NRC FORM 195 (2-76)

U.S. NUCLEAR REGULATORY COMMISSION

DOCKET NUMBER: 50-335

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NRC DISTRIBUTION FOR PART 50 DOCKET MATERIAL

TO: Mr Ziemann DL	FROM: Florida Power & Light Co Miami, Fla R E Uhrig	DATE OF DOCUMENT: 2-1-77 DATE RECEIVED: 2-3-77
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DESCRIPTION

Ltr notarized 2-1-77....trans the following:

lp

PLANT NAME: St Lucie #1

ENCLOSURE

Amdt to OL/Change to Tech Specs: Consisting of revisions with regard to reevaluation of ECCS cooling performance calculated in accordance with Combustion Eng evaluation model .....(40 cys encl rec'd)

½inch

ACKNOWLEDGED

DO NOT REMOVE!

SAFETY — FOR ACTION/INFORMATION — ENVIRO — 2-3-77 ehf

	ASSIGNED AD:			ASSIGNED AD:
✓	BRANCH CHIEF:	Ziemann (5)		BRANCH CHIEF:
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CONTROL NUMBER: 1227

38

P. O. BOX 013100, MIAMI, FL 33101

FLORIDA POWER & LIGHT COMPANY

February 1, 1977
L-77-37

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

Dear Mr. Ziemann:

Re: St. Lucie Unit 1
Docket No. 50-335
Proposed Amendment to Facility
Operating License DPR-67

In accordance with provision (1) of the June 17, 1976 Order for Modification of License DPR-67, Florida Power & Light Company hereby submits a re-evaluation of ECCS cooling performance calculated in accordance with an approved Combustion Engineering Evaluation Model. The re-evaluation supports reactor operation with a maximum allowable peak linear heat generation rate (PLHGR) of 14.8kw/ft and supplements our earlier submittal L-76-254 of July 9, 1976.

Based on the above, we request that the St. Lucie Unit 1 Operating License be amended by depleting provisions (1) and (2) of the June 17 Order, and that our proposed Technical Specification amendment contained in letter L-76-254 be approved. Our current schedule shows that ascension to 100 percent power will be possible after February 4, 1977, therefore, your timely review of our request will be appreciated. With the current PLHGR limit of 12.7 kw/ft, we may not be able to perform certain tests which have been scheduled as part of the 100% power portion of the startup test program.

The proposed Technical Specification amendment has been reviewed by the St. Lucie Plant Facility Review Group and the Florida Power & Light Company Nuclear Review Board. They have concluded that it does not involve an unreviewed safety question.

Very truly yours,

Robert E. Uhrig

Robert E. Uhrig
Vice President

REU/MAS/cpc
Attachment
cc: Mr. Norman C. Moseley, Region II
Robert Lowenstein, Esquire

1227

St. Lucie Unit 1, Core 1A ECCS Performance Results
Supplement 1

S-I. Introduction

Recent modifications to the STRIKIN-II code prompted a spectrum reanalysis for St. Lucie Unit 1, Core 1, which was reported in Reference 1. These calculations used a STRIKIN-II version which allowed a return to nucleate boiling. Subsequently, STRIKIN-II was modified to prevent a return to nucleate boiling, and the Core 1 poison rods were replaced. The purpose of this submittal is to report the results of a worst break reanalysis of the reconstituted core (Core 1A), using the STRIKIN-II version which does not allow a return to nucleate boiling.

S-II. Summary

The calculations documented herein consist of a reanalysis of the most limiting break (0.8 DES/PD)* as reported in Reference 1, at a peak linear heat generation rate (PLHGR) of 14.8 kw/ft. The table below compares the results to those reported in Reference 1.

	Peak Clad Temperature (^{o}F)	Clad Oxidation (%) Local	Core Wide
Reference 1 (return to nucleate boiling)	2181	13.1	< 0.795
Reanalysis (no return to nucleate boiling)	2157	12.9	<0.791

The reanalysis yielded clad temperatures and oxidation percentages which are within the NRC Acceptance Criteria published in the Federal Register on January 4, 1974. The decrease in peak clad temperature is explained in Sections III-A, C, and E.

*0.8 DES/PD = 0.8 Double-Ended Slot at the Pump Discharge

S-III. Large Break Spectrum Analysis

A. Method of Calculation

The only differences between the method used in Reference 1 and that used in the current calculation are the post-CHF heat transfer logic in STRIKIN-II and the treatment of the fuel-clad gap region immediately following clad rupture. The STRIKIN-II version used in Reference 1 allowed a return to nucleate boiling, while the version used in the current calculation does not [2]. Also, in Reference 1, the gap at the rupture location was assumed to fill with steam immediately at rupture, while the current calculation assumes that the gap contains fission gas until the blowdown peak clad temperature is reached, then fills with steam [2].

B. Emergency Core Cooling System Assumptions

The ECCS assumptions are the same as those stated in Reference 1.

C. Core, System, and Containment Parameters

The parameters are the same as those given in Reference 1, except that the calculation of the steady-state gap conductance and stored energy in the fuel has been updated to reflect the as-operated condition of the reconstituted core. Included in this update was a reduction in the PLHGR used in FATES to the actual limit of 14.8 kw/ft. The steady-state gap conductance and fuel temperatures are compared to those reported in Reference 1 in Table S-III.1. The effect of the replacement of the poison rods upon other system parameters has also been considered and is negligible.

D. Break Selection

Reference 1 presented the results of a full six break spectrum. As requested in Reference 3, this supplement to Reference 1 analyzed the most limiting break, the 0.8 DES/PD.

E. Results

Since only the STRIKIN-II calculations were repeated in this analysis, only the results which are different from those reported in Section III of Reference 1 will be presented. Table S-III.2 contains a list of the variables plotted. The times of interest for the break analyzed are the same as in Reference 1, except for the hot rod rupture time. Table S-III.3 presents the rupture time, the peak clad temperature, and the clad oxidation percentages for this analysis. For comparison purposes, the results of the spectrum reported in Reference 1 are also shown.

The prevention of return to nucleate boiling, taken alone, would have resulted in an increase in peak clad temperature over that reported in Reference 1. However, as reported in Tables IV-2 and IV-3 of Reference 2, this effect is essentially cancelled by the change in the gap treatment at rupture. The additional effect of updating the steady-state fuel temperature calculation results in a net decrease in the peak clad temperature.

F. Computer Code Version Identification

The following STRIKIN-II code version was used in this analysis:

STRIKIN-II: Version 76234

REFERENCES

1. L-76-254 Letter from R. E. Uhrig (FP&L) to Victor Stello (NRC), July 9, 1976.
2. Supplement 4 to CENPD-135, "STRIKIN-II, A Cylindrical Geometry Fuel Rod Heat Transfer Program", August, 1976.
3. Letter from D. L. Ziemann (NRC) to R. E. Uhrig (FP&L), August 26, 1976.

TABLE S-III.1

St. Lucie Unit I

General System Parameters

Quantity	Value	
	Reference 1 (Return to Nucleate Boiling)	Reanalysis (No Return to Nucleate Boiling)
Peak Linear Heat Generation Rate (PLHGR)	14.8 kw/ft	14.8 kw/ft
Gap Conductance at PLHGR	760.4 BTU/hr-ft^2-^{o}F	794.8 BTU/hr-ft^2-^{o}F
Fuel Centerline Temperature at PLHGR	3882.5^{o}F	3843.7^{o}F
Fuel Average Temperature at PLHGR	2573.6^{o}F	2537.7^{o}F

Table S-III.2

St. Lucie Unit 1

Variables Plotted for the

0.8 x Double-Ended Slot Break in

Pump Discharge Leg (0.8 x DES/PD)

Variable	Figure Number
Peak Clad Temperature	S-III.1
Local Clad Oxidation	S-III.2
Hot Spot Gap Conductance	S-III.3
Clad, Fuel Centerline, Fuel Average, and Coolant Temperature for the Hottest Node	S-III.4
Hot Spot Heat Transfer Coefficient	S-III.5
Hot Rod Internal Gas Pressure	S-III.6

Table S-III.3

St. Lucie Unit 1

Rupture Times, Peak Clad Temperatures,

and Oxidation Percentages

Break	Hot Rod Rupture Time (sec)	Peak Clad Temperature (^{o}F)	Clad Oxidation % Local	Clad Oxidation % Core-Wide
Reference 1 (Return to Nucleate Boiling)				
1.0 DES/PD	10.1	2148	13.2	<0.803
0.8 DES/PD	9.9	2181	13.1	<0.795
0.6 DES/PD	10.5	2080	12.3	<0.727
1.0 DEG/PD	10.2	2139	13.4	<0.828
0.8 DEG/PD	10.1	2129	13.3	<0.850
0.6 DEG/PD	29.1	1937	9.6	<0.565
Reanalysis (No Return to Nucleate Boiling)				
0.8 DES/PD	10.1	2157	12.9	<0.791

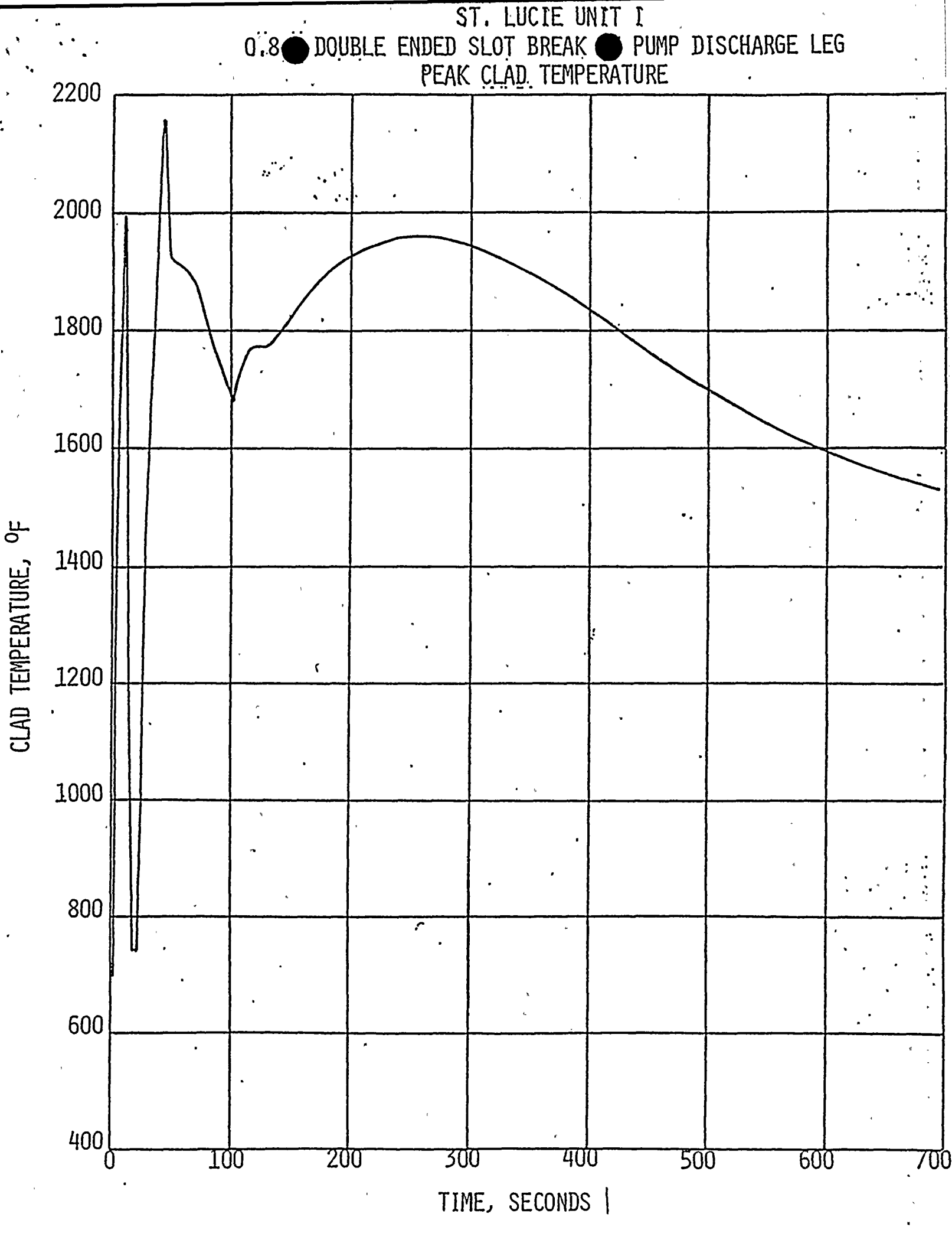

ST. LUCIE UNIT I
0.8 ● DOUBLE ENDED SLOT BREAK ● PUMP DISCHARGE LEG
PEAK CLAD TEMPERATURE
2200
2000
1800
1600
1400
1200
1000
800
600
400
CLAD TEMPERATURE, °F
0
100
200
300
400
500
600
700
TIME, SECONDS

FIGURE 6.1.1-2

ST. LUCIE UNIT 1

0.8 x DOUBLE ENDED SLOT BREAK IN PUMP DISCHARGE LEG

LOCAL CLAD OXIDATION

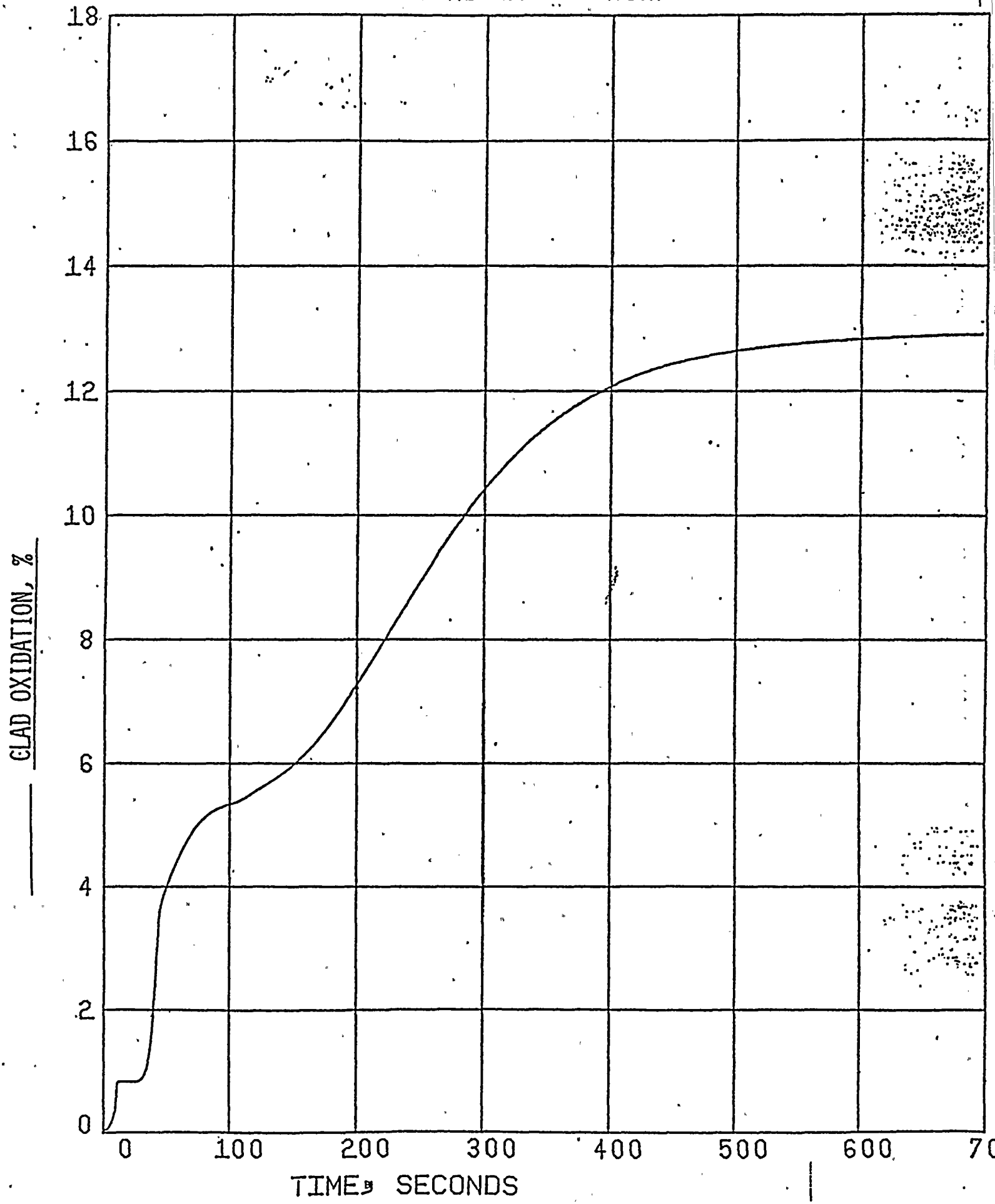
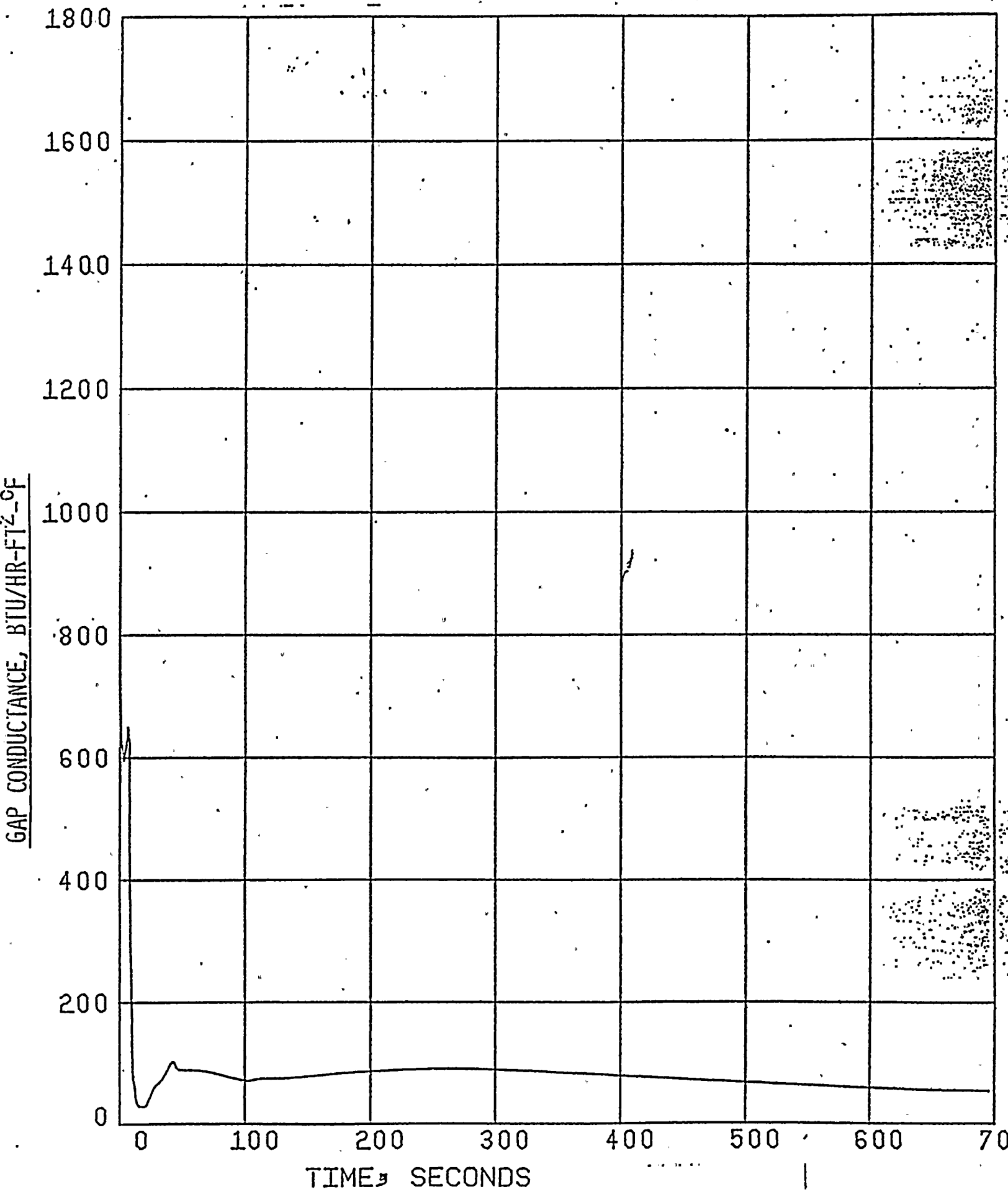


FIGURE S-III.3

ST. LUCIE UNIT I

0.8 x DOUBLE ENDED SLOT BREAK IN PUMP DISCHARGE LEG

HOT SPOT GAP CONDUCTANCE



ST. LUCIE UNIT I

0.8 x [redacted]UBLE ENDED SLOT BREAK IN [redacted]MP DISCHARGE LEG

CLAD TEMPERATURE, CENTERLINE FUEL TEMPERATURE, AVERAGE FUEL TEMPERATURE AND COOLANT TEMPERATURE FOR HOTTEST NODE

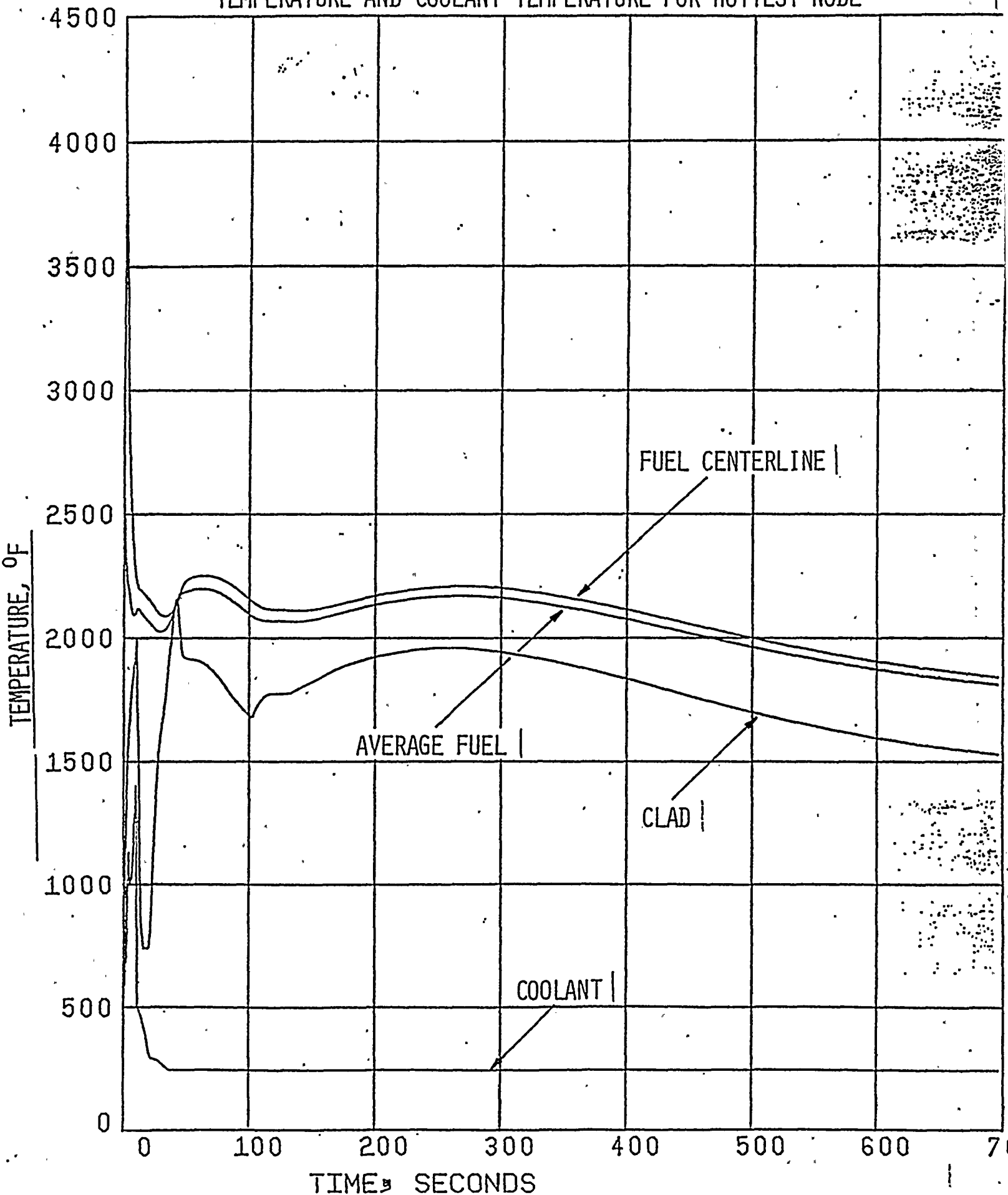


FIGURE S-III.5
ST. LUCIE UNIT I
0.8 x DOUBLE ENDED SLOT BREAK IN PUMP DISCHARGE LEG
HOT SPOT HEAT TRANSFER COEFFICIENT

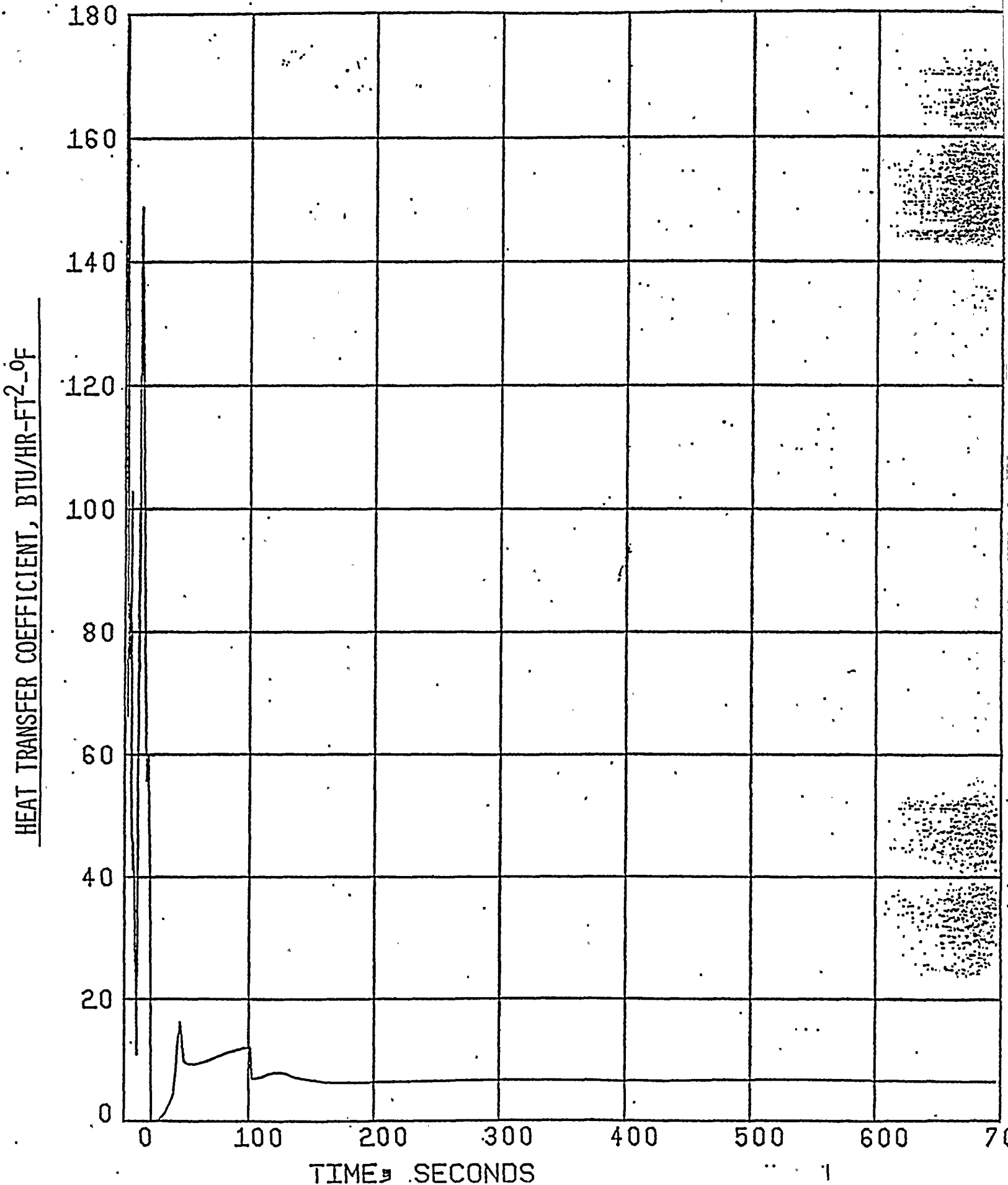
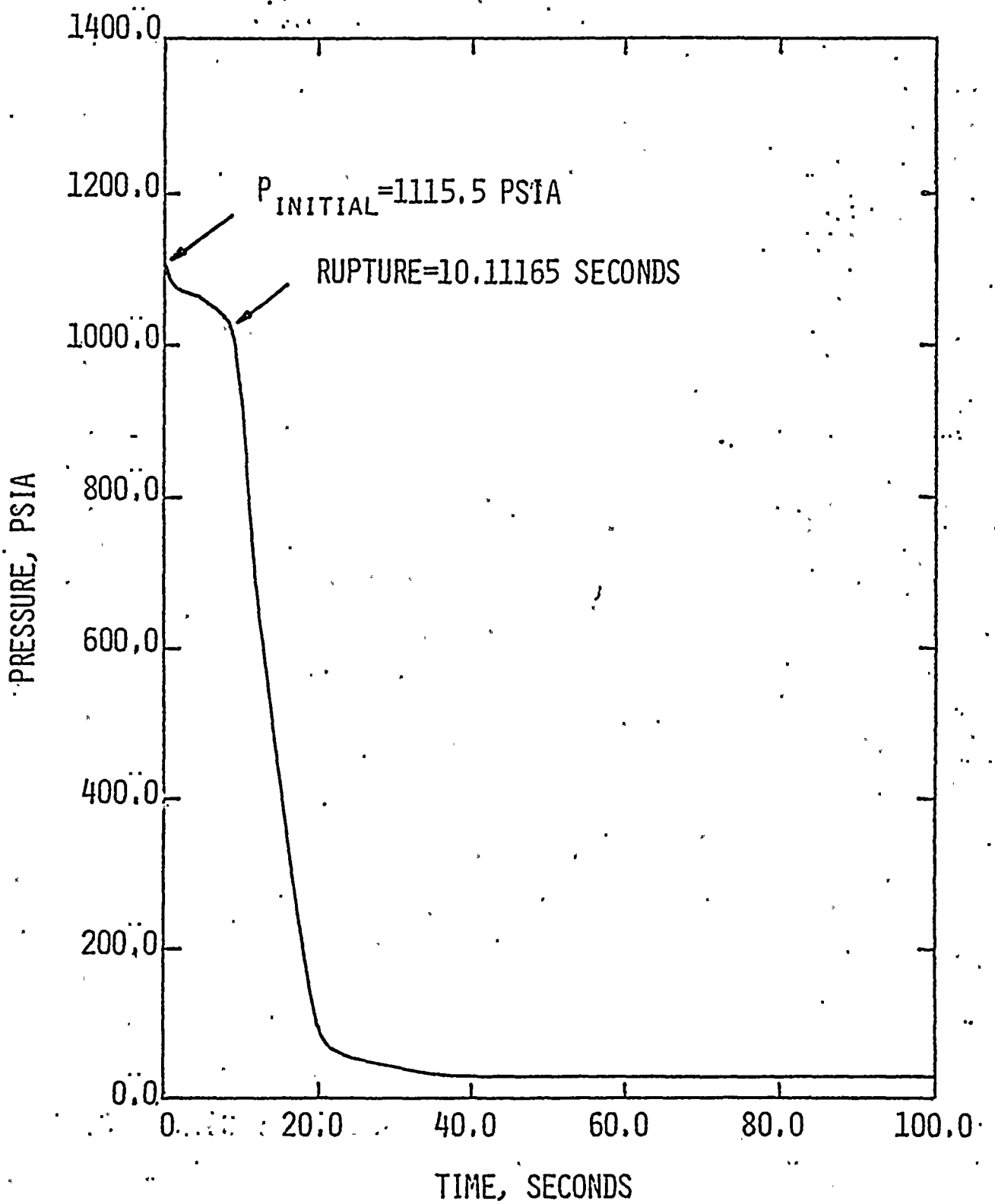


FIGURE S-III.6
ST. LUCIE UNIT 1
0.8 x DOUBLE ENDED SLOT BREAK IN PUMP DISCHARGE LEG
HOT ROD INTERNAL GAS PRESSURE



STATE OF FLORIDA)
) ss.
COUNTY OF DADE)

Robert E. Uhrig, being first duly sworn, deposes and says:

That he is a Vice President of Florida Power & Light Company, the Licensee herein;

That he has executed the foregoing document; that the statements made in this said document are true and correct to the best of his knowledge, information, and belief, and that he is authorized to execute the document on behalf of said Licensee.

Robert E. Uhrig

Robert E. Uhrig

Subscribed and sworn to before me this

1st day of February, 1977

Helen L. Carson

NOTARY PUBLIC, in and for the County of Dade, State of Florida

NOTARY PUBLIC STATE OF FLORIDA AT LARGE
MY COMMISSION EXPIRES NOV. 30 1979
BONDED THRU GENERAL INS. UNDERWRITERS

My commission expires: