Progress Energy

Crystal River Nuclear Plant
Docket No. 50-302
Operating License No. DPR-72

Ref: 10 CFR 50.73

May 16, 2005
3F0505-02

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Subject: LICENSEE EVENT REPORT 50-302/2005-002-00

Dear Sir:

Please find enclosed Licensee Event Report (LER) 50-302/2005-002-00. The LER discusses Emergency Diesel Generator EGDG-1A being inoperable for a period longer than permitted by Crystal River Unit 3 Improved Technical Specification 3.8.1, due to fuel oil header check valves leaking past their seats. This report is being submitted pursuant to 10CFR50.73(a)(2)(i)(B).

No new regulatory commitments are made in this letter.

If you have any questions regarding this submittal, please contact Mr. Sid Powell, Supervisor, Licensing and Regulatory Programs at (352) 563-4883.

Sincerely,

Jon A. Franke
Plant General Manager
Crystal River Nuclear Plant

JAF/dwh

Enclosure

xc: Regional Administrator, Region II
Senior Resident Inspector
NRR Project Manager

IE22

Progress Energy Florida, Inc.
Crystal River Nuclear Plant
15760 W. Powerline Street
Crystal River, FL 34428

NRC FORM 366 (6-2004) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 06/30/2007

Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to Infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

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(See reverse for required number of digits/characters for each block)

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4. TITLE
Emergency Diesel Generator Inoperable Due To Fuel Oil Header Check Valves Leaking Past Their Seats

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
03	23	2005	2005	- 002 -	00	05	16	2005	N/A	05000
									FACILITY NAME: N/A	DOCKET NUMBER: 05000

9. OPERATING MODE
1

10. POWER LEVEL
100%

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: *(Check all that apply)*

- ☐ 20.2201(b)
- ☐ 20.2201(d)
- ☐ 20.2203(a)(1)
- ☐ 20.2203(a)(2)(i)
- ☐ 20.2203(a)(2)(ii)
- ☐ 20.2203(a)(2)(iii)
- ☐ 20.2203(a)(2)(iv)
- ☐ 20.2203(a)(2)(v)
- ☐ 20.2203(a)(2)(vi)
- ☐ 20.2203(a)(3)(i)
- ☐ 20.2203(a)(3)(ii)
- ☐ 20.2203(a)(4)
- ☐ 50.36(c)(1)(i)(A)
- ☐ 50.36(c)(1)(ii)(A)
- ☐ 50.36(c)(2)
- ☐ 50.46(a)(3)(ii)
- ☐ 50.73(a)(2)(i)(A)
- ☒ 50.73(a)(2)(i)(B)
- ☐ 50.73(a)(2)(i)(C)
- ☐ 50.73(a)(2)(ii)(A)
- ☐ 50.73(a)(2)(ii)(B)
- ☐ 50.73(a)(2)(iii)
- ☐ 50.73(a)(2)(iv)(A)
- ☐ 50.73(a)(2)(v)(A)
- ☐ 50.73(a)(2)(v)(B)
- ☐ 50.73(a)(2)(v)(C)
- ☐ 50.73(a)(2)(v)(D)
- ☐ 50.73(a)(2)(vii)
- ☐ 50.73(a)(2)(viii)(A)
- ☐ 50.73(a)(2)(viii)(B)
- ☐ 50.73(a)(2)(ix)(A)
- ☐ 50.73(a)(2)(x)
- ☐ 73.71(a)(4)
- ☐ 73.71(a)(5)
- ☐ OTHER

Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER (Include Area Code)
Dennis W. Herrin – Lead Engineer (Licensing & Regulatory Programs)	(352) 563-4633

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
A	EK	V	T103	Y					

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

At 14:16, on March 23, 2005, Progress Energy Florida, Inc., Crystal River Unit 3, was in MODE 1 (POWER OPERATION) at 100 percent RATED THERMAL POWER. During performance of surveillance procedure SP-354A, "Monthly Functional Test of the Emergency Diesel Generator EGDG-1A," EGDG-1A did not achieve steady state voltage and frequency in less than or equal to 10 seconds from standby conditions as required by Technical Specifications. The cause for this event was a loss of fuel oil header prime due to leakage past diesel fuel header check valves DFV-39 and DFV-61. Contributing to the event was an inadequate fuel oil header design in which the fuel oil header is the system high point. These conditions allowed fuel oil to gradually drain back through the header to the diesel fuel oil day tank, partially depleting the fuel oil header prime. The check valves were replaced with a new design check valve. Based on engineering judgment, EGDG-1A was inoperable for a period of time longer than allowed by Technical Specifications. This condition is being reported under 10CFR50.73(a)(2)(i)(B) as a condition prohibited by Technical Specifications. This condition does not represent a reduction in the public health and safety. A similar occurrence was reported in LER 50-302/2004-002-00 on June 21, 2004.

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17. NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)*

EVENT DESCRIPTION

At 14:16, on March 23, 2005, Progress Energy Florida, Inc., (PEF) Crystal River Unit 3 (CR-3) was in MODE 1 (POWER OPERATION) at 100 percent RATED THERMAL POWER. During performance of surveillance procedure SP-354A, "Monthly Functional Test of the Emergency Diesel Generator EGDG-1A," EGDG-1A [EK, DG] did not achieve steady state voltage and frequency in less than or equal to 10 seconds from standby conditions as required by CR-3 Improved Technical Specification (ITS) Surveillance Requirement 3.8.1.6. The fast start time was 14.8 seconds (highest time of two stop watch measurements which both recorded 14.8 seconds). EGDG-1A was shut down in accordance with SP-354A.

The actions of ITS 3.8.1, Condition B, "One EDG inoperable," were previously entered for the performance of SP-907A, "Monthly Functional Test of 4160V ES Bus "A" Undervoltage and Degraded Grid Relaying." Those actions remained applicable following the unacceptable EGDG-1A fast start testing.

Troubleshooting the EGDG-1A start problem revealed fuel oil header supply check valve DFV-39 [EK, V] and fuel oil header outlet check valve DFV-61 [EK, V] leaking by their seats. This condition allowed fuel oil to gradually drain back through the header to the fuel oil tank [EK, TK], partially depleting the fuel header prime (e.g., not maintaining EGDG fuel header full of fuel in standby conditions). DFV-61 had been replaced on April 25, 2004, as a corrective action for a similar EGDG-1A start problem documented in Licensee Event Report LER 50-302/2004-002-00.

Evidence to establish a time and date for EGDG-1A becoming unable to demonstrate a successful fast start test result is limited. However, the following information is known: (1) DFV-61 was replaced with a new component that had been bench tested successfully on receipt inspection and was placed in service for the first time on April 25, 2004; (2) the most recent successful completion of the fast start surveillance test was documented on November 3, 2004; (3) the most recent documented demonstration of adequate fuel oil header prime was upon shutdown of EGDG-1A from its most recent run on February 23, 2005; and, (4) the failure mode of the fuel oil header loosing prime is a standby phenomenon and could not have happened immediately upon the start demand on March 23, 2005. Therefore, loss of adequate fuel oil header prime occurred between February 23, 2005, and March 23, 2005.

EGDG-1A was returned to service at 12:50 on March 24, 2005. In order for this event to be determined not reportable, EGDG-1A would have had to become inoperable within 72 hours of performing SP-354A. Based on engineering judgment, EGDG-1A became inoperable at some point prior to that time. Therefore, EGDG-1A is considered to have been inoperable for a period of time longer than the 72 hours allowed by ITS 3.8.1, Condition B. This condition is reportable under 10CFR50.73(a)(2)(i)(B) as a condition prohibited by Technical Specifications.

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SAFETY CONSEQUENCES

Two EGDGs automatically provide alternating current (AC) electrical power to 4160 volt (v) Engineered Safeguards (ES) buses 3A and 3B [EB, BU] following a loss of off-site power or a degraded grid voltage condition. Power to the 4160v ES buses supplies motive and control power to equipment required for safe shutdown of the plant and for mitigation and control of accidents.

EGDG-1A not achieving steady state voltage and frequency in less than or equal to 10 seconds from standby conditions as required by Technical Specifications was reviewed to determine if the Emergency AC Power System safety function was lost at any time between February 23, 2005, and March 23, 2005. The review concluded that the safety function was never lost. Although the 14.8 second start time exceeded CR-3 ITS requirements, the delay did not challenge the assumptions of the analysis documented in Calculation N04-0002, "CR-3 Loss of Coolant Accident (LOCA) Summary Report," Revision 0, dated January 28, 2004. Calculation N04-0002, Table 4-1, "LOCA Inputs and Assumptions for CR-3," identifies Engineered Safeguards Actuation System (ESAS) [JE] delay times after ESAS Low Reactor Coolant System Trips for Low Pressure Injection (LPI) [BP] and High Pressure Injection (HPI) [BQ] for a Small Break LOCA (SBLOCA) and a Large Break LOCA (LBLOCA). The bounding figure (the minimum assumed delay) is the assumed delay of 35 seconds for LPI during a LBLOCA. (SBLOCA assumes a delay of 40 seconds for LPI and 67 seconds for HPI). Adding the 14.8 seconds EGDG-1A start time to the LPI initiation time delay of 15 seconds and LPI pump start time of 5 seconds equals a value of 34.8 seconds. This value is less than the 35 second assumption.

Therefore, had the EGDG-1A slow fast start time condition existed at the same time EGDG-1B was voluntarily removed from service, or if EGDG-1B had become unavailable for any other reason, the safety function of the Emergency AC Power System would not have been lost. One train of the Emergency AC Power System would have been available at all times.

The impact of the identified condition is currently limited to EGDG-1A. EGDG-1B has demonstrated successful fast start test response times that support the conclusion that the EGDG-1B fuel oil header is remaining primed in standby conditions. However, since similar components and fuel oil header design concerns exist in EGDG-1B, corrective actions planned for EGDG-1A will be applied to EGDG-1B.

Based on the above discussion, PEF concludes that the EGDG-1A slow fast start time did not represent a reduction in the public health and safety. This event does not meet the Nuclear Energy Institute definition of a Safety System Functional Failure (NEI 99-02, Revision 2).

CAUSE

The cause for this event was fuel oil header supply check valve DFV-39 and fuel oil header outlet check valve DFV-61 leaking by their seats. DFV-39 is a ½ inch check valve, Model No. 481-1/2B1-2, and DFV-61 is a 1/8 inch check valve, Model No. 484-4B28-2, both manufactured by Parker

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Hannifin Corporation – Hydraulic Valve Division (formerly Teledyne - Republic). These check valves prevent back flow and maintain the pressure boundary of the fuel oil system for the EGDGs. Results of a laboratory analysis performed at the Harris [Nuclear Plant] Energy and Environmental Center indicate that the failure mechanism was valve leakage due to insufficient spring force for the intended application. This conclusion was based on the relative absence of degraded check valve seating conditions and the relative absence of any meaningful particulate on the check valve seating surfaces.

Two causes have been identified for this event. One cause is unreliability of the check valves to provide a leak tight seal with 30 day intervals between fuel oil header re-prime and diesel start activities. The second cause is inadequate fuel oil header design. The fuel oil header is at the high point of the fuel oil system.

Based on the above causes, focus is being placed on improving the existing design of the check valves and incorporating additional barriers to prevent fuel header pressure depletion due to a single check valve failure. Inspection of the fuel oil filter on March 23, 2005, revealed a clean filter condition consistent with past inspection results from routine replacement intervals.

CORRECTIVE ACTIONS

1. DFV-39 and DFV-61 were replaced, SP-354A was performed successfully, and CR-3 ITS 3.8.1, Condition B, actions were exited at 12:50 on March 24, 2005.

2. A review of EGDG-1B fast start test response times supports the conclusion that the fuel oil header had been adequately primed in standby conditions. Additionally, a successful fast start of EGDG-1B was performed in accordance with SP-354B at 13:44 on March 24, 2005.

3. Engineering Change (EC) 60670 was implemented to replace the 2 pounds per square inch (psi) closing spring check valve for DFV-61 (EGDG-1A) with a 10 psi closing spring check valve and EC 60671 was implemented to replace the 2 psi closing spring check valve for DFV-62 (EGDG-1B) with a 10 psi closing spring check valve.

4. Other actions associated with this event, including long term fuel oil header design changes, are being addressed in the CR-3 Corrective Action Program in Nuclear Condition Report 154522.

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PREVIOUS SIMILAR EVENTS

A previous similar event involving loss of EGDG-1A fuel oil header prime was reported to the NRC in LER 50-302/2004-002-00 on June 21, 2004. LER 50-302/2004-002-00 concluded that the failure mechanism for DFV-61 was valve leakage due to foreign material lodged between the valve disk and seat. PEF concluded that unintentional introduction of foreign material into the fuel system components during replacement component manufacturing, during component receipt inspection and/or during maintenance activities on February 24, 2004, resulted in interference of DFV-61, culminating in the slow fast start of EGDG-1A on April 23, 2004. The most probable source of the identified clear polyvinylchloride (PVC) and the Iron Oxide particle was the transfer process used for the initial fill of the fuel filter cartridges, with the possibility existing that it could also have been introduced in trouble-shooting after the failure. The most probable source of the identified Teflon material was concluded to be the manufacturing process, with the possibility existing that it could also have been introduced during receipt inspection.

ATTACHMENTS

Attachment 1 - Abbreviations, Definitions, and Acronyms

Attachment 2 - List of Commitments

ATTACHMENT 1

ABBREVIATIONS, DEFINITIONS AND ACRONYMS

AC	Alternating Current
CFR	Code of Federal Regulations
CR-3	Crystal River Unit 3
DFV	Diesel Fuel Valve
EC	Engineering Change
EGDG	Emergency Diesel Generator
ES	Engineered Safeguards
ESAS	Engineered Safeguards Actuation System
HPI	High Pressure Injection
ITS	Improved Technical Specifications
LBLOCA	Large Break Loss of Coolant Accident
LER	Licensee Event Report
LOCA	Loss of Coolant Accident
LPI	Low Pressure Injection
NEI	Nuclear Energy Institute
NRC	Nuclear Regulatory Commission
PEF	Progress Energy Florida, Inc.
psi	pounds per square inch
PVC	PolyVinylChloride
SBLOCA	Small Break Loss of Coolant Accident
SP	Surveillance Procedure
v	volt

NOTES: Improved Technical Specifications defined terms appear capitalized in LER text {e.g., MODE 1}

Defined terms/acronyms/abbreviations appear in parenthesis when first used {e.g., Reactor Building (RB)}.

EIIS codes appear in square brackets {e.g., reactor building penetration [NH, PEN]}.

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ATTACHMENT 2

LIST OF COMMITMENTS

The following table identifies those actions committed to by PEF in this document. Any other actions discussed in the submittal represent intended or planned actions by PEF. They are described for the NRC's information and are not regulatory commitments. Please notify the Supervisor, Licensing & Regulatory Programs, of any questions regarding this document or any associated regulatory commitments.

RESPONSE SECTION	COMMITMENT	DUE DATE
	No regulatory commitments are being made in this submittal.	