Ventilation

By letter dated January 12, 1987 the licensee requested approval of an exemption from the technical requirements of Section III.J. of Appendix R to 10 CFR 50. Specifically, the licensee requested approval to utilize existing "hard-wired" AC/DC essential lighting in portions of the Auxiliary and Turbine Buildings and to utilize hand-held portable lighting units in outside plant areas. The staff was initially concerned that a fire could damage the circuits and components associated with the AC/DC system such that emergency lighting essential for operator access and manual actions would not be available. The licensee responded that the results of an internal evaluation confirm that the AC/DC lighting system would not be

PVC cables enclosed in conduits are not considered a significant hazard. Because the quantity of exposed PVC cables is minimal the staff also judges that no [illegible]

[illegible] safe shutdown actions within the fire area, where emergency lighting units may be damaged, portable lighting units will be utilized. The staff finds this acceptable.

disabled by a fire in those locations (Control Room and Cable Spreading Room) where reliance on the system is credited. The adequacy of this internal evaluation will be confirmed in a future audit.

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For several outside plant areas the licensee requested approval of the use of hand-held lighting units. The staff had several concerns with this proposal. The first was that manual operator actions necessary to achieve safe shutdown would be made more difficult by carrying portable lighting units. The licensee confirmed that no manual actions requiring the use of both hands would be necessary in these locations.

The staff was also concerned that the route of travel for operators outside would be potentially hazardous to someone equipped with just a portable lighting unit. The licensee confirmed that the subject areas are free from potentially hazardous conditions.

For all other areas where operator actions are necessary for post fire safe shutdown within the first 8-hours after a fire event. A fixed, 8-hour battery powered lighting units have been installed. The staff expressed concern that the level of illumination in certain areas may not be sufficient for the operators to perform required actions. The licensee responded to this concern as part of the exemption request. A plant walkdown was performed by plant operators of the locations where manual actions are required and routes of travel to those areas. The adequacy of the existing lighting was assessed on the basis of their engineering judgement. As a result of this walkdown, additional emergency lighting units were installed, others were repositioned. The licensee's approach to this issue is consistent with the guidance provided in Generic Letter 86-10 and is therefore acceptable. Based on the above evaluation the staff concludes that the licensee's request for exemption should be approved.

In their comparison of the fire protection program to the guidelines contained in Appendix A to the BTP, the licensee identified several deviations related to the design of the HVAC system. Contrary to the above criteria, in some locations cables and controls for ventilation systems are located within the area served by the system. The staff was initially

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concerned that a fire could damage the HVAC system, complicating smoke removal during and following a fire. The licensee responded to this concern in the January 6, 1988 letter to the staff. In the event that HVAC systems are damaged by a fire, smoke removal will be accomplished manually by the plant fire brigade using portable fans and flexible ducting ("elephant trunks"). The pre-fire plans of the site fire brigade address smoke removal during a fire. This provides reasonable assurance that safety systems that are being relied upon during the fire are not adversely affected by smoke removal activities. On this basis, the staff considers this deviation to be acceptable.

The licensee identified a deviation from staff fire protection criteria in that unit charcoal filters have not been protected by fire suppression systems. Instead, the licensee has stated that the filters have been provided with design features such that the ventilation system will not experience a level of radioactivity induced heating sufficient to ignite the charcoal filters. This alternative has been accepted by the staff as satisfying the criteria established by Regulatory Guide 1.52. On this basis, the subject deviation is considered acceptable.

The licensee listed several deviations from the criteria contained in NFPA Standard No. 204 pertaining to the design, installation and maintenance of Turbine Building roof venting. The principal staff concern was the lack of a program for testing the roof vents to confirm their operation. However, in a July 31, 1989 letter to the staff the licensee committed to develop and implement a comprehensive program for periodic testing and verification of vent operation. On this basis the staff's concerns are considered resolved.

IV FIRE PROTECTION FOR SPECIFIC AREAS

Control Room

In the May 27, 1987 letter to the staff the licensee described new carpeting which has been installed in the control room. The carpeting has not been qualified to the standard fire test method delineated in ASTM E-84. Instead, the carpeting was subjected to the radiant panel

test of ASTM E-648. The results establish that the carpeting has an equivalent level of fire resistance to Class A-type carpeting. The staff, therefore, concludes that the use of this carpeting in the control room is acceptable.

In revision 7 of the FHAR the licensee stated as an assumption that the design of the control room is such that a fire would not spread from one essential cabinet to its redundant counterpart. The staff responded that this position was not valid and that for all areas, including the control room, the licensee should assess the adequacy of fire protection for safe shutdown systems on the basis that all cables and components within the fire area are damaged, except where systems within a fire area are protected per Section III.G, of Appendix R or by an alternate level of protection that the staff has specifically reviewed and approved. The licensee has ~~agreed to~~ change their fire hazards analysis to be consistent with the staff's position. On this basis this issue is considered closed.

Containment

The licensee identified a deviation from the guidelines contained in Appendix A to the BTP in that there are no standpipes and hose stations within the containment vessel. This deviation has previously been approved by the staff in the original safety evaluation of the Davis Besse Fire Protection Program.

By letter dated January 12, 1987 the licensee requested approval of an exemption from the technical requirements of Section III.G.2 of Appendix R to the extent that it requires that redundant safe shutdown equipment inside non-inerted containments be separated by a horizontal distance of more than 20 feet with no intervening combustibles or fire hazards. Specifically, redundant containment air cooler fans are located within approximately ten feet of each other. The physical configuration of the area, including fire hazards and available protection, along with the licensee's justification is contained in the above-referenced letter. The licensee committed to protect the circuits associated with the fans by radiant energy shields. The staff was initially concerned that a fire could damage

all three fans. However, the fire loading in the vicinity of the fans is minimal. The area is such that the smoke and hot gases from a potential fire would tend to be dissipated away from the equipment. Also, the fan housing would shield the radiant energy from a fire. Under the most conservative assumption, two fans might be damaged by any fire leaving the third available to achieve safe shutdown. The staff concludes, therefore, that the licensee's request for exemption should be approved.

By letter dated July 31, 1989 the licensee requested approval of an exemption from the technical requirements of Appendix R because redundant pressurizer level instrumentation was not protected in accordance with Section III.G of the rule. The staff evaluated this issue and concluded that the licensee had not provided an adequate level of fire protection. By letter dated October 26, 1989 the licensee committed to protect the vulnerable cables and components by a 1/2 hour fire rated radiant energy shield. The shield will provide protection up to a point where 20 feet of spatial separation is achieved. This configuration will meet the requirements of the rule and, therefore, the licensee withdrew the request for exemption. The licensee noted that the steel instrument tubing for the pressurizer level transmitters will not be protected because the tubing is not subject to damage by the temperatures expected to be produced by a fire in the area. The staff evaluated the licensee's justification and concludes, based on the licensee's fire hazards analyses, that protection of the tubing is not necessary.

The staff requested clarification as to the nature of radiant energy shielding in containment. The licensee supplied this information in a letter to the staff dated May 27, 1987. Subsequently, by letter dated October 26, 1989, the licensee revised the commitment for shielding with a 1-hour fire rating to that having a 1/2 hour rating. This is in accordance with the guidance issued in Generic Letter 86-10 and is, therefore, acceptable.

Cable Spreading Room

In their comparison of the fire protection program to staff guidelines, the licensee identified a number of deviations in the cable spreading

room. Specifically, aisle way dimensions between cable trays and divisional cable separation are not in accordance with Appendix A to the BTP. The staff does not consider these deviations significant because the room is protected by an automatic fire detection system and an automatic, wet-pipe sprinkler system, which provides reasonable assurance that any potential fire will be detected early and controlled before significant heat and smoke generation occurs. The congested aisles would tend to limit fire brigade accessibility but this would, at most, delay brigade arrival at the origin of the fire. Because of the active fire protection features in the room, this delay is judged not to be significant.

The lack of divisional separation of cables is also not considered significant because of the above mentioned fire protection features. In addition, the licensee has provided an alternate shutdown capability which is physically and electrically independent from the cable spreading room. Thus, if redundant safety-related cables were damaged by fire in this area, safe plant shutdown would still be capable of being achieved and maintained. On this basis only, the staff considers the fire protection deviations in the cable spreading room to be acceptable.

Switchgear Rooms and Safety Related Pumps

The licensee noted that, contrary to staff guidance, automatic fire suppression systems are not provided in switchgear rooms and to protect certain safety related pumps. Details relating to the configuration of the areas, including fire hazards and available protection are provided in the FHAR. The staff reviewed the licensee's fire hazards analysis and concludes that the existing level of protection, which includes fire detectors, fire-rated barriers and manual fire fighting equipment, is sufficient to mitigate the hazard. In addition, the licensee has assured that at least one division of post-fire safe shutdown systems will remain free of damage. The staff, therefore, concludes that the lack of an automatic fire suppression system is acceptable.

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Diesel Generator and Oil Storage Areas

The licensee identified several deviations from the guidance in Appendix A to the BTP in the subject areas pertaining to the lack of complete, 3-hour fire rated construction which separates these areas from adjoining plant locations. The hazards associated with the existing conditions are mitigated by the presence of active fire protection features (fire detectors and suppression systems) on at least one side of the barrier. The staff has evaluated the fire hazards as described by the licensee in comparison to the available protection and concludes that these conditions are not safety significant.

Safety Related Water Tanks

The Borated Water Storage Tank is coated with a foam insulation. The licensee affirms that the insulation has a flame spread rating of 25 when measured in accordance with the test method of ASTM Standard E-84. A hose ~~stations~~ with sufficient lengths of fire hose to fight a fire at the tank are present in the area. Because the flammability characteristics of the insulation meet staff guidelines and because manual fire fighting equipment is available, the foam insulation on the tank is considered acceptable.

General Areas

In letters to the staff dated April 29, 1982 and September 30, 1983 the licensee requested approval of a number of exemptions from the technical requirements of Appendix R to 10 CFR 50. The staff approved these exemptions by letters dated November 23, 1982 and August 30, 1984 respectively. These exemptions remain in effect.

By letters dated January 12, 1987 and July 31, 1989 the license requested additional exemptions from the rule. The exemptions pertaining to emergency lighting and separation of shutdown systems in containment have been addressed previously in this safety evaluation. The staff's evaluation of the remaining exemptions follows:

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Fire Area R - Room 324

Fire Area EE - Rooms 500, 501, 515

Fire Area HH - Rooms 603, 603A

Fire Area U - Rooms 310, 312, 313

Fire Area AB - Rooms 105, 113, 113A

The licensee requested approval of exemptions in the above referenced areas from the requirements of Section III.G.3 of Appendix R to 10 CFR 50 to the extent that it requires the installation of a fixed fire suppression system in an area for which an alternate shutdown capability has been provided. For area HH the licensee requested approval of an exemption to the extent that the area is not equipped with an area-wide fire detection system. However, as stipulated in Generic Letter 86-10 exemptions for the lack of area-wide detection and suppression systems are not necessary. Instead, licensees may justify these conditions on the basis of a fire hazards analysis. The staff considers the information supplied in support of the exemption as constituting the analyses recommended in the generic letter.

The physical configuration of the subject areas, including perimeter construction, fire hazards and available protection can be found in the licensee's January 12, 1987 letter, FHAR and Compliance Assessment Report (CAR). The licensee justified the exemptions on the basis of the limited fire hazard and available fire protection. The staff was initially concerned that a fire of significant magnitude would occur and spread beyond the boundaries of these areas and damage cables or components of the alternate shutdown capability. However, as described by the licensee, the in-situ combustible loading is low. The principle hazards in the areas are cable insulation. A fire involving cable insulation would be characterized initially by slow burning, gradual room temperature rise, and significant quantities of smoke. The products of combustion would be detected by the existing smoke detection system or plant operators. The fire brigade would be dispatched and would suppress the fire using manual fire fighting equipment. Pending arrival of the brigade, the fire-rated walls and floor/ceiling assemblies would be effective in confining the effects of the fire to the area of origin. Because the alternate shutdown capability is both physically and electrically independent of these areas, as represented

by the licensee, safe plant shutdown following the fire would be assured. Based on the evaluation, the staff concludes that the subject exemption requests should be approved.

Fire Area A

The licensee requested approval of an exemption from the technical requirements of Section III.G.2 of Appendix R to 10 CFR 50 to the extent that it requires that redundant safe shutdown systems be separated by a 3-hour fire related barrier. Specifically, "Train 1" circuits in rooms # 123 and 124 are not separated from "Train 2" circuits in room #115 by a complete 3-hour barrier. The specific area configuration is described in the exemption request. In summary, the fire area is a complex of a number of rooms encompassing more than one elevation. A portion of the barrier separating redundant trains is 3-hour fire rated but other portions are not. The licensee justifies the level of protection on the assessment that smoke and heat from a fire in order to damage both trains would have to travel via a complicated path through locations protected in part, by an automatic sprinkler system. The staff reviewed the licensee's fire hazards analysis and toured the area during a regional inspection and agrees that the existing level of fire protection is acceptable.

During their review of this exemption the staff expressed concern that there may be some confusion experienced by plant operators in attempting to implement post-fire safe shutdown procedures in this area. The licensee responded to this concern in the May 27, 1987 letter. Reliance on "Train 1" shutdown systems is credited in this area. If Train 1 systems were damaged by a fire in rooms 123 and 124, the procedures would direct operators in methods to utilize undamaged "Train 2" systems to achieve safe shutdown. On the basis that operators are fully trained in these procedures the staff's concern is considered resolved.

The staff also expressed concern that a cable chase in Area A exhibits a significant in-situ fire load as described in the FHA. The staff noted that the chase was not protected by an automatic fire suppression system and felt initially that this hazard warranted additional protection.

The licensee responded to this concern in the May 27, 1987 letter. The high fire loading (BTU/sq. ft) results from the fact that the chase has a small floor area. The cable trays in the chase have solid bottoms and are covered with a fire resistant material (KAOWOOL). The chase is protected by a fire detection system and manual fire fighting equipment. Upon further review, the staff concludes that the existing level of protection in the chase is acceptable.

Based on the above evaluation, the staff recommends that the licensee's exemption request should be approved.

Manhole 3001

By letter dated July 31, 1989 the licensee requested approval of an exemption from the requirements of Section III.G.2 of Appendix R to the extent it requires separation and protection of redundant safe shutdown systems. Specifically, redundant shutdown circuits are located less than 6 feet from one another in a manhole in the yard area. The manhole features no active or passive fire protection. The physical arrangement of the manhole is as described in the above referenced letter. The licensee justifies the exemption on the limited fire hazard and the absence of sources of ignition.

The staff was concerned regarding the perceived vulnerability of redundant trains of safe shutdown cabling within the manhole. The only observable threat to the cables is from a cable induced fire within the manhole itself. Because the manhole is constructed with a concrete raised sill and features an opening on the top with a bolted-in-place steel cap, external fire sources are not considered credible. The licensee affirmed that the cables within the manhole are qualified to the criteria of IEEE Standard 383-1974 or its equivalent and will not sustain combustion unless an external heat source is present. This, coupled with the fact that redundant cables are separated in accordance with the criteria delineated in Regulatory Guide 1.75 leads the staff to conclude that the existing configuration of cables within the manhole is acceptable. The licensee's request for exemption should, therefore, be approved.

Multiple Locations - Embedded Conduit Issue

By letter dated July 31, 1989 the licensee requested approval of an exemption from the technical requirements of Section III.G. of Appendix R to 10 CFR 50 to the extent that it requires separation and protection of redundant safe shutdown systems. Specifically, certain circuits associated with post-fire safe shutdown systems are enclosed in conduit and embedded in concrete walls and floor ceiling assemblies. The depth and configuration of concrete covers which would protect the cables in the event of a fire is insufficient to meet the fire barrier requirements of Section III.G. of the rule. Supplemental information on this issue was provided to the staff in a letter dated September 30, 1989. The staff also inspected a number of locations encompassed by this exemption in a visit to the site on the 15th and 16th of August 1989.

The subject letters describe a comprehensive effort undertaken by the licensee to determine where potentially vulnerable cables exist and the depth and configuration of the concrete cover, steel reinforcing bar and anchor bolts, all of which have an effect on the fire resistance of the cover. The results of the licensee's analysis indicate that if a fire were to occur in any of these areas and develop a heat input in accordance with the time temperature curve delineated in ASTM E-119, circuit temperatures would not exceed 310°F in 30 minutes. Once the heat source is removed, such as when the fire brigade arrives and begins active fire suppression activities, conduit temperatures would rise to 370°F and then diminish. The above time/temperatures were used as a "benchmark" to assess the adequacy of fire safety in the subject areas. The staff agrees that 370°F is an acceptable limit below which significant cable damage would not occur. The use of the E-119 time temperature curve as a basis for heat input is also considered conservative because the nature and configuration of combustibles in these areas is such as to produce a time/temperature profile below that of the standard. The licensee then compared the fire hazards and existing protection in the areas to the benchmark. All those areas with a fire loading less than 30 minutes were considered acceptable because an all consuming fire would not produce a heat input sufficient to damage the cables. Because of the conservatisms in the methodology, the staff considers this approach acceptable.

Several areas have combustible loadings in excess of 30 minutes but are protected by an automatic fire suppression system. Because the suppression system would actuate automatically during the early stages of a fire, the staff considers the existing level of protection in these areas to be acceptable.

Only two locations (rooms 428 and 515) have loadings in excess of 30 minutes and no automatic fire suppression systems. The staff evaluated the licensee's justification and toured the areas during a plant inspection. Based on this review, the staff agrees that any potential fire in these rooms would be suppressed by the plant fire brigade well before room temperatures reached a level high enough to cause cable damage.

Based on the validity of the licensee's heat transfer analyses and the result of its evaluation, the staff concludes that the licensee's exemption pertaining to the subject embedded conducts should be approved.

Multiple Locations - General Issues

During its review of the fire protection program, the staff expressed concern that the licensee may not have adequately planned to deal with the smoke produced by a fire. Specific concern centered on the venting of products of combustion to avoid damage to redundant shutdown equipment. The licensee responded to this concern in the May 27, 1987 letter by committing to revise the Fire Protection Strategy Procedures to prioritize the methods of smoke venting so as to minimize the potential impact of smoke on sensitive electrical equipment. The staff reviewed the licensee's proposals and conclude that this is an acceptable approach to this issue.

The staff requested that the licensee provide information to verify the adequacy of the plant communications capability during and after a fire. The staff was specifically concerned that structural steel would interfere with radio communications. The licensee responded in the May 27, 1987 letter by providing a description of the multi-faceted communication capability. In the event that one part of the system may be rendered inoperable, such as the "Gai-Tronics" system, the remaining communications

capability, including radios and sound powered phones, would be available. The licensee also performed and documented a verification test of the radio and sound powered phone system in those plant areas requiring manual operator actions for post-fire safe shutdown. This test verified that the communications capability is effective for assuring safe shutdown following a fire. On this basis this issue is considered closed.

In their comparison of the plant fire protection program to the guidelines in Appendix A to the BTP the licensee identified a deviation pertaining to the combustibility of piping and ductwork insulation. Staff guidelines stipulate that insulation material should have a flame spread, smoke and fuel contribution rating of 25 or less as determined by the test method of ASTM E-84. As delineated by the licensee in a January 6, 1988 letter, the insulation meets the flame spread rating but exceeds the smoke and fuel contribution rating. However, the staff concludes that the degree of deviation is insignificant from a safety standpoint based on the relatively limited quantity of insulation compared to other in-situ combustible materials and the active and passive fire protection features that comprise the defense in depth philosophy of fire protection at the plant. The staff, therefore, considers this deviation to be acceptable.

The licensee identified several deviations from the criteria delineated in NFPA Standard No. 10 which applies to portable fire extinguishers. The principal deviations pertain to the spacing and accessibility of extinguishers. During its evaluation of the licensee's code conformance analysis the staff disagreed with several of their assumptions, such as: the use of hose stations in lieu of class A-type extinguishers; and the use of CO_2-type extinguishers to control class A-type fires. Additional information on this issue was provided by the licensee in a meeting with the staff on August 15, 1989 and by a letter dated October 11, 1989. In an effort to resolve their concerns, the staff conducted a walkdown of certain areas in the turbine and auxiliary buildings where deviations had been identified by the licensee. The staff observed that all of the locations audited had been provided with a sufficient number of extinguishers of the proper type. On the basis of this small sample of areas, plus the licensee's written justification, the staff concludes that the number, type and placement of fire extinguishers in the plant is acceptable.

During its review of the NFPA conformance analyses, the staff requested clarification on a number of issues including: automatic shutoff valves for flammable liquid tanks; maintenance of hydrogen system features; and ventilation in Seal Oil Room 333. The licensee, provided satisfactory response to these requests in a letter dated October 11, 1989.

V ADMINISTRATIVE CONTROLS, FIRE BRIGADE AND TECHNICAL SPECIFICATIONS

Supplemental guidance on fire protection functional responsibilities, administrative controls and quality assurance was issued by the staff in a letter dated August 29, 1977. The staff requested confirmation that the fire protection program at Davis Besse conforms with this guidance. The licensee responded in the May 27, 1987 letter to the staff. The licensee stated that, with one exception, the plant fire protection program conforms with this guidance. The exception concerns the application of the guidance, retroactively, to the design, procurement, construction and pre-operational testing of previously installed fire protection systems. The licensee's stated ~~exemption~~ exception does not encompass fire brigade organization, training and procedures or control of combustible materials and ignition sources as delineated in the subject letter. The exception does apply to some of the quality assurance aspects of the letter, such as documentation relating to the procurement of materials. The staff considers the exemption acceptable because the design, construction procurement and testing of fire protection systems are also governed by the relevant sections of Appendix A to the BTP and the NFPA codes. The staff has reviewed the licensee's comparison of the fire protection program to these guidelines as described previously in the safety evaluation and had concluded that the program is acceptable. With regard to the lack of quality assurance documentation prior to 1978

on fire protection systems the staff concludes that the past performance of the systems without significant degradation provides reasonable assurance that these same systems will perform acceptably in the future. Any future degradation that may occur would be compensated for by the action statements of the plant technical specifications. The staff concludes, therefore, that the lack of such documentation is acceptable.

During a recent plant inspection, the staff expressed concern that the plant fire brigade was not being dispatched to an area upon receipt of a fire alarm in the control room from that area. The staff was specifically concerned that there may be areas in the plant containing redundant shutdown systems that might be damaged if the fire brigade response was delayed. The licensee responded to this concern in a letter to the staff dated September 30, 1989. The licensee described criteria by which individual plant fire areas were evaluated for potential vulnerability. The result was that three locations were identified as requiring the immediate assembly of the brigade. The staff, initially, expressed concern that the criteria would not require the dispatch of the brigade if multiple alarms of a certain type were received (such as multiple alarms off of the fire detection system). The licensee's criteria mentions "diverse" alarms. The licensee affirmed that multiple fire detector alarms would be considered "diverse." The staff reviewed the licensee's approach to this issue and concludes that it provides reasonable assurance that fire brigade response will be timely in areas which contain potentially vulnerable redundant shutdown systems. This issue is considered closed.

During its review of fire brigade related issues, the staff requested an update on the licensee's response to a previous inspection report open item concerning the updating of brigade pre-fire plans. The licensee responded in the May 27, 1987 letter that the fire brigade pre-plans have been upgraded after consulation with the staff as documented in an NRC issued meeting summary dated February 1, 1984. The update included the delineation of fire hazards and floor layout and reflects the revised safe shutdown methodology and existing fire rated barriers and fire fighting systems. On this bases, this issue is considered closed.

During its review of the licensee's comparison of the fire protection program to NFPA Standard No. 7, the staff expressed concern that relevant portions of the standard relating to planning and coordination with public fire departments were considered not applicable. The staff was specifically concerned that there was no agreement with the offsite fire department to respond to an emergency at the plant, if requested, and that there was no planning and training with the offsite department to familiarize them with conditions at the plant. The licensee's position on these issues is delineated in Table 4-1 of the FHAR. An agreement with the offsite fire department does exist which covers mutual responsibilities in the event assistance is requested. In addition, periodic training is performed with personnel from the local fire department so as to facilitate effective assistance in the event that it is needed. The staff acknowledges, nevertheless, that the plant fire brigade is staffed and equipped to deal with all anticipated fire-related incidents. In the unlikely event that an unusual incident may be beyond the capabilities of the brigade, offsite assistance would be expected. On this basis, the staff considers the licensee's position as delineated in Table 4-1 to meet NFPA Standard No. 7.

In a related matter, the staff expressed concern that the responsibilities of a Fire Loss Prevention Manager, stipulated in Section 310 of NFPA Standard No. 6, were considered not applicable to Davis Besse. Again, the licensee's position is delineated in Table 4-1 of the FHAR. The staff was concerned that responsibilities such as reviewing: fire protection inspection findings, training programs, procedures, fire losses, etc. were not part of the responsibilities of the Davis Besse Fire Protection Compliance Manager. The Fire Protection Compliance Manager (or equivalent future title) is responsible for all programmatic aspects of the Davis Besse Fire Protection Program. Specific review, audit, engineering and training responsibilities, etc. are delegated, if necessary, to qualified individuals within the licensee's organization. On this basis, the staff considers the licensee's position to be in accordance with Section 310 of NFPA No. 6.

The staff requested clarification that training of the fire brigade is in accordance with NRC fire protection guidelines. The licensee has identified no deviations from the drill and instructional guidelines for fire

brigades delineated in Appendix A to the BTP and the staff's August, 1977 supplemental guidance, referenced above. On this basis, this issue is considered closed.

By letter dated March 16, 1987 NRC issued Amendment No. 101 to the Davis Besse operating license which revised certain fire protection plant Technical Specifications. These T.S. changes were considered transitional in that not all aspects of the approved fire protection program at the plant have been reflected. For example, certain fire barrier and safe shutdown components which the licensee relies upon to satisfy NRC fire protection criteria have not been encompassed by the Technical Specification. This issue remains open.

The licensee noted in their NFPA code conformance review that the frequency of inspections and surveillance testing of certain fire protection systems at the plant differs from the recommendations in the codes. The staff, however, considers the surveillance and testing requirements of the Technical Specifications to be the basis of an acceptable program. The subject NFPA deviations are, therefore, considered acceptable.

The Action Statements of certain fire protection Technical Specifications establish that an hourly fire watch patrol should be implemented when degraded fire protection features are discovered, provided that an operable fire detection system is installed in the area. By letter dated July 28, 1989 the licensee described their intent to install a portable fire detection system, under limited circumstances, to compensate for degraded fire protection features. An alarm signal from the system would be transmitted via a telephone circuit to the Control Room, Central Alarm Station and the Secondary Alarm Station. The staff was concerned that the placement of the detectors would not conform with the guidance provided in NFPA Standard 72E. The licensee intends to follow these guidelines except where special circumstances may warrant an alternative configuration. In such an instance, a qualified fire protection engineer will decide the position of detectors. The staff also notes the licensee's commitment to utilize this concept only in conjunction with hourly fire watch patrols. On this basis, the staff considers the licensee's proposal to be acceptable.

Finally, in their comparison of the fire protection program to the criteria of NFPA Standard No. 30, the licensee identified a deviation pertaining to the quantity of flammable and combustible liquids located outside of a storage area. To evaluate this issue the staff reviewed Administrative Procedure DB-FP-00007 (Revision 00) which covers the control of transient combustibles. The procedure limits quantities of flammable and combustible liquids (as well as other combustible materials) to that necessary for plant operations. When excess quantities are present in an area prior approval is necessary and, in certain configurations, additional compensatory fire protection measures are taken. The staff considers the procedure, and the noted deviation from NFPA 30, to be acceptable.

VI POST FIRE SAFE SHUTDOWN CAPABILITY

Introduction

NRC criteria that is applicable to the Davis Besse post fire safe shutdown capability is contained in Sections III.G. and III.L. of Appendix R to 10 CFR 50, in Generic Letter 81-12 and its subsequent clarification letter and in Generic Letter 86-10.

The licensee's description of the methodology for achieving and maintaining post fire safe shutdown is contained in the CAR through Revision 3. The staff evaluated the information provided in Revision 1 of the CAR and expressed concern that the licensee's approach to several issues was not in accordance with the above-referenced criteria. The staff also requested clarification and additional information on several other issues to be able to determine the acceptability of the licensee's technical approach. In response, the licensee provided additional information on the safe shutdown methodology in letters to the staff dated May 27 and July 30, 1987; January 6, February 8, May 23, June 6, and August 9, 1988; and March 15, 1989 and incorporated changes to the methodology in subsequent revisions to the CAR. This correspondence forms the basis of the licensee's program.

Methodology For Assuring Post-Fire Safe Shutdown

The performance goals for safe shutdown functions are stipulated in Section III.L. of Appendix R. The licensee has affirmed that the safe shutdown methodology is sufficient to satisfy these performance goals as described below.

Reactor Reactivity Control:

Safe shutdown of the reactor is performed by a manual trip from the control room. An automatic trip will occur in the event of loss of offsite power. After a reactor trip, the reactivity control function is capable of achieving and maintaining at least a 1% reactivity shutdown margin (Δ k/k) from zero power hot standby to cold shutdown. The function is capable of compensating for any reactivity changes associated with xenon decay and the reactor coolant temperature decrease which occurs during cooldown to cold shutdown conditions.

The Makeup and Purification System (MUPS), High Pressure Injection System (HPIS) and Low Pressure Injection System (LPIS) provide boron injection for subsequent reactivity control during cooldown. The Makeup Pumps take suction from the Makeup Tank or Borated Water Storage Tank (BWST). The HPI and LPI Systems take suction from the BWST.

Reactor Coolant Pressure and Level Control:

The reactor coolant make-up control function is capable of assuring that sufficient make-up inventory is provided to compensate for Reactor Coolant System (RCS) fluid losses due to leakage from the RCS water volume during cooldown from hot standby to cold shutdown conditions, and to compensate for contraction volume of the RCS. The same injection systems are used for this protective function as those previously mentioned for the reactor reactivity control function.

Reactor Coolant pressure control is provided by the Pilot-Operated Relief Valve (PORV) or the Pressurizer Vent Header (as a backup), if available.

Reactor Heat Removal:

Decay heat removal in hot standby is accomplished by natural circulation through the use of the Auxiliary Feedwater Pumps supplying water to the Steam Generators from the Condensate Storage Tanks and rejecting heat from the Steam Generators to the atmosphere through the Atmospheric Vent Valves or the Main Steam Safety Valves as a backup. In the event of a long term plant cooldown, a backup supply of auxiliary feedwater is provided from the Service Water System.

Decay heat removal in cold shutdown is provided by the Decay Heat Removal System (DHRS) through the Decay Heat Coolers. The Component Cooling Water System (CCWS) provides cooling to the Decay Heat Coolers, and is in turn cooled by the Service Water System (SWS).

Secondary System Pressure and Level Control:

The Secondary System pressure in the steam generators is maintained within allowable limits by operation of the Atmospheric Vent Valves. The steam generator water level is maintained by the Auxiliary Feedwater System or the Motor Driven Feedwater Pump (as an alternate). Normally, steam generator water level is maintained by the Main Feedwater System. However, on a loss of offsite power, this system is not available.

Process Monitoring:

Monitoring information on process variables is available from the Control Room or local control stations. The process monitoring function is capable of providing direct readings of those plant process variables necessary for plant operators to perform and/or control the identified safe shutdown functions.

Supporting Systems:

The systems and equipment used to perform the previous functions require miscellaneous supporting functions. The supporting functions required include process cooling (CCWS and SWS), area cooling for certain rooms

(HVAC) and Essential AC/DC power. The supporting functions are protected from fire damage as described in the CAR and are capable of providing the support necessary to assure acceptable performance of the previously identified safe shutdown functions.

Having identified the overall systems necessary to achieve and maintain the performance goals identified in Section III.L. of Appendix R, the licensee undertook a comprehensive effort to identify required safe shutdown components and cables (including associated circuits as defined in Generic Letter 81-12). The list of these required components and cables is found in the CAR along with fire area specific lists of shutdown systems which are located in each plant fire area. For any individual fire area, one "train" of postfire shutdown systems was identified as the preferred method of shutdown. Components and cables of that train were then protected to assure that they will be free of damage. The protection provided for the preferred train is, in general, in accordance with the specific protection "options" delineated in Section III.G. of Appendix R. Staff approval of certain exemptions from these options is found in other sections of this safety evaluation and in previous staff safety evaluations.

Where redundant trains of safe shutdown equipment were not protected against fire damage the licensee has provided an alternate safe shutdown capability that is physically and electrically independent of the fire area.

In performing their compliance assessment to the staff's fire protection criteria for individual fire areas the licensee identified a significant number of "potential" noncompliances. These are specifically identified in Section 4.0 of the CAR. Each potential noncompliance ~~was subsequently~~ was resolved on the basis of a plant modification and/or procedure change and/or evaluation. The staff has reviewed the summaries of the licensee's resolution of these conditions and concludes that resolution ~~has been implemented~~ is consistent with the above referenced staff criteria.

The staff requested that the licensee prepare and submit a simplified flow chart which shows the interrelationships between the systems and components

necessary to achieve postfire safe shutdown. This information was submitted as Enclosure 2 in the licensee's May 27, 1987 letter.

By letter dated August 20, 1984 the staff granted approval of an exemption in order to extend the allowable time to achieve cold shutdown from 72 hours to 193 hours. In Revision 1 of the CAR credit was taken for a time to achieve cold shutdown of 277 hours. The staff requested clarification and justification of this change. The licensee responded in the May 27, 1987 letter that this change was inadvertent and that the safe shutdown methodology is based on the shutdown duration originally approved by the staff. On this basis, this issue is considered closed.

During its review of the safe shutdown methodology the staff requested justification regarding the licensee's conclusion that reactor coolant pump seal injection and cooling via the component cooling water system is not necessary. The licensee responded in letters dated May 27, 1987 and February 8, 1988. The licensee referenced a test performed on seals identical to those used at Davis Besse which purport to demonstrate that no seal failure of significant leakage will occur due to loss of seal cooling for 39 hours or due to the restoration of cooling water. The licensee committed nevertheless to "re-establish seal cooling <u>well within</u> (emphasis added) 39 hours after its loss."

The licensee evaluated the results of the test and the available methods of providing seal cooling at Davis-Besse. It was initially concluded that the preferred method of seal cooling is seal injection via the MU or HPI Systems and that this method could be established well within 39 hours without physical modifications with controlled seal staging isolated. However, the seal test was conducted with controlled seal bleedoff (staging) unisolated. The licensee determined that a single exposure fire in certain plant fire areas could cause controlled seal bleedoff to be isolated. The licensee has been unable to locate data from other tests which would demonstrate that the controlled seal bleedoff may be isolated without any seal cooling and not lead to seal failure. Consequently, the time to implement the manual operator actions for seal injection via the MU or HPI Systems may

not be adequate in plant fire areas where a single exposure fire could be postulated to cause the isolation of controlled seal bleedoff and the loss of CCWS seal cooling.

The licensee committed in the February 8, 1988 letter to identify whether CCWS seal cooling would be assured available following a fire or whether controlled seal bleedoff flow could be assured in a fire and to identify any associated modifications or manual actions. The licensee will also attempt to identify information that demonstrates that controlled seal bleedoff may be isolated without any seal cooling and not lead to seal failure. The licensee's technical resolution of this issue will be the subject of a future audit and safety evaluation.

The licensee has identified the manual operator actions required to re-establish seal injection via the MU or HPI Systems. These manual operator actions would be adequate in those fire areas in which a single exposure fire would not cause the isolation of controlled seal bleedoff. These manual operator actions would involve manually repositioning certain valves or verifying that these valves are opened. Additionally, the licensee has evaluated the location of these valves relative to the location of any fire postulated to cause the loss of all seal cooling. Based on this evaluation, the licensee has identified that certain HPI and MU valves could be subjected to the postulated exposure fire and also require subsequent manual operation in order to establish seal cooling. The staff evaluation of these manual actions is evaluated separately.

As part of its review of the licensee's safe shutdown methodology the staff requested that the licensee discuss the implications of IE Information Notice 86-79. The staff was concerned that systems required for shutdown following a fire which are provided with a "swing" capability can be degraded or lost as a result of design deficiencies in interlocking circuitry or inadequacies in maintenance procedures. The licensee provided the results of their review of this issue in a letter to the staff dated July 30, 1987. The licensee indicated that the only post fire safe shutdown components that feature a "swing" design are the component cooling water

system and the service water system and that the design of these systems is such as to not cause a loss of function as delineated in the information notice. On this basis, this issue is considered closed.

Based on the lack of sufficient explicit information in Section 3.0 of the CAR the staff requested confirmation that all emergency diesel engine (EDG) auxiliary systems had been analyzed for conformance to the technical requirements of Appendix R. The licensee provided a description of required EDG auxiliary systems in the May 27, 1987 letter and described the measures provided to assure that loss of function will not occur as a result of a fire. The staff reviewed the licensee's response and concludes that it is acceptable.

The licensee originally proposed to compensate for damage to redundant fuel and transfer pumps by providing a backup source of fuel (tank truck) from a local offsite source. The staff concluded that this approach was not justifiable on the basis of potential unanticipated events which might prevent the tank truck from reaching the site in sufficient time. In the May 27, 1987 letter the licensee proposed an alternate solution. The Main Fuel Oil Tank has an adequate supply of fuel oil exceeding 193 hours. A pipe from this tank enters Room 319 containing EDG 1-2. The licensee will install an isolation valve with a hose connection on this pipe and provide a portable pump to transfer fuel oil from the Main Fuel Oil Tank to the EDG Day Tank 1-2 located in Room 320A, adjacent to Room 319. This portable pump would be powered from an essential power supply or a portable generator. This alternative source of fuel would be protected by the 3-hour rated fire walls of Rooms 319 and 320A and would not be required for a fire in Rooms 319 and 320A. Because this proposal will assure a sufficient, onsite, source of fuel to the EDGs without reliance on an offsite capability the staff considers this proposal to be acceptable.

The staff requested clarification as to how valve operators have been protected from fire damage. The licensee responded that the safe shutdown methodology is predicated on the assumption that certain passive components are assumed to remain functional during a fire. The staff agrees that heat

exchangers, piping, tanks as well as manual and check valves will not be damaged by a credible plant fire based on the implementation of the defense-in-depth philosophy. Where valve repositioning is necessary for safe shutdown the licensee will rely upon manual operator actions. The staff's evaluation of manual actions is evaluated separately. On the basis that valves in shutdown flowpaths feature no device or component the damage of which would prevent manipulation by a plant operator, this issue is considered closed.

In reviewing the original and subsequent revision of the CAR the staff noted a number of described conditions that were not in conformance with the provisions of Appendix R or the guidance contained in Generic Letter 81-12. Examples include ~~the lack of RCS Loop 1 cold leg temperature indication~~ cutting wires as ~~part of the post fire shutdown instrumentation~~ and certain repairs to achieve hot shutdown. The licensee responded that these conditions reflected the staff-approved interim actions implemented by the licensee as part of their response to the original Appendix R regional audit. Subsequent revisions to the CAR reflect the implementation of modifications and procedures which conform with staff fire protection criteria. The staff also discovered a number of errors of an editorial nature. By letter dated May 27, 1987 the licensee affirmed that these errors have been corrected. On this basis, the staff considers this issue closed.

Alternate Shutdown Capability

In most areas of the plant the licensee has provided fire protection sufficient to assure that one train of safe shutdown systems is free of fire damage. In several fire areas (delineated in the CAR) plant operators will perform manual actions, such as valve manipulation, to compensate for fire damage to shutdown related circuits. Because these actions are associated with normal shutdown systems (Train 1 or 2) they are not considered to be part of the alternate shutdown capability. Instead, compliance is achieved on the basis of III.G.1 of Appendix R to 10 CFR 50. For the remaining areas (identified in Tables 7-1 through 7-4 and Section 4.0 of the CAR) the licesee has provided an alternate shutdown capability which, with several approved exceptions, the licensee affirms is in conformance with Section III.L. of Appendix R and the supplemental guidance contained in Generic Letters 81-12 and 86-10.

For a fire in the Control Room or Cable Spreading Room the licensee will implement procedure [redacted] "Serious Control Room Fire." This procedure is predicated on a series of actions such as tripping breakers and locally operating components manually or by a local controller. For a fire in other plant areas, the licensee will implement procedure [redacted] "Serious Station Fire."

The staff initially had several concerns with the licensee's approach. The first was that the performance goals for the alternate shutdown function, as stipulated in Section III.L. may not have been met. At Davis Besse as with other Pressurized Water Reactors certain plant transients of short durations may cause the pressurizer level to drop below or go above the indications and certain reactor coolant process variables may not be within those predicted for a loss of normal A.C. power. These transients would occur for a short duration and could result from a reactor trip or from equipment manipulations such as the time to properly align auxiliary feedwater valves. The staff has evaluated the repercussions of these transients and concludes that they are not safety significant as long as no unrecoverable plant condition will occur, such as the degradation of the Emergency Core Cooling System. The staff's position is also based on the understanding that the capability to return the pressurizer level to within the indications and to restore the process variables to within those predicted by a normal A.C. power loss will be preserved. In addition, the core will not be uncovered and the fission product boundary integrity will not be affected during the transients.

In a similar vein, a short-term break of a high-low pressure interface, such as opening the PORV and the block valve due to a spurious actuation from a fire in the Control Room or Cable Spreading Room is considered acceptable as long as the capability to close one of the valves is available by timely manual operator actions resulting in no unrecoverable plant condition. Based on the above evaluation this issue is considered closed.

The staff was also concerned that the alternate shutdown capability may not be physically and electrically independent of the fire area. The staff noted specifically the condition described in IE Information Notice 85-09. The licensee responded to the issue of physical independence in submittals

relating to manual operator actions which are evaluated separately. With regard to electrical independence, the licensee responded in the May 27, 1987 letter that isolation switches and fuses have been installed in accordance with Generic Letter 81-12 such that electrical independence of the alternate shutdown capability from the fire area is achieved. The staff considers this response acceptable.

The staff also expressed concern that based on a review of Revision 8 of the control room shutdown procedure and Revision 3 of the serious station fire procedure that the licensee was crediting repair for hot shutdown. However, as previous explained, these actions are part of the staff approved interim shutdown methodology and will not be relied upon after all Appendix R related modifications are complete.

In the August 9, 1988 letter, the licensee identified a number of "repairs" for which specific approval was requested. One such repair involves the installation of a portable digital readout device to measure reactor coolant system hot and cold leg indications. The circuit for each indication would be disconnected via a multi-pin twist disconnect plug and then connected to the digital readout device as described in a letter to the staff dated May 27, 1987. Because each action is simple in nature and involves a brief interval of time to implement, the staff considers this "repair" to be acceptable.

The licensee will also implement certain "precautionary" measures not <u>required</u> to satisfy Appendix R but desired to "enhance" the shutdown capability. These repairs will not significantly delay critical shutdown actions as confirmed by the licensee's time/manpower analyses. The staff, therefore, considers these precautionary measure to be acceptable.

Finally, the licesee will utilize portable fans in a few isolated instances to compensate for damage to HVAC cables and components. The staff had two concerns with this approach. The first was that the fans might not be effective in maintaining an acceptable room temperature. However, the licensee has performed an analyses which confirms the

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viability of this approach. The staff will evaluate this analysis in a subsequent audit(s). The second concern was that the fans relied upon will be available for use when needed. The licensee affirmed that the fans will be different from those needed by the fire brigade for smoke removal and will be controlled as will other tools and equipment needed for post-fire safe shutdown. On this basis, the staff's concerns are considered resolved.

The staff was also concerned that sufficient time and personnel were not available to achieve safe shutdown independent of the plant fire brigade. The licensee will not rely upon the plant fire brigade for personnel to implement the above referenced shutdown procedures. In addition, the licensee developed a time line based on actual plant walkdowns to confirm that sufficient time is available to achieve safe shutdown with conservative margin. The staff has evaluated the licensee's time and personnel analyses in conjunction with the procedures and concludes that they appear feasible. However, the staff will further confirm the feasibility of the procedures in a future audit(s).

The staff requested clarification regarding the number and nature of operator actions within the control room that are credited for a control room fire. The licensee responded in the May 26, 1987 submittal. Nine operator actions are credited in the control room. Two of the actions, reactor trip and turbine trip are to be completed prior to evacuation due to a fire. The remaining actions may either be taken in the control room, if conditions permit, or they may be completed and verified outside of area, regardless of circuit damage in the room, in accordance with the above-referenced procedures.

In the event control room evacuation is necessary, the licensee has analyzed the consequences of circuit damage that may occur from the time evacuation is deemed necessary until electrical isolation is achieved and has confirmed that no unrecoverable plant condition will occur during this interval. To facilitate this end, the licensee has prioritized operator actions

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to focus on time critical activities early in the shutdown procedure. On the basis that a safe, viable method is available outside the control room to implement and verify the seven optional operator actions, the licensee's response to the staff's request for information is considered acceptable.

The staff was also concerned that as part of the postfire safe shutdown methodology the licensee may have taken credit for operator actions within the fire area or that operators may have been directed to travel through the area experiencing the fire in order to reach locations where shutdown-related activities needed to be implemented. The staff was specifically concerned with personnel entry into a fire area within the first hour after the discovery of a fire. Operator entry beyond the first hour is not considered significant because of the intervention of the plant fire brigade to suppress the fire and to begin smoke removal activities in conjunction with established procedures. A related concern was that there may be certain critical actions that need to be taken outside of the control room within a short duration to avoid an unrecoverable plant condition. The staff's specific concern was that there may be an insufficient time-related margin of safety built into the shutdown procedures to achieve these actions. The staff requested that the licensee's response to this concern to focus on the first 30 minutes after a fire is discovered. The licensee responded to these issues in letters to the staff dated June 6 and August 9, 1988 and March 15, 1989. The licensee's response is predicated on a definition of an unrecoverable plant condition as loss of any shutdown function(s) for such a duration as to ultimately cause the reactor coolant level to fall below the top of the core and subsequent breach of the fuel cladding. The analyses to determine the time to reach this condition is based on the assumption that the fire causes safe shutdown equipment in the fire area to assume its most detrimental position. This conforms with the guidance issued in Generic Letter 86-10 and is, therefore, acceptable.

All manual actions identified in post fire safe shutdown procedures were assessed. Of this total, the licensee initially identified 19 actions that needed to be performed within one hour in the fire area and within

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30 minutes outside of the fire area. Upon further review (refer to March 15, 1989 letter) the licensee concluded that four of these actions could be performed beyond these time limits. All but two of the remaining actions were resolved so as to meet the staff's acceptance criteria on the basis of plant modifications delineated in the June 6, 1988 letter. An operator action associated with establishing temporary ventilation in the CCW pump room is no longer considered necessary because the licensee has performed an assessment which confirms that the pumps will not malfunction upon loss of ventilation. The remaining action relates to compensatory actions that would be necessary to prevent damage associated with the spurious opening of the PORV, letdown valves and the RCS sample valves due to a fire in the control room or cable spreading room. Based on an internal analysis performed by the licensee, required compensatory actions include establishing auxiliary feedwater and makeup within 25 minutes and isolating the high-low pressure interface valves within 30 minutes. These actions would be taken outside of the fire area. The licensee has affirmed that, based on a plant walkdown of the shutdown procedures by ~~licensed~~ plant operators, these actions can be accomplished within 15 minutes and 20 minutes respectively. The staff has reviewed the submitted information on this issue and concludes, subject to a confirmation of the viability of the procedure, that there remains an adequate time-related margin of safety to accomplish these actions. Therefore, the staff's concerns regarding manual actions should be considered resolved.

Associated Circuits Analysis

Section III.G of Appendix R stipulates that fire protection features be provided for associated non-safety circuits whose damage by fire could prevent operation of shutdown systems or cause maloperation due to hot shorts, open circuits or shorts to ground. Three categories of associated circuits ~~were~~ are of concern to the staff:

1. Common power source,
2. Common enclosure, and
3. Spurious operation.

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The licensee provided a summary of the methodology used to evaluate and protect such circuits in the CAR with supplemental information supplied in letters to the staff dated May 27, 1987, January 6 and May 23, 1988, and October 11, 1989.

The licensee's Common Power Source Analyses was based on a review of the electrical distribution system to ensure that acceptable coordination and selective tripping for all circuits in the essential power system. The scope of the licensee's analyses for fire safety was limited to circuits critical to the post fire safe shutdown capability as stipulated by NRC requirements and guidelines.

All common power sources which feed power to safe shutdown and non-safe shutdown circuits were identified. The licensee then confirmed that proper coordination of breakers and fuses was provided. The results of this analyses revealed that, except for high impedance single line to ground faults, all circuits of concern were provided with adequate coordination in accordance with the criteria delineated in Generic Letter 81-12. The licensee committed in the CAR to provide ground fault protection for those associated circuits determined to be normally energized and whose failure from a high impedance ground fault could result in a loss of power to a common power source which is required to supply safe shutdown equipment following a fire.

As a precautionary measure, Seneca Station Fire procedure [redacted]02 provides guidelines for tripping the breakers for the de-energized associated circuits within each fire area. This would preclude the electrical operation of certain equipment which is not required to achieve safe shutdown. If required, operators would manually operate such equipment.

Based on the results of the licensee's analyses, proposed modifications and emergency procedures, the staff concludes that the licensee's technical approach to associated circuits by common power supply is acceptable. The licensee's fuse/breaker coordination study will be reviewed during a future Appendix R compliance audit.

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The licensee's common enclosure analysis was based on a review of the electrical distribution system to verify that a circuit intercepting device has been provided for circuits routed within a common enclosure as defined in Generic Letter 81-12. In addition, the licensee verified that sufficient measures (fire barriers and barrier penetration seals) have been provided to prevent fire propagation into a common enclosure. The licensee's "Safe Shutdown Circuit/Sub-component Location Summary by System" was used to identify typical common enclosures such as junction boxes, cabinets and panels which contain both safe shutdown circuits and non safe shutdown circuits. The licensee then confirmed that a proper breaker or fuse was provided for the circuit as was done for the common power supply issue. Finally, the licensee assessed the adequacy of fire barriers and penetration sealants to prevent fire propagation. The results of the licensee's analyses confirmed that there are no common enclosure associated circuit of concern. The licensee's detailed analyses of this issue will be subject to future audit(s).

The licensee's spurious signal analysis was predicted on the circuit damage assumptions delineated in Generic Letter 86-10.

A systems engineering review was performed on plant systems and equipment to determine which of the components had the potential to defeat safety functions by their spurious operation. These components and their normal and unacceptable operating states were identified. The components were assumed to have the potential to go to an unacceptable position for the purposes of selecting the spurious actuation components.

Spurious actuation components were included on the Safe Shutdown Components List as part of the safe shutdown system or supporting system.

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The spurious actuation components and their circuits were tabulated in the same computer data base listing as the safe shutdown systems.

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The computer data base was then sorted by fire area. The resulting information was then utilized in the Appendix R, Section III.G separation evaluation, previously evaluated.

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The elementary wiring diagrams for each component were analyzed in order to identify which circuits could potentially fail in such a way as to cause a spurious action of the component. For each conductor within a cable, the impact of a hot short, open circuit and short to ground was evaluated. The results of this evaluation was a list of potential nonconformances which are identified in Section 4.0 of the CAR. Resolution of these nonconformances included the provision of fire protection features to prevent damage which would result in spurious signals, plant modifications, such as installing isolation and the ~~such as racking out power to an affected component~~ to preclude spurious signals and reliance on ~~emergency~~ procedures including racking out power to an affected component. to compensate for a spurious signal that might occur.

During their review of the licensee's approach to the associated circuits issue, the staff expressed concern that the licensee's procedures may have been based on interrupting the offsite power supply to all essential and nonessential loads to compensate for fire damage. Shutdown capability would then be based solely on the on-site power supply. The staff views this tactic as being insufficiently conservative because of the voluntary loss of a source of power to shutdown system that may not be damaged due to the fire. In the event that the diesel generator would not start or would not continue to run after starting, power to safely shutdown the plant would be unavailable. The licensee confirmed in a letter to the staff dated October 11, 1989 that voluntary tripping of offsite power sources is a part of shutdown procedures. This issue is, therefore considered unresolved.

VII CONCLUSION

Based on it evaluation of the licensee's fire protection program, and subject to the approved deviations and exemptions the staff concludes that the program at Davis Besse conforms with the guidelines in Appendix A to the BTP, the requirements of Appendix R and the supplemental staff guidance on fire protection.

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