UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET SW SUITE 23T85
ATLANTA, GEORGIA 30303-8931

August 23, 2002

Mr. Dale E. Young, Vice President
Crystal River Nuclear Plant (NA1B)
ATTN: Supervisor, Licensing &
Regulatory Programs
15760 West Power Line Street
Crystal River, FL 34428-6708

SUBJECT: CRYSTAL RIVER UNIT 3 - NRC INSPECTION REPORT 50-302/02-05

Dear Mr. Young:

On July 12, 2002, the Nuclear Regulatory Commission (NRC) completed a triennial fire protection inspection at your Crystal River Unit 3 Plant. The enclosed report documents the results of this inspection which were discussed on July 12, 2002, with you and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

Based on the results of this inspection, the inspectors identified an unresolved item, with three examples, for failure to ensure in three fire areas that one of the redundant trains of a system necessary to achieve and maintain hot shutdown conditions would be free of fire damage. The issue remains unresolved pending NRC review of a technical analysis being performed by your staff of local manual operator actions in response to a fire in these areas.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's Document

system (ADAMS). ADAMS is accessible from the NRC web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Charles R. Ogle, Chief
Engineering Branch 1
Division of Reactor Safety

Docket No.: 50-302
License No.: DPR-72

Enclosure: NRC Inspection Report 50-302/02-05
w/Attachment

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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No:	50-302
License No:	DPR-72
Report No:	50-302/02-05
Licensee:	Florida Power Corporation (FPC)
Facility:	Crystal River Unit 3
Location:	15760 West Power Line Street Crystal River, FL 34428-6708
Dates:	June 24 - July 12, 2002
Inspectors:	D. Billings, Resident Inspector, Oconee Nuclear Power Plant N. Merriweather, Senior Reactor Inspector, Region II G. Wiseman, Fire Protection Inspector, Region II C. Smith, P. E. , Senior Reactor Inspector, Region II (Lead Inspector)
Accompanying Personnel:	M. King, Resident Inspector, V.C. Summer N. Staples, Nuclear Safety Intern, Region II C. Payne, Fire Protection Team Leader, Region II
Approved by:	Charles R. Ogle, Chief Engineering Branch 1 Division of Reactor Safety

Enclosure

SUMMARY OF FINDINGS

IR 05000302-02-05, Florida Power Corporation, on 06/24/2002 - 7/12/2002, Crystal River Unit 3, triennial baseline inspection of the fire protection program.

The inspection was conducted by three regional inspectors and the Oconee resident inspector. The inspection identified one unresolved item. The significance of issues is indicated by their color (Green, White, Yellow, Red) using IMC 0609 “Significance Determination Process” (SDP). Findings for which the SDP does not apply may be “Green” or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, “Reactor Oversight Process,” Revision 3, dated July 2000.

A. Inspector Identified Findings

Cornerstone: Mitigating Systems

- TBD. An unresolved item was identified for failure to ensure in three fire areas that one of the redundant trains of a system necessary to achieve and maintain hot shutdown conditions would be free of fire damage.

  – Redundant electrical cables for redundant makeup system valves MUV-23, 24, 25, and 26 were located in fire areas CC-108-102 [Example 1] and CC-108-107 [Example 2] without adequate spatial separation or fire barriers in accordance with10 CFR 50, Appendix R, Section III.G.2. In the event of a severe fire in one of these areas, fire damage to the unprotected cables could prevent opening of the valves from the main control room which would require local manual operators actions to establish adequate injection flow to the reactor coolant system.

  – Redundant electrical cables for redundant emergency diesel generators (EDG) 1A and 1B and makeup pumps 1A, 1B, and 1C were located in fire area CC-108-106 [Example 3] without adequate spatial separation or fire barriers. In the event of a severe fire in this area, fire damage to these unprotected cables could prevent starting a makeup pump from the main control room which would require local manual operator action to establish adequate injection flow to the reactor coolant system and reactor coolant pump seals. In addition, a fire in this area could result in a loss of both EDGs thereby increasing the risk associated with a fire in this area.

  This finding is unresolved pending NRC review of a technical analysis being performed by the licensee of local manual operator actions in response to a fire in these areas. The finding affects the mitigating systems cornerstone only. (Section 1R05.01)

B. Licensee Identified Violations

None

Report Details

1. REACTOR SAFETY
Cornerstones: Initiating Events, Mitigating Systems

1R05 FIRE PROTECTION

.01 Systems Required To Achieve and Maintain Post-Fire Safe Shutdown (SSD) and Post-Fire SSD Circuit Analysis

a. Inspection Scope

The team evaluated the licensee's fire protection program against applicable rules and requirements, including Operating License Condition 2.(C).9, Fire Protection; Title 10 of the Code of Federal Regulations Part 50 (10 CFR 50), Appendix R; Appendix A of Branch Technical Position (BTP) Auxiliary and Power Conversion Systems Branch (APCSB) 9.5-1; 10 CFR 50.48; related NRC Safety Evaluation Reports (SERs); and the plant Technical Specifications (TS).

The team used the licensee's Individual Plant Examination for External Events (IPEEE) and in-plant walkdowns to select four risk significant fire areas for inspection. The four fire areas selected were:

- **Fire Area 102:** Fire Area 102 is the hallway and remote shutdown room on the 108' 0" elevation of the Control Complex. The area extends from the 108' 0" elevation to the 124' 0" elevation and is shown on drawing 213-005, level 28. No automatic fire suppression system is provided in this area and ionization detectors have been installed in the area to provide for warning of fire for fire brigade response.

  A fire in this area would involve shutdown of the unit from the Main Control Room (MCR) using Train B SSD equipment.

- **Fire Area 106:** Fire Area 106 is Battery Charger Room 3A in the Control Complex. The area extends from the 108' 0" elevation to the 124' 0" elevation and is shown on drawing 213-005, level 28. The walls, floor, and ceiling are of concrete construction and are considered to be rated as three-hour fire barriers. No automatic fire suppression system is provided in this area and ionization detectors have been installed in the area to provide for early warning of fire for fire brigade response.

  A fire in this area would involve shutdown of the unit from the MCR using Train B SSD equipment.

- **Fire Area 107:** Fire Area 107 is the 3B 4160 Volt Engineered Safeguard (ES) switchgear room in the Control Complex. The area extends from the 108' 0" elevation to the 124' 0" elevation and is shown on drawing 213-005, level 28. No automatic fire suppression system is provided in this area and ionization

detectors have been installed in the area to provide for warning of fire for fire brigade response.

A fire in this area would involve shutdown of the unit from the MCR using Train A SSD equipment.

- **Fire Area 121:** Fire Area 121 is the Control Complex heating, ventilation and air conditioning (HVAC) area and is divided into four fire zones: 121A, 121B, 121C and 121D. The area extends from the 163' 0" elevation to the 186' 0" elevation and is shown on drawing 213-005, level 28. Ionization detectors are installed in zones 121A, 121B, and 121C to provide for warning of fire for fire brigade response. No detection is provided in zone 121D.

  A fire in this area would involve alternate safe shutdown (ASD) of the unit from the Remote Shutdown Panel Room and the redundant switchgear rooms using Train B SSD equipment.

For a selected sample of SSD systems, components, and plant monitoring instruments, the team reviewed the CR3 Appendix R Fire Study, applicable fire protection related SERs, and system flow diagrams to evaluate the completeness and adequacy of the CR3 Appendix R Fire Study and the systems relied upon to mitigate fires in the selected fire areas. The inspection included review of the post-fire SSD capability and of the fire protection features to ensure that at least one post-fire SSD success path was maintained free of fire damage.

The team examined cable routing, raceway drawings, the actual configuration of the circuits, fire detection and alarm systems, manual fire suppression equipment, and the electrical raceway fire barrier system (ERFBS) for conformance to applicable NRC requirements and National Fire Protection Association (NFPA) standards. In addition, the team walked down these fire areas to verify that the licensee's documentation reflected the as-built configuration.

On a sample basis, the team reviewed the licensee's CR3 Appendix R Fire Study to determine whether redundant trains of components or circuits required for SSD were located in the same fire area. From this review, the team selected makeup system valves MUV-23, MUV-24, MUV-25, and MUV-26; makeup pumps MUP-1A, 1B, and 1C; and emergency diesel generators EDG-1A and 1B to review the routing and installation of the associated power and control cables. The team reviewed the cables to verify that adequate spatial separation or proper fire barrier protection features were installed in accordance with the design requirements of 10 CFR 50, Appendix R. Specifically, the inspectors assessed whether fire-induced faults (e.g., hot shorts, open circuits, and shorts to ground) could prevent safe shutdown.

Additionally, the team reviewed electrical coordination and protection data (e.g., circuit breaker trip characteristics, fuse melt characteristics, and relay trip characteristics) for a sample of SSD components to assess the adequacy of electrical protection provided from non-essential cables or loads which share a common power source or enclosure with cables of equipment required to achieve and maintain SSD conditions. Specific

components examined included: emergency feedwater valves EFV-11 and EFV-32; pressurizer power actuated relief valve RCV-10; makeup system valves MUV-9 and MUV-49; makeup pump MUP-1C; air handling fans AHF-22C and AHF-22D; service water pump SWP-1C; and emergency diesel generator EDG-1B.

b. Findings

An unresolved item (URI) with three examples was identified, in that, some control cables for components associated with the makeup pumps, EDGs, and selected valves in the makeup flow path in three fire areas had not been protected from fire damage as required by 10 CFR 50, Appendix R. This finding is unresolved pending NRC review of a technical analysis being performed by the licensee of local manual operator actions in response to a fire in these areas.

10 CFR 50.48, “Fire Protection,” and Appendix R to 10 CFR 50, “Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979," establish specific fire protection features required to satisfy General Design Criterion 3, “Fire Protection” (GDC 3, Appendix A to 10 CFR 50). Section III.G of Appendix R requires fire protection features be provided for equipment important to safe shutdown. An acceptable level of fire protection may be achieved by various combinations of fire protection features (barriers, fire suppression systems, fire detectors, and spatial separation of safety trains) delineated in Section III.G.2. For areas of the plant where compliance with the technical requirements of Section III.G.2 can not be achieved, the licensee must either seek an exemption or deviation from the specific requirement(s) or provide an ASD capability in accordance with Sections III.G.3 and III.L of the regulation. The use of local manual operator actions is not specifically addressed in Section III.G.2 as being an acceptable alternative method for meeting the requirements of this section.

The team found that the 108' 0" level of the Control Complex area contained cables for redundant trains of SSD equipment. Because these redundant cables were located in close proximity to each other, compliance with the fire protection requirements of Appendix R, Section III.G.2 was required. The licensee had originally used Thermo-Lag wraps to meet these requirements. But later when that material could not be qualified for the appropriate fire rating, the licensee chose not to protect certain cables in this area. Instead, the licensee developed an alternate fire response strategy which procedurally directed local manual operator actions should control of the equipment be lost from the MCR. The licensee did not develop an ASD methodology for this area.

Based on a review of cable routing information provided by the licensee, the inspection team determined that redundant electrical cables for redundant makeup system valves MUV-23, 24, 25, and 26 were located in fire areas CC-108-102 [Example 1] and CC-108-107 [Example 2]. While the licensee considered the cables associated with this equipment to be necessary for achieving and maintaining hot shutdown conditions, the team identified that the licensee did not provide adequate spatial separation or fire barriers in accordance with 10 CFR 50, Appendix R, III.G.2. Hence, in the event of a severe fire in these areas, fire damage to the unprotected cables could prevent opening of the valves from the MCR and challenge the operators’ ability to establish adequate injection flow to the reactor coolant system. The licensee credited local manual actions

of the makeup system valves located in the Auxiliary Building to throttle valves MUV-23, 24, 25 and 26 to establish adequate injection flow.

The team also found that redundant electrical cables for redundant EDG-1A and 1B and makeup pumps MUP-1A, 1B, and 1C were located in fire area CC-108-106 [Example 3] without adequate spatial separation or fire barriers installed in accordance with 10 CFR 50, Appendix R, III.G.2. In the event of a severe fire in this area, fire damage to these unprotected cables could prevent starting a makeup pump from the MCR and subsequently challenge the operators' ability to establish adequate injection flow to the reactor coolant system and reactor coolant pump seals. The licensee credited local manual actions to restore makeup pump 1C by operating the pump motor circuit breaker at the switchgear (4KV ES Bus 3B). In addition, a fire in this area could result in a loss on both EDGs thereby increasing the risk associated with a fire in this area.

This finding had a credible impact on safety, in that, during a fire that required shutdown from the MCR, local manual operator actions would have to be performed in the plant in order to achieve and maintain safe shutdown conditions. These actions have not been reviewed or approved by the NRC as being acceptable for meeting the III.G.2 criteria of 10 CFR 50, Appendix R. Nor have these actions been fully analyzed by the licensee for timeliness, complexity, quantity, availability of manpower, or human performance under high stress or risk. This finding only affects the mitigating system cornerstone.

Prior to the NRC's triennial fire protection inspection, the licensee conducted the triennial assessment of its fire protection program in May 2002 (NAS Assessment C-FP-02-01.) This evaluation identified that "some manual actions contained in OP-880A, Appendix R Post-Fire Safe Shutdown Information, may not be in conformance with the current NRC position regarding the use of manual actions to satisfy the requirements of 10 CFR 50, Appendix R." The licensee stated its position that changes to the approved fire protection program could be made under 10 CFR 50.59 per CR-3 Operating Licence Condition 2.(C).9 and that this was an industry-wide concern. The NRC and Nuclear Energy Institute (NEI) have corresponded and met on several occasions to define this issue and attempt to resolve it in a mutually agreeable manner. The licensee is tracking the issue until the need for corrective action is further clarified.

The licensee also identified an issue involving the rigor/adequacy of the safety analyses used to justify the addition of manual actions for certain Thermo-Lag protected circuits in lieu of the circuit protection or separation as specified in 10 CFR 50, Appendix R, III.G.2. In general, the analyses lacked sufficient information to determine if factors other than emergency lighting and accessibility were considered in determining the acceptability of the additional manual operator actions and that the "changes would not adversely effect the ability to achieve and maintain safe shutdown in the event of a fire" as required by the CR-3 Operating License Condition 2.(C).9. These issues were entered into the licensee's corrective action program in Non-Conformance Report (NCR) No. 61781.

The examples in the finding described above represent situations where the licensee's alternate fire response strategy could adversely affect the ability to achieve and maintain safe shutdown of CR-3 in the event of a fire. While the licensee had identified which circuits were not adequately protected and had specified compensatory manual operator actions, there was no comprehensive safety or risk analysis confirming the adequacy

these changes. Additionally, no new enhanced or expanded safety analyses of manual operator actions were provided or available to the inspectors during this inspection. The safety characterization of this finding has not yet been finalized. Therefore, This finding is unresolved pending NRC review of a technical analysis being performed by the licensee of local manual operator actions in response to a fire in these areas. This finding will be tracked as URI 50-302/02-05-01, Failure to Protect One Train of Safe Shutdown Equipment From Fire Damage in Accordance with Appendix R, Section III.G.2 (Three Examples).

The team also identified a condition that could result in possible delay in fire brigade response to a fire event and hence, increase the risk associated with a fire in Fire Areas 102, 106 and 107. Fire service valve FSV-257 must be opened to supply water to the fire hose stations in the Control Complex. This may be accomplished either by operator action from the MCR or local manual action at a pull station within the Control Complex. The team identified that a fire in the Control Complex could potentially damage the control and power cables for FSV-257. If the actuation cables for FSV-257 were damaged by fire, then manual action outside the MCR would be required to open FSV-257 to align fire fighting water to the Control Complex fire brigade hose stations. The inspectors estimated that the delay in opening this valve could result in an overall delay of over three minutes in fire brigade response to a fire event. The licensee documented this finding in their corrective action program as NCR No. 065526.

.02 Fire Protection of SSD Capability

b. Inspection Scope

The team reviewed selected portions of the site Fire Protection Plan (FPP), the Fire Hazards Analysis (FHA) and fire prevention/combustible hazards control procedures to determine if the objectives established by the licensee's commitments, as established in the fire protection licensing basis documents, were satisfied. Using procedure SP-809 the team, accompanied by the site fire protection specialist, toured the selected fire areas to observe whether the licensee limited fire hazards in a manner consistent with the fire prevention/combustible hazards control procedures. Fire brigade response and emergency/incident reports from 1999 through 2002, as well as corrective action program Action Requests (ARs) resulting from fire, smoke, sparks, arcing, and equipment overheating incidents were reviewed. This review was conducted to assess the effectiveness of the fire prevention program and to identify any maintenance or material condition problems related to fire incidents. Additionally, design control procedures were reviewed to verify that plant changes were adequately reviewed for the potential impact on the fire protection program, SSD equipment, and procedures as required by fire protection program.

Team members also walked down the selected fire areas to compare the associated fire fighting pre-fire plans and drawings with as-built plant conditions. This was done to verify that fire fighting pre-fire plans and drawings were consistent with the fire protection features and potential fire conditions described in the FHA. Additionally, the team reviewed drawings and engineering flood analysis associated with the 164' elevation control building floor and equipment drain system to verify that those actions

required for ASD would not be inhibited by fire suppression activities or leakage from fire suppression systems.

The team reviewed fire brigade response, training, and drill program procedures, drill critiques, and drill records for the operating shifts from June 2001 through May 2002. The reviews were performed to determine whether fire brigade drills had been conducted in high fire risk plant areas and whether fire brigade personnel qualifications, drill response, and performance met the requirements of the licensee's approved fire protection program. The team walked down the primary fire brigade staging and locker area in the maintenance shop adjacent to the turbine building to assess the condition of fire fighting and smoke control equipment. Fire brigade personal protective equipment located in the fire brigade dress-out area and fire fighting equipment in the turbine building fire brigade staging area were reviewed to evaluate equipment accessibility and functionality.

The team toured the plant to determine if emergency exit lighting was provided for personnel evacuation pathways to the outside exits as identified in the NFPA 101, Life Safety Code. The team also checked if backup emergency lighting was provided for access pathways to and within the fire brigade staging and dress-out areas in support of fire brigade operations should power fail during a fire emergency. The fire brigade self-contained breathing apparatuses (SCBAs) were examined for adequacy as well as the availability of supplemental breathing air tanks.

b. Findings

No findings of significance were identified.

.03 ASD Capability

a. Inspection Scope

The team reviewed the licensee's ASD methodology to determine the adequacy of the identified components and systems required to achieve and maintain SSD conditions for a severe fire in fire area 121. A fire in this area would involve shutdown of the unit from the Remote Shutdown Panel Room and the redundant switchgear rooms using Train B SSD equipment.

The team focused its review on the adequacy of the systems and components used for reactivity control, reactor coolant makeup, reactor heat removal, process monitoring, and support system functions. The team reviewed electrical control schematics of remote shutdown relays located in Remote Shutdown Relay Cabinets "B" and "B-1" to ensure that the control circuits of SSD equipment required to mitigate a fire in fire area CC-164-121 were provided a permissive by logic inputs from these relays upon operation of control switch CS/ISB to the remote shutdown panel (RSP) position. The team reviewed electrical control schematics of selected SSD equipment to determine if operation from Remote Shutdown Panel B was enabled by manipulation of selector switches mounted on this cabinet. The 120 VAC and 125 VDC control circuits of safe shutdown equipment were also examined to ascertain whether separate control fuses were installed in the control circuit to ensure that a fire induced failure from a fire in the

MCR would not defeat the capability of controlling SSD equipment from RSP B after placing control switch CS/ISB to the RSP position. The electrical control schematics of SSD equipment fed from the 4160 VAC ES bus were also reviewed by the team to identify if logic inputs from the Remote Shutdown Relay Cabinets defeated equipment operation from the MCR upon placing control switch CS/ISB in the RSP position.

The team reviewed the electrical control schematic of emergency diesel generator EDG-1B to determine if logic inputs, which ensure that electrical power required for achieving and maintaining hot shutdown from outside the MCR, with or without offsite power, had been provided to the emergency diesel generator EDG-1B control circuit from Remote Shutdown Relay Cabinet B. The team reviewed coordination curves of selected power supplies in order to ensure that selective circuit breaker coordination had been established for power supplies feeding SSD equipment.

The team also reviewed records of the latest surveillance and performance tests performed on the remote shutdown panel instruments to ensure that instrumentation channels were operating within normal operating limits in accordance with the program acceptance criteria delineated in the procedures.

b. Findings.

No findings of significance were identified.

.04 Operational Implementation of ASD Capability

a. Inspection Scope

The team reviewed the operational implementation of the ASD capability for a fire in the selected fire areas to verify that (1) the procedures used for ASD were consistent with the Safe Shutdown Analysis (SSA) methodology and assumptions; (2) the procedures were written so that the operator actions could be correctly performed within the times assumed in the SSA; (3) the training program for operators included alternative or dedicated SSD capability; (4) the personnel required to achieve and maintain the plant in hot standby from outside the control room could be provided from normal onsite staff, exclusive of the fire brigade; and (5) the licensee periodically performed operability testing of the SSD instrumentation and the transfer and control functions. The team walked down selected portions of AP-990 and EOP-02 to verify that the procedures could be performed within the required times, given the minimum required staffing level of operators, with or without offsite power. Operator and fire brigade staffing was reviewed to verify compliance with the TS and conformance with the Fire Protection Program. The team reviewed operator training lesson plans and job performance measures (JPMs), and discussed the training with operators to determine if ASD activities were included in the training program.

b. Findings

No findings of significance were identified.

.05 Communications During Performance of ASD Functions

a. Inspection Scope

The team reviewed the adequacy of the communication system to support plant personnel in the performance of ASD functions and fire brigade duties. The licensee credited the radio repeater systems for prompt fire brigade personnel response and post-fire SSD MCR operator response. The inspectors reviewed the adequacy of the radio communication system utilized by the fire brigade and to assess whether the licensee's portable radio channel features would operate should the radio repeaters be unavailable. The team walked down sections of the ASD procedures and inspected selected shutdown equipment required for remote manual operator actions to evaluate if adequate communications equipment would be available for the personnel performing the procedures. The team also reviewed the periodic testing of the SSD radio repeater systems and inventory surveillance of post-fire SSD operator equipment to assess whether the surveillance test program for the radios was sufficient to verify proper operation of the system.

b. Findings

No findings of significance were identified.

.06 Emergency Lighting During Performance of ASD Functions

a. Inspection Scope

The team walked down the selected fire areas to observe whether battery pack emergency lighting units (ELUs) were installed to allow operation of ASD equipment if normal lighting was lost. In some cases, the installed ELUs were tested to demonstrate functionality. The locations and identification numbers on the ELUs were compared to design documents to confirm the as-built configuration. The team reviewed vendor documentation to verify that the battery power supplies were rated for at least eight-hour capacity. The team also reviewed licensee periodic tests to verify that the ELUs were being maintained in an operable manner.

b. Findings

No findings of significance were identified.

.07 Cold Shutdown Repairs

a. Inspection Scope

The team inspected plant procedures and equipment to ascertain if the licensee had dedicated repair procedures, equipment, and materials to accomplish repairs of damaged components required for cold shutdown, that these components could be made operable, and that cold shutdown could be achieved within 72 hours. The team observed cold shutdown repair equipment and cables stored in nearby warehouses for providing electrical power to pumps and valves if needed after a large fire. The team

checked to determine if the equipment was appropriately labeled and was maintained in good condition. Also, the team walked down procedural actions and the projected route for installing temporary cabling to power Decay Heat Pump 1B, Decay Heat Service Water Seawater Pump, and a Decay Heat Closed Cycle Cooling Pump after a large fire. The team evaluated whether the estimated manpower and installation time was reasonable.

b. Findings

No findings of significance were identified.

.08 Fire Barriers and Fire Area/Zone/Room Penetration Seals

a. Inspection Scope

The team walked down the selected fire areas to evaluate the fire resistance of barrier enclosure walls, ceilings, floors, and structural steel support protection. This evaluation also included fire barrier penetration seals, fire doors, fire dampers, and the MECATISS ERFBS to ensure that at least one train of SSD equipment would be maintained free of fire damage. The team observed the material condition and configuration of the installed fire barrier features, as well as, reviewed construction details and supporting fire endurance tests for the installed ERFBS. The team compared the observed fire barrier penetration seal configurations to the design drawings and tested configurations. The team also compared the penetration seal ratings with the ratings of the barriers in which they were installed.

The team reviewed ASD procedures, selected fire fighting pre-plan procedures, and HVAC systems to verify that access to remote shutdown equipment and operator manual actions would not be inhibited by smoke migration from one area to adjacent plant areas used to accomplish SSD. In addition, the team reviewed licensing documentation, engineering evaluations of Generic Letter 86-10 fire barrier features, and NFPA code deviations to verify that the fire barrier installations met design requirements and license commitments.

b. Findings

No findings of significance were identified.

.09 Fire Protection Systems, Features, and Equipment

a. Inspection Scope

The team reviewed flow diagrams, cable routing information, periodic test procedures, engineering evaluations for NFPA code deviations, and operational valve lineup procedures associated with the fire pumps and fire protection water supply system. The review evaluated whether the common fire protection water delivery and supply components could be damaged or inhibited by fire-induced failures of electrical power supplies or control circuits. Additionally, team members walked down the fire protection water supply system in selected areas to assess the adequacy of the system material

condition, consistency of as-built configuration with engineering drawings, and operability of the system in accordance with applicable administrative procedures and NFPA standards.

The team examined the adequacy of installed fire protection features in accordance with the separation and design requirements in 10 CFR 50, Appendix R, III.G.2. The team walked down accessible portions of the fire detection and alarm systems in the four selected fire areas to evaluate the engineering design and operation of the installed configurations. The team also reviewed engineering drawings for fire detector spacing and locations in the four selected fire areas for consistency with the licensee's fire protection plan and the requirements in NFPA 72D.

The team reviewed the adequacy of the design, installation and operation of the manual suppression standpipe and fire hose system for the Control Complex. The team examined design calculations to verify that the required fire hose water flow and sprinkler system density for each protected area were available. The team checked a sample of manual fire hose lengths to determine whether they would reach the SSD equipment. Additionally, the team observed placement of the fire hoses and extinguishers to assess consistency with the fire fighting pre-plans.

b. Findings

No findings of significance were identified.

.10 Compensatory Measures

a. Inspection Scope

The team reviewed the licensee's Form OI 07-03, Degraded Equipment Log, which identified compensatory measures for all degraded structures, systems, and components. The review was performed to verify that the risk associated with removing fire protection and/or post-fire systems or components was properly assessed and adequate compensatory measures were implemented in accordance with the approved fire protection program. The team also reviewed non-conformance reports generated over the last 18 months as a result of any fire protection features that were not returned to service within the time frames required.

b. Findings

No findings of significance were identified.

.11 Identification and Resolution of Problems

a. Inspection Scope

The team reviewed a sample of action requests for fire protection equipment to determine whether the licensee was identifying fire-related issues at an appropriate threshold and entering those issues into the corrective action program. The team also reviewed self-assessments and audits related to the fire protection and SSD programs

to assess whether the licensee was performing comprehensive audits of these programs in accordance with the requirements set forth in Appendix A of BTP APCSB 9.5-1.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA6 Meetings

Exit Meeting Summary

The team presented the inspection results to Mr. D. Young, Site Vice President and other members of licensee management and staff at the conclusion of the inspection on July 12, 2002. The licensee acknowledged the findings presented. No proprietary information is included in this report.

Partial List of Persons Contacted

Licensee

S. Barlofski, Supervisor, Elec./I&C Design
D. Brass, Superintendent, Prog., Proj. & Facility Svs.
J. Franke, Plant General Manager-CR3
C. Miller, Supervisor, ECCS Systems
H. Oates, Superintendent, Design Engineering
D. Porter, Superintendent, Operations Support
S. Powell, Supervisor, Licensing & Reg. Programs
P. Rubio, Lead Engineer, Design Engineering
D. Taylor, Manager, Site Support Services
R. Warden, Manager, Nuclear Assessment
R. Wiemann, Supervisor, Elec./I&C Systems
D. Young, Vice President, Crystal River Nuclear Plant

NRC

S. Stewart, Senior Resident Inspector, Crystal River

ITEMS OPENED AND CLOSED

Opened

URI 50-302/02-05-01	Failure to Protect One Train of Safe Shutdown Equipment From Fire Damage in Accordance with Appendix R, Section III.G.2 (Three Examples)

Closed

None

LIST OF DOCUMENTS REVIEWED

PROCEDURES

AP-880, Fire Protection, Rev 15
AP-990, Shutdown From Outside the Control Room, Rev 18
OP-880A, Appendix "R" Post Fire Safe Shutdown Information, Rev 00
EOP-02, Vital System Status Verification, Rev 07
MP-192, Post Fire Repair of decay Heat Closed Cycle Cooling Pump Motors, Decay Heat Pump 1B, Decay Heat Service Seawater Pump and Power Cables, Rev 07
MP-193, Temporary Cooling to Control Complex, Rev 04
AI-1000, Housekeeping/Material Condition Program, Rev. 37
AI-2001, Control of Combustible Chemicals, Rev. 9
AI-2100, Chemical Hygiene Plan and Safety Guidelines for Environmental and Chemistry Work Areas and Activities, Rev. 8
AI-2200, Guidelines for Handling Use and Control of Transient Combustibles, Rev. 8
AI-2205, Administration of CR-3 Fire Brigade Organization and Duties of the Fire Brigade, Rev. 17
AI-2210, Fire Watch Program, Rev. 8
AI-2215, Management of the CR-3 Fire Protection Program, Rev. 2
AR-801, Fire Service Annunciator Response, Rev. 17
CP-113B, Work Request Evaluation/Planning, Rev. 32
CP-118, Fire Prevention Work Request, Rev. 32
CP-137, Fire Barrier Breaches, Rev. 16
MP-805, Sealing of Penetrations, Rev. 12
PM-175, Fire Door Maintenance, Rev. 3
PM-185, Diesel Fire Pump Engine Inspection and Maintenance, Rev. 5
SP-190D, Functional Test of Fire Detection Systems-Control Complex, Rev. 14
SP-802, Fire Hose Hydro Test and Hose Reel Inspections, Rev. 26
SP-804, Surveillance of Plant Fire Brigade Equipment, Rev. 32
SP-807, Surveillance of Mounted Emergency Battery-Powered Light Units, Rev. 16
SP-809, Weekly Inspection Fire Protection, Rev. 9
TPP-219, Nuclear Emergency Team Training Program, Rev. 2
95 MC 0011, MECATISS Operating Procedure for the Installation of MTS. 3 Three Hours Fire Barrier System, Rev. B
95 MC 0020, MECATISS Detailed Sketches on MPF/MTS Installations, Rev. B
95 MC 0057, MECATISS Operating Procedure for the Installation of MPF-180 Three Hours Fire Barrier System Over Thermo-Lag 330.1 Material, Rev. E

JOB PERFORMANCE MEASURES (JPMs) AND LESSON PLANS

JPM 9818, Actuate Main Steam and Main Feed Line Isolation from Outside the Control Room
JPM 017, Initiate EFW in Accordance with Ap-990
JPM 085, Manually Trip the Reactor in Accordance with AP-990
Lesson Plan OPS-4-16-LP, Remote Shutdown System
Lesson Plan OPS-5-31LP, AP-990 Shutdown Outside Control room, Rev 00
Lesson Plan OPS-8-38, Shutdown From Outside Control room, Rev 02
Lesson Plan AP-880 Fire Protection, Rev 01

Lesson Plan OPS-5-91LP, NLO Emergency and Abnormal Tasks, Rev 00
Simulator Exercise Guide LOR-1-08, Shutdown Outside the Control Room, Rev 00

COMPLETED SURVEILLANCE TEST RECORDS

PT-315, Remote Shutdown Relay Operability, Rev 09
SP-338, Remote shutdown and Post Accident Monitoring Channel Check, Rev 41

DESIGN CRITERIA AND CALCULATIONS

Topical Design Basis Document for Appendix R, Rev 05
Enhanced Design Basis Document for the Fire Service System, Rev. 8
Design Basis Document for the Remote Shutdown System, Rev 06

DRAWINGS

FD-302-082, Emergency Feedwater
FD-302-601, Nuclear services Closed Cycle Cooling Water
FD-302-611, Nuclear Services and Decay Heat Seawater
FD-302-631, Decay Heat Closed Cycle Cooling Water
FD-302-641, Decay Heat Removal
FD-302-661, Makeup and Purification
FD-302-753, Control Complex
FD-302-769, Appendix R
A-107-013, Fire Barrier Penetrations, Rev. 10
B-208-031, Elementary Diagram, Fire Service System, Rev. 7
E-213-005, Appendix R Protected Raceways, Control Complex, Rev. 7
E-213-012, Appendix R Protected Raceways, Control Complex El. 108', Rev. 12
E-215-204, Conduit Layout Fire Service, Control Complex, Rev. 29
EC-209-014, Electrical Interconnection Wiring Diagram, Communications System, Rev. 15
BS-311-653, Sewage Pump Discharge Thru Turbine Bldg., Control Complex Plan, Rev. 17
BS-311-714, Ventilation Systems, Control Complex Plan, Rev. 28
FD-302-753, sheets. 1-4, Flow Diagram Air Handling, Control Complex, Rev. 41
B-208-082, Elementary Diagram, Remote Shutdown Panel "B" Relay Actuation,
- Sheet RS-05, Revision 3
- Sheet RS-06, Revision 8
- Sheet RS-07, Revision 11
- Sheet RS-08, Revision 6
- Sheet RS-12, Revision 7
- Sheet RS-14, Revision 11
- Sheet RS-16, Revision 13
- Sheet RS-18, Revision 8

B-208-021, Elementary Diagram,
- Sheet No. DH-10, Revision 21"B" LPI Flow Control Valve DHV-111,
- Sheet No. DH-02, Revision 21, D.H. Removal Pump 3B, (DHP-1B), 4160 V ES Bus 3B MTSW-2E-3B11

Sheet No. DH-06, Revision 24, L.P. Injection Cont. Isol. from DHP-1B, DHV-6, ES MCC 381, MTMC-5.-

B-208-026, Elementary Diagram, Sheet No. EF-08, Revision 21, T.D. Emerg. Feed Pump 3B EFP-2 and Aux. Feed Water Disch. Iso. To Steam Generator EFV-11

B-208-039 Elementary Diagram,

Sheet No. MS-09, Revision 23, Main Steam Supply Iso. to EFP-2 Turbine Drive MSV-56

Sheet No. MS-10, Revision 24, Main Steam Supply Iso. to EFP-2 Turbine Drive MSV-55

Drawing No. B-208-041, Elementary Diagram,

Sheet No. MU-03, Revision 19, Makeup and Purification Pump 3B (MUP-1B)

Sheet No. MU-17, Revision 18, HP Pp. Suction from Borated Water Storage Tank, (MUV-58)

Electrical Block Diagrams Drawing No. SS-211-008,

Sheet No. AS-01, Revision 16, Emergency Feed Pump Stop Valve ASV-5

Electrical Block Diagrams Drawing No. SS-211-026,

Sheet No. EF-08, Revision 10,T.D. Emerg. Feed Pump 3B & Aux. F. W. Disch. Isol. to Steam Gen. EFV-11

Sheet No. EF-10, Revision 9, T.D. Emerg. Feed Pump 3B & Aux. F. W. Disch. Isol. to Steam Gen. EFV-32

Sheet No. EF-11, Revision 10, Motor Driven Emerg. Feed pump 3A & Aux. F. W. Disch. Isol. to Stm. Gen. EFV-33

Sheet No. EF-14, Revision 5, MOVs EFV-11, 14, 32, 33 " C' and "D" Power Supplies

Sheet No. EF-17, Revision 7, Emergency Feed water Valve EFV-55

Sheet No. EF-18, Revision 7, Emergency Feed water Valve EFV-56

Sheet No. EF-19, Revision 7, Emergency Feed water Valve EFV-57

Sheet No. EF-20, Revision 7, Emergency Feed water Valve EFV-58

Electrical Block Diagrams Drawing No. SS-211-039,

Sheet No. MS-09, Revision 12, Stm. Gen. 3B to Emerg. Feed Pp. Isol. Vlv. (MSV-56)

Sheet No. MS-10, Revision 13 Stm. Gen. 3B to Emerg. Feed Pp. Isol. Vlv. (MSV-55)

Electrical Block Diagrams Drawing No. SS-211-041,

Sheet No. MU-01, Revision 5, Makeup and Purification Pump 3A, MUP-1A

Sheet No. MU-04, Revision 3, Makeup and Purification Pump 3C, MUP-1C

Sheet No. MU-05, Revision 2, M.U. & P. Pump 3A Main Oil Pump MUP-2A

Sheet No. 17, Revision 7, H. P. Pp. Suct. From Bor. Water Storage Tank MUV-58

Sheet No. MU-19, Revision 14, H. P. Inj. Cont. Vlv. To React. Inlet Line Loop A, (MUV-23).

Sheet No. MU-20, Revision 10, H. P. Inj. Cont. Vlv. To React. Inlet Line Loop A, (MUV-24).

Sheet No. MU-22, Revision 10, H. P. Inj. Cont. Vlv. To React. Inlet Line Loop B, (MUV-26).

Sheet No. MU-24, Revision 5, Makeup Pump Recirc. Vlv. 3B (MUV-257)

Sheet No. MU-25, Revision 5, Makeup Pump Recirc. Vlv. 3A (MUV-53)

APPLICABLE CODES AND STANDARDS

NFPA 13, Standard for the Installation of Sprinkler Systems, 1983 Edition.

NFPA 14, Standard for the Installation of Standpipe and Hose Systems, 1970 Edition.

NFPA 15, Standard for Water Spray Fixed Systems for Fire Protection, 1969 Edition.

NFPA 20, Standard for the Installation of Centrifugal Fire Pumps, 1970 Edition.
NFPA 72D, Standard for the Installation, Maintenance, and Use of Proprietary Protection Signaling Systems, 1967 Edition.
NFPA 80, Standard on Fire Doors and Windows, 1970 Edition.
NFPA 90A, Standard on Air Conditioning and Ventilating Systems, 1981 Edition.
NUREG-1552, Supplement 1, Fire Barrier Penetration Seals in Nuclear Power Plants, dated January 1999
Underwriters Laboratory, Fire Resistance Directory, January 1998

AR REPORTS, AUDITS, AND SELF ASSESSMENTS

AR 00063067: Transient Fire Loading Concerns on 163' Control Complex
NAS Assessment C-FP-02-01; Action Request 00061781, OP-880A Manual Actions

OTHER DOCUMENTS

UFSAR 1.4.3 – Criterion 3, Fire Protection
UFSAR 7.4.6 – Aux Control Stations (Remote Shutdown System)
UFSAR 9.7 – Plant Ventilation
UFSAR 9.8 – Plant Fire Protection Program
Fire Hazards Analysis Fire Protection Program Description & Review Per App. A to BTP APCSB 9.5-1
Crystal River Appendix R Fire study, Rev 11
Crystal River Unit 3 Fire Protection Plan, Rev. 19
Crystal River Unit 3 Flood Analysis Notebook, Rev. 0
Crystal River Unit 3 Individual Plant Examination of External Events, Rev. 1
Safety Evaluation of MECATISS Fire Barrier Test Program, dated January 29, 1997
Memorandum, NRC to Florida Power Corporation, Confirmatory Order for Completion of Corrective Actions Regarding Resolution of Thermo-Lag 330-1 Fire Barriers, dated May 21, 1998
Pre-fire Plan No. CC-108-1, Battery Room Area and 4160 E. S. Buss Room, Inverter Rooms, Control Complex, Elev. 108'
Pre-fire Plan No. CC-163-1, HVAC Equipment Room, Control Complex, Elev. 163' - 10", Rev 9
Pre-fire Plan No. CC-95-1, Radiation Protection Area, Control Complex, Elev. 95', Rev. 9
FPDS 5.10, Crystal River Nuclear Plant Fire Zone Combustible List, Rev 5
Crystal River Unit 3 Fire Brigade Drill Critiques, Operating shifts from June, 2001 through May, 2002.
Factory Mutual Research, Fire Endurance Test, Penetration Seal Systems in Precast Concrete Floor Utilizing Silicone Elastomers, dated May 18, 1977
CECO Corporation, Certification for Underwriters Laboratories Labeled Fire Doors, dated June 10, 1971
Exide Electronics, Emergency Lighting Unit Equipment, Rev. 1

CORRECTIVE ACTION PROGRAM ITEMS

NCR 00065592:	Evaluate Work Planning Process and Transient Fire Loading process to Ensure Risk Significance is Evaluated Prior to Work Performance
NCR 00065310:	Evaluate Differing Design Inputs for the FHA and IPEEE Documents and Reconcile Differences
NCR 00061867:	Failed to Complete Identified Corrective Actions to Evaluate Need for Battery Powered Emergency Lighting to Illuminate Fire Brigade Dress-Out Locker Room and Staging Areas
NCR 00065525:	Evaluate Potential Fire Damage to Control and Power Cables to Fire Service Valve to Control Complex Fire Hose Stations
NCR 00061031	Discrepancies identified during cold shutdown repair walkdown of licensee's pre-staged materials while using MP-192.(Appendix R repair kit box)
NCR 00064170	Evaluate the plant modification process used for removing computer cabinets (MUX) doors.
NCR 00061321	Review improved TS to determine if cleaning is required to be performed during determination of cell operability.
NCR 00065455	Evaluate section 2.2.5.9 of the appendix R Topical Design Basis Document concerning the use of " Post fire manual actions for meeting the requirements of III.G.1 and III.G.2 fire areas.
NCR 00064207	Evaluate all fuse data associated with MAR97-03-02-01 to ensure that the information is included in the EBD.
NCR 00065405	Revise drawing 208-082RS-06 to correct drawing error associated with valve DHV-111 (DHV-110)
NCR 00056381	Evaluate procedure AP-880 concerning a need to actuate FSV-257 (with contingencies) on confirmation of a fire in the control complex.