UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO TMI ACTION PLAN ITEMS (NUREG-0737)

II.F.1.4 CONTAINMENT PRESSURE MONITOR

II.F.1.5 CONTAINMENT WATER LEVEL MONITOR

II.F.1.4 CONTAINMENT HYDROGEN MONITOR

SURRY POWER STATION UNITS 1 & 2

DOCKET NOS. 50-280 & 50-281

VIRGINIA ELECTRIC AND POWER COMPANY

1.0 BACKGROUND

By our letter of September 5, 1980 (Reference 1) to: (1) licensees of operating plants; (2) applicants for operating licenses; and (3) holders of construction permits; we issued a summary listing of all the approved TMI Action Plan Requirements. In November of 1980 we issued NUREG-0737, Clarification of TMI Action Plan Requirements (Reference 2), which specifies TMI Action Plan Items approved by the Commission for implementation. This Safety Evaluation (SE) addresses three of the TMI Action Plan Items, II.F.1.4, 5 and 6. For Items II.F.1.4, 5 and 6 there is no difference between the hardware being installed in the two plants being reviewed. Therefore the discussion in this SE refers to both plants.

2.0 II.F.1.4: CONTAINMENT PRESSURE MONITOR SYSTEM (CPMS)

2.1 NUREG-0737 CPMS POSITION

A continuous indication of containment pressure shall be provided in the control room of each operating reactor. Measurement and indication capability shall include three times the design pressure of the containment for concrete, four times the design pressure for steel, and -5 psig for all containments.

2.2 NUREG-0737 CPMS CLARIFICATION

(1) Measurement and indication capability shall extend to 5 psia (-10 psig) for subatmospheric containments.

(2) Two or more instruments may be used to meet the range requirements. However, instruments that need to be switched from one scale to another scale to meet the range requirements are not acceptable.

(3) Continuous display and recording of the containment pressure over the specified range in the control room is required.

(4) The accuracy and response time specifications of the pressure monitor shall be provided and justified to be adequate for their intended function.

2.3 SCOPE OF CPMS EVALUATION

The licensee has described its design for the CPMS in References 3 and 4. Our review of the licensee's submittals consisted of the following: (1) checking for deviations from our requirements which are stated in Sections 2.1 and 2.2 above, (2) reviewing the adequacy of the accuracy specifications of the CPMS, and (3) reviewing the adequacy of the response time specifications of the CPMS. The figures quoted herein for system accuracy are the root-sum-square of the module accuracies quoted by the licensee. The accuracy figures are expressed as a percentage of full scale. The figures quoted for response time are the 100% response values. For linear transfer functions we are using the convention that the time for 100% response is four time constants.

2.4 LICENSEE COMPLIANCE WITH NUREG-0737 CPMS REQUIREMENTS

After reviewing the licensee's submittals, we find that the CPMS design meets all the requirements of Sections 2.1 and 2.2 above.

2.5 EVALUATION OF CPMS ACCURACY AND TIME RESPONSE

The CPMS indicator and recorder are separate devices. The CPMS indicators chosen by the licensee have a system accuracy of 1.6% of full scale and a response time of 2.6 seconds. The CPMS recorders chosen by the licensee have a system accuracy of 0.6% of full scale and a system response time which varies between 0.1 second and 1.0 second, increasing with the magnitude of the pressure transient. These values, which are consistent with the present state of the art, will provide information over the intended range of the CPWS that is sufficiently accurate and useful to allow the plant operator to adequately assess pressure conditions within the containment.

3.0 II.F.1.5: CONTAINMENT WATER LEVEL MONITOR SYSTEM (CWLMS)

3.1 NUREG-0737 CWLMS POSITION

A continuous indication of containment water level shall be provided in the control room for all plants. A narrow-range instrument shall be provided for PWRs and cover the range from the bottom to the top of the containment sump. A wide-range instrument shall also be provided for PWRs and shall cover the range from the bottom of the containment to the elevation equivalent to 600,000 gallon capacity. For BWRs, a wide-range instrument shall be provided and cover the range from the bottom to five feet above the normal water level of the suppression pool.

3.2 NUREG-0737 CWLMS CLARIFICATION

(1) The measurement capability of 600,000 gallons is based on recent plant designs. For older plants with smaller water capacities, licensees may propose deviations from this requirement based on the available water supply capability at their plant.

(2) Narrow range water level monitors are required for all sizes of sumps inside the containment and shall meet the requirements of Regulatory Guide 1.89.

(2) For BWR pressure-suppression containments, the Emergency Core Cooling System (ECCS) suction line inlets may be used as a starting reference point for the wide-range water level monitors, instead of the bottom of the suppression pool.

(4) The accuracy requirements of the water level monitors shall be provided and justified to be adequate for their intended function.

3.3 SCOPE OF CWLMS EVALUATION

The licensee has described his design for the CWLMS in References from 3 and 4. Our review of the licensee's submittals consisted of the following: (1) checking for deviations form our requirements which are stated in Sections 3.1 and 3.2 above, and (2) reviewing the adequacy of the accuracy specifications for the CWLMS. The figures quoted herein for system accuracy are the root-sum-square of the module accuracies quoted by the licensee. The accuracy figures are expressed as a percentage of full scale.

3.4 LICENSEE COMPLIANCE WITH NUREG-0737 CWLMS REQUIREMENTS

After reviewing the licensee's submittals, we find that the CWLMS design meets all the requirements of Sections 3.1 and 3.2 above.

3.5 EVALUATION OF CWLMS ACCURACY

The licensee has installed a narrow-range CWLMS in the sump and a wide-range CWLMS in the containment, both of which have readout on an indicator only. The narrow-range indicator has an accuracy of 2.8% of full scale and the wide-range indicator has an accuracy of 1.7% of full scale. These values, which are consistent with the present state of the art, will provide information over the intended range of the CWLMS that is sufficiently accurate and useful to allow the plant operator to adequately assess water level conditions within the containment.

4.0 II.F.I.6: CONTAINMENT HYDROGEN MONITOR SYSTEM (CHMS)

4.1 NUREG-0737 CHMS POSITION

A continuous indication of hydrogen concentration in the containment atmosphere shall be provided in the control room. Measurement capability shall be provided over the range of 0% to 10% hydrogen concentration under both positive and negative ambient pressures.

4.2 NUREG-0737 CHMS CLARIFICATION

(1) The continuous indication of hydrogen concentration is not required during normal operation. If an indication is not available at all times, continuous indication and recording shall be functioning within 30 minutes of the initiation of safety injection.

4.3 SCOPE OF CHMS EVALUATION

The licensee has described his design for the CHMS in References from 3 and 4. Our review of the licensee's submittals consisted of the following: (1) checking for deviations from our requirements which are stated in Sections 4.1 and 4.2 above,

(2) reviewing the adequacy of the accuracy specifications for the CHMS, and (3) reviewing the adequacy of the hydrogen sample port placement for the CHMS. The figures quoted herein for system accuracy are the root-sum-square of the module accuracies quoted by the licensee. The accuracy figures are expressed as a percentage of full scale.

4.4 LICENSEE COMPLIANCE WITH NUREG-0737 CHMS REQUIREMENTS

After reviewing the licensee's submittals, we find that the CHMS design meets all the requirements of Sections 4.1 and 4.2 above.

4.5 EVALUATION OF CHMS ACCURACY AND SAMPLE PORT PLACEMENT

The CHMS indicators and recorders are separate devices. The CHMS indicators chosen by the licensee have a system accuracy of 2.9% of full scale and the CHMS recorders have a system accuracy of 2.6% of full scale. These values, which are consistent with the present state of the art, will provide information over the intended range of the CHMS that is sufficiently accurate and useful to allow the plant operator to adequately assess the hydrogen concentration within the containment. The licensee has installed 2 hydrogen sample ports within containment, which permits rapid detection of hydrogen escaping from the reactor.

5.0 CONCLUSION

Based on the above evaluations, the licensee has met all the requirements of NUREG-0737 for items II.F.1.4, 5, and 6; we therefore find his design for these three items acceptable.

6.0 REFERENCES

(1) Letter from D. G. Eisenhut (NRC) to All Licensees of Operating Plants and Applicants for Operating Licenses and Holders of Construction Permits, dated September 5, 1980. Subject: Preliminary Clarification of TMI Action Plan Requirements.

(2) NUREG-0737, "Clarification of TMI Action Plan Requirements," U. S. Nuclear Regulatory Commission, November 1980.

(3) Letter from R. H. Leasburg (VEPCO) to Harold R. Denton (NRC): Revision 0 - December 10, 1980, Revision 2 - October 31, 1981, Revision 3 - May 31, 1982, Revision 4 - June 28, 1982. Subject: System Descriptions for all NUREG-0737 Items.

(4) Letter from W. L. Stewart (VEPCO) to Harold Denton (NRC), February 18, 1983. Subject; Response to NRC Request for Additional Information.

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