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Subject: River Bend Station
Unit 1
Docket No. 50-458
License No. NPF-47
RBS Fire Protection Program
File No.: G9.5, G15.4.1

RBG-40145

Gentlemen:

The purpose of this letter is twofold. The first is to provide an update to the status of recent and current activities in the River Bend Station (RBS) Fire Protection Program. Attachment 1 to this letter is an update of current activities as well as planned enhancements within the Fire Protection Program.

The second purpose is to supplement the letter from J. J. Fisicaro to the NRC dated December 6, 1993, summarizing modifications to equipment and procedure changes identified during revision of the RBS post-fire Safe Shutdown Analysis (SSA). During the week of December 13-17, 1993, NRC Inspection No. 50-458/93-30 was conducted by Messrs. M. Murphy, H. Bundy and K. Sullivan of the RBS post-fire SSA. Their review included those modifications and procedure changes. Attachment 2 provides requested supplemental information as well as other pertinent information regarding the issues discussed in the December 6, 1993, letter.

Should you have any questions regarding the attached or require additional information, please contact Mr. O. P. Bulich of my staff at (504) 336-6251.

Sincerely,

James J. Fisicaro
Manager - Safety Assessment and
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River Bend Nuclear Group

JJF/jcm
attachments

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# ATTACHMENT 1 - RIVER BEND STATION FIRE PROTECTION PROGRAM

## PENETRATION SEALS

A 100 percent inspection of all safety-related fire barrier penetration seals was completed on December 7, 1993. A total of 3385 penetration seals were inspected of which 1961 were found to be unacceptable based on one or more criterion. As of February 16, 1994, 104 of the 3385 penetration seals inspected remained to be dispositioned. Rework activities for remaining penetration seals will be completed by the end of the next refueling outage, currently scheduled to begin April 15, 1994. Although evaluation of penetration seals per Generic Letter 86-10 is an appropriate means of disposition, as a proactive effort EOI intends to rework as many of the evaluated seals as possible. The fire areas in which these penetration seals are located will remain under hourly firewatch patrols until the seals have been dispositioned.

## STRUCTURAL STEEL

Design Specification 210.505, "Fireproof Coatings," has been reviewed and revised to add appropriate detail and references to ensure that fireproofing construction conforms to specified design requirements. The revision also includes improvements to the QA program requirements within the specification to account for materials and configurations not addressed previously.

Evaluations identifying which structural steel is required to be fireproofed have been completed. Where installed configurations are considered inadequate, the structural steel fireproofing is being reworked. As of February 16, 1994, 232 of the 638 beams and columns evaluated require additional fireproofing. All structural steel rework activities will be complete by April 15, 1994. All fire areas in which structural steel fireproofing rework is not complete will remain under an hourly fire watch.

## FIRE HAZARDS ANALYSIS/SAFE SHUTDOWN ANALYSIS

RBS revised design criterion document 240.201 and restructured it into a complete post-fire safe shutdown analysis (SSA). The SSA was completed on 11/19/93. The associated licensing change notice, procedure changes, and design document changes were implemented by 11/25/93. The work done in developing the SSA was treated as Quality Assurance Category I work with the required independent design verification.

## THERMO-LAG

As stated in the RBS response to the Request for Additional Information concerning GL 92-08, for those in-plant assemblies bounded by the NUMARC testing and determined feasible for continued utilization, RBS will implement non-outage corrective actions within 24 months from receipt of the necessary documentation. With respect to fire barriers outside the scope of the NUMARC program, RBS will provide a description of the selected

corrective action(s) and a schedule for implementation within 90 days of receipt of documentation of the final scope of the NUMARC generic test program.

All Thermo-Lag fire barriers at RBS were declared inoperable on October 26, 1989, following an unsuccessful fire endurance test performed by RBS at Southwest Research Institute. Hourly firewatch patrols were immediately established in compliance with the compensatory action required by Technical Specification 3/4.7.7.

**PLANNED ENHANCEMENTS**

Planned enhancements have been scheduled to detect any remaining issues and prevent any new issues within the RBS Fire Protection Program. Some of these planned enhancements are listed below:

IMPROVE DOCUMENTATION OF SSA

Planned improvements to the SSA include:

1.) Supplement the appropriate sections of the SSA to provide additional detail of how the spurious actuation analysis requirements described in GL 86-10 are applied.

2.) Incorporate into the instrument damage discussion the effects of fire on the instrument sensing line process fluid and add an instrument tubing table with instrument mark number, fire area/zone, tubing route by fire area/zone, and location of tubing endpoints to document sensing line evaluation.

3.) A review of assumptions made in the SSA will be completed by the end of February, 1994.

RF-5 has been selected as the completion date to coincide with the completion of installation of modifications required as a result of the SSA review. It is anticipated that a revision to the SSA will be necessary as part of the implementation of one or more of these modifications. In the interim a clarification document (DCN 93-0650) has been issued for informational posting against Design Criterion 240.201A (SSA) to address item 1 above.

EMERGENCY LIGHTING STUDY

To insure adequate lighting for safe shutdown, installed emergency lighting was verified to function properly by December 31, 1993. Independently, an engineering evaluation of emergency lighting was completed by January 31, 1994. A walkdown was performed to identify which emergency lighting units were needed for the operation of safe shutdown equipment as well as access/egress routes. With the assistance of Operations, both normal and alternate routes were determined from the main control room and the Division I remote shutdown room to equipment which may need to be manually positioned for post-fire safe shutdown.

As a result of the above activities, the need for additional lighting in specific areas and improvements to preventive maintenance procedures was identified. Corrective actions are being evaluated and interim compensatory measures are currently in place.

A list of emergency lighting units and the drawings showing the manual action locations and access/egress routes was incorporated into the SSA as Appendix M of Design Criterion 240.201A.

MANUAL ACTION OPTIMIZATION STUDY

A review of operator actions required during a fire will be completed to document that adequate manpower is available. This study will also determine if procedure steps can be prioritized to more efficiently allocate operator manpower. Some independent re-verification of past analyses will be performed in support of this study.

EOI SELF ASSESSMENT

A self assessment of the RBS Fire Protection Program by engineers from other EOI plants will provide insight into the program's strengths and weaknesses. This self assessment will be completed prior to RF-5.

MODIFICATION BACKLOG DISPOSITIONING

As part of the Long Term Performance Improvement Plan, RBS will prioritize outstanding modifications for future action. As modifications are dispositioned they will be reviewed for impact on the fire protection program.

INDIVIDUAL PLANT EVALUATION OF EXTERNAL EVENTS (IPEEE)

In response to Generic Letter 88-20, Supplement 4, RBS will be submitting an IPEEE by June 27, 1994. A major portion of this submittal will address fire protection. This will provide an additional tool to prioritize efforts in improving the fire protection program.

STRENGTHEN STAFFING AND MANAGEMENT

A multi-discipline review group was set up to monitor the SSA revision, as well as other fire protection projects, in June, 1993. A fire protection engineer, senior reactor operator, electrical design engineer, nuclear safety engineer, civil/structural engineer, and maintenance fire protection coordinator were assigned to the group. Several members of the fire protection team are part of the in-line modification review process.

To further improve the fire protection team, a project manager will be designated to coordinate all fire protection activities and an in-house fire protection system engineer will be added to the staff.

# ATTACHMENT 2 - SUPPLEMENT TO 12/6/93 LETTER

## BACKGROUND

A letter from J. J. Fisicaro to the NRC dated December 6, 1993, summarized modifications to equipment and procedure changes identified during revision of the River Bend Station (RBS) post-fire Safe Shutdown Analysis (SSA). During the week of December 13-17, 1993, NRC Inspection No. 50-458/93-30 was conducted by Messrs. M. Murphy, H. Bundy and K. Sullivan of the RBS post-fire SSA. Their review included those modifications and procedure changes.

After reviewing the SSA the Inspectors requested that the December 6, 1993, letter be revised to delete the section entitled "50.59 On Water Curtain." The Inspectors indicated that this section was not necessary since it described an issue which was identified through corrective action other than the SSA revision.

The Inspectors also requested the addition of a section addressing the revised criterion used in the SSA with respect to the potential for erroneous indication due to fire induced changes to fluid in instrument lines. RBS considered this change to the SSA an enhancement and, thus, did not include it in the December 6, 1993 letter.

During a re-evaluation of the issue identified in the December 6, 1993, letter as "Division III Control Circuits," it was discovered that an assumption made during the revision of the SSA was less than conservative. In essence, it was assumed that a loss of control building HVAC due to a fire in fire area C-17 or C-24 could be mitigated using the same operator actions credited during a station blackout (SBO). However, recent work with the control building chillers sensitized engineers to question the adequacy of these operator actions. The engineers discovered that the loss of portions of control building HVAC could cause a loss of all control building HVAC due to a cascading of events.

Messrs. M. Murphy and L. Constable visited RBS on January 10-11, 1994, to discuss the issues identified during the revision of the SSA and conduct a final Exit Meeting for NRC Inspection No. 50-458/93-30. During the Exit Meeting it was requested that the information gained through further evaluation of the "Division III Control Circuits" issue identified above be included in the revision.

Below is the requested information concerning modifications to equipment and procedure changes identified during revision of the RBS SSA. Included is additional information concerning the "Cross-Powered Service Water Valves."

## FIRE HAZARDS ANALYSIS

LER 89-036 identified 19 MOVs listed in Tables 2 and 5 of design specification 240.201 as having power removed during plant operations which had not been de-energized. As part of the corrective action an initial review of the Fire Hazards Analysis (FHA) by engineering was completed in January, 1990, to verify the consistency of the existing design and operational procedures. NRC Inspection Report 90-02 made this an Unresolved

Item (9002-02) since the review was not complete at the time of the Exit Meeting. No other procedural inconsistencies were identified during this review.

A final review of the FHA by an independent contractor was completed in January 1991. During this review, 106 discrepancies were identified. Some of these discrepancies required resolution prior to completing a final verification of the FHA. Of the 106 discrepancies, 23 were identified as potentially affecting Pre-fire Strategies, Appendix R separation, and the USAR. These 23 items were reviewed and corrective actions identified by April 15, 1991. Corrective actions identified for 22 of the 23 items are considered enhancements and involve changes to the FHA, USAR, Pre-fire Strategies, procedures or design documents. The remaining item involved fire areas where potential fire damage could cause loss of reactor core isolation cooling (RCIC). RCIC is used for vessel level control in Method 1 Safe Shutdown Methodology as identified in the FHA. Analysis has shown that alternate equipment, free of fire damage, is available in each of these fire areas to assure safe shutdown capability.

Evaluations for the remaining 83 items were completed prior to January 24, 1992. Corrective actions identified for 79 of these items were categorized as enhancements and involved revisions to the FHA, USAR, Pre-fire Strategies, procedures or design documents. The remaining 4 items are discussed individually below.

APPENDIX R SEPARATION

Three areas were identified where compliance with Appendix R separation criteria, as identified in the FHA and/or USAR, was not provided. Two of the areas, the main control room (MCR) and a fire area in the fuel building, involved equipment required for spent fuel pool cooling only and not equipment required for safe shutdown of the reactor vessel. Procedural changes were made during fuel cycle 4 to implement immediate corrective action. MR 92-0038 is scheduled for installation during fuel cycle 5 as long term corrective action.

The third area is in the reactor containment building. Containment cooling could be lost due to potential fire damage in this fire area since adequate separation is not provided. The need for the unit coolers for shutdown during a fire was re-evaluated and it was determined that the unit coolers were not necessary for safe shutdown during a fire. They have been removed from the Appendix R safe shutdown component list.

NEW FIRE AREA/PRE-FIRE STRATEGIES

One new fire area, not previously evaluated in the FHA, was identified, and 4 fire areas where administrative controls specified in the FHA were omitted from their respective pre-fire strategies were identified. MR 92-0013 was approved on January 27, 1992, to make necessary changes to the FHA and USAR for the new fire area. A new pre-fire strategy was prepared to identify this information to reactor operators and the Fire Brigade. Pre-fire strategies for the four fire areas were revised to include the omitted administrative controls identified in the FHA.

BREAKER/FUSE COORDINATION

No documented short circuit analysis for the protection and coordination of 125 VDC and 120 VAC control circuits had been performed. This analysis was completed and corrective actions were identified by October 30, 1992.

MULTIPLE HIGH IMPEDANCE FAULTS

There was no documentation explaining the method used for analyzing multiple high impedance faults involving associated circuits as identified in Generic Letter 86-10, section 5.3.8. A high impedance fault recovery procedure was finalized and implemented by August 19, 1992.

**SAFE SHUTDOWN ANALYSIS**

During NRC Inspection 93-09 it was discovered that the FHA did not contain information necessary to support certain assumptions that electrical control circuits required to assure a safe shutdown of the facility would not be adversely affected by certain associated circuits.

RBS revised design criterion document 240.201 and restructured it into a complete post-fire safe shutdown analysis (SSA). The SSA was completed on 11/19/93. The associated licensing change notice, procedure changes, and design document changes were implemented by 11/25/93. The work done in developing the SSA was treated as Quality Assurance Category I work with the required independent design verification. Due to the heightened awareness and questioning attitude of the fire protection team during their reviews of the SSA, several concerns were identified. These concerns and their respective corrective actions are described below.

INSTRUMENT TUBING

During the revision of the SSA, instrumentation tubing was evaluated for potential damage during a fire. The analysis identified one area (AB-7) where the potential exists for erroneous indication due to fire induced changes to fluid contained in the instrumentation lines. An erroneous signal due to fluid changes caused by heating may delay automatic initiation of standby service water (SWP). Taps and instrumentation lines for SWP are in AB-7, but the pressure transmitters are in another fire area (AB-2). Evaluation indicates that this design is in compliance with 10CFR50, Appendix R. However, as an enhancement, procedural changes were made to Abnormal Operating Procedure (AOP) 0052, "Fire Outside Main Control Room (In Areas Containing Safety Related Equipment)," to ensure manual initiation of SWP for a fire in fire area AB-7.

To determine the safety significance of the absence of this procedural revision, the two possible scenarios were evaluated:

1.) Fire with Loss of Offsite Power

If a loss of offsite power occurred concurrent with a fire in fire area AB-7, then the operators would verify automatic initiation of standby service water per plant procedural guidance (AOP-0004).

2.) Fire without Loss of Offsite Power

If offsite power was available, normal service water flow was lost, and the loss was undetected by the affected pressure transmitters, then numerous other indications would be available to the operator to indicate that normal service water flow was not adequate. Examples include closed cooling water and residual heat removal high temperature indications or instrument air compressor high temperature which would alert the operators to manually initiate SWP based on the plant symptoms. Therefore, since equipment was available for the operators to identify the loss of normal service water in spite of erroneous indications and to take action in a timely manner to safely shutdown the plant, there was minimal safety significance.

SERVICE WATER VALVES

Four service water system (SWP) valves were identified to be a spurious concern during a fire event. The four valves are normally open and do not automatically close on loss of one division of SWP. Operator action to close the necessary isolation valves is necessary to maintain divisional separation.

Two of the affected valves are on the discharge of the HPCS diesel generator cooling water heat exchanger and provide divisional flow separation to a common standby cooling tower (SCT). The other two affected valves are on the discharge of the HPCS pump room unit cooler and provide divisional flow separation to a common SCT. Inventory loss will not occur due to cross divisional flow, since the final heat sink is a common SCT.

A spurious closure of any one of the above valves may cause flow diversion of the discharge flow through a different divisional flow path than originally designed. However, analysis shows that cross divisional flow will not introduce excessive flow restrictions and adequate cooling will be provided for all credible flow combinations. Therefore, spurious operation would not result in inadequate cooling of the affected equipment. This design was determined to be in compliance with 10CFR50, Appendix R.

The first pair of cross-powered service water valves are associated with the HPCS pump room unit cooler. The only areas where both valve circuits could be affected by a single fire (i.e., a potential second spurious signal is of concern) do not take credit for the HPCS pump room unit cooler. Therefore, a second spurious operation is not a concern.

With respect to the second set of valves, the three fire areas where the routing of cables for both valves is common are discussed below:

ET-1 (B-Tunnel East)

Fire area ET-1 uses method 2 to achieve post-fire safe shutdown. Since method 2 does not require the HPCS diesel generator to be operable, spurious operation of these valves is not a concern for this fire area.

ET-2 (B-Tunnel West)

Fire area ET-2 contains valve 1SWP*MOV506B and cables for the redundant valve, 1SWP*MOV506A. The circuits for valve 1SWP*MOV506B are routed in conduit within fire area ET-2. The circuits for 1SWP*MOV506A are partially routed in a cable tray for this area and are assumed to be affected such that fire initiated spurious closure may occur. However, the redundant valve (1SWP*MOV506B) circuits are routed in a conduit such that no credible failure of the circuits within the conduit will spuriously close this valve. Therefore, no credible source of a second spurious fault exists for valve 1SWP*MOV506B in fire area ET-2.

C-25 (Main Control Room)

Fire area C-25 uses method 1E (remote shutdown panel) to achieve post-fire safe shutdown. Valve 1SWP*MOV506B is controlled from this panel. This valve could spuriously close; however, a transfer switch is used to isolate the valve from the main control room. AOP-0031, "Shutdown From Outside the Main Control Room," requires that the affected system be checked within the first 10 minutes of the event. This guidance has been included in AOP-0031 since plant startup.

Therefore, there was minimal safety significance. With respect to components required for safe shutdown, these are the only examples of crosspowered valves at RBS. As an enhancement operator actions were added to AOP-0052, "Fire Outside Main Control Room (In Areas Containing Safety Related Equipment)," to verify or restore the normal flow paths for SWP when time permits.

ASSOCIATED CIRCUITS, COMMON ENCLOSURE

During the review of the SSA, ten circuits were found which have the potential to damage cables required for safe shutdown method 1E when method 1E is needed for post-fire safe shutdown. These circuits did not have adequate overcurrent protection and share a raceway with a cable required for safe shutdown method 1E. In the event of a main control room (MCR) fire, these ten circuits could be damaged due to overcurrent and may cause damage to safe shutdown cables in a raceway remote from the MCR.

Modification request (MR) 93-0060 was initiated to install properly sized fuses in the circuits associated with these cables. The circuits that form an associated circuit, common enclosure concern are scheduled to be modified before the end of RF-5. In the interim, the affected cables have been treated as having a missing fire barrier per 10CFR50, Appendix R, III.G.2. Thus, the action statement for RBS Technical Specification 3/4.7.7, "Fire Rated Assemblies," was entered and a roving

firewatch was verified for the MCR and areas of the plant containing the affected raceway.

REMOTE SHUTDOWN PANEL

During the revision of the RBS SSA the electrical design member of the fire protection team discovered that the control circuits for 4160 volt and 480 volt circuit breakers may not function properly in the event of a MCR fire. These circuit breakers supply power to loads required for remote shutdown from outside the MCR. For the 4160 volt and 480 volt loads required for safe shutdown, it was found that fuses protecting the control circuits for these loads did not adequately protect the cables in the circuits. In the event of a MCR fire, these circuits could short in the MCR. Due to the length of the cable in these circuits, there would be insufficient short circuit current to blow the fuse before the occurrence of cable damage. The postulated ten minutes to exit the MCR and operate the transfer switches to isolate the MCR from remote shutdown systems is greater than the estimated time in which cable damage would occur. The cable which would be damaged contains conductors which are required for remote shutdown as well as conductors that are isolated by the remote shutdown transfer switch. The following list shows the components affected:

1E22*S004
1E22*S001G1C
1E22*S002
1EJS*LDC1A
1EGS*EG1A
1ENS*SWG2A
1E12*PC002A
1ENS*SWG1A (normal and alternate supply breakers)
1HVC*ACU2A
1SWP*P2A
1SWP*P2C
1HVK*CHL1A
1HVP*FN2A
1HVR*UC1A
1HVR*UC11A
1HVK*CHL1C

The corrective action for this concern was completed with the installation of appropriately sized fuses to ensure that circuits are available for post fire safe shutdown or that they are no longer an associated circuit concern. RBS expedited the completion of the 17 fuse installations, restoring those circuits that serve credited safe shutdown equipment within the time limit of the technical specification LCO. As a follow-up action a thorough review of the remote shutdown system was completed to verify that no other control circuits for 4160 volt and 480 volt circuit breakers could prevent remote shutdown capability in the event of a MCR fire due to inadequately sized fuses.

STANDBY SERVICE WATER COOLING TOWER FANS

Analysis of the control circuits for the Division I standby cooling tower (SCT) fans identified the potential loss of the ability to start the Division I SCT fans (1SWP*FN1A,C,E,G,J,L,Q,S and U) from their local motor control center (MCC) following a MCR fire. The RBS FHA takes credit for starting the SCT fans from the MCC during a MCR fire. In the event of a MCR fire, the control circuits for the SCT fans could short and blow the fuse protecting the circuit. The circuit is not isolated

from the MCR, therefore, after repositioning the local remote selector switch at the MCC, fan starting would not occur due to the short circuit. Replacement of the fuse, as stated in the FHA, would not solve the problem since this does not remove the short from the circuit.

The corrective action for the standby cooling tower fans was to implement MR 93-0056. This MR provided fuses to isolate portions of the affected circuits which enter the MCR from the portions of the circuit required for remote shutdown functions. The additional fuses ensure that the standby cooling tower fans will be available following a fire in the MCR.

During a validation of the SSA, it was discovered that in the event of a MCR fire the local/remote transfer switches for the SCT fans could short to ground and cause the fuses in these circuits to blow thus rendering the fans inoperable. If the transfer switches are placed in the LOCAL position and the fuse is replaced, the fans can be operated locally. The SCT fans are required to achieve and maintain cold shutdown. Evaluation indicates that sufficient time is available to complete fuse replacement under worst case conditions. Therefore, there was minimal safety significance.

As an enhancement a design modification was completed to add appropriate fuse protection. This modification will be installed during a system outage. In the interim, AOP-0031, "Shutdown From Outside the Main Control Room," was revised to include specific steps to install fuses to enable the SCT transfer function. Materials were staged at appropriate locations to implement this repair if necessary.

REACTOR HIGH WATER LEVEL TRIP

While verifying revisions to procedure AOP-0031, "Shutdown from Outside the Main Control Room," resulting from the revised SSA, an operator assisting with the SSA revision discovered that a fire in panel 1H13-P612 or 1H13*P680 in the main control room could disable the continuity of 125 volt DC circuity to the "Reactor High Water Level" (Level 8) trip circuitry or the breaker control circuitry for the reactor feedwater pumps. This could cause a loss of automatic shut-off of feedwater supply into the reactor pressure vessel (RPV). This potential loss of 125 volt DC circuit continuity would occur if the fire created circuit faults such as open circuits or hot shorts which resulted in a loss of the ability to provide power to trip coils or which blew control circuit fuses. The only instance in which the proposed scenario could occur is if the fire disabled the continuity of the 125 volt DC cables in a continuously monitored and manned panel (P680) in the main control room without initiating the Halon suppression system protecting the wireways containing the affected cables.

Immediately after this condition was identified, a MCR Fire Response Brief was written to inform oncoming shifts of the identified concern and established new interim measures in the event of a MCR fire (i.e., a dedicated operator will be immediately dispatched to the normal power supply switchgear (NPS-SWG) located in normal switchgear building regardless of fire severity). The MCR Fire Response Brief provides heightened operator awareness of the condition described above.

Also, a Standing Order was written to provide operators with instructions for responding during a MCR fire at panel 1H13*P680. The Standing Order coupled with heightened operator awareness provides adequate assurance that this is not a condition adverse to quality and that the plant can be safely shutdown in the event of a MCR fire. Alternatives for long term corrective action are currently being evaluated.

DIVISION III CONTROL CIRCUITS

The original FHA acknowledged and justified the separation between the Division I and Division II transformers in fire area C-24 (RBS USAR 9A.2.5.1). Two shutdown methods were credited for fire area C-24 depending upon the location of a fire within the area. Method 1 was credited for a fire in one side of the fire area while method 2 was credited for a fire in the other side of the fire area.

The original FHA credited either shutdown method 1 or method 2 depending upon the location of the fire within fire area C-17. A fire in fire area C-17 could cause a loss of control building HVAC and possibly result in the loss of main control room (MCR) habitability. If MCR habitability was lost, the operators were directed to shutdown from the remote shutdown panels.

As a revision to the FHA (now the Safe Shutdown Analysis), the credited shutdown method for fire area C-24 was changed to a single shutdown method for the entire fire area. Similarly, the shutdown method for fire area C-17 was changed to a single shutdown method for the entire fire area. The changes made in the credited methods of shutdown for fire areas C-17 and C-24 were considered enhancements to the SSA. The previous methods of shutdown for these areas were based on justifications in the FHA.

In the process of changing the credited method in fire area C-24, it was discovered that Division III cables exist in the area which had been incorrectly labeled as "spared" in the Electrical Cable Scheduling and Information System. These cables provide control power to 4.16 kV circuit breakers associated with Division III incoming line breaker 1E22*ACB04, Division III diesel generator output breaker 1E22*ACB01, and Division III 480 volt supply transformer breaker 1E22*ACB03. Since these cables are physically located in the portion of C-24 which had previously credited shutdown method 1, they should have been protected with a fire barrier. The SSA was revised to change the shutdown method for fire area C-24 to method 2. Since the referenced cables are only credited for method 1, no further corrective action was necessary.

Recent work on the control building chillers sensitized engineers to question previous assumptions used in the FHA. A review of the 10CFR50.59 evaluation for fire areas C-17 and C-24 indicated it did not adequately address all aspects of regulatory guidance for fire protection. The evaluation for fire area C-24 did not include a discussion of the lack of area wide suppression and partial area detection. The evaluation for fire area C-17 did not include a discussion of the lack of area wide suppression. Further evaluation by the engineers led to the discovery that a

single exposure fire in either fire area C-17 or C-24 could cause a loss of all control building HVAC.

Upon discovery of this condition an hourly fire watch was verified to be in place for fire areas C-17 and C-24. Also, procedure changes to Abnormal Operating Procedure (AOP) 0052, "Fire Outside Main Control Room (In Areas Containing Safety Related Equipment)," have been made to identify operator actions to open doors into the affected areas to provide cooling. This will ensure that the best effort is identified for action until the final corrective action is determined. Alternatives for long term corrective action are currently being evaluated.

Upon discovering that the SSA contained an assumption which was not properly substantiated, efforts were initiated to review assumptions made in the SSA. This effort will be completed by the end of February, 1994.

This issue resulted in the potential for credited safe shutdown components to be unavailable following a fire in fire area C-17 or C-24. The fixed combustibles in fire area C-17 are relatively low with a 35 minute fire loading while the fixed combustibles in fire area C-24 have a 25 minute fire loading. Based on NUMARC guidance these fire loading values are conservative in that they include heat load values for Thermo-Lag in the fire areas. Realistically, the Thermo-Lag would not be expected to contribute to the heat load based on the actual configurations in these areas. The realistic fire loading of the remaining combustibles would represent a 23 minute fire load for fire area C-17 and a 13 minute fire load for fire area C-24. This low fire load, in combination with fixed automatic fire detection, ensures that a fire would not affect redundant safe shutdown components.

A review of the circuits in both fire areas shows that a fire would not directly result in a loss of offsite power to Division I or Division II safety-related circuits. This would greatly increase the availability of equipment necessary for safe shutdown of the plant in the event of a fire in either area.

Four of the issues discussed above involve a MCR fire. Several aspects of MCR design minimize the potential effects of a fire. A main control room fire "zone" (PGCC zone) consists of termination cabinets, panels, and floor space beneath these items for each row of cabinets. For a fire to spread from one PGCC zone to another, it must either propagate from one row of unconnected cabinets to another or propagate beneath the floor. Propagation from cabinets in one PGCC zone to cabinets in another PGCC zone is not expected for a realistic fire due to the separation of the cabinets and the tendency for cabinet fires to remain within the cabinet. Propagation beneath the floor would require failure of at least one and most likely two Halon suppression systems. This is unexpected since the reliability of Halon suppression is relatively high. Also, failure of the Halon system to automatically initiate can be mitigated by operator action (i.e., Halon actuation push buttons are located on the cabinets in each PGCC zone).

The MCR is continuously manned by operators trained in the use of portable fire extinguishers. Also, one hour roving fire watches have been in effect for all normally accessible safety related areas of the plant, including the MCR, since 1991. Widespread use of firewatches combined with fixed fire detection systems ensure that incipient fires

will not develop without being detected and extinguished. Firewatch personnel are trained to inspect for protection of combustibles, introduction of new combustibles, housekeeping requirements, and evidence of fire.