

May 16, 1990

Docket No. 50-346

Mr. Donald C. Shelton  
Vice President, Nuclear  
Toledo Edison Company  
Edison Plaza - Stop 712  
300 Madison Avenue  
Toledo, Ohio 43652

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Dear Mr. Shelton:

SUBJECT: AMENDMENT NO. 148 TO FACILITY OPERATING LICENSE NO. NPF-3  
(TAC NO. M72015)

The Commission has issued Amendment No. 148 to Facility Operating License No. NPF-3 for the Davis-Besse Nuclear Power Station, Unit No. 1. The amendment revises the Technical Specifications in response to your application dated February 21, 1989 as supplemented July 19 and September 1, 1989.

This amendment revises Table 3.3-2 of the Technical Specifications to increase the allowable response time for the High Flux/Number of Reactor Coolant Pumps On (power/pumps) trip function of the Reactor Protection System from 451 milliseconds to 631 milliseconds. In addition, a change is made to a footnote of Table 3.3-2 to clarify the identification of the pump monitor.

Copies of the Safety Evaluation and of the notice of issuance are also enclosed. The notice of issuance has been forwarded to the Office of the Federal Register for publication.

Sincerely,

Thomas V. Wambach, Sr. Project Manager  
Project Directorate III-3  
Division of Reactor Projects - III, IV,  
V & Special Projects  
Office of Nuclear Reactor Regulation

Enclosures:

1. Amendment No. 148 to License No. NPF-3
2. Safety Evaluation
3. Notice of Issuance

cc: See next page

Office: LA/PDIII-3  
Surname: *PKreutzer*  
Date: *5/14/90*

PM/PDIII-3  
TWambach/bj  
*5/17/90*

PD/PDIII-3  
JHannon  
*5/17/90*

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*5/14/90*

DOCUMENT NAME: M72015 AMD

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

May 16, 1990

Docket No. 50-346

Mr. Donald C. Shelton  
Vice President, Nuclear  
Toledo Edison Company  
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Sincerely,

A handwritten signature in cursive script that reads "Thomas V. Wambach".

Thomas V. Wambach, Sr. Project Manager  
Project Directorate III-3  
Division of Reactor Projects - III, IV,  
V & Special Projects  
Office of Nuclear Reactor Regulation

Enclosures:

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License No. NPF-3
2. Safety Evaluation
3. Notice of Issuance

cc: See next page

Mr. Donald C. Shelton  
Toledo Edison Company

Davis-Besse Nuclear Power Station  
Unit No. 1

cc:

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DERR--Compliance Unit  
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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

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. 148  
License No. NPF-3

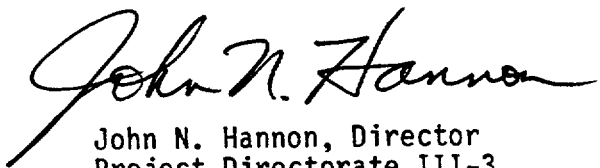
1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by the Toledo Edison Company and The Cleveland Electric Illuminating Company (the licensees) dated February 21, 1989 as supplemented July 19 and September 1, 1989, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. NPF-3 is hereby amended to read as follows:

(a) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 148, 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 its date of issuance and shall be implemented not later than 45 days after issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

A handwritten signature in black ink, reading "John N. Hannon". The signature is fluid and cursive, with the first name "John" being the most prominent part.

John N. Hannon, Director  
Project Directorate III-3  
Division of Reactor Projects - III, IV,  
V, & Special Projects  
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical  
Specifications

Date of Issuance: May 16, 1990

ATTACHMENT TO LICENSE AMENDMENT NO. 148

FACILITY OPERATING LICENSE NO. NPF-3

DOCKET NO. 50-346

Replace the following page of the Appendix "A" Technical Specifications with the attached page. The revised page is identified by amendment number and contains vertical lines indicating the area of change.

Remove

3/4 3-6

Insert

3/4 3-6

TABLE 3.3-2

REACTOR PROTECTION SYSTEM INSTRUMENTATION RESPONSE TIMES

<u>FUNCTIONAL UNIT</u>	<u>RESPONSE TIMES**</u> (seconds)
1. Manual Reactor Trip	Not Applicable
2. High Flux*	$\leq 0.266$
3. RC High Temperature	Not Applicable
4. Flux - $\Delta$ Flux - Flow* - Variable Flow	$\leq 1.77$
- Constant Flow	$\leq 0.266$
5. RC Low Pressure	$\leq 0.341$
6. RC High Pressure	$\leq 0.341$
7. RC Pressure - Temperature - Constant Temperature	Not Applicable
8. High Flux/Number of Reactor Coolant Pumps On*	$\leq 0.631^{***}$
9. Containment High Pressure	Not Applicable
<p>* Neutron detectors are exempt from response time testing. Response time of the neutron flux signal portion of the channel shall be measured from detector output or input of first electronic component in channel.</p> <p>** Including sensor (except as noted), RPS instrument delay and the breaker delay.</p> <p>*** A 0.24 sec delay time has been assumed for pump monitor.</p>	



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 148 TO FACILITY OPERATING LICENSE NO. NPF-3  
TOLEDO EDISON COMPANY  
AND  
THE CLEVELAND ELECTRIC ILLUMINATING COMPANY  
DAVIS-BESSE NUCLEAR POWER STATION, UNIT NO. 1  
DOCKET NO. 50-346

1.0 INTRODUCTION

By letter dated February 21, 1989, as supplemented by letters dated July 19 and September 1, 1989, Toledo Edison Company requested an amendment to the Davis-Besse Technical Specifications (TS). Specifically, the TS change request is to increase from .451 seconds to .631 seconds the response time requirement for the "High Flux/Number of Reactor Coolant Pumps On" trip in Table 3.3-2 of TS 3/4.3.1.1, Reactor Protection System Instrumentation. The present response time of .451 seconds is close to the physical limit of the system, and the increased response time may prevent unnecessary plant outage time. This proposed change is based on an analysis performed with the VIPRE-01 code. The staff evaluation of these changes follows.

2.0 DISCUSSION

During power operation, the status of the reactor coolant pumps (RCP) is monitored. The "High Flux/Number of RCP On" trip, or Power/Pumps trip, circuit utilizes the pump status information to determine the trip setpoint, and initiates a trip signal when the reactor power exceeds the setpoint. The safety function of the Power/Pumps trip is to provide protection against departure from nucleate boiling (DNB) for loss of forced reactor coolant flow transients including (1) multiple RCP coastdowns, (2) single RCP coastdowns from partial pump operation, or (3) RCP coastdowns resulting in the loss of both pumps in either loop. For a coastdown of a single RCP from four RCP initial condition, the Power/Pumps trip is not necessary because the flux/delta flux/flow trip ensures that there is sufficient flow and heat removal capability while the reactor is automatically running back in power.

3.0 EVALUATION

The most limiting transient for the loss of forced reactor coolant flow that relies on the Power/Pumps trip is the four-pump coastdown transient. The



four-pump coastdown transient had previously been analyzed using a closed channel thermal-hydraulic code RADAR and the B&W-2 critical heat flux correlation. Using a total RPS response time of .620 seconds, the resulting calculated minimum DNBR was higher than 1.80 compared to the minimum DNBR limit of 1.30. Therefore, no DNB is anticipated with 95 percent probability at a 95 percent confidence level if the reactor is tripped within .620 seconds of the time the reactor power exceeding the trip setpoint. Since the RPS response time specified in the TS is defined as the time interval from the time the monitored parameter exceeds its trip setpoint at the channel sensor to the power interruption at the control rod drive (CRD) breaker (i.e., the sum of the sensor and RPS delay and CRD breaker delay times), the RPS response time of .451 seconds was obtained by subtracting .125 seconds for the CRD release delay and .044 seconds for a dedicated margin for uncertainty from the total response time of .620 seconds used in the analysis.

In support of the proposed response time of .631 seconds, the four-pump coastdown transient was reanalyzed using the VIPRE-01 thermal-hydraulic code and the B&W-2 CHF correlation. Using a total response time of .800 seconds, the calculated minimum DNBR is 1.885, significantly higher than the DNBR limit of 1.3 for the B&W-2 correlation. Subtracting the same CRD release delay and uncertainty margin previously used (a total of .169 seconds), the resulting response time is .631 seconds for the "High Flux/Number of RCPs On" trip in TS Table 3.3-2.

The VIPRE-01 code is an open-lattice subchannel core thermal-hydraulic code developed by Battelle Pacific Northwest Laboratories under the sponsorship of Electric Power Research Institute. In the open-lattice analysis, the reactor core or fuel bundles is divided into a number of quasi-one-dimensional channels that communicate laterally by diversion crossflow and turbulent mixing. This approach more realistically considers the flow redistribution effects in the open-lattice core of a pressurized water reactor and results in less severe hot channel thermal hydraulic conditions than that obtained from the closed-channel approach used in RADAR. The VIPRE-01 code has been approved for licensing applications with conditions requiring the licensee to document its intended use of VIPRE-01 and justification for its specific modeling assumptions, choices of particular models and correlations, and input values of plant specific data. In addition, since the DNBR limit of 1.3 for the B&W-2 CHF correlation was developed with another thermal-hydraulic code, it is necessary for the licensee to demonstrate that use of this DNBR limit in VIPRE-01 can predict its data base of the DNB occurrence with at least a 95 percent probability at a 95 percent confidence level, or to increase the DNBR limit.

In using the VIPRE-01 code, the licensee has developed an 11-channel core model for the thermal-hydraulic analysis of the complete loss of RC flow transient. The 11-channel model characteristics, including the geometry, power distribution, flow and heat transfer correlations, mixing models and CHF correlation, are summarized in Appendix A to the February 21, 1989 letter. Since the B&W-2 correlation with the LYNXT code has been approved with DNBR limit of 1.3, the licensee also provided a VIPRE-01/B&W-2 benchmark against LYNXT/B&W-2. The results of analyses for the locked rotor transient showed a DNBR difference of 0.04 between VIPRE-01/B&W-2 and LYNXT/B&W-2.

At the staff request, the licensee, in letters of July 19 and September 1, 1989, provided sensitivity studies on VIPRE-01 input parameters, heat transfer correlations, solution scheme, radial and axial noding, hot channel location, and power distribution. The results show that the 11-channel model is appropriate for the analysis of the loss of flow transient. No analysis was performed to show the appropriateness of the VIPRE-01/B&W-2 DNBR limit of 1.30. However, since the four-pump coastdown transient analyzed with VIPRE-01/B&W-2 has a minimum DNBR of 1.89, there is ample margin to account for uncertainty for the DNBR limit of 1.3, and there is reasonable assurance that DNB will be avoided. This is further assured by the small difference (0.04) in the DNBRs calculated by LYNXT/B&W-2 and VIPRE-01/B&W-2 for the locked rotor transient. Therefore, the staff concludes that the four-pump coastdown analysis using VIPRE-01/B&W-02 is acceptable to show no DNB occurrence with a total response time of .800 seconds even though no effort is made to justify the DNBR limit of 1.30. The licensee has indicated in the September 1, 1989 letter that this is a one-time specific use of VIPRE-01 and further justification will be provided to use VIPRE-01 in other applications.

The staff has reviewed the licensee's request for a TS change to increase the "High Flux/Number of RCP ON" trip response time from .451 seconds to .631 seconds, and has found that the four-pump coastdown transient analysis using VIPRE-01/B&W-2 and the TS change are acceptable. However, further justification will be needed to use VIPRE-01/B&W-2 with a DNBR limit of 1.3 for other applications.

#### 4.0 ENVIRONMENTAL CONSIDERATION

Pursuant to 10 CFR 51.21, 51.32, and 51.35, an environmental assessment and finding of no significant impact has been prepared and published in the Federal Register on May 9, 1990 (55 FR 19374). Accordingly, based on the environmental assessment, the Commission has determined that the issuance of this amendment will not have a significant effect on the quality of the human environment.

#### 5.0 CONCLUSION

The 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, 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.

Principal Contributor: Y. Hsii, NRR/SRXB

Dated: May 16, 1990

UNITED STATES NUCLEAR REGULATORY COMMISSION  
THE CLEVELAND ELECTRICAL ILLUMINATING COMPANY, ET AL.  
DOCKET NO. 50-346  
NOTICE OF ISSUANCE OF AMENDMENT TO  
FACILITY OPERATING LICENSE

The U.S. Nuclear Regulatory Commission (Commission) has issued Amendment No. 148 to Facility Operating License No. NPF-3, issued to Toledo Edison Company and Cleveland Electric Illuminating Company, which revised the Technical Specifications for operation of the Davis-Besse Nuclear Power Station located in Ottawa County, Ohio. The amendment was effective as of the date of issuance.

The amendment modified the Technical Specifications to increase the allowable response time for the High Flux/Number of Reactor Coolant Pumps On (power/pumps) trip function of Table 3.3-2 of the Reactor Protection System from 451 milliseconds to 631 milliseconds. In addition, a change is made to a footnote of Table 3.3-2 to clarify the identification of the pump monitor.

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.

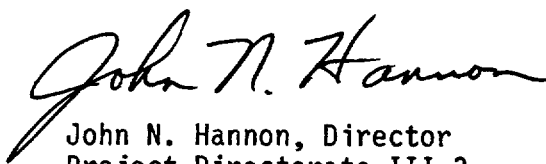
Notice of Consideration of Issuance of Amendments and Opportunity for Hearing in connection with this action was published in the FEDERAL REGISTER on October 26, 1989 (54 FR 43636). No request for a hearing or petition for leave to intervene was filed following this notice.

The Commission has prepared an Environmental Assessment related to the action and has determined not to prepare an environmental impact statement. Based upon the environmental assessment, the Commission has concluded that the issuance of this amendment will not have a significant effect on the quality of the human environment.

For further details with respect to the action see (1) the application for amendment dated February 21, 1989, and supplemented July 19 and September 1, 1989, (2) Amendment No. 148 to License No. NPF-3, (3) the Commission's related Safety Evaluation dated May 16, 1990 and (4) the Environmental Assessment dated May 1, 1990 (55 FR 19374). All of these items are available for public inspection at the Commission's Public Document Room, Gelman Building, 2120 L Street N.W., and at the University of Toledo Library, Documents Department, 2801 Bancroft Avenue, Toledo, Ohio 43606. 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 Reactor Projects III, IV, V and Special Projects.

Dated at Rockville, Maryland this 16th day of May 1990.

FOR THE NUCLEAR REGULATORY COMMISSION

A handwritten signature in black ink, reading "John N. Hannon". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

John N. Hannon, Director  
Project Directorate III-3  
Division of Reactor Projects - III,  
IV, V and Special Projects  
Office of Nuclear Reactor Regulation