Distribution

Docjet	Atty, OELD
ORB #3	OI&E (3)
NRR Reading	BJones (4)
Local PDR	BScharf (10)
NRC PDR	STS Group
HDenton	ACRS (16)
DEisenhut	CMiles, OPA
RTedesco	RDiggs
WGammill	TERA
JMiller	NSIC
LShao	
BGrimes	
RVollmer	
TIppolito	
SSheppard	
TKevern	

Docket No. 50-331

FEBRUARY 15 1980

Mr. Duane Arnold
President
Iowa Electric Light & Power Company
P. O. Box 351
Cedar Rapids, Iowa 52406

Dear Mr. Arnold:

The Commission has issued the enclosed Amendment No. 57 to Facility Operating License No. DPR-49 for the Duane Arnold Energy Center. This amendment consists of changes to the Technical Specifications in response to your application dated January 2, 1980.

This amendment changes the Technical Specifications to allow the count rate in the Source Range Monitor channels to drop below 3 counts per second when the entire core is being removed or replaced.

Copies of the Safety Evaluation and Notice of Issuance are also enclosed.

Sincerely,

Original Signed By
T. A. Ippolito

Thomas A. Ippolito, Chief
Operating Reactors Branch #3
Division of Operating Reactors

GD

Enclosures:
1. Amendment No. 57
2. Safety Evaluation
3. Notice

cc w/enclosures:
See attached page

Obvious defection p 2 of Notice and ~~Re~~ notice the (u) which follows 51.5(d) on 3rd from bottom line page one should be stricken as form of notice + amendment only

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OFFICE	DOR:ORB#3	DOR:ORB#3	DOR	DOR:ORP	OELD	DOR:ORB#3
SURNAME	SSheppard	TKevern	PCheck	WPGammill	PATON	TAIppolito
DATE	2/12/80	2/12/80	2/12/80	2/12/80	2/14/80	2/12/80

cc:

Mr. Robert Lowenstein, Esquire
Harold F. Reis, Esquire
Lowenstein, Newman, Reis and Axelrad
1025 Connecticut Avenue, N. W.
Washington, D. C. 20036

Office for Planning and Programming
523 East 12th Street
Des Moines, Iowa 50319

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

Iowa Electric Light & Power Company
ATTN: Ellery L. Hammond
P. O. Box 351
Cedar Rapids, Iowa 52406

Director, Technical Assessment Division
Office of Radiation Programs (AW-459)
US EPA
Crystal Mall #2
Arlington, Virginia 20460

U. S. Environmental Protection Agency
Region VII
ATTN: EIS COORDINATOR
1735 Baltimore Avenue
Kansas City, Missouri 64108

Cedar Rapids Public Library
426 Third Avenue, S. E.
Cedar Rapids, Iowa 52401

P [redacted]

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

IOWA ELECTRIC LIGHT AND POWER COMPANY
CENTRAL IOWA POWER COOPERATIVE
CORN BELT POWER COOPERATIVE

DOCKET NO. 50-331

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 57
License No. DPR-49

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

   A. The application for amendment by Iowa Electric Light and Power Company, Central Iowa Power Cooperative, and Corn Belt Power Cooperative (the licensee) dated January 2, 1980 complies with the standards and requirements of the Atomic Energy Act of 1954, 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 10 CFR Part 51 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 Appendices A and B, as revised through Amendment No. 57, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

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3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Thomas A. Ippolito, Chief
Operating Reactors Branch #3
Division of Operating Reactors

Attachment:
Changes to the Technical
Specifications

Date of Issuance: February 15, 1980

ATTACHMENT TO LICENSE AMENDMENT NO. 57

FACILITY OPERATING LICENSE NO. DPR-49

DOCKET NO. 50-331

Replace the following pages of the Appendix "A" Technical Specifications with the enclosed pages. The revised pages are identified by Amendment number and contain vertical lines indicating the area of change.

Remove	Insert
3.9-4	3.9-4
3.9-9/3.9-10	3.9-9/3.9-10

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENT
B. Core Monitoring During core alterations two SRM's shall be operable one in the core quadrant where fuel or control rods are being moved, and one in an adjacent quadrant, except as specified in 3 and 4 below. For an SRM to be considered operable, the following conditions shall be satisfied: 1. The SRM shall be inserted to the normal operating level. (Use of special movable, dunking type detectors during initial fuel loading and major core alterations in place of normal detectors is permissible as long as the detector is connected to the normal SRM circuit). 2. The SRM shall have a minimum of 3 cps with all rods fully inserted in the core. 3. Prior to spiral unloading, the SRM's shall be proven operable as stated above, however, during spiral unloading the count rate may drop below 3 cps. 4. Prior to spiral reload, two diagonally adjacent fuel assemblies, which have previously accumulated exposure in the reactor, will be loaded into their previous core positions next to each of the 4 SRM's to obtain the required 3 cps. Until these eight assemblies have been loaded, the 3 cps requirement is not necessary.	B. Core Monitoring Prior to making any alterations to the core, the SRM's shall be functionally tested and checked for neutron response. Thereafter, while required to be operable, the SRM's will be checked daily for response. Prior to spiral unloading or reloading the SRM's shall be functionally tested. Prior to spiral unloading, the SRM's shall also be checked for neutron response.
C. Spent Fuel Pool Water Level Whenever irradiated fuel is stored in the spent fuel pool, the pool water level shall be maintained at or above a level of 36 feet.	C. Spent Fuel Pool Water Level Whenever irradiated fuel is stored in the spent fuel pool, the water level shall be recorded daily.

normally available during refueling operations. In order to withdraw more than one control rod, it is necessary to bypass the refuleing interlock on each withdrawn control rod which prevents more than one control rod from being withdrawn at a time. The requirement that the fuel assemblies in the cell controlled by the control rod be removed from the reactor core before the interlock can be bypassed ensures that withdrawal of another control rod does not result in inadvertent criticality. Each control rod provides primary reactivity control for the fuel assemblies in the cell associated with that control rod.

Thus, removal of an entire cell (fuel assemblies plus control rod) results in a lower reactivity potential of the core. The requirements for SRM operability during these core alterations assure sufficient core monitoring.

2. Core Monitoring

The SRM's are provided to monitor the core during periods of station shutdown and to guide the operator during refueling operations and station startup. Requiring two operable SRM's in or adjacent to any core quadrant where fuel or control rods are being moved assures adequate monitoring of that

quadrant during such alterations. The requirement of 3 counts per second provides assurance that neutron flux is being monitored and insures that startup is conducted only if the source range flux level is above the minimum assumed in the control rod drop accident.

During spiral unloading, it is not necessary to maintain 3 cps because core alterations will involve only reactivity removal and will not result in criticality.

The loading of diagonally adjacent bundles around the SRM's before attaining the 3 cps is permissible because these bundles were in a subcritical configuration when they were removed and therefore they will remain subcritical when placed back in their previous position.

3. Spent Fuel Pool Water Level

To assure that there is adequate water to shield and cool the irradiated fuel assemblies stored in the pool, a minimum pool water level is established. The minimum water level above the top of the fuel is established to provide adequate shielding and is well above the level to assure adequate cooling.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 57 TO LICENSE NO. DPR-49

IOWA ELECTRIC LIGHT & POWER COMPANY
CENTRAL IOWA POWER COOPERATIVE
CORN BELT POWER COOPERATIVE

DOCKET NO. 50-331

DUANE ARNOLD ENERGY CENTER

1.0 INTRODUCTION

By letter dated January 2, 1980[1] Iowa Electric Light and Power Company (the licensee) requested an amendment to the Technical Specifications for the Duane Arnold Energy Center (DAEC). The effect of the amendment would be to allow the count rate in the Source Range Monitor (SRM) channels to drop below 3 counts per second (cps) when the entire reactor core is being removed or replaced. The present Technical Specifications require that a count rate of at least 3 cps be maintained whenever one or more fuel assemblies are present in the core.

2.0 DISCUSSION

During any core alteration, and especially during core loading, it is necessary to monitor flux levels. In this manner, even in the highly unlikely event of multiple operator errors, there is reasonable assurance that any approach to criticality would be detected in time to halt operations.

The minimum count rate requirement in the Technical Specifications accomplishes three safety functions: (1) it assures the presence of some neutrons in the core, (2) it provides assurance that the analog portion of the SRM channels is operable, and (3) it provides assurance that the SRM detectors are close enough to the array of fuel assemblies to monitor core flux levels.

Unloading and reloading of the entire core leads to some difficulty with this minimim count rate requirement. When only a small number of assemblies are present within the core, the SRM count rate will drop below the minimum due to the small number of neutrons being produced, and due to attenuation of these neutrons in the water and control blades separating the fuel from the SRM detectors. Past practice has been to connect temporary "dunking" chambers to the SRM channels in place of the normal detectors, and to locate these detectors near the fuel.

Besides being operationally inconvenient, dunking chambers suffer from signal variations due to their lack of fixed geometry. Moreover, the use of dunking chambers increases the risk of loose objects being dropped into the vessel.

3.0 EVALUATION

3.1 Subcriticality of the Intermediate Arrays

The proposed Technical Specification would only allow spiral unloading and reloading of the core. In such a program, only cells on the edge of the array are unloaded or reloaded. No major imbedded cavities or major peripheral concavities would be permitted. In such a case, the neutron multiplication factor of the intermediate arrays must be less than or equal to that of the fully loaded core. Since the shutdown margin of the fully loaded core is well assured by Section 3.3.A., we find the proposed change to be acceptable from the point of view of shutdown margin.

3.2 Flux Monitoring

3.2.1 Minimum Flux in the Core

A multiplying medium with no neutrons present forms the basis for an accident scenario in which reactivity is gradually but inadvertently added until the medium is highly supercritical. No neutron flux will be evident since there are no neutrons present to be multiplied. The introduction of some neutrons at this point would cause the core to undergo a sudden power burst, rather than a gradual startup, with no warning from the nuclear instrumentation. This scenario is of great concern when loading fresh fuel, but is of lesser concern for exposed fuel. Exposed fuel continuously produces neutrons by spontaneous fission of certain plutonium isotopes, photofission and photodisintegration of deuterium in the moderator. This neutron production in exposed fuel is normally great enough to meet the 3 cps minimum for a full core after a refueling outage with the lumped neutron sources removed.

There is assurance that a sufficient flux level will be present as long as some exposed fuel is present. The proposed Technical Specification (Section 3.9.B.4) requires that two diagonally adjacent fuel assemblies, which have previously accumulated exposure in the reactor, be loaded into their previous core positions next to each of the SRM's to provide a minimum of 3 cps prior to loading any other fuel. Additionally, the licensee has agreed that at least 50% of the fuel assemblies to be loaded into the core will have previously accumulated a minimum exposure of 1000 MWd/T. We therefore find the proposed change to be acceptable from the point of view of minimum flux.

We do not find the proposed Technical Specification to be applicable to the loading of a new core containing only fresh fuel. Such a loading must use lumped neutron sources and dunking chambers to meet the normal 3 cps minimum count rate.

3.2.2 SRM Operability

The Technical Specifications normally require a functional check of the SRM channels, including a check of neutron response, prior to making any alteration to the core and daily thereafter. This would be sufficient for core unloading and reloading, except that the more extensive fuel handling operations involved imply a greater possibility of SRM failure. The licensee has committed to load two assemblies diagonally adjacent to each SRM location prior to loading any other fuel. This should bring the count rate up to 3 cps and thus continuously verify operability. We find this alternative to be acceptable.

3.2.3 Flux Attenuation

The four SRM detectors are located, one per quadrant, roughly half a core radius from the center. Although these are incore detectors and thus very sensitive when the reactor is fully loaded, they lose some of their effectiveness when the reactor is partially defueled and the detectors are located some distance from the array of remaining fuel.

GE's spent fuel pool studies have shown[2] that 16 or more fuel assemblies (i.e., four or more control cells) must be loaded together before criticality is possible. Moreover, in a spiral reloading, the cell centered on the control blade must be loaded first. Given this, we have examined the Duane Arnold core layout and determined that the worst case configuration for monitoring purposes consists of four loaded cells, centered on blades 23-23, 22-27, 18-27 and 18-23. This array is two control cells (i.e., about two feet) away from the nearest SRM detector. (All other arrays containing 16 or more assemblies are closer to a detector.) We have previously examined the sensitivity loss in such a case on another docket[3] and found that a maximum of one decade of sensitiviey would be lost (i.e., about one fifth of the SRM's logarithmic scale). As in Reference 3, we find this to be acceptable.

4.0 SUMMARY

We have examined the safety issues and found the proposed amendment to be acceptable provided that the spiral reload consists of 50% previously exposed fuel as discussed herein (Section 3.2.1).

5.0 ENVIRONMENTAL CONSIDERATIONS

We have determined that the amendment does not authorize a change in effluent types or total amounts nor an increase in power level and will not result in any significant environmental impact. Having made this

determination, we have further concluded that the amendment involves an action which is insignificant from the standpoint of environmental impact, and pursuant to 10 CFR Section 51.5(d)(4) that an environmental impact statement, or negative declaration and environmental impact appraisal need not be prepared in connection with the issuance of the amendment.

6.0 CONCLUSION

We have concluded, based on the considerations discussed above, that: (1) because the amendment does not involve a significant increase in the probability or consequences of accidents previously considered and does not involve a significant decrease in a safety margin, the amendment does not involve a significant hazards consideration, (2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (3) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Dated: February 15, 1980

References

1. Letter, L. D. Root (Iowa Electric) to H. Denton (NRC), dated January 2, 1980.

2. General Electric Standard Safety Analysis Report, 251-GESSAR, Section 4.3.2.7, pg. 4.3-27.

3. "Safety Evaluation by the Office of Nuclear Reactor Regulation Supporting Amendment No. 27 to Facility Operating License No. DPR-63." Docket No. 50-220, enclosed with letter, T. A. Ippolito (NRC) to D. P. Dise (Niagara Mohawk Power Corporation), dated March 2, 1979.

UNITED STATES NUCLEAR REGULATORY COMMISSION

DOCKET NO. 50-331

IOWA ELECTRIC LIGHT AND POWER COMPANY, ET AL

NOTICE OF ISSUANCE OF AMENDMENT TO FACILITY OPERATING LICENSE

The U. S. Nuclear Regulatory Commission (the Commission) has issued Amendment No. 57 to Facility Operating License No. DPR-49 issued to Iowa Electric Light and Power Company, Central Iowa Power Cooperative, and Corn Belt Power Cooperative, which revises the Technical Specifications for operation of the Duane Arnold Energy Center, located in Linn County, Iowa. The amendment is effective as of the date of its issuance.

The amendment changes the Technical Specifications to allow the count rate in the Source Range Monitor channels to drop below 3 counts per second when the entire reactor core is being removed or replaced.

The application for the amendment complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations. The Commission has made appropriate findings as required by the Act and the Commission's rules and regulations in 10 CFR Chapter I, which are set forth in the license amendment. Prior public notice of this amendment was not required since the amendment does not involve a significant hazards consideration.

The Commission has determined that the issuance of this amendment will not result in any significant environmental impact and that pursuant to 10 CFR Section 51.5(d)(4) an environmental impact statement or negative declaration and environmental impact appraisal need not be prepared in connection with issuance of this amendment.

For further details with respect to this action, see (1) the application for amendment dated January 2, 1980, (2) Amendment No. 57 to License No. DPR-49, and (3) the Commission's related Safety Evaluation. All of these items are available for public inspection at the Commission's Public Document Room, 1717 H Street, N.W., Washington, D. C. and at the Cedar Rapids Public Library, 426 Third Avenue, S.E., Cedar Rapids, Iowa 52401. A copy of items (2) and (3) may be obtained upon request addressed to the U. S. Nuclear Regulatory Commission, Washington, D. C. 20555, Attention: Director, Division of Operating Reactors.

Dated at Bethesda, Maryland this 15th day of February 1980.

FOR THE NUCLEAR REGULATORY COMMISSION

Thomas A. Ippolito, Chief
Operating Reactors Branch #3
Division of Operating Reactors