



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

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AUG 30 1982

MEMORANDUM FOR: Darrell Eisenhut, Director, Division of Licensing
FROM: Roger J. Mattson, Director, Division of Systems
Integration
SUBJECT: BOARD NOTIFICATION CONCERNING RECENT SEMISCALE TEST
RESULTS

SUMMARY

The purpose of this memorandum is to request that you notify all PWR licensing boards of the results of a recent Semiscale "feed and bleed" test.

During a recent test in the Semiscale facility* in which the "feed and bleed" mode of core cooling** was being tested, uncovering of the core simulator occurred, causing the test to be prematurely terminated to prevent core simulator overheating. The relevancy of this result is that core simulator uncovering was not expected to occur.

BACKGROUND

Recent licensing proceedings (in particular TMI-1 restart hearing) have focused on the ability of PWRs to remove decay heat using "feed and bleed" cooling in the event of loss of all feedwater.

Although neither the staff nor the licensees or applicants have ever relied upon feed and bleed in order to meet the Commission's regulations, and although the staff has never concluded that all plants with installed HPI and safety-relief systems can successfully "feed and bleed," we believe that there is an inherent margin of safety attributable to a feed and bleed capability.

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*Semiscale is a test facility approximately 1/1500th volume-scaled to a typical Westinghouse 4-loop PWR.

**"Feed and Bleed" refers to a mode of core cooling in which all feedwater (main and auxiliary) is not available, and decay heat removal is accomplished by adding coolant inventory with the HPI system, and removing decay heat energy through the safety or relief valves.

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SEMISCALE RESULTS AND RELIANCE

The Semiscale test simulated a loss of all feedwater with a complete dryout of the steam generator secondary side. The scaled PORV was opened as the recommended action to depressurize the system to below the HPI pump shutoff head to allow the HPI flow to restore primary coolant inventory. Prior to achieving an equilibrium thermal hydraulic condition for core cooling, the core simulator rods began to heat up excessively. This caused the test to be prematurely terminated to protect the core simulator rods.

The relevance of this result is that core simulator uncovering was not expected to occur. Pretest predictions were not performed for this particular test, and it is not known if any new phenomena occurred that were not capable of being predicted by current analysis computer codes. (The expectation that no core simulator uncovering would occur was based on engineering judgment and not on detailed calculations.) Thus, the applicability of these results to the feed and bleed capability of large PWRs is unknown. Further information is presented in the RES memorandum from Bassett to Speis covering this topic which is attached.

A related test has been run in LOFT, which is approximately 1/60th in volume compared to a typical Westinghouse 4-loop plant. In this test, the PORV was latched open and the system depressurized to below the HPI shutoff head (the HPI was not allowed to inject for other testing purposes). There was no indication of core uncovering.

Westinghouse has also performed an analysis that indicates that with low-head HPI, core uncovering would occur if feed and bleed is not initiated before the steam generators have dried out. An analysis of a PWR at the Semiscale test conditions is part of the resolution plan.

RESOLUTION PLAN

To fully understand the relevance of the test, the following resolution plan will be pursued by the Office of Nuclear Regulatory Research:

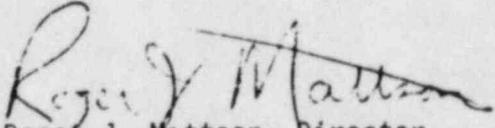
1. Analysis of the Semiscale test, including study of the data and RELAP 5 computer code calculation of the experiment.
2. Analysis of the atypicality of Semiscale as compared to the PWR for this type of operation.
3. Analysis of a PWR for the same conditions that existed during the Semiscale test with the RELAP5 code.

CONCLUSIONS

Based on our assessment of the results to date and on the criteria of Office Letter Number 19, we do not believe that a board notification is warranted. However, due to the interest in feed and bleed cooling in recent licensing proceedings, we believe it is in the best interest of the regulatory process to inform the licensing boards of this recent

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test result. We do not believe that sufficient information is available yet to draw any conclusion from the results. We also do not believe that these results adversely impact our present staff position regarding reliance on feed and bleed cooling. We intend to pursue resolution of the issue with RES. We expect this resolution by approximately September 30, 1982 and we will inform the boards of our conclusions at that time.


Roger J. Mattson, Director
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Enclosure: As Stated

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