

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
IMPLEMENTATION REVIEW OF TME ACTION PLAN ITEMS (NUREG-0737)

II.F.1.4 CONTAINMENT PRESSURE MONITOR
II.F.1.5 CONTAINMENT WATER LEVEL MONITOR
II.F.1.6 CONTAINMENT HYDROGEN MONITOR

FACILITY OPERATING LICENSE NO. NPF-3

THE TOLEDO EDISON COMPANY

AND

CLEVELAND ELECTRIC ILLUMINATING COMPANY

DAVIS-BESSE NUCLEAR POWER STATION, UNIT NO. 1

DOCKET NO. 50-346

1.0 BACKGROUND

By our letter of September 5, 1980 (Ref. 1) 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 (Ref. 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, II.F.1.5, and II.F.1.6.

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) 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.
- (2) Continuous display and recording of the containment pressure over the specified range in the control room is required.
- (3) 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 the design for the CPMS in Refs. 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 accuracy are three standard deviations, which represents a 99.7% confidence level. All accuracy figures are quoted 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 identified above except requirement 2.2(2), which stipulates that the licensee must have recorders in the control room. At Davis-Besse CPMS data are recorded as computer points on disk

at the Technical Support Center. In particular, monitor outputs are stored in the Data Acquisition and Display System (DADS) on disk files. These files may be examined via printer/plotter or CRT. Current data may also be examined. Various formats are available. A complete discussion of the Technical Support Center and Data Acquisition System is given in Ref. 3. DADS output is available to control room operators via two colorgraphic CRTs located in the control room, but DADS can not be displayed on strip charts in the control room. The DADS would be running approximately one minute behind real time under accident conditions. There are indicators for containment pressure, water level (narrow and wide-range) and hydrogen in the control room. Each measured variable has two indicators per channel for a total of eight indicators in the control room. We judge this system to fully meet the intent of requirement 2.2(2).

2.5 EVALUATION OF CPMS ACCURACY AND TIME RESPONSE

As explained in Section 2.4, the CPMS indicator and recorder are separate devices. The CPMS indicator chosen by the licensee has a system accuracy of 1.0% of full scale and a response time of 5 seconds. The CPMS recording system described in Section 2.4 has a system accuracy of 0.6% of full scale and a system response time of 0.8 seconds. These values, which are consistent with the present state of the art, will provide information over the intended range of the CPMS that is sufficiently accurate and useful to allow the plant operator to adequately assess pressure conditions within 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.

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.

- (3) 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 the design for the CWLMS in Refs. 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 3.1 and 3.2 above, and (2) reviewing the adequacy of the accuracy specifications for the CWLMS. The figures quoted herein for accuracy are three standard deviations, which represents a 99.7% confidence level. All 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 indicator and recorder readouts (as noted in Section 2.4). The narrow-range indicator has an accuracy of 1.4% of full scale and the narrow-range recorder has an accuracy of 1.2% of full scale. The wide-range indicator and recorder both have an accuracy of 7.8% 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.

4.0 II.F.1.6: 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 Refs. 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 accuracy are three standard deviations, which represents a 99.7% confidence level. All 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 CHMS design meets all the requirements of Sections 4.1 and 4.2 above.

4.5 EVALUATION OF CHMS ACCURACY AND SAMPLE PORT PLACEMENT

As explained in Section 2.4, the CHMS indicator and recorder are separate devices. The CHMS indicator chosen by the licensee has a system accuracy of 5.4% of full scale. The CHMS recording system described in Section 2.4 has an accuracy of 5.0% 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 containment. The licensee has installed 4 hydrogen sample ports within containment, which permits rapid detection of hydrogen escaping from the reactor.

5.0 CONCLUSION

Based on the evaluations identified above the licensee has met all the requirements of NUREG-0737 for Items II.F.1.4, II.F.1.5, and II.F.1.6; we therefore find the design for these three items acceptable.

6.0 ACKNOWLEDGEMENT

The following NRC employee was the principal contributor to this Safety Evaluation:

Peter Kapo

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7.0 REFERENCES

- (1) Letter from D. G. Eisenhut (NRC) to All Licensee 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 Richard P. Crouse (TE) to Harold R. Denton (NRC), May 27, 1981. Subject: Emergency Response Facilities.
- (4) Letter from Richard P. Crouse (TE) to Harold R. Denton (NRC), January 28, 1983. Subject: Response to NRC Request for Additional Information.