Progress Energy

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

Ref: 10 CFR 50.90

November 01, 2007
3F1107-04

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

Subject: Crystal River Unit 3 – License Amendment Request #296, Revision 1, Measurement Uncertainty Recapture Response to Request for Additional Information (TAC No. MD5500)

References:
1. FPC to NRC letter, 3F0607-05, "Crystal River Unit 3, License Amendment Request #296, Revision 1, Measurement Uncertainty Recapture Uprate," dated June 28, 2007
2. FPC to NRC letter, 3F0907-06, License Amendment Request (LAR) #296, Revision 1, "Measurement Uncertainty Recapture Uprate Response to Request for Additional Information," dated September 13, 2007 (TAC No. MD5500)

Dear Sir:

On September 25th and 26th, 2007, the Nuclear Regulatory Commission (NRC) issued, by email, two Requests for Additional Information (RAIs) regarding License Amendment Request (LAR) #296 (Reference 1). These RAIs originated with the Reactor Systems Branch (SRXB), Electrical Engineering Branch (EEEB) and Instrumentation and Controls Branch (EICB). These are considered to be follow up questions to the RAI response addressed in Reference 2. In accordance with the provisions of 10 CFR 50.90, Florida Power Corporation (FPC), doing business as Progress Energy Florida, Inc., hereby provides the response to the RAIs.

This letter establishes no new regulatory commitments.

If you have any questions regarding this submittal, please contact Mr. Dennis Herrin, Acting Supervisor, Licensing and Regulatory Programs at (352) 563-4633.

Sincerely,

Dale E. Young
Vice President
Crystal River Nuclear Plant

DEY/par

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NRR

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

Attachments:
- A. RAI Response – Electrical Engineering Branch (EEEB)
- B. RAI Response – Instrumentation and Controls Branch (EICB)
- C. RAI Response – Reactor Systems Branch (SRXB)
- D. Progress Energy Florida, Inc., Proposed Florida Nuclear Site Transmission Planning Study
- E. Engineering Report ER-608, Revision 2 (Proprietary)
- F. Cameron International Application For Withholding Proprietary Information From Public Disclosure
- G. CR-3 Excerpt From Draft Engineering Calculation I-95-0003
- H. CR-3 Plant Surveillance Procedure SP-113A, Revision 2, "Channel A, Power Range Nuclear Instrumentation Calibration"
- I. Isometric Drawings of Applicable Sections of CR-3 Feedwater Piping
- J. Alden Research Laboratory, Report No. 2007-133/C1229, "Calibration of Two 18" LEFM CHECKPLUS Flow Meters" (Proprietary)
- K. Cameron International Application For Withholding Proprietary Information From Public Disclosure

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

STATE OF FLORIDA

COUNTY OF CITRUS

Dale E. Young 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.

Dale E. Young
Vice President
Crystal River Nuclear Plant

The foregoing document was acknowledged before me this 1st day of November, 2007, by Dale E. Young.

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

LICENSE AMENDMENT REQUEST #296, REVISION 1

MEASUREMENT UNCERTAINTY RECAPTURE
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
ELECTRICAL ENGINEERING BRANCH (EEEB)

ATTACHMENT A

Request for Additional Information Response

On September 26, 2007, Florida Power Corporation (FPC) received a Request for Additional Information (RAI) concerning License Amendment Request (LAR) #296, Revision 1 (Reference 1) via email. On September 28, 2007, a conference call was conducted with the Staff to discuss the questions. Based on the results of that conference call, FPC hereby provides the following responses to this RAI from the Electrical Engineering Branch (EEEB).

NRC Request EEEB-1

The staff would like further clarification on the RAI responses, as follows:

A. The licensee should provide detail explanation of all the graphs that are provided in its response such as (1) for Graph #2, the result is a loss of synchronism but the generator is still outputting 812 MW and (2) similar explanation for Graph #4.

   Why isn't this considered as an adverse effect?

B. Power flow study should (1) indicate loading on all lines and any bus voltage violations and (2) provide details on the studies that are not post transients. (3) For dynamic study, the licensee only analyzed 3 phase faults on 500 KV bus. It is not clear that there are no adverse effects on the grid without considering other N-1 contingencies such as outage of transmission lines or generating unit, and (4) in the response on page 5, Appendix E, the licensee indicated that with a 3 phase fault, 720 MW load is dropped and 1529 MW generation is lost but no loading or voltage problems exist post-fault. Please explain why this is not considered an adverse effect and how this adverse effect is dealt with.

FPC Response 1

The objective of the Transmission system study is to make sure that the increase in capacity will not adversely affect the dynamic performance of the bulk power system. The planned capacity increase will not cause any North American Electric Reliability Corporation (NERC) criteria violation.

The uprating of Crystal River Unit 3 (CR-3) will be accomplished in three phases:

a. 14 MWe in December 2007
b. 26 MWe in December 2009
c. 140 MWe in December 2011

The dynamic stability analysis was performed for a single increase in output of 180 MWe. All studies were performed for Summer 2012 conditions or later. Since the results were satisfactory for the 180 MWe, it is concluded that the 14 MWe increase associated with the Measurement Uncertainty Recapture (MUR) uprate is also satisfactory and need not be studied separately.

The Florida peninsula electrical grid is connected in the north with the rest of the North American power grid. Any loss of a generator in Florida is compensated for very quickly by the rest of the North American grid.

A. Graph 1 on Page 7 of CR-3 to NRC letter, 3F0907-06, dated September 13, 2007, shows the speed of the machine for a three phase fault at the Crystal River 500 kV bus for 9.5 cycles when the machine is modeled at 812 MW. The graph indicates that the machine speed will oscillate and eventually settle to stable operation.

Graph 2 on Page 8 shows the speed of the machine for a three phase fault at the Crystal River 500 kV bus for 10.0 cycles when the machine is modeled at 812 MW. The graph indicates that the machine will increase speed and go out of synchronism. It is concluded that the Critical Clearing Time (CCT) is 9.5 cycles for the machine when modeled at 812 MW. In other words, the protective devices have to actuate within 9.5 cycles to protect the electrical generator or the machine will lose synchronism and trip on overspeed.

Graph 3 on Page 9 shows the speed of the machine for a three phase fault at the Crystal River 500 kV bus for 8.5 cycles when the machine is modeled at 992 MW. The graph indicates that the machine speed will oscillate and eventually settle to stable operation.

Graph 4 on Page 10 shows the speed of the machine for a three phase fault at the Crystal River 500 kV bus for 9.0 cycles when the machine is modeled at 992 MW. The graph indicates that the machine will increase speed and go out of synchronism. It is concluded that the CCT is 8.5 cycles for the machine when modeled at 992 MW. In other words, the protective devices will have to actuate within 8.5 cycles to protect the electrical generator or the machine will lose synchronism and trip on overspeed.

Critical Clearing Time is an important parameter. It helps to predict the stability of the generator. If the fault is cleared within the CCT window, the machine will sustain the impact of the fault and will not be thrown out of synchronism. If the fault continues beyond the CCT, the machine will lose synchronism with the system and will trip. It is determined that the upgrade will change the CCT from 9.5 cycles to 8.5 cycles. This means that if a bus fault occurs, and remains for less than or equal to 8.5 cycles, the generator will not lose synchronism and trip.

The graphs discussed above would only indicate an adverse condition for the grid if the protective devices were not able to provide isolation within 8.5 cycles. As 8 cycles is well within the capability of existing protective schemes, the additional power produced post-MUR will not provide any adverse impacts on the grid.

B. Based on the results of the conference call conducted between FPC and the NRC on September 28, 2007, FPC is providing a response based on our understanding of the NRC's concerns related to the power flow study performed for Progress Energy – Florida's Transmission Planning organization.

The power flow study was performed to support the additional capacity expected to be installed at CR-3 and the Levy County site (expected after all the CR-3 uprates). This study includes the CR-3 full uprated condition of 180 MWe (Summer 2012). This study is included as Attachment D and was not previously supplied in Reference 2. Pages 11 - 16 of the study are applicable to the CR-3 total uprate of 180 MWe.

The analysis for each scenario centers on transmission equipment loading and bus voltages within the study area under normal (pre-contingency) and N-1 design criteria contingency conditions. Several scenarios were identified that indicate a potential grid overload condition could exist. However, none of the overload conditions are related to the CR-3 uprates; as such, the MUR uprate does not adversely impact the power flow study.

The loss of CR-3 does not violate any NERC criteria. The dynamic performance of the bulk power grid remains stable.

NRC Request EEEB-2

In Attachment D, Section 5.2.5., "Station Auxiliary Electric Power Distribution System," of the submittal dated June 28, 2007, the licensee states that the condensate pump motor, the feedwater booster pump motor and the AC power system will experience minor load changes as a result of the MUR uprate. Please provide the above loads for pre and post MUR uprate and compare with the existing capacities of the equipment to support the conclusion that the AC system has adequate capacities to operate the plant equipment within design to support the MUR uprate.

FPC Response 2

The calculation that performed the short circuit, voltage drop, and ARC Flash analysis for the 4160 VAC and 6900 VAC buses was reviewed. Since the feedwater booster pump and condensate pump motors are not being changed out, the short circuit current and the ARC flash evaluation are not affected. This review considers the effect on voltage drop load flow from all impacting Refueling Outage 15 (R15) modifications, including the uprate to 2609 MWt.

To determine the pre-MUR conditions, loading of condensate pumps CDP-1A/1B and feedwater booster pumps FWP-1A/1B pumps at an output power of 2568 MWt was calculated. The pre-MUR equipment loading is identified below.

When the 4160 V and 6900 V buses are aligned to the Unit Auxiliary Transformer, the following results are obtained. Only components and power sources related to MUR changes are described below.

Component	Parameter	Rating	Acceptable
CDP-1A Motor	Amps = 235.1	SF Amps = 292	Yes
CDP-1A Motor	Volts = 3852	4000 V ± 10 %	Yes
CDP-1A Breaker	Amps = 235.1	1200AF set at 320 A	Yes
CDP-1B	Amps = 235.4	SF Amps = 292	Yes
CDP-1B	Volts = 3847	4000 V ± 10 %	Yes
CDP-1B Breaker	Amps = 235.4	1200AF set at 320A	Yes
FWP-1A	Amps = 298.4	SF Amps = 359	Yes
FWP-1A	Volts = 3847	4000 V ± 10 %	Yes
FWP-1A Breaker	Amps = 298.4	1200AF set at 400 A	Yes
FWP-1B	Amps = 291.9	SF Amps = 351	Yes
FWP-1B	Volts = 3845	4000 V ± 10 %	Yes
FWP-1B Breaker	Amps = 291.9	1200AF set at 400 A	Yes
Unit Aux Transformer	4160 V winding loading = 23660.4 KVA	4160 V winding FOA 65 deg C rating = 28000 KVA	Yes
Unit Aux Transformer	6900 V winding loading = 25771.5 KVA	6900 V winding FOA 65 deg C rating = 33600 KVA	Yes
Unit Aux Transformer	Primary (22 KV) winding loading = 51866.4 KVA	22 KV winding FOA 65 deg C rating = 61600 KVA	Yes

When the 4160 V and 6900 V buses are aligned to the Start Up Transformer, the following results are obtained. Only components and power sources related to MUR changes are described below.

Component	Parameter	Rating	Acceptable
CDP-1A	Amps = 235.2	SF Amps = 292	Yes
CDP-1A	Volts = 3850	4000 V ± 10 %	Yes
CDP-1A Breaker	Amps = 235.2	1200AF set at 320 A	Yes
CDP-1B	Amps = 235.6	SF Amps = 292	Yes
CDP-1B	Volts = 3844	4000 V ± 10 %	Yes
CDP-1B Breaker	Amps = 235.6	1200AF set at 320 A	Yes
FWP-1A	Amps = 298.6	SF Amps = 359	Yes
FWP-1A	Volts = 3845	4000 V ± 10 %	Yes
FWP-1A Breaker	Amps = 298.6	1200AF set at 400 A	Yes
FWP-1B	Amps = 292.1	SF Amps = 351	Yes
FWP-1B	Volts = 3842	4000 V ± 10 %	Yes
FWP-1B Breaker	Amps = 292.1	1200AF set at 400 A	Yes
Start Up Transformer	4160 V winding loading = 23703.5 KVA	4160 V winding FOA 65 deg C rating = 28000 KVA	Yes
Start Up Transformer	6900 V winding loading = 25784 KVA	6900 V winding FOA 65 deg C rating = 33600 KVA	Yes
Start Up Transformer	Primary (230 KV) winding loading = 53050.6 KVA	230 KV winding FOA 65 deg C rating = 61600 KVA	Yes

To represent the post-MUR conditions which will exist after R15, the loading of the CDP-1A/1B and FWP-1A/1B pumps at an output power of 2619 MWt was calculated. The post-MUR equipment loading is identified below.

When the 4160 V and 6900 V buses are aligned to the Unit Auxiliary Transformer, the following results are obtained. Only components and power sources related to MUR changes are described below.

Component	**Parameter**	**Rating**	**Acceptable**
CDP-1A Motor	Amps = 255.1	SF Amps = 292	Yes
CDP-1A Motor	Volts = 3845	4000 V ± 10 %	Yes
CDP-1A Breaker	Amps = 255.1	1200 AF set at 320 A	Yes
CDP-1B	Amps = 255.5	SF Amps = 292	Yes
CDP-1B	Volts = 3839	4000 V ± 10 %	Yes
CDP-1B Breaker	Amps = 255.5	1200 AF set at 320 A	Yes
FWP-1A	Amps = 312	SF Amps = 359	Yes
FWP-1A	Volts = 3840	4000 V ± 10 %	Yes
FWP-1A Breaker	Amps = 312	1200 AF set at 400 A	Yes
FWP-1B	Amps = 305.2	SF Amps = 351	Yes
FWP-1B	Volts = 3838	4000 V ± 10 %	Yes
FWP-1B Breaker	Amps = 305.2	1200 AF set at 400 A	Yes
Unit Aux Transformer	4160 V winding loading = 24087.5 KVA	4160 V winding FOA 65 deg C rating = 28000 KVA	Yes
Unit Aux Transformer	6900 V winding loading = 25771.5 KVA	6900 V winding FOA 65 deg C rating = 33600 KVA	Yes
Unit Aux Transformer	Primary (22 KV) winding loading = 52358.7 KVA	22 KV winding FOA 65 deg C rating = 61600 KVA	Yes

When the 4160 V and 6900 V buses are aligned to the Start Up Transformer, the following results are obtained. Only components and power sources related to MUR changes are described below.

Component	Parameter	Rating	Acceptable
CDP-1A	Amps = 255.4	SF Amps = 292	Yes
CDP-1A	Volts = 3842	4000 V ± 10 %	Yes
CDP-1A Breaker	Amps = 255.4	1200 AF set at 320 A	Yes
CDP-1B	Amps = 255.8	SF Amps = 292	Yes
CDP-1B	Volts = 3835	4000 V ± 10 %	Yes
CDP-1B Breaker	Amps = 255.8	1200 AF set at 320 A	Yes
FWP-1A	Amps = 312.2	SF Amps = 359	Yes
FWP-1A	Volts = 3837	4000 V ± 10 %	Yes
FWP-1A Breaker	Amps = 312.2	1200 AF set at 400 A	Yes
FWP-1B	Amps = 305.5	SF Amps = 351	Yes
FWP-1B	Volts = 3834	4000 V ± 10 %	Yes
FWP-1B Breaker	Amps = 305.5	1200 AF set at 400 A	Yes
Start Up Transformer	4160 V winding loading = 24130.8 KVA	4160 V winding FOA 65 deg C rating = 28000 KVA	Yes
Start Up Transformer	6900 V winding loading = 25784 KVA	6900 V winding FOA 65 deg C rating = 33600 KVA	Yes
Start Up Transformer	Primary (230 KV) winding loading = 53611.6 KVA	230 KV winding FOA 65 deg C rating = 61600 KVA	Yes

Notes:

CDP – 1A/B and FWP – 1A/B are 1.15 Service Factor motors
SF Amps are Service Factor Amps
1200 AF means 1200 Amp Frame (size of the circuit breaker)
FOA means forced oil and forced air

Conclusion

Based on the above tabulations, the equipment affected by the MUR-related changes (condensate pumps (CDP)-1A/1B, feedwater booster pumps (FWP)-1A/1B motors, Unit Auxiliary Transformer and the Start Up Transformer) are acceptable for operation at 2609 MWt. The differences in power consumption for pre-MUR and post-MUR conditions are due to the differences in required brake horsepower for the conditions.

PROGRESS ENERGY FLORIDA, INC.

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302 / LICENSE NUMBER DPR-72

LICENSE AMENDMENT REQUEST #296, REVISION 1

MEASUREMENT UNCERTAINTY RECAPTURE RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION INSTRUMENTATION AND CONTROLS BRANCH (EICB)

ATTACHMENT B

Request for Additional Information Response

On September 25, 2007, Florida Power Corporation (FPC) received a Request for Additional Information (RAI) concerning License Amendment Request (LAR) #296, Revision 1 (Reference 1) via email. FPC hereby provides the following responses to this RAI from the Instrumentation and Controls Branch (EICB).

NRC Request EICB 1

> Please submit ER-608, Rev.2 for staff review and confirm that the uncertainties due to transducer locations and replacement are included in 0.3301% uncertainty of total power measurement due to Feedwater Flow/ Temp uncertainty contribution.

FPC Response 1

Engineering Report ER-608, Revision 2, is proprietary to Cameron International (formerly Caldon) and is included as Attachment E. The associated affidavit for withholding proprietary information from public disclosure is included as Attachment F.

Table 8 of ER-608, Revision 2, in Section 4.2 (Page 21) addresses the impact of variation in transducer location.

ER-579, Revision 2, "Bounding Uncertainty Analysis for Thermal Power Determination for Crystal River Unit 3 Using the LEFM CheckPlus System," was previously included in FPC to NRC letter, 3F0807-05, dated August 30, 2007. ER-579 addresses uncertainty due to transducer replacement. Appendix A.4 of ER-579, Revision 2, discusses the uncertainty from this activity in the section referred to as, "Uncertainty Sources Random Only," under Delta T (time) Electronics and Transducer Bias.

The overall uncertainty for the Feedwater flow and temperature instrumentation addressed in ER-579, Revision 2, is now 0.30%. This is an updated value based on testing performed at the Alden Research Laboratory (Attachment J). The associated affidavit for withholding proprietary information from public disclosure is included as Attachment K. As noted above, it includes the contributions from both transducer location variation and potential replacement.

NRC Request EICB 2

> For an inoperable LEFM, Condition J requires reducing thermal power to ≤ 2568MWt within 12 hours but waits for an additional 36 hours to change instrument setpoint that reflects the reduced RTP. Why is the setpoint which reflects an RTP of 2605MWt allowed to provide safety function at ≤ 2568MWt for a period of 36 hours? Bases J.1.1 and J.1.2 do not provide the reason for the 36 hour waiting period. Please explain.

FPC Response 2

As discussed in the CR-3 ITS Bases Section pages, included for information only, in FPC to NRC letter, 3F1007-03, dated October 18, 2007, the 12 and 48 hours are proposed to allow for the orderly execution of the Required Actions. The power reduction is a significant reactivity evolution for which CR-3 imposes additional human performance (HU) tools (additional briefs,

oversight, etc.) The Nuclear Instrumentation (NI) setpoint adjustment is an activity that can cause a significant plant transient if not executed with care and deliberation. CR-3 believes that careful planning, staff augmentation, use of HU tools, etc. are appropriate.

A similar evolution is the quarterly calibration of the NI System. This activity is scheduled to require 6 hours per channel to complete; one channel on each of four (4) days, with appropriate staffing and other considerations factored into the 12 week schedule. Additional time is allowed for adjustments if necessary. Resetting the setpoint is not as extensive an evolution and will take 4 hours or less per channel. An emergent activity like resetting the Nuclear Overpower – High Trip setpoint due to failed equipment is expected to take a maximum of 16 hours with additional time required for callouts, planning and preparations. This time frame allows for orderly reactivity control and work management.

The NI's will remain calibrated for an extended period of time. The current value used for the drift component in the calculation is 0.399% over 30 months. As such, the expected drift of the instrument channel over 2 days is insignificant.

Perhaps more importantly, the Required Actions are not urgent from a safety perspective. The power reduction adds 1.6% margin between the trip and the analytical limit because the heat balance is presumed to be similarly less certain. That is the appropriate action to restore full compliance with setpoint methods and analytical assumptions. However, the actual secondary heat balance with the current equipment is likely under 2%. There are other unallocated margin and conservatisms in the calculation of the Allowable Value and Nominal Trip Setpoint. The Required Action completion time remains less than standard Improved Technical Specifications (ITS) values for loss of Emergency Core Cooling Systems (ECCS) equipment, etc. Finally, these were chosen after a review of related actions for other MUR applications.

NRC Request EICB 3

A. The following two TS notes should be added applicable to Nuclear Overpower High Function Surveillance Requirements similar to Davis- Besse MUR power uprate LAR TS changes, as defined in September 7, 2005 NRC letter to NEI.

Note 1: If the as-found channel setpoint is conservative with respect to the Allowable Value (AV) but outside its predefined as-found acceptance criteria band, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service. If the as-found instrument channel setpoint is not conservative with respect to the AV, the channel shall be declared inoperable.

Note 2: The instrument channel setpoint shall be reset to a value that is within the as-left tolerance of the Limiting Trip Setpoint (LSP), or a value that is more conservative than the LSP; otherwise the channel shall be declared inoperable. The LSP and the methodology used to determine the LSP, the predefined as-found acceptance criteria band, and the as-left setpoint tolerance band are specified in the UFSAR or TS Bases or a document incorporated into the UFSAR such as technical requirement manual (TRM).

B. The TS Bases shall contain a statement that the LSP is based on the calculated total loop uncertainty per the plant specific methodology documented in the UFSAR or a document incorporated into the UFSAR such as the TRM.

C. Additionally, please confirm that Nuclear Overpower High function has a Limiting Safety System setpoint and submit this calculation which documents the methodology used for establishing the limiting set point or the nominal setpoint and the limiting acceptable values for the as-found and as-left setpoint as measured in periodic surveillance testing. This calculation should also indicate the related analytical limit and other limiting design values (and the source of these values) for the Nuclear Overpower High functional unit LSSS.

FPC Response 3

A. Notes 1 and 2 were added to Table 3.3.1-1 as Footnotes (f) and (g). The only deviation from the suggested wording above is in the terminology for the Limiting Trip Setpoint. At CR-3, the term "In-Plant Setpoint" is used in place of the "Limiting Trip Setpoint." The ITS Bases were revised to include the equivalent text. Both the revised ITS pages and the revised Bases pages (for information only) are included in Attachments C and D of FPC to NRC letter, 3F1007-03, dated October 18, 2007.

B. The draft Bases pages included as Attachments C and D of FPC to NRC letter, 3F1007-03, dated October 18, 2007, contain a statement that the In-Plant Setpoint is based on the calculated total loop uncertainty per the plant specific methodology documented in the FSAR.

C. The pre-established Nuclear Overpower - High Trip In-Plant Setpoint is a Limiting Safety System Setting as it directly protects the health and safety of the public by preventing the reactor from producing power at an unanalyzed power level, either during steady state operation or during a transient.

The Reactor Protection System (RPS) tolerances are calculated in CR-3 Calculation I-95-0003 and are routinely verified in Surveillance Procedures SP-113, A through D (one for each channel). The tolerance calculation establishes the In-Plant Setpoint as well as the As-Left and As-Found Tolerances as illustrated in Attachment G, Figure 1 of this letter. The pertinent portion of the current pending revision to the calculation, which provides the specific setpoints and application of the CR-3 methodology for determining these setpoints, is included in Attachment G of this letter. It is a pending revision because CR-3 has not yet implemented the 103.3% Allowable Value. Attachment H is the current version of SP-113A. CR-3 will revise the applicable surveillance procedures to include a new In-Plant Setpoint in support of the lowered Allowable Value as well as contingency guidance to fully implement the new ITS footnotes that were proposed by the Staff.

For ease of review, CR-3 has extracted the specific As-Found and As-Left Tolerances and nominal setpoint for the Nuclear Overpower – High Trip setpoints which are common to both documents. These values and are:

Allowable Value	104.9%
In-Plant Setpoint	104.0%

As-Found Tolerance	0.729%
As-Left Tolerance	0.328%

The CR-3 tolerance calculation and procedures protect the RPS Allowable Values. In this case, an additional margin of 0.171% remains between the As-Found Tolerance and the Allowable Value, and is referred to as Engineering Margin. The RPS Allowable Values were established and are validated by the NSSS supplier. They are based on protecting the Analytical Limits used in the CR-3 Safety Analysis with due consideration of appropriate uncertainties. They are addressed in the NRC approved Reload Methods Topical Report (BAW-10179P-A, "Safety Criteria and Methodology for Acceptable Cycle Reload Analyses") and various calculations. These are validated by AREVA for each Reload Cycle and major plant changes (such as the MUR uprate).

PROGRESS ENERGY FLORIDA, INC.

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302 / LICENSE NUMBER DPR-72

LICENSE AMENDMENT REQUEST #296, REVISION 1

MEASUREMENT UNCERTAINTY RECAPTURE RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION REACTOR SYSTEMS BRANCH (SRXB)

ATTACHMENT C

Request for Additional Information Response

On September 25, 2007, Florida Power Corporation (FPC) received a Request for Additional Information (RAI) concerning License Amendment Request (LAR) #296, Revision 1 (Reference 2) via email. FPC hereby provides the following responses to this RAI from the Reactor Systems Branch (SRXB).

NRC Question 1.

> Please provide a description and drawings that illustrate the feedwater piping configuration from the outlet of the feedwater pumps to the containment pressure boundary. Identify any perturbations in the piping wall that could affect the flow profile.

FPC Response 1

The requested drawings (305-831 and 305-832) are included in Attachment I. They are isometric drawings of the Feedwater (FW) piping system and represent the actual configuration of the plant with the proposed addition of the Leading Edge Flow Meters (LEFM). For the run of pipe that is significant to the flow characteristics of interest, no protrusions into the pipe exist that would affect flow. The significant impacts on FW flow characteristics are the pipe elbows and geometry upstream of the FW flow instruments.

NRC Question 2

> Please provide a description and drawings of the Alden Laboratory test configuration to be used for the plant's current piping configuration and variations of the plant's configuration. Identify any differences between the test and plant configurations.

FPC Response 2

The requested drawings are included as Figures 1 and 2 in Attachment D, ER-608, Revision 2.

The Alden Laboratory test configuration was intended to represent the applicable portions of the actual FW piping installed in the plant. The two testing campaigns were performed as the first test did not adequately reflect one of the two trains and was retested with a more accurate representation of that train's configuration. Cameron Engineering Report ER-608 describes the details of the modeling and pipe configuration more fully. The final tested configuration accurately reflects the post-MUR plant configuration over a sufficient length of pipe to capture all necessary parameters.

NRC Question 3

> If an LEFM becomes inoperative, we understand you will rely upon venturis for a short time that have been calibrated with the last valid LEFM data. If a venturi defouling event should occur during this time, an overpower condition could result. Please discuss this possibility.

FPC Response 3

CR-3 does not plan on calibrating the existing flow nozzles to the LEFM. Therefore, should a venturi defouling event occur, there will not be any resulting overpower condition.

NRC Question 4

How are plant personnel qualified to perform maintenance and calibration of the LEFM system?

FPC Response 4

Plant personnel are not currently qualified to perform maintenance and calibration of the LEFM system. Cameron personnel will be present to oversee the commissioning of the system during Refueling Outage 15 and will be present to help resolve any problems or failures during this period. Cameron will provide training to a sufficient number of craft, supervision, and other personnel, as necessary, as part of project close-out. The training will include classroom and hands on training on LEFM CheckPlus theory, components, application software, and troubleshooting. The training session is anticipated to be approximately eight hours in length. The exact date of this training has not been determined.

NRC Question 5

Discuss the frequency of the listed preventive maintenance activities.

FPC Response 5

The Preventative Maintenance (PM) for the LEFM system is based on original equipment manufacturer's recommendation, operating experience, and significance. These are established as part of the Engineering Change process, prior to package closure. It is anticipated that most components will initially be on a 2 year PM frequency.

The Preventative Maintenance activities perform the following checks:

- General inspection of the terminal and cleanliness
- Power Supply inspection of magnitude and noise
- Central Processing Unit inspection
- Acoustic Processor Unit Checks of the 5 MHz clock and LED status
- Analog Input checks of the A/D converter
- Alarm Relay checks
- Watchdog Timer checks that ensures the software is running
- Transducer Cable checks
- Calibration checks of each of the Feedwater pressure transmitters.

The Preventative Maintenance program and continuous monitoring of the LEFM ensures that the LEFM remains bounded by the analysis and assumptions set forth in Cameron Topical Report ER-80P.

NRC Question 6

> Section 2.2.1, "Uncompensated Operating Reactivity Changes," of Attachment D of the License Amendment Request states, "the individual accidents are discussed below." However, it does not appear that the following reactivity accidents are a part of this class of transients, neither in the LAR, nor in the FSAR. Please explain this statement.

FPC Response 6

The sentence referenced was incorrectly included in the section on Uncompensated Reactivity Changes and should be discounted.

NRC Question 7

> Regarding the Rod Ejection Accident, discuss how the value of 2 cal/g was obtained for the increase in fuel heatup resulting from a rod ejection.

FPC Response 7

For the control rod ejection analysis, the primary acceptance criteria relates to an adiabatic heat up of the fuel. The peak enthalpy is equal to the initial enthalpy plus the integrated energy from the core prior to control rod insertion. The limit defined in the CR-3 Final Safety Evaluation Report (FSAR) is 280 cal/gm. However, the safety analyses generally attempt to limit the heat up to 210 to 220 cal/gm. Using Figure 14-30 of the CR-3 FSAR as a guide, the peak enthalpy for an ejected rod worth of 0.7% dk/k is 200 cal/gm. Note that using a 0.7% rod worth is conservative as the core designs are required to maintain at least 15% margin to the analytical limit of 0.65% dk/k. The peak enthalpy is calculated by adding the initial fuel enthalpy to the energy added during the transient. The initial fuel enthalpy is approximately 95 cal/gm. This does not change for the MUR as the peak linear heat rate limit does not change. Therefore, the FSAR transient resulted in an enthalpy rise of 105 cal/gm (200 cal/gm – 95 cal/gm). Since the integrated transient full power seconds will not change, the energy increase is proportional to the increase in core power. Assuming a power level increase for the heat balance error of 2%, based on 2568 MWt (which covers the MUR), the increase due to the transient is 105 cal/gm * 0.02 = 2.1 cal/gm.

A comparison to a RELAP5 analysis that was performed for another Babcock and Wilcox (B&W) plant at 102% of 2772 MWt was also made. For CR-3 at 2568 MWt, the peak enthalpy was 200 cal/gm. The results for the other B&W plant at 2827.44 MWt (102% of 2772 MWt), determined that the peak enthalpy was 210 cal/gm. By interpolation, for CR-3 at 2619.4 MWt (102% power), the peak enthalpy would be ~201.98 cal/gm. This validates the results described above and in the LAR.

NRC Question 8

Explain whether the LOCA events analyzed considered a small break LOCA concurrent with ECCS actuation.

FPC Response 8

ECCS actuation is not considered concurrent with the Small Break Loss of Coolant Accident (SBLOCA). The break is assumed to open at time zero. The Reactor Coolant System (RCS) depressurizes to the reactor trip setpoint on low RCS pressure which also initiates a turbine trip. The RCS pressure will continue to decrease to the ECCS actuation setpoint. The timing of the actual delivery of ECCS flow to the RCS is dependent on whether a Loss of Offsite Power was modeled at the time of the turbine trip. Early actuation of ECCS would be non-conservative as a portion of the core power would be absorbed by the ECCS fluid rather than contributing to the loss of primary coolant.

PROGRESS ENERGY FLORIDA, INC.

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302 / LICENSE NUMBER DPR-72

LICENSE AMENDMENT REQUEST #296, REVISION 1

MEASUREMENT UNCERTAINTY RECAPTURE

CAMERON INTERNATIONAL APPLICATION FOR WITHHOLDING PROPRIETARY INFORMATION FROM PUBLIC DISCLOSURE

ATTACHMENT K

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CAMERON

September 5, 2007
CAW 07-17

Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, DC 20555

APPLICATION FOR WITHHOLDING PROPRIETARY INFORMATION FROM PUBLIC DISCLOSURE

Subject: "Calibration of Two 18" LEFM CheckPlus Flow Meters, Cameron Measurement Systems, Purchase Order Number CP70059 and CP700659, June and July 2007 – Report No. 2007-133/C1229"

Gentlemen:

This application for withholding is submitted by Cameron International Corporation, a Delaware Corporation (herein called "Cameron") on behalf of its operating unit, Caldon Ultrasonics Technology Center, pursuant to the provisions of paragraph (b)(1) of Section 2.390 of the Commission's regulations. It contains trade secrets and/or commercial information proprietary to Cameron and customarily held in confidence.

The proprietary information for which withholding is being requested is identified in the subject submittal. In conformance with 10CFR Section 2.390, Affidavit CAW 07-17 accompanies this application for withholding setting forth the basis on which the identified proprietary information may be withheld from public disclosure.

Accordingly, it is respectfully requested that the subject information, which is proprietary to Cameron, be withheld from public disclosure in accordance with 10CFR Section 2.390 of the Commission's regulations.

Correspondence with respect to this application for withholding or the accompanying affidavit should reference CAW 07-17 and should be addressed to the undersigned.

Very truly yours,

CR Hastings

Calvin R. Hastings
General Manager

Enclosures (Only upon separation of the enclosed confidential material should this letter and affidavit be released.)

September 5, 2007
CAW 07-17

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF ALLEGHENY:

Before me, the undersigned authority, personally appeared Calvin R. Hastings, who, being by me duly sworn according to law, deposes and says that he is authorized to execute this Affidavit on behalf of Cameron International Corporation, a Delaware Corporation (herein called "Cameron") on behalf of its operating unit, Caldon Ultrasonics Technology Center, and that the averments of fact set forth in this Affidavit are true and correct to the best of his knowledge, information, and belief:

C R Hastings

Calvin R. Hastings
General Manager

Sworn to and subscribed before me

this 5th day of

September, 2007

Joann B Thomas

Notary Public

COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Joann B. Thomas, Notary Public
Findlay Twp., Allegheny County
My Commission Expires July 28, 2011
Member, Pennsylvania Association of Notaries

1. I am the General Manager of Caldon Ultrasonics Technology Center, and as such, I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in connection with nuclear power plant licensing and rulemaking proceedings, and am authorized to apply for its withholding on behalf of Cameron.

2. I am making this Affidavit in conformance with the provisions of 10CFR Section 2.390 of the Commission's regulations and in conjunction with the Cameron application for withholding accompanying this Affidavit.

3. I have personal knowledge of the criteria and procedures utilized by Cameron in designating information as a trade secret, privileged or as confidential commercial or financial information. The material and information provided herewith is so designated by Cameron, in accordance with those criteria and procedures, for the reasons set forth below.

4. Pursuant to the provisions of paragraph (b) (4) of Section 2.390 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.

   (i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Cameron.

   (ii) The information is of a type customarily held in confidence by Cameron and not customarily disclosed to the public. Cameron has a rational basis for determining the types of information customarily held in confidence by it and, in that connection utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system constitutes Cameron policy and provides the rational basis required. Furthermore, the information is submitted voluntarily and need not rely on the evaluation of any rational basis.

Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential advantage, as follows:

(a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of Cameron's competitors without license from Cameron constitutes a competitive economic advantage over other companies.

(b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.

(c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, and assurance of quality, or licensing a similar product.

(d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Cameron, its customer or suppliers.

(e) It reveals aspects of past, present or future Cameron or customer funded development plans and programs of potential customer value to Cameron.

(f) It contains patentable ideas, for which patent protection may be desirable.

There are sound policy reasons behind the Cameron system, which include the following:

(a) The use of such information by Cameron gives Cameron a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Cameron competitive position.

(b) It is information that is marketable in many ways. The extent to which such information is available to competitors diminishes the Cameron ability to sell products or services involving the use of the information.

(c) Use by our competitor would put Cameron at a competitive disadvantage by reducing his expenditure of resources at our expense.

(d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component may be the key to the entire puzzle, thereby depriving Cameron of a competitive advantage.

(e) Unrestricted disclosure would jeopardize the position of prominence of Cameron in the world market, and thereby give a market advantage to the competition of those countries.

(f) The Cameron capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.

(iii) The information is being transmitted to the Commission in confidence, and, under the provisions of 10CFR Section 2. 390, it is to be received in confidence by the Commission.

(iv) The information sought to be protected is not available in public sources or available information has not been previously employed in the same manner or method to the best of our knowledge and belief.

(v) The proprietary information sought to be withheld is the submittal titled "Calibration of two 18" LEFM CheckPlus Flow Meters, Cameron Measurement Systems, Purchase Order Number CP70059 and CP700659, June and July 2007 – Report No. 2007-133/C1229" and is designated therein in accordance with 10CFR §§ 2.390(b)(1)(i)(A,B), with the reason(s) for confidential treatment noted in the submittal and further described in this affidavit. This information is voluntarily submitted for use by the NRC Staff in their review of the accuracy assessment of the proposed methodology for LEFM CheckPlus Systems used by Crystal River Unit 3 for an MUR UPRATE.

Public disclosure of this proprietary information is likely to cause substantial harm to the competitive position of Cameron because it would enhance the ability of competitors to provide similar flow and temperature measurement systems and licensing defense services for commercial power reactors without commensurate expenses. Also, public disclosure of the information would enable others to use the information to meet NRC requirements for licensing documentation without the right to use the information.

The development of the technology described in part by the information is the result of applying the results of many years of experience in an intensive Cameron effort and the expenditure of a considerable sum of money.

In order for competitors of Cameron to duplicate this information, similar products would have to be developed, similar technical programs would have to be performed, and a significant manpower effort, having the requisite talent and experience, would have to be expended for developing analytical methods and receiving NRC approval for those methods.

Further the deponent sayeth not.