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

- References:
- 1) Fermi 2
NRC Docket No. 50-341
NRC License No. NPF-43
 - 2) NRC Generic Letter 88-01, "NRC Position on IGSCC In BWR Austenitic Stainless Steel Piping", dated January 25, 1988
 - 3) Detroit Edison Letter to NRC, "Response to NRC Generic Letter 88-01", NRC-88-0191, dated August 5, 1988
 - 4) NRC Letter to Detroit Edison, "Fermi Nuclear Power Plant, Unit 2, Generic Letter 88-01 Response - Request for Additional Information (RAI) (TAC No. 69135)," dated March 16, 1989
 - 5) Detroit Edison Letter to NRC, "Revised Response to NRC Generic Letter 88-01," NRC-89-0088, dated April 27, 1989
 - 6) Detroit Edison Letter to NRC, "Submittal of NRC Requested Additional Information on Generic Letter 88-01", NRC-89-0106, dated May 12, 1989
 - 7) NRC Letter to Detroit Edison, "NRC Position on IGSCC in BWR Austenitic Stainless Steel Piping, Generic Letter 88-01", dated January 4, 1990
 - 8) Detroit Edison Letter to NRC, "Supplement Response to NRC Request for Additional Information on Generic Letter 88-01", NRC-89-0297, dated January 12, 1990

Subject: Detroit Edison Response to NRC Position on
Reactor Coolant Leakage Limits

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By References 3, 5, and 6, Detroit Edison provided responses to Generic Letter 88-01 (Reference 2) and the related NRC request for additional information (Reference 4). This response was accepted by the NRC in Reference 7 with the exception of our response to the item concerning reactor coolant leakage limits. This letter is to provide additional justification for our earlier response and provide a reply to the NRC position on leakage limits as given in References 2 and 7.

The NRC position regarding the rate of change of unidentified reactor coolant leakage was changed in GL 88-01. The previous rate of change limit was an increase of 2 gallons per minute in four (4) hours, and the GL 88-01 rate of change limit is an increase of 2 gallons per minute in twenty-four (24) hours. The GL 88-01 rate of change limit has been reduced by a factor of six (6) from the previous limit. This change was based on the NRC's concern over the history of Intergranular Stress Corrosion Cracking (IGSCC) in BWR austenitic stainless steel piping, since IGSCC has resulted in unidentified reactor coolant pressure boundary (RCPB) leakage.

Detroit Edison understands the NRC's intention of reducing the total reactor coolant leakage. However, tightening the current rate of increase leakage limit may not be the appropriate way of achieving this goal since it is possible that the new requirement may result in some unacceptable operational situations such as unnecessary shutdowns and forced outages. The concerns can be addressed by employing other measures such as total mitigation of IGSCC and improved leakage detection system.

Detroit Edison believes that the existing Fermi 2 Technical Specifications Limit for an increase in unidentified reactor coolant pressure boundary (RCPB) leakage of 2 gpm over a four hour interval is justified. This is based primarily upon the extremely high level of metallurgical integrity present in the Fermi 2 stainless steel piping. Additionally, the existing Technical Specifications unidentified leakage limit augmented by the superior rate-of-change sensitivity of the existing drywell floor drain sump level monitoring system provides the ability to monitor and track very small changes in RCPB leakage without the threat of unnecessary reactor shutdowns which can result from the more restrictive rate-of-change leakage limit in Generic Letter 88-01.

At Fermi 2 all of the austenitic stainless steel or Inconel piping welds inside the drywell included in Generic Letter 88-01 requirements have received an NRC accepted Intergranular Stress Corrosion Cracking (IGSCC) mitigation treatment. The three mitigation methods used at Fermi 2 are: Solution Annealing, Induction Heating Stress Improvement (IHSI) and the Mechanical Stress Improvement Process (MSIP). All three mitigation methods are accepted in both Generic Letter 88-01 and in NUREG-0313, Revision 2. All three treatments were completed either before operation or during the first refueling outage at Fermi 2.

During the shop fabrication of the Recirculation System piping spools, as many shop welds as possible were solution annealed to remove the IGSCC susceptible material microstructure. In July 1983, IHSI was performed on seventy-nine (79) welds in the Reactor Recirculation System piping. This was done during the construction phase, prior to any exposure of the piping welds to an aggressive environment (oxygenated, high temperature, high purity water). Completion of this treatment prior to operation precludes initiation of any IGSCC cracks in the IHSI mitigated welds.

During Fermi 2's first refueling outage, which was completed in December 1989, MSIP was applied to the six (6) recirculation system piping and RWCU welds which had not been IHSI treated, two (2) recirculation system outlet nozzle to safe-end (inconel buttered) welds, ten (10) core spray nozzle to Inconel 600 safe-end (inconel buttered) welds, two (2) core spray safe-end to carbon steel safe-end extension (inconel buttered) welds, one (1) CRD hydraulic return nozzle to Inconel 600 cap (inconel buttered) weld, two (2) jet pump instrumentation nozzle to safe-end (inconel buttered) welds, and finally, two (2) jet pump instrumentation safe-end to seal assembly welds.

In summary, Fermi 2 has applied an NRC accepted IGSCC mitigation method to all susceptible piping and welds in the drywell that are 4 inches or larger in nominal diameter and contain reactor coolant at a temperature above 200°F during power operation prior to or during the first refueling outage. The balance of the piping (4 inch or larger) in the drywell is carbon steel and is not susceptible to IGSCC. Based on these IGSCC mitigation actions, the probability of IGSCC initiation has been reduced to an extremely low level. Furthermore, with the augmented inspection scope provided in GL 88-01 any IGSCC which does initiate will be detected well in advance of any IGSCC propagating thru-wall and therefore resulting in physical leakage. Therefore, complete IGSCC mitigation of all susceptible welds in the drywell provides justification for the existing leakage detection system and limits.

Fermi 2 has completed operation through the first fuel cycle using two Technical Specification limits for RCPB unidentified leakage. Total unidentified leakage is restricted to 5 gpm. The fixed time interval drywell floor drain sump method is used to establish conformance with Tech. Spec. 3.4.3.2.e for rate-of-change of unidentified leak rate presently limited to 2 gpm in a four hour period. The Fermi 2 unidentified RCPB leakage criteria are consistent with the BWR Standard Technical Specifications and are the same as the majority of similar BWRs. Technical Specifications limits have been established and verified to be compatible with sensitivity requirements without resulting in unnecessary shutdowns through years of operating experience.

Small rates-of-change in drywell sump in-leakage can be measured and monitored by the analog floor drain sump level system installed as part of the Fermi 2 response to Reg. Guide 1.45 criteria. This particular analog monitor has the sensitivity to detect and alarm a change as small as 1 gpm. Since this analog system is a continuous monitor, an increase in leak rate can be detected and alarmed on a real time basis and does not require the passage of an interval of time to establish the onset of an increase in leakage. This level of sensitivity and timeliness enhances the detection of small leaks without requiring tighter limits on the allowed leakage rate-of-change.

Operating experience during the first fuel cycle has indicated that a more conservative leakage rate-of-change limit such as 2 gpm in a 24 hour period could have possibly required unnecessary and/or untimely plant shutdowns due to leakage resulting from equipment problems which were subsequently corrected by prompt maintenance actions. A reasonably protracted period of time is required to evaluate possible leakage sources and pinpoint the actual source by selective system isolation. In some cases, a leaking valve packing can be mitigated by cycling or backseating the valve, allowing continued operation until a scheduled outage. A number of non-primary system valves and flanges within the drywell are also potential sources of drywell floor drain in-leakage which could contribute to increase in measured sump activity and potentially produce a leakage rate requiring reactor shutdown.

In summary, the probability of IGSCC induced RCPB leakage has been reduced to a very small level at Fermi 2 due to the complete mitigation of the weld affected stainless steel piping. Additionally, Fermi 2 has a relatively unique leakage detection system which employs a superior method of detecting small leaks when compared to the guidance of GL 88-01. It has also experienced operational situations during which untimely shutdowns could have resulted if the GL 88-01 unidentified leakage rate-of-change requirement had been imposed on Fermi 2 during the first cycle.

Thus, Detroit Edison believes that current Fermi 2 Technical Specification limits are adequate to address unidentified reactor coolant pressure boundary leakage.

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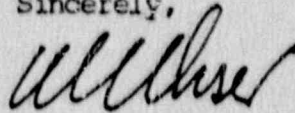
July 3, 1990

NHC-90-0103

Page 5

If you have any questions, please contact Mr. Girija Shukla at (313) 586-4270.

Sincerely,



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Senior Vice President

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