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March 8, 1979

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(FSS-79-140)

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SUBJECT: FLECHT-SEASET Program
Informal Monthly Progress Report - January 1979
Contract: NRC-04-77-127, EPRI No: RP959-1

Gentlemen:

Attached is an informal progress letter for the month of January 1979 for FLECHT-SEASET.

Sincerely,

WESTINGHOUSE ELECTRIC CORPORATION
NUCLEAR TECHNOLOGY DIVISION

H. W. Massie, Jr.
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jb

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FLECHT-SEASET PROGRAM

Contract: NRC-04-77-127
EPRI Project No: RP959-1

INFORMAL MONTHLY PROGRESS REPORT

JANUARY 1979

PROGRAM MANAGEMENT - H. W. MASSIE, JR.

A PMG meeting was held on January 16-18, 1979, (at Palo Alto) to attempt to resolve funding on the 21 Rod Bundle Task and complete the contract modification language. The PMG agreed to initiate processing of a contract modification that would replace the Single Tube Task with a 21 Rod Bundle Task and delete the Alternate ECC portion of the Systems Effects Task. No authorization was given Westinghouse to continue work on the 21 Rod Bundle Task beyond the PMG set limit equal to the original budget of the Single Tube Task. Based on this, Westinghouse was forced to stop work on this task until completion of the contract modification. Preliminary language for a contract modification was agreed to by the PMG, and Westinghouse has the action to redo its June 1978 cost proposal. It is currently anticipated that work can restart in April.

Work effort is being redirected to the 161 Rod Blocked Bundle Task (from the 21 Rod Bundle Task) to optimize use of program human resources and to minimize startup costs on the 21 Rod Bundle.

TEST PLANNING AND ANALYSIS - L. E. HOCHREITER/R. P. VIJUK

Unblocked Bundle Task (Task 3.2.1)

Shakedown testing is complete. Problems with window replacement, window sealing problems, DP zero shift and turbine meter recalibration have delayed matrix testing, but the first matrix test was run January 30, 1979.

Westinghouse, EPRI, and EG&G mutually developed sequencing strategy which attempts to minimize facility changeovers, provides time between runs to analyze movies, and obtains high priority data early in the testing series.

Work on upgrading data reduction codes continued. CATALOG and FFLOWS changes are nearly complete. A comparison of the DATA code with the other DATARH version used to reduce the cosine and skew data was completed. The DATAR method was accepted for FLECHT-SEASET usage because it calculates the same averaged heat transfer coefficient with savings in required computer time.

Work continued this month to develop an error analysis method for the FFLOW computer program. This study will result in the development of a error analysis subroutine for the FFLOW mass balance computer code. Work is now beginning on the sensitivity study using the most important input and output variables that were selected from all variables.

Three prototype heater rods are now available for testing. Testing is scheduled to start in the middle of February.

21-Rod Bundle Flow Blockage Task (Task 3.2.2)

EPRI provided their detailed comments on the 21-rod bundle task plan draft report. The appropriate modifications were made and subsequently reported to EPRI at a meeting on January 26, 1979. However, per further discussion received at this review meeting, additional modification of the task plan report is being done.

The shakedown test prospectus, describing the tests to be performed prior to matrix testing in order to qualify the test facility for proper operation, was issued to Facility Engineering.

A memo describing the computer program required for the reduction of data in the hydraulic characteristics test was issued. The purpose of this program is to calculate the bundle friction factor, grid pressure loss of coefficient, and flow blockage loss coefficient utilizing bundle pressure differential data during isothermal steady-state water flow tests. This program could also be utilized in the large 161-Rod Blocked Bundle Task.

Assembly of the sleeve attachment test on a single rod was completed and is available for testing. For this test, 20 mil diameter thermocouples were successfully brazed to the short concentric sleeves. In addition, a 21-rod steam probe prototype was installed in the center grid.

As a result of the discussions with EPRI, work has been initiated on a TAP-A model to determine the effect of a "quenched" flow blockage sleeve on the response of heater rod thermocouples immediately downstream of the sleeve.

Steam Generator Separate Effects Tests (Task 3.2.7)

Test photographic requirements were issued to Facilities Engineering for the movies and still shots for the steam generator tests. The high speed movie camera was run in a mock test to check performance. The film was under exposed and further tests will be run at lower camera speeds. Requirements for pre-test and post test data collection and the test run sequence were also issued to Forest Hills Facility Engineering.

During the shakedown tests to verify the vortex meter accuracy evidence of boiler moisture carryover was noticed. Subsequent tests confirmed that at high steam flows (2250 lbs/hr) there was 7% moisture in the boiler steam. The boiler vender was consulted and he recommended chemically cleaning the boiler with a detergent solution. The boiler was cleaned and flushed out and subsequent tests indicated no measurable carryover.

Three mixer characteristics shakedown tests and five single phase tube wall T/C calibration tests were run. A preliminary review of the data from these tests indicates that the tests are valid. During these tests, the vortex meters were inoperative. The boiler flow was measured with the water meter in the feedline and a stop watch. The water meter was calibrated and it's as accurate as the vortex meters.

The bundle bypass option of the SGFLOWS program was debugged. Several additions and modifications to the original version of the program were required. The code will be used to reduce the mixer characteristics shakedown tests.

The temperature interpolation program SGTEMPS was modified by transforming the elevation parameter, z, to the log z before entering the temperature interpolation subroutine. This transform helps to eliminate overshoot and oscillation in the interpolated temperatures.

Systems Effects Tests (Task 3.2.8)

Work has been continued on upper plenum design considerations. It was found that the knowledge of upper plenum velocity field was necessary for a design of hot leg nozzles and the determination of upper plenum height. Available codes which could be used to predict the hot leg and upper plenum are being investigated.

In the mean time a computer program to plot velocity fields has been developed based on previous works. This will be helpful to visualize the fluid flow in the upper plenum. Also, dimensional analysis of upper plenum flows was initiated to provide more theoretical bases.

A preliminary instrumentation plan has been issued to Facility Engineering for review. This overall instrumentation plan indicates that in order to supply all needed information for the mass and energy balance equations. The detailed draft instrumentation plan is now being prepared to be issued.

FACILITY ENGINEERING/TEST OPERATIONS - L. R. KATZ/C. E. FUCHS

Unblocked Bundle (Task 3.2.1)

The quartz windows have been installed, the window flanges heaters were installed and the housing and plenums have been insulated. The housing D/P manifold and the upper plenum D/P were bled again. The camera platforms were completed. The platforms for the timers and mirrors were fabricated. They have not been installed.

21 Rod Bundle

Work on the 21 Rod Bundle Task was stopped until the completion of a contract modification.

At the time of the work stoppage, considerable progress had been made in loop fabrication. As previously reported, the main injection pipe line, steam injection line, and several rupture disc lines were installed. All major loop and internals components had been received. Since the last reporting period, the backup housing, the upper and lower plenums, steam separator and exhaust lines were installed in the loop. The axial DP cell manifold was assembled and is ready for installation.

Loop instrumentation schematics were completed. Wiring on the thermocouple (T/C) patch panel and loop T/C wiring has started along with differential pressure and pressure transducer patch panels.

Steam Generator Separate Effects (Task 3.2.6)

Failure of the Vortex steam flow rate meter electronics slowed down shake-down progress. The meter electronics were returned to the vendor for repair; spare boards were also ordered. Both the spare and repaired boards are due in by the end of January. In the meantime, the steam generator T/C calibration tests with water injection have been completed. Also, the steam generator T/C calibration test with steam flow and the mixer characteristics tests were performed using the boiler house water meter (in lieu of the Vortex meters) to determine steam flow.

A problem with boiler carryover was resolved by using a chemical "boil-out" compound to remove oil in solution with the boiler water. Steam generator lower plenum divider plate and gasket leak rate checks were performed after the steam generator T/C calibration tests were completed. Leak rates were found to be negligible.

Twin Bundle Task

A drawing (1462E86) and equipment specification (FEES-023) defining alterations to the small steam generator lower plenum were issued. Quotations for this modification were requested. Purchase orders for thermocouples, steam probe tubing, Grayloc fittings and sight glass windows were issued.

Detailed design drawings of the penthouse addition were received
The AE is presently obtaining construction quotations for the electrical and structural work. Design of the test vessel and internals was initiated and an analysis of the various methods to measure the water injection flow was also initiated.

The design specification for the new bundle power controller has begun.

PRELIMINARY

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