December 29, 1993

Docket Nos. 50-331

Mr. Lee Liu Chairman of the Board and Chief Executive Officer Iowa Electric Light and Power Company Post Office Box 351 Cedar Rapids, Iowa 52406

Dear Mr. Liu:

SUBJECT: ENVIRONMENTAL ASSESSMENT AND FINDING OF NO SIGNIFICANT IMPACT, FUEL POOL EXPANSION, DUANE ARNOLD ENERGY CENTER (TAC NO. M86284)

By letter dated March 26, 1993, as supplemented by additional correspondence dated September 15 and November 23, 1993, Iowa Electric Light and Power Company (IELP) requested a license amendment to increase the allowable capacity of the spent fuel pool.

Enclosed is our Environmental Assessment related to this proposed action. Based on our assessment, we have concluded that there are no significant radiological or nonradiological impacts associated with the proposed spent fuel pool expansion and it will have no significant impact on the quality of the human environment.

We have also enclosed a Notice of Issuance of Environmental Assessment and Finding of No Significant Impact. This Notice is being forwarded to the Office of the <u>Federal Register</u> for publication.

Sincerely, Original signed by Robert M. Pulsifer

Robert M. Pulsifer, Project Manager Project Directorate III-3 Division of Reactor Projects III/IV/V Office of Nuclear Reactor Regulation

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Enclosure:

1. Environmental Assessment

2. Notice of Issuance of Environmental Assessment

cc w/enclosure: See next page

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# UNITED STATES NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

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Robert M. Pulsifer, Project Manager Project Directorate III-3 Division of Reactor Projects III/IV/V Office of Nuclear Reactor Regulation

Enclosure:

- 1. Environmental Assessment
- 2. Notice of Issuance of
- Environmental Assessment

cc w/enclosure: See next page Mr. Lee Liu Iowa Electric Light and Power Company

Duane Arnold Energy Center

cc:

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Chairman, Linn County Board of Supervisors Cedar Rapids, Iowa 52406

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U.S. Nuclear Regulatory Commission Resident Inspector's Office Rural Route #1 Palo, Iowa 52324

Regional Administrator, Region III U.S. Nuclear Regulatory Commission 801 Warrenville Road Lisle, Illinois 60532-4351

Mr. Stephen N. Brown Utilities Division Iowa Department of Commerce Lucas Office Building, 5th Floor Des Moines, Iowa 50319



UNITED STATES NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

# ENVIRONMENTAL ASSESSMENT

# BY THE OFFICE OF NUCLEAR REACTOR REGULATION

# RELATING TO THE EXPANSION OF THE SPENT FUEL POOL

# FACILITY OPERATING LICENSE NO. DPR-49

# IOWA ELECTRIC LIGHT AND POWER COMPANY

# DUANE ARNOLD ENERGY CENTER

# DOCKET NO. 50-331

#### 1. INTRODUCTION

#### Description of Proposed Action 1.1

By letter dated March 26, 1993, Iowa Electric Light and Power Company (IELP) requested an amendment to Facility Operating License No. DPR-49 for Duane Arnold Energy Center (DAEC) to allow the expansion of the capacity of the spent fuel pool. Further information was provided in the form of answers to staff questions by letters dated September 15 and November 23, 1993.

The amendment would specifically authorize the licensee to increase the capacity of the spent fuel pool from the currently approved capacity of 2050 storage cells to the proposed capacity of 3152 storage cells, including a rack which can be used for temporarily storing 323 fuel assemblies in the cask pit. The proposed expansion would be achieved by removing the current spent fuel racks from the pool and replacing them with new racks (i.e., reracking), in which the cells for the spent fuel assemblies are more closely spaced. The proposed arrangement would make use of free standing racks.

The existing racks in the pool have 1898 fuel storage cells. In the 1998 time frame, the station will no longer have full core discharge reserve. Consequently, IELP proposes to replace the existing spent fuel racks for DAEC with racks of a high density design. These free standing racks will have capacity for the storage of 3152 fuel assemblies, including 323 storage locations in a cask pit rack.

These spent fuel storage racks provide smooth full length square storage cells of stainless steel in a welded honeycomb structure. Each storage cell utilizes boral neutron absorbing poison panels. Each rack is supported on the pool floor by a minimum of 4 support legs welded to the bottom of the rack.

#### Need for Increased Storage Capacity 1.2

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DAEC received its full power operating license on February 22, 1974. At the time of licensing, the spent fuel pool contained sufficient storage capacity to accommodate up to 480 fuel assemblies. In 1978, the Nuclear Regulatory Commission (NRC) authorized the reracking of the pool to increase the capacity to 2050 fuel assemblies (Amendment No. 45). To maintain full core discharge capability beyond 1998, the licensee recently proposed to replace the existing racks with high density racks which will have 3152 storage cells, including a cask pit rack.

The Nuclear Waste Policy Act of 1982 provided for limited away-from reactor storage, and stipulated that a spent fuel repository would be available by 1998. Since the Act does not require a repository before this date, it is not clear whether there will be any place to ship spent fuel in the mid to late 1990's. Therefore, in the interim, IELP needs to provide more storage capacity.

# 1.3 <u>Alternatives</u>

Commercial reprocessing of spent fuel has not developed as originally anticipated. In 1975, the NRC directed its staff to prepare a Generic Environmental Impact Statement (GEIS) on spent fuel storage. The Commission directed the staff to analyze alternatives for the handling and storage of spent light water power reactor fuel with particular emphasis on developing long-range policy. The GEIS was to consider alternative methods of spent fuel storage, as well as the possible restriction or termination of the generation of spent fuel through nuclear power plant shutdown.

A "Final Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel" (NUREG-0575), Volumes 1-3 (the FGEIS) was issued by the NRC in August 1979. The finding of the FGEIS is that the environmental impact costs of interim storage are essentially negligible, regardless of where such spent fuel is stored. A comparison of the impact costs of various alternatives reflects the advantage of continued generation of nuclear power versus its replacement by coal-fired power generation. Continued nuclear generation of power versus its replacement by oil-fired generation provides an even greater economic advantage. In the bounding case considered in the FGEIS, that of shutting down the reactor when the existing spent fuel storage capacity is filled, the cost of replacing nuclear stations before the end of their normal lifetime makes this alternative uneconomical. The storage of spent fuel as evaluated in NUREG-0575 is considered to be an interim action, not a final solution to permanent disposal.

One spent fuel storage alternative considered in detail in the FGEIS is the expansion of the onsite fuel storage capacity by modification of the existing spent fuel pools. Applications for more than 100 spent fuel pool expansions have been received, and have been approved or are under review by the NRC. The finding in each case has been that the environmental impact of such increased storage capacity is negligible. However, since there are variations in storage design and limitations caused by the spent fuel already stored in some of the pools, the FGEIS recommends that licensing reviews be done on a case-by-case basis to resolve plant-specific concerns.

The licensee has considered several alternatives to the proposed action of the spent fuel pool expansion. The staff has evaluated these and certain other alternatives with respect to the need for the proposed action as discussed in Section 1.2 of this assessment. The following alternatives were considered:

- (1) Shipment of spent fuel to a permanent federal fuel storage/disposal facility.
- (2) Shipment of Fuel to a Reprocessing Facility
- (3) Shipment of Fuel to Another Utility or Site for Storage
- (4) Reduction of Spent Fuel Generation
- (5) Construction of a New Independent Spent Fuel Storage Installation
- (6) No Action Taken

Each of these alternatives are discussed below.

# 1. <u>Shipment of Spent Fuel to a Permanent Federal Fuel Storage/Disposal</u> <u>Facility</u>

Shipment to a permanent federal fuel storage/disposal facility is a preferred alternative to increasing the onsite spent fuel storage capacity. The Department of Energy (DOE) is developing a repository under the Nuclear Waste Policy Act of 1982 (NWPA). However, the facility is not likely to be ready to receive spent fuel until the year 2010, at the earliest.

Under the NWPA, the federal government has the responsibility to provide not more than 1900 metric tons capacity for the interim storage of spent fuel. The impacts of storing fuel at a Federal Interim Storage (FIS) facility fall within those already assessed by the NRC in NUREG-0575. In enacting the NWPA, Congress found that the owners and operators of nuclear power stations have the primary responsibility for providing interim storage of spent nuclear fuel. In accordance with the NWPA and 10 CFR Part 53, shipping of spent fuel to a FIS facility is considered a last resort alternative. At this time, the licensee cannot take advantage of FIS because existing storage capacity is not maximized.

# 2. <u>Shipment of Fuel to a Reprocessing Facility</u>

Reprocessing of spent fuel from DAEC is not viable because there is no operating commercial reprocessing facility in the United States, nor is there the prospect for one becoming operational in the foreseeable future.

# 3. Shipment of Fuel to Another Utility or Site For Storage

The shipment of spent fuel from DAEC to the storage facility of another utility company could provide short-term relief from the storage capacity problem. However, the NWPA and 10 CFR Part 53 clearly place the responsibility for the interim storage of spent nuclear fuel with each owner or operator of a nuclear power plant. The shipment of spent fuel to another site is not an acceptable alternative since the licensee does not own or control any facility where it could transfer spent fuel.

# 4. <u>Reduction of Spent Fuel Generation</u>

Improved usage of fuel in the reactor and/or operation at a reduced power level would extend the life of the fuel in the reactor. In the case of extended burnup of fuel assemblies, the fuel cycle would be extended and fewer offloads would take place. However, the current storage capacity would still be exhausted as discussed in Section 1.2. Operation at reduced power would not be an effective use of available resources and would create undue economic disadvantages for the licensee and its customers. Therefore, this is not a practical alternative for DAEC.

#### 5. Construction of a New Independent Spent Fuel Storage Installation

Additional storage capacity could be developed by building a new, independent spent fuel storage installation (ISFSI), similar either to the existing pool or a dry storage facility. The NRC staff has generically assessed the impacts of the pool alternative and found, as reported in NUREG-0575, that "the storage of LWR spent fuels in water pools has an insignificant impact on the The staff has not made a generic assessment for environment." the dry storage alternative . However, assessments for the dry cask ISFSI at the Surry Power Station and the dry modular concrete ISFSIs at both the H.B. Robinson Steam Electric Plant and the Oconee Nuclear Station resulted in findings of no significant impact. Subsequent to these licensing actions, the NRC promulgated a final rule that permits the onsite storage of spent fuel in NRC-approved dry storage casks under a general license. Several casks designs have been approved by the staff pursuant to this rule.

While these alternatives are environmentally acceptable, such a new storage facility, either at DAEC or at a location offsite, would require new site-specific design and construction, including equipment for the transfer of spent fuel. NRC review, evaluation and licensing of such a facility would also be required. It is not likely that this entire effort would be completed in time to meet the need for additional capacity as discussed in Section 1.2. Furthermore, such construction would not utilize the existing expansion capabilities of the existing pool and thus would waste resources.

## 6. No Action Taken

If no action were taken, i.e., the spent fuel pool storage capacity would become exhausted in the very near future and DAEC would have to be shut down. This would be a waste of an available resource and is not considered viable. It would also place a heavy financial burden on the customers served by the licensee and cannot be justified.

#### 2.0 RADIOACTIVE WASTES

DAEC contains radioactive waste treatment systems designed to collect and process the gaseous, liquid, and solid waste that might contain radioactive material. The radioactive waste treatment systems were evaluated in the Final Environmental Statement (FES) dated March 1973. There will be no change in the waste treatment systems described in the FES because of the proposed spent fuel pool (SFP) rerack.

# 2.1 Radioactive Material Released to the Atmosphere

With respect to releases of gaseous radioactive materials to the atmosphere, the only radioactive gas of significance which could be attributable to storing additional spent fuel assemblies onsite for a longer time is the radionuclide Krypton-85 (Kr-85). Average annual releases of Kr-85 are estimated by assuming that all of the Kr-85 released from any defective fuel assembly stored in the SFP will be released prior to the next refueling. Enlarging the storage capacity of the SFP would have no effect on the calculated average quantities of Kr-85 released to the atmosphere each year. Consequently, calculated annual doses to an individual would likewise be unchanged as a result of the proposed modification to the SFP.

Iodine-131 releases from spent fuel assemblies to the SFP water will not increase appreciably since Iodine-131 will decay to negligible levels between refuelings.

Most of the tritium in the SFP water results from activation of boron and lithium in the primary coolant, and this will not be affected by the proposed changes. A relatively small amount of tritium is contributed during reactor operation by fissioning of reactor fuel and subsequent diffusion of the tritium through the fuel and cladding. Tritium releases from the fuel assemblies occur mainly during reactor operations and, to a limited extent, shortly after shutdown. Therefore, increasing the SFP capacity will not increase the tritium activity in the SFP.

Aside from the above considerations, the station is limited in its total releases of gaseous activity by the Offsite Dose Assessment Manual.

# 2.2 Solid Radioactive Wastes

The staff does not expect any significant increase in the amount of solid waste generated from the SFP cleanup system due to the proposed modification. Solid radioactive wastes from the SFP can result from the discharge of spent resins from the SFP cleanup system. The necessity for resin replacement is determined primarily by the requirement for water clarity. Water clarity problems are caused by the frequency of refueling operations and should be independent of the number of spent fuel assemblies stored. During the reracking operation, a small amount of additional resin may be generated by the pool cleanup system on a one time basis as a result of the expected effects of physical activity in the pool. Thus, the expanded capacity of the storage pool is not expected to significantly alter the frequency of resin replacement above that which is currently experienced. Therefore, the proposed reracking of the SFP will not significantly alter the environmental impact due to solid radioactive wastes.

The existing spent fuel storage racks will be released as low-level radioactive waste. They are projected to be shipped to the Barnwell facility in South Carolina before June 30, 1994, or be stored compacted in the onsite low level storage facility, if access is denied at Barnwell.

## 2.3 Radioactive Material Released to Receiving Waters

There should not be a significant increase in the liquid release of radionuclides from the plant as a result of the proposed modifications. The SFP demineralizer resin removes soluble radioactive materials from the SFP water. These spent resins are periodically backflushed with water. The amount of radioactivity in the SFP filter demineralizer resin may increase slightly due to the additional spent fuel in the pool, but the resultant liquid effluent (from backflushing) will be processed prior to release to the environment. After processing, the amount of radioactivity released via liquid effluent to the environment as a result of the proposed modification would be negligible.

## 3.0 RADIOLOGICAL IMPACT ASSESSMENT/OCCUPATIONAL EXPOSURE

This section contains the staff's estimates of the impact on the public from the proposed SFP expansion. This section also contains the staff's evaluation of the estimates of the additional radiological impacts on the plant workers from the proposed modification of the SFP.

## 3.1 <u>Public Radiation Exposure</u>

Sections 2.1 and 2.3 indicated that releases to the atmosphere and receiving waters would not be significant and would be well within regulatory limits. Consequently, the estimated increase in doses due to exposure of individuals and the population to radioactive material associated with the SFP expansion will not be significant, i.e., will be within regulatory limits.

#### 3.2 Occupational Exposure

The collective occupational dose for the proposed modification of the SFP is estimated by the licensee to be about 6 to 12 person-rem including possible diver exposure. Similar operations have been performed at a number of other facilities as well as at DAEC in 1979 and there is every reason to believe that the SFP modification can be accomplished safely and efficiently with minimum radiation exposure to personnel.

On the basis of our review of the licensee's report, we conclude that the proposed storage of spent fuel in the modified SFP will not result in any significant increase in doses received by workers and can be performed in a manner that will ensure that exposure to workers will be as low as is reasonably achievable (ALARA) and within the limits of 10 CFR 20.

## 4.0 NON-RADIOLOGICAL IMPACT

The only non-radiological effluent affected by the SFP expansion is the additional waste heat rejected from the plant. The total increase in heat load rejected to the environment will be insignificant compared to the current total heat load from all plant sources to the environment. Thus, the increase in rejected heat will have a negligible affect on the environment.

The licensee has not proposed any change in the use or discharge of chemicals in conjunction with the SFP modification. The proposed reracking project will not require any change in the National Pollution Discharge Elimination System permit. Therefore, the staff concludes that the non-radiological environment impact of expanding the capacity of the SFP will be insignificant.

# 5.0 SEVERE ACCIDENT CONSIDERATIONS

## 5.1 Accident Considerations

The staff, in its Safety Evaluation (SER) issued August 9, 1972, addressed both the safety and environmental aspects of a fuel handling accident. A fuel handling accident may be viewed as a "reasonably foreseeable" design basis event which the pool and its associated structures, systems, and components (including the racks) are designed and constructed to withstand. The environmental impacts of the accident were found not to be significant.

## 5.2 Radiological Assessment if Potential Accidents

Although no onsite fuel-handling accidents having significant offsite radiological consequences have ever occurred, such accidents must be postulated and their potential environmental consequences must be analyzed. Potential environmental consequences of such postulated accidents may be realistically bounded by extrapolation of results obtained from conservative estimates. Offsite dose consequences are conservatively estimated for plant-siting purposes and for performing design and operation reviews. The combination of assumptions used for these conservative dose estimates assure that calculations of doses for such accidents result in dose estimates that are unrealistically high. As a result, safe plant siting, design, and operation are enhanced because the doses so calculated would exceed regulatory limits without the adoption of plant safety features and/or operational controls. The principal regulatory dose limits for safety reviews, the limiting dose, is set at 25 rem to the whole body and 300 rem to the thyroid from iodine exposure. For reactor safety reviews such as those performed to evaluate consequences from fuel handling accidents, doses to the thyroid from inhalation of accident-released iodine are controlling.

By increasing the spent fuel storage capacity at DAEC, the accidents considered and evaluated previously are still bounding and do not require reevaluation. Therefore, the environmental consequences of postulated accidents meet our criteria and are, therefore, acceptable.

# 6.0 <u>SUMMARY</u>

The Final Generic Environmental Impact Statement (FGEIS) on handling and storage of spent light water power reactor fuel concluded that the cost of the various alternatives reflects the advantage of continued generation of nuclear power with the accompanying spent fuel storage. Because of the differences in SFP designs, the FGEIS recommended environmental evaluation of SFP expansions on a case-by-case basis.

For DAEC, the expansion of the storage capacity of the spent fuel pool will not create any significant additional radiological effects or measurable nonradiological environmental impacts. The small increase in radiation dose should not affect the licensee's ability to maintain individual occupational dose at DAEC within the limits of 10 CFR Part 20 and ALARA. The only non-radiological effluent affected by the SFP expansion is the additional waste heat rejected. The increase in total plant waste heat is insignificant. Thus, there is no significant environmental impact attributable to the waste heat from the plant due to the SFP expansion.

#### 6.1 <u>Alternative Use of Resources</u>

This action does not involve the use of resources not previously considered in connection with the Nuclear Regulatory Commission's Final Environmental Statement, dated March 1973, related to the operation of DAEC.

#### 6.2 Agencies and Persons consulted

The NRC staff reviewed the licensee's request. No other agencies or persons were consulted.

# 7.0 <u>BASIS AND CONCLUSIONS FOR NOT PREPARING AN ENVIRONMENTAL IMPACT</u> <u>STATEMENT</u>

The staff has reviewed the proposed spent fuel pool modification to DAEC relative to the requirements set forth in 10 CFR Part 51. Based upon the environmental assessment, the staff has concluded that there are no significant radiological or non-radiological impacts associated with the proposed action and that the proposed license amendment will not have significant effect on the quality of the human environment. Therefore, the Commission has determined, pursuant to 10 CFR 51.31, not to prepare an environmental impact statement for the proposed amendment.

Principal Contributor: Robert M. Pulsifer

Dated: December 29, 1993

# UNITED STATES NUCLEAR REGULATORY COMMISSION IOWA ELECTRIC LIGHT AND POWER COMPANY DOCKET NO. 50-331 NOTICE OF ISSUANCE OF ENVIRONMENTAL ASSESSMENT AND FINDING OF NO SIGNIFICANT IMPACT

The U. S. Nuclear Regulatory Commission (the Commission) is considering issuance of an amendment to Facility Operating License No. DPR-49, issued to Iowa Electric Light and Power Company (the licensee), for operation of the Duane Arnold Energy Center (DAEC), located in Linn County, Iowa.

# Identification of Proposed Action:

The amendment would consist of a change to the Operating License that would increase the storage capacity of the spent fuel pool to 3152 fuel assemblies, including a rack which can be used for temporary storage of 323 fuel assemblies.

The amendment to the TS is responsive to the licensee's application dated March 26, 1993, and supplemented by additional correspondence dated September 15 and November 23, 1993. The NRC staff has prepared an Environmental Assessment of the proposed action.

# Summary of Environmental Assessment:

The "Final Generic Environmental Impact Statement (FGEIS) on Handling and Storage of Spent Light Water Power Reactor Fuel" (NUREG-0575), Volumes 1-3 (1979), concluded that the environmental impact of interim storage of spent fuel was negligible and the cost of the various alternatives reflects the advantage of continued generation of nuclear power with the accompanying spent fuel storage. Because of the differences in design, the FGEIS recommended

9401070318 931229 PDR ADOCK 05000331 P PDR evaluating spent fuel pool expansions on a case-by-case basis. For DAEC, the expansion of the storage capacity of the spent fuel pool will not create any significant additional radiological effects or nonradiological environmental impacts beyond those assessed in the Commission's Final Environmental Statement (FES) issued in March 1973 related to the operation of DAEC, and in the Safety Evaluation Report issued July 7, 1978, in support of a previous license amendment concerning storage capacity.

The occupational radiation dose for the proposed operation of the expanded spent fuel pool is estimated to be less than 2 percent of the total annual occupational radiation exposure for this facility.

#### FINDING OF NO SIGNIFICANT IMPACT

The staff has reviewed the proposed spent fuel pool expansion to the facility relative to the requirements set forth in 10 CFR Part 51. Based on this assessment, the staff concludes that there are no significant radiological or nonradiological impacts associated with the proposed action and that the issuance of the proposed amendment to the license will have no significant impact on the quality of the human environment. Therefore, pursuant to 10 CFR 51.31, no environmental impact statement needs to be prepared for this action.

For further details with respect to this action see (1) the application for amendment dated March 26, 1993, and supplemental correspondence dated September 15 and November 23, 1993, (2) the FGEIS on Handling and Storage of Spent Light Water Power Reactor Fuel (NUREG-0575), (3) the FES for DAEC dated March 1973 and (4) the Environmental Assessment dated December 29, 1993.

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These documents are available for public inspection at the Commission's Public Document Room, 2120 L Street, NW., Washington, DC. 20555 and at the Cedar Rapids Public Library, 500 First Street, SE, Cedar Rapids, Iowa 52401.

Dated at Rockville, Maryland, this <sup>29th</sup> day of December 1993.

Robert M. Pulsifer, Project Manager Project Directorate III-3 Division of Reactor Projects III/IV/V Office of Nuclear Reactor Regulation These documents are available for public inspection at the Commission's Public Document Room, 2120 L Street, NW., Washington, DC. 20555 and at the Cedar Rapids Public Library, 500 First Street, SE, Cedar Rapids, Iowa 52401.

Dated at Rockville, Maryland, this 29th day of December 1993.

Original signed by Robert M. Pulsifer

Robert M. Pulsifer, Project Manager Project Directorate III-3 Division of Reactor Projects III/IV/V Office of Nuclear Reactor Regulation

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