June 5, 2001

MEMORANDUM TO: Stuart A. Richards, Director
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

FROM: Jack Cushing, Project Manager, Section 2 ***/RA/***
Project Directorate IV
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SUBJECT: SUMMARY OF MEETING HELD ON MAY 21, 2001, WITH WESTINGHOUSE REGARDING ZIRLO™ TOPICAL REPORT

On May 21, 2001, the staff held a public meeting with Westinghouse at the Nuclear Regulatory Commission (NRC) headquarters in Rockville, Maryland. Portions of the meeting involved discussions of proprietary information. These portions were closed to the public. The purpose of this meeting was to discuss the review of CENPD-404-P, Rev 00, "Implementation of ZIRLO™ Cladding Material in CE Nuclear Power Fuel Designs." Attachment 1 lists the meeting participants. Below are the areas that the staff discussed with Westinghouse. The staff plans to issue a request for additional information (RAI) covering these areas in the near future.

1. Figure 3.4-2 on page 18 of CENPD-404-P, shows modified fuel duty index vs. measured oxide thickness. Please provide the details of the measurements shown. Will the CE plants limit fuel duty index until actual corrosion data is obtained for ZIRLO™ in CE plants?

2. Page 3-6, first sentence, "Full batch implementation of ZIRLO™ may be implemented for the following CENP 14X14 and 16X16 fuel designs." Is this application for use of ZIRLO™ cladding in CE fuel assembly designs for the designs listed or for all designs, present and future?

3. Section 3.6.1 clearly states that approval is sought to 60MWd/kgU; thus this review will be limited to burnups to 60MWd/kgU, and the safety evaluation (SE) will limit burnups to 60MWd/kgU.

4. Page 4-4, last sentence before Section 4.3.1; specifically what dimensional characteristics will differ for those of OPTIN?

5. Page 4-14, Equations 4-23 and 4-24 do not appear to be "nearly identical" as stated. Please provide justification for the statement.

6. On pages 4-15 through 4-17, please provide additional justification for using Equations 4-27, 4-30, and 4-32.

7. On page 4-18, last sentence, first paragraph, please provide a table comparing thermal and mechanical properties to justify the statement.

8. At the May 16, 2001, Westinghouse Fuel Performance Update Meeting, results of the LOCA basis testing of ZIRLO™ cladding were presented. Please provide more details of these tests including the optical metallography and hydrogen concentration measurements.

9. Please provide details of the root cause investigation of the Ft. Calhoun fuel fretting. In particular, please address why a similar problem will not occur with ZIRLO™ implementation in CE nuclear power fuel designs.

10. NRC safety evaluations (SEs) of WCAP-12610, Appendices F and G, dated October 9, 1991, addressed application of approved large break loss-of-coolant accident (LBLOCA) and small break loss-of-coolant accident (SBLOCA) analysis methodologies to cores containing ZIRLO™ fuel. These SEs state that Appendix K LOCA methodologies may (should) retain the Appendix K treatment of material properties, such as the Baker-Just equation, when prescribed by Appendix K and justified as suitably conservative. The SEs did not say that it is appropriate to use properties of Zircaloy in analyses of ZIRLO™, or that it is appropriate to use the properties of ZIRLO™ in analyses of Zircaloy. The SEs also state that ZIRLO™ and Zircaloy are sufficiently alike that when performing LOCA analyses of cores containing both ZIRLO™ and Zircaloy in assemblies with like features (geometry), no mixed-core penalty need be applied.

    The above-referenced document implies the intention to perform LOCA analyses assuming a representative fuel combining various properties from both fuel cladding types. This is not the intention of the NRC SE. Each fuel must be analyzed separately to identify the limiting fuel type, which could conceivably change in subsequent fuel cycles. Also, in the case of a change in limiting fuel type, the limiting fuel could approach the 10 CFR 50.46 reporting requirements as well. Please clarify the intention in the document referenced above.

11. In Equation 3-1, provide detailed information to show how the Tavg is obtained.

12. The corrosion measurement technique and data acquisition including uncertainty can vary from vendor to vendor. Are there any differences between Westinghouse and CE; if yes, please provide both results for comparison.

13. There is a 100 microns corrosion limit for Westinghouse design. What is the CENP corrosion limit for this report?

14. Provide a derivation of Mt in Equation 3-2.

15. Sections 4.3.3 and 4.3.4 show that CENPD will use the old correlations from FATES3B rather than those from ZIRLO™ properties. Please provide comparison plots for these properties.

16. Provide results of FATES3B licensing calculations of fuel centerline temperature, power-to-melt, strain limit, rod and assembly growths, creep collapse, delta P beyond the system pressure, and LOCA initial conditions for both Zircaloy and ZIRLO™ claddings in typical CENPD fuel designs and maximum/nominal power histories.

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Attachment: Meeting Participants

cc w/att: See next page

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MEETING WITH WESTINGHOUSE REGARDING ZIRLO™ TOPICAL REPORT

MAY 21, 2001

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