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Docket No. 50-346

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REGULATORY DOCKET FILE COPY

Mr. Lowell E. Roe
Vice President, Facilities
Development
Toledo Edison Company
Edison Plaza
300 Madison Avenue
Toledo, Ohio 43652

Dear Mr. Roe:

The Commission has issued the enclosed Amendment No. 19 to Facility Operating License No. NPF-3 for the Davis-Besse Nuclear Power Station, Unit No. 1. The amendment consists of changes to the Technical Specifications in response to your application dated December 19, 1977, as supplemented April 4, 1978, June 22, 1978, and May 4, 1979.

This amendment allows an increase in spent fuel storage capability from 260 to a maximum of 735 fuel assemblies in the spent fuel pool through the use of high capacity spent fuel racks.

Copies of the Safety Evaluation, Environmental Impact Appraisal and the Notice of Issuance/Negative Declaration are also enclosed.

Sincerely,

Original signed by
Robert W. Reid

Robert W. Reid, Chief
Operating Reactors Branch #4
Division of Operating Reactors

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Side 1
6D

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Enclosures:
1. Amendment No. 19
2. Safety Evaluation
3. Environmental Impact Appraisal
4. Notice/Negative Declaration

cc w/enclosures: See next page

TA-ORB:DOR
TJCarter
7/ 79

OELD
M.B. Ulman
7/27/79 concur in Fed. Reg. Notice and amend.

OFFICE	ORB#4:DOR	ORB#4:DOR	C-ORB#4:DOR	M STSG	C-PSB:DOR	AD-ORP: DOR
SURNAME	RIngram	GVissing/cb	RReid	MVirgillio	GKnighton	WGammill
DATE	7/19/79	7/6/79	7/31/79	7/30/79	7/19/79	7/23/79

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

August 1, 1979

Docket No. 50-346

Mr. Lowell E. Roe
Vice President, Facilities
Development
Toledo Edison Company
300 Madison Avenue
Toledo, Ohio 43642

Dear Mr. Roe:

The Commission has issued the enclosed Amendment No. 19 to Facility Operating License No. NPF-3 for the Davis-Besse Nuclear Power Station, Unit No. 1. The amendment consists of changes to the Technical Specifications in response to your application dated December 19, 1977, as supplemented April 4, 1978, June 22, 1978, and May 4, 1979.

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Copies of the Safety Evaluation, Environmental Impact Appraisal and the Notice of Issuance/Negative Declaration are also enclosed.

Sincerely,

Robert W. Reid

Robert W. Reid, Chief
Operating Reactors Branch #4
Division of Operating Reactors

Enclosures:
1. Amendment No. 19
2. Safety Evaluation
3. Environmental Impact Appraisal
4. Notice/Negative Declaration

cc w/enclosures: See next page

Toledo Edison Company

cc w/enclosure(s):

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Washington, D.C. 20555

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Arlington, Virginia 20460

U. S. Environmental Protection Agency
Federal Activities Branch
Region V Office
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230 South Dearborn Street
Chicago, Illinois 60604

Mr. Samuel J. Chilk, Secretary
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

The Honorable Tim McCormack
Ohio Senate
Statehouse
Columbus, Ohio 43216

The Honorable Tim McCormack
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Atomic Safety & Licensing Board Panel
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Atomic Safety and Licensing Appeal Panel
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Toledo Edison Company

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cc w/enclosure(s) & incoming
dtd.: 12/19/77

Ohio Department of Health
ATTN: Director of Health
450 East Town Street
Columbus, Ohio 43216

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

THE TOLEDO EDISON COMPANY

AND

THE CLEVELAND ELECTRIC ILLUMINATING COMPANY

DOCKET NO. 50-346

DAVIS-BESSE NUCLEAR POWER STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 19
License No. NPF-3

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

A. The application for amendment by The Toledo Edison Company and The Cleveland Electric Illuminating Company (the licensees) dated December 19, 1977, as supplemented April 4, 1978, June 22, 1978, and May 4, 1979, 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.

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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. NPF-3 is hereby amended to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 19, are hereby incorporated in the license. The Toledo Edison Company shall operate the facility in accordance with the Technical Specifications.

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

FOR THE NUCLEAR REGULATORY COMMISSION

W.P. Gammill

William P. Gammill, Acting Assistant Director
for Operating Reactor Projects
Division of Operating Reactors

Attachment:
Changes to the Technical
Specifications

Date of Issuance: August 1, 1979

ATTACHMENT TO LICENSE AMENDMENT NO. 19

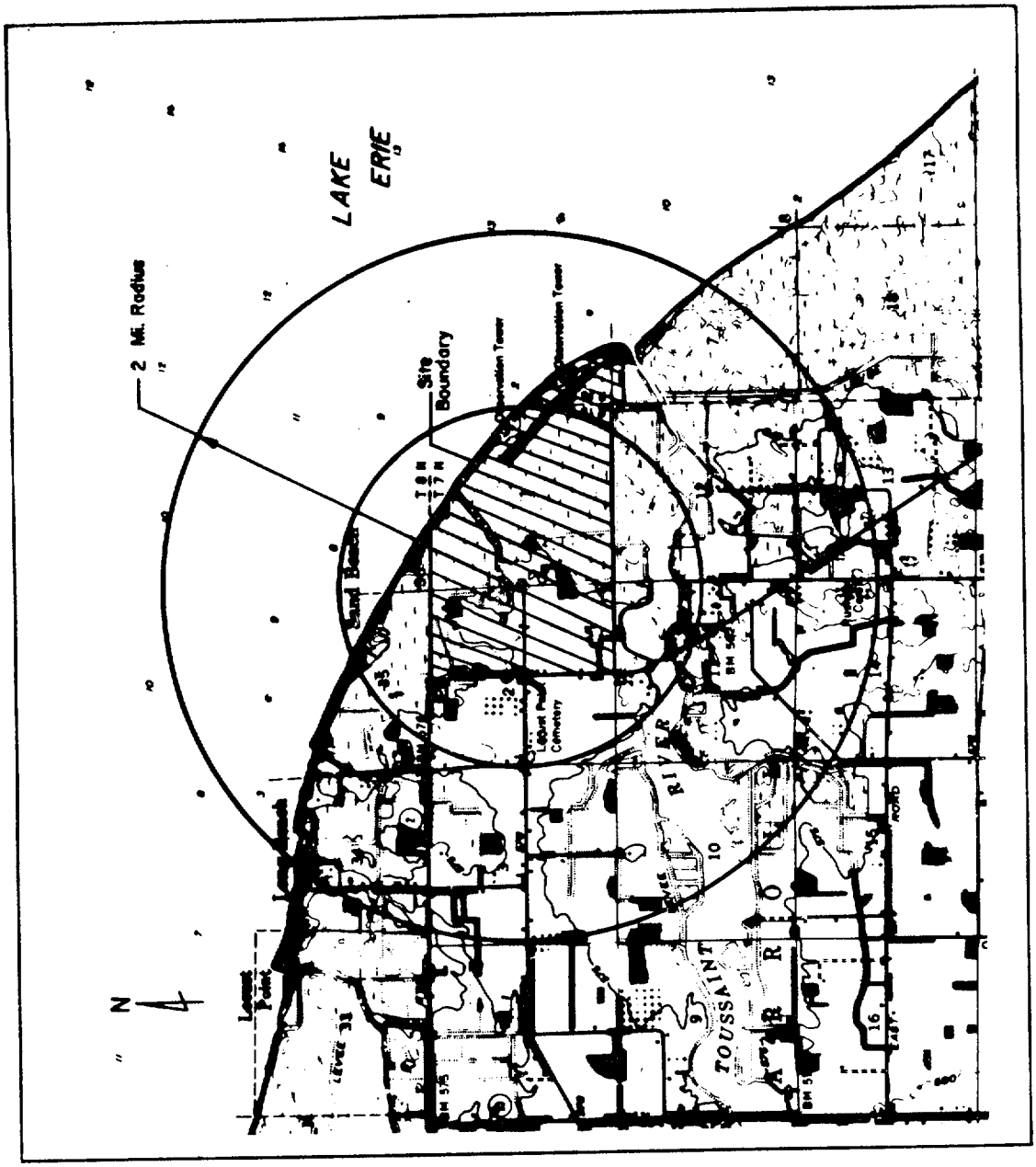
FACILITY OPERATING LICENSE NO. NPF-3

DOCKET NO. 50-346

Replace the following pages of the Appendix "A" Technical Specifications with the enclosed pages as indicated. The revised pages are identified by Amendment number and contain vertical lines indicating the area of change. The corresponding overleaf pages are also provided to maintain document completeness.

Pages

5-4
5-5
5-6



DAVIS-BESSE NUCLEAR POWER STATION
LOW POPULATION ZONE
FIGURE 5.1-2

DESIGN PRESSURE AND TEMPERATURE

5.2.2 The reactor containment building is designed and shall be maintained for a maximum internal pressure of 40 psig and a temperature of 264°F.

5.3 REACTOR CORE

FUEL ASSEMBLIES

5.3.1 The reactor core shall contain 177 fuel assemblies with each fuel assembly containing 208 fuel rods clad with Zircaloy -4. Each fuel rod shall have a nominal active fuel length of 144 inches and contain a maximum total weight of 2500 grams uranium. The initial core loading shall have a maximum enrichment of 3.0 weight percent U-235. Reload fuel shall be similar in physical design to the initial core loading and shall have a maximum enrichment of 3.3 weight percent U-235.

CONTROL RODS

5.3.2 The reactor core shall contain 53 safety and regulating and 8 axial power shaping (APSR) control rods. The safety and regulating control rods shall contain a nominal 134 inches of absorber material. The APSR's shall contain a nominal 36 inches of absorber material at their lower ends. The nominal values of absorber material shall be 80 percent silver, 15 percent indium and 5 percent cadmium. All control rods shall be clad with stainless steel tubing.

5.4 REACTOR COOLANT SYSTEM

DESIGN PRESSURE AND TEMPERATURE

5.4.1 The reactor coolant system is designed and shall be maintained:

a. In accordance with the code requirements specified in Section 5.2 of the FSAR, with allowance for normal degradation pursuant to applicable Surveillance Requirements.

b. For a pressure of 2500 psig, and

c. For a temperature of 650°F, except for the pressurizer and pressurizer surge line which is 670°F.

VOLUME

5.4.2 The total water and steam volume of the reactor coolant system is 12,110 ± 200 cubic feet at a nominal T_{avg} of 525°F.

5.5 METEOROLOGICAL TOWER LOCATION

5.5.1 The meteorological tower shall be located as shown on Figure 5.1-1.

5.6 FUEL STORAGE

CRITICALITY

5.6.1.1 The spent fuel storage racks are designed and shall be maintained with:

a. A K_{eff} equivalent to less than or equal to 0.95 when flooded with unborated water, which includes a conservative allowance of 1% delta k/k for calculation uncertainty.

b. A rectangular array of stainless steel cells spaced 12 31/32 inches on centers in one direction and 13 3/16 inches on centers in the other direction. Fuel assemblies stored in the spent fuel pool shall be placed in a stainless steel cell of 0.125 inches nominal thickness or in a failed fuel container.

5.6.1.2 The new fuel storage racks are designed and shall be maintained with:

a. A K_{eff} equivalent to less than or equal to 0.95 when flooded with unborated water, which includes a conservative allowance of 1% delta k/k for uncertainties as described in Section 9.1 of the FSAR.

b. A nominal 21 inch center-to-center distance between fuel assemblies placed in the storage racks.

DRAINAGE

5.6.2 The spent fuel storage pool is designed and shall be maintained to prevent inadvertent draining of the pool below 9 feet above the top of the fuel storage racks.

CAPACITY

5.6.3 The spent fuel storage pool is designed and shall be maintained with a storage capacity limited to no more than 735 fuel assemblies.

5.7 COMPONENT CYCLIC OR TRANSIENT LIMIT

5.7.1 The components identified in Table 5.7-1 are designed and shall be maintained within the cyclic or transient limit of Table 5.7-1.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 19 TO FACILITY OPERATING LICENSE NO. NPF-3

TOLEDO EDISON COMPANY

AND

CLEVELAND ELECTRIC ILLUMINATING COMPANY

DAVIS-BESSE NUCLEAR POWER STATION, UNIT NO. 1

DOCKET NO. 50-346

Introduction

By letter dated December 19, 1977 as supplemented April 4, June 22, 1978, and May 4, 1979, the Toledo Edison Company (TECo or the licensee) requested an amendment to Facility Operating License No. NPF-3 for the Davis-Besse Nuclear Power Station, Unit No. 1 (Davis-Besse 1). The amendment request would revise Sections 5.3 and 5.6 of the Technical Specifications (TS) to allow an increase in the spent fuel storage capability from the existing capacity of 260 fuel assemblies (approximately 1 1/3 cores) having a maximum enrichment of 3.0 weight percent U-235, to 735 fuel assemblies (approximately 4 cores) having a maximum enrichment of 3.3 weight percent U-235.

Background

TECo proposed to modify the existing Davis-Besse 1 spent fuel pool (SFP) to allow continued operation while accommodating an expected increase in the inventory of spent fuel assemblies above the present pool capacity. The first refueling of Davis-Besse 1 is scheduled to begin about March 1, 1980. The present spent fuel storage racks would be removed and replaced with new storage racks consisting of stainless steel boxes, each having 0.125 inch thick walls, sized to accept a single fuel assembly per box (cell). The cells would be installed in rows with center-to-center spacing of 12 31/32 inches in one direction, and 13 3/16 inches in the other orthogonal direction.

Evaluation

1. Nuclear and Mechanical Design Aspects

The licensee performed a criticality analysis of the proposed spent fuel storage racks with the assumptions of unborated water in the pool, fresh fuel in the racks with 3.3 weight percent U-235 (as compared to the original fuel having a maximum enrichment of 3.0 weight percent U-235), and a pool water temperature of 68°F. The rack configuration is infinite in all dimensions, and no credit is taken for poison other than the existing stainless steel. The licensee has cal-

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culated the effect of variation in pool temperature increase, eccentric fuel placement in the racks, and reduced pitch of the racks. A diffusion theory-transport bias was obtained by performing a transport theory calculation for the nominal case. The results of the calculation for k_{eff} of the racks for the nominal case was 0.92 with a total uncertainty on the positive side of 0.024 including a maximum increase of 0.01 k_{eff} to allow for the worst case of fuel placement eccentricity. This results in a maximum k_{eff} value of 0.944 which meets our acceptance criterion of 0.95 or less. We conclude that the analysis methods are acceptable and that the results meet our acceptance criteria and are, therefore, acceptable.

The design of the proposed racks would preclude storage of fuel assemblies in other than their prescribed location. The proposed racks are also designed to seismic Category 1 requirements and can withstand the maximum uplift force resulting from a stuck fuel assembly. Seismic design was performed with methods which have been previously reviewed and found acceptable by the NRC staff. The proposed rack arrangement would not affect the present tornado missile and flood protection for the spent fuel storage facility as there would be no structural changes made to the present pool design. Since the supports of the proposed fuel racks extend higher than the fuel elements, the dropping of a fuel bundle would cause the same damage as previously assumed and therefore the calculated potential dose would not change with respect to what was previously accepted. The proposed rack design thus meets our criteria and we find it acceptable.

The licensee has performed a design basis heat load calculation to demonstrate that the existing SFP cooling system is able to handle the increased cooling requirement resulting from the proposed additional spent fuel storage. The decay heat generated by the spent fuel is calculated on the basis that the average discharge batch would be 60 fuel assemblies which have undergone an average continuous operating period for 3 years at 2772 MWt discharging into the SFP after 150 hours of decay. We have evaluated the increased heat load for maximum normal refueling heat load conditions on the basis of annual refueling of the reactor.

Our evaluation verifies that the increased heat load resulting from the storage of 8 additional fuel batches (4 years and older) would be insignificant (less than 2% of the original design heat load) and that the existing pool cooling system would maintain the water temperature below 125°F, which is acceptable. We have also reevaluated the increased heat load under abnormal conditions resulting from one entire core being discharged 150 hours after shutdown, 65 days after the last of 9 annual refueling batches. Under this condition, the residual heat removal (RHR) system would be used to remove the decay heat from the SFP. Our evaluation verifies that the RHR system would be able to maintain the pool water temperature at 140°F and is acceptable. We therefore conclude that the existing SFP cooling system and the RHR system are adequate.

An increase in spent fuel storage capacity has not led to increased concentrations of radionuclides in the SFP water at other operating plants. Measurements taken of the activity in the pool water before and after refueling have indicated essentially no change in concentrations of the impurities. We, therefore, find the existing purification portion of the system is adequate to perform its function.

The proposed increase in spent fuel storage capacity would have essentially no impact on the concentration of radioactivity in the air of the fuel building or heat load on the fuel building ventilation system. No modification to this system is required in support of this change.

We had previously found the design for the SFP cooling and purification system, and the fuel handling building ventilation system to be acceptable, and reach the same conclusion now.

2. Material Aspects

Since the possibility of long-term storage of spent fuel exists, we are investigating on a generic basis the effects of the pool environment on the racks, fuel cladding and pool liner. Based upon our preliminary review and previous operating experience, we have concluded that at the pool temperature which will be experienced and the quality of the demineralized water, and taking no credit for inservice inspection, there is reasonable assurance that no significant corrosion of the racks, the fuel cladding or the pool liner will occur over the lifetime of the plant. However, if the results of the current generic review indicate that additional protective measures are warranted to protect the racks, the fuel cladding and/or the liner from the effects of corrosion, the necessary steps and/or inspection programs will be required to assure that an acceptable level of safety is maintained. Any conceivable problems which could be uncovered are of a long-term nature and warrant no need for immediate concern.

3. Fuel Handling

The NRC staff has under way a generic review of load handling operations in the vicinity of SFPs to determine the likelihood of a heavy load impacting fuel in the pool and, if necessary, the radiological consequences of such an event. Because the licensee is required to prohibit loads greater than the weight of a fuel assembly plus the associated handling tool to be transported over spent fuel in the Davis-Besse 1 SFP, we have concluded that the likelihood of a heavy load handling accident is sufficiently small that the proposed modification is acceptable and no additional restrictions on load handling operations in the vicinity of the SFP are necessary while our review is under way.

The consequences of fuel handling accidents in the SFP area are not changed from those presented in the Safety Evaluation (SE) dated December 1976.

4. Occupational Radiation Exposure

We have reviewed the licensee's plan for the removal and disposal of the low density racks and the installation of the high density racks with respect to occupational radiation exposure. Although the proposed modification will be completed prior to placement of irradiated fuel into the pool, the SFP water has been contaminated with low level quantities of radionuclides during transfer of contaminated burnable poison rod assemblies from the pool to the adjacent cask pit for storage. It will, therefore, be necessary to decontaminate the existing low density racks prior to their removal and disposal, as well as the walls and floors of the pool prior to installation of the new high density racks. These actions will be necessary in order to achieve as low as reasonably achievable exposure to

to personnel during the modification. The licensee estimates that the occupational exposures during the modification will be about 5 man-rem. We believe this to be a reasonable estimate based on relevant experience of SFP modifications of other licensees who have performed this operation in similar radiation fields. Therefore, with proper decontamination of the low density fuel racks and the SFP area, the modifications will be performed with as low as reasonably achievable occupational exposure.

We have estimated the increment in onsite occupational dose resulting from the proposed increase in stored fuel assemblies on the basis of information supplied by the licensee and by utilizing relevant assumptions for occupancy times and for dose rates in the spent fuel area from radionuclide concentrations in the SFP water. The spent fuel assemblies themselves contribute a negligible amount to dose rates in the pool area because of the depth of water shielding the fuel. The occupational radiation exposure resulting from the proposed action represents a negligible burden. Based on present and projected operations in the SFP area, we estimate that the proposed modification should add less than one percent of the total annual occupational radiation exposure burden at this facility. The small increase in radiation exposure will not affect the licensee's ability to maintain individual occupational doses to as low as is reasonably achievable and within the limits of 10 CFR Part 20. Thus, we conclude that storing additional fuel in the SFP will not result in any significant increase in doses received by occupational workers.

5. Radioactive Waste Treatment

The plant contains waste treatment systems designed to collect and process the gaseous, liquid, and solid wastes that might contain radioactive material. The waste treatment systems were evaluated in the SE dated December 1976. There will be no change in the waste treatment systems or in the conclusions of the evaluation of these systems as described in Section 11.0 of the SE because of the proposed modification.

6. Conclusion

Based on our review, we conclude that the proposed modified high density fuel storage design of 735 fuel assemblies having a maximum enrichment of 3.3 weight percent U-235 meets the requirements of General Design Criterion 61 of Appendix A to 10 CFR Part 50, and the positions of Regulatory Guide 1.13, "Fuel Storage Facility Design Basis," and Regulatory Guide 1.29, "Seismic Design Qualification," and is, therefore, acceptable. Based on the conclusion of our evaluation, we find that the proposed changes to Sections 5.3, 5.6 and 3.9.3 of the plant TS are acceptable.

We have 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, and (2) 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: August 1, 1979

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

ENVIRONMENTAL IMPACT APPRAISAL BY THE OFFICE OF NUCLEAR REACTOR REGULATION SUPPORTING AMENDMENT NO. 39 TO FACILITY OPERATING LICENSE NO. NPF-3

TOLEDO EDISON COMPANY

AND

CLEVELAND ELECTRIC ILLUMINATING COMPANY

DAVIS-BESSE NUCLEAR POWER STATION, UNIT NO. 1

DOCKET NO. 50-346

1.0 DESCRIPTION OF PROPOSED ACTION

By letter dated December 19, 1977, as supplemented April 4, 1978, June 22, 1978, and May 4, 1979, the Toledo Edison Company (TECo or the licensee) requested an amendment to Facility Operating License No. NPF-3 for the Davis-Besse Nuclear Power Station, Unit No. 1 (Davis-Besse 1). The amendment request would allow an increase in the spent fuel storage capability from the existing capacity of 260 fuel assemblies (approximately 1 1/3 cores) having a maximum enrichment of 3.0 weight percent U-235, to 735 fuel assemblies (approximately 4 cores) having a maximum enrichment of 3.3 weight percent U-235. TECo proposes to modify the existing Davis-Besse 1 spent fuel pool (SFP) to allow continued operation while accommodating an expected increase in the inventory of spent fuel assemblies above the present pool capacity. The first refueling of Davis-Besse 1 is scheduled to begin about March 1, 1980. The present installed spent fuel assembly storage racks have a minimum center-to-center distance of 21 inches. The proposed rack design will establish a center-to-center spacing of 12 31/32 inches in one direction, and 13 3/16 inches in the other orthogonal direction.

2.0 Need for Increased Storage Capacity

Davis-Besse 1 received its initial operating license on April 22, 1977, and is currently in its first fuel cycle. The first refueling is scheduled for the Spring of 1980. A full core consists of 177 fuel assemblies. During the normal refueling of a pressurized water reactor, about one-third of the fuel assemblies are replaced.

Davis-Besse 1 is designed to refuel every 12 months. With the presently designed storage capacity of 260 fuel assemblies, the SFP at Davis-Besse 1 could accommodate the projected refueling of the facility through 1983. If the storage capacity of the SFP is not increased or if alternate storage space for spent fuel from this facility is not located, the Davis-Besse 1 facility would have to shut down in 1984. Full power operation and a plant load factor of 72% was selected for estimating the length of a fuel cycle. In addition, it is prudent engineering practice to reserve space in the SFP to permit the discharge of a full core should it be necessary to inspect or repair core internals. With the present design, Davis-Besse 1 would not have the capability to discharge a full core to the SFP after the 1981 refueling outage.

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The basic need for the proposed increase in onsite spent fuel storage capacity stems from the current unavailability of offsite storage for spent fuel and the expectation that several years will be required before the necessary storage capacity can be made available.

With the proposed modification, the SFP would have storage capacity to accommodate eight additional refuelings over the current storage capacity (of 60 fuel assemblies per refueling). This would provide storage space for the spent fuel which is expected to be generated through 1991. There would also be space in the SFP to discharge a full core through 1988. With the proposed modification, Davis-Besse 1 could operate through 1991 before the facility would be forced to shut down due to lack of storage space for spent fuel in the SFP. In our evaluation, we considered the impacts which may result from storing up to an additonal 475 spent fuel assemblies in the SFP.

The proposed modification would not alter the external physical geometry of the SFP or involve modifications to the SFP cooling or purification systems. The proposed modification does not affect in any manner the quantity of uranium fuel utilized in the reactor over the anticipated operating life of the facility and thus in no way affects the generation of spent uranium fuel by the facility. The rate of spent fuel generation and the total quantity of spent fuel generated during the anticipated operating lifetime of the facility remains unchanged as a result of the proposed expansion. The modification will increase the number of spent fuel assemblies that could be stored in the SFP and the length of time that some of the fuel assemblies could be stored in the pool. On the basis of the evaluation discussed herein, we have concluded that the storage capacity for the Davis-Besse 1 SFP should be increased.

3.0 Fuel Reprocessing History

Currently, spent fuel is not being reprocessed on a commercial basis in the United States. The Nuclear Fuel Services (NFS) plant at West Valley, New York, was shut down in 1972 for alterations and expansions; on September 22, 1976, NFS informed the Commission that they were withdrawing from the nuclear fuel reprocessing business. The Allied-General Nuclear Services (AGNS) proposed plant in Barnwell, South Carolina, is not licensed to operate. The General Electric Company's (GE) Midwest Fuel Recovery Plant (MFRP) in Morris, Illinois, now referred to as Morris Operation (MO), is in a decommissioned condition. Although no plants are licensed for reprocessing fuel, the storage pool at Morris, Illinois, and the storage pool at West Valley, New York (on land owned by the State of New York and leased to NFS through 1980) are licensed to store spent fuel. The storage pool at West Valley is not full but NFS is presently not accepting any additional spent fuel for storage, even from those power generating facilities that had contractural arrangements with NFS. Construction of the AGNS fuel receiving and storage station has been completed. AGNS has applied for, but has not been granted, a license to receive and store irradiated fuel assemblies in the storage pool at Barnwell prior to a decision on the licensing action relating to the reprocessing facility. A fourth plant, the Exxon plant proposed for construction in Tennessee, was under license review; this review was suspended as a result of the Commission's decision announced December 23, 1977 to terminate the proceedings on pending or future plutonium recycle-related license applications.

4.0 The Plant

The Davis-Besse 1 (plant) is described in the Final Environmental Statement (FES) issued by the Commission in October 1975. The plant is a pressurized water reactor, manufactured by the Babcock & Wilcox Company. The reactor has a rating of 2772 megawatts thermal (MWt), corresponding to a net electrical output of 906 megawatts electrical (MWe). Pertinent descriptions of principal features of the plant as it currently exists are summarized below to aid the reader in following the evaluations in subsequent sections of this appraisal.

4.1 Fuel Inventory

The Davis-Besse 1 reactor contains 177 fuel assemblies. A fuel assembly consists of a fuel bundle and the channel which surrounds it. A fuel bundle contains 208 fuel rods, which are arranged in a 15 x 15 array. Each fuel rod consists of fuel pellets stacked in a Zircaloy-4 cladding tube. The weight of the fuel in each rod as UO_2 is 2.5 kg. About one-third of the assemblies are removed from the reactor and replaced with new fuel each year.

4.2 Plant Cooling Water Systems

A natural draft counter flow cooling tower at Davis-Besse 1 is used dissipate 98% of the total heat from the condenser and other plant sources to the atmosphere by means of evaporative cooling. The remaining 2% of the heat is discharged to Lake Erie in the blowdown from the cooling tower system. Condenser cooling water is pumped through the cooling tower at the rate of 480,000 gpm using four circulating pumps, each with a capacity of 120,000 gpm. The temperature rise across the condenser and the drop through the cooling tower is 26°F at full power, corresponding to a heat rejection to the atmosphere of 6.21×10^9 BTU per hour.

In additon to the major heat which is rejected through the cooling tower, heat is rejected to Lake Erie through the service water system. The makeup water for the cooling tower evaporation, drift, and blowdown is obtained from the service water system. The service water system transfers heat from other portions of the plant.

Waste heat from the SFP is dissipated through the SFP cooling heat exchangers which, inturn, are cooled by the component cooling water system. The component cooling water heat exchangers are cooled by the service water system which obtains its water from Lake Erie. Therefore, waste heat generated by spent fuel in storage is ultimately dissipated to Lake Erie.

The capacity of the service water system is 20,730 gpm. The average makeup flow is approximately 18,450. The remainder is used for plant systems cooling and dilution to the station discharge to the lake so that the maximum effluent temperature does not exceed 20°F above ambient.

4.3 Radioactive Wastes

The plant contains waste treatment systems designed to collect and process the gaseous, liquid and solid waste that might contain radioactive material. The waste treatment systems for Davis-Besse 1 are evaluated in the FES dated October 1975. There will be no change in the waste treatment systems described in Section 3.4 of the FES because of the proposed modification.

4.4 Purpose of SFP

The SFP at the plant was designed to store spent fuel assemblies prior to shipment to a reprocessing facility. These assemblies may be transferred from the reactor core to the SFP during a core refueling, or to allow for inspection and/or modification to core internals. The latter may require the removal and storage of up to a full core. The assemblies are initially intensely radioactive due to their fission product content and have a high thermal output. They are stored in the SFP to allow for radioactive and thermal decay.

The major portion of decay occurs during the 150-day period following removal from the reactor core. After this period, the assemblies may be withdrawn and placed into a heavily shielded fuel cask for offsite shipment. Space permitting, the assemblies may be stored for an additional period allowing continued fission product decay and thermal cooling prior to shipment.

4.5 Spent Fuel Pool Cooling and Purification System

The SFP cooling and purification system for Davis-Besse 1 consists of two pumps, two heat exchangers, one filter, one demineralizer and the required piping, valves and instrumentation. The pumps draw water from the pool. This flow is passed through the filter and demineralizer or heat exchangers and then returned to the pool.

Because we expect only a small increase in radioactivity released to the pool water as a result of the proposed modification as discussed in Section 5.3, we conclude that the SFP purification system will keep concentrations of radioactivity in the pool water to levels which have existed prior to the modification.

5.0 Environmental Impacts of Proposed Action

5.1 Land Use

The Davis-Besse 1 SFP is located in the Auxiliary Building. The proposed modification will not alter the external physical geometry of the SFP. No additional commitment of land is required. The SFP was designed to store spent fuel assemblies under water for a period of time to allow shorter-lived radioactive isotopes to decay and to reduce the thermal heat output. The Commission has never set a limit on how long spent fuel assemblies could be stored onsite. The longer the fuel assemblies decay, the less radioactivity they contain. The proposed modification will not change the basic land use of the SFP. The pool was designed to store the spent fuel assemblies for up to four normal refuelings. The modification would provide storage for up to twelve normal refuelings. The pool was intended to store spent fuel. This use will remain unchanged by the proposed modification.

5.2 Water Use

There will be no significant change in plant water usage as a result of the proposed modification. Storing additional spent fuel in the SFP will increase the heat load on the SFP cooling system, which is transferred to the component cooling water system and thence to the service water system. In the December 19, 1977 submittal, the licensee stated that, with one freshly discharged batch in

addition to 11 batches from previous refueling outages, the existing SFP cooling system is capable of maintaining the SFP at 125°F or less. Also under abnormal conditions, when one entire core is discharged 150 hours after shutdown, 65 days after the last of 9 batches from previous refueling outages, the residual heat removal (RHR) system would be able to maintain the pool water temperature at 140°F or less. Since the temperature of the SFP water during normal refueling operations will remain below 140°F, the rate of evaporation and, thus, the need for makeup water will not be significantly changed.

5.3 Radiological

5.3.1 Introduction

The potential offsite radiological environmental impacts associated with the expansion of the spent fuel storage capacity were evaluated and determined to be environmentally insignificant as addressed below.

The additional spent fuel which would be stored due to the expansion is the oldest fuel which has not been shipped from the plant. This fuel should have decayed at least four years. During the storage of the spent fuel under water, both volatile and nonvolatile radioactive nuclides may be released to the water from the surface of the assemblies or from defects in the fuel cladding. Most of the material released from the surface of the assemblies consists of activated corrosion products such as Co-58, Co-60, Fe-59 and Mn-54 which are not volatile. The radionuclides that might be released to the water through defects in the cladding, such as Cs-134, Cs-137, Sr-89 and Sr-90 are also predominately nonvolatile. The primary impact of such nonvolatile radioactive nuclides is their contribution to radiation levels to which workers in and near the SFP would be exposed. The volatile fission product nuclides of most concern that might be released through defects in the fuel cladding are the noble gases (xenon and krypton), tritium and the iodine isotopes.

Experience indicates that there is little radionuclide leakage from spent fuel stored in pools after the fuel has cooled for several months. The predominance of radionuclides in the spent fuel pool water appear to be radionuclides that were present in the reactor coolant system prior to refueling (which becomes mixed with water in the spent fuel pool during refueling operations) or crud dislodged from the surface of the spent fuel during transfer from the reactor core to the SFP. During and after refueling, the spent fuel pool cleanup system reduces the radioactivity concentrations considerably. It is theorized that most failed fuel contains small, pinhole-like perforations in the fuel cladding at the reactor operating condition of appoximately 800°F. A few weeks after refueling, the spent fuel cools in the spent fuel pool so that fuel clad temperature is relatively cool, approximately 180°F. This substantial temperature reduction should reduce the rate of release of fission products from the fuel pellets and decrease the gas pressure in the gap between pellets and clad, thereby tending to retain the fission products within the gap.

In addition, most of the gaseous fission products have short half-lives and decay to insignificant levels within a few months. Based on the operational reports submitted by the licensee or discussions with the operators, there has not been any significant leakage of fission products from spent light water reactor fuel stored in the Morris Operation (MO) (formerly Midwest Recovery Plant) at Morris, Illinois, or at Nuclear Fuel Services' (NFS) storage pool at West Valley, New York. Spent fuel has been stored in these two pools which, while it was in a reactor, was determined to have significant leakage and was therefore removed from the core. After storage in the onsite spent fuel pool, this fuel was later shipped to either MO or NFS for extended storage. Although the fuel exhibited significant leakage at reactor operating conditions, there was no significant leakage from this fuel in the offsite storage facility.

5.3.2 Radioactive Material Released to Atmosphere

With respect to gaseous releases, the only significant noble gas isotope attributable to storing additional assemblies for a longer period of time would be Krypton-85. As discussed previously, experience has demonstrated that after spent fuel has decayed 4 to 6 months, there is no significant release of fission products from defective fuel. However, we have conservatively estimated that an additional 33 curies per year of Krypton-85 may be released when the modified pool is completely filled. This increase would result in an additional total body dose of less than 0.0002 mrem/year to an individual at the site boundary. This dose is insignificant when compared to the approximately 100 mrem/year that an individual receives from natural background radiation. The additional total body dose to the estimated population within a 50-mile radius of the plant is less than 0.003 man-rem/year. This is small compared to the fluctuations in the annual dose this population would receive from natural background radiation. Under our conservative assumptions, these exposures represent an increase of less than 0.1% of the exposures from the plant evaluated in the FES for the individual (page III-11) and the population (Table 5.2). Thus, we conclude that the proposed modification will not have any significant impact on exposures offsite.

Assuming that the spent fuel will be stored onsite for several years, Iodine-131 releases from spent fuel assemblies to the SFP water will not be significantly increased because of the expansion

of the fuel storage capacity since the Iodine-131 inventory in the fuel will decay to negligible levels between refuelings.

Storing additional spent fuel assemblies is not expected to significantly increase the bulk water temperature during normal refuelings above the 120°F used in the design analysis. The licensee has stated (by letter dated April 4, 1978) that an increase in temperature in the SFP to 125°F will occur for 10 to 15 days following a refueling. This time frame is based on the maximum heat which consists of one freshly discharged batch in addition to 11 batches from previous refueling outages. After 10 to 15 days, the newly discharged spent fuel will have decayed sufficiently to reduce the heat load such that the spent fuel pool cooling system can maintain the pool less than the design temperature (120°F). Therefore, it is not expected that there will be any significant change in the annual release of tritium or iodine as a result of the proposed modification from that previously evaluated in the FES. Most airborne releases from the plant result from leakage of reactor coolant which contains tritium and iodine in higher concentrations than the spent fuel pool. Therefore, even if there were a slightly higher evaporation rate from the spent fuel pool, the increase in tritium and iodine released from the plant as a result of the increase in stored spent fuel would be small compared to the amount normally released from the plant and that which was previously evaluated in the FES. If levels of radioiodine become too high, the air can be diverted to charcoal filters for the removal of radioiodine before release to the environment. In addition, the plant radiological effluent Technical Specifications, which are not being changed by this action, restrict the total releases of gaseous activity from the plant including the SFP.

5.3.3 Solid Radioactive Wastes

The concentration of radionuclides in the pool is controlled by the filter and the demineralizer and by decay of short-lived isotopes. The activity is high during refueling operations while reactor coolant water is introduced into the pool and decreases as the pool water is processed through a filter and the demineralizer. The increase of radioactivity, if any, should be minor because the additional spent fuel to be stored is relatively cool, thermally, and radionuclides in the fuel will have decayed significantly.

While we believe that there should not be an increase in solid radwaste from the SFP operations due to the modification, as a

conservative estimate, we have assumed that the amount of solid radwaste may be increased by 30 cubic feet of resin a year from the demineralizer (an additional resin bed/year). The estimated annual amount of solid waste shipped, on the average, from two PWRs during 1974 to 1976 is about 14,000 cubic feet per year. If the storage of additional spent fuel does increase the amount of solid waste from the SFP purification systems by about 30 cubic feet per year, the increase in total waste volume shipped from Davis-Besse 1 would be less than 0.3% of that shipped per year, on the average, from two PWRs. This will not have any significant environmental impact.

The present fuel racks to be removed from the SFP have been exposed to SFP water which has had a small amount of contamination. The contamination was due to the mixing of borated refueling water present in the adjacent transfer pit during a transfer of material from the SFP to the transfer pit. With proper washing down of the racks, contamination of the racks would be minimal. Prior to disposal of the racks the racks will be surveyed for contamination and further decontaminated to allow disposal of the racks. In case small areas of the racks cannot be decontaminated to controlled levels for disposal, the areas will be removed for disposal as low level waste. This is not predicted to be a significant amount of material and therefore will not have any significant environmental impact.

5.3.4 Radioactivity 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 modification. The amount of radioactivity on the SFP filter and demineralizer might slightly increase due to the additional spent fuel in the pool but this increase of radioactivity should not be released in liquid effluents from the station.

The cartridge filter removes insoluble radioactive matter from the SFP water. This is periodically removed to the waste disposal area in a shielded cask and placed in a shipping container. The insoluble matter will be retained on the filter or remain in the SFP water.

The demineralizer resins are periodically flushed with water to the spent resin storage tank. The water used to transfer the spent resin is decanted from the tank and returned to the liquid radwaste system for processing. The soluble radioactivity will be retained on the resins. If any activity should be transferred from the spent resin to this flush water, it would be removed by the liquid radwaste system. After processing in the liquid radwaste system there should not be a significant increase in the amount of radioactivity release to the environment in liquid effluents as a result of the proposed modification.

Leakage from the SFP is collected in the reactor building floor drain sumps. This water is transferred to the liquid radwaste system and is processed by the system. After processing in this sytem, there should not be a significant increase in the amount of radioactivity release to the environment in liquid effluents attributable to the proposed modification.

5.3.5 Occupational Exposures

We have reviewed the licensee's plan for the removal and disposal of the low density racks and the installation of the high density racks with respect to occupational radiation exposure.

Although the proposed modification will be completed prior to placement of irradiated fuel into the pool, the SFP water has been contaminated with low level quantities of radionuclides during transfer of contaminated rod assemblies from the pool to the adjacent cask pit for storage. It will therefore be necessary to decontaminate both the existing low density racks, prior to their removal and disposal, as well as the walls and floors of the pool prior to installation of the new high density racks. These actions will be necessary in order to achieve as low as reasonably achievable exposures to personnel during the modification. The licensee estimates that occupational exposure during the modification will be about 5 man-rem. We believe this to be a very conservative estimate based on relevant experience of SFP modifications of other licensees who have performed this operation in similar radiation fields. Therefore with proper decontamination of the low density fuel racks and the SFP area, the modification can be performed with as low as reasonably achievable occupational exposure.

We have estimated the increment in onsite occupational dose resulting from the proposed increase in stored fuel assemblies on the basis of information supplied by the licensee and by utilizing relevant assumptions for occupancy times and for dose rates in the spent fuel pool area from radionuclide concentrations in the SFP water. The spent fuel assemblies themselves contribute a negligible amount to dose rates in the pool area because of the depth of water shielding the fuel. The occupational radiation exposure resulting from the proposed action represents a negligible burden. Based on present and projected operations in the spent fuel pool area, we estimate that the proposed modification should add less than one percent to the total annual occupational radiation exposure burden at this facility. The small increase in radiation exposure will not affect the licensee's ability to maintain individual occupational doses to as low as is reasonably achievable and within the limits of 10 CFR Part 20. Thus, we conclude that storing additional fuel in the SFP will not result in any significant increase in doses received by occupational workers.

5.3.6 Impacts of Other Pool Modifications

As discussed above, the additional radiological environmental impacts in the vicinity of Davis-Besse 1 resulting from the proposed modification are very small fractions (less than 1%) of the impacts evaluated in the Davis-Besse 1 FES. These additional impacts are too small to be considered anything but local in character.

Based on the above, we conclude that an SFP modification at any other facility should not significantly contribute to the environmental impact of the Davis-Besse Nuclear Power Station and that the Davis-Besse 1 SFP modification should not contribute significantly to the environmental impact of any other facility.

5.3.7 Evaluation of Radiological Impact

The proposed modification does not significantly change the radiological impact evaluated in the FES.

5.4 Impacts on the Community

The new storage racks will be fabricated offsite and shipped to the plant. No environmental impacts on the environs outside the spent fuel storage building are expected during removal of the existing racks and installation of the new racks. The nonradiological impacts were discussed in Section 5.4. No significant environmental impact on the community is expected to result from the fuel rack conversion or from subsequent operation with the increased storage of spent fuel in the SFP.

6.0 Environmental Impact of Postulated Accidents

Although the new high density racks will accommodate a larger inventory of spent fuel, we have determined that the installation and use of the racks will not change the radiological consequences of a postulated fuel handling accident in the SFP area from those values reported in the FES for Davis-Besse 1 dated October 1975.

Additionally, the NRC staff has under way a generic review of load handling operations in the vicinity of spent fuel pools to determine the likelihood of a heavy load impacting fuel in the pool and, if necessary, the radiological consequences of such an event. Because Davis-Besse 1 will be required to prohibit heavy loads greater than the weight of a fuel assembly plus the associated handling tool (a maximum of 2430 pounds) to be transported over spent fuel in the SFP, we have concluded that the likelihood of a heavy load handling accident is sufficiently small that the proposed modification is acceptable and no additional restrictions on load handling operations in the vicinity of the SFP are necessary while our review is under way.

7.0 Evaluation of Proposed Action
7.1 Unavoidable Adverse Environmental Impacts
7.1.2 Radiological Impacts

As discussed in Section 4.0, expansion of the storage capacity of the SFP will not create any significant additional radiological effects. The additional total body dose that might be received by an individual or the estimated population within a 50-mile radius is less than 0.0002 mrem/yr and 0.003 man-rem/yr, respectively. These exposures are small compared to the fluctuations in the annual dose this population receives from background radiation and represent an increase of less than 0.1% of the exposures from the plant evaluated in the FES. Since the proposed modification will be completed prior to placement of irradiated fuel into the pool, no occupational exposure is expected from this operation. Operation of the plant with additional spent fuel in the SFP should add less than one percent to total annual occupational radiation exposure burden at this facility.

7.1.2.1 Evaluation of Radiological Impact

As discussed above, the proposed modification does not significantly change the radiological impact evaluated in the FES.

7.1.3 Nonradiological Effluents

There will be no change in the chemical or biocidal effluents from the plant as a result of the proposed modification.

The only potential offsite nonradiological environmental impact that could arise from this proposed action would be additional discharge of heat to the atmosphere and to Lake Erie. Storing spent fuel in the SFP for a longer period of time will add more heat to the SFP water. The SFP heat exchangers are cooled by the component cooling water system which in turn is cooled by the service water system. An evaluation of the augmented spent fuel storage facility was made to determine the effects of the increased heat generation on the plant cooling water systems, and ultimately, on the environment. The maximum incremental heat load due to the proposed modification is 9.9×10^5 BTU/hr. This would be the heat load immediately after the twelfth off load and the eight preceeding off loads. The incremental heat load represents less than a three percent increase on the maximum duty of the component cooling water system. The intake of the racks will not change the radiological consequences of a postulated fuel handling accident in the SFP area from those values reported in the FES for Davis-Besse 1 dated October 1975.

8.0 Alternatives

In regard to this licensing action, the NRC staff has considered the following alternatives: (1) shipment of spent fuel to a fuel reprocessing facility, (2) shipment of spent fuel to a separate fuel storage facility, (3) shipment of spent fuel to another reactor site, and (4) ceasing operation of the facility. These alternatives are considered in turn.

The total construction cost associated with the proposed modification is estimated to be about $1,300,000 or approximately $2738 for each of the 475 fuel assemblies that the increased storage capacity will accommodate.

8.1 Reprocessing of Spent Fuel

As discussed earlier, none of the three commercial reprocessing facilities in the U. S. is currently operating. The General Electric Company's Midwest Fuel Recovery Plant at Morris, Illinois is in a decommissioned condition. On September 22, 1976, Nuclear Fuel Services, Inc. (NFS) informed the Nuclear Regulatory Commission that they were "withdrawing from the nuclear fuel reprocessing business." The Allied-General Nuclear Services (AGNS) reprocessing plant received a construction permit on December 18, 1970. In October 1973, AGNS applied for an operating license for the reprocessing facility; construction of the reprocessing facility is essentially completed but no operating license has been granted. On July 3, 1974, AGNS applied for a materials license to receive and store up to 400 MTU of spent fuel in the onsite storage pool, on which construction has also been completed but hearings with respect to this application have not been completed and no license has been granted.

In 1976, Exxon Nuclear Company, Inc submitted an application for a proposed Nuclear Fuel Recovery and Recycling Center (NFRRC) to be located at Oak Ridge, Tennessee. The plant would include a storage pool that could store up to 7,000 MTU in spent fuel.

On April 7, 1977, the President issued a statement outlining his policy on continued development of nuclear energy in the U. S. The President stated that: "We will defer indefinitely the commercial reprocessing and recycling of the plutonium produced in the U. S. nuclear power program. From our own experience, we have concluded that a viable and economic nuclear power program can be sustained without such reprocessing and recycling."

On December 23, 1977, the Nuclear Regulatory Commission announced that it would order the termination of the now-pending fuel cycle licensing actions involving GESMO (Docket No. RM-50-5), Barnwell Nuclear Fuel Plant Separations Facility, Uranium Hexfluoride Facility, and Plutonium Product Facility (Docket No. 50-332, 70-1327 and 70-1821), the Exxon Nuclear Company, Inc. Nuclear Fuel Recovery and Recycling Center (Docket No. 50-564), the Westinghouse Electric Corporation Recycle Fuels Plants (Docket No. 70-1432), and the Nuclear Fuel Services, Inc. West Valley Reprocessing Plant (Docket No. 50-201). The Commission also announced that it would not at this time consider any other applications for commercial facilities for reprocessing spent fuel, fabricating mixed-oxide fuel, and related functions. At this time, any consideration of these or comparable facilities has been deferred for the indefinite future. Accordingly, we consider that shipment of spent fuel to such facilities for reprocessing is not a reasonable alternative to the proposed expansion of the Davis-Besse 1 SFP especially when considered in the relevant timeframe - i.e., through the early-1980's - when increased capacity at Davis-Besse 1 will be needed.

The licensee had intended to reprocess the spent fuel to recover and recycle the uranium and plutonium in the fuel. Due to a change in national policy and circumstances beyond the licensee's control, reprocessing of the spent fuel is not an available option at this time.

8.2 Independent Spent Fuel Storage Facility

An alternative to expansion of onsite SFP storage is the construction of new "independent spent fuel storage installations" (ISFSI). Such installations could provide storage space in excess of 1,000 MTU of spent fuel. This is far greater than the capacities of onsite storage pools. Fuel storage pools at GE Morris and NFS are functioning as ISFSIs although this was not the original design intent. Likewise, if the receiving and storage station at AGNS is licensed to accept spent fuel, it would be functioning as an ISFSI until the reprocessing facility is licensed to operate. The license for the GE facility at Morris, Illinois (MO) was amended on December 3, 1975 to increase the storage capacity to about 750 MTU:* as of November 1, 1977, 295 MTU was stored in the pool in the form of over 1,000 assemblies. We have discussed the status of storage space at MO with GE personnel. We have been informed that GE is primarily operating the MO facility to store either fuel owned by GE (which had been leased to utilities) or fuel which GE has previously contracted to reprocess. We were informed that the present GE policy is not to accept spent fuel for storage except for the fuel for which GE has a previous commitment. The NFS facility has capacity for about 260 MTU, with approximately 170 MTU presently stored in the pool. The storage pool at West Valley, New York, is on land owned by the State of New York and leased to NFS through 1980. Although the storage pool at West Valley is not full, since NFS withdrew from the fuel reprocessing business, correspondence we have received indicates that they are not at present accepting additional spent fuel for storage even from the reactor facilities with which they had contracts. The status of the storage pool at AGNS was discussed above.

With respect to construction of new ISFSIs, on October 6, 1978 the NRC proposed a new Part 72 of its regulations specifying procedures and requirements for the issuance of relevant licenses, along with requirements for the siting, design, operation and record keeping activities of the facilities (43 FR 46309).

We have estimated that at least five years would be required for completion of an independent spent fuel storage facility. This estimate assumes one year for preliminary design; one year for preparation of the license application, environmental report, and licensing review in parallel with one year for detail design; two and one-half years for construction and receipt of an operating license; and one-half year for plant and equipment testing and startup.

Industry proposals for independent spent fuel storage facilities are scarce to date. In late 1974, E. R. Johnson Associates, Inc., and Merrill Lynch, Pierce, Fenner and Smith, Inc. issued a series of joint proposals to a number of electric utility companies having nuclear plants in operation or contemplated for operation, offering to provide independent storage services for spent nuclear fuel. A paper on this proposed project was presented at the American Nuclear Society meeting in November 1975 (ANS Transactions, 1975 Winter Meeting, Vol. 22, TANSAO 22-1-836, 1975). In 1974, E. R. Johnson Associates estimated their construction costs at about $20 million.

* An application for an 1100 MTU capacity addition is pending. Present schedule calls for completion in 1980 if approved. However, by motion dated November 8, 1977, General Electric Company requested the Atomic Safety and Licensing Board to suspend indefinitely further proceedings on this application. The motion was granted.

Several licensees have evaluated construction of a separate independent spent fuel storage facility and have provided cost estimates. In 1975, Connecticut Yankee, for example, estimated that to build an independent facility with a storage capacity of 1,000 MTU (BWR and/or PWR assemblies) would cost approximately $54 million and take about five years to put into operation.

Commonwealth Edison estimated the construction cost to build a spent fuel storage facility at about $10,000 per fuel assembly. To this would be added the costs for maintenance, operation, safeguards, security, interest on investment, overhead, transportation and other costs.

On December 2, 1976, Stone and Webster Corporation submitted a topical report requesting approval for a standard design for an independent spent fuel storage facility. No specific locations were proposed, although the design is based on location near a nuclear power facility. No estimated costs for spent fuel storage were included in the topical report.

On a short-term basis (i.e., prior to 1983) an independent spent fuel storage installation does not appear to be a viable alternative based on cost or availability in time to meet the licensee's needs. It is also unlikely that the total environmental impacts of constructing an independent facility and shipment of spent fuel would be less than the minor impacts associated with the proposed action.

In the long-term, the U. S. Department of Energy (USDOE) is modifying its program for nuclear waste management to include design and evaluation of a retrievable storage facility to provide Government storage at central locations for unreprocessed spent fuel rods. The pilot plant is expected to be completed by late 1985 or 1986. It is estimated that the long-term storage facility will start accepting commercial spent fuel in the time frame of 1993 to 1996. The design is based on storing the spent fuel in a retrievable condition for a mimimum of 25 years. The announced criterion for acceptance is expected to be that the spent fuel must have a decayed minimum of ten years so it can be stored in a dry condition without need for forced air circulation. As an interim alternative to the long term retrievable storage facility, on October 18, 1977, DOE announced a new "spent nuclear fuel policy." DOE will determine industry interest in providing interim fuel storage services on a contract basis. If adequate private storage services cannot be provided, the Government will provide interim fuel storage facilities. These interim facilities would be designed for storage of the spent fuel under water. The announced criterion states that spent fuel will not be accepted for interim storage until it has decayed for a minimum of five years. DOE, through its Savannah River Operations Office, is preparing a conceptual design for an interim spent fuel storage pool of about 5000 MTU capacity. Congressional authorization has been requested to borrow $300 million (about $30,000 per spent PWR fuel assembly) for design and construction of this facility. DOE has issued generic environmental impact statements analyzing the impacts associated with alternatives with respect to implementation of this domestic and foreign spent fuel storage policy ("Storage of U. S. Spent Power Reactor Fuel", DOE/EIS-0015 dated August 1978). The reports emphasize that the preferred policy approach is encouragement to expanded storage of spent fuel in basins at reactor sites (i.e., increasing the storage capacity of existing spent fuel pools and construciton of new, interim storage pools at reactor sites).

Another aspect of the announced policy is that the Federal Government will charge a one-time fee to fully recover all the Government's costs for spent fuel storage and disposal. DOE has recently published the proposed charges for interim and permanent storage of spent fuel by the U. S. Government ("Charge for Spent Fuel Storage", DOE/EIS-0041 dated December 1978). The reference fee structure assumes a "use-based" or dual cost center pricing philosophy in which those utilities requiring both storage and disposal will pay a single fee for both of those services together, while those requiring only disposal (having suitable storage independent of the Government facilities) would pay for disposal only. The total proposed changes (in 1978 dollars) for disposal are only $114 per kg and $202 per kg for both storage and disposal. A PWR fuel assembly contains in the order of 0.5 metric tons of uranium (MTU) while a typical BWR fuel assembly contains about 0.2 MTU. The costs to the utilities and to their customers will be about $44,000 more per PWR fuel assembly and $17,600 more per BWR fuel assembly if the utility cannot store the spent fuel onsite until such time as the permanent surface and/or geologic repository is ready to accept spent fuel.

Based on recent testimony before Congress on HR 2586 (June 25-27, 1979), the proposed "Spent Nuclear Fuel Act of 1979" (which would authorize DOE to receive title to spent fuel and to acquire or construct facilities for interim storage and ultimate disposal of spent fuel), it appears that the earliest DOE could have a storage pool licensed to accept spent fuel would be about 1984 or 1985. It should be noted that in a report to the Congress dated June 27, 1979 ("Federal Facilities for Storing Spent Nuclear Fuel - Are They Needed"), the Comptroller General recommended that DOE "should not develop an interim spent fuel storage program but, instead, should concentrate its efforts on getting resolution to whether commercial spent fuel will be processed and how and where spent fuel will be permanently stored". GAO recommended that spent fuel be stored at reactor sites, either in existing or new storage pools. For those utilities where this is not practical, GAO recommended that DOE pursue purchase or lease of the storage pools at the three existing but closed reprocessing plants (NFS, MO and AGNS).

In summary, an independent away from reactor (AFR) spent fuel storage installation is not available now and is not likely to be available in time to meet the licensee's needs. Thus, this is not a viable alternative to the proposed action.

The Davis-Besse 1 plant will not have space in the SFP to discharge a full core after 1980. If the storage capacity of the SFP is not increased, the pool will be filled in 1983. The precise date that interim storage would be available is not known at this time with sufficient precision to provide for planning. Should government facilities not be available by 1984, the Davis-Besse 1 plant might be forced to shut down. Therefore, this does not appear to be a practical alternative, especially when considering the impact of plant shutdown as compared with the negligible environmental consequences of the proposed amendment.

The proposed increase in storage capacity will allow Davis-Besse 1 to operate until about 1991, by which time the Federal repository for spent fuel may be operable or alternative methods for compacting the storage of spent fuel are developed (e.g., double-tiering of the fuel, dessambly of fuel bundles, dry storage, etc.).

8.3 Storage at Another Reactor Site

The licensee owns no other nuclear power plants. However, he does have two plants under construction at the same site as Davis-Besse 1. These plants are not scheduled for operation earlier than 1985 which would not make them available to store Davis-Besse 1 spent fuel assemblies when the existing SFP would become full. Therefore, we cannot consider use of Davis-Besse Units 2 and 3 SFPs as "viable alternatives". TECo has no alternative spent fuel storage available or planned.

According to a survey conducted and documented by the former Energy Research and Development Administration, up to 27 of the operating nuclear power plants will lose the ability to refuel during the period 1977-1986 without additional spent fuel storage pool expansions or access to offsite storage facilities. Thus, the licensee cannot assuredly rely on any other power facility to provide additional storage capability except on a short-term emergency basis. If space were available in another reactor facility, it is unlikely that the cost would be less than storage onsite as proposed.

8.4 Shutdown of Facility

Storage of spent fuel at Davis-Besse 1 in the existing racks is possible for only a short period of time. As discussed above, if expansion of the SFP capacity is not approved and if an alternate storage facility is not located, the licensee may have to shut down Davis-Besse 1 in 1984 due to a lack of spent fuel storage facilities, resulting in the cessation of up to 906 megawatts net electrical energy production.

The current energy replacement value for Davis-Besse 1 is approximately $1,045,000 per week in 1978 dollars (assuming 906 MWe). The licensee did not identify the source or availability of replacement power. In any case, shutdown is not an economical alternative and would have an adverse socio-economic impact on the customers, employees of TECo and on the communities in the licensee's service area.

8.5 Summary of Alternatives

In summary, the alternatives (1) to (3) described above are presently not available to the licensee or could not be made available in time to meet the licensee's need. Even if available, alternatives (2) and (3) are likely to be more expensive than the proposed modification and do not offer any advantages in terms of environmental impacts. The alternative of ceasing operation of the facility would be much more expensive than the proposed action because of the need to provide replacement power. In addition to the economic advantages of the proposed action, we have determined that the expansion of the storage capacity of the SFP for Davis-Besse 1 would have a negligible environmental impact. Accordingly, deferral or severe restriction of the proposed action would result in substantial harm to the public interest.

9.0 Evaluation of Proposed Action

9.1 Unavoidable Adverse Environmental Impacts

9.1.1 Physical Impacts

As discussed above, expansion of the storage capacity of the SFP would not result in any significant adverse environmental impacts on the land, water, air or biota of the area.

9.1.2 Radiological Impacts

Expansion of the storage capacity of the SFP will not create any significant additional adverse radiological effects. As discussed in Section 5.3, the additional total body dose that might be received by an individual or the estimated population within a 50-mile radius is less than .0002 mrem/yr and .003 man-rem/yr, respectively, and is less than the natural fluctuations in the dose this population would receive from background radiation. The total dose to workers during removal of the present storage racks and installation of the new racks is estimated by the licensee to be about 5 man-rem which averaged over the lifetime of the plant is a small fraction of the total man-rem burden from occupational exposure. Operation of the plant with additional spent fuel in the SFP is not expected to increase the occupational radiation exposure by more than one percent of the present total annual occupational exposure at this facility.

9.2 Relationships Between Local Short-Term Use of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

Expansion of the storage capacity of the SFP, which would permit the plant to continue operation until 1992 when offsite storage facilities are expected to be available for interim or long-term storage of spent fuel, will not change the evaluation in the FES.

9.3 Irreversible and Irretrievable Commitments of Resources

9.3.1 Water, Land and Air Resources

The proposed action will not result in any significant change in the commitments of water, land and air resources as identified in the FES. No additional allocation of land would be made; the land area now used for the SFP would be used more efficiently by reducing the spacings between fuel assemblies.

9.3.2 Material Resources

Under the proposed modification, the present stainless steel storage racks at the plant will be replaced by new stainless steel racks that will increase the storage capacity of the SFP by 475 spent fuel assemblies.

The resources to be committed for fabrication of the new spent fuel storage racks total approximately 283,000 pounds of stainless steel. The amount of stainless steel used annually in the U. S. is about 2.82×10^{11} pounds. The material is readily available in abundant supply. The amount of stainless steel

required for fabrication of the new racks is less than 0.1 percent of this resource consumed annually in the U. S. We conclude that the amount of material required for the new racks at Davis-Besse 1 is insignificant and does not represent a significant irreversible commitment of material resources.

The longer term storage of spent fuel assemblies withdraws the unburned uranium from the fuel cycle for a longer period of time. Its usefulness as a resource in the future, however, is not changed. The provision of longer onsite storage does not result in any cumulative effects due to plant operation since the throughput of materials does not change. Thus, the same quantity of radioactive material will have been produced when averaged over the life of the plant. This licensing action would not constitute a commitment of resources that would affect the alternatives available to other nuclear power plants or other actions that might be taken by the industry in the future to alleviate spent fuel storage problems. No other resources need be allocated because the design characteristics of the SFP remain unchanged.

We conclude that the expansion of the SFP at the Davis-Besse 1 facility does not constitute a commitment of either material or nonmaterial resources that would tend to significantly foreclose the alternatives available with respect to any other individual licensing actions designed to ameliorate a possible shortage of spent fuel storage capacity.

9.4 Commission Policy Statement Regarding Spent Fuel Storage

On September 16, 1975, the Commission announced (40 Fed. Reg. 42801) its intent to prepare a generic environmental impact statement on handling the storage of spent fuel from light water reactors. In this notice, the Commission also announced its conclusion that it would not be in the public interest to defer all licensing actions intended to ameliorate a possible shortage of spent fuel storage capacity pending completion of the generic environmental impact statement. The draft statement (NUREG-0404) was published in March 1978.

The Commission directed that in the consideration of any such proposed licensing action, among other things, the following five specific factors should be applied, balanced, and weighed in the context of the required environmental statement or appraisal:

1. Is it likely that the licensing action proposed here would have a utility that is independent of the utility of other licensing actions designed to ameliorate a possible shortage of spent fuel capacity?

   A reactor core for Davis-Besse 1 contains 177 fuel assemblies. Typically, the reactor is refueled once every 12 months. Each refueling replaces about 1/3 of the core (about 60 assemblies). The SFP was designed on the basis that a fuel cycle would be in existence that would only require storage of spent fuel for a year or two prior to shipment to a reprocessing facility. Initially, sufficient racks were installed to store 260 spent fuel assemblies (1-1/3 cores), which was a typical design basis for PWRs in the late sixties and early seventies. When Davis-Besse 1 was designed, a SFP storage capacity for 1-1/3 cores was considered adequate. This provided for

complete unloading of the reactor even if the spent fuel from a previous refueling were in the pool. While not required from the standpoint of safety considerations, it is a desirable engineering practice to reserve space in the SFP to receive an entire reactor core, should this be necessary to inspect or repair core internals or because of other operational considerations.

If 60 fuel assemblies are discharged every 12 months, the SFP will be full after the refueling in 1983. The spent fuel must be stored onsite or elsewhere if the facility is to be refueled. If expansion of the SFP capacity is not approved or if an alternate storage facility is not located, the licensee will have to shut down Davis-Besse 1 about 1984. As discussed under alternatives, an alternate storage facility is not now available. Storage onsite is an interim solution to allow the plant to continue to operate.

The proposed licensing action (i.e., installing new racks of a design that permits storing more assemblies in the same space) would provide the licensee with additional flexibility which is desirable even if adequate offsite storage facilities hereafter become available to the licensee.

We have concluded that a need for additional spent fuel storage capacity exists at Davis-Besse 1 which is independent of the utility of other licensing actions designed to ameliorate a possible shortage of spent fuel capacity.

2. Is it likely that the taking of the action here proposed prior to the preparation of the generic statement would constitute a commitment of resources that would tend to significantly foreclose the alternatives available with respect to any other licensing actions designed to ameliorate a possible shortage of spent fuel storage capacity?

With respect to this proposed licensing action, we have considered commitment of both material and nonmaterial resources. The material resources considered are those to be utilized in the expansion of the SFP. The nonmaterial resources are primarily the labor and talent needed to accomplish the proposed modification.

The increased storage capacity of the Davis-Besse 1 SFP was also considered as a nonmaterial resource and was evaluated relative to proposed similar licensing actions at other nuclear power plants, fuel reprocessing facilities and fuel storage facilities. We have determined that the proposed expansion in the storage capacity of the SFP is only a measure to allow for continued operation and to provide operational flexibility at the facility, and will not affect similar licensing actions at other nuclear power plants. Similarly, taking this action would not commit the NRC to repeat this action or a related action in 1991 at which time the modified pool is estimated to be full if no spent fuel is removed.

We conclude that the expansion of the SFP at Davis-Besse 1 prior to the preparation of the generic statement, does not constitute a commitment of either material or nonmaterial resources that would tend to significantly foreclose the alternatives available with respect to any other individual licensing actions designed to ameliorate a possible shortage of spent fuel storage capacity.

3. Can the environmental impacts associated with the licensing action here proposed be adequately addressed within the context of the present application without overlooking any cumulative environmental impacts?

   Potential nonradiological and radiological impacts resulting from the spent fuel rack conversion and subsequent operation of the expanded SFP at this facility were considered by the NRC Staff.

   No environmental impacts on the environs outside the spent fuel storage building are expected during disposal of the existing racks and installation of the new racks. The impacts within this building are expected to be limited to those normally associated with metal working activities and to the occupational radiation exposure to the personnel involved.

   The potential nonradiological environmental impact attributable to the additional heat load in the SFP was determined to be negligible compared to the existing thermal effluents from the facility.

   We have considered the potential radiological environmental impacts associated with the expansion of the SFP and have concluded that they would not result in radioactive effluent releases that significantly affect the quality of human environment during either normal operation of the expanded SFP or under postulated fuel handling accident conditions.

4. Have the technical issues which have arisen during the review of this application been resolved?

   This Environmental Impact Appraisal and the accompanying Safety Evaluation respond to the questions concerning health, safety and environmental concerns. All technical issues which have arisen in connection with this application have been resolved with the licensee.

5. Would a deferral or severe restriction on this licensing action result in substantial harm to the public interest?

   We have evaluated the alternatives to the proposed action, including storage of the additional spent fuel offsite and ceasing power generation from the plant when the existing SFP is full. We have determined that there are significant economic advantages associated with the proposed action and that expansion of the storage capacity of the SFP will have a negligible environmental impact. Accordingly, deferral or severe restriction of the action here proposed would not be in the public interest.

9.0 Benefit-Cost Balance

This section summarizes and compares the cost and the benefits resulting from the proposed modification to those that would be derived from the selection and implementation of each alternative. The table below presents a tabular comparison of these costs and benefits. The benefit that is derived from three of these alternatives is the continued operation of Davis-Besse 1 and production of electrical energy. As shown in the table, the reactor shutdown and subsequent storage of fuel in the reactor vessel results in the cessation of electrical energy production. While this would have the "benefit" of eliminating thermal,

chemical and radiological releases from Davis-Besse 1, these effluents have been evaluated in the FES and it has been determined that the environmental impacts of these releases are not significant. Therefore, there would be no significant environmental benefit in their cessation. The remaining alternative, storage at other nuclear plants, is not possible at this time or in the foreseeable future except on a short term emergency basis.

From examination of the table, it can be seen that the most cost-effective alternative is the proposed spent fuel pool modification. As evaluated in the preceding sections, the environmental impacts associated with the proposed modification would not be significantly changed from those analyzed in the FES for Davis-Besse 1 issued October 1975.

10.0 Basis and Conclusion for Not Preparing an Environmental Impact Statement

We have reviewed this proposed facility modification relative to the requirements set forth in 10 CFR Part 51 and the Council of Environmental Quality's Guidelines, 40 CFR 1500.6 and have applied, weighed, and balanced the five factors specified by the Nuclear Regulatory Commission in 40 FR 42801. We have determined that the proposed license amendment will not significantly affect the quality of the human environment and that there will be no significant environmental impact attributable to the proposed action other than that which has already been predicted and described in the Commission's FES for the facility dated October 1975. Therefore, we have found that an environmental impact statement need not be prepared, and that pursuant to 10 CFR 51.5(c), the issuance of a negative declaration to this effect is appropriate.

Dated: August 1, 1979

SUMMARY OF COST-BENEFITS

Alternative	Cost	Benefit
Reprocessing of Spent Fuel		None - This alternative is not available either now or in the foreseeable future.
Increase Storage Capacity	$2,738/assembly	Continued operation of Davis-Besse 1 and production of electrical energy.
Storage at Independent Facility	$4,000 to $8,000/ assembly/10 Yr* plus shipping costs	Continued operation of Davis-Besse 1 and production of electrical energy. However, this alternative is not available now. It is uncertain whether this alternative will be available in the future.
Storage at Other Nuclear Plants	Comparable to storage at Davis-Besse 1	Continued operation of Davis-Besse 1 and production of electrical energy. However, this alternative is not available.
Reactor Shutdown	$1,045,000/week for replacement energy	None - No production of electrical energy.

* In order to use this alternative a minimum commitment of seven to ten years of storage is required.

UNITED STATES NUCLEAR REGULATORY COMMISSION

THE TOLEDO EDISON COMPANY

AND

THE CLEVELAND ELECTRIC ILLUMINATING COMPANY

DOCKET NO. 50-346

NOTICE OF ISSUANCE OF AMENDMENT TO FACILITY OPERATING LICENSE AND NEGATIVE DECLARATION

The U. S. Nuclear Regulatory Commission (the Commission) has issued Amendment No. 19 to Facility Operating License No. NPF-3, issued to The Toledo Edison Company and The Cleveland Electric Illuminating Company (the licensees), which revised Technical Specifications for operation of the Davis-Besse Nuclear Power Station, Unit No. 1 (the facility) located in Ottawa County, Ohio. The amendment is effective as of its date of issuance.

The amendment allows an increase in spent fuel storage capability from 260 to a maximum of 735 fuel assemblies in the spent fuel pool through the use of high capacity spent fuel racks.

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. Notice of Proposed Issuance of Amendment to Facility Operating License in connection with this action was published in the FEDERAL REGISTER on March 15, 1978 (43 FR 10750). No request for a hearing or petition for leave to intervene was filed following notice of the proposed actions.

The Commission has prepared an environmental impact appraisal for this action and has concluded that an environmental impact statement for this particular action is not warranted because there will be no environmental impact attributable to the action other than that which has already been predicted and described in the Commission's Final Environmental Statement for the facility dated October 1975.

For further details with respect to this action, see (1) the application for amendment dated December 19, 1977, as supplemented April 4, 1978, June 22, 1978, and May 4, 1979, (2) Amendment No. 19 to License No. NPF-3, (3) the Commission's related Safety Evaluation, and (4) the Commission's Environmental Impact Appraisal. 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 Ida Rupp Public Library, 310 Madison Street, Port Clinton, Ohio. A copy of items (2), (3) and (4) 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 1st day of August 1979.

FOR THE NUCLEAR REGULATORY COMMISSION

Robert W. Reid

Robert W. Reid, Chief
Operating Reactors Branch #4
Division of Operating Reactors