

MAR 23 1977

Docket No. 50-346

MEMORANDUM FOR: D. B. Vassallo, Assistant Director
for Light Water Reactors
Division of Project Management

FROM: J. P. Knight, Assistant Director
for Engineering

SUBJECT: TOLEDO EDISON DAVIS-BESSE NUCLEAR POWER STATION, UNIT
NO. 1 (OL), DOCKET NUMBER 50-346, SER SUPPLEMENT RELATED
INFORMATION

Plant Name: Davis-Besse Nuclear Power Station, Unit No. 1
Suppliers: Babcock & Wilcox; Bechtel Associates
Docket Number: 50-346
Licensing Stage: OL
Responsible Branch and Project Manager: LWR 1; L. Engle
Reviewer: M. R. Hum
Requested Completion Date: Not Specified
Description of Response: SER Supplement Related Information
Review Status: Applicant Response Required

The Materials Engineering Branch has completed the review of Toledo Edison letter number 232 dated March 2, 1977 describing new information about the Davis-Besse Unit No. 1 reactor vessel material surveillance program. Our technical evaluation with a request for additional information is attached.

Our conclusions are summarized as follows:

1. We will require additional information to justify the higher lead factor and the withdrawal schedule different from Appendix H, Section II.C.3.c.
2. The Davis-Besse Unit No. 1 reactor vessel material surveillance program with the new surveillance specimen holder tube locations is

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acceptable through the first fuel cycle when the first capsule is scheduled to be withdrawn and evaluated.

J. P. Knight, Assistant Director
for Engineering
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Enclosure:
As stated

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Plant Name: Davis-Besse Nuclear Power Station, Unit No. 1
Docket Number: 50-346
Report Number: Serial No. 232
Report Subject: Reactor Vessel Material Surveillance Program
Report Date: March 2, 1977
Originating Organization: Toledo Edison
Reviewed By: Materials Engineering Branch

SUMMARY OF REPORT

In the subject report, Toledo Edison submitted new information about the reactor vessel material surveillance (RVMS) program. The design and installation of the new surveillance specimen holder tubes (SSHT) in the Davis-Besse Unit No. 1 reactor vessel has resulted in modifications to the RVMS program described in topical report BAW-10100A. The subject report documents two significant changes to the RVMS program described in the FSAR: (1) the neutron flux lead factor for the specimen capsules with the new SSHT exceeds the lead factor required in 10 CFR Part 50, Appendix H, Section II.C.2. and described in BAW-10100A and (2) the capsule withdrawal schedule is different from Appendix H, Section II.C.3.c.

EVALUATION OF REPORT

Our SER input concerning the RVMS program that was published in NUREG-0136, Section 5.3, December 1976 contains an outstanding issue since the applicant was considering a modification to his RVMS program.

The Davis-Besse Unit No. 1 construction permit was issued in March 1971. When the requirements of 10 CFR Part 50, Appendix H became effective on August 16, 1973, it was recognized that plants under construction may not be able to comply with all provisions of Appendix H. The July 17, 1973 issue of the FEDERAL REGISTER provided for a case-by-case evaluation by the NRC of the method of compliance with Appendix H. The FSAR referenced an acceptable topical report, BAW-10100A, and, thus, the applicant did not request that the NRC evaluate his method of compliance. In addition, Section II.C.3.g. of Appendix H requires that proposed withdrawal schedules that differ from Section II.C.3.c. be submitted, with a technical justification, to the NRC for approval.

The subject report defines neutron flux lead factors of 3.9 and 5.4 for the specimen capsules as related to the vessel inner surface. Appendix H requires that the neutron flux received by the specimens be at least as high but not more than three times as high as that received by the vessel inner surface. The subject report defines a shorter withdrawal schedule than required by Appendix H with the third and fourth capsules withdrawn at approximately end of vessel design service life accumulated neutron fluence.

Associated with the generic subject of "Integrated Surveillance Programs" for B & W reactor vessels, the unresolved issue of lead factors higher than three was discussed by the NRC staff at the ACRS Subcommittee meeting on Regulatory Activities on January 5, 1977. A generic conclusion defining acceptable lead factors will be developed by the NRC staff associated with the integrated surveillance program for B & W reactor vessels.

In addition, the subject report states that the materials selected for surveillance monitoring are those identified as being the materials which will first control the operating limitations of the reactor vessel during its service life.

REGULATORY POSITION

1. Our evaluation of the available information concludes that the Davis-Besse Unit No. 1 reactor vessel material surveillance program with the new surveillance specimen holder tube locations is acceptable through the first fuel cycle when the first capsule is scheduled to be withdrawn and evaluated. The technical basis for this conclusion is that the results during this period of operation will be conservative since the irradiation effects on the surveillance specimens will lead the reactor vessel.

2. The Davis-Besse Unit No. 1 RVMS program does not meet provisions of 10 CFR Part 50, Appendix H, Sections II.C.2. and II.C.3.c. However, the RVMS program does meet the intent of Appendix H to monitor changes in the fracture toughness properties in the reactor vessel beltline region resulting from exposure to neutron irradiation and thermal environment.

3. To resolve the outstanding SER issue associated with the RVMS program, we will require additional information to justify the higher lead factor and the withdrawal schedule different from Appendix H, Section II.C.3.c. The applicant may choose to resolve this SER issue by committing to accept the generic conclusions on lead factor and withdrawal schedule developed from the integrated surveillance program for B & W reactor vessels. We recognize that resolution of this issue may require long-term, out-of-reactor research and development.

4. A capsule withdrawal schedule based on end-of-life fluence rather than calendar years of operation is acceptable provided that the higher lead factor can be demonstrated as not significant. In the subject report Table 4.4-5 "Reactor Vessel Material Irradiation Surveillance Schedule" is acceptable for initial operation but is subject to modification based on the resolution of the outstanding SER issue.

REQUEST FOR ADDITIONAL INFORMATION

1. We will require additional information to justify (1) the neutron flux lead factor for the reactor vessel material surveillance specimen capsules exceeding the value required in 10 CFR Part 50, Appendix H, Section II.C.2. and (2) the capsule withdrawal schedule different from Appendix H, Section II.C.3.c. Specific information and/or data that should be included is as follows:

a. Justification that the rate of irradiation does not effect the measured fracture toughness properties of the weld metal, base metal and HAZ.

b. Describe any dosimetry checks that you plan to make to verify your analytical predictions.

The applicant may choose to resolve this SER issue by committing to accept the generic conclusions on lead factor and withdrawal schedule developed from the integrated surveillance program for B & W reactor vessels. We recognize that resolution of this issue may require long-term, out-of-reactor research and development.

2. State the location of the weld or welds expected to be controlling with regard to irradiation damage and provide the basis for selecting these welds, i.e., given expected neutron flux, initial RT_{NDT}, Charpy upper shelf energy, and chemical composition. Verify that this weld or welds are included in your surveillance program.