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MAR 5 1973

Docket No. 50-331

Iowa Electric Light & Power Co.
ATTN: Mr. Duane Arnold, President
Security Building
P. O. Box 351
Cedar Rapids, Iowa 52406

Gentlemen:

Five copies of Supplement Number 1 to the Safety Evaluation for the Duane Arnold Energy Center are enclosed for your use. A copy of this Supplement is simultaneously being placed in the Commission's Public Document Room at 1717 H Street, N.W., Washington, D.C. 20545 and in the Cedar Rapids Public Library, 426 Third Avenue, S.E., Cedar Rapids, Iowa 52401, the Local Public Document Room.

Sincerely,

Original signed by
V. A. Moore

V. A. Moore, Assistant Director
for Boiling Water Reactors
Directorate of Licensing

Enclosure: (5)
Supplement No. 1 to
Safety Evaluation

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DATE ▶	3/2/73	3/5/73	3/5/73			

March 2, 1973

SUPPLEMENT NUMBER 1

TO THE

SAFETY EVALUATION

BY THE

DIRECTORATE OF LICENSING

U.S. ATOMIC ENERGY COMMISSION

IN THE MATTER OF

IOWA ELECTRIC LIGHT AND POWER COMPANY

DUANE ARNOLD ENERGY CENTER

DOCKET NO. 50-331

Introduction

The Atomic Energy Commission's Safety Evaluation Report (SER) on the Duane Arnold Energy Center dated January 23, 1973, identified certain matters as requiring additional information from the applicant or that were still under review by the Regulatory staff.

The purpose of this Supplement is to update the SER based on the Regulatory staff's review of information contained in Amendment 12 to the FSAR and on a discussion held with the applicant since issuance of the SER.

Each of the sequentially-numbered items in this Supplement contains a specific reference to the sub-section of the SER that is being updated, either by replacement with or addition of the material provided in this Supplement.

Appendix A of this Supplement contains an updated chronology of our review and Appendix B is a listing of errata to the SER.

Item 1 Replace Section 2.3.6 with:

2.3.6 Conclusion

The opinion of the staff is that the onsite meteorological data presented in the FSAR, and subsequently verified by the applicant, indicates that the atmospheric dispersion conditions at the plant site are much less favorable than would normally be expected for this part of the country. Since both the applicant and the staff used these less favorable dispersion conditions as presented in the FSAR in calculating relative concentrations for the site, the staff concludes that the relative concentrations used for evaluation of the site are conservative and acceptable.

Item 2 In Section 5.2.2 insert the following on page 5-4 before the first full paragraph.

The capacity of the six safety/relief valves is sufficient to prevent actuation of the spring loaded safety valves, following any anticipated operational transient with an anticipatory scram initiated by the steam line or turbine valve position switches. In addition, the combined capacity of the six safety/relief and the two safety valves is sufficient to maintain the reactor pressure below 1350 psig (a 25 psi margin below the ASME code allowable pressure of 1375 psig), following any anticipated operational transient assuming that a scram is initiated by high reactor pressure and assuming that any one safety/refief or safety valve fails to open.

Item 3 Add the following at the end of Section 6.2.6

On February 7, 1973, a meeting was held with the applicant to discuss the status of the main steam line isolation valve seal system for the Duane Arnold plant. The applicant described three alternative seal systems which were studied: a water seal system, a pressurizing nitrogen system, and a controlled leakage system. The applicant proposes to adopt the controlled leakage system for the Duane Arnold plant. The detailed design of the controlled leakage system will be submitted in Amendment 13 on about March 15, 1973.

The controlled leakage system proposed by the applicant for the Duane Arnold plant used the one-inch diameter drain pipes located on each of the four steam lines just inboard of the outer isolation valve to collect and transport any leakage from the containment through the isolation valves, to the reactor building where the leakage will be filtered by the standby gas treatment system before being released to the atmosphere via the off-gas stack. Valve actuations necessary for system operation will be remote manually initiated, and will have interlocks to prevent initiation unless the pressure in the steam line at a point between the inner and outer isolation valves is below 50 psig. Design of the system will be in accordance with the ASME Boiler and Pressure Vessel Code, Section III, Class 2 requirements and seismic Category I requirements. Each of the four main steam lines will have an independent controlled leakage system and each system will be testable.

The controlled leakage system proposed would not preclude the later adoption and use of a water seal or nitrogen seal system in the event one of these alternative systems is developed and found acceptable by the Regulatory staff.

The applicant indicated that the proposed controlled leakage system could be installed prior to the first refueling outage.

Although the staff has not completed its detailed review of the proposed controlled leakage system we conclude that the proposed system would reduce the direct leakage through the main steam isolation valves. We find the approach acceptable and will review the design prior to installation at the first refueling outage.

Item 4 <u>Substitute the following for a portion of Section 9.1.2</u>

9.1.2 Spent Fuel Storage

On page 9-3, last paragraph, delete the last 8 lines starting with, "For the postulated event of...," and replace with: "The applicant has analyzed the postulated event of a cask drop and determined that the cask could penetrate the floor of the cask pool. The applicant has proposed, in Amendment 12, to install an energy absorbing material to mitigate the consequence of a cask drop on the cask pool floor. The design of the energy absorbing material will be submitted by the applicant and reviewed by the Regulatory staff, prior to its installation, which will be no later than the first refueling operation.

We conclude that the proposed use of an energy absorbing material and the proposed modification to provide redundancy of the active components of the crane (see item 5 of this Supplement) are acceptable methods to reduce the probability of dropping the fuel cask and to mitigate the consequences in the event a cask drop were to occur."

Item 5 Substitute the following for Section 9.1.4

The applicant has completed its analysis of the consequences of dropping heavy components such as the shield plugs, drywell head, pressure vessel head, steam driers, and steam separators during preparation of refueling operations. The applicant's study of this matter was submitted in Amendment 12. The results of the applicant's study indicate that any dropping of the above cited heavy components during lifting operations could result in damage to the pressure vessel and some of the core internals such as the core spray headers, but it would not cause a loss-of-coolant type accident or result in a release of radioactivity from the core.

The applicant indicated in Amendment 12 that, although no loss-of-coolant type accident or radioactivity release would occur, the cost of repair to return the plant to operational status would be large. The applicant indicated that it would modify the present crane design to make the active components of the crane redundant to mitigate the

consequences of a single failure of any active crane component with regard to the crane load.

The applicant has indicated that the necessary crane modifications will be completed prior to the initial refueling of the Duane Arnold plant. The applicant's approach in the active components of the crane having the modifications completed prior to the initial refueling outage is acceptable. We will discuss the particular components under consideration with the applicant prior to the first refueling outage.

Item 6 Substitute the following for Section 9.4.2

9.4.2 Turbine and Auxiliary Building Ventilation Systems

Auxiliary buildings, such as the turbine building, radwaste building, and pump house, have their own ventilation systems for filtering, heating, and cooling.

The turbine building ventilation system is a once-through system composed of the following three subsystems:

1. Two full capacity exhaust fans take suction from the areas where the air ejectors and condensate demineralizers are located. These are the areas in the turbine building most likely to contain radioactive gases. During normal operation, the air from these areas is exhausted through the off-gas stack.

2. Areas below about 15 feet above the turbine operating floor are exhausted to the main plant exhaust plenum located in the reactor building. During normal operation the air in this plenum is exhausted through the reactor building vents.

3. Areas that are higher than 15 feet above the turbine operating floor are intermittently exhausted, during warm weather, via fans located in the turbine building roof.

In addition to the 3 subsystems described above, the diesel-generator rooms located in the turbine building have their own separate ventilation systems.

In the event of high radiation in the main plant exhaust plenum, the turbine building ventilation system is shutdown. The turbine building roof ventilation fans are manually shutdown, if necessary. All reactor building ventilation effluents are exhausted through the standby gas treatment system to the off-gas stack on detection of excessive radiation levels in the main plant exhaust plenum.

Item 7 <u>Add the following at the end of Section 10.3</u>

On February 2, 1973, the staff met with the applicant to review the results of its analysis of the consequences of high energy pipe

ruptures occuring external to the primary containment building. The applicant submitted these analyses and related consequences in Amendment 12. The bases and evaluation criteria regarding the location and type of breaks that were to be considered, were developed by the Regulatory staff. The principal systems reviewed by the applicant were main steam lines, feedwater lines, HPCI, and RCIC steam supply lines. In addition to the effects of pipe whip and jet forces, the effects of the resultant steam-water environment were considered.

Based on our preliminary review of these high energy pipe lines located outside the primary containment, we conclude that if the postulated rupture of these lines were to occur, safe shutdown of the Duane Arnold plant would not be precluded. We further conclude that any modifications that might later be required are likely to be of a minor nature and can be resolved on completion of our review of the applicant's submittal on this matter and prior to the initial fuel loading date.

Item 8 <u>Substitute the following for the last sentence on page 10-5 of Section 10.6</u>:

To control the growth of algae and fungus in the circulating water system, acid is added at the circulating water wet pump pit and chlorine is added downstream of the blowdown discharge point.

Appendix A

Chronology after January 8, 1973

January 15, 1973	Meeting held with applicant to discuss proposed Appendix I related limits for Duane Arnold Energy Center.
January 19, 1973	Received letter from applicant indicating that General Electric Topical Report on fuel densification was applicable to DAEC fuel.
January 23, 1973	Received letter from applicant committing to installation of additional systems to meet proposed Appendix I limits if the environmental monitoring program indicates these limits are exceeded.
January 27, 1973	ACRS subcommittee meeting held in Washington, D.C.
February 2, 1973	Meeting held with applicant to review analyses and consequences of high energy pipe ruptures outside containment.
February 7, 1973	Meeting held with applicant to discuss status of the main steam line isolation valve seal system.
February 28, 1973	Received Amendment 12 to the FSAR containing analyses of high energy pipe rupture outside containment and other outstanding documentation requirements.

Appendix B

ERRATA SHEET

FOR THE

DUANE ARNOLD ENERGY CENTER SAFETY EVALUATION REPORT

Page 1-4	4th line from bottom of page, change "48" to "49".
Page 1-5	3rd line of second paragraph, change "absorber" to "adsorber".
Page 1-6	9th line, delete "for the normal operational containment inerting and".
Page 1-9	Add to "other firms associated with this facility include: Eberline Instrument Corporation and Nuclear Audit and Testing Company", just above paragraph 1.5.
Page 2-19	2nd sentence at top of page, change "which will be supported" to "which is supported".
Page 3-1	1st line of last paragraph, remove extra "i".
Page 3-11	Last paragraph at bottom of page, add "USAS B-31.7 - 1971" and "ASME Nuclear Pump and Valve Code".
Page 4-8	In the last sentence of the first paragraph insert "based on a single operator error will be limited to a peak fuel enthalpy less than 280 claories per gram" before the period.
Page 4-10	4th line from bottom of page, add "but three points" between "all" and "of".
Page 5-3	Last line at bottom of page, change 1657 MW to read "1658 MW".

Page 5-6	Last sentence of third paragraph, change "is to "are".
Page 5-8	Last line at bottom of page, change "has" to "have".
Page 6-11	3rd line of last paragraph, Capitalize "l" in "Loss".
Page 6-15	3rd line from bottom of the page, change "1.5 psi" to "2.7 psi"
Page 6-17	6th line in first paragraph of 6.3.2 insert "or core spray" between "LPCIS" and "pump".
Page 9-3	1st sentence of last paragraph, change "mechanical stops" to read "electrical limit switches".
Page 9-15	8th line from top of page, change "fire pumps" to "fire pump".
Page 11-7	5th line of second paragraph, change "100,00 microcuries" to read "50,000 microcuries".
Page 18-2	2nd line from top of page, correct spelling of "audited".