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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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NRC Research and Technical
Assistance Report

1072 227

GENERAL ELECTRIC

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BUSINESS GROUP

GENERAL ELECTRIC COMPANY, 175 CURTNER AVE., SAN JOSE, CALIFORNIA 95125

September 11, 1979

Mr. Edward L. Halman, Director
Division of Contracts
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SUBJECT: BWR BLOWDOWN/ECC PROGRAM
CONTRACT NO. NRC-04-76-215
INFORMAL MONTHLY PROGRESS REPORT FOR AUGUST 1979

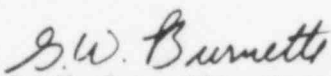
Gentlemen:

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

Planning for a small break scoping test continues with the test targeted for November 1979. The hardware modification cost estimate for the BD/ECC-lB Phase has been updated. Because of recent non-LOCA requirements and delays in obtaining concurrence, it is no longer possible to complete the BD/ECC-lB Phase as suggested within the current cost and schedule constraints of the contract. Various alternatives are being evaluated. Facility shakedown tests for the current test series are nearing completion with blowdown/ECC testing expected to resume during September.

Distribution of this report is being made in accordance with the "Monthly Distribution List" provided with W. D. Beckner's letter of April 20, 1979.

Very truly yours,


G. W. Burnette, Manager
External Programs
M/C 583, Telephone (408) 925-5375

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cc: RG Bock

GWB/cat

NRC Research and Technical
Assistance Report

BWR BD/ECC PROGRAM
FORTY-SIXTH MONTHLY REPORT
AUGUST 1979

Prepared for:

Division of Reactor Safety Research
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555
NRC FIN No. B3014

and

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

and

General Electric Company
175 Curtner Avenue
San Jose, CA 95125

By

General Electric Company

Under

Contract No. NRC-04-76-215

1072 229

NRC Research and Technical
Assistance Report

GENERAL ELECTRIC COMPANY, 175 CURTNER AVE., SAN JOSE, CALIFORNIA 95125

FORTY-SIXTH MONTHLY REPORT

CONTRACT NO. NRC-04-76-215

BWR Blowdown/Emergency Core Cooling Program

August 1979

SUMMARY

Planning for a small break scoping test continues with the test targeted for November 1979. The hardware modification cost estimate for the BD/ECC-1B Phase has been updated. Because of recent non-LOCA requirements and delays in obtaining concurrence, it is no longer possible to complete the BD/ECC-1B Phase as suggested within the current cost and schedule constraints of the contract. Various alternatives are being evaluated. Facility shakedown tests for the current test series are nearing completion with blowdown/ECC testing expected to resume during September.

TASK AA - Program Planning and Administration

Small Break Test

Small break scoping test planning continued with an objective to further accelerate the schedule. A November, 1979 test data is now targeted. The upcoming small break test is designated as a scoping test because many of the large break scaling choices of the present facility may compromise the small break response, and because of some mechanical procedural difficulties in conducting such a test in the existing TLTA. Several features of the current TLTA have been identified which could make this test non-representative of a BWR. Potential means to offset these features have been identified and are currently being evaluated.

A tentative set of test conditions has been selected for the scoping test. Included in the selection are: Break area simulation in the range of 0.05 to 0.1 ft.², loss of feedwater and trip of the recirculation pumps, no high pressure ECC systems (i.e., no HPCS), but the full compliment of other ECC systems (LPCI, LPCS and FOS). These conditions are based on previous BWR small break analyses and consideration of the TMI incident. They are subject to change pending the outcome of current evaluations and at the PMG review stage. The status of this activity was documented in a separate memo⁽¹⁾.

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BD/ECC-1B Configuration

The TLTA configuration² suggested for BD/ECC-1B Phase (extending through bundle reflood) was endorsed by the PMG at the March 1979 PMG Meeting. However, engineering activities on this phase were deferred pending NRC review. In May, 1979, a special PMG meeting was held to discuss potential non-LOCA transient simulation using the TLTA. NRC desired assurance that proposed modifications would not preclude running non-LOCA transients if future sponsor agreement were to be reached. The PMG recommended that the suggested 1B modification be evaluated with the additional requirements that the pressure vessel rating be increased and that design concepts for non-LOCA be developed to assure compatibility.

Following the PMG review, the facility cost estimate has been updated. Because of the additional non-LOCA requirements and the escalation of costs due to delay in obtaining concurrence, it is no longer possible to complete the suggested BD/ECC-1B Phase within the contract schedule and allocated funds. Alternatives are being evaluated.

TASK EE - Facility Shakedown

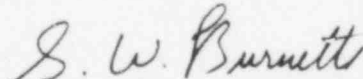
Shakedown testing as outlined in the May, 1979 Monthly Report continued during the month, including an adiabatic blowdown. The data acquisition mini-computer was inoperative for about two weeks and delayed completion of the shakedown test series to September.

TASK FF - TLTA Testing

BD/ECC Testing is expected to resume during September.

TASK GG - Analysis

Analytical efforts have been accelerated in order to provide input for the small break scoping test planning. Existing analysis methods are being used to evaluate the scaling compromises of the existing TLTA. A pre-test assessment of the response of the modified TLTA has been made. The assessment was made for the reference test (average power, nominal ECC flows and temperatures) and is attached as Appendix I.


G. W. Burnette, Manager
External Programs

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References:

- ¹Letter, G. W. Burnette to W. D. Beckner, "Status of Small Break Scoping Test", dated August 17, 1979.
- ²BD/ECC Forty-First Monthly Report, March 1979.

A P P E N D I X I

PRE-TEST ASSESSMENT OF TLTA-5A

L. S. Lee

August 1979

INTRODUCTION

The PMG decided in January 1979¹ to modify TLTA for further testing after it had reviewed the test results from the first series of BD/ECC-1A tests. Details of the TLTA modifications are documented in an addendum² to the test plan. Significant changes for the upcoming tests include: improved simulation of the bypass leakage flow paths, improved simulation of system inventory, and more representative bundle power decay. The new configuration of TLTA is designated as TLTA-5A whereas the previous one TLTA-5.

In TLTA-5A, two bypass flow paths are included. One path diverts a portion of the flow that entered the side entry orifice to the bypass region to simulate the combined BWR leakage paths through the lower tie-plate holes and finger springs. The other path permits fluid to flow from the lower plenum into the guide tube to simulate the BWR equivalent leakage. This latter path is the same as in TLTA-5A except that the hole (orifice) was made smaller.

EXPECTED RESPONSE

Figure 1 and 2 show the expected TLTA-5A response. These figures show a comparison with the previous TLTA-5 results for the reference test.

¹ Transmittal, G. W. Burnette (GE) to M. Merilo (EPRI) and E. H. Davidson (NRC), "Documentation of Informal BWR BD/ECC PMG Meeting, January 18, 1979", January 19, 1979.

² Contract No. NRC-04-76-215, Informal Monthly Progress Report for June 1979, Transmittal G. W. Burnette (GE) to E. L. Halman (NRC), April 5, 1979.

The new leakage flow path in TLTA-5A is expected to influence the response in the bypass region. It is likely that the draining and refilling in the region will result in manometer-type response, as shown in Figure 1, due to the interaction of the leakage flow paths which communicate between the bypass and guide tube, and between the bypass and bundle. Improved simulation of system inventory, i.e., removal of the steam separator liquid reservoir and isolation of the intact loop after 20 seconds, is expected to accelerate the early system depressurization somewhat. The combined effects of the different hydraulic response and improved bundle power simulation are expected to lead to a delay in bulk bundle heat-up and in net reduction in the bundle heat-up rate.

Figure 1. TLTA 5A Reference Test projected responses in comparison with TLTA 5 responses.
 (a) two-phase level at lower plenum, bundle, and upper plenum.

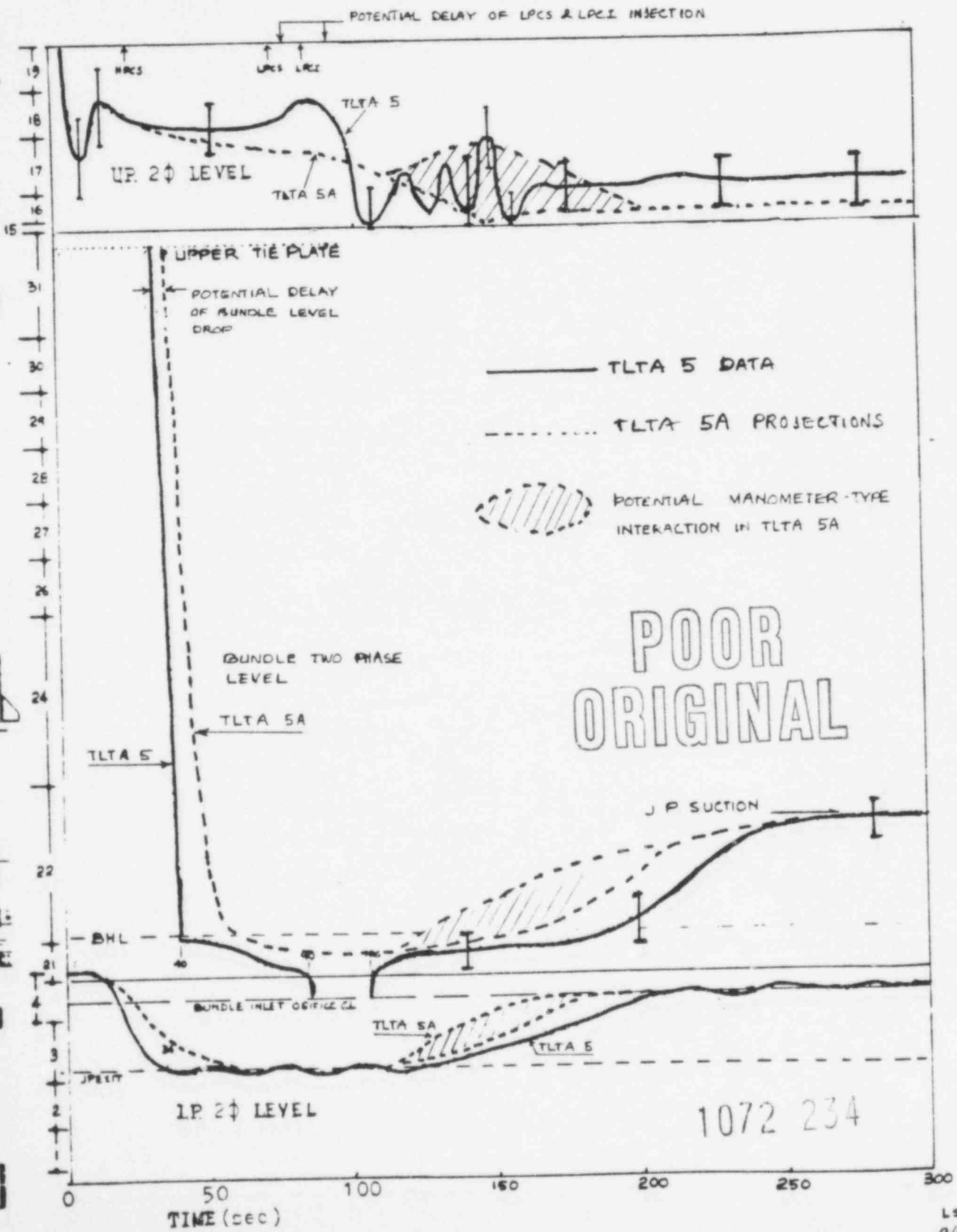
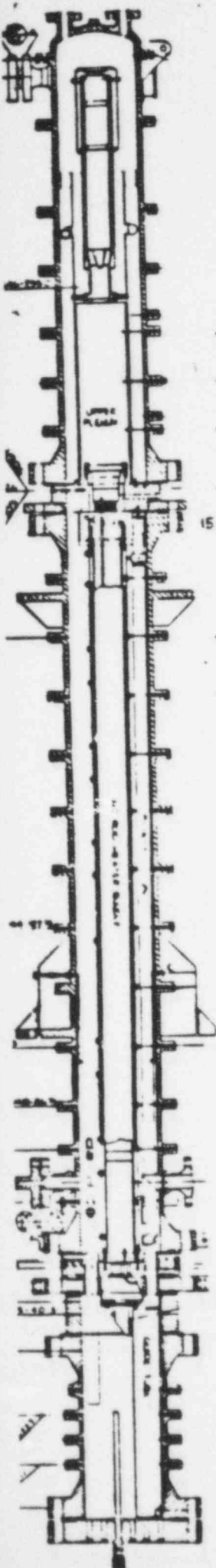
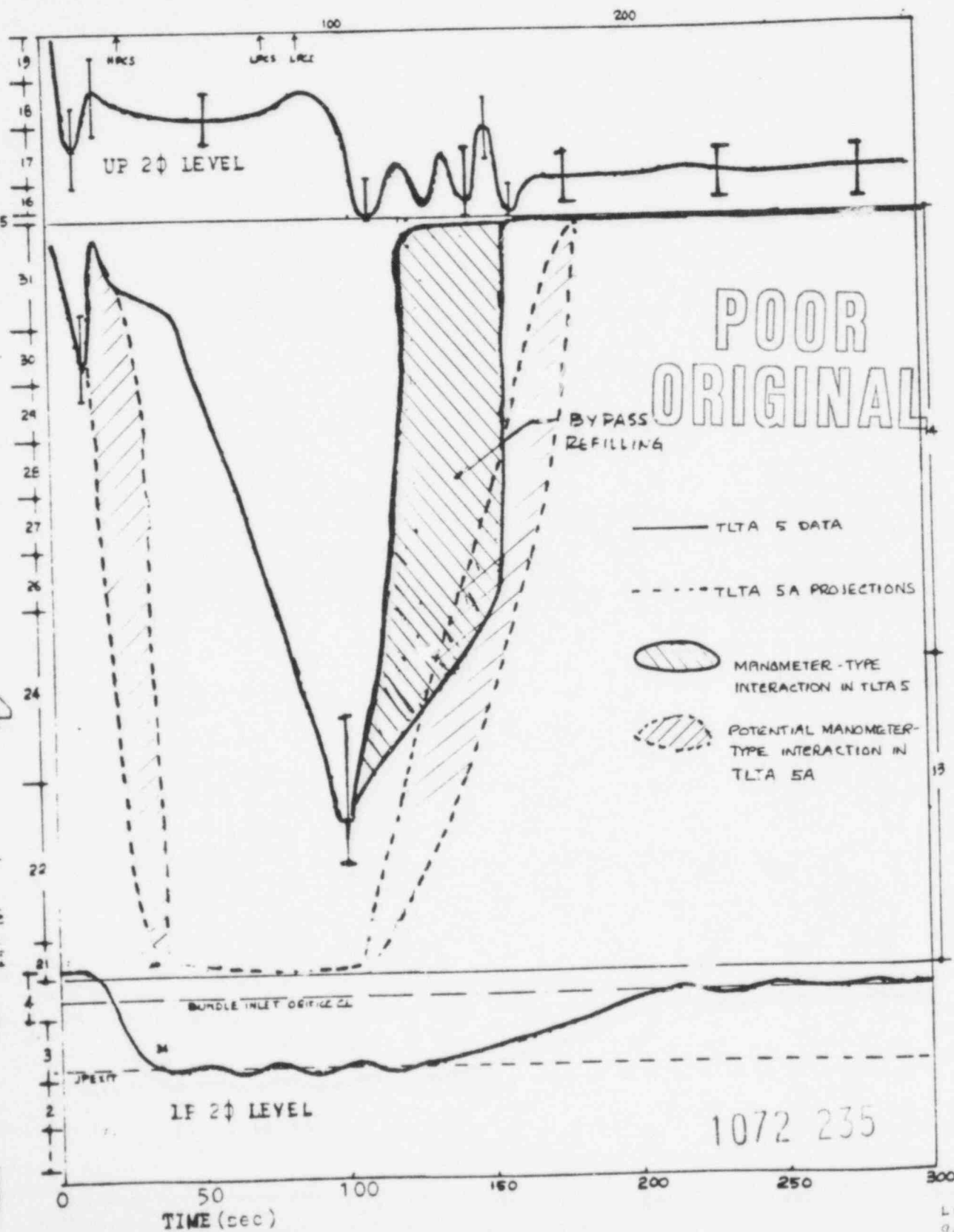
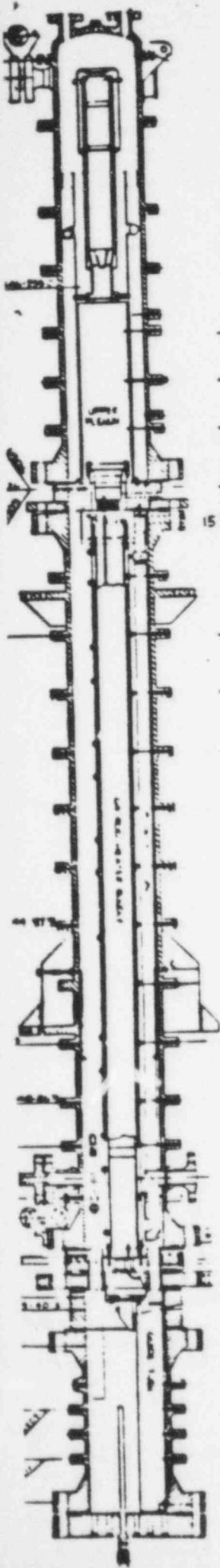
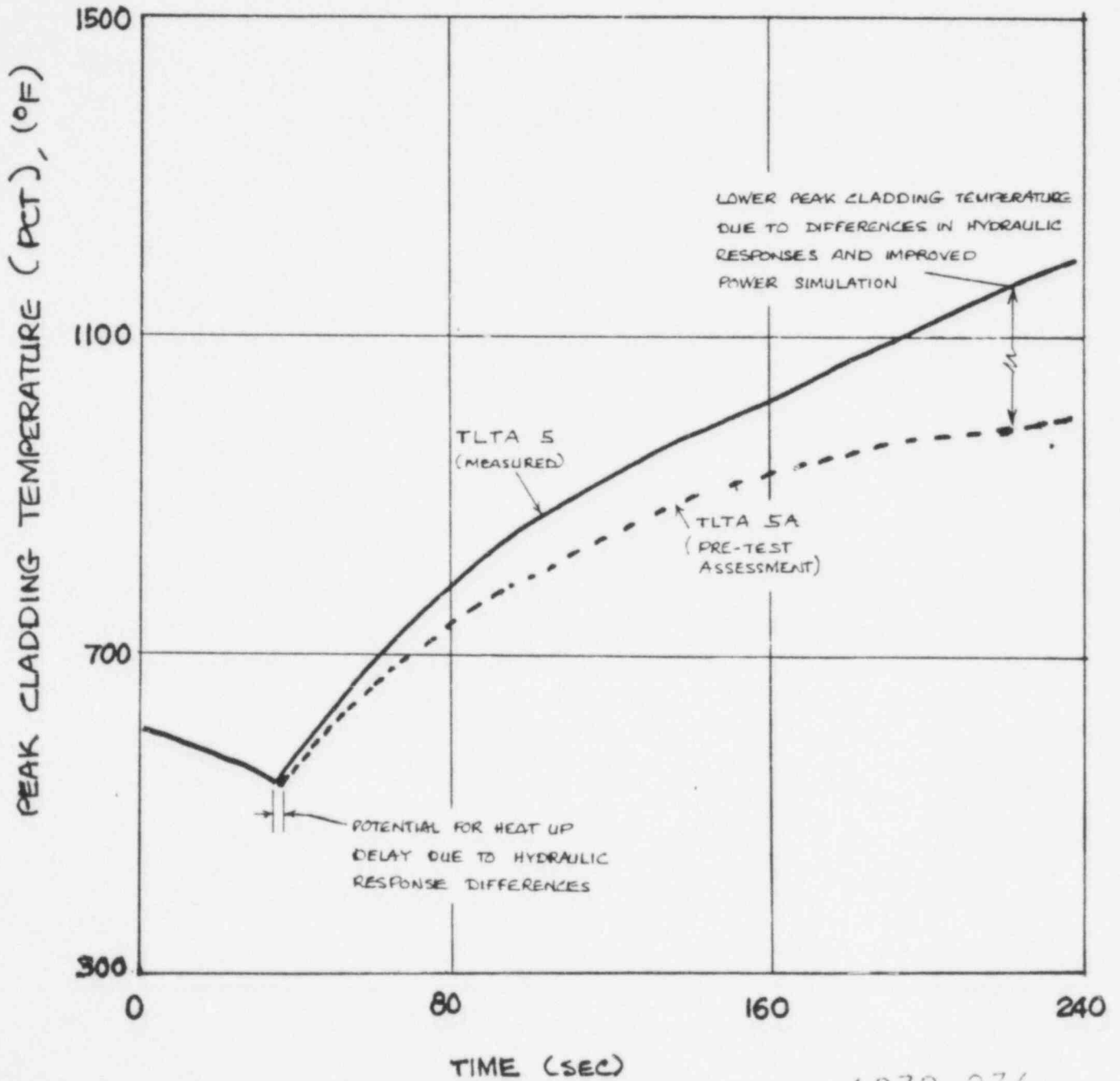


Figure 1, TLTA 5A Reference Test projected responses in comparison with TLTA 5 responses,

(b) bypass region two-phase level.



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Figure 2. Projected TLTA 5A Reference Test PCT