

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-295/87034(DRS); 50-304/87035(DRS)

Docket Nos. 50-295; 50-304

Licenses No. DPR-39; DPR-48

Licensee: Commonwealth Edison Company
P. O. Box 767
Chicago, IL 60690

Facility Name: Zion Nuclear Power Station, Units 1 and 2

Inspection At: Zion, Illinois

Inspection Conducted: November 16, 1987 through March 14, 1988

Inspectors: *Jeff Holmes*
Jeff Holmes

April 7, 1988
Date

Jeff Holman Fox
K. Parkinson (Sonalysts, Inc.)

April 7, 1988
Date

Jeff Holman Fox
R. Odor (BNL)

April 7, 1988
Date

Ronald N. Gardner
Approved By: Ronald N. Gardner, Chief
Plant Systems Section

4/7/88
Date

Inspection Summary

Inspection conducted during the period of November 16, 1987 through March 14, 1988 (Reports No. 50-295/87034(DRS); No. 50-304/87035(DRS)).

Areas Inspected: Special, announced safety inspection conducted to assess compliance with 10 CFR 50, Appendix R, and review Fire Protection Program requirements. The following inspection modules were utilized by the inspectors: 2515-62 and 64704.

Results: Of the areas inspected, four violations were identified (Paragraph 2.e(2) - failure to adequately establish, implement and maintain procedures; Paragraph 3.b - failure to update and comply with technical surveillance requirements for fire walls; Paragraph 2.h - failure to provide adequate emergency lighting, and Paragraph 3.k - failure to meet a license condition to install a Fire Pump Controller).

DETAILS

1. Persons Contacted

Commonwealth Edison Company (CECo)

- +*G. Pliml, Plant Manager
- *A. Amoroso, PWR Engineering
- *A. Bleu, Regulatory Assurance
- +*T. Boyce, Fire Marshal
- +R. Cascarano, Tech Staff Supervisor
- +*E. Fuerst, Production Superintendent
- *T. Hausheer, Production Services Department
- *W. Kurth, Assistant Superintendent of Operations
- +*P. LeBlond, Nuclear Licensing Administrator
- +*F. Lentine, PWR Licensing Supervisor
- +*M. Manning, Station Operations
- *I. Netzel, Tech. Staff Engineer
- *C. Sprandel, Quality Assurance
- +*W. Stone, Regulatory Assurance Supervisor
- *D. Wozniak, Project Engineer

Sargent and Lundy (S&L)

- *F. Berry, Licensing Project Engineer
- *R. Hameetman, Project Manager
- *J. Reedy, Electrical Project Engineer
- *I. Warner, Senior Electrical Project Engineer

Engineering Planning and Management Company (EPM)

- *D. Brecken, Project Manager
- *A. Melikian, Electrical Engineer
- +*P. Nicholson, Fire Protection Engineer

Nuclear Regulatory Commission (NRC)

- +P. Eng, Resident Inspector
- *R. Hodor, Mechanical Safe Shutdown Specialist
- *M. Holzmer, Senior Resident Inspector
- *D. Calhoun, Electrical Engineer
- *R. Gardner, Chief, Plant Systems Section
- *K. Parkinson, Electrical Safe Shutdown Specialist

*Denotes persons attending the exit meeting of November 20, 1987.

+Denotes persons attending the exit meeting of January 15, 1988.

2. Assessment of Appendix R Compliance

On a sample basis, the inspectors examined measures that the licensee implemented to assure safe shutdown capability and compliance with 10 CFR 50.48, Appendix R. The inspection consisted of an assessment of the licensee's implementation of Appendix R requirements for physical plant conditions, required operator actions, systems and components, operator training, supplemental procedures, and the methodology employed to mitigate resultant adverse equipment operability due to plant exposure to fires. The results of the inspectors review are as follows:

a. Systems Required for Safe Shutdown

The Appendix R functional goals required to achieve post-fire safe shutdown are:

- ° Reactivity control capable of achieving and maintaining cold shutdown reactivity conditions (reactor coolant temperature less than or equal to 200°F).
- ° Reactor coolant make-up capable of maintaining water level within the level indication in the pressurizer at all times during shutdown operation.
- ° Process monitoring capable of providing direct readings to perform and control the above functions.
- ° Supporting functions capable of providing process cooling, lubrication, etc. necessary to permit operation of the equipment used for safe shutdown functions.

In accomplishing the goals outlined above, the equipment and systems used to achieve and maintain hot shutdown conditions should be free of fire damage and capable of maintaining such conditions for 72 hours, using offsite or onsite emergency power. The equipment and systems used to achieve and maintain cold shutdown conditions should be either free of fire damage or the damage to these systems should be limited such that repairs can be made and cold shutdown conditions achieved within 72 hours, using offsite or onsite emergency power.

(1) Reactivity Control Function

Upon detection of a fire that requires evacuation of the main control room, the reactors of both units will be tripped either automatically or manually prior to evacuation. The reactors can also be tripped from the respective Rod Control MG set rooms by opening the rod control breakers. Subsequently, the Refueling Water Storage Tank (RWST) is aligned manually to the charging pump inlet. The RWST is kept at 200 ppm boron (by Technical Specifications) insuring negative reactivity for the reactor at hot shutdown.

(2) Reactor Coolant Make-up (Level and Pressure Control)

For a post-fire safe shutdown, reactor coolant system (RCS) inventory is controlled first by isolating all reactor coolant leakage paths and verifying isolation of those paths. Isolation of these paths will limit most of the variation in pressurizer level due to coolant inventory shrinkage. Borated inventory makeup can be provided as required via the coolant charging pumps taking suction from the refueling water storage tanks.

(3) Decay Heat Removal

Decay heat is removed from the reactor following a reactor scram via the steam generators by natural circulation cooldown. Only one steam generator is required for safe shutdown. In order to preclude steam generator dryout, the auxiliary feedwater system starts feeding the steam generators in less than 30 minutes. The condensate storage tank (CST) serves as the water source for the auxiliary feedwater system. During cooldown to cold shutdown conditions, the atmospheric dump valves are opened to vent steam to the atmosphere. If instrument air is lost, the valves are manually opened.

(4) Process Monitoring Instrumentation

In order to achieve and maintain the post-fire safe shutdown goals of reactivity control, reactor coolant makeup, pressure control and decay heat removal, the operator requires instrumentation to ascertain and control various plant parameters. Process monitoring instrumentation provided at Zion Units 1 and 2 includes:

- Pressurizer Level
- Primary System Pressure
- Cold & Hot Leg Temperatures T_H and T_C
- Steam Generator Level - Wide Range
- Steam Generator Pressure
- CST Level (from local pressure gage)
- RWST Level (from local pressure gage)

The source range neutron flux monitoring is not provided except in those cases where shutdown is from the Main Control Room. The Licensee provided the inspector with an analysis titled "Assessment of source range monitoring requirements for shutdown and cooldown due to a fire at the Zion Plant" (P075 Task 26, Project File F).

Section III.L.2.d of Appendix R to 10 CFR Part 50 indicates that the process monitoring function shall be capable of providing direct reading of the process variables necessary to perform and control the reactivity function.

Information notice 84-09 is specific in stating that hot shutdown source range neutron flux monitoring for PWRs is considered necessary to achieve hot shutdown.

The Licensee has elected to implement an alternate method of compliance as identified in Generic Letter 86-10 (the guidance approved by the Commission regarding Appendix R.). As stated in Enclosure 1 to the Generic Letter titled "Interpretations of Appendix R," while Information Notice 84-09 provides an acceptable method for compliance with the regulation, it does not exclude other alternative methods of compliance. Accordingly, a licensee may propose to the staff alternative instrumentation to comply with the Regulation (e.g., Boron Concentration Indication). While such a submittal is not an exemption request, it must be justified based on a Technical Evaluation.

In the letter dated January 21, 1988, to A. B. Davis, NRC, from F. Lentine, CECO, the licensee indicated that CECO had provided justification for the use of Boron sampling instead of source range monitoring in its July 1984, Appendix R submittal.

This is considered an open item (295/87034-01, 304/87035-01) pending acceptance of the Technical Evaluation for the Boron sampling method by NRR.

(5) Supporting Equipment

The safe shutdown components and systems described in Sections 1-4 of the licensee's analysis require the availability of the following support systems in order to properly perform their safe shutdown functions.

- ° Emergency Diesel Generators
- ° 4160V AC
- ° 480V AC
- ° 125V DC
- ° 120V DC
- ° Component Cooling System
- ° Service Water System

b. Cold Shutdown

The reactor coolant system temperature and pressure are reduced by natural circulation using the atmospheric dump valves and the auxiliary feedwater system. After reduction of the RCS temperature and pressure below approximately 350°F and 400 psig, the Residual Heat Removal System is initiated to establish long-term cooling. This is accomplished by the transfer of decay and sensible heat from the RCS to the environment via the Residual Heat Removal System, Component Cooling Water System, and the Service Water System to Lake Michigan.

c. Alternative Safe Shutdown

The licensee has developed alternative shutdown capability for a fire occurring in the Main Control Room, the Inner or Outer cable Spreading Rooms, and the Auxiliary Electric Equipment Room. There are four remote shutdown panels per unit in the Auxiliary Building. These panels provide the instrument and controls for the safe shutdown systems which are required for alternative shutdown.

Components controlled from the Remote Shutdown Panels are as follows:

- ° Auxiliary Feedwater Pumps (1 turbine, 2 electric)
- ° Charging Pumps (2)
- ° MSIV Isolation Valves (loops A,B,C & D)
- ° Auxiliary Feedwater Steam Generator A&D Level Control Valves (4)

Instrumentation installed on the remote shutdown panels is as follows:

- ° Steam Generator Level (A & D)
- ° Steam Generator Pressure (A & D)
- ° Loop A & D Hot Leg Temperature
- ° Loop A & D Cold Leg Temperature
- ° Pressurizer Level
- ° Pressurizer Pressure

Procedure FOP-1 has been developed by the licensee to implement safe shutdown from outside the control room in the event of a fire in the control room.

d. Area Compliance with Appendix R, Section III.G.2

Appendix R, Section III.G.2, specifies that where redundant trains of systems necessary to achieve and maintain hot shutdown conditions are located within the same fire area, one of the following means of ensuring that one of the redundant trains is free of fire damage shall be provided:

- ° Separation of cables and equipment and associated non-safety circuits of redundant trains by a fire barrier having a 3-hour rating.
- ° Separation of cables and equipment and associated non-safety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustible or fire hazards. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area; or
- ° Enclosure of cable and equipment and associated non-safety circuits of one redundant train in a fire barrier having a 1-hour rating. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area.

- (1) Fire Area/Fire Zone 11.3-0, Auxiliary Building, Miscellaneous was selected because it contained redundant components and cabling for redundant safe shutdown equipment including:

- ° Centrifugal Charging Pumps (CCP)
- ° Auxiliary Feedwater Pumps (AFW)

During this inspection, the following conditions were identified:

- (a) Unit 1 CCP power feeds are installed with less than 20 feet of horizontal separation with intervening combustibles present.
- (b) CCP 1A power feed is routed in conduit protected by 1 hour fire wrap.
- (c) Fire detection is installed in the area of the CCP power feeds.
- (d) Automatic fire suppression has not been installed in the entire area. Partial automatic suppression is provided in the area of the AFW pumps.
- (e) Unit 2 AFW pumps are installed with less than 20 feet of horizontal separation with intervening combustibles present.
- (f) Fire stops have been installed in cable trays that are located between redundant AFW pumps.
- (g) Fire detection is installed in the area of the AFW pumps.
- (h) Partial height concrete barriers are installed between the AFW pumps.

Fire area 11.3-0 is not in compliance with Section III.G.2, however the licensee had previously requested an exemption from the requirements for full area automatic suppression, full area detection and 20 feet of separation. This exemption request is under review by NRR.

- (2) Fire Area/Fire Zone 5.3-2, Unit 2 Diesel Generator 0 Switchgear Room (Division 27, ESS Bus 247) was selected because it contained the safe shutdown (4KV bus 247) power supply for the following equipment:

- ° Centrifugal charging Pump 2B
- ° Service Water Pump 2A

Fire Zone 5.3-2 was found to be in compliance with Section III.G.2 separation requirements.

e. Alternative Safe Shutdown Procedures

(1) Fire Operating Procedure for Main Control Room

The licensee provided the inspectors with procedure FOP-1 titled "Safe Shutdown Procedure for a Fire in the Main Control Room." This procedure is utilized to perform alternative shutdown from outside of the control room. FOP-1 is a lengthy procedure containing 96 pages. It requires nine licensee personnel to achieve stable hot shutdown for Units 1 and 2. Personnel assigned to perform the procedure are excluded from the brigade responsibility. Additional licensee personnel will be recalled as required to perform a subsequent plant cooldown to achieve cold shutdown conditions. The procedure is written in a two column sequential format, with the first column containing required actions and the second column contingency actions. Fourteen Appendices (A through N) are included in the procedure with Appendices D through K delineating the various tasks to be performed by the operators. Listed below are the nine operators required to bring Units 1 and 2 to stable Hot Shutdown and their designated responsibilities.

<u>Operator</u>	<u>Title</u>	<u>Responsibilities</u>
1	Unit 1 Nuclear Station Operator	Direct Operators of Unit 1
2	Unit 2 Nuclear Station Operator	Directs Operators of Unit 2
3	Electric "A" qualified Personnel	Aligns Diesel Generators and Switchgear (Unit 1)
4	Equipment Attendant	Atmospheric relief valve and valve house lineups (Unit 1)
5	Equipment Attendant	Performs Auxiliary Building valve lineups (Unit 1)
6	Rad Waste Foreman	Lineups and manual control of turbine driven auxiliary feed water pumps (Unit 1&2)
7	Electric A Qualified Personnel	Aligns Diesel Generators and Switchgear (Unit 2)

8	Equipment Attendant	Manual Control of steam A atmospheric relief valve and valve House Lineups (Unit 2)
9	Equipment Attendant	Performs Auxiliary Building valve lineups (Unit 2)

Based on review of FOP-1, no unacceptable items were identified. The inspectors, however, cautioned the licensee that implementing the procedure would require well thought out staging, good communications and good direction.

(2) Fire Operating Procedures for Inner and Outer Cable Spreading Rooms.

Background

A fire in either the Inner Cable Spreading Room or the Outer Cable Spreading Room requires alternative shutdown. Procedure FOP-1 provides for a fire in the Main Control Room and does not cover the effects of a fire in the Inner and Outer Cable Spreading Rooms. In response to the inspectors questions regarding a fire in the these areas, the licensee provided the following handwritten draft appendices to FOP-1:

- ° Appendix O - Fire in the Inner Cable Spreading Room.
- ° Appendix P - Fire in the Outer Cable Spreading Room.

The draft appendices each contain a note specifying that "all steps associated with FOP-1 and its appendices apply as directed by the Shift Engineer with the exception of the steps identified below."

The licensee indicated on February 2, 1988, that new Fire Operating Procedures would be developed for the Cable Spreading Rooms.

In response to a request by the inspection team on November 18, 1987, for the licensee to establish interim compensatory measures to deal with a fire in either the inner or outer Cable Spreading Rooms, the licensee initiated a standing order to the control room. This standing order incorporated the necessary guidance for the affected areas to be effective until replaced with approved final procedures.

10 CFR 50.48 requires that each operating nuclear power plant have a fire protection plan that satisfies Criterion 3 of Appendix A to 10 CFR 50. Criterion 3 of Appendix A to 10 CFR 50 requires that structures, systems and components important to safety be protected against the effects of fires and explosions. To satisfy the requirements of Criterion 3 of Appendix A to 10 CFR 50, the Licensee was required to meet the Technical Requirements of Appendix R to 10 CFR 50 in accordance with 10 CFR 50.48(c) schedule. The date required by this schedule was July 7, 1983.

Section III.L.3 of Appendix R required the licensee to have procedures in effect to implement this shutdown capability. Technical Specification 6.2.1.K requires that written procedures shall be established, implemented, and maintained for the fire protection program.

After dated November 21, 1983, the licensee requested an exemption to the schedule for implementation of fire protection modifications required by Section III.G, and III.L of Appendix R to 10 CFR Part 50 until December 31, 1985, for both Zion units. This request was based on three factors including an initial underestimate of the scope of work involved, identification during the design review process that certain design elements proposed were detrimental to overall safety, and an apparent misinterpretation of certain Appendix R requirements. During the time period of the proposed exemption the licensee indicated that fire protection modifications completed to date and interim procedures for effecting safe shutdown would provide an acceptable level of protection.

In a December 21, 1983 letter from H. Denton, NRC, to C. Reed, CECO, the NRC indicated that both Zion Units would be in violation of the 10 CFR 50.48(c) schedule until NRC approved the revised schedule. The letter stated "It should be understood that enforcement action may be taken if the June 1984 submittal is found to be seriously inadequate, or if there is otherwise an indication of lack of good faith toward the requirements of 10 CFR 50.48 and Appendix R."

In a letter dated August 31, 1984, from R. Cascarano, CECO, to H. Denton, NRC, the licensee presented a modification schedule that indicated that work would be completed for Unit 1 during the 1986 outage and for Unit 2 during the 1985 outage.

The licensee was in violation as previously identified in the December 21, 1983 letter from H. Denton, NRC, to C. Reed, CECO. The licensee's updated modification (Appendix R) schedule indicated that work would be completed for Unit 1 during the 1986 outage and for Unit 2 during the 1985 outage.

During the Appendix R Inspection on November 18, 1987, it was observed by the inspectors that Fire Operating Procedures were not adequately established to achieve Hot Shutdown for a fire in the Inner Cable Spreading Room or the Outer Cable Spreading Room. This is considered a violation of 10 CFR 50, Appendix A (295/87034-02; 304/87035-02).

In a January 21, 1988 letter, to B. Davis, NRC, from F. Lentine, CECO, the licensee stated that the required procedures would be implemented by June 1988.

(3) Fire Operating Procedure For Auxiliary Equipment Room

The licensee demonstrated that Fire Operating Procedure FOP-1 (Fire in Control Room) contained the necessary steps in the event of an Auxiliary Electric Equipment Room Fire. The licensee, however, agreed to enhance the Fire Operating Procedures by developing a specific Fire Operating Procedure for the Auxiliary Electric Equipment Room. In the January 21, 1988 letter to B. Davis, NRC, from F. Lentine, CECO, the licensee indicated that the revision will be completed by June 1988. This is considered an open item (295/87034-03; 304/87035-03) pending review and acceptance of the licensee's revised Fire Operating Procedure for the Auxiliary Electric Equipment Room.

(4) Standing Order

As indicated above, the licensee initiated a standing order (on November 19, 1987) until the Procedures for the Inner and Outer Cable Spreading Room were developed and implemented. On February 2, 1988, CECO personnel met with NRC personnel to further discuss the standing order and the draft Fire Operating Procedures (FOP-1 - Fire in the Control Room).

The results of the meeting were:

- ° The licensee agreed to clarify some of the guidance in the Fire Operating Procedure.
- ° A standing order was not required for the Auxiliary Electric Equipment Room since FOP-1 contained the requisite operator actions.
- ° CECO would develop and implement a new Fire Operating Procedure for the Cable Spreading Rooms.

(5) Walkdown of Fire Operating Procedure for Main Control Room

On November 19, 1987, a walkdown of procedure FOP-1 was initiated for Unit 2. Each operator was accompanied by an inspector during the walkdown. The inspectors provided the following conditions for the Appendix R scenario:

- Unit 2 shutdown only
- Fire in Control Room requiring evacuation
- Reactor at 100% power
- Emergency Diesel Generators fail to auto start

One inspector accompanied the Nuclear Station Operator (NSO) whose primary function was the direction of Unit 2 shutdown operations from the remote shutdown panels in the Auxiliary Building. A second inspector accompanied the operator responsible for the valve lineups in the Auxiliary Building and the manual control of the Turbine Driven Auxiliary Feedwater Pumps. The third inspector accompanied the operator assigned to the diesel generator and associated switchgear. The fourth inspector accompanied the operator performing valve house lineups and manual control of steam generator A atmospheric relief valves.

The inspectors observed operator actions, crew direction and leadership, communications, training and familiarity with the procedure.

The walkdown was terminated upon completion of Step No. 18 of Appendix D (FOP-1), at which point stable hot shutdown conditions would have been achieved.

The inspection team observations regarding the walkdown of FOP-1 for a fire in the Main Control Room were as follows:

- (a) A lack of coordination and direction was observed during staging and the subsequent walkdown. When the NSO was requested to establish communication with the operators, it was discovered that two operators had failed to pickup their handheld radios during initial staging at the FOP locker located in the shift engineers cage. In addition, Operator No. 6, who was to perform additional valve lineups for the turbine driven AFW pumps, could not be located.
- (b) Two operators were observed to lack familiarity with the procedure. These operators missed some of the procedural steps during the walkdown.
- (c) The inspectors noted incorrect or missing labeling on components. For example, in Appendix J of FOP-1, Step 5.b, the procedure indicates that the operator is to bleed instrument air pressure down using the air regulator located in the valve house. The inspector observed that no valve tag or number was assigned to this valve. Also in Appendix J of FOP-1, Step 5.d, the procedure indicates that the operator is to crack and slowly open the isolation valve for pressure indicator 2PI-514. The inspector

observed that no tag was provided for the valve. Finally, in Appendix J of FOP-1, Step 5.i, the procedure indicates that the operator is to verify that steam generator A atmospheric Relief Valve 2MOV-MS0017 is closed. The inspector observed that there was no tag or label for this valve.

The licensee indicated to the inspectors that there was a new valve identification and labeling program underway and that the valves utilized for manual operations for Appendix R operations would be adequately marked and labeled. The tagging of the valves will be verified in future inspections.

- (d) Manual operation of seal injection valve 2VC8787B involved stepping on a charging pump for access. A ladder was not available.
- (e) Emergency lighting required to facilitate manual valve operation was missing in the upper valve house. Disposition of the item is discussed in Section 2.h of this report.
- (f) Emergency lighting inside the remote shutdown panels for Unit 1 was located on top of the panel. The same lighting for the Unit 2 panels was installed in a narrow space on the right-hand side and towards the back of the front panel requiring the operator to unsecure the panel and and remount the light in the top front.

During subsequent discussions, the licensee committed to take corrective actions to resolve the observed walkdown deficiencies including a re-examination of the adequacy of training.

(6) FOP-1 Training

As discussed with the licensee there is no formal lesson plan for operator training. Operator training relies on the actual procedure and a lesson plan outline. The operators are relied upon to read through the new fire operating procedures step by step and discuss equipment location and operation, local indications, tools required for operation and reasons/purpose for individual steps. Slides of the equipment and components used for shutdown are also shown to the operators as part of the training program. Also included is a walk through of the procedures.

Training records were produced showing that the operators had been trained in the procedure titled "Safe Shutdown Procedure For a Fire in the Main Control Room."

In subsequent discussions with the licensee, the inspection team recommended that the licensee reexamine and improve the training program particularly in view of the observations made by the team during the procedure walkdown.

f. Protection for Associated Circuits

The following associated circuit concerns were evaluated:

- ° Common Bus Associated Circuits: 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.
- ° Spurious Signal Associated Circuits: The spurious signal concern consists of two parts:
 - ° False motor control and instrument readings such as occurred at the 1975 Brown's Ferry Fire. The indications could be caused by fire initiated grounds, shorts, or open circuits.
 - ° Spurious operation of safety related components that would adversely affect shutdown capability (e.g., RHR isolation valves).
- ° Common Enclosure Associated Circuits: The common enclosure concern is found when redundant circuits are routed together in a raceway or enclosure and they are not electrically protected or fire can destroy both circuits due to inadequate fire protection means.

The inspection results were as follows:

(1) Common Bus Concern

(a) Circuit Coordination

Breaker Coordination is audited by reviewing the time current curves developed during the licensee's bus coordination study. At Zion Station the following circuits were randomly selected for review:

<u>CIRCUIT</u>	<u>COMMENT</u>
4KV BUS 149	Coordination Satisfactory
4KV BUS 147	Coordination Satisfactory
4KV BUS 148	Coordination Satisfactory
480V BUS 139	Coordination Satisfactory
480V BUS 137	Coordination Satisfactory

MCC 1393A	Coordination Satisfactory
MCC 1393B	Coordination Satisfactory
MCC 1393C	Coordination Satisfactory
MCC 1372	Coordination Satisfactory
MCC 1371	Coordination Satisfactory
MCC 1391	Coordination Satisfactory
120VAC BUS 111	Coordination Satisfactory
120VAC BUS 112	Coordination Satisfactory
120VAC BUS 113	Coordination Satisfactory
120VAC BUS 114	Coordination Satisfactory
120VAC BUS 111	Coordination Satisfactory
120VAC BUS 112	Coordination Satisfactory

The licensee's circuit coordination program was found to be satisfactory.

The licensee performs protective relay/circuit breaker testing and maintenance at 36 month intervals (every other refueling outage). Breaker and relay maintenance and testing are currently scheduled manually and by computer. The licensee is in the process of converting to an automated maintenance scheduling system.

(b) High Impedance Fault Analysis

The high impedance fault concern is found in the case where multiple high impedance faults exist as loads on a safe shutdown power supply and cause the loss of the safe shutdown power supply prior to clearing the high impedance faults.

The licensee analyzed for high impedance faults and determined that existing electrical distribution system design did not provide protection for high impedance faults. The inspectors determined that the existing FOP-1 procedure adequately addressed manual circuit breaker operations for a fire located in the control room. However, procedures were not in place to provide for manual circuit breaker operations for fires in areas outside of the control room. A proposed procedure titled "Operating Instructions for the reclosing of an Essential Supply Breaker on the Emergency Power distribution System," was under review for future implementation. While the licensee's proposed method of controlling high impedance faults was found to be satisfactory, the licensee had not fully implemented procedures for isolating high impedance faults by manual circuit breaker operation. Therefore, the licensee's protection for high impedance faults was determined to be unsatisfactory. This is considered to be another example of the violation identified in Section 2.e.(2) of this report (295/87034-02; 304/87035-02).

(2) Spurious Signals

(a) High/Low Pressure Interface

The licensee has identified the following high/low pressure interfaces and methods for controlling the interfaces:

<u>INTERFACE</u>	<u>METHOD OF CONTROL/STATUS</u>
PRESSURIZER POWER OPERATED RELIEF VALVES (PORVs) 1,2PCV-456 1,2PCV-455C	Post fire action: For a fire in the main control room, procedure FOP-1 directs the disconnection of DC power to the PORVs utilizing switch operation. Approved procedures were not available for disconnecting DC power to the PORVs in the event of a fire in the inner or outer cable spread rooms.
RHR/RCS BOUNDARY ISOLATION VALVES 1,2MOV-RH8701 1,2MOV-RH8702	Pre-fire actions: The valves are closed during normal operation. MOV circuit breakers are maintained open during normal operations. Interface control was found to be satisfactory.
REACTOR HEAD VENT VALVES 1,2SOV-RC08 1,2SOV-RC09 1,2SOV-RC10 1,2SOV-RC11	Pre-fire action: The valves are closed during normal operation. SOV circuit breakers are maintained open during normal operations. Interface control was found to be satisfactory.

The licensee's protection for fire induced spurious operation of high/low pressure interfaces in the event of a fire in the Cable Spreading Rooms was found to be unsatisfactory for the Pressurizer PORVs, 1,2PCV-456 and 1,2PCV-455C. This is considered another example of the violation identified in Section 2.e.(2) of this report (295/87034-02; 304/87035-02).

The licensee is investigating modifying the fuse panels for 1,2PCV-456 and 1,2PCV-455C to permit disconnecting the fuses by use of a fuse block similar to the fuse blocks installed in switchgear control power circuits.

(b) Current Transformer Secondaries

The licensee's Current Transformer (CT) analysis, Evaluation of Electrical Stresses and Fire Hazards Associated with the Opening of Current Transformer Secondaries, determined that the CT saturation characteristics limited the potential and energy in CT secondaries such that secondary fires could not be induced by open CT secondaries. The licensee's determination was based upon the characteristic curve for the current transformers used for remote metering and protective relaying associated with the diesel generator output breakers. Other installed current transformers were "considered" to have saturation characteristics similar to the characteristic curve used in the analysis. Since the licensee did not provide characteristic curves for all installed current transformers, protection for current transformer open secondary circuits could not be verified. This is considered an unresolved item (295/87034-04; 304/87035-04) and will remain open pending review of the licensee's submittal of characteristic curves.

(c) Isolation of Fire Instigated Spurious Signals

The licensee has provided isolation for fire instigated spurious signals by various methods, including:

- Administrative controls
- Rerouting of cables
- Wrapping cables
- Isolation/Transfer switches (redundant fuses used)
- Fuses
- Manual component operation

During the inspection, all forms of isolation listed above were observed.

The licensee's methods of fire instigated spurious signal isolation were found to be satisfactory.

(3) Common Enclosure

The common enclosure associated circuit concern is created when redundant circuits are routed together in a raceway or enclosure and are not electrically protected, or fire can destroy both circuits due to inadequate fire protection means.

During the inspection, the following redundant cables were verified to be protected for common enclosure concerns:

<u>COMPONENT</u>	<u>CABLE/TYPE</u>	<u>COMPONENT</u>	<u>CABLE/TYPE</u>	<u>REMARKS</u>
Charging Header Isolation Valve 1MOV-VC8105	16106/control	Charging Header Isolation Valve 1MOV-VC8106	16103/control	Not routed in common enclosure with each other/ manual valve operation if cables fail.
AFW Pump 1A Suction Valve 2MOV-FW0075	26910/control	AFW Pump 1C Suction Valve 2MOV-FW0076	23347/control	Not routed in common enclosure with each other/ manual valve operation if cables fail.
AFW Pump 1A SG 1A 1MOV-MS0005	11281/control	AFW Pump 1A SG 1D 1MOV-MS0011	11393/control	Common enclosure routing in cable spreading room/ manual valve operation if cables fail.

The licensee's protection for the common enclosure associated circuit concern was found to be satisfactory.

g. Communications

Safe shutdown communications for alternate shutdown are provided by portable hand held VHF radios. Under normal operations the system is controlled from a base station located in the control room. In the event of fire requiring alternate shutdown, the system is isolated from the control room areas by isolation switches. The VHF radio system isolation switches are located in the Primary Security Control Center.

Additionally, the Plant Dial Telephone System and Plant Announcing System may be available to support safe shutdown communications. The licensee does not take credit for these systems.

During the walkdown demonstration of the safe shutdown procedure for a fire in the control room, the safe shutdown communications were found to be satisfactory.

h. Emergency Lighting

10 CFR Part 50, Appendix R, Section III. J requires emergency lighting units with at least an 8-hour battery power supply in all areas needed for operation of safe shutdown equipment and egress routes.

In the letter dated November 21, 1983 from F. Lentine, CEC, to H. Denton, NRC, the licensee indicated that the installation schedule of 10 CFR 50.48(c)(4) could not be met.

In the letter dated December 21, 1983, from H. Denton, NRC, to C. Reed, CEC, the NRC indicated that the NRC recognized that the Zion Units would be in violation of the 10 CFR 50.48(c) schedule from the period of time extending from expiration of the existing deadlines until NRC approval of a revised schedule. The letter stated, "It should be understood that enforcement action may be taken if the June 1984 submittal is found to be seriously inadequate, or if there is otherwise an indication of lack of good faith toward meeting the requirements of 10 CFR 50.48 and Appendix R".

By letter dated August 31, 1984, the licensee submitted a modified implementation schedule of work necessary to achieve compliance with 10 CFR 50, Appendix R. Item No. 23 of this schedule indicated that the adding of additional emergency lighting units and the aiming of their attached lamps was planned to be completed by January 1, 1986, to satisfy Section III. J of Appendix R.

During the NRC inspection conducted during November 16-20, 1987, it was identified by the inspectors that inadequate or no emergency lighting existed in the following areas:

617' Auxiliary Building, General Area (Front of elevator)
MCC 2391 Switchgear Room
MCC 2381B Switchgear Room
Main Steam Valve House
Upper Valve House

The failure of the licensee to adequately install emergency lighting, as stated above, is considered a violation of 10 CFR 50, Appendix R, Section III.J (295/87034-05; 304/87035-05).

i. Other Electrical Evaluation

(1) Cable Routing

Physical in-plant inspection and documentation review was conducted on a sample number of power, instrumentation and control cables. The inspectors determined that the licensee had provided satisfactory cable protection which was in compliance with Appendix R, Section III.G.2 separation requirements, or had implemented manual operations, or had provided an alternative shutdown capability.

(2) Modification Review

The licensee's process for controlling the design and installation of modifications was reviewed for proper review and approval, including 10 CFR 50.59 aspects. The administration of modifications for Appendix R concerns was found to be satisfactory.

j. Oil Collection System

10 CFR Part 50, Appendix R, Section III.0, titled "Oil Collection System for Reactor Coolant Pump," requires that the reactor coolant pump be equipped with an oil collection system if the containment is not inerted during normal operation. In addition, the oil collection system shall be so designed, engineered and installed that failure will not lead to fire during normal or design basis accident conditions and there is reasonable assurance that the system will withstand the safe shutdown earthquake.

As documented in NRC Inspection Reports 50-295/85011(DRS); 50-304/85012(DRS), the licensee requested a "reactor coolant pump oil collection system exemption. The report also indicated that the request was under review by NRR pending receipt of an analysis of the radiation and heat effects on the rubber hose that connects the oil collection system to the main header. This analysis needed to consider the effects of a seismic event on rubber hose connections.

The July 3, 1986, (NRC) Franklin Research Center Technical Evaluation (TE) discussed the review of the licensee request for exemption for the oil collection system for the reactor coolant pumps. The review identified that the oil collection system consisted of a set of catch basins, drip pans and enclosures assembled as attachments to the pump to contain or catch any leaking lube oil. The oil would then be directed to a main ring header connecting the collection system of all four pumps via rubber hoses. The main ring header and discharge pipe was capped at the time of the review and had a capacity of 68 gallons. In addition it was identified that there was a source of high pressure leaks from

the lift pump. And finally, there were several short sections of rubber hose that connect the collection system to the main header that were identified not to be seismically qualified. The TE recommended that the exemption for the oil collection system be denied.

In the letter dated February 9, 1987, from P. LeBlond, CEC, to H. Denton, NRC, the licensee stated that the exemption requirements were no longer required and that the upgraded oil collection system was presented at a meeting in Bethesda, Maryland on September 30, 1986, to Jan Norris and other members of the staff. The letter indicated that during this meeting CEC addressed the concerns regarding the capacity of the oil collection system, high pressurized leakage points and the seismic qualifications of the short runs of hose.

During this inspection the inspectors were not able to inspect the oil collection system due to high radiation during normal operation. No items of noncompliance were identified.

3. Fire Protection Features

As part of the Appendix R compliance assessment, several fire protection features were also reviewed as listed below:

- ° Fire-Rated Walls and Floor/Ceiling Assemblies
- ° Fire-Rated Cable Wraps
- ° Fire Dampers, Doors and Penetration Seals
- ° Automatic Fire Suppression Systems
- ° Fire Detection and Alarm Systems
- ° Manual Fire Fighting Equipment
- ° Shutdown System Physical Separation/Protection
- ° Fire Brigade Training
- ° Post-Fire Training
- ° Gaseous Fire Protection Systems
- ° Fire Pumps
- ° Fire Protection Staffing

The following plant locations which contain safety related and/or safe shutdown related systems were inspected:

- (1) Main Control Room Complex
- (2) Unit 1 Outer Cable Spreading Room
- (3) Unit 1 Inner Cable Spreading Room
- (4) Unit 1 Outer Penetration Vault
- (5) Unit 1 EDG 1A and 1B Switchgear Rooms
- (6) Unit 2 EDG 2A Switchgear Room
- (7) Unit 1 Nonessential Switchgear Room
- (8) Unit 1 Rod Drive MG Set Room
- (9) Unit 1 Auxiliary Electrical Equipment Room

- (10) Unit 1 Division 18 DC Distribution Panel Room
- (11) Units 1 and 2 Turbine Building
- (12) Unit 1 Steam Pipe Tunnel
- (13) Unit 1 EDG 1B and 0 Rooms
- (14) Unit 1 EDG OA Diesel Fuel Oil Storage Room
- (15) Auxiliary Building General Floor Areas
- (16) Unit 2 Safety Injection Pump 2A Room
- (17) Unit 1 Centrifugal Charging Pump "A" Room
- (18) Inner and Outer Crib Houses

a. Fire Barriers

During the inspection, the audit team discovered that an HVAC duct penetration without a fire damper existed in the wall which separates the control complex from the turbine building. The licensee presented an internal evaluation of this condition which purports to justify this condition. However, this analysis did not address a significant number of unmitigated fire hazards which the audit team observed in the turbine building. These hazards included: shop areas; storage areas; office areas constructed with ceilings which obstruct the discharge from the existing sprinkler system; and a number of other degradations of the sprinkler system such as paint-coated sprinkler heads and misaligned sprinkler piping.

This is considered an unresolved item (295/87034-06; 304/87035-06) pending review and acceptance of the licensee's actions addressing these conditions.

b. Fire Barrier Surveillances

During the inspection, it was identified that several required fire barriers, such as the fire wall along the "G" column line which separates the auxiliary building from the turbine building, and the fire walls which enclose two stairways (as indicated in the July 1984 submittal titled "Safe Shutdown Capability Reassessment and Proposed Modifications 10 CFR 50, Appendix R") were not being surveilled.

In addition, during the inspection, it was identified by an NRC inspector that surveillances of fire barriers identified in the fire hazard analysis (which is part of the licensee's Fire Protection Plan) were not being performed in safety and nonsafety areas of the plant as indicated below.

Safety Related Areas

- 1. Fire Zone 11.2-0 (Auxiliary Building Basement)
- 2. Fire Zone 11.3-0 (Miscellaneous Levels)

Nonsafety-Related Areas

- ° Unit 1 enclosed stairwell elevation 642' - 592' between column lines 23 & 25 and H & G.
- ° Unit 2 enclosed stairwell elevation 642' - 592' between column lines 13 & 17 and H & G.
- ° Fire wall between Unit 1 & Unit 2, Elevation 560' - 617' between column lines 20 and A & G.
- ° Fire Zone 8.1-0 which contains a 20,000 gallon dirty oil tank on Elevation 560 between C & B and 18 & 22.

In a letter dated December 16, 1987, the licensee contended that the technical specifications regarding surveillances of fire walls were based on the licensee's 1977 Fire Hazards Analysis which did not identify portions of the G wall as a safety related fire barrier. In addition, the licensee contended that Fire Zones 11.2 and 11.3 which do contain safety-related equipment such as the Component Cooling Water Pumps and the Auxiliary Feedwater Pumps and which are separated from the turbine building by the G wall are not required based on local application of the CO₂ suppression systems. The licensee further contended that no reliance was placed on these fire barriers, and therefore the non-surveillance of those portions of the G wall separating Fire Zones 11.2-0 and 11.3-0 from the turbine building did not violate existing Appendix A technical specification criteria for penetration fire barriers. The lack of fire barrier surveillance for Fire Zones 11.2-0 and 11.3-0 is considered an unresolved item (295/87034-07; 304/87035-07) pending further review by Region III.

Technical Specification 4.21 indicates that each of the safety related penetration fire barriers shall be verified to be functional by a visual inspection at least once per 18 months. The licensee was required to update procedures to include safety related fire barriers by July 7, 1983.

Contrary to the above, on November 18, 1987, it was identified that the fire wall along the G column line which separates the auxiliary building from the turbine building and which is considered a safety related fire wall in the licensee's July 1984 Appendix R submitted was not being surveilled.

This is considered a violation of 10 CFR 50, Appendix R (295/87034-08; 304/87035-08).

c. Fire Dampers

In 1984, NRC received a 10 CFR Part 21 notification from Ruskin, a manufacturer of fire dampers. The Part 21 stated that under certain air flow conditions, dampers of a type manufactured by the

company would not close. During the inspection, the audit team requested information concerning the licensee's response to this issue. The licensee's response pertained only to dampers manufactured by Ruskin and did not cover other similarly designed dampers which exist in the plant. These other fire dampers may also be subject to the same failure mode. The licensee was requested to address all fire dampers other than Ruskin that are subject to the same failure mode. This is considered an open item (295/87034-09; 304/87035-09).

d. Fire Damper Surveillances

The licensee's technical specification 4.21 requires that each of the safety related penetration fire barriers be verified as being functional by a visual inspection once every 18 months. The licensee's PT-230 titled "Visual Inspection of Fire Dampers" indicates that a visual inspection should be performed every 18 months to verify the integrity of the fire dampers.

The inspector informed the licensee that a sample number of five dampers should be drop tested to ensure the dampers will function as designed. The licensee indicated that drop testing of fire dampers would be reviewed. This is considered an open item (295/87034-10; 304/87035-10) pending review and acceptance of the licensee's actions.

e. Heating, Ventilation, and Air-Conditioning Systems Necessary to Support Safe Shutdown Systems During a Fire

The licensee's methodology for assuring post-fire safe shutdown is based on a conclusion that heating, ventilation, and air-conditioning systems are not necessary to support safe shutdown systems. The licensee had justified this conclusion for the charging pumps on the basis of an analysis which was reviewed and approved by NRR. During the inspection, the audit team requested similar supporting analyses for the remaining shutdown systems in the auxiliary building. The licensee responded that the charging pump room analysis was considered a worse-case condition. However, the licensee could not support that conclusion with data or engineering analyses.

This is considered an open item (295/87034-11; 304/87035-11) pending review and acceptance by NRR.

f. Fire Alarm System Design

During the inspection, the audit team discovered that not all fire alarm circuits were electrically supervised. This means that a single break or ground fault condition could render a portion of the fire alarm system inoperable without warning. In addition, the fire alarm system lacks a "reflash" capability. This means that if the fire or trouble condition annunciator panel light in the control room was lit for any reason, a subsequent fire or trouble alarm could not be received.

This is considered an open item (295/87034-12; 304/87035-12) pending review and acceptance of the licensee's NFPA Code Deviations by NRR.

g. Fire Detectors

In conjunction with a request for exemption from the requirements of Appendix R to 10 CFR Part 50, the licensee committed to install fire detectors along the run of power feed cables to the component cooling water pumps on elevation 560 feet of the auxiliary building. Contrary to the above, the audit team observed that detectors had not been completely installed in accordance with this commitment.

This is considered an open item (295/87034-13; 304/87035-13) pending issuance of the exemption and completion of the addition of sufficient detectors.

h. Fire Hazard Analysis

During the inspection, the audit team observed that the licensee's fire hazards analysis (FHA) was not consistent with conditions as they exist in the plant.

This is considered an open item (295/87034-14; 304/87035-14) pending receipt and acceptance of an updated FHA by NRR.

i. NFPA Code Deviations

In Generic Letter 86-10, the staff indicated that licensees should identify and justify all National Fire Protection Association (NFPA) Code deviations in the FSAR or Fire Hazards Analysis. The licensee has not completed this effort at the time of the inspection.

This is considered an open item (295/87034-15; 304/87035-15) pending receipt of a complete report delineating such deviations and acceptance by NRR.

j. Halon Fire Protection System

Inadvertent Operation

Criterion 3 of Part 50 (Appendix A) states that firefighting systems shall be designed to assure that their rupture or inadvertent operation does not significantly impair the safety capability of structures, systems and components.

In the event of a disabling fire in the auxiliary electrical equipment room, it would be necessary to enter the outer cable spreading room to initiate manual actions to achieve hot standby conditions.

During the inspection, it was determined that a single short circuit between terminals HP and IVHPB on Pyralarm terminal board TBA in the auxiliary electric equipment room may cause a spurious signal and an inadvertent release of halon in the outer cable spreading room, where manual operator action is required.

In discussions with several operators, it was determined that in all cases the operator responding to the outer cable spreading room to initiate manual action to achieve hot standby would enter the area should the halon inadvertently discharge due to a disabling fire in the auxiliary electric equipment room. Several operators indicated that they would enter the room only after donning self-contained breathing apparatus.

In the letter dated January 21, 1988, to B. Davis, NRC, from F. Lentine (CECo), the licensee indicated that the Fire Operating Procedures for a fire in the auxiliary electric equipment room would be revised to address this concern. The inspector recommended that the licensee relocate the Pyralarm terminal board so that an inadvertent halon discharge due to a fire would not discharge halon into an area where manual actions are required. The licensee indicated that they would consider this recommendation and also would explore the possibility of protecting the terminal board from a fire in its present location. This is considered an open item (295/87034-16; 304/87035-16) pending review and acceptance of licensee actions by Region III.

k. Fire Pump Controller

License Amendment 32 (Unit 1) and 33 (Unit 2) states, "The licensee may proceed with and is required to complete the modifications indicated in Paragraphs 3.1.1 through 3.1.20 of the NRC's Fire Protection Safety Evaluation report on the Zion Nuclear Power Station dated February 1978. These modifications shall be completed by the end of the third refueling outage of Zion Unit 2 and prior to return to operation for cycle 4. In addition, the licensee shall submit the additional information identified in Table 3.2 of the above cited Safety Evaluation Report in accordance with the schedule contained therein. In the event these dates for submittal cannot be met, the licensee shall submit a report explaining the circumstances, together with a revised schedule."

The 1978 Zion SER in Section 3.1.5 titled "Fire Water System" requires that an approved controller which conforms to the requirements of NFPA 20 be provided at the electric motor driven fire pump.

During the inspection, it was observed that the required fire pump controller was not installed by the licensee. This is considered a violation of a license amendment (295/87034-17; 304/87035-17).

1. Fire Pumps

In the licensee's 1977 Fire Protection Report, Section E.2 of the licensee's response to Appendix A of BTP APCSB 9.5-1 indicates that the fire pumps are installed to NFPA 20 "Standard for the Installation of Centrifugal Fire Pumps."

In NFPA 20, Section 11-2, titled "Field Acceptance Test," a copy of the manufacturer's certified pump test characteristic curve is required to be available for comparison with the results of the field acceptance test. NFPA 20 also requires that the fire pump as installed equal the performance as indicated on the manufacturer's certified shop test characteristic curve within the accuracy limits of the test equipment.

Deviation Report (DER) 22-1-85-184 indicated that while performing periodic test 202, the OB diesel fire pump was found to perform outside of the manufacturer's lab generated pump curve at its rated capacity. The DER indicated that the pump manufacturer's acceptance criteria for the pump performance as guaranteed to Commonwealth Edison Company was a lesser value on the original certified pump data sheet.

The licensee was requested to provide the inspector with the field acceptance test (performed by the manufacturer) for the OB diesel fire pump and provide technical justification that the field acceptance test equals the performance as indicated on the manufacturer's certified shop test. This is considered an unresolved item (295/87034-18; 304/87035-18).

Also NFPA 20 in Section 8-2.4 titled "Instrument and Control" requires that engine be provided with a governor capable of regulating engine speed within a range of 10 percent between shutoff and maximum load condition of the pump. It further requires that the governor be field adjustable, set and secured to maintain rated pump speed at maximum pump load.

The licensee's Procedure, PT-202, titled "Fire Protection Pumps Capacity Test" states in Step 9.4 that "Rated pump speed is 1770 RPM at a diesel speed of 2125 RPM. If necessary, for full flow (six nozzles open) test only, adjust diesel speed to obtain rated pump shaft speed of 1770 RPM. If speed is adjusted, record new flow and pressure measurements on data sheet."

The NFPA 20 requirements for a shutoff test for vertical shaft fire pumps do not exceed 140 percent of rated discharge pressure. Should the licensee adjust the governor as indicated in PT-202, the fire pump governor cannot be verified to regulate the engine speed within a range of 10 percent between shutoff and maximum load condition and it cannot be verified that the fire pump will not exceed 140 percent of rated discharge pressure. The licensee is requested to review

PT 202 to insure that the fire pumps are tested in accordance with manufacturer's instructions and NFPA-20. This is considered an unresolved item (295/87034-19; 304/87035-19) pending review and acceptance of licensee actions.

m. Fire Protection Staffing

It was identified by the inspector that the fire protection coordinator position as indicated in the licensee's response to Appendix A of BTP APCSP 9.5-1 (Section 3.1.A.1.b) was not filled. The licensee contended that the functions of the fire protection coordinator had been assumed by the station fire marshal and the corporate fire protection engineers. During the inspection the licensee agreed to review and update the fire protection staffing organization structure and to clarify the position and duties of the personnel responsible for implementing the fire protection program. The completed review of the fire protection organization structure should be part of the licensee's fire hazard analysis (FHA) when it is submitted for NRR review (refer to section 3.h of this report).

This is considered an unresolved item (295/87034-20; 304/87035-20) pending further review of the present fire protection staffing organization by Region III.

n. Carbon Dioxide System

The inspector requested and was provided with the carbon dioxide surveillance procedure for the inner and outer cable spreading room and diesel generator rooms. During the review the inspector determined that the procedure required removing electro-thermo links (ETL) during the test.

The removal of the ETL during testing of the carbon dioxide surveillance test does not allow testing of it's associated damper. The licensee was requested to review the carbon dioxide surveillance procedures with NFFA 12 (1980) titled "Standard on Carbon Dioxide Extinguishing Systems" and manufactures instructions to insure that the carbon dioxide systems are thoroughly inspected and tested for proper operation. The licensee indicated to the inspector that the present surveillance procedures would be reviewed. The licensee also indicated that the carbon dioxide system testing conducted at other CECO sites would be reviewed. This is considered an open item (295/87034-21; 304/87035-21) pending review and acceptance of licensee actions.

o. Halon System

The inspector requested and was provided with the halon surveillance procedure for the inner and outer cable spreading room. In review of PT 227 titled "Halon Fire Protection System Functional Test" It

was observed that the fuses for damper electro thermo link (ETL) circuit OL P89 were required to be removed. The removal of the ETL during testing of the halon surveillance test does not allow testing of its associated damper. The licensee was requested to review the halon surveillance procedures with NFPA 12A (1980) titled "Standard on Halon 1301 Fire Extinguishing Systems" and manufacturers instructions to insure that the carbon dioxide system are thoroughly inspected and tested for proper operation. The licensee indicated that the present procedures would be reviewed. The licensee also indicated that the halon system testing conducted at other CECO sites would be reviewed. This is considered an open item (295/87034-22; 304/87035-22) pending review and acceptance of licensee actions.

4. 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 are discussed in paragraphs 2.a(4), 2.e(3), 3.c, 3.d, 3.e, 3.f, 3.g, 3.h, 3.i, 3.j, 3.n and 3.o of this report.

5. Unresolved Items

Unresolved Items are matters about which more information is required in order to ascertain whether they are acceptable items, violations, or deviations. Unresolved Items are discussed in paragraphs 2.f.(2)(b), 3.a, 3.b, 3.l, and 3.m of this report.

6. Exit Interview

The inspector met with the licensee representative at the conclusion of the inspection on November 20, 1987 and January 15, 1988. The inspector discussed the likely content of this report and the licensee did not indicate that any information discussed during the inspection could be considered proprietary in nature.

In addition, on March 14, 1988, a conference call was held with F. Lentine to discuss the results of the in-office review of documents discussed in this report.