Docket Number 50-346 License Number NPF-3 Serial Number 2570 Enclosure Page 1

APPLICATION FOR AMENDMENT

TO

FACILITY OPERATING LICENSE NUMBER NPF-3

DAVIS-BESSE NUCLEAR POWER STATION

UNIT NUMBER 1

Attached are the requested changes to the Davis-Besse Nuclear Power Station, Unit Number 1, Facility Operating License Number NPF-3. Also included is the Safety Assessment and Significant Hazards Consideration.

The proposed changes (submitted under cover letter Serial Number 2570) concern:

Appendix A, Technical Specification Section 3/4.4.10, Reactor Coolant System - Structural Integrity – ASME Code Class 1, 2 and 3 Components.

I, Guy G. Campbell, state that (1) I am Vice President - Nuclear of the FirstEnergy Nuclear Operating Company, (2) I am duly authorized to execute and file this certification on behalf of the Toledo Edison Company and The Cle[•] and Electric Illuminating Company, and (3) the statements set forth herein are true and correct to the best of my knowledge, information and belief.

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Guy G. Campbell, Vice President - Nuclear

Sworn to and subscribed before me this 9th day of March, 1999.

Jora L. Flood

Notary Public, State of Ohio - Nora L. Flood My commission expires September 4, 2002.

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The following information is provided to support issuance of the requested changes to the Davis-Besse Nuclear Power Station (DBNPS), Unit Number 1, Facility Operating License Number NPF-3, Appendix A, Technical Specifications. The changes involve Appendix A, Technical Specification Section 3/4.4.10, Reactor Coolant System - Structural Integrity - ASME Code Class 1, 2 and 3 Components.

- A. Time Required to Implement: This change is to be implemented within 120 days after the NRC issuance of the License Amendment.
- B. Reason for Change (License Amendment Request Number 97-0001):

This application proposes to revise the TS Surveillance Requirement 4.4.10.1.a, which specifies the inspection requirements for Reactor Coolant Pump Flywheels. The request proposes adoption of changes in the frequency and scope of volumetric and surface examinations justified by the Westinghouse Topical Report WCAP-14535A, "Topical Report on Reactor Coolant Pump Flywheel Inspection Elimination." This topical report was approved by the NRC in their safety evaluation transmitted by letter dated September 12, 1996. This TS revision would reduce the potential for flywheel or motor damage during disassembly and reassembly, and also result in lower personnel radiation exposure due to the increased inspection interval and the revised inspection procedure.

C. Safety Assessment and Significant Hazards Consideration: See Attachment.

Docket Number 50-346 License Number NPF-3 Serial Number 2570 Attachment

SAFETY ASSESSMENT AND SIGNIFICANT HAZARDS CONSIDERATION FOR LICENSE AMENDMENT REQUEST NO. 97-0001

(10 Pages Follow)

SAFETY ASSESSMENT AND SIGNIFICANT HAZARDS CONSIDERATION FOR LICENSE AMENDMENT REQUEST NUMBER 97-0001

TITLE:

Proposed Modification to the Davis-Besse Nuclear Power Station (DBNPS) Unit Number 1, Facility Operating License NPF-3, Appendix A Technical Specifications (TS) to Revise TS 3/4.4.10.1, Reactor Coolant System - Structural Integrity - ME Code Class 1, 2 and 3 Components, to Incorporate New Inspection Requirements for the Reactor Coolant Pump Flywheels

DESCRIPTION:

This License Amendment Request proposes a revision of the DBNPS TS Surveillance Requirement (SR) 4.4.10.1.a. This SR specifies the inspection requirements for Reactor Coolant Pump Flywheels. The request proposes the adoption of changes in the frequency and scope of volumetric and surface examinations, as justified by the Westinghouse Topical Report WCAP-14535A, "Topical Report on Reactor Coolant Pump Flywheel Inspection Elimination" (Reference 1). This Topical Report, which also specifically addressed DBNPS Reactor Cool at Pump Flywheels, was approved by the NRC in their letter dated September 12, 1996, (Reference 2). The NRC's Safety Evaluation Report found that the Reactor Coolant Pump flywheel inspections for the plants covered by the Topical Report can be reduced without impairing plant nuclear safety.

The current SR 4.4.10.1.a reads as follows:

The reactor coolant pump flywheels shall be inspected per the recommendations of Regulatory Position C.4.b. of Regulatory Guide 1.14, Revision 1, August 1975.

Regulatory Guide 1.14, Revision 1, August 1975, "Reactor Coolant Pump Flywheel Integrity," Regulatory Position C.4.b has five recommendations for inspecting flywheels. As described below, it is proposed that reference to the recommendations in positions 1 and 2 of Section C.4.b be replaced with reduced inspection requirements.

It is proposed that this SR be revised to be very similar to the wording previously approved by the NRC for Crystal River Unit 3 in Operating License No. DPR-72 Amendment No. 170 dated August 31, 1998 (TAC No. MA2145). Crystal River Unit 3 Reactor Coolant Pump Flywheels were also addressed by the Topical Report. The proposed revised SR 4.4.10.1.a would read as follows:

Inservice inspection of each reactor coolant pump flywheel shall be performed at least once every 10 years. The inservice inspection shall be either an ultrasonic

examination of the volume from the inner bore of the flywheel to the circle of one-half the outer radius, or a surface examination of exposed surfaces of the disassembled flywheel. The recommendations delineated in Regulatory Guide 1.14, Revision 1, August 1975, Positions 3, 4 and 5 of Section C.4.b shall apply.

Positions C.4.b (1) and (2) of Regulatory Guide 1.14 specify an in-place ultrasonic volumetric examination of the areas of higher stress concentration at the bore and keyway at approximately three year intervals, along with a surface examination of all exposed surfaces and complete ultrasonic volumetric examination at approximately ten year intervals thereby requiring disassembly.

This proposed change would allow for an extended inspection period from the three-year interval currently required to once each ten years. Also, the proposed change allows for an in-place ultrasonic examination each ten years in lieu of a surface examination and complete ultrasonic examination that requires disassembly. This is beneficial because disassembly and re-assembly can cause damage that would not otherwise occur.

In addition to the reduced potential for flywheel or motor damage during disassembly and reassembly, the proposed change will also result in lower personnel radiation exposure due to the increased inspection interval and the revised inspection procedure. The DBNPS plans to utilize this revised TS during the Twelfth Refueling Outage that is currently scheduled for the Spring of 2000.

The DBNPS would continue to meet Regulatory Positions C.4.b(3), (4) and (5) regarding examination procedures, acceptance criteria and submittal of flaw results to the NRC.

The proposed change is shown on the attached marked-up Operating License pages.

SYSTEMS, COMPONENTS, AND ACTIVITIES AFFECTED:

The systems, components, and activities affected by the proposed change include the Reactor Coolant System (RCS), the Reactor Coolant Pump (RCP) Flywheels, and the RCP flywheel inservice inspection program requirements.

FUNCTIONS OF THE AFFECTED SYSTEMS, COMPONENTS, AND ACTIVITIES:

The Reactor Coolant System is described in the DBNPS Updated Safety Analysis Report (USAR) Sections 1.2.2, "Nuclear Steam Supply System," and 5.0, "Reactor Coolant System," (Reference 3). Additional detail regarding the flywheels is provided in USAR Appendix 5A, "Safety Evaluation of RC Pump Motor Flywheels."

The Reactor Coolant System consists of the reactor vessel, two vertical once-through steam generators, four snaft-sealed reactor coolant pumps, an electrically heated pressurizer, and interconnecting piping. The system, located entirely within the Containment Vessel, is arranged in two heat transport loops, each with two reactor

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coolant pumps and one steam generator. Reactor coolant is transported through piping connecting the reactor vessel to the steam generators and flows downward through the steam generator tubes, transferring heat to the steam and water on the shell side of the steam generator. In each loop, the reactor coolant is returned to the reactor through two lines, each containing a reactor coolant pump.

The Reactor Coolant System performs the following functions which are important to safe plant operation:

- a. Transfers heat from the reactor core to the Steam Generator.
 - The RCS transfers heat from the core to the Steam Generator during steady state operation and for any design transient without exceeding core thermal limits.
 - The RCS removes decay heat from the core via redundant components and features using controls from inside or outside the control room.
 - The RCS is designed to be capable of natural circulation cooldown from normal operating temperature and pressure to conditions that permit operation of the Decay Heat Removal System.
- b. Forms a barrier against the release of reactor coolant and radioactive material to the environs.
- c. Transfers heat from the reactor core to containment during a loss of Steam Generator Coolin; with high RCS pressure utilizing Make-up/High Pressure Injection (MU/HPI) Core Cooling.

The RCP motors are vertical, squirrel-cage induction machines. Each RCP motor has a two-piece bolted flywheel to increase the rotational energy, thus prolonging pump coastdown and ensuring a more gradual loss of main coolant flow to the core in the event that pump power is lost. The flywheel assembly is at the upper end of the rotor and includes an anti-reverse device to prevent back-rotation, thereby reducing starting time and rotor heating.

The current RCP flywheel inservice inspection program requirements are as per the recommendations of Regulatory Position C.4.b of Regulatory Guide 1.14, "Reactor Coolant Pump Flywheel Integrity," Revision 1, dated August 1975, and are described in USAR Section 5A.6.2, "Inservice Inspection."

The purpose of the RCP flywheel inservice inspection is to ensure that the flywheels do not degrade due to fatigue crack growth during use throughout their service life. The inspection monitors for flaws to ensure that if they exist, they will not exceed the critical crack length prior to the next scheduled inspection. The critical crack length is that

length that would cause the flaw stress intensity factor due to pump overspeed during the design limiting event to exceed the fracture toughness of the flywheel material.

EFFECTS ON SAFETY:

Westinghouse Topical Report WCAP-14535A (Reference 1) provides the technical basis for the proposed change to SR 4.4.10.1.a. This report, using an engineering analysis based on fracture mechanics, demonstrates that RCP flywheel inspections for the plants involved can be eliminated, without impairing plant nuclear safety. By cover letter dated September 12, 1996, (Reference 2) to its Safety Evaluation Report, the NRC stated that they do not intend to repeat the review of the matters described in the report when the report appears as a reference in license amendment applications, except to ensure that the material presented is applicable to the specific plant involved.

For the DBNPS, the RCP motor flywheel material installed during original construction was included for review in WCAP-14535A and appears as Group 11 in Table 2-1, "Summary of Westinghouse and Babcock & Wilcox Domestic Flywheel Information." The material is identified in Table 2-1 as SA533B material. The DBNPS USAR identifies the flywheel material as ASTM A533-69A, Grade B Class 1. Section 2.2 of WCAP-14535A indicates that the flywheels are made of A533 Grade B Class 1 steel. The 1971 ASME Boiler and Pressure Vessel (B&PV) Code Section II contains a specification for SA533 steel, and states that SA533 is identical with ASTM Specification A533-69A steel. This is the same alloy with two different designations; one by the American Society of Mechanical Engineers (ASME) and the other by the American Society for Testing and Materials (ASTM). Therefore, within WCAP-14535A, the NRC safety evaluation approving the WCAP, and this Safety Assessment, the term SA533B, when used, is intended to be synonymous with A533 Grade B Class 1 steel.

In 1993, the DBNPS Reactor Coolant Pump 2-1 motor and flywheel were replaced during the Eighth Refueling Outage (8 RFO). The replacement flywheel is made of SA508 Class 3 material. Prior to installation, the SA508 Class 3 flywheel received a volumetric and surface pre-service examination. In 1996 (10 RFO), the bore and keyway area of this flywheel were ultrasonically examined from the balance holes with the flywheel in place. No flaws were detected during this examination. In 1998 (11 RFO), the RCP motor flywheel was removed during maintenance of the Reactor Coolant Pump. The flywheel was ultrasonically examined from the balance holes and from the flywheel periphery. In addition, both the top and bottom surfaces of the flywheel were magnetic particle examined. The bore and keyways of the flywheel also received a liquid penetrant examination. No flaws were detected during these examinations.

The NRC safety evaluation for WCAP-14535A requires that plants with a flywheel not made of SA533B or A516 demonstrate that their material properties are bounded by those of SA533B material. The mechanical properties of SA533B and SA508 are given in ASME B&PV Code Section II "Materials," Part A, "Material Specification – Ferrous" as:

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Material	SA533B Cl 1	SA508 Cl 3
Tensile Strength ksi	80 - 100	80 - 105
Yield Strength ksi (min)	50	50
% Elongation in 2 in. (min)	18	18

The above table shows that the material properties of SA508 Class 3 steel, used on Reactor Coolant Pump 2-1, are bounded by those of the SA533B material. In addition, the Material Test Certification for the SA508 Class 3 flywheel material used at the DBNPS shows a measured nil-ductility transition temperature (NDTT) of <10 °F. This is bounded by the reference temperature of 60 °F cited by the NRC safety evaluation as a reasonable bounding value for the SA533B material.

Although the Topical Report justified complete elimination of the RCP flywheel inspections, the NRC did not want to eliminate inspections completely. The NRC's Safety Evaluation Report found that the RCP flywheel inspections for the plants covered by the Topical Report, can be reduced to once every ten years by either in-place ultrasonic examination, or surface examination of disassembled flywheels.

Based on the above discussion, it is acceptable to reduce the frequency of the RCP flywheel inspection and revise the scope of the inspection in accordance with the attached TS wording. Overall plant nuclear safety will be increased because man rem doses will be lowered, and the potential for flywheel or motor damage during disassembly and reassembly for inspection will be eliminated.

SIGNIFICANT HAZARDS CONSIDERATION:

The Nuclear Regulatory Commission has provided standards in 10 CFR 50.92(c) for determining whether a significant hazard exists due to a proposed amendment to an Operating License for a facility. A proposed amendment involves no significant hazards consideration if operation of the facility in accordance with the proposed changes would: (1) Not involve a significant increase in the probability or consequences of an accident previously evaluated; (2) Not create the possibility of a new or different kind of accident from any accident previously evaluated; or (3) Not involve a significant reduction in a margin of safety. The Davis-Besse Nuclear Power Station has reviewed the production of the Davis-Besse Nuclear Power Station, (DBNPS) Unit No. 1, in accordance with these changes would:

 Not involve a significant increase in the probability of an accident previously evaluated because no accident initiators, conditions, or assumptions are affected by the proposed changes to Technical Specification Surveillance Requirement 4.4.10.1.a in the frequency and scope of volumetric and surface examinations for the Reactor Coolant Pump (RCP) motor flywheels.

1b. Not involve a significant increase in the consequences of an accident previously evaluated because changes in the frequency and scope of volumetric and surface examinations for the RCP motor flywheels will not affect any previously evaluated accidents. Accidents associated with failure of the flywheel were not evaluated in the DBNPS Updated Safety Analysis Report (USAR). The design, fabrication, and testing of flywheels in accordance with the guidance found in NRC Regulatory Guide 1.14, "Reactor Coolant Pump Flywheel Integrity," Revision 1, August 1975, minimizes the potential for flywheel failure. The proposed changes have been demonstrated to maintain conservative testing requirements for the flywheels.

2. Not create the possibility of a new or different kind of accident from any previously evaluated because changes in the frequency and scope of volumetric and surface examinations for the RCP motor flywheels will not affect the reliability of RCP motor flywheels. No new failure mode is introduced since the proposed changes do not involve a modification or change in operation of any plant systems, structures, or components.

3. Not involve a signif cant reduction in the margin of safety. As shown in Westinghouse Topical Report WCAP-14535A, "Topical Report on Reactor Coolant Pump Flywheel Inspection Elimination," November 1996, RCP motor flywheels have been inspected for twenty years without any service induced flaws being identified. Additionally, the analyses demonstrated that the flywheels are manufactured from high quality steel, have a high fracture toughness, and have a very high flaw tolerance. The topical report indicates that the flywheels could be operated for forty years without inspection, and there would be no significant increase in the probability of failure of the flywheels. However, inspections are proposed to continue at a frequency of once every ten years as a conservative measure. Thus, the margin of safety is not reduced significantly by the proposed change in inspection frequency.

CONCLUSION:

Based on the above, the Davis-Besse Nuclear Power Station has determined that the License Amendment Request does not involve a significant hazards consideration. As this License Amendment Request concerns a proposed change to the Technical Specifications that must be reviewed by the Nuclear Regulatory Commission, this License Amendment Request does not constitute an unreviewed safety question.

ATTACHMENT: Attached is the proposed marked-up change to the Operating License.

REFERENCES:

- 1. WCAP-14535A, "Topical Report on Reactor Coolant Pump Flywheel Inspection Elimination," November 1996.
- NRC letter to Duquesne Light Company, "Acceptance for Referencing of Topical Report WCAP-14535, Topical Report on Reactor Coolant Pump Flywheel Inspection Elimination," dated September 12, 1996.
- 3. DBNPS Updated Safety Analysis Report (USAR) through Revision 21.
- 4. Davis-Besse Nuclear Power Station (DBNPS) Unit No. 1, Operating License NPF-3, Appendix A, Technical Specifications, through Amendment 228.
- 5. DBNPS System Description for Reactor Coolant System, SD-039A.
- NRC Regulatory Guide 1.14, "Reactor Coolant Pump Flywheel Integrity," Revision 1, August 1975.
- NRC Letter to Florida Power Corporation dated August 31, 1998, Crystal River Unit 3 Facility Operating License No. DPR-72, Amendment No. 170 regarding Reactor Coolant Pump Flywheel Inspection Requirements (TAC No. MA2145).