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Director, Nuclear Reactor Regulation
United States Nuclear Regulatory Commission
Washington, DC 20555

Attention: Document Control Desk

Subject: Dresden Nuclear Power Station Units 2 and 3.
NRC Docket Numbers 50-237 / 249
LPCI and Core Spray Pump Casing Fracture Toughness.

References:
1. D. Muller (NRC) letter to T. Kovach (ComEd) dated May 1, 1989
2. I. Johnson (ComEd) letter to T. Murley (NRC) dated January 6,1989
3. T. Rausch (ComEd) letter to P. O'Connor (NRC) dated November 22, 1982

The purpose of this letter is to document an inconsistency in the design criteria used to resolve Systematic Evaluation Program (SEP) Topic III-1 between the NRC prepared Safety Evaluation (Reference 1) and the ComEd basis contained in various sections of the Updated Safety Analysis Report (i.e., 6.1.1.1). SEP Topic III-1 addressed seismic and quality classification of components. It compared the Code requirements that the component was originally purchased to the requirements of the Code in effect at the time of the SEP. The specific item being addressed by this letter is the fracture toughness of the LPCI and Core Spray pump casings and the Lowest Service Temperature (LST) at which they meet the requirements of the applicable Code.

The inconsistency between the SER and the UFSAR is due to an incorrect minimum temperature of 60F that was contained in Reference. 2. The minimum design temperature of these systems is 40F. This temperature is contained in the original design specifications prepared by GE. This was based on original plant design. Water for surveillance testing of these systems was to be taken from an outside storage tank with a minimum temperature of 40F. Reference 3 correctly indicated the minimum operating temperature of these pumps and this value is shown in section 6.1.1.1 of the UFSAR concerning material selection and fabrication It is unclear at this time why the incorrect temperature of 60F was provided in Reference 2, but the conclusions as to the acceptability of design presented by ComEd in this letter do not depend on this value.

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The NRC SER which closed this issue was based on a minimum operating temperature of 60F, which would have exempted the material from testing. ComEd had consistently presented to the NRC, over the course of resolving this issue, code interpretations based on the use of 40F to demonstrate that the pump material meets Code of construction as well as later Code fracture toughness requirements. When this inconsistency in the temperature was identified, ComEd immediately prepared an Operability Evaluation per station procedures. This evaluation supports our previous code interpretations that these systems meet material requirements at the design minimum temperature of 40F.

The pumps were built and tested in accordance with the code in effect at the time of purchase, however certain original test documentation could not be retrieved during the SEP. Because the material test results for these pump casings (A216 Grade WCB), are not available to demonstrate sufficient fracture toughness, NUREG-0577, Revision 1, defines the procedure to establish the Nil-Ductility-Temperature (NDT), and provide assurance against brittle failure. NUREG-0577, Revision 1 states that adequate fracture toughness exits if the LST is greater than the material NDT plus the temperature margin defined in Figure 1(of NUREG-0577).

The NDT evaluation procedure in NUREG-0577 requires the estimated NDT value for the pump casing material be obtained from NUREG/CR-3009, and defines estimated NDT as the mean NDT plus 1.3 standard deviations. NUREG/CR-3009 documents the results of a study performed by Sandia National Labs which collected Charpy V-notch (CVN), test data on A216 grade WCB material. The average NDT, based on a 20 ft-lb_f CVN criterion, and the standard deviation from a normal distribution of this data is provided in Table 4.4. For A216 as heat treated material with wall thickness 1" and less, the NDT and standard deviation was determined to be -6F and 12F respectively. Based on this distribution, the NDT of 10F is a reasonable estimate of the NDT for the LPCI and Core Spray pump casings. The temperature margin required by NUREG-0577, Revision 1, Figure 1 is 30F for a shell thickness of less than 2½ inches. Since the LPCI and Core Spray pump casings are 13/16 inch thickness, the NDT plus temperature margin equates to 10F + 30F resulting in 40F.

The material fracture toughness requirements of the ASME Section III code, 1989 edition, for class C components, exempts materials from impact testing in ND-2311(a). In subparagraph ND-2311(a)(1), components with nominal thickness 5/8 inch and less are exempt from impact testing requirements. ND-2311(a)(1)(a) defines nominal thickness for pumps as the largest nominal pipe wall thickness of the connecting pipes. Because the largest connecting pipe wall thickness for the LPCI and Core Spray pumps is 3/8 inch, the pump casings are exempt from impact testing requirements and the material fracture toughness requirements are met for this Code edition.

ND- 2311(a)(8) of the referenced code also provides an exemption from material impact testing for components with an LST equal to or greater than the temperature specified in Table ND-2311-1 for the pump casing material. Per Table ND-2311-1, the LST must be equal to or greater than 30F for SA 216 Grade WCB material. Since the LST for these pumps was defined as 40F by GE, the material fracture toughness requirements of the ASME Section III code would be met without impact testing.

These ASME Section III code impact test exemptions reflect the impact of product thickness on fracture toughness and the code consensus on NDT for SA 216 Grade WCB material. The results of the Sandia National Laboratory study and these code directions provide reasonable justification for defining the LST of the core spray and LPCI pump casings as 40F.

If there are any questions regarding this issue please contact Frank Spangenberg Dresden Station Regulatory Assurance Manager, at (815) 942-2920, ext. 3800

Sincerely,

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