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DTE Energy

10 CFR 50.46

June 10, 2009
NRC-09-0037

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 Letter to NRC, "Submittal of Plant Specific Emergency Core Cooling System (ECCS) Evaluation Model Reanalysis," (NRC-08-0046) dated June 23, 2008

Subject: Additional Information to Support Review of Plant Specific Emergency Core Cooling System Evaluation Model Reanalysis

In Reference 2, Detroit Edison submitted a reanalysis of the Emergency Core Cooling System (ECCS) Evaluation model for Fermi 2 for both the GE11 and GE14 fuel types using the SAFER/GESTR-Loss-of-Coolant-Accident methodology. During a conference call on May 15, 2009, the NRC staff requested additional information regarding a manual action described in the analysis reports provided with the submittal. Enclosure 1 provides the requested additional information.

No new commitments are made in this letter.

Should you have any questions or require additional information, please contact Mr. Rodney W. Johnson of my staff at (734) 586-5076.

Sincerely,

Joseph H. Plona

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Enclosure 1: Additional Information to Support Review of ECCS Evaluation Model Reanalysis

cc: NRC Project Manager
NRC Resident Office
Reactor Projects Chief, Branch 4, Region III
Regional Administrator, Region III
Supervisor, Electric Operators,
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Enclosure 1 to NRC-09-0037

Additional Information to Support Review of ECCS Evaluation Model Reanalysis

Additional Information to Support Review of ECCS Evaluation Model Reanalysis

Introduction:

During a conference call on May 15, 2009, the NRC staff requested additional information regarding the manual action described for a feedwater line break in the 10CFR50.46 Fermi 2 SAFER/GESTR Loss of Coolant Accident (LOCA) Analysis for GE 11 and GE 14 fuel types submitted in Reference 2. The analysis reports contained the following statement:

> "The analysis in the Fermi 2 SAFER/GESTR LOCA analysis demonstrated that the non-recirculation line break cases are clearly non-limiting and therefore not re-analyzed for GE11or GE14 transition. Note that the feedwater line break basis includes an assumption of operator action to depressurize the reactor during the division 1 battery failure scenario. This is necessary since High Pressure Coolant Injection (HPCI) may be lost through the break and therefore is unable to restore level or depressurize the reactor."

In the feedwater line break scenario, credit for manual depressurization using Division 2 Safety Relief Valves (SRVs) is necessary as the Automatic Depressurization System and Division 1 powered SRVs are lost as a result of the postulated single failure of the division 1 batteries and DC power supplies.

The NRC staff requested information to demonstrate that the operators have appropriate training, procedures, indications, and time to effect the manual depressurization of the Reactor Pressure Vessel in response to this small break scenario.

Additional Information

The 10CFR50.46 reanalysis submitted under Reference 2 describes a non-limiting small feedwater line break in which a manual operator action to depressurize the reactor 10 minutes after the line break is assumed. The 10 minute assumption is consistent with the earliest acceptable post-accident delay after which credit for manual operator actions (such as initiation of suppression pool cooling) is typically considered for licensing and design bases analyses. In contrast, Emergency Operating Procedures (EOPs) direct operator actions in response to vessel conditions. EOP operator action to manually depressurize the reactor vessel is not based on a specific time, but rather on meeting the EOP requirements to assure adequate core cooling.

The discussion below demonstrates that Fermi 2 operators are provided with the training, procedures, instrumentation, and the time necessary to ensure manual depressurization would be successfully taken.

Procedures for Emergency Depressurization:

The Fermi 2 EOPs are based on the BWR Owners Group Emergency Procedure Guidelines (EPGs)/Severe Accident Guidelines (SAGs). The EOPs used at Fermi 2 require manual emergency depressurization if reactor water level cannot be maintained above the top of active fuel. This action is required to be taken before reactor water level reaches the Minimum Steam Cooling Reactor Water Level.

The Minimum Steam Cooling Reactor Water Level is defined as the lowest reactor water level at which the covered portion of the reactor core will generate sufficient steam to prevent any clad temperature in the uncovered part of the core from exceeding 1500 degrees Fahrenheit assuming the most limiting top-peaked power shape prior to reactor shutdown. For Fermi 2 the Minimum Steam Cooling Reactor Water Level is 25 inches below the top of active fuel.

In addition, as of the NRC approved Revision 4 of the EPGs (Reference 1), manual inhibition of the Automatic Depressurization System (ADS) is required to allow time for high-pressure Emergency Core Cooling Systems (ECCS) injection systems to restore reactor water level and avoid unnecessary core uncovering. This action effectively makes reactor vessel depressurization a manual action regardless of the particular LOCA event.

The EOP instructional steps for emergency depressurization are:

- Open 5 SRVs (ADS valves preferred)
- Bypass and restore drywell pneumatics if necessary (this is accomplished by use of a key lock switch on the control room panels)
- Are greater than or equal to 4 SRVs open? (4 SRVs is the minimum required number of SRVs for emergency depressurization at Fermi 2)
- Actions taken after this point are to initiate shutdown cooling when depressurized or to use alternate emergency depressurization systems, if 4 SRVs can not be opened.

Training:

Fermi 2 has a licensed operator training program with a plant referenced simulator facility in accordance with 10 CFR 55.46(c). Shift crews are typically evaluated in the simulator during each training cycle. Each simulator evaluation includes performance of Critical Tasks. Critical Tasks must be accomplished in order to pass the simulator evaluation.

During 2008 Licensed Operator Training (Cycle 2) shift crews were evaluated on a Fermi 2 evaluation scenario that requires actions similar to the emergency depressurization manual action specified in the postulated feedwater line small break LOCA. The evaluation scenario included a loss of high pressure feedwater/LOCA in the primary containment requiring emergency depressurization when reactor water level reached the top of active fuel. Four license operator requalification crews received and passed this evaluation scenario.

In the evaluation scenario, the plant is operating at 100 percent reactor power with steady state conditions. A feedwater line leak in the primary containment (drywell) occurs 60 seconds after the mode switch is placed in shutdown (due to other simulated events). The crew is expected to recognize that the High Pressure Coolant Injection (HPCI) system is unavailable and that other high pressure injection systems (Standby Feedwater System, Control Rod Drive System, Reactor Core Isolation Cooling System, and Standby Liquid Control System) are unable to maintain reactor water level in the normal level band (173 to 214 inches above top of active fuel). The crew is expected to continue action to attempt to inject with high pressure systems and to expand the reactor water level band to between 0 and 214 inches in accordance with the EOPs. The crew is then expected to determine that they will be unable to maintain reactor water level above the top of active fuel (0 inches) and proceed to hold a briefing in preparation for emergency depressurization.

In accordance with the EOPs, after reactor water level reaches the top of active fuel, but before it reaches the Minimum Steam Cooling Reactor Water Level, manual emergency depressurization is performed. The action to emergency depressurize was considered a Critical Task during this simulator evaluation scenario and was required to be correctly performed in order to pass the evaluation.

The EOP steps for emergency depressurization are:

- Open 5 SRVs (Automatic Depressurization System valves preferred).

  At Fermi 2, SRV position indication comes from pressure in the individual SRV tailpipe. When pressure is sensed in the tailpipe, the red open indication is illuminated. When no pressure is sensed in the tailpipe, the green closed indicator is illuminated. The indicators receive power from their respective divisional Direct Current (DC) power supplies. Upon loss of DC power, the open and closed indications are absent. Operators use this position indication to verify the SRVs have opened. If the operators cannot verify SRVs open they continue in the EOPs.

- Bypass and restore drywell pneumatics if necessary

  The action to bypass drywell pneumatics is accomplished by use of a key lock switch on the control room panels. The key is located in the control room and readily available.

- Are greater than or equal to 4 SRVs open?

  4 SRVs is the minimum required number of SRVs for emergency depressurization at Fermi 2.

The shift crews performed as expected, correctly performing all Critical Tasks. The evaluation scenario demonstrated that Fermi 2 operators are provided with the training, procedures, instrumentation, and the time necessary to ensure manual depressurization would be successfully taken.

Applicability of Training Scenario:

The differences between this training evaluation scenario and the small feedwater line break event in the LOCA analysis are the feedwater line break size, the loss of the division 1 batteries and DC power supplies, and timing of the manual actions.

In the LOCA event analysis, the feedwater break is assumed to be just the right size to prevent HPCI injection into the reactor vessel. In the training evaluation scenario, HPCI becomes unable to inject and the feedwater break size is large enough to prevent other high pressure injection systems (Standby Feedwater, Control Rod Drive, Reactor Core Isolation Cooling, and Standby Liquid Control) from recovering water level in the reactor vessel.

In the analyzed LOCA event, the division 1 batteries and DC power supplies are not available. Should this occur, it would be annunciated in the control room. Visual and audible annunciation would occur for power supply failure and logic power failure for the SRV, Automatic Depressurization, Core Spray, Residual Heat Removal, Reactor Core Isolation Cooling, and Steam Leak Detection Systems.

These alarms are symptoms for entry into an Abnormal Operating Procedure (AOP) for Loss of 130/260 Volt DC battery busses. Actions per this AOP would be performed in parallel with the EOP actions. The AOP also contains a note stating that loss of the division 1 batteries and DC power supplies results in closure of valves that supply division 1 drywell pneumatic air operated valves.

The loss of division 1 batteries and DC power supplies would result in loss of power, including position indication, to 7 of 15 SRVs. In the Fermi 2 control room, SRVs normally have their closed light illuminated and the open light extinguished. Without the 130 volts DC from the division 1 batteries and DC power supplies, the closed and open indications would be unlit for the 7 division 1 SRVs and the closed indication would be lit for the 8 division 2 SRVs. The crew would follow the EOP direction to open greater than or equal to 4 SRVs. The EOPs include directions to bypass and restore drywell pneumatics to Division 2 SRVs.

The action to manually depressurize would require only a few minutes or less to perform, including restoration of drywell pneumatics.

The Fermi 2 SAFER/GESTR LOCA Analysis for GE 11 and GE 14 fuels demonstrates that manual operator action to emergency depressurize within 10 minutes produces a non-limiting event. The EOPs are symptom based procedures. The operators are trained to take action to emergency depressurize based on reactor water level. As stated above, EOP use ensures that adequate core cooling is maintained.

The ability to recognize the need for manual depressurization is based on the observation of reactor vessel pressure and core narrow-range reactor water level instrumentation. These indications are designed as safety-related divisional Class 1E loops; thus, the design of the plant ensures the operators are provided with reliable instrumentation necessary to indicate the need for the action and provide the necessary feedback that the action is successful.

Conclusion:

On the basis of the above, it is clear that the operators have sufficient training, procedures, instrumentation, and time to complete the Critical Task of performing manual emergency depressurization of the reactor pressure vessel in response to this small break scenario.

References:

1) Letter from USNRC Ashok C. Thadani to BWROG Chairman Donald Grace, "Safety Evaluation of "BWR Owners' Group - Emergency Procedure Guidelines, Revision 4," NEDO-31331, March 1987, " dated September 12, 1988.

2) Detroit Edison Letter to USNRC, "Submittal of Plant Specific Emergency Core Cooling System (ECCS) Evaluation Model Reanalysis," (NRC-08-0046) dated June 23, 2008