Progress Energy

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

Ref: 10 CFR 54

January 27, 2010
3F0110-04

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

Subject: Crystal River Unit 3 – Response to Request for Additional Information for the Review of the Crystal River Unit 3, Nuclear Generating Plant, License Renewal Application (TAC NO. ME0274) and Amendment #9

References: (1) CR-3 to NRC letter, 3F1208-01, dated December 16, 2008, "Crystal River Unit 3 – Application for Renewal of Operating License"

(2) NRC to CR-3 letter, dated November 30, 2009, "Request for Additional Information for the Review of the Crystal River Unit 3 Nuclear Generating Plant, License Renewal Application (TAC NO. ME0274)"

Dear Sir:

On December 16, 2008, Florida Power Corporation (FPC), doing business as Progress Energy Florida, Inc. (PEF), requested renewal of the operating license for Crystal River Unit 3 (CR-3) to extend the term of its operating license an additional 20 years beyond the current expiration date (Reference 1). Subsequently, the Nuclear Regulatory Commission (NRC), by letter dated November 30, 2009, provided a request for additional information (RAI) concerning the CR-3 License Renewal Application (Reference 2). Enclosure 1 to this letter provides the response to Reference 2. Enclosure 2 includes changes to the License Renewal Application commensurate with the RAI responses and additional Progress Energy-identified changes.

No new regulatory commitments are contained in this submittal. However, the RAI responses resulted in a change to License Renewal Commitment #27. Enclosure 2 describes revised Commitment #27.

If you have any questions regarding this submittal, please contact Mr. Mike Heath, Supervisor, License Renewal, at (910) 457-3487, e-mail at mike.heath@pgnmail.com.

Sincerely,

Jon A. Franke
Vice President
Crystal River Unit 3

JAF/dwh

Enclosures: 1. Response to Request for Additional Information
2. Amendment #9, Changes to the License Renewal Application

xc: NRC CR-3 Project Manager
NRC License Renewal Project Manager
NRC Regional Administrator, Region II
Senior Resident Inspector

A140
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 27 day of January, 2010, by Jon A. Franke.

Carolyn E Portmann

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

ENCLOSURE 1

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

REQUEST FOR ADDITIONAL INFORMATION

RAI B.2.37-2

1. In July 2008, BADGER testing of Carborundum plates at Palisades Nuclear Plant (Palisades) revealed degradation of neutron absorber materials exceeding technical specification requirements. In response to the Palisades operating experience, the U.S. Nuclear Regulatory Commission issued Information Notice 2009-26: "Degradation Of Neutron-Absorbing Materials in the Spent Fuel Pool." Crystal River Unit 3 Nuclear Generating Plant (CR-3) has not provided sufficient information to justify the current surveillance of Carborundum using only a weight loss correlation of a 15% boron loss for a 20% weight loss. Given recent operating experience with Carborundum, discuss how the material condition of Carborundum will be monitored during the period of extended operation aside from the coupon testing and whether neutron attenuation testing will be used during the period of extended operation. If neutron attenuation or a comparable test will be performed, please provide the following:

   - Provide the scope of the testing. Include the structures and components that will be under surveillance.
   - Describe how the neutron-absorbing capacity and degradation of material will be monitored and trended. Include a description of the parameters, calculations, and acceptance criteria pertaining to the additional testing.
   - Discuss how the structures and components will be maintained for the extended licensing period. Please include the methods, techniques (e.g., BADGER testing, blackness testing), frequency, sample size, data collection and timing.
   - Describe the acceptance criteria of the testing and how it ensures that Carborundum's structure and function are maintained over the extended period.
   - Describe the corrective actions that would be implemented if test results are not acceptable (e.g., expansion criteria).

2. The inspection interval for Carborundum was recently extended from every five years to every 10 years. Based on current operating experience, i.e., Palisades, and a 2004 failed sample with weight loss of 21% at CR-3, please provide additional justification for extending the surveillance inspections of the sample coupons to 10 years.

CR-3 RESPONSE

1. *Each bullet of Request 1 is discussed in turn below:*

   Periodic neutron attenuation testing will be used to monitor the Carborundum neutron absorber material at Crystal River Unit 3 (CR-3) during the period of extended operation.

   - Provide the scope of the testing. Include the structures and components that will be under surveillance.

The CR-3 Fuel Pool Rack Neutron Absorber Monitoring Program will monitor the Carborundum (B_4C) neutron absorber material in the spent fuel racks in Spent Fuel Pool A in the Auxiliary Building. The spent fuel racks in Spent Fuel Pool B in the Auxiliary Building do not contain Carborundum.

- Describe how the neutron-absorbing capacity and degradation of material will be monitored and trended. Include a description of the parameters, calculations, and acceptance criteria pertaining to the additional testing.

  Due to recent industry Operating Experience (OE) at Palisades, two methods will be used to determine and trend Carborundum poison:

  a) In-situ neutron attenuation methods (BADGER or comparable) will be used to determine if degradation of the Carborundum has occurred in representative areas of the Spent Fuel Pool A spent fuel racks. Acceptance criteria will be established to assure the level of neutron attenuation currently assumed in the criticality analyses underlying Improved Technical Specification (ITS) Limiting Condition for Operation (LCO) 3.7.15, "Spent Fuel Assembly Storage," is still present and will be continually maintained through the period of extended operation.

  b) The current sample coupon visual and weight inspection program will be continued. Acceptance criteria will initially be maintained at the current 20% weight loss, but weight loss trends will be compared to the neutron attenuation, and results would be modified as appropriate. For example, if the neutron attenuation results demonstrate poison loss greater than the weight loss measurement results, the weight loss acceptance criteria would be revised to reflect the as-measured correlation.

- Discuss how the structures and components will be maintained for the extended licensing period. Please include the methods, techniques (e.g., BADGER testing, blackness testing), frequency, sample size, data collection and timing.

  Two testing methods will be used:

  a) BADGER, or comparable, testing methods will be performed in accordance with vendor recommendations for testing and data collection methods. Industry OE will be monitored and sample size will be determined based on both vendor recommendations and experience at other units. Rack loading history will be considered to target locations for testing.

  BADGER, or comparable, in-situ neutron attenuation testing will be initially performed prior to the period of extended operation, and will be repeated at 10-year intervals within the extended operating period. BADGER testing will be staggered with the current sample coupon testing program so that either BADGER or the sample coupon testing will occur approximately every 5 years through the period of extended operation. Industry OE will be monitored and the test interval will be revised as appropriate based on test results and/or industry OE.

  b) The previously discussed sample coupon test program will be continued. This program consists of removing and inspecting Carborundum sample coupons.

Coupons are visually inspected for signs of degradation – such as spalling, loss of boron grains, separation of backing material – and weighed. The weight loss results and trends will be compared to the BADGER in-situ neutron attenuation test results. The sample coupons will be removed and inspected on a 10-year interval, implemented on a staggered basis with the BADGER testing, such that either neutron attenuation testing (BADGER) or sample coupon testing will occur approximately every 5 years.

- Describe the acceptance criteria of the testing and how it ensures that Carborundum's structure and function are maintained over the extended period.

  a) *BADGER (or comparable neutron attenuation testing): The acceptance criteria will be established such that it assures the neutron attenuation assumptions of the current criticality analysis are met. The results will then be projected based on time and dose to the next performance interval to ensure the attenuation capabilities assumed in the criticality analysis are continually met through the period of extended operation.*

  b) *Acceptance criteria for the sample coupon test program are based on two aspects – visual inspection and weight loss. Visual inspections look for the general condition of the sample coupons ensuring no spalling, blistering or loss of grain material. Based on previous testing by the poison material vendor, weight loss can be correlated to boron loss, with a 20% weight loss equivalent to a 15% boron loss. A 15% boron loss has been assumed in the current criticality analysis that supports ITS LCO 3.7.15. Therefore, the current acceptance criterion is a 20% weight loss.*

     The sample coupon test program will verify that there are no visual signs of accelerating degradation. The weight loss results and trends will:

     (1) Be projected to the next scheduled BADGER and sample coupon test interval to ensure no unacceptable weight loss correlated to unacceptable loss of neutron attenuation is expected, and

     (2) The weight loss will be compared to the BADGER in-situ neutron attenuation test results. This comparison will be used to determine if the projected weight loss at the next test interval indicates unacceptable degradation. This comparison of BADGER results and weight loss results will also be used to revise the weight loss acceptance criteria, if required.

- Describe the corrective actions that would be implemented if test results are not acceptable (e.g., expansion criteria).

  Surveillance Procedure SP-192, "High Density Rack Poison Sampling (SF Pool A)," provides a method for verifying the condition of the B_4C poison material of the high density poison racks in Spent Fuel Pool A. Failure to meet K_{eff} requirements at the time of testing would result in initiation of a Licensee Event Report for being in an unanalyzed condition that significantly degraded plant safety. The initial response to this condition would be to ensure the spent fuel pool soluble boron concentration is at the required concentration. Corrective actions associated with failure to meet projected K_{eff}

requirements would depend upon the specifics of the test/results. Options could include: re-performance of the criticality analysis to take credit for soluble boron, purchase of neutron absorbing fuel inserts (either inserts in the fuel or rack inserts) to restore the rack neutron attenuation capabilities, or accelerated forward dry storage container loading to reduce the fuel loading in the pool and add additional empty rack locations to lower installed K_{eff}. In any case, failure to meet criticality acceptance criteria would be tracked to resolution in the CR-3 Corrective Action Program, including completion of any prescribed corrective actions.

Based on this response and the response to RAI 3.3.2.2.6-2 below, changes to the CR-3 License Renewal Application (LRA) are necessary. The required LRA changes are presented in Enclosure 2.

CR-3 RESPONSE

2. *Crystal River Unit 3 had an average weight loss of less than 7% at the last surveillance interval (from rack installation to 2004). The 11-year period from 1993 to 2004 had an increase in weight loss of less than 2%. There is an available weight loss margin of 13% with historical increases in weight loss of less than 2% per 10-year period. Additionally, the sample coupon weight loss measurements will be staggered with the BADGER in-situ neutron attenuation testing, which will also on a 10-year test interval. The result will be a Spent Fuel Pool A rack poison surveillance test, either BADGER or sample coupon weight loss, every 5 years. The weight loss will be correlated to the BADGER in-situ neutron attenuation measurements to provide for more meaningful projections of rack poison status between test intervals and to modify the weight loss acceptance criteria if required.*

   Regarding the 2004 failed sample with weight loss of 21%, the sample coupon with greater than 21% loss is considered an anomaly in that the coupon experiencing the 21% weight loss is directly opposite the vent/inspection hole in the packet, and was believed to have been damaged (eroded) by water rinsing/lancing for decontamination during removal of the holder from the spent fuel pool. The sample coupon packet contained 10 sample coupons. The 9 other coupons in the same sample packet ranged from approximately 4% to 5% weight loss. The inspection revealed the only damage was the area opposite the vent/inspection hole in the packet. Since the abnormal weight loss was only on one sample coupon in the sample packet and only in the area opposite the vent/inspection hole, it was not considered representative of the performance of the rack material installed in the spent fuel pool racks.

   Additionally, the investigation performed via the CR-3 Corrective Action Program explored the ramifications on rack criticality should this same degradation be actually occurring opposite the vent/inspection holes in the installed racks. The vent/inspection holes in the racks are at the top of the racks, above the active fuel length of the fuel rods. Should degradation opposite the vent/inspection holes be occurring in the racks as it did in the sample coupon, the only degradation would be above the active fuel length and consequently there would be no significant impact to the criticality analysis. Boron concentration in the Spent Fuel Pool is normally maintained at or above the refueling boron concentration as an additional conservative measure.

RAI 3.3.2.2.6-2

Discuss the surveillance program that will be implemented for Boral used in the spent fuel storage racks during the extended license period by providing the following:

- Provide the scope of the program. Please include the structures and components that will be under surveillance.
- Describe how the neutron-absorbing capacity and degradation of material will be monitored and trended. Please include a description of the parameters, calculations, and acceptance criteria.
- Discuss how the structures and components will be maintained for the extended licensing period. Include the methods, techniques (e.g., visual, weight, volumetric, surface inspection), frequency, sample size, data collection and timing.
- Describe the acceptance criteria of the program and how it ensures that Boral's structure and function are maintained over the extended period.
- Describe the corrective actions that would be implemented if test results are not acceptable.

CR-3 RESPONSE

Responses to the individual parts of the RAI are provided below:

- Provide the scope of the program. Please include the structures and components that will be under surveillance.

  The CR-3 Fuel Pool Rack Neutron Absorber Monitoring Program will monitor the Boral used in the spent fuel racks in Spent Fuel Pool B.

- Describe how the neutron-absorbing capacity and degradation of material will be monitored and trended. Please include a description of the parameters, calculations, and acceptance criteria.

  In-situ neutron attenuation methods (BADGER or comparable) will be used to determine if degradation of the Boral has occurred in representative areas of the Pool B racks. Acceptance criteria will be established to assure the level of neutron attenuation currently assumed in the criticality analyses underlying ITS LCO 3.7.15 is present and will be continually maintained through the period of extended operation.

- Discuss how the structures and components will be maintained for the extended licensing period. Include the methods, techniques (e.g., visual, weight, volumetric, surface inspection), frequency, sample size, data collection and timing.

  BADGER, or comparable, testing methods will be performed in accordance with vendor recommendations for testing and data collection methods. Industry OE will be monitored and sample size will be determined based on both vendor recommendations and *experience at other units. Rack loading history will be considered to target locations for testing.*

BADGER, or comparable, in-situ neutron attenuation testing will be initially performed prior to the period of extended operation, and will be repeated at 10-year intervals within the extended operating period. Industry OE will be monitored and the test interval will be revised as appropriate based on test results and/or industry OE.

- Describe the acceptance criteria of the program and how it ensures that Boral's structure and function are maintained over the extended period.

  The acceptance criteria will be established such that it assures the neutron attenuation assumptions of the current criticality analysis are valid. The results will then be projected based on time and dose to the next performance interval to ensure the attenuation capabilities assumed in the criticality analysis are continually maintained.

- Describe the corrective actions that would be implemented if test results are not acceptable.

  The CR-3 Fuel Pool Rack Neutron Absorber Monitoring Program will provide a method for verifying the condition of the B_4C poison material of the high density poison racks in Spent Fuel Pool B. Failure to meet K_{eff} requirements at the time of testing would result in initiation of a Licensee Event Report for being in an unanalyzed condition that significantly degraded plant safety. The initial response to this condition would be to ensure the spent fuel pool soluble boron concentration is at the required concentration. Corrective actions associated with failure to meet projected K_{eff} requirements would depend upon the specifics of the test/results. Options could include: re-performance of the criticality analysis to take credit for soluble boron, purchase of neutron absorbing fuel inserts (either inserts in the fuel or rack inserts) to restore the rack neutron attenuation capabilities, or accelerated forward dry storage container loading to reduce the fuel loading in the pool and add empty rack locations to lower installed K_{eff}. In any case, failure to meet criticality acceptance criteria would be tracked to resolution in the CR-3 Corrective Action Program, including completion of any prescribed corrective actions.

Based on this response and the response to RAI B.2.37-2 above, changes to the CR-3 LRA are necessary. The required LRA changes are presented in Enclosure 2.

RAI B.2.7-2.1

The response to RAI B.2.7-2 (in letter dated October 13, 2009) included a sample list of Condensate System components for which wall thinning is predicted and measured by ultrasonic testing (UT). The list includes the initial wall thickness (nominal), current (measured) wall thickness and the thickness predicted by the CHECWORKS FAC model.

Clarify the information in the Wear Rate Analysis: Combined Summary Report table. In particular, describe the initial, predicted, and measured wall thicknesses. For example, line Item 108-001P has an initial wall thickness of 0.375, a CHECWORKS predicted value of 0.444, and a current measured value of 0.455 mils. Clarify how the current measured thickness is greater than the initial thickness. In addition, provide the initial (measured) wall thickness for each system found in the table.

CR-3 RESPONSE

1. Describe the initial, predicted, and measured wall thicknesses.

   Initial Wall Thickness

   The initial wall thickness for any given wear rate run is based on the nominal wall thickness required by the original design specification for the piping. The exception to this is equipment nozzles. The initial thickness for equipment nozzles is based on the nominal wall thickness provided by the equipment manufacturer. The measured initial wall thickness always meets or exceeds the nominal wall thickness required by the design specification. Nominal wall thickness required by the design specification is always used as the initial wall thickness because the initial thickness of any given component is not known.

   Measured Wall Thickness

   For uninspected components, CHECWORKS uses the initial wall thickness as the measured wall thickness upon which to base wall thickness predictions. For inspected components, CHECWORKS uses the minimum measured wall thickness, based upon Ultrasonic Test (UT) measurements, as the base for predicting wall thickness. In the attached table, all of the components in the third to the last column have a measured thickness (MT).

   Predicted Wall Thickness

   For uninspected components, predicted wall thickness is based on the initial wall thickness since CHECWORKS has no measured value to base future predictions.

   As an example, refer to the following Wear Rate Analysis report data for component 108-004E (uninspected):

   Tpred = Tinit – (Average Wear Rate x Time)

   From the example provided for 108-004E:

   Average Wear Rate = 3.323 mils/year,
   Time = Total Plant Operating Time = 216776 hrs/8760 hrs/year = 24.75 years.

   Therefore:

   Tpred = 0.375 in. – (3.323/1000 x 24.75) = 0.293 in.

   For inspected components, predicted wall thickness is based on the measured wall thickness from the minimum measured UT wall thickness.

   As an example, for component 108-007P DS (inspected):
   Tpred = Tmeas – (Current Wear Rate x Time)

Where:

Current Wear Rate = 0.936 mils/yr
Time = Total Plant Operating Hours – In-Service Component Time
= (216776 hrs – 135675 hrs)/8760 hours/year = 9.26 years.

Therefore,

Tpred = 0.360 in. – (0.936/1000 x 9.26) = 0.351 in.

2. Clarify how line Item 108-001P has the current measured thickness as greater than the initial thickness.

   It is not possible that the current measured thickness is greater than the initial thickness. A plant walkdown was performed and confirmed that item 108-001P does not actually exist. The Item 108-001P measurement was actually taken on the nearby nozzle which is thicker than the adjoining pipe. The CHECWORKS model has been updated and the revised Wear Rate Analysis report is attached.

3. Provide the initial (measured) wall thickness for each system found in the table.

   In the subject table, all of the following components with MT in the third to the last column have a measured thickness. All other components have not had their thickness measured. The components that identify MT in the third to last column have a measured thickness as follows:

Component Name	***Measured Thickness (Tmeas)***
111-001N	*0.480*
111-010P	*0.330*
111-012EE	*0.339*
111-012EE (D/S)	*0.309*
108-001N	*0.455*
108-002RE	*0.383*
108-002RE (D/S)	*0.404*
108-003P US	*0.344*
108-007P DS	*0.360*
108-008E	*0.364*
108-009EE	*0.389*
108-009EE (D/S)	*0.379*

Company: *PROGRESS ENERGY SERVICE COMPANY*
Plant: *CRYSTAL RIVER*
Unit: *3*
DB Name: Validation-CR3-SFA

Report Date/Time: 06-Dec-2009 09:55 am
Analysis Date/Time: 06-Dec-2009 9:52 am

CHECWORKS SFA Version: 2.2 SP-1 (build 70)

Wear Rate Analysis: Combined Summary Report

Run Name: *CD CDHE-2 TO CDHE-3*
Ending Period: *17R OUTAGE*
Total Plant Operating Hours: 216776
WRA Data Option: *NFA->ARD->HBD->COMP*
Line Correction Factor: *0.709*

Duty Factor (Global) : *1.000*
Exclude Measure Wear : *NO*

Component Name	Geom Code	Average Wear Rate (mils/yr)	Current Wear Rate (mils/yr)	Thickness Init.	Thickness Prd.[1]	Thickness Thoop	Thickness Tcrit	Comp Predict [1] Time to Tcrit (hrs)	Inspected	Total Lifetime Wear (mils) Prd [2]	Total Lifetime Wear (mils) Meas.	In-Service Comp Wear (mils) Prd [2]	In-Service Comp Wear (mils) Meas.	In-Service Comp Tmeas. (in)[4]	Method [3]	Time Hrs[4]	Time (hrs) Last Inspected
=== > Grouped by Line: CD-100 CDHE-2A to CDHE-3A, Sorted By: Flow Order																	
111-001 N	31	1.423	0.593	0.500	0.477	0.235	0.235	3575395	Yes	31.8	50.0	31.8	50.0	0.480	MT	169064	169064
111-002RE	16	1.923	0.801	0.375	0.327	0.235	0.235	1015603	No	0.0	0.0	0.0	0.0	0.375		0	0
111-002RE (D/S)	16	2.784	1.160	0.375	0.306	0.208	0.208	737234	No	0.0	0.0	0.0	0.0	0.375		0	0
111-003P	66	1.796	0.748	0.375	0.331	0.208	0.208	1428884	No	0.0	0.0	0.0	0.0	0.375		0	0
111-004E	2	3.323	1.385	0.375	0.293	0.208	0.208	533308	No	0.0	0.0	0.0	0.0	0.375		0	0
111-005P	52	2.245	0.936	0.375	0.319	0.208	0.208	1039045	No	0.0	0.0	0.0	0.0	0.375		0	0
111-006E	2	3.323	1.385	0.375	0.293	0.208	0.208	533308	No	0.0	0.0	0.0	0.0	0.375		0	0
111-007P	52	2.245	0.936	0.375	0.319	0.208	0.208	1039045	No	0.0	0.0	0.0	0.0	0.375		0	0
111-008E	2	3.323	1.385	0.375	0.293	0.208	0.208	533308	No	0.0	0.0	0.0	0.0	0.375		0	0
111-009E	4	3.323	1.385	0.375	0.293	0.208	0.208	533308	No	0.0	0.0	0.0	0.0	0.375		0	0
111-010P	54	2.874	1.197	0.375	0.313	0.208	0.208	766071	Yes	54.3	44.0	54.3	44.0	0.330	MT	103510	103510
111-011E	2	3.323	1.385	0.375	0.293	0.208	0.208	533308	No	0.0	0.0	0.0	0.0	0.375		0	0
111-012EE	19	3.593	1.497	0.375	0.333	0.208	0.208	730435	Yes	83.2	61.0	83.2	61.0	0.339	MT	185384	185384
111-012EE (D/S)	19	3.077	1.282	0.375	0.304	0.235	0.235	475439	Yes	71.2	102.0	71.2	102.0	0.309	MT	185384	185384
111-013N	30	3.134	1.306	0.500	0.422	0.235	0.235	1260846	No	0.0	0.0	0.0	0.0	0.500		0	0
=== > Grouped by Line: CD-101 CDHE-2B to DCHE-3B, Sorted By: Flow Order																	
108-001N	31	3.917	1.632	0.500	0.436	0.235	0.235	1080568	Yes	77.8	76.0	77.8	76.0	0.455	MT	119830	119830
108-002RE	16	1.923	0.801	0.375	0.374	0.235	0.235	1520568	Yes	38.2	54.0	38.2	54.0	0.383	MT	119830	119830
108-002RE (D/S)	16	2.784	1.160	0.375	0.390	0.208	0.208	1373721	Yes	55.3	51.0	55.3	51.0	0.404	MT	119830	119830
108-003P US	66	1.796	0.748	0.375	0.335	0.208	0.208	1483528	Yes	35.7	63.0	35.7	63.0	0.344	MT	119830	119830
108-003P DS	66	1.796	0.748	0.375	0.331	0.208	0.208	1428884	No	0.0	0.0	0.0	0.0	0.375		0	0
108-004E	2	3.323	1.385	0.375	0.293	0.208	0.208	533308	No	0.0	0.0	0.0	0.0	0.375		0	0
108-005P	52	2.245	0.936	0.375	0.319	0208	0.208	1039045	No	0.0	0.0	0.0	0.0	0.375		0	0
108-006E	2	3.323	1.385	0.375	0.293	0.208	0.208	533308	No	0.0	0.0	0.0	0.0	0.375		0	0

Component Name	Geom Code	Average Wear Rate (mils/yr)	Current Wear Rate (mils/yr)	Thickness Init.	Thickness Prd.[1]	Thickness Thoop	Thickness Tcrit	Comp Predict [1] Time to Tcrit (hrs)	Inspected	Total Lifetime Wear (mils) Prd [2]	Total Lifetime Wear (mils) Meas.	In-Service Comp Wear (mils) Prd [2]	In-Service Comp Wear (mils) Meas.	In-Service Comp Tmeas. (in)[4]	Method, [3]	Time Hrs[4]	Time (hrs) Last Inspected
108-007P US	52	2.245	0.936	0.375	0.319	0.208	0.208	1039045	No	0.0	0.0	0.0	0.0	0.375		0	0
108-007P DS	52	2.245	0.936	0.375	0.351	0.208	0.208	1332841	Yes	46.4	27.0	46.4	27.0	0.360	MT	135675	135675
108-008E	2	3.323	1.385	0.375	0.350	0.208	0.208	897965	Yes	68.6	67.0	68.6	67.0	0.364	MT	135675	135675
108-009EE	19	3.593	1.497	0.375	0.374	0.208	0.208	970474	Yes	74.2	92.0	74.2	92.0	0.389	MT	135675	135675
108-009EE (D/S)	19	3.077	1.282	0.375	0.366	0.235	0.235	901224	Yes	63.5	65.0	63.5	65.0	0.379	MT	135675	135675
108-010N	30	3.134	1.306	0.500	0.422	0.235	0.235	1260846	No	0.0	0.0	0.0	0.0	0.500		0	0

Notes:

[1] Predictions are based on last Tmeas to analysis ending period.
[2] Predictions are for the time of last known meas. wear. Can be P-to-P value depending on meas. wear method.
[3] GW = Tmeas is minimum thickness from Band, Blanket or Area Method of greatest wear
MT = Tmeas is component minimum thickness.
PW = Tmeas is Tinit - predicted wear.
US = Tmeas is user specified.
[4] If no Tmeas has been determined from measured data then Tmeas = Tinit and Time = current component installation time.
Tmeas is used to determine Predicted Thickness and Component Predicted Time to Tcrit.

RAI B.2.16-1.1

The response to RAI B.2.16-1 (in letter dated October 13, 2009) stated that "Performance of UT of the two tanks [FST-2A and FST-2B] is no longer contingent upon whether visual inspection proves inadequate or indeterminate. New preventive maintenance periodic activities using UT and internal tank inspections have recently been generated for FST-2A and FST-2B."

Provide the frequency of UT and internal inspections of the FST-2A and -2B tanks. Discuss whether periodic cleaning of the tanks will be conducted.

CR-3 RESPONSE

Internal tank inspections and flushing were performed on FST-2A and FST-2B during 2009. Preventive Maintenance (PM) activities have been generated for FST-2A and FST-2B. The PM activities include draining fuel oil from the tanks. An inspection of the tank internals will be performed to determine the material condition of the tank. Engineering will perform and document the results of the internal inspection. Based upon the results of the inspection, the tanks will be cleaned/flushed as necessary. These PM activities are to be performed every two years, unless trending indicates an appropriate change in frequency is warranted, with both tanks being scheduled for inspection in 2010. UT of both tanks will be performed prior to the period of extended operation, with the frequency of subsequent UT inspections dependent upon the initial UT results, not to exceed an interval of ten (10) years.

PROGRESS ENERGY FLORIDA, INC.

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50 - 302 / LICENSE NUMBER DPR - 72

ENCLOSURE 2

AMENDMENT 9,
CHANGES TO THE LICENSE RENEWAL APPLICATION

Amendment 9, Changes to the License Renewal Application

<table>
<tr><th>Source of Change</th><th>License Renewal Application Amendment 9 Changes</th></tr>
<tr><td>RAI 3.3.2.2.6-2 and RAI B.2.37-2</td><td>
Replace Subsection 3.3.2.2.6 on LRA Page 3.3-68 with the statement: "Deleted consistent with the recommendations of LR-ISG-2009-01."
Revise Table 3.3.1 line item 3.3.1-13 on LRA Page 3.3-77 as follows:
<table>
<tr><td>3.3.1-13</td><td>Boral, boron steel and other materials (excluding Boraflex) spent fuel storage racks neutron-absorbing sheets exposed to treated water or treated borated water and radiation effects</td><td>Reduction of neutron-absorbing capacity, change in dimensions and loss of material due to the effects of the SFP environment</td><td>Plant specific</td><td>Yes, plant specific</td><td>Consistent with NUREG-1801

CR-3 has identified reduction of neutron-absorbing capacity, change in dimensions, and loss of material as applicable aging effects consistent with the recommendations of LR-ISG-2009-01. These aging effects are managed by the Fuel Pool Rack Neutron Absorber Monitoring Program, which is a plant specific program. The Fuel Pool Rack Neutron Absorber Monitoring Program has been compared to the aging management program recommendations of LR-ISG-2009-01, and determined to be consistent with the ISG.</td></tr>
</table>
Change the title of the Carborundum (B4C) Program for the Auxiliary Building on LRA Page 3.5-7 to the Fuel Pool Rack Neutron Absorber Monitoring Program.
Combine the AMR line items for Boral and Carborundum Spent Fuel Storage Racks on LRA Page 3.5-77 as follows:
<table>
<tr><td>Boral, Carborundum (B_4C)</td><td>Treated Water</td><td>Reduction of neutron-absorbing capacity, loss of material, change in dimensions</td><td>Fuel Pool Rack Neutron Absorber Monitoring</td><td>VII.A2-3 (A-89)</td><td>3.3.1-13</td><td>F, 540</td></tr>
</table>
On LRA Page 3.5-153, change Plant-Specifc Note 528 to read: "Deleted."
On LRA Page 3.5-154, change Plant-Specifc Note 540 to read:
The CR-3 AMR incorporates the recommendations of LR-ISG-2009-01, and manages CR-3 fuel pool rack neutron absorbing materials for the aging effects Reduction of Neutron-Absorbing Capacity, Change in Dimensions, and Loss of Material with the Fuel Pool Rack Neutron Absorber Monitoring Program.
On LRA Pages A-3 and A-20, revise the title of program A.1.1.37 to "Fuel Pool Rack Neutron Absorber Monitoring Program," and revise the program description on Page A-20 to read:
(continued)
</td></tr>
</table>

Source of Change	License Renewal Application Amendment 9 Changes
RAI 3.3.2.2.6-2 and RAI B.2.37-2 (continued)	The Fuel Pool Rack Neutron Absorber Monitoring Program is an existing program that manages the effects of aging on the Carborundum (B_4C) panels located in the high density spent fuel storage racks in Spent Fuel Pool A, and Boral panels located in the high density spent fuel storage racks in Spent Fuel Pool B. Administrative controls for the Program will be enhanced, prior to the period of extended operation, to (1) include provisions to monitor and trend data for incorporation in test procedures to ensure the projection meets the acceptance criteria, (2) incorporate acceptance criteria tables for accumulated weight losses of monitored Carborundum samples, (3) implement periodic Boron-10 Areal Density Gauge for Evaluating Racks (BADGER) testing or comparable neutron attenuation testing for racks in Pools A and B to ensure that the neutron absorption intended function is maintained, and that technical specification criticality requirements are continually met. This change requries a revision to LR Commitment #27 which is revised as follows:

27	Administrative controls for the Program will be enhanced to: (1) include provisions to monitor and trend data for incorporation in test procedures to ensure the projection meets the acceptance criteria, (2) incorporate acceptance criteria tables for accumulated weight losses of monitored Carborundum samples, (3) implement periodic Boron-10 Areal Density Gauge for Evaluating Racks (BADGER) testing or comparable neutron attenuation testing for racks in Pools A and B to ensure that the neutron absorption intended function is maintained, and that technical specification criticality requirements are continually met.	A.1.1.37	Prior to the period of extended operation	Fuel Pool Rack Neutron Absorber Monitoring Program LRA Section B.2.3, RAI 3.3.2.2.6-2, RAI B.2.37-2

On LRA Pages B-3, B-11, and B-107, revise the title of program B.2.37 to "Fuel Pool Rack Neutron Absorber Monitoring Program," and revise Subsection B.2.37 on Page B-107 to read:

(continued)

Source of Change	License Renewal Application Amendment 9 Changes
RAI 3.3.2.2.6-2 and RAI B.2.37-2 (continued)	**Program Description** The CR-3 Fuel Pool Rack Neutron Absorber Monitoring Program is an existing program that monitors the effects of aging on the neutron absorber panels in the high density spent fuel storage racks installed in the CR-3 spent fuel pools. Carborundum (Spent Fuel Pool A) and Boral (Spent Fuel Pool B) are shielding materials utilized as a neutron absorber for the CR-3 spent fuel storage racks. Stability of the shielding material supports the fuel storage pool Technical Specifications 3.7.14 and 3.7.15 criticality analysis requirement that the effective neutron multiplication factor (K_{eff}) of ≤ 0.95 must be maintained for all postulated events. The condition of the neutron absorber material in the high density spent fuel racks located in Pools A and B is an indication of the effective multiplication factor (K_{eff}) of the pool. The Program periodically removes and examines Carborundum (B_4C) poison samples from the pool to ensure that the effective multiplication factor is maintained below 0.95. The Program performs Boron-10 Areal Density Gauge for Evaluating Racks (BADGER) testing or comparable neutron attenuation testing in Pools A and B to ensure that the spent fuel rack neutron absorber intended function is maintained. **Aging Management Program Elements** The results of an evaluation of the aging management activities for the Fuel Rack Neutron Absorber Monitoring Program against the ten elements described in LR-ISG-2009-01 is provided below. • **Scope of Program** The CR-3 Fuel Pool Rack Neutron Absorber Monitoring Program monitors the effects of aging on the Carborundum panels in the high density spent fuel storage racks in Spent Fuel Pool A, and the Boral panels in the high density fuel storage racks in Spent Fuel Pool B. • **Preventive Actions** The CR-3 Fuel Pool Rack Neutron Absorber Monitoring Program is a condition monitoring program. No actions are taken as part of this inspection program to prevent or mitigate aging degradation. • **Parameters Monitored/Inspected** The parameters monitored or inspected will verify that 1) Carborundum (B_4C) sample coupons shall meet visual acceptance criteria and will be managed during the period of extended operation, and 2) Carborundum (B_4C) sample weight loss shall be within acceptable criteria and will be managed during the period of extended operation. The inspections monitor Carborundum (B_4C) samples that have been exposed to either: (1) gamma radiation dose plus borated water or (2) borated water alone to determine percentage weight loss of the sample. Based on the low percentage weight loss of Carborundum (B_4C) for sample inspections performed every five years; the inspection interval has been increased to nominally every 10 years. CR-3 will perform periodic in-situ Boron-10 Areal Density Gauge for Evaluating Racks (BADGER) or comparable neutron attenuation testing of spent fuel racks in Pool A and Pool B to directly monitor the neutron absorption capabilities of Carborundum and Boral absorber materials in these racks. (continued)

<table>
<tr><th>Source of Change</th><th>License Renewal Application Amendment 9 Changes</th></tr>
<tr><td>RAI 3.3.2.2.6-2 and RAI B.2.37-2 (continued)</td><td>

Detection of Aging Effects
The Carborundum (B_4C) panels within the scope of this program are to be inspected nominally every 10 years. This is an adequate period to detect aging effects before a loss of component intended function, since experience has shown that aging degradation for the Carborundum (B_4C) is a slow process. A five-year nominal testing interval has been utilized up to 2004, and enough data has been accumulated to determine that the degradation (loss of material) rate is low enough to satisfy acceptance criteria through the period of extended operation.

BADGER or comparable neutron attenuation testing will be initially performed for racks in Pool A (Carborundum) and Pool B (Boral) prior to the period of extended operation, and repeated at an initially prescribed frequency of once every 10 years. For Carborundum racks in Pool A, neutron attenuation testing and coupon monitoring will be scheduled in a staggered basis, such that one or the other will be performed approximately every five years.
Monitoring and Trending
Monitoring and trend data is incorporated in test procedures to be used to project and compare for upcoming sample testing. Trending of discrepancies is also performed (as required) in accordance with the Corrective Action Program. The Corrective Action Program is implemented by the CR-3 QA Program in accordance with 10 CFR 50, Appendix B. Prior to the period of extended operation, Program administrative controls will be revised to include provision to monitor and trend data for incorporation in test procedures to ensure the projection meets acceptance criteria.

Neutron attenuation test results will be compared to baseline information or prior measurements and analysis and trended against previous test results (as applicable).
Acceptance Criteria
Inspection findings are to be within the acceptance criteria to ensure that the structure or component intended function(s) are maintained under all current licensing basis (CLB) design conditions during the period of extended operation. Program administrative controls contain the applicable acceptance criteria. Prior to the period of extended operation, the administrative controls for the program will be revised to incorporate accumulated weight losses of monitored Carborundum samples.

Procedural controls for neutron attenuation testing will require evaluation to verify the ability of the fuel racks to perform their intended function through the next test interval, and to ensure that criticality requirements of Technical Specification 3.7.14 and 3.7.15 are continually met.
Corrective Actions
Corrective actions will be implemented through the CR-3 Corrective Action Program when inspection results do not meet the acceptance criteria. This program element is addressed in Subsection B.1.3.
Confirmation Process
This program element is addressed in Subsection B.1.3.
Administrative Controls
This program element is addressed in Subsection B.1.3.

(continued)</td></tr>
</table>

Source of Change	License Renewal Application Amendment 9 Changes
RAI 3.3.2.2.6-2 and RAI B.2.37-2 (continued)	• **Operating Experience** NUREG-1801 is based on industry operating experience (OE) through January 2005. NUREG-1801 and recent industry OE has been reviewed for applicability to CR-3. Industry OE identified in Information Notice 2009-26 has been evaluated, and regulatory guidance outlined in LR-ISG-2009-01 was incorporated. OE is captured on an ongoing basis through the normal Operating Experience Program where it is screened for applicability. This process will continue through the period of extended operation. Plant-specific OE has also been reviewed. At CR-3, carborundum neutron absorber has been tested since 1984. Tests have been carried out on Carborundum (B_4C) sample coupons exposed to gamma dose plus borated water. Also, samples were tested that had been exposed to only borated water. A 5-year testing interval had been utilized up to 2004, and enough data has been accumulated to determine that the degradation rate is low enough to satisfy minimum neutron attenuation capability through the period of extended operation. Additionally, because of the low degradation rate, the inspection interval has been increased to nominally every 10 years. During 2004, OE included a failed sample for a weight loss of 21% (compared to 4% to 5% for the comparable samples). It was determined that the weight loss was a result of the material loss adjacent to the sample packet vent hole. It was also determined that the vent holes were above the active fuel length, therefore degradation opposite the vent holes would not result in neutron streaming and would have no effect on reactivity. Therefore, there are no adverse consequences from material degradation opposite the holes. The Spent Fuel Pool A criticality analysis remains valid. Also during 2004, a non-conformance report was initiated concerning sample dose exposure. In 2001, during fuel movement for Spent Fuel Pool B re-rack, fuel was inadvertently moved away from the gamma sample holder. The total missed dose was estimated to be about 1% of the accumulated total dose on the samples. Since samples are exposed to accelerated gamma dose compared to the racks themselves; this 1% is considered insignificant. Therefore, the loss of exposure does not invalidate the spent fuel rack poison surveillance program. A criticality analysis was performed for Spent Fuel Pool A and B. The analysis demonstrates that for the defined acceptance criteria, the maximum K_{eff} is less than 0.95 without credit for soluble boron at a 95% probability with a 95% confidence level. Technical Specification 3.7.14 requires maintaining a concentration of dissolved boron in the fuel pool ≥ 1925 ppm until a verification of assembly loading has been performed. This concentration of dissolved boron is the minimum required concentration for fuel assembly storage and movement within the fuel storage pool. **Conclusion** Implementation of the CR-3 Fuel Pool Rack Neutron Absorber Monitoring Program will provide reasonable assurance that the Carborundum panels that are located in the spent fuel storage racks of Spent Fuel Storage Pool A, and the Boral panels in the spent fuel storage racks in Pool B, will perform their intended function consistent with the CLB through the period of extended operation.

Source of Change	License Renewal Application Amendment 9 Changes
Progress Energy-Identified Changes	Add the following descriptions after the discussion of Miscellaneous Pipe Supports and before the final paragraph on LRA Page 2.4-42:

<u>EFV-143 Valve Enclosure</u>

The EFV-143 Valve Enclosure is a reinforced concrete vault with a steel cover plate and is located in the yard between the Emergency Feedwater Pump Building and the Condensate Storage Tank. The EFV-143 Valve Enclosure provides missile protection for the valve. Also located in the enclosure are valves EFV-155 and EFV-178 that are required for Station Blackout.

C-2	Structural Support for Criterion (a)(1) components
C-3	Shelter, Protection
C-6	Missile Barrier
C-7	Structural Support for Criterion (a)(2) and (a)(3) components

<u>CDV-290 Valve Enclosure</u>

The CDV-290 Valve Enclosure is a reinforced concrete vault with an access hatch and is located in the yard between the Condensate Storage Tank and the Fire Service Water Tanks. The CDV-290 Valve Enclosure supports License Renewal intended functions based on providing support for the CDV-290 Valve.

C-7	Structural Support for Criterion (a)(2) and (a)(3) components

On LRA Page 3.5-132, for "Cable Tray, Conduit, HVAC Ducts, Tube Track," add the following Air - Indoor AMR lines for the stated material:

Galvanized Carbon Steel	Air - Indoor	None	None	III.B2-5 (TP-11)	3.5.1-58	A

Stainless Steel	Air - Indoor	None	None	III.B2-8 (TP-5)	3.5.1-59	A

Add Intended Function C-3 to the following Component/Commodity:
"Concrete: Above Grade" on LRA Pages 3.5-132 and 3.5-133,
"Concrete: Below Grade" on LRA Page 3.5-134, and
"Concrete: Foundation" on LRA Page 3.5-134.

On LRA Page 3.5-135, for "Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures," add Intended Function C-3 and also add the following AMR line:

Aluminum	Air - Outdoor	Loss of Material	Structures Monitoring	III.B4-7 (TP-6)	3.5.1-50	C. 532

On LRA Page 3.5-136, for "Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation," add the following AMR line:

Stainless Steel	Air - Indoor	None	None	III.B3-5 (TP-5)	3.5.1-59	A

<table>
<tr><th>Source of Change</th><th>License Renewal Application Amendment 9 Changes</th></tr>
<tr><td>Progress Energy-Identified Change</td><td>On LRA Page 3.5-76, add a new AMR line item for stainless steel "Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures" as follows:
<table><tr><td>Air - Outdoor</td><td>Loss of Material</td><td>Structures Monitoring</td><td>III.B4-7 (TP-6)</td><td>3.5.1-50</td><td>C, 532</td></tr></table></td></tr>
<tr><td>Progress Energy-Identified Change</td><td>On LRA Page 2.4-40, to correct the manholes associated with Plant Outside Areas and Hot Machine Shop revise the numbered list of manholes to read as follows:

1. Plant Outside Areas: E2, E3, E7
2. Hot Machine Shop: E1
3. Discharge Canal (Cable Bridge, East): SB1, SB2</td></tr>
<tr><td>Progress Energy-Identified Change</td><td>On LR Page 2.4-48, delete C-11 from the table of Intended Functions.

On LRA Page 2.4-49, delete Intended Function C-11 from the Component/Commodity "Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures" on Table 2.4.2-18.

On LRA Page 3.5-148, delete Intended Function C-11 from the Component/Commodity "Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures."</td></tr>
<tr><td>Progress Energy-Identified Change</td><td>Change the designation "120-Ton Fuel Handling Area Crane" to "Auxiliary Building Overhead Crane" in the following locations in the LRA:

• Page 2.3-92, in the list of primary components in the Fuel Handling System,
• Page 2.4-10, in the fourth paragraph of subsection 2.4.2.1,
• Page 3.5-154, in Plant-Specific Note 535,
• Page A-10, in the table of cranes provided in Subsection A.1.1.12, and
• Page B-42, in the table of cranes provided in Subsection B.2.12.</td></tr>
</table>