

November 13, 2001

Mr. Robert P. Powers, Senior Vice President
Indiana Michigan Power Company
Nuclear Generation Group
500 Circle Drive
Buchanan, MI 49107

SUBJECT: DONALD C. COOK NUCLEAR PLANT, UNITS 1 AND 2 - ISSUANCE OF
AMENDMENTS (TAC NOS. MA9394 AND MA9395)

Dear Mr. Powers:

The U.S. Nuclear Regulatory Commission has issued the enclosed Amendment No. 258 to Facility Operating License No. DPR-58 and Amendment No. 241 to Facility Operating License No. DPR-74 for the Donald C. Cook (D. C. Cook) Nuclear Plant, Units 1 and 2. The amendments consist of changes to the Design and Licensing Basis for D. C. Cook Units 1 and 2 in response to your application dated June 12, 2000, as supplemented by letters dated November 7, 2000, June 19, and August 17, 2001.

The amendments propose to use the methodology and the alternative source term (AST) in 10 CFR 50.67 and described in NUREG-1465, "Accident Source Terms for Light-Water Nuclear Power Plants," and Draft Regulatory Guide 1081, "Alternative Radiological Source Terms for Evaluating the Radiological Consequences of Design Basis Accidents at Boiling and Pressurized Water Reactors." Implementing the AST of 10 CFR 50.67 results in a new acceptance criterion for 10 CFR 50, Appendix A, General Design Criterion (GDC) 19, of 5 rem total effective dose equivalent (TEDE). Your staff determined that use of the revised analysis assumptions, methodology, and acceptance criterion required prior Nuclear Regulatory Commission (NRC) approval. In addition the NRC requires, in 10 CFR 50.67, a license amendment to implement the AST as a replacement for the Technical Information Document (TID)-14844 source term.

By letter dated March 29, 2001, the NRC staff issued a request for additional information (RAI) concerning the application. By letters dated June 19, and August 17, 2001, the licensee responded to the RAI. The information provided by the licensee was only sufficient to allow the staff to review the design bases accident (DBA) associated with the fuel handling accident (FHA). By letter dated September 14, 2001, the licensee indicated that all requested information would not be provided to the NRC staff until January 17, 2002.

You have requested two additional license amendments for the upcoming refuel outage for Unit 2 scheduled for January 2002. The license amendments require an independent assessment of the radiological consequences following a FHA. Therefore, this license amendment approves only the licensing basis changes to allow the use of the AST following a FHA. The licensing basis changes associated with the remaining design basis accidents will be issued under a separate cover following the receipt of the necessary information to allow the NRC staff to make an independent assessment.

Mr. R. Powers

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A copy of our related safety evaluation is also enclosed. A Notice of Issuance will be included in the Commission's next biweekly *Federal Register* notice.

Sincerely,

/RA/

John F. Stang, Senior Project Manager, Section 1
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-315 and 50-316

Enclosures: 1. Amendment No. 258 to DPR-58
2. Amendment No. 241 to DPR-74
3. Safety Evaluation

cc w/encls: See next page

Mr. R. Powers

-2-

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Donald C. Cook Nuclear Plant, Units 1 and 2

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INDIANA MICHIGAN POWER COMPANY

DOCKET NO. 50-315

DONALD C. COOK NUCLEAR PLANT, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 258
License No. DPR-58

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Indiana Michigan Power Company (the licensee) dated June 12, 2000, as supplemented November 7, 2000, June 19, and August 17, 2001, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
 - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
 - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
 - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
 - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, by Amendment No. 258 Facility Operating License No. DPR-58 is hereby amended to authorize a change to the current design and licensing basis to allow the use of an alternative source term in accordance with 10 CFR 50.67 to evaluate the radiological consequences of a fuel handling accident, as set forth in the license amendment application dated June 12, 2000 as supplemented November 7, 2000, June 19 and August 17, 2001, and evaluated in the associated safety evaluation by the Commission's Office of Nuclear Reactor Regulation. The licensee shall update the Updated Final Safety Analysis Report by adding a description of this change as authorized by this amendment, and in accordance with 10 CFR 50.71(e).
3. This license amendment is effective as of its date of issuance and shall be implemented within 60 days.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

William D. Reckley, Acting Chief, Section 1
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Date of Issuance: November 13, 2001

INDIANA MICHIGAN POWER COMPANY

DOCKET NO. 50-316

DONALD C. COOK NUCLEAR PLANT, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 241

License No. DPR-74

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Indiana Michigan Power Company (the licensee) dated June 12, 2000, as supplemented November 7, 2000, June 19, and August 17, 2001, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
 - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
 - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
 - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
 - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, by Amendment No. 241 Facility Operating License No. DPR-74 is hereby amended to authorize a change to the current design and licensing basis to allow the use of an alternative source term in accordance with 10 CFR 50.67 to evaluate the basis radiological consequences of a fuel handling accident, as set forth in the license amendment application dated June 12, 2000 as supplemented November 7, 2000, June 19 and August 17, 2001, and evaluated in the associated safety evaluation by the Commission's Office of Nuclear Reactor Regulation. The licensee shall update the Updated Final Safety Analysis Report by adding a description of this change as authorized by this amendment, and in accordance with 10 CFR 50.71(e).
3. This license amendment is effective as of its date of issuance and shall be implemented within 60 days.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

William D. Reckley, Acting Chief, Section 1
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Date of Issuance: November 13, 2001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 258 TO FACILITY OPERATING LICENSE NO. DPR-58
AND AMENDMENT NO. 241 TO FACILITY OPERATING LICENSE NO. DPR-74
INDIANA MICHIGAN POWER COMPANY
DONALD C. COOK NUCLEAR PLANT, UNITS 1 AND 2
DOCKET NOS. 50-315 AND 50-316

1.0 INTRODUCTION

By application dated June 12, 2000, as supplemented by letters dated November 7, 2000, June 19, and August 17, 2001, the Indiana Michigan Power Company (I&M, the licensee) requested changes to the licenses for the Donald C. Cook (D. C. Cook) Nuclear Plant, Units 1 and 2.

The amendments propose to use the methodology and the alternative source term (AST) in 10 CFR 50.67 and described in NUREG-1465, "Accident Source Terms for Light-Water Nuclear Power Plants," and Draft Regulatory Guide 1081, "Alternative Radiological Source Terms for Evaluating the Radiological Consequences of Design Basis Accidents at Boiling and Pressurized Water Reactors." Implementing the AST of 10 CFR 50.67 results in a new acceptance criterion for 10 CFR 50, Appendix A, General Design Criterion (GDC) 19, of 5 rem total effective dose equivalent (TEDE). The licensee determined that use of the revised analysis assumptions, methodology, and acceptance criterion requires prior Nuclear Regulatory Commission (NRC) approval. In addition NRC requires, in 10 CFR 50.67, a license amendment to implement the AST as a replacement for the Technical Information Document (TID)-14844 source term.

By letter dated March 29, 2001, the NRC staff issued a request for additional information (RAI) concerning the application. By letters dated June 19, and August 17, 2001, the licensee responded to the RAI. The information provided by the licensee was only sufficient to allow the NRC staff to review the design bases accident (DBA) associated with the fuel handling accident. By letter dated September 14, 2001, the licensee indicated that all requested information would not be provided to the staff until January 17, 2002.

The licensee has requested two additional license amendments for the upcoming refuel outage for Unit 2 scheduled for January 2002. The license amendments require an independent assessment of the radiological consequences following a fuel handling accident (FHA). Therefore, the licensee has requested the NRC staff to review and approve the licensing basis changes to allow the use of the AST following a FHA. The licensing basis change associated

with the remaining DBAs will be issued under a separate cover following the receipt of the necessary information to allow the staff to make an independent assessment. The November 7, 2000, June 19, and August 17, 2001, letters, provided clarifying information within the scope of the original application and did not change the initial proposed no significant hazards consideration determination.

2.0 EVALUATION

2.1 AST for Control Room Habitability During FHAs

In December 1999, the NRC issued a new regulation, 10 CFR 50.67, "Accident Source Term," which provided a mechanism for licensed power reactors to replace the traditional accident source term used in their design basis accident analyses with ASTs. Regulatory guidance for the implementation of these ASTs is provided in Regulatory Guide 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors." 10 CFR 50.67 requires a licensee seeking to use an AST to apply for a license amendment and requires that the application contain an evaluation of the consequences of affected design basis accidents. I&M's application of June 12, 2000, addresses these requirements in proposing to selectively use the AST described in Regulatory Guide (RG) 1.183 as the D. C. Cook Nuclear Plant design basis accident source term for evaluation of control room habitability during DBAs. I&M did not propose to implement the AST for use in offsite accident dose calculations. As part of the I&M proposed implementation of the AST, the total effective dose equivalent (TEDE) acceptance criterion of 10 CFR 50.67 (b)(2)(iii) replaces the previous whole body or equivalent dose guideline of 10 CFR 50, Appendix A, General Design Criterion (GDC)-19, for the DBAs previously analyzed for D. C. Cook Units 1 and 2.

The NRC staff has not completed its review of the June 12 application due to pending requests for additional information from I&M. However, the staff has completed those aspects related to control room habitability during FHAs. As such, the staff is separating its review of the FHA from the larger AST application so that the FHA AST review can be used to support the safety finding for the current license amendment request. The staff will consider the remainder of the June 12 application at a future date. This selective approach to AST implementation is provided for in Regulatory Guide (RG) 1.183.

2.2 Radiological Consequences of a Design Basis Fuel Handling Accident

The objective of any design basis accident (DBA) radiological analysis is to evaluate the performance of various plant safety systems intended to mitigate the postulated release of radioactive materials from the plant to the environment. Specifically, the DBA FHA is evaluated to demonstrate compliance with GDC-60 and GDC-61. The NRC staff reviewed I&M's analysis description and performed a confirmatory calculation. Analysis assumptions used by the staff are consistent with those used by I&M and are tabulated in Table 1 to this safety evaluation. The control room radiation doses reported by the licensee are tabulated in Table 2. In performing this analysis, I&M selected analysis parameters that would provide analysis results that would bound the consequences of both a FHA inside containment and a FHA in the fuel handling building.

However, the volatile constituents of this inventory will migrate from the pellets to the gap between the pellets and the fuel rod clad. I&M assumes that the core inventory of fission products, decayed 100 hours, is equally distributed in all 193 fuel assemblies in the core. To account for differences in core power distribution across the core, the averaged fission product inventory in the dropped assembly is conservatively multiplied by a factor of 1.65. I&M assumes that 12 percent of the fuel inventory of iodine-131, 15 percent of the krypton-85, and 10 percent of the inventory of all other nuclides is in the fuel rod gap and available for release. The use of these gap fractions is a conservative deviation from the guidance in RG 1.183. This deviation is the result of I&M's use of preliminary guidance in Draft Guide-1081. Since the values used are more conservative than those in RG 1.183, this is an acceptable alternative to the guidance.

The fission product inventory in the fuel rod gap of the damaged fuel rods is assumed to be instantaneously released because of the accident. This activity is assumed to be released from (1) the damaged fuel via the spent fuel pool to the fuel handling building, or (2) from the damaged fuel via the reactor cavity to the containment, from which it is assumed to be released to the environment over two hours as an unfiltered ground-level release. Fission products released from the damaged fuel are decontaminated by passage through the spent fuel pool or reactor cavity water, depending on their physical and chemical form. I&M assumed no decontamination of noble gases or organic iodines, a factor of 400 decontamination of elemental radioiodines, and retention of all aerosol and particulate fission products. I&M assumed that 99.75 percent of the iodine was elemental and 0.25 percent was organic. RG 1.183 provides for an effective DF of 200 for 99.85 percent elemental and 0.15 percent organic iodine species fractions. The staff has accepted I&M's proposed alternative to RG 1.183 on the following basis: (1) I&M did not credit iodine mitigation other than pool DF, rendering the iodine species fraction differences moot; and (2) use of I&M's species fraction and elemental DF assumptions yields an acceptable effective DF of 200.25. The NRC staff notes, however, that if I&M elects to credit iodine mitigation features (such as filters) in the future, these assumptions will need to be re-considered. I&M used atmospheric dispersion (γ/Q) values that are different from those in the current licensing basis. These values are addressed in Section 2.3 of this safety evaluation.

I&M evaluated the dose to operators in the control room. It was assumed that the operators would manually place the control room ventilation in emergency operation mode at 30 minutes following the start of the event. The control room isolation can be actuated within the control room with a small number of operator actions. During refueling operations, continuous communications are maintained between the control room and the refueling crew. During a FHA, there are only limited actions required of the control room operators to contend with this event. As such, the staff finds the assumed 30 minute delay in isolation acceptable. I&M analyzed the control room doses over a thirty-day period. Although the control room is designed to be pressurized during an accident event once the ventilation system is placed in the emergency mode, I&M assumes that unfiltered in-leakage occurs. I&M previously established, by means of an integrated tracer gas test, that the unfiltered in-leakage would be less than 98 cfm. The NRC staff notes, however, that it is currently developing regulatory guidance regarding control room habitability, including periodic surveillance testing of unfiltered in-leakage. The NRC staff's acceptance of I&M unfiltered in-leakage assumption does not foreclose on any future generic regulatory actions that may become applicable to D. C. Cook.

Based on its review of the I&M analysis as described above and as confirmed by its independent analysis, the NRC staff finds the I&M analyses of control room doses due to a FHA and the reported results to be acceptable. The NRC staff reviewed the I&M selective implementation of the AST and TEDE criteria to the control room habitability due to a FHA and found it to meet the requirements of 10 CFR 50.67 and the guidance provided in RG 1.183 and, therefore, acceptable.

As part of the current review, the NRC staff reviewed its safety evaluations issued as part of the license amendments 169 and 197 for D. C. Cook Unit 1 and license amendments 152 and 182 for D. C. Cook Unit 2. The NRC staff determined that these offsite consequence analyses were performed assuming a decay time of only 100 hours and that there have been no changes to other analysis assumptions. As such, the staff finds that the conclusions of these safety analyses are applicable to the current amendment request. Therefore, the staff finds that the proposed revision to the design and licensing basis will not increase the consequences of the previously analyzed FHA, with regard to offsite dose consequences.

2.3 Atmospheric Dispersion (χ/Q) Value Changes

In performing the radiological consequence analyses supporting the control room habitability amendment submitted on June 12, 2000, I&M calculated atmospheric dispersion values (χ/Q) using a different methodology than had been used previously in the D. C. Cook licensing basis. I&M did not provide sufficient information for the staff to confirm the new χ/Q values and the staff requested additional information. I&M responded to this request by providing a table of configuration parameters and floppy disk files of the hourly meteorological observation data for the calendar years 1996-1998. In its review of this information, the staff identified concerns with the quality of the meteorological observation data. I&M personnel subsequently notified the staff that an error had been uncovered in the processing of the collected meteorological data. This error affected all of the χ/Q values used in the June 2000 application. I&M had the affected values re-calculated. While the preliminary results of these analyses indicate some significant changes in the χ/Q values for other accidents and other time intervals, the change in the 0-2 hour χ/Q for the FHA is only about 2-3 percent. The NRC staff has decided to accept the FHA radiological analysis submitted with the June 2000 amendment request in approving the present amendment request. The staff made this finding on the following bases: (1) the negligible magnitude of the projected difference; (2) the projected increase is consistent with staff expectations for the 0-2 hour interval; (3) with the exception of the χ/Q value, FHA analysis methods and assumptions were found acceptable; (4) the projected doses for the FHA are directly proportional to the 0-2 hour χ/Q value; and (5) there is acceptable margin between the uncorrected dose results and the acceptance criteria to absorb the 2 percent increase in χ/Q .

However, this finding should not be construed as approving the use of any of the χ/Q values provided in the June 2000 application. I&M is required to correct the identified deficiencies in the June 2000 amendment request in order for the NRC staff to complete its review of the amendment request.

3.0 SUMMARY

The NRC staff has reviewed the refueling decay period technical specification changes proposed by I&M for D. C. Cook. In doing this review, the staff relied upon information placed on the docket by I&M, staff experience in doing similar reviews and, where deemed necessary, on staff confirmatory calculations. The NRC staff reviewed the assumptions, inputs, and methods used by I&M to assess the impacts of the proposed changes on the control room radiological consequences of a FHA. With regard to offsite dose consequences, the staff finds that existing analyses of the FHA were performed assuming a decay period of 100 hours. As such, those analysis results bound the decay periods proposed in the technical specification change.

With regard to the impact on control room habitability, I&M referenced an analysis submitted as part of a selective implementation of the AST in June 2000. That selective implementation addresses control room habitability for all of the radiological DBAs addressed in the D. C. Cook design basis, including a FHA with a decay period of 100 hours.

The NRC staff has reviewed the selective AST implementation as it applies to the control room dose for a FHA. The NRC staff finds that I&M used analysis methods and assumptions consistent with the conservative guidance of RG 1.183. The NRC staff compared the doses estimated by I&M to the applicable criteria and to the results of confirmatory analyses by the staff. The staff finds, with reasonable assurance, that the licensee's estimates of the control room total effective dose equivalent due to a FHA will comply with the requirements of 10 CFR 50.67 and the guidance of Regulatory Guide 1.183. The NRC staff finds reasonable assurance that D. C. Cook AST implementation will continue to provide sufficient safety margins with adequate defense-in-depth to address unanticipated events and to compensate for uncertainties in accident progression and in analysis assumptions and parameters, as they apply to the control room dose from a design basis FHA.

This licensing action is considered a selective implementation of the AST. With the approval of this amendment, the AST, the TEDE criteria, and the associated analysis methods, assumptions, and inputs become the design basis for the assessment of radiological consequences of the control room dose for a design basis FHA. All future control room dose analyses associated with the design basis FHA accident shall use this approved design basis. This approval is limited to this specific application. Until the NRC staff approves the remainder of the June 2000 amendment request, the AST and TEDE criteria shall not be extended to other aspects of plant design or operation.

The NRC staff concludes that the selective implementation of the AST to control dose analyses for DBA FHA is acceptable. The staff finds that there is reasonable assurance that radiological consequences of a FHA at D. C. Cook would result in doses that meet the acceptance criteria of 10 CFR 100.11 and 10 CFR Part 50, Appendix A, GDC-19, as clarified in NUREG-0800 Sections 6.4 and 15.7.4.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Michigan State official was notified of the proposed issuance of the amendments. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

These amendments change the requirements with respect to surveillance requirements of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration and there has been no public comment on such finding (65 FR 51356). Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

6.0 CONCLUSION

The NRC staff has 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, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: S.F. LaVie

Date: November 13, 2001

TABLE 1

Fuel Handling Accident Analysis Assumptions

Reactor Thermal Power, MWt	3588 x 1.02	
Core Inventory, Ci	Table 4 of June 12, 2000 application	
Number of Fuel Assemblies in core	193	
Radial Peaking Factor	1.65	
Fuel Rod Gap Fraction		
I-131		12%
Other iodines		10%
Kr-85		15%
Other noble gases		10%
Iodine Species		
Elemental		99.75%
Organic		0.25%
Particulate		none
Water Depth, ft	23	
Effective Pool Scrubbing Factor (DF)	200	
Filter Efficiency		
Offsite; FHA in FB	90% all iodine species	
Offsite; FHA in CNMT	No release filtration assumed	
Control Room, either	No release filtration assumed	
Building Holdup and Dilution	None assumed	
Release Duration	Assumed to be released in 2 hours	
Control Room Volume, ft ³	50616	
Control Room Flow Rates, scfm		
	<u>0 to 30 minutes</u>	<u>0.5 to 2 hours</u>
Filtered makeup	0	1000
Filtered recirculation	0	4400
Unfiltered makeup	1000	0
Unfiltered recirculation	13400	13400
Unfiltered inleakage	0	98
Control Room Filter Efficiencies		
Elemental		95%
Organic		95%
Particulate		98%
Switchover to Emergency Ventilation,	Operator manual action @ 30 minutes	
Control Room 0-2 hour χ/Q , sec/m ³	1.74E-3	

TABLE 2

FHA RADIOLOGICAL ANALYSIS RESULTS, REM

<u>Event</u>	0-2 hr EAB		30-day CR
	<u>Whole Body</u>	<u>Thyroid</u>	<u>TEDE</u>
U1/U2 in FB ¹	0.67	7.07	
U1/U2 in CNMT ²	1.3	82.3	
U1/U2 AST ³			1.7

- a) License amendment request dtd July 26, 1991; Safety Evaluation Report (SER) dtd January 14, 1993
- b) Amendment 197/182, SER dtd July 12, 1995
- c) License amendment request dtd June 12, 2001; this SER