Fermi 2
6400 North Dixie Hwy., Newport, MI 48166

Detroit Edison

March 15, 2000
NRC-00-0008

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington D C 20555-0001

References: 1) Fermi 2
NRC Docket No. 50-341
NRC License No. NPF-43

2) Detroit Edison's Letter to the NRC,
"Submittal of the Inservice Inspection/Nondestructive Examination Program – Second Ten-year Interval,"
NRC-99-0056, dated August 19, 1999

Subject: Submittal of Revised Inservice Inspection Second Ten-Year Interval Relief Request RR-A25

In Reference 2, Detroit Edison submitted the revised Inservice Inspection (ISI)/Nondestructive Examination (NDE) program for the second ten-year interval of the Fermi 2 plant operation. The submittal included several relief requests for NRC review and approval as required by 10CFR50.55a(a)(3).

The enclosure to this letter contains a revision to Relief Request RR-A25 with corrected temperature values for the most critical Reactor Pressure Vessel (RPV) circumferential shell weld at the end of the initial license period. This revision was discussed in a telephone conversation between Detroit Edison and the NRC staff on March 10, 2000.

Should you have any questions or require additional information, please contact Mr. Norman K. Peterson of my staff at (734) 586-4258.

Sincerely,

W. T. O'Connor, Jr.
Assistant Vice President
Nuclear Assessment

Enclosure

cc: A. J. Kugler
M. A. Ring
NRC Resident Office
Regional Administrator, Region III
Supervisor, Electric Operators,
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SECOND INTERVAL RELIEF REQUEST
RR-A25

COMPONENT FUNCTION/DESCRIPTION:
Pressure Retaining Reactor Pressure Vessel (RPV) Circumferential Shell Welds (Welds 4-308A, 4-308B, 1-313, and 9-307; ref Figure 1)

SYSTEM:
Reactor (B11)

ASME CODE CLASS:
Class 1

ASME SECTION XI REQUIREMENTS:
ASME Section XI, 1989 Edition, Subsection IWB, Table IWB 2500-1, Examination Category B-A, Item No. B1.11, and the augmented examination requirement of 10CFR50.55a(g)(6)(ii)(A)(2) requires volumetric examination of essentially 100% of RPV circumferential weld and base material regions in the reactor pressure vessel each inspection interval.

BASIS FOR ALTERNATIVE:
Pursuant to 10CFR55.55a(a)(3)(i), and consistent with information contained in NRC Generic Letter 98-05, Detroit Edison is requesting an alternative from ASME Section XI requirements to examine essentially 100% of accessible Category B-A circumferential welds and is proposing permanent relief (for the remaining portion of the initial license period) from these examinations.

The basis for this request for inspection relief is documented in the report "BWR Vessel and Internals Project, BWR Reactor Pressure Vessel Shell Weld Inspection Recommendations (BWRVIP-05)," that was transmitted to the NRC in September 1995. The BWRVIP-05 report provides the technical basis for eliminating inspection of BWR RPV circumferential shell welds. The BWRVIP-05 report concludes that the probability of failure of the BWR RPV circumferential shell welds is orders of magnitude lower than that of the longitudinal shell welds. The NRC staff has conducted an independent risk-informed assessment of the analysis contained in BWRVIP-05. This assessment also concluded that the probability of failure of the BWR RPV circumferential welds is orders of magnitude lower than that of the longitudinal shell welds. Additionally, the NRC assessment demonstrated that inspection of BWR RPV circumferential welds does not measurably affect the probability of failure.

As discussed during the ACRS Full Committee meeting on July 9, 1998 the Staff has completed its evaluation of the BWR Vessel and Internals Project (BWRVIP) recommendations for reduced inspections of the reactor pressure vessel shell welds as described in the BWRVIP-05 report. Based on the Staff's review, it has been concluded that inservice inspection (ISI) of the BWR

RPV circumferential welds is not necessary during the current license term since these welds have low failure frequencies. The NRC issued a Final Safety Evaluation documenting acceptance of the BWRVIP-05 report on July 28, 1998.

The NRC Staff issued Generic Letter 98-05 regarding the use of the BWRVIP-05 report as the basis for BWR licensees to request relief from the requirements to conduct volumetric examinations of the BWR RPV circumferential welds. This independent NRC assessment utilized the FAVOR code to perform a probabilistic fracture mechanics (PFM) analysis to estimate RPV failure probabilities. Three key assumptions in the PFM analysis are: the neutron fluence was estimated to be end-of-license mean fluence, the chemistry values are mean values based on vessels types and the potential for beyond design basis events is considered.

Although BWRVIP-05 provides the technical basis supporting this relief request, the following information is provided to show the conservatism of the NRC analysis for the Fermi 2 Nuclear Power Plant. For plants with RPVs fabricated by Combustion Engineering the mean end-of-license neutron fluence use in the NRC PFM analysis was 20×10^{17} n/cm^2. However, at Fermi 2 the highest fluence anticipated at the end of the requested relief period (end of the initial license period) is 6.5×10^{17} n/cm^2. Thus, embrittlement due to fluence effects is much lower, and the NRC analysis is conservative for Fermi 2 in this regard. Therefore, there is significant conservatism in the already low circumferential weld failure probabilities as related to Fermi 2. Other Fermi 2 RPV shell weld information that the NRC staff has requested (GL 98-05) be included in requests for relief is provided in attached Table 1. The data in Table 1 indicates that Fermi 2 upper bound adjusted reference temperature (ART) remains within acceptable limits as defined in the NRC Final Safety Evaluation of the BWRVIP-05 report.

At an August 8, 1997 meeting with industry, the NRC staff indicated that the potential for, and consequences of, nondesign basis events (not addressed in the BWRVIP-05 report) should be considered. In particular, the NRC staff stated that nondesign basis cold over-pressure transients should be considered. It is highly unlikely that a BWR would experience a cold overpressure transient. For a BWR to experience such an event multiple operator errors would be required. At the August 8, 1997 meeting, the NRC staff described several types of events that could be precursors to BWR RPV cold over pressure transients. These were identified as precursors because no cold overpressure event has occurred at an U.S. BWR. Also at the August 8 meeting, the NRC staff identified one actual cold overpressure event that occurred during shutdown at a non-U.S. BWR. This event apparently included several operator errors that resulted in a maximum RPV pressure of 1150 psi with a temperature range of 79°F to 88°F.

As provided in the following discussion, Fermi 2 has in place procedures and Technical Specifications which monitor and control reactor pressure, temperature, and water inventory during all aspects of cold shutdown which would minimize the likelihood of a Low Temperature Over-Pressurization (LTOP) event from occurring. Additionally, these procedures are reinforced through operator training.

The Pressure Test procedures, which are used at Fermi 2, have sufficient procedural guidance to prevent a cold, over-pressurization event. Pressure testing is performed at the conclusion of each outage. The system leakage tests include requirements for operations management to perform a "pre-job briefing" with all essential personnel. This briefing details the anticipated testing evolution with special emphasis on: conservative decision making, plant safety awareness, lessons learned from similar in-house or industry operating experiences, the importance of open communications, and finally, the process in which the test would be aborted if plant systems responded in an adverse manner. Vessel temperature and pressure are required to be monitored throughout these tests to ensure compliance with the Technical Specification pressure-temperature curve.

Additionally, to ensure a controlled, deliberate pressure increase, the rate of pressure increase is administratively limited throughout the performance of the test. If the pressurization rate exceeds this limit, direction is provided to remove the CRD pumps which are used for pressurization, from service.

With regard to inadvertent system injection resulting in an LTOP condition, the high pressure make-up systems (High Pressure Coolant Injection (HPCI) and Reactor Core Isolation Cooling (RCIC) systems, as well as the normal feedwater supply (via the Reactor Feedwater Pumps) at Fermi 2 are all steam driven. During reactor cold shutdown conditions, no reactor steam is available for the operation of these systems. Therefore, it is not possible for these systems to contribute to an over-pressure event while the unit is in cold shutdown.

The Standby Feed Water (SBFW) system is an available high pressure electric driven make up system. The SBFW system does not automatically inject water into the RPV. The SBFW system requires deliberate operator action to open the injection isolation valve. Procedures are in place to administratively control the use of the SBFW system.

In the case of low pressure system initiation, the Fermi 2 pressure-temperature limit curves for hydrostatic testing as provided in Fermi Technical Specifications, permit pressures up to 312 psig at temperatures from 71^{0}F up to 100^{0}F. Above 100^{0}F, the permissible pressure increases immediately to near 600 psig and increases rapidly with increasing temperature. The shutoff head for the Core Spray and Residual Heat Removal Pumps are both below 400 psig. Therefore, the potential for an over-pressurization event which would exceed the pressure-temperature limits, due to an inadvertent actuation of this system is very low.

Procedural control is also in place to respond to an unexpected or unexplained rise in reactor water level, which could result from a spurious actuation of an injection system. Actions specified in this procedure included preventing condensate pump injection, securing ECCS system injection, tripping CRD pumps, terminating other injection sources, lowering RPV level via the RWCU system, and the steam line drains.

In addition to procedural barriers, Licensed Operator Training is given which further reduces the possibility of the occurrence of LTOP events. During Initial Licensed Operator Training the following topics are covered: Brittle fracture and vessel thermal stress; Operational Transient (OT) procedures, including the OT on reactor high level; Technical Specifications training, including discussion of Pressure/Temperature (P/T) Limits; and Simulator Training of plant heatup and cooldown including performance of surveillance tests which ensure pressure-temperature curve compliance.

In addition to the above, continuous review of industry operating plant experiences is conducted to ensure that the Fermi 2 procedures consider the impact of actual events, including potential LTOP events. Appropriate adjustments to the procedures and associated training are then implemented to preclude similar situations from occurring at Fermi 2.

Based on the above, the probability of a cold over-pressure transient is considered to be highly unlikely.

The NRC staff transmitted a Request for Additional Information (RAI) regarding the BWRVIP-05 report to the BWR Vessel and Internals Project (BWRVIP). The BWRVIP provided a response to the RAI that included additional information on the BWRVIP PFM analysis, comparisons to the NRC Staff PFM analysis, and additional information regarding beyond design basis cold overpressure transients. We believe the BWRVIP-05 report and the NRC Final Safety Evaluation Report analysis provide sufficient basis to support this relief request.

Based on the documentation in BWRVIP-05, the risk-informed independent assessment performed by the NRC staff and the discussion above, permanent relief (for the remaining portion of the initial license period) from completing inspection of the RPV circumferential shell welds at Fermi 2 is justified.

TABLE 1

Fermi 2 RPV Shell Weld Information
Bounding Circumferential Weld

Neutron fluence at the end of the requested relief period (upper bound value)	6.5×10^{17} n/cm^2
Initial (unirradiated) reference temperature	-50°F
Weld Chemistry factor (CF)	236°F
Weld Copper content	0.23%
Weld Nickel content	1.0%
Increase in reference temperature due to irradiation (ΔRT_{NDT})	79.3°F
Margin term	56°F
Mean adjusted reference temperature (ART)	29.3°F
Upper bound adjusted reference temperature (ART)	85.3°F

ALTERNATIVE:
The beltline circumferential weld (1-313) was partially examined during the first inspection interval (approximately 54% complete, RF02, Spring 1991). Additionally, Detroit Edison will perform examination of approximately 5% of the Fermi 2 RPV circumferential weld areas only at the intersection of longitudinal seams.

APPLICABLE TIME PERIOD:
Relief is requested for the remaining portion of the initial license period.

FERMI 2 SHELL WELD LAYOUT
RR-A25
Figure 1