

Detroit
Edison

William S. Orser
Executive Vice President
Nuclear Generation

Fermi 2
6400 North Dixie Highway
Newport, Michigan 48165
(313) 586-5201



Nuclear
Operations

March 23, 1993
NRC-93-0032

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555

Reference: Fermi 2
NRC Docket No. 50-341
NRC License No. NPF-43

Subject: Proposed Technical Specification Change
(License Amendment) - Suppression Chamber-to-Drywell
Vacuum Breakers

Pursuant to 10CFR50.90, Detroit Edison Company hereby proposes to amend Operating License NPF-43 for the Fermi 2 plant by incorporating the enclosed changes into the Plant Technical Specifications. The proposed change limits the periodic cycling through full travel of each suppression chamber-drywell vacuum breaker to Cold Shutdown conditions. In addition, all 12 installed vacuum breakers are proposed to be required to be operable instead of the current requirement of 10 operable vacuum breakers.

Detroit Edison is proposing this change because we believe that performance of this test during power operation entails an unnecessary risk to plant safety without an accompanying safety benefit. Experience has shown these vacuum breakers to be extremely reliable devices in performing their vacuum relief function.

This test requires the use of a vacuum breaker actuator mechanism unrelated to the safety function of the vacuum breakers. Actuator failures have caused the associated vacuum breaker to fail in the open position. This subjects the plant to potential excessive containment loading in the event of a loss of coolant accident and also requires a prompt plant shutdown for repairs.

This proposed change is potentially applicable to several plants with a similar design. Due to the safety significance discussed above and in the enclosed evaluation, Detroit Edison requests that this change be promptly reviewed as a line-item improvement for ultimate incorporation into the Standard Technical Specifications.

010017

9304010173 930323
PDR ADOCK 05000341
P PDR

Handwritten:
A001
111
Cert No
P162863686

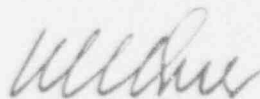
USNRC
March 23, 1993
NRC-93-0032
Page 2

Implementation of this proposal also requires relief from the requirements of Section XI of the ASME Code. In accordance with 10CFR50.55a, a relief request will be submitted under separate cover.

Detroit Edison has evaluated the proposed Technical Specifications against the criteria of 10CFR50.92 and determined that no significant hazards consideration is involved. The Fermi 2 Onsite Review Organization has approved and the Nuclear Safety Review Group has reviewed the proposed Technical Specifications and concurs with the enclosed determinations. In accordance with 10CFR50.91, Detroit Edison has provided a copy of this letter to the State of Michigan.

If you have any questions, please contact Mr. Glen D. Ohlemacher at (313) 586-4275.

Sincerely,



Enclosure

cc: T. G. Colburn
A. B. Davis
W. J. Kropp
M. P. Phillips
Supervisor, Electric Operators, Michigan
Public Service Commission - J. R. Padgett

USNRC
March 23, 1993
NRC-93-0032
Page 3

I, WILLIAM S. ORSER, do hereby affirm that the foregoing statements are based on facts and circumstances which are true and accurate to the best of my knowledge and belief.

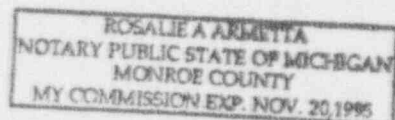
William S. Orser

WILLIAM S. ORSER
Executive Vice President

On this 23rd day of March, 1993, before me personally appeared William S. Orser, being first duly sworn and says that he executed the foregoing as his free act and deed.

Rosalie A. Armetta

Notary Public



INTRODUCTION

This proposed Technical Specification (TS) change limits the periodic full cycle testing of the suppression chamber (torus)-to-drywell vacuum breakers to Cold Shutdown conditions. The basis for this proposal is that the performance of this test during power operation presents an undue risk considering the benefits of the test. In addition, the TS is being modified to require all 12 installed vacuum breakers to be operable instead of the current requirement of 10 operable vacuum breakers.

EVALUATION

In order to prevent external drywell pressure from exceeding the design value, 12 torus-to-drywell vacuum breaker valves are installed within the torus. These vacuum breakers are self-actuating, opening when the torus pressure reaches 0.5 psi greater than the drywell pressure. The vacuum breakers are sized with a 20 inch diameter seat with an 18 inch diameter flanged outlet. The sizing and number of vacuum breakers have been chosen so that 25 percent (three of 12) could fail to open and adequate venting of the torus would still be provided.

The torus-to-drywell vacuum breakers act to limit drywell external pressure by drawing gas into the drywell from the torus. If necessary, a second set of vacuum breakers will draw air from the reactor building into the torus to limit external pressure.

The torus-to-drywell vacuum breakers must remain closed during normal operation. An open vacuum breaker creates a bypass path for the steam blowdown from a loss-of-coolant accident (LOCA) directly to the torus atmosphere instead of through the torus water volume. This bypassed steam is not condensed and causes an increase in post-LOCA torus loads. The limiting bypass leakage area has been determined to be .25 ft², which corresponds to a 7-inch line.

The Fermi 2 torus-to-drywell vacuum breakers were strengthened by replacement of critical components with stronger stainless steel components. These changes were made prior to the licensing of Fermi 2 as a result of the Mark I containment full scale testing program.

Surveillance Requirement (SR) 4.6.4.1.b.1 requires each torus-to-drywell vacuum breaker be cycled through at least one complete cycle of full travel at least once per 31 days and within 12 hours after any discharge of steam to the suppression chamber from the safety relief valves. SR 4.6.4.b.2 also requires the operation of the

vacuum breaker position indicators to be verified during the monthly cycling test.

To operate the vacuum breakers remotely from the Control Room, pneumatic actuators are installed. The actuator exerts a force in the opening direction without restraining the opening of the vacuum breaker disc. The actuator is also sized such that it has insufficient power to open the vacuum breaker if a back flow differential pressure exists. Thus, the test actuator is designed to not interfere with the vacuum breaker's safety function.

Operation of the vacuum breaker during power operation entails two risks. First, during the performance of the test, the plant is vulnerable to a LOCA with an open vacuum breaker. This can result in excessive bypass steam leakage and greater than allowable torus loadings.

The response of the vacuum breaker and actuator when subjected to LOCA blowdown loads while in an open position is unknown. These components were not designed for this situation and, though it is possible that the vacuum breaker may close, the substantial forces involved may cause damage such that closure is not obtained.

A second risk is that the actuator may fail during the test in a manner to hold the vacuum breaker in the open position. In this case it is less likely that the vacuum breaker will close under LOCA conditions. The failure of the actuator is likely to interfere with proper closure.

Should the vacuum breaker fail in the open position, TS 3.6.4.1 action b. allows two hours to close the open vacuum breaker or shutdown the plant. During this two hours and the subsequent 36 hours allowed by the action statement to reach cold shutdown, the plant is vulnerable to a LOCA with excessive bypass leakage. In addition, the evolution of shutting down the plant entails a risk; due to the off-normal conditions created and the increased potential for unplanned transients which arise from this evolution.

The vacuum breakers are open only a small fraction of the time and vacuum breaker failures to close are infrequent. This would indicate that the probability of a LOCA simultaneous with an open vacuum breaker is quite small. However, the consequences could be great should this occur. The risk involved, considering both probability and consequence, must be balanced against the benefit of the test.

The cycling test is performed to demonstrate the vacuum breaker's operability; that it is able to travel throughout its range of

travel. The test addresses the concern that a vacuum breaker may not open when called upon or may be binding such that it would not reclose.

The monthly frequency is currently specified in the BWR Standard Technical Specifications (STS) and has been so specified at least as early as May, 1977. The basis for the frequency is a quarterly ASME Code requirement. An increased frequency is specified to provide additional assurance of vacuum breaker operability since the vacuum breaker is located in an inaccessible location and a harsh environment (the torus air space).

However, in the time frame which these requirements were formulated, the primary containment atmosphere was typically not inerted with nitrogen and the vacuum breaker materials were typically highly susceptible to corrosion. The Fermi 2 containment atmosphere is required to be inerted during power operation. This eliminates the presence of oxygen required for most forms of corrosion. Also, prior to initial licensing the materials used in many vacuum breaker components were upgraded. The vacuum breaker now rotates when actuated about a stainless steel hinge pin in a bronze bushing. These materials are much less susceptible to corrosion.

Detroit Edison has conducted a search of the Nuclear Plant Reliability Data System (NPRDS) and has surveyed by telephone plants with a similar design. This search revealed no failures of vacuum breakers to open. Further, failures of vacuum breakers to reclose were all attributable to failure of the test actuator. Since the test actuator does not act during actual actuation of the vacuum breaker, these failures do not represent any degradation of the vacuum breaker's ability to perform its safety function.

Since the concern being addressed by the Surveillance Requirement (SR) is not being observed, it is not prudent to perform the SR during power operation which entails a risk to plant safety. In addition, excessive performance of the test creates unnecessary wear of the vacuum breaker seating surface and position indication limit switches. This increases maintenance requirements and the associated radiation exposure.

A failure of a vacuum breaker to reclose due to a faulty test actuator occurred at Fermi 2 in April 1992. The survey described above determined that at least two other similar occurrences have occurred in the past at other plants. In addition, the survey and NPRDS search determined several instances of vacuum breaker limit switch problems. This information shows that this monthly SR is having an actual negative impact on plant operation. Another factor mitigating the

concern that a vacuum breaker may not open when called upon is that, as described above, 9 of the 12 installed vacuum breakers are sufficient to assure the drywell design external pressure is not exceeded during a design basis event. Thus, 4 of the vacuum breakers must fail to open in order for the safety function to be jeopardized.

Under the proposed test frequency the maximum possible interval of power operation where a vacuum breaker would not be tested is 22.5 months. This corresponds to the 18-month refueling interval including a 25% extension allowed per TS 4.0.2. Further extension of the operating cycle is addressed in NRC Generic Letter 91-04, "Changes in Technical Specification Intervals to Accommodate a 24-Month Fuel Cycle." This guidance requires an evaluation of the effect on safety for 18-month interval surveillances when lengthening the refueling interval.

The telephone survey described previously also searched for instances of prolonged vacuum breaker inactivity due to extended plant shutdown which were followed by functional tests. Two instances, one of four months and one of one year, were found after which the vacuum breakers were successfully functionally tested. No instances were found where the vacuum breakers failed a functional test.

The net result of the above considerations is that the use of the test actuator during power operation when there is no indication of a vacuum breaker problem degrades the reliability and availability of the vacuum breaker in performing its design function. The vacuum breaker will not perform its design function to limit bypass leakage during the test and whenever failure of the test actuator causes the vacuum breaker to remain open. The test also degrades the reliability of the vacuum breaker position indications.

Currently, the TS require 10 operable vacuum breakers. This request is proposing to increase this to all 12 vacuum breakers. This recognizes the role that the installed redundancy plays in supporting this proposal. The most likely time to find an inoperable vacuum breaker would be during the proposed test which would normally take place during Cold Shutdown. Since an inoperable vacuum breaker would be accessible at this time for repair, it is prudent to require this repair prior to an extended period of operation where the vacuum breaker would be inaccessible.

The proposed Technical Specifications require the cycling of these vacuum breakers each Cold Shutdown unless performed within the previous 92 days. The 92 day period is consistent with the minimum

periodicity specified in the Fermi 2 Inservice Testing Program for tests deferred to Cold Shutdown conditions.

The cycling of the vacuum breaker will continue to be required following any discharge of steam into the torus from the safety relief valves. In addition, the TS specify the following additional surveillances:

- o Verification that each vacuum breaker indicates closed at least every 7 days.
- o Performance of a pressure drop test between Drywell and Torus every 18 months. This test verifies that the vacuum breakers adequately seal.
- o Recalibration of position indication switches every 18 months.
- o Verification that the vacuum breaker opens prior to a differential pressure of 0.5 psid every 18 months. This test is done with a push gage.

Additional activities are performed by the Fermi 2 Preventive Maintenance Program:

- o Visual inspection of vacuum breaker components once every 18 months. This inspection assures that the pallet opens at least 60 degrees and does not strike the valve body when opening.
- o Replacement of the pallet seals and magnetic spacers every third refueling. This is typically done on a staggered basis.
- o The testability actuators are scheduled to be replaced every other refueling outage.

The frequencies of preventative maintenance activities involving replacement of parts are under review pending further studies of their material properties.

The above activities provide assurance that the vacuum breakers will operate reliably during the operating cycle between refueling outages.

In conclusion, this proposal limits the periodic vacuum breaker cycling test to Cold Shutdown conditions based upon:

- o The consequence of a potential LOCA while the vacuum breaker is open, either while being tested or as a consequence of a test actuator failure.

- o The lack of failures to open detected by this test, which demonstrates the good reliability of the vacuum breakers in performing their function when in the normal in-service condition.
- o The degradation of the vacuum breaker created by unnecessary testing.
- o The level of installed redundancy which is proposed to be required by the TS.

SIGNIFICANT HAZARDS CONSIDERATION

In accordance with 10CFR50.92, Detroit Edison has made a determination that the proposed amendment involves no significant hazards considerations. To make this determination, Detroit Edison must establish that operation in accordance with the proposed amendment would not: 1) involve a significant increase in the probability or consequences of an accident previously evaluated, or 2) create the possibility of a new or different kind of accident from any accident previously evaluated, or 3) involve a significant reduction in a margin of safety.

The proposed change limits the periodic full cycle testing of the Suppression Chamber (torus)-to-drywell vacuum breakers to Cold Shutdown conditions. In addition, all 12 installed vacuum breakers will be required to be operable instead of the current requirement of 10 operable vacuum breakers. The proposed change does not:

- 1) Involve a significant increase in the probability or consequences of an accident previously evaluated. The proposed change does not affect the response of the plant to any accident. The proposed limiting of the periodic cycling of the vacuum breakers to Cold Shutdown conditions will continue to provide assurance that the vacuum breakers will properly function. Increasing the required number of operable vacuum breakers will add a requirement for increased redundancy in this area. Therefore, the change does not involve a significant increase in the probability or consequences of any accident.
- 2) Create the possibility of a new or different kind of accident from any accident previously evaluated. The proposed change does not involve a change to plant design and does not involve any new modes of operation or testing methods. No new accident modes are created.

- 3) Involve a significant reduction in a margin of safety. The proposed frequency still provides assurance that the vacuum breakers will perform their intended function. The change eliminates the risks associated with performing the surveillance during power operation and unnecessary wear on components due to the more frequent testing currently required. The requirement to maintain all 12 vacuum breakers operable provides a requirement for greater redundancy for this function. The change results in a safety improvement.

Based on the above, Detroit Edison has determined that the proposed amendment does not involve a significant hazards consideration.

ENVIRONMENTAL IMPACT

Detroit Edison has reviewed the proposed Technical Specification changes against the criteria of 10CFR51.22 for environmental considerations. The proposed change does not involve a significant hazards consideration, nor significantly change the types or significantly increase the amounts of effluents that may be released offsite, nor significantly increase individual or cumulative occupational radiation exposures. Based on the foregoing, Detroit Edison concludes that the proposed Technical Specifications do meet the criteria given in 10CFR51.22(c)(9) for a categorical exclusion from the requirements for an Environmental Impact Statement.

CONCLUSION

Based on the evaluation above: 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 proposed amendments will not be inimical to the common defense and security or to the health and safety of the public.

In order to accomplish procedure changes associated with this change, Detroit Edison requests that the proposed license amendment be issued with a 30-day implementation period.