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Docket Nos. 50-263
50-237
50-220

Donald J. Skovholt, Assistant Director for Operating Reactors, L

TECHNICAL ASSISTANCE REQUEST NOS. ORB-2-78 (TR-634), ORB-2-79 (TR-635), AND ORB-2-70 (TR-636)

Plant Name: Monticello, Dresden Unit-3, and Nine Mile Point-1
Docket Nos: 50-263, 50-237, and 50-220
Licensing Stage: OL
OL
POL
Project Leaders: J. J. Shea, ORB #2
R. D. Silver, " "
C. J. Debevac, " "
Technical Review Branches: Reactor Systems and Core Performance Branches
Requested: November 16, 1973
Response Date: December 15, 1973
Review Status: Awaiting Information

Attached are questions prepared by the Reactor Systems and Core Performance Branches relating to Section 3, 4 and 5 of NEDO-20103. These questions apply generically to General Electric 8x8 fuel assemblies being used as reload assemblies. In addition to the attached questions relating to Section 3, the information requested in questions 3.69 and 4.13 through 4.46 relating to GESSAR and transmitted to GE on November 1, 1973, is also required. The response to these GESSAR questions is scheduled for December 17, 1973.

Victor Stello, Jr., Assistant Director
for Reactor Safety
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Enclosure:
Questions

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Distribution
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DATE ▶	11/23/73	11/23/73	11/23/73			

8x8 BWR RELOAD FUEL NEDO-20103

Section 3.0 Mechanical Design

3.1 Provide an assembly drawing of the fuel assembly and, if necessary for completeness and clarity, detail drawings of components. The drawing should be similar to Figure 4.2-2 in GESSAR, but the following additional information should be provided:

(a) Dimensional tolerances

(b) Fuel pellet dimensions, including pellet length, edge chamfer and end dishing.

(c) Filler gas pressure and composition, including water vapor and other impurity content.

(d) A description of the getter, including the volume, weight, surface area and alloy constituents.

(e) Water rod dimensions, including diameter, wall thickness and number, location and size of vent holes.

3.2 For tables 3-3, 3-4, 3-5 and 3-6 of NEDO-20103, provide the dimensions of the edge chamfer and end dish of the pellets in each type of rod. For tables 3-3 and 3-5 provide the mean density of the pellets in each type of rod. For Table 3-4, provide the fuel rod diameter, clad thickness, pellet-to-clad gap, active fuel length, plenum volume, and maximum linear heat generation rate for each type of rod.

3.3 Provide the basis for the statement that the flow-induced fuel rod "vibrational amplitude" does not exceed 0.002 inch (Section 3.2.9). Describe the tests and analyses of flow-induced vibration in an 8x8 assembly which have been performed.

3.4 Describe the tests of 8x8 fuel assemblies mentioned in Section 3.2.10 which "have been conducted both out of reactor as well as in reactor." Provide the results of "All tests and post-irradiation examinations" which have indicated that fretting corrossion does not occur."

3.5 Describe the post-irradiation surveillance program planned for the 8x8 reload assembly. Describe the proposed tests and inspections, the number of rods and assemblies involved, and the exposure and time-in-reactor of the assemblies.

Section 4 Thermal-Hydraulic Characteristics

4.1 Demonstrate that the referenced CHF correlation is applicable to an 8x8 assembly. Compare the available data from full scale tests of 8x8 bundles to the preductions based on this referenced correlation. From the test data which most closely approximates the conditions in the hot assembly at normal full power operation, estimate the bundle power which will produce the onset of transition from nucleate boiling. Compare the test parameters with expected operating conditions (e.g., bundle power and flow, inlet enthalpy, axial and local power peaking factors).

4.2 Describe the methods used to calculate the steady state flow distribution in terms of mass velocity between 8x8 and 7x7 assemblies. Estimate the error in calculating the flow in an 8x8 assembly relative to a 7x7 assembly. Provide the basis for this estimate.

4.3 Explain the difference between the tests "performed in single-phase water to calibrate the orifice and tie plate and in both single-and two-phase flow to arrive at best-fit design values for spacer and upper tie plate pressure drop" (Section 4.1.1.2 of NEDO 20103) and the full scale 8x8 tests" performed to determine the local loss coefficients for upper and lower tie plates and fuel rod spacers." Compare the results of these tests to each other and to the pressure drop at various flows and powers calculated using the standard design method.

4.4 For the hot 8x8 and 7x7 assemblies, provide the flow rate, bundle power, axial and local peaking and exit void fraction at normal full power operation.

4.5 Provide the design correlations, including all constants, used to calculate the friction factor, two-phase friction multiplier and two-phase local multiplier described in Sections 4.1.1.1 and 4.1.1.2 of NEDO-20103.

8x8 BWR RELOAD FUEL NEDO-20103

Section 5 Nuclear Characteristics

5.1 Provide comparisons of calculated parameters (e.g., relative power and reactivity coefficients) with experimental observations (critical facilities and reactor irradiation) for the cores referred to in Section 5.2 of NEDO 20103 which contain:

(1) mixtures of 6x6 and 7x7 bundles,

(2) mixtures of 8x8 and 9x9 bundles, and

(3) only 7x7 bundles.

5.2 Define the terms "controlled" and "uncontrolled" used in Figure 5.2 of NEDO-20103. Provide comparisons of multiplication factors as functions of void fraction similar to Figure 5.2 for the 50% controlled case.

5.3 Provide the assumptions and bases used to calculate the maximum local peaking as a function of exposure as shown in Figure 5.7 of NEDO-20103, (e.g., was an infinite lattice of one bundle type assumed; what value of void fraction, what control rod program and gadolinia distribution were assumed?) Explain why the variation in maximum local peak with exposure is different for the two lattices.

5.4 What would be the initial value of maximum local peaking immediately after loading and the variation with exposure if, 1) fresh 8x8 bundles were reloaded and, 2) fresh 7x7 bundles were reloaded?

5.5 What is the maximum expected exposure of a six inch axial segment of 1) the 7x7 bundles which remain in the core, 2) the 8x8 bundles which are to be loaded in the core and 3) fresh 7x7 bundles which could be loaded in lieu of 8x8 bundles. If greater than 22 GWd/t, provide the maximum local peaking factor for each type of bundle out to its maximum exposure.

5.6 Provide the expected operating power level as a function of exposure of 1) the 8x8 bundles and, 2) the 7x7 bundles which could have been used in lieu of 8x8 bundles.

5.7 If fuel shuffling is to be done, describe the procedures to be used. What calculations are done to a) determine local and gross peaking factors, b) verify shutdown margin and, c) determine weighting factors used in calculating behavior following accidents involving significant spatial effects, such as a rod drop accident