Progress Energy

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

Ref: 10 CFR 50.54(f)

October 8, 2010
3F1010-04

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
11555 Rockville Pike
Rockville, MD 20852

Subject: Crystal River Unit 3 – Nine-Month Supplemental (Post-Outage) Response to NRC Generic Letter 2008-01

References:

1. NRC Generic Letter 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems," dated January 11, 2008

2. CR-3 to NRC letter dated May 8, 2008, "Three 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)"

3. F. E. Saba to D. E. Young letter dated September 25, 2008, "Crystal River Unit 3 – Generic Letter 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems," Proposed Alternative Course of Action (TAC No. MD7816)"

4. 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. MD 7816)"

5. CR-3 to NRC letter dated January 25, 2010, "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)"

Dear Sir:

The Nuclear Regulatory Commission (NRC) issued Generic Letter (GL) 2008-01 (Reference 1) to request that each licensee evaluate the licensing basis, design, testing and corrective actions for the Emergency Core Cooling System (ECCS), Decay Heat (DH) Removal System, and Containment Spray (Building Spray (BS)) System to ensure that gas accumulation is maintained less than the amount that challenges the operability of these systems, and that appropriate action is taken when conditions adverse to quality are identified.

As provided in the Crystal River Unit 3 (CR-3) three month response to GL 2008-01 (Reference 2), Florida Power Corporation (FPC), now doing business as Progress Energy Florida, Inc., committed that CR-3 would complete detailed walkdowns and ultrasonic examinations of inaccessible piping at locations potentially susceptible to gas accumulation for systems within the scope of GL 2008-01. As approved by the NRC (Reference 3), this alternative course of action included the submittal of a GL 2008-01 post-outage supplemental response, describing any changes to the nine month response (Reference 4) resulting from walkdowns and any

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necessary ultrasonic examinations of inaccessible piping, to the NRC within 90 days following the completion of Refueling Outage 16 (R16).

Although CR-3 has not completed all activities associated with R16, all inspection and testing activities associated with GL 2008-01 have been completed.

Accordingly, the Attachments to this letter contain CR-3's post-outage supplemental response. This supplemental response also confirms the long-term GL 2008-01 activities that remain to be completed as previously identified in the NRC acceptance of CR-3's alternative course of action (Reference 3).

In summary, FPC has concluded that the subject systems at CR-3 are operable and that CR-3 is currently in compliance with the licensing basis documentation and applicable regulations, including 10 CFR 50 Appendix B, Criteria III, V, XI, XVI, and XVII, with regard to the concerns outlined in GL 2008-01 pertaining to managing gas accumulations in these systems/functions.

This submittal also completes the following regulatory commitments contained in CR-3's three month response (Reference 2):

1. Complete the detailed walkdowns and ultrasonic examinations of inaccessible piping at locations potentially susceptible to gas accumulation for systems within the scope of the GL prior to startup from the next refueling outage.

2. Submit supplemental response to the NRC within 90 days following completion of Refueling Outage R16, which will describe any changes to the nine month GL 2008-01 response resulting from walkdowns and ultrasonic examination of inaccessible piping.

Additionally, it was discovered that the initial nine month response (Reference 4) contained an incorrect statement in Attachment 1, Page 9 of 14. The letter indicated that the Make-Up (MU) System discharge piping vent valves were located on the mid-plane of elbows (2 total). The letter should have stated these vent valves are on the suction side of the MU pumps.

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

Attachments: A. Nine-Month Supplemental Response (Post-Outage) to NRC Generic Letter 2008-01
B. Corrective Action Update

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

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 8th day of October, 2010, by Jon A. Franke.

Charlene Miller

Signature of Notary Public
State of Florida

CHARLENE MILLER
Notary Public - State of Florida
My Comm. Expires Nov 12, 2012
Commission # DD 837023
Bonded Through National Notary Assn.

Charlene Miller

(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 A

NINE-MONTH SUPPLEMENTAL RESPONSE (POST-OUTAGE) TO NRC GENERIC LETTER 2008-01

Nine-Month Supplemental (Post-Outage) Response to NRC Generic Letter 2008-01

This Attachment provides the Nine-Month Supplemental (Post-Outage) Response to Generic Letter 2008-01 for actions that were deferred until the next refueling outage as requested in Reference 2.

The following information is provided in this attachment:

- A description of the results of evaluations that were performed pursuant to Generic Letter 2008-01 on the previously incomplete activities, such as system piping walkdowns, at Crystal River Unit 3 (CR-3) (see section A of this Attachment).

- A description of any additional corrective actions determined necessary to assure system operability and compliance with the quality assurance criteria in Sections III, V, XI, XVI, and XVII of Appendix B to 10 CFR Part 50, and the licensing basis and operating license with respect to the subject systems, including a schedule and a basis for that schedule (see Section B1 of this Attachment), and a summary of any changes or updates to previous corrective actions, including any schedule change and the basis for the change (see Section B2 of this Attachment).

The original conclusions documented in the nine month response with respect to the licensing basis evaluation, testing evaluations, and corrective action evaluations have not changed. This supplement will only discuss the results of design evaluation reviews conducted during the recent refueling outage associated with previously uncompleted activities.

Additionally, it was discovered that the initial nine month response (Reference 4) contained an incorrect statement in Attachment 1, Page 9 of 14. The letter indicated that the Make-Up (MU) System discharge piping vent valves were located on the mid-plane of elbows (2 total). The letter should have stated these vent valves are on the suction side of the MU pumps.

A. EVALUATION RESULTS

1. Design Basis Documents

Calculations M09-0049, Evaluation of Gas Accumulation in CR3 LPI/DHR Suction Piping (which includes Building Spray), and M09-0051, Evaluation of Gas Accumulation in CR-3 DH & ECCS Discharge Piping (which includes Building Spray), were issued to define maximum acceptable void fractions in the subject system suctions and discharges.

The suction side acceptance criteria used was less than 2% peak void fraction at the pump suction. Gothic 3-D modeling was used with 0.1-second increments for calculation steps and 0.2-second increments for data graphing. The discovered adverse slope locations were taken into consideration in the analysis. Bounding acceptable void volumes resulting in less than 2% peak void fraction at the pump suction were determined and found to be in excess of potential static fill and vent void fractions for the given adverse slope locations.

Discharge side acceptance criteria for discharge side voids were based on acceptable loads for resulting gas water hammer. For High Pressure Injection (HPI) discharge lines, inside the Reactor Building (RB), it was concluded that potential static fill/vent voids, inside RB HPI lines, were to be eliminated by dynamic fill and venting rather than having an acceptance criteria. For Decay Heat/Low Pressure Injection (DH/LPI) and Building Spray (BS), it was concluded that acceptable void fractions in the DH/LPI and BS discharge lines bounded potential static fill and vent void fractions.

2. Confirmatory Walkdowns

CR-3 conducted piping walkdowns of the containment Emergency Core Cooling System (ECCS) and Decay Heat (DH) Removal System during Refueling Outage 16 (R16) to comply with the requirements of GL 2008-01. The walkdowns were conducted to confirm that the as-built piping is accurately reflected in design drawings, including isometric drawings. The results are as follows:

1) Previously Unreported Walkdown Results:

a) The scope of previously unreported walkdown results was all of the piping in the HPI, LPI, BS systems and the DH common suction line inside containment.

b) Discrepancies were identified between the design drawings and the as-built configuration during the confirmatory walkdowns, consisting of minor adverse slope conditions in HPI piping, LPI piping and the DH common suction line inside containment. No discrepancies were reported on the Reactor Building Spray (BS) piping.

c) Nuclear Condition Reports (NCRs) were initiated on the adverse slope and corrective actions were completed, as appropriate. The corrective actions consisted of:

i) Evaluations to determine the acceptability of potential static fill and vent voids.

ii) Determination as to whether Engineering should require a dynamic fill and vent should a piping section have a potential static fill and vent void:

(1) HPI discharge piping inside the RB contains adverse slope conditions that could result in a static fill and vent void. Because the operating condition of HPI is near the critical pressure for water, it becomes difficult to predict behavior. Therefore, CR-3 will require a dynamic fill and vent with a Froude number greater than 2.0 anytime the HPI discharge piping inside the RB is drained.

(2) The DH common suction piping inside containment, just downstream of the upstream DH suction isolation valve, has an adverse slope. Following static fill and vent of this piping, ultrasonic testing (UT) results indicated a

void. The void was analyzed under the CR-3 Corrective Action Program and was determined to pose no challenge to a running DH pump. The void was then dynamically vented and ultimately purged to the Borated Water Storage Tank (BWST) with no adverse consequences to the DH pump. Therefore, CR-3 will perform dynamic fill and vent of the DH common suction line anytime the system is breached or drained between the outboard containment isolation valve and the Reactor Coolant System (RCS). CR-3 will also implement guidance which precludes draining the DH common suction line inside containment, upstream of the outboard containment isolation valve while fuel is loaded in the reactor vessel.

d) The subject walkdowns did not identify any new locations that would require the installation of any new high point vent valves.

2) Results of Venting and UT Examinations:

a) As-found UTs inside the reactor building for voids were performed:

i) downstream of the upstream DH common suction line isolation valve – no voids.

ii) downstream of the inboard containment isolation valve in the DH common suction line – no voids.

iii) upstream of the LPI injection line check valves – no voids.

iv) upstream of the downstream HPI injection check valves to the Reactor Coolant (RC) piping at Reactor Coolant Pump (RCP) B, C and D. Small voids were discovered upstream of two of the HPI check valves and were entered into the CR-3 Corrective Action Program for resolution. The voids were determined to be the result of depressurization and lowering of the reactor vessel water level. At normal operating pressure, no voids would exist since at normal operating pressure the observed volume of gas would all go into solution.

v) upstream of the upstream HPI check valves to the RC piping at RCP B, C and D – no voids.

vi) upstream of the HPI injection check valves to RCP A were not inspected as this line is the normal make-up line to the RCS and the continuous flow is sufficient to prevent the formation of voids from gas accumulation.

b) Post maintenance fill and vent UT was performed downstream of the first two isolation valves in the DH common suction line inside containment. A small void was discovered just downstream of the first isolation valve and it was documented in the CR-3 Corrective Action Program. The DH pump was jogged sufficiently long to transport the void into the Auxiliary Building where the DH pump suction

was realigned to the BWST and the pump discharge aligned to recirculate to the BWST. The void was dynamically vented to the BWST and was verified removed by post dynamic vent UT.

A dynamic fill and vent of the DH common suction line inside containment is now required anytime any part of the DH common suction line inside containment upstream of the outboard DH containment isolation valve is drained. The flow velocity is sufficient in the 12" piping to result in a Froude number greater than 2.0 when the flow rate is 3000 gallons per minute (gpm). The resulting transient void fraction at the pump was calculated to be 1.66%, with the DH pump suction from the common suction line inside containment and the reactor vessel drained/vented, and 1.23% with the DH pump suction aligned to the BWST.

3. Vent Valves

No new vent valve locations were deemed necessary. Additionally, modifications to existing vent valves, or utilization of existing vent valves that were previously considered to be in inaccessible area, resulting from the confirmatory walkdowns were identified as not necessary.

4. Procedures

The following Surveillance Procedure (SP) changes were determined to be required following the confirmatory walkdowns, UT, and venting evolutions:

1) SP-630, MU/HPI Check Valves Full Flow Test
2) SP-340B, DHP-1A, BSP-1A and Valve Surveillance
3) SP-340E, DHP-1B, BSP-1B and Valve Surveillance
4) OP-402, Makeup and Purification System
5) OP-404, Decay Heat Removal System

B. DESCRIPTION OF NECESSARY ADDITIONAL CORRECTIVE ACTIONS

1. Additional Corrective Actions

The following additional corrective actions are required as a result of the outage activities and evaluations. The schedule for completion of the corrective actions and the basis for the schedule are also provided.

a) Dynamic venting of the HPI lines is required anytime a portion of the HPI system is drained on the reactor side of the injection valves. Due to maintenance activities during R16, a dynamic fill and vent of HPI is required before restoring the system to operable status.

CR-3 will require a dynamic fill and vent with a Froude number greater than 2.0 anytime the HPI piping inside the RB is drained. HPI flow sufficient to create a Froude number greater than 2.0, for a sufficient duration, will be used. Procedures directing this activity were revised during R16.

b) Dynamic fill and vent of the DH common suction line inside containment is required anytime any part of the common suction line upstream of the outboard containment isolation valve is drained. CR-3 performed the dynamic fill and vent of the DH common suction line inside containment following maintenance activities during R16. UTs were performed to verify the venting activity was successful. Flow velocity is sufficient in the 12" piping to result in a Froude number greater than 2.0 when flow rate is approximately 3000 gpm.

CR-3 will perform a dynamic fill and vent of the DH common suction line anytime the system is breached or drained between the outboard containment isolation valve and the RCS. Since a dynamic fill and vent of the DH common suction line inside containment cannot be performed at normal RCS pressure, guidance will be implemented to preclude draining the DH common suction line inside containment upstream of the outboard containment isolation valve while fuel is loaded in the reactor vessel. Procedures directing this activity were revised during R16.

Analysis performed demonstrated that the potential voids remaining in the DH/LPI lines, after static fill and vent activities, are less than the applicable acceptance criteria. The delivery of ECCS flow is not adversely impacted and the amount of gas injected has no adverse impact on the reactor core cooling, as discussed in Attachment 1 to the following document: LTR-LIS-08-543, "PWROG Position Paper on Non-condensable Gas Voids in ECCS Piping; Assessment of Potential Effects on Reactor Coolant System Transients Including Chapter 15 Event, Task 3 of PA-SEE-450," dated August 19, 2008.

2. Corrective Action Updates

Corrective actions committed to in the October 13, 2008, letter from CR-3 to the NRC (Reference 4), are discussed in Attachment B.

Conclusion

Florida Power Corporation has evaluated the previously unevaluated portions of the applicable systems at Crystal River Unit 3 that perform the functions described in GL 2008-01 and concludes that these systems are operable.

PROGRESS ENERGY FLORIDA, INC.

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302 /LICENSE NUMBER DPR-72

ATTACHMENT B

NINE-MONTH SUPPLEMENTAL RESPONSE (POST-OUTAGE) TO NRC GENERIC LETTER 2008-01

CORRECTIVE ACTION UPDATE

Corrective Action Update

This Attachment contains the Crystal River Unit 3 (CR-3) Generic Letter (GL) 2008-01 Nine-Month Supplemental (Post-Outage) update to the corrective action schedule from the CR-3 letter dated October 13, 2008, to the Nuclear Regulatory Commission (NRC).

Commitment	Update
Quarterly monitoring will be developed and implemented to ensure that the Emergency Core Cooling System (ECCS), Decay Heat (DH), and Building Spray (BS) suction and discharge piping will be maintained sufficiently full of water to ensure that the systems can reliably perform their intended functions.	Completed
The inspections will include a requirement for periodic verification (every 92 days) that the ECCS, DH, and BS 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).	Preventative Maintenance Identification Number, PMID 27742-04, was established on October 17, 2008
Additionally, should any maintenance activities breach the ECCS, DH, or BS System boundary, a UT will be performed, as deemed necessary, to verify the respective system(s) are sufficiently full prior to return to service.	The following procedures have been revised to perform UT as deemed necessary: OPS-NGGC-1301, CP -113D, OP-402, OP-404, OP-405
Florida Power Corporation (FPC) will install the new vent valves and relocate existing vent valves as discussed in the Design Evaluation section of Crystal River Unit 3 – Nine-Month Response to NRC Generic Letter 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems".	Completed Actions include Work Order (WO): WO 01443058 – DHV-212 New WO 01443054 – DHV-216 New WO 01443071 – DHV-215 New WO 01443060 – DHV-213 New WO 01443056 – DHV-217 New WO 01443224 – DHV-214 New WO 01443062 – DHV-218 New WO 01443069 – MUV-653 New WO 01443067 – MUV-535 Relocation WO 01443066 – MUV-533 Relocation WO 01484250 – MUV-655 New WO 01479278 – MUV-654 New WO 01479274 – MUV-657 New WO 01479276 – MUV-656 New WO 01484249 – MUV-660 New WO 01443063 – MUV-659 New WO 01443064 – MUV-658 New WO 01443052 – BSV-261 New WO 01443053 – BSV-260 New

Submit supplemental response to the NRC within 90 days following completion of Refueling Outage R16 that will describe any changes to the nine month GL 2008-01 response resulting from walkdowns and ultrasonic examination of inaccessible piping.	Completed
CR-3 will develop an acceptance criterion for the maximum allowable void volume that will not challenge ECCS, DH, or BS System operability.	Completed Calculation M09-0051 Calculation M09-0049
Procedures will be enhanced to provide additional detail, where needed, concerning venting sequence, venting duration, dynamic venting, etc., and to UT appropriate piping locations following fill and vent, as deemed necessary, to ensure piping is sufficiently full prior to return to service.	The following procedures were revised/ enhanced to fulfill the commitment. OP-402, Makeup and Purification System OP-402 was revised to contain the following statement: "If any portion of the MU system is drained, a UT is required to ensure that the MU system is filled and vented. The requirement for performing a UT can be waived by Engineering based on system configuration or history. If a UT reveals significant gas as determined by Engineering, an NCR shall be initiated." OP-402 was revised to include new high point vent valves: MUV-653, MUV-655, MUV-654, MUV-657, MUV-656, MUV-660, MUV-659, MUV-658 OP-404, Decay Heat Removal System OP-404 was revised to contain the following statement: "If any portion of the DH system is drained, a UT is required to ensure that the DH system is filled and vented. The requirement for performing a UT can be waived by Engineering based on system configuration or history. If a UT reveals significant gas as determined by Engineering, an NCR shall be initiated."

	OP-404 was revised to include new high point vent valves: DHV-212, DHV-216, DHV-215, DHV-213, DHV-217, DHV-214, DHV-218 OP-405, Reactor Building Spray System OP-405 was revised to contain the following statement: "If any portion of the DH and/or BS system is drained for maintenance, an UT is required to ensure that the DH and/or BS system is filled and vented. The requirement for performing a UT can be waived by Engineering based on system configuration or history. If a UT reveals significant gas as determined by Engineering, an NCR shall be initiated." OP-405 was revised to include two new high point vent valves: BSV-260 and 261 CP-113D, Post Maintenance Testing Contains the following statement: "Generic Letter 2008-01 requires verification that ECCS (DH, BS, MU) systems are filled and vented prior to return to service after a breach. A UT will be performed as necessary." OPS-NGGC-1301, Equipment Clearance OPS-NGGC-1301 was revised to contain the following statement: "System fill and vent should be performed according to site procedures and OPS-NGGC-1309, as applicable. When establishing a clearance boundary, the Clearance Preparer should ensure that the piping within the boundary can be adequately filled and vented via station fill and vent procedures during clearance

	restoration. If the proposed clearance boundary on an ECCS system will result in a fill and vent configuration different from that assumed in station fill and vent procedures, contact the appropriate system engineer and request an assessment to ensure a complete fill and vent can be accomplished. The assessment should ensure that voids introduced into the piping during maintenance can be eliminated or reduced to an acceptable size during fill and vent activities. This may include performing a UT to ensure systems are adequately filled and vented."
FPC is continuing to support the industry and the Nuclear Energy Institute Gas Accumulation Management Team activities regarding resolution of generic Improved Technical Specification (ITS) changes via the Technical Specification Task Force (TSTF) Traveler process. Within nine months after NRC approval of the TSTF Traveler, FPC will evaluate its applicability to CR-3, and evaluate adopting the TSTF Traveler to supplement the current ITS requirements.	Ongoing: Nine months after NRC approval of TSTF-523, Generic Letter 2008-01, Managing Gas Accumulation.