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 50-316 Donald C. Cook Nuclear Power Plant, Unit 2, Indiana & 05000316  
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 MURLEY, T.E. Office of Nuclear Reactor Regulation, Director (Post 870411)

SUBJECT: Application for amends to Licenses DPR-58 & DPR-74, extending duration of operating licenses to 40 years.

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AEP:NRG:0930

Donald C. Cook Nuclear Plant Units 1 and 2  
Docket Nos. 50-315 and 50-316  
License Nos. DPR-58 and DPR-74  
PROPOSED LICENSE AMENDMENT - 40-YEAR LIFE

U.S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, D.C. 20555

Attn: T. E. Murley

December 27, 1989

Dear Dr. Murley:

This letter and its attachments constitute an application for amendment to the Facility Operating Licenses for the Donald C. Cook Nuclear Plant Units 1 and 2. Specifically, we are proposing to extend the duration of the operating licenses to 40 years from the date of issuance of the full-power licenses. The Cook Nuclear Plant units are currently licensed for operation for 40 years commencing with issuance of the construction permit and expiring on March 25, 2009. However, a license term of 40 years from the date of issuance of the full power operating license is permitted under 10 CFR 50.51. This amendment application requests the expiration date of the Facility Operating License for Donald C. Cook Nuclear Plant Unit 1 to be changed to October 25, 2014, and for Unit 2 to December 25, 2017. Attachment 1 to this letter contains the reasons for the changes and our analyses concerning significant hazards consideration. Attachment 2 contains the proposed revised license page for both units.

We believe that the proposed changes will not result in (1) a significant change in the types of effluents or a significant increase in the amounts of any effluent that may be released offsite, or (2) a significant increase in individual or cumulative occupational radiation exposure.

These proposed changes have been reviewed by the Plant Nuclear Safety Review Committee and by the Nuclear Safety and Design Review Committee.

In compliance with the requirements of 10 CFR 50.91(b)(1), copies of this letter and its attachments have been transmitted to Mr. R. C. Callen of the Michigan Public Service Commission and NFEM Section Chief of the Michigan Department of Public Health.

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Dr. T. E. Murley

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AEP:NRC:0930

This letter has been prepared following Corporate procedures that incorporate a reasonable set of controls to ensure its accuracy and completeness prior to signature by the undersigned.

Sincerely,



M. P. Alexich  
Vice President

ldp

**Attachments**

cc: D. H. Williams, Jr.  
A. A. Blind - Bridgman  
R. C. Callen  
G. Charnoff  
A. B. Davis - Region III  
NRC Resident Inspector - Bridgman  
NFEM Section Chief

ATTACHMENT 1 TO AEP:NRC:0930

REASONS AND 10 CFR 50.92 ANALYSES FOR  
CHANGES TO THE DONALD C. COOK NUCLEAR PLANT  
UNITS 1 AND 2 FACILITY OPERATING LICENSES

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### 1.0 Description of Proposed Amendment

Currently, the Donald C. Cook Nuclear Plant units are licensed to operate for 40 years from the date of issuance of the construction permit on March 25, 1969. The licenses will expire on March 25, 2009. The purpose of this submittal is to request a 40-year operating term from the date of issuance of the full power licenses, i.e., October 25, 1974 for Unit 1 and December 25, 1977 for Unit 2. The new proposed dates are 40 years from the above dates, i.e., October 25, 2014 and December 25, 2017, respectively.

### 2.0 Justification of Change

Currently the duration of all nuclear power reactor licenses is restricted to 40 years. Section 103.C of the Atomic Energy Act specifies that a license is to be issued for a period not exceeding 40 years. In addition, 10 CFR 50.51 states that each license will be issued for a fixed period of time not to exceed 40 years from the date of issuance.

Prior to 1982, the Commission granted operating licenses (OL) with the date of expiration linked to the issuance date of the construction permit. However, this practice was modified when Commonwealth Edison Company was granted an OL for LaSalle Unit 1 for a full term of 40 years commencing with the issuance of the full-power license.

The Commission extended its new practice of granting 40-year OLs to plants licensed prior to 1982 by issuing Baltimore Gas and Electric Company license amendments which changed the OL expiration dates of Calvert Cliffs Units 1 and 2 to extend the duration of both licenses to 40 years from the date of issuance of the OL. Since the Commission granted the Calvert Cliffs amendments on May 1, 1985, similar amendments have been granted to Point Beach 1 and 2, Indian Point 2, Oconee 1, 2 and 3, Crystal River 3, Hatch 1 and 2, St. Lucie 1, Farley 1 and 2, Surry 1 and 2, North Anna 1 and 2, Haddam Neck, Millstone 1, FitzPatrick, Yankee Rowe, Kewaunee, Beaver Valley 1, Browns Ferry 1, 2 and 3, McGuire 1 and 2, Prairie Island 1 and 2,<sup>1</sup> Sequoyah 1 and 2.

The operating licenses for the Donald C. Cook Nuclear Plant Units 1 and 2 are similar to those of these plants in that they were all issued prior to 1982 and their licensed 40-year lifetime originally started from the date of issuance of their construction permits. This amendment request is to modify the licenses of the Cook Nuclear Plant in the same manner that was granted to these units' licenses. That is, to extend the duration of the licenses to 40 years starting from the date of issuance of the full power licenses. The current licenses represent an operating license term of 34 years, 5 months for Unit 1 and 31 years, 3 months for Unit 2.



### 3.0 Environmental Impacts of the Proposed Amendment

The Atomic Energy Commission (AEC) staff prepared and issued the Final Environmental Statement (FES) dated August 1973 for the Cook Nuclear Plant. Prior to its issuance, the AEC staff considered the following: a final cost-benefit analysis which considered and balanced the environmental effects of the facility and the alternatives available for reducing or avoiding adverse environmental effects, as well as the environmental, economic, technical, and other benefits of the facility. The FES's conclusion after weighing the benefits against environmental costs, and considering available alternatives, called for the issuance of Cook Nuclear Plant's proposed license.

We have reviewed the FES and have concluded that the impact on man and the environment associated with recapturing the construction years in the operating licenses are not significant, and have been analyzed since the FES assumed a 30 to 40-year operational life.

There are no plans to build major new structures on the site which would be visible from immediately adjacent land. New buildings have been erected on the Cook Nuclear Plant site since it was originally built. The most significant are as follows: training center, new sewage plant, two office building extensions, three pole barns, steam generator storage facility, new security access building, and a radwaste handling building.

The site boundary has not been changed since the licenses were originally granted.

No plant modifications have been made which would affect the conclusions of the environmental report or FES, such as modifications to the intake and discharge structures. Appendix B of Cook Nuclear Plant's Technical Specifications states:

"Before engaging in unauthorized construction or operational activities which may affect the environment, the licensee shall prepare and record an environmental evaluation of such activity. When the evaluation indicates that such activity involves an unreviewed environmental question, the licensee shall provide a written evaluation of such activities and obtain prior approval from the NRC. When such activity involves a change in the Environmental Protection Plan, such activity and change to the Environmental Protection Plan may be implemented only in accordance with an appropriate license amendment as set forth in Section 5.3."

In addition, we issue the Semi-Annual Radioactive Effluent Release Report for the NRC's review, which discusses the radioactive discharges, and the Annual Environmental Operating Report, which details the results and findings of ongoing environmental, radiological and non-radiological surveillance programs.

White the following sections of the FES are for the most part accurate, a few minor discrepancies exist.

V.D. Radiological Impact on Man

VI. Environmental Impact of Postulated Accidents

These topics are addressed in Sections 3.1 and 3.2 of this submittal.

3.1 Radiological Impact on Man

A comparative review was performed of the FES's gaseous and liquid radioactive effluent release projections with that of the actual operating releases. The actual gaseous average releases were about seven percent of what was projected in the FES report. The actual liquid average releases were found to be approximately nine percent of the projected annual releases which were estimated in the FES, except for tritium. Tritium average effluent releases were found to be about 46 percent higher than what was projected in the FES. However, it must be noted that tritium is a low energy beta radionuclide that would contribute very little to the overall dose consequence to the general public, and the liquid tritium annual release (average over the last three years) was found to be less than one percent of the regulatory requirement (10 CFR 20).

A comparison of the projected annual maximum individual dose to the dose calculated from actual releases was made. It was determined that the calculated individual dose, based on actual plant gaseous effluents averaged over the last three years, was only about 16 percent of the projected gaseous dose. However, the actual calculated annual dose to individuals resulting from liquid effluents were greater than what had been projected (i.e., 0.6 mRem vs. 0.006 mRem). Nevertheless, the maximum individual dose resulting from all plant effluents (gaseous and liquid combined) is still only about 2.3 percent of what is allowed by our Technical Specifications.

3.2 Environmental Impact of Postulated Accidents

A study was conducted comparing the projected population reflected in the FES for 1980 with the 1980 census. The actual population as of 1980 was 17% greater than the 1980 population projected in the FES.

The following is the current population estimate for the years 2009 and 2015. This estimate was based on the 1970 and 1980 census.

Year 2009:

<u>Ring Mile</u>	<u>Ring Population</u>	<u>Cumulative Miles</u>	<u>Cumulative Population</u>
0-10	45,401	0-10	45,401
10-20	208,435	0-20	253,836
20-30	669,930	0-30	923,766
30-40	416,420	0-40	1,340,186
40-50	1,119,900	0-50	2,460,086
50-60	6,588,075	0-60	9,949,891

Year 2015:

<u>Ring Mile</u>	<u>Ring Population</u>	<u>Cumulative Miles</u>	<u>Cumulative Population</u>
0-10	44,140	0-10	44,140
10-20	222,925	0-20	267,065
20-30	718,350	0-30	985,415
30-40	451,100	0-40	1,436,515
40-50	1,229,700	0-50	2,666,215
50-60	7,124,491	0-60	10,878,999

It is our opinion that the increase in the rate of population growth versus that originally estimated will not change the conclusions of the FES report with regard to the adequacy of the plant systems. We base our opinion on the fact that Cook Nuclear Plant's gaseous radioactive effluent releases are much less than what the FES had projected, and that the maximum individual dose resulting from all plant effluents is only about 2.3 percent of what is allowed by our Technical Specifications. Also it must be noted we are still operating within the guidelines of 10 CFR 100 and 10 CFR 20, and the radiological releases resulting from Cook Nuclear Plant operation are well below the Technical Specification limits.

### 3.3 Occupational Exposure

Cook Nuclear Plant has a strong commitment to keep occupational radiation exposure as-low-as-reasonably-achievable (ALARA). Cook Nuclear Plant personnel occupational radiation exposure history is provided in the following table.



Occupational Exposure History (manRem)

Year	Projected Exposure (SRD)	Exposure (SRD)	Official Exposure (TLD)	Maintenance Exposure (SRD)
86	Not Available*	829.258	672.859	243.492
87	1003.315	746.037	666.172	289.252
88	555.258	444.183	324.352	200.495
89	487.772	645.707**	496.748**	Not Available***

\* No exposure projections were made in 1986

\*\*Data is taken through October 31, 1989

\*\*\*Data not yet available at the time of the submittal

Our commitment to maintain radiation exposure ALARA is further exemplified by the occupational exposures incurred during the Steam Generator Repair Project (SGRP), which were reported in AEP:NRC:0980T. The estimated manRem expenditure of this project was 1032 manRem. Official dose as measured by TLD was 561 manRem.

It would be impossible to accurately predict a numerical value for our annual exposure 20 years in the future. We have kept our annual exposure totals consistently below the industry average for many years. Our future intentions are to take advantage of technological advancements and ALARA operating improvements so that we can maintain our exposures at or below the industry average.

Additional occupational exposures will result from decommissioning of the Cook Nuclear Plant, although these doses would be incurred with or without the license extension periods. Increases in corrosion product buildup incurred by the license extension are expected to be offset by technological improvements in chemistry controls and ALARA operating improvements. Consequently, the extended operating time should have no measurable adverse effect on decommission dose requirements.

### 3.4 Low-Level Radioactive Waste

In keeping with the spirit of its ALARA program, Cook Nuclear Plant is committed to keeping its volume of radioactive waste to a minimum. Our most recent efforts in this area include using Quadrex, an offsite radwaste processor, to process our dry active waste (DAW), and the use of a Duratek waste water cleanup system.

Quadrex has achieved an approximate 30% reduction in the burial volume of Cook Nuclear Plant's DAW. This is largely due to Quadrex's ability to put better emphasis on volume reduction and material recovery.

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The Duratek waste water cleanup system uses very specialized ion exchange media to remove radioactivity from the water. Duratek has reduced the volume of Cook Nuclear Plant's liquid waste over 90%.

In the future, we intend to assess new technological developments to further reduce the amount of radioactive waste generated by Cook Nuclear Plant.

### 3.5 Spent Fuel

Cook Nuclear Plant's spent fuel is stored in the plant's spent fuel pool, which currently has a capacity for 2050 fuel assemblies. Present fuel cycle plans indicate that the pool, in its present racking configuration, will lose its capacity for one unit full core offload in 1995.

Consequently, plans are being considered to rerack the pool to accommodate 3500 assemblies. The pool would then lose its capacity for one full core offload between 2007 and 2009.

In accordance with the Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste and the Nuclear Waste Policy Act, as amended, the U.S. Department of Energy (DOE) is obligated to accept spent fuel from the utilities starting in 1998. In its Report to Congress dated November 1989, the DOE stated that the schedule for the start of repository operations has slipped from the year 2003 to approximately 2010. However, DOE also reconfirmed its obligation to accept the spent fuel and stated its belief that waste acceptance at a monitored retrievable storage facility could begin by 1998 or soon thereafter. If, however, off-site storage or disposal is not available when needed, the Company will take such steps as are necessary to store its spent fuel.

### 3.6 Aquatic Issues

Appendix B of Cook Nuclear Plant's Technical Specifications specifies that aquatic issues are addressed by the effluent limitations, monitoring requirements and Section 316 of the Clean Water Act requirements contained in the effective NPDES permit issued by the state of Michigan. Section 3.2 of Appendix B states the reporting requirements to the NRC of any changes to the NPDES permit.

The NPDES permit is renewed every five years and may be modified more frequently to assure that the discharges to state waters will not cause adverse environmental impacts for the life of the plant. As such, the NPDES permit will assure that non-radiological discharges from Cook Nuclear Plant will comply with applicable water quality standards.

#### 4.0 Electrical Equipment Assessment

Extending the operating licenses to 40 years will not significantly impact the safety-related electrical systems and equipment. For equipment within the scope of 10 CFR 50.49, aging reviews have been conducted so as to establish a qualified life for the equipment. Plant Manager's Instruction (PMI) 5025, Rev. 3, Page 4 of 12, Section 3.2.1 states: "for originally installed components, time equal to 'zero' is defined as the hot functional test date." That is, the installed-but-not-operated time period before start-up in a "cold" plant is not considered significant for 40-year qualified life equipment. To ensure that equipment qualification is maintained over the life of the plant, qualification related maintenance/surveillance/refurbishment/replacement requirements are integrated into station procedures.

Although some components will be expected to require replacement during the plant lifetime, as in all power plants, these will be replaced using normal maintenance activities, and are unaffected by the requested change in the operating license. Design features have been incorporated and inservice programs are in place to facilitate the inspection of systems and equipment ensuring continuous operating integrity. Surveillance and maintenance practices, which are implemented in accordance with ASME codes and the facility Technical Specifications, provide assurance that any unexpected degradation in plant equipment will be identified and corrected.

#### 5.0 Reactor Vessel Material Analysis

Assurance of adequate fracture toughness of the reactor coolant system is provided by compliance with the requirements for fracture toughness testing included in Section III of the ASME Boiler and Pressure Vessel Code and the Code of Federal Regulations, 10 CFR 50, Appendices G and H, and 10 CFR 50.61.

#### 6.0 Steam Generator Repair

Unit 2 of the Cook Nuclear Plant experienced secondary side corrosion in a number of tubes in the four steam generators. Various measures were taken to arrest the corrosion, including plugging of degraded tubes, boric acid addition and reduction of the reactor coolant system operating temperature. The reduction in operating temperature was achieved by operating the unit at 80% power.

To increase availability and return the unit to full-power operation, the lower assemblies of the four steam generators were replaced. The repair project began on November 21, 1988, and was brought to conclusion on January 31, 1989. The unit returned to service on March 17, 1989.

Unit 2 steam generator repairs were similar to those of Virginia Electric and Power Company's Surry Power Station and Wisconsin Electric Power Company's Point Beach Nuclear Plant, Unit 1 (both of these plants were granted amendments similar to what is being requested in this submittal).

Pursuant to 10 CFR 50.59, an evaluation to verify that the steam generator repairs did not pose any unreviewed safety questions or required changes to the Technical Specifications was performed and submitted to the NRC in AEP:NRC:0980 series of letters starting from November 7, 1986. Upon review of our submittals, the NRC issued Amendment No. 100 to the Unit 2 Technical Specifications, which approved the steam generator replacement. The evaluation showed that although certain design improvements were made, the repaired steam generators match the design performance of the original steam generators. Very little change was made to the original operating parameters. Therefore, the impact on the accident analyses was insignificant. The repairs did not result in any adverse changes in the plant operating conditions used in the plant's licensing basis and therefore the accident analyses in our licensing bases are still valid. It was concluded that no unreviewed safety questions exist due to operation with the repaired steam generators.

In an effort to preclude secondary side corrosion in the steam generators of Unit 1, the NRC issued, at our request, amendment number 126 to Cook Nuclear Plant, Unit 1, Technical Specifications. This amendment permits the unit to operate at reduced temperature and pressure. As stated in the NRC's Safety Evaluation Report (SER), "The licensee's contractor (Westinghouse) has determined that this RTP program should more than double the time to reach a given level of steam generator U-tube corrosion in comparison to the original temperatures and pressure."

Our intentions are to evaluate and implement accordingly future technological advancements and operating improvements to minimize any additional corrosion in both units' steam generators.

#### 7.0 Economic Assessment

Operation of Cook Nuclear Plant beyond its current operating license period will be a considerable financial benefit to the customers served by Indiana Michigan Power. Whenever the Cook Nuclear Plant units retire, we would expect to replace them with base-load capacity. If this application is denied, this capacity would have to be ready for service in 2009. Based on replacement of the units with base-load capacity, our estimate shows the cost of replacement power over the years that we are requesting to extend Cook Nuclear Plant's license would be approximately \$5.9 billion in 1989 dollars. However, our estimate also shows that the cost to operate the Cook Nuclear Plant units over the same period of time would be approximately \$1.6 billion, which is an approximate \$4.3 billion savings in 1989 dollars.

### 8.0 Benefits to the Service Area Economy

If this application is approved the units will continue to enhance the economic health and well being of the company's service area. The plant is a major asset to Bridgman and surrounding communities by virtue of its ongoing contributions to the property tax base and secondary benefits to the local economy from employee payroll and from expenditures for goods and services to operate the plant. In addition, as previously discussed, customers throughout the company's service area will benefit from the lower cost of electricity that will result from the continued operation of the units compared to that of establishing new base-load capacity.

### 9.0 Significant Hazards Considerations

Per 10 CFR 50.92, a proposed amendment will not involve a significant hazards consideration if the proposed amendment does not:

- 1) involve a significant increase in the probability or consequences of an accident previously evaluated,
- 2) create the possibility of a new or different kind of accident from any accident previously evaluated, or
- 3) involve a significant reduction in a margin of safety.

#### Criterion 1

The probability or consequences of an accident are determined by the design and operation of plant systems. Existing programs are unaffected by this change and will remain in effect throughout the duration of the operating license, whatever duration it is. Thus, this proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

#### Criterion 2

The possibility of a new or different kind of accident is not created by this proposed change since it does not involve hardware or procedural modifications. Surveillance and maintenance practices, which are implemented in accordance with the ASME code and the facility Technical Specifications, provide assurance that any unexpected degradation in plant equipment will be identified and corrected. Thus, any degradation that might create a different kind of accident would be detected and corrected by existing programs and routine maintenance.

Criterion 3

This proposed change does not involve a significant reduction in a margin of safety. The Cook Nuclear Plant Units 1 and 2 were designed and constructed for a 40-year operating life. In addition, existing programs, routine maintenance, and existing Technical Specifications provide assurance that an adequate margin of safety is maintained. These activities will remain in effect through the duration of the operating license. Thus, the extension of the duration of the operating license does not result in a reduction in any margin of safety.

Thus, we conclude that the change does not involve a significant hazards consideration as defined by 10 CFR 50.92, which is consistent with previous NRC actions on applications of this type.