



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

ENVIRONMENTAL IMPACT APPRAISAL

BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 53 TO FACILITY LICENSE NO. DPR-49

IOWA ELECTRIC LIGHT AND POWER COMPANY, ET AL.

DUANE ARNOLD ENERGY CENTER

DOCKET NO. 50-331

Description of Proposed Action

By letter dated March 29, 1978, the Iowa Electric Light and Power Company (the licensee) requested changes to Appendix B, Environmental Technical Specifications for the Duane Arnold Energy Center (DAEC). The licensee's proposed changes are to Specifications 2.2.1 Chlorine and 2.2.2 Other Chemicals.

The proposed change to Specification 2.2.1 is to increase the discharge of chlorine to the levels allowed in the DAEC NPDES permit. Subsequent discussions between the NRC staff and the licensee have resulted in modifications to the licensee's proposed request. The licensee has agreed to these modifications. The proposed changes to Specification 2.2.2 are to allow the discharge of new water treatment chemicals to be used in the circulating water system.

This appraisal reviews the environmental impacts associated with the changes to the discharge of chlorine and other chemicals from the DAEC.

Environmental Impacts of Proposed Action

Specification 2.2.1

This specification presently limits the discharge of total residual chlorine (TRC) to 0.1 mg/l for a maximum of two hours per day. The licensee's proposal, as modified by the staff, is to allow continuous discharge of total residual chlorine at 0.1 mg/l. The licensee has proposed that a dechlorination system be put into operation, capable of operating continuously to bring the concentration of TRC in the plant discharge to 0.1 mg/l or less at all times. Catalyzed sodium sulfite is proposed for dechlorination.

The licensee and its consultant have conducted studies of plant heat exchanger performance under the current Technical Specification limitation. Results of these studies^{1,2} indicate that biofouling is occurring in the heat exchanger surfaces at a rate that cannot be controlled by the present circulating water treatment system. In addition, mud and silt deposition, scale formation and corrosive effects in some parts of the circulating water systems are interfering with normal system operation.

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Under the Water Quality Standards of the State of Iowa³, the Cedar River in the site vicinity is designated as Class B waters for a warmwater fishery. The surface water quality criteria require all toxic substances to be present in concentrations or amounts nontoxic or nondetrimental to aquatic life. The applicable criteria are designated by the State to be those found in Quality Criteria for Water⁴. For a warmwater fishery, total residual chlorine should not be present, according to this reference, in excess of 0.01 mg/l.

The DAEC Final Environmental Statement (FES) indicates that a discharge concentration of 0.1 mg/l TRC would result, based on dilution alone (and not considering uptake by chemical reaction), in a TRC concentration after mixing of 0.01 mg/l or less based on the historical 10 year low flow in the Cedar River at the site vicinity. The FES also indicates that the circulating water and receiving water chlorine demand are high whenever it is likely to be necessary to chlorinate at levels that would result in a violation of the TRC discharge concentration limit (without dechlorination). This fact, plus dechlorination at the plant discharge by the application of sodium sulfite, is expected to result in the removal of all measurable free available chlorine in the discharge. Dechlorination will lessen the potential for adverse effects on receiving water biota in the immediate vicinity of the plant discharge, where mixing of the discharge with the Cedar River water is incomplete and TRC levels are above the 0.01 mg/l level.

Discussions with the State of Iowa indicate that an officially defined mixing zone has not been established for the DAEC cooling tower blowdown discharge. The Water Quality Standards require that toxic effects in the mixing zone be considered when establishing such a zone on a case-by-case basis. The FES indicates that the area in which the TRC concentration will likely be above the completely mixed level will be relatively small in extent. The plant discharge is a single port submerged diffuser with a design exit velocity of 2 m/sec. This design is expected to promote mixing to the extent that, under all conditions, not more than 25% of the river width and less than 1 acre of surface area are to be affected by the unmixed effluent. The area of mixing is near the river shoreline and therefore has the potential for adversely affecting juvenile fish species which are typically found in shallow areas. These life stages are typically somewhat more sensitive to TRC than the adult life stages⁵. However, the Cedar River does not represent a unique fishery with respect to other midwestern streams and is considered to be predominantly comprised of species relatively pollution tolerant. If the river's water quality should improve to the extent that the species composition should change, the potential adverse effects of the chlorination scheme at DAEC would likely be mitigated by a reduction in the expected usage of chlorine.

The U. S. Environmental Protection Agency (EPA) has reviewed the licensee's dechlorination proposal. The staff has contacted the EPA and the State concerning the dechlorination scheme for DAEC. No objections to the proposal were received as a result of these reviews, nor were potentially adverse effects from its use identified. In addition, these agencies as well as staff records were examined to determine if adverse effects have been noted as a result of the chlorination procedures used at the DAEC to date (i.e., discharge concentrations of TRC of 0.1 mg/l or less resulting from chlorine application to the closed cycle cooling system for up to 2 hours per day). No adverse effects have been reported.

Specification 2.2.2

The licensee proposes to add 8 chemicals to the list of other chemicals which are used at DAEC. According to the licensee, small quantities of these chemicals are needed to provide control of water chemistry for certain specific water treatment problems. The compositions of these chemicals has been designated as proprietary by the manufacturer. Information provided by the manufacturer¹ indicates that only one of the formulations to be used at the plant is designated as toxic by EPA. This product is an organo-bromine compound known as NALCO 7320. The licensee will only use this compound when the regular chlorinating system is not operating as planned, and during its use, blowdown will be suspended, allowing for its rapid decomposition by chemical reaction to unidentified less toxic substances¹. Anticipated mean daily use and annual total use is low relative to other plant chemical uses. Of the remaining seven formulations, fish bioassay data are available for three as follows:

<u>Formulation Identification</u>	<u>96 hr Bioassay Results on Trout and Bluegill</u>
Nalsperse 7348	No effects @ 1000 ppm
Nalco 7315	TL ₅₀ >10,000 ppm
Nalco 345	TL ₅₀ >10,000 ppm

As proposed for use at DAEC none of these proprietary formulations will be discharged in concentrations cited as harmful to aquatic biota. Other adverse effects due to the use of these chemicals, such as contributions to conditions that would be in violation of State water quality standards, alterations to levels of dissolved solids, dissolved oxygen or availability of nutrients contributing to eutrophication, are not expected.

Conclusion and Basis for Negative Declaration

On the basis of the foregoing analysis, it is concluded that significant adverse impacts on the environment in the vicinity of the Duane Arnold Energy Center will not occur as a result of the proposed changes to Specification 2.2.1 Chlorine and 2.2.2 Other Chemicals.

On this basis and in accordance with 10 CFR Part 51.5(d), the Commission concludes that no environmental impact statement for the proposed action be prepared and a negative declaration to this effect is appropriate.

Dated: August 7, 1979

REFERENCES

1. Letter from R. H. McKenzie, NALCO Chemical Co. to R. Thiede, Iowa Electric Light and Power Co.; May 3, 1979.
2. Letter from R. H. McKenzie, NALCO Chemical Co. to R. Thiede, Iowa Electric Light and Power Co.; May 9, 1979.
3. State of Iowa Water Quality Standards; Chapter 16 400 Iowa Administrative Code; March 1978.
4. Quality Criteria for Water; U. S. Environmental Protection Agency; EPA-440/9-76-023; July 1976.
5. Effects of Wastewater and Cooling Water Chlorination on Aquatic Life; W. Brungs; U. S. Environmental Protection Agency; EPA-600/3-76-098; August 1976.