OCT 19 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

In my memorandum dated August 30, 1982, I reported the results of a recent Semiscale "feed and bleed" test (S-SR-2). In that memorandum, I stated that there was insufficient information available at that time to draw any conclusions from the results and we would pursue resolution of this issue and inform the Boards of our conclusions following completion of our evaluation. The purpose of this memorandum is to request that you inform the Boards that we have completed our evaluation and have concluded that Semiscale test S-SR-2 does not exhibit any new phenomena and can be adequately predicted by our computer codes.

Semiscale test S-SR-2 simulated a loss of all feedwater which resulted in a complete dryout of the secondary side of the steam generators. This resulted in a pressurization of the primary system. The scaled PORV was opened to depressurize the primary system to below the HPI pump shutoff head. This action, referred to as primary feed and bleed, was done in an attempt to reach an equilibrium thermal-hydraulic condition for core cooling. This involves relieving the primary pressure increase due to core decay heat through the PORV and replacing the primary coolant inventory lost out of the PORV with HPI coolant. The high head charging pump was assumed to be inoperable for this test. Prior to achieving this equilibrium thermal hydraulic condition, the core simulator rods began to heat up excessively.

Our evaluation and conclusions are based on RELAP-5 analyses conducted by EG&G, Idaho, for the Office of Nuclear Regulatory Research of both the Semiscale S-SR-2 test and a corresponding feed and bleed mode of operation for a typical Westinghouse 4-loop plant (RESAR plant). These analyses have shown the following:

1) A RELAP-5 analysis of the Semiscale test SR-2 demonstrates the code's ability to accurately calculate both the overall system response and local responses. The RELAP-5 results show good quantitative agreement with the test data.

2) RELAP-5 feed and bleed analyses for a Westinghouse RESAR plant design both with and without full ECCS (charging and HPI) agree with the general behavior seen in the Semiscale experiments. (The RESAR calculation with ECCS results in steady state core cooling being achieved and an eventual restoration of subcooling in the primary system.)*

*The RESAR calculation assumed that ECCS charging flow was available and a decay heat curve was used while Semiscale used only HPI pumps and a constant power level.

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Finally, the following conclusions are reached about the Semiscale test results. After voiding of the hot leg, the ability to maintain steady state core cooling is considered within the experimental uncertainties of the values of core decay heat, PORV characteristics and HPI pumping capability. A small reduction in core power or PORV mass flowrate or an increase in HPI flowrate would probably have resulted in steady-state core cooling before core uncovery. The RELAP-5 calculation of the test results in either steady-state cooling before core uncovery or just as core uncovery begins depending on how uncertainties in steam generator heat transfer are treated in the code input.

The test analysis confirms our previous conclusion that the viability of feed and bleed as well as the system response is a function of many parameters, including core decay heat level, PORV characteristics, ECCS pumping capacity and operator action time. In summary, our review of the test data and the RELAP-5 analyses performed to predict this test data lead us to conclude that no new phenomena are exhibited by Semiscale test S-SR-2 and that the staff's RELAP-5 analysis code adequately predicts the test data and associated thermal hydraulic phenomena.

We point out that regardless of the conclusions that may have been reached from this test regarding viability of feed and bleed, feed and bleed cooling is not a design basis requirement considered necessary to meet the Commission's Regulations for any LWRs currently licensed or being considered for a license. We are providing this follow-up evaluation due to the interest in feed and bleed cooling expressed in recent licensing proceedings and because we believe it is in the best interest of the regulatory process to keep the licensing boards informed of these recent test results.

These analyses and this test are not a generic indication of the ability of PWRs to feed and bleed. The detailed capability of a PWR to feed and bleed must be determined by individual analyses.

Roger J. Mattson, Director
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BOARD NOTIFICATION 82-107 DATED NOVEMBER 16 1982

Semiscale Test Results

To Commission

Summer
Floating Nuclear Plants
Diablo Canyon

To ASLB

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Comanche Peak
Palo Verde Midl
Midland
Waterford

To ASLAB

Diablo Canyon
Summer
Floating Nuclear Plants

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