

January 16, 2001

Mr. William T. O'Connor, Jr.  
Vice President - Nuclear Generation  
Detroit Edison Company  
6400 North Dixie Highway  
Newport, MI 48166

SUBJECT: FERMI 2 - DEFERRAL OF REPORTING THE FIRST REACTOR PRESSURE  
VESSEL SURVEILLANCE CAPSULE TEST RESULTS (TAC NO. MB0219)

Dear Mr. O'Connor:

By letter dated September 29, 2000, as supplemented December 13, 2000, Detroit Edison Company (DECo or the licensee) requested approval of a proposal to defer testing and reporting the test results of the first Fermi 2 reactor pressure vessel (RPV) surveillance capsule for one cycle. DECo's request would extend the date for reporting the test results of the capsule, which was withdrawn on April 29, 2000, from April 29, 2001, until October 29, 2002.

The NRC staff has evaluated DECo's request. Based on the information provided in the September 29 and December 13, 2000, letters, the NRC staff finds DECo's request acceptable. Accordingly, the results of the testing of the first Fermi 2 surveillance capsule must be reported to the NRC no later than October 29, 2002. A copy of our safety evaluation (SE) is enclosed.

If you have any questions regarding this issue or the enclosed SE, please contact the Fermi 2 Project Manager, Mohammed A. Shuaibi, at 301-415-2859.

Sincerely,

*/RA/*

Claudia M. Craig, Chief, Section 1  
Project Directorate III  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket No. 50-341

Enclosure: Safety Evaluation

cc w/encl: See next page

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NAME	MShuaibi	RBouling	KWichman	CCraig
DATE	1/12/01	1/12/01	01/10/01	1/12/01

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Fermi 2

cc:

Mr. Peter Marquardt  
Legal Department  
688 WCB  
Detroit Edison Company  
2000 2nd Avenue  
Detroit, MI 48226-1279

Drinking Water and Radiological  
Protection Division  
Michigan Department of  
Environmental Quality  
3423 N. Martin Luther King Jr Blvd  
P. O. Box 30630 CPH Mailroom  
Lansing, MI 48909-8130

U.S. Nuclear Regulatory Commission  
Resident Inspector's Office  
6450 W. Dixie Highway  
Newport, MI 48166

Monroe County Emergency Management  
Division  
963 South Raisinville  
Monroe, MI 48161

Regional Administrator, Region III  
U.S. Nuclear Regulatory Commission  
801 Warrenville Road  
Lisle, IL 60532-4351

Norman K. Peterson  
Director, Nuclear Licensing  
Detroit Edison Company  
Fermi 2 - 280 TAC  
6400 North Dixie Highway  
Newport, MI 48166

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO DEFERRAL OF REPORTING THE FIRST REACTOR PRESSURE VESSEL  
SURVEILLANCE CAPSULE TEST RESULTS  
DETROIT EDISON COMPANY

FERMI 2

DOCKET NO. 50-341

## 1.0 INTRODUCTION

By letter dated September 29, 2000, as supplemented December 13, 2000, Detroit Edison Company (DECo or the licensee), submitted a request for NRC review and approval of its proposal to defer testing and reporting of the test results from the first Fermi 2 reactor pressure vessel (RPV) surveillance capsule. This surveillance capsule was withdrawn from the Fermi 2 RPV on April 29, 2000. The requirements of Section IV of Appendix H to Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, mandate that a summary technical report of the test results be submitted to the NRC within 1 year of the date of capsule withdrawal unless an extension is granted by the Director, Office of Nuclear Reactor Regulation. The change proposed by DECo would extend the date for reporting the test results from April 29, 2001, until October 29, 2002. The DECo submittal was also made in support of the Integrated Surveillance Program (ISP) for boiling-water reactor (BWR) plants, which has been submitted for NRC review and approval by the Boiling Water Reactor Vessel and Internals Project (BWRVIP). The DECo submittal was developed consistent with guidance issued by the NRC staff to the BWRVIP on May 16, 2000, regarding issues to be addressed by BWR licensees seeking one-cycle capsule deferrals.

## 2.0 REGULATORY REQUIREMENTS AND NRC STAFF POSITIONS

Nuclear power plant licensees are required by Appendix H to 10 CFR Part 50 to implement RPV surveillance programs to "monitor changes in the fracture toughness properties of ferritic materials in the reactor vessel beltline region...which result from exposure of these materials to neutron irradiation and the thermal environment." Regarding RPV surveillance program design and specimen testing, Appendix H to 10 CFR Part 50 incorporates by reference the editions of the American Society for Testing and Materials (ASTM) Standard Practice E 185, "Conducting Surveillance Tests for Light-Water Cooled Nuclear Power Reactor Vessels," through the 1982 edition. Pursuant to Section IV of Appendix H to 10 CFR Part 50, the licensee must test the surveillance capsule that has been removed from the RPV as part of its surveillance program and report the results of the testing to the NRC within 1 year of the date of capsule withdrawal, unless an extension is granted by the Director, Office of Nuclear Reactor Regulation.

Additional NRC staff guidance has been published regarding licensee requests for capsule testing deferrals to support the ISP proposed by the BWRVIP. The ISP proposed by the BWRVIP was designed to integrate and share data from the surveillance programs from all existing BWRs in the United States. The BWRVIP noted that, for some licensees, existing surveillance capsules would not need to be tested if the ISP was approved by the staff, and licensees having such capsules may desire to seek deferral of their removal and/or testing of these capsules to reduce monetary expenditures and personnel exposure. The NRC staff has noted its general support for the ISP proposal, and, by letter to the BWRVIP dated May 16, 2000, identified criteria to be addressed by licensees requesting one-cycle capsule withdrawal or testing deferrals to support the ISP.

The first criterion addressed in the staff's May 16, 2000, letter requested that licensees explain how their deferral request is consistent with the ISP plan submitted in topical report BWRVIP-78. Principally, the letter requested that licensees examine how their surveillance capsules would be used (or not used) under the proposed ISP and confirm that their request for a one-cycle deferral would not affect the ability of the ISP to meet its objectives. The second criterion requested that licensees provide a justification as to why the materials property data to be acquired from the capsule in question was not necessary to support safe operation of the facility over the period of the deferral. Several options were given in the staff's letter regarding possible responses to this criterion. The staff's third and final criterion requested that licensees explain why the dosimetry data to be acquired from the capsule in question was not necessary to support safe operation of the facility over the period of the deferral.

### 3.0 LICENSEE'S DETERMINATION

In its September 29, 2000, submittal, DECo stated that the reason for requesting this deferral of the testing of the first Fermi 2 surveillance capsule was to support their involvement in the ISP. DECo then addressed, as described below, the three criteria cited in the NRC staff's May 16, 2000, letter.

Regarding the first criterion, the licensee noted that according to the scope of the ISP discussed in the BWRVIP-78 report, the surveillance capsules for Fermi 2 were not to be included in the ISP. This determination was made by the BWRVIP since neither the surveillance weld nor the surveillance plate material from the Fermi 2 surveillance program represents the limiting RPV material for any U.S. BWR. Hence, deferral of the testing of the first Fermi 2 capsule for one cycle (or potentially indefinitely) would not affect the ISP. Thus, the licensee concluded that deferral of the Fermi 2 capsule would be consistent with the intent of the BWRVIP's proposed ISP.

To address the second criterion, DECo noted that the material test data from the first capsule was not necessary to ensure continued safe operation of the Fermi 2 RPV for several reasons. First, no complete baseline (unirradiated) Charpy curve exists for either the Fermi 2 surveillance weld or surveillance plate material. Therefore, the licensee's ability to acquire meaningful data regarding the shift in the surveillance materials' Charpy transition region would be limited. Second, since the surveillance capsule whose testing is to be deferred is the first capsule from the Fermi 2 surveillance program, even if shift values were obtained, only one shift data point would be available for the surveillance weld and the surveillance plate. Per the guidance provided in NRC Regulatory Guide (RG) 1.99, Revision 2, two shift data points are required from a given surveillance material before they can be used to evaluate the properties of an RPV

material. However, sufficient information is available from other BWR surveillance specimens manufactured from materials similar to those found in the Fermi 2 RPV to ensure that an adequate level of general embrittlement trend monitoring is provided through the period of deferral. Third, based on the projected fluence of the first surveillance capsule and the chemical compositions of the Fermi 2 surveillance weld and plate, DECo concluded that even if shift values were obtained, they would be expected to be significantly less than the scatter in the Charpy test method. This would further complicate any attempt to correctly evaluate the embrittlement behavior of the surveillance materials from the available data.

Finally, regarding the third criterion, DECo concluded that the dosimetry information from the capsule to be deferred was not necessary to ensure continued safe operation of the Fermi 2 RPV. The licensee noted that current fluence projections for the Fermi 2 RPV are based on the evaluation of dosimetry removed from the RPV at the end of the first operating cycle, with adjustments for a subsequent 10-percent power uprate. DECo stated that making fluence projections based on this data would be conservative since first cycle loading patterns tend to produce higher neutron fluxes at the core periphery (and thus at the RPV) than do the loading patterns used in subsequent cycles. Further, the licensee noted that the current Fermi 2 RPV heatup and cooldown P-T limit curves have been approved for 32 effective full-power years of operation (EFPY) and that limiting RPV material for establishing these curves is a non-beltline material which is not affected by irradiation embrittlement. Therefore, the licensee concluded that even including the conservatisms in the fluence calculations indicated above, no Fermi 2 beltline material would be expected to become limiting for P-T limit curve development until after Fermi 2 had been in operation for more than 32 EFPY. Currently, Fermi 2 has been operating for approximately 9 to 10 EFPY. In addition, in their December 13, 2000, supplemental letter, DECo confirmed that a deferral of the testing of the surveillance capsule was not expected to have a significant adverse effect on the quality of dosimetry data that could be obtained from the capsule.

For these reasons, DECo concluded that its request to defer testing of the first Fermi 2 surveillance capsule was justified and consistent with its intent to support the BWRVIP ISP.

#### 4.0 NRC STAFF EVALUATION

The NRC staff has reviewed the information supplied by the licensee and the regulatory requirements and guidance stated in Section 2.0 above. Regarding the requirements of Section IV of Appendix H to 10 CFR Part 50, the staff concludes that the licensee's request to defer the testing and reporting of the test results from the first Fermi 2 surveillance capsule is acceptable. The staff's conclusions on the technical justifications provided in response to the three criteria given in the NRC staff's May 16, 2000, letter are given below.

First, the NRC staff agrees that the testing deferral request is acceptable within the BWRVIP ISP plan. The staff concurs that based on the conclusions drawn by the BWRVIP in their development of an ISP, the surveillance capsules from Fermi 2 would not be required. Further, although the NRC staff has not completed the review of the proposed ISP, the staff has not concluded that the justifications given by the BWRVIP for excluding the Fermi 2 surveillance materials from the ISP are unacceptable.

Second, the NRC staff agrees with the position taken by the licensee that the material property data to be acquired from the first Fermi 2 surveillance capsule is not necessary at this time to ensure the integrity of the Fermi 2 RPV through the requested period of deferral. The staff concurs with the licensee in that, because the testing of this capsule would provide only one Charpy shift data point for the facility's surveillance weld and surveillance plate, insufficient surveillance data would be available to utilize the methodology provided in RG 1.99, Revision 2, for making plant-specific adjustments to the general embrittlement trend curves. Further, the NRC staff also agrees that sufficient data is available from the testing of other BWR surveillance capsules to ensure that general embrittlement monitoring of materials similar to those found in the Fermi 2 RPV is conducted. Finally, the NRC staff also agrees with DECo in that even if the testing of the Fermi 2 surveillance capsule were not deferred, because of the projected fluence level of the capsule and the chemical compositions of the Fermi 2 surveillance materials, the observed Charpy shifts would not be expected to be differentiable from the scatter in the test method and, hence, of limited value in determining the embrittlement behavior of the Fermi 2 RPV.

Finally, the NRC staff agrees that the acquisition of the dosimetry data from the capsule is not necessary to support continued safe operation of the facility over the period of the deferral. Although Fermi 2 has only been in operation for approximately 10 EFPY, the licensee intends to utilize 32 EFPY P-T limit curves for plant heatup, cooldown, normal power operation, and leak rate testing. Although the NRC staff has recently identified significant issues associated with fluence analyses performed by General Electric (GE) used to support BWR P-T limit calculations, the staff has consistently concluded that the use of bounding 32 EFPY P-T limit curves is sufficient to ensure safe plant operation when facilities have achieved only a fraction of the 32 EFPY exposure level. GE has submitted an updated methodology in a topical report dated September 1, 2000, to address the issues raised by the NRC staff regarding BWR fluence calculations (primarily that they have been based on older, potentially non-conservative methodologies which do not reflect state-of-the-art improvements in fluence calculations). The NRC staff expects to complete its review of this updated methodology in 2001, prior to the time when updated fluence analyses for Fermi 2 would be required based on the testing of the deferred surveillance capsule. Therefore, the staff finds that the acquisition of dosimetry data from the surveillance capsule to be deferred is not necessary given that the use of the approved Fermi 2 32 EFPY P-T limit curves through the period of the requested capsule deferral will continue to ensure that the integrity of the RPV will be maintained for heatup, cooldown, normal power operation, and leak rate testing.

## 5.0 CONCLUSION

The NRC staff has concluded that, in accordance with the provisions of Appendix H to 10 CFR Part 50, deferral of the testing and reporting of the test results from the first Fermi 2 surveillance capsule for one cycle is acceptable. This approved change extends the date upon which the licensee must report to the NRC the results of the testing of the first Fermi 2 surveillance capsule from April 29, 2001, until October 29, 2002.

Principal Contributor: M. A. Mitchell

Date: January 16, 2001