UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
SAM NUNN ATLANTA FEDERAL CENTER
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ATLANTA, GEORGIA 30303-8931

March 14, 2005

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

Dear Mr. Young:

SUBJECT: CRYSTAL RIVER UNIT 3 - NRC TRIENNIAL FIRE PROTECTION INSPECTION REPORT NO. 05000302/2004009

On January 28, 2005, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Crystal River Nuclear Plant. The enclosed inspection report documents the inspection findings, which were discussed on that date 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 team reviewed selected procedures and records, observed activities, and interviewed personnel.

This report documents three findings involving post-fire safe shutdown and design control vulnerabilities. These findings involve violations of NRC requirements; however, the safety significance of the findings has not been determined and could potentially be greater than very low (Green). Two of the findings, which involved the design of common protection and metering circuits, were immediate safety concerns. However, they currently are not immediate safety concerns because the licensee made modifications to correct the nonconforming conditions before the inspection team left the site. The third finding involved reliance on local manual operator actions which had not been reviewed and approved by the NRC instead of having the required physical protection or separation of cables for equipment needed to achieve and maintain post-fire safe shutdown. This finding is not an immediate safety concern because each of those manual actions could be reasonably accomplished and the postulated time line demonstrated that there was sufficient time to perform each action. If you contest any finding in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN.: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region 2; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Crystal River Nuclear Plant.

In accordance with 10 CFR 2.390 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).

Should you have any questions concerning this letter, please contact us.

Sincerely,

/RA/

D. Charles Payne, Chief
Engineering Branch 2
Division of Reactor Safety

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

Enclosure: NRC Triennial Fire Protection Inspection Report 05000302/2004009
w/Attachment: Supplemental Information

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U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.:	50-302
License No.:	DPR-72
Report No.:	05000302/2004009
Licensee:	Progress Energy Florida (Florida Power Corporation)
Facility:	Crystal River Unit 3
Location:	15760 West Power Line Street Crystal River, FL 34428-6708
Dates:	January 10-14, 2005 (Week 1) January 24-28, 2005 (Week 2)
Inspectors:	R. Rodriguez, Reactor Inspector R. Schin, Senior Reactor Inspector (Lead Inspector) C. Smith, Senior Reactor Inspector G. Wiseman, Senior Reactor Inspector
Accompanying Personnel:	X. Bellarmine, Nuclear Safety Professional J. Quinones-Navarro, Nuclear Safety Professional T. Harrison, Fire Protection Co-op (Week 1 only)
Approved by:	D. Charles Payne, Chief Engineering Branch 2 Division of Reactor Safety

Enclosure

SUMMARY OF FINDINGS

IR 05000302/2004009; 01/10 - 14/2005 and 01/24 - 28/2005; Crystal River Unit 3; Triennial Fire Protection.

This report covers an announced two-week period of inspection by four regional inspectors. Three unresolved items with potential safety significance greater than Green were identified. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter 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," Rev. 3, dated July 2000.

A. NRC-Identified and Self-Revealing Findings

Cornerstone: Mitigating Systems

- TBD. The team identified a violation of 10 CFR 50, Appendix R, Section III.G.2, for failure to physically protect or separate cables from fire damage and instead relying on an unapproved local manual operator action. The unprotected cables were associated with a common electrical protection and metering circuit which was installed such that fire damage to a cable in or just above the 3A 4160V engineered safeguards (ES) switchgear could result in tripping and locking out all feeder breakers to both 4160V ES busses, resulting in a loss of all safety-related alternating current power.

  In addition, the local manual operator action to reset the 3B emergency diesel generator breaker lockout on the 3B 4160V ES switchgear was determined to be non-feasible. During a severe fire in the adjacent 3A 4160V Switchgear Room the fire response activities would cause the location for the operator action (the 3B 4160V Switchgear Room) to be exposed to hot smoke, water mist, and water on the floor. This finding was an immediate safety concern and the licensee made modifications to correct the nonconforming condition before the inspection team left the site.

  This finding is unresolved pending the completion of a significance determination. The finding is greater than minor because it degraded the defense in depth for fire protection and also because it is associated with the protection against external factors attribute and degraded the reactor safety mitigating systems cornerstone objective. The finding adversely affected the reliability and capability of equipment required to achieve and maintain a safe shutdown condition following a severe fire in the 3A 4160V ES Switchgear Room. (Section 1R05.01.b.1)

- TBD. The team identified a violation of 10 CFR 50, Appendix B, Criterion III, Design Control, for installing and modifying electrical protection and monitoring circuits that did not meet the general design criteria for single active failures. A common electrical protection and metering circuit was installed such that a single active failure of a component in the circuit could trip and lock out all feeder

breakers to both 4160V ES busses, resulting in a loss of all safety-related alternating current power. This finding was an immediate safety concern and the licensee made modifications to correct the nonconforming condition before the inspection team left the site.

This finding is unresolved pending the completion of a significance determination. The finding is greater than minor because it is associated with the design control and equipment performance attributes of the reactor safety mitigating systems cornerstone. The finding adversely affects the objectives of availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. (Section 1R05.01.b.2)

- TBD. The team identified a violation of 10 CFR 50, Appendix R, Section III.G.2, for failure to physically protect or separate cables from fire damage and instead relying on unapproved local manual operator actions. The operator actions were to be accomplished outside the main control room (MCR) and were relied on to achieve and maintain safe shutdown from the MCR during a severe fire in the 3A 4160V ES Switchgear Room or the 3A 480V ES Switchgear Room.

  This finding is unresolved pending the completion of a significance determination. The finding is greater than minor because it degraded the defense in depth for fire protection and also because it is associated with the protection against external factors attribute and degraded the reactor safety mitigating systems cornerstone objective. The finding adversely affected the reliability and capability of equipment required to achieve and maintain a safe shutdown condition following a severe fire. This finding is not an immediate safety concern because each of the manual actions could be reasonably accomplished and the postulated time line demonstrated that there was sufficient time to perform each action. However, this issue remains unresolved pending further NRC review of the overall complexity and number of the manual actions. The finding is applicable to post-fire safe shutdown from the control room during a fire in the 3A 4160V ES Switchgear Room. (Section 1R05.01.b.3)

B. Licensee-Identified Violations

None.

REPORT DETAILS

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R05 Fire Protection

The purpose of this inspection was to review the Crystal River Unit 3 fire protection program (FPP) for selected risk-significant fire areas. Emphasis was placed on verification that the post-fire safe shutdown (SSD) capability and the fire protection features provided for ensuring that at least one redundant train of SSD systems was maintained free of fire damage. Another inspection focus was to verify that local manual operator actions were consistent with the licensing basis. The inspection was performed in accordance with the U.S. Nuclear Regulatory Commission's (NRC) Reactor Oversight Process using a risk-informed approach for selecting the fire areas and attributes to be inspected. The inspection team used the licensee's Individual Plant Examination for External Events and in-plant tours to choose three risk-significant fire areas for detailed inspection and review. The fire areas (zones) chosen for review during this inspection were:

- Fire Area 108; 3A 4160V Engineered Safeguards (ES) Switchgear Room, located on the 108 foot (ft.) elevation of the control complex. A large fire in this area would involve shutdown of the unit from the main control room (MCR).

- Fire Area 117; 3A 480V ES Switchgear Room, located on the 124 ft. elevation of the control complex. A large fire in this area would involve shutdown of the unit from the MCR.

- Fire Zone 118B; Control Room, located on the 145 ft. elevation of the control complex. A large fire in this area would involve evacuation of the MCR and shutdown of the unit from the remote shutdown panel.

The inspection team evaluated the licensee's FPP against applicable requirements, including Operating License Condition 2.C.(9); Title 10 of the Code of Federal Regulations, Part 50 (10 CFR 50), Appendix R; 10 CFR 50.48; commitments to Appendix A of Branch Technical Position Auxiliary and Power Conversion Systems Branch 9.5-1; related NRC safety evaluation reports (SERs); and plant Technical Specifications (TS). The team also reviewed related FPP requirements, including the Updated Final Safety Analysis Report (UFSAR) Section 9.8, Plant Fire Protection Program; Fire Hazard Analysis; 10 CFR 50 Appendix R Fire Study; and Fire Protection Plan. The team evaluated all areas of this inspection, as documented below, against these requirements.

Specific documents reviewed by the team are listed in the attachment.

.01 Systems Required to Achieve and Maintain Post-fire Safe Shutdown

d. Inspection Scope

In addition to the requirements listed above, the team reviewed the licensee's electrical elementary drawings, piping and instrumentation drawings, cable routing drawings, cable routing data sheets; and related operating procedures to evaluate the licensee's methodology for SSD in the event of a fire in one of the three selected fire areas/zones. The team also performed walkdown inspections of the three fire areas/zones. In addition, the team walked down the proceduralized operator actions that could be needed to achieve and maintain post-fire safe shutdown following a fire in any of the three fire areas/zones. The objectives of this review were to:

- Verify that the licensee's post-fire safe SSD methodology had correctly identified the components and systems necessary to achieve and maintain SSD conditions.

- Confirm the adequacy of the systems selected for reactivity control, reactor coolant makeup, reactor heat removal, process monitoring and support system functions.

- Verify that SSD can be achieved and maintained with or without off-site power unless it can be confirmed that a postulated fire in any of the selected fire areas/zones could not cause the loss of off-site power (LOOP).

- Verify that local manual operator actions are consistent with the plant's fire protection licensing basis.

The team evaluated whether the Appendix R Fire Study properly identified and categorized components in terms of safe shutdown function. Additionally, the team evaluated the Appendix R Fire Study results of fire induced damage to the control circuits for feeder breakers supplying power to the 4160V ES switchgear to verify that SSD could be achieved with or without a (LOOP) for a fire in any of the selected fire areas/zones. The team also checked if instrumentation required for post-fire SSD (e.g., pressurizer level and steam generator level) was analyzed by the licensee to demonstrate that the instruments would be free from fire damage for the fire areas/zones inspected. The SSD components which were reviewed for operability during and after a fire in each of the selected fire areas/zones are listed in the attachment. Drawings and operating procedures reviewed are also included in the attachment.

b. Findings

1) Unprotected Post-Fire Safe Shutdown Cable and Related Non-feasible Local Manual Operator Action

Introduction: The team identified a violation of 10 CFR 50, Appendix R, Section III.G.2, for failure to physically protect or separate cables from fire damage and instead relying on a local manual operator action that was not approved by the NRC. The unprotected

cables were in common electrical protection and metering circuits which were installed such that fire damage to a cable in or just above the 3A 4160V ES switchgear could trip and lock out all feeder breakers to both 4160V ES busses, resulting in a loss of all safety-related alternating current (a.c.) power.

In addition, the team found that the licensee's local manual operator action to mitigate this condition was not feasible. The action was to reset the 3B emergency diesel generator (EDG) breaker lockout on the 3B 4160V ES switchgear. However, that action was not feasible because the fire in the 3A 4160V Switchgear Room and fire fighting activities through the adjacent 3B 4160V Switchgear Room would cause the location for the operator action (in the 3B 4160V Switchgear Room) to be exposed to hot smoke, water mist, and water on the floor. This finding was an immediate safety concern and the licensee made modifications to correct the nonconforming condition before the inspection team left the site. This finding is unresolved pending completion of a significance determination.

Description: The team found that the licensee's 10 CFR 50 Appendix R Fire Study and post-fire SSD procedure OP-880A, Appendix "R" Post-Fire Safe Shutdown Information, Rev. 5, Step 9-6, included a local manual operator action that was not approved by the NRC and also was not feasible. The action was to reset the 3B EDG breaker lockout on the 3B 4160V ES switchgear during a fire in the 3A 4160V ES Switchgear Room. This action was time critical and required to be completed within 30 minutes of entering OP-880A. Operators were to trip the reactor and enter OP-880A if a fire in the 3A 4160V Switchgear Room impacted safe operation of the plant. The licensee had considered that the action was needed because a fire in the 3A 4160V ES switchgear could affect cables for the electrical protection and metering circuit and could lock out all feeder breakers to both the 3A and the 3B 4160V ES switchgear. However, the licensee's post-fire SSD methodology relied upon equipment powered from the 3B 4160V ES switchgear. Specifically, the licensee's analysis determined that power to the 3B 4160V switchgear was needed within 30 minutes to enable operators to restore ventilation cooling to the Emergency Feedwater Initiation and Control (EFIC) rooms. The EFIC system was needed for automatic emergency feedwater (EFW) flow control.

The team found that cables for the electrical protection and metering circuit were located within and directly above the 3A 4160V switchgear, where a fire originating in certain sections of the switchgear could immediately damage them. The team noted that these cables were four-conductor, #8 American Wire Gage (AWG), Institute of Institute of Electrical and Electronic Engineers (IEEE) 383 qualified, thermoset-type cables with no protective fire wrap. Damage to one of these cables could result in immediate loss of both the 3A and the 3B 4160V ES switchgear, and a loss of all safety-related a.c. power. Plant operators would conclude this had an impact on safe operation of the plant, would trip the reactor, and immediately enter OP-880.

During this fire condition, the primary plant operator (PPO) had a number of proceduralized time-critical local manual operator actions to perform in a prescribed sequence. Based on Pre-fire Plans and fire brigade drill results, the fire brigade would attack a fire in the 3A 4160V Switchgear Room through the 3B 4160V Switchgear Room about 15 minutes after confirmation of the fire. Based on licensee time validations and NRC team walkdowns of the actions, the team determined that the PPO would arrive at

the 3B 4160V Switchgear Room about 25 minutes into the fire event. When the PPO arrived, the fire brigade would have the door between the two switchgear rooms open and would have sprayed fire water into the 3A 4160V Switchgear Room. Hot smoke from the fire would have filled both the 3A and 3B 4160V ES switchgear rooms and the hallway leading to those rooms because the fire brigade would have all doorways between the two rooms and the hallway blocked open with their fire hose. In addition, water from the fire hose would have created mist in the air and water on the floors of both switchgear rooms (the switchgear rooms had no floor drains). At 25 minutes into the fire event, the fire brigade would not yet have had time to evacuate the smoke with portable fans. In addition, the portable fans would not have electrical power available because the outlets for the fans were powered from the 3A and 3B 4160V switchgear, which would potentially be de-energized. While the fire brigade could obtain a portable generator to power the fans, this would take too long to allow the operator to complete the action within the time-critical 30 minutes. In view of all of these conditions, the team concluded that the operator action was not feasible.

Analysis: This finding is unresolved pending the completion of a significance determination. The finding is greater than minor because it degraded the defense in depth for fire protection and also because it is associated with the protection against external factors attribute and degraded the reactor safety mitigating systems cornerstone objective. The finding adversely affected the reliability and capability of equipment required to achieve and maintain a SSD condition following a severe fire. The finding is applicable to post-fire SSD from the control room during a fire in the 3A 4160V ES Switchgear Room. This finding was an immediate safety concern and the licensee made modifications to correct the nonconforming condition before the inspection team left the site.

Enforcement: 10 CFR 50.48(b)(1) requires, in part, that all nuclear power plants licensed to operate prior to January 1, 1979, must satisfy the applicable requirements of Appendix R, Section III.G. Section III.G.2 applies to the ability to achieve and maintain hot SSD from the control room during a fire. It states, in part, that where cables or equipment, including associated non-safety circuits that could prevent operation or cause maloperation due to hot shorts, open circuits, or shorts to ground, of redundant trains of systems necessary to achieve and maintain hot shutdown conditions are located within the same fire area outside of primary containment, one of three means of protecting cables to ensure that one of the redundant trains is free of fire damage shall be provided. The three means involve physical protection or separation of cables to preclude fire damage - III.G.2 does not allow local manual operator actions in lieu of protection.

Contrary to the above, on January 26, 2005, cables for the electrical protection and metering circuit located in the 3A 4160V ES Switchgear Room were vulnerable to fire damage that could disable both the 3A 4160V ES switchgear and the redundant train 3B 4160V ES switchgear. In addition, a local manual operator action to mitigate the condition was not feasible.

Pending completion of a significance determination, this finding is identified as unresolved item (URI) 05000302/2004009-01, Unprotected Post-Fire Safe Shutdown Cables and Related Non-feasible Local Manual Operator Action.

2) Single-Failure Vulnerability of Common Electrical Protection and Metering Circuits

Introduction: The team identified a violation of 10 CFR 50, Appendix B, Criterion III, Design Control. The licensee's design of the electrical protection and metering circuits resulted in both the 3A and 3B 4160V switchgear being vulnerable to the failure of a single active component. A common electrical protection and metering circuit was installed such that a single failure of a component in the circuit could trip and lock out all feeder breakers to both 4160V ES busses, resulting in a loss of all safety-related a.c. power. This finding was an immediate safety concern and the licensee made modifications to correct the nonconforming condition before the inspection team left the site. This finding is unresolved pending completion of a significance determination.

Description: After reviewing the fire vulnerabilities of the electrical protection and metering circuit as described in Section 1R05.01.b.1 above, the team reviewed whether the circuit met the general design criteria for single failure. The Crystal River 3 design criteria were described in UFSAR Section 1.4, Principal Architectural and Design Criteria. Specifically, UFSAR Section 1.4.39, titled "Criterion 39, Emergency Power for Engineered Safety Features," specifies that the onsite power system and the offsite power system shall each, independently, provide the capability (to power the engineered safety features) assuming a failure of a single active component in each power system.

The Crystal River design was such that the 3A and 3B 4160V ES switchgear could each be powered from either the offsite power transformer (OPT) or the backup ES transformer (BEST). The normal alignment was to the 3A 4160V ES switchgear powered from the OPT and the 3B 4160V ES switchgear powered from the BEST. Each ES bus also had one EDG as a standby power source and could also be supplied from the station auxiliary transformer. The electrical protection and metering circuit for each of the normal offsite power supplies (the OPT and BEST) included three current transformers (CTs) at the feeder breaker to each ES bus, phase overcurrent relays, and ground fault overcurrent relays, all connected in a basic residual scheme. Additionally, each circuit included a single electrical ground connection. Each circuit also included one watt-hour meter which would sum the power to both ES busses. This interconnection of a protection and metering circuit between two ES busses was identified by the team as a common-mode single failure vulnerability. A failure on this interconnected circuit (e.g., a fire-induced cable bus fault or a watt-hour meter failure) would be interpreted by the protection circuit as an electrical bus fault on both ES busses. Consequently, the relay logic would lock out both ES busses and prevent automatic or manual reenergization from any power source until after the lock out was reset.

Plant modifications that installed and modified the electrical protection and metering circuits, associated with the OPT and the BEST power supplies to the safety-related 3A and 3B 4160V ES switchgear, failed to meet the general design criteria for single failure as stated in Criterion 39. Those modification included: Modification Approval Record (MAR) 89-08-11-03, which installed the OPT in 1990-1991; MAR 91-03-23-01, which installed the BEST in 1993; MAR 97-02-11-01, which added CT secondary protectors in 1997; and MAR 97-08-91-01, which modified the EDG breaker lockout relays in 1997.

The Appendix R Fire Study was revised as a result of evaluations performed under MAR 97-02-11-01, and manual actions were added for fire areas 108, 117, and 107. These manual actions were to reset the EDG breaker lockouts to mitigate fire-induced faults in the electrical protection and metering circuit cables.

This finding was an immediate safety concern and the licensee made modifications to correct the nonconforming conditions before the inspection team left the site. Licensee engineering changes (EC) 60150, Disconnect Watt-Hour Meter from OPT, and EC 60155, Disconnect Watt-Hour Meter "AL" from Breaker 3206, modified the electrical protection circuits to align each circuit to one ES bus and to disconnect the watt-hour meters. In this corrected configuration, each circuit is contained within one switchgear, a single fault will affect only one ES bus, and a fire in any area will not affect ES busses that are relied upon for post-fire safe shutdown.

Analysis: This finding is unresolved pending the completion of a significance determination. The finding is greater than minor because it is associated with the design control and equipment performance attributes of the mitigating systems cornerstone of reactor safety. The finding affects the operability, reliability, and capability of systems that respond to initiating events.

Enforcement: 10 CFR 50, Appendix B, Criterion III, Design Control, requires that measures be established to assure that the design basis is correctly translated into specifications, drawings, procedures, and instructions. Crystal River 3 Design Criterion 39 specifies that the onsite power system and the offsite power system shall each, independently, provide the capability (to power the engineered safety features) assuming a failure of a single active component in each power system.

Contrary to the above, on January 26, 2005, the electrical protection and metering circuits for the OPT and BEST feeders to the 3A and 3B 4160V ES switchgear were not designed to meet Criterion 39, in that a single active failure in one of these circuits could result in failure of all offsite and onsite a.c. power to both ES busses. Modifications during 1989 through 1997 contributed to that design deficiency. This condition has existed since 1989. Pending completion of a significance determination, this finding is identified as URI 05000302/2004009-02, Single Failure Vulnerability of Common Electrical Protection and Metering Circuits.

3) Unapproved Local Manual Operator Actions Instead of Required Physical Protection or Separation of Cables to Preclude Fire Damage

Introduction: The team identified a violation of 10 CFR 50, Appendix R, Section III.G.2, with significance to be determined, for failure to have the required physical protection or separation of cables from fire damage and instead relying on local manual operator actions for post-fire SSD that were not approved by the NRC. The operator actions were to be accomplished outside the MCR and were relied on for achieving and maintaining hot SSD from the MCR for a severe fire in the 3A 4160V ES switchgear room or the 3A 480V ES switchgear room. Each operator action could be reasonably accomplished and the postulated time line demonstrated that there was sufficient time to perform all of the actions. However, this issue remains unresolved pending further NRC review of the overall complexity and number of the manual actions.

Description: The team noted that procedures AP-880, Fire Protection, Rev. 22; and OP-880A, Appendix "R" Post-Fire Safe Shutdown Information, Rev. 5; relied on local manual operator actions to achieve and maintain hot SSD. The local manual operator actions were relied on instead of meeting the physical protection or separation requirements of 10 CFR 50, Appendix R, Section III.G.2. The licensee had not received NRC exemptions from these requirements for protecting cables from fire damage.

One local manual operator action included in this finding involved the PPO opening a direct current breaker in the Control Rod Drive (CRD) room in the control complex, to de-energize the solenoid for the pressurizer power operated relief valve (PORV), to prevent spurious opening. Another local manual action involved the same PPO subsequently opening eight breakers for four EFW motor-operated valves (MOVs) in the A and B 480V ES Switchgear Rooms in the control complex; and then manually opening two MOVs and closing two MOVs in the lower level of the intermediate building, inside the radiologically controlled area (RCA); to establish EFW flow to the steam generators. Another local manual action involved the same PPO then opening breakers for two decay heat (DH) MOVs in the auxiliary building (inside the RCA) to prevent them from spuriously opening and draining the borated water storage tank (BWST) to the reactor building sump. Another local manual action involved the same PPO then resetting the lockout for the B EDG output breaker in the B 4160V ES Switchgear Room, to recover a.c. power to one ES bus. This action was considered to be not feasible, is discussed separately in the previous section of this report, and is not included in the further evaluation of this section. Other local manual actions involved the same PPO then opening breakers for and locally operating several high pressure injection valves in the auxiliary building (inside the RCA) to restore makeup flow to the reactor coolant system (RCS).

The team noted that, prior to the inspection, the licensee had reviewed these local manual operator actions against the feasibility criteria listed in NRC Inspection Procedure (IP) 71111.05, Enclosure 2, "Inspection Criteria For Fire Protection Manual Actions," dated March 6, 2003. The team independently reviewed the actions and judged that all but one of the actions (which is discussed in a previous section of this report) individually met the criteria of IP 71111.05, Enclosure 2, and could be reasonably accomplished. Also, the postulated time line demonstrated that there was sufficient time to perform all of the actions. However, this issue remains unresolved pending further NRC review of the overall complexity and number of the manual actions.

Analysis: This finding is unresolved pending the completion of a significance determination. The finding is greater than minor because it degraded the defense in depth for fire protection and also because it is associated with the protection against external factors attribute and degraded the reactor safety mitigating systems cornerstone objective. The finding adversely affected the reliability and capability of equipment required to achieve and maintain a safe shutdown condition following a severe fire. Each manual action could be reasonably accomplished and the postulated time line demonstrated that there was sufficient time to perform all of the actions. However, this issue remains unresolved pending completion of a significance determination, including further NRC review of the overall complexity and number of the manual actions. The finding is applicable to post-fire safe shutdown from the control room during a fire in the 3A 4160V ES switchgear room.

Enforcement: 10 CFR 50.48(b)(1) requires, in part, that all nuclear power plants licensed to operate prior to January 1, 1979, must satisfy the applicable requirements of Appendix R, Section III.G. Section III.G.2 applies to the ability to achieve and maintain hot SSD from the control room during a fire. It states, in part, that where cables or equipment, including associated non-safety circuits that could prevent operation or cause maloperation due to hot shorts, open circuits, or shorts to ground, of redundant trains of systems necessary to achieve and maintain hot shutdown conditions are located within the same fire area outside of primary containment, one of three means of protecting cables to ensure that one of the redundant trains is free of fire damage shall be provided. The three means involve physical protection or separation of cables to preclude fire damage - III.G.2 does not allow local manual operator actions in lieu of protection.

Contrary to the above, on January 26, 2005, local manual operator actions were relied on for post-fire hot SSD instead of physical protection or separation of cables to preclude fire damage. These actions were in procedures AP-880, Rev. 22, and OP-880A, Rev. 5 and are listed in the attachment. This issue has been entered into the licensee's corrective action program in Non-conformance Report (NCR) 061781. This finding is identified as URI 05000302/2004009-003, Unapproved Local Manual Operator Actions In Lieu of Required Physical Protection or Separation of Cables to Preclude Fire Damage.

4) No Cooling to Reactor Coolant Pump Seals for up to Eight Hours

Introduction: The team noted that the licensee's Appendix R Fire Study and post-fire SSD procedures relied on reactor coolant pump (RCP) seals remaining intact, without leaking, without cooling for up to eight hours. Because this practice differed significantly from general industry RCP seal design capabilities, this issue is unresolved pending further NRC review of the technical basis for acceptability.

Discussion: Crystal River 3 had Byron-Jackson (now Flowserve) N-9000 seal cartridges installed in the RCPs. Further, the licensee had a vendor analysis titled "RCP N-9000 Seal Appendix R Evaluation" supporting the ability of the seals to go without any cooling for up to eight hours without failing or leaking. Because RCP seals are not generally designed for eight hours without cooling and without failing or leaking, the team determined that NRC review of the vendor analysis was necessary. This issue is identified as URI 05000302/2004009-004, No Cooling to Reactor Coolant Pump Seals for up to Eight Hours.

5) Motor Operated Valves Not Protected From Hot Shorts that Could Bypass Torque Switches

Introduction: The team noted that the licensee's Appendix R Fire Study indicated that a number of motor-operated valves were not protected from certain hot shorts that could spuriously actuate the valve and also bypass the torque and limit switches. The team noted that such an occurrence could potentially defeat the post-fire SSD strategy, and the licensee planned to further evaluate whether such a vulnerability actually existed. This issue is unresolved pending NRC review of the licensee's evaluation.

Discussion: The licensee's Appendix R Fire Study stated that many MOVs have had their control circuits modified such that hot shorts which can spuriously actuate the valves will not be able to bypass the torque and limit switches as addressed in NRC Information Notice 92-18. The Fire Study further stated that one exception to this is for a fire located at the valve's motor control center. The team noted that fires could occur at motor control centers, and if such a fire caused a hot short that spuriously actuated a motor operated valve that was needed for post-fire SSD and also bypassed the torque switch, the valve could be rendered inoperable by becoming jammed into its valve seat. Consequently, operators would not be able to subsequently open the valve.

The team also noted that the plant design included MOVs that were relied upon for both A train and B train post-fire SSD. Examples included the makeup pump minimum-flow valves. These two MOVs were installed in series in the combined minimum-flow line for all three makeup pumps. One was powered from the A train and one from the B train of the electrical system. If either one of these valves were to become damaged in the closed position, all minimum-flow for all makeup pumps would be lost. However, the licensee's Appendix R Fire Study relied on having makeup pump mininimum-flow available for post-fire SSD. Another example would be the decay heat drop line, which similarly included two MOVs in series.

In response to NRC questions about this potential vulnerability that could affect post-fire SSD, the licensee initiated NCR 148225 to further evaluate whether such a vulnerability actually existed. This issue is unresolved pending NRC review of the licensee's evaluation: URI 05000302/2004009-005, Motor Operated Valves Not Protected From Hot Shorts That Could Bypass Torque Switches.

.02 Fire Protection of Safe Shutdown Capability

a. Inspection Scope

For the selected fire areas/zones, the team evaluated the potential for fires, the combustible fire load characteristics, potential exposure fire severity, the separation of systems necessary to achieve and maintain SSD, and the separation of electrical components and circuits to ensure that at least one SSD train of equipment was free of fire damage. The team reviewed selected portions of the references listed in the introduction to Section 1R05 and also reviewed Administrative Instruction AI-2200, Guidelines for Handling, Use, and Control of Transient Combustibles. This review was conducted to determine if the licensee's commitments, as established in the fire protection licensing basis documents, were satisfied.

The team reviewed licensee documents which establish and implement controls and practices to prevent fires, and to control the storage of permanent and transient combustible materials and ignition sources, to verify that the objectives established by the NRC-approved FPP were satisfied. The documents reviewed are listed in the attachment.

The team toured the selected plant fire areas/zones to observe: (1) the material condition of fire protection systems and equipment, (2) the storage of permanent and transient combustible materials, and (3) the licensee's implementation of the

programmatic procedures for limiting fire hazards, combustible waste collection, housekeeping practices, and cleanliness conditions. These reviews were accomplished to ensure that the licensee was maintaining the fire protection systems, had properly evaluated in-situ combustible fire loads, controlled hot-work activities, and limited transient fire hazards in a manner consistent with the UFSAR, administrative procedures and other FPP procedures. In addition, the team reviewed design control procedures to determine if plant changes were adequately evaluated for the potential impact on the FPP, SSD equipment and plant procedures (as required by the FPP).

The team reviewed operator and fire brigade staffing, fire brigade response, fire brigade qualification training, fire drill program procedures, and fire brigade drill critiques for brigade shifts from July 2002 to October 2004. Fire brigade response and emergency/incident reports from March 2002 through December 2004 as well as corrective action program Action Requests (ARs) resulting from fire, smoke, sparks, arcing, and equipment overheating incidents for this period were also reviewed. In addition, the team reviewed fire brigade initial and continuing training course materials. The reviews were conducted to assess the effectiveness of the fire prevention program and to determine whether fire brigade drills had been conducted in high fire risk plant areas and whether fire brigade personnel training, qualifications, manning assignments, drill response, and performance was at an acceptable level and met the requirements of the FPP.

The team reviewed fire fighting pre-fire plans and fire response procedures for the selected fire areas/zones to determine if appropriate information was provided to fire brigade members to identify SSD equipment and to facilitate suppression of an exposure fire that could impact SSD capability. The team walked down the selected fire areas/zones to compare the associated pre-fire plans and drawings with as-built plant conditions and fire response procedures. This was done to verify that fire fighting pre-fire plan instructions and drawings were consistent with the fire protection features and potential fire conditions described in the fire hazards analysis. The team also evaluated whether the fire response procedures and pre-plans for the selected fire areas/zones could be implemented as intended.

The team walked down the primary and secondary fire brigade emergency equipment storage locations, equipment staging areas, and dress-out areas to evaluate equipment accessibility and functionality. The team inspected the fire brigade personnel protective ensembles, smoke control equipment, and various fire brigade equipment on fire carts to determine operational readiness for fire fighting. Plant normal and emergency power supply systems were reviewed for the impact of any damage which could result from fires in the selected fire areas/zones on fire brigade response and fire fighting equipment to ensure that the reliability of the power supply system was adequate to support fire brigade actions. The fire brigade self-contained breathing apparatuses (SCBA) were reviewed for adequacy as well as the availability of supplemental breathing air bottles and the capability to refill these bottles. Additionally, the team assessed the adequacy of the off-site fire fighting assistance including entry into the plant area, communications, dosimetry, and fire equipment usage.

The team reviewed criteria in the licensee engineering department standards and design control procedures to verify that plant changes were adequately reviewed for the potential impact on the FPP, fire protection features, SSD equipment, and procedures as required by Crystal River Unit 3 Facility Operating License, Condition 2.C.(9).

b. Findings

No findings of significance were identified.

.03 Post-fire Safe Shutdown Circuit Analysis

a. Inspection Scope

The team reviewed how systems would be used to achieve SSD of Crystal River Unit 3 during and following a postulated fire in the fire areas selected for review. Portions of the licensee's Appendix R Fire Study, which described the methodology and systems relied upon to achieve SSD, were reviewed. From this review, the team selected a sample of SSD components and plant monitoring instruments from the fire areas under evaluation. For this sample, the team reviewed electrical elementary and block diagrams and identified the necessary power, control, or instrument cables that support operation of these equipment. Consequently, conduit and cable tray layout drawings for these cables as well as cable routing information was used to verify that fire protection features are in place to satisfy the separation and design requirements of Section III.G of Appendix R. Additionally, the team walked down these fire areas to compare the actual plant configuration to the layout indicated on the drawings. The following MOVs and other components were reviewed:

1. ESP-2 (ASV-5), Turbine Driven Emergency Feed Pump Inlet Isolation Valve
2. SWP-1B, Emergency Nuclear Service Close Cycle Cooling Pump
3. MUP-1B, Makeup & Purification Pump
4. EFV-55, Emergency Feedwater Valve
5. EFV-56, Emergency Feedwater Valve
6. MUV-49, Letdown Cooler Isolation Valve
7. MUV-25, High Pressure Injection Control Valve to Reactor Inlet Lines Loop B
8. MUV-26, High Pressure Injection Control Valve to Reactor Inlet Lines Loop B
9. MS-107/109/111/113-PT, Main Steam Instrumentation Pressure Channels
10. F-099-LT/LT1, Emergency Feedwater Tank Level Channels
11. SP-20/24/28/32-LT, OTSG Operate Level Hi Range Channels
12. RCV-11, Pressurizer Isolation Valve

b. Findings

Section 1R05.01.b includes findings involving circuit analysis of the common electrical protection and metering circuits.

.04 Alternative Shutdown Capability

a. Inspection Scope

The team reviewed the licensee's Appendix R Fire Study and walked down the selected fire areas/zones to evaluate the adequacy of the licensee's strategy for post-fire SSD for a severe fire in the MCR. Additionally, the team reviewed control wiring diagrams and cable routing information for the control circuits for selected SSD components. The objectives of these reviews were to:

- Verify that the licensee's alternative shutdown methodology had correctly identified the components and systems necessary to achieve and maintain hot SSD conditions.

- Confirm the adequacy of the systems selected for reactivity control, reactor coolant makeup, reactor heat removal, process monitoring, and support system functions.

- Verify that hot SSD from outside the MCR can be achieved and maintained with or without offsite power.

b. Findings

No findings of significance were identified.

.05 Operational Implementation of Safe Shutdown Capability

a. Inspection Scope

The team reviewed the operational implementation of the SSD capability that would be used during a severe fire in one of the selected fire areas/zones. Training program records were reviewed to verify that operator training included both MCR and alternative SSD using the emergency operating procedures (EOPs), abnormal procedures (APs), annunciator response procedures (ARPs), and operating procedures (OPs). Staffing was reviewed to verify that it would provide the minimum required personnel to implement both normal and alternative post-fire SSD and concurrently staff the fire brigade.

The team reviewed the following procedures and the licensee's procedure validation results to verify that the operators could achieve and maintain SSD with the procedures and within the time requirements established in the licensee's SSD analysis. The team also conducted detailed walkthroughs of portions of the procedures that contained operator actions outside of the control room. The team focused on timing and human factors aspects as listed in IP 71111.05T, Enclosure 2, to verify that the procedures were adequate to achieve and maintain SSD for a fire in any of the selected fire areas/zones.

- AP-880, Fire Protection, Revision (Rev.) 22
- AP-990, Shutdown From Outside the Control Room, Rev. 20

- ARP-801, Fire System Annunciator Response, Rev. 21
- EOP-10, Post-Trip Stabilization, Rev. 6
- OP-880A, Appendix "R" Post-Fire Safe Shutdown Information, Rev. 5

b. Findings

Section 1R05.01.b includes findings involving operational implementation of SSD capability.

.06 Communications for Performance of SSD Capability

a. Inspection Scope

The team reviewed plant communication capabilities to evaluate the availability of the communication systems to support fire event notification, fire brigade fire fighting activities, and plant personnel in the performance of local manual operator actions to achieve and maintain SSD conditions. The team reviewed the use of the fixed plant public address (PA) system for emergency fire notification and/or personnel instructions. The team also reviewed the use of the portable radio system for use during fire fighting activities, as credited in Section 4.3.6 of the Crystal River Unit 3 FPP. Both fixed and portable communication systems were reviewed for the impact of any damage, which could result from fires in the selected fire areas/zones, on the functions the systems were intended to support. The team also reviewed communications systems to ensure that the design of the systems was adequate to support operator and fire brigade actions, as applicable.

The team reviewed completed fire brigade drill critique reports for brigade shifts from July 2002 to October 2004 to assess proper operation and effectiveness of the fire brigade command post portable radio communications during fire drills and identify any history of operational or performance problems with radio communications during fire drills. In addition, the team reviewed preventative maintenance and surveillance test procedures and test records to ensure that the licensee properly maintained the communications equipment.

b. Findings

No findings of significance were identified.

.07 Emergency Lighting

a. Inspection Scope

The team reviewed the design, placement, and operation of self-contained battery-powered emergency lighting units (ELUs) and dedicated battery-powered ELUs. During walkdowns of local manual operator actions, the team assessed ELUs for proper location and operation. The team also observed whether backup emergency lighting was provided for the primary and secondary fire emergency equipment storage locker locations, fire equipment staging areas, and brigade dress-out areas in support of fire brigade operations should power fail during a fire emergency. This review also included

examination of whether emergency exit lighting was provided for personnel evacuation pathways to the outside exits as identified in the National Fire Protection Association (NFPA) 101, Life Safety Code, and the Occupational Safety and Health Administration (OSHA) Part 1910, Occupational Safety and Health Standards.

The team reviewed vendor documentation for the battery pack ELUs to verify that the battery power supplies were rated for at least eight-hour capacity. Additionally, the team reviewed the licensee's quarterly surveillance tests as well as associated work orders to verify that the ELUs were been maintained in an operable manner.

b. Findings

No findings of significance were identified.

.08 Cold Shutdown Repairs

a. Inspection Scope

The licensee's Appendix R Fire Study and NRC team reviews did not identify a need for post-fire repairs to achieve a cold shutdown condition for the selected fire areas. Consequently, cold shutdown repairs were not reviewed during this inspection.

b. Findings

No findings of significance were identified.

.09 Fire Barriers and Penetration Seals

a. Inspection Scope

The team reviewed the selected fire areas/zones to evaluate the adequacy of the fire resistance of fire area/zone barrier enclosure walls, ceilings, floors, fire barrier mechanical and electrical penetration seals, fire doors, and fire dampers in accordance with the requirements of 10 CFR 50, Appendix A and Appendix R, Section III.G.2, and Branch Technical Position APCSB 9.5-1, Rev. 0, dated May 1, 1976. The review was performed to ensure that at least one train of SSD equipment was free of fire damage. This was accomplished by observing the material condition and configuration of the installed fire barrier features, as well as reviewing construction details, engineering evaluations, and fire endurance tests for the installed fire barrier features, to verify that the as-built configurations were either properly evaluated or qualified by appropriate fire endurance tests. The fire protection features included in the review are listed in the attachment.

The team reviewed fire barrier walls and ceilings shown on the fire plan drawings for the selected fire areas/zones to evaluate the adequacy of the fire resistance of steel plate and beam ceilings, and concrete enclosure walls. The team also reviewed the plant calculations to verify that the fire loading used by the licensee was appropriate for determining the fire resistive rating of the fire barrier enclosures. In addition, the team reviewed the licensing documentation, such as 10 CFR 50, Appendix R exemptions,

engineering evaluations of fire barrier features, and engineering evaluations for NFPA code deviations, to verify that the fire barrier installations met design requirements and licensing basis commitments.

The team reviewed the design, installation details, and qualification testing for seven mechanical fire dampers in the selected fire areas/zones. Selected fire damper location and vendor detail drawings, and heating, ventilation, and air conditioning system drawings were reviewed to verify that access to alternate shutdown equipment and performance of safe shutdown operator actions would not be inhibited by smoke migration through duct work from the area of a fire to adjacent plant areas/zones. The team also reviewed engineering evaluations and a summary of completed inspection and maintenance procedures for five fire doors in the selected fire areas/zones. These reviews were performed to ensure that these passive fire barrier features were properly inspected, maintained, and met the licensing and design bases as described in the licensee submittals, NRC SERs, and the UFSAR.

The team selected seven penetration fire seals in the selected fire areas/zones for review. The team conducted a detailed examination of the seals to confirm proper installation and qualification. For the selected mechanical and electrical fire barrier penetration seals, the team reviewed installation details, penetration seal detail drawings, fire resistance and water tightness qualification tests, and the penetration seal engineering evaluation to verify that the fire seal installations met design requirements, license commitments, and standard industry practices. The team compared the penetration seal ratings with the ratings of the barrier enclosures in which they were installed. The team also reviewed the licensing documentation and engineering evaluations for NFPA code deviations to verify that the fire seal installations met design requirements and license commitments. In addition, the team reviewed a summary of completed surveillance and maintenance procedures for the selected fire barrier walls to verify the fire seals were being adequately inspected and maintained.

The team reviewed the physical configurations of electrical raceway fire barrier systems (ERFBS) in the selected fire areas/zones. Visual inspections of selected ERFBS barriers within Fire Area 108 were performed to confirm that the rated fire barriers were installed on the required circuits and their installations were consistent with the tested configurations. The team also reviewed design and installation drawings, qualifications testing documents, and engineering analyses for the selected configurations. This was accomplished to verify that the selected ERFBS met their design and licensing basis.

b. Findings

No findings of significance were identified.

.10 Fire Protection Systems, Features, and Equipment

a. Inspection Scope

The team reviewed SSD calculations, vendor documentation, flow diagrams, cable routing information, system operating instructions, operational valve lineup procedures, and system availability studies associated with the fire pumps and fire protection water

supply system. Using operating and test procedures, the team toured selected fire pumps and portions of the fire main piping system to evaluate material condition, consistency of as-built configurations with engineering drawings, and to verify correct system valve lineups. The team evaluated the common fire protection water delivery and supply components to assess if they could be damaged or inhibited by fire-induced failures of electrical power supplies or control circuits. In addition, the team reviewed periodic surveillance and operability flow test data for the fire pumps and fire main loop piping to assess whether the test program was sufficient to validate proper operation of the fire protection water supply system in accordance with those design requirements and acceptance criteria specified in Table 6 of the Crystal River Unit 3 FPP and the UFSAR.

For the selected fire areas/zones, the team reviewed the adequacy of the design, installation, and operation of the automatic detection and alarm system to actuate in the early stage of a fire. This included walk downs of the systems and an examination of the types of detectors, detector spacing, the licensee's technical NFPA Code Compliance evaluation of the detector locations, and the structural ceiling-beam reinforcing plans to assess whether the areas were protected by fire detectors in accordance with the Code of Record requirements (NFPA 72D, 1967). The team also reviewed the licensee's submittals and associated NRC SERs for the selected fire areas/zones to ensure that the fire detection systems for the selected fire areas were installed in accordance with the design and licensing bases of the plant. Additionally, the team reviewed fire detection surveillance procedures to determine the adequacy of fire detection component testing to ensure that the detection systems could function when needed.

The team reviewed the manual suppression standpipe and fire hose system to verify adequate design, installation, and operation in the selected fire areas/zones. The team examined flow measurement/pressure test data to verify that sufficient pressure and flow volume was available to produce electrically safe and effective fire hose operation within the nozzle manufacturer's specified flow range. The team also performed a review of standpipe and fire hose system flow diagrams and probabilistic risk assessment internal flood analysis, to evaluate fire suppression-caused flooding within the control complex. This review focused on ensuring that SSD systems and operator actions required for post-fire SSD would not be inhibited by the effects of a fire event, fire brigade activities, or fire suppression systems within the selected fire areas/zones or from an adjacent plant area/zone. During plant tours, the team walked down selected standpipe systems, hose reels, and portable fire extinguishers to observe placement of the fire hoses and extinguishers to verify they were not blocked and were consistent with the fire fighting pre-plan drawings and fire protection program documents. Additionally, the team checked a sample of fire hose lengths to confirm they could reach the affected fire areas/zones in support of manual fire fighting efforts.

b. Findings

No findings of significance were identified.

.11 Compensatory Measures

a. Inspection Scope

The team reviewed the administrative controls for out-of-service, degraded, and/or inoperable fire protection features. The team reviewed selected items on the fire barrier breach tracking log and compared them with the fire areas/zones selected for inspection. The compensatory measures that had been established in these areas were compared to those specified in Table 6 of the Crystal River Unit 3 FPP to verify that the risk associated with removing fire protection from service was properly assessed and adequate compensatory measures were implemented in accordance with the approved FPP. Additionally, the team reviewed the adequacy of the licensee's short term compensatory measures to compensate for a degraded function or feature until appropriate corrective actions were taken.

b. Findings

No findings of significance were identified.

4OA2 Identification and Resolution of Problems

a. Inspection Scope

The team reviewed selected licensee audits, self assessments, and ARs to verify that items related to fire protection and SSD were appropriately entered into the licensee's corrective action program (CAP) in accordance with the licensee's quality assurance program and procedural requirements.

ARs related to Appendix R, safe shutdown, fire, smoke, sparks, arcing, and equipment overheating were reviewed for the period of March 2002 through December 2004. The team also reviewed selected fire brigade response, emergency/incidents, and fire safety inspection reports. These reviews were conducted to assess post-fire SSD, frequency of fire incidents, effectiveness of the fire prevention program, and maintenance-related or material condition problems related to fire incidents. The team also reviewed other CAP documents, including completed corrective actions documented in selected ARs, and operating experience program (OEP) documents to verify that industry-identified fire protection problems potentially or actually affecting Crystal River Unit 3 were appropriately entered into, and resolved by, the corrective action program process. Items included in the OEP effectiveness review were NRC Information Notices, industry or vendor-generated reports of defects and noncompliance under 10 CFR Part 21, and vendor information letters. In addition, the team reviewed a sample of the fire protection program audits, fire service system health reports, and self-assessments which the licensee performed in the previous two-year period. The team evaluated the effectiveness of the corrective actions for the identified issues.

b. Findings

No findings of significance were identified.

4OA6 Meetings, Including Exit

On January 28, 2005, the lead inspector presented the inspection results to Mr. D. Young and other members of his staff. Proprietary information was reviewed during this inspection, but is not included in this report.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel:

M. Annacone, Manager, Engineering
M. Bishara, Superintendent, Design Engineering
J. Curham, Lead Engineer
F. Dola, Lead Nuclear Operations Specialist
J. Ertman, Principal Engineer, Corporate Engineering
D. Herrin, Lead Engineer, Licensing & Regulatory Programs
C. Miller, Superintendent, Equipment Performance
K. Miller, Lead Engineer
S. Powell, Supervisor, Licensing & Regulatory Programs
D. Porter, Superintendent, Shift Operations
P. Rubio, Lead Engineer
D. Young, Site Vice President

NRC Personnel:

C. Payne, Chief, Engineering Branch 2, Division of Reactor Safety, Region II
R. Reyes, Resident Inspector
S. Stewart, Senior Resident Inspector

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

05000302/2004009-01	URI	Unprotected Post-Fire Safe Shutdown Cables and Related Non-feasible Local Manual Operator Recovery Action (Section 1R05.01.b.1)
05000302/2004009-02	URI	Single Failure Vulnerability of Common Electrical Protection and Metering Circuits (Section 1R05.01.b.2)
05000302/2004009-03	URI	Unapproved Local Manual Operator Actions Instead of Required Physical Protection or Separation of Cables to Preclude Fire Damage (Section 1R05.01.b.3)
05000302/2004009-04	URI	No Cooling to Reactor Coolant Pump Seals for up to Eight Hours (Section 1R05.01.b.4)

05000302/2004009-05	URI	Motor Operated Valves Not Protected From Hot Shorts that Could Bypass Torque Switches (Section 1R05.01.b.5)

Closed

None

Discussed

None

SECTION 1R05.01.b.3 LIST OF UNAPPROVED LOCAL MANUAL OPERATOR ACTIONS INSTEAD OF REQUIRED PHYSICAL PROTECTION OR SEPARATION OF CABLES TO PRECLUDE FIRE DAMAGE

1. AP-880, Step 3.4: PPO open breaker DPDP-4B-1, 125V DC Control for RCV-10SV (Pressurizer PORV), in CRD Room (124 ft. elevation of control complex), to ensure the pressurizer PORV is closed. This unapproved operator action is applicable to fires in fire areas 108 and 117.

2. OP-880A, Step 9-3: PPO open breakers for EFV-11, 32, 14, and 33, in 3A and 3B 480V ES switchgear rooms (124 ft. elevation of control complex). Then PPO manually open EFV 11 and 32 and manually close EFW 33 and 14 (95 ft. elevation of auxiliary building), to enable EFW flow to the steam generators. These unapproved operator actions are applicable to fires in fire area 108.

3. OP-880A, Step 9-5: PPO de-energize DHV-34 and 32, at MCC 3A-1 (95 ft. elevation of the auxiliary building) to prevent the BWST from draining to the reactor building sump. These unapproved operator actions are applicable to fires in fire area 108.

4. OP-880A, Step 9-6 and Step 18-6: PPO reset the 86B/3210 B EDG relay lockout, in B ES 4160V switchgear room (108 ft. level of the control complex), to enable restoration of B train 4160V ES electrical power. This unapproved operator action is applicable to fires in fire areas 108 and 117. NOTE: OP-880A, Step 9-6 was found to be not feasible and is discussed separately in Section 1R05.01.b.1.

5. OP-880A, Step 9-12: If BWST level is greater than 7 ft., then PPO de-energize HPI valves MUV-24 and 23 (95 ft. level of auxiliary building). Then PPO manually close MUV-24 and 23 (95 ft. elevation of auxiliary building). Then PPO manually open MUV-62 (95 ft. elevation of auxiliary building). Then PPO open breaker for MUV-53 (119 ft. level of auxiliary building). Then PPO manually open MUV-53 (95 ft. elevation of auxiliary building). All of these operator actions are to align the makeup system for operation. These unapproved operator actions are applicable to fires in fire area 108.

6. OP-880A, Step 9-13: If BWST level is less than 7 ft., then PPO unlock and close DPDP-8B-8 “MUV-545, MUV-546", in B ES 4160V switchgear room (108 ft. level of control complex) to energize the HPI recirculation to sump valves. Then PPO de-energize MUV-24 and 23 at MMC MUMC-1 (95 ft. level of auxiliary building). Then PPO ensure MUV-23 and 24 are closed (95 ft. level of auxiliary building). Then PPO manually crank MUV-69 closed and MUV-62 open (95 ft. elevation of auxiliary building). Then PPO open breaker for MUV-53 on MTMC-4-7C (119 ft. elevation of auxiliary building). Then PPO manually crank MUV-53 closed (95 ft. level of auxiliary building). All of these operator actions are to align the makeup system for piggyback operation. These unapproved operator actions are applicable to fires in fire area 108.

7. OP-880A, Step 9-14: If MUV-25 and 26 do not operate, then PPO manually throttle MUV-23 or 24 (95 ft. elevation of auxiliary building), to maintain stable pressurizer level. This operator action is applicable to fires in fire area 108.

8. OP-880A, Step 18-5: PPO de-energize DHV-34 and 32, at MCC 3A-1 (95 ft. elevation of the auxiliary building) and then crank closed DHV-34 (‘A’ DH vault below the 95' elevation of the auxiliary building) to prevent the BWST from draining to the reactor building sump. These unapproved operator actions are applicable to fires in fire area 117.

9. OP-880A, Step 18-12: If BWST level is greater than 7 ft., then PPO manually open MUV-62 (95 ft. elevation of auxiliary building). Then PPO open breaker for MUV-53 (119 ft. level of auxiliary building). Then PPO manually open MUV-53 (95 ft. elevation of auxiliary building). All of these operator actions are to align the makeup system for operation. These unapproved operator actions are applicable to fires in fire area 117.

10. OP-880A, Step 18-13: If BWST level is less than 7 ft., then PPO unlock and close DPDP-8B-8 “MUV-545, MUV-546", in B ES 4160V switchgear room (108 ft. level of control complex) to energize the HPI recirculation to sump valves. Then PPO manually crank MUV-69 closed and MUV-62 open (95 ft. elevation of auxiliary building). Then PPO open breaker for MUV-53 on MTMC-4-7C (119 ft. elevation of auxiliary building). Then PPO manually crank MUV-53 closed (95 ft. level of auxiliary building). All of these operator actions are to align the makeup system for piggyback operation. These unapproved operator actions are applicable to fires in fire area 117.

SECTION 1R05.03 LIST OF COMPONENTS INSPECTED

Components	Description
BKR. 3212	Feed to ES "B" Switchgear from Transformer MTTR 9
BKR. 3211	Feed to ES "B" Switchgear from Transformer MTTR 9
BKR. 3210	Feed from EDG-1B to ES "B" Switchgear
BKR. 3209	Feed from EDG-1A to ES "A" Switchgear
MUP 1C	Makeup and Purification Pump 3C
MUV 73	Borated Water Storage Tank to Makeup Pump
FWV 14	Feedwater Pump 3A Suction Isolation Valve
MSV 55	Steam Generator 3B to Emergency Feed Pump Isolation Valve
MSV 56	Steam Generator 3B to Emergency Feed Pump Isolation Valve
EFV 32	Turbine Driven Emergency Feed Pump 3B and Auxiliary Feed Water Discharge Isolation to Steam Generators
EFV 11	Turbine Driven Emergency Feed Pump 3B and Auxiliary Feed Water Discharge Isolation to Steam Generators
EFV 56	Emergency Feedwater Valve
DHV 3	Decay Heat Removal Outlet at Reactor Coolant Piping
DHV 4	Reactor Coolant Removal Outlet Isolation Valve

SECTION 1R05.03 LIST OF FUSES/CIRCUIT BREAKERS INSPECTED FOR ELECTRICAL COORDINATION

480 V Engineered Safeguard MCC 3B1, Circuit Breakers MTMC-5-7C and 3340
480 V Engineered Safeguard MCC 3A1, Circuit Breakers MTMC-3-11D and 3341
480 V Engineered Safeguard MCC 3A3, Circuit Breakers MTMC-21-3BDR and 3331
480 V Engineered Safeguard MCC 3B3, Circuit Breakers MTMC-22-6AN and 3330
480 V Engineered Safeguard Switchgear Bus 3B, Circuit Breakers 3210 and 3320

SECTION 1R05.09 LIST OF FIRE BARRIER FEATURES INSPECTED IN RELATION TO SAFE SHUTDOWN SEPARATION REQUIREMENTS

Floors/Ceilings	Description
Steel Plate Floor-Ceiling Assembly	Control Building Complex, Fire Area- CC-124-117 to Fire Area CC-134-118A

Fire Dampers	Description
AHFD-218	Fire Area CC-108-108, Damper to Fire Area CC-108-107
AHFD-219	Fire Area CC-108-108, Damper to Fire Area CC-108-109
AHFD-221	Fire Area CC-108-108, Damper to Fire Area CC-108-105
AHFD-4	Fire Area CC-124-117, Damper to Fire Area CC-124-111
AHFD-16	Fire Area CC-124-117, Damper to Fire Area CC-124-111
AHFD-223	Fire Area CC-145-118,Zone 118B, Fire Damper to Fire Area CC-145-119
AHFD-224	Fire Area CC-145-118,Zone 118B, Fire Damper to Fire Area CC-145-119

Fire Doors	Description
C-211	Fire Area CC-108-108, Fire Door to Fire Area CC-108-109
C-212	Fire Area CC-108-108, Fire Door to Fire Area CC-108-107
C-304	Fire Area CC-124-117, Fire Door to Fire Area CC-124-111
C-501	Fire Area CC-145-118,Zone 118B, Fire Door to Fire Area CC-145-119
C-503	Fire Area CC-145-118,Zone 118B, Fire Door to Fire Area TB-145-400F

Fire Barrier Penetration Seals	Description
ECB-56	Fire Area CC-108-108, Wall Penetration Seal to Fire Area CC-108-107
ECB-190	Fire Area CC-124-117, Wall Penetration Seal to Fire Area CC-124-116
ECB-211	Fire Area CC-108-108, Wall Penetration Seal to Fire Area CC-108-107
ECB-212	Fire Area CC-108-108, Wall Penetration Seal to Fire Area CC-108-107
ECB-219	Fire Area CC-124-117, Floor/Ceiling Penetration Seal to Fire Area CC-108-108
ECB-220	Fire Area CC-124-117, Floor/Ceiling Penetration Seal to Fire Area CC-108-108
ECB-234	Fire Area CC-124-117, Wall Penetration Seal to Fire Area AB-119-6A

Fireproofing	Description
Fireproofing for Unrestrained Beam	Fire Area CC-124-117, Fireproofing on Wall/Ceiling Steel Beam to Fire Area CC-124-111

ERFBS	Description
Fire Barrier Enclosure	Fire Area CC-108-108, ERFBS For Conduit Raceway DCP-15

LIST OF DOCUMENTS REVIEWED

Procedures

ADM-NGGC-0104, Work Management Process, Rev. 27
AI-2200, Guidelines for Handling Use and Control of Transient Combustibles, Rev. 11
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00668072-02, Perform Installation of EC 60150 for OPT (MTTR-9) Watt-Hour Removal Per Attached Instructions.
00668072-03, Perform Functional Test for EC Installation Performed Under WO No. 668072-02.
00668072-04, Perform Installation of EC 60155 for BEST (MTTR-6) Watt-Hour Removal Per Attached Instructions.
00668072-05, Perform Functional Test for EC Installation Performed Under WO No. 668072-04.

Design Changes

Engineering Change No. 0000060150, Disconnect Watt-Hour Meter From OPT, Rev. 0
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Applicable Codes and Standards

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, UL Design No. N722, January 1998
OSHA Standard 29 CFR 1910, Occupational Safety and Health Standards
Underwriters Laboratory Standard 401, Standard for Portable Spray Hose Nozzles for Fire Protection Service, dated August 27, 1993
Underwriters Laboratory Standard 555, Standard for Fire Dampers and Ceiling Dampers, dated May 14, 1979

Technical Manuals and Vendor Information

Data Sheet for Carboline Pyrocrete Fireproofing 102, dated December 1980
Data Sheet for Motorola HT 1000 FM Portable Radio, Rev. R3-4-149F
Data Sheet for SONEXone Open-cell Melamine-based Foam Panels by Illbruck Architectural Products, dated July 2003
Data Sheet for Pyrotronics Ionization Smoke Detector, Models DIS-5B, and DIS-3/5A, dated February 1977
Factory Mutual Research, Evaluation By ASTM E-84 Fire Test Method of Flexible Foam Material, dated July 8, 1987
Mar 78-6-7, Specification Sheets for Bullet Resistant Door and Frame, dated November 1979
3-M Technical Reference Guide, Light Water AFFF & ATC Agents, dated August 1994
S & R Products Inc., Technical Data and Installation Instructions of Electro-Thermal Links (ETL), dated September 1996
AFH-01-Redskin, Angus Industrial Fire Hose Specifications, Rev. 1987
Elkhart Brass, Model L-205-EB, Industrial Non-Shock Fog Nozzle Specification and Flow Data, Rev. 12/17/03
Gilbert Associates Inc., RO-2935, Requirement Outline for Hollow Metal Doors and Frames, dated December 11, 1970
IM No. 1436, Exide Electronics Emergency Lightning Unit Equipment, Rev. 0

Audits and Self Assessments

Fire Service System Health Reports, dated January 2003 through June 2004
Nuclear Assessment Section, Report File No. C-FP-04-01, CNAS-2004-28, Fire Protection Assessment, dated May 12, 2004

Licensing Basis Documents

Crystal River UFSAR 9.8 – Plant Fire Protection Program, Rev. 28
Crystal River Safety Evaluation Report, dated July 27, 1979
Crystal River Safety Evaluation Report, dated October 14, 1980
Crystal River Safety Evaluation Report, dated March 16, 1988
Letter to Mr. John F. Stolz, Division of Licensing, USNRC from G. R. Westafer, Manager Nuclear Operations, Crystal River Unit 3 Appendix R/Fire Protection Evaluations, dated July 25, 1985 (3F0785-31)
Branch Technical Position (APCSB) 9.5-1 and Appendix A, Rev 0, dated May 1, 1976
Crystal River Unit 3 Fire Hazards Analysis, Report 03-0920-1103, Rev. 11
Crystal River Unit 3 Safety Evaluation of Mecatiss Fire Barrier Test Program, dated January 29, 1997
Crystal River Unit 3 10 CFR 50 Appendix R Fire Study, Rev. 12

Other Documents

Access Orientation Training, AO-02, Smoking Policy, Rev. 10
Fire Brigade Drill Critiques for Brigade Shifts from July, 2002, to October, 2004
CR-3 Safety Meeting Training, 2004 Fire Safety Presentation, dated October 2004
CR-3 Probabilistic Safety Assessment, Internal Flood Analysis Notebook, Rev. 0
FPDS 5.10, Crystal River Nuclear Plant Fire Zone Combustible List, Rev 5.1
Fire Barrier Breach Tracking Log for the Period October 2003 through December 2004

NRC Information Notice 1997-48, Inadequate or Inappropriate Interim Fire Protection Compensatory Measures, dated July 9, 1997
NRC Information Notice 2002-24, Potential Problems with Heat Collectors on Fire Protection Sprinklers, dated July 19, 2002
NRC Information Notice 2003-08, Potential Flooding through Unsealed Concrete Floor Cracks, dated June 25, 2003
TRF-000, Initial Fire Brigade Training, Lesson Sections L-LP, Hose Handling
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Installation Procedure 95MC0011, Operating Procedure for the Installation and Maintenance of MTS-3, Three Hour Fire Barrier System, 95PM0063, Installation on Conduit, Rev. C
CR-3 Passport Electronic Database,, Panel DO-30, Equipment Database for Penetration Fire Barrier Seals
Underwriters Laboratories Inc., Fire Endurance Test, Floor and Wall Penetration Fire Stops, dated November 17, 1980
Peak Seals Incorporated, Factory Mutual Research, Fire Endurance Test, Penetration Seal Systems in Precast Concrete Floor Utilizing Silicone Elastomers, dated May 18, 1977
Peak Seals Incorporated, Insulation Consultants and Management Services, Inc., (ICMS), Fire and Hose-Stream Tests for Penetration Seal Systems (NMP2-PSS6), dated March 1986
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AR resulting from fire, smoke, sparks, arcing, and equipment overheating incidents for the period March, 2002 through December, 2004
AR 61867, Battery Powered Lighting to Illuminate Fire Brigade Dress-out Locker Room and Staging Areas
AR 65525, Possible Delay in Fire Brigade Response Time
AR 67621, OE Item, Sprinkler Heat Collectors Evaluation Summary
AR 134184, MEL - 13 Fails to meet requirements of SP - 807, 08/06/04
AR 134880, Adverse Condition Investigation, CAP-NGGC-200-3-11, Discrepancies With NFPA 72D
AR 97771, OE Item, Flooding Through Unsealed Concrete Floor Cracks Evaluation Summary

Action Requests and Non-Conformance Reports Generated as a Result of This Inspection

NCR 147684, Plastic Egg Crate Grills In The MCR Do Not Match Metal Grills Specified by Drawing BS-711-716
NCR 148000, Labels on valves MUV-62 and MUV-69 Not Readily Visible From the Floor
NCR 148225, Fire at an MCC Could Spuriously Actuate an MOV and Bypass the Torque Switch
NCR 149129, Update OP-880A for SPO Actions to Throttle MSV-25 and MSV-26 Regarding Room Temperatures and Precautions for Heat
NCR 149231, Revise AI-2205A Sections 3.3 and 3.4 Cautions
NCR 149266, Evaluate Barrier Acceptability For Fire Areas Adjacent To The Cable Spreading Room Floor Using NUREG-1805 Methodology For Future Fire Inspections
NCR 149454, Correct Various Minor Drawing Errors

NCR 149507, The OPT and BEST Protection Relay Scheme Does Not Meet Single Failure Design Criteria
NCR 149509, Validate Fire Study Evaluations On Operator Manual Actions Near Fire Fighting Activities And Enhancements To Pre-Fire Plans For Fire Fighting Tactics
NCR/PPR 149129, Caution Statements In Sections 3.3 And 3.4 of AI-2205A Are Not Correct For The Layout Of The Control Complex