

April 2, 2003

MEMORANDUM TO: James W. Clifford, Chief, Section 2  
Project Directorate I  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

FROM: Travis L. Tate, Project Manager, Section 2 /RA/  
Project Directorate I  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

SUBJECT: PILGRIM NUCLEAR POWER STATION - REQUEST FOR  
ADDITIONAL INFORMATION REGARDING APPENDIX K  
MEASUREMENT UNCERTAINTY RECOVERY - 1.5% POWER  
UPRATE REQUEST (TAC NO. MB5603)

Attachment 1 contains a request for additional information (RAI) transmitted by electronic mail (e-mail) on January 13, 2003, to Mr. Bryan Ford of Entergy Nuclear Operations, Inc. (the licensee), regarding the Nuclear Regulatory Commission (NRC) staff's review of the licensee's application dated July 5, 2002. The question was transmitted to clarify information needed following telephone discussions with the licensee's staff. Additional discussions on January 14, 2003, identified the need to modify the requested information as reflected in the licensee's response dated February 4, 2003.

Attachment 2 contains the licensee's unsolicited draft RAI response sent by e-mail on February 25, 2003, to facilitate discussions with the staff prior to formally submitting the requested information. The licensee sent the information in response to the NRC's RAI sent by e-mail on February 12, 2003. Following discussions with the staff on February 25, 2003, it was determined that the licensee needed to increase the scope of information needed to complete the review. The licensee docketed its response by letter dated March 17, 2003.

The purpose of this memorandum is to document the information exchanged with the licensee associated with the staff's review.

Docket No. 50-293

Attachments: As stated

CONTACT: Travis Tate, NRR/DLPM  
301-415-8474

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## **ATTACHMENT 1**

### **Request for Addition Information Pilgrim Nuclear Power Station License Amendment Request**

#### **Appendix K Measurement Uncertainty Recovery - 1.5% Power Uprate Request**

1. Please confirm whether the analysis used 22 psid drift for all of the SRVs. The application states that it was used; however, the Nov. 21, 2002, RAI response indicates otherwise. In addition, the application did not have a section on the ASME overpressure; however, the RAI response does state what the ASME peak pressure was for the last cycle. The application also states that SRV modifications are necessary in order to meet overpressure conditions. Please confirm whether the overpressure referred to is the ATWS pressurization or ASME upset condition overpressure.

## ATTACHMENT 2

### **NRC Request:**

Please provide a plant-specific calculation of the total power measurement uncertainty in accordance with RIS 2002-03, Item I.1.E, for the uncertainty in the feedwater flow measurement itself and for the thermal power uncertainty. Please include a description of the thermal power assessment computation in detail to support the calculation.

### **Response:**

Pilgrim provided the equations used in the existing Power Measurement Uncertainty Calculation based on current licensed thermal power in section 4.2.5 in Entergy letter 2.02.048, "License Amendment Request Appendix K Measurement Uncertainty Recovery – Power Uprate Request," dated July 5, 2002. As requested, copies of the feedwater flow measurement calculation (I-NI-226), the uncertainty calculation in the core thermal power (I-IN-231), and the Core Thermal Power Evaluation procedure (PNPS 9.3) are attached.

### **NRC Request:**

The justification provided for the 14-day allowed outage time (AOT) is based upon experience with a type of UFM (Crossbeam) described to be similar to the units to be used in connection with measurement uncertainty recapture (Crossflow). Even if the Crossbeam UFM were deemed sufficiently similar to the Crossflow units, it is not clear that the Crossbeam data would be suitable to justify the AOT with the proposed power uprate. For example, if the data are too widely spaced in time, they might not reflect the effects of the build-up and then rapid removal of fouling materials on the venturi: the venturi performance would look constant despite a possibly sizable transient condition. Also, there is no provision for early termination of the AOT in the event of rapid power change or other event which might render the correction factor non-conservative (such as by resulting in defouling of a venturi to which a correction factor has already been applied). Please provide justification of the AOT considering these factors.

### **Response:**

The currently installed ultrasonic flow measurement system is called Crossbeam. It has been used for several years to calibrate the feedwater flow venturis. The experience gained indicates very stable venturi measurements with a fixed calibration difference. Significant data has been collected for this system to confirm its accuracy and reliability. In Entergy Letter 2.02.112, it was discussed that the Crossbeam system would be used when the redundant Crossflow systems were out of service, in support of the 14 day AOT. However, since that submittal, it has been decided to only use Crossbeam to CLTP and then permanently discontinue use once the new equipment is operational following RFO-14. Since this system will not be available, Entergy is asking for a 24 hour AOT if both Crossflow systems are out of service as was originally discussed in Entergy Letter 2.02.112. Consequently, in this situation, reactor thermal power would be lowered to the original licensed thermal power of 1998 MWt within 24 hours utilizing the procedures that we committed to developing in Entergy Letter 2.02.048 Section C5.

### **NRC Question:**

Item 2 of the attachment to the December 30, 2002, supplement implies that the Cross *beam* UFM's may play a part in uprated reactor operation if the Cross*flow* UFM's are unavailable. Item 1 of the letter implies that the licensee has been using the Crossbeam UFM to modify the calibration of the FW flow

venturi. The Crossbeam UFM has never been submitted for NRC evaluation, and the Staff has no assurance that the Crossbeam instrument as applied at Pilgrim provides Feedwater Flow measurements within the Appendix K allowance. Therefore, the staff has no independent basis for recognizing the suitability of the Crossbeam UFM for service in support of uprated power or even in support of the pre-uprate power level. Please provide clarification of the past and intended future use to the Crossbeam UFM, and of the influence that they might have had over venturi calibration/correction.

**Response:**

As stated in the response for Question 2, the Crossflow UFM will be the only instrumentation that will be used to provide a correction factor to the installed feedwater flow venturis in support of the Appendix K Measurement Uncertainty Recapture.

As is typical at many utilities, Pilgrim has used an ultrasonic flow measurement system to calibrate the feedwater flow venturis and obtain more accurate information used in calculating current licensed thermal power. This system will no longer be used following the implementation of the proposed system.

**NRC Question:**

In the November 6, 2002, supplement, Attachment 1, Item 4a the licensee asserts that computer points are self-checking and therefore do not need to be calibrated. Self-checking relies upon some reference standard(s) contained within the system. Please explain why the reference standard(s) do not need to be verified periodically.

**Response:**

The reference standard used to check the calibration of the computer points does not need to be manually verified because the computer analog input modules contain two precision stable reference standards that are continuously compared to detect excessive drift or a shift in either reference. This reference comparison indicates a calibration failure anytime the comparison is out of tolerance. (Reference EPIC Operation and Maintenance Instructions-GEY-5578 Volume VIII; ANDS4810 General Purpose Analog Input Module Theory of Operation)

**NRC Question:**

Section 4.2.2 of attachment 1 to July 5, 2002, application states, "There will be automatic detection of non-conservative readings due to rapid defouling or component failure." This assertion should be explained. What provides this detection, and how does it discriminate among possible causes for the conditions that it detects?

**Response:**

Section 4.4.2 of Attachment 1 to the July 5, 2002 letter states, "There will be online detection of non-conservative readings..."

Pilgrim has multiple means of identifying events such as defouling that could make the correction factors less accurate. The new system will include new alarms that will be generated by the AMAG, and others, which will operate even with the AMAG off-line. The Crossflow system provides improved data scanning and more data points for statistical correlations. The Crossflow system will have automatic feedback and alarms through the EPIC plant computer.

Although Pilgrim does not anticipate a defouling event, it continuously monitors the system for evidence that an event is taking place. The EPIC computer points CSTMFW\_R, "STEAM/FW FLOW ROLLING AVG" and CPRESFWR, "1<sup>ST</sup> ST PRES/FW" flow as measured by the in-plant feedwater venturis. These ratios are compared to HI alarm set "FLOW ROLLING AVG" determine ratios for Turbine first stage pressure and total steam flow to feedwater points that represent approximately a 0.25% increase in Turbine first stage pressure and/or the total steam flow without a corresponding increase in indicated steam flow. Concurrent HI alarms on CSTMFW\_R and CPRESFWR indicate that the CTP as indicated by CO17 may be inaccurate if the feedwater correction factor is applied. (Reference PNPS Procedure 8.P.4) To assist in discriminating among the likely causes of defouling, resin intrusion, and other chemistry parameters (ph, conductivity, etc.) are monitored and controlled by procedure 2.4.148 "Abnormal Reactor Water Chemistry", 7.8.1 "Water Quality Limits," and 7.8.7 "Recording and Trending of Chemistry Data."

**NRC Question:**

Section 10.4 (p10-5), Attachment 2 of July 5, 2002, application indicates that a  $\pm 3$  inch water level change and a 3 psi step change in pressure setpoint are to be used in testing the FW/level control system, but it does not indicate the basis for these numbers. Please explain the basis for these numbers.

**Response:**

The basis for the disturbances used in the feedwater and pressure control system testing for TPO can be found in the TPO licensing topical report, NEDC-32938P, in Appendix L, section L.2.3.