August 26, 2002

Martin W. Schwartz
2244 University Ave.
Sacramento, CA 95825

Dear Dr. Schwartz:

Thank you for your letter of July 16, 2002, which followed up your previous letter of June 3, 2002, regarding recommended design changes to mitigate the problem of primary water stress corrosion cracking (PWSCC) of Alloy 600 nozzles. Your letters correctly identify key principles necessary to properly understand and improve the current design of safety-related nuclear power plant components. Specifically, material selection is critical in the design of these nozzles. In accordance with that principle, new designs for replacement reactor pressure vessel heads will have Alloy 690 nozzles and equivalent weld materials. In addition, we agree that conformance to the recommendations of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code is necessary, but may not always be sufficient to minimize uncertainties inherent in the design and analysis.

As you are well aware, the NRC is a regulatory agency and does not engage in, nor does it dictate, the detailed design of safety-related nuclear power plant components. In this regard, the NRC's role is limited to ensuring that corrective actions proposed by the FirstEnergy Nuclear Operating Company meet regulatory requirements and provide adequate safety for the public. Specifically, NRC inspectors, under the auspices of the Inspection Manual Chapter 0350 Panel, will ensure that the Midland reactor pressure vessel head meets the requirements of the original ASME Code of construction.

Your most recent letter questions whether there is sufficiently reliable data on Alloy 690 to assure the public that it will make a significant improvement in performance. The data available for this material and worldwide operating experience indicate that Alloy 690 is highly resistant to PWSCC. For example, 46 domestic and foreign plants have replaced their steam generators using Alloy 690 tubes. Operating experience for these replacement steam generators (from 1989 until the present) indicate no occurrence of PWSCC. Significant amounts of data have been generated under the sponsorship of the NRC and by the industry. In terms of reactor pressure vessel upper head nozzles, it is well known that EdF (Electricite de France) has replaced approximately 75 percent of its reactor pressure vessel heads with Alloy 690 materials using essentially the same configuration, e.g., equivalent to Fig. NB-4244(d)2c. Other foreign utilities have followed suit. Meanwhile, more data relevant to these nozzles (including appropriate stress intensity levels) is being obtained via NRC and industry supported testing.

In summary, the NRC believes that in terms of design requirements, the focus on material selection is the right course of action. In addition, more frequent and effective inspections, as recommended in NRC Bulletins 2002-01, "Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity," and 2002-02, "Reactor Pressure Vessel Head and Vessel Head Penetration Nozzles Inspections Programs," will manage any degradation that may occur. Your specific recommendations regarding improved design concepts would be best

addressed to the respective owners groups and ASME Code Committees for their consideration for next generation designs.

Thank you for your interest in these important matters. If you have any further questions, please contact me.

Sincerely,

/RA/

Anthony J. Mendiola, Section Chief
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

may occur. Your specific recommendations regarding improved design concepts would be best addressed to the respective owners groups and ASME Code Committees for their consideration for next generation designs.

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Sincerely,

/RA/

Anthony J. Mendiola, Section Chief
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