

September 25, 2001

Mr. Gary Van Middlesworth
Site Vice President
Duane Arnold Energy Center
Nuclear Management Company, LLC
3277 DAEC Road
Palo, IA 52324-0351

SUBJECT: DUANE ARNOLD ENERGY CENTER - USE OF NET POSITIVE SUCTION HEAD
MARGIN AS AN ACCEPTANCE CRITERION (TAC NO. MB0543)

Dear Mr. Van Middlesworth:

By letter dated November 16, 2000, you submitted an application to the Nuclear Regulatory Commission (NRC) for a power uprate for the Duane Arnold Energy Center (DAEC). This application requests NRC approval for you to operate DAEC at a power level of 1912 MWt, which is 20 percent above the original rated power of 1593 MWt. On May 8, 2001, you transmitted to the NRC, Topical Report NEDC-32980P, "Safety Analysis Report for Duane Arnold Energy Center Extended Power Uprate," Revision 1. This topical report includes a summary of the results of all significant safety analyses and evaluations to justify the requested increase in power level. Based on our review of the material provided in these submittals and a follow-up conference call with your staff on July 24, 2001, we confirmed that your interpretation of the net positive suction head (NPSH) licensing basis for DAEC, as related to taking credit for containment overpressure in calculations of NPSH of the emergency core cooling system (ECCS), is not consistent with the staff's position on NPSH, as set forth below.

The staff considers the NPSH of the ECCS to be a parameter important to reactor safety. The NRC's Safety Guide 1, "Net Positive Suction Head for Emergency Core Cooling and Containment Heat Removal System Pumps," states that adequate NPSH should be demonstrated assuming no increase in containment pressure (i.e., no credit for containment overpressure). However, in some cases, in which no other practical approach was available to demonstrate adequate available NPSH, the NRC staff has approved NPSH analyses that assume a limited amount of containment overpressure for operating power plants.

We first examined your approach on this subject during the original operating license (OL) review for DAEC. The assumption of a limited amount of containment overpressure was allowed during the DAEC OL review based on the original Figure 5-G1.1-1 of the DAEC final safety analysis report (FSAR) dated September 29, 1972. Figure 5-G1.1-1 exhibited a margin of at least 2.7 psi between the calculated containment pressure and the pressure required for adequate available NPSH for the core spray pump. Although this figure presented the margin, it also gave the values of the containment accident pressure and the pressure required for adequate available NPSH as a function of time. All these factors were considered by the NRC staff when we accepted your analyses at the time of OL review for DAEC.

We reexamined the validity of your approach during our review of your response to Generic Letter (GL) 97-04, "Assurance of Sufficient Net Positive Suction Head for Emergency Core Cooling and Containment Heat Removal Pumps." In our letter dated September 2, 1998, we expressed our concern over the use of the margin between the calculated containment pressure and the pressure required for adequate available NPSH as the sole acceptance criterion. However, despite our concern, you held your position that maintaining the 2.7 psi margin was sufficient without regard to other conditions. The staff did not pursue this issue further at the time because the information on the containment accident pressure and the pressure required for adequate available NPSH as a function of time was provided and was still included in Figure 5-G1.1-1 of the Updated FSAR for DAEC. Our acceptance was based not only upon the available margin, but also on the information in the figures in the Updated FSAR.

In the course of our review of GL 97-04 responses, we discussed the topic of NPSH with the Advisory Committee on Reactor Safety (ACRS). The ACRS expressed concern about the use of containment overpressure in calculations to demonstrate adequate available NPSH. In a letter from the ACRS to NRC Chairman Shirley Ann Jackson dated December 12, 1997, the ACRS stated that it concurs with the NRC staff's position that "selectively granting credit for small amounts of overpressure for a few cases may be justified." We have maintained our position that no more credit be given for containment overpressure than is necessary in NPSH reviews.

Our fundamental disagreement with your use of margin as an acceptance criterion is that it places no limit on the absolute value of the overpressure that may be assumed in NPSH calculations nor on the time period over which the overpressure may be assumed. This is contrary to the position we established in GL 97-04. The failure to place limits on the absolute value of overpressure for which credit may be taken and the time for which such credit may be taken is contrary both to basic safety considerations, such as defense-in-depth, as well as the risk concern that relying on containment accident pressure makes a plant more vulnerable to beyond-design-basis-accident sequences.

Based on our review of your calculations as part of the staff's work on GL 97-04, and the independent audit calculations performed as part of the review of the power uprate request, we consider the current NPSH calculations to be acceptable. However, the potential for ECCS failure increases with higher reliance on containment pressure. You should be aware that with the request to increase the power of DAEC and the lack of information provided for the use of the margin criterion, as displayed in Figure 5.4-15 of the DAEC Updated FSAR, we consider the use of a margin criterion by itself for NPSH to be unacceptable.

This letter is to notify you that we believe based on 10 CFR 50.59 (c)(2) that any future changes that lead to increased reliance on containment overpressure (either with regard to magnitude or duration) in the calculations for the NPSH of the ECCS would require prior NRC staff review and approval.

G. Van Middlesworth

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The calculations supporting any such change should clearly show the time that containment overpressure is required and the amount of containment overpressure required. Any such changes made without prior approval by the staff would very likely be considered a violation of 10 CFR 50.59 and subject to enforcement action in accordance with the NRC Enforcement Policy.

Sincerely,

/RA/

Brenda L. Mozafari, Project Manager, Section 1
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-331

cc: See next page

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