U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-454/84-60(DRS)

Docket No. 50-454 License No. CPPR-130

Licensee: Commonwealth Edison Company
Post Office Box 767
Chicago, IL 60690

Facility Name: Byron Station, Units 1 and 2

Inspection At: Byron Site, Byron, IL

Inspection Conducted: August 13-17 and October 5, 1984

Inspectors: C. Ramsey for L. Reyes — 10/10/84 Date

A. Coppola for L. Reyes — 10/10/84 Date

H. Thomas for L. Reyes — 10/10/84 Date

Approved By: L. Reyes, Acting Chief
Operational Programs Section — 10/10/84 Date

Inspection Summary

Inspection on August 13-17 and October 5, 1984 (Report No. 50-454/84-60(DRS))
Areas Inspected: Nonroutine, announced inspection for verification of implementation and compliance with the NRC's requirements for post fire safe shutdown as stated in Section 3.5.c.(7) of the Byron Fire Protection Report and to verify corrective actions taken in response to Inspection Report No. 50-454/83-62. The inspection involved 155 inspector-hours onsite by three NRC inspectors, including 10 inspector-hours during off-shifts.
Results: No items of noncompliance or deviations were identified.

DETAILS

1. Persons Contacted

Commonwealth Edison

R. Querio, Station Superintendent
**R. Ward, Assistant Superintendent - Administration
*D. St. Clair, Technical Staff Supervisor
*P. J. Nodzenski, QA Engineer
*P. F. Hart, QA Engineer
*D. Sible, QA Engineer
***C. J. Diaz, FP Engineer
*A. Roberts, Fire Marshal
*T. A. Gray, Technical Services Nuclear FP Engineer
*T. J. Tulen, Operating Systems Engineer
***K. A. Ainger, PED
*L. Sues, Assistant Superintendent Maintenance

Sargent and Lundy

*E. R. Crass, Licensing
*J. D. Regan, Electrical Engineer

M&M Protection Consultants

***R. J. Smith, Jr., Fire Protection Consultant
S. J. Chingo, Fire Protection Consultant

NRC

*P. G. Brockman, Resident Inspector
**J. Hinds, Senior Resident Inspector
**L. Reyes, Section Chief
**J. Ulie, Reactor Inspector

*Denotes those attending the exit meeting of August 17, 1984.
**Denotes those attending the meeting of October 5, 1984.
***Denotes those attending the exit meeting of August 17, 1984 and the meeting of October 5, 1984.

2. Applicant's Actions on Previous Inspection Findings

a. (Closed) IE Circular 78-18 "UL Fire Test": NRC Circular 78-18 informed applicant/licensee's of the potential use of fast response sprinkler heads in automatic sprinkler systems. The inspectors verified the applicant's use of ordinary hazard 165 degree sprinkler head in combination with heat collectors, appeared to be adequate to provide timely sprinkler actuation given a fire in areas where delayed sprinkler activation could occur, i.e., open stairwells.

b. (Open) Deviation (454/83-62-01(DE)) - Failure to provide a fully operational fire protection program in the fuel handing building prior to receipt of fuel onsite.

(1) Fire Hose Stations

(a) Closed - Fire hose stations were demonstrated operable in Hunter Corporation Pressure Directive and Report Test No. F.P.13 dated June 23, 1984, as indicated on Byron Station Drawing No. M-52-1.

(b) Closed - Fire hoses were connected to their respective standpipe outlets as indicated in the applicant's June 20, 1984 submittal to the NRC.

(c) Open - The applicant did not install pressure reducing devices on standpipe outlets on the refuel floor or throughout the plant. The applicants rationale and basis for this failure to comply with Section 4-4.2 of NFPA 14 is as follows:

1 All fire brigade members have been trained in the use of high pressure fire hoses up to 200 PSI, as is documented in a letter from the Byron Fire Department to the applicant dated July 17, 1984.

2 The applicants fire brigade training program requires at least two fire brigade members man the smallest (1½ inch) fire hose used in fighting internal structural fires.

3 The fire brigade uses a fog stream in attacking all internal structural fires except in the new fuel storage areas.

4 Prior to fuel load, the applicant will post sign on all standpipes with outlet pressures greater than 150 psi with a caution notice.

5 Only fire brigade members will be allowed to use standpipe fire hoses for internal structural firefighting.

The applicant's position was discussed with NRR on October 3, 1984 and was determined to be acceptable pending verification of implementation of the proposed alternatives.

(d) Closed - The applicant has replaced the adjustable fogging type nozzles with the proper type straight stream nozzles on hose stations in the new fuel storage areas as required.

(2) (Open) Fire Pumps and Water Supplies

Component demonstrations test No. 12 (F.P. 2.33.21) satisfactorily demonstrated operability of the station fire pumps in accordance

with Chapter 12 of NFPA 20. Characteristic curve plotted from the flow test data indicated acceptable pump performances. The fire pump assemblies were determined acceptable by NRR.

The applicant's response to Inspection Report 50-454/83-62 dated June 20, 1984, stated that an engineering analysis performed by fire protection consultants determined that the fire protection water supply system was not degraded by the butterfly valves installed at essential and nonessential service water system crossties to the fire water system. Backflow check valves are not installed at these connections as required by Article 3202 of NFPA 20.

The applicants rationale and basis for this deviation from NFPA requirements are:

(a) Internal hydrostatic test No. QA 3908 for the fire water system indicated an acceptable leakage rate.

(b) To address the problem of future undetected leakage of the fire water system into the service water systems, the applicant's surveillance procedure Nos. BVS FP-12 and BVS FP-9 requires periodic monitoring of leakage rates at the service water system crossties. Upon detection of leakage, each of the crossties can be isolated from the fire water system by the closure of various gate valves installed on the systems.

The applicant's position was discussed with NRR on October 3, 1984 and was determined to be acceptable pending verification of implementation of the proposed alternatives.

(3) (Closed) Fire Detectors

Marsh McClennan's review of the applicant's fire detector installations dated June 20, 1984, resulted in the installation of approximately 372 additional ionization type fire detectors which alarm locally and alarm and annunciate in the control room. The installations appear to satisfy inspector concerns in this area except that the analysis of ventilation air flows was complete. This is further discussed in unresolved item 454/83-62-14.

c. (Open) Deviation (454/83-62-45) - Preoperational test procedures were not developed to demonstrate operability of the fire protection system in accordance with NFPA and design requirements.

(1) Open - The applicant had not completed preoperational testing of the essential service water system to demonstrate its adequacy as a backup to the fire water system.

(2) Open - The applicant's Preoperational Test Procedure No. 2.48.20 requires preoperational testing of Emergency Lighting Units. Testing was not complete at the time of this inspection. The applicant indicated this testing will be completed in accordance with the applicant's open items list for fuel load. This is further discussed in Open Item No. 454/83-62-11.

(3) Open - Draft Procedure No. 2.104.20 and Preoperational Test No. C-144 requires preoperational testing of the non essential service water system as a backup to the fire water system. This testing was incomplete at the time of the inspection. The applicant indicated that the testing would be completed in accordance with the applicant's open item list for fuel load. This is further discussed in Open Item No. 454/83-62-11.

(4) Closed - Procedure No. BMS 7.10.5.C.2-1 required preoperational testing of fire hose stations and combined automatic sprinkler systems in accordance with the National Fire Protection Association (NFPA) standards. The results of this testing was satisfactory.

(5) Closed - QA Surveillance Procedure No. 3980 required preoperational testing of the underground loop, fire hydrants and the primary fire protection water supply system in accordance with NFPA requirements. The results of this testing was satisfactory.

d. (Closed) Unresolved (454/83-62-08) - Preoperational test procedure did not incorporate NFPA and design requirements.

(1) Closed - Section 4.0 of all test was revised to conform with system design and readiness requirements.

(2) Closed - Section 5.0 of all tests was revised to include reference to NFPA codes and standards.

(3) Closed - Sections 9.2 and 9.3 of Test Nos. 2.33.21 and 2.24.21 were revised to require that the electric and diesel fire pumps be demonstrated operable in accordance with NFPA 20.

(4) Closed - Section 9.16, 9.17, 9.18, 9.19, 9.20 and 9.21 of Preoperational Test No. 2.33.21 were revised to require that spray, sprinkler and foam systems be demonstrated operable in accordance with NFPA 13A.

(5) Closed - Section 9.32 of Preoperational Test No. 2.33.21 was revised to include measurement of detector sensitivity and response times in accordance with NFPA 72.E.

(6) Closed - Preoperational Test No. 2.33.20 and Sections 9.27, 9.28, 9.29 and 9.30 of Preoperational Test No. 2.33.21 were revised to require verification of room hazard design conditions in order to maintain Co_2 and Halon discharge concentrations in accordance with NFPA 12 and 12A.

e. (Closed) Deviation (454/83-62-02) - Failure to demonstrate operability of the station fire pumps in accordance with NFPA and design requirements. The inspectors verified that the applicant retested the station fire pumps in order to demonstrated their operability in accordance with NFPA and design requirements. The

test results were satisfactory and resolved all of the inspectors concerns. Items a through e are closed.

f. (Closed) Deviation (454/83-62-04) - Failure to install fire detectors in the fuel handling building in accordance with NFPA 72D and NFPA 72E. The inspectors verified that the applicant's corrective actions were satisfactory. Twenty-three additional fire detectors were installed in the fuel handling building which alarm and annunciate locally and in the control room.

g. (Open) Deviation (454/83-62-05) - Failure to install fire hose stations in accordance with NFPA 14 requirements. The inspectors verified that the applicant took satisfactory corrective actions by:

(1) Connecting standpipe hoses to their respective outlets throughout the plant.

(2) Providing the proper type nozzles on hoses.

(3) Hydrostatically testing hose stations in accordance with Chapter 7 of NFPA 14.

Regarding Item (1) of this deviation, the applicant takes exception to the installation of pressure reducers on fire hose station standpipe outlets and proposed to take corrective actions as discussed in Deviation No. 454/83-62-01.

h. (Open) Deviation (454/83-62-06) - Failure to provide qualified staffing to implement the fire protection program. The applicant provided the inspectors with a draft copy of a document discussing the qualifications of trained and experienced fire protection personnel in implementing the site fire protection program. While the qualifications of these individuals appear to be satisfactory, the applicant was requested by NRR to docket the draft document provided to the inspectors and update the plant's FSAR (Fire Protection Report) including submittal of updated individual resume's of personnel implementing the fire protection program.

Pending NRR's review and acceptance of the applicant's submittal, this item remains open.

i. (Open) Unresolved (454/83-62-09) - Capability of the essential and nonessential service water systems to perform as a backup to the fire water system was not demonstrated. At the time of the inspection, the applicant had not completed analysis, procedural development and station review of the actions necessary to use the service water pumps for this purpose. The applicant proposed to designate the essential service water system as the back up to the fire water system because the essential service water system is seismically qualified. Use of the essential service water system for this purpose could degrade their function to support safe shutdown.

The applicant has determined that the multiple redundancy of the fire water system fulfills the intent of NFPA 20 requirements. The applicant also determined that both service water systems are adequate backups to the fire water system based on an analysis performed by M&M Protection Consultant which was forwarded to the applicant by letter dated May 18, 1984. The analysis concluded that the nonessential service water systems (WS) could supply 72 percent of the fire water system demand while also supplying normal service water usage. With no service water usage, the nonessential service water system could supply 86 percent of the fire water system demand (750 GPM at 65 psi).

Hydraulic analysis and preoperational testing of the essential service water system (SX) was incomplete. However preliminary indications are that with one essential service water pump operating at 26,000 GPM, 100 GPM is available at the top of the most remote standpipe at a residual pressure of approximately 40 psi. Although this does not meet the minimum design requirements of NFPA, the analysis concluded that if essential service water demands could be eliminated during a fire, approximately 20 additional psi or 100 GPM at 60 psi would be available.

The essential service water system is required for emergency diesel generator cooling and cooling of other components required for safe shutdown. The applicant's staff indicated that because the essential service water system and the nonessential service water system are not SSE designed, the essential service water system would be used as a backup to the fire water system in the event of a seismic event and subsequent fire.

The applicant's position was discussed with NRR on October 3, 1984 and determined to be acceptable, pending completion of preoperational testing of the service water systems.

j. (Open) Unresolved (454/83-62-10) - Co_2 and Halon system preoperational test results did not demonstrate the systems operable in accordance with NFPA and design requirements. The inspectors verified that the applicant conducted satisfactory testing of all Co_2 and Halon systems except the upper cable spreading room Halon system.

Viking Sprinkler Corporation's letter of February 2, 1984, indicated that the completed tests demonstrated that the systems were operable in accordance with NFPA and design requirements.

The applicants Administrative Procedure BAP 1100-2 was revised to include a list prepared by Sargent and Lundy of Halon and Co_2 systems for future surveillance testing and verification that the design conditions required to achieve and maintain the required concentration hold times will be adhered to during plant operation. This item remains open pending completion of preoperational testing of the upper cable spreading room Co_2 system.

k. (Closed) Unresolved (454/83-62-41) - The applicant's proposed operating technical specifications for fire protection were inconsistent with NFPA design requirements and existing standard technical specifications.

The inspectors verified that the applicant's proposed operating technical specifications were revised to be consistent with existing standard technical specifications. In many instances, the proposed operating technical specifications are inconsistent with appropriate NFPA and design requirements. This is a generic problem that the Region has referred to the NRR. Revision of existing Standard Technical Specification by the NRC is under review by NRR. Based on the foregoing, these Items (1) through (5) concerning the applicant's proposed operating technical specifications are closed (see Paragraph 5.c of Report No. 50-454/83-62).

l. (Open) Open Item (454/83-62-42) - The applicant's proposed operating surveillance testing procedures were not developed to satisfy technical specification requirements and the procedures were inconsistent with NFPA and design requirements.

The inspectors verified that the applicant's proposed operating surveillance testing procedures were revised to include the appropriate design and technical specification surveillance requirements except as noted below:

(1) (Open) BOS 7.10.1.1.a-1.a did not consider use of the service water systems as a backup to the fire water system. The applicant's revision of this procedure is pending NRR's acceptance of the essential service water system as a backup to the fire water system as is discussed in Deviation No. 454/83-62-01.

(2) (Closed) Items (2) through (10) were satisfactory revised to include the appropriate design and technical specification surveillance requirements (see Paragraph 4.c of Report No. 50-454/83-62).

m. (Open) Unresolved (454/83-62-11) - Penetration openings in fire barriers were unsealed. The inspectors verified the following corrective actions had been taken by the applicant.

(1) (Open) - The opening around the pipe penetration through the wall of the enclosure containing the diesel fire pump is identified in Amendment No. 4 of the Fire Protection Report as a deviation from previous commitments to the NRC by the applicant. The applicant indicated that this opening will be sealed prior to exceeding 5 percent power. The applicant also proposed to cover the hole through the metal deck roof of the diesel fire pump enclosure prior to exceeding 5 percent power.

(2) (Open) - The applicant indicated that all penetration openings in fire barriers and preoperational testing will be completed prior to fuel load in accordance with the applicant's open items list for fuel load.

(3) (Open) - The applicant indicated that membrane protection of all structural steel will be completed prior to fuel load. This item remains open pending verification of the above by the inspector.

n. (Closed) Unresolved (454/83-62-12) - Components in the fire pump assemblies and the fire protection water supply system were not tested and approved for usage in fire water systems as specified in NFPA standards. The inspectors verified that the applicants fire pump assemblies have been accepted by NRR. Usage of the service water systems as a backup to the fire water system has been referred to NRR for review.

o. (Open) Unresolved (454/83-62-44) - Backflow check valves were not installed at crossties connecting the service water systems to the fire water system. The applicant takes exception to this requirement of NFPA 24. Instead, the applicant proposed to revise administrative procedures BVS FP-12 and BVS FP-9 to periodically check each crosstie connection for leakage. The procedures will specify upon detection of leakage of the fire water system into the service water system or excessive starting of the main fire pumps, the butterfly valves at these connections will be isolated from the fire water system. It is possible to isolate each of these valves by manually closing a series of sectionalizing isolation valves on the ring header to the fire water system. As stated in deviation Number 454/83-62-01, the applicant's position was discussed with NRR on October 3, 1984 and was determined to be acceptable pending verification of implementation of the proposed alternatives.

p. (Open) Unresolved (454/83-62-13) - The applicant's safety-related battery rooms were not separated from other areas and the ventilation systems appeared to be inadequate to maintain hydrogen concentrations below the lower explosive limits. During this inspection the applicant was in the process of installing 3-hour rate fire walls which enclosed and separate safety-related battery rooms from other areas of the plant. The fire wall installations were not complete at the conclusion of the inspection. Items a through d concerning safety related battery rooms remain open pending further verification by the inspector (See Paragraph 5.E (3) of Report 50-454/62-13).

q. (Open) Unresolved (454/83-62-14) - Plant wide fire detection system was inadequate. The inspectors verified that the applicant installed approximately 372 additional fire detectors throughout the plant in accordance with NFPA standards to satisfactory close out Items a, b, c and f. Items d and e remain open pending the applicants completion of an evaluation of fire detector installations in areas where there are high ventilation air flows.

r. (Closed) Unresolved (454/83-62-15) - Yard hydrant hose houses were not adequately constructed and equipped with firefighting equipment. The applicant purchased and installed new hydrant hose houses which are of adequate construction and are equipped with a satisfactory compliment of firefighting equipment. The hose houses were purchased under the applicants Purchase Order No. 286301.

s. (Closed) Unresolved (454/83-62-16) - Fire protection water supply system control and sectionalizing isolation valves were inadequately supervised plant wide. The inspectors verified that control and isolation valves were properly supervised. The applicant's administrative procedure No. BOS 7.10.11.C-1 requires periodic visual verification of valve positions and verification that seals and locks are intact on valves that are not electronically supervised.

t. (Closed) Unresolved (454/83-62-17) - Remote shutdown panel area does not meet the requirements for safe shutdown. The inspectors verified the following corrective actions taken by the applicant:

(1) (Closed) - Procedures were developed.

(2) Unsealed penetration openings are discussed in (Open) Unresolved Item No. (454/83-62-11).

(3) (Closed) - Additional fire detectors were installed.

(4) (Closed) - Emergency lighting unit was installed.

(5) The applicant requested an exemption from the requirements for automatic fire suppression in this area. The acceptability of the applicant's request is pending NRR approval.

u. (Closed) unresolved (454/83-62-18) - Control room does not meet requirements for safe shutdown. The inspectors verified the following corrective action taken by the applicant:

(1) (Closed) - Penetration openings in fire barriers are discussed in (Open) Unresolved Item No. (454/83-62-11).

(2) (Closed) - Unprotected steel beams are discussed in (Open) Unresolved Item No. (454/83-62-11).

(3) (Closed) - Emergency lighting units were operable.

(4) (Closed) - Additional fire detectors were installed.

v. (Closed) Unresolved (454/83-62-19) - Lower cable spreading rooms do not meet the requirements for safe shutdown. The inspectors verified that additional fire detectors were satisfactorily installed in the area.

w. (Closed) Unresolved (454/83-62-20) - Auxiliary electric equipment room does not meet the requirements for safe shutdown. This item is rewritten as Open Item No. 454/84-60-05.

x. (Closed) Unresolved (454/83-62-21) - Fire Suppression System not installed in HEPA filter room as required. The inspectors verified that manual deluge fire suppressions system are installed in HEPA filter rooms. P&ID No. M-103, Sheet 3 of 3 indicates that the drainage of fire suppression water from these rooms flows through

a fixed pipe drainage system at floor level of the rooms which drains to the containment and radwaste sumps. This was verified and determined satisfactory.

y. (Closed) Unresolved (454/83-62-22) - Auxiliary building, elevation 426 feet does not meet the requirements for safe shutdown. The inspectors verified that the applicant rerouted safe shutdown cables in this area and identified the lack of required fire suppression for the area as a deviation from NRC guidelines in Amendment No. 3 of the Byron Fire Protection Report.

z. (Closed) Unresolved (454/83-62-23) - Auxiliary Building, elevation 401 feet does not meet the requirements for safe shutdown. The inspectors verified the following corrective actions taken by the applicant:

(1) The applicant elected not to use the boric acid transfer pumps in achieving the required boration for post fire safe shutdown. Instead, the Refueling Water Storage Tank (RWST) will be used.

(2) One train of redundant safe shutdown cables that interface within 20 feet is shielded from fire by a 3-hour fire barrier wrap material.

(3) Automatic fire suppression is no longer required as a result of the installation of the 3-hour fire barrier wrap material.

aa. (Closed) Unresolved (454/83-62-24) - Auxiliary building, elevation 383 feet does not meet the requirements for safe shutdown. The inspectors verified the following corrective actions taken by the applicant:

(1) The applicant identified the lack of automatic fire suppression for the area as a deviation request in Amendment No. 3 to the Byron Fire Protection Report.

(2) Additional fire detectors were added.

(3) Local reading of auxiliary feed flow was deleted from the safe shutdown analysis as identified in Amendment No. 3 to the Byron Fire Protection Report.

(4) The division 11 cables within 10 feet of division 12 cables were shielded in a 3-hour fire barrier wrap material.

(5) Emergency lighting was installed.

bb. (Closed) Unresolved (454/83-62-25) - Diesel auxiliary feedwater pump room does not meet the requirements for safe shutdown. The inspectors verified the following corrective actions taken by the applicant:

(1) An automatic CO_2 fire suppression system was provided.

(2) Additional fire detectors were added.

cc. (Closed) Unresolved (454/83-62-26) - Auxiliary building, elevation 364 feet does not meet the requirements for safe shutdown. The inspectors verified the following corrective actions taken by the applicant:

(1) The applicant has requested a deviation from the requirements for automatic fire suppression in Amendment No. 3 of the Fire Protection Report.

(2) Additional fire detectors were installed.

(3) Procedures were developed for required manual actions to accomplish safe shutdown.

dd. (Closed) Unresolved (454/83-62-27) - Charging pump room 1A did not meet the requirements for safe shutdown. The inspectors verified the following corrective actions taken by the applicant:

(1) The applicant requested a deviation from the requirements for separation of redundant safe shutdown trains in Amendment No. 3 of the Fire Protection Report.

(2) The applicant requested a deviation from the requirements for automatic fire suppression in Amendment No. 3 of the Fire Protection Report.

(3) The applicant requested a deviation from the requirements for protection of redundant safe shutdown trains in Amendment No. 3 of the Fire Protection Report.

ee. (Closed) Unresolved (454/83-62-28) - Charging pump room 1B did not meet the requirements for safe shutdown. The inspectors verified the following corrective actions taken by the applicant:

(1) The applicant requested a deviation from the requirements for separation of redundant safe shutdown trains in Amendment No. 3 of the Fire Protection Report.

(2) Area fire detection was reevaluated and determined satisfactory by the inspectors.

(3) The applicant requested a deviation from the requirements for automatic fire suppression in Amendment No. 3 of the Fire Protection Report.

(4) The applicant requested a deviation from the requirements for protection of redundant safe shutdown trains in Amendment No. 3 of the Fire Protection Report.

ff. (Closed) Unresolved (454/83-62-29) - RHR pump room 1A did not meet

the requirements for safe shutdown. The inspectors verified the following corrective actions taken by the applicant:

(1) The applicant requested a deviation from the requirements for separation of redundant safe shutdown trains in Amendment No. 3 of the Fire Protection Report.

(2) Area fire detection was reevaluated and determined satisfactory by the inspectors.

(3) The applicant requested a deviation from the requirements for automatic fire suppression in Amendment No. 3 of the Fire Protection Report.

(4) The applicant requested a deviation from the requirements for protection of redundant safe shutdown trains in Amendment No. 3 of the Fire Protection Report.

gg. (Closed) Unresolved (454/83-62-30) - RHR pump room 1B did not meet the requirements for safe shutdown. The inspectors verified the following corrective actions taken by the applicant:

(1) The applicant requested a deviation from the requirements for separation of redundant safe shutdown trains in Amendment No. 3 of the Fire Protection Report.

(2) The applicant requested a deviation from the requirements for automatic fire suppression in Amendment No. 3 of the Fire Protection Report.

(3) The applicant requested a deviation from the requirements for protection of redundant safe shutdown trains in Amendment No. 3 of the Fire Protection Report.

(4) The applicant requested a deviation from the requirements for sealing penetration openings in fire barriers in Amendment No. 3 of the Fire Protection Report.

hh. (Closed) Unresolved (454/83-62-31) - Boric Acid Transfer Pump room did not meet the requirements for safe shutdown. The applicant elected not to use the boric acid transfer pump to achieve post fire safe shutdown. Use of the Refueling Water Storage Tank (RWST) was determined acceptable by the inspectors. Therefore, Items a through e concerning the boric acid transfer pump room are closed (See Paragraph 6.A.(16) of Inspection Report 50-454/83-62).

ii. (Closed) Unresolved (454/83-62-32) - Division II Switchgear room did not meet the requirements for safe shutdown. The inspectors verified the following corrective action taken by the applicant:

(1) Satisfactory procedures were developed for accomplishing post fire safe shutdown.

(2) Equipment required to be manually operated was identified.

(3) Emergency lighting was installed.

(4) Membrane protection of structural steel is discussed in Open Item No. 454/83-62-11.

(5) Ten additional fire detectors were installed.

jj. (Closed) Unresolved (454/83-62-33) - Division 12 Switchgear room did not meet the requirements for safe shutdown. The inspectors verified the following corrective actions taken by the applicant:

(1) Satisfactory procedures were developed for accomplishing post fire safe shutdown.

(2) Emergency lighting was installed.

(3) Membrane protection of structural steel is discussed in Open Item No. 454/83-62-11.

(4) Twelve additional fire detectors were installed.

kk. (Closed) Unresolved (454/83-62-34) - Component Cooling Water Pump room did not meet the requirements for safe shutdown. The inspectors verified the following corrective actions taken by the applicant:

(1) The applicant provided the capability for local operation of the atmospheric main steam relief valves as discussed on page 2.4-18 of Amendment No. 3 of the Fire Protection Report.

(2) The applicant requested a deviation from the requirements for separation of redundant safe shutdown trains in Amendment No. 3 of the Fire Protection Report.

(3) Additional fire detectors were installed.

(4) The applicant installed partial automatic suppression and requested an exemption from the requirements for full automatic fire suppression in Amendment No. 3 of the Fire Protection Report.

(5) The applicant wrapped the power cable to the swing pump and installed a partial height wall between the Unit 1 and Unit 2 pumps. While this does not satisfy the NRC's safe shutdown criteria for protection of redundant safe shutdown trains, the applicant and the inspection team determined that the component cooling water pumps are not required to achieve post fire hot shutdown.

ll. (Closed) Unresolved (454/83-62-35) - Separation of redundant safe shutdown trains. The applicant requested an exemption from the requirements for considering combustible loading in fire areas and the installation of area wide automatic fire detection and suppression

in Amendment No. 3 of the Fire Protection Report. This closes Items (1), (2) and (3).

mm. (Closed) Unresolved (454/83-62-36) - Plant-wide emergency lighting was inadequate to support the safe shutdown function in the event of a loss of offsite power. The inspectors verified that adequate numbers of additional emergency lighting units were provided through out the plant. Aiming of beams, repositioning of lighting units and illumination levels will be evaluated and corrective actions taken in accordance with the applicant's open items list for fuel load as discussed in Open Item No. 454/83-62-11.

nn. (Open) Unresolved (454/83-62-37) - Reactor Coolant Pump Oil Collection System has inadequate capacity to hold the entire lube oil inventory from all four reactor coolant pumps. The oil collection system overflows to the oil separator which cannot be utilized due to Technical Specification requirements to maintain the oil separator full. The total inventory for all four reactor coolant pumps is 980 gallons rather than 1100 gallons. However the capacity of the containment sump is only 750 gallons. This item remains open pending the applicant's resolution.

oo. (Closed) Unresolved (454/33-62-38) - The applicant had no procedure developed for the calibration of protective relays and a complete analysis of associated circuits and their affects in post fire safe shutdown was not provided. The applicant's Procedure No. BHS 8.4.1-a.2-2 satisfactorily addressed the calibration of protective relays. The applicant's associated circuits analyses is discussed in Section 6 of the report.

pp. (Closed) Unresolved (454/83-62-39) - The applicants response to NRC Question No. 10.65 dated August 2, 1984, discussed the applicant's analysis of equipment whose spurious operation due to fire that would adversely affect post fire safe shutdown. This information was forwarded to NRR for review.

qq. (Open) Unresolved (454/83-62-43) - Associated circuit cable routing was not in compliance with IEEE 384. The applicant determined that based on the non-safety function of the identified cable No. 1C507, separation in accordance with IEEE 384 was not required. Since cable No. 1C507 interfaces with two redundant reactor protection system channels, this is being referred to Region III's Division of Reactor Safety, Plant Systems Section for their review and disposition.

rr. (Closed and rewritten) Unresolved (454/83-62-40) - Safe shutdown procedures were not developed and plant operators were not trained to accomplish post fire safe shutdown. This item is closed and rewritten as Open Item No. 454/84-60-05.

ss. (Open) Unresolved (454/83-62-07) - Inadequate Quality Assurance Program for fire protection. The applicant did not provide the inspectors with acceptable evidence that appropriate quality assurance measures were being applied to fire protection. This item remains open pending further review by the inspector.

3. Documents Reviewed

a. Procedures

Number	Title
BVS 7.10.1.1.F.1-1	Annual Fire Pump Surveillance Test
BMS 7.11.1.d-1	18 Month Fire Damper Surveillance
2.48.20	Open Items List for Fuel Load
2.104.10, C-144	Service Water System Preoperational Test
3980	QA Surveillance
BAP 1100-2	Breaking of Fire Barriers, Penetration Seals, Fire Dampers, Fire Doors and Floor Plugs
BVS 7.10-2	Foam Sprinkler Systems Surveillance
BMS 7.11.1.3-B	Fire Damper Surveillance Testing
BOS 7.4.A-1	Service Water System Contained Volume Weekly Surveillance
BOS FP-6	Spray and Sprinkler System Surveillance Testing
BVS 7.10.2-d	3 Year Spray/Sprinkler System Surveillance Testing
BOP 199-A27	Daily CO_2 Supply Verification
BOS 7.10.3.2.A-1	Weekly CO_2 Supply Verification
BOS FP-3	Spray/Sprinkler System 2 Inch Drain and Inspectors Test
BVS 7.10.2.d-1	3 Year Air Flow Testing of Deluge Systems
BMP 3200-002	Verification of Halon Storage Tank Weight
BHS 7.10.3.2.B-1 thru 11	18 Month Operability Testing of CO_2 and Halon Systems
BMS 7.11.1.3-B	18 Month Operability Testing of Fire Dampers
BAP 1100-16	Fire Watch Inspection
BVS FP-12	Degradation of the Fire Main System
BVS FP-9	Leakage of the Fire Main System
BOS 7.10.11.C-1	Fire Protection System Isolation Valve Surveillance
B01AP-06E	Station General Surveillance
BHS 8.4.1.a.2-2	Calibration of Undervoltage Protective Relays
1B0A Elect 3	Local Emergency Start of Diesel Generator
1B0A Elect 5	Local Control of Safe Shutdown Equipment
1B0A PRI-5	Control Room Inaccessability

b. Drawings - Mechanical - P&ID (Safe Shutdown Systems)

Number	Rev. No.	Title
M-37	AC	Auxiliary Feedwater
M-42 sh1	S	Essential Services Water

Number	Rev. No.	Title
M-42 sh3	AC	Essential Services Water
M-42 sh4	AD	Essential Services Water
M-42 sh5	T	Essential Services Water
M-42 sh7	G	Essential Services Water
M-42A	C	Essential Services Water
M-42 sh8	D	Essential Services Water
M-42 sh2	Z	Essential Services Water
M-42 sh6	W	Essential Services Water
M-64 sh1	W	Chemical & Volume Control & Boron Thermal Regen.
M-64 sh2	Z	Chemical & Volume Control & Boron Thermal Regen.
M-64 sh3	AF	Chemical & Volume Control & Boron Thermal Regen.
M-64 sh4	AG	Chemical & Volume Control & Boron Thermal Regen.
M-64 x	B	Chemical & Volume Control & Boron Thermal Regen.
M-64 sh7	AA	Chemical & Volume Control & Boron Thermal Regen.
M-64 sh8	T	Chemical & Volume Control & Boron Thermal Regen.
M-66 sh1	AA	Component Cooling
M-66 sh2	W	Component Cooling
M-66 sh3	Z	Component Cooling
M-103		Oil Collection System drains to containment sump
M-52-1		Byron Station Drawing

c. Electrical Schematics

Number	Title
6E-1-4030-AF01	Auxiliary Feedwater Pump 1A
6E-1-4030-4F02	Auxiliary Feedwater Pump 1B
6E-1-4030-AF12	Auxiliary Feedwater Trip 1B (Diesel Driven)
6E-0-4030-CC01	Component Cooling Pump 0 (Div. 11)
6E-0-4030-CC02	Component Cooling Pump 0 (Div. 12)
6E-0-4030-CC03	Component Cooling Pump 0 (Div. 21)
6E-0-4030-CC04	Component Cooling Pump 0 (Div. 22)
6E-0-4030-CC05	Component Cooling Pump 0 (Div. 11)
6E-0-4030-CC06	Component Cooling Pump 0 (Div. 12)
6E-0-4030-CC07	Component Cooling Pump 0 (Div. 21)
6E-0-4030-CC08	Component Cooling Pump 0 (Div. 22)
6E-1-4030-CC01	Component Cooling Pump 1A
6E-1-4030-CC02	Component Cooling Pump 1B
6E-1-4030-CV01	Centrifugal Charging Pump 1A
6E-1-4030-CV02	Centrifugal Charging Pump 1B
6E-1-4030-DG01	Diesel Generator 1A Feed to 4.16 KV ESF SWGR Bus 141 ACB & 1413
6E-1-4030-DG02	Diesel Generator 1B Feed to 4.16 KV ESF SWGR Bus 142 ACB & 1423

Number	Title
6E-1-4030-DG31	Diesel Generator Starting Air Compressors
6E-1-4030-DG32	Diesel Generator 1A Starting Sequence Control
6E-1-4030-DG32	Diesel Generator 1A Starting Sequence Control
6E-1-4030-DG33	Diesel Generator 1A Starting Sequence Control
6E-1-4030-DG34	Diesel Generator 1A Starting Sequence Control (Description of Operation)
6E-1-4030-DG44	Diesel Generator 1A Control Cabinet Switches Development
6E-1-4030-DG52	Diesel Generator 1B Starting Sequence Control
6E-1-4030-DG53	Diesel Generator 1B Starting Sequence Control
6E-1-4030-DG54	Diesel Generator 1B Starting Sequence Control (Description of Operation)
6E-1-4030-RY12	Pressurizer Relief Isolation Valves 1RY8000A & 1RY8000B
6E-1-4030-SX01	Essential Service Water Pump 1A
6E-1-4030-SX02	Essential Service Water Pump 1B
6E-1-4020A	Relaying & Metering Diagram Diesel Gen. 1A 10G01KA Generator Control Engine Governor Control System Part 1
6E-1-4020B	Relaying & Metering Diagram Diesel Gen. 1A 10G01KA Generator Control Part 2
6E-1-4031-AF01	Aux. Feedwater Steam Gen. 1A Flow Control System ESF-11
6E-1-4031-AF02	Aux. Feedwater Steam Gen. 1A Flow Control System ESF-12
6E-1-4031-AF03	Aux. Feedwater Steam Gen. 1B Flow Control System ESF-11
6E-1-4031-AF05	Aux. Feedwater Steam Gen. 1C Flow Control System ESF-11
6E-1-4031-AF06	Aux. Feedwater Steam Gen. 1C Flow Control System ESF-11
6E-1-4031-AF07	Aux. Feedwater Steam Gen. 1D Flow Control System ESF-11
6E-1-4031-AF08	Aux. Feedwater Steam Gen. 1D Flow Control System ESF-12
6E-1-4031-FW01	Steam Gen. Wide Range Level Loop "1A" (1LT-0501) Protection Cabinet 1 (1PA01J)
6E-1-4031-FW02	Steam Gen. Wide Range Level Loop "1B" (1LT-0502) Protection Cabinet 2 (1PA021)
6E-1-4031-NR001	Source & Intermediate Range Neutron Level Part 1
6E-1-4031-NR002	Source & Intermediate Range Neutron Level Part 2
6E-1-4031-RC13	Wide Range Temp. (Hot Leg) Protection I (1TE413A, 1TE423A) Protection Cabinet 1 (1PA01J)
6E-1-4031-RC14	Wide Range Temp. (Cold Leg) Protection II (1TE-413B, 1TE-423B) Protection Cabinet 2 (1PA02J)
6E-4031-RC25	Wide Range Temp. (Hot Leg) Protection I (1TE-433A, 1TE-443B) Protection Cabinet 2 (1PA02J)

Number	Title
6E-1-4031-RC28	Wide Range Temp. (Cold Leg) Protection II (1TE-433B, 1TE-443B) Protection Cabinet 2 (1PA02J)
6E-1-4031-RY01	Pressurizer Pressure Protection 1 (1PT-0455) Protection Cabinet 1 (1PA01J)
6E-1-4031-RY02	Pressurizer Pressure Protection II (1PT-0456) Protection Cabinet 2 (1PA02J)
6E-1-4031-RY03	Pressurizer Pressure Protection III (1PT-0457) Protection Cabinet 3 (1PA04J)
6E-1-4031-RY06	Pressurizer Pressure Protection IV "C" (1LT-0460) Protection Cabinet 2 (1PA02J)
6E-1-4031-RY07	Pressurizer Pressure Protection III (1LT-0461) Protection Cabinet 3 (1PA03J)
6E-1-4031-RY08	Reactor Coolant System Wide Range Pressure (1PT-0405) Protection Cabinet 1 (1PAC1J)

d. Test Results

Number	Date	Title
F.P.-13	06/23/84	Hunter Corp. Pressure Directive and Report Component Demonstration Test
F.P.2.33.2.21 Test No. 12	06/27/84	M&M Protection Consultant's Halon System Concentration Test

e. Procurement/Design Specifications

Number	Date	Title
VH-10	06/16/84	Design Change

f. Proposed Operating Technical Specification

Number	Title
3.3.3.5	Remote Shutdown Panel Instrumentation
3/4.5.4	Refueling Water Storage Tank
3/4.8.1	Diesel Generator Fuel Oil Storage Tank and Fuel Oil Transfer Pump
3.1.2.5 & 6	RWST Minimum Boron Concentration
3.3.3.8	Fire Detection Instrumentation
3.7.11.1	Fire Protection System
3.7.11.2	Spray and/or Sprinkler System
3.7.11.3	CO_2 Systems
3.7.11.4	Halon Systems
3.7.11.5	Fire Hose Station
3.7.11.6	Yard Fire Hydrants and Hydrant Hose House
3.4.7.12	Fire Rated Assemblies

g. Reports

Date	Title
06/20/84	M&M Protection Consultant Fire Detector Installation Review

4. Post Fire Safe Shutdown Capability

a. Systems Required to Achieve and Maintain Post Fire Safe Shutdown

The inspectors examined these safe shutdown systems and determined that the systems were grouped under the headings of the goals established for PWR Safe Shutdown for both hot standby and cold shutdown. The following redundant systems and components required for post fire safe shutdown were examined to determine that at least one train would remain free of fire damage in order to achieve and maintain hot standby conditions from either the control room or remote shutdown station.

(1) Reactivity Control

Upon detection of a disabling fire, the control rods will be inserted using the scram switch in the control room. If fire forces evacuation of control room before scram, then the reactor will be scrammed at the control rod drive panel in the battery and miscellaneous electrical equipment room at elevation 451', or at the remote shutdown panel. Additional negative reactivity will be added by boration via the charging pumps using the refueling water storage tank as a source (2000 PPM Boron). The inspectors determined this to be satisfactory.

(2) Reactor Coolant Makeup (Level and Pressure Control)

Either Train A or B centrifugal charging pump (100-125 gpm) feeds water via normal charging path and Reactor Coolant Pump seals. Level is controlled by cycling the pump on and off. This cycling may have to be accomplished at the pump breaker if fire has damaged the control circuit at the control room or remote shutdown panel. (See associated circuits discussion, Section 6 which describes the modification required to isolate breakers from control circuits.)

Pressure is controlled by the PORV's either in the control room or at the remote shutdown panel. If a fire disables the control circuits (either at the remote shutdown panel or in the control room), for the PORV block valves, they may be closed by a switch at their respective motor control centers. These switches must be modified in order to provide complete isolation from the control room. (See associated circuits discussion, Section 6 of the report which describes the modifications required to isolate the control circuits form the control room.)

(3) Decay Heat Removal

Natural circulation is established by dumping steam from steam generators via the atmospheric steam dumps. Auxiliary feedwater is provided by either Train A or B motor driven pump, or in case of a control room fire by the diesel driven auxiliary feedwater pump which can be started at the local panel. (The motor driven pumps can also be used if the pump breakers are modified as in the case of the charging pump). Suction for the chosen pump is aligned to the condensate storage tank which has a minimum volume for 9 hours of operation. When this source is exhausted, the suction is switched to the essential service water system (from the base of the cooling towers). Valves for this operation can be manually positioned.

The steam generator PORV's (atmospheric dumps) can be opened and closed with hydraulic hand pumps, and the safety relief valves are available as back-ups. The MSIV's and the steam dump valves to the condenser can also be closed manually. The inspectors determined this to be satisfactory.

(4) Process Monitoring (Instrumentation)

The following instrumentation is available on the remote shutdown panel (1PL04, 5, 6J):

- R. C. Hot Leg Temperature
- R. C. Cold Leg Temperature
- Pressurizer Level
- Pressurizer Temperature
- Pressurizer Pressure
- Steam Generator Level
- Steam Generator Pressure
- Aux. Feedwater Flow
- Source Range Neutron Flux
- RWST Level

For a fire in the Aux. Electrical Equipment Room, all signal conditioning may be lost, and it is possible to lose all instrumentation in the control room and at the remote shutdown panel.

The applicant has proposed a "Fire Hazards Panel" to be located in the electrical penetration area at Elevation 426' which will as a minimum contain the following instrumentation:

- Steam Generator Level (2 Channels)
- Steam Generator Pressure (2 Channels)
- Pressurizer Level (1 Channel)
- Pressurizer Pressure (1 Channel)
- R. C. Hot Leg Temperature (4 Channels)
- R. C. Cold Leg Temperature (4 Channels)
- Source Range Neutron Monitor (1 Channel)

(Aux. feed pump flow can be monitored by pump discharge pressure at pump and pump motor amperage at breaker)

The design of this panel is not yet complete. However, the applicant has proposed to operate with a fire watch in the Aux. Electrical Equipment Room until the design has been reviewed and the panel installed. The applicant would not commit to a date when the panel would be installed. This deviation from the NRC's post fire safe shutdown criteria was identified by the applicant in Amendment No. 3 of the Byron Fire Protection Report. This is further discussed in open item Number 454/84-60-03.

(5) Support Systems

The emergency diesel generator auxiliary feedwater diesel, auxiliary feedwater pumps, charging pumps, pumps room coolers, and HVAC for all essential areas are cooled by the Essential Services Water System. The component cooling water system is required only for cold shutdown (RHR heat exchangers), and as a back-up to RCP seal injection (seal cooling). Therefore, only the ESW system is required for hot standby. The ESW Pumps may require manual operation of breakers in the case of fire damage to the control circuits in the control room or remote shutdown panel. (This is further discussed in Section 6 of the report.)

Either Diesel Generator A or B (see discussion in Section 6.2), is required for hot standby and cold shutdown. The ventilation systems (fans & coolers) for all essential areas, and either Train A or B of the DC batteries are also required. The inspectors determined this to be satisfactory.

(6) Cold Shutdown

The systems required for achieving cold shutdown include all of the support systems listed in Section 4.a(5) above, in addition to the RHR system (one train). Repairs to this system, in the form of cable replacement, may be required. This material will be ordered and stored onsite, dedicated for this purpose only. Other repairs presently indicated in the Byron Amendment No. 3 (Section 2.4), such as the replacement of a boric acid pump, will be deleted form the post fire procedures. This is considered an Open Item (454/84-60-01) pending verification of the applicants acquisition, storage and designation of replacement cable required to make repairs for cold shutdown.

b. Alternative Safe Shutdown

(1) Areas Where Alternative Safe Shutdown Capability Is Not Required Or Proposed

Appendix 5.8 of Amendment No. 3 to the Byron/Braidwood Fire Protection Report describes 34 existing deviations to the

requirements of Section III G of Appendix R, for Byron Unit 1, and the applicants proposed corrections for these deviations. This document is presently under review by NRR and therefore the audit team did not evaluate these corrections. In general, the redundant equipment required for safe shutdown was well separated and/or protected by 3 hour rated fire barriers. The deviations discussed in the applicants Appendix 5.8 are mainly cases of electrical power and control cables which lacked proper separation, and the correction in most cases will be to encase one train of cables in fire rated barriers.

(2) Areas Requiring Alternative Safe Shutdown Capability

(a) Control Room

For a control room fire of unknown magnitude and duration, which caused fire damage to safe shutdown circuits and forced plant operators to evacuate the control room, the applicant has installed remote shutdown capability outside of the control room. This remote shutdown capability consists of control panels and a group of cabinets which are adjacent to each other in the same fire area. The cabinets contain all of the required controls and instrumentation for both redundant safe shutdown Trains A and B which enhance the capability of achieving and maintaining hot standby and hot shutdown. Cold shutdown outside of the control room can be accomplished by local operation of the pumps and valves required for cold shutdown.

The controls and instrumentation provided on the remote shutdown panels are not electrically isolated from the control room and thus, could be lost due to a control room fire (see discussion in Section 6 of the report). In view of this, the applicant has developed procedures which specify local operation of the required pumps (at the breakers) and valves (at the respective motor control centers). This method of achieving and maintaining hot standby and hot shutdown will require some repairs (jumpers). This is not consistent with the NRC's position for achieving and maintaining hot standby and hot shutdown conditions. In view of this inspector concern, the applicant agreed during the inspection to install switches at the required breakers which would isolate them from either the control room or remote shutdown panels so that the breakers can be operated without making repairs in order to achieve and maintain hot standby or hot shutdown conditions.

The present control room alternative post fire safe shutdown method does not meet the NRC's requirements for safe shutdown. This is considered an Open Item (454/84-60-02) pending verification of the applicants corrective actions.

The control room for Unit 1 and the control room for Unit 2 are located in the same same fire area. The controls and instrumentation associated with each unit are at opposite ends of the control room (fire area) and control all general plant functions (i.e., switch yard, power distribution, etc.) and safe shutdown functions.

Although unit two is not yet licensed to operate, for the purpose of discussion, it was determined by the inspectors that the postulated fire scenario applicable to the Byron Unit 1 control room would force complete evacuation of the control room including the Unit 2 shift crew. It was postulated that the fire would only cause fire damage to safe shutdown controls and instrumentation for Unit 1. However, remote shutdown outside of the control room would be necessary for both units if both units were operating at the time the fire occurred. This position was arrived at with the guidance of NRR/ASB. Whenever Unit 2 becomes operational, this will result in the need for safe shutdown procedures and the necessary staffing on site at all times to accomplish remote post fire safe shutdown of both units in the event of a control room fire.

(b) Auxiliary Electric Equipment Room

The signal conditioning equipment for all of the instrumentation required for post fire safe shutdown from the control room or remote shutdown panel is located in this fire area. A single fire in this area could cause the loss of all instrumentation indication in the control room and at the remote shutdown panel. In addition, the emergency diesel generator load sequencer would be lost as a result of this fire. In view of the above, the applicant has proposed to install a fire hazards panel as discussed in Section 4.A(4) of this report. According to the applicant, this panel will not be installed prior to fuel load and initial startup. In lieu of the panel installation, the applicant proposes to establish a continuous fire watch in the auxiliary electric equipment room as an interim compensatory measure during power operation. The acceptability of this is being referred to NRR for resolution. This is considered an open item (454/84-60-03) and is being referred to NRR.

(c) Corridor Outside of Diesel Driven Auxiliary Feedwater Pump Room-Elevation 383 Feet (Fire Zone 11.4.0)

Cables for both motor driven auxiliary feedwater pumps are located in this area. However, given a fire in this area, post fire safe shutdown can be achieved by use of the diesel driven auxiliary feedwater pump providing access to the diesel driven auxiliary feedwater pump room is possible.

To insure the availability of the diesel driven auxiliary feedwater pump if access to the room is not possible due to a fire in Fire Zone 11.4.0, the applicant agreed to install a remote switch at the elevation below this space (fire zone 11.3.0) which would allow starting of the diesel driven auxiliary feedwater pump. This is considered an open item (454/84-60-04) pending verification of the applicant's corrective action.

No items of noncompliance or deviations were identified.

5. Post Fire Safe Shutdown Procedures

The procedures reviewed during this inspection included:

- 1BOA PRI-5 (Rev. 2), "Control Room Inaccessability - Unit 1"
- 1BOA ELEC-3 (Rev. 0), "Local Emergency Start of a Diesel Generator, Unit 1
- 1BOA ELEC-5 (Rev. 0), "Local Emergency Control of Safe Shutdown Equipment"

The procedure for control room inaccessability (1BOA PRI-5) is written for going from power operation to cold shutdown if required. It is written in a two column format. The first column assumes operation of the remote shutdown panel and the second (right hand column) gives the local actions required (refers to other procedures such as IBOA ELEC-3 or 1BOE ELEC-5) if the required response is not obtained by the action called for in the first column.

The procedure as presently written does not meet the NRC's requirements for safe shutdown for the following reasons:

a. Repairs - If a fire in the control room damages the diesel loading controls, the present procedure calls for repairs (jumpers) to the diesel starting breakers prior to operation.

b. Pressurizer Heaters - Present procedures call for use of pressurizer heaters for reactor pressure control. Since these are not available for all fires, the procedure should be rewritten to allow control using PORV's and pressurizer safety relief valves only.

c. Time and Manpower - The procedure should be exercised with available manpower (depending on one or two unit operation), and the applicant should be able to demonstrate that the procedure can be accomplished within the time constraints established in the FSAR and Technical Specifications for establishing auxiliary feedwater flow and level control to the secondary side and establishing level and pressure control on the primary side.

The procedure was walked through on August 15, 1984, and all the operations called for appeared feasible, given the modifications to the breakers outlined in Sections 4 above and 6 of the report. The procedure was not timed however, and it should be noted that all the

areas required for entry to affect safe shutdown are vital areas and protected by security card locks. It took longer in most cases for the inspection team to gain entry, than it would have for an operator, but this must be accounted for in any demonstration of the procedure. The procedure should also indicate how communication is established and maintained between the remote shutdown panel and all other locations requiring safe shutdown operations. This is considered an open item (454/84-60-05) pending verification of the applicants corrective actions.

No items of noncompliance or deviations were identified.

6. Associated Circuits

The inspectors examined Byron Unit 1 for compliance with the associated circuits provisions of Section 3.5.c(7) of the Byron Fire Protection Report which requires that the safe shutdown equipment and systems for each fire area be known to be isolated from associated circuits in the fire area so that hot shorts, open circuits or shorts to ground in the associated circuits will not prevent operation of the safe shutdown equipment.

The inspection included evaluation of the following three associated circuit concerns:

a. The criteria for associated circuit interrupting device time - overcurrent trip characteristics for all circuit faults is discussed in Section 2.4.1.5.5.a. of the Byron Fire Protection Report.

The common bus concern is found in circuits, either non-safety related or safety-related, where there is a common power source with shutdown equipment, and the power source is not electrically protected from the circuit of concern. A sample selection of circuits was checked in order to audit for this concern at Byron 1. Circuits were examined for fuse, circuit breaker, or relay coordination. The sampling included the following:

- Diesel Generator 1B feed to 4.16 KV ESF switchgear
- Essential Service Water Pump 1A
- Essential Service Water Pump 1B
- Centrifugal Charging Pump 1B
- Component Cooling Water Pump 1B
- Motor Driven Auxiliary Feedwater Pump
- Pressurizer Relief Isolation Valves - 1RY 8000 & 1RY 8000B

The applicant has initiated a program for the coordination of relays, circuit breakers and fuses. Samples of the coordination effort supplied by the applicant were as follows:

- 480 Volt Unit Substation
  Calculation No. 4391/19 AN-4

- Protective Relay Settings for 4160 V Non-Safety Related
  Switchgear Calculation No. 4391/19 AU-4

. Protective Relay Settings for 4.16 KV ESF Switchgear 141/142 Calculation No. 4291/19 AN-3

b. Spurious Signal Concern

The criteria for the case of equipment whose spurious operation due to a fire, could adversely affect post fire safe shutdown capability is discussed in Section 2.5.1.5.5b. of the Byron Fire Protection Report. Fundamentally, the spurious signal concern considers the false motor, control and instrumentation readings and, spurious operation of safety-related or non safety-related components that adversely affect post fire safe shutdown (i.e. RHR/RCS isolation valves) such as those that occurred in the 1975 Browns Ferry fire.

The inspectors examined the spurious signal concern at Byron Unit 1 for the following cases.

(1) Current Transformer Secondaries

The current transformer secondaries which are installed in the diesel generator metering circuits were checked. The applicant has installed a switch, (at the local panel) to isolate the instrumentation which is located at the main control board from the diesel generator local control panel.

This was determined to be satisfactory by the inspectors.

(2) High Low Pressure Interfaces

The applicant identified two high low pressure interfaces, namely, the RHR pump suction lines and the pressurizer relief isolation valves. The applicant determined that the RHR/RCS isolation valves operate spuriously only when the control switch at the main control board is closed and the reactor pressure switch interlock is closed. Since the reactor pressure switch is remotely located from the control room, this method was found to be satisfactory.

The pressurizer relief isolation valve circuitry was determined to be vulnerable to damage as the result of a fire in the control room which would prevent operation at their respective motor control centers.

During the inspection, the applicant agreed to modify the transfer switches to provide an additional source of 125 V.D.C control power which will be independent of the control room. Upon completion of this modification, electrical isolation of control power from the control room can be achieved.

This is considered an open item (454/84-60-06) pending verification of the applicants corrective actions.

(3) Isolation of Other Fire Instigated Spurious Signals

(a) The applicant had analyzed for this concern as part of a response to questions raised by NRC. This concern was resolved by removing power for valves such as the essential service water pump suction valves 1SX001A and 1SX001B. The auxiliary feedwater pump test discharge valves 1AF004A and 1AF004B would require that the operators utilize available instrumentation to analyze for the event since time was considered to be available.

At the time of the inspection, it was determined that the 125 V.D.C. control power required to start the emergency diesel generators 1A, 1B could be lost for a fire in the control room. The same situation would exist for the pressurizer relief isolation valves. As a result, the following components would not be operable.

- Diesel Generator Feeder Breakers - Train A, Train B
- Essential Service Water Pumps 1A, 1B
- Charging Pumps 1A, 1B
- Motor Driven Auxiliary Feedwater Pumps 1A, 1B

During the inspection, the applicant agreed to make the necessary modifications to provide acceptable isolation to insure that these safe shutdown functions would remain operable in the event of a control room fire. This is considered an open item (454/84-60-07) pending verification of the applicant's corrective actions.

(b) A fire at the remote shutdown panels 1PL03J and 1PL04J may result in a loss of 125 V.D.C. control power for both divisions and consequently the ability to electrically energize the circuit breakers for the following post fire safe shutdown systems and equipment:

- Essential Service Water Pump 1A, 1B
- Charging Pump 1A, 1B
- Motor Driven Auxiliary Feedwater Pump 1A, 1B
- Diesel Generator Feeder Breaker (Both Trains)

During the inspection, the applicant agreed to make the necessary modifications to provide acceptable isolation to insure that these safe shutdown functions would remain operable in the event of a fire at the remote shutdown panel. This is considered an open item (454/84-60-08) pending verification of the applicants corrective actions.

c. Common Enclosure Concern

The criteria for the case of the common enclosure concern is discussed in Section 2.4.1.5.5.c. of the Byron Fire Protection Report. The common enclosure concern is found where associated

cables share a common enclosure with safe shutdown cables such as a raceway. Where this case exists, proper isolation must be provided so that a fire involving the associated cable will not adversely affect the safe shutdown cable.

At Byron Unit 1, the inspectors determined that the common enclosure concern was answered satisfactorily by the applicant when a sample of circuits selected were found to be electrically protected. In addition, the applicant stated that non safety-related circuits were never routed from one train to another; and, safety-related divisions were not mixed in the same raceways or conduits or, mixed with non-safety-related cables in raceways and conduits. The inspectors verified that power, control and instrumentation cables are routed in separated raceways or conduits.

The applicant had analyzed for all non-safety-related cables which share an enclosure with safety-related cables and demonstrated that an ongoing circuit breaker, relay and fuse coordination program was in effect and that the coordination was satisfactory.

No items of noncompliance or deviations were identified.

7. Communications

Walkie talkies are powered by the security-emergency diesel generator which is independent of the control room.

The other available modes of communication are the hard wired sound powered phones and the normal station telephone system. The station telephone system is also powered by the security emergency diesel generator.

Adequate communication appear to be available to support post fire safe shutdown. However the applicant had not established what modes of communications would be utilized in accomplishing post fire safe shutdown. The plant gaitronics (PA) system cannot be relied upon for this purpose since it could be lost due to a fire in the control room or in other areas of the plant. This is discussed in Section 5.c. of the report.

No items of noncompliance or deviations were identified.

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 Paragraphs 4.a(6), 4.b(2)(a), 4.b.(2)(b), 4.b.(2)(c), 5, 6.b.(2), 6.b(3)(a) and 6.b(3)(b).

9. Exit Interview

The inspectors met with the applicant's representatives (denoted in paragraph 1) on August 17 and October 5, 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 concerns.