

March 15, 2000

Template # - NRR-058  
(To Be Scanned)

Mr. Guy G. Campbell, Vice President - Nuclear  
FirstEnergy Nuclear Operating Company  
5501 North State Route 2  
Oak Harbor, OH 43449-9760

SUBJECT: ISSUANCE OF AMENDMENT - DAVIS-BESSE NUCLEAR POWER STATION,  
UNIT 1 (TAC NO. MA3552)

Dear Mr. Campbell:

The U.S. Nuclear Regulatory Commission has issued the enclosed Amendment No. 239 to Facility Operating License No. NPF-3 for the Davis-Besse Nuclear Power Station, Unit 1. The amendment revises the Technical Specifications in response to your application dated September 8, 1998 (License Amendment Request No. 98-0006, Serial Number 2552).

This amendment revises Technical Specification (TS) 5.3.1, "Design Features - Reactor Core - Fuel Assemblies," and TS Bases Section 2.1, "Safety Limits." The amendment permits the use of the Framatome Cogema Fuels "M5" advanced alloy for fuel rod cladding and fuel assembly spacer grids. An associated Exemption, in response to your request dated September 15, 1998, is being forwarded by separate correspondence.

A copy of the Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's next biweekly Federal Register notice.

Sincerely,

/RA/

Douglas V. Pickett, Senior Project Manager, Section 2  
Project Directorate III  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket No. 50-346

Enclosures: 1. Amendment No.239 to  
License No. NPF-3  
2. Safety Evaluation

cc w/encls: See next page

Distribution w/encls:

File Center GHill (2)  
PUBLIC WBeckner  
PD3-2 r/f OGC  
ACRS GGrant, RIII  
RCaruso DPickett  
AMendiola THarris

DOCUMENT NAME: G:\PDIII-2\DAVISBES\3552amd.wpd

To receive a copy of this document, indicate in the box: "C" = Copy without enclosures "E" = Copy with enclosures "N" = No copy

OFFICE	PM:PD3-2 DVE	E	LA:PD3-2	E	OGC RAW	SC:SRXB	SC:PD3-2
NAME	DPickett		THarris JD#		RWelsman	RCaruso*	AMendiola
DATE	2/10/00		2/10/00		March 7/00	1/21/00	3/10/00

\*See RCaruso to DPickett memo dated 1/21/00

OFFICIAL RECORD COPY

\* With comments, based on OGC's understanding that ~~no limit~~ there are no limitations on the use of M5 fuel in B&W plants.

ORC FILE CENTER COPY

DFOI

Mr. Guy G. Campbell  
FirstEnergy Nuclear Operating Company

Davis-Besse Nuclear Power Station, Unit 1

cc:

Mary E. O'Reilly  
FirstEnergy  
76 South Main Street  
Akron, OH 44308

Harvey B. Brugger, Supervisor  
Radiological Assistance Section  
Bureau of Radiological Protection  
Ohio Department of Health  
P.O. Box 118  
Columbus, OH 43266-0118

James L. Freels  
Manager - Regulatory Affairs  
FirstEnergy Nuclear Operating Company  
Davis-Besse Nuclear Power Station  
5501 North State - Route 2  
Oak Harbor, OH 43449-9760

James R. Williams, Executive Director  
Ohio Emergency Management Agency  
2855 West Dublin Granville Road  
Columbus, OH 43235-2206

Jay E. Silberg, Esq.  
Shaw, Pittman, Potts  
and Trowbridge  
2300 N Street, NW.  
Washington, DC 20037

Director  
Ohio Department of Commerce  
Division of Industrial Compliance  
Bureau of Operations & Maintenance  
6606 Tussing Road  
P.O. Box 4009  
Reynoldsburg, OH 43068-9009

Regional Administrator  
U.S. Nuclear Regulatory Commission  
801 Warrenville Road  
Lisle, IL 60523-4351

Ohio Environmental Protection Agency  
DERR--Compliance Unit  
ATTN: Zack A. Clayton  
P.O. Box 1049  
Columbus, OH 43266-0149

Michael A. Schoppman  
Framatome Technologies Incorporated  
1700 Rockville Pike, Suite 525  
Rockville, MD 20852

State of Ohio  
Public Utilities Commission  
180 East Broad Street  
Columbus, OH 43266-0573

Resident Inspector  
U.S. Nuclear Regulatory Commission  
5503 North State Route 2  
Oak Harbor, OH 43449-9760

Attorney General  
Department of Attorney  
30 East Broad Street  
Columbus, OH 43216

James H. Lash, Plant Manager  
FirstEnergy Nuclear Operating Company  
Davis-Besse Nuclear Power Station  
5501 North State Route 2  
Oak Harbor, OH 43449-9760

President, Board of County  
Commissioners of Ottawa County  
Port Clinton, OH 43252



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

FIRSTENERGY NUCLEAR OPERATING COMPANY

DOCKET NO. 50-346

DAVIS-BESSE NUCLEAR POWER STATION, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 239  
License No. NPF-3

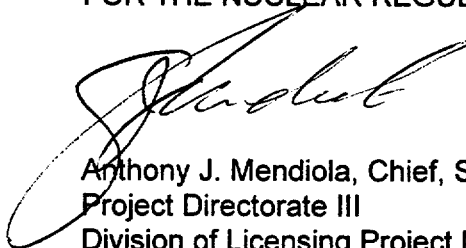
1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by the FirstEnergy Nuclear Operating Company (the licensee) dated September 8, 1998, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and 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) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 239 , are hereby incorporated in the license. FirstEnergy Nuclear Operating 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 120 days after issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Anthony J. Mendiola, Chief, Section 2  
Project Directorate III  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical  
Specifications

Date of Issuance: March 15, 2000

ATTACHMENT TO LICENSE AMENDMENT NO. 239

FACILITY OPERATING LICENSE NO. NPF-3

DOCKET NO. 50-346

Replace the following pages of the Appendix A Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove

Insert

B 2-1

B 2-1

5-1

5-1

## 2.1 SAFETY LIMITS

### BASES

---

#### 2.1.1 AND 2.1.2 REACTOR CORE

The restrictions of this safety limit prevent overheating of the fuel cladding and possible cladding perforation which would result in the release of fission products to the reactor coolant. Overheating of the fuel cladding is prevented by restricting fuel operation to within the nucleate boiling regime where the heat transfer coefficient is large and the cladding surface temperature is slightly above the coolant saturation temperature.

Operation above the upper boundary of the nucleate boiling regime would result in excessive cladding temperatures because of the onset of departure from nucleate boiling (DNB) and the resultant sharp reduction in heat transfer coefficient. DNB is not a directly measurable parameter during operation and therefore THERMAL POWER and Reactor Coolant Temperature and Pressure have been related to DNB using critical heat flux (CHF) correlations. The local DNB heat flux ratio, DNBR, defined as the ratio of the heat flux that would cause DNB at a particular core location to the local heat flux, is indicative of the margin to DNB.

The B&W-2 and BWC CHF correlations have been developed to predict DNB for axially uniform and non-uniform heat flux distributions. The B&W-2 correlation applies to Mark-B fuel and the BWC correlation applies to all B&W fuel with zircaloy or M5 spacer grids. The minimum value of the DNBR during steady state operation, normal operational transients, and anticipated transients is limited to 1.30 (B&W-2) and 1.18 (BWC). The value corresponds to a 95 percent probability at a 95 percent confidence level that DNB will not occur and is chosen as an appropriate margin to DNB for all operating conditions.

The curve presented in Figure 2.1-1 represents the conditions at which a minimum DNBR equal to or greater than the correlation limit is predicted for the maximum possible thermal power 112% when the reactor coolant flow is 380,000 GPM, which is approximately 108% of design flow rate for four operating reactor coolant pumps. (The minimum required measured flow is 389,500 GPM). This curve is based on the design hot channel factors with potential fuel densification and fuel rod bowing effects.

The design limit power peaking factors are the most restrictive calculated at full power for the range from all control rods fully withdrawn to minimum allowable control rod withdrawal, and form the core DNBR design basis.

## 5.0 DESIGN FEATURES

---

### 5.1 Site Location

The Davis-Besse Nuclear Power Station, Unit Number 1, site is located on Lake Erie in Ottawa County, Ohio, approximately six miles northeast from Oak Harbor, Ohio and 21 miles east from Toledo, Ohio. The exclusion area boundary has a minimum radius of 2400 feet from the center of the plant.

---

### 5.2 (Deleted)

---

### 5.3 Reactor Core

#### 5.3.1 Fuel Assemblies

The reactor core shall contain 177 fuel assemblies. Each assembly shall consist of a matrix of zircaloy, M5, or ZIRLO clad fuel rods with an initial composition of natural or slightly enriched uranium dioxide ( $UO_2$ ) as fuel material. Limited substitutions of zirconium alloy or stainless steel filler rods for fuel rods, in accordance with approved applications of fuel rod configurations, may be used. Fuel assemblies shall be limited to those fuel designs that have been analyzed with applicable NRC staff approved codes and methods and shown by tests or analyses to comply with all fuel safety design bases. A limited number of lead test assemblies that have not completed representative testing may be placed in non-limiting core regions.

#### 5.3.2 Control Rods

The reactor core shall contain 53 safety and regulating control rod assemblies and 8 axial power shaping rod (APSR) assemblies. The nominal values of absorber material for the safety and regulating control rods shall be 80 percent silver, 15 percent indium and 5 percent cadmium. The absorber material for the APSRs shall be 100 percent Inconel.

---

### 5.4 (Deleted)

---

### 5.5 (Deleted)

---

### 5.6 Fuel Storage

#### 5.6.1 Criticality

5.6.1.1 The spent fuel pool 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.

(continued)

---



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 239 TO FACILITY OPERATING LICENSE NO. NPF-3

FIRSTENERGY NUCLEAR OPERATING COMPANY

DAVIS-BESSE NUCLEAR POWER STATION, UNIT 1

DOCKET NO. 50-346

1.0 INTRODUCTION

By letter dated September 8, 1998 (Ref. 1), the FirstEnergy Nuclear Operating Company submitted a request to amend the technical specifications (TSs) for the Davis-Besse Nuclear Power Station. The proposed TS amendment reflects changes to permit the use of M5 advanced alloy for fuel rod cladding and fuel assembly spacer grids.

2.0 EVALUATION

Framatome Cogema Fuels (FCF) submitted topical report BAW-10227P, "Evaluation of Advanced Cladding and Structural Material (M5) in PWR Reactor Fuel," dated September 1997, (Ref. 2) for NRC review and approval. This report provides the licensing basis for the FCF advanced cladding and structural material, designated M5, and requested full batch implementation of this material for their Mark-B (15x15) fuel design for B&W type reactors up to the currently approved rod-average burnup level of 62 GWd/MTU for the Mark-B fuel design. By letter dated February 4, 2000 (Ref. 3), the staff approved BAW-10227P for referencing in license applications.

The proposed TS amendment references BAW-10227P to support the use of M5 fuel rod cladding and fuel assembly spacer grids at Davis-Besse. Davis-Besse is a B&W designed reactor and is a type of reactor for which BAW-10227P analyzes the use of the FCF Mark-B fuel design with M5 fuel rod cladding and fuel assembly spacer grids. Therefore, the staff concludes that the use of M5 alloy for fuel rod cladding and fuel assembly spacer grids is acceptable for Davis-Besse.

2.1 Technical Specification Changes

The Bases for TS 2.1.1 and 2.1.2 "Safety Limits - Reactor Core," specifies only zircaloy spacer grids. The licensee has proposed to change this section of the bases to include M5 spacer grids.



TS 5.3.1 "Design Features - Reactor Core - Fuel Assemblies," specifies only zircaloy or ZIRLO fuel rod cladding. The licensee has proposed to change this TS to include M5 fuel rod cladding.

These changes are required to permit the planned use of M5 alloy for fuel rod cladding and fuel assembly spacer grids for Davis-Besse operating Cycle 13. Based on the evaluation above regarding the acceptability of the use of M5 alloy for Davis-Besse, the proposed TS changes are acceptable.

The staff has reviewed the licensee's proposed TS changes related to the use of M5 advanced alloy for fuel rod cladding and fuel assembly spacer grids. Based on the review, as set forth above, the staff concludes that the use of M5 alloy is acceptable for Davis-Besse, and therefore the proposed TS changes are acceptable.

### 3.0 STATE CONSULTATION

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

### 4.0 ENVIRONMENTAL CONSIDERATION

This amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluent 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 amendment involves no significant hazards consideration and there has been no public comment on such finding (63 FR 53961). Accordingly, the amendment meets 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 amendment.

### 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, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) 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: A. Cabbage

Date: March 15, 2000

## REFERENCES

1. Letter from John K. Wood, First Energy, to U.S. NRC, "License Amendment Application to Revise Technical Specifications and Bases to Permit Use of "M5" Advanced Alloy (License Amendment Request No. 98-0006)," dated September 8, 1998.
2. BAW-10227P, "Evaluation of Advanced Cladding and Structural Material (M5) in PWR Reactor Fuel," dated September 1997.
3. Letter from Stuart A. Richards, U.S.NRC, to Framatome Cogema Fuels, "Revised Safety Evaluation (SE) for Topical Report BAW-10227P: 'Evaluation of Advanced Cladding and Structural Material (M5) in PWR Reactor Fuel,'" dated February 4, 2000.