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EF2 - 57,987

Mr. B. J. Youngblood
U. S. Nuclear Regulatory Commission
Licensing Branch No. 1
Division of Licensing
Washington, D. C. 20555

Dear Mr. Youngblood:

References: (1) Enrico Fermi Atomic Power Plant, Unit 2
NRC Docket No. 50-341
(2) Letter of May 5, 1982, B. J. Youngblood
to H. Tauber

Subject: Errors in BWR Water Level Indication

This is in response to your letter of May 5, 1982 regarding errors in BWR water level indication.

Reactor vessel water level indication is accomplished on BWR designs by employing the hydraulic differential pressure measurement method. The particular design implemented on Fermi 2 is the cold reference leg design. Condensing chambers connected to the steam space in the vessel are used to generate a fixed reference level for the cold reference leg. Pressure taps at different elevations in the water space of the vessel are employed as the variable leg of each differential pair. No hydraulic connection or path exists normally between the two differential legs of the measurement at the instrument end. Each leg includes a restriction orifice near the primary coolant pressure boundary and an excess flow check valve at the primary containment wall. The differential pressure instruments are mounted on racks which are located in the reactor building near the drywell wall.

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The Fermi 2 design utilizes two types of level transmitters, the Rosemount 1151 series and the General Electric GE-MAC 555. The Rosemount is a capacitive sensor design with a 4 to 20 milliampere output, and the General Electric is a bellows/force balance primary sensor design with a 10 to 50 milliampere output span. The level instrument designations and arrangements are shown on Figure 7.3-9 of the FSAR. All of the Fermi level indicators are referenced to the top of active fuel as discussed in Section H.II.K.3.27 of the FSAR.

Reactor vessel taps, lines, racks and instruments are divided into two divisional groups to maintain spatial diversity. The ability of the ECCS systems to withstand a single failure is dependent upon the physical separation inherent in the level sensing logic design.

In order to minimize the effects of drywell temperature changes, each pair of sensing lines is run with approximately equal vertical drops within the drywell. This approach essentially eliminates the effect of drywell temperature changes on level by producing a self-compensating effect. A further measure to preclude potential level measurement errors is limiting the vertical drop of both sensing lines within the drywell. Only the amount of slope necessary to assure self-venting of the lines is maintained within the drywell. As a result, the potential error due to a loss of liquid in the sensing lines is minimized. The nominal level sensing line vertical drop in the drywell is sixteen inches. This distance is measured from vessel tap elevation to the drywell penetration.

As a result of the preceding design features, drywell temperature effects on level instruments are judged to be very minor. Potential for instrument line vaporization (flashing) is very nearly zero due to the fact that cold reference leg designs have a saturation pressure of 118 psia when the drywell is at the maximum predicted temperature of 340°F.

An analysis of the potential failures which result in high drywell air temperatures has been performed by General Electric Company and the results published in NEDE-24801, "Review of BWR Reactor Vessel Water Level Measurements". This report concludes that the cold reference leg level measurement design with parallel lines in the drywell and restricted vertical drop will

perform adequately under any postulated degradation without further modification. In addition, the Fermi 2 level measurement system includes a degree of enhancement to allow the plant to withstand failures beyond the design basis as discussed in Section 2.4 of the NEDE report.

Edison has concluded that supplemental procedures in addition to those presently developed in response to the emergency procedure guidelines are not necessary.

Should you have any additional questions, please contact L. E. Schuerman, (313) 649-7652.

Sincerely,

Harry Tauber

cc: L. L. Kintner
B. Little