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NUCLEAR ENERGY

ENGINEERING

DIVISION

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SUBJECT: BWR BLOWDOWN/BOC PROGRAM
CONTRACT NO. NRC-04-76-215
INFORMAL MONTHLY PROGRESS REPORT FOR NOVEMBER 1979

Gentlemen:

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

Planning for the small break test continued including the recommendation for addition of a second test. The blowdown system, including a direct measurement of the blowdown flow, has been designed and installed. Other preparation for small break tests included installation of an automatic depressurization system simulation and modification of the low pressure coolant injection system. Several tests were conducted including shakedown tests, the most severe large break test, and a series of boiloff tests requested by EPRI.

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.

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Very truly yours,

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BWR BD/ECC PROGRAM

FORTY-NINTH MONTHLY REPORT

NOVEMBER 1979

Prepared for:

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U.S. Nuclear Regulatory Commission
Washington, DC 20555
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and

Electric Power Research Institute
3412 Hillview Avenue
Palo Alto, CA 94304
EPRI Project No. RP-495-1

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General Electric Company
175 Curtner Avenue
San Jose, CA 95125

By

General Electric Company

Under

Contract No. NRC-04-76-215

BWR BD/ECC PROGRAM

FORTY-NINTH MONTHLY REPORT

NOVEMBER 1979

SUMMARY

Planning for the small break test continued including the recommendation for addition of a second test. The blowdown system, including a direct measurement of the blowdown flow, has been designed and installed. Other preparation for small break tests included installation of an automatic depressurization system simulation and modification of the low pressure coolant injection system. Several tests were conducted including shakedown tests, the most severe large break test, and a series of boiloff tests requested by EPRI.

TASK AA - PROGRAM PLANNING AND ADMINISTRATION

In conjunction with the Annual Water Reactor Safety Meeting, a meeting was held to review the status of planning and preparation for an upcoming small break scoping test. Subsequent discussions have defined an additional small break scoping test for the test matrix. The additional test provides a more representative (less severe) BWR transient than was planned for the original facility scoping test (with degraded conditions). Since this test would be much less difficult to execute, it could provide a valuable small break learning experience for the engineers and test operators.

Break area would be selected such that the High Pressure Core Spray (HPCS) system flow at rated conditions will slightly exceed the break flow rate. The two-phase level in the TLTA is expected to drop initially and then gradually recover after the HPCS injection begins. Bundle uncovery is not expected; whereas, bundle uncovery is expected during the degraded condition test during which the HPCS system will be inactivated. A meeting will be held with program sponsors early in December to discuss and seek PMG concurrence with the additional test.

To meet an NRC-REG requirement, pre-test predictions are planned by General Electric for both tests; however, the prediction activity will be completed outside the BD/ECC Program.

A direct measurement of the blowdown flow rate is planned. The very small flow rates make it possible to condense the vapor component using a series of heat exchangers downstream of the limiting orifice. A calibrated orifice is then used to measure the single phase liquid flow.

TASK CC - TEST FACILITY PREPARATION

Hardware was installed to simulate the Automatic Depressurization System (DAS) as indicated in Figure 1. Simulation is achieved through use of an orifice and quick-opening valve installed in series in the TLTA steam line. ADS is activated long after cessation of normal steam line flow, so the TLTA steam line serves a dual purpose. The ADS will be used for the second small break test, and has not yet been checked out.

TASK CC - TEST FACILITY PREPARATION (cont.)

The TLTA Low Pressure Coolant Injection (LPCI) system and characteristics were modified from a single pump simulation to two pump simulation. Two LPCI pumps will be simulated during the second small break test. The LPCI system plays an important role following ADS activation.

The small break blowdown line and accompanying measurement system were designed and installed. The small break blowdown system is shown schematically in Figure 2.

TASK FF - TLTA TESTING

Several types of tests were conducted during the month including one matrix test, a series of constant pressure boiloff tests and some shakedown tests in preparation for the upcoming small break tests. The peak bundle power, low ECC flow, high ECC fluid temperature test was completed. Constant pressure boiloff tests were conducted at 1,000 psi with bundle power levels of 500, 350 and 250 KW. A series of shakedown tests was started to evaluate system leakage, heat loss and to develop operating techniques.

TASK GG - ANALYSIS

Analytical effort was provided in support of planning the TLTA small break test. The effort was directed toward achieving those phenomena which are significant in the small break scenario to be as representative of the BWR as possible, consistent with the many TLTA scaling compromises. The boiloff test results were reviewed briefly. The test technique appears to be adequate and further tests at lower bundle power levels will be conducted later (in the automatic pressure control mode) after repairs are made to the pressure control valve.

A cursory review of the peak power matrix test indicates that the test was successful. Peak cladding temperatures were below 1,000°F throughout the test period of about 500 seconds--even under these very severe conditions.

G W Burnette

G. W. Burnette, Manager
External Programs

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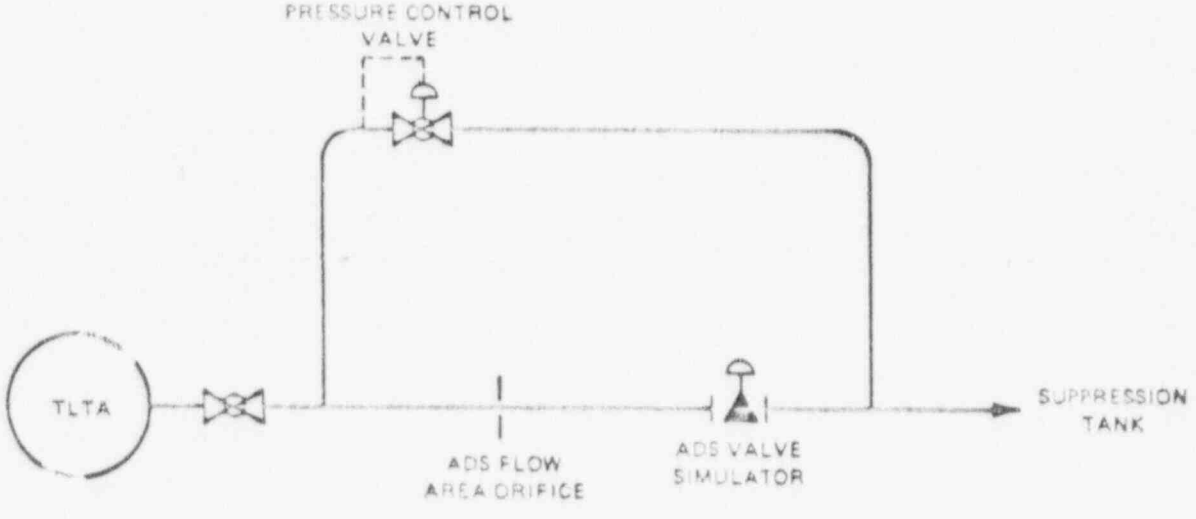
Attachments

FIGURE 1

TLTA Steam Line

SMALL AREA LIQUID BREAK CONFIGURATION



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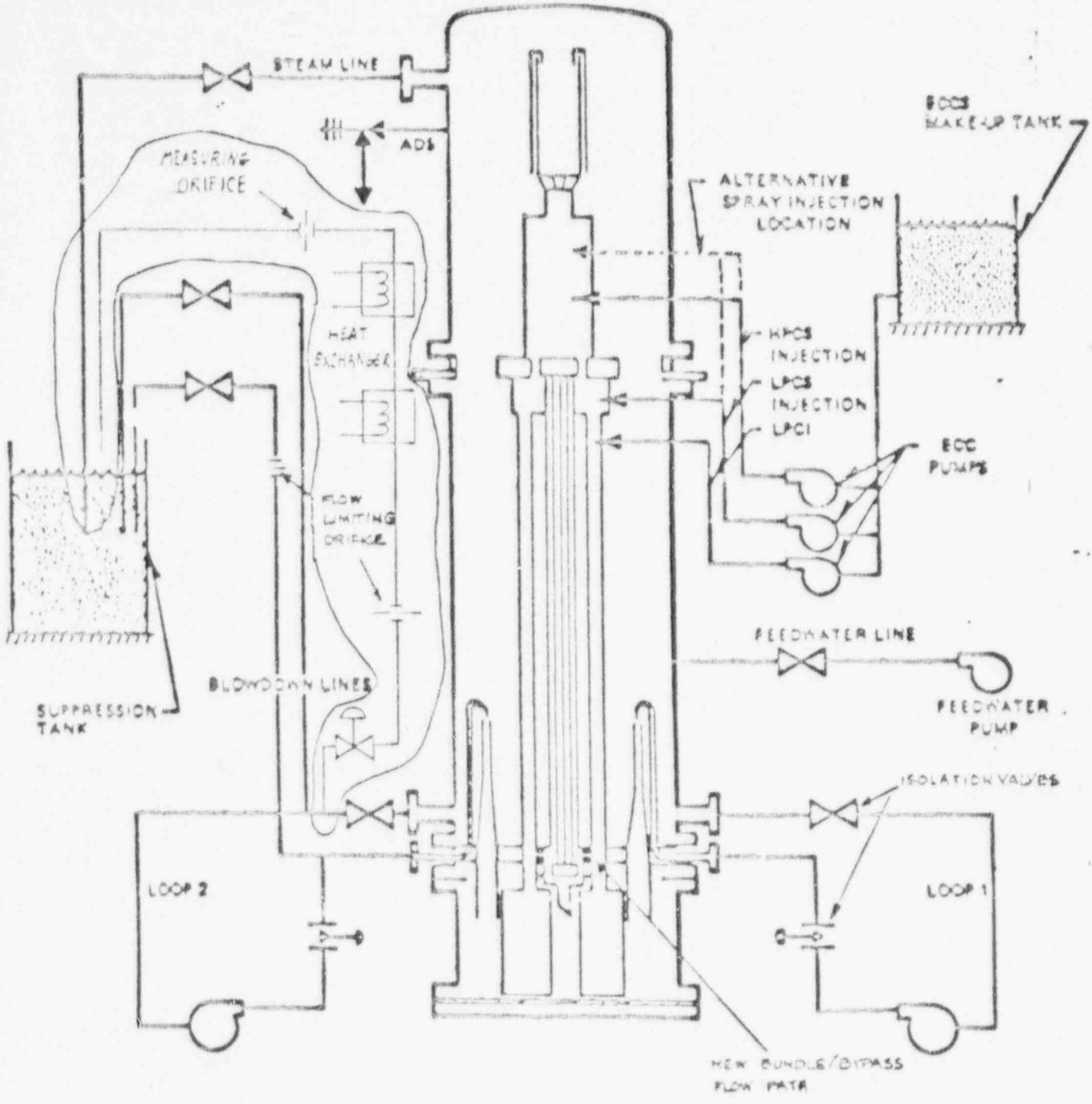

FIGURE 2. TWO LOOP TEST APPARATUS CONFIGURATION 5A (TLTA-5A) WITH EMERGENCY CORE COOLING SYSTEMS.

Small Break Blowdown Line (Outlined)

INTERIM REPORT

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INTERIM REPORT