Minor rewording done by R. Schin for S. Ninh on 10/2/03

Input to Crystal River Integrated IR 50-302/03-05

GENERAL INFORMATION

Site: Crystal River **Report No:** 50-302/03-05 **Dates:** Sept. 8-12, 2003

Inspectors:

Original signed by N. Merriweather — 9/26/2003
Norman Merriweather (Lead) — Date Signed
Senior Reactor Inspector

Original signed by R. Schin — 9/25/2003
Robert Schin — Date Signed
Senior Reactor Inspector

Branch Chief Concurrence:

Original signed by J. Moorman for C. Ogle — 9/26/2003
Charles R. Ogle, Chief — Date Signed
Engineering Branch 1
Division of Reactor Safety

IPs Used	Sample Size	Status (Open/Closed)
71111.05T	N/A	Open

OFFICE	RII:DRS		RII:DRS		RII:DRS							
SIGNATURE	RA		RA		RA							
NAME	RSchin		NMerriweather		COgle							
DATE	9/25/03		9/26/03		9/26/03							
E-MAIL COPY?	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
PUBLIC	YES	NO										

OFFICIAL RECORD COPY DOCUMENT NAME: P:\CR-IR 2003-05INPUT-CRfireURI.wpd

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REPORT INPUT

SUMMARY OF FINDINGS

A. Inspector Identified Findings

Cornerstone: Mitigating Systems

- Green. A non-cited violation of 10 CFR 50, Appendix R, Section III.G.2, Fire Protection of Safe Shutdown Capability, was identified for failure to protect certain electrical cables for safe shutdown equipment from fire damage in three fire areas. The licensee has corrected related identified procedural deficiencies and plans to resolve the noncompliance with cable protection through licensing correspondence with the NRC.

  This finding is of greater than minor safety significance because it affected the objectives of the Mitigating Systems Cornerstone of Reactor Safety. It affected the availability and reliability of systems that mitigate initiating events to prevent undesirable consequences and it involved a lack of required fire barriers for equipment relied upon for safe shutdown following a fire. The finding is of very low safety significance because it would not result in a complete loss of a safe shutdown function during a fire event. The licensee had proceduralized manual operator actions in place that would have effectively enabled safe shutdown of the reactor plant. (Section 1R05.1.b)

Report Details

1. REACTOR SAFETY

Cornerstones: Initiating Events and Mitigating Systems

1R05 FIRE PROTECTION

.1 (Closed) Unresolved Item (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)

a. Inspection Scope

This inspection followed up on URI 50-302/02-05-01, which had been opened for NRC review of the local manual operator actions for three fire areas. The licensee had relied on these operator actions instead of physically protecting electrical cables for the makeup (high pressure injection) and emergency electrical power systems from fire damage. The URI also described a concern with unprotected cables for a fire service valve that could potentially degrade the response of the fire brigade. The URI was also open for NRC review of the overall safety significance of the potential finding.

During this inspection, the inspectors reviewed the potential findings that were described in the URI and also reviewed the licensee's proceduralized local manual operator actions for the three fire areas of concern for feasibility, using the guidance of NRC

Inspection Procedure 71111.05, Enclosure 2. To accomplish this review, the inspectors inspected the three fire areas of concern and walked down all of the local manual operator actions for the three fire areas. The inspectors also reviewed cable routings of concern in the three fire areas, design information for affected equipment, fire brigade procedures, and records of previous fire drills in the fire areas of concern. In addition, the inspectors discussed the plant design, procedures, and staffing with licensee operators and engineers and evaluated the safety significance of identified deficiencies and findings.

b. Findings

Introduction. A Green non-cited violation (NCV) of 10 CFR 50, Appendix R, Section III.G.2, Fire Protection of Safe Shutdown Capability, was identified for failure to protect certain electrical cables for safe shutdown equipment from fire damage in three fire areas.

Description. The inspectors identified that the licensee had failed to protect certain electrical cables, for equipment that was relied upon for safe hot shutdown, from fire damage. The affected equipment included:

- Electrical control cables for makeup system motor-operated valves (MOVs) MUV-23, -24, -25, and -26 (which were in parallel in the required flowpath) were not protected from fire damage in fire areas CC-108-102 [hallway and remote shutdown room on the 108 foot elevation of the control complex] and CC-108-107 [3B 4160 volt engineered safeguard switchgear room on the 108 foot elevation of the control complex]. At least one of these valves should have been protected from fire damage because one was needed to establish and maintain a makeup flowpath to the reactor coolant system (RCS) for safe hot shutdown.

- Electrical control cables for makeup pump (MUP) 1A, 1B, and 1C were not protected from fire damage in fire area CC-108-106 [battery charger room 3A on the 108 foot elevation of the control complex]. MUP 1C should have been protected as it was relied upon, per the licensee's safe shutdown analysis and procedures, to supply makeup to the RCS for safe hot shutdown.

- Electrical control cables for MUP flow recirculation MOVs MUV-53 and MUV-257 (which were in series in the required flowpath and affected all three MUPs) were not protected from fire damage in fire areas CC-108-102 and CC-108-107, respectively. Both valves should have been protected from fire damage to ensure that the MUP minimum flow recirculation flowpath would be available as needed for safe hot shutdown.

After reviewing the potential effects of cable damage due to fire, the system design, and the operating procedures, the inspectors found that even with these unprotected electrical cables and some deficient operator actions, licensee procedures and training would have enabled operators to maintain the makeup function as needed for safe shutdown following a fire in fire areas CC-108-102, -106, or -107. [The deficient operator actions involved locally manually repositioning MOVs that were vulnerable to spurious actuations and failing to open the power supply breakers to the MOVs, leaving the MOVs still vulnerable to spurious actuations.] The inspectors evaluated that with the

proceduralized operator actions, the makeup function would have been sufficient to maintain reactor coolant system process variables within acceptable ranges. The inspectors also noted that the licensee had corrected all of the identified deficient operator actions in the current revision of the procedure. In addition, the licensee plans to resolve the noncompliance with cable protection through licensing correspondence with the NRC.

The inspectors determined that some other concerns described in the URI should not be considered as findings, as described below:

- Electrical cables for emergency diesel generators (EDGs) 1A and 1B were not protected from fire damage in fire area CC-108-106; however, the licensee's safe shutdown analysis and procedures did not rely on the EDGs. The licensee had determined that offsite power would not be affected by a fire in fire area CC-108-106 and would be available for safe shutdown. Inspector review of selected electrical circuits did not identify any flaws in the licensee's determination that offsite power would be unaffected by the fire.

- Electrical cables for fire service valve FSV-257 were not protected from fire damage in the fire areas of concern. The inspectors verified that this could delay the fire brigade by about three minutes in pressurizing a fire hose from a fire station in the control building. However, by procedure and also by actual practice during fire drills, the fire brigade brought a second fire hose that would be pressurized from the turbine building. That hose would be unaffected by FSV-257. Since the fire brigade needed only one hose, they would not be delayed by damage to FSV-257 cables. The inspectors verified that the hose from the turbine building, plus an additional 50 feet of hose from the fire brigade cart, would provide sufficient length and water pressure to fight fires in all of the fire areas of concern. The inspectors also verified that fire brigade response time during drills was less than the acceptance criteria, such that a three-minute delay to locally manually open FSV-257 would not result in the fire brigade being considered degraded.

Analysis. The inspectors determined that the licensee's failure to protect the electrical cables for certain makeup system components from fire damage was a performance deficiency because it was not in compliance with the requirements of 10 CFR 50, Appendix R, Section III.G.2. This finding is of greater than minor safety significance because it affected the objectives of the Mitigating Systems Cornerstone of Reactor Safety. The finding affected the availability and reliability of systems that mitigate initiating events to prevent undesirable consequences and also involved a lack of required fire barriers for equipment relied upon for safe shutdown following a fire. The significance was not greater than very low significance because it would not result in a complete loss of a safe shutdown function during a fire event. Licensee procedures and training would have enabled operators to maintain the makeup function sufficiently to maintain reactor coolant system process variables within acceptable ranges.

Enforcement. 10 CFR 50, Appendix R, Section III.G.2 requires that, where cables or equipment, ... 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 the following means of ensuring that one of the redundant trains is free of fire damage shall be provided: a) physical protection by a three-hour fire barrier, b) physical protection by a separation of more than 20 feet, with no intervening combustibles or fire hazards, plus fire detectors and automatic suppression, or c) physical protection by a one-hour fire barrier plus fire detectors and automatic suppression.

Contrary to the above, the licensee failed to protect cables, ... that could prevent operation or cause maloperation due to hot shorts, of redundant trains of systems necessary to achieve and maintain hot shutdown conditions, from fire damage by one of the prescribed methods. These cables had been unprotected for years and certainly for more than 30 days. Because this failure to protect cables is of very low safety significance and has been entered into the licensee's corrective action program as Non-Conformance Report (NCR) No. 061781; this violation is being treated as an NCV, consistent with Section VI.A of the NRC Enforcement Policy: NCV 50-302/03-05-__, Failure to Protect One Train of Safe Shutdown Equipment From Fire Damage. URI 50-302/02-05-01 is closed.

4. OTHER ACTIVITIES

4OA6 Meetings

The inspectors presented the inspection results to Mr. D. Young and other members of the licensee's staff on September 12, 2003. The licensee acknowledged the findings presented. Proprietary information is not included in the inspection report.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

J. Franke, Plant General Manager
D. Porter, Superintendent, Operations Support
S. Powell, Supervisor, Licensing and Regulatory Programs
P. Rubio, Lead Electrical Design Engineer
J. Terry, Engineering Manager
D. Young, Site Vice President

NRC

J. S. Stewart, Senior Resident Inspector
R. Reyes, Resident Inspector

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

50-302/03-05-__	NCV	Failure to Protect One Train of Safe Shutdown Equipment From Fire Damage (Section 1R05.01.b)

Closed

50-302/02-05-01	URI	Failure to Protect One Train of Safe Shutdown Equipment From Fire Damage in Accordance with Appendix R, Section III.G.2 (Three Examples) (Section 1R05.01.b)

COVER LETTER PARAGRAPH

None

PARTIAL LIST OF DOCUMENTS REVIEWED

Procedures

AR-801, Fire System Annunciator Response, Rev. 17
AP-880, Fire Protection, Rev. 15
AP-880, Fire Protection, Rev. 19
EPIP EM-216, Duties of the Fire Brigade, Rev. 23
OP-880A, Appendix "R" Post-Fire Safe Shutdown Information, Rev. 0
OP-880A, Appendix "R" Post-Fire Safe Shutdown Information, Rev. 3

Drawings

E-213-013, 10 CFR 50 Appendix R Protected Raceways, Control Complex El. 108'-0", Rev. 13
FD-302-661, Make-up & Purification, Sheet 2 of 5, Rev. 74
FD-302-661, Make-up & Purification, Sheet 3 of 5, Rev. 76
FD-302-661, Make-up & Purification, Sheet 4 of 5, Rev. 76

Analyses and Calculations

Crystal River Unit 3 Fire Hazards Analysis, Rev. 11
Crystal River 3 Individual Plant Examination of External Events, Rev. 1