Progress Energy

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

April 4, 2012
3F0412-05

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

Subject: Crystal River Unit 3 – Response to Second Request for Additional Information to Support NRC Health Physics and Human Performance Branch (AHPB) Technical Review of the CR-3 Extended Power Uprate LAR (TAC No. ME6527)

References:
1. CR-3 to NRC letter dated June 15, 2011, "Crystal River Unit 3 – License Amendment Request #309, Revision 0, Extended Power Uprate" (Accession No. ML112070659)
2. Email from S. Lingam (NRC) to D. Westcott (CR-3) dated February 20, 2012, "Crystal River, Unit 3 EPU LAR - Draft RAIs from AHPB (TAC No. ME6527)"
3. NRC to CR-3 letter dated March 2, 2012, "Crystal River Unit 3 Nuclear Generating Plant – Request For Additional Information For Extended Power Uprate License Amendment Request (TAC No. ME6527)" (Accession No. ML12052A130)

Dear Sir:

By letter dated June 15, 2011, Florida Power Corporation, doing business as Progress Energy Florida, Inc., requested a license amendment to increase the rated thermal power level of Crystal River Unit 3 (CR-3) from 2609 megawatts (MWt) to 3014 MWt (Reference 1). On February 20, 2012, via electronic mail, the NRC provided a draft request for additional information (RAI) related to human performance needed to support the AHPB technical review of the CR-3 Extended Power Uprate (EPU) License Amendment Request (LAR) (Reference 2). By teleconference on February 29, 2012, CR 3 discussed the draft RAI with the NRC to confirm an understanding of the information being requested. On March 2, 2012, the NRC provided a formal RAI required to complete its evaluation of the CR-3 EPU LAR (Reference 3).

The attachment, "Response to Second Request for Additional Information – Health Physics and Human Performance Branch Technical Review of the CR-3 EPU LAR," provides the CR-3 formal response to the RAI.

This correspondence 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/krw

A001
NRR

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

Attachment: Response to Second Request for Additional Information – Health Physics and Human Performance Branch Technical Review of the CR-3 EPU LAR

Enclosure: SP-5145: Human Factors Design Conventions for the Control Room Specification and Criteria

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

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 4 day of April, 2012, by Jon A. Franke.

Carolyn E Portmann

Signature of Notary Public
State of Florida

CAROLYN E. PORTMANN
Commission # DD 937553
Expires March 1, 2014
Bonded Thru Troy Fain Insurance 800-385-7019

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

Personally Known ✓ -OR- Produced Identification _____

FLORIDA POWER CORPORATION

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302 /LICENSE NUMBER DPR-72

ATTACHMENT

RESPONSE TO SECOND REQUEST FOR ADDITIONAL INFORMATION – HEALTH PHYSICS AND HUMAN PERFORMANCE BRANCH TECHNICAL REVIEW OF THE CR-3 EPU LAR

RESPONSE TO SECOND REQUEST FOR ADDITIONAL INFORMATION – HEALTH PHYSICS AND HUMAN PERFORMANCE BRANCH TECHNICAL REVIEW OF THE CR-3 EPU LAR

By letter dated June 15, 2011, Florida Power Corporation (FPC), doing business as Progress Energy Florida, Inc., requested a license amendment to increase the rated thermal power level of Crystal River Unit 3 (CR-3) from 2609 megawatts (MWt) to 3014 MWt. On February 20, 2012, via electronic mail, the NRC provided a draft request for additional information (RAI) related to human performance needed to support the Health Physics and Human Performance Branch (AHPB) technical review of the CR-3 Extended Power Uprate (EPU) License Amendment Request (LAR). By teleconference on February 29, 2012, CR-3 discussed the draft RAI with the NRC to confirm an understanding of the information being requested. On March 2, 2012, the NRC provided a formal RAI required to complete its evaluation of the CR-3 EPU LAR. The following provides the CR-3 formal response to the RAI needed to support the AHPB technical review of the CR-3 EPU LAR. For tracking purposes, each item related to this RAI is uniquely identified as AHPB X-Y, with X indicating the RAI set and Y indicating the sequential item number.

AHPB RAIs

18. (AHPB 2-1)

In Section 2.11.1.2, under "Description of Analyses and Evaluations," Question 2 CR-3 Response, 1, of the original LAR, it is stated, "The Loss of Subcooling Margin procedure will be revised to include specific guidance for ensuring each of the automatic actuation functions of the [Inadequate Core Cooling Mitigation System] ICCMS occur within their allotted time." Please clarify how the timing is monitored and how the start times are determined for each function.

Response:

The current and modified Safety Parameter Display System (SPDS) screens include an explicit timing indication (i.e., digital banner across the display screens counting up) that the operators use to support the timing of the current actions being automated with the ICCMS. Each ICCMS timing function will include an appropriate delay. Following a reactor trip, the subcooling margin (SCM) alarm function will be armed following a time delay of approximately 10 seconds. If at any time following arming of the SCM alarm function adequate SCM is lost, the SCM alarm display will increase in size to fill the screen with a negative value for SCM, a small box indicating the temperature source, and a timer showing the elapsed time since the loss of adequate SCM. When the operator acknowledges the audible loss of SCM alarm, the visual alarm screen shifts to a banner at the bottom of the SPDS display and continues to show the total accumulated time since the loss of SCM was first sensed. The 10 second time delay before arming the SCM alarm function minimizes the potential for spurious alarm actuations during normal reactor trip transients.

The SPDS is being modified to include a similar alarm function for inadequate High Pressure Injection (HPI) System flow margin during a loss of SCM event. The inadequate HPI flow display starts approximately one minute from the actual condition and the SPDS display will show a second full screen visual alarm containing another embedded visual timer showing total accumulated time since loss of SCM was first sensed. Again, when acknowledged, the visual alarm screen shifts to a banner at the bottom of the SPDS display. The one minute time delay

before arming the inadequate HPI flow alarm minimizes the potential for spurious alarm actuations by allowing sufficient time for the HPI System to start during a loss of SCM event. The timing, by which the SPDS audible indications and visual alarms are actuated on these plant conditions, may vary slightly during finalization of the ICCMS modification.

19. (AHPB 2-2)

In Section 2.11 of the original LAR, it is stated several times that Safety Parameter Display System (SPDS) and ICCMS perform the same functions independently, for example, "To support EPU the ICCMS and Safety Parameter Display System (SPDS) will independently perform the [High Pressure Injection] HPI flow monitoring function automatically," as stated in Section 2.11.1.2, under "Description of Analyses and Evaluations," Question 2 CR-3 Response, 3.

a. Is the SPDS safety-related?

Response:

No. The SPDS was previously installed at CR-3 to meet, in part, the requirements of NUREG-0737, "Clarification of TMI Action Plan Requirements," (References 2 and 3) and is not required to meet safety-related requirements as stated in Supplement 1 of NUREG 0737.

b. Will the SPDS and the ICCMS be used by operators to verify each other's output?

Response:

No. Per CR-3 procedures, operators are directed to use Regulatory Guide 1.97, "Criteria for Accident Monitoring Instrumentation for Nuclear Power Plants," (RG 1.97) compliant instruments as the primary method for monitoring and controlling plant parameters during degraded plant conditions and to use redundant or alternate indication when verifying critical parameters, if available. Thus, the operator will use existing RG 1.97 indications and the new ICCMS displays. ICCMS and SPDS will not be used by operators to verify each other's inputs.

c. What guidance will be provided for situations when ICCMS and SPDS differ significantly?

Response:

Operator response to plant instrumentation that differs significantly is not altered. A situation where ICCMS and SPDS indication differ significantly is not appreciably different from a scenario where an SPDS indication differs significantly with indications of other automatic protective systems (e.g., Reactor Protection System and Engineered Safety Actuation System). Per CR-3 procedures, operators are directed to use RG 1.97 compliant instruments during degraded plant conditions for monitoring and controlling plant parameters. The ICCMS displays provide RG 1.97 indication for monitoring the proper operation of the ICCMS functions.

d. How can these instruments be independent when the SPDS HPI low range flow comes from HPI flow transmitters in ICCMS? Other examples are Reactor Coolant System (RCS) wide range pressure and RCS low range pressure.

Response:

The use of the term "independent" as specified in Section 2.11.1, "Human Factors," of the EPU Technical Report (TR) (Reference 1, Attachments 5 and 7) refers to the independence of the indication, alarms, displays, and the generation of the loss of SCM and inadequate HPI flow curves; and is not intended to imply independent input parameters. The ICCMS and SPDS are designed to receive input from the applicable plant parameters and separately process and calculate SCM and HPI adequacy. ICCMS Channels 1 and 2 use common field instruments with the two SPDS channels with electrical isolation between the safety-related functions and the non safety-related monitoring systems. ICCMS Channel 3 receives input from the applicable plant parameters via new instrumentation.

e. Additionally, Section 2.11.1.2, under "Description of Analyses and Evaluations," Question 4 CR-3 Response, of the original LAR contains the following statement: "The SPDS will provide backup indication to be used in conjunction with the ICCMS and will be available if the ICCMS based instrumentation was lost." How will operators be warned that the displays being obtained for SPDS from ICCMS are invalid?

Response:

SPDS does not obtain input parameters or algorithm outputs from ICCMS. SPDS retains its 'validity checking' capability. Additionally, an ICCMS status panel will be mounted on the main control board above the ICCMS display section. This status panel will provide positive status indicators for the three ICCMS initiation channels and the two ICCMS actuation trains to warn the operators that the ICCMS displays are invalid.

20. (AHPB 2-3)

Contrary to RS-001, "Review Standard for Extended Power Uprates," Section 2.11.1, "Human Factors," Question 5, of the original LAR, the licensee did not provide the implementation schedule for making the changes to the training program and the control room simulator. Provide the above information so that the NRC staff can determine whether the changes will be completed in a logical sequence and prior to operating under uprated conditions. If an implementation schedule is not available, the licensee should commit to completing the simulator changes prior to simulator training, and to completing all EPU-required training prior to operation under uprated conditions.

Response:

As stated in Section 2.11.1, "Human Factors," of the EPU TR (Reference 1, Attachments 5 and 7), training program revisions and simulator modifications will be completed prior to pre-startup simulator training and operators will receive simulator training on the EPU related Control Room changes prior to the first plant startup under EPU conditions.

21. (AHPB 2-4)

Were any human factors lessons learned from other plant EPU experiences? If yes, describe.

Response:

FPC has and will continue to benchmark other EPU plants, as appropriate. While there have not been any specific, directly applicable lessons learned, FPC noted and evaluated the following:

- Some plants have experienced over-ranging of key instruments. FPC is re-evaluating plant instrumentation to minimize this potential at CR-3;

- Changes to key mitigation strategies require consideration of competing priorities. FPC is carefully sequencing required steps during emergency operating procedure revisions to minimize potential conflicts; and

- FPC has not identified specific Operational Experience applicable to the ICCMS and Fast Cooldown System (FCS) since these systems are unique in pressurized water reactor designs.

22. (AHPB 2-5)

In Section 2.11.1.2, under "Introduction" the original LAR, it is stated, "When initiating a plant change, the engineering change (EC) process requires the completion of a Human Factors review for changes that may impact the Control Room layout (alarms, indication, appearance or performance)." Provide a copy of a Human Factors review that was done for an EC supporting the EPU.

Response:

The Progress Energy fleet design control procedure explicitly requires human factors reviews as one of the design review considerations associated with plant modifications. Engineering Changes (ECs) at CR-3 that include modification to the main control board are reviewed for compliance to CR-3 Specification SP-5145, "Human Factors Design Conventions for the Control Room Specification and Criteria." As discussed with the NRC staff during a teleconference on February 29, 2012 regarding the AHPB RAI, the enclosure to this correspondence provides a copy of Specification SP-5145. Additionally, operations and training staff focus on human factors as a key design attribute addressed during their review of plant modifications that impact the control room design and layout.

Also, the following is an example of a human factors review performed for an EPU modification:

- A senior engineer from the CR-3 design engineering organization, independent of the CR-3 EPU Design Team, reviewed proposed changes to the CR-3 main control board associated with the FCS modification using applicable criteria specified in Specification SP-5145. No modifications or recommendations were identified and this human factors review was completed and electronically signed in the associated EC package on February 10, 2012.

- The EPU operations support group provided a comprehensive review of the EC package associated with the FCS modification design, including a review of the proposed control

room design and layout changes. Comments and recommendations from this review were dispositioned and the design revised as necessary.

- Prior to final approval of EC package associated with the FCS modification design, the plant design review board reviewed and endorsed the design considering human factors.

To further supplement the CR-3 human factors review of the EPU EC design packages affecting the main control room design and layout, FPC is also obtaining the services of an experienced human factors reviewer(s) to independently assess the integrated impact of the proposed EPU plant modifications. The independent assessment will focus on the overall human factors impacts to the CR-3 main control room design as a result of the EPU modifications. FPC will disposition the recommendations from this independent assessment and revise the applicable modification design packages prior to installation.

References

1. FPC to NRC letter dated June 15, 2011, "Crystal River Unit 3 – License Amendment Request #309, Revision 0, Extended Power Uprate." (Accession No. ML112070659)

2. NUREG-0737, "Clarification of TMI Action Plan Requirements," dated November 1980.

3. NUREG-0737 Supplement No. 1, "Clarification of TMI Action Plan Requirements – Requirements for Emergency Response Capability," dated January 1983.