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INTERIM REPORT

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Prepared for
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

INTERIM REPORT



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October 22, 1981

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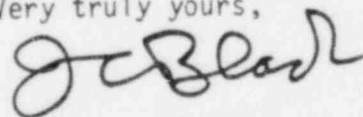
SUBJECT: BWR Refill-Reflood Program
Contract No. NRC-04-79-184
Informal Monthly Progress Report for August & Sept. 1981

Gentlemen:

Please find attached subject report:

Distribution of this report is being made in accordance with the "Monthly Distribution List" provided with W. D. Beckner's letter of September 6, 1979.

Very truly yours,



J. C. Black, Senior Program Manager
External Programs (408) 925-1988

Attachments

/kf

BWR REFILL REFLOOD PROGRAM

TWENTY - FOURTH INFORMAL MONTHLY PROGRESS REPORT

Aug/Sept.

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UNDER:

Contract No. NRC-04-79-184

Summary

The BWR-6 system response tests in SSTF were completed in August. The facility modifications for BWR-4 testing were completed in September.

The technical reviews of the first version of TRAC was completed in August and the quality assurance review in September.

Qualification studies for various facilities proceeded through August and the detailed TLTA studies completed in September will be issued separately.

Significant Decisions/Upcoming Events

The PMG meeting held at Lynn October 14 and 15 included a major decision to stop SSTF testing. Detailed meeting minutes have been issued separately.

CCFL/REFILL SYSTEM EFFECTS (30° Sector) (Task 4.4) August

The SSTF BWR/6 System Response Test series was completed in August. Three tests identified as low priority in the Addendum C System Response Test Plan were abandoned to maintain the program schedule. Preliminary analysis of these tests indicate rapid test section reflood through ECCS subcooling and beneficial three-dimensional effects.

Fabrication and installation of the BWR/4 LPCI piping was completed in August and separate effect BWR/4 lower plenum mixing tests were initiated. Facility shutdown for installation of the BWR/4 LPCS header will begin early in September after completion of BWR/4 lower plenum mixing tests. BWR/4 ECCS parameter variation tests will continue in late September/early October after completion of the facility shutdown.

Data evaluation/application activity in August was directed toward drafting a report of parallel channel effects, side entry orifice CCFL, and SSTF initial conditions.

CCFL/REFILL SYSTEM EFFECTS (30° Sector) (Task 4.4) September

Facility shutdown for installation of the BWR/4 LPCS header was concluded in September. Test operation was continued in September and the BWR/4 ECCS variation separate effects test series was completed. The effects of BWR/4 LPCS and LPCI ECCS injection locations on upper plenum and lower plenum mixing phenomena during ECC injection were addressed in the steady pressure separate effects test series. Preliminary analysis of these tests indicates effective peripheral upper tie-plate subcooling and efficient lower plenum refill/core reflood, due to the decreased LPCS header elevation and the jet pump LPCI injection location of the BWR/4 ECCS variation will be conducted in October.

Data evaluation/application activity in September was directed at depressurization analyses on simple blowdown experiments, multi-channel phenomena analysis on separate effect tests, and system response test evaluation. Results of the multi-channel refill phenomena evaluation will be presented at the October PMG meeting in Lynn, Massachusetts. A paper titled "BWR Refill/Reflood Test Results" was prepared for presentation at the 9th Water Reactor Safety Research Information Meeting at Gaithersburg, Maryland.

Preliminary analysis of these tests indicates effective peripheral upper tie-plate subcooling and efficient lower plenum refill/core reflood, due to the decreased LPCS header elevation and the jet pump LPCI injection location of the BWR/4 design. System response tests with the BWR/4 ECCS variation will be conducted in October.

Data evaluation/application activity in September was directed at depressurization analyses on simple blowdown experiments, multi-channel phenomena analysis on separate effects tests, and system response test evaluation. Results of the multi-channel refill phenomena evaluation will be presented at the October PMG meeting in Lynn, Massachusetts. A paper titled "BWR Refill/Reflood Test Results" was prepared for presentation at the 9th Water Reactor Safety Research Information Meeting at Gaithersburg, Maryland.

MODEL DEVELOPMENT TASK 4.7 - August and September

General

A major activity has been the technical reviews of the models in the first version of TRAC. The technical adequacy of the models in TRAC was reviewed on August 28 and the quality assurance procedures were reviewed on September 8. A separate report has been issued for this review.

4.7.1 Basic Model and Correlations

Improved correlations for the interfacial heat transfer has been developed, implemented into TRAC and debugged. Assessment of the interfacial heat transfer is in progress. Improvements to the wall heat transfer has been developed, and implementation is currently in progress.

4.7.2 Single Channel Option

The single channel option is complete and verified and has been implemented on the INEL computer.

4.7.3 TRAC BWR Support

The development of an upper plenum model is progressing rapidly. An integral model for the ECC injection, which includes the effect of buoyancy, steam updraft and jet trajectory has been developed and is currently being debugged. Furthermore, turbulence models for the upper plenum have been reviewed, and a mixing length model for the momentum and energy transport has been formulated.

October 22, 1981

4.7.3 TRAC BWR Support (Cont.)

A DBA transient on a BWR/6 218-624 plant has been simulated with TRAC. The case was run up to 135 seconds at which time all the fuel rods were cooled to saturation and the vessel pressure was less than 2 Bar. The peak cladding temperature observed for this DBA is below 600°K.

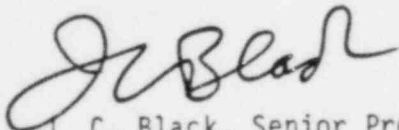
4.8 Model Qualification - August

Work continue during this reporting period on an accelerated effort to support an external review the TRAC BWR effort. The qualification studies for the following facilities have been completed:

- TLTA - with and without ECC injection
- TLTA - single channel for peak power test
- Vessel Blowdown - 3 tests
- Single Heated Bundle - 1 test
- ORNL - film boiling test

In addition to these, a detailed input deck is being prepared for the JAERI ROSA III facility; a large break test will be predicted. Experimental support for the SSTF also continued during this reporting period.

Qualification results for the TLTA studies performed in September 81 will be presented in detail in the near future (by end Oct 81)



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