



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

Report Nos.: 50-250/89-37 and 50-251/89-37

Licensee: Florida Power and Light Company  
9250 West Flagler Street  
Miami, FL 33102

Docket Nos.: 50-250 and 50-251

License Nos.: DPR-31 and DPR-41

Facility Name: Turkey Point 3 and 4

Inspection Conducted: November 13-17, 1989

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12-26-89  
Date Signed

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SUMMARY

Scope:

This special, announced inspection was in the areas of fire protection and the licensee actions regarding the implementation of the requirements of 10 CFR 50 Appendix R, Sections III.G, III.J, III.L, and III.O., for safe shutdown capabilities, associated circuits of concern and alternate shutdown capabilities. A review of information related to a fire protection allegation was also conducted.

Results:

In the areas inspected, no violations or deviations were identified. As part of this inspection, the NRC inspectors reviewed the results of two Florida Power and Light QA audits dated August 16 and 18, 1989. QA audit



QAO-PTN-89-981, Fire Protection and Loss Prevention Program, was recently completed. Part of this audit's purpose was to review background information and FP&L commitments contained in the NRC Safety Evaluation Reports (SERs) for exemptions from the technical requirements of 10 CFR 50 Appendix R for Turkey Point Units 3 and 4. During this licensee sponsored audit, conducted by both licensee and contractor personnel, a comparison was made between the plant descriptions and commitments contained in the SERs and the configuration of the plant as defined in plant drawings and other design documentation. Where the exiting design differed from the description or commitments of the SER, further investigation by the audit team was performed.

The commitments made in the granted exemptions were reviewed and compared with the design of the physical plant. In several instances, the audit team found that actions taken to comply with the requirements of 10 CFR 50 Appendix R were different from those described in the NRC's SERs.

Appendix R allows the use of any of several means for ensuring that one of the redundant trains remains free of fire damage. The licensee believes that the implemented designs utilize the requirements and options of Appendix R to provide a level of protection equivalent to the modifications relied upon by the NRC as a basis when the NRC granted the exemption requests. The inspectors reviewed most of these differences and agree with the justifications provided in QAO-PTN-89-981. The QA audits identified 16 concerns, and a number of observations, related to safe shutdown and fire protection. The licensee performed engineering evaluations and responses which outlined the corrective actions taken for each finding. These audits were thorough and the responses technically adequate. An overall assessment of the licensee's performance revealed both strengths and weaknesses as summarized below. The strengths listed were beneficial and enhanced the licensee's Appendix R program.

#### Strengths

\*The licensee's self assessment QA audits, although completed only just prior to the NRC audit, were adequate enough to provide the licensee assurance that their Appendix R modification program was complete and satisfactory.

\*The licensee's technical and management support, both corporate and site, during the audit was excellent. Engineering evaluations in support of fire protection issues were technically adequate. Records and engineering data were complete, well maintained and readily available during the NRC audit.

In general, all fire zones and areas that the inspectors looked at had the necessary protection and modifications to provide a level of protection that meets or exceeds the level relied upon by NRR when granting the exemptions. Based on this review, the inspectors have reason to believe that the licensee has complied with all Appendix R exemption requirements required by NRR.

Responses to all NRC inspection inquires were technically sound, thorough, and timely.

#### Weaknesses

In various cases, it was noted that as-built conditions did not match drawings nor FSAR statements of descriptions of cable routing or fire protection features provided.



## REPORT DETAILS

### 1. Persons Contacted

#### Licensee Employees

- \*J. H. Goldberg, Executive Vice President
- \*K. N. Harris, Vice President
- \*J. E. Cross, Plant Manager
- \*J. D. Kirk, Project Overview Technical and Operational Support
- \*R. Gritz, Licensing Response Coordinator
- \*D. Smith, Manager, Electrical and I&C Department
- \*P. Banaszak, System Engineer (Electrical), Technical Support Department
- \*W. Reynold, Electrical Engineer
- \*C. Fisher, Mechanical Engineering Supervisor
- \*M. Pearce, Electrical Engineer
- \*D. Taylor, System Enhancement Coordinator
- \*T. Lightfoot, Non-Licensed Operator Training Coordinator
- \*E. Traczyk, Fire Protection Supervisor
- \*D. Powell, Regulation and Compliance Supervisor

Other licensee employees contacted during this inspection included craftsmen, engineers, operators, technicians, and administrative personnel.

#### NRC Resident Inspectors

- \*G. Schnebli, Resident Inspector
- \*T. McElhinney, Resident Inspector

\*Attended exit interview

Acronyms and Initialisms used throughout this report are listed in the last paragraph.

### 2. Compliance with 10 CFR 50, Appendix R, Sections III.G. and III.L. (Module 64100)

An inspection was conducted to determine if the fire protection features, structures, systems and components important to safe shutdown at Turkey Point Units 3 and 4, were in compliance with 10 CFR 50, Appendix R, Sections III.G. and III.L. The scope also included inspection to determine if the fire protection features provided for reactivity control, reactor coolant makeup, reactor pressure control, reactor heat removal, process monitoring function, and safe shutdown system support functions were capable of limiting potential fire damage so that one train of safe shutdown systems essential for achieving and maintaining plant shutdown from either the control room or remote shutdown stations remained free of fire damage.

a. Safe Shutdown Capabilities

Where cables or equipment of redundant trains of systems necessary to achieve and maintain hot standby conditions are located within the same fire area outside the primary containment, 10 CFR 50, Appendix R, Section III.G.2 requires that one train of hot standby systems be maintained free of fire damage by providing fire protection features which meet the requirements of either III.G.2.a, III.G.2.b, or III.G.2.c.

On the basis of the above Appendix R criteria, the inspectors made an inspection of cabling and components associated with the Chemical Volume Control System, Auxiliary Feedwater System, Component Cooling Water System, Intake Cooling Water System, and Onsite Power Distribution System to determine the adequacy of the fire protection features and the separation afforded for these essential safe shutdown systems.

(1) Fire Protection for Safe Shutdown Systems/Components

The licensee performed a Fire Hazards/Safe Shutdown Analysis to ensure that no single fire can prevent Turkey Point from achieving a safe cold shutdown. This analysis is described in Appendix 9.6A of the licensee's Updated Final Safety Analysis Report (UFSAR) Revision 5, dated July 1987.

Turkey Point Units 3 and 4 are divided into 50 fire areas as described in Section 4.0, Fire Hazards Analysis, of the UFSAR. These fire areas are further subdivided in 132 fire zones, and are listed in Table 9.6A-1b of the UFSAR.

Within the above areas, the licensee has performed an essential safe shutdown equipment and cable analysis to identify essential equipment and systems required to achieve hot standby and cold shutdown. The results of the licensee's Fire Hazards/Safe Shutdown analysis indicate that a fire in three plant areas would potentially cause damage to both trains of safe shutdown functions thus requiring alternative shutdown capability. In the event of a fire, in those three areas, resulting in loss of the Control Room, Cable Spreading Room or North-South Breezeway, alternative means of controlling and monitoring essential shutdown systems are provided.

An inspection was made to determine if redundant cabling for the plant safe shutdown systems have been provided with adequate separation or protected in accordance with Appendix R, Section III.G.2.



Included in the review was an evaluation of the acceptability of the barrier on enclosure as a fire rated barrier. Also, the review verified the adequacy of the installed penetration sealing systems and fire dampers/fire doors with respect to installation completeness, physical condition, and fire test documentation.

Within the following fire areas and their associated fire zones, the cable routings for redundant safe shutdown and the fire protection features afforded for these areas were inspected:

- (a) Auxiliary Building - Elevation 18.0, Fire Area F, Fire Zone 58, Units 3 and 4 Auxiliary Building Hallway.

An inspection was made of the Auxiliary Building Hallway (Fire Zone 58) to determine if the systems and components required for safe shutdown were provided with fire protection features as described in the UFSAR and that the following cabling associated with redundant Component Cooling Water (CCW) and Charging pumps were separated or protected:

<u>Cable/Raceway</u>	<u>Function</u>
4F012	CCW Pump 4P21IA Power
4F101	Charging Pump 4P201A Power
4F063	CCW Pump 4P201B
4F141	Charging Pump 4P20B
4F017	CCW Pump 4P211C Power
4F103	Charging Pump 4P201C Power

The licensee stated that these power cables for essential safe shutdown equipment are installed in embedded conduit, thus a three hour fire barrier is provided. The inspectors requested the basis and documentation that verified that the depth of the embedded conduit constitutes a three hour fire barrier. In response, the licensee provided Fire Protection Evaluation (FPE 89-06), 10 CFR 50 Appendix R Evaluation of Cables in Embedded Conduits and Trenches in Turkey Point Units 3 and 4, approved October 25, 1989. This evaluation was performed for all fire zones that were identified as having embedded conduits that serve systems and equipment needed for safe shutdown. This thermal analysis, based on Generic Letter 86-10, concluded that the most severe fire scenario postulated for any of the analysed fire areas/zones will not produce sufficient temperatures at the conduit, or in the concrete, to exceed 325F at a depth of three inches. Therefore, the concrete protection of three inches is adequate to prevent cable



temperature rise above the insulation breakdown limit and to withstand the fire hazards associated with the respective areas/zones.

The inspectors made an inspection of Fire Zone 58 and verified that Fire Area F was separated from other plant areas as described in the fire hazards analysis.

Based on the review of the licensee's fire hazards analysis, Fire Protection Evaluation 89-06, and the routings of the above sampled safe shutdown related cables, it appears that the level of protection in Fire Area F/Fire Zone 58, will maintain one train of systems necessary to achieve and maintain hot standby free from fire damage during a worst case fire accident.

- (b) Control Building - Elevation 12.5', Fire Area H, Fire Zone 19, Unit 3 Control Building West Electrical Penetration Room.

The licensee's Fire Hazards/Safe Shutdown analysis for Fire Zone 19 identified protection required for alternative shutdown and pressurizer power operated relief valve cables in this area. An inspection was made to verify the routing of the cable raceways associated with this equipment:

<u>Cable/Raceway</u>	<u>Function</u>
3K1284*	Pressurizer power operated relief valve 3V455C Control cables
3K1814*	
PB3711*	

\*Provided with three hour fire rated barrier wrap enclosure

The inspection verified that the above cable/raceways were enclosed in separate three-hour rated cable/raceway fire barrier enclosures. The fire barrier enclosures are a preformed wrap design by TSI utilizing Thermo-Lag 330 fire barrier material. The enclosures appeared continuous and were applied to the length of the cable raceways routed through the fire area.

The inspectors, during their walkdown of Fire Area H, verified that five early warning ionization type detectors are installed near the ceiling with additional devices located at lower elevations. The fire barriers which make up the fire area boundary are three-hour rated except for the wall formed by the Unit 3 Containment Building which is

discussed in the UFSAR Section 3.11. No sprinklers are provided in this area. Water from hydrants/hose stations are the primary suppression for this area.

Based on the review of the licensee's Fire Hazards/Safe Shutdown Analysis, the fire area boundary, and the routings of the sampled safe shutdown related cables, it appears that the level of protection in Fire Area H should maintain one train of systems necessary to achieve and maintain hot standby free of fire damage.

- (b) Auxiliary Building - Elevation 18.00', Fire Area N, Fire Zone 45, Unit 4 Auxiliary Building Charging Pump Room.

Auxiliary Building - Elevation of 18.00', Fire Area O, Fire Zone 55, Unit 3 Auxiliary Building Charging Pump Room.

Fire Areas N and O (Fire Zones 45 and 55), are Units 4 and 3 Charging Pump Rooms. These two rooms are essentially identical areas, both housing the respective units three charging pumps. These areas are separated from other plant areas by 3-hour fire rated barriers except for a non-rated radiation shield wall for which separate permission was granted by NRR to eliminate the need for the licensee to upgrade the door to a 3-hour door. The licensee has received NRC exemption from enclosing one of the charging pumps in a one-hour rated fire barrier. In addition they received an exemption from providing a fire suppression system that provides coverage for all of the fire areas.

The licensee's Fire Hazards/Safe shutdown analysis demonstrates that for a fire in this area safe shutdown train B will be available.

An inspection was made of the charging pump area (Fire Zone 45) to determine if the systems and components required for safe shutdown were provided with the fire protection features as described in the UFSAR and that the following cables associated with redundant chemical volume control system functions were separated or protected in accordance with Appendix R, Section III.G.2 criteria:

<u>Cable Raceway</u>	<u>Function</u>
B-4F141**	Charging pump 4P201B Power
B-4H1314**	Raw Water storage Tank (RWST) to charging Header Supply Valve 4V115B Control
PB-4872**	Charging Pump 4P201B Control



4H436

Boric acid injection stop  
valve MOV4-350 power

\*\*Provided with one hour fire rated barrier wrap enclosure

The licensee has modified these areas by upgrading perimeter walls in each area to 3-hour rated barriers by sealing all piping and other penetrations.

During a recently conducted QA audit (QAO-PTN-89-981), Fire Protection and Loss Prevention, several discrepancies were noted between the UFSAR requirements, the SER requirements, and the actual plant configuration. For example, the UFSAR requirement states that the local control station for redundant pumps will be separated by a distance of more than 20 feet or will be protected with a one-hour fire barrier where separation becomes less than 20 feet. The SER requirement is similar in stating the local control stations for charging pumps 3B and 4B will be protected by providing an enclosure fabricated from one-hour rated materials or relocated outside of this fire area. The actual plant configuration is that the 3B and 4B charging pumps local control stations are not in enclosures fabricated from one-hour rated materials.

The licensee has recognized this disparity and is in the process of changing the UFSAR to reflect the actual plant configuration for this discrepancy, as well as several others. The licensee's justifications, which in the inspectors opinion are adequate, are summarized in the audit. This one example is provided to illustrate the type of discrepancies found.

Other discrepancies noted for Zones 45 and 55 are listed. The doors into or out of the fire areas are non-rated radiation shield doors for which a specific exemption was requested and granted as previously mentioned.

The inspectors verified that, other than approved by exemption requests, Fire Zone 45 was separated from other plant areas by equivalent three-hour fire rated barriers. In addition, the inspectors made a walkdown of the partial coverage sprinkler system provided in Zone 45. This sprinkler system is a preaction type system activated by a fire detection system located in the ceiling space over the charging pumps. It appears that if an exposure fire were to occur within the charging pump area of Zone 45 the present sprinkler system design should be capable of controlling the fire and discharging water onto the one-hour protected conduits and pull boxes as well as the associated safe shutdown equipment.



Based on the review of the licensee's Fire Hazards/Safe Shutdown analysis, the routings of the above sampled cable raceways, and the existing fire protection features, the level of fire protection in Fire Area N should maintain one train of systems necessary to achieve and maintain hot standby free of fire damage.

Fire Zone 55 is similar to Zone 45. The NRC granted exemptions from separation as described above. An inspection was made of the Unit 3 charging pump room to determine if the systems and components for safe shutdown were provided with fire protection features as described in Section 4.0.1 of the USFSAR and that the following cabling associated with the CVCS system were separated or protected as required:

<u>Cable/Raceway</u>	<u>Function</u>
B - 3E141**	Charging Pump 3P201B Power
B - 3H1318**	Charging Pump 3P201B Control
B - 3H1319**	RWST to charging System
B - 3H1323	Header Supply LCV3-115B Control

\*\*Provided with one hour fire rated barrier wrap enclosures.

The design basis and installation of the fire area boundaries, detection system, and sprinkler system for Fire Zone 55 is similar to that provided for Fire Zone 45 as discussed previously. Based on the review of these areas the level of fire protection in Fire Area 0 should maintain one train of systems necessary to achieve and maintain hot standby free of fire damage.

- (c) Fire Area V, Fire Zone 68 - Elevation 18.00 416V. Switch Gear 4A Room.

The inspectors reviewed safe and alternate safe shutdown equipment in this zone which includes the 4160V switchgear 4A and the Unit 4 Emergency Load Sequencer Cubicle 4A.

The following cable raceways and conduits associated with the Emergency Load Sequencers and Unit 4 Motor Control Centers (MCC) are routed through the Switchgear room (Fire Zone 68):



<u>Cable/Raceway</u>	<u>Function</u>
4AXT10*	MCC 4B Breaker Power
4A0640*	Load Center 4B Power

\*Protected by three hour fire rated barrier wrap enclosure

The conduits and cable tray raceways above were verified by the inspectors to be enclosed in three hour rated barrier enclosures. In addition, the inspectors performed a walkdown of the fire barriers and verified that each assembly installation appears to be installed on the raceways in accordance with the design limitations imposed on the fire tested configuration. The fire barrier application is continuous and applied to the entire length of the raceways, from equipment to the fire barrier boundary, through Fire Area V. The inspectors also verified that ionization type smoke detection is provided throughout the fire area.

- (d) Fire Area CC, Fire Zone 79A - Elevation 18.00' - Units 3 and 4 Auxiliary Building North - South Breezeway.

This zone contains cable tray risers and conduit exiting the plant duct banks and entering the Cable Spreading Room. The licensee's Fire Hazard/Safe Shutdown analysis for Fire Area CC demonstrates that for a fire in this area alternative shutdown may be required utilizing train B equipment and cables. The fire barriers which make up the fire area boundary are three-hour rated except the North and South sides of the breezeway which are open to the atmosphere and adjacent to Fire Area OD, Zones 79 and 84.

The analysis drawing 5610-E-119A identifies Train B cable/raceway B-4J1769, control cabling for Auxiliary Feedwater Steam Supply Valve MOV-4-1403, as routed through this area and requiring barrier protection. An inspection was made to verify the routing and protection provided for this cable raceway. The drawing indicted that the four-inch cable conduit was exiting the east Unit 4 Reactor Control Rod Equipment Room C (Fire Zone 61) wall, however, the cable conduit was actually exiting on the south wall of 4B MCC room next to fire door 61-E, routed up and over the corrugated metal walkway cover adjacent to the North-South Breezeway, and then entered the west wall of the Machine Shop (Fire Zone 25). The inspectors verified that the cable was wrapped with a one hour fire rated TSI enclosure



for its entire length in the outdoor location through Fire Area CC. The licensee stated that drawing 5610-E-119A would be revised to show the correct location of conduit raceway B-4J1769.

Review of this area demonstrates that it meets the requirements of Appendix R, Section III.G.3 and II.L.

- (e) Fire Area OD Fire Zones 119 and 120 Unit 4 and Unit 3 Circulating Water Intake Structure.

Fire Zones 119 and 120 are the Circulating Water intake structures for Units 3 and 4. These zones are open areas and contain the Circulating Water Pumps, the Intake Cooling Water pumps and associated motors, instruments, piping, and valves.

The licensee was granted an exemption from providing a one-hour rated enclosure around one redundant Intake Cooling Water Pump for each unit. They were also granted an exemption from providing an automatic fire suppression system in Fire Zones 119 and 120. Power cable for pump motors are routed in embedded conduit in this zone except for a short length that runs from the floor up to the motor terminal box. The licensee had proposed to wrap the 4C and 3C power and control cables. Instead, the short length of power cable conduit between the embedded conduit and the motor terminal box for Train B pumps have been wrapped with one-hour rated fire wrap. This information does not agree with the SER, nor supplemental information provided to the NRC. However, the information does comply with the UFSAR and the requirements of Appendix R.

Another discrepancy noted was that the local control stations for Intake Cooling Water pumps 4B, 4C, 3B, and 3C have not been enclosed in a one-hour fire rated barrier. Justification is provided in QA audit QAO-PTN-89-981. Fire protection in the zones consist of manual hose stations and portable fire extinguishers.

The inspector verified the routing and protection for the following cable/raceways:

<u>Cable/Raceway</u>	<u>Function</u>
B-3R067 **	Intake Cooling Water Pump 3P-9B Power
B-3R077 **	Intake Cooling Water Pump 3P-9B Power



B-4R067 **	Intake Cooling Water Pump 4P-9B Power
B-4R077 **	Intake Cooling Water Pump 4P-9B Power

\*\*Provided with one-hour fire rated fire barrier wrap enclosure.

Based on the review of the routing of the sampled safe shutdown cables and the fire protection features of fire Zones 119 and 120 the level of protection provided should maintain one train of the Intake Cooling Water system necessary to achieve and maintain hot standby free of fire damage.

- (f) Fire Area OD, Fire Zone 84-Elevation 18.00', Units 3 and 4 Auxiliary Feedwater Pump Area.

Fire Zone 84 is an outside area which houses all three turbine driven auxiliary feedwater pumps and associated instruments, piping and valves. Redundant safe shutdown cables are also routed through this area.

NRR granted an exemption for providing fire detection and automatic fire suppression for the required redundant safe shutdown related cables having greater than 20' of separation, as well as, for cables less than 20' with a one-hour fire wrap. Control cables for RCS Pressurizer Pressure transmitters (PT-3-455 and PT-3-457) are protected with one-hour fire rated wrap. This does not agree with the information provided to the NRC in the exemption request, however, it does meet the intent of the exemption request.

The inspectors verified cable/raceway routing and protection provided for the following in Fire Zone 84:

<u>Cable/Raceway</u>	<u>Function</u>
3J 1674 **	Diesel Generator 4E35 Lock-Out Relay 4 Control
3K1696 **	EDG Control Panel 4k4 Voltage Control-Governor
PB-3861 **	EDG 4E38 Control Panel 4K4 Control
PB-3841 **	Auxiliary Feedwater Pump 3KC Turbine Trip and Throttle Valve Control



3J1761 \*\*

Feedwater Flow Bypass  
Valve SV3-479-99A  
Control

\*\* Provided with one-hour fire rated wrap protection.

The inspectors performed a walkdown of Fire Zone 84 and verified that the above fire barrier wrap assemblies were installed in accordance with the TSI design limitations and that they were continuous and applied to the required lengths of the cable/raceways as they were routed through Fire Zone 84.

The inspectors verified that the insitu combustible inventory for the zone was in accordance with that presented in the Fire Hazards Analysis and that no major fire exposures existed within the fire zone. Based on review of the analysis, the routing of the above sampled safe shutdown cables, and review of the fire protection features provided for the plant area the level of fire protection of Fire Zone 84 should maintain one train of systems necessary to achieve and maintain hot standby free of fire damage.

- (g) Fire Area OD, Fire Zone 47-Elevation 18.00' Unit 4 Component Cooling Pump and Heat Exchanger Area.

Fire Zone 47 is outdoors and separated from other plant areas by 3-hour rated fire barriers. The licensee's Fire Hazards/Safe Shutdown analysis demonstrates that for a fire in this area safe shutdown train B will be available.

This area contains three redundant Component Cooling Water pumps and associated heat exchangers for Unit 4. Because the control cables for each pump were located in a common enclosure the licensee rerouted the local controls for one of the pumps to achieve twenty feet of separation free of intervening combustibles. Specifically, the local controls for the "B" pumps have been relocated greater than 20 feet from the controls for the "A" and "C" pumps. The conduits for the "B" pumps have been provided with one-hour rated fire wrap. A portion of the wrapped controls for the "B" pumps is not covered with suppression. Justification for this discrepancy is provided in QAO-PTN-89-981.

Another discrepancy was noted in that an automatic wet pipe sprinkler system was not installed due to inadequate design considerations. Instead, two fully automatic, functionally redundant deluge systems actuated by fast response ultraviolet detection systems have been installed in Fire



Zone 47, as well as, Fire Zone 54. These installed systems provide an increased level of reliability and better sensitivity than that described in the SER.

The cable routing and protection reviewed for this equipment are as follows:

<u>Cable/Raceway</u>	<u>Function</u>
B-4H1361 **	CCW Pump 4P211B Control
B-PB4800 **	CCW Pump 4P211B Control

\*\* Provided with one-hour fire rated barrier wrap enclosure

This area also contains manholes and duct banks which contain redundant intake cooling water cables. The licensee installed 2-inch curbs around each manhole, sealed each manhole with a gasket and screwed the plates down to preclude flammable liquid spills from entering.

The inspectors noted that the high traffic pathway through Fire Zone 47 to the Auxiliary Building was not fully covered by the suppression system but, was fully protected by the detection system. The licensee agreed to correct the UFSAR documentation here and in other places with minor points of deviation.

- (h) Fire Zone 54 which contains the three redundant Component Cooling Water pumps for Unit 3 were modified in the same way as Unit 4 except no manholes or duct banks exist, and therefore this modification was not performed.
- (i) Fire Area OD, Fire Zone 88-Elevation 18.00' Unit 3 Switchgear/D.G. Building Vestibule.

The licensee's Fire Hazards/Safe Shutdown analysis for Fire Zone 88 demonstrates that for a fire in this area shutdown Train B will be used. The fire zone is provided with two fire extinguishers and partially protected by an automatic fire suppression system. Fire hose stations are available for manual fire fighting activities within the fire zone.

A portion of Fire Zone 88 is provided with wet pipe fire suppression even though an exemption was granted relieving the requirement of providing fire detection and fire suppression systems for selected outside areas, including this one.

The licensee's analysis identifies both Train A and Train B cables associated with the Emergency Diesel Generator Day Tank Fuel Oil Transfer system as routed unprotected through this fire zone. An inspection was made to verify the location of these cable/raceways, as well as, cables associated with the AFW system:

<u>Cable/Raceway</u>	<u>Function</u>
3ATK10	Fuel oil transfer pump 3P10 isolation valve control
3KVT10	Fuel oil transfer pump 4P10 isolation valve power
B-3K 1326 **	AFW Flow Control Valve CV3-2831 Control

\*\* Provided with one-hour fire rated barrier enclosure protection

The analysis has identified these cables as having spurious actuation concerns for which the licensee has identified mitigating manual actions in the Pre-Fire Plan, Operation Safe Shutdown Manual Actions dated October 19, 1989 for Fire Zone 88. This procedure identifies manual actions to be taken within 15 minutes to prevent overflow of the day tanks. Also an alternate method of transfer of fuel oil to either Diesel Day Tank from a remote truck fill station is required per Operation Procedure O-OP023. The inspectors reviewed Sections 7.3 through 7.4 of this procedure which specifies, in detail, steps for emergency tie-in from a mobile fuel tank unit and the subsequent filling of the Diesel Oil Day Tanks. Based on this review and the routing of the above sampled safe shutdown related cables, it appears the level of protection in Fire Zone 88 should maintain one train of systems necessary to achieve and maintain hot standby free from damage.

Fire Zone 89 in Fire Area OD, Condensate Storage Area, Unit 3 is an open area which contains the condensate storage tank, transfer pumps, and safe shutdown related equipment and cables. Portable fire extinguishers, standpipe and hose stations are available. The licensee has received an exemption for the control cables for Auxiliary Feedwater Supply Backup Control Valves and the Diesel Generator Breaker to Bus control cables. The licensee has separated the cables by more than 20 feet and where this was not practical wrapped the shutdown train with an approved 1-hour rated fire barrier until 20 feet of separation was achieved.



The Diesel Generator Radiator Room (Fire Zone 131) houses radiators, cooling fans, and associated instruments, piping, and valves, for both units Diesel Generators. The control cables for Diesel Generator 3 Breaker to Bus 4A which were suppose to be rerouted independent of the area and separated with a 3-hour fire rated barrier are not. However, the licensee has installed a partial height 3-hour fire rated barrier between the radiators. Justification is provided in QAO-PTN-89-981.

Fire Zone 106, Units 3 and 4 control room were also observed to be in compliance with NRR requirements for Appendix R exemption.

The inspector was unable to review Fire Areas B or C (Fire Zones 11, 12, 13, 14, 14, 16) Units 3 and 4 Residual Heat Removal Area because of ALARA concerns.

b. Associated Circuits of Concern

The separation and protection requirements of 10 CFR 50, Appendix R, apply not only to safe shutdown circuits but also to associated circuits that could prevent operation or cause the undesired operation of safe shutdown systems and equipment. The identification of these associated circuits of concern was performed for Turkey Point Nuclear Station in accordance with NRC Generic Letter (G/L) 81-12 and subsequent NRC clarifications. Associated circuits of concern are defined as those circuits that have a physical separation less than that required by Section III.G.2 of Appendix R, and have one of the following:

- A common power source (common Bus) where the shutdown equipment and the power source is not electrically protected from the circuit of concern by coordinated breakers, fuses, or similar devices; or
- A connection to circuits of equipment whose spurious operation (spurious signal) would adversely affect the shutdown capability; or
- A common enclosure with the shutdown cables, and

Type (1) are not electrically protected by circuit breakers, fuses or similar devices, or

Type (2) will allow propagation of the fire into the enclosure.

(1) Associated Circuits by Common Power Supply (Common Bus)



Circuits and cables associated by common power supply are simply non-safe shutdown cables whose fire-induced failure will cause the loss of power source (bus, distribution panel, or MCC) that is necessary to support safe shutdown. This problem could exist for power, control or instrumentation circuits. The problem of associated circuits of concern by common power supply is resolved by ensuring adequate electrical coordination between the safe shutdown power source supply breaker and the component feeder breakers or fuses. Such coordination ensures that the protective device nearest to the fault operates prior to the operation of any "upstream" devices, and limits interruption of electrical service to a minimum amount of equipment.

The licensee's evaluation is based on coordinating the highest rated branch circuit protective device at a power distribution bus, regardless of the load being supplied, with the first upstream protective device to ensure that a fault on a branch circuit for that bus will trip clear before the feeder circuit trips clear of the distribution bus. Each unit has two 4 KV busses, energized from either the off-site power source or its respective diesel generator. These diesel generators are shared between units. The coordination for these buses was verified for feeds from the Start-up and Auxiliary transformers as well as the diesel generators. It should be noted that on a loss of off site power various 4KV loads are shed thus the power requirements are reduced. It appeared that the operating curves for the diesel generator output breaker and the breaker supplying power to the 480V load centers overlapped at approximately 3200 amps fault current flow. However, the maximum diesel generator fault current is 1544 amps at which point the load center feeder breakers will trip before the diesel generator output breaker trips.

The inspector examined the time/current characteristic curves for the worst case condition at each distribution bus to verify coordination as listed below:

4160 Volt bus versus feeder breakers to Steam Generator Feed Pump motor and/or 480 Volt Load Center if off-site power is available.

4160 Volt bus versus feeder breakers to the 480 Volt Load Centers if loss of off-site power occurs.

480 Volt Load Center 3 (4) B to Motor Control Center 3(4) B.

480 Volt Load Center 3 (4) A to Motor Control Center 3 (4) A.



The various 480 Volt Motor Control Center Feeder breakers were found coordinated with the largest branch load.

The D. C. coordination studies revealed no major problems.

During the review of the circuit breaker/fuse Coordination Study, it was noted that certain circuits had molded case circuit breakers (MCB) which had to be coordinated. Testing of molded case circuit breakers was discussed with the licensee. The concern was that the MCBs would maintain their characteristics to support the coordination. The licensee stated that when spare parts are available and industry test procedures are acceptable, testing to assure Appendix R breaker/fuse coordination would be performed in accordance with Plant Procedure MI-E-023.1 which is now in the issue cycle.

Since fuses are also important to the coordination of Appendix R circuits, the fuse control procedure O-ADM-030 was reviewed and found acceptable.

Walkdown of various equipment breaker/fuse arrangements were performed to verify fuse sizing and to verify that the fuses in use were of the type specified on the fuse list or that they were an acceptable substitute. Since both Units were at full power, only circuits that were not critical to the plant while in operation were examined. In addition, the control fuses for various shutdown circuits ("B" train) were verified to ensure that they were redundant and independent of the main control room circuits. The "B" train is the protected Appendix R electrical train when control room evacuation is necessary. The fuse independency and redundancy for Train "B" circuits after transfer is made for a control room evacuation satisfies the NRC concerns that were set forth to the industry by the issuance of IE Information Notice (IEN) 85-09.

IEN 85-9, Isolation Transfer Switches and Post-fire Shutdown Capability was issued January 31, 1985. This Notice identifies a potential problem concerning fuses in control circuits that are common for operation of equipment from the Control Room and Remote shutdown area (Designated as ASP at TP). A fire which could require the evacuation of the Control Room could cause these common fuses to blow before transfer is made to the Remote Shutdown Area. If the control circuit is needed at the Remote Shutdown area to energize a piece of equipment and if the fuse(s) blew before transfer, equipment would not be operable without replacing the blown fuse(s). Turkey Point's review for Associated Circuits recognized the above potential and they have modified circuits accordingly so that transfer operations isolates the control room circuits and fuses. In addition to



the above mentioned walkdown, the following drawings were reviewed to ensure independency and/or redundancy of fuses after transfer for various shutdown circuits.

<u>Drawing Number</u>	<u>Description</u>
5613-E-25 sheet 27B	Reactor Auxiliaries Pressurizer Relief Isolation Valve, MOV-3-535
5613-E-25 sheet 64B	Reactor Auxiliaries Pressurizer Relief Valve, PCV-3-455C
5614-E-25 sheet 4B	Reactor Auxiliaries RHR Pump 4B Breaker 4AB15
5614-E-28 sheet 8B	Electrical Auxiliary Diesel Generator Breaker 4AB21
5610-J-539C	SG "B" Level and Pressurizer Level Alternate Shutdown Loop Diagram
5610-J-539B	SG "A" and "C" Level Alternate Shutdown Loop Diagram
5613-E-29 sheet 7A	Turbine Auxiliary MSIV POV-3-2604 Channel B

It should be noted that there are no transfer switches in the instrumentation circuits of the Alternate Shutdown Panel (ASP). These instrumentation circuits are protected by isolation modules that prevent a potential fire-induced electrical fault from affecting the instruments located in the ASP. These circuits are powered from a source which is not located in or passes through any of the three areas that would require the use of the ASP.

(2) Associated Circuits Causing Spurious Operation (Spurious Signals)

Circuits associated because of spurious operation are those that can, by fire-induced failures cause safe shutdown equipment or non-safe shutdown equipment to operate or not to operate in a way that defeats the function of safe shutdown systems or



equipment. Examples include uncontrolled opening or closing of valves or circuit breakers due to fire-induced damage to non-safe shutdown instrument and control circuits that affect the control circuit interlock of the safe shutdown components.

The licensee's analysis for spurious operations for Appendix R alternate shutdown and safe shutdown systems was based on the following:

- (a) Safe shutdown capability should not be adversely affected by any one spurious actuation or signal resulting from a fire in any plant area (zone); and
- (b) The safe shutdown capability should not be adversely affected by a fire in any plant area (zone) which results in the loss of all automatic functions (signals, logic) from the circuits located in the area (zone) in conjunction with one worst case spurious actuation or signal resulting from the fire; and
- (c) The safe shutdown capability should not be adversely affected by a fire in area (zone) which results in spurious actuation of the redundant valves in any one high-low pressure interface line.

All equipment that is needed or could impact safe shutdown was compiled in an Appendix R Essential Equipment List (Drawing 5610-M723/99-179). Each piece of equipment and its cable routing was analyzed for spurious operations and its impact as part of the Appendix R Safe Shutdown (SSD) Analysis. A resolution was provided for all potential spurious operations of equipment that could cause a loss of primary coolant and/or adversely impact SSD. These resolutions fell into one or a combination of the following:

- (a) Pre-fire action (e.g., maintain a breaker open during normal operations)
- (b) Plant modification which has been accomplished (e.g., rerouting of cable, protection of cable, installation of switches and redundant fuses, etc.)
- (c) Post-fire operator action (e.g., open a breaker)

Post-fire actions in accordance with TP's O-ONOP-016.10, Pre-fire Plan Guidelines and SSD Manual Actions, will take place shortly following the identification of a substantial fire at TP. The Pre-fire Plan Guidelines and SSD Manual actions are identified for each potential fire area.

Primary coolant high-low pressure interface electrically operated valves were reviewed for spurious signal concerns. These valves are the residual heat removal (RHR) isolation valves, normal and excess letdown valves, sampling system valves, pressurizer power operated relief valves (PORV) and the reactor head vent valves. The spurious operation of these valves is mitigated by valve redundancy, proper separation, protection, analysis, operator actions and flow restrictors installed in some reactor coolant system fluid lines. These valves were discussed in the TP's FSAR, Appendix R, Section 6.

The licensee stated that IEN 87-50, Potential LOCA at High- and Low-pressure Interfaces from Fire Damage, concern was not applicable to TP. IEN 87-50 identified two motor operated valves that may be installed as by-pass valves around the check valves in the RHR discharge lines. These by-pass valves are used to warm up the RHR system discharge line by backflow from the reactor before initiating residual heat removal to prevent thermal shocking of the reactor vessel nozzle safe ends. The inspectors verified by review of the P&ID diagrams that these valves do not exist at TP. RHR warm up is done via another means at TP.

(3) Associated Circuits by Common Enclosure

The common enclosure concern is found when redundant trains are routed together with a non-safety circuit which crosses from one raceway or enclosure to another, and the non-safety circuit is not electrically protected or fire can destroy both redundant trains due to fire propagating into enclosures containing redundant safe shutdown circuits.

The licensee advised that their electrical coordination, conduits and routing thereof and use of rated fire seals at fire barriers, and the other actions taken with regard to Associated Circuits of Concern provides this protection. In addition cable wrapping/sprinklers have been installed in areas that present a challenge to the concept of common enclosure separation. This is discussed in another section of this report. It is considered that the licensee's action with regard to Appendix R Common Enclosure concerns are satisfactory.

c. Alternative Shutdown Capability

The licensee program for providing alternative shutdown capability is addressed in a letter to the NRC dated October 7, 1983 and is presently described in the UFSAR Appendix 9.6A. NRC Safety



Evaluation Report (SER) dated April 16, 1984, approved the licensee program for alternative shutdown capability for Units 3 and 4 based on all of the licensee Appendix R submittals up to and including the October 7, 1983 submittal.

The inspectors reviewed operating personnel training, shift staffing, the alternative shutdown procedure, post-modification tests of alternative shutdown panels (ASP) and the surveillance tests program for the ASP components (control, isolation, transfer, indication) and instrumentation. These activities were reviewed to determine if the requirements of Appendix R, Section III.G.3 and III L. for obtaining hot standby conditions and subsequent cold shutdown are being met.

(1) Shift Staffing

Appendix R Section III L.4. requires that the number of operating shift personnel exclusive of the fire brigade members, to operate alternative shutdown equipment and systems shall be on site at all times.

The licensee normal shift staffing was reviewed to verify that sufficient manpower is available to operate the equipment and systems described in O-ONOP-105, Control Room Evacuation Procedure. This procedure implements the alternative shutdown capability in the event of a significant fire in the control room, cable spreading room, or north-south breezeway. O-ONOP-105, Control Room Evacuation identifies eight operators as being necessary to accomplish the procedure steps for placing both Units in hot standby condition at designated locations outside the control room. Operating Procedure OP-0204.2 Periodic Test, Checks and Operating Evaluations, assigns operating personnel to O-ONOP-105 at the beginning of the shift. The fire brigade roster was also checked to ensure separation of assignments. The inspectors reviewed the shift staffing roster and noted operating personnel were appropriately assigned and were on shift.

Adequate shift staffing was further demonstrated during a simulated walk-through of O-ONOP-105, Control Room Evacuation. This procedure requires the use of eight operators to achieve hot standby conditions. The same number of operators are sufficient to take the plant to cold shutdown conditions although additional personnel would be made available as required by the plant Emergency Plan.

(2) Review of Alternative Shutdown Procedure

Alternative shutdown capability in accordance with Section III.G.3 and III.L of Appendix R is necessary for fire in the control room, cable spreading room and the north-south breezeway. When required

the implementation of the alternative shutdown capability is accomplished using Procedure O-ONOP-105, Control Room Evacuation. For all other fire areas in the plant safe shutdown capability is in accordance with Section III.G.1 and III.G.2 of Appendix R.

The "entry" into alternative shutdown procedures (O-ONOP-105) as well as all other fire areas is determined by O-ONOP-016.10, Pre-fire Plan Guidelines and Safe Shutdown Manual Actions. This procedure establishes guidelines for attacking and combating the fire for the fire brigade and identifies to the operators the equipment and systems in the fire area so an assessment can be made on the operating methods to maintain or place the plant in a safe condition.

The inspector reviewed O-ONOP-105 dated November 9, 1989 to verify that the performance goals of Appendix R, Section III.L could be accomplished. The action steps of the procedures did identify the equipment and systems necessary to implement subcritical reactivity conditions, control of reactor pressure, level and decay heat removal. In addition to the review a walk-through of O-ONOP-105, Control Room Evacuation was conducted. The simulated walk-through started with a fire in the control room, the plant at a 100 percent power and a subsequent loss of offsite power. The off-shift crew was used and after taking the necessary procedural steps in the control room, they proceeded to man the alternate shutdown panels (both units) and stations in the plant. The walk-through ended when the units were stabilized in hot standby conditions. The purpose of the walk-through was to verify that:

- Communications between various stations is adequate and operable.
- Identification plates installed on valves and instrumentation agree with that called for in the procedure steps.
- Lighting at stations, access and egress paths is adequate.
- Equipment and valves to be operated can be reached and are not obstructed.
- Sound power phone headsets and procedures to be used are available and contain the latest revision.
- Steps of procedures are clear and can be accomplished.



The review and walk-through of 0-ONOP-105 indicated that the performance goals of Appendix R, establishing hot standby conditions and subsequently place the plant in cold shutdown are provided for in the procedure. Several procedure improvements were identified by the inspectors. Proposed corrective actions were provided for each item identified and has been added to the plant's tracking system for implementation .

e. Alternate Shutdown Capabilities

(1) Operator Training

The inspectors reviewed the licensee's program for providing training to licensed and non-licensed operators who are required to perform the functions of the alternate shutdown procedures. The inspectors verified that a comprehensive training program was provided by the review of lesson plans and completed training reports. The training to the operators also included walk through drills using the alternate shutdown procedure 0-ONOP-105, Control Room Evacuation, where both units are required to be shutdown from outside the main control room (MCR). Operations personnel also receive training on procedure 0-ONOP-16.10, Pre-fire Plan Guidelines and Safe Shutdown Manual Actions. In addition to the classroom training and walkdown performed by operations personnel, the licensee's simulator also includes an ASP which is an exact replica of the ASPs located in the plant. However, licensee training personnel stated that the ASP simulator is not very practical for procedure 0-ONOP-105 training since this procedure involves the coordination and interface of a number of operations personnel located at different places outside the MCR. Training on the ASP simulator would only involve the RCO located at the ASP. The inspector noted that while the ASP simulator does not appear to be practical for all the operations personnel involved in 0-ONOP-105, it appears that the ASP simulator would aid the RCOs in becoming familiar with the location and operation of the ASP instrumentation and components.

(2) Post Modification Testing of the ASPs

There were a number of PC/Ms implemented over several years which involved Appendix R and alternate shutdown capability. The inspectors focused on the post modification tests (PMT) which tested the overall alternate shutdown capability and the dedicated communication system for alternate shutdown. In addition to reviewing the PMT, the inspectors also reviewed the test procedures written to test operation of the ASPs while in Mode 3. The following tests were reviewed.

- Preoperational Procedure 0800.62, Alternate Shutdown Capability, Unit 4, Preoperational Test



- Preoperational Procedure 0800.152, Alternate Shutdown Capability, Unit 3, Preoperational Test
- Preoperational Procedure 0800.207, Alternate Shutdown Communication System, Units 3 and 4, Preoperational Test
- TP-519, Unit 3 Alternate Shutdown Panel - Mode 3
- TP-522, Unit 4 Alternate Shutdown Panel Performance Check

The ASPs were installed in accordance with PC/M 83-154 for Unit 3 and PC/M 83-155 for Unit 4. Preoperational procedures 0800.62 and 0800.152 were performed after implementation of the PC/Ms. The preoperational procedures verified equipment functioning from the ASP when the transfer or isolation switch was placed in the local position and the equipment could not be operated from the MCR; and the equipment operated from the MCR but could not be operated from the ASPs when the transfer or isolation switch was in the remote position. The alternate shutdown dedicated communication system was installed in accordance with PC/M 85-15. Preoperational procedure 0800.207 verified that the alternate shutdown communication system was functioning properly by paging from each station and proved the ability to monitor communication between all alternate shutdown paging stations.

Procedure TP-519 demonstrated that the proper cooldown rate for Unit 3 could be established from the Unit 3 ASP by cooling down the RCS from approximately 550F to 525F. Procedure TP-522 demonstrated that the RCS could be cooled down and the RHR system placed in service from the ASP. Proper RCS cooldown rate via the RHR system was established and demonstrated from the Unit 4 ASP.

Based on review of the above tests, the inspectors concluded that the testing performed to demonstrate operability of Units 3 and 4 ASPs and the alternate shutdown communication systems was adequate.

### (3) Alternate Shutdown Surveillances

The inspectors reviewed the surveillance procedures listed below which were developed by the licensee to demonstrate operability of the Alternate Shutdown Capability in the event of a MCR evacuation. The following procedures were reviewed.

- 3-OP-300, Alternate Shutdown Panel
- 3-OSP-300.1, Alternate Shutdown Panel 3C264 Operability Test



- 3-OSP-300.2, Alternate Shutdown Panel 3C264 Switch and Instrumentation Alignment Check
- 3-OSP-300.3, 4160 Volt Switchgear Safe Shutdown Communications System Operability Test
- 3-OSP-300.4, Dedicated Alternate Shutdown Communications System Operability Test
- 4-OP-300, Alternate Shutdown Panel
- 4-OSP-300.1, Alternate Shutdown Panel 4C264 Operability Test
- 4-OSP-300.2, Alternate Shutdown Panel 4C264 Switch and Instrumentation Alignment Check
- 4-OSP-300.3, 4160 Volt Switchgear Safe Shutdown and Alternate Shutdown Operability Test
- 4-OSP-300.4, Dedicated Alternate Shutdown Communications System Operability Test
- 0-OSP-200.1, Schedule of Plant Checks and Surveillance
- 0-OSP-200.2, Plant Startup Surveillance

The inspectors reviewed the above surveillance procedures to determine if they were adequate for determining operability of the alternate shutdown capability. This review included the most recently completed copies of procedures 3-OSP-300.2 and 4-OSP-300.2, which are monthly surveillances. The inspectors raised a question concerning the calibration of the ASP instruments since calibration was not included in any of the surveillance procedures reviewed by the inspectors. Licensee personnel stated that instrument calibration was handled by their I&C Department. The inspectors were provided a list of procedures which covered calibration of the ASP instrumentation.

Based on review of the above surveillance procedures, the inspectors concluded that the procedures are adequate for determining operability of the alternate shutdown capability.

e. Section III.J Emergency Lighting

The inspectors reviewed the licensee's emergency lighting provided for areas needed for operation of safe shutdown equipment and the access and egress routes for these areas. This consisted of a walkdown of the emergency lighting and a review of vendor manuals and

surveillance/maintenance procedures. The inspectors determined that the licensee's emergency lighting was in compliance with 10 CFR 50, Appendix R, Section III.J. The specific areas are discussed below:

(1) Walkdown of Emergency Lighting

The inspectors toured the plant to inspect the emergency lights installed in those areas required for post-fire shutdown and in the access routes to those areas. This inspection verified the following:

- (a) lamps were properly aimed
- (b) the batteries were being properly maintained
- (c) sufficient illumination was provided to permit access for the monitoring of safe shutdown indications and/or the proper operation of safe shutdown equipment

The inspectors noted numerous minor discrepancies during the plant tour. Many of these discrepancies were corrected prior to the end of the inspection. The following discrepancies had a proposed resolution that was agreed upon by FP&L and NRC, but the actions were not completed prior to the end of this inspection:

<u>DISCREPANCY</u>	<u>ACTION TO BE TAKEN</u>
1. Emergency lighting located in the 3C/3D, 4C/4D load centers not shown on drawing 5610-A-62, Revision 1.	Drawing will be revised.
2. Aiming of lightings in the AFW pump area not consistent with drawing 5610-A-62, Sheet 3, Revision 1.	Drawing 5610-A-62 will be revised to reflect proper orientation.
3. Emergency light (EL) 009-18 had a small leak.	A replacement battery had been ordered, the work will be done under PWO-69-4067.
4. Turbine Operator Shack did not have Emergency lighting. Operators are required to obtain procedures and radios during a shutdown from outside the main control room.	An additional light will be installed to improve lighting.



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|----|---|--|
| 5. | Drawing 5610-A-62, Sheet 3, Revision 1, shows EL-49-1B are used for access. These lights are actually for Intake Cooling Water throttle bypass valves 4-406 and 3-406.                              | Drawing 5610-62, Sheet 3 will be revised to reflect proper orientation.  |
| 6. | MOV-3-749 A&B were illuminated by E-005-18 not EL-009-18. On Unit 4, 749 A&B are illuminated by EL-43-18 not EL-46-18.  | Change Request Notice (CRN) 2643 was written to revise drawing 5610-A-62, Sheet 3, and procedures SME-104.1 and SME-104.2 will be revised.   |
| 7. | MOV-3626 was illuminated by EL-07-18 not EL-06-18. On Unit 4, MOV-4-626 was illuminated by EL-44-18 not EL-45-18.   | CRN 2643 was written to revise drawing 5610-A-62, Sheet 3 and procedures SME-104.1 and SME-104.2 will be revised.                            |
| 8. | 125 V DC panel 3D01 needs additional lighting for operator actions.   | A remote head will be relocated to improve lighting levels.  |
| 9. | ONOP-105, Control Room Evacuation, dated October 19, 1989, did not require operators to pick up portable 8 hour emergency lamps. Some manual operator actions would be difficult without their use. | ONOP-105 will be enhanced to reflect the use of portable lamps. A training brief on the location and use of portable lights will be written. |

(2) Maintenance/Surveillance of Emergency Lighting

The inspectors reviewed the Electrical Maintenance procedures listed below to verify that vendor recommendations were being followed:

- O-SME-104.1, Self Contained, Battery Powered, Emergency Lighting Monthly Performance Test, Revision Dated November 9, 1989.
- O-SME-104.2, Self Contained, Battery Powered, Emergency Lighting Performance Test, Revision Dated November 9, 1989.

The inspectors determined the vendor maintenance frequencies and procedures were being followed. The licensee was inspecting the batteries and lamps monthly and also performing the required eight hour discharge test annually. The inspectors reviewed eight copies of O-SME-104.1 for the past five months and O-SME-104.2 for the past year to verify that frequencies were being met. There were no discrepancies identified in the area of maintenance/surveillance of emergency lighting.

(3) Vendor Manuals

The inspectors reviewed the vendor manuals for each of the four types of emergency lighting units. These manuals indicated that each emergency lighting type was rated for an eight hour time period. The review of the completed eight hour discharge tests performed in accordance with O-SME-104.2, supported the vendor specifications. The inspectors also reviewed Preoperational Procedure 0800.185, dated August 15, 1989. This test verified that the portable emergency lamps located throughout the plant for operators use were rated for eight hours. These results were satisfactory.

3. Regional Case File No. RII-89-A-0082, Questionable Fire Protection Practices

Summary of Information: Regional Allegation Coordinator received a phone call from an anonymous alleger who did not want to identify himself. The Regional Allegation Coordinator allowed the alleger to provide the following information without interruption.

a. Questionable Thermo Lag Repair of Trapped Moisture

The Alleger said that the Thermo-lag located on the emergency shutdown system which is located outside the plant is exposed to the environment and consequently gets wet. The alleger said that the moisture gets trapped and the licensee is repairing the trapped moisture by drilling inch holes in the Thermo-lag which the alleger believes is inadequate. The alleger said the reason he believed this practice to be inadequate is because it no longer becomes an effective fire barrier.

The inspectors reviewed Industrial Testing Laboratory Report No. 86-1-43 one hour fire endurance test conducted on three thin wall steel conduits to 325F when exposed to an ASTM E 119 type time/temperature fire environment for a period of one hour. The report contains the following test results and observations:

- (1) The test assembly was exposed to the Standard time/temperature environment of ASTM E 119 for a minimum of one hour, followed by a three minute minimum water hose test.



- (2) The water hose stream did not adversely effect the Thermo-lag 330 Fire Barrier System remaining on the test assembly following the fire endurance test.
- (3) The recorded surface temperatures in the thinwall steel conduit sections during exposure to the ASTM E 119 type fire endurance test for one hour, did not exceed:
  - a) Highest Average Surface Temperature 237F
  - b) Maximum Individual Thermocouple Temperature 258F
- (4) The 1-1/4 diameter plastic drain holes installed along the base of the pre-fabricated Panel Fire Barrier functioned successfully and sealed when exposed to the ASTM E 119 type fire environment.

The purpose of this test was to:

Qualify the .500" minimum thickness pre-fabricated Panel Box Design of the Thermo-lag 330 Fire Barriers System for use as a one hour fire rated barrier for thinwall steel conduit.

Demonstrate the capability of the 1/4" diameter plastic tubes to function successfully as drain holes and yet seal when exposed to a one hour ASTM E 119 type fire environment.

Demonstrate that the fire barrier design as tested, complies with the 325F temperature limitation imposed by Nuclear Jurisdictional Authorities.

The test was conducted on January 13, 1986 at the laboratory of TSI in St. Louis, Missouri, and under the direct supervision and total control of Industrial Testing Laboratories, Inc., St. Louis, Missouri.

The inspectors also reviewed FP&L procedure for installation of Drainage holes. The installation of drainage holes along the bottom of all sections of the fire barrier where water can accumulate and pond is accomplished by disassembling the fire barrier, drilling 1/2 inch diameter holes at three inch spacing where applicable, buttering the 1/8 inch plastic tubes with the Thermo-lag 330-1 Subliming Catalyzed Material Trowel Grade and then inserting the plastic tube into the drilled holes.

Procedure steps were as follows:

Identify all fire barrier sections where water is likely to accumulate and pond.

Cut the tie wires and steel bands fastening the pre-fabricated panels or preshapped conduit sections together and remove the fire barrier from the raceway or structural steel entity.

Drill 1/2 inch holes at three inch spacing along the bottom of all section of the barrier where water may accumulate and pond.

Select the required number of inch plastic tubes and butter them with the thermo-lag 330-1 Subliming Catalyzed Material Trowel Grade.

Insert the Plastic tubes in the drilled holes and tap them into place.

Reassemble the fire barrier sections using approved stainless steel tie wire or stainless steel banding material. The recommended maximum spacing between the tie wire or steel banding should not exceed 12 inches.

Filling the edges and joints with a bead of Thermo-lag 269 Sealistic Rapid Curing Elastometric Caulk. The minimum cross section thickness of the beam shall be .500 inches for a one hour fire barrier and 1.00 inches for a three hour fire barrier.

After the elastometric caulk has hardened to touch, apply the Thermo-lag 350-2000 topcoat by brush or roller in multiple passes of criss-cross techniques, at a spread rate of 50 square feet per gallon.

After the Thermo-lag 350-2000 topcoat has hardened to touch, apply the Thermo-lag 350-5000-10 topcoat by brush or roller in multiple passes or criss-cross technique, at a spread rate of 50 square feet per gallon.

During the inspection the inspectors verified that the work had been done in accordance with the above listed requirements.

b. Flammable Caulking Not Being Adequately Removed

The allegor said that the thermo-lag pieces have a seam that is caulked in order to seal the pieces together. The allegor said that the caulking that was used was flammable and the licensee is in the process of reworking the problem. The allegor said that his concern is that the rework is not removing all the flammable caulking. The allegor said that the flammable caulk is soft and the replacement, ceramic caulk is hard. The allegor said that as the crews are reworking flammable caulking they are not entirely removing all the old caulk. The allegor said that in some cases they only remove 1/8 inch and leave the rest. The allegor said that they apply the new ceramic caulk over the old flammable caulk. The allegor said that this is an ineffective repair of the problem. The allegor said that he has mentioned this problem to Bechtel and they said don't worry about it.



The inspectors reviewed the requirements of Procedure No. 5610-E-311 for Removal and Replacement of Defect caulking material. This procedure states that the removal and replacement of defective caulking material is accomplished by removing all caulking material that has cracked or receded from the edges of joints of fire barriers and the resealing of these edges and joints using joint caulk. Procedure steps are as follows:

Remove all cracked or receding caulking material from the edges and joints of the fire barrier by means of cutting, scraping, and grinding methods. The minimum thickness of the material and the stress skin location must be maintained per Section 3.0.

Brush all foreign matter from the edges and joints.

Reinstall joint caulk to obtain a total minimum thickness of the new and existing caulk of .500 inches for a one hour fire barrier and 1.00 inches for a three hour fire barrier.

After the joint caulk has cured apply the Thermo-lag 350-2000 Topcoat per Section 7.1.

After the Thermo-lag 350-2000 topcoat has hardened to touch apply the Thermo-lag 350-5000-10 topcoat per Section 7.0.

Removal and replacement of cracked or otherwise damaged topcoat. This procedure description is to provide the steps needed to remove and replace cracked or otherwise damaged topcoat. Procedure steps are as follows:

Visual inspect the existing topcoat for pinholes damages cracking, peeling

Remove any damaged topcoat by wire brushing or sanding methods

Brush away all foreign matter

Apply a coating of the Thermo-lag 350-2000 topcoat per Section 7.1.

After the Thermo-lag 350-2000 topcoat has hardened to touch apply the Thermo-lag 3230-5000-10 topcoat per Section 7.1.

During this inspection the inspectors did a walk down and verified that the flammable caulking was being properly removed and that the new ceramic caulk over the old caulking was being properly applied.



## 4. Followup on Information Notices and Part 21 Reports (92703)

## Information Notices on Automatic Sprinkler Corporation Valves

By letter dated March 2, 1984, IE Information Notice No. 84-16, Failure of Automatic Sprinkler System Valves to Operate, was issued. The notice identified that deluge valves manufactured by Automatic Sprinkler Corporation may not open when required due to excessive friction in the operating mechanism. This notice was followed by letter dated March 24, 1986, which transmitted IE Information Notice No. 86-17, Update of Failure to Automatic Sprinkler System Valves to Operate, which provided additional information on valve failures.

To resolve this problem the licensee implemented a retrofit to their affected valves and replaced the valve clapper assembly and latch arm as directed by the valve manufacturer.

Plant Change and Modification (PC/M) No. 87-314, dated January 25, 1988, implemented the retrofit of the valves for the affected deluge systems for the startup, Main Auxiliary Transformers for Both Units 3 and 4.

Based on the completion of the manufacturers recommended retrofit the licensee's response to the subject Information Notice is acceptable.

## 5. Exit Interview

The inspection scope and results are summarized on November 17, 1989, with those persons indicated in paragraph 1. The inspectors described the areas inspected and discussed the inspection results.

## 6. Acronyms and Initialisms used in this Section of the Report:

ASP	Alternate Shutdown Panel
D.C.	Direct Current
FSAR	Final Safety Analysis Report
G/L	Generic Letter
IEN	IE Information Notice
KV	Kilovolts
LOCA	Loss of Coolant Accident
MCC	Motor Control Center
MCB	Molded Case Circuit Breakers
MOV	Motor Operated Valve
MSIV	Main Steam Isolation Valve
PCV	Pressure Control Valve
POV	Power Operated Valve
PORV	Power Operated Relief Valve
RHR	Residual Heat Removal
SG	Steam Generator
TP	Turkey Point
TSI	Thermal Science Incorporated
V	Volts

