



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30323

Report No.: 50-395/85-26

Licensee: South Carolina Electric and Gas Company
Columbia, SC 29218

Docket No.: 50-395

License No.: NPF-12

Facility Name: Summer

Inspection Conducted: June 3 - 7, 1985

Inspectors: Gerald R. Wiseman for
W. H. Miller, Team Leader

8/13/85
Date Signed

A. B. Ruff for
M. D. Hunt

8-13-85
Date Signed

P. M. Madden

8-13-85
Date Signed

T. E. Conlon for
P. A. Taylor

8-13-85
Date Signed

Accompanying Personnel: R. Anand, NRC/NRR-ASB

Approved by: T. E. Conlon
T. E. Conlon, Chief
Plant Systems Section
Division of Reactor Safety

8-13-85
Date Signed

SUMMARY

Scope: This special, announced inspection entailed 144 inspector-hours on site in the areas of the licensee's actions regarding the implementation of the fire protection and plant safe shutdown requirements of 10 CFR 50, Appendix R, Sections III.G, III.J, III.L and III.O.

Results: Four apparent violations and one deviation were identified in the areas of fire protection and the licensee's compliance with 10 CFR 50 Appendix R Sections III.G, III.J, III.L and III.O: Failure to Meet the Requirements of Appendix R, Section III.G, with Regard to Maintaining One Train of Hot Standby Systems Free From Fire Damage - paragraph 5.a.(1); Failure to Meet the Requirements of Appendix R, Section III.G, with Regard to Providing Separation for Nuclear Instrumentation Required to Support Safe Shutdown Fire Areas - paragraph 5.a(1); Inadequate Fire Barrier Between Fire Areas IB-20 and IB-25.6 - paragraph 8.a; Nonfunctional Fire Barrier for Raceway VUL 34B in Fire Zone IB-23.2 - paragraph 8.b; and Failure to Conduct Fire Watch Patrol for Fire Area IB-25 - paragraph 8.c.

REPORT DETAILS

1. Licensee Employees Contacted

- *O. W. Dixon, Vice President, Nuclear Operations
- *O. S. Bradham, Director, Nuclear Plant Operations
- *D. A. Nauman, Director, Nuclear Services
- *J. G. Connelly, Deputy Director, Operations and Maintenance
- *K. Woodward, Manager, Operations
- *M. B. Whitaker, Group Manager Regulatory and Support Services
- *A. R. Koon, Associate Manager Regulatory Compliance
- *J. Barker, Project Manager, Fire Protection
- *H. I. Donnelly, Senior Licensing Engineer
- *L. W. Lunden, Nuclear Engineer
- *T. Wessner, Plant Operations
- *H. O'Quinn, Plant Operations
- *C. Fields, Plant Operations Technical Advisor
- *W. L. Safley, Plant Fire Protection Coordinators

Other Organizations

- *D. K. Kelly, Electrical Engineer, Gilbert
- *J. Seibert, Electrical Engineer, Gilbert
- *R. D. Angus, Fire Protection Engineer, Gilbert
- *T. J. Keckeisen, Fire Protection Engineer, Inter Science Incorporated
- Rick Christensen, Nuclear Systems Engineer, Inter Science Incorporated

NRC Resident Inspectors

- *C. Hehl
- P. Hopkins

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on June 7, 1985, with those persons indicated in paragraph 1 above. The inspector described the areas inspected and discussed in detail the inspection findings listed below. No dissenting comments were received from the licensee.

- a. Unresolved Item (395/85-26-01), Review Resolution of Summer's Appendix R Reanalysis Issues Regarding Revised Shutdown Schemes, Associated Circuits and Demonstrating Compliance with Appendix R, Sections III.G and III.L by NRR - paragraphs 5.a.(1) and 5.a(2)(b).
- b. Unresolved Item (395/85-26-02), Review Resolution of Fire Induced Spurious Signal and Safe Shutdown System Modification by NRR - paragraph 5.a.(1).

- c. Violation Item (395/85-26-03), Failure to Meet the Requirements of Appendix R, Section III.G, With Regard to Maintaining One Train of Hot Standby Systems Free From Fire Damage - paragraph 5.a.(1).
- d. Violation Item (395/85-26-04), Failure To Meet the Requirements of Appendix R, Section III.G, With Regard to Providing Separation for Nuclear Instrumentation Required to Support Safe Shutdown - paragraph 5.a.(1).
- e. Inspector Followup Item (395/85-26-05), Verify Breaker Coordination Between XBCIA and DPNIHA and XMCIDB2X and APNIFB-EM - paragraph 5.a.(2)(a).
- f. Inspector Followup Item (395/85-26-06), Review the Affects of Spurious Valve Operation for Centrifugal Charging Pump - paragraph 5.a.(2)(b).
- g. Unresolved Item (395/85-26-07), Review Resolution of the Licensee's Associated Circuit Methodology with Regard to the Sample Size and Circuits Analyzed for Over Current Protection by NRR - paragraph 5.a.(2)(c).
- h. Unresolved Item (395/85-26-08), Correct Inadequacies Identified in Procedure FEP 1.0 Based on Review and Approval of the Licensee's Appendix R Reanalysis by NRR - paragraph 5.a.(3)(a).
- i. Unresolved Item (395/85-26-09), Provide Limiting Times/Assumptions to Arrive at Operator Action Time Lines to NRR for Review - paragraph 5.a.(3)(b).
- j. Unresolved Item (395/85-26-10), Identify/Issue Procedures to Accomplish Appendix R Section III.L Requirements and Performance Goals Which are Based on the Appendix R Reanalysis Approved by NRR - paragraph 5.a.(3)(c).
- k. Inspector Followup Item (395/85-26-11), Provide Training for All FEP Procedures to Support Appendix R - paragraph 5.a.(3)(d).
- l. Unresolved Item (395/85-26-12), Inadequate Number of 8-Hour Battery Powered Emergency Lighting Units Provided for Areas Need for Operation of Safe Shutdown Equipment - paragraph 7.
- m. Violation Item (395/85-26-13), Inadequate Fire Barrier Between Fire Areas IB-20 and IB-25.6 - paragraph 8.a.
- n. Violation Item (395/85-26-14), Non-Functional Fire Barrier for Raceway VUL 34B in Fire Zone IB-23.2 - paragraph 8.b.
- o. Inspector Followup Item (395/85-26-15), Review Licensee's Analysis for Unprotected Cable Tray Supports - paragraph 8.b.

- p. Unresolved Item (395/85-26-16), Verification That the "M" Board Fire Barrier was Reviewed and A Deviation was Granted for This Plant Condition by NRR - paragraph 8.b.
- q. Deviation Item (395/85-26-17), Failure To Conduct Fire Watch Patrol for Fire Area IB-25 - paragraph 8.c.

The licensee did not identify as proprietary any of the materials provided to or reviewed by the inspectors during this inspection.

3. Licensee Action on Previous Enforcement Matters

This subject was not addressed in the inspection.

4. Unresolved Items

Unresolved items are matters about which more information is required to determine whether they are acceptable or may involve violations or deviations. Eight new unresolved items identified during this inspection are discussed in paragraphs 5.a.(1), 5.a.(2)(a), 5.a.(3)(a), 5.a.(3)(b), 5.a.(3)(c), 7 and 8.b.

5. Compliance With 10 CFR 50, Appendix R, Section III.G And III.L

Operating License Section 2.c.(18)a issued on November 12, 1982, states that SCE&G shall maintain in effect, and fully implement, all provisions of the approved fire protection plan, as amended through Amendment No. 33 to the Final Safety Analysis Report (FSAR). In addition, this license section also requires SCE&G to maintain the fire protection program set forth in Appendix R to 10 CFR 50.

By letter dated April 20, 1981, SCE&G committed to the NRC to comply with the requirements of 10 CFR 50 Appendix R Sections III.G, III.J, and III.O. Subsequently, on June 1, 1981, SCE&G requested deviations with regard to the literal technical requirements of 10 CFR 50 Appendix R for the following:

- Component Cooling Water Pumps B&C do not meet Appendix R separation requirements
- HVAC equipment water chiller pumps do not meet Appendix R separation requirements
- Partial automatic suppression provided in the auxiliary building and intermediate building
- Fire detection capabilities are not provided throughout the auxiliary building and intermediate building

On the basis of the licensee's fire hazard analysis, their commitment to meet 10 CFR 50 Appendix R Section III.G, III.J and III.O and the above deviations, the NRC issued Safety Evaluation Report (SER) Supplement Nos. 3 and 4 on January and August 1982, respectively.

SER Supplement No. 3 indicated that the licensee's safe shutdown analysis identified the systems necessary to achieve and maintain hot and cold shutdown conditions. In addition, the SER stipulated that one of the redundant trains required for safe shutdown would be maintained free from fire damage by providing separation, fire barriers, repair procedures (for equipment required for cold shutdown only) and/or alternative shutdown capabilities. Also, SER Supplement No. 3 indicated that the licensee's safe shutdown analysis identified those components, cabling and support equipment required for safe shutdown and performed a cable separation analysis for all rooms of the plant housing safe shutdown equipment. The licensee by letter dated June 1, 1981, committed to provide a 1½ hour fire rated barrier for one safe shutdown train where redundant shutdown circuits or equipment are not separated by 20 feet with a very low intervening fire load or no intervening combustibles. SER Supplement No. 3 concluded that the licensee's separation analysis was an acceptable means of demonstrating that separation exists between redundant safe shutdown system trains.

SER Supplement No. 4 granted the licensee's request to deviate from the technical requirement of 10 CFR 50 Appendix R with regard to the component cooling water pumps, HVAC water chiller pumps and partial automatic suppression and fire detection capabilities in the auxiliary and intermediate buildings. Therefore, SER Supplement No. 3 and 4 concluded that the fire protection program, with the accepted deviations, meets the technical requirements of Appendix R to 10 CFR 50.

On the basis of the additional guidance and information obtained at the May 4, 1984, NRC Region II Appendix R Fire Protection Workshop SCE&G initiated an Appendix R Reanalysis. The licensee contends that the associated circuit review guidance pertaining to spurious signals provided in Generic Letter 81-12 and its clarification letter was not considered in their original Appendix R safe shutdown evaluation. The licensee stated that this guidance was not provided to them during plant licensing and in order to ensure compliance a complete reevaluation of their shutdown scheme was required. Generic Letters 81-12, 83-33 and Draft 85-01 and other applicable interpretive documents were used as guidance for their reanalysis effort.

Therefore, an inspection of the licensee's reanalysis and revised shutdown scheme was conducted to determine if fire protection features provided for structures, systems, and components important to safe shutdown at the Summer facility were in compliance with 10 CFR 50, Appendix R, Sections III.G and III.L. The scope of this inspection determined if the fire protection features provided for reactor coolant system inventory control, steam

generator inventory control, and reactor coolant system pressure control were capable of limiting fire damage so that one train of these systems essential to achieving and maintaining hot standby from either the control room or emergency control stations are free from fire damage.

a. Safe Shutdown Capabilities

In order to ensure safe shutdown capabilities, where redundant trains of systems necessary to achieve and maintain hot standby conditions are located outside the primary containment, 10 CFR 50 Appendix R requires that one train of hot standby systems be maintained free of fire damage by providing fire protection features which meet the requirements of either Sections III.G.2.a, III.G.2.b, or III.G.2.c.

On the basis of the above Appendix R criteria, the inspectors made an inspection of cabling and components associated with the chemical volume control system, emergency feedwater system, service water system, chilled water system, instrumentation associated with reactor inventory and steam generator inventory control and onsite power distribution to determine the adequacy of the fire protection features and the separation afforded for these essential systems.

(1) Separation/Fire Protection of Redundant Cabling to Safe Shutdown Equipment

Based on the licensee's Appendix R Reevaluation, SCE&G has changed their shutdown scheme with respect to fire conditions occurring in plant areas outside of the control room, relay room and cable spreading room. The licensee's preliminary results indicate that a fire in certain plant areas outside the control room complex could potentially cause damage to both trains of safe shutdown systems. Thus, it appears control of the safe shutdown function from the control room could be rendered inoperable. The licensee indicated that local operator actions outside the control room would be required in order to regain control of one train of the fire damaged safe shutdown (hot standby) function.

The following table, identifies the fire areas outside the control room complex which, when affected by a fire may require local operator actions in order to regain a safe shutdown function or system and notes the safe shutdown train which will be controlled:

<u>Building</u>	<u>Fire Area</u>	<u>Designated Shutdown Train</u>	<u>Level of Actions Required To Regain Control</u>
Auxiliary	AB-1	A or B*	Minor Local Control
Control	CB-5	B	Minor Local Control

Control	CB-10	B	Minor Local Control
Control	CB-12	A	Minor Local Control
Control	CB-18	B	Minor Local Control
Control	CB-20	A	Minor Local Control
Intermediate	IB-25	A or B*	Moderate Local Control
Control	CB-1	A	Minor Local Control
Control	CB-2	A	Minor Local Control
Turbine	TB-1	A or B	Very Minor Local Control

*Shutdown train utilized depends on the location of the fire in the fire area, B train preferred.

By letter dated May 29, 1985, the licensee identified the following B-Train equipment which is necessary for safe shutdown and is subject to maloperation due to fire induced hot shorts.

<u>Equipment Tag #</u>	<u>Description</u>
XPP-43B-CSS	Charging Pump "B"
XPP-45B-SW	S. W. Booster Pump "B"
XPP-1B-CC	Component Cooling Pump "B"
XPP-48B-VU	Chilled Water Pump "B"
MFN-97B-AH and MFN-97D-AH	Reactor Building Train B Cooling Fans
XSW-1DB-ES, U4	Switchgear, XSW-1EB Feeder
XSW-1DB-ES, U7	Switchgear, XSW-1DB1 and XSW-1DB2 Feeder
XSW-1EB-ES, U3	Switchgear, XSW-1EB1 Feeder
XSW-1DB1-ES	480V Main Breaker
XSW-1DB2-ES	480V Main Breaker
XSW-1EB1-ES	480V Main Breaker
XFN-45A-AH	Diesel Generator "B" Cooling Fans
XFN-45B-AH	Diesel Generator "B" Cooling Fans
XPP-39B-SW	S.W. Pump "B"
XEG-1B-DG	Diesel Generator "B"
XHX-1B-VU	Chiller Unit "B"

At the time of this inspection, the licensee had not identified the control cable routing for these B-Train components. Therefore, they could not verify if these B-Train safe shutdown functions were separated from the A-Train. The licensee contends that their revised fire/shutdown scheme takes credit for local manual control of this equipment. However, in order to implement

local manual operator actions, the licensee proposes to either modify this equipment by adding control transfer switches and local controls or develop jumper procedures. The licensee proposes to complete the plant modifications and develop the appropriate jumper procedures by the end of the 3rd refueling outage. The inspectors informed the licensee that repairs (i.e., termination of leads, fuse pulling utilization of jumpers) to achieve and maintain hot standby conditions have been found to be unacceptable. The inspectors indicated that, in order to comply with 10 CFR 50 Appendix R Section III.G, one train of systems necessary to achieve and maintain hot standby conditions from either the control room or emergency control stations must be maintained free from fire damage. The licensee contends that repair procedures are functionally equivalent to the requirements of 10 CFR 50 Appendix R, Section III.G.

With regard to the licensee's Appendix R reanalysis program the inspectors identified the following concerns:

- The Appendix R reanalysis does not specifically demonstrate that the alternative shutdown capability provided for the control room, cable spreading room and relay room can achieve and maintain cold shutdown conditions within 72 hours.
- The Appendix R reanalysis does not identify all the equipment, components and cabling required to achieve and maintain hot standby and cold shutdown conditions.
- The Appendix R Associated Circuit Reanalysis does not appear to follow the guidance provided in generic letter 81-12 and its April 7, 1982, clarification letter with respect to fuse/breaker coordination, common enclosures, and spurious signals.
- The Appendix R reanalysis does not identify the analysis assumptions associated with the local control of safe shutdown systems for fires which affect plant areas outside the control room complex nor did the reanalysis justify the timeliness associated with these local controls
- The Appendix R reanalysis relies on fuse removal to isolate spurious signal to equipment and/or components which can cause the maloperation of systems necessary to achieve and maintain hot standby.

Upon completion of the Appendix R reanalysis, the licensee committed to revise Summer's fire protection evaluation report and submit a draft revision during the second quarter of 1986 to the NRC staff for review. The licensee indicated that their submittal will address the above inspection concerns, describe the safe shutdown system modifications required as a result of the

reanalysis, and explain the various shutdown schemes for fires outside the control room which utilize local manual operator actions to regain control of shutdown functions independent of the control room. This is identified as Unresolved Item (395/85-26-01), Review resolution of Summer's Appendix R reanalysis issues regarding revised shutdown schemes, associated circuits and demonstrating compliance with Appendix R Sections III.G and III.L by NRR.

An inspection was made to determine if the cables or equipment including associated nonsafety circuits that could prevent operation or cause maloperation due to hot shorts, open circuits, or shorts to ground, of redundant trains of systems necessary to achieve and maintain hot shutdown conditions were provided with adequate separation and/or fire protection features in accordance with Appendix R Section III.G.2.

(a) Auxiliary Spray Valve Cabling

Control cabling associated with auxiliary spray valve (XVT-8145-CS) are routed through the following fire areas:

- Auxiliary Building Fire Area AB-1
- Control Building Fire Areas CB-6, CB-10, CB-15, and CB-17
- Intermediate Building Fire Area IB-25
- Reactor Building Fire Area RB-1

Therefore, a fire occurring in any of the above listed fire areas could cause spurious operation of the auxiliary spray valve due to a hot short to the solenoid control cable. Inadvertent opening of this valve with a charging pump in operation could result in primary plant de-pressurization. By letter dated May 29, 1985, the licensee identified this condition to the NRC.

In order to preclude the potential spurious operation of the auxiliary spray valve from an external hot short, the licensee proposes to replace the control cables from the control room to the valve with cabling which includes a grounded shield. In addition, the licensee proposes to provide a second control power disconnect independent from the control room disconnect in order to prevent spurious auxiliary spray valve operation in the event of a control room fire. This modification has been scheduled to be completed by the end of the third refueling outage (second quarter of 1987).

(b) Steam Generator Power Operated Relief Valve Cabling

Control cabling associated with the steam generator power operated relief valves (IPV-2000-MS, IPV-2010-MS, and IPV-2020-MS) are routed through the following fire areas:

- Auxiliary Building Fire Area AB-1
- Control Building Fire Areas CB-1, CB-2, CB-4, CB-5, CB-6, CB-10, CB-12, CB-17, CB-18,
- Intermediate Building Fire Areas IB-20, IB-22 and IB-25

Therefore, a fire occurring in any of the fire areas listed above, could cause spurious operation of steam generator power operated relief valves due to a hot short to the control cables associated with either of the two control solenoids for each valve. Inadvertent opening of these valves could cause excessive cooldown and reactor coolant system shrinkage. By letter dated May 29, 1985, the licensee identified this condition to the NRC.

In order to preclude the potential spurious operation of the steam generator power operated relief valves from an external hot short, the licensee proposes to replace the control cables with cabling from the control room to the valves which includes a grounded shield. In addition, the licensee proposes to provide a second control power disconnect independent from the control room disconnect in order to prevent spurious steam generator power operated relief valve operation in the event of a control room fire. This modification is scheduled to be completed by the end of the third refueling outage (second quarter of 1987).

(c) Excess Letdown Isolation Valve Cabling

Control cabling associated with the excess letdown isolation valves (XVT-8153-CS and XVT-8154-CS) are routed through the following fire areas:

- Control Building Fire Areas CB-1, CB-6, CB-12, CB-15 and CB-17
- Intermediate Building Fire Area IB-25
- Reactor Building Fire Area RB-1

Therefore, a fire occurring in any of the above listed fire areas could cause spurious operation of both excess letdown isolation valves. Inadvertent opening of these valves could cause a loss of reactor coolant system inventory. By letter dated May 29, 1985, this condition was identified by the licensee to the NRC.

In order to preclude the potential spurious operation of both excess letdown isolation valves, the licensee proposes to identify the control power disconnects in the control room and install a second set of control power disconnects in the cable spreading room. The licensee contends that this will ensure closure of these valves and two independent hot shorts would have to occur in order to open these valves. This modification is scheduled to be completed by the end of the third refueling outage (second quarter of 1987).

(d) Main Steam Isolation and Bypass Valve Cabling

Control cabling associated with the main steam isolation and bypass valves (XVM-2801A, B, C and XVT-2869A, B, C-MS) are routed through the following fire areas:

- Control Building Fire Areas
CB-1, CB-2, CB-4, CB-6, CB-10, CB 12, CB-15,
CB-17 and CB-18
- Intermediate Building Fire Areas
IB-20, IB-22, and IB-25

Therefore, a fire occurring in any of the above listed fire areas could cause spurious operation of the main steam isolation and bypass valves. Inadvertent opening of these valves due to external hot shorts could cause a loss of secondary side inventory. By letter dated May 29, 1985, this condition was identified by the licensee to the NRC.

In order to preclude the potential spurious operation of the main steam isolation and bypass valves the licensee proposes to identify the control power disconnects in the control room and install a second set of disconnects in a separate fire area. The licensee contends that this will ensure closure of these valves and two independent hot shorts would have to occur in order to open these valves. This modification is scheduled to be completed by the end of the third refueling outage (second quarter of 1987).

(e) Pressurizer Power Operated Relief Valve Cabling

Control cabling associated with the pressurizer power operated relief valves (IPV-444B, IPV-445A, and IPV-445B) are routed through the following fire areas:

- Auxiliary Building Fire Area AB-1
- Control Building Fire Areas
CB-10, CB-15 and CB-18
- Intermediate Building Fire Areas
IB-14, IB-20, IB-21, IB-22 and IB-25
- Reactor Building Fire Area RB-1

Therefore, a fire occurring in any of the fire areas listed above could cause spurious operation of a pressurizer power operated relief valve. Inadvertent opening of a pressurizer power operated relief valve due to an external hot shorts could cause a loss of reactor coolant inventory. By letter dated May 29, 1985, the licensee identified this condition to the NRC.

Thus, in order to preclude the potential spurious operation of a pressurizer power operated relief valve the licensee proposes to replace the control cabling from the control room to the valves with cable which includes a grounded shield. In addition, the licensee proposes to install a second set of control power disconnects independent from the control room disconnects in order to prevent spurious pressurizer power operated relief valve operation in the event of a control room fire. This modification is scheduled to be completed by the end of the third refueling outage (second quarter of 1987).

(f) Diesel Generator Control Transfer Switch

Cables (DGM 29B, DGM 21B, and DGM 22B) associated with the train "B" diesel generator control transfer switch are routed through the cable spreading room, CB-15. Therefore, a fire in the cable spreading room could result in external hot shorts which could render the Train B diesel generator inoperable in addition to damaging cabling associated with the Train "A" diesel generator. Thus, the ability to achieve and maintain hot standby conditions from the control room evacuation panel (CREP) utilizing onsite power capabilities may be jeopardized.

The licensee proposes to relocate cables DGM 21B and 22B outside the fire area of concern and cable DGM 29B will be isolated by modifying the circuit and utilizing additional contacts associated with the existing control transfer switch. This modification is scheduled to be completed by the end of the second refueling outage (fourth quarter of 1985).

(g) Current Transformer Circuits

A fire in either the control room or cable spreading room could damage both trains of switchgear required for safe shutdown by damaging the current transformer circuits. The fire could possibly cause the current transformer circuit to open, resulting in a secondary fire at the current transformer in the respective switchgear. By letter dated May 29, 1985, the licensee identified this condition to the NRC.

Thus, in order to preclude the potential secondary fire in the switchgear the licensee proposes to install surge suppressors in the circuit parallel with the current transformer. This will prevent the over voltage surge which could occur in the event of an open current transformer circuit. This modification is scheduled to be completed by the end of the second refueling outage (fourth quarter of 1985).

(h) Reactor Coolant Temperature Instrumentation Cabling

The licensee indicated that for fires which could potentially disable Train "B" power it is intended to shutdown from the control room using RCS Loop "B" and steam generator "B". A fire in the following fire areas could cause a loss of Train "B" power:

- Control Building Fire Areas
CB-1, CB-2, CB-12, and CB-20
- Diesel Generator Building Fire Area DG-2
- Intermediate Building Fire Areas IB-4, IB-6, IB-9 and IB-20

The loss of Train "B" power presently results in a loss of RCS instrumentation (ITE-420-RC and ITE-420A-RC) for loop "B" Tcold. By letter dated May 29, 1985, the licensee identified this condition to the NRC.

Thus, in order to preclude the loss of Tcold instrumentation on RCS Loop "B" the licensee proposes to provide Train "A" power in lieu of Train "B" power to this instrumentation. This modification is scheduled to be completed by the end of the third refueling outage (second quarter in 1987).

(i) Emergency Feedwater System Cabling

In the Intermediate Building, on elevation 412'-0", Fire Area IB-25.1, over the motor driven emergency feedwater pumps on the mezzanine level, power cables for the "A" and "B" train motor driven emergency feedwater pumps interact with control cabling associated with turbine driven emergency feedwater pump discharge valves (IFV-3556-EF and IFV-3546-EF) to steam generators B and C.

Since, these cables are not provided with 20 feet of spacial separation without intervening combustibles, a postulated fire in this area could potentially cause fire damage to both redundant trains of emergency feedwater. Thus, if an exposure fire were to occur in this area, there is a potential that both trains of motor driven emergency feedwater pumps and discharge from the turbine driven emergency feedwater pump could be rendered inoperable. The licensee's proposed

shutdown scheme for a fire in this area is to fail the valves open by pulling the control fuses in the main control board, regaining local manual control of the turbine speed control valve and controlling the flow to the steam generators from inside the turbine driven pump room.

The licensee proposes to enclose Train "A" Cable Tray 3088 in a 1-hour Fire Barrier throughout fire area IB-725. This modification is scheduled to be completed by the end of the first quarter of 1986.

(j) Source Range Nuclear Instrumentation Cabling

A fire in the north cable chase of the control building on elevation 436'-0" could cause all three of the available source range nuclear instruments to be damaged. On May 29, 1985, by letter, the licensee identified this condition to the NRC.

In order to preclude the loss of all three source range instruments due to a fire in fire area CB-1 the licensee proposes to either enclose one train of source range cabling in an 1-hour fire barrier or install a power source selector switch for one train of source range instrumentation. This modification is scheduled to be completed by the end of the first quarter in 1986.

(k) Power Cable Tray Separation

A fire in the southwest corner of elevation 412'-0" of the intermediate building, fire area IB-25, near column line 7.5/G.4, redundant cabling required for systems necessary to achieve and maintain hot standby conditions could be damaged. Tray 3088 contains Train "A" DC control power to all essential safe shutdown systems interacts with Tray 4149 which contains Train "B" control power for the chilled water system and the component cooling water system. In addition, conduit VUC-2B which contains Train "B" control power cabling for the chilled water system and trays 1025, 2058 and 3128 which contain Train "B" power to the chilled water system and component cooling water system also interact with cable tray 3088. Since, the chilled water system provides bearing cooling capabilities to the charging pumps, a fire in this area affecting the chilled water system could possibly render both charging pumps inoperable. By letter dated May 29, 1985, the licensee identified this condition to the NRC. The inspector indicated that operator access into the turbine driven pump room in order to implement local manual operator actions may be difficult since, the access door to this area is adjacent to the plant area experiencing the fire.

Based on our review of the associated circuit issue, it was established that the licensee did not receive Generic Letter 81-12, associated circuit guidance during the licensing phase. Thus, it appears that the original associated circuit analysis was inadequate with regard to meeting the requirements of 10 CFR 50 Appendix R, Sections III.G and III.L. Therefore, the safe shutdown capability concerns identified in 5.a.(1)(a) through 5.a.(1)(i) could have prevented the operation or caused the mal-operation of safe shutdown functions due to fire induced hot shorts, open circuits, or shorts to ground. This item is identified as Unresolved Item (395/85-26-02), Review Resolution of Fire Induced Spurious Signal and Safe Shutdown System Modifications By NRR.

In addition, at the time of the inspection it appears that if a fire were to occur of the plant area identified in 5.a.(1)(k), redundant hot standby systems could be rendered inoperable; thus, the plant's ability to achieve and maintain hot standby could not be assured. This is identified as Violation Item (395/85-26-03), Failure To Meet the Requirements of Appendix R, Section III.G, With Regard to Maintaining One Train of Hot Standby Systems Free From Fire Damage.

In order to achieve and maintain safe shutdown conditions, process monitoring functions necessary to provide direct readings of the process variables are required. It appears that if a fire were to occur in the area identified in 5.a.(1)(j) redundant direct reading nuclear instrumentation functions could be rendered inoperable; thus, certain process variable could not be monitored. This is identified as Violation Item (395/85-26-04), Failure to Meet the Requirements of Appendix R, Section III.G with Regard to Providing Separation for Nuclear Instrumentation Required to Support Safe Shutdown.

(2) Protection of Associated Circuits

The inspection was conducted to verify compliance with associated circuit provisions of 10 CFR 50 Appendix R, Sections III.G and III.L. The emphasis was on the following area of concern:

- Common Bus Concern
- Spurious Signal Concern
- Common Enclosure Concern

(a) Common Bus Concern

The common bus concern is found in circuits, either safety or nonsafety-related, where there is a common power source with shutdown equipment and the power source is not electrically protected from the circuit of concern. The licensee selected the worst case load breaker for each unit substation, motor

control center (MCC) and distribution panel. Time-current characteristic curves were then plotted to demonstrate the coordination for each grouping of electrical equipment associated with a common bus based on the worst case condition.

The following time-current characteristic curves were reviewed:

- 1) 7200V Board (Bvd) XSW1DA to 480V Bvd XSW1DA1 to service water pump XPP-45-A-SW motor
- 2) 7200V Bvd XSW1DA to 480V Bvd XSW1DA2 to 480V Motor control Center (MCC) XMC1DA2Y to Battery charger XBC1A-1B
- 3) MCC XMC1DA2Y to Battery Charger XBC1A-1B and 75 HP Motor
- 4) MCC XMC1DA2Z and Panel XPN47
- 5) 7200 V Bvd XSW1EA to 480V Bvd XSW1EA1, 480VMCC XMC1EA1X, 480V MCC XMC1EC1X to XPP44C (penetration pressurizing equipment)
- 6) 125VDC Battery Bvds XBC1A, XBA1A to Distribution Panel DPN1HA to DPN1HA1 to Service Water System Control Circuits XSW1DA and XSW1EA
- 7) 480V MCC XMC 1DB2X-ES to 125V Feeder Panel APN1FB or APN1FA to the rod position indication panel which has 150A fuse protection

During discussions with the licensee representatives it was noted that the coordination study for item (6) above was border line in that the upper limits of the feeder breaker to distribution panel DPN1HA1 from distribution panel DPN1HA and the lower limit of the feeder breaker to DPN1HA from the 125VDC Battery Board XBC1A appear to overlap and approach a common current interrupt value. This item was identified to the licensee who agreed to further investigate these breaker limits.

Another possible coordination problem was identified later by the inspector in the fuse/breaker coordination between the feeder breaker to the rod position indication panel located on Distribution Panel APN1FB-EM and the feeder breaker from MCC XMC1DB2X-ES to APN1FB-EM should a fault occur between the rod position indication panel feeder breaker and its protective fuse.

These two items are identified as Inspector Followup Item (395/85-26-05), Verify Breaker Coordination Between XBC1A and DPN1HA and XMC1DB2X and APN1FB-EM.

(b) Spurious Signal Concern

A review of the licensee's spurious signal analysis was conducted to determine if the following conditions had been considered:

- Unwanted motor operations, control signals undesired or not responsive and false instrument readings such as what occurred at the 1975 Browns Ferry Fire, that could affect safe shutdown of the plant. These could be caused by fire-initiated grounds, shorts or open circuits.
- Spurious operation of safety-related or non-safety-related components that would adversely affect shutdown capability (e.g., RHR/RCS Isolation Valves).

The licensee developed a composite equipment list for the safe shutdown of the plant. The list was then evaluated for equipment that if it were to operate spuriously the resultant operation could jeopardize the capability to safely shutdown the plant. From the evaluation, the licensee advises that fuses will be pulled on the control circuits for the equipment identified as being detrimental to safe shutdown if spuriously operated. Additionally, the licensee has proposed to install disconnect switches in circuits to replace the fuse removal operation and perform the control functions manually. This action is taken in lieu of protection of a train of shutdown equipment. The present plant condition appears to conflict with the license requirements for compliance with Appendix R IIIG. This is another example of Unresolved Item (395/85-26-01).

The inspector also reviewed the possible consequences of a fire in the area termination cabinets with a loss of offsite power and the consequences of spurious operation of the charging pump suction and discharge valves when the centrifugal charging pumps are sequenced into operation from the onsite power source. During discussions it was determined that the suction and discharge valves for the auxiliary feedwater and service water pumps are manually locked in the proper position at all times and would not be affected. The licensee advised that they have selected Train B as the preferred shutdown train. They further advised that they will clear the 7200 volt Boards XSWIDA and XSWIDB in that order upon evacuation of the control room. These actions are an effort to protect/save equipment during a fire. Through

manual operation of breakers the needed equipment will be started. However, the concern is the possible damage to equipment during the time required for an operator to move to the 7200V board rooms and deenergize the boards. The licensee advised that the additional charging pump "C" would be available if it not in operation in place of the "A" pump or the "B" pump. This substitute condition is classified as an out of normal operating mode and is not addressed as an Appendix R requirement. This item will be examined further and is identified as an Inspector Followup Item (395/85-26-06), Review the Affects of Spurious Valve Operation for Centrifugal Charging Pumps.

(c) The Common Enclosure Concern

The common enclosure concern is found when redundant trains are routed together with a non-safety circuit which crosses from one raceway or enclosure to another, and the non-safety circuit is not electrically protected or fire can destroy both redundant trains due to inadequate fire protection means.

The licensee performed a statistical analysis to produce a report which indicated that there was 95% confidence that 95% of the power circuits with cables greater than 10AWG have overcurrent protection. A total of 1834 power circuits were identified which had power feeds using wire size greater than #10. A random sample of 59 circuits was selected from all the power circuits in the overall plant. The NRC inspector noted that the sample included two spare circuits, sixteen welding system feeds, eight air handling system power circuits and four control rods and position indication system circuits. The remaining 31 circuits were spread over various systems with no more than two circuits selected for any system. Of these remaining circuits, several were not associated with systems required for safe shutdown. The actual circuits were identified by circuit number only; thus, the actual function of the circuits could not be determined. But just by counting those analyzed circuits in systems that would not normally be used for safe shutdown, there were approximately 32 circuits or 54% of the total sample circuits that are not related to safe shutdown systems. This was discussed with the licensee in view of the fact that most licensees have performed a 100% analysis of the safety-related and nonsafety circuits that are required for shutdown in order to determine those circuits requiring protection.

The analysis results reviewed for the circuits chosen indicated that each circuit is fuse/breaker protected such that the power will be tripped off before auto ignition of the cable would occur. During the inspection, the licensee

presented the analysis for two circuits to replace the two spare circuits. Neither of these two circuits could be identified as circuits required for safe shutdown. The licensee was advised of the inspector's concern regarding the number of circuits used for safe shutdown that were analyzed versus the number of total circuits analyzed. The licensee was advised that this concern will be identified as an Unresolved Item (395/85-26-07), Review Resolution of the Licensee's Associated Circuit Methodology with Regard to the Sample Size and Circuits Analyzed for Over Current Protection by NRR.

(3) Alternative Shutdown Capability

In a letter dated May 2, 1985, to Dr. J. Nelson Grace, Regional Administrator, Region II, the licensee submitted several sections of a manual entitled, Preaudit Submittal Package for NRC Appendix R Compliance Audit. This document Volume 3, Section 8.0 identifies new procedures to be used when fire has made the control room uninhabitable and shutdown from outside the control room must be implemented. The development of new operating procedures is due to the licensee's Appendix R Reanalysis the results of which were submitted to the NRC in a letter to H. R. Denton, Director, NRR dated May 29, 1985.

(a) Procedure Development Review

Fire Emergency Procedure (FEP) 1.0, Revision 1, Control Room Evacuation Due to Fire, is the new procedure to use for fire in the control room complex or control building that has made controls and indications unreliable. This procedure was approved and issued for use May 30, 1985.

The basic concept and approach that this procedure takes is one in which manual operator actions are taken to isolate the primary and secondary system volumes to prevent significant losses in plant water inventory and pressure. In addition electrical breakers are opened such that the incoming and emergency power to the 7.2 kw switchgear loads are removed, all electrical breakers on train A and B motor control centers (MCC) are open to prevent spurious operation of equipment and motor operated valves. Fluid systems such as chemical and volume control system (CVCS), emergency feed-water system (EFW), and service water system (SWS) have manual valve alignments conducted in order to supply make up water to RCS and steam generator and cooling water for the B diesel generator. Borated makeup water from the RWST to the RCS is via a CVCS charging pump to the reactor coolant pump seals. The B diesel generator is manually started and operator action is taken to restore power to electrical buses and essential equipment is energized. The licensee concept

indicates that pressure control for the RCS is the use of pressurizer heaters and code safety valves. The steam generator safety valves are used for steam generator pressure control and decay heat removal. It should also be noted that the licensee has selected train B equipment to provide the Alternative Shutdown Capability.

The inspectors reviewed and walked through FEP1.0, Control Room Evacuation Due to Fire, to verify that the procedure incorporates the requirements delineated by Appendix R Section III.L and the procedure can be implemented. The following inadequacies and concerns were presented to the licensee for resolution:

- 1) Procedure contains no check-off or sign-off blocks for procedure action steps. This practice is presently required for the plant's emergency operating procedures.
- 2) Procedure steps have not been provided to determine if Natural Circulation has been established nor operator actions to be taken if it is not established.
- 3) Appendix R Section III.L.2.d requires that the process monitoring function shall be capable of providing direct readings of the process variables that are being used. Make up water to the reactor coolant system will be from the refueling water storage tank (RWST). No direct reading of tank water level is provided outside the control room at the control room evacuation panels (CREP) or locally at the tank to monitor changes in RWST level.
- 4) Procedure step 9 Caution h allows taking the pressurizer to solid water conditions then use the pressurizer code safeties for pressure control. The procedure presently requires the charging pump to be run continuously through the RCP seal. The licensee indicated that the pulsation from starting and stopping the charging pump may damage the RCP seals. The inspectors concerns with this operation is that no analysis was provided to ensure that taking the pressurizer solid through the code safeties will not cause damage to the valves if water comes in contact with the safety valve seating surfaces. Warped valve seating surfaces could cause pressure control and inventory control problems within the reactor coolant system. In addition, the licensee provided no plant procedure outlining the operational controls necessary to manage solid plant operation if this method was to be used.

- 5) Procedure step 9 note h states "Consider Emergency Boration for Shutdown Margin See Attachment VII." The inspector is concerned that this note does not provide the operator with the parameters or reasons he would need to evaluate, in order to make the determination to emergency borate.
- 6) Procedure, Attachment II Step 1.0. This step as presently written does not provide the operator with those indications (e.g., decrease reactor power level, rod bottom lights, etc.) to verify that the reactor has tripped. This information is necessary in order to determine if the "Alternative Action" steps that are provided need to be implemented. These steps would direct the operator to trip the reactor at the rod drive MG sets.
- 7) Procedure, Attachment III Step 1.0 provides operator actions to stop multiple spurious operation of primary and secondary system valves (e.g., steam generator power operated relief valves (PORV), pressurizer PORVs, pressurizer spray valve, main steam isolation valves, etc.) by pulling fuses inside the main control board thus securing the loss of water inventory from the RCS and steam generators. The Alternative Action states "If fuses are not accessible, maintenance personnel will be required to implement Attachment X when they report to control room evacuation panels". The operator time line shows the maintenance personnel not arriving at the CREP for 20 minutes once FEP 1.0 is initiated. They are also assigned to start Attachment V when they arrive at CREP. Attachment V duties consist of opening all breakers on the 480VAC motor control center then restoring selected equipment needed to achieve and maintain hot standby conditions. Attachment X consists of lifting leads to stop multiple spurious valve operation. The time of maintenance personnel arrival at the CREP coupled with performing Attachment X would lead to the performance goals and conditions of Appendix R Section III.L being jeopardized. In addition, no operator time lines have been established for Attachment X.
- 8) Attachments I through V and also procedure steps 1 through 9 are necessary to be accomplished in order to achieve and maintain in hot standby conditions. These portions of the procedure describe equipment such as flash lights, keys, fuse pullers, wire cutters, screw drivers, etc. as being necessary in order to do the steps in the procedure. This equipment needs to be placed in emergency kits at appropriate locations for operator use. In addition, inventory check lists need

to be established under the routine surveillance program to ensure availability of this equipment.

- 9) Correct the following typographical errors:
 - Procedure step 10.b change Attachment VII to VI
 - Attachment V step 8b change 06EH to 06EI
- 10) Procedure, Attachment II, steps 6 and 7 rearrange XSW1DB bus stripping sequence to deenergize Train B switchgear first as this train has been identified by the licensee as the alternative shutdown capability.
- 11) Add headsets to the emergency kits as noise level could prevent communication using hand held radios in areas of diesel generator operation.
- 12) Procedure, Attachment VI, page 3 add a note to provide the operator with a breaker charging spring tool so 7.2kw breakers can be manually operated. This tool should be part of the emergency kit being established for this procedure.
- 13) Procedure Step 9.c.2 list valve XVT-8102B RCP B seal supply isolation valve as being in 412W penetration room (the valve is located in 412E penetration room).
- 14) Procedure Step 9d requires opening valve XVT-8102C, RCP C seal supply isolation valve and the valve is located in 412E penetration room. Entry to this room is through door PA103 which was locked. The operator had keys to unlock other doors, but not this one. The valves listed in item (13) and (14) is the flowpath to supply sealing water for RCP B and C and make up water to the RCS.

The above procedure inadequacies and concerns will remain unresolved until the licensee has completed his reanalysis and submitted his new Appendix R program to the NRC for review and final approval. This area is identified as Unresolved Item (395/85-26-08), Correct Inadequacies Identified in Procedure FEP 1.0 Based on Review and approval of the licensee's Appendix R Reanalysis by NRR.

(b) Operator Action Time Line to Achieve and Maintain Hot Standby

As previously discussed, the licensee's new program will be one of a series of manual operations to regain control of the plant systems on the onset of a control room complex fire and subsequently achieve and maintain the plant in hot standby condition. The inspector requested the licensee's analyses and assumptions on which the operator time lines are based. The licensee indicated

that this analysis was not complete and no information was given to the inspectors. The inspectors presented the following areas of concern, but is not to be misinterpreted as a complete listing of areas that the licensee should be considering when conducting his analysis.

- Provide limiting times required to isolate and secure the primary volume to ensure that loss of reactor coolant system water inventory and pressure doesn't exceed the performance goals and conditions of Appendix R Section III.L.
- Provide limiting time required to isolate and secure the secondary volume to ensure that a loss of steam generator water inventory doesn't impair the decay heat removal capability and emergency feedwater system (EFS) is put into service to prevent this from occurring and the performance goals and conditions of Appendix R, Section III.L are met.
- Determine the time that reactor coolant pumps (RCP) seals can be without chemical volume control system (CVCS) sealing water to ensure that damage to the RCP seals doesn't occur which would result in loss of makeup water to the RCS. The licensee source of makeup water to RCS is via the reactor coolant pump seals which is a nominal 15gpm. Presently no operator time line is provided as to when the CVCS charging pump must be put into service.

The above matter will remain unresolved until the licensee has completed his reanalysis and submitted his new Appendix R program to the NRC for review and final approval.

This item is identified as Unresolved Item (395/85-26-09), Provide Limiting Times/Assumptions to Arrive at Operator Action Time Lines to NRR for Review.

(c) Additional Plant Operating Procedure

The inspectors were provided a draft copy of FEP 1.1 Plant Shutdown From Hot Standby to Cold Shutdown Due to Fire In Control Building. This procedure is still under development and is not complete.

The licensee has identified several fire areas outside the control room complex where a fire could potentially effect both trains of systems necessary to achieve and maintain hot standby conditions. The licensee provided a tentative completion schedule of the third quarter 1986 for issuing these procedures which describe operator action.

The above matter will remain unresolved until the licensee has completed his reanalysis and submitted his new Appendix R program to the NRC for review and final approval.

This item is identified as Unresolved Item (395/85-26-10) Identify/Issue Procedures to Accomplish Appendix R Section III.L Requirements and Performance Goals Which are Based on the Appendix R Reanalysis Approved by NRR.

(d) Training

The licensee has initiated training on procedure FEP 1.0 which consists of a lecture series for senior reactor operators (SRO), reactor operators (RO), and Shift Technical Advisors (STA). This training is essentially completed for all shift operating personnel. The licensee is presently reviewing method of training that will be used and how this training will be factored into the required licensed operator requalification program. The inspector discussed the additional FEPs that will be issued and the licensee plans to include all FEPs in the requalification program. The training of operators as well as maintenance personnel that are required to support the FEPs will be reviewed at a subsequent inspection. This is identified as Inspector Followup Item (395/85-26-11), Provide Training for All FEP Procedures to Support Appendix R.

(e) Damage Control Measures

Appendix R Sections III.G.1.b and III.L.5 require fire protection features to be provided for structures, systems and components important to safe shutdown and to be capable of limiting fire damage so that systems necessary to achieve and maintain cold shutdown are free of fire damage or can be repaired such that the equipment can be made operable and cold shutdown achieved within 72 hours. Materials for such repairs are required to be readily available on site and procedures are to be in effect to implement such repairs.

The licensee has identified the power supply cables for the RHR pumps as items which could be damaged by a fire and which must be repaired to permit cold plant shutdown. Procedure EMP-100.002, Emergency Installation of Cable For "B" RHR Motor, has been prepared to provide a guide for installation of spare feeder cable following a fire which has caused a loss of both RHR pumps. This procedure also identifies the material which is to be maintained on site to accomplish these repairs.

The inspector(s) conducted an inspection to verify that the required materials were available. Procedure EMP-100.002 Section 7.1.1 requires a 500' reel of 3C-350 MCM cable, 12 mechanical wire lugs, 3 boxes of "biseals," 2 boxes of scotch 33+ tape, and a roll of rope. This material is stored in warehouse "B". The cable is stored on a reel and

the other items are stored in a wooden box and marked with a hold tag. This material appeared to be properly stored and maintained.

A plant tour was made by the inspector(s) which verified that the cable routes specified by Procedure EMP-100.002, Section 7.2 were feasible.

6. Compliance to 10 CFR 50 Appendix R, Section III.0 Oil Collection System for Reactor Coolant Pumps

The reactor coolant pumps are required to be equipped with an oil collection system if the containment is not inerted during normal plant operations. The oil collection system is to be so designed, engineered and installed such that failure will not lead to fire during normal or design basis accident conditions and there is reasonable assurance that the system will withstand the "Safe Shutdown Earthquake." The system is to be adequately sized and capable of collecting lube oil from all potential leakage sites in the reactor coolant pump lube oil system. Leakage is to be collected and drained to a closed container sized to hold the entire lube oil system inventory. A flame arrester is required in the container vent if the flash point characteristics of the oil presents the hazard of fire flash back.

The inspectors reviewed the design of the oil collection system for the reactor coolant pumps. An inspection of the system was not made since the plant was in operation and access to the containment was not possible. However, Gilbert's Drawing B-305-601, Sheets 1-3 and Westinghouse Drawings 9550D34, 1540E28 - E30, 1540E81 - E83, 1540E88 and 1188F97 were reviewed. These drawings indicate that the oil collection system provided for each pump motor contains sufficient splash guards, catch basins and enclosures at potential oil leakage locations on the reactor coolant pump motors to collect and drain off potential oil leaks to a collection tank. Each motor is provided with an independent collection system arranged with a drain piping system which terminates in a 275 gallon tank. Each tank is sized to receive the total lube oil capacity of 240 gallons for the pump to which it is connected to. The tank vents are provided with flame arresters. The oil spillage enclosures on each pump motor, drain piping and collection tank have been evaluated and certified by the design organization, Gilbert/Commonwealth, in letters dated April 12, 1982 and May 20, 1985, to remain functional following a safe shutdown earthquake. The licensee's QC office has conducted a detailed inspection of the collection system for reactor coolant pump "A" and verified that the installed system is in conformance with the construction drawings, except for several minor discrepancies which have been reviewed by the licensee and the designer and found to be acceptable. The oil collection systems for pumps "B" and "C" are to be inspected by the licensee to verify that these are also in conformance with the design requirements. These inspections are to be completed prior to startup from the next refueling outage.

Within the areas examined, no violations or deviations were identified.

7. Compliance to 10 CFR 50 Appendix R Section III.J, Emergency Lighting

Emergency lighting units equipped with at least an 8-hour battery power supply are required to be provided in all areas required for operation of safe shutdown equipment and in access and egress routes thereto.

The inspectors reviewed the licensee's evaluation of the plant's emergency lighting in Appendix R Audit Support Package Volume 22 Section 8-3. Approximately thirty 8-hour emergency lighting units are presently provided. However, the licensee's evaluation identified the need for approximately 40 additional lighting units and the relocation of three existing lighting units. Approximately 20 units are required to provide illumination for equipment needed for manual shutdown operations as a result of the Appendix R reevaluation, and approximately 20 units are required for egress and access to this equipment. Several other plant areas presently are not provided with emergency lighting and will either require lighting or deviation requests to permit the use of portable lights for reading gauges, verification of valve alignment, or to supplement the existing access lighting.

During the plant tour the inspectors verified that emergency lighting was not provided for the following plant areas as required by Appendix R: 388' of auxiliary building at charging pumps, 412' of intermediate building, east and west penetration rooms on 412' and 436' elevations, 424' of auxiliary building, 436' auxiliary building filter galley, 485' of auxiliary building, 427' of diesel generator building, turbine building areas, portions of service water pump building, and outside yard areas. This discrepancy is identified as Unresolved Item (395/85-26-12), Inadequate Number of 8-Hour Battery Powered Emergency Lighting Units Provided for Areas Needed for Operation of Safe Shutdown Equipment, pending resolution of the licensee's Appendix R reanalysis by NRR.

8. Fire Protection and Prevention Program

a. Structural Fire Barriers

A general walkthrough inspection was conducted of the walls, floors, ceiling and associated penetrations of the following plant areas to verify that 3-hour fire resistance construction is provided between adjacent fire areas as required:

<u>Fire Area</u>	<u>Description</u>
IB-2	Train A Battery Room
IB-3	Train A Battery Charger
IB-4	Train B Battery Charges
IB-6	Train B Battery Room
IB-7	Water Chiller Pump Room

IB-8	HVAC Equipment C Water Chiller
TB-1	Turbine Driven Feed Water Pump Room
IB-12	Train B Speed Switchgear Room
IB-13	Train C Speed Switchgear Room
IB-14	CREP Room
IB-16	ESF Switchgear Room
	Room Cooling Units - Train A
IB-17	ESF Switchgear Room Cooling Units - Train B
IB-20	Train A Switchgear Room
IB-22.2	Train B Switchgear Room
IB-23.3	Train A Speed Switchgear Room
DG-1	Diesel Generator A
DG-2	Diesel Generator B

The walls, floors, ceiling and penetrations of the above fire areas appear to meet the required fire resistance rating, except for fire area IB-20. This room communicated with fire area IB-25.6 on the below elevation below through an open floor penetration, approximately 6-inches by 30 feet in size, along the north wall of the switchgear room. The lack of protection for this floor penetration is a failure to meet Technical Specification Section 3.7.10 and is identified as Violation Item (395/85-26-13), Inadequate Fire Barrier Between Fire Areas IB-20 and IB-25.6.

b. Raceway Fire Barriers

An inspection was made of the following raceways to verify that each raceway was provided with the 3-inch "Kaowool" wrap to provide a nominal 1-hour fire resistant rating:

<u>Fire Zones</u>	<u>Raceway No.</u>	<u>Function</u>
AB-19	1012	"B" Power Cable for B and C CVCS
AB-1.4 & 1.9	4065	"B" Control Cable for B and C CVCS
CB-12	4284	All A Train Power
IB-23.2	XX-3115B	Component Cooling Pump B Power
IB-11	XX-3116A	Component Cooling Pump A Power
AB-1.9	CSM1A	Charging/Safety Injection Pump A Power
AB-1.4	CSM11B	Charging/Safety Injection Pump B Power
CB-10	ESM 171B	Train B 480V Power

IB-25.6	ESM 171B	Train B 480V Power
IB-25.1	SWL 11A	Service Water Booster Pump Power
AB-1.9	VLC4B	Charging/Safety Injection Pump B Cooling Power
IB-23.2	VUL 34B	Chilled Water Pump B Power
IB-16 and IB-17	VLC 44B	Cooling Fan Power for B Train Switchgear Room

The barriers were found to be in place and appeared to be properly installed, except the barrier for raceway no. VUL34B in Fire Zone IB-23.2 was not complete, in that portions of the conduit raceway was exposed and thus not functional. This is identified as Violation Item (395/85-26-14), Nonfunctional Fire Barrier for Raceway VUL34B in Fire Zone IB-23.2. Also, the structural supports for the raceways enclosed within the fire barriers have not been provided with protection to provide a fire resistance rating equivalent to the fire resistance rating of the barriers. The licensee is preparing an analysis which is to provide justification for the lack of this protection. A preliminary review of the licensee's incomplete analysis indicates that sufficient data is to be provided to justify the lack of protection for these structural supports. This item is identified as Inspector Followup Item (395/85-26-15), Review Licensee's Analysis for Unprotected Cable Tray Supports, and will be reviewed during a subsequent NRC inspection following completion of the licensee's analysis.

The inspectors performed an evaluation to determine the adequacy of the horizontal "M" board fire barrier provided over the "A" train service water booster pump on elevation 412'-0" of the intermediate building to provide protection equivalent to that of the one-hour barrier requirement of Appendix R Section III.G. By letter dated June 1, 1981, the licensee requested an exemption for the following:

- (1) Component cooling water pump area, separation between pumps B and C does not meet Appendix R.
- (2) HVAC equipment water chiller pump area, separation between pumps does not meet Appendix R.
- (3) Partial automatic fire suppression provided in the auxiliary and intermediate buildings.
- (4) Partial fire detection provided in the auxiliary and intermediate buildings.

The licensee's June 1, 1981 letter identified the rationale for their exemption request and identified the "M" board barrier as a fire protection feature which supports the above exemption requests. However, the licensee's June 1, 1981 letter did not specifically ask for exemption to the technical requirements of Appendix R with regard to the service water booster pump area. Therefore, safety evaluation report supplement no. 4 dated August 1982, granted the licensee's request to deviate from the Appendix R Section III.G requirement for only those areas identified above.

The horizontal "M" board fire barrier provided over the "A" Train service water booster pump is supported by unprotected rod hangers and a steel uni-strut frame assembly. This non-rated fire barrier design was provided to separate the "A" Train pump from redundant "B" train circuits routed in overhead raceway near the ceiling of fire zone IB-25.1.

The in-situ fire load for fire zone IB-25.1 is 43,000 BTU/FT² with a total BTU content of 471,145,000 BTUs. Area sprinkler protection and fire detection capabilities are provided above and below the barrier assembly. In addition, fusible type water spray nozzles are provided for the cable tray stacks in the overhead. However, the area sprinkler protection installed in the ceiling overhead is obstructed by piping, electrical raceway and HVAC ducting. The sprinkler design does not meet with the design guidance of NFPA-13, in that the system does not compensate for significant obstructions and overlapping obstructions exceeding 48 inches. In the event of an exposure fire in this area, the sprinkler response to the fire condition could be delayed due to the sprinkler obstructions. This, in conjunction with the nonfire rated structural steel supporting the "M" board barrier, could jeopardize the fire barrier design by causing structural deformation to the barrier support system. The failure of the barrier support system could cause both redundant trains of shutdown systems to be damaged by fire. The licensee contends that this barrier design was found acceptable as documented by their June 1, 1981 letter. Therefore, this item is identified as Unresolved Item (395/85-26-16), Verification That the "M" Board Fire Barrier was Reviewed and a Deviation was Granted for this Plant Condition by NRR.

c. Fire Watch

During the licensee's Appendix R reanalysis two areas were identified in which the need for a roving fire watch were required. SCE&G's letter of May 29, 1985, from O. W. Dixon, Jr., SCE&G to H. R. Denton, NRC/NRR stated that a roving fire watch was to be provided for Fire Areas IB-25/Room 1202, (intermediate building 412' elevation) and CB-12 (control building cable chase, room 3603).

The inspector(s) reviewed the licensee's fire watch program. Nuclear Education and Training Group Manual, Attachment X indicates the training required for fire watch personnel. Training records for four of

the fire watch personnel were reviewed. These personnel had received the required training within the past twelve months.

The fire watch log data for May 29-31 and June 1-2, 1985 was reviewed. It was noted that the log did not specify that room IB 1202 was covered by the roving fire watch as stipulated by the above May 29, 1985 letter. This item is identified as Deviation Item (395/85-26-17), Failure to Conduct Fire Watch Patrol for Fire Area IB-25. Fire watch patrol was provided for the other areas indicated by the above May 29, 1985 letter.

d. Fire Brigade Drill

During this inspection, the inspectors witnessed an unannounced fire brigade drill. The fire scenario was a fire in the cable spreading room, fire area CB-15 on control building elevation 448'-0", the initial fire scenario condition inside the room upon the arrival of the fire brigade leader was heavy fire involvement in the cable trays below the termination cabinets with heavy smoke conditions inside the room. In addition, the sprinkler protection inside the room had operated; however, the system was not effectively controlling and or suppressing the fire. Five fire brigade members, in full protective clothing and self-contained breathing apparatus, responded to the fire and placed two 1½-inch hose lines in service on the fire in approximately 25 minutes. Based on the drill/fire scenario, it was the inspectors' observation that additional fire brigade training emphasis was needed in ventilation, hose deployment, breathing apparatus donning, and salvage techniques.