Progress Energy

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

Ref: 10 CFR 50.54(f)

January 25, 2010
3F0110-11

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

Subject: Crystal River Unit 3 – Generic Letter 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal and Containment Spray Systems," Response to a Request for Additional Information (TAC No. MD7816)

References:
1. CR-3 to NRC letter, dated October 13, 2008, "Nine Month Response to NRC Generic Letter 2008-01, Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems" (TAC No. MD7816)
2. NRC to CR-3 letter, Request for Additional Information Regarding the Response to Generic Letter 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems," dated December 10, 2009 (Accession No. ML093360457)

Dear Sir:

Florida Power Corporation (FPC), doing business as Progress Energy Florida, Inc, submitted the required nine month response to Generic Letter 2008-01, by letter dated October 13, 2008 (Reference 1). Subsequently, the Nuclear Regulatory Commission (NRC) issued a Request for Additional Information (RAI) to Crystal River Unit 3 (CR-3) by letter dated December 10, 2009 (Reference 2). A response time of 45 days from the date of the RAI letter was specified.

The CR-3 response to the RAI is provided in the Attachment to this submittal.

This submittal contains no new regulatory commitments.

If you have any questions regarding this submittal, please contact Mr. Dan Westcott, Superintendent, Licensing and Regulatory Programs at (352) 563-4796.

Sincerely,

Jon A. Franke
Vice President
Crystal River Nuclear Plant

JAF/par

Attachment: Response to Request for Additional Information

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

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

A134
NRR

STATE OF FLORIDA

COUNTY OF CITRUS

Jon A. Franke states that he is the Vice President, Crystal River Nuclear Plant for Florida Power Corporation, doing business as Progress Energy Florida, Inc.; that he is authorized on the part of said company to sign and file with the Nuclear Regulatory Commission the information attached hereto; and that all such statements made and matters set forth therein are true and correct to the best of his knowledge, information, and belief.

Jon A. Franke
Vice President
Crystal River Nuclear Plant

The foregoing document was acknowledged before me this 25 day of January, 2010, by Jon A. Franke.

Signature of Notary Public
State of Florida

CAROLYN E. PORTMANN
Notary Public - State of Florida
My Commission Expires Mar 1, 2010
Commission # DD 524380
Bonded By National Notary Assn.

(Print, type, or stamp Commissioned Name of Notary Public)

Personally Known ✓ -OR- Produced Identification _____

PROGRESS ENERGY FLORIDA, INC.

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302 / LICENSE NUMBER DPR-72

ATTACHMENT

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

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By letter dated October 13, 2008, Florida Power Corporation provided a nine month response to Generic Letter (GL) 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems," for the Crystal River Unit 3 (CR-3). By letter dated December 10, 2009, the Nuclear Regulatory Commission (NRC) forwarded a request for additional information (RAI) to CR-3. The letter stated that additional information was required for the NRC staff to determine that CR-3 has acceptably demonstrated that, as stated in GL 2008-01, "the subject systems are in compliance with the current licensing and design bases and applicable regulatory requirements, and that suitable design, operational, and testing control measures are in place for maintaining this compliance."

NRC Request #1:

The licensee states that gas intrusion "through the high to low pressure interfaces...is not expected to occur without Operations knowledge due to one or more of the following: possible relief valve lifting; unexplained level increases in the BWST; decreasing level in a Core Flood Tank; and/or a mismatch in the reactor coolant system water balance calculation." Clarify how frequently these parameters are monitored and whether abnormal results would trigger inspections for voids.

Response

By letter dated October 13, 2008, CR-3 defined the locations of potential susceptibility to leakage at the high to low pressure interfaces as upstream of the Decay Heat (DH) pump discharge side outboard containment isolation valves and downstream of the DH outboard containment isolation valve on the common suction line. The most likely scenario would be for a pump discharge containment isolation valve to leak by, pressurizing the DH piping and potentially lifting the DH pump suction relief valve.

The lifting of the DH pump suction relief valve would occur if the corresponding Borated Water Storage Tank (BWST) suction check valve performed adequately and would not be rapidly detected, as no alarm would be triggered by the lifting of the relief valve. It would take several iterations of relief valve cycling to result in an auto-start of the respective DH vault sump pump. Operators in the Main Control Room are alerted to auto-starts of the DH vault sump pumps via a computer alarm and would dispatch an Auxiliary Building Operator to investigate the situation. Additionally, Operators are required to enter the DH vaults for log taking on a weekly basis in accordance with surveillance procedure SP-300, "Operating Daily Surveillance Log." Indication of relief valve lifting, such as moisture and/or boron accumulation on the relief valve tailpipe and/or on the floor level underneath the valve, would be identified upon entry. A decrease in Core Flood Tank (CFT) level would eventually be noted, as would an increase in BWST level, if leak-by existed across the associated BWST suction check valve. Due to the much larger capacity of the BWST, the CFT level decrease would be seen well in advance of any noticeable increase in BWST level.

The BWST level and CFT-1A/1B levels are required to be logged every shift (i.e., once per 12 hours) by the Main Control Room Operators, in accordance with SP-300. The Reactor Coolant System (RCS) water inventory balance calculation is performed daily to verify that RCS leakages (controlled, identified, unidentified) are within the Improved Technical Specification (ITS) acceptance criteria. The calculation is part of the performance of surveillance test procedure SP-317, "RC System Water Inventory Balance." The verification that RCS leakages are within the ITS acceptance criteria is on a 72-hour frequency during on-line operation; however, CR-3 has transitioned to an administratively imposed 24-hour frequency based on industry recommended good practices.

An off-normal indication of increasing BWST level trend or decreasing CFT-1A/1B level trend would result in an investigation/technical evaluation required by CR-3's Corrective Action Program. The same is true of inadvertent DH pump suction relief valve lifts once discovered. For BWST level to increase, a minimum of two check valves and one containment isolation valve in series would have to leak by. Due to the interfaces that exist between the BWST, CFT-1A/1B, and the DH trains, any investigation would eventually result in evaluating the potential for inventory intrusion into the respective DH train. Since the suction piping for each Building Spray (BS) train originates off of the same-train DH suction piping, the investigation would in turn lead to an evaluation of the associated BS train.

One action that would also be taken as part of any investigative effort would be to perform ultrasonic (UT) examinations immediately upstream of the respective DH pump discharge side outboard containment isolation valve (DHV-5 for the "A" DH train and DHV-6 for the "B" DH train) and immediately downstream of the outboard containment isolation valve on the common suction line (DHV-41). These locations in the DH system are the logical high points where any gases coming out of solution will accumulate. Based on the initial findings, additional UT examinations of BS/DH piping sections would proceed as required until the extent of the inventory intrusion is fully determined. This action is not procedurally required; however, it would be part of any reasonable engineering investigative effort of leakage past the DH or BS isolation valves. If any of the UT examinations were to reveal gas pockets, then gas would subsequently be collected for chemical analysis using the respective high point vent valve.

The Make-Up (MU) System was not discussed in this response as the high to low pressure interface exists with the high pressure on the pump side. Therefore, the MU pump discharge piping is not susceptible to gas accumulation by high pressure fluid intrusion. The MU pump suction side was determined to be not susceptible as the suction is not aligned to any high pressure sources.

NRC Request # 2:

The licensee has established "inspections [which] include a requirement for periodic verification (every 92 days) that the ECCS [emergency core cooling system], DH [decay heat removal system], and BS [containment spray system] piping will be maintained sufficiently full of water by a combination of ultrasonic testing (UT), and venting as deemed necessary, of locations identified to be potentially susceptible to gas intrusion (high to low pressure interfaces)." Justify that this is an acceptable inspection interval given previous operating history; include a discussion of the parameters from question one.

Response

CR-3 has determined that all potentially susceptible locations from leakage through a high to low pressure interface are in the DH system and that these are the locations that would be periodically inspected. These locations are immediately upstream of the DH pump discharge motor operated isolation valves (DHV-5 and DHV-6) and immediately downstream of the outboard containment isolation valve on the common suction line (DHV-41). The MU system operates at a higher pressure than the RCS. The BS train suction line ties into the respective DH train suction line sufficiently far from DHV-41 while the discharge lines are voided downstream of the flow control valves. For these reasons only, the DH system was determined to be potentially susceptible to this phenomenon.

The 92-day surveillance frequency was based on plant operating history over the past 15 years. During that time, there has not been an instance where any unusual trend in BWST level or CFT level has been shown to be the result of inventory intrusion into the DH system from either the RCS or the CFTs. Although there have been many anomalies observed during performance of SP-317 since 1995, none of those anomalies were the result of RCS or CFT inventory intrusion into the DH system. All were found to be the result of other phenomena. There have also been no recorded events since 1995

involving inadvertent lifting of a DH pump suction relief valve in response to inventory intrusion into a DH train. It should also be noted that no water hammer events have been observed on either of the DH pump discharge lines during this same time frame.

Additionally, multiple surveillance activities provide opportunity for discovery of an inventory intrusion event. These activities include control board surveillances, RCS water inventory calculation, water or boric acid discovered beneath a DH pump suction relief valve. A computer alarm will actuate if the Auxiliary Building sump pump starts. Based on the operating history since 1995, and the diverse methods for detection, a 92-day frequency for the UT examinations of the high-to-low pressure interfaces was determined to be reasonable.

NRC Request #3:

Consistent with Section 3.7 of Reference 2, briefly discuss your plan for training at CR-3 that is "considered to be a necessary part of applying procedures and other activities when addressing the issue identified in the GL."

Response

Progress Energy (PE) is an active participant in the Nuclear Energy Institute (NEI) Gas Accumulation Team, which is currently coordinating with INPO in the development of generic training modules for gas accumulation and management. These training modules target the Engineering, Operations, and Maintenance disciplines. When these training modules are completed and become available to the industry, Progress Energy will evaluate them for applicability to CR-3, and may implement a version tailored to meet station needs.

Additionally, when any plant procedure is modified, an assessment for training needs is required in accordance with procedure PRO-NGGC-0204, "Procedure Review and Approval." The determination and development of training is consistent with the accredited systematic approach to training. If required, training is accomplished prior to, or in parallel with, the issuance of the procedure. For fill and vent procedure revisions, the changes have generally been minor and have been considered enhancements; training on the procedure changes was determined to not be required. Procedures or work orders which direct the periodic examination for the presence of gas were created or modified to provide detailed instruction for the ultrasonic inspection of piping to verify that it is full of water.

NRC Request #4:

In Reference 1, the licensee stated that "industry guidance will be considered when either evaluating operability or establishing acceptance criteria." Industry guidance is not in accordance with NRC staff's acceptance criteria in Reference 4. Clarify if the analysis to determine the void size acceptance criteria follows NRC guidance (particularly the use of 0.5 second intervals) or provide additional justification that the current analysis bounds the behavior of the system.

Response

PE has actively participated in the NEI Gas Accumulation Team and the respective PWR and BWR Owners' Group activities that are focused on developing suitable guidance for licensees in the evaluation of voids in the piping systems of the PE plants. These groups have engaged recognized industry experts, and Nuclear Steam Supply System vendors to determine the most appropriate criteria applicable to current reactor designs. The assessment of voids on the suction side, through the pump, on the discharge, and the effects on downstream piping and the reactor has been considered. The criteria are documented in eight separate reports generated to support this effort. All of these reports have been

made available to the NRC staff for their information. These were the criteria that formed the basis of the CR-3 response.

In order to summarize and focus these separate industry efforts, NEI issued Administrative Points of Contact letter, APC 09-20, "Generic Letter (GL) 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems" – Evaluation of Unexpected Voids or Gas Identified in Plant ECCS and Other Systems," on May 18, 2009. This letter and its enclosure reference these industry documents and provide insight on their application to the evaluation of operability and is not based on NRC guidance. This industry guidance is being used by Progress Energy until such time that the NRC criteria can be formally issued and evaluated.