

INTERIM REPORT

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W. D. Beckner

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Prepared for
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Washington, D.C. 20555

INTERIM REPORT

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NRC Assistance Report

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NUCLEAR ENERGY
ENGINEERING
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December 10, 1979

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SUBJECT: BWR REFILL/REFLOOD PROGRAM
CONTRACT NO. NRC-04-79-184
INFORMAL MONTHLY PROGRESS REPORT FOR NOVEMBER 1979

Gentlemen:

The following summarizes the subject matter covered in the attached report:

BWR/465 double nozzle testing was completed in the 30° Sector Facility. Preliminary evaluation of these data indicate essentially no interaction for one type of nozzle, but significant interaction for a second type. Initial, Single Heated Bundle tests produced expected phenomena. Work continues on planning the modification to the 30° Sector Facility for conducting CFL-Refill tests. New subroutines which are suitable for incorporation into TRAC have been developed for the calculation of interfacial shear and heat transfer and for CFL. Techniques have been recommended to restructure TRAC to include ECC injection and heat transfer from the core to the bypass region. These models are preliminary and need further refinement.

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,

90010541



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BWR REFILL-REFLOOD PROGRAM
FOURTH MONTHLY REPORT
NOVEMBER 1979

Prepared for:

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Washington, D.C. 20555
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and

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General Electric Company

Under

Contract No. NRC-04-79-184

BWR REFILL-REFLOOD PROGRAM

NOVEMBER MONTHLY

SUMMARY

BWR/4&5 double nozzle testing was completed in the 30° Sector Facility. Preliminary evaluation of these data indicate essentially no interaction for one type of nozzle, but significant interaction for a second type. Initial, Single Heated Bundle tests produced expected phenomena. Work continues on planning the modification to the 30° Sector Facility for conducting CCFL-Refill tests. New subroutines which are suitable for incorporation into TRAC have been developed for the calculation of interfacial shear and heat transfer and for CCFL. Techniques have been recommended to restructure TRAC to include ECC injection and heat transfer from the core to the bypass region. These models are preliminary and need further refinement.

CORE SPRAY DISTRIBUTION (TASK 3.2)

Tests with the BWR/4&5 double nozzle assembly were completed at the Lynn 30° Test Sector Facility. Evaluation of data from these BWR/4 double nozzle tests was started. Tests conducted in steam to evaluate interaction effects between upper and lower sparger nozzles indicate essentially no interaction for one nozzle type (Spraco S3101). However, for the VNC nozzles the downward momentum of the upper nozzle tends to dominate the lower nozzle to concentrate the flow near the periphery of the sector. The double nozzle assembly has been removed from the facility and the hardware for the Lower Sparger 30° Sector tests has been installed. Nozzles have been installed in the sparger and aimed. Shake-down tests have been performed to obtain individual nozzle flow rates and 30° Sector air tests will be started in December.

SINGLE HEATED BUNDLE TASK (Task 4.3)

Two tests have been performed at the ECCS Test Loop to demonstrate facility adequacy. The data showed that the predicted phenomena were produced by the facility responses. Additional tests to determine bundle power and initial rod temperature effects will be performed before addressing the major objectives of scaling basis confirmation and typical response data for developing adiabatic steam injection techniques.

CCFL/REFILL SYSTEM EFFECTS [30° SECTOR] (TASK 4.4)

Design information is being generated to provide a test facility functional summary and detailed functional specifications. Program planning includes the near-term goal of completing a conceptual design description during January 1980. Initial discussions are being held to determine where designs of specific facility components will be conducted.

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BASIC MODELS AND CORRELATIONS (TASK 4.7.1)

The assessment and improvement of the TRAC constitutive correlations for the shear and heat transfer has continued during this month. Introduction of the 1-dimensional two-fluid model requires that all the constitutive correlations developed for the 3-dimensional two-fluid model be removed from the routines that solve the conservation equations and replaced by subroutine calls. New subroutines suitable for incorporation into TRAC have been created for the calculation of the interfacial shear and heat transfer and for the CCFL.

SINGLE CHANNEL CODE (TASK 4.7.2)

The feasibility study of the single channel code has continued in November. The study, however, has been slowed down due to instabilities originating from the wall heat transfer in TRAC.

SUPPORT DEVELOPMENT OF TRAC BWR (TASK 4.7.3)

Further development of the TRAC/BWR model continued. A technique was developed and recommended to restructure the model to include EOC injection and heat transfer from the core to the bypass region. A core spray model for both high and low pressure core spray was developed using pipe sources that spray the core and bypass uniformly and isothermally. This spray model is preliminary in nature and will be assessed, based on TRAC predictions. Heat transfer from the core to the bypass region, across the channel wall, employs double slab walls that face both sides of the neighboring fluid regions. At present, the slab wall temperature is characterized by radial heat conduction only. Further refinement of this model* will include axial heat conduction and wall rewetting.

MODEL QUALIFICATION (TASK 4.8)

Work continued on data base classification (utilization) and on development of the Model Qualification Task Plan. A first draft of the task plan document has been completed for internal review.

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* Based in part on an early model developed by EG&G.