



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20545

REVISED SAFETY EVALUATION REPORT

DUKE POWER COMPANY

MCGUIRE NUCLEAR STATION, UNITS 1 AND 2

DOCKET NOS. 50-369 AND 50-370

CONFORMANCE TO REGULATORY GUIDE 1.97

FOR SG LEVEL MONITORING

1.0 INTRODUCTION

By letter dated August 17, 1987, Duke Power Company (the licensee) submitted a request for a deviation from the recommendations of Regulatory Guide (R.G.) 1.97, Revision 2, relating to the wide-range steam generator level instrumentation. Conformance to RG 1.97 is required by NUREG-0737 Supplement 1, transmitted by Generic Letter 82-33.

R.G. 1.97 recommends that Category 1 steam generator level instrumentation be provided, with a range from the tube sheet to the separators (wide range), to monitor the operation of each steam generator.

The licensee has proposed the use of the existing Category 1 narrow-range steam generator level instrumentation to meet the R.G. 1.97 criteria for wide-range steam generator level monitoring. Additionally, upgrading of the qualifications of the wide-range monitors is planned at the end of cycle 5 refueling outages of each McGuire unit.

2.0 EVALUATION

McGuire has four redundant, safety-related channels of narrow-range level instrumentation per steam generator. The instrumentation is powered by Class 1E buses. Transmitters and the electronics are environmentally and seismically qualified. Control room indicators are provided for each channel and are the same device as used in safety-related circuits. Each steam generator has one channel recorded. Three channels per steam generator are also available on the plant computer.

The licensee's current wide-range steam generator level instrumentation detects level from 9 inches above the tube sheet to the separators and does not meet the environmental or seismic qualification criteria for Category 1 instrumentation specified by R.G. 1.97. However, unlike most domestic Westinghouse plants with four steam generators, the licensee's narrow-range steam generator level instrumentation covers a range from five inches above the U-tube bundle to the separators. Most Westinghouse plants with four steam generators have narrow-range steam generator level instrumentation with ranges from approximately twenty-six inches or more above the U-tube bundle to the separators. Thus, because of the larger narrow-range, the McGuire units do not go offscale low on the narrow-range level instrument for a reactor trip not associated with a loss or reduction of main feedwater prior to trip. Additionally, because the narrow-range low level tap is closer to (i.e., only 5 inches above) the top of the U-tube bundle, going off-scale low on this instrument is a more precise indication of the U-tube bundle becoming uncovered.

The licensee's procedures require that if the steam generator level is off the narrow range low, the wide-range steam generator level instrumentation should be used. In addition to serving as backup to the narrow-range instrumentation, wide-range level is used to determine the rate at which to refill a hot, dry steam generator. If the wide-range instrumentation is unavailable or is suspected of failure, the operator is directed to assume hot dry steam generator conditions and to pump water into the steam generator at a reduced rate of 100 gpm, rather than the 450 gpm which would be used if the water level were on-scale of the narrow-range monitor. Also, because of the location of the lower tap for the wide-range level instrumentation, the lower 9 inches of water in the steam generator is conservatively assumed to correspond to an empty steam generator.

The licensee has committed to upgrade the current wide-range steam generator level instrumentation by replacing the existing wide-range steam generator level transmitters, currently located in the containment, with seismically and environmentally qualified transmitters, to be located in the Annulus. This modification will make use of existing impulse lines that are located in the Annulus. These impulse lines are off the same steam generator taps to which the existing transmitters are connected. The channel electronics will be identical to that used for safety-related applications. Power will be supplied by a highly reliable battery backed supply configured in an auctioneering mode with a highly reliable regulated power supply. Control room display will be via seismically mounted indicating recorders. These recorders are made by the same manufacturer as those used in safety-related applications. Indication will also be available through the plant computer.

After the upgrade in qualification of the wide-range steam generator level instrumentation, including the use of a highly reliable backup power source, there will exist a high confidence that the wide-range instrumentation will be available during post-accident conditions. Therefore, we conclude that the licensee's narrow-range steam generator level instrumentation, in conjunction with the upgraded wide-range steam generator level instrumentation, is an acceptable deviation from R.G. 1.97, Revision 2 criteria for wide-range steam generator level monitoring.