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DTE Energy
Detroit Edison

10 CFR 52.79

December 14, 2011
NRC3-11-0043

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555-0001

References: 1) Fermi 3
Docket No. 52-033
2) Letter from Michael Eudy (USNRC) to Jack M. Davis (Detroit Edison), "Request for Additional Information Letter No. 68 Related to Section 10.4.7 for the Fermi 3 Combined License Application," dated November 1, 2011

Subject: Detroit Edison Company Response to NRC Request for Additional Information Letter No. 68

In Reference 2, the NRC requested additional information to support the review of certain portions of the Fermi 3 Combined License Application (COLA). The response to the Request for Additional Information (RAI) associated with Reference 2 is provided as Attachment 1 of this letter.

If you have any questions, or need additional information, please contact me at (313) 235-3341.

I state under penalty of perjury that the foregoing is true and correct. Executed on the 14th day of December 2011.

Sincerely,

Peter W. Smith, Director
Nuclear Development – Licensing and Engineering
Detroit Edison Company

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NRO

Attachment: 1) Response to RAI Letter No. 68, RAI Question No. 10.04.07-1

cc: Jerry Hale, NRC Fermi 3 Project Manager
Adrian Muniz, NRC Fermi 3 Project Manager
Raj Anand, NRC Fermi 3 Project Manager
Michael Eudy, NRC Fermi 3 Project Manager
Bruce Olson, NRC Fermi 3 Environmental Project Manager (w/o attachment)
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NRC Region II Regional Administrator (w/o attachment)
Supervisor, Electric Operators, Michigan Public Service Commission (w/o attachment)
Michigan Department of Natural Resources and Environment
Radiological Protection Section (w/o attachment)

Attachment 1

NRC3-11-0043

Response to RAI Letter No. 68

RAI Question No. 10.04.07-1
(eRAI Tracking No. 6071)

(5 pages)

NRC RAI 10.04.07-1

In the applicant's August 5, 2011 supplemental response to RAI Question 12.02-7, the applicant proposed to make changes to FSAR Section 10.4.7, which currently incorporates by reference Section 10.4.7 of the ESBWR DCD with no departures or supplements. The proposed change would add, as supplemental information, the following statement: "The C&FS components can accommodate 100% feedwater flow to support a cascading feedwater configuration."

The staff has reviewed the relevant information in the ESBWR DCD. The staff found that the ESBWR DCD design and the BOP heat balance are based on the C&FS operating in a pumped forward configuration. The DCD does not directly identify a system configuration to route all feedwater flow through the CPS as stated in the RAI response, nor is it indicated in the DCD that pipe analysis (pipe hazards, transients, anticipated operational occurrences) was performed based on cascade operation with higher flows through the condensate system.

The staff requests for the applicant to clarify whether or not the proposed change to the FSAR constitutes a departure, and to provide adequate justification supporting the conclusion. If the proposed change is a departure, then the applicant is requested to provide the following information in the Departures Report and the FSAR:

1. *If it is determined that the change is a departure requiring NRC review and approval in accordance with 10 CFR 52.63 Item 5(b)(2), then provide appropriate justification and supporting information, or;*

2. *If it is determined that NRC review and approval is not required for the change, then provide the bases for the determination that the departure does not require NRC review and approval in accordance with 10 CRF 52.63 Item 5(b)(2). In addition, the applicant should provide the basis and appropriate justification for its determination.*

Response

Background

In a supplemental response to NRC RAI 12.02-7, Detroit Edison letter NRC3-11-0032, dated August 5, 2011 (ML11221A075), supplemental statements were added to the Fermi 3 FSAR Sections 10.4.6.2.2 and 10.4.7.2.1 for the condensate purification system (CPS) and the condensate and feedwater system (C&FS). Detroit Edison added this information in FSAR Chapter 10 to support FSAR Chapter 12 supplemental information which addresses reactor water iodine concentration assumptions for the 10 CFR 50 Appendix I offsite dose analysis. These reactor water iodine concentration assumptions in the Fermi 3 FSAR address DCD source term calculation changes, which were incorporated into DCD Revision 7 to reflect the ESBWR pumped forward design (previous revisions had assumed 100% feedwater flow through CPS). Fermi 3 reactor water iodine concentration limits are established, based on 100% feedwater flow through CPS, i.e. cascade configuration.

Detroit Edison does not anticipate that operation in cascade mode will be necessary to control reactor water iodine concentrations; however, the Fermi 3 FSAR includes that operational flexibility if needed. Normal Fermi 3 operation will be in the pumped forward configuration. As stated in FSAR Chapter 12, cascade operation is one means of controlling reactor water iodine

concentrations for Fermi 3, if necessary. This is discussed within the Fermi 3 Chapter 12 SER which states in part:

> ... the applicant adds that the limits established in Table 12.2-205 were developed assuming that plant was operating in a cascade configuration; 100 percent of steam flow is treated by the condensate demineralizer. In the supplemental response to RAI 12.02-7 dated August 5, 2011 (ML11221A075), the applicant states that the ESBWR DCD does not describe the maximum capabilities of the condensate polishing system (CPS) or the condensate system components (pumps, valves, and pipes). The maximum component capabilities are established during the detailed design. Therefore, the applicant adds supplements EF3 SUP 10.4-1 and EF3 SUP 10.4-2 in FSAR Subsections 10.4.6.2.2 and 10.4.7.2.1, respectively, to ensure that the CPS and condensate system components design can accommodate 100 percent of feedwater flow to support cascade configuration.
>
> .... The staff found that the applicant's approach, through two site-specific supplements EF SUP 10.4-1 and 10.4-2, in ensuring that the CPS and condensate components design will have the capability for 100 percent feedwater flow is acceptable.

The Fermi 3 FSAR, Section 1.1.1.8, "Departures from the Standard Design Certification (or Application)" references Regulatory Guide 1.206 for the definition of DCD departures. RG 1.206, Section C.III.1.6 reads, in part:

> The following definition for "departure" is provided for COL applicants:
>
> A *departure* is a plant-specific deviation from design information in a standard design certification rule.

Response Discussion

The supplemental information referenced in RAI 10.04.07-1 does not represent a deviation from the design information in the ESBWR DCD. Rather, the supplements provide more detailed Fermi 3 site-specific BOP system capacities. As discussed further below, the system capabilities for cascade configuration are included in the ESBWR standard design, and the design requirements specified in the DCD will be implemented during Fermi 3 detailed design activities to address C&FS and CPS capacity.

The system capabilities for cascading feedwater configuration are included in the ESBWR DCD standard design description. RAI 10.04.07-1 requests information related to the C&FS and CPS, which are part of the steam and power conversion system described in Chapter 10 of the ESBWR DCD and the Fermi 3 FSAR. The ESBWR feedwater heater drain systems are normally operated in a pumped forward configuration. The Fermi 3 FSAR does not modify the ESBWR DCD description of normal plant operation; i.e., Detroit Edison intends to operate Fermi 3, as described in the DCD, in a pumped forward configuration. The ESBWR BOP heat balances are at rated power and stretch power (as suggested in NRC Regulatory Guide 1.206, Section C.I.10.1), which are not impacted by the supplemental information for the normal pumped forward configuration.

Based on operational conditions and reactor water iodine concentrations, if necessary, actions could be implemented to maintain the Fermi 3 iodine concentrations within specified limits, by cascading some or all of the heater drains to the condenser. The supplemental information added to the Chapter 10 FSAR ensures sufficient capacity in the C&FS and CPS to allow full feedwater flow to pass through the CPS.

The ESBWR DCD standard design identifies the components necessary for system configuration to route feedwater flow through the CPS (i.e., cascading feedwater lineup). Specifically, DCD Figures 10.1-1, 10.4-6a, 10.4-6b, 10.4-7a, and 10.4-7b show valves that can be aligned for system configurations to route high pressure heater drains, moisture separator reheater drains, and low pressure turbine extraction steam (normally routed to open feedwater heater number 4) to the condenser. In addition, DCD Sections 10.4.7.2.2.3 and 10.4.7.2.2.4 describe process lines to the condenser for high pressure heater drains and moisture separator reheater drains, respectively.

The ESBWR DCD safety analyses and anticipated operational occurrences analyses are not impacted by operation in the cascade configuration because feedwater temperature must be maintained within the feedwater temperature operating domain. DCD Figure 15.2-17, "ESBWR Core Power-FW Temperature Operating Domain with Representative Rod/FW Temperature Block and Scram Lines," and NEDO-33338 (Rev. 1), "ESBWR Feedwater Temperature Operating Domain Transient and Accident Analysis (ML091380173)," describe the feedwater temperature operating domain for the ESBWR. During Fermi 3 ESBWR operation, transition to cascading feedwater configuration would be a gradual plant evolution, involving several stages of intermediate feedwater heater drain configurations. If necessary, Feedwater Heater No. 7 can be placed into service to ensure that feedwater system temperature is maintained within the operating domain. Chapter 10 of the DCD discusses power maneuvers during system startup, plant startup and shutdown, and power changes that cascade heater drains to the condenser. The Fermi 3 supplemental information will ensure sufficient capacity to operate in a cascading configuration with 100% feedwater processed through CPS. As described in the DCD, C&FS and CPS systems will have sufficient capacity and control stability to accommodate normally anticipated step and ramp changes in reactor power.

When operating in a cascade configuration, feedwater heaters will remain in service. Feedwater flow will continue to be controlled and regulated by ESBWR control systems. ESBWR setpoints and controls maintain feedwater within the feedwater temperature operating domain, throughout evolutions of BOP system configurations. Thus, reactor safety is unaffected by operation in a cascade configuration. Cascade configuration does not impact safety-related functions or components.

The design requirements specified in the DCD will be implemented during Fermi 3 detailed design activities to incorporate C&FS and CPS capacity. The FSAR and DCD describe the design bases, design features, and system functional requirements that are implemented during detailed design and procurement for construction of the plant. The BOP system capacity, identified in the Fermi 3 FSAR supplements, will be applied during detailed design activities, by implementing the design requirements of the ESBWR DCD. For example, codes and standards referenced by the ESBWR DCD will be implemented as described by the DCD. DCD Chapter 3, "Design of Structures, Components, Equipment, and Systems," describes ESBWR design criteria, including classification, flood protection, protection against dynamic effects associated with the postulated rupture of piping, and seismic design requirements, among others. ESBWR

DCD Chapter 10 describes design requirements specifically related to the CPS and C&FS, e.g. criteria to address flow accelerated corrosion and fluid instabilities (see DCD Sections 10.4.7.2.1 and 10.4.7.3 respectively). These and other DCD sections describe design requirements which are implemented throughout Fermi 3 ESBWR detailed design activities. In addition, FSAR Section 6.6.7.1 implements the flow accelerated corrosion program for Fermi 3.

The functional design requirements of the CPS and C&FS, as described in the ESBWR DCD, along with the system capacities identified in the Fermi 3 supplements, are maintained throughout detailed design activities. The DCD defines no safety functions in design bases for C&FS and CPS (DCD Section 10.4.7.1 and 10.4.6.1). The C&FS and CPS systems do not perform, ensure or support any safety-related function, and thus, have no safety design basis. The non-safety power generation design bases functions described in DCD Sections 10.4.6.1.2 (CPS) and 10.4.7.1.2 (C&FS) are not impacted by the Fermi 3 FSAR supplemental information, and will be maintained throughout detailed design of the Fermi 3 ESBWR. For example, system capacities will be implemented in detailed design in accordance with DCD system functional requirements in DCD Sections 10.4.6.2 (CPS) and 10.4.7.2 (C&FS). As described in the DCD, C&FS and CPS systems will have sufficient capacity and control stability to accommodate normally anticipated step and ramp changes in reactor power. In all cases, for each plant system, detailed design activities must ensure that Fermi 3 FSAR and ESBWR DCD safety analyses are unaffected.

Conclusion

The ESBWR DCD standard design describes system capabilities for cascading feedwater configuration. By adding system capacity information to Fermi 3 FSAR Sections 10.4.6 and 10.4.7, detail design will ensure sufficient capacity to operate in a cascading configuration with 100% feedwater processed through CPS. The design bases of the CPS and C&FS are not changed by adding the supplemental information. The C&FS and CPS design functions described in the ESBWR DCD are maintained. ESBWR reactor safety analyses remain bounding when operating within the feedwater temperature operating domain, whether in the pumped forward configuration or the cascading configuration. The Fermi 3 supplemental information ensures that detailed design will verify capability consistent with Chapter 12 assumptions. The design requirements specified throughout the DCD will be implemented during Fermi 3 detailed design activities to address C&FS and CPS capacity.

For the reasons explained above, the information added to the Fermi 3 FSAR Chapter 10 does not represent a departure. The supplements do not deviate from the DCD standard design but rather provide more detailed site-specific BOP system capacities.

Proposed COLA Revision

None