Designated Original per D. Pickett

Calvert Cliffs Nuclear Power Plant

1650 Calvert Cliffs Parkway
Lusby, Maryland 20657

Constellation Energy
Nuclear Generation Group

December 30, 2008

U. S. Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: Document Control Desk

SUBJECT: Calvert Cliffs Nuclear Power Plant
Unit Nos. 1 & 2; Docket Nos. 50-317 & 50-318
Response to Request for Additional Information – License Amendment for Measurement Uncertainty Recapture Power Uprate - Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2

REFERENCES:

(a) Letter from Mr. D. R. Bauder (CCNPP), to Document Control Desk (NRC) dated August 29, 2008, License Amendment Request: Appendix K Measurement Uncertainty Recapture – Power Uprate Request

(b) Letter from Mr. D. V. Pickett (NRC) to Mr. J. A. Spina (CCNPP), dated November 17, 2008, Request for Additional Information Re: License Amendment for Measurement Uncertainty Recapture Power Uprate-Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2

(c) Letter from Mr. D. V. Pickett (NRC) to Mr. J. A. Spina (CCNPP), dated October 3, 2008, Request for Additional Information Re: License Amendment for Measurement Uncertainty Recapture Power Uprate-Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2

(d) Letter from Mr. J. A. Spina (CCNPP) to Document Control Desk (NRC), dated December 3, 2008, Response to Request for Additional Information – License Amendment Request for Measurement Uncertainty Recapture Power Uprate – Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2

In Reference (a), Calvert Cliffs Nuclear Power Plant, Inc. submitted a license amendment request to the Nuclear Regulatory Commission (NRC) for a measurement uncertainty recapture power uprate for Calvert Cliffs Nuclear Power Plant, Units 1 and 2. In Reference (b) the NRC requested additional information to be submitted to support their review of the submittal. Attached are the responses to the Mechanical & Civil Engineering Branch and the Fire Protection Branch Requests for Additional Information (RAIs) from Reference (b).

Calvert Cliffs is unable to provide responses to the Reactor Systems Branch RAIs from Reference (b) and the RAIs # 1.2, 2.a, and 2.c contained in Reference (c) by December 31, 2008. Responses were previously provided [Reference (d)] for the remainder of the RAIs in Reference (c). The delay in providing the indicated responses is due to emergent plant related issues and the timing of the completion of the vendor testing and the vendor's flow uncertainty calculations. These calculations are the key element in fully answering many of the remaining RAIs. Calvert Cliffs intends to provide the responses to the remaining RAIs by February 18, 2009. In Reference (a), Calvert Cliffs requested NRC approval of

Received 5/1/09

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our license amendment request by March 1, 2009. Due to the delay in providing responses to some of the NRC RAIs, Calvert Cliffs now requests NRC approval by April 20, 2009.

Should you have any questions regarding this matter, please contact Mr. Jay S. Gaines at (410) 495-5219.

Very truly yours,

Mark D. Flaherty

STATE OF MARYLAND :
: **TO WIT:**
COUNTY OF CALVERT :

I, Mark D. Flaherty, being duly sworn, state that I am Manager – Engineering Services, Calvert Cliffs Nuclear Power Plant, Inc. (CCNPP), and that I am duly authorized to execute and file this License Amendment Request on behalf of CCNPP. To the best of my knowledge and belief, the statements contained in this document are true and correct. To the extent that these statements are not based on my personal knowledge, they are based upon information provided by other CCNPP employees and/or consultants. Such information has been reviewed in accordance with company practice and I believe it to be reliable.

Mark D. Flaherty

Subscribed and sworn before me, a Notary Public in and for the State of Maryland and County of St. Mary's, this 30th day of December, 2008.

WITNESS my Hand and Notarial Seal:

Notary Public

My Commission Expires:

March 1, 2011
Date

MDF/KLG/bjd

Attachment: (1) Response to Request for Additional Information dated November 17, 2008 - Measurement Uncertainty Recapture Power Uprate

cc: D. V. Pickett, NRC
S. J. Collins, NRC
Resident Inspector, NRC
S. Gray, DNR

ATTACHMENT (1)

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION DATED NOVEMBER 17, 2008 - MEASUREMENT UNCERTAINTY RECAPTURE POWER UPRATE

Calvert Cliffs Nuclear Power Plant, Inc.
December 30, 2008

ATTACHMENT (1)

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION DATED NOVEMBER 17, 2008 - MEASUREMENT UNCERTAINTY RECAPTURE POWER UPRATE

MECHANICAL & CIVIL ENGINEERING BRANCH

RAI 1:

Table IV-1 of your August 29, 2008 submittal indicates that the steam flow per steam generator will increase to 5.999 Mlbm/hr (million pound mass per hour) from 5.9 Mlbm/hr. In addition to note 6 of this table, Table 4-3 of the Calvert Cliffs Final Safety Analysis Report (FSAR) indicates that the design steam flow value for the secondary of the Nuclear Steam Supply System (NSSS) is "approximately" 6 Mlbm/hr. Page v of Attachment 2 of your submittal indicates that the approach utilized in this application follows the guidance provided in Regulatory Issue Summary (RIS) 2002-03. With regards to the bounding nature of this approximate value for steam flow, please summarize the effect(s) this may have on the secondary side components with respect to the guidance provided in Section IV.B of Attachment 1 to RIS 2002-03.

CCNPP Response:

The impact of the MUR power uprate on operating parameters for the main steam system was evaluated in calculations based on an increase in reference thermal power by 1.7%. The primary impact of the MUR power uprate on the main steam system is an increase in the steam flow rate. As part of the calculations, the major components of the main steam system and its associated piping were analyzed for their capability to operate as designed at this higher steam flow rate. Among the major components analyzed were:

- Main Steam Isolation Valves (MSIV) – The MSIVs are not impacted because the steam generator and main steam service pressure are not increased as the result of the MUR power uprate. The ability of the MSIV to close within the Technical Specification limit closure time following a postulated steam line break event is also not affected.
- Main Steam Safety Valves (MSSVs) – The total relieving capabilities of the MSSVs are higher than the MUR steam flow rate. The Updated Final Safety Analysis Report (UFSAR) Chapter 14 accident analysis demonstrates sufficient relief capacity at 102% power. As a result the MSSVs maintain their required capabilities with the MUR power uprate.
- Atmospheric Dump Valves (ADV) and Turbine Bypass Valves (TBV) – Analysis indicates that following the MUR power uprate, the maximum SG pressure during a reactor trip increases by approximately 6 psi to 950 psig. This remains below the lowest setpoint of the MSSVs. Thus the ADVs and TBVs are able to control the secondary side steam pressure at MUR uprate conditions without necessitating operation of the MSSVs.
- System piping – Pipe stress analysis for sustained loading and thermal expansion were performed at service conditions that bound the MUR uprate service conditions. While the MUR power uprate will result in an increase in steam hammer loads, the existing design steam hammer loads bounds the MUR rated conditions so the piping systems will not be impacted by the MUR power uprate. The increased steam flow will also increase turbulent induced vibration by approximately 4% however because there is no shift in vibration excitation frequency it will not induce any adverse effect on vibration.

The calculations combine to show that the components of the main steam system are capable of handling the change in operating parameters at this higher power level (1.7% increase) with respect to the guidance provided in Section IV.B of Reference 1. As a result, the calculations bound the proposed MUR power increase of 1.38%.

Calvert Cliffs UFSAR Table 4-3 bounds the current main steam flow values of 5.90 Mlbm/hr. Following implementation of the MUR power uprate, Calvert Cliffs UFSAR Table 4-3 will be updated to reflect and bound the changed operating parameters including the higher steam flow rate.

FIRE PROTECTION BRANCH

RAI 1:

Attachment 2 of the license amendment request (LAR), Section IV.11, "Appendix R" mentions safe-shutdown fire analysis. This section states that ".... Appendix R compliance can be affected by adding heat to plant areas that could affect Appendix R equipment and plant operators. However, the overall temperature changes in the primary and secondary systems are "very small " (i.e., provide the values) and, at these higher temperatures, Appendix R equipment and plant operators are "unaffected," thereby remaining in compliance with 10 CFR Part 50, Appendix R. Further, the staff requests the licensee to verify that additional heat in the plant environment from the measurement uncertainty recapture (MUR) power uprate will not prevent required post-fire operator manual actions, as identified in the Calvert Cliffs fire protection program from being performed at their designated time.

CCNPP Response:

As a result of the MUR power uprate, the major changes potentially affecting existing heat loads in the buildings/areas are:

- Reactor Coolant (RCS) T_{hot} will increase from 595.1F to 595.9F
- Feedwater (FW) temperature will increase 2.1F from 431.5F to 433.6F

To simplify quantifying the effect of the additional heat load due to the increase in process temperatures, the following inputs and conservative assumptions were made:

- It is conservatively assumed that for purposes of heat transferred from the RCS, the system consists of 3000 ft of 42" ID, 4.125" wall thickness hot leg piping insulated with 3.5" of insulation. The increase in heat rejection to the environment is due to the increase in delta T from the above length pipe.

  It is calculated the additional heat rejected to the Containment environment as a result of the higher T_{hot} value would be ~3144 Btu/hr. This value represents only a 0.16% increase over what would be currently released from the same length of pipe.

  It should be noted that the 3000 ft of pipe is conservative in representing the total RCS since the hot leg piping is a relatively short length of pipe, less than 100 ft. The rest of the length is for representing the surface of the reactor pressure vessel which is less than 3000 sq.ft., which is approximately the equivalent of ~400 ft of 42" pipe.

  The overall heat removal capability of the three operating containment air coolers (CAC) is ~ 6.6 x 10^6 Btu/hr. The increase in heat load as a result of the increased RCS temperature is only 0.05% of the total capacity of the CACs. As a result this additional heat load from higher RCS T_{hot} can easily be handled by existing heat removal capabilities.

- The heat load addition from the FW lines inside and outside Containment (Auxiliary Building and Turbine Building) was addressed in a similar fashion.

  The entire length of feedwater and condensate piping from the Condenser through the Steam Generator (SG) Feed Pumps to the SG is assumed to be the equivalent of 7000 ft of 24" pipe with 1" wall thickness and 3" of insulation. The heat load added to the space due to the higher temperature of

the condensate and feedwater system piping, as it traverses through the Turbine Building, Auxiliary Building, and the Containment is ~ 11,117 Btu/hr, which represents an increase of only 0.63% in heat load.

Given that the ventilation system removes approximately 15 $x10^6$ Btu/hr from the Turbine Building, 8 $x10^5$ Btu/hr from the Auxiliary Building, and that the combined capacity of the three CACs is approximately 6.6 $x10^6$ Btu/hr, the increase in heat load has an infinitely small impact on the overall temperature in these buildings/areas.

It is therefore appropriate to conclude that the effect of the increased temperatures in the RCS hot leg and in the condensate/feedwater trains have no meaningful impact on the Containment, Auxiliary Building and Turbine Building environments under normal, accident and Appendix R plant conditions and scenarios.

RAI 2:

The results of the Appendix R evaluation for MUR power uprate are provided in Attachment 2 of the LAR, Section IV.11, "Appendix R." However, this section does not discuss the time necessary for the repair of systems required to achieve and maintain cold shutdown nor the increase in decay heat generation following plant trips. The staff requests the licensee to verify that the plant can meet the 72-hour requirements in both 10 CFR Part 50, Appendix R, Sections III.G.1.b and III.L with increased decay heat at MUR power uprate conditions.

CCNPP Response:

All Appendix R calculations have been verified to use core decay heat generation rates which bound those calculated for the MUR core power level of 2737 MWt. In addition, no other Appendix R Safe Shutdown requirements (such as Condensate requirements, 72 hour cold shutdown requirements, or the repair requirements) have been impacted. As a result Calvert Cliffs, even with the MUR power uprate, remains in compliance with the requirements in 10 CFR Part 50, Appendix R, Sections III.G.1.b and III.L.

REFERENCE:

1. NRC Regulatory Issue Summary 2002-03, Guidance on the Content of the Measurement Uncertainty Recapture Power Uprate Applications, January 31, 2002