UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

January 23, 2001

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

SUBJECT: DUANE ARNOLD ENERGY CENTER - ISSUANCE OF AMENDMENT REGARDING STANDBY LIQUID CONTROL MINIMUM BORON CONCENTRATION (TAC NO. MB0102)

Dear Mr. Van Middlesworth:

The U.S. Nuclear Regulatory Commission has issued the enclosed Amendment No. 236 to Facility Operating License No. DPR-49 for the Duane Arnold Energy Center. This amendment consists of changes to the Technical Specifications (TS) in response to your application dated September 19, 2000.

The amendment revises the Standby Liquid Control boron solution requirements in TS Figure 3.1.7-1 to ensure a minimum boron concentration of 660 parts per million in the reactor.

A copy of the Safety Evaluation is also enclosed. Notice of Issuance will be included in the Commission's next biweekly *Federal Register* notice.

Sincerely,

Darl S Hood

Darl S. Hood, Senior Project Manager, Section 1
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-331

Enclosures: 1. Amendment No. 236 to License No. DPR-49
2. Safety Evaluation

cc w/encls: See next page

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Duane Arnold Energy Center

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

NUCLEAR MANAGEMENT COMPANY, LLC

DOCKET NO. 50-331

DUANE ARNOLD ENERGY CENTER

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 236
License No. DPR-49

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Nuclear Management Company, LLC (NMC),, September 19, 2000, complies with the standards and requirements of the Atomic Energy Act of l954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with l0 CFR Part 5l of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment and paragraph 2.C.(2) of Facility Operating License No. DPR-49 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 236 , are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. The license amendment is effective as of the date of issuance and shall be implemented before entering Mode 2 during Cycle 18.

FOR THE NUCLEAR REGULATORY COMMISSION

Claudia M. Craig

Claudia M. Craig, Chief, Section 1
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: January 23, 2001

ATTACHMENT TO LICENSE AMENDMENT NO. 236

FACILITY OPERATING LICENSE NO. DPR-49

DOCKET NO. 50-331

Replace the following pages of the Appendix A Technical Specifications with the attached revised pages. The revised areas are identified by amendment number and contain marginal lines indicating the areas of change. Bases page is included for information only.

Remove	Insert
3.1-23	3.1-23
B 3.1-39	B 3.1-39

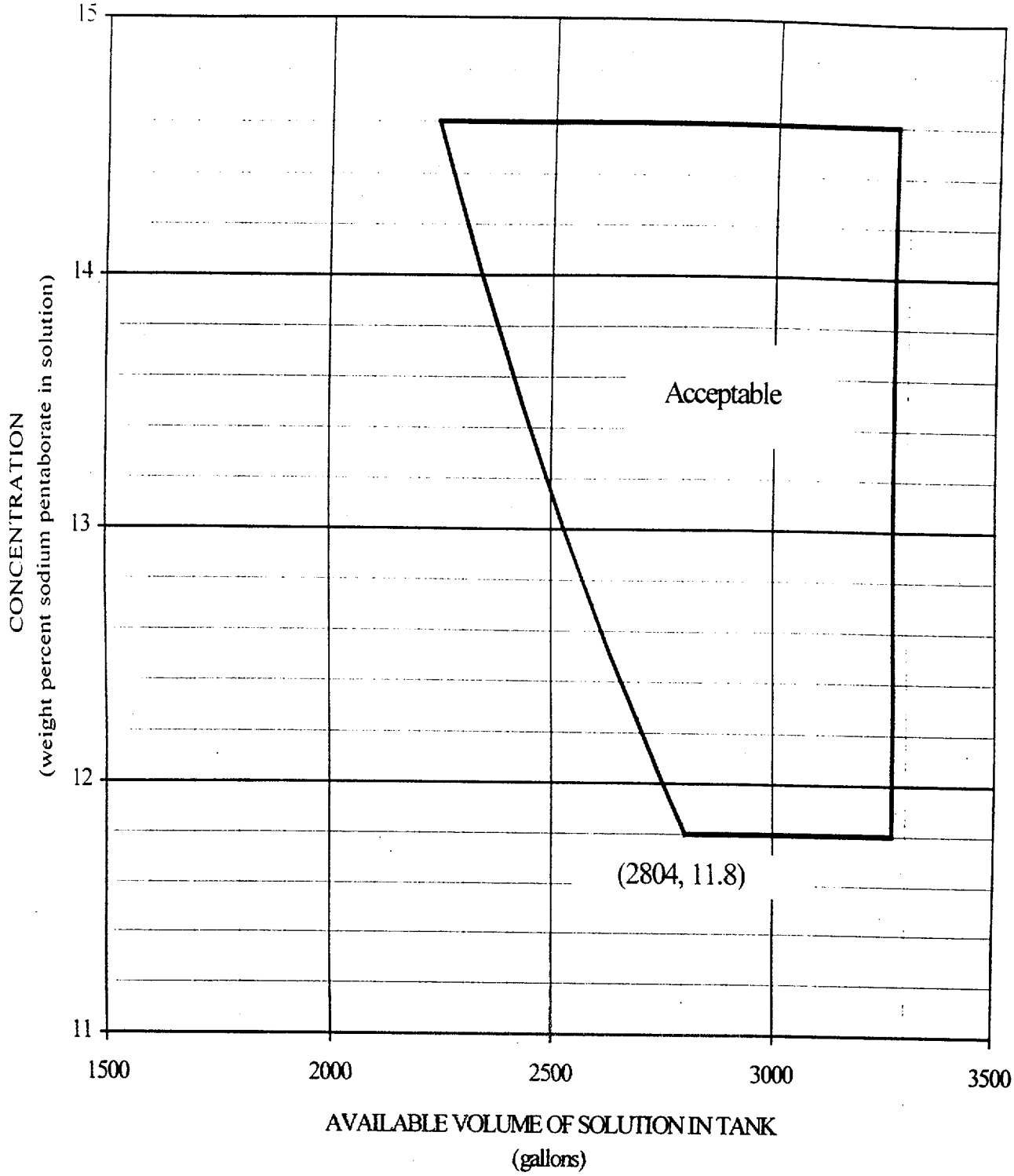

Figure 3.1.7-1 (page 1 of 1)
Sodium Pentaborate Solution Volume
Versus Concentration Requirements

B 3.1 REACTIVITY CONTROL SYSTEMS

B 3.1.7 Standby Liquid Control (SLC) System

BASES

BACKGROUND

The SLC System is designed to provide the capability of bringing the reactor, at any time in a fuel cycle, from full power and minimum control rod inventory (which is at the peak of the xenon transient) to a subcritical condition with the reactor in the most reactive, xenon free state without taking credit for control rod movement. In addition, the SLC System is relied upon to satisfy the requirements of 10 CFR 50.62 (Ref. 1) on Anticipated Transient Without Scram (ATWS).

The SLC System consists of a boron solution storage tank, two positive displacement pumps, two explosive valves that are provided in parallel for redundancy, and associated piping and valves used to transfer borated water from the storage tank to the reactor pressure vessel (RPV). The borated solution is discharged near the bottom of the core shroud, where it then mixes with the cooling water rising through the core. A smaller tank containing demineralized water is provided for testing purposes.

APPLICABLE SAFETY ANALYSES

The SLC System is manually initiated from the main control room, as directed by the emergency operating procedures, if the operator believes the reactor cannot be shut down, or kept shut down, with the control rods. The SLC System is used in the event that enough control rods cannot be inserted to accomplish shutdown and cooldown in the normal manner. The SLC System injects borated water into the reactor core to add negative reactivity to compensate for all of the various reactivity effects that could occur during plant operations. To meet this objective, it is necessary to inject a quantity of boron, using both SLC pumps, which produces a concentration of 660 ppm of natural boron, in the reactor coolant at 70°F. To compensate for potential leakage and imperfect mixing in the reactor system, an additional amount of boron equal to 25% of the amount cited above is added (Ref. 2). The volume versus concentration limits in Figure 3.1.7-1 and the temperature versus concentration limits in Figure 3.1.7-2 are calculated

(continued)

UNITED STATES
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 236 TO FACILITY OPERATING LICENSE NO. DPR-49

NUCLEAR MANAGEMENT COMPANY, LLC

DUANE ARNOLD ENERGY CENTER

DOCKET NO. 50-331

1.0 INTRODUCTION

By letter dated September 19, 2000 (Ref. 1), the Nuclear Management Company, LLC (the licensee) submitted a request to amend the technical specifications (TS) for the Duane Arnold Energy Center (DAEC). The proposed TS amendment changes the standby liquid control system boron solution requirements to ensure a minimum boron concentration of 660 ppm in the reactor.

2.0 EVALUATION

The function of the standby liquid control (SLC) system is to provide a backup method, independent of control rods, to initiate and maintain reactor subcriticality as the nuclear system cools. The DAEC SLC system is currently designed to inject a quantity of boron solution such that a concentration of 600 ppm in the reactor core is reached. An additional 25 percent of that quantity of boron is also injected to compensate for imperfect mixing, leakage and volume in other small piping connected to the reactor. The boron concentration of 600 ppm ensures the capability to initiate and maintain reactor subcriticality.

The Duane Arnold Energy Center is currently pursuing the use of GE-14 fuel, a power uprate to 1912 MWth, and extended cycle length to 24 months. The current SLC system boron concentration of 600 ppm was found to be insufficient to satisfy the SLC system shutdown margin design requirements for future planned core reloads. The licensee has proposed to change the SLC system boron concentration from 600 ppm to 660 ppm. An analysis was performed by General Electric (GE) using the approved methods described in Revision 14 to NEDE 24011-P-A, "General Electric Standard Application for Reactor Fuel (GESTAR II)," (Ref. 2) to provide the basis for the increase in minimum SLC system boron concentration. The results of the GE analysis demonstrated that, with a minimum boron concentration of 660 ppm, sufficient shutdown margin is maintained (>1.0%Δk/k) in the reactor with respect to the DAEC TS 3.1.1 requirement for shutdown margin of 0.38%Δk/k . This analysis assumed DAEC with an equilibrium core of GE-14 fuel, operating at 1912 MWth with 24-month fuel cycles. The analysis is bounding for the upcoming cycle, which utilizes GE-10, GE-12, and GE-14 fuel designs, and for all currently planned future core designs.

The DAEC TS include surveillance requirement 3.1.7.1 which requires that the available volume of boron solution in the SLC tank be within the limits of TS Figure 3.1.7-1. DAEC TS surveillance requirement 3.1.7.5 requires that the concentration of boron in solution be within the limits of TS Figure 3.1.7-1. The licensee has proposed to modify TS Figure 3.1.7-1 to contain the acceptable volume and concentration values which would result in a minimum boron concentration of 660 ppm consistent with the results of GE's analysis. An additional 25 percent of the quantity of boron required to achieve a minimum boron concentration of 660 ppm in the reactor will also be injected, maintaining the margin which compensates for imperfect mixing and potential leakage in the reactor system.

The design of the DAEC SLC system complies with the requirements of 10 CFR 50.62 for anticipated transients without scram (ATWS). The current DAEC SLC system boron concentration requirement bounds that required by 10 CFR 50.62, and the SLC system will continue to comply with the requirements of 10 CFR 50.62 when the minimum SLC boron concentration is increased to 660 ppm.

The licensee has also proposed a change to clarify TS Figure 3.1.7-1. Figure 3.1.7-1 is currently titled "Gross Volume of Solution in Tank." Since the SLC tank outlet is above the bottom of the tank, the gross volume in the tank is not available for injection in the reactor. The licensee has proposed to change the title of Figure 3.1.7-1 to "Available Volume of Solution in the Tank." This change corrects a potential inconsistency in the TS, and is therefore, acceptable.

The staff has reviewed the licensee's submittal. The analysis performed by GE to support the amendment request was performed using approved methods, and the licensee has demonstrated that the proposed minimum boron concentration ensures that sufficient shutdown margin will be maintained and the SLC system will continue to comply with the requirements of 10 CFR 50.62 for ATWS. Therefore, the staff finds the proposed change to be acceptable.

NRC Staff Conclusion

The staff has reviewed the licensee's proposed changes to TS Figure 3.1.7-1 and the associated Bases section related to the standby liquid control boron solution requirements. Based on the review, the staff concludes that the proposed TS changes are acceptable.

3.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Iowa State official was notified of the proposed issuance of the amendment. The State official had no comments.

4.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in *Title 10 Code of Federal Regulations* (10 CFR) Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public

comment on such finding (65 FR 65343, dated November 1, 2000). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

5.0 CONCLUSION

The Commission has concluded based on the considerations discussed above, that (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance With the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: A.Cubbage, SRXB

Date: January 23, 2001