



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

Report No.: 50-302/85-30

Licensee: Florida Power Corporation
3201 34th Street, South
St. Petersburg, FL 33733

Docket No.: 50-302

License No.: DPR-72

Facility Name: Crystal River 3

Inspection Conducted: July 29 - August 2, 1985

Inspectors:	<u>W. H. Miller</u>	<u>9-20-85</u>
	W. H. Miller, Jr., Team Leader	Date Signed
	<u>G. R. Wiseman</u>	<u>9/19/85</u>
	G. R. Wiseman	Date Signed
	<u>L. S. Mellen</u>	<u>9-20-85</u>
	L. S. Mellen	Date Signed
	<u>M. D. Hunt</u>	<u>9-20-85</u>
	M. D. Hunt	Date Signed
	<u>T. F. McElhinney</u>	<u>9/19/85</u>
	T. F. McElhinney	Date Signed
Approved by:	<u>T. E. Conlon</u>	<u>9-20-85</u>
	T. E. Conlon, Chief, Plant Systems Section	Date Signed
	Division of Reactor Safety	

SUMMARY

Scope: This special announced inspection involved 220 inspector-hours on site in the areas of fire protection and the licensee's actions regarding the implementation of the requirements of 10 CFR 50, Appendix R, Sections III.G., III.J., III.L., and III.O.

Results: No violations or deviations were identified.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

- *W. Wilgus, Vice President Nuclear Operations
- *P. McKee, Plant Manager
- *G. Boldt, Plant Operations Manager
- *E. Howard, Director, Site Nuclear Operations
- *E. Renfro, Director, Nuclear Operations Materials and Controls
- *W. Rossfeld, Site Nuclear Compliance Manager
- *J. Alberdi, Site Nuclear Operations Technical Services Manager
- *L. Kelley, Nuclear Operations Training Manager
- *G. Westafer, Manager, Licensing and Fuel Management
- *K. Wilson, Supervisor, Site Nuclear Licensing
- *S. Powell, Senior Nuclear Licensing Engineer
- R. Widell, Manager, Nuclear Engineering
- *R. Schmiedel, Nuclear Electrical Engineer
- *R. Low, Nuclear Electrical Engineer
- C. Bergstrom, Nuclear Operator
- T. Miller, Nuclear Shift Supervisor
- M. Kirk, Nuclear Operations Technical Advisor
- T. Metcalf, Nuclear Operations Technical Advisor
- W. Stephenson, Operations Engineer
- H. Koon, Senior Electrical and I&C Supervisor
- M. Penovich, Supervisor, Operations Training
- L. Allegood, Nuclear Materials Coordinator
- *J. Russell, Senior Nuclear Fire Protection Specialist
- *C. Williams, Nuclear Fire Protection Specialist
- T. Austin, Nuclear Mechanical Engineer

Other Organizations

- *R. Vaughn, Gilbert Commonwealth Inc.
- *S. Ford, Science Application International Corp.
- M. Horrell, EBASCO
- *P. Blomberg, Fluor Engineers Inc.
- *K. Kimball, Impell Corp.
- *D. Rhoads, Gilbert Commonwealth Inc.
- *K. Kramer, Gilbert Commonwealth Inc.
- *P. Shipper, Gilbert Commonwealth Inc.
- R. O'Laughlin, Professional Loss Control Inc.
- J. Antignano, Fluor Mechanical Services, Inc.

NRC Resident Inspector

- *T. Stetka, Senior Resident Inspector

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on August 2, 1985, with those persons indicated in paragraph 1 above. The inspectors described the areas inspected and discussed in detail the inspection findings listed below. No dissenting comments were received from the licensee.

- a. Inspector Followup Item 302/85-30-01, Verification of Cable Raceway Fire Barrier Installation - paragraph 5.b.
- b. Inspector Followup 302/85-30-02, Technical Specifications Required for New Remote Shutdown Panel - paragraph 5.c.
- c. Unresolved Item 302/85-30-03, Completion of Dedicated HVAC System for Control Complex - paragraph 5.d.
- d. Inspector Followup Item 302/85-30-04, Review of Licensee's Completed Fire Door Modifications as Denoted by MAR No. 85-02-10-01 - paragraph 5.f.
- e. Inspector Followup Item 302/85-30-05, Verification of Unobstructed Sprinkler System Spray Patterns - paragraph 5.g.
- f. Inspector Followup Item 302/85-30-06, Review of Licensee's Corrective Actions for NCR No. 85-130 - paragraph 5.h.
- g. Inspector Followup Item 302/85-30-07, Examine the Reliability of the Motor Overload Heater Element Trip Devices as Opposed to a Magnetic Trip Circuit Breaker for RB Fan No. 3B. - paragraph 6.a.
- h. Inspector Followup Item 302/85-30-08, Review of the Implementation and Training for AP-880 - paragraph 7.a.(1).
- i. Inspector Followup Item 302/85-30-09, Review of Communications and Area Access for Control Room Evacuation - paragraph 7.d.(2)(a).
- j. Unresolved Item 302/85-30-10, NRR Review and Approval of Appendix R Emergency Lighting - paragraph 8.

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

3. Licensee Action on Previous Enforcement Matters

This subject was not addressed in the inspection.

4. Unresolved Items

Unresolved items are matters about which more information is required to determine whether they are acceptable or may involve violations or deviations. New unresolved items identified during this inspection are discussed in paragraphs 5.c, 5.d, and 8 of the report.

5. Compliance with 10 CFR, Appendix R, Sections III.G. and III.L.

An inspection was conducted to determine if the protection features provided for structures, systems, and components important to safe shutdown at Crystal River Unit 3, were in compliance with 10 CFR 50, Appendix R, Sections III.G. and III.L. The scope of this inspection determined if the fire protection features provided for identified essential safe shutdown systems were capable of limiting potential fire damage so that one train of these systems essential to achieving and maintaining hot standby from either the control room or emergency control stations are free from fire damage.

a. Safe Shutdown Capabilities

In order to ensure safe shutdown capabilities, where 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 makeup and purification system, emergency feedwater, electrical power system, nuclear service closed cycle cooling system, reactor coolant system, main steam system, support air handling systems, and secondary plant instrumentation to determine the adequacy of the fire protection features and the separation afforded for these essential shutdown systems.

(1) Fire Protection for Safe Shutdown Systems/Components

Crystal River Unit 3 is divided into numerous fire areas as designated by the building name, building elevation, and area/zone number as depicted on the fire areas and zones (Cadd Levels 11 and 30: L-001-Series) set of drawings.

An inspection was made to determine if redundant cabling for the safe shutdown systems, required to achieve and maintain hot standby and cold shutdown conditions 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 or enclosure construction configuration as a fire rated barrier as used in the plant. 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 95', Fire Area 3, Fire Zones AB-95-3AA, 3B, 3D, 3E, 3F, 3G, 3K, 3X, 3Z, 3Y.

<u>Safe Shutdown Systems/Function</u>	<u>Fire Zone Fire Area</u>	<u>Train 1 Raceway/Conduit</u>	<u>Train 2 Raceway/Conduit</u>
Makeup Charging	3AA	*MUM13-4	MUM55-4
	3E&3F	MUM1-T	MUM33-T
		500	*503
	3X	*MUV-73	MUV-58
	3W	*MUC403-1	MUC399-1
	3B	*100	503
Nuclear Service	3G	500	*503
Seawater	3Z	501	*540
Emergency Feedwater 3B		*629	EFE75-3
		*300	EFS59-2
		*100	
		*516	

NOTE: *Raceways or components to be protected with fire rated enclosures

An inspection was made of the makeup charging pumps area to determine if the system and the components required for safe shutdown were provided with the fire protection features and cable separation in accordance with Appendix R, Section III.G.2 criteria.

The inspectors verified that the three makeup pump cubicles (Fire Zones AB-95-3E, 3AA, and 3F) were separated from Fire Zone AB-95-3D by a full height three hour fire barrier wall.

One makeup pump is located in each of the three cubicles. One end pump (3A) is powered and controlled by Train 1 circuits, the other end pump (3C) by Train 2 circuits and the center swing pump (3B) by either Train 1 or 2 circuits.

The makeup pump cubicles are separate by two full height concrete walls; however, are connected by an open three foot wide common corridor.

The local control stations for makeup pumps 3A, 3B, and 3C are located on the cubicles walls near the openings which form the common corridor between pump cubicles.

The control stations for pumps 3A and 3C are separated by 16 feet and the two partial concrete walls. No intervening combustibles are located in the corridor between the control stations. In addition, the swing pump (3B) control station, located in the center cubicle, is normally deenergized and must be powered by closing a breaker in a MCC located in a separate fire area.

In the makeup pump area there are ionization smoke detectors installed which alarm and annunciate in the control room. Also, an automatic wet pipe sprinkler system has been installed in the common corridor that connects the pump cubicles. This arrangement was the subject of an exemption request and has been reviewed and approved by NRC/NRR. Refer to paragraph 5.b for a discussion of this exemption request.

Redundant cabling and the valves (MUV-73 and MUV-58) for the makeup pump's suction alignment to the borated water storage tank are located within the common Fire Zone, AB-95-3X. Valve MUV-73 and its associated circuits will be provided with three-hour fire noted barrier enclosure wraps. The inspectors reviewed the completed fire barrier enclosure for valve MUV-73. This enclosure appears to provide the required fire barrier separation in accordance with Appendix R, Section III.G.2, to protect one train of the makeup charging path from a postulated fire in this area.

During the fire barrier walkdown in Fire Area 3, (Fire Zone AB-95-3Z), the inspectors noted that the seismic rattle space between the Auxiliary Building/Intermediate Building walls and the Reactor Building wall was sealed with a cork seal material. This material has not yet been tested as an approved through-penetration fire stop system. This wall (located near door assembly A-107) is designated as a three hour rated fire area boundary wall separating the Auxiliary Building and Intermediate Building. The licensee provided an evaluation dated July 30, 1985, of the boundary wall which was reviewed.

The evaluation indicates that on the Auxiliary Building side of the fire barrier wall (Fire Zone AB-95-3Z) is located safe shutdown equipment (Emergency Nuclear Service Cooling Pumps)

approximately 15 feet away in an area with low combustible loading (less than 15 minute duration). On the Intermediate Building side of the barrier wall there is negligible combustible loading in the Annulus (Fire Zone IB-95-200-B) and no safe shutdown equipment or cables within 100 feet of the boundary wall. Based on our review of the evaluation and a walkdown, it appears that the unrated cork penetration seal material installed in the fire wall seismic rattle space between the Intermediate Building and Auxiliary Building on elevation 95 feet will not adversely affect plant safe shutdown in event of a fire in this area and that the existing configuration is, therefore, acceptable.

- (b) Auxiliary Building, Elevation 119', Fire Area 6, Fire Zones AB-119-6A, 6E, 6J

<u>Safe Shutdown Systems/Function</u>	<u>Fire Zone</u>	<u>Train 1 Raceway/Conduit</u>	<u>Train 2 Raceway/Conduit</u>
Makeup Charging System (Makeup Pumps)	6A 6E	118 570	*121 *567
Air Handling System (Diesel Generator Room Fans)	6A 6E	667 562	*567 *567
Electrical Power Distribution	6E	*551	*567

NOTE: *Raceways to be protected with fire rated enclosures

The inspectors verified that Fire Zones AB-119-6A and 6E (Fire Area 6) were separated from other plant areas by equivalent three hour fire rated barriers. During their walkdown, the inspectors noted that the hydrogen (H2) line to the makeup tank was routed through the area. The licensee stated that the H2 line is routed inside guard piping throughout the area and is seismically supported. It appears that this arrangement would preclude a potential hydrogen leak in a plant area that contains safe shutdown equipment and/or cabling, and is, therefore, acceptable.

The inspectors verified that early warning ionization type fire detectors were provided in the area of Fire Zones AB-119-6A and 6E. In addition, the inspectors verified that the sprinkler system protecting these fire zones provided full floor coverage. The sprinkler system protecting these

fire zones is a dual level automatic wet pipe type system comprised of ceiling level sprinklers over the cable/conduit runs and a level of sprinklers located below the cable tray obstructions. It appears that if an exposure fire was to occur within either Fire Zones AB-119-6A or 6E, the present sprinkler design should be capable of controlling the fire.

- (c) Auxiliary Building, Elevation 119', Fire Area 7, Fire Zones AB-119-7A and 7B

<u>Safe Shutdown Systems/Function</u>	<u>Fire Zone Fire Area</u>	<u>Train 1 Raceway/Conduit</u>	<u>Train 2 Raceway/Conduit</u>
Electrical Power Distribution	7A	*562	571 and 572
Air Handling System (Diesel Generator Room Fans)	7A	*562	572

NOTE: *Raceway, to be protected with fire rated enclosures

The inspectors, during their walkdown of Fire Area 7, verified that early warning ionization type smoke and thermal heat detectors which alarm and annunciate in the control room, were provided and approximately distributed throughout the area. In addition, the inspectors verified that the sprinkler system protecting these zones provided full area coverage.

- (d) Intermediate Building - Elevation 95', Fire Area 200, Fire Zones IB-95-200B, and 200C.

<u>Safe Shutdown Systems/Function</u>	<u>Fire Zone Fire Area</u>	<u>Train 1 Raceway/Conduit</u>	<u>Train 2 Raceway/Conduit</u>
Emergency Feedwater	200B	EFM-5, EFM4, EFE96, EFE55, EFE35, EFE113, EFE115, EFE32, EFE34, EFE52, EFE54, EFE78, 302	*EFE24, *EFE22 *MOV ASV-5, *EFV-11, *EFV-14, *EFE45, *EFE25 *EFE26, EFV32, *EFE97, *EFE95, *EFE42, *EFE44 *EFE108, *EFE110, *EFE73
	200C	*EFE96, *302	EFS70, EFS59, EFE95, EFE75

NOTE: *Raceways or components to be protected by fire rated enclosures

The inspectors reviewed the installation of a Thermolag 330-1 fire barrier enclosure assembly constructed around emergency feedwater valve EFV-14 located in Fire Zone IB-95-200B. This enclosure is designed to protect the valve and its associated electrical components from an exposure fire and provide fire barrier separation from the systems redundant valve located in the same fire area. The inspectors reviewed the design modification package MAR No. 82-10-19-11 to verify the details of construction of the enclosure and its associated pipe penetration fire stop seals. The inspectors reviewed FCN No. 6A, drawing 5-521-267, Revision A, which provides the details of the enclosure and drawing ICMS CR-M-03-13 which details the pipe penetrations sealing system. These documents indicate that the installed enclosure configuration is of an approved one hour fire resistive construction as documented by TSI Inc., and that the 3/4 inch thick Dow Corning #96-081 RTV caulk pipe penetration fire stop seal system was fire tested by Underwriters Laboratories [ASTME-814 (UL1479)] on June 1984, for a 1 hour rating.

The inspectors verified that early warning ionization type detectors were provided throughout Fire Zone IB-95-200C and within the area of the emergency feedwater pump cubicles in Fire Zone IB-95-200B. As discussed in paragraph 5.a.(1)(a) of this report the inspectors verified that no shutdown related cabling was routed within the annulus area of Fire Zone IB-95-200B.

Based on this review and walk-through, it appears that the fire protection features associated with Fire Zones IB-95-200B and 200C provide a level of protection which should maintain one train of systems necessary to achieve and maintain hot standby free from fire damage.

- (e) Intermediate Building, Elevation 119', Fire Area 201, Fire Zone IB-119-201A.

The inspectors observed the installation of the TSI Thermolag fire rated barrier enclosures/wraps for the protected safe shutdown conduits (MSE42 and 52) located in Fire Zone IB-119-201A. The completed fire barrier enclosures within this area appear to be installed on the conduits in accordance with the design limitations imposed on the TSI Thermolag fire tested configurations. The installed fire barrier application appeared continuous and included fire-proofing of the load-bearing structural steel members which support the conduit fire barrier enclosure assemblies. The inspectors noted that all structural steel and non-safe shutdown conduits that interface with the fire barrier

enclosure assembly were provided the required fireproofing protection application in accordance with the fire-tested configurations for the Thermolag fire rated barrier designs. This review indicates that the Crystal River 3 conduit fire barrier enclosure design and installation compare favorably with the "as-tested" configurations for the conduit fire barrier enclosures and; appears to be acceptable.

(f) Control Complex, Elevation 108', Fire Area CC-108-102.

<u>Safe Shutdown Systems/Function</u>	<u>Fire Zone Fire Area</u>	<u>Train 1 Raceway/Conduit</u>	<u>Train 2 Raceway/Conduit</u>
Electrical Power Distribution	102	628	*640
Emergency Feedwater	102	628	*640
		633	*EFE73-3
Makeup Charging	102	628	*120, *643
		633	*650, *651
Nuclear Service Closed Cycle Cooling	102	628	*640

NOTE: *Raceways to be protected by fire rated enclosures

The inspectors verified that Fire Area CC-108-102 was separated from other plant areas (Fire Areas CC-108-103, 105, and 107.) by equivalent three hour fire barriers. The inspectors reviewed doors C208 and C213. These doors appear to be UL listed fire door assemblies; however, door C213 has piping, heating and ventilating (HVAC), and cable penetrations through the transom panel which voids the labeled door assembly. This item has been identified by the licensee and a modification package has been developed. This item is discussed in detail in paragraph 5.a.(1)(f) of this report.

The inspectors performed a walkdown of the area and verified that early warning ionization type detectors were provided.

(g) Control Complex, Elevation 108', Fire Area CC-108-104

<u>Safe Shutdown Systems/Function</u>	<u>Fire Zone Fire Area</u>	<u>Train 1 Raceway/Conduit</u>	<u>Train 2 Raceway/Conduit</u>
Electrical Power Distribution	104	101	*103

NOTE: *Raceways to be protected by fire rated enclosures

The inspectors performed a walkdown and verified that fire area CC-108-104 was separated by equivalent three hour rated construction from adjacent Fire Areas, CC-108-103 and 106. The inspectors verified that early warning ionization type detectors were provided within the fire area.

(h) Control Complex, Elevation 108', Fire Area CC-108-105

<u>Safe Shutdown Systems/Function</u>	<u>Fire Zone Fire Area</u>	<u>Train 1 Raceway/Conduit</u>	<u>Train 2 Raceway/Conduit</u>
Air Handling System/(Diesel Generator Room Fans)	105	*629, *630	642
Makeup Charging	105	*628, *629, *630	120
Emergency Feed- water	105	*631, *630 *628, *629	641, 642

NOTE: *Raceways to be protected by fire rated enclosures

The inspectors verified that Fire Area CC-108-105 was separated by equivalent three hour rated construction from adjacent fire areas and that ionization type smoke detectors were provided within the fire area.

(i) Control Complex, Elevation 108', Fire Area CC-108-106

<u>Safe Shutdown Systems/Function</u>	<u>Fire Zone Fire Area</u>	<u>Train 1 Raceway/Conduit</u>	<u>Train 2 Raceway/Conduit</u>
Makeup Charging	106	114, 212	*120
Air Handling System		114, 212	*120
Diesel Generator Room			
Fans			

Emergency Feedwater 114, 212 *EFE107-1½

*NOTE: Raceways to be protected by fire rated enclosures

The inspectors verified that this fire area was separated from the adjacent fire areas by equivalent three hour rated construction.

(j) Control Complex, Elevation 124', Fire Area CC-124-111

Safe Shutdown	Fire Zone	Train 1	Train 2
<u>Systems/Function</u>	<u>Fire Area</u>	<u>Raceway/Conduit</u>	<u>Raceway/Conduit</u>
Air Handling	111	212	*120
System (Diesel			
Generator Room Fans)			
Makeup Charging	111	212	*120
Electrical Power	111	212	*120
Distribution			
Nuclear Service	111	212	*120
Seawater		*633	634
Nuclear Service	111	*633	634
Closed Cycle Cooling			

NOTE: *Raceways to be protected by fire rated enclosures

The inspectors performed a walkdown of Fire Area CC-124-111 and verified that it was separated from adjacent fire areas by equivalent three hour rated construction except that fire doors C304 and C305 leading to fire areas CC-124-117 and CC-124-116, respectively have unrated penetrations in their transoms. This concern is discussed further in paragraph 5.f. of this report. In addition, the inspectors reviewed the design detail drawings within MAR Nos. 80-10-66-01, 80-10-66-02 and 80-10-66-19 and verified that the gypsum wall assemblies and their associated penetration seals which separate fire areas CC-124-112, 113, 114, and 115 from area CC-124-111 were of approved three hour rated fire barrier construction.

During this inspection, the licensee identified control circuits located in Fire Area CC-124-111 of the control complex to valves MUV 23, 24, and 25 which are associated with the reactor coolant makeup charging path were all in cable raceway No. 623. To protect these valves in accordance with the requirements of Appendix R, Section III.G., the licensee is to reroute the circuits for valves MUV 23 and 24 into another raceway and is to provide a one hour cable tray fire barrier enclosure for raceway No. 623. This fire barrier has been added to work package MAR 82-10-19-04 by Field Change Notice 94. The addition of this fire barrier will result in these cables meeting the protection and separation requirements of Appendix R, Section III.G. The existing fire protection compensatory measures provided for the additional cable interaction discrepancies within this area are considered adequate until these modifications are complete.

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

- b. Exemptions From Fire Protection Technical Requirements of 10 CFR 50, Appendix R Sections III.G.2 and III.G.3.

FPC letters of September 24, October 5 and December 11, 1984 requested 12 exemptions from the separation and protection requirements specified in Appendix R Sections III.G.2 and 3. NRC's letter and SER of July 18, 1985, approved these 12 items, but reclassified them into 6 exemptions from Appendix R and three deviations from the NRC fire protection guidelines of Appendix A to Branch Technical Position 9.5-1. The exemptions were for the following plant areas:

- Fire Area IB-95-200, Intermediate Building redundant emergency feedwater system pumps and valves.
- Fire Area AB-95-3, Auxiliary Building seawater pump room
- Fire Area AB-95-3, Auxiliary Building makeup pumps
- Fire Area AB-95-3, Auxiliary Building makeup system valves
- Fire Area IB-119-201, Reactor Building penetration assemblies
- Fire Area CC-164-121, Control Complex HVAC equipment room

The deviations were for the following areas:

- Penetration between Fire Areas AB-95-3 and AB-119-6
- Separation of Auxiliary Building decay heat pits, Fire Areas AB-75-4 and AB-75-5
- Ceiling and floor penetrations between Fire Areas IB-95-200 and IB-119-201

The inspectors reviewed the above areas and verified that the modification commitments except for the required cable raceway fire barriers needed to protect and maintain one train of redundant circuits free of fire damage, had been implemented. The installation of cable raceway fire barriers is scheduled to be completed prior to March 31, 1986. This schedule was reviewed by the NRC/NRR and approved by letter dated July 16, 1985. This is identified as Inspector Followup Item (302/85-30-01), Verification of Cable Raceway Fire Barrier Installation, for review during a subsequent NRC inspection.

c. Technical Specifications for Remote Shutdown System

FPC's letter of August 30, 1984, from G. R. Westafer to H. R. Denton, NRC/NRR requested an amendment to the Technical Specification to revise the existing Section 3.3.3.5, Remote Shutdown Instrumentation, to include data on the new remote shutdown panel which was installed during Refueling Cycle V. On July 3, 1985, the NRC issued Amendment No. 75 to the Crystal River Operating License which restricted this requested change to only indicated that the previous instrumentation was relocated to the new remote shutdown panel. Other features of the new remote shutdown panel such as transfer switches were not incorporated into the revised Technical Specifications. Pending issuance of a revised Technical Specification by NRC/NRR covering the features of the new remote shutdown panel, this item is identified as Inspector Followup Item 302/85-30-02, Technical Specifications Required For New Remote Shutdown Panel.

d. Control Complex Dedicated Cooling System

FPC's evaluation of the installed ventilation system for the control complex indicated that it was economically impractical and technically unfeasible to protect this system to meet the requirements of Appendix R, Section III.G.2. Therefore, a dedicated cooling system is to be provided for the shutdown component areas of the control complex which require cooling. A description of this system was provided to the NRC on January 2, 1985, and a scheduler exemption was requested by letter dated March 1, 1985, to defer completion of this modification to March 31, 1986. The scheduler exemption was approved by the NRC by letter dated July 16, 1985; however, the review of the design by NRC/NRR has not yet been completed. Pending NRC/NRR review and approval of the system design and completion of the installation by the licensee, this item is identified as Unresolved Item 302/85-30-03, Completion of Dedicated HVAC System for Control Complex.

Until the dedicated HVAC system is installed the licensee has established compensatory measures consisting of a roving fire watch patrol in the control complex and a temporary HVAC system for the required areas of the control complex.

The licensee has located temporary HVAC units in the turbine building and on the roof above the control complex. These units are wired temporarily to Motor Control Centers (MCC). The HVAC unit located on the turbine room floor is powered from MCC-A compartment 13 and will supply air to the control room through temporary cloth ducts (elephant trunks) through an open door into the control room. The HVAC units above the control complex is powered from MCC-3 located in the machine shop. The unit will supply cooling air into the top of the control complex stairwell. The licensee advised the inspectors that, during the recent outage the systems were used for a period of time and functioned adequately. All circuits and breakers are identified.

e. Fire Watch Program

On July 29, 1985, FPC initiated a roving fire watch program for all plant areas which contain Appendix R, Section III.G.2 cable interaction discrepancies, fire barrier discrepancies, and open or unprotected fire barrier penetrations. A total of 25 personnel have received general employee training and special fire protection and prevention training and are to be assigned fire watch duties as required. Three people per shift are performing fire watch duties. All required plant areas are visited once each 20 minutes.

The inspectors reviewed the fire watch records for July 29 and 30, 1985, and verified that the fire watch program was being satisfactorily implemented.

f. Fire Doors

On October 15-17, 1984, FPC and a fire protection consultant, Professional Loss Control (PLC), conducted a survey at Crystal River Nuclear Plant to verify the level of adequacy of the installed fire doors. The inspectors reviewed the results of this survey contained in PLC Report, dated December 1, 1984 (File Reference No. FP-11-001-08).

The report identified and provided recommended corrective actions or justification for deviations from National Fire Protection Association (NFPA) Standards for the following fire door features:

- (1) Fire door/Frame Assembly Lack Labels
- (2) Signs Attached to Doors
- (3) Protection Plates Attached to Doors
- (4) Latch Throw Less than Minimum
- (5) Holes in Doors
- (6) Penetrations in Transoms
- (7) Security Hardware Attached to Fire Doors

The inspectors reviewed the licensee's documented engineering analysis and justifications for items (1), (2), (3), (5), and (7) noted above. It appears that the licensee's engineering analysis is adequate for justifying the above noted deviations from NFPA Standards. Based on this review, the inspectors concluded that the deviations noted in items (1), (2), (3), (5), and (7) above do not degrade the overall performance of the fire door assemblies. The licensee stated that fire door latch adjustments for Item (4) will be reverified upon completion of the existing refueling out-age activities. The licensee's corrective actions for Item (6) are to be completed under MAR No. 85-02-10-01 dated March 13, 1985. The inspectors' review of this MAR Package indicates that modifications to fire doors C-213, C-304, and C-305 are required. Completion of these modifications will be reviewed during future routine NRC inspections of the plant fire protection program, and is identified as Inspector Followup Item 302/85-30-04, Review of Licensee's Completed Fire Door Modifications as Denoted by MAR No. 85-02-10-01.

The inspectors verified that compensatory measures for the degraded fire barrier door assemblies (Fire Doors - C213, C304, and C305) consisting of a roving fire watch as described in paragraph 5.a.(1)e of this report had been established for the affected fire areas/zones. These measures will remain in effect until the modifications are complete.

g. Automatic Sprinkler Systems

Automatic wetpipe sprinkler systems have been installed for portions of the auxiliary, intermediate and control complex buildings. These systems were provided to meet the fire protection requirements of

Appendix R, Section III.G. and were designed and installed to conform to the requirements of NFPA Standard 13, Sprinkler Systems, for ordinary hazard occupancy. The inspectors evaluated the systems and noted that the installed systems appeared to meet NFPA-13. However, due to the large quantity of scaffolding and other temporary construction features in place for the existing plant outage, the inspectors could not determine if serious obstructions existed between the ceiling level sprinklers and the floor which might affect the proper water spray pattern from the systems in the event of fire. This is identified as Inspector Followup Item 302/84-30-05, Verification of Unobstructed Sprinkler System Spray Patterns, and will be reviewed during a subsequent NRC inspection after all of the temporary construction features have been removed.

h. Interior Fire Hose System

On July 19, 1985, the licensee identified a number of plant areas primarily within the control building, which could not be reached by less than 100 feet of 1½-inch fire hose. Operating license paragraph 2.C.(9) states that the licensee is required to complete the modification identified by paragraph 3.1 through 3.31 of the Fire Protection Safety Evaluation Report (SER) dated July 27, 1979. If these modifications were not to be completed a report explaining the circumstances was to be submitted to the NRC. SER paragraph 3.24 required the licensee to verify that all safety-related areas of the plant including the control complex could be reached with at least one effective hose stream utilizing no more than 100 feet of hose. Apparently this verification was not accomplished.

The inadequate interior fire hose station coverage was identified by the licensee and documented by Nonconforming Operational Report (NCOR) No. 85-130. This condition is being evaluated by the licensee to determine the appropriate corrective action. Also, the licensee stated that this discrepancy was to be reported to the NRC by a letter type report. This appears to meet the intent of the license.

The inspectors reviewed fire protection system layout drawings, walked down the installed fire hose stations and verified that a number of plant areas could not be reached with an effective hose stream supplied by less than 100 feet of 1½-inch fire hose. The licensee's corrective action on this NCOR will be reviewed during future routine NRC inspections of the plant fire protection program, and is identified as Inspector Followup Item 302/85-30-06, Review of Licensee's Corrective Actions for NCOR No. 85-130.

i. Damage Control Measures for Cold Shutdown

Appendix R, Sections III.G.1.b and III.L.5 require fire protection features to be provided for structures, system and components important to safe shutdown and to be capable of limiting fire damage so that

systems necessary to achieve and maintain cold shutdown are free of fire damage or can be repaired such that the equipment can be made operable and the capability for cold shutdown achieved within 72 hours. Materials for such repairs are required to be readily available on site and procedures are to be in effect to implement such repairs.

The licensee has designated an electric motor and set it aside with proper identification to restore a decay heat pump to service if required to enable the unit to be taken to cold shutdown. Additionally the cable and termination materials to effect repairs or totally replace the power cable are set aside and identified. This material is controlled and audited in accordance to Procedure MP-192, Post Fire Cold Shutdown Repair of Decay Heat Closed Cycle Cooling Motors Power Cable DCP-1A and DCP-1B. The inspectors verified that the materials set aside are adequate for the service intended.

6. Protection of Associated Circuits

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

Common Bus Concern
Spurious Signal Concern
Common Enclosure Concern

a. Common Bus Concern

The common bus concern is found in circuits, either safety or nonsafety-related, where there is a common power source with shutdown equipment and the power source is not electrically protected from the circuit of concern by coordinated breakers, fuses or similar devices. The inspectors examined the licensee's fuse/breaker coordinations study for the largest load circuit from Engineered Safeguard Buses 3A and 3B. The time-current characteristic curves for the following circuits were examined:

- Emergency Feedwater Pump PP-3A (800 HP Motor)
- Diesel Generator Feeder Breaker to 4160V Bus 3A
- Diesel Generator Feeder Breaker to 4160V Bus 3B
- Normal Feeder Breaker to 4160V Bus 3A
- Normal Feeder Breaker to 4160V Bus 3B
- Emergency Nuclear Service Water Pump PP-3B
- Normal Feeder from 4160V Bus 3A to Engineered Safeguard Auxiliary 4160/480V Transformer 3A
- Feeder Breaker to 480V Bus 3A from Auxiliary 4160/480V Transformer 3A
- 480V Bus 3A Feeder from 480V Bus 3A to Engineered Safeguard Motor Control Center (MCC) 3A-2
- 480V Feeder from 480V Bus 3A to Engineered Safeguard MCC 3A-3

- 480V Feeder from 480V Bus 3B to Engineered Safeguard MCC 3B-3
- 480V Feeder to Control Complex Chiller CHHE-2D from 480V Bus 3B

In addition to the above listed items, the fuse/breaker coordination was examined for the 480V Engineered Safeguard Bus 3B 250VDC control voltage from the 250V battery thru Breaker DPDP-1B and 300 Amp fuses to Panel DPDP-5B, to 100 Amp fuses thru MTE-17 switch 9 to Breaker 3310 and fused to each compartments.

It was noted that the curves for the Reactor Building Fan 3B appeared to approach the same trip value for the motor breaker and the feeder board breaker. The licensee advised the inspectors that the circuit contained specially designated motor overload elements to prevent the current flow from approaching the value close to the trip setting of the board feeder and motor circuit breaker. The inspectors inquired as to what assurance had been established that the motor overload heater tripping device would function at the same setpoint over an extended period of time and not be affected by the thermal cycling that occurs during normal starting of the fan motor. The licensee advised that consideration would be given to installing a magnetic trip-only circuit breaker to replace the motor heater trip devices for improved reliability. This item will be identified as an Inspection Followup Item 302/85-30-07, Examine the Reliability of the Motor Overload Heater Element Trip Devices as Opposed to a Magnetic Trip Circuit Breaker for RB Fan No. 3 B.

The inspectors reviewed the isolation methods used for instruments that furnish indication/control functions to both the main control and the remote shutdown panels. Where a signal was shared between panels, the inspectors verified that isolation equipment was installed to insure that a fault on one indication/control circuit would not disable the other parallel function. The following instrument loops were examined:

- Once Through Steam Generator (OTSG) A Level
- OTSG B Level
- OTSG A&B Pressure
- Emergency Feedwater Flow Loop A
- Emergency Feedwater Flow Loop B
- High Pressure Injection Flow A1, A2
- High Pressure Injection Flow B1, B2 Pressure Level
- Letdown Flow
- Decay Heat Inlet/Outlet Temperature
- Emergency Feedwater Control Valve Status Lights for EFV 57, 58, 55 and 56.

Since the signals from the various sensing devices are in the milliamp range the main concern is to assure that there is adequate isolation between devices sharing a common signal. The protection was found adequate for those circuits reviewed.

b. Spurious Signal Concern

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

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

The inspectors reviewed the licensee's analysis of the circuits for the various motor operated valves and solenoid operated valves which are needed to bring the unit to hot standby or could have an adverse affect on bringing the unit to a hot standby condition. The logic and methods used were found adequate. In certain instances valves will be locked in the proper position to insure that movement would not occur as the result of a fire induced spurious signal. The following motor and solenoid operated valves' circuits were examined to determine where spurious signals could be developed as the result of shorts or ground faults:

MUV-73	Borated water to makeup pump 3A
MUV-69	Suction Header Isolation valve between makeup pump 3A and 3B
MUV-62	Makeup pump 3C Suction Header Isolation valve between makeup pumps 3C and 3B
MUV-58	Borated water to makeup pump 3C Suction Header
MUV-27	Makeup Discharge Header valve to Reactor Loop A Inlet
MSV-55&56	Main Steam to Turbine Driven Emergency Feedwater Pump
ASV5 and 204	Turbine Driven Emergency Feedwater Pump Steam Inlet Valve.
EFV 1	Hotwell to Turbine Driven Emergency (TDE) FW Pump 3B
EFV 2	Hotwell to Motor Driven Emergency (MDE) FW Pump 3A
EFV 3	Condensate Storage Tank to MDE FW Pump 3A
EFV 4	Condensate Storage Tank to TDE FW Pump 3B
EFV 11 and 14	FW Inlet valves to Once Through Steam Generator 3A
(OTSG)	
EFV 32 and 33	Inlet Valves to OTSG 3B
EFV 56 and 58	FW Flow Control valves to OTSG 3A
EFV 55 and 57	FW Flow Control valves to OTSG 3B

The licensee advised the inspectors that at present, valves EFV 1 and 2 would be locked closed and valves EFV 3 and 4 would be locked in the open position. The licensee's studies indicated that the valve control

circuits are located such that there is adequate valving provided in each instance to enable the operators to bring the unit to a hot standby condition through either manual operation or that the required equipment is protected by fire barriers.

c. Common Enclosure Concerns

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

The fire barriers for protection of cable tray and seismic cable tray supports had not been completely installed at the time of this inspection. This item is addressed in paragraph 5.b of this report. The licensee reported that all power and control cables are protected by breakers and/or fuses sized to preclude any cable overheating that would impact on cabling used for safe shutdown. The fuse/breaker protection for the circuits identified as part of associated circuits were found adequate.

The inspectors examined the schematics for various items of equipment which have the control function transferred from the main to the remote shutdown panel. The circuits reviewed were found to have alternate fusing as discussed in IE Information Notice No. 85-09, Isolation Transfer Switches and Post-fire Shutdown Capability, with the exception of the diesel generator governor control circuit. However, the licensee had identified this condition and had completed protective measures to assure that fire induced shorts or spurious signals would not affect the operation of the diesel generator governor circuits by encasing the wiring in fire barrier material. This protection was inspected in the congested area behind the main control boards and found adequate.

Because proper fuse size and type are important to the function of various circuits, the special fuses installed in the various circuits must be controlled to insure that like replacements are used. The licensee acknowledged that special fuses had been incorporated into several circuits and agreed to review the drawings and fuse replacement lists to insure that all specially fused circuits were identified with the proper fuse requirements identified. This item will be followed as part of an existing Inspector Followup Item 50-302/85-09-02, relating to fusing to AC and DC distribution panels.

7. Alternate Shutdown Capabilities

The inspectors reviewed operating personnel training, shift staffing, and the licensee's use of normal operating and alternate shutdown procedures to determine if the requirements of Appendix R, Section III.L were met.

a. Personnel Training

- (1) Procedure AP-880, Fire Protection System Activation, Revision 3 was issued during the Appendix R inspection. The inspectors did not review implementation or training for AP-880 Fire Protection System Activation, Revision 3. This item is identified as Inspector Followup Item 302/85-30-08, Review of the Implementation and Training for AP-880.
- (2) Procedure AP-990, Shutdown from Outside Control Room, Revision 1 had been fully implemented prior to the Appendix R inspection. The licensee demonstrated adequate training for AP-990 during selected operator interviews, discussions with training personnel, and a procedure walkthrough.

b. Shift Staffing

The licensee demonstrated the minimum Technical Specification staff level was adequate for AP-990 during the procedure walkthrough. The inspector reviewed AP-880 for staffing requirements for Appendix R shutdown from within the control room. While the staffing levels appear adequate, the review will be included in Inspector Followup Item 302/85-30-08.

c. Appendix R Shutdown from the Main Control Room

The licensee has not prepared individual procedures for Appendix R fires that do not require shutdown from outside the main control room. The licensee uses their normal symptom based procedure for all Appendix R fires when the main control room is available. NRC Region II, Nuclear Operator Licensing Section has previously identified this matter; therefore, it will not be addressed further in this report.

d. Appendix R Shutdown from Outside the Main Control Room

- (1) The inspectors reviewed AP-990, Shutdown from Outside Control Room, and operating procedure, OP-209, Plant Cooledown, to verify that Appendix R, Section III L requirements listed below have been incorporated:
 - Achieve and maintain hot standby conditions
 - Achieve and maintain subcritical reactivity conditions in the reactor
 - Provide decay heat removal capabilities
 - Maintain reactor coolant inventory and steam generator inventory

- Achieve and maintain control shutdown conditions
- Provide direct readings of process variable necessary to control the above conditions

The inspectors verified that the following instrumentation was available to the operator at the remote shutdown panel.

- (a) Pressurizer Level
- (b) Pressurizer pressure (Hot leg pressure)
- (c) Hot Leg temp (exit core thermocouples)
- (d) cold leg temp
- (e) S/G pressure
- (f) S/G Level
- (g) Flux (Source Range)
- (h) Level indication

Condensate Storage Tank (CST)
Borated Water Storage Tank (BWST)

(2) AP-990 Walkthrough

The inspectors conducted a walkthrough of AP-990 to verify that:

- Communications between various stations are adequate and operable.
- Identification plates installed on valves and instrumentation agree with that called for in the procedure steps.
- Emergency lighting at stations is adequate.
- Equipment and valves to be operated can be reached and are not obstructed.
- Procedure to be used are available and contain the latest revision.
- Steps of procedures are clear and can be accomplished.
- Instrumentation identified in IEN 84-09 is available to monitor system process variables or approval received from NRR to use other means.

The results of the walkthrough are as follows:

- (a) The licensee has agreed to review the storage location of access keys and hand held radios with their associated charging stand. They are currently located in the fire area

which requires the use of the remote shutdown panel and may be unavailable if a rapid evacuation of the control room was required. This is identified as Inspector Followup Item 302/85-30-09, Review of Communications and Area Access for Control Room Evacuation.

- (b) In all cases, the identification plates on valves and instruments agreed with the nomenclature in the procedure.
- (c) Emergency lighting is discussed in report Section 8.
- (d) Equipment and Valves that require manual operation were accessible.
- (e) The latest revision for all required procedures were available in a dedicated storage area in the Remote Shutdown Panel Room.
- (f) The licensee demonstrated a thorough knowledge of AP-990 and the operations procedures such that the remote shutdown panel could be used successfully to bring the plant to a safe condition.

8. Compliance With 10 CFR 50, Appendix R, Section III.J., Emergency Lighting

Section III.J requires emergency lighting units with at least 8-hour battery power supply to be provided in all areas needed for operation of safe shutdown equipment and in access and egress routes thereto.

A total of approximately 33 battery powered emergency lighting units have been provided in plant areas needed for operation of hot shutdown equipment and components and in the access and egress routes to these areas. These units are Exide Model B-200 and are rated by the manufacturer to provide in excess of 8 hours illumination with the number of lights supplied by each battery powered unit. The installation and arrangement of the installed lighting units were reviewed by the inspectors and found to meet Appendix R, Section III.J; however, battery powered emergency lighting units are not provided in a number of plant areas in which operators verify shutdown component operability, valve alignment, etc. and for operator actions which may be required due to spurious operations. For these plant areas the plant operators are to use the existing permanently installed emergency lighting system supplied from the emergency diesel generators and from lighting supplemented by portable hand lights. The portable hand lights are maintained in designated storage cabinets located in the remote shutdown panel room, auxiliary building nuclear operators office on 95' elevation, and turbine building operators office on 119' elevation. By letter dated July 25, 1985 from G. R. Westafer, FPC to J. F. Stolz, NRC/NRR, FPC provided an evaluation and justification for the existing emergency lighting system. Pending NRR review and approval, this item is identified as Unresolved Item 302/85-30-10, NRR Review and Approval of Appendix R Emergency Lighting.

The inspectors reviewed procedure SP-807, Mounted and Hand Held Emergency Battery-Powered Light Units. This procedure requires a monthly inspection and operability test of each 8-hour battery unit. Procedure PM-110, Miscellaneous Plant Batteries, is being revised to require the portable hand lights to be inspected and tested weekly for operability. These procedures should assure that the emergency lighting units will be functional in the event of an emergency.

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

9. Compliance With 10 CFR 50 Appendix R, Section III.0

The inspectors reviewed the following documentation/drawing file Modification Authorizaton Record, MAR 1-03-65-01, of the oil collection system for the reactor coolant pumps.

a. System Drawings:

<u>Drawing Nos.</u>	<u>Title</u>
FD-302-292	Flow Diagram - Reactor Coolant Pump Motor Lube Oil Collection
NUS Corporation drawings 8605-M-007 through 8605-M-023	Details - RCP Motor Oil Collection System

b. Design/Seismic Documents:

- NUS Corporation Seismic Report No. 4223
- Installation Procedure No. I-8605-03
- Seismic Test Program Report No. 45781-1

There is a total of 192 gallons of oil contained in each of four reactor coolant pumps (RCPs).

Potential oil leakage points for each pump have been provided with a oil containment system consisting of a lower bearing catch pan, lower bearing oil level indicator enclosure, oil line enclosure, and oil header and flange/riser enclosure.

These enclosures are connected to oil collection piping headers which are designed in accordance with ANSI B31.1 and are supported to withstand a design basis seismic event.

The oil collection piping headers for each pair of the four reactor coolant pumps discharge into two separate 400 gallon tanks. Each collection tank is vented and provided with a vent flame arrestor. Each tank's capacity is sufficient to hold the full volume of oil from the two connected RCPs.

Within the areas reviewed, no items of noncompliance or deviations were identified.