William S. Orser
Senior Vice President

Detroit Edison

Fermi 2
6400 North Dixie Highway
Newport, Michigan 48166
(313) 586-5201

Nuclear Operations

August 2, 1990
NRC-90-0127

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 Letter to Detroit Edison, dated January 23, 1990

3) Detroit Edison Letter to NRC, NRC-90-0025, dated February 22, 1990

4) NRC Letter to Detroit Edison, dated May 15, 1990

Subject: Proposed Technical Specification Change (License Amendment)-3.5.1, ECCS-Operating; 3.5.2, ECCS-Shutdown; 3.4.9.1, Reactor Coolant System - Hot Shutdown; 3.4.9.2, Reactor Coolant System - Cold Shutdown; 3.6.2.2, Containment Systems-Suppression Pool and Drywell Spray; 3.6.2.3, Containment Systems - Suppression Pool Cooling; 3.9.11.1, RHR and Coolant Circulation, High Water Level; 3.9.11.2, RHR and Coolant Circulation, Low Water Level

Recent events during shutdown conditions, especially the Vogtle event described in NUREG 1410, emphasize the importance of actions to protect the reactor during shutdown. 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 will permit Detroit Edison to maintain the residual heat removal (RHR) system operable with the minimum flow valve disabled in the closed position when the system is in the shutdown cooling mode of operation. Maintaining the minimum flow valve in the closed position will prevent any potential vessel drain down through this flow path. This action will improve plant safety during shutdown conditions.

This issue has been discussed with representatives of the NRC in References 2, 3, and 4. Reference 4 stated that prior to implementing this operating strategy NRC review and approval would be required.

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

A001
1/1

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. John Tibai at (313) 586-4289.

Sincerely,

Enclosure

cc: A. B. Davis
R. W. DeFayette
W. G. Rogers
J. F. Stang
Supervisor, Electric Operators, Michigan
Public Service Commission - J. Padgett

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
Senior Vice President

On this 2nd day of August, 1990, 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 Armetta

Notary Public

ROSALIE A. ARMETTA
Notary Public, Monroe County, MI
My Commission Expires Jan. 11, 1992

INTRODUCTION

The residual heat removal (RHR) system is a multifunctional system that can be aligned in several different configurations to achieve specific design functions. The various modes of operation include: low pressure coolant injection (LPCI), shutdown cooling, suppression pool cooling/spray, containment spray and fuel pool cooling and cleanup system assist. With the exception of piping connected directly to the reactor vessel the system is designed for and operates at a relatively low pressure. Figure 1 is a simplified drawing of division 2 of the system. In general, the RHR system function is accomplished when water is taken from the suppression pool, routed through a heat exchanger, then directed to the desired function through a specific valve lineup. Cooling can be controlled by regulating bypass flow around the heat exchanger. Initiation of the LPCI occurs automatically whenever a high drywell pressure or low water level signal is generated. Because the LPCI mode may be automatically activated while the reactor is at a high pressure a minimum flow valve and flow path have been provide to protect the pump from overheating as required by Regulatory Guide 1.139. The minimum flow valve automatically opens anytime a pump is started and a no flow condition continues to exist for more than ten (10) seconds. With high reactor pressure the injection valves (F015 and F017) will remain closed, with the pumps running, until reactor pressure decreases to a level compatible with the RHR system. When this pressure is reached (about 400 psig) the injection valves will open. When reactor pressure decreases to less than that of the RHR pump shutoff head (about 300 psig) flow will commence to the reactor and the minimum flow valve will automatically close.

Shutdown cooling differs somewhat from the other modes of RHR operation in that the pump suction path is aligned to the reactor vessel rather than the suppression pool. This alignment can only be established with reactor pressure less than the RHR cut-in permissive (nominal 95 psig.) Above this pressure a Group 4 isolation (shutdown cooling isolation) occurs. As with the other modes of operation water is routed through a heat exchanger and then returned to the reactor vessel. Because water is taken directly from the reactor vessel some valve misalignments, which would not be a significant problem in other modes of operation, can become a flow path for a substantial loss of reactor coolant to the suppression pool. The industry has experienced a number of these kind of misalignments. These were analyzed by the Nuclear Safety Analysis Center of the Electric Power Research Institute and the results were documented in NSAC-88, "Residual

Heat Removal Experience Review and Safety Analysis: Boiling Water Reactors." The analyzed events took place either during cold shutdown with the RHR system operating to remove decay heat (shutdown cooling mode), or during late stages of normal plant cooldown at a time when the RHR system was placed into service. Thirteen events were cited which resulted in a loss of reactor coolant inventory. Four of these involved the minimum flow valve with the system lined up in the shutdown cooling mode. When the minimum flow valve opens in this mode, reactor coolant is short circuited and is pumped to the suppression pool thus causing a loss of reactor coolant inventory.

To eliminate this potential mechanism of reactor coolant inventory loss it is being proposed that the minimum flow valve be allowed to be deenergized in the closed position when the RHR pump suction is aligned to the reactor pressure vessel. This will prevent the valve from opening as a result of any unanticipated event. Because this valve is considered to be an integral part of attendant support features necessary to maintain the OPERABILITY of the RHR system, changes to Technical Specification sections 3.4.9.1, 3.4.9.2, 3.5.1, 3.5.2, 3.6.2.2, 3.6.2.3, 3.9.11.1, and 3.9.11.2 are necessary to implement this operating strategy. Detroit Edison proposes to add a footnote to these sections stating, "With the RHR pump suction path aligned to the reactor pressure vessel for shutdown cooling the RHR minimum flow valve may be deenergized in the closed position." These changes will permit the RHR system to remain OPERABLE in the shutdown cooling mode while the RHR minimum flow valve is disabled in the closed position.

EVALUATION

The minimum flow valve automatically opens to provide a flow path for pump cooling should an injection signal occur but reactor pressure is too high for the RHR pumps to inject. In this alignment water is taken from the suppression pool, transported through the pump and discharged to the suppression pool through the minimum flow line. When reactor pressure decreases, the injection valve automatically opens; with reactor pressure less than pump shutoff head pressure, flow commences to the reactor and the minimum flow valve automatically closes. In the shutdown cooling mode of operation the RHR pump suction path is aligned to the reactor vessel rather than the suppression pool. A low pressure permissive prevents completion of this alignment until reactor pressure is less than a nominal 95 psig. Because of the relatively low pressure, flow would be established immediately upon starting the RHR pump and the opening of the injection

valves. The system operating procedure provides detailed instructions on performing this evolution. Because flow is immediately established through the pump the minimum flow valve function is not required. It is therefore desirable to deenergize the minimum flow valve in the closed position to prevent any inadvertent reactor coolant inventory loss through the minimum flow line. The proposed change would be limited to those Operational Conditions where the potential to be in shutdown cooling exists, that is, in Operational Conditions 3 with reactor pressure less than the RHR cut-in permissive (95 psig), 4, and 5.

When in shutdown cooling, with the minimum flow valve deenergized closed, the only credible loss of pump cooling would be the closure of the RHR injection valves, which would also halt the shutdown cooling water flow to the reactor vessel. In the situation where a low water level 3 signal occurred the inboard injection valve (F015) would close, but this same signal would also close the suction valves which would in turn trip the pump. Thus pump overheat protection is provided indirectly. Nevertheless, should an unforeseen event cause the injection path to be blocked without a subsequent pump trip there are other administrative controls and design features that would mitigate this situation.

1) In Operational Condition 3, loss of shutdown cooling would result in an increase in reactor pressure. At the RHR cut-in permissive pressure, 95 psig, an auto isolation (Group 4) would occur. The subsequent closure of the suction valve would initiate a pump trip.

2) In Operational Conditions 4 and 5, administrative controls require that the shutdown cooling path and flow be verified every hour. This verification includes a check of flow, flow path, and temperature of coolant.

Finally, the practice of disabling the RHR minimum flow valve is common in the industry. In a survey of five similar plants located in the United States four were found that disable the minimum flow valve in some manner. The purpose is to prevent inadvertent draining of the vessel to the suppression pool via this flow path. The safety risk of running the pump dead headed is considered less than pumping the reactor vessel coolant inventory to the suppression pool.

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.

1) The proposed change does not involve a significant increase in the probability of an accident previously evaluated because the proposed change does not alter the causes of the events and frequency of occurrences of the transients and accidents currently defined in the UFSAR. The proposed change will only be implemented with the reactor in a shutdown condition and therefore, has no impact on the those accidents and transients analyzed for Operational Conditions 1 and 2. The initial conditions for an assumed accident or transient in Operational Conditions 3, 4, or 5 are significantly less severe than for Operational Conditions 1 and 2. The change will reduce the probability of a loss of coolant accident while in the shutdown condition because a potential flow path is eliminated. Should the injection valve close, the potential for pump failure of the one pump in service may be slightly increased but this is more than offset by the reduced potential for a loss of reactor coolant inventory through this path. The consequences of any accident or transient are not increased for the following reasons:

   a. Any event requiring this feature to protect the pump has already rendered the RHR pumps ineffective by blocking the injection flow path.

   b. The Core Spray system and/or the other RHR subsystem provide backup capability for the RHR subsystem should an RHR subsystem fail to perform, as required by Technical Specification 3.5.1 and 3.5.2.

   c. In Operational Condition 3 loss of shutdown cooling would result in an increase in reactor pressure. At 95 psig a Group 4 isolation would occur. The RHR pumps will trip when the suction valves close. This will protect the pump for future use to mitigate any accident.

d. Administrative controls are in place in Operational Conditions 4 and 5 to verify on an hourly basis that shutdown cooling is in service by checking flow, flow path, and reactor coolant temperature.

e. The second RHR pump is not affected and would remain available for use.

2) The proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated. Disabling the RHR minimum flow valve in the closed position cannot cause or prevent an accident. The change impacts only an RHR pump protective feature. No new equipment has been added by this change.

3) The proposed change does not involve a significant reduction in a margin of safety. The proposed change does not change any safety limit or safety system setpoint. No safety margins are modified by this change. Overall margin of safety is improved because a potential flow path for a loss of reactor coolant inventory is eliminated.

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.

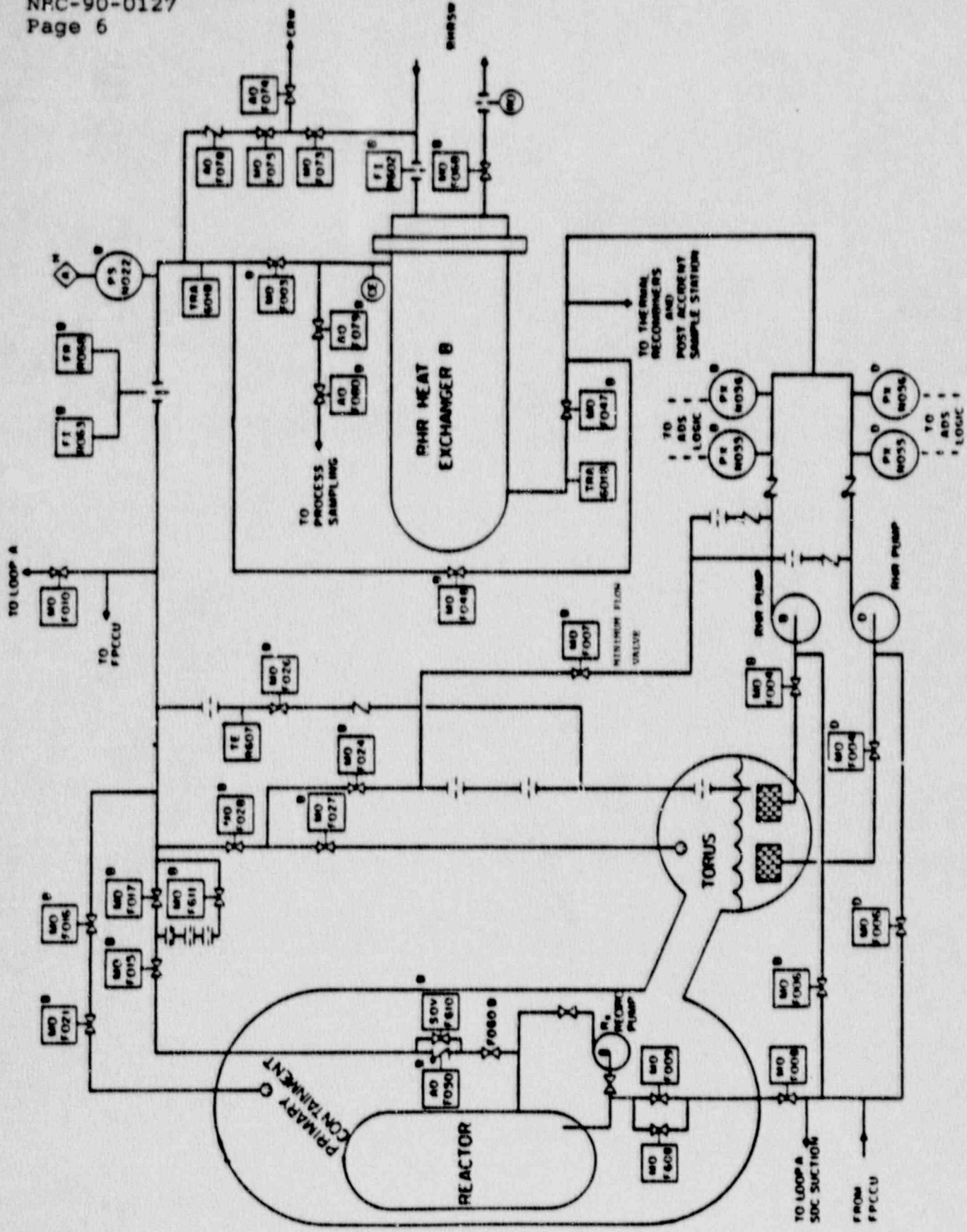

FIGURE 1: SIMPLIFIED RHR SYSTEM
(DIVISION 2)