

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-483/84-15(DE)

Docket No. 50-483

License No. CPPR-139

Licensee: Union Electric Company  
Post Office Box 149  
St. Louis, MO 63166

Facility Name: Callaway, Unit 1

Inspection At: Callaway Site, Callaway County, MO

Inspection Conducted: March 5-9, 12-16, 26-29, April 11-12, and May 3-4, 1984

Inspectors: C. Ramsey

*C. Ramsey*  
Date 6/15/84

A. Gautam

*A. Gautam*  
Date 6/15/84

Approved By: W. Guldemon, Chief  
Operation Program Section

*W. Guldemon*  
Date 6/18/84

Inspection Summary

Inspection on March 5-9, 12-16, 26-29, April 11-12, and May 3-4, 1984  
(Report No. 50-483/84-15(DE))

Areas Inspected: Routine, unannounced inspection of the applicant's fire protection program implementation and safe shutdown capability in the event of a fire during operations. The inspection involved 155 inspector-hours by two NRC inspectors, including 11 inspector-hours on site during off-shifts.

Results: No items of noncompliance or deviations were identified

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## DETAILS

### 1. Persons Contacted

#### Union Electric

- \*J. E. Davis, Compliance Superintendent
- J. C. Gearhart, Supervising Engineer, Operations QA
- \*R. Allen, Safety Supervisor
- \*G. A. Patrissi, Fire Protection Consultant
- \*L. Kanuckel, Quality Assurance Engineer
- \*S. F. Miltenberger, Manager Callaway Plant
- \*P. S. Hobbs, Operations Supervisor
- \*A. C. Passwater, Superintendent, Licensing
- \*P. T. Appleby, Assistant Manager, Support Section
- \*J. L. Blackwell, Fire Protection Specialist
- \*S. E. Chomos, Fire Protection Engineer
- \*D. Heinlein, Assistant Superintendent Operations

#### NRC

- \*J. Neisler, Resident Inspector

\*Denotes those attending the exit meeting of April 12, 1984.

### 2. Meeting of May 4, 1984

#### Union Electric

- L. H. Kanuckel, Assistant QA Engineer
- J. E. Davis, Superintendent of Compliance
- G. A. Patrissi, Fire Protection
- D. C. Poole, Advisory to Plant Manager
- D. E. Shafer, Supervisor Engineering Licensing
- R. Stright, Nuclear Engineer
- A. Passwater, UENE, Superintendent of Licensing

#### NRC

- W. S. Little, Chief, Engineering Branch 2, RIII
- B. H. Little, Senior Resident Inspector

### 3. Licensee Actions on Previous Inspection Findings

(Closed) Noncompliance 483/82-14-01a): Missile resistance door No. 36042 did not have the required U.L. label attesting to its 3 hour fire resistive rating. The door had not been tested to ASTM E-152 requirements and no acceptable documentation was provided to the inspectors to verify that this door met the test requirements.

The inspectors verified that Bechtel Engineering Analysis #BLSE 12.631 dated August 23, 1983, evaluated the SNUPPS plant missile resistant doors located in fire barrier walls and concluded that the doors meet the test acceptance criteria established in ASTM E-152.

(Closed) Noncompliance (483/82-14-01b): Fire doors Nos. 4 and 5 in the fire pump house and fire door No. 33011 did not have the required U.L. labels permanently affixed to them attesting to their fire resistive rating as required by Drawing Number 8600-X-8846, Revision 3 and U.E. Specification Number 4645-23A.

The inspectors verified that fire doors Nos. 4 and 5 in the fire pump house were replaced with Class A U.L. listed and labeled fire doors as specified in Purchase Order No. 7186-NS-04685. Nonconforming Report No. 2NN-4553-CW/DLUC 10,733, was closed on October 27, 1983 with the installation of the new doors. Nonconforming Report No. DLUC 10,686 was closed on October 12, 1983 as a result of the installation of a Class A, U.L. listed and labeled fire door for door No. 33011.

Furthermore, the applicant identified 27 additional fire doors of improper construction or otherwise not meeting the fire resistive labeling requirements or Underwriter's Laboratories Inc. and ASTM E-152. These doors were identified in deficiency report Nos. 2ND 1719c, 2ND-3118c and 2ND-3024C and were either replaced or modified and provided with appropriate permanently affixed U.L. labels by the door vendor. Nonconforming Report No. DLUC 10,858 was closed on December 6, 1983 as a result of corrections made to fire doors in all safe shutdown areas.

(Closed) Open Item (483/82-14-02): Fire pumps were not being tested in accordance with NFPA 20-1974 as stated in Union Electric's letter of July 5, 1978 to the NRC (UENRC-271).

The inspectors verified that the pre-operational test results of Test No. CSP-04KC1-09 for the fire protection system verified the operability of the station fire pumps in accordance with NFPA 20 and design requirements. Station approved Operating Surveillance Procedure No. OSP-IC-00002 was revised by Temporary Change Notice (TCN) No. 84-130 dated March 28, 1984, to include the appropriate NFPA and design requirements in future Technical Specification surveillance testing of the station fire pumps.

(Closed) Open Item (483/82-14-03): The three main ring header isolation valves to the fire loop on the discharge side of the fire pumps were not locked in the open position or otherwise administratively controlled as required by Section 9.5.1.13 of the SNUPPS FSAR.

The inspectors verified that these valves and all valves to the fire protection system that are not electrically supervised with indication of valve position in the control room are locked in the open position and under administrative control. Station approved Operating Surveillance Procedure No. OSP-KC-00005 requires monthly visual inspection of these valves.

(Closed) Open Item (483/82-14-04): The required fire protection equipment in the fuel handling building was not operable as required by Special Nuclear Materials License No. SNM-1901 in that:

- a. Numerous fire hose stations were wrapped with tape, preventing the hose to be freely pulled from the rack to a fire scene.
- b. All 2½ gallon pressurized water portable fire extinguishers were found to have unsealed pull pins, denoting uncertainty as to whether or not the extinguishers had been used.
- c. Numerous fire doors were found in the unlatched position due to recessed or inoperative latching mechanisms.

The inspectors verified that these conditions were corrected prior to the receipt of fuel onsite. Each item was satisfactorily closed out in U.E. operations letter U.O. 82-188, dated November 24, 1982. Administrative Procedures No. OSP-KC-00014 and OSP-KC-00015 specifies adequate control over unlatched fire doors.

(Closed) Open Item (483/82-14-05): Fire protection administrative and surveillance testing procedures did not conform to the applicable codes and standards committed to by the applicant in Section 9.5.1 of the SNUPPS FSAR.

The inspectors verified that administrative procedure No. AP-22-00741 has been revised to adequately control transient fire loads. Administrative procedure No. AP-22.00742 has been revised to adequately control ignition sources. Procedures No. MSM-22-FW001 and MSM-FZ001 adequately control surveillance of penetration openings in fire barriers (fire doors and cable penetration seals). Surveillance testing of fire dampers was not adequately addressed in surveillance procedure MSM-22-FG001 in that only a visual inspection of fire dampers is required during the life of the plant. This is a generic problem industry wide and is further discussed in paragraph 4.B of the report.

(Closed) Open Item (483/82-14-06): The applicant's general employee training in fire protection did not satisfy the NRC training requirements for persons performing fire watch duty. Training for persons performing fire watch duty for the control of ignition sources did not conform to the requirements of NFPA Standard No. 51B and the Fire Brigade Training Program did not conform to NFPA 27 requirements as specified in Section 9.5.1 of the SNUPPS FSAR.

The inspector verified that the applicant's general employee training program in fire protection has been revised. In the event of fire, general employees are instructed to notify the control room. Persons performing fire watch duty for the control of ignition sources such as welding, cutting and grinding are provided with the additional hands-on training in the use of fire fighting equipment as required by NFPA 51B. The Fire Brigade Training Program conforms to NFPA 27 training requirements as specified in Section 9.5.1 of the SNUPPS FSAR.



(Closed) Open Item (483/82-14-07): Follow-up on commitments made to NRR. The applicant's transmittal dated July 5, 1978 committed the licensee to provide acceptable documentation to demonstrate the fire resistive capability of installed fire stops throughout the plant.

The inspectors verified that the applicant's fire stop installations consists of DOW Corning Silicone RTV Foam installed in wall and floor penetrations. TSI thermo-lag 330-1 prefabricated panels are installed on cable trays on each side of the silicone RTV foam to provide a three foot minimum overall fire stop. This is discussed in enclosure No. 4 the applicant's submittal of February 1, 1984 (SLNRC 84-0014).

4. Documents Reviewed

a. Procedures

<u>NUMBER</u>	<u>TITLE</u>
APA-ZZ-00023	Conduct of Operations - Compliance
APA-ZZ-00600	Design Change Control
EDP-ZZ-04005	Design Change Review
APA-ZZ-00550	FSAR Change/Revision Process
	Preoperation Test
CS-04QD01	Emergency Lighting System Fuel Building
CS-04QD01-6	Emergency Lighting System Fuel Building
CSP-04KC1-08	FPS Sump Pump
CSP-04KC-09	FPS Pre Op Test for Fuel Receipt
CSP-04KC1-10	Outside area building FPS
CS-06ELZ1	Fire Detection Loop
CS-06ELZ4	Motor Operated Fire Dampers
Q-S-710-83-6	Installation Inspection Checklist
QCP-10-5-3	Fire Damper Post Installation Inspection
C-04-QDOZ	Emergency Light DC Supply Test
OSP-RP-00001	Auxiliary Shutdown Panel Channel Checks
OTO-ZZ-00001	Off Normal Operating Procedure
OTS-ZZ-0001	Cooldown from Outside the Control Room
APA-ZZ-220742	Welding and Cutting
APA-ZZ-00740	Requirements for and Duties of Fire Watches
APA-ZZ-00741	Control and Transportation of Combustible Materials
APA-ZZ-00743	Fire Team Organization and Duties
APA-ZZ-00742	Control of Ignition Sources
QSP-ZZ-20000	Fire Brigade Equipment Locker Monthly Surveillance Record
02/07/84	Fire Protection Training
T66.06.05	Fire Watch Training
OSP-KC-00002	Fire Pump Performance Test
MSE-KC-FW001	Fire Detection Functional Test
MSE-KC-FW003	Containment Fire Detection Surveillance
OSP-KC-00001	Fire Pump Starting Test and Fire Water Storage Tank Inspection
OSP-KC-00012	Refueling Outage Fire Protection Surveillance Inside Containment

<u>NUMBER</u>	<u>TITLE</u>
MSM-KC-FK001	18 Month Inspection of Fire Pump Diesel Engine
ESP-KC-03001	Fire Main Flow Test
OSP-KC-0002	Fire Pump Performance Test
CS-04KC01	Preoperational Test Fire Protection System (Water)
CS-04KC03	Fire Protection System Detection and Alarm Preoperational Test
APA-ZZ-00010	Conduct of Operations - Operations
MSE-ZZ-QN001	Containment Penetration Conductor Overcurrent Protective Devices Fuse Surveillance
CS-04KC02	Fire Protection System Halon Preoperational Test
QDP-ZZ-08001	Fire Preplan Auxiliary Building Elevation 2047 Feet
QDP-ZZ-08002	Fire Preplan Fuel Building Elevation 2000 Feet
QDP-ZZ-08005	Fire Preplan Reactor Building
QDP-ZZ-08030	Fire Preplan Communications Corridor Elevations 2000 and 2016 Feet
QDP-ZZ-08040	Fire Preplan Fire Pumphouse
QDP-ZZ-08042	Fire Preplan Essential Service Water Pumphouse Rooms A and B
QDP-ZZ-08050	Fire Preplan Technical Support Center
MSE-ZZ-QS004	Containment Penetration Conductor Overcurrent Protective Devices 480 V. Motor Control Center Breaker Functional Test

b. Quality Assurance Documents

<u>NUMBER</u>	<u>TITLE</u>
2ND-2811-C	Deficiency Report - Fire Door #43211
2ND-2822-H	Deficiency Report - Fuel Building E. 2012
2ND-2888-MQ	Deficiency Report - Fire Pump Casing
2ND-2924-C	Deficiency Report - Fire Door #13101
2ND-3126-EQ	Deficiency Report - Fire Protection Indication Panel
2NN-5185-HW	Deficiency Report - Large Bore Pipe Support
2NN-5346-PW	Deficiency Report - Weld Edge Surfaces
2NN-5401-ES	Deficiency Report - Cable Tray Support Installed without Proper Authorization
2NN-5409-C	Deficiency Report - Installation of Fire Doors Nos. 62021 and 62022
2NN-5417-P	Pipe not Installed within Design Tolerance
840206	Surveillance Report - Fire Protection Program Review
83-02-03	Audit Finding Report

<u>NUMBER</u>	<u>TITLE</u>
83-02-06 AD5A8311A	Audit Finding Report Quality Assurance Audit of Fire Protection - Operations Aspects

c. Drawings

<u>NUMBER</u>	<u>REV. NO.</u>	<u>TITLE</u>
E-OR1123	20	Charging Pump A Aux Bldg Cable Routing
E-OR1122	6	Charging Pump A Aux Bldg Cable Routing
E-OR3212	13	CCW Pump OIA, Charging Pump A Control Bldg Cable Routing
E-OR3313	20	CCW Pump OIA, Charging Pump A Control Bldg Cable Routing
E-OR3513	20	CCW Pump OIA, Charging Pump A Control Bldg Cable Routing
E-OR3514	19	CCW Pump OIA, Charging Pump A Control Bldg Cable Routing
E-ZR2612	0	Pressurizer PORV Rx Bldg Cable Routing
E-ZR2512	2	Pressurizer PORV RX Bldg Cable Routing
E-ZR2512	1	Pressurizer PORV RX Bldg Cable Routing
E-ZR2901	0	Pressurizer PORV RX Bldg Cable Routing
E-OR3613	16	Pressurizer PORV Control Bldg Cable Routing
E-ZR3614	0	Pressurizer PORV Control Bldg Cable Routing
E-OR3714	6	Pressurizer PORV Control Bldg Cable Routing
E-OR3713	16	Pressurizer PORV Control Bldg Cable Routing
E-OR3613	16	Pressurizer PORV Control Bldg Cable Routing
E-ZR1433A	1	Pressurizer PORV Aux Bldg Cable Routing
E-ZR2412	1	Pressurizer PORV RX Bldg Cable Routing
E-OR1413	15	Pressurizer PORV Control Bldg Cable Routing
E-OR1423	17	CCW Pump OIA, Control Bldg Cable Routing
E-OR3412	17	Pressurizer PORV Control Bldg Cable Routing
M-OS-KC14	0	Piping Isometric Fire Protection System - Fuel Building
M-OS-KC16	0	Piping Isometric Fire Protection System - Fuel Building
M-23KC16	0	Piping Isometric Fire Protection System - Fuel Building
M-03KC14	3	Piping Isometric Fire Protection System - Fuel Building
E-01001	7	Safe Shutdown Bus NB01 and NB02 Time Current Characteristic Curve
E-01023Sh6	0	Pump Feeder Breaker 152NB010Z Time Current Characteristic Curve
E-01023Sh13	0	Feeder Breaker 152NB0203 For Buses NB01 and NB02 Time Current Characteristic Curve
E-0123Sh	2	Relay Setting Tabulation
E-03BB39	7	Pressurizer PORV Schematic
E-2R3614	0	Raceway drawing

d. Computer Printouts

<u>PROGRAM</u>	<u>DATE</u>	<u>TITLE</u>
E-580	2/22/84	Conduit Schedules
EFHAP	8/83	Electrical Fire Hazard Analysis Program
VIAS	1/16/84	Associated Cables

e. Test Results

<u>NUMBER</u>	<u>TITLE</u>
CSP-04LE1-03	Fire Pumphouse Sump Pumps
CSP-04KCL-08	Fire Protection Sump Pump Acceptance Test
CSP-04KCL-10	Outside Building Fire Protection System
CSP-04KCL-03	Fire Protection 480V System
CS-04QD01-6	Emergency Lighting System Fuel Building
CS-06CS02J	Generic Calibration of Pressure Switches
CS-06CS09F	Generic Functional Check of Pneumatic Regulators
CS-06CS04A	Generic Calibration of Pressure Actuated Indicators
CSP-04KC1-09	Fire Protection Preoperational Test For Fuel Receipt
KCG-085	Hydrostatic and Pneumatic Test Report
KC-061	Hydrostatic and Pneumatic Test Report
CS-03BB05	HFT Remote Shutdown Panels
CS-06CS04C	Generic Calibration of Electrically Actuated Indicators

f. Procurement Specifications

<u>NUMBER</u>	<u>TITLE</u>
MIS Material Data Sheet No. 65	Hydrogen Gas
4645-P23	Fire Pump and Accessories
Catalog No. 6120	Pyrotronics Infra Red Flame Detectors

g. Proposed Technical Specifications

<u>NUMBER</u>	<u>TITLE</u>
3.3.3.7	Fire Detection Instrumentation
3.7.10.1	Fire Suppression Water System
3.7.10.2	Spray and/or Sprinkler Systems
3.7.10.3	Halon Systems
3.7.10.4	Fire Hose Stations
3/4.7.11	Fire Barrier Penetrations



<u>NUMBER</u>	<u>TITLE</u>
3.3.3.5	Remote Shutdown Instrumentation
3/4.8.4	Electrical Equipment Protective Devices
6.0 Table 6.2-1	Minimum Shift Crew Composition
6.2.2	Unit Staff

5. Fire Protection Program Implementation

a. Program Organization and Personnel Staffing

Appendix 9.5.A-1 of the SNUPPS FSAR requires the person responsible for the fire protection program to have within the organization the necessary staffing to provide a balanced approach in directing the fire protection program for nuclear power plants. Staff personnel are required to be qualified by training and experience in fire protection and nuclear plant safety.

The inspectors reviewed the licensee's fire protection program organization and staffing of personnel.

Administrative Procedure No. APA-ZZ-00023 describes the conduct of operations for compliance with the licensee's commitments to administer the site fire protection program as approved by the NRC staff. A safety group from the compliance department develops and implements policy to assure that implementation of the fire protection program is performed in accordance with established procedures.

The Safety Supervisor is a qualified Fire Protection Engineer who is responsible for the development, administration and implementation of the fire protection program while serving as the designated Site Fire Marshal.

The Safety Coordinator is responsible for assisting in the implementation of the fire protection program. This position is responsible for reviewing and evaluating nonconforming items associated with installed fire protection equipment, reviewing drawings and plans for plant modifications and evaluating, recommending or reporting appropriate corrective actions.

Administrative Procedure No. APA-ZZ-00600 provides a system of administrative controls to ensure that the original plant design is not adversely affected by development and implementation of design changes.

Engineering Department Procedure No. EDP-ZZ-04005 provides guidance to engineering department personnel for the review and development of design changes. Administrative Procedure No. APA-ZZ-00550 establishes instructions for submitting, reviewing and processing fire protection FSAR changes/revisions. Proposed changes to Technical Specifications and elements of the fire protection program affecting the plant operating license are addressed by Administrative Procedure No. APA-ZZ-00551.

The Superintendent of Engineering is responsible for reviewing proposed plant design changes and forwarding fire protection considerations to the Safety Supervisor. This position ensures that all fire protection nonconformances are dispositioned and fire protection surveillance procedures are developed.

No items of noncompliance or deviations were identified.

b. Preoperational Test Procedures

Section 9.5.1.4 of the SNUPPS FSAR requires preoperational testing of the fire protection system demonstrate the operability of the fire protection system in accordance with design requirements. The inspectors examined 14 preoperational test procedures for the fire protection system that were developed and approved by the applicant. Each of the procedures examined adequately incorporated the applicable test parameters to demonstrate the operability of those aspects of the fire protection system in accordance with design requirements.

No items of noncompliance or deviations were identified.

c. Preoperational Test Results

Section 9.5.1.6 of the Callaway Site addendum to the SNUPPS FSAR states in part, "the fire protection program and procedures are implemented before fuel loading."

Section 9.5.1.4 of the SNUPPS FSAR requires preoperational testing of the fire protection systems to demonstrate the operability of the fire protection system in accordance with design requirements.

The inspectors examined the following aspects of the applicant's preoperational testing for the fire protection system:

(1) Test Instrument Calibration

The applicant's calibration of test instruments was reviewed by the inspectors to verify the accuracy of the instruments within the tolerances specified in vendor instructions, drawings and instrument loop diagrams. Tests CS-06CS02J, CS-06CS09F, CS-06CS04A, and CS-06CS04C verified functional checks of required set points for test gauges, pressure switches, pneumatic regulators, and pressure and electrically actuated indicators. The test results indicated proper operation of these instruments.

No items of noncompliance or deviations were identified.

(2) Fire Protection Systems

The inspectors examined the results of preoperational tests for 9 fire protection systems and components and found that the results indicated satisfactory conformance with designs and readiness requirements. No items of noncompliance or deviations were identified.

(3) Fire Dampers

The licensee's staff did not provide acceptable documentation to verify preoperational testing of fusible link activated fire dampers. The Inspectors reviewed a selected sample of the fire damper post installation inspection reports contained in records package Q-S-710-83-9. These reports indicated that closure and proper cycling of the damper blades had been observed and found satisfactory by Robert Irsay Company Quality Control.

The applicant has taken exception to the requirements for pre-operational testing and subsequent periodic operability testing of fusible link activated fire dampers. The applicant's rationale and basis for this position is supported by Section 4.7.11.1 of Technical Specification 3.7.11 which requires only a visual inspection of such fire dampers every 18 months. This is a generic problem that the NRC has notified all licensees of in Information Notice 83-69.

(4) Halon Systems

In a May 7, 1984 submittal to NRR, the applicant identified testing of the North Electrical Penetration Room (No. 1440) Halon Systems and Halon Systems in four other locations for deferral for testing after fuel load. In the interim, the applicant proposed to take compensatory measures per technical specifications for the inoperability of these systems. Completion of these actions will be tracked as an open item and is further discussed in paragraph 6.a(6) of the report.

(5) Remote Shutdown Panel Preoperational Test

Remote shutdown capability in the event of a control room fire is provided by Remote Shutdown Panels RP-118A and RP-118B. Section 7 of Hot Functional Test No. CS-03BB05 required, in part, that the capability of these panels be demonstrated by transfer of plant control from the control room to panels RP-118A and RP-118B in accordance with Off Normal Procedure OTO-ZZ-00001. The test results demonstrated the operability of the systems and equipment used to meet alternate shutdown capability outside the control room.

Controls and instrumentation provided on RP-118A are not electrically isolated from the control room and could be lost as a result of a control room fire. Controls and instrumentation on RP-118B are electrically isolated from the control room and

should not be lost as a result of a control room fire. Section C.27.7.3 of the SNUPPS FSAR (page 9.5B-189) indicates that the plant can be taken to safe shutdown with control at RP-118B only. Because of the manner in which the remote shutdown function was tested per CS-03BB05 and the design of RP-118A the applicant has not clearly demonstrated the capability to take the plant to safe shutdown in the event of a control room fire.

The ability to take the plant to safe shutdown conditions was further called into question during an April 12, 1984 walkdown of Off Normal Procedure OTO-ZZ-0001. The walkdown was performed at the inspectors' request in response to a postulated control room fire. During the walkdown an operator was observed alternating between RP-118A and RP-118B to achieve simulated safe shutdown indicating the potential need for both shutdown panels.

The applicant's control room fire hazards analysis submittal SLNRC 82-046 dated November 15, 1982 does not consider the loss of both redundant trains of safe shutdown equipment in the event of a control room fire. The applicant states in Appendix A of this document that, based on the NRC's review of FERMI-2 Nuclear Plant the NRC staff considered the area affected by an exposure fire in the control room to be about 10 feet in width. Therefore, the applicant determined that a fire that is 10 feet in diameter is consistent with separation dimensions found to be acceptable in the FERMI-2 evaluation. Despite the fact that the Callaway plant control room area, safe shutdown panel construction, and console configurations are not the same as the FERMI-2 arrangement, the applicant based their control room fire hazard analysis on twelve separate fires which individually affect safe shutdown systems or equipment within a 10 foot diameter circle.

In view of the foregoing, it is not clear whether:

- (a) A postulated worst case control room fire should assume the loss of both redundant safe shutdown trains and immediate evacuation of the control room.
- (b) Controls for and instrumentation of systems required for safe shutdown on remote shutdown panel RP-118A are assumed to be damaged and therefore lost as a result of the control room fire.
- (c) The postulated worst case control room fire assumes only the loss of safe shutdown controls and instrumentation for systems contained in a panel or cabinet which is affected by one of the 10 foot diameter fires postulated by the applicant with or without control room evacuation.



- (d) The postulated worst case control room fire assumes all twelve 10 foot diameter fires postulated by the applicant occurring simultaneously and immediate evacuation of the control room.
- (e) The postulated worst case control room fire assumes the loss of both redundant safe shutdown trains in the control room and the loss of control and instrumentation for safe shutdown systems on remote shutdown panel RP-118A and safe shutdown, hot standby, and plant cooldown must be achieved and maintained from remote shutdown panel RP-118B.
- (f) Section 7 of Hot Functional Test No. 03BB05 should have demonstrated this capability using remote shutdown panel RP-118B only, nor is it clear that Off Normal Operating Procedure OT0-ZZ-00001 and plant Cooldown Procedure OTS-ZZ-0001 are to be written to accomplish safe shutdown using remote Shutdown Panel RP-118 (This is further discussed in paragraph 6B of the report).

Subsequent to the identification of these concerns the applicant changed procedure OT0-ZZ-0001 and performed a successful simulated shutdown from outside the control room without utilizing RP-118A. This resolves concerns in this area.

(6) Emergency Lighting

Section D.5 of Appendix 9.5A and Section III.J. of Appendix 9.5E of the SNUPPS FSAR requires emergency lighting units with at least an 8-hour battery power supply be provided in all areas needed for operation of safe shutdown equipment and in access and egress routes thereto.

The applicant provided the inspectors with the test results of Preoperational Test No. C-04QDOZ for installed emergency lighting units. Of 12 emergency lights tested, one (auxiliary building elevation 2026 feet, No. AF-A3, inside the north electrical penetration room) failed at approximately seven and one-half hours during an 8-hour discharge test. The licensee indicated that this pass/fail ratio was acceptable and stated there were no future plans for 8-hour discharge testing of emergency lighting units. This is further discussed in paragraph 5.f(3) of this report.

e. Administrative Controls and Fire Brigade

Section B.1 of Appendix 9.5A and Section 4.K of Appendix 9.5E of the Callaway Site Addendum to the SNUPPS FSAR requires administrative controls be established to minimize fire hazards in areas containing structures, systems and components important to safety. Section H.1 of Appendix 9.5E and Section B.4 of Appendix 9.5A of the Callaway Site Addendum requires a site fire brigade trained and equipped for fire fighting be established to ensure adequate manual firefighting capability for all areas of the plant containing structures, systems

and components important to safety. Section 9.5.1.6 of the Callaway Site Addendum requires these aspects of the fire protection program be implemented before fuel load.

The inspectors examined these aspects of the fire protection program to determine the applicant's degree of compliance with commitments made to the NRC.

Administrative Procedure Numbers APA-ZZ-00740, 00741, and 00742 appeared to adequately control welding, cutting, open flame work activity, the transportation of combustible materials, and fire watch duties and training.

Administrative Procedure Number APA-ZZ-00743 appeared to adequately address fire brigade team organization and the duties of fire brigade members; however, this procedure is not consistent with the applicant's NRC guidance on offsite department assistance.

Section 9.5.1.8 of the Callaway site addendum states in part, "The Callaway plant has been designed to be self sufficient with respect to firefighting activities. Reliance on public fire departments for backup support has been excluded from the fire protection program..."

Section B.4 of Appendix A to NRC Branch Technical Position 9.5.1 and Standard Review Plan 9.5.1 requires offsite fire department assistance at each nuclear power plant. As nuclear power plants are most often located in remote areas where first response public fire departments are likely to be volunteer, Section B.4 of Appendix A to Branch Technical Position 9.5-1 and Standard Review Plan 9.5-1 require that the plant firefighting capability be self sufficient with reliance on public fire departments for supplemental and backup capability.

Given that local fire departments respond to provide backup assistance, responsibilities and duties need to be delineated in advance as necessary. Local fire departments need to be educated in the operational precautions when fighting fires on nuclear plant sites and must be made aware of the need for radioactive protection of personnel and the special hazards associated with a nuclear plant site. This coordinated training and supplemental firefighting capability is not part of the Callaway Fire Protection Program.

During the inspection, the licensee's staff indicated that an agreement with nearby offsite fire departments were being negotiated. The details of this agreement was provided to the inspectors and found satisfactory, resolving concerns in this area.

f. Proposed Operating Technical Specifications

Draft Technical Specifications 3.3.3.7, 3/4.7.10, 3.7.10.2, 3.7.10.3, 3.7.10.4, and 3/4.7.11 covering limiting conditions for operation and surveillance requirements for the fire protection system were reviewed. Draft Technical Specification 3.3.3.5 covering limiting conditions for operation and surveillance requirements for remote shutdown panel instrumentation required for safe shutdown outside the control room in the event of a control room fire was also reviewed.

The inspectors' review consisted of examination of the applicant's draft and station approved technical specifications against the Westinghouse Standard Technical Specifications, FSAR commitments to applicable codes and standards, and the NRC's model technical specifications for alternative shutdown systems required by 10 CFR Part 50, Appendix R. The following concerns were identified.

- (1) The action statement contained in Technical Specification 3.3.3.7 appears to be in conflict with commitments to install fire detection systems in accordance with NFPA 72D and NFPA 72E as stated in Section E-1 of the applicant's response to Appendix A to Branch Technical Position APCS 9.5-1 (Page 9.5A-13 of the SNUPPS FSAR). In most cases, where fire detectors are installed in accordance with NFPA requirements, the detection circuits are required to be designed to perform their detection functions in the event of a single break or ground fault condition in the circuits (this means that a distinctive trouble alarm must be given should a detector become inoperable). The applicant indicated in their response to Section E-1 of Appendix A to Branch Technical Position APCS 9.5.1 (Page 9.5A-13 of the SNUPPS FSAR) that only detection circuits which actuate automatic suppression systems serving safe shutdown areas are designed to perform under faulted conditions. However, it appears upon the inoperability of a single fire detector in a detection zone, a trouble signal will be indicated on the control room fire protection panel. While a trouble signal indication exists a fire alarm indication in that zone cannot be received in the control room. Therefore, all of the zone's detectors would be inoperable.

Based on the above, the action statement of Technical Specification 3.3.3.7 which states in part, "with any, but not more than half the total in any fire zone, Function A detection instruments shown in Table 3.3-11 inoperable, restore the inoperable instrument(s) to OPERABLE status within 14 days or within the next hour establish a fire watch patrol to inspect the zone(s) with the inoperable instrument(s) at least once per hour," is in conflict with the licensee's FSAR commitment to install fire detection systems in accordance with NFPA requirements and compromises the system's design.

As each fire detector installed in a fire area is not required to give a distinctive trouble signal in the event faulted condition, the reliability of the fire detection system is

compromised. With half of the detectors permitted to be inoperable, the the fire detection system loses its capability to provide the earliest possible warning of a fire. Furthermore, according to this action statement, this degraded condition can exist indefinitely as long as the fire area is patrolled by a fire watch once per hour. While this situation is less than desirable, it is within the framework of existing requirements and is acceptable by present standard technical specifications.

- (2) Section 417.11.1 of draft Technical Specification 3/4.7.11 requires only a visual inspection of fire dampers. This is discussed in paragraph 5.c(3) of the report.
- (3) The applicant has no plans for future operability testing of emergency lighting units required by Section 9.5.A and 9.5E of the SNUPPS FSAR. Existing standard technical specifications do not address this aspect of the fire protection system. This is a generic problem that is applicable to all plants, and that NRC Region III has referred to NRR for resolution.
- (4) Table 4.3-6 of draft Technical Specification No. 3.3.3.5 for the remote shutdown panel instrumentation appears to be inadequate in that it does not include all of the remote shutdown controls and instrumentation required for safe shutdown. The control and transfer switches for the chemical and volume control system and reactor coolant average temperature indication on remote shutdown panel RP-118B are not included in the specifications. The applicant's off normal procedure No. OT0-ZZ-00001 requires the reactor operator at the remote shutdown panel to start a boric acid transfer pump (A or B) to achieve the required boron concentration necessary for the shutdown margin at hot Xenon free conditions in the event of a control room fire. The applicant's representatives stated that the procedure was incorrect. The boric acid transfer pumps would not be used to achieve the required boron concentration for this condition. Instead, the Refueling Water Storage Tank (RWST) would be used. The boric acid transfer pump flow rate, the RWST boron concentration, and tank level indication are not included in the Technical Specification requirements. This is considered an unresolved item (483/84-15-02) pending further NRC review.

g. Station Approved Operating Surveillance Procedures

Section C.5 of Appendix 9.5A of the Callaway site addendum to the SNUPPS FSAR requires that a test program be established and implemented to assure that testing is performed and verified by inspection and audit to demonstrate conformance of the fire protection system with design and system readiness requirements. Section 9.5.1.6. of the Callaway Site Addendum requires these aspects of the fire protection program be implemented prior to fuel load.

The inspectors reviewed a selected sample (13) of the licensee's station approved technical specification surveillance procedures to



determine the adequacy of the procedures in accordance with the licensee's FSAR commitments. No items of noncompliance or deviations were identified.

h. Quality Assurance

Section C of Appendix 9.5A of the Callaway Site Addendum to the SNUPPS FSAR requires a quality assurance program be developed and implemented to assure that requirements for design, procurement, installation, testing and administrative controls for the fire protection program for safe shutdown areas of the plant are satisfied.

The inspectors verified that the fire protection quality assurance program is a graded Q.A. program under the management of the applicant's quality assurance organization. The inspectors' review of quality assurance surveillance reports, nonconforming reports, deficiency reports and audits, verified that the licensee is making efforts to effectively fulfill the responsibilities of the quality assurance program for fire protection. No items of noncompliance or deviations were identified.

6. Safe Shutdown Capability

a. Facility Design - Fire Protection

The applicant's commitments in Sections 9.5 of the SNUPPS FSAR and 9.5 of the Callaway Site Addendum require fire protection features to be provided in the plant design in accordance with applicable codes and standards so that one train of systems and equipment necessary to achieve and maintain hot shutdown conditions from either the control room or remote shutdown panel will remain free of fire damage in the event of a fire. Section 9.5.1.6 of the Callaway Site Addendum requires these design features be implemented prior to fuel load.

During plant tours, the inspectors examined the as-built plant configurations and found the following conditions:

(1) Fire Area C-9, ESF Switchgear Room - North, Room 3301

The safe shutdown analysis (Section 9.5B of the SNUPPS FSAR) indicates that only separation group circuits and switchgear are contained in this fire area.

The inspectors verified that adequate fire protection features have been provided for the fire area. No items of noncompliance or deviations were identified.

(2) Fire Area A-1, Auxiliary Building - Elevations 1974-1988, Feet  
Rooms 1101-1106, 1115, 1120-1125, 1128-1130, 1201-1207  
and 1329

The safe shutdown analysis (Section 9.5B of the SNUPPS FSAR) indicates that redundant safe shutdown circuits are contained in these rooms. Centrifugal charging capability is assured for hot shutdown by at least 35 feet separation of redundant circuits in room 1101. Redundant RHR System circuits required for cold shutdown may be damaged due to a fire in room 1121, however, these adverse conditions can be circumvented by manual realignment of valves.

Room 1128 contains circuits for both motor driven auxiliary feedwater pumps; however, the turbine driven auxiliary feedwater pump would not be affected by a fire in this area.

Rooms 1206 and 1207 in fire area A-1 are located directly above rooms 1128 and 1129. The rooms may be accessed from room 1129 by ladder. The floor opening in room 1207 is partially covered by a steel security hatch. Rooms 1206 and 1207 contain redundant circuits for all three auxiliary feedwater pumps which are located within 3 feet of each other. The suction valves for all three auxiliary feedwater pumps and the condensate storage tank level transmitters which switch the pumps' suction source to essential service water on low condensate storage tank level are also located in these rooms. Rooms 1206 and 1207 are essentially one room. A partial wall separates the two areas on one side.

The inspectors evaluated the fire protection features provided for these area and determined the following:

- (a) There is one fire detector installed in the area designated as room 1206. No fire detection is provided in the area designated as room 1207. No automatic fire suppression is provided in the fire area. To assure a suction source for the turbine driven auxiliary feedwater pump, the applicant stated in Section 9.5B of the SNUPPS FSAR that the turbine driven Auxiliary Feedwater Pump Suction Valve (No. AL-HV-32) and the associated conduits will be enclosed/wrapped to provide a 3-hour barrier. This condition was determined to be acceptable by NRR during a conference call on May 9, 1984. At the time of the inspection, the fire barrier wrap was not installed.
- (b) Trains A and B charging pump circuits are not separated by a 3-hour fire barrier in rooms 1101 and 1122 of fire area A-1. 35 foot separation exists between the redundant trains. An automatic preaction sprinkler system is provided over inaccessible cable trays in these rooms, but complete area wide fire detection and automatic fire suppression is not provided in the fire area. The existing installation has, however, been accepted by NRR.

(3) Fire Area A-23 - Main Steam and Feedwater Valve Compartment, Rooms 1508, 1509, 1411 and 1412

Loops 1, 2, 3, and 4 main steam piping (steam generators A&D) and associated isolation valves, power operated relief valves, feedwater piping and associated isolation and nonreturn valves for loops 1, 2, 3 and 4 and the steam generator blowdown isolation valves are installed in this fire area. Automatic fire suppression is not provided in the fire area. The applicant stated in the fire hazard analysis that an automatic detection system consisting of infrared flame detectors is installed in the fire area. Products of combustion fire detectors (ionization or photoelectric) are not installed in the fire area.

Catalog Number 6120 (Engineer and Architect Specification) for the installed infrared flame detectors states that "the flame detector is not recommended for protection against incipient and smoldering stage fires. These are better protected by the ionization detector." The flame detector is intended to protect hazards where anticipated fires will develop quickly with little or no incipient or smoldering stages such as flammable liquids, combustible gases or loose cotton fiber. Flame detectors respond to flicker or flame only.

The fixed combustibles in the fire area consist of cables and hydraulic fluid in the actuators of the main steam and feedwater isolation valves. The fluid is contained in a totally enclosed system and is not flammable. The applicant stated that transient combustibles introduced into the fire area will be those associated with maintenance of equipment such as hydraulic fluid, solvents and rags.

The applicant's response in Section III F of Appendix 9.5E of the SNUPPS FSAR states in part "automatic fire and smoke detector systems are installed throughout the plant on the basis of the fire hazards analysis and consequences of specific postulated fires." Based on the applicant's analysis of the fire hazard in Fire Area A-23, the use of infrared detectors would appear to satisfy existing commitments. Region III will separately pursue with NRR the use of infrared versus ionization type detectors in this and similar applications.

(4) Penetration Openings in Fire Barriers

Section A.1.2 of Appendix 9.5B of the FSAR indicates that Rooms 1111 and 1114 (fire area A-2) containing safe shutdown equipment are separated from adjacent fire areas by three-hour rated fire barriers. All penetrations through fire rated barriers are

required to be filled with three-hour rated penetration seal prior to fuel load in accordance with Section 9.5.1.6 of the Callaway Site Addendum to the SNUPPS FSAR. At the time of the inspection, auxiliary building electrical penetration number 312 in room 1114 (Charging Pump A) and electrical penetration number 307 in Room 1111 (Charging Pump B) had not been filled.

The applicant failed to provide the inspectors with acceptable documentation or other objective evidence to verify auxiliary building electrical penetration numbers 307, 312, 604 and other electrical penetration openings in fire barriers would be filled prior to fuel load. Contrary to the fire protection requirements for fuel load, the applicant's staff indicated certain fire barrier penetration openings might not be filled prior to fuel load. Completion of seals as committed to in the applicant May 7, 1984, submittal to NRR will be tracked as an open item (483/84-15-03).

(5) Fire Detectors - Reactor Building

The applicant's staff indicated that a "Protecto" wire line type fire detector would not be installed above the reactor vessel head or pre-operationally tested prior to fuel load as required by Section 9.5.1.6 of the Callaway Site Addendum to the SNUPPS FSAR. In lieu of this fire protection feature, the applicant committed to implement technical specification required compensatory measures for fuel load. Per the applicant's May 7, 1984 submittal to NRR, the detector will be installed and tested prior to exceeding 5% power. This will be tracked as an open item (483/84-15-04). Penetration openings in fire barriers must be sealed as committed to in the applicants May 7, 1984 submittal to NRR.

(6) Halon System Installations

The applicant's 10 CFR 50.55(e) report No. U-78 identified the installation of defective Chemetron check valves in all of the plant's halon fire suppression systems. Failure of these valves could have significant impact on the operability of the halon systems. The spring seat fracture that can occur obstructs the halon system discharge piping preventing minimum design concentrations from being achieved. Preoperational testing the systems could cause a check valve spring seat failure and render the systems inoperable.

In a meeting with the applicant on May 4, 1984 the applicant stated that they expected to replace the suspect check valves with an improved design by May 11, 1984. Until such time as the check valves are replaced the licensee stated that if the Halon systems are "fired" they will inspect the check valves after firing to make certain that the valves remain operable.



The applicant's submittal ULNRC-793 reported that final resolution to this problem will be implemented after fuel load. Per the applicant's May 7, 1984 submittal to NRR, for fuel load, applicant technical specification required compensatory measures will be implemented. This is considered an open item (50-483/84-15-01). Halon system testing must be completed and compensatory measures implemented as committed to in the applicant's May 7, 1984 submittal to NRR.

(7) Combustion Exhaust Gases in the Control Room

The applicant's 10 CFR 50.55(e) Report No. U-71 described a potentially significant event regarding the introduction of auxiliary boiler combustion exhaust gases into the plant control room. The event occurred on December 30, 1983 when exhaust gases from the plant's auxiliary boiler stack apparently entered the control building ventilation system air intake as a result of a temperature inversion or a down draft condition. Subsequently, an individual in the control room indicated he was nauseated and could not complete his work shift. Another individual indicated that he was light headed but did not become ill. A third individual indicated that the odor was unpleasant, he did not become ill. Reportedly, the control room operators noticed the smell of exhaust gas odors for approximately 30 minutes to one hour.

The inspectors verified that the applicant's auxiliary boiler stack and diesel generator exhaust stack installations conform to the design requirements of National Fire Protection Association Code 211.

The applicant indicated that the ionization type smoke detector provided in the control building ventilation system air intake was not operational at the time of the event to alert the control room operators to the presence of combustion gases or smoke in the ventilation system. The applicant acknowledged that, had this detector had been operational at the time, it is indeterminate whether or not its sensitivity to combustion gases to detect at the level that could impair control room operator performance could be relied upon. To circumvent recurrence of this condition the licensee proposed to demonstrate the operability of the installed control building ventilation system air intake smoke detector prior to fuel load. In addition, by 5 percent power either a carbon monoxide gas monitor will be installed and operational in the intake duct or portable carbon monoxide detection equipment will be in use in the control room. This item is further discussed in Region III Inspection Report 50-483/84-11.

(8) Emergency Lighting System

Section III J. of Appendix 9.5E to the SNUPPS FSAR and Section D.5 of Appendix 9.5A to the Callaway Site Addendum requires that emergency lighting units with an eight-hour

battery power supply be provided in all areas needed for operation of safe shutdown equipment and in access and regress routes thereto. Section 9.5.1.6 or the Callaway Site Addendum requires these fire protection features be provided prior to fuel load.

The licensee's installed emergency lighting system is inadequate to accommodate post fire shutdown conditions for the following reasons:

- (a) The inspectors walked down selected paths from the control room to the remote shutdown panel P-118B. Emergency lighting outside the control room in paths to stairwells, in stairwells, and in areas where the control room operators have to perform manual actions or repairs was either not provided or was inadequate with respect to location, obstructions and improper aiming of beams.
- (b) At the remote shutdown panels, fire area A-28, Room 1413, installed emergency lighting units are obstructed by the remote shutdown panels so that sufficient lighting cannot be obtained by positioning of the unit lamps. The lighting units are installed in positions behind and on the side of the remote shutdown panels such that the controls and instrumentations on the panels receive the least amount of illumination provided by the units.
- (c) In Room 1512, fire area A-21, operator actions are required to open breakers on motor control center NG-03C. Emergency lighting in access routes to auxiliary building general area (rooms 1504, 1506, and 1513) from the control building through adjacent fire area A-22 is inadequate in that the units are not provided, or where provided, they are not installed in a manner so that sufficient illumination exists for safe access or egress. At MCC NG-03C for the control room air conditioning filtration units in room 1512, the lighting unit is installed in a position where it is not possible to adjust the lamps to provide illumination at the MCC. Similar conditions exist at MCC's NB-02, NG-02, and NG-04 in the south ESF switchgear room 3302; at MCC NG-04C in control room air conditioning filtration unit room 1501; at MCC NG-02B in the south electrical penetration room 1409; outside the north electrical penetration room 1401, and at MCC NG-01B. Measures to assure proper aiming of lamps on properly installed emergency lighting units were not in place at the time of the inspection. Establishment of adequate emergency lighting will be tracked as an open item (50-483/84-15-05) which must be resolved prior to 5% power.

(9) Reactor Coolant Pump Oil Collection System

Section III.0 of Appendix 9.5E to the SNUPPS FSAR requires that an oil collection system be provided to hold the entire inventory of all four reactor coolant pumps. Section 9.5.1.6 of the Callaway Site Addendum requires this fire protection feature be installed prior to fuel load.

The applicant's reactor coolant pump oil collection system consists of installed drip pans and oil collection system piping routed to two 300 gallon oil collection tanks. Each reactor coolant pump holds an inventory of approximately 265 gallons. One lube oil collection tank serves to collect the oil from either of two pumps.

The capacity of the oil collection system is not sufficient to hold the entire lube oil inventory of all four reactor coolant pumps; however, the licensee accurately described this system in Section 9.5-1.22 of the SNUPPS FSAR and it has been accepted by NRR.

(10) Communication System

Sections 9.5.1.2.2.5 and 9.5.2 of the SNUPPS FSAR requires that a communications system, including portable radios, interplant voice communication public address (PA), and a maintenance jack system utilizing plug-in telephone type handsets and handsets with 5-channel jack stations be provided for effective communication among various plant locations and between the plant and locations external to the plant. Section 9.5.1.6 of the Callaway site addendum requires that these features be provided prior to fuel load.

During the inspection and walkdown of Off Normal Procedure OTO-ZZ-0001 the inspectors determined that the applicant's communication system is inadequate in that:

- (a) The plug-in handsets for operator use at the remote shutdown panel were not installed.
- (b) The Gaitronics (PA) System is such that messages cannot be clearly understood in all areas of the plant.
- (c) An analysis has not been performed to determine what portions of the Gaitronics System would be lost given a fire in specific plant areas. Reliance is placed on the Gaitronics Systems as a means of communicating to accomplish safe shutdown in the event of a fire.
- (d) Reliance is also placed on portable radio communications to accomplish safe shutdown; however, portable radio communications are unreliable due to the number of dead spots where portable radio communications cannot be transmitted or heard, including inside the remote shutdown

panel rooms. Establishment of reliable means of communications for shutdown outside the control room will be tracked as an open item (483/84-15-06) which must be resolved prior to 5% power.

(11) Safe Shutdown Cable Routings and Associated Circuits

Sections III.G.2 and III.L.7 of Appendix 9.5E to the SNUPPS FSAR requires that redundant trains of safe shutdown circuits for each fire area be known to be isolated from associated nonsafety circuits in the fire area so that hot shorts, open circuits or shorts to ground in the associated circuits will not prevent operation of safe shutdown equipment. The separation and barriers between trays and conduits containing associated circuits of one safe shutdown division and trays and conduits containing associated circuits or safe shutdown cables from the redundant division; or the isolation of these associated circuits from the safe shutdown equipment is required to be such that a postulated fire involving associated circuits will not prevent safe shutdown.

The applicant failed to respond to the NRC position stated in these sections of the SNUPPS FSAR; however, Section III Appendix B of the applicant's control room fire hazard analysis submittal (SLNRC 82-046) dated November 15, 1982 indicates that acceptable isolation features are provided such as circuit breakers, fuses, control switches, isolation switches, amplifiers, relays, transducers, and fiber optic couplers to circumvent the possibility of hot shorts between redundant safety divisions.

The applicant further indicates in the document identified above that the separation criteria for circuits within control panels recommended by Regulatory Guide 1.75 and IEEE 384 were adhered to in the plant design. The applicant also indicated that the effects of AFMs in solid state electronic components were not evaluated, but were assumed to be enveloped by the effects of AFMs in the electrical circuits associated with the same component.

No objective evidence was provided that an associated circuits review had been conducted to satisfy the specific criteria stated in the NRC position in Section III of Appendix 9.5E of the SNUPPS FSAR. The inspectors reviewed the routing of safe shutdown cables and associated nonsafety circuits on a sample basis to determine compliance with NRC requirements and found the following:



- (a) Power cable Number IBGB01AA and control cables numbers IBGB01AB and IBGB01AE for centrifugal charging pump PBG05A were traced by the inspectors from their point of origin at the pump motor (DPBG05A) through fire areas of the plant to their termination point at control panel NB0104.

Power cable numbers 4BBK40BG, 4BBK40BM, 4BBk40BL and control cable number 4BBK40BB, 4BBK40BD, 4BBK40BE, 4BBK40BJ, 4BBK40BK and 4BBK40BM for pressurizer Power Operated Relief Valve (PORV) BB-PCV-456A were traced from their point of origin at valve BB-PCV-456A through fire areas of the plant to termination points at penetrations ZSI-234, ZSE-234, ZSI-234 and control panels RL021, RL022, SB032D, and NK4421.

Power Cable number IEBG01AA and Control Cable numbers IEBG01AB, IEBG01AC, IEBG01AD, IEBG01AE, IEBG01AF, IEBG01AG, IEBG01AH, IEBG01AK, IEBG01AL for component cooling water pump PEG01A were traced from their point of origin at the pump motor DPEG01A through fire areas of the plant to termination points at control panels NB0107, RL019, RL020, and RP139.

The as built cable routings as identified in cable trays and conduits conformed with electrical raceway drawings and the separation/protection criteria of Section III G.2 of Appendix 9.5E of the SNUPPS FSAR. No items of noncompliance or deviations were identified.

(b) Common Power Source

Section III.G.2 of Appendix 9.5E to the SNUPPS FSAR requires that shutdown capability be protected from the effects of damage to associated circuits by physical separation, isolation, or enclosures. Power supply sources are required to supply necessary fault current for sufficient time to prevent loss of function of the shutdown loads. For associated circuits with a common power source, the associated circuit interrupting devices time-overcurrent trip characteristic must be such that a trip will be initiated prior to initiation of a trip of any upstream interrupting device which will cause the loss of the common power source.

The applicant indicated to the inspectors that there were no power sources common to associated circuits and safe shutdown circuits. For example, safe shutdown busses NB01 and NB02 contain only safety related circuits, thus precluding simultaneous failures of both busses due to the presence of associated circuits sharing the same power

source. The applicant further determined that if a safety circuit having a common power source with a safe shutdown circuit shorted due to a fire, the breaker time-overcurrent trip characteristic for the safety circuit would isolate the safety circuit before affecting the power source to the safe shutdown circuit.

The inspectors postulated a fire which shorted the main single line (diagram E-01001 Revision 7) in the feeder cable of containment spray pump DPEN01A. Time-current (T-C) characteristic curve E01023, Sheet 6, Revision 0 for the pump feeder breaker 152NB0102 (safety-related), indicated instantaneous tripping of the breaker at 800 amperes.

Time-current characteristic curves E01023, Sheet 13, Revision 0 and relay setting tabulation E01023, Sheet 1, Revision 2 for Feeder breakers 152NB0102 and 152NB0203 for safety related busses (safe shutdown) indicated that these breakers maintain an 800 ampere signal for indefinite period of time. Based on this information, it appears that a fire induced signal causing circuit faults in safety related circuits will not cause the loss of redundant or alternative power sources to safe shutdown circuits. No items of compliance or deviations were identified.

(c) Spurious Operation of Equipment

Section III.G.2 of Appendix 9.5E of the SNUPPS FSAR requires that a means be provided to isolate circuits of equipment and/or components whose spurious operation would affect the capability to safety shutdown in the event of a fire. Schematic diagram E-03BB39, Revision 7 for the pressurizer power operated relief valves (PORV's) was reviewed by the inspectors to determine compliance with the criterion. A fire was postulated in the control room causing spurious signals, opening the pressurizer PORV's.

During normal operation, the K713 contact closes on pressurizer high pressure and opens the pressurizer PORV. Manual opening of this contact can be effected by placing a hand indicating switch (HIS) in the close position. According to the applicant's safe shutdown analysis and statements made by their staff during the inspection, placing the hand switch in the close position is an activity that is accomplished from within the control room and an activity which may not be possible during a fire.

Schematic E03BB39, Revision 7, for the pressurizer relief isolation valves was also reviewed. During the postulated control room fire, contact K750 could open due to fire damage, causing a spurious opening signal to the valves. By manual adjustment of hand indicating switches in the control room, the valves can be closed in the same manner as the pressurizer PORV's. Again, this action may be precluded by the fire.

During the inspection, the inspectors informed the applicant that this method of circumventing spurious operation of equipment affecting safe shutdown within the fire area was contrary to previous NRC positions and therefore unacceptable. The applicant acknowledged the inspectors' position and agreed to respond to spurious opening of the pressurizer PORV's by closing the PORV block valves outside the control room at MCC NG02B in the event of a control room fire. Procedural incorporation of this action will be tracked as an open item which must be closed prior to 5% power (483/84-15-07).

(d) Common Enclosure

Where associated circuits share a common enclosure with safe shutdown circuits, Section III.G.2 and III.L.7 of Appendix 9.5E of the SNUPPS FSAR requires that appropriate measures such as breakers, fuses, or similar devices which isolate the associated circuits be provided to prevent the propagation of fire damage to safe shutdown circuits.

A common enclosure case was identified where associated cable 24 GKYITDA was routed from control panel RP068 and enclosed in a raceway containing train B safe shutdown cables. Associated cable 24GKY17DA separated from train B safe shutdown cables at raceway 23401F05 was routed through raceways 23401F1B, 23403027 and Firewalls 23403028, 23403024 and 23403025 to terminate in damper GKHZ175A. While in raceway 23403024, associated cable 24GKYITDA is within 5 feet of train A safe shutdown cables contained in cable tray 1BGB01AA. The 3-hour fire wall between raceways 23403025 and 23403028 provided separation between the redundant safe shutdown divisions but associated circuit 24 GKYITDA interfaces with both train A and B safe shutdown cables. Proper isolation of associated circuits 24GKY17DA was not verified; however the licensee indicated this isolation feature was provided for all such circuits. No items of noncompliance or deviations were identified.

(e) Containment Penetration Conductor Overcurrent Protective Devices

Electrical penetrations separating the reactor building and auxiliary building fire areas are discussed in Section 9.5.1.2.2.3. of the SNUPPS FSAR. Section 4.8.4.1 of the the applicant's draft technical specification for all containment penetration conductor overcurrent protective devices requires that these devices be demonstrated operable at least once power 18 months.

The applicant provided the inspectors with an approved surveillance procedure for the surveillance requirements of Draft Technical Specification 4.8.4.1.

B. Safe Shutdown Procedures

Section III.L.3 of Appendix 9.5.E to the SNUPPS FSAR requires procedures be in effect to implement alternative shutdown capability for specific fire areas in the plant. Section III.L.4 of this document requires that the number of operating shift personnel, exclusive of fire brigade members, required to operate such equipment and systems be on site at all times.

The inspectors reviewed and monitored the simulation of plant control from the remote shutdown panels using Off Normal Procedure OTO-ZZ-0001. The inspectors postulated a control room fire and subsequent evacuation of the control room by the reactor operators and made the following observations:

- (1) Technical Specification 6.2.2 specifies minimum staffing requirements during operations in Operational Modes 1, 2, 3, and 4. These staffing levels are:
  - a. One Shift Supervisor
  - b. One Senior Reactor Operator
  - c. Two Reactor Operators
  - d. Two Equipment Operators
  - e. One Shift Technical Advisor (STA)
  - f. One member of the Health Physics Organization qualified in radiation protection procedures
  - g. A site Fire Brigade of at least five members not to include the Shift Supervisor, two other members of the minimum shift crew necessary for safe shutdown of the unit, and any personnel required for other essential functions during a fire emergency

Thus, a minimum of nine personnel must be onsite at all times exclusive of added personnel required to perform essential functions during a fire emergency.

By specific assignment, the Shift Supervisor, two operators, and the health physics representative on shift will not be members of the fire brigade. Of the remaining operating staff, three



operators and the STA would technically be available as members of the fire brigade; however, given the emergency response duties of the STA as defined in NUREG 0737 it would be imprudent to assign the STA fire brigade responsibilities. Thus, at most, three members of the normal shift complement would be available for fire brigade duties.

Off Normal Procedure OT0-ZZ-0001 requires at least four reactor operators to implement (see paragraph 4.3(2)). Given this situation, staffing strictly in accordance with Table 6.2-1 of Technical Specification 6.0.1 would be inadequate under remote shutdown conditions. Additional personnel pursuant to Technical Specification 6.2.2e would be required. Staffing plans to satisfy these requirements will be tracked as an open item (483/84-15-08) which must be closed prior to 5% power.

This area was discussed with NRR on May 9, 1984. NRR's position was that if the stations administrative procedures specified the adequate number and type of personnel required on each shift, this was acceptable and the Technical Specifications did not have to be modified to be consistent with the administrative procedures. The applicants Administrative Procedure Number APA-ZZ-00010 (Conduct of Operations) does not specifically address this problem. Prior to exceeding five percent power, the applicant will demonstrate adequate on-shift staffing levels to support concurrent remote shutdown activities and fire brigade activities and establish specific administrative procedures to control these staffing levels at all times.

- (2) Off Normal Procedure OT0-ZZ-00001 does not consider the loss of the diesel generator load sequencer given a control room fire. Manual loading of the diesel generators would be required; the procedure does not address this action.

Procedure revisions to accomplish manual diesel generator loading in the event of a control room fire will be tracked as an open item (483/84-15-12). Prior to exceeding five percent power, the applicant will implement procedures prescribing manual loading of the diesel generators and local closure of the MSIV bypass, head vents and excess letdown valves if required, during a control room fire.

- (3) Section 5.0 of Attachment 2 to Off Normal Procedure OT0-ZZ-00001 does not require the operator to verify the diesel generator day tank level in room 5201 or to verify that the diesel generator fuel oil transfer pump is running during or following to a control room fire. Loss of the pump would require repairs to be made (i.e. splicing cable) to maintain hot shutdown conditions. No procedures are in place for making this repair. This lack of procedures is an open item (50-483/84-15-10). Prior to exceeding five percent power, the applicant will have in place procedures requiring periodic verification of diesel fuel oil availability and restoration of the diesel fuel oil transfer pumps in the event of a control room fire.

7. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, items of noncompliance or deviations. An unresolved item disclosed during the inspection is discussed in Paragraph 5.e(4) of the report.

8. Open Items

Open items are matters which have been discussed with the licensee, which will be reviewed further by the inspector, and which involve some action on the part of the NRC or licensee or both. Open items disclosed during the inspection are discussed in Paragraph 6.b(1), 6.b(2), and 6.b(3).

9. Exit Interview

The inspectors met with the licensee's representatives (denoted in paragraph 1) on April 12 and May 4, 1984 and summarized the scope and findings of the inspection. The applicant acknowledged the statements made by the inspectors and agreed to take corrective actions on all of the items of concern.