September 29, 2004

Mr. Joseph E. Venable
Vice President Operations
Entergy Operations, Inc.
17265 River Road
Killona, LA 70066-0751

SUBJECT: WATERFORD STEAM ELECTRIC STATION, UNIT 3 (WATERFORD 3) - REQUEST FOR ADDITIONAL INFORMATION RELATED TO REVISION TO FACILITY OPERATING LICENSE AND TECHNICAL SPECIFICATIONS - EXTENDED POWER UPRATE REQUEST (TAC NO. MC1355) AND ALTERNATE SOURCE TERM REQUEST (MC3789)

Dear Mr. Venable:

By letter dated November 13, 2003, as supplemented by letters dated January 29, March 4, April 15, May 7, May 12, May 13, May 21, May 26, July 14, July 15, July 28, August 10, August 19, August 25, September 1, and September 14, 2004, Entergy Operations, Inc. proposed revisions to the Waterford 3 Operating License and Technical Specifications, which would allow an increase in the rated power from 3,441 megawatts thermal (MWt) to 3,716 MWt. The July 15, August 19, and September 1, 2004, supplements related to your request for approval to implement an alternate source term for calculating offsite doses and doses to control room personnel and was merged with your November 13, 2003, application for a power uprate.

After reviewing your request, the Nuclear Regulatory Commission staff has determined that additional information is required to complete the review. We discussed this information with your staff by telephone and they agreed to provide the additional information requested in the enclosure within 30 days of receipt of this letter.

If you have any questions, please call me at (301) 415-1480.

Sincerely,

/RA/

N. Kalyanam, Project Manager, Section 1
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-382

Enclosure: Request for Additional Information

cc w/encl: See next page

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REQUEST FOR ADDITIONAL INFORMATION

ENTERGY OPERATIONS, INC. (ENTERGY)

WATERFORD STEAM ELECTRIC STATION, UNIT 3 (WATERFORD 3)

DOCKET NO. 50-382

Questions from Containment and Accident Dose Assessment branch:

July 15, 2004, Alternate Source Term (AST) Submittal:

1. How were the values in Table 1-1.A, “Core Inventory for Steaming Events,” determined?

2. Table 1-2 lists the secondary coolant mass for two conditions.

   A. Are these mass values per steam generator (SG) or the total mass for both SGs?
   B. Is this the liquid mass only, or does it include the mass of the steam in the secondary system?
   C. What values are used for secondary coolant mass in each SG for each of the design basis accident (DBA) dose analyses that assume a steaming release from the secondary coolant system?

3. What is the assumed value of the reactor coolant system mass for each of the DBA dose analyses that assume primary to secondary leakage and a steaming release from the secondary coolant system?

4. The DBA control room habitability analyses take credit for the operators manually selecting, at 2 hours, the intake with the lesser amount of radioactivity entering, as per NUREG-0800, "Standard Review Plan," (SRP) Section 6.4. This credit uses the atmospheric dispersion factor (X/Q) for the more favorable intake reduced by a factor of 4, and is subject to some limitations as discussed in SRP 6.4 and Regulatory Guide (RG) 1.194.

   A. Are the two control room intakes in different wind direction windows?
   B. Are there redundant, engineered safety feature-grade radiation monitors within each intake with control room indication and alarm?
   C. Are there procedures and training to direct the control room operators to select the least contaminated outside air intake and to take steps to monitor to ensure the least contaminated intake is in use throughout the event?

Loss of Coolant Accidents (LOCAs):

5. What is the basis for the assumed reduction in the sprayed fraction of containment from 0.85 to 0.80? Is this change based on a revised analysis of the sprayed volume of containment?

ENCLOSURE

6. What is the basis for the assumed removal coefficient for natural deposition of elemental iodine of 0.4 per hour?

7. For the large break LOCA (LBLOCA) emergency core cooling system (ECCS) leakage release pathway analysis, what input value is assumed for the sump volume or mass? What is the basis for this value?

8. The small break LOCA (SBLOCA) secondary containment steaming pathway analysis assumes a reduced primary-to-secondary leakage at the Technical Specification (TS) limit of 75 gallons per day (gpd), as proposed for the extended power uprate (EPU) amendment request (TAC MC1355). The current TSs limits are 1 gallon per minute (gpm) total primary to secondary and 720 gpd through any one SG. This amounts to almost a factor of 10 reduction in the allowed leakage. Does the 75 gpd primary-to-secondary leakage assumed in the dose analysis bound the expected leakage due to the SBLOCA?

Inside Containment Main Steam Line Break (MSLB):

9. The inside containment MSLB analysis assumes primary-to-secondary leakage of 540 gpd through the faulted SG and 150 gpd for the unaffected SG for this accident, whereas the newest proposed TS limit for the EPU submittal is 75 gpd primary-to-secondary leakage through any SG.

   A. What is the basis for the faulted SG leakage value of 540 gpd?
   B. What amount of leakage could be expected through the SG tubes on the affected SG for a postulated MSLB inside containment? Does the 540 gpd primary-to-secondary leakage assumed in the dose analysis bound the expected leakage?
   C. Considering that the calculated control room dose is fairly close to the limit, how much primary-to-secondary leakage can be tolerated for this accident without going over the 10 CFR 50.67 and General Design Criterion (GDC)-19 total effective dose equivalent (TEDE) limit of 5 rem in the control room?

Steam Generator Tube Rupture (SGTR):

10. On page 44 of the submittal, the timeline for the SGTR accident indicates that the operator would open the atmospheric dump valve (ADV) on the affected SG as needed after 6.6 hours. This later steaming release is not accounted for in the dose analyses of the SGTR accident. Revise the analysis of the SGTR to include the release from the affected SG ADV after 6 hours.

11. On pages 48 and 49 of the submittal, the calculation of scaled effective control room X/Qs is discussed. The table on page 49 includes the base control room X/Qs used in the calculation.

   A. The 2 - 8 hr X/Q for “SG_1 to MCR” [main control room] is not the same value as appears in the table in the middle of page 48 for “East ADV to West MCR Air

Intake," which the staff assumes is the same source-receptor pair. Should these be the same value?

B. The 2 - 8 hr X/Q for "SG_2 to MCR" is not the same value as appears in the table in the middle of page 48 for "West ADV to West MCR Air Intake," which the staff assumes is the same source-receptor pair. It instead appears to be unchanged from the 0 - 2 hr "SG_2 to MCR" X/Q value. Although it results in a conservative dose, why was this X/Q unchanged?

12. Provide the calculated value for the control room dose due to the SGTR with accident-induced iodine spiking.

Outside Containment MSLB:

13. The analysis of the MSLB outside containment assumes increased primary-to-secondary leakage of 540 gpd through the faulted SG and 150 gpd for the unaffected SG for this accident, whereas the newest proposed TS limit for the EPU submittal is 75 gpd primary-to-secondary leakage through any SG.

    A. What is the basis for the faulted SG leakage value of 540 gpd?
    B. What amount of leakage could be expected through the SG tubes on the affected SG for a postulated MSLB outside containment? Does the 540 gpd primary-to-secondary leakage assumed in the dose analysis bound the expected leakage?
    C. Considering that the calculated control room dose is fairly close to the limit, how much primary-to-secondary leakage can be tolerated for this accident without going over the 10 CFR 50.67 and GDC-19 TEDE limit of 5 rem in the control room?

<u>August 18, 2004, Supplement:</u>

No questions

<u>September 1, 2004, Supplement 2:</u>

Revised LBLOCA :

14. The LBLOCA and the LBLOCA shine analyses both have a reduced assumption for ECCS leakage of 0.5 gpm, which was previously 1 gpm. What is the basis for this change?

15. The questions above (5, 6, and 7) for the July 15, 2004 AST submittal LBLOCA analysis still apply to the revised LBLOCA analysis.

LBLOCA shine calculation:

16. With regard to the RADTRAD calculations performed to provide source term input for the LBLOCA shine calculations in MicroShield, besides the changes noted in Section 5 of the September 1, 2004, supplement, are there any other differences as compared to

the DBA LBLOCA containment release pathway assumptions, as discussed in Section 4 of that supplement?

17. What is the basis for assuming a reduced flashing fraction in the ECCS leakage pathway analysis for the shine dose source term calculations, as compared to the analysis performed to determine the inhalation and submersion dose for the LBLOCA?

18. Page 12 of the September 1, 2004, supplement to the AST amendment request provides a constant enthalpy calculation of the maximum flashing fraction, based on the maximum ECCS fluid temperature. The filter shine dose analyses assumed a flashing fraction value of 2%, based on the result of this calculation multiplied by a factor of 10. Section 5.5 of Appendix A of RG 1.183 states that for leakage with temperatures less than 212 °F or for calculated flashing fractions less than 10%, the airborne iodine should be assumed to be 10% of the total iodine activity in the leaked fluid, unless a smaller amount can be justified, based on the actual sump pH history and area ventilation rates. Provide the justification for the lower flashing fraction value based on the actual sump pH history and area ventilation rates. Consider also the projected pH of the ECCS leakage and area ventilation rates for the DBA LBLOCA.

19. Provide the isotopic source terms used as input to each of the filter shine calculations, the direct containment shine calculation, and the external plume shine calculation.

20. Was cesium included in the filter shine source terms? If not, why wasn't shine dose from deposition of radioactive cesium in the filters considered?

21. Provide assumptions and inputs for each of the shine dose analyses performed in MicroShield. This should include, but is not limited to, assumptions on shielding, geometry, source type, and location and receptor location, along with their bases. Provide plant plans that identify the assumed shine sources and control room receptor point locations for the 3 filter shine dose analyses (shield building ventilation system, controlled ventilation areas system, and control room emergency air recirculation system), the direct containment shine dose analysis, and the external plume shine dose analysis.

Questions from Materials and Chemical Engineering branch:

22. In order to complete its evaluation, the staff needs to review the general assumptions and calculations used by the licensee to demonstrate that the containment sump pH will be maintained above 7 throughout the duration of the accident. Please describe the procedure utilized for calculating pH of the containment sump water during the 30 day period after a LOCA. Please provide the inputs to the STARpH 1.04 code and the results calculated by it.

23. SRP 6.5.2, "Containment Spray as a Fission Product Cleanup System," states that the removal of iodine from the containment is achieved during injection and recirculation phases. In your submittal, only the elemental and particulate iodine removal coefficients are discussed. The staff assumes these are the coefficients for the injection phase. Please discuss the technical basis for only calculating the elemental and particulate iodine removal coefficients during injection.

24. The SRP states that the maximum value of decontamination factor (DF) for elemental iodine should not exceed 200. However, if the calculated value of DF is less than 200, this value should be used in the analysis. In order for the staff to verify that the calculated value of DF is not less than 200, please provide the method used in calculation and the values of the corresponding input parameters.

25. In order to complete its evaluation, the staff needs to review the calculation of the natural deposition removal coefficient of elemental iodine during injection. Please provide the input parameters used to calculate the natural deposition removal coefficient for elemental iodine.

Waterford Steam Electric Station, Unit 3

cc:

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