TIC

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May 21, 1979

1-059-25

Mr. K. V. Seyfrit, Director
Office of Inspection & Enforcement
U. S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 1000
Arlington, Texas 76011

Subject: Arkansas Nuclear One - Unit 1
Docket No. 50-313
License No. DPR-51
Anticipatory Reactor Trips
(File: 1510.1)

Gentlemen:

Our response to IE Bulletin No. 79-05B, dated May 4, 1978, committed us to install control-grade, anticipatory reactor trips on loss of main feedwater and/or on a turbine trip, and to upgrade these to safety-grade trips commensurate with our letter of May 11, 1979. Item 5 of Bulletin 79-05B also requested an anticipatory reactor trip on low steam generator level. Attached is a report on the assessment of these proposed trip signals which shows that a trip on low steam generator level would not be anticipatory. This trip is, therefore, not included in our design.

Appendix A to the attached report is a proposed Safety Evaluation Program for Anticipatory Trips. Arkansas Power and Light intends to fully complete Phase 1 of this proposed program. A determination will be made at that time of the necessity of continuation of the program. Another determination for continuation will be made upon completion of Phase 2, provided Phase 2 is implemented.

Appendix B to the attached report is our proposed design for safety grade anticipatory trips on loss of main feedwater and/or on turbine trip. The design of these trips is submitted for your review as requested in Item 5 of Bulletin 79-05B. Following approval of the design of the trips by the staff, we will implement these changes during our next outage (following completion of the design change engineering) to cold shutdown conditions which is of sufficient length to accommodate the change but no later than the next refueling outage.

MEMBER MIDDLE SOUTH UTILITIES SYSTEM

In response to Item 7 of IE Bulletin 79-05B, we have previously submitted two Technical Specification Change Requests for your review and approval. We have no further changes to request as a result of the TMI-2 incident at this time.

Very truly yours,

David C. Trimble

David C. Trimble
Manager, Licensing

DCT:ERG:vb

Attachment

ANTICIPATORY TRIP FUNCTIONS
FOR 177 FA PLANTS

INDEX

1.0 INTRODUCTION

For the purposes of this report, an anticipatory trip is defined as a trip function that would sense the start of a loss of OTSG heat sink and actuate much earlier than presently installed reactor trip signals. Possible anticipatory trip signals indicative of changes in OTSG heat removal are: turbine trip, loss of main feedwater, and low steam generator level.

This report evaluates the effectiveness of anticipatory trips compared to the existing high RC pressure trip for a LOFW. Qualitative and quantitative arguments are presented which support elimination of the level trip in the steam generators from final design considerations of anticipatory trips.

Functional response is presented in terms of a parametric study of time to trip. Thus, irrespective of the plant specific trip signals and actuation time, the hardware design can proceed with greater flexibility. That is, by presenting system parameters, such as pressurizer fill time, as a function of time to trip, then if one plant's turbine trip signal occurs 2.1 secs after initiation of the event and another plant's trip signal occurs at 2.5 secs, this study will still be applicable to both.

Some of the results presented in this report have already been submitted to the NRC in Reference 1. The analyses are performed with the revised setpoints, i.e., high RC pressure trip at 2300 psig and PORV setpoint at 2450 psig. It is shown that anticipatory trips provide additional margin between the peak RC pressure after the reactor trip and the PORV setpoint, but provide little additional margin in the longer term repressurization to the PORV setpoint with continued delay of auxiliary feedwater initiation.

2.0 ASSESSMENT OF POSSIBLE ANTICIPATORY TRIPS

In accordance with Bulletin 79-05B, item 5, an evaluation for design basis for anticipatory trips on turbine trip, loss of main feedwater, and low steam generator level has been completed.

The evaluation showed low steam generator level not to be anticipatory and, therefore, it has not been recommended as an anticipatory trip function. Figure 2-1 shows the OTSG startup level from site data and the CADDS calculated OTSG mass inventory as functions of time following the TMI-2 event. The time of reactor trip on high RC pressure is noted on the figure and clearly demonstrates that a steam generator level trip would not have been anticipatory for a level setpoint that would not interfere with normal operations and maneuvers. The initial rapid fall in OTSG level occurs as the turbine stop valves close, momentarily stopping steam flow out of the generators. The mass inventory increases during this period due to the loss of flow friction ΔP. By the time the reactor trip occurs, at 8 seconds, steam flow is re-established through the bypass system, flow friction ΔP re-establishes the level and both mass and measured level start to decrease uniformly. An OTSG level trip set to trip on the initial drop shown in Figure 2-1 would need to be set restrictively high for normal plant maneuvers and/or lower power levels.

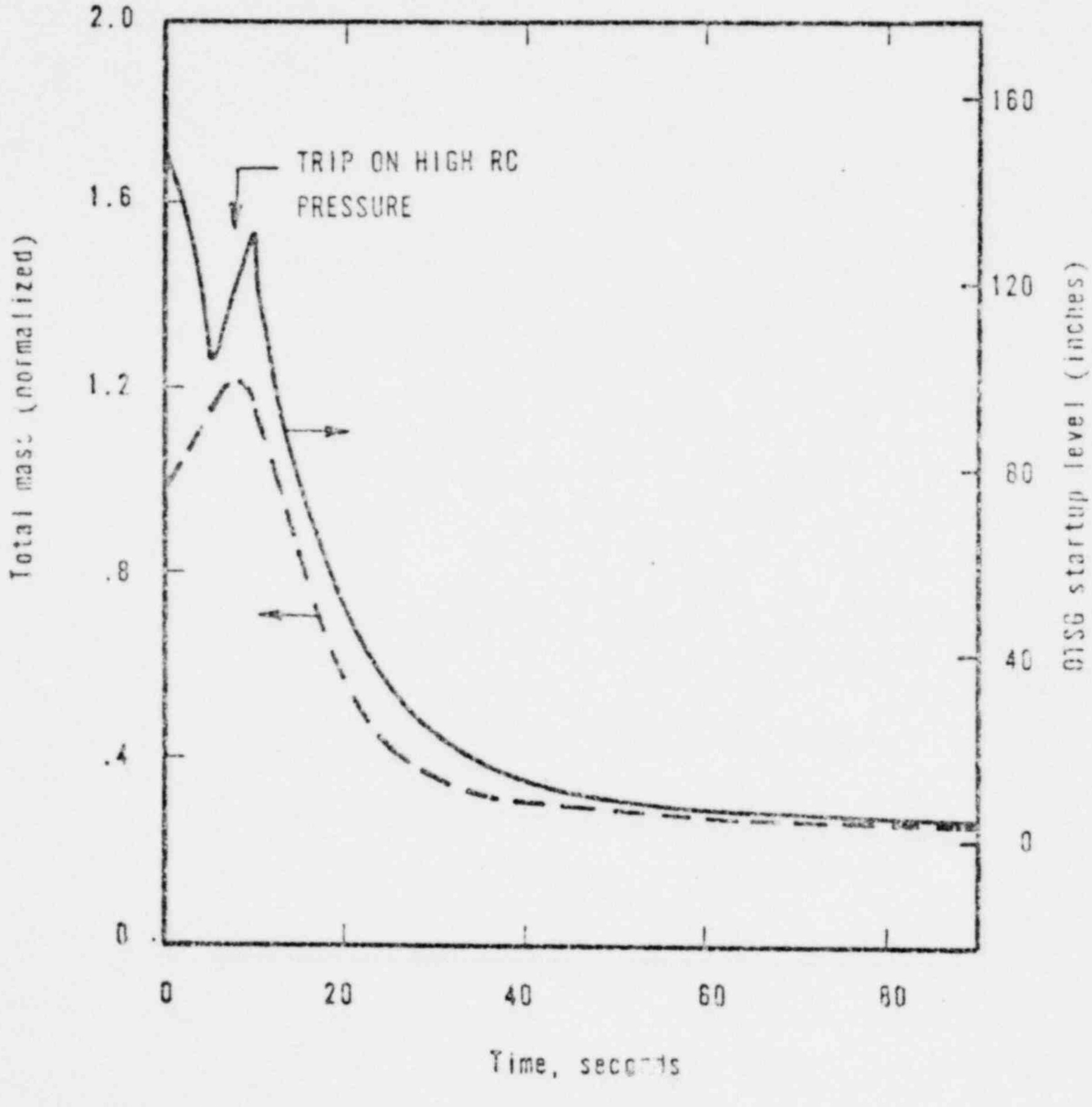
Further level information (in terms of mass inventory) is given in the figures for the analysis in Section 3.0. The results for those cases also indicate that the steam generator low level trip function would not be sufficiently fast to be considered anticipatory.

Anticipatory trips for loss of feedwater and turbine trip can be designed to trip the reactor in a more expedient manner than the high

RC pressure trip for some overheating transients. An anticipatory trip will provide more margin to PORV setpoint during the initial overpressurization resulting from loss of feedwater and/or turbine trip. These trips will provide slightly more time to PORV setpoint and pressurizer fill for delayed auxiliary feedwater initiation conditions.

Figure 2-1

LOFW (TMI-2 EVENT)



3.0 FUNCTIONAL ANALYSIS

A series of LOFW evaluations were performed at 100% full power (2772 MWt) with a reactor trip assumed on an anticipatory signal. With the new high RC pressure setpoint of 2300 psig, a reactor trip would be expected at about 8 seconds after the LOFW. The anticipatory trip study considered reactor trips with 0.4 sec, 2.5 sec, and 5 sec delays from time zero. These studies also included sensitivities to AFW failure and reactor coolant pump coastdown.

The anticipatory trip study modeled a generic 177 FA plant, and is considered applicable to raised or lowered loop designs. A feedwater coastdown similar to that estimated to have occurred at the March 28th TMI-2 event was used to generate separate heat demands for each CADDS analysis. The heat demands will change as the reactor trip time is delayed, because the additional heat input will boil off the fixed steam generator inventory at different rates.

For the cases where AFW flow was modeled, 1000 gpm was assumed, starting at 40 seconds. With proper steam generator level and pressure control, the system parameters will begin to stabilize at 195-290 seconds, depending on trip delay time and RCP operation; see Table 3-1 and Figure 3-12. The PORV will not be actuated, nor would the pressurizer fill or empty.

With the assumption of no AFW, the PORV will be actuated about three minutes into the event, as a result of system swell; the pressurizer fills at 10-12 minutes (see Table 3-1). A delay of reactor trip of 2-3 seconds is seen to reduce PORV time to actuate by about one minute, and pressurizer fill by about 2 minutes. For PORV setpoints other than 2450 psig, the times will vary and can be determined from Figures 3-3, 3-4, 3-8, and 3-10.

In each of these cases, the mass addition and cooling effect of expected make-up system operation is not modeled. One make-up pump running will add about 10 inches per minute to pressurizer level, and ~1/2% heat demand. It should be noted that the May 7 report used a heat demand which reproduced the TMI-2 LOFW event; it has been reported by the operator that two make-up pumps were running from 13 sec into the event, creating a higher heat demand than the anticipatory trip studies of the report assume. The difference is shown in Figure 3-12.

The steam generator heat demands, reactor power, RC system pressure, pressurizer level, and RC inlet/outlet temperatures are given in Figures 3-1 through 3-5 for the trip at time zero case and Figures 3-7 through 3-11 for the trip on high RC pressure (t=8 secs) case. The effects of delayed auxiliary feedwater initiation are also shown on the high RC pressure trip curves.

TABLE 3-1

LOFW EVENT
(LOFW at T=0 sec)

TIME OF REACTOR TRIP ("DELAY")	REACTOR COOLANT PUMPS	AUXILIARY FEEDWATER	PORV OPERATES	PRESSURIZER FULL (400")	S/G LEVEL CONTROL (P_{stm}=1025 psig)
0.4	Run	at 40 sec	-	-	195 sec
2.5	Run	at 40 sec	-	-	225 sec
5.0	Run	at 40 sec	-	-	275 sec
0.4	Run	None	235 sec	790 sec	-
2.5	Run	None	180 sec	685 sec	-
5.0	Run	None	140 sec	575 sec	-
0.4	Coastdown	at 40 sec	-	-	255
0.4	Coastdown	None	190 sec	700 sec	-

LOFW EVENT - TIME=0 sec

REACTOR TRIP AT 2300 PSIG

TIME OF TRIP	RCP	AFW	PORV	PRESS. FULL	S/G LEVEL CONT.
8.0	Run	at 40 sec	-	-	260 sec
8.0	Run	None	175 sec	620 sec	-

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Figure 3-1 Heat Demand Model for Reactor Trip at Time Zero Studies

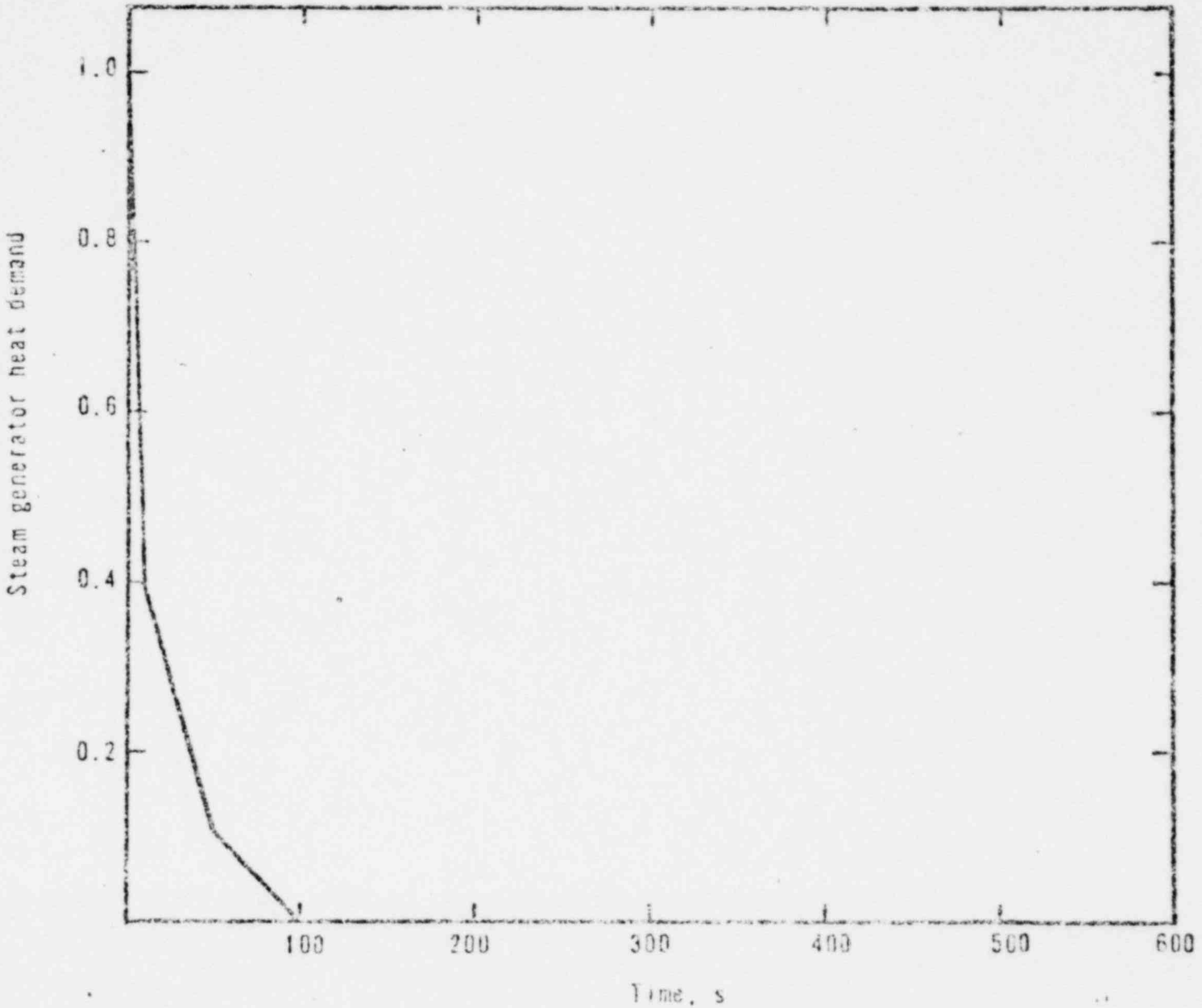


Figure 3-2 Reactor Trip at T=0, No AFW

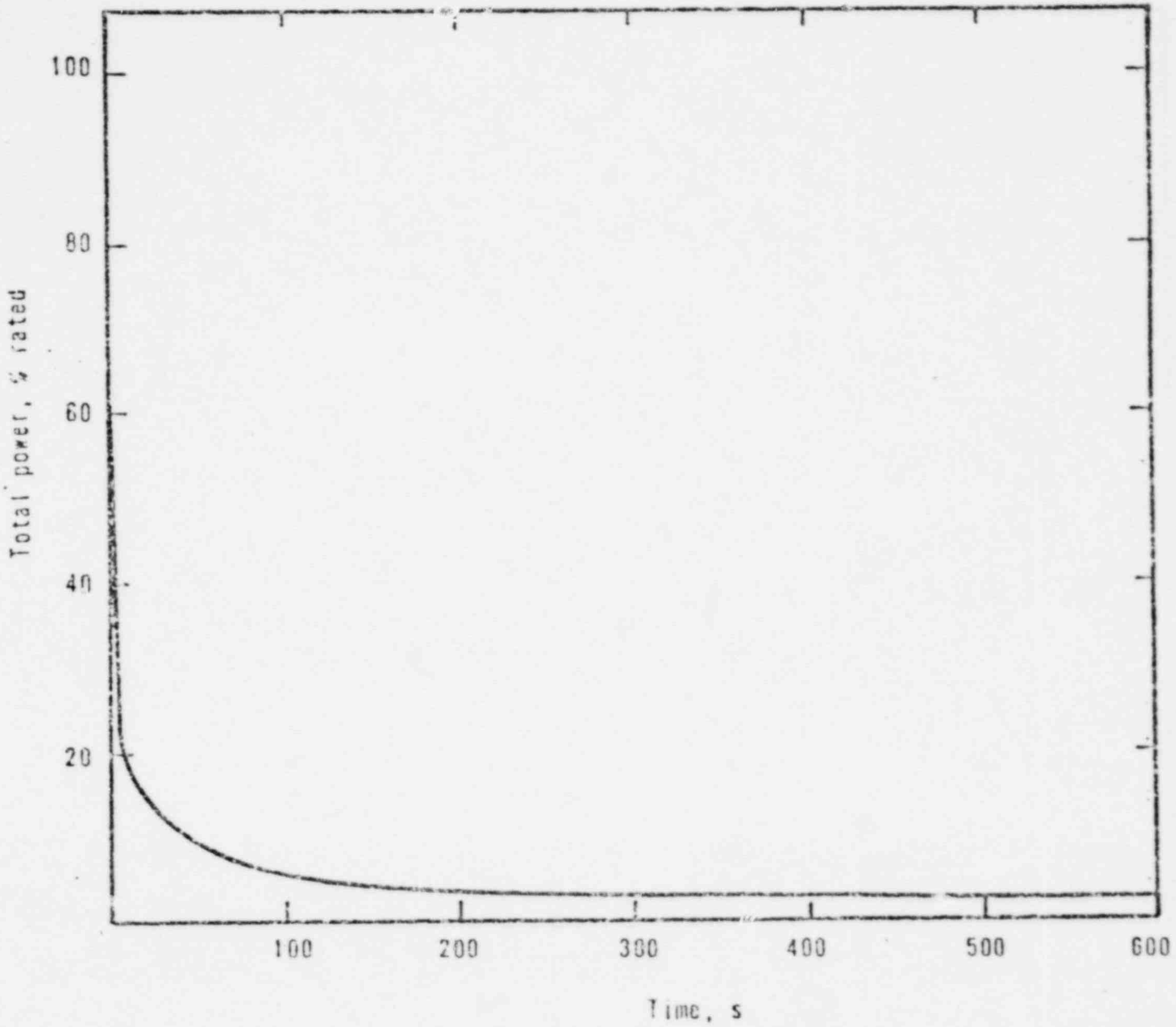


Figure 3-3 Reactor Trip at T=0, No AFW

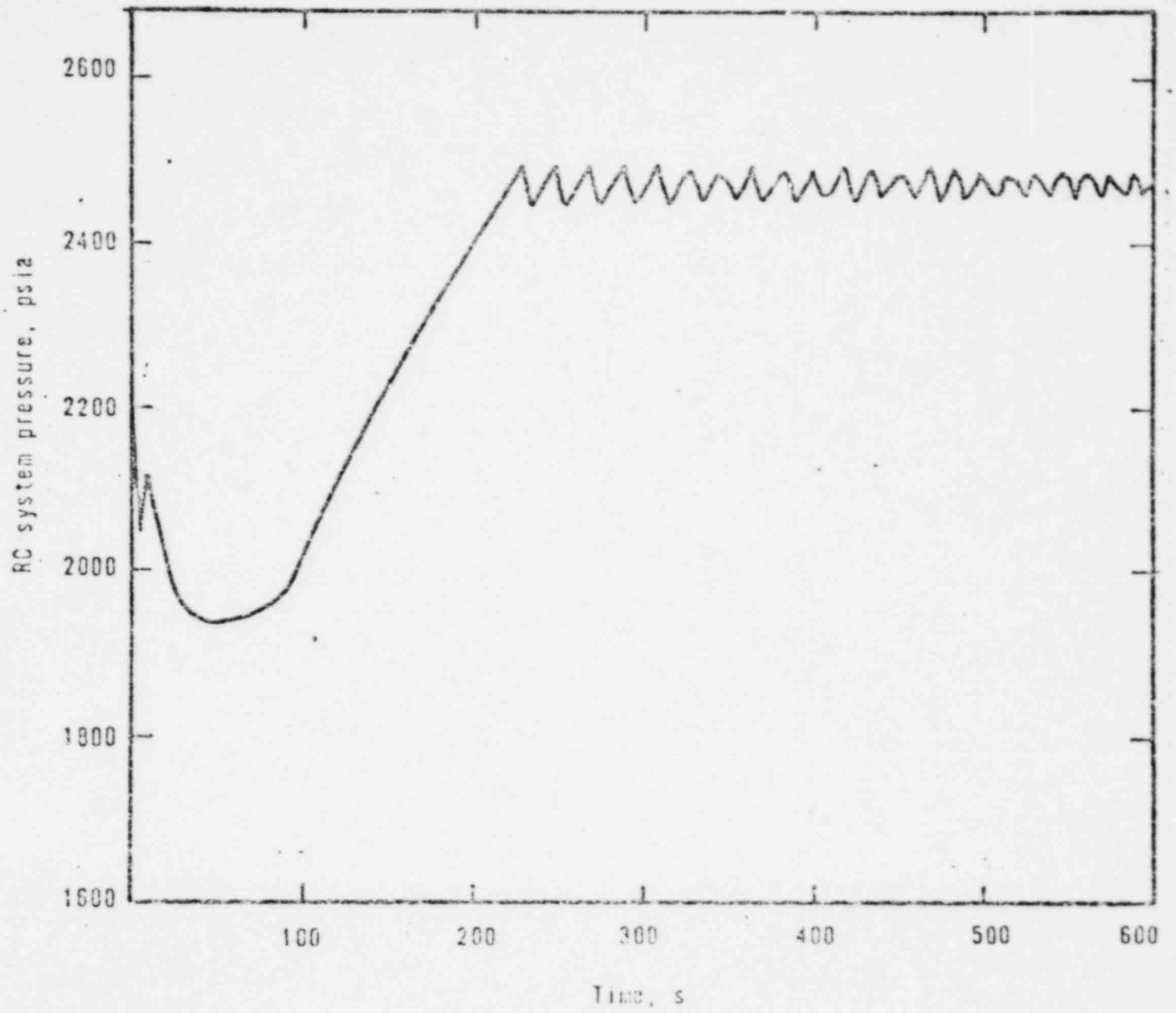


Figure 3-4 Reactor Trip at T=0, No AFW

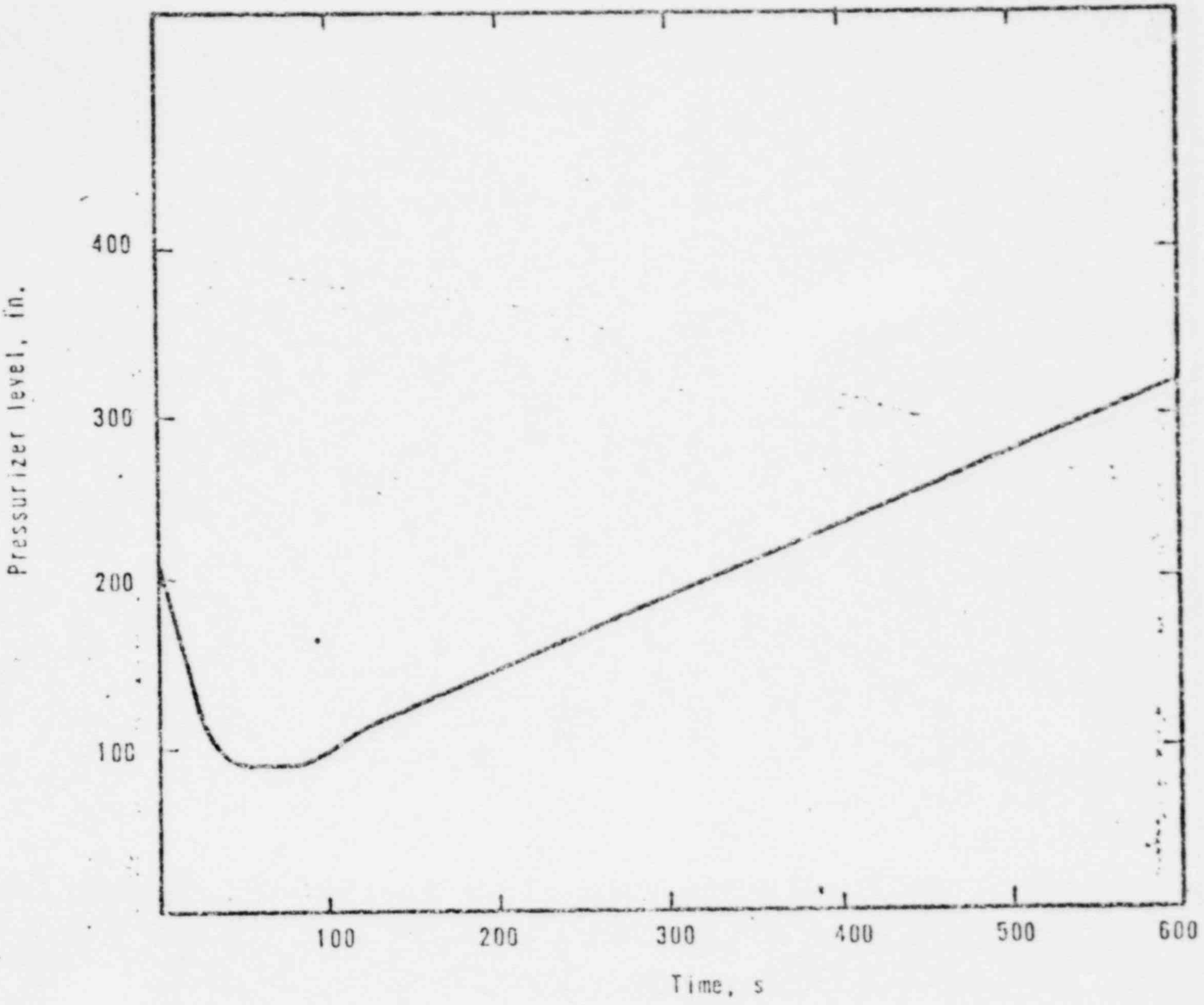


Figure 3-5 Reactor Trip at T=0, No AFW

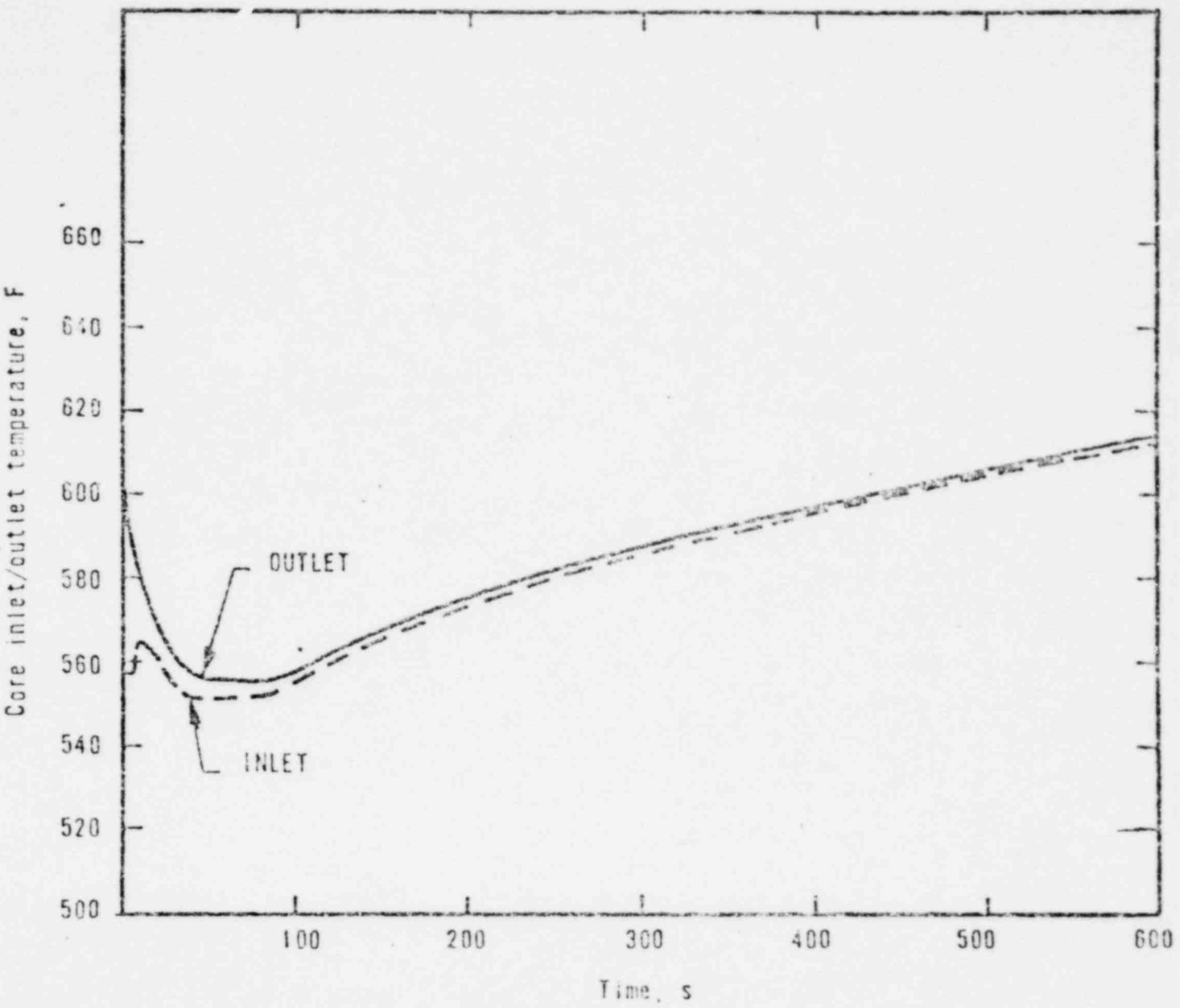


Figure 3-6 Steam Generator Heat Demand Vs Time Following Loss of Main Feedwater From Rated Power

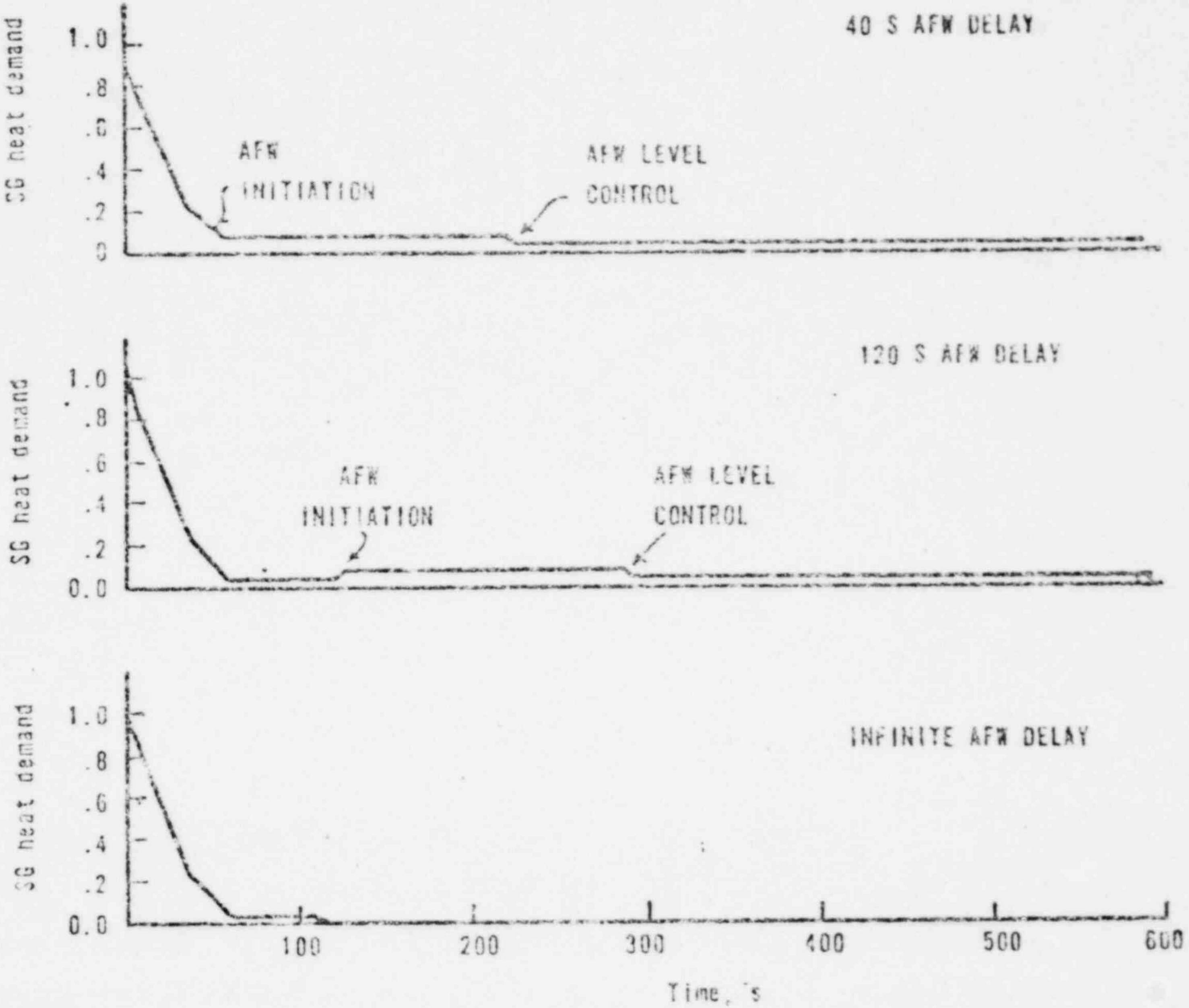
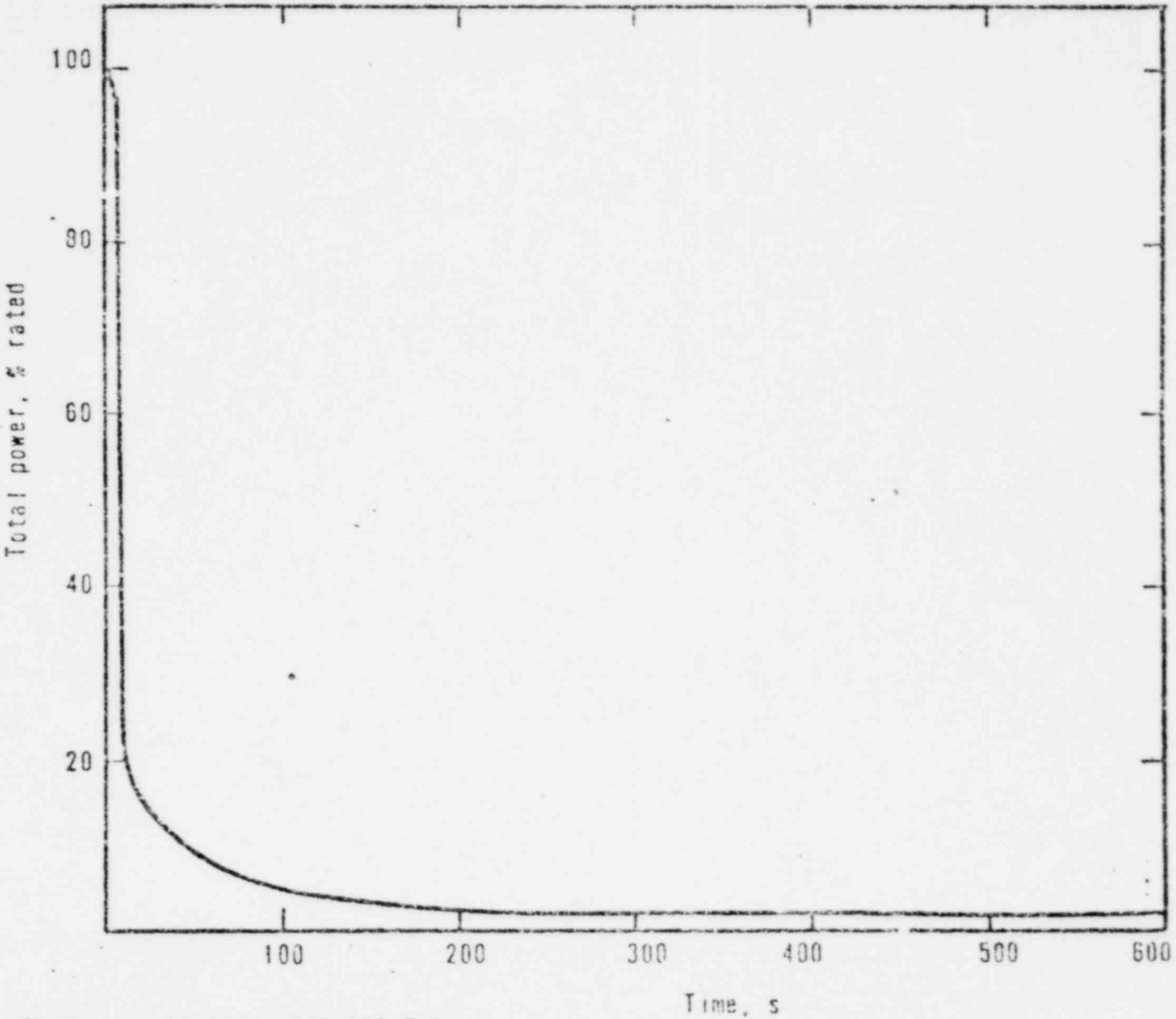


Figure 3-7 Total Power Vs Time Following Loss of Main Feedwater for Various AFW Initiation Times



NOTE: POWER RESPONSES ARE THE
SAME FOR 40, 120, AND
INFINITE AFW DELAY TIMES

Figure 3-8 RC System Pressure Vs Time Following Loss of Main Feedwater From Rated Power

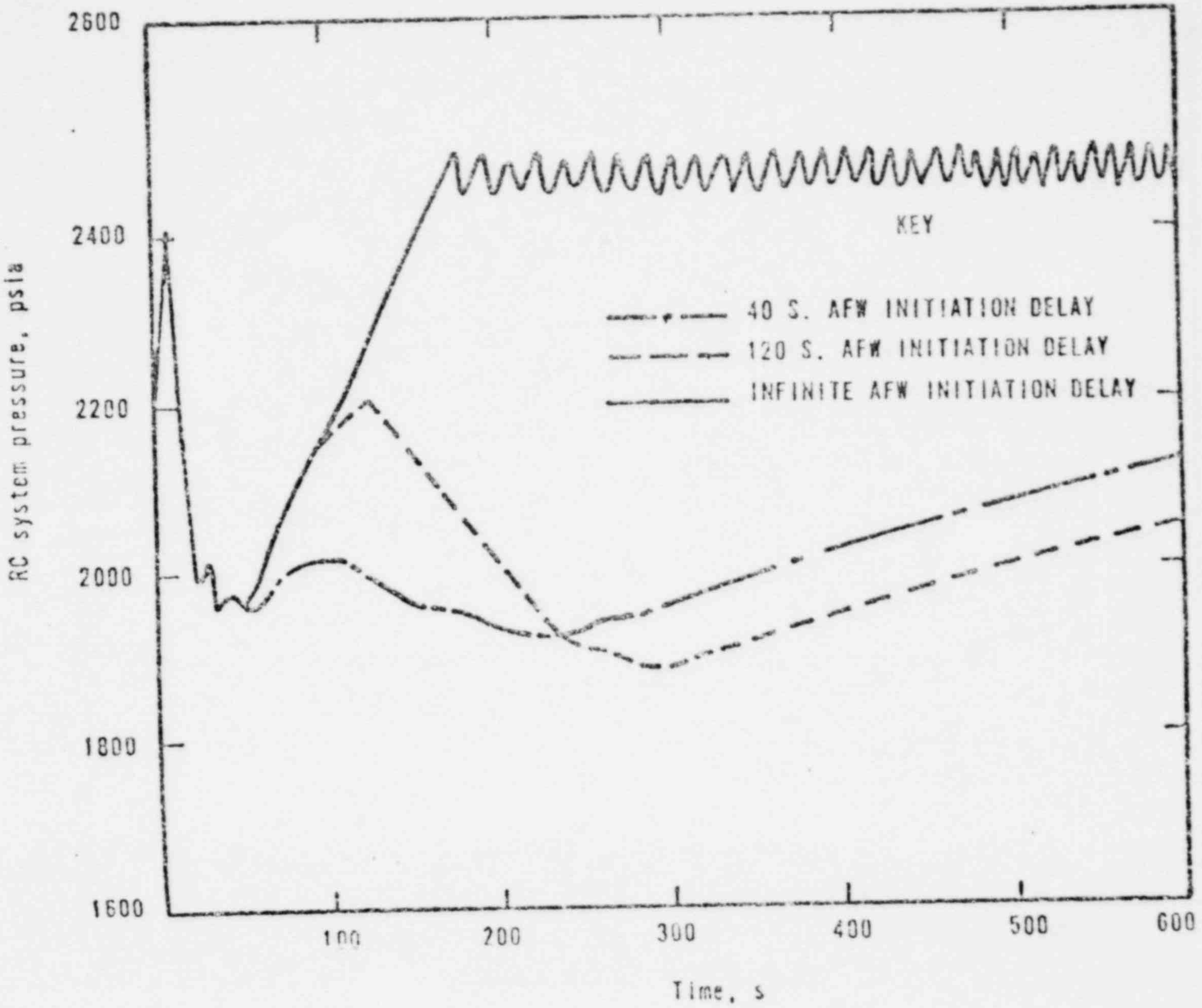


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Figure 3-9 Pressurizer Pressure Vs Time Following Loss of Main Feedwater From Rated Power

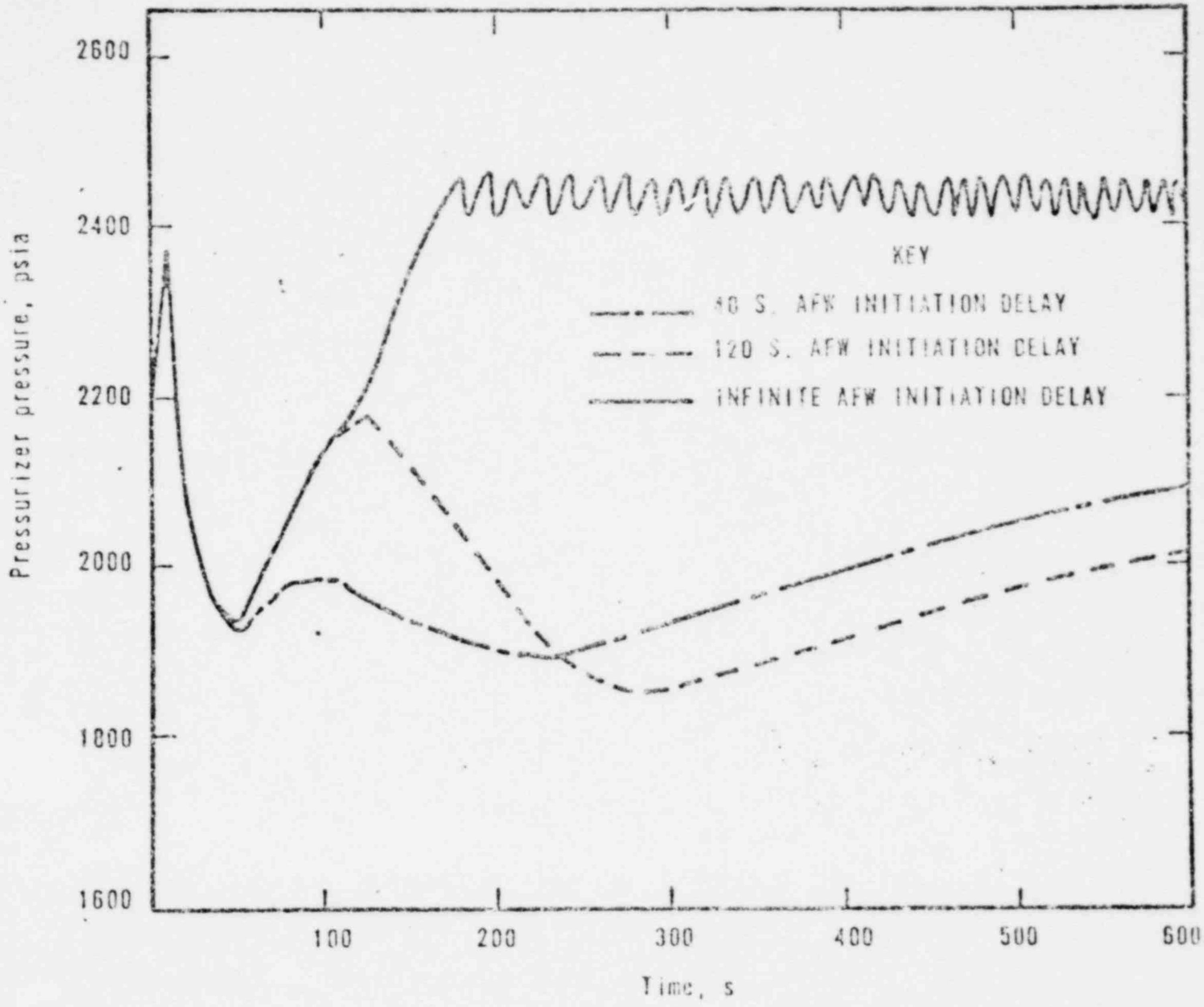

Figure 3-10 Pressurizer Level Vs Time Following Loss of Main Feedwater From Rated Power

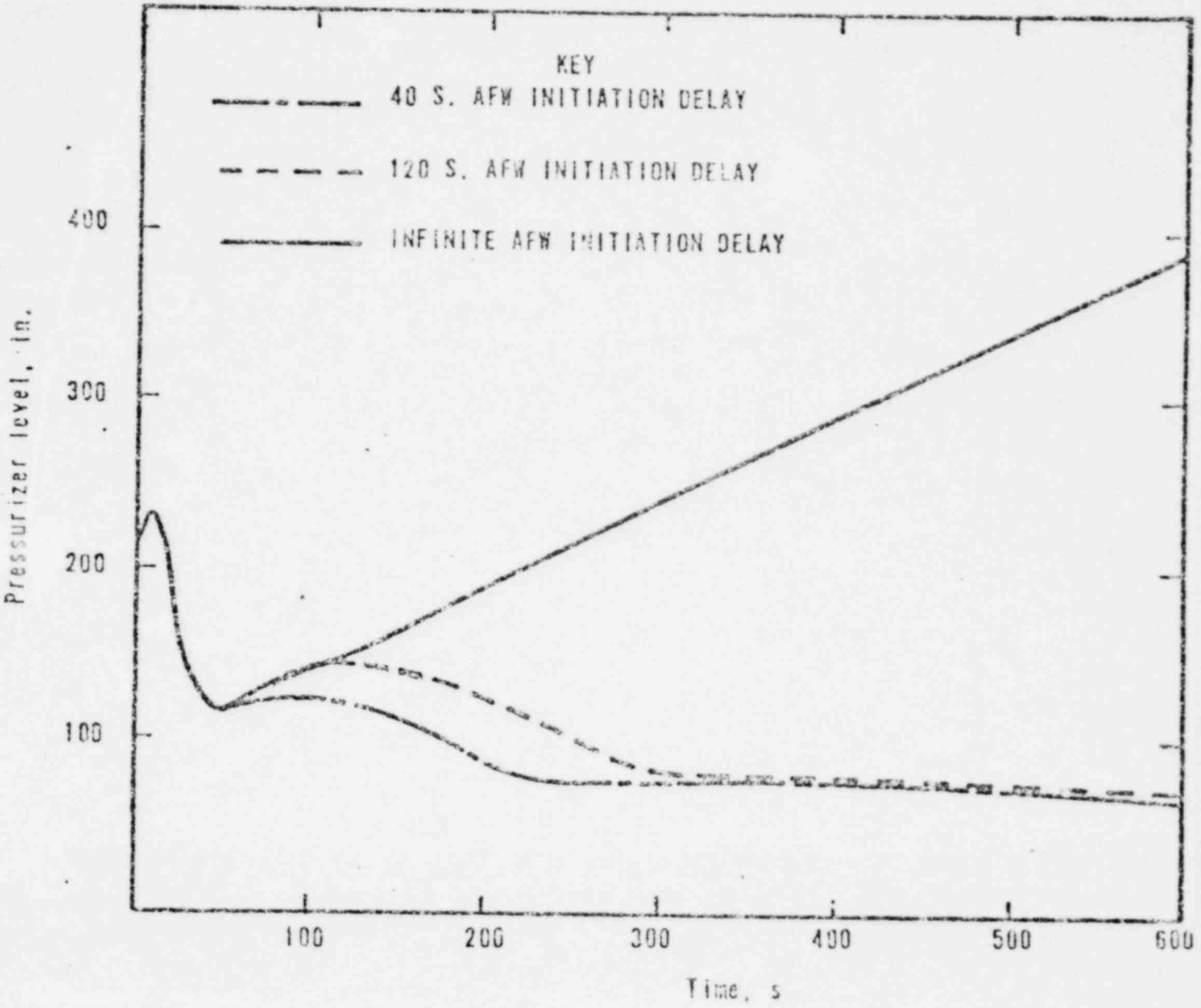

Figure 3-11 Core Inlet and Outlet Temperature Vs Time Following Loss of Main Feedwater From Rated Power

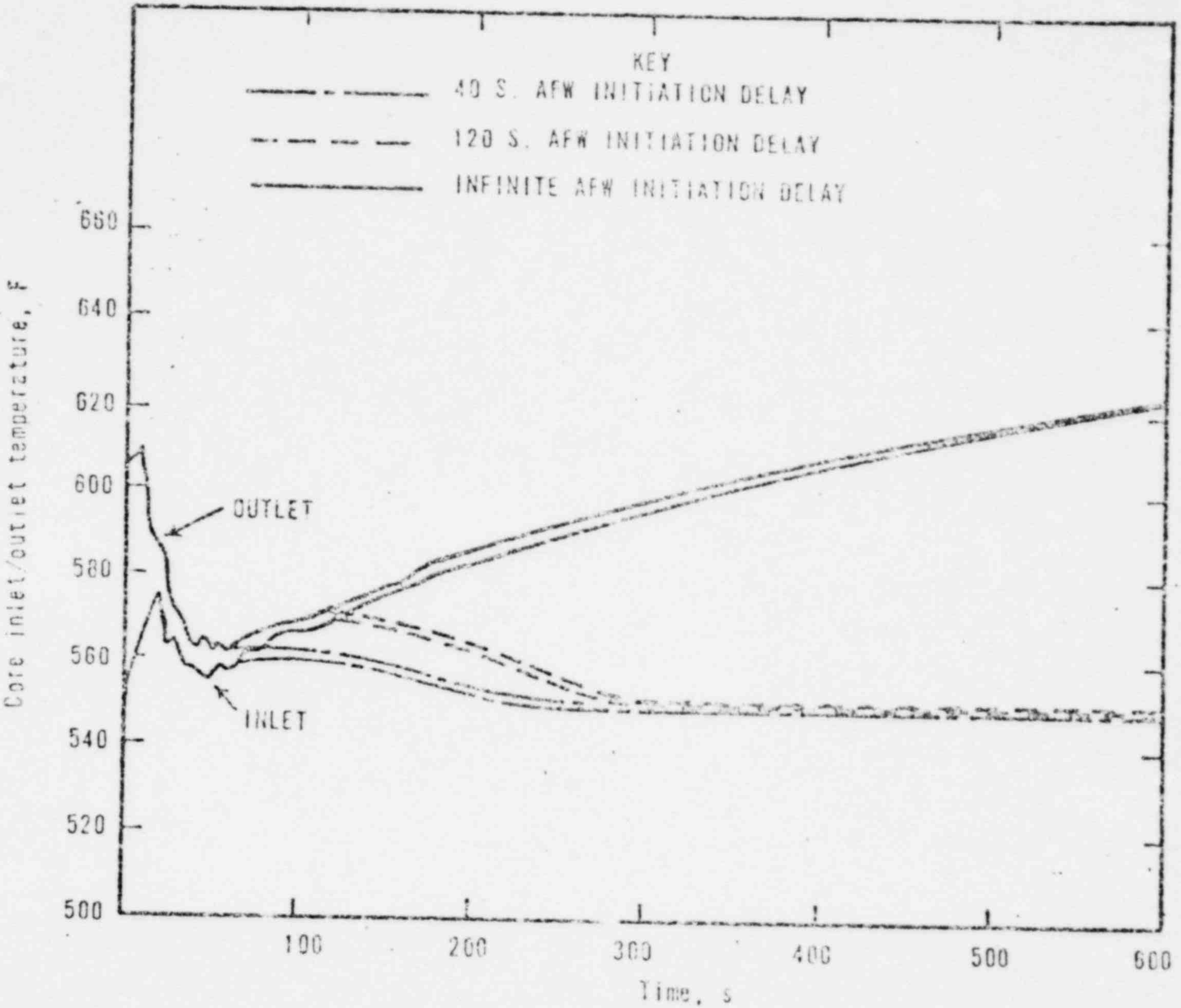

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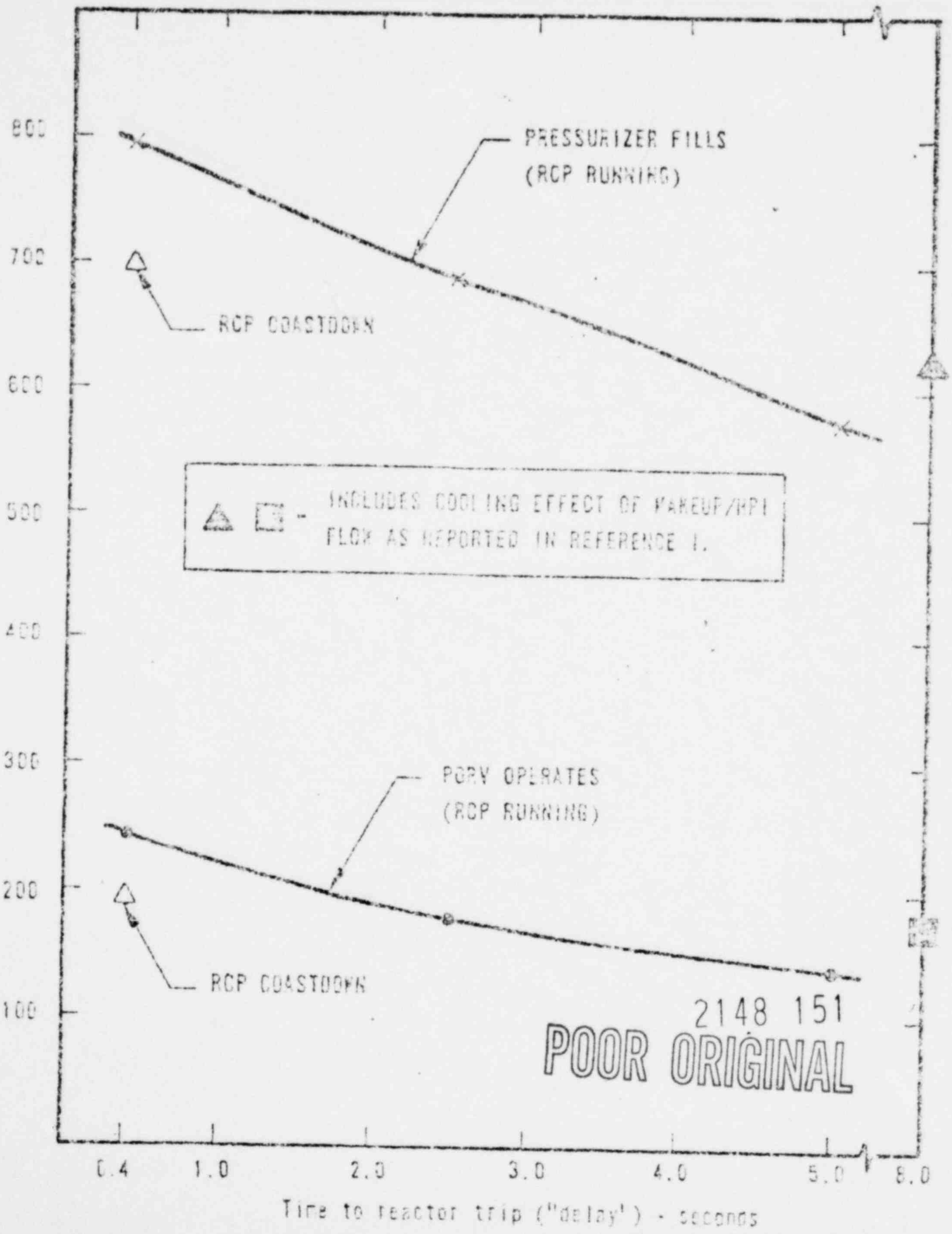
Figure 3-12

LOSS OF FEEDWATER AT T = 0 SEC NO AUXILIARY FEEDWATER



4.0 CONCLUSIONS AND SUMMARY

A spectrum of delay times, representing anticipatory trips, has been analyzed for the loss of feedwater transient. The spectrum included trips at time zero, with a 0.4 second instrument delay, up to high RC pressure trip at time 8.0 seconds. Since a high RC pressure trip occurs very soon after a loss of heat sink (overpressurization) transient from 100% FP, only turbine trip and direct loss of feedwater detection trips would be considered anticipatory.

For all trips considered, including high RC pressure, the PORV is not actuated when normal system operations occur. The pressure rise in the primary side is less for the anticipatory trips providing additional margin to PORV lift. If auxiliary feedwater is significantly delayed, then an anticipatory trip will, at best, provide about 1 minute additional time to PORV lift and about 3 minutes additional time to filling of the pressurizer. These results can be seen in Table 4-1 which shows the sequence of events for a LOFW transient with trip on high RC pressure (2300 psig) and trip at time zero.

TABLE 4-1. LOFW-SEQUENCE OF LOW EVENTS COMPARISON

EVENT	40-s AFW	120-s DELAY	NO AFW	TRIP AT ZERO, NO AFW
Loss of feedwater initiated	0	0	0	0 (trip occurs) (0.4 delay)
High-pressure trip (2300 psig)	8	8	8	a
PORV opens (2450 psig)	a	a	175	235
Peak RCS pressure	10	10	175	235
Pressurizer full	a	a	620	790

[a] Does not occur for these cases

5.0 References

1) Babcock and Wilcox Report entitled "Evaluation of Transient Behavior and Small Reactor Coolant System Breaks in the 177 Fuel Assembly Plant" dated May 7, 1979.

APPENDIX A

SAFETY EVALUATION PROGRAM FOR ANTICIPATORY TRIPS

The following constitutes a proposed safety evaluation program for the 177 FA plants with anticipatory trips installed as part of the RPS. The scope of the study is to provide the necessary review of all transients.

A complete safety evaluation of the operating plants is complicated by the numerous licensing requirement changes that have occurred since the FSAR's were completed. The following work scope is predicated on a review and analysis which meets current regulatory format and requirements as applicable. If current designs or equipment do not meet all of the requirements or standards, these will be noted.

The program allows for changes to be incorporated in the design, prior to plant unique analyses being completed.

The proposed safety evaluation provides a logical sequence of review, general analysis to limit scope, and plant specific evaluations, as follows:

Phase 1: Safety Evaluation Review

The transients will be reviewed for possible impact by anticipatory trips in terms of the following categories of events:

- Increases in Heat Removal by the Secondary System
- Decrease in Heat Removal by the Secondary System
- Decrease in Reactor Coolant System Flowrate
- Reactivity and Power Distribution Anomolies
- Increase in Reactor Coolant Inventory
- Decrease in Reactor Coolant Inventory

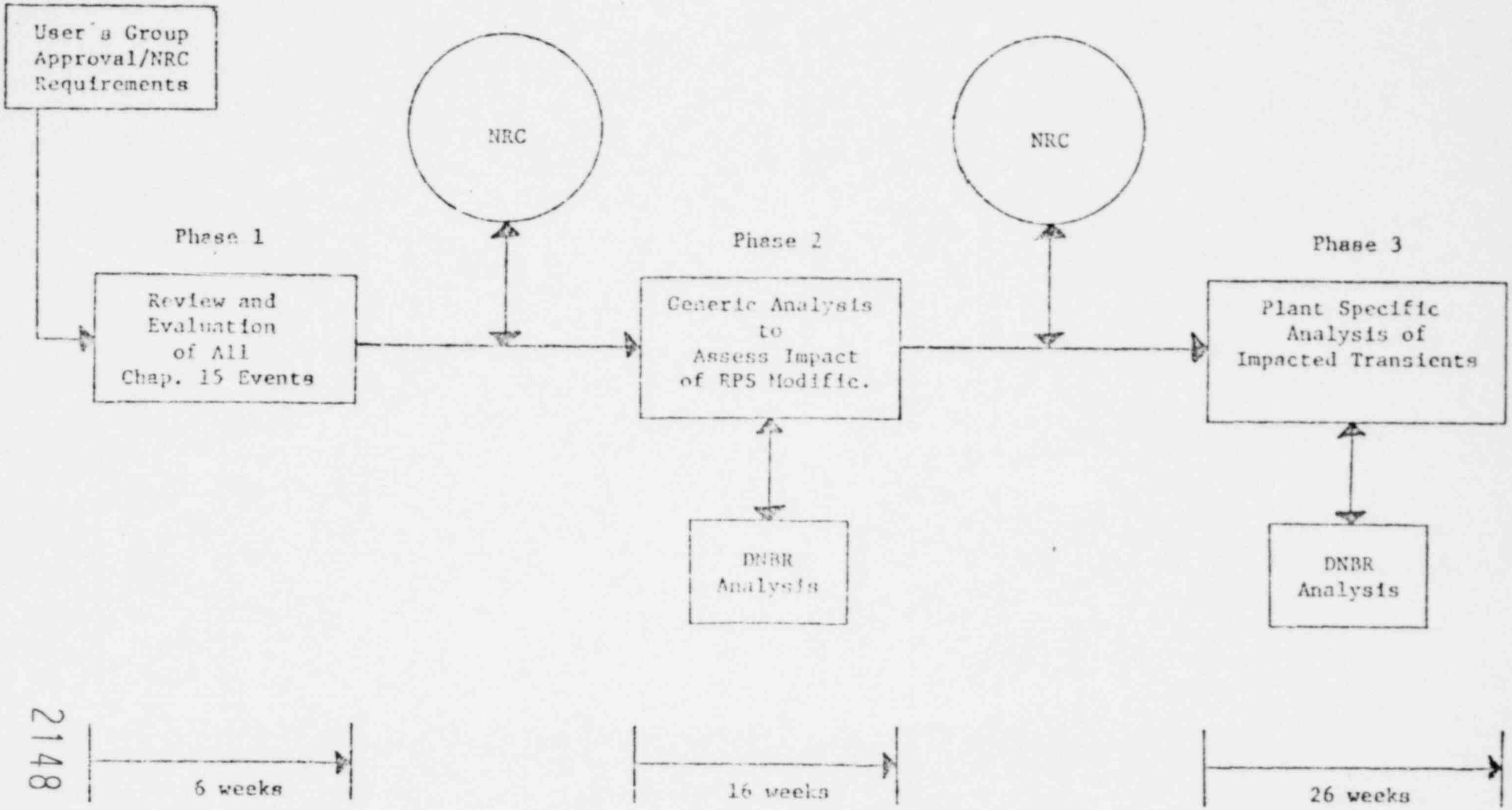
Each transient within the above category will be discussed in terms of what normal trip function occurs (and when), what type of signal would be anticipatory, and what would be a qualitative assessment of the impact of the anticipatory trip. This assessment would be as generic as possible, with plant specific characteristics mentioned where they would impact the conclusions.

Phase 2: Generic Screening Process

Phase 1 of this evaluation will identify those transients that may be adversely impacted by an anticipatory trip. The purpose of this phase of the program is to assess quantitatively the magnitude of impact. This process, to be done generically, will possibly allow elimination of those transients that are impacted but to a small or negligible degree.

Phase 3: Analytical Evaluation

The exact scope will be dependent on the results from Phases 1 and 2. It is envisioned that for those transients that are significantly impacted by anticipatory trips, each plant specific design will need analytical evaluation. This analysis will account for what signals have been installed which may vary from plant to plant. The goal will be to show that, although adversely affected, the transient results meet the acceptance criteria.


User's Group
Approval/NRC
Requirements
NRC
NRC
Phase 1
Review and
Evaluation
of All
Chap. 15 Events
Phase 2
Generic Analysis
to
Assess Impact
of RPS Modific.
Phase 3
Plant Specific
Analysis of
Impacted Transients
DNBR
Analysis
DNBR
Analysis
6 weeks
16 weeks
26 weeks

APPENDIX B

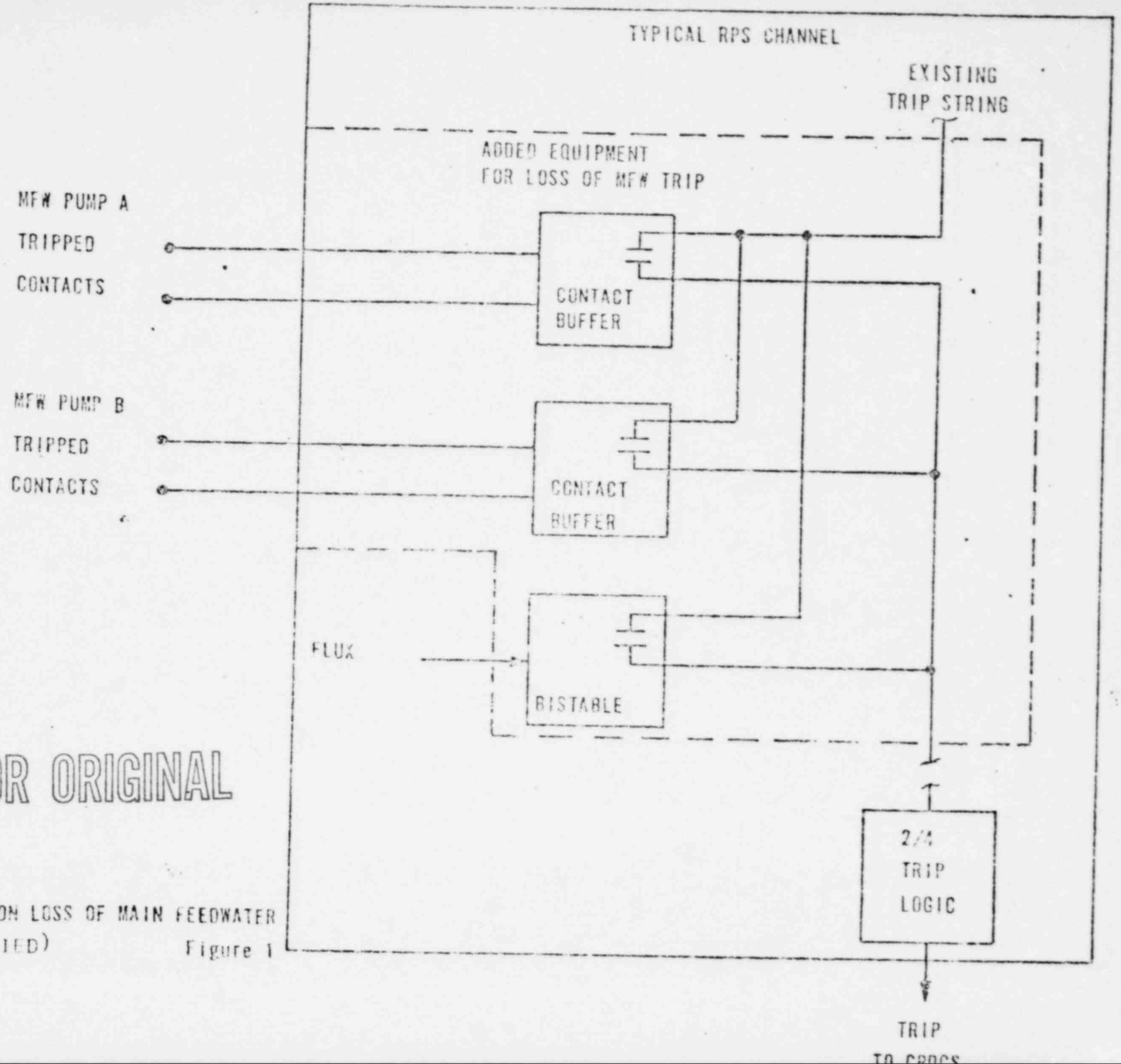
DESIGN FOR SAFETY GRADE ANTICIPATORY TRIPS

The following describes the implementation of safety-grade reactor trips into the RPS-I for loss of main feedwater turbine trip.

Loss of Main Feedwater Trip - Control oil pressure switches on both main feedwater pumps will input an open indication to the RPS on feedwater pump trip. Contact buffers in the RPS will sense the contact inputs and initiate an RPS trip when both pumps have tripped. This trip will be bypassed below a predetermined flux level, typically 20% FP. Reference Figure 1.

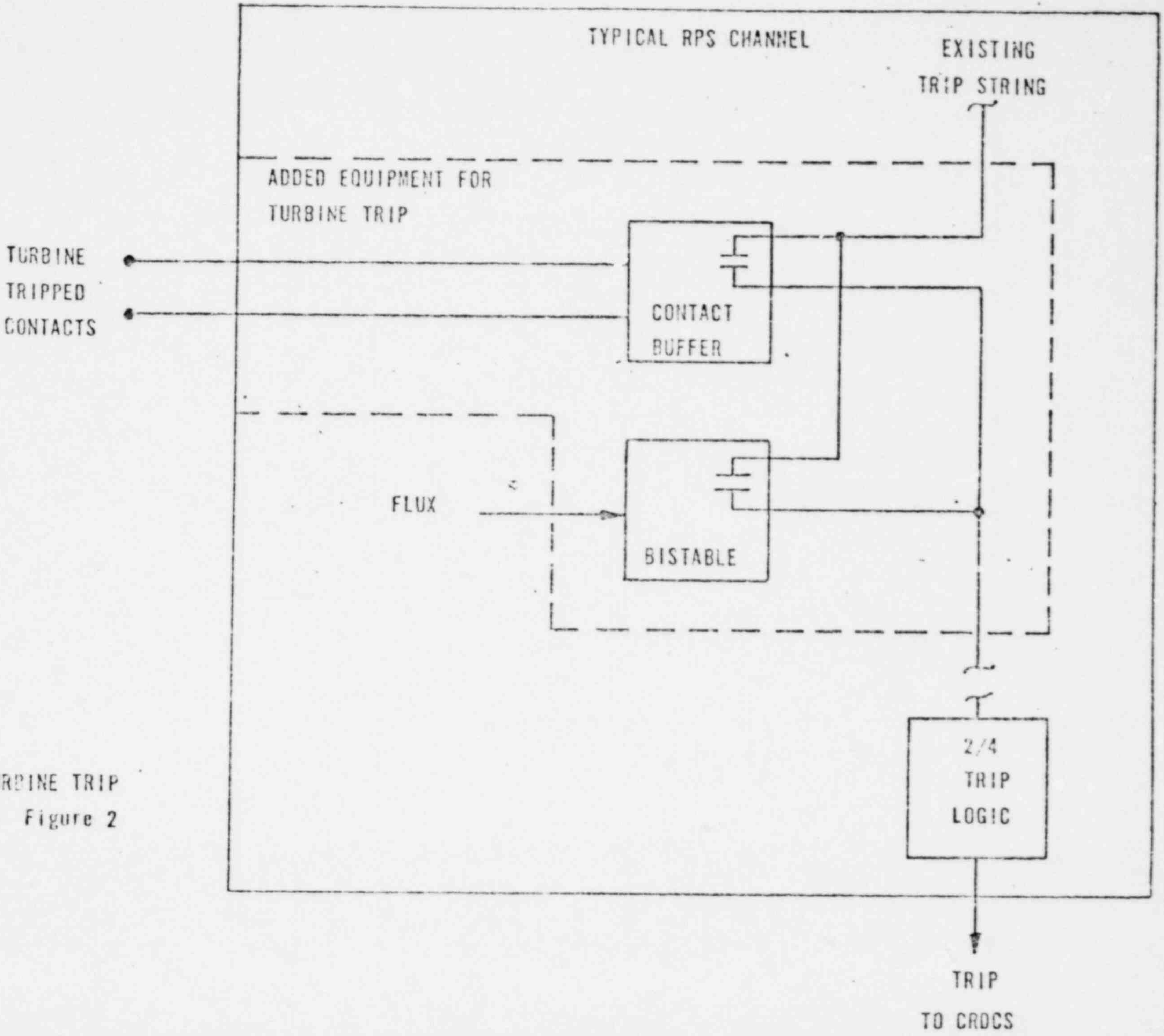
Turbine Trip - Contact outputs from the main turbine electro-hydraulic control unit will input an open indication to the RPS on turbine trip. Contact buffers in the RPS will sense the contact inputs and initiate an RPS trip when a turbine trip is indicated. This trip will be bypassed below a predetermined flux level, typically 20% FP. Reference Figure 2.

Figure 1 is a simplified drawing of the main feedwater pump trip.
Figure 2 is a simplified drawing of the turbine trip.
Drawing 51079DGB-1 shows the generic logic for the new trips.
Drawing 51079MLG-1 is a legend for the generic logic drawing.



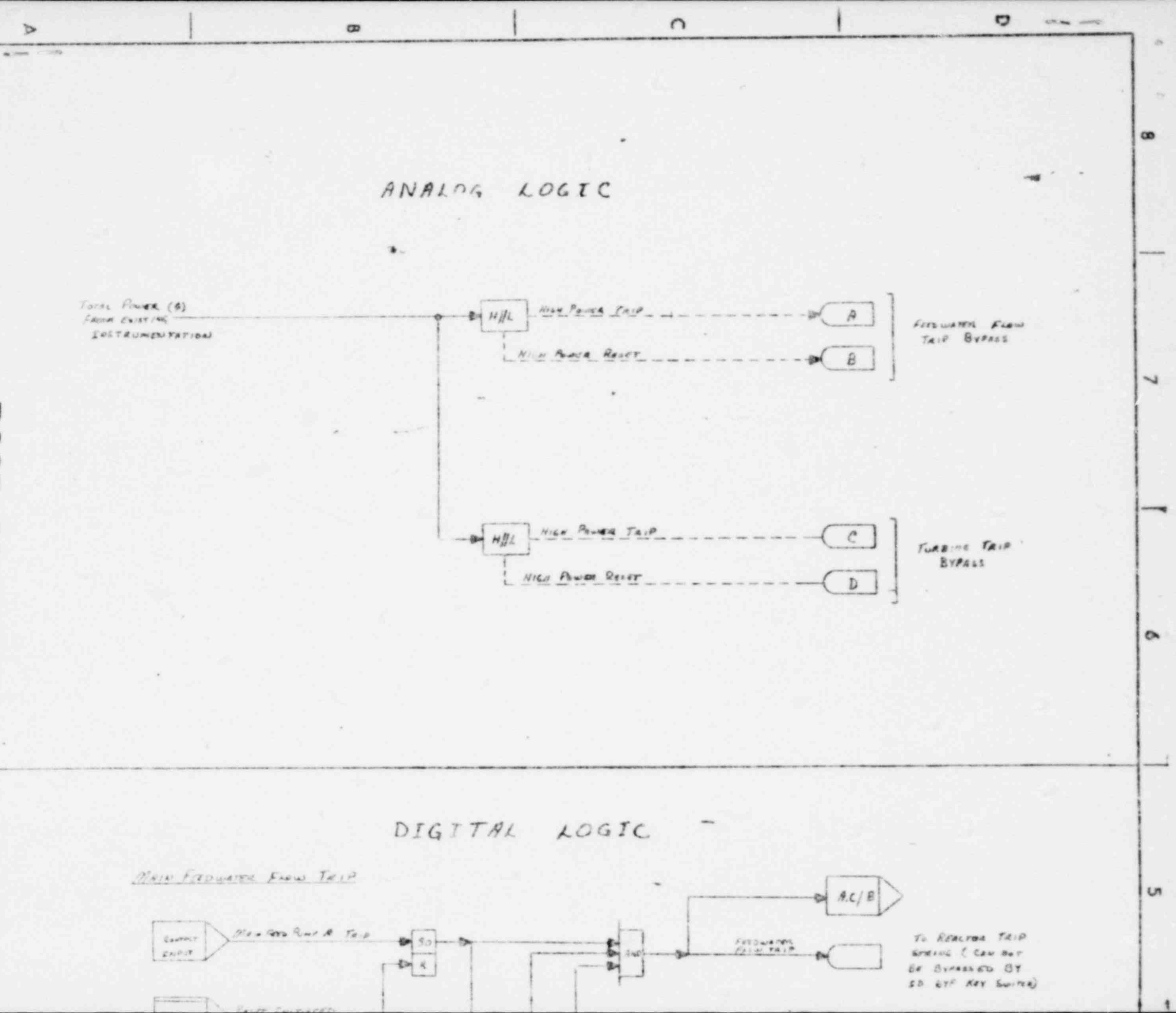
RPS TRIP ON LOSS OF MAIN FEEDWATER
(SIMPLIFIED)

Figure 1



RPS TRIP ON TURBINE TRIP
(SIMPLIFIED) Figure 2

POOR ORIGINAL



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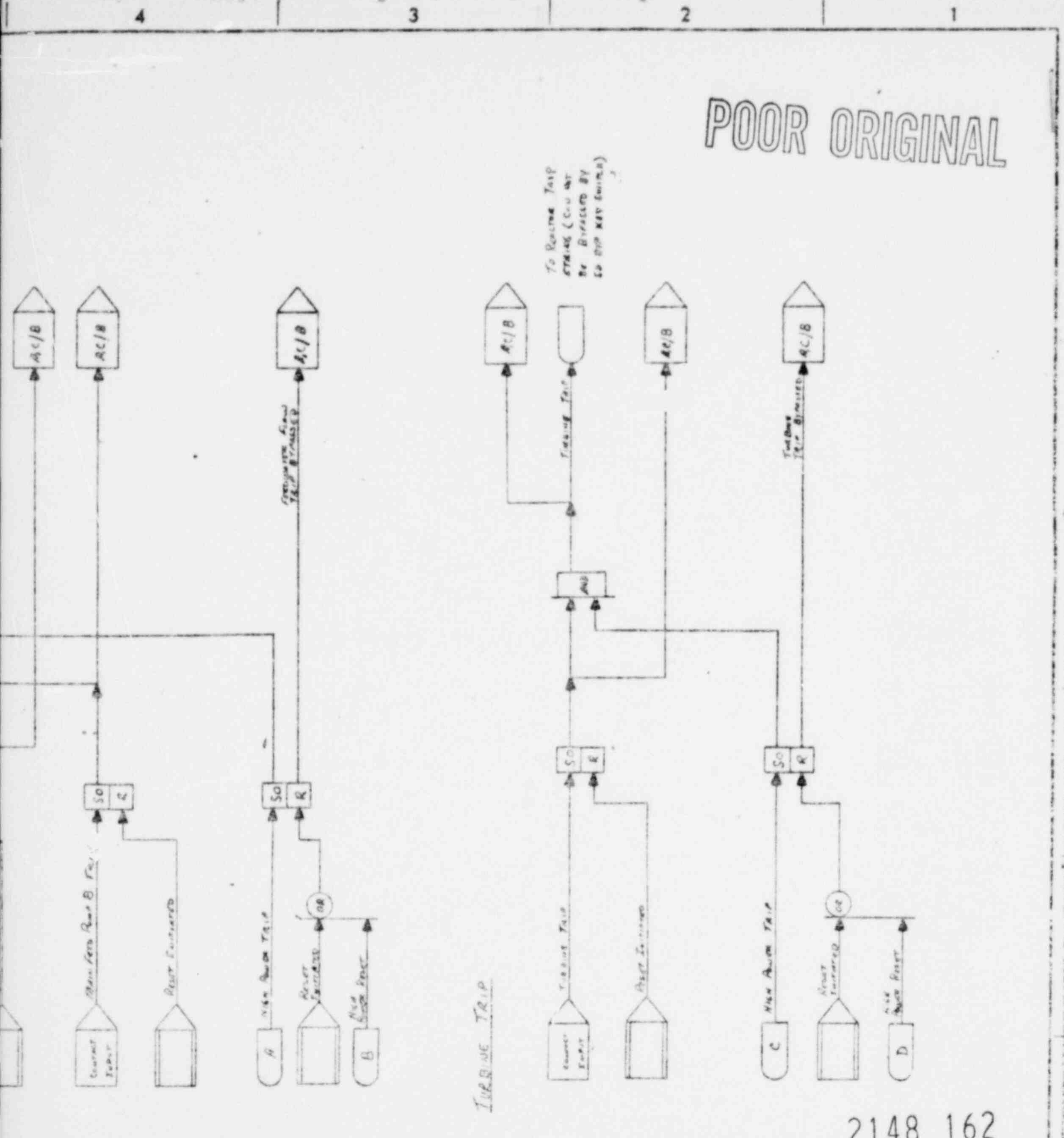

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Generic Logic
Safety Grade Trips

CUSTOMER:
PLANT:
CONTRACTING ENG.:
B.C.CO. JOB NO.:
CUST. ORDER NO.:

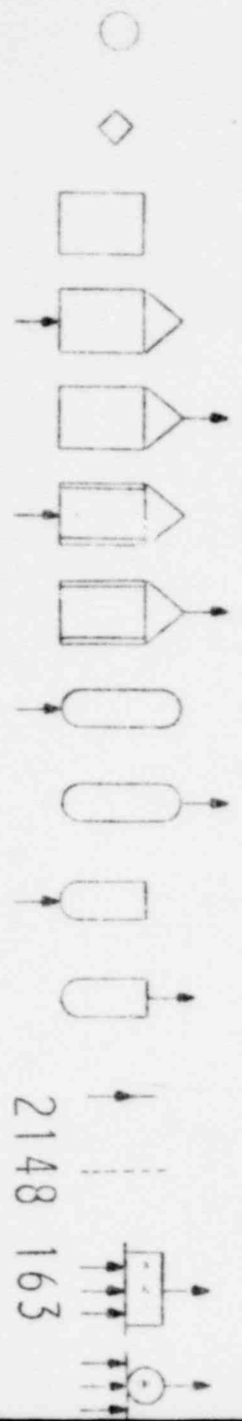
5-18-79

Babcock & Wilcox
Bailey Controls Company

D 5/079248-1

TABLE 1

ENCLOSURE AND DISTRIBUTION SYMBOLS



Symbol	Description
MEASURING OR LOCAL READOUT	
MANUAL SIGNAL PROCESSING	
AUTOMATIC SIGNAL PROCESSING	
SYSTEM OUTPUT (PROCESS/OTHER SYSTEM TYPE) SYSTEM INPUT (PROCESS/OTHER SYSTEM TYPE)	THE SYMBOL REPRESENTS ACTUAL INPUTS FROM OR ACTUAL OUTPUTS TO A PROCESS OR ANOTHER SYSTEM.
SYSTEM OUTPUT (HUMAN COMMUNICATION TYPE) SYSTEM INPUT (HUMAN COMMUNICATION TYPE)	THE SYMBOL REPRESENTS ACTUAL INPUTS FROM OR ACTUAL OUTPUTS TO THE OPERATOR.
BREAK POINT RESUMPTION POINT	THE SYMBOL DENOTES BREAKS AND RESUMPTIONS OF SIGNAL LINES ON A SINGLE PAGE OF LOGIC AND/OR BETWEEN PAGES OF LOGIC. (DIGITAL LOGIC TO DIGITAL LOGIC DRAWING.)
BREAK POINT RESUMPTION POINT	THE SYMBOL DENOTES BREAKS AND RESUMPTIONS OF SIGNAL LINES ON A SINGLE PAGE OF LOGIC AND/OR BETWEEN PAGES OF LOGIC. (ANALOG LOGIC TO DIGITAL LOGIC DRAWING.)
ARROWHEAD	THE ARROWHEAD SYMBOL SHOWS DIRECTION OF FLOW OF A SIGNAL LINE.
DASHED LINE	THE DASHED LINE SYMBOL SHOWS ANALOG SIGNAL LINES ON A DIGITAL LOGIC DRAWING OR DIGITAL SIGNAL LINES ON AN ANALOG LOGIC DRAWING.
AND	THE OUTPUT IS A LOGIC ONE IF ALL OF THE INPUT SIGNALS ARE LOGIC ONE.
OR (INCLUSIVE)	THE OUTPUT IS A LOGIC ONE IF THERE IS ONE OR MORE LOGIC ONE INPUT.

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TABLE 2

[illegible]

[illegible]	[illegible] ION CHAMBER
[illegible]	BOTTOM ION CHAMBER INDICATOR
CIC	COMPENSATED ION CHAMBER
[illegible]	COUNT RATE INDICATOR
[illegible]	DIVISION ALARM PANEL
DPS	DETECTOR POWER SUPPLY
dPT	DIFFERENTIAL PRESSURE TRANSMITTER
[illegible]	FAN FAILURE DETECTOR
FLI	FLOW LIMIT UNIT [illegible]
[illegible]	[illegible]
[illegible]	[illegible] INDICATOR
MI	MODULE INTERFACE
[illegible]	[illegible] INDICATOR
PC	PROPORTIONAL COUNTER
PII	POWER IMBALANCE INDICATOR
[illegible]	[illegible]
[illegible]	[illegible] LEVEL INDICATOR
PT	PRESSURE TRANSMITTER
RCI	RATE OF CHANGE INDICATOR
RPI	REACTOR COOLANT PRESSURE INDICATOR
RTI	REACTOR COOLANT TEMPERATURE INDICATOR
SPS	SYSTEM POWER SUPPLY
TFI	TOTAL FLOW INDICATOR
TIC	TOP ION CHAMBER
TII	TOP ION CHAMBER INDICATOR
TPI	TOTAL POWER INDICATOR
TT	TEMPERATURE TRANSMITTER

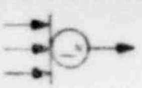
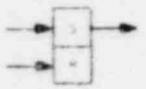
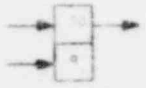
TABLE 3

SIGNAL PROCESSING SYMBOLS

Σ	SUMMING	THE OUTPUT EQUALS THE ALGEBRAIC SUM OF ALL INPUTS.
Δ	DIFFERENCE	THE OUTPUT EQUALS THE ALGEBRAIC DIFFERENCE BETWEEN THE TWO INPUTS.
K	PROPORTIONAL	THE OUTPUT IS DIRECTLY PROPORTIONAL TO THE INPUT.
d/dt	DERIVATIVE	THE OUTPUT IS PROPORTIONAL TO THE RATE OF CHANGE (DERIVATIVE) OF THE INPUT.
$\sqrt{\ }$	ROOT EXTRACTION	THE OUTPUT EQUALS THE ROOT (I.E., SQUARE ROOT, FOURTH ROOT, ETC.) OF THE INPUT.
>	HIGH SELECTING	THE OUTPUT IS EQUAL TO THAT INPUT WHICH IS THE GREATEST OF THE INPUTS.
A	ANALOG SIGNAL GENERATOR	THE OUTPUT IS AN ANALOG SIGNAL DEVELOPED WITHIN THE GENERATOR.
T	TRANSFER	THE OUTPUT EQUALS THE INPUT WHICH HAS BEEN SELECTED BY TRANSFER [illegible]

POOR ORIGINAL

[illegible] ..., THE STATE OF THE [illegible]

	OR COINCIDENCE GATE	THE OUTPUT IS A LOGIC ONE IF THE NUMBER OF LOGIC ONE INPUTS IS __N, WHERE N IS 0,1,2,... AND __ REPRESENTS ONE OF THE FOLLOWING: GT = GREATER THAN LE = LESS THAN OR EQUAL TO LT = LESS THAN GE = GREATER THAN OR EQUAL TO EQ = EQUAL TO
	NOT	THE OUTPUT IS A LOGIC ONE IF THE INPUT IS A LOGIC ZERO.
		WHEN AN INPUT TO A SQUARE IS LOGIC ONE, THE OUTPUT FROM THAT SQUARE IS LOGIC ONE. WHEN ONLY THE INPUT TO THE SYMBOL IS LOGIC ONE AND THIS INPUT IS SUBSEQUENTLY LOST (I.E., LOGIC 0), THE OUTPUT ASSOCIATED WITH THAT INPUT IS MEMORIZED (RETAINED AT LOGIC ONE).
	MAINTAINED MEMORY	WHEN AN OVERRIDE DESTINATION (O) IS IN ONE OF THE SQUARES AND INPUTS TO BOTH SQUARES ARE LOGIC ONE, ONLY THE OUTPUT FROM THE SQUARE WITH THE OVERRIDE DESIGNATION IS LOGIC ONE.

HI	BISTABLE	THE OUTPUT WILL BE TRIPPED WHEN THE INPUT IS ≥ SET POINT.
LO	BISTABLE	THE OUTPUT WILL BE TRIPPED WHEN THE INPUT IS ≤ SET POINT.
H/L	BISTABLE	THE OUTPUT WILL BE TRIPPED WHEN THE INPUT IS ≥ SET POINT AND WILL RESET WHEN THE INPUT IS ≤ DEADBAND (I.E., [illegible]).
∫	INTEGRAL	THE OUTPUT VARIES IN ACCORDANCE WITH BOTH MAGNITUDE AND DURATION OF THE INPUT. THE OUTPUT IS PROPORTIONAL TO THE TIME INTEGRAL OF THE INPUT.
LOG	LOGARITHMIC	THE OUTPUT EQUALS THE LOGARITHM (I.E., [illegible]) OF THE INPUT.

ULTIMATE DESTINATION LEGEND

SYSTEM OUTPUTS ARE IDENTIFIED BY THE FOLLOWING LETTER CODES. THE FIRST LETTER DESCRIBES THE DESTINATION AND THE SECOND LETTER DESCRIBES THE PURPOSE OR USE (E.G., A/B MEANS UNIT ANNUNCIATOR FOR ALARM USE).

DESTINATION	PURPOSE
A = UNIT ANNUNCIATOR	A = REQUIRED FOR HEAT BALANCE CALCULATION
C = UNIT COMPUTER	B = HIGH OR LOW LEVEL ALARM (ANALOG); ALARM (DIGITAL)
CR = CONTROL ROOM	C = ALARM ON ERRATIC DEVIATION FROM NORM OR OTHER INPUTS MONITORING SAME PARAMETER
CRD = CONTROL ROD DRIVE CONTROL SYSTEM	D = HOURLY LOG
DI = DIGITAL INDICATOR	E = CONTROL
I = CONTROL ROOM INDICATOR	F = FUTURE
ICS = INTEGRATED CONTROL SYSTEM	I = OPERATOR INFORMATION
R = CONTROL ROOM RECORDER	

NOTES:

1) A COMPLETE SYMBOL CONSISTS OF AN ENCLOSURE OR DIAGRAMMING SYMBOL (TABLE 1) WITHIN WHICH IS CONTAINED A MEASURING OR READOUT LETTER (TABLE 2) OR A SIGNAL PROCESSING SYMBOL (TABLE 3). COMPLEX FUNCTIONS ARE REPRESENTED BY THE COMBINATIONS OF THESE BASIC SYMBOLS.

2) NI/RPS CHANNEL INPUT/OUTPUT DEVICE IDENTIFICATION

PARAMETER	NI/RPS DIVISION A	B	C	D
LOOP A RC FLOW	RC-FT-1A1	RC-FT-1A2	RC-FT-1A3	RC-FT-1A4
LOOP B RC FLOW	RC-FT-1B1	RC-FT-1B2	RC-FT-1B3	RC-FT-1B4
NI DETECTOR	5	6	7	8
NI POWER MONITORS	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]
RC PRESS	[illegible]	[illegible]	[illegible]	[illegible]
PZR LEVEL	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	A	B	C	D
[illegible]	[illegible]	B	C	D

3) [illegible] INPUT/OUTPUT DEVICE IDENTIFICATION

PARAMETER	[illegible]	[illegible]
SOURCE RANGE	NI-1	NI-2
INTERMEDIATE RANGE	NI-3	NI-4
LOG N RECORDER	NI-[illegible]	NONE
OPTIC SIGNALS FROM NI/RPS	N&R	TBD
AUCTIONEERED TOTAL POWER RECORDER	NONE	NI-[illegible]

2148 164

NI/RPS & ICS - LOGIC-LEGEND AND REFERENCE

CUSTOMER:
PLANT:
CONTRACTING ENG.:
B&W CO. JOB NO.:
CUST. ORDER NO.:

REV	DATE	CHANGE	APPD

Babcock & Wilcox
Bailey Meter Company, U.S.A.

DATE 5-10-79

D 51079 MLG-1