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EF2-63,233

Director of Nuclear Reactor Regulation
Attention: Mr. B. J. Youngblood, Chief
Licensing Branch No. 1
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Youngblood:

Reference: (1) Fermi 2
NRC Docket No. 50-341

Subject: Secondary Containment Drawdown Time

SER Section 6.2.3 states, in part, that the SGTS will take six minutes to drawdown the secondary containment pressure to minus one-quarter inch of water following a DBA-LOCA with coincidental loss of all off-site power. The six minute drawdown time was based on the response to question 042.28 of FSAR Appendix E.5. The analysis that was performed in the response to question 042.28 assumed a maximum outdoor temperature of 105°F, which was the worst case for the internal environmental profile. However, this is not the most limiting case for drawdown time. As ambient air temperature decreases, more mass leaks into the secondary containment and thus, more mass must be removed to attain design negative pressure.

The secondary containment pressure response analysis has been reperformed using an outdoor temperature of -10°F (Attachment 1). The analysis shows that in order to drawdown the secondary containment in six minutes following a DBA LOCA, the secondary containment would have to be made unreasonably leak tight and the SGTS would have to operate at or beyond its maximum design flowrate of 4000 CFM. However, by operating the SGTS at 3800 CFM, a negative one-quarter inches of water pressure is predicted to be achieved in ten minutes based on the limiting case. At this flow rate, the steady state secondary containment pressure will be well below minus one-quarter inches of water. It should be noted that the drawdown time under non-environmentally extreme conditions will be much less than ten minutes.

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The Fermi 2 SER assumes a secondary containment drawdown time of six minutes (Section 6.2.3). A radiological consequence analysis using this time is discussed in SER Section 15.2.3.1. An extrapolation of this analysis was made to assess the effects of the increase in drawdown time. The post LOCA thyroid dose at the site boundary would be increased approximately thirty percent but would remain well within the guidelines of 10CFR100. This dose is based on very conservative assumptions.

The FSAR is being revised to reflect a maximum ten minute drawdown time to achieve minus one-quarter inch of water pressure in the secondary containment post LOCA. Your expedited review and concurrence is requested. Please coordinate a revision to the SER with our technical specification reviewer to support the proof and review process.

If you have any questions, please contact Mr. O. Keener Earle (313) 586-4211.

Sincerely,

Wayne H. Jens

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Attachment 1 - SECONDARY CONTAIMENT PRESSURIZATION DURING DBA LOCA

The Standby Gas Treatment System (SGTS) provides sufficient flow to maintain the secondary containment pressure at or below -0.25 inches of water, thus ensuring that any airborne radioactive material in the secondary containment is not released to the surrounding atmosphere without passing through the SGTS filters. In the event of a DBA-LOCA, loss of off-site power is assumed; consequently, there is a delay period from the start of the event to the activation of the SGTS and the emergency area coolers.

During the delay period, the secondary containment pressure increases above -0.25 inches of water due to heat generated by emergency equipment and other sources. Upon initiation of the SGTS and emergency area coolers, a short period of time is required to reduce the secondary containment pressure to a negative pressure at or below -0.25 inches of water.

The purpose of this calculation is to generate the secondary containment pressure response during a DBA-LOCA and to determine the period of time where the secondary containment pressure is above -0.25 inches of water.

The method of analysis, assumptions and results are described below.

METHOD OF ANALYSIS AND ASSUMPTIONS

The computer code HVAC (Reference 1) was used to generate the secondary containment pressure response.

All major assumptions are given below:

1. No credit was taken for exfiltration from the secondary containment.

2. Infiltration to the secondary containment was included in the pressure response analysis.

3. No heat transfer was allowed to the outdoor atmosphere.

4. Heat transfer to interior secondary containment walls, floors and ceilings was included.

5. Heat transfer from the torus room to the secondary containment is based on flow through the pressure relieving doors in the corner room basement walls.

6. Only one SGTS filter train is available with a minimum volumetric flow rate of 3800 CFM.

7. Off-site power is lost at the start of the DBA-LOCA event.

8. The activation of the SGTS is delayed by 33 seconds and the activation of the emergency area coolers is delayed by 38 seconds.

9. The RHR pump rooms and the core spray and RCIC pump rooms in the reactor building sub-basement are treated separately from the main secondary containment volume. These rooms have their own emergency coolers to handle emergency equipment and lighting heat loads.

   Because the heat loads and cooling are confined to partially enclosed volumes at the very bottom of the secondary containment, the area coolers will absorb the heat loads within the confines of the corner rooms.

10. The heat loads from the RHR, core spray and RCIC pump rooms will not affect the main secondary containment volume prior to the initiation of the area coolers. The RHR pumps are activated 13 seconds after the start of the DBA-LOCA event. The emergency coolers are activated at 38 seconds. For the heat loads to affect the main volume, the pumps, piping, and subsequently the corner room atmospheres must heat up. After the corner room atmospheres have heated up, the only mode of heat tranfer to the main volume is by natural convection. Considering that natural convection is a rather slow process, no significant heat transfer to the main secondary containment volume from the corner rooms is expected during the 25 seconds from the intiation of the RHR pumps to the initiation of emergency cooling.

11. An outdoor temperature of -10°F was used in the analysis.

Results

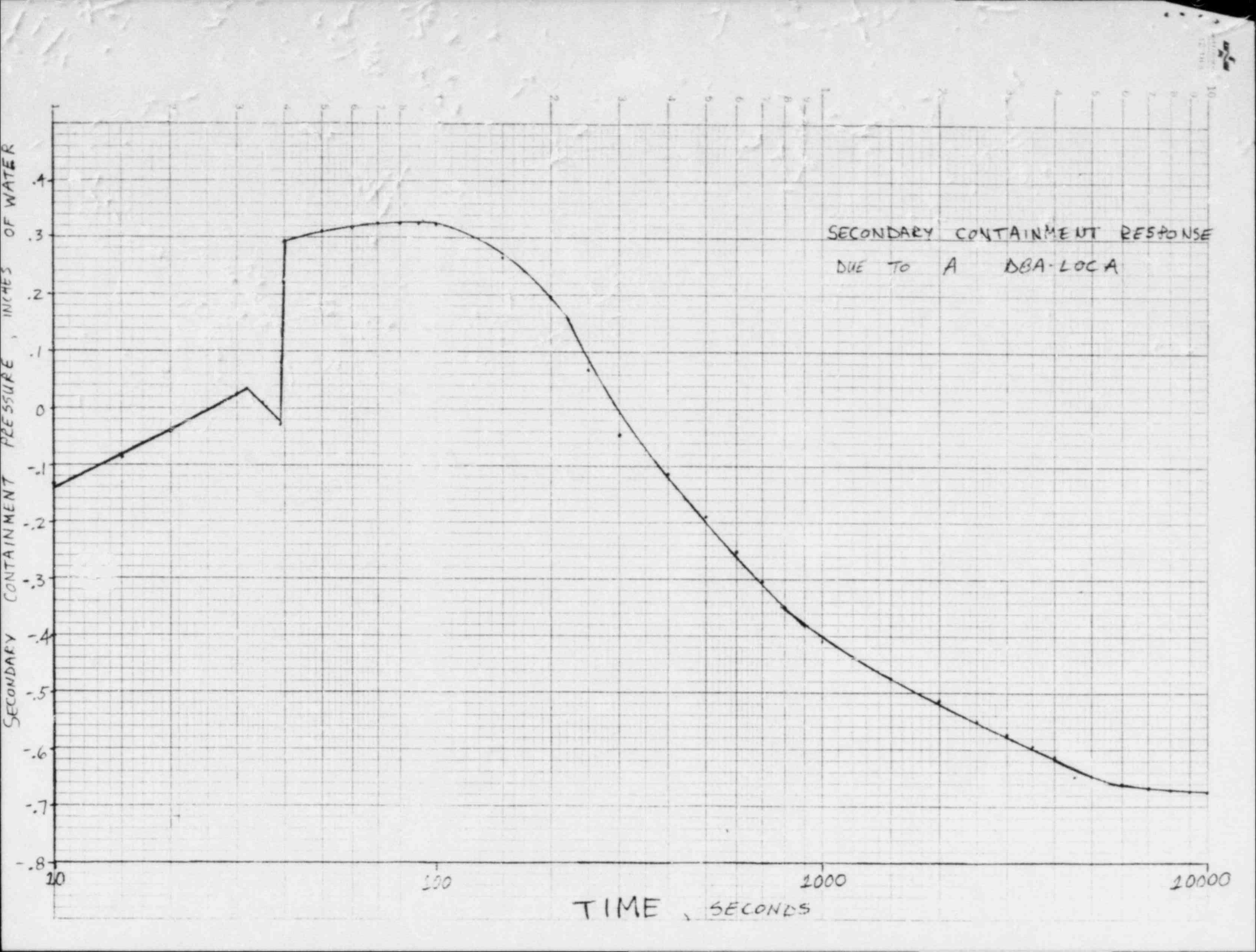
The secondary containment response due to a DBA-LOCA is shown in Figure 1. During the first 33 seconds, the pressure increases to a slightly positive value. With the activation of the SGTS at 33 seconds and the activation of the area coolers at 38 seconds, the pressure decreases to near atmospheric.

At 40 seconds, pressure relieving doors on the common wall between the torus room and the corner rooms open and allow heated torus room air to enter the rest of secondary containment. This step input of heat into the secondary containment appears as a sharp pressure spike on Figure 1.

The pressure then decreases past -0.25 inches of water to a steady state secondary containment pressure. A period of approximately 600 seconds elapses from the start of the DBA-LOCA event to the point where the secondary containment pressure decreases to and subsequently stays below -0.25 inches of water.

References

1. DET-07-035, "HVAC Computer Code for Environmental Response Profiles", Nutech File No. 50.0407.132E, Rev. 0


SECONDARY CONTAINMENT RESPONSE
DUE TO A DBA-LOCA
SECONDARY CONTAINMENT PRESSURE, INCHES OF WATER
.4
.3
.2
.1
0
-.1
-.2
-.3
-.4
-.5
-.6
-.7
-.8
10
100
1000
10000
TIME, SECONDS