March 10, 2010

MEMORANDUM TO: Stewart N. Bailey, Senior Project Manager
Plant Licensing Branch II - 2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

FROM: Aladar A. Csontos, Chief ***/RA/***
Component Integrity Branch
Division of Engineering
Office of Nuclear Regulatory Research

SUBJECT: REQUEST FOR INFORMATION REGARDING AMERICAN SOCIETY OF MECHANICAL ENGINEERS BOILER AND PRESSURE VESSEL CODE, SECTION XI, "SPIRIT OF APPENDIX VIII" INSPECTION OF THE BROWNS FERRY REACTOR PRESSURE VESSEL

I am requesting that the Tennessee Valley Authority (TVA) provide certain information as described below regarding an inspection of a Browns Ferry Nuclear Station reactor vessel conducted in the mid-1990s that was referred to as a "spirit of Appendix VIII" inspection. The NRC staff believes that the results of the "spirit of Appendix VIII" inspection would be highly useful to the staff in conducting the nondestructive examination (NDE) capability study relative to Title 10 of the *Code of Federal Regulations* 50.61 (10 CFR 50.61), "Fracture toughness requirements for protection against pressurized thermal shock events."

The U.S. Nuclear Regulatory Commission (NRC) is conducting research to re-evaluate the technical basis for 10 CFR 50.61. Based on experimental data, calculations, and expert judgment, it has been concluded that the risk of through-wall cracking due to pressurized thermal shock events is low. Nonetheless, localized embrittlement of the walls of reactor pressure vessels (RPV) from neutron radiation occurs. If an embrittled RPV had an existing flaw of critical size and certain severe system transients were to occur, this flaw could very rapidly propagate through the vessel, resulting in a through-wall crack that could challenge the integrity of the RPV.

Based on the technical basis developed by the Office of Nuclear Regulatory Research (RES), the Office of Nuclear Reactor Regulation (NRR) developed a new, voluntary option (10 CFR 50.61a). Licensees may choose to use the new rule or continue to use 10 CFR 50.61. The new rule requires a plant-specific evaluation of the degree of vessel embrittlement. The new rule also requires that licensees intending to implement 10 CFR 50.61a perform inspections and analyses to verify that the flaw distributions in their vessels are consistent with those used by the NRC staff in the Pressurized Thermal Shock (PTS) Reevaluation Project.

The flaws of concern for PTS are smaller in size than those usually addressed in American Society of Mechanical Engineers (ASME) Code, Section XI inspections of the vessel. The NRC staff believes that current inspection capabilities are sufficient to characterize the flaw distributions of interest, but no documentation of this conclusion is available. To aid in the implementation of the rule, the NRC staff is undertaking an effort to verify and document the capability of NDE procedures that will be used to characterize the flaw distributions in reactor vessels.

The ASME Code, Section XI, Appendix VIII, contains requirements for qualifying inspection systems. The NRC incorporated Appendix VIII into the regulations in 1999. In the mid-1990s, TVA conducted an inspection of a Browns Ferry reactor vessel that was referred to as a “spirit of Appendix VIII” inspection. The procedures that were used for this examination included steps requiring the recording of small flaws that are in the range of concern for PTS. The staff believes that the results of the “spirit of Appendix VIII” inspection would be highly useful to the staff in conducting the NDE capability study for 10 CFR 50.61a. Therefore, the staff is requesting that the following information be provided:

1. A brief explanation of why TVA called the inspection a "spirit of Appendix VIII" vessel inspection;

2. The inspection procedures that were used for the "spirit of Appendix VIII" vessel inspection;

3. The calibration set up procedures;

4. The inspection results in terms of indications recorded, including as available, the sizes, locations, orientations; and

5. Any documentation that is available on the basis for dispositioning the indications and the results.

If you have any questions on this request, please call the RES project manager for the PTS NDE issue, Mr. Wallace Norris, at (301) 251-7650.

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