

BOSTON EDISON COMPANY  
GENERAL OFFICES 800 BOYLSTON STREET  
BOSTON, MASSACHUSETTS 02199

June 24, 1976

BECo. Ltr. #76-53

Director of Nuclear Reactor Regulation  
ATTN: D. L. Ziemann, Chief  
Operating Reactors Branch #2  
Division of Reactor Licensing  
Office of Nuclear Reactor Regulation  
U.S. Nuclear Regulatory Commission  
Washington, D. C. 20555



Docket No. 50-293  
License No. DPR-35

ADDITIONAL INFORMATION ON SINGLE LOOP OPERATION

Reference: Letter, D. L. Ziemann to J. E. Larson, dated May 28, 1976

Dear Sir:

In response to a request transmitted by the referenced letter, we hereby submit the following information which has been provided by General Electric Company.

1. Furnish, in graphical form, the results of a complete DBA LOCA calculation for Pilgrim when operating in the single recirculation loop mode. Also provide the results of a complete break spectrum analysis to demonstrate that the DBA is the limiting case. The parameters of interest are as follows:

Peak Clad Temperature (ruptured and unruptured nodes)  
Reactor Vessel Pressure  
Water Level Inside the Shroud  
Thermal Power  
Heat Transfer Coefficients

The requested information is shown in Figures 1-6 for Peach Bottom 2/3 and in Figures 7-9 for Pilgrim.

2. Provide a set of calculations as a function of core life for Pilgrim to justify selection of the MAPLGR curve. The above parameters should be provided in graphical form.

The MAPLGR as a function of exposure is obtained by multiplying the MAPLGR for two-loop operation (which varies with exposure) by the MAPLGR Reduction Factor as explained in the Pilgrim Single Loop Operation License Submittal, which contains the justification for this approach. For each of the points

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shown on Figure 1 of the submittal, a set of sensitivity calculations were made of the MAPLHGR multiplier with respect to exposure (see Table 1) and the most conservative MAPLHGR reduction factor was selected. For Pilgrim (point 5 of Figure 1) the most conservative factor occurs at 17,500 MWD/t exposure. It is common practice for G.E. to truncate the MAPLHGR reduction factor to two significant figures. The value of 0.867 is the calculated reduction factor at 17,500 MWD/t for Pilgrim and is shown as such to be consistent with the initial submittal.

TABLE 1

PILGRIM INITIAL  
CORE FUEL

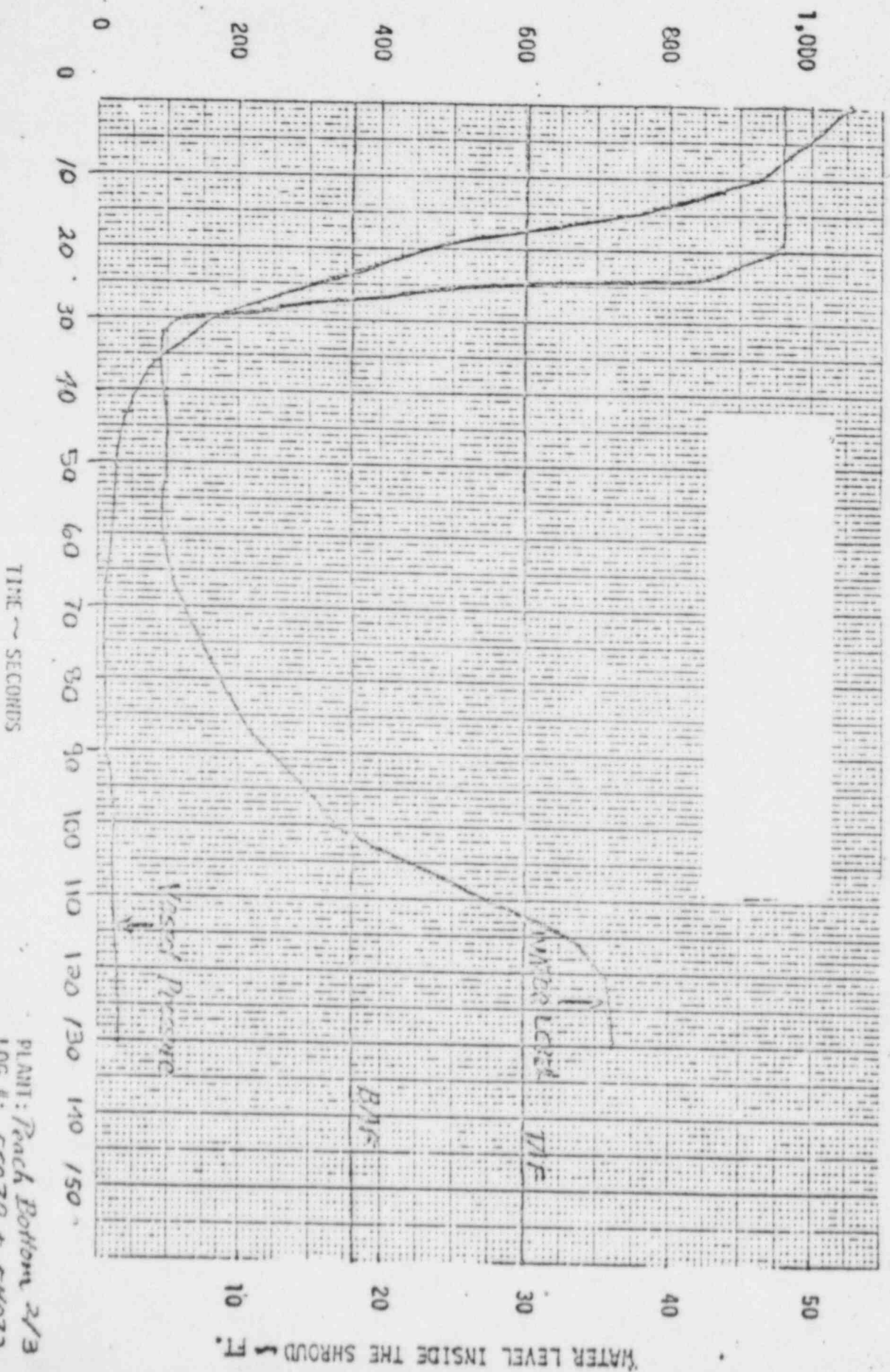
<u>Exposure</u> <u>MWD/t</u>	<u>MAPLHGR Reduction</u> <u>Factor</u>
200	.91
1000	.91
5000	.91
10000	.90
17500	.867
25000	.91
30000	.91

We believe that this additional information should be sufficient to all issuance of the proposed Technical Specification revisions which would authorize single loop operation.

Very truly yours,

*G. C. Andognini*  
G. C. Andognini  
Manager  
Nuclear Operations

REACTOR VESSEL PRESSURE - PS.



WATER LEVEL INSIDE THE SHROUD AND REACTOR VESSEL PRESSURE FOLLOWING A DESIGN BASIS ACCIDENT, (SUCCTION GRV) LPCI INJECTION VALVE FAILURE. SYSTEMS AVAILABLE - 2 CORE CRYST, 2 LPCI IN ONE LOOP, SINGLE LOOP OPERATIONAL. HPCI, and ADS

FIGURE 1

TM 7/25/76

TIME - SECONDS

SD

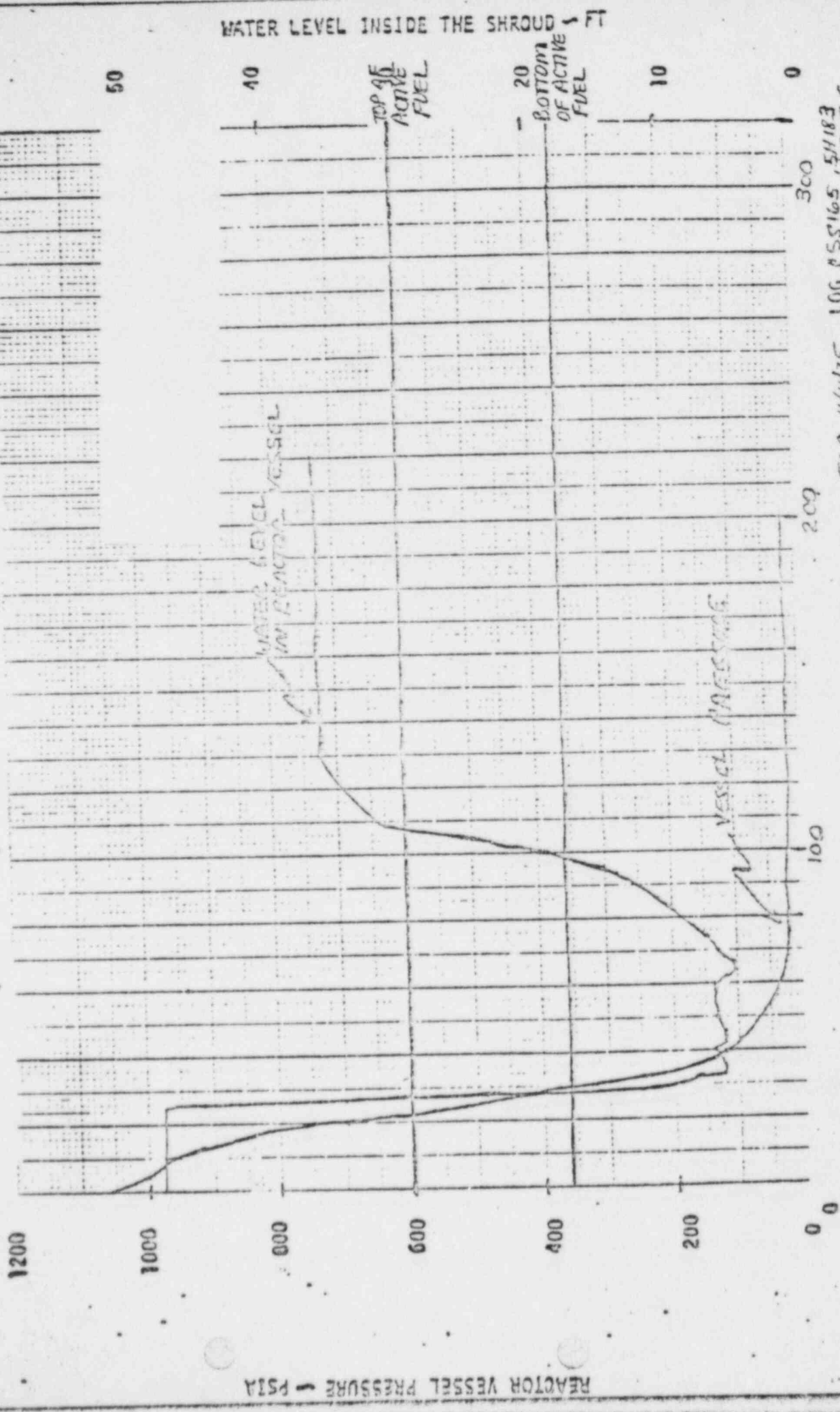
APP. TREP 6/9/75

PLANT: Peach Bottom 2/3  
 LOG #: 55070 + 5H072  
 SHURB #: 82/55 + 01815  
 ENGINEER: OSW  
 6/19/75

WATER LEVEL INSIDE THE SHROUD - FT.

WATER LEVEL INSIDE THE SHROUD AND REACTOR VESSEL PRESSURE FOLLOWING A LARGE BREAK OF THE

RECIRCULATION LINE - LPCI 1/4 FAILURE. BREAK AREA = 80% DOA  
 SINGLE LOOP OPERATION  
 (SUCTION)



1200

1000

800

600

400

200

0

REACTOR VESSEL PRESSURE - PSIA

WATER LEVEL INSIDE THE SHROUD - FT

TOP OF ACTIVE FUEL

BOTTOM OF ACTIVE FUEL

WATER LEVEL IN REACTOR VESSEL

VESSEL PRESSURE

300

200

100

0

50

40

10

0

TOP 11/11/75 LOG # 55165, SHEET 5  
 ERIHS # 59155, SNRUB # 094675  
 CNR 11/15/75 ENGINEER: PAL  
 PLANT: PEAC # BOTTOM 2/3

TOP 5/25/76 1 SECONDS

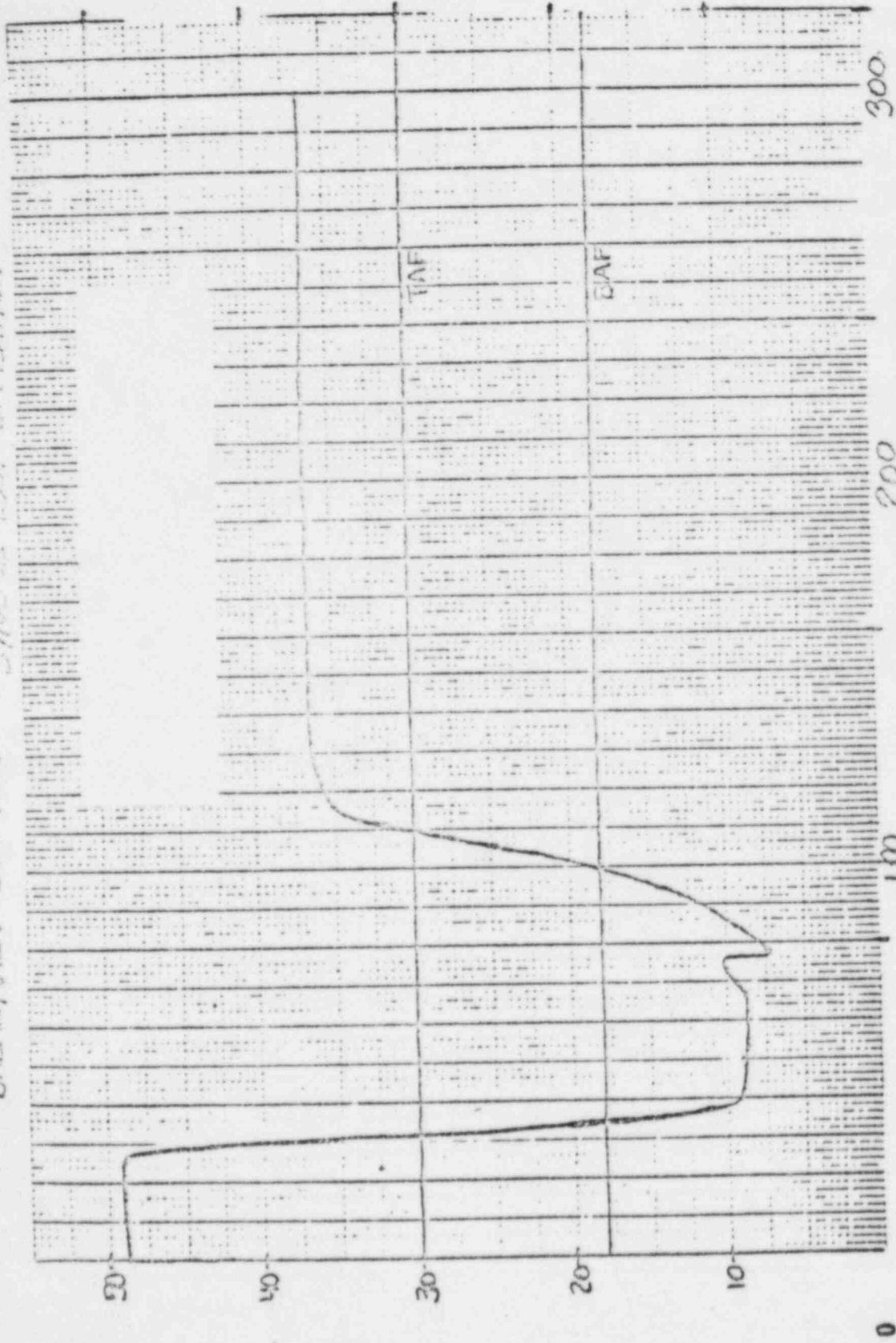
FIGURE 2a

WATER LEVEL INSIDE THE SHROUD FOLLOWING A LARGE GROSS OF THE RECIRCULATION LINE (SECTION)

LPCI INJECTION VALVE FAILURE.

BREAK AREA = 6070 LBS

SHUT-TOFF OPERATION



WATER LEVEL INSIDE THE SHROUD ~ FT.

TOP 11/17/75 PLANT: PEACHTOTTOM 2/3  
LOG #: 5H183  
SHROUD #: 95575  
ENGINEER: PAL 11/6

TIME ~ SECONDS

TOP 5/25/76

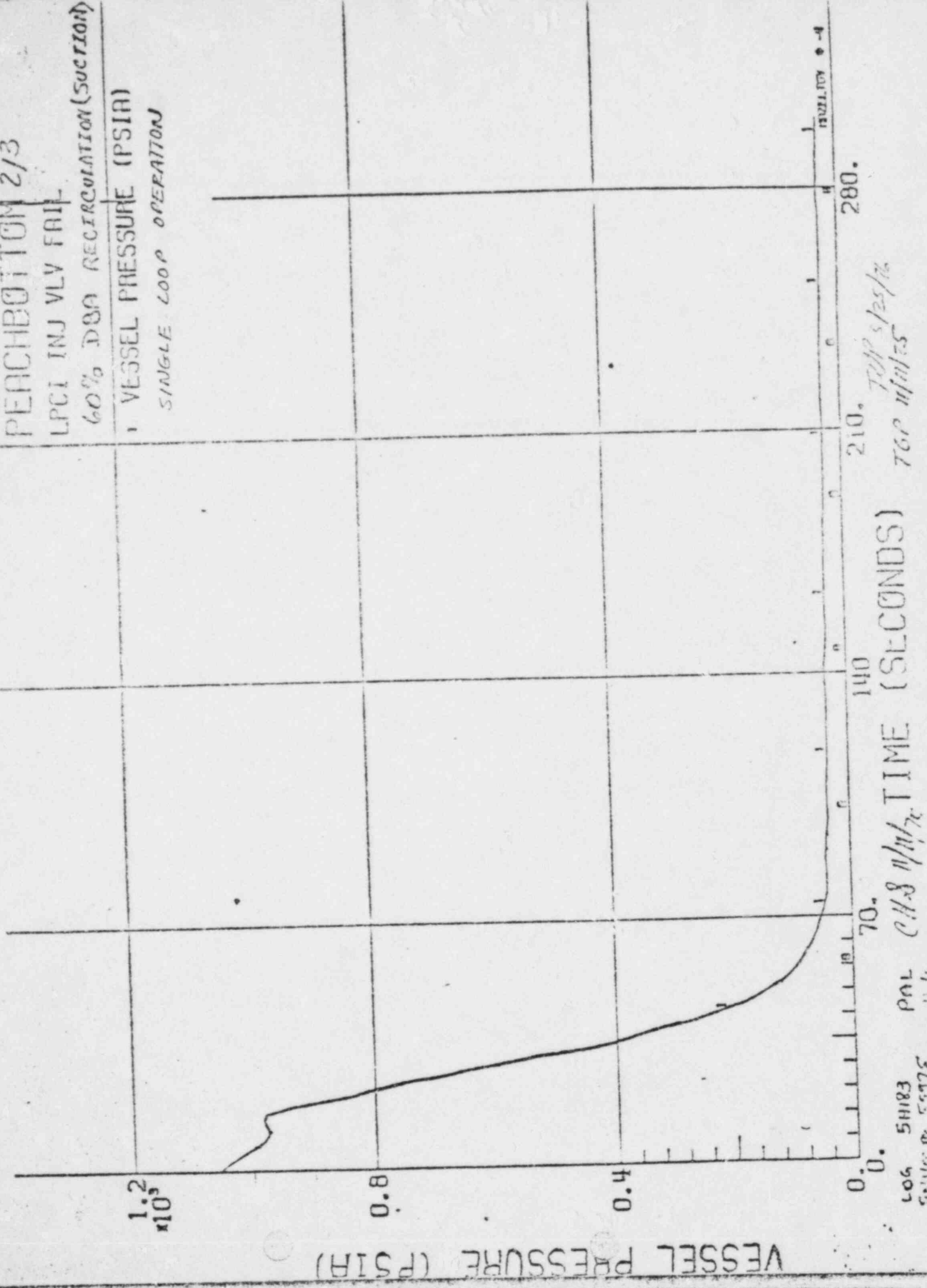
FIGURE 36  
PEACHBOTTOM 2/3

LPCI INJ VLV FAIL

60% DDA RECIRCULATION (SUCTION)

VESSEL PRESSURE (PSIA)

SINGLE LOOP OPERATION



LOG 51183  
51183-55975

POL

CHS 11/11/72

TIME (SECONDS)

210. TOP 5/25/72  
760 11/11/75

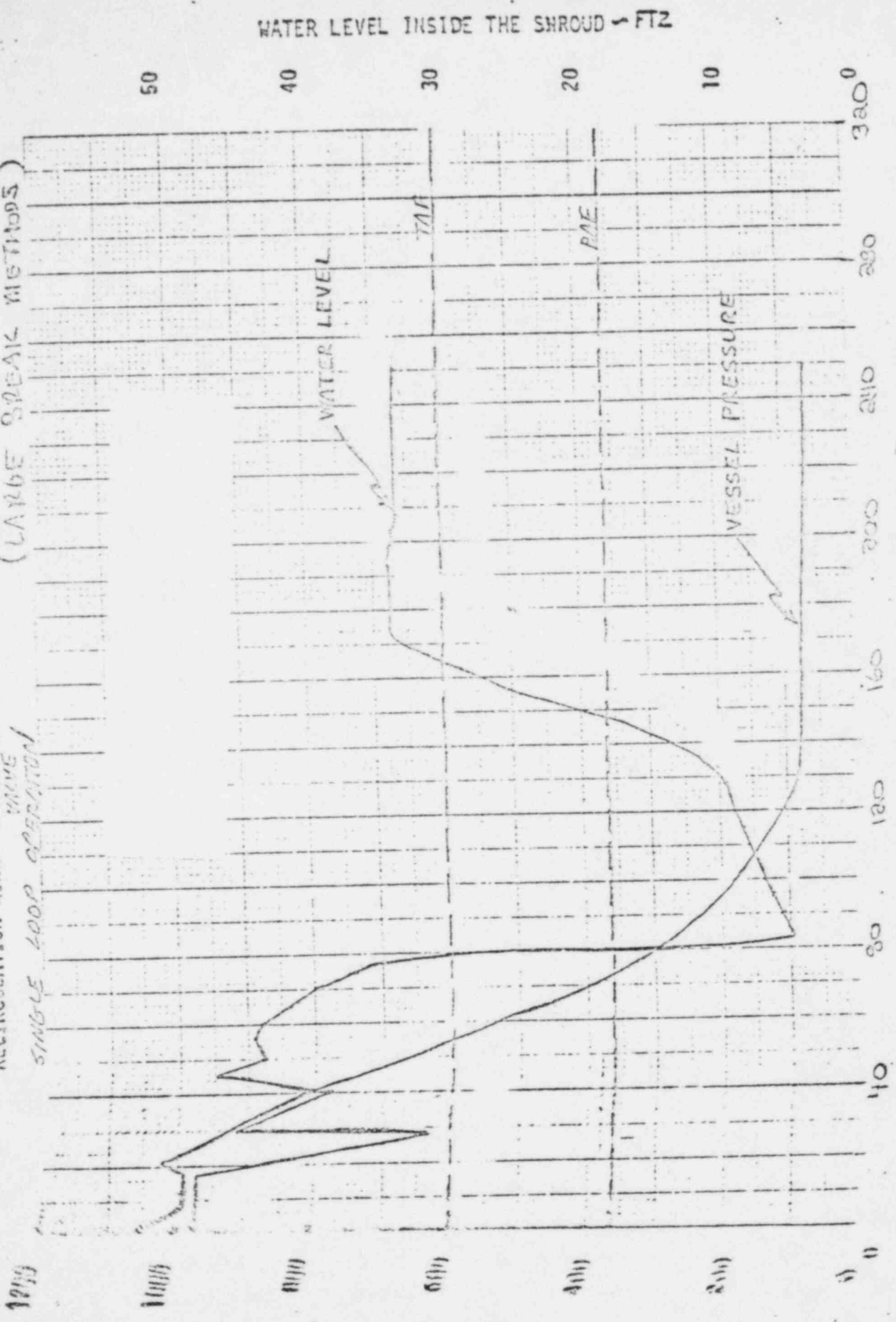
280.

11/11/72

FIGURE 4

WATER LEVEL INSIDE THE SHROUD AND REACTOR VESSEL PRESSURE FOLLOWING A BREAK OF THE

RECIRCULATION LINE - INJECTOR FAILURE, BREAK AREA = 1.0 ft. 2 (SECTION BREAK)  
L.P.C.I.  
(LARGE BREAK METHODS)  
SINGLE LOOP OPERATION



TAP 5/25/76  
TIM SECONDS  
TAF 5/4/76

JDD

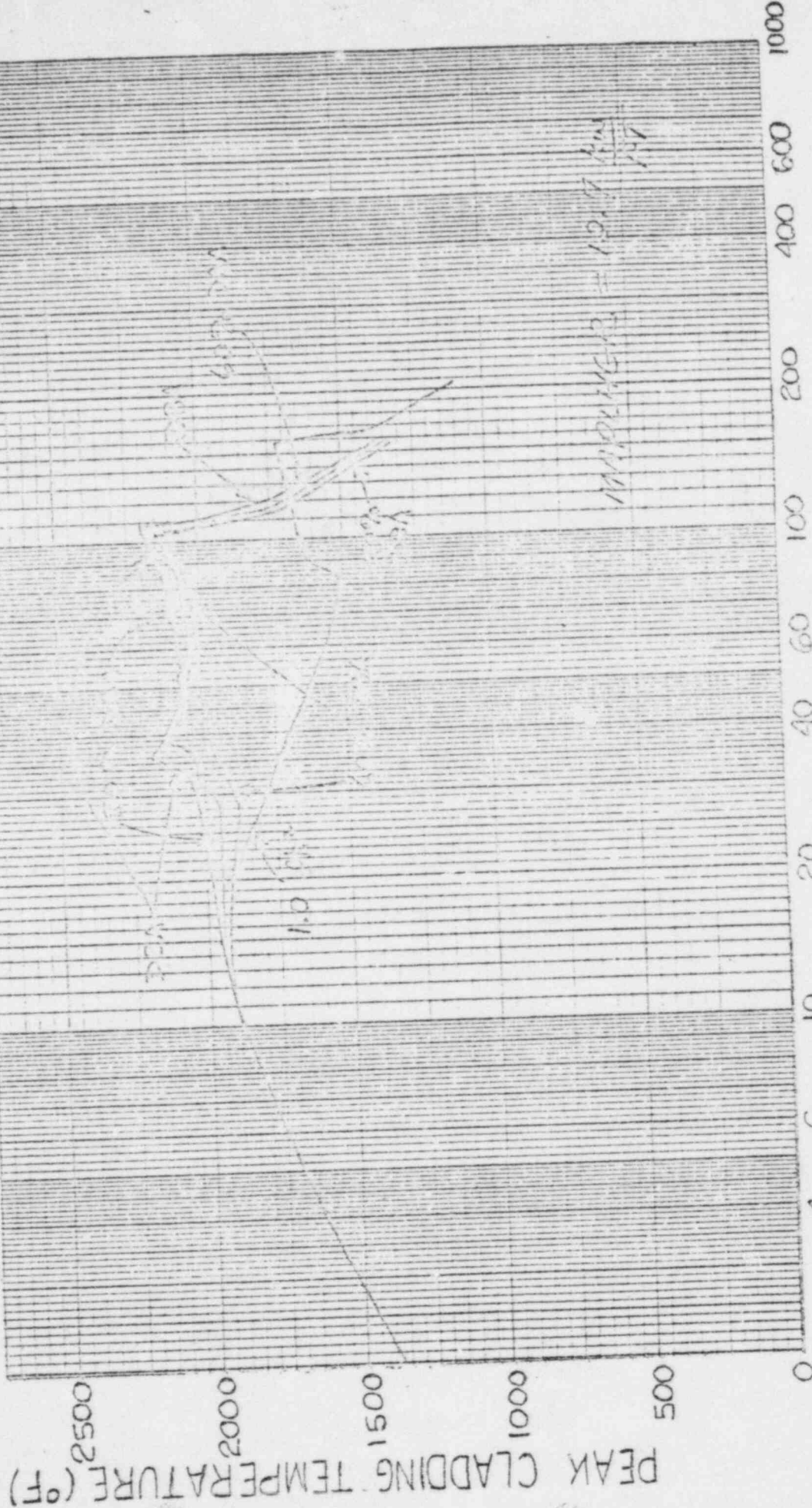
ENGINEER  
PLANT: Peach Bottom 2/3

1760 11558 124 125 11 11. 1438

FIGURE 5  
PEAK CLADDING TEMPERATURE FOLLOWING:

A DSA; 80% DSA; 60% DSA; 1.0 ft. BREAK

SINGLE LOOP OPERATION



TIME ~ SECONDS

DA 5/24/76

LOG# 50326  
SNUMB# 03745, 97245, 09845  
DATE CKI  
DATE APF

7/30 9/25/76

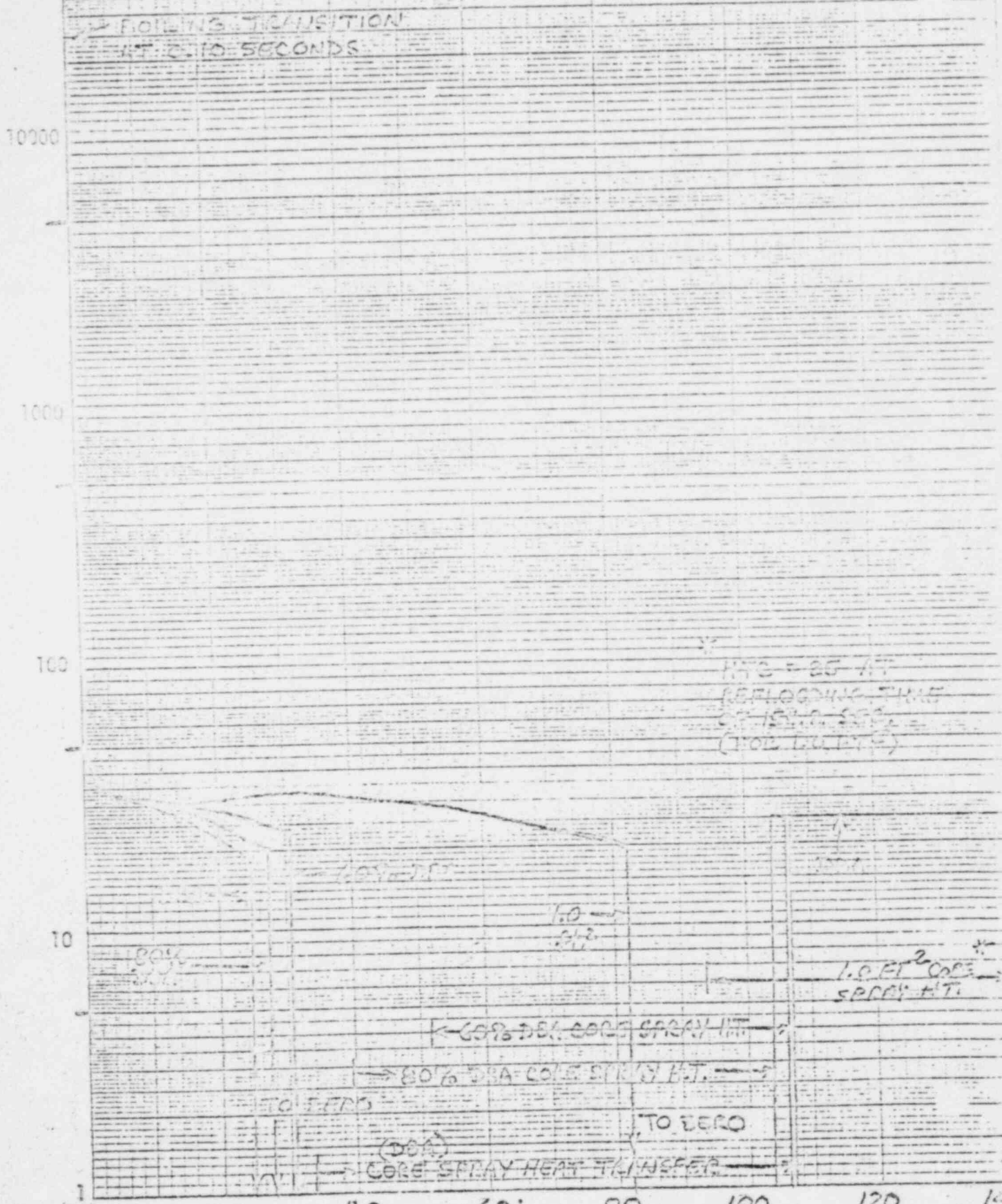
PLANT: PEACH BOTTOM 2/3



FIGURE 6

FUEL ROD CONVECTIVE HEAT TRANSFER COEFFICIENT  
DURING BLOWDOWN AT THE HIGH POWER AXIAL NODE  
SINGLE LOOP OPERATION

CONVECTIVE HEAT TRANSFER COEFFICIENT ON HIGHEST TEMPERATURE ROD ( $\text{BTU}/\text{hr}\text{-ft}^2$ )

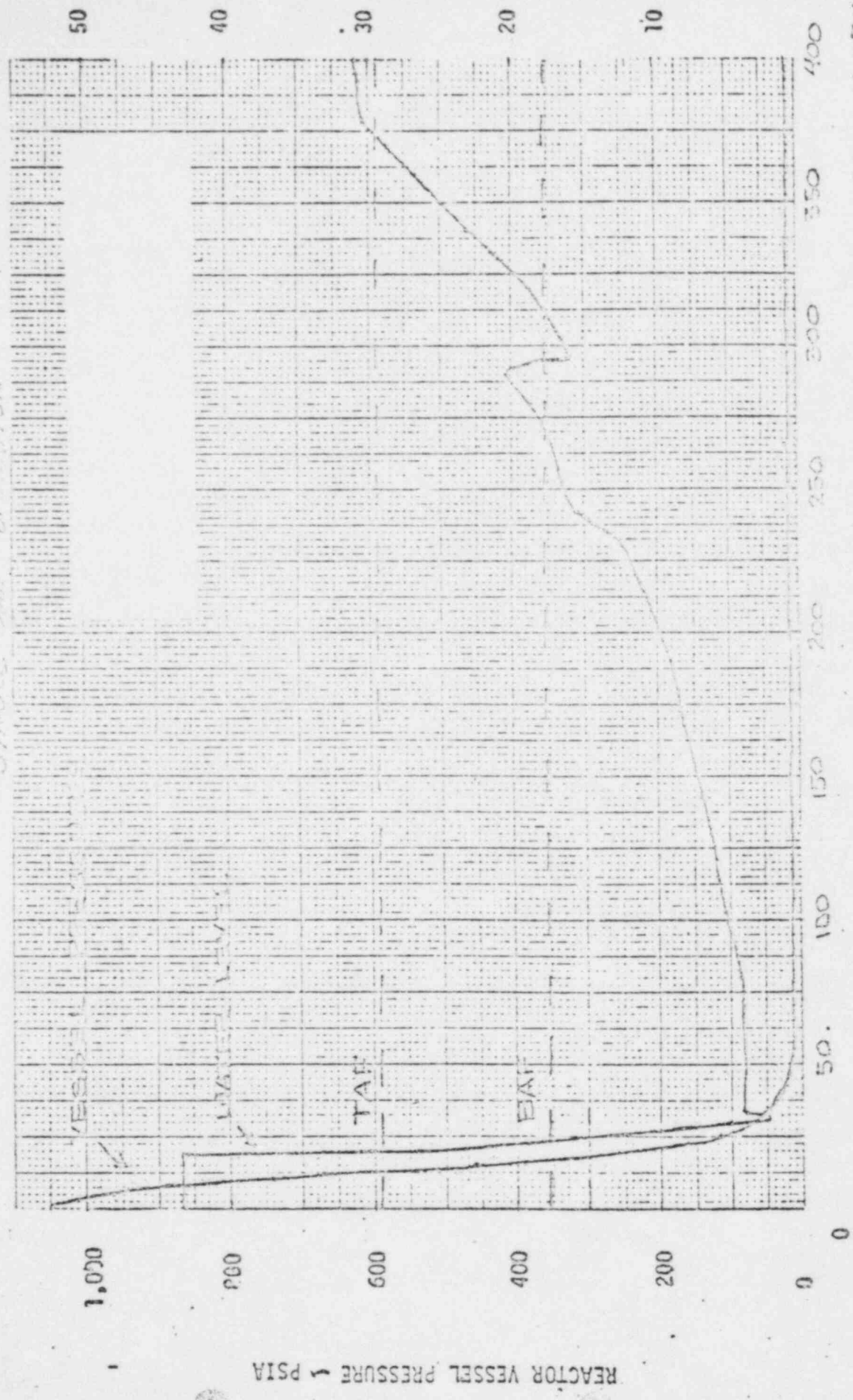


1004 50326 DATE CHK. 20 TIME 60 SECONDS  
 SNLMB-03715 DATE APR 76 5/25/76  
 PLANT: PEACH BOTTOM 2/3

SHRIF 7

WATER LEVEL INSIDE THE SHROUD AND REACTOR VESSEL PRESSURE FOLLOWING A DESIGN BASIS ACCIDENT  
LPCI INJECTION VALVE FAILURE.

*SINGLE LOOP OPERATION*

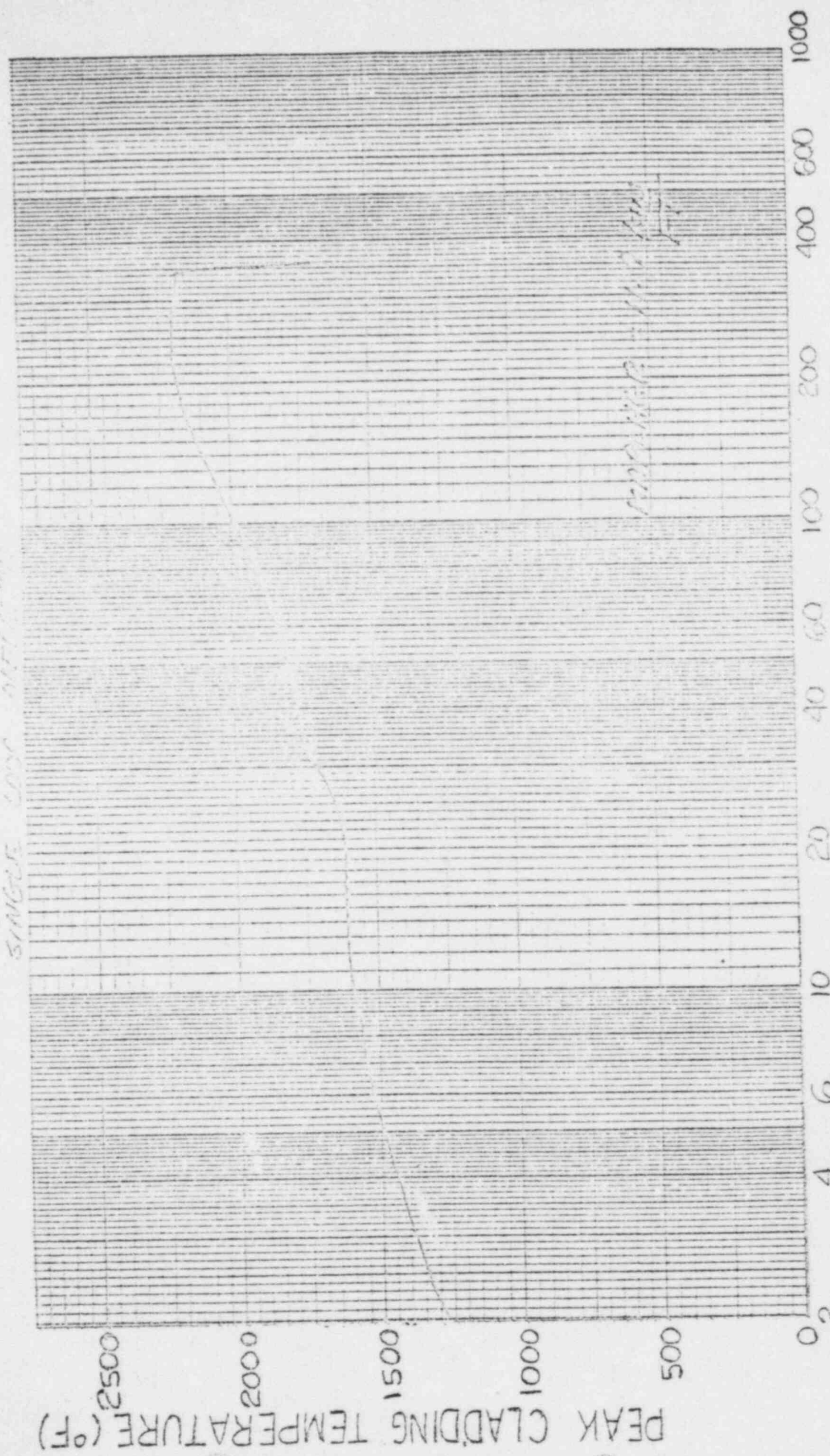


PLANT: PILGRIM POWER  
 LOG #: 5500 54024  
 SHROUD #: 7542 11105  
 ENGINEER: C. A. L. 6/18/75

TIME ~ SECONDS  
*TOP 4/21/76*  
*AD*

FIGURE 3  
 PEAK CLADDING TEMPERATURE FOLLOWING:  
 A DESIGN BASIS ACCIDENT

SINGLE LOOP NPP



TIME ~ SECONDS

PLANT: PILGRIM

LOG# 5C347  
 SNUMR# 07245  
 DATE CKD.  
 DATE APF

MA 5/4/76  
 TSP Spent

FIGURE 9

FUEL ROD CONVECTIVE HEAT TRANSFER COEFFICIENT  
DURING BLOWDOWN AT THE HIGH POWER AXIAL NODE  
SINGLE LOOP OPERATION

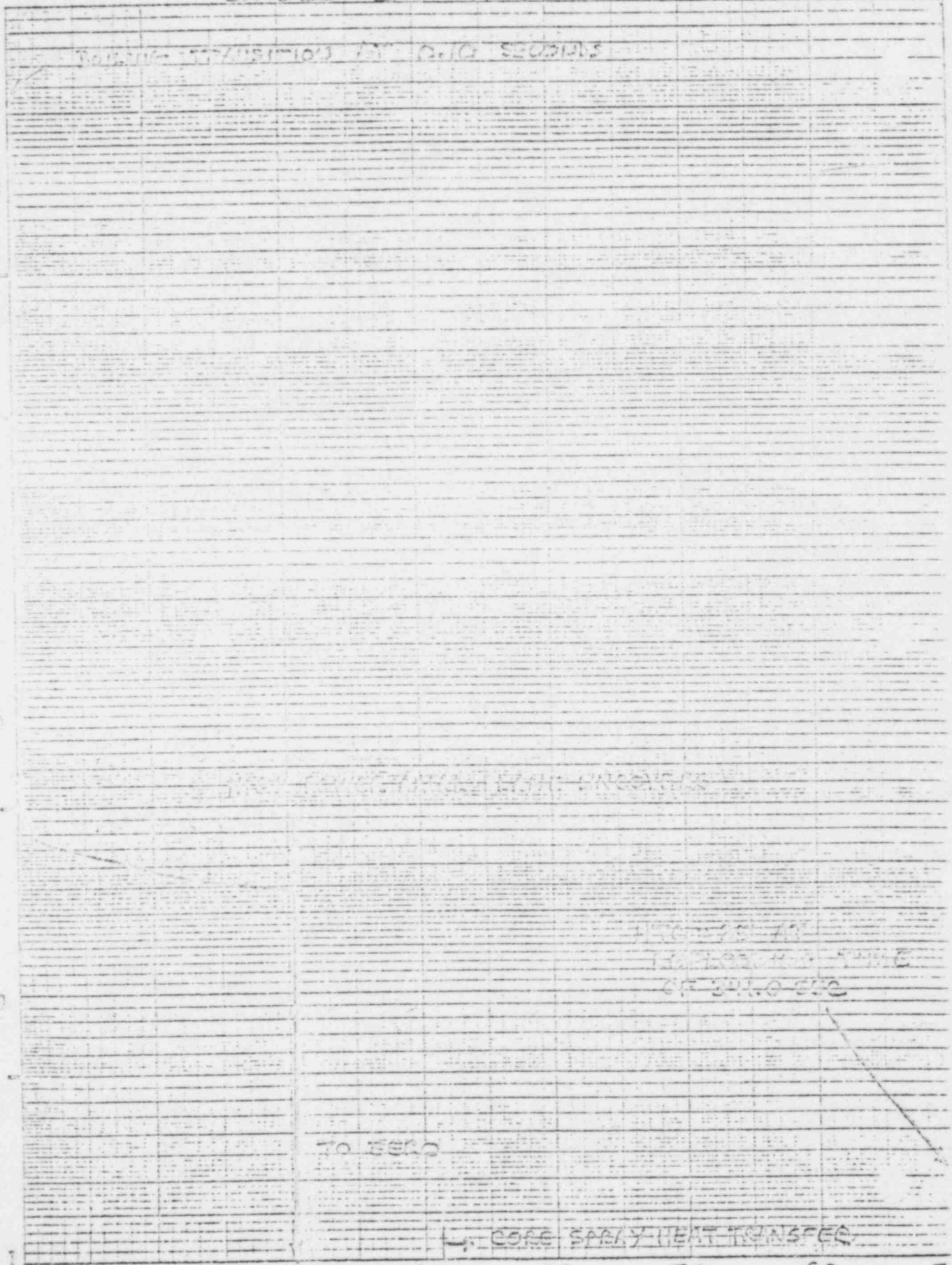
CONVECTIVE HEAT TRANSFER COEFF. AGAIN AS SURFACE TEMPERATURE RISES (BTU/hr-ft<sup>2</sup>)

10000

1000

100

10



LOG# 50347 DATE CHK. 20 TIME 30' 40' 50' 60' 70'  
 SNUM# 07243 DATE APR. 5/25/76 PLANT: PILGRIM