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VAN BRUNT,E.E. Arizona Nuclear Power Project (formerly Arizona Public Serv
RECIP.NAME RECIPIENT AFFILIATION
KNIGHTON,G.W. Office of Nuclear Reactor Regulation, Director

SUBJECT: Forwards results of steam generator tube rupture w/loss of offsite power & 851015 schedule for implementation of mods, per 851029 telcon re auxiliary pressurizer spray sys.

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Arizona Nuclear Power Project
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ANPP-33905-EEVB/KLM

November 4, 1985

Director of Nuclear Reactor Regulation
Attention: Mr. George W. Knighton, Project Director
PWR Project Directorate #7
Division of Pressurized Water Reactor Licensing - B
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Units 1, 2 and 3
Docket Nos. STN-50-528 (License No. NPF-41)/529/530
Information Concerning the PVNGS Auxiliary
Pressurizer Spray System
File: 85-056-026; G.1.01.10

References: (1) Letter to G. W. Knighton, NRC, from E. E. Van Brunt, Jr., ANPP, dated October 15, 1985 (ANPP-33713); Subject: Auxiliary Pressurizer Spray Design

(2) Letter to G. W. Knighton, NRC, from E. E. Van Brunt, Jr., ANPP, dated October 22, 1985 (ANPP-33771); Subject: Additional Information Concerning the September 12, 1985 Event at Palo Verde Unit 1

Dear Mr. Knighton:

As a result of a telephone conversation on October 29, 1985, with members of the NRC staff, ANPP is providing information in addition to that previously provided in References 1 and 2. The requested information, provided in Attachments to this letter, is as follows:

Attachment 1: Results of Steam Generator Tube Rupture with a Loss of Offsite Power and a fully stuck open ADV using the Pressurizer Gas Vent System (Auxiliary Pressurizer Spray System inoperable).

Attachment 2: Schedule for Implementation of Modifications described in ANPP-33713, dated October 15, 1985 (Reference 1).

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Attachment 3: Additional Considerations to ANPP-33713, dated October 15, 1985 (Reference 1).

If you should have any questions concerning this matter, contact Mr. W.F. Quinn, of my staff.

Very truly yours,

E E Van Brunt Jr /JH

E. E. Van Brunt, Jr.
Executive Vice President
Project Director

EEVB/KLM/dlm
Attachments

cc: E. A. Licitra
R. P. Zimmerman
M. C. Ley
A. C. Gehr

ATTACHMENT 1

STEAM GENERATOR TUBE RUPTURE WITH A LOSS OF OFFSITE POWER AND A FULLY STUCK OPEN ATMOSPHERIC DUMP VALVE (ADV)

The Steam Generator Tube Rupture (SGTR) analysis currently contained in the PVNGS FSAR Appendix 15A, was performed in response to a NRC staff concern that operator actions may affect the assumption of a worst single failure. As a result, the Appendix 15A analysis was submitted, (Appendix to Reference 1 and subsequent information in References 2 and 3) considering the operator actions that are outlined in the plant procedures.

These procedures provide guidance to the operator in the event of a SGTR with a loss of offsite power to lower RCS pressure through the use of the Auxiliary Pressurizer Spray System (APSS). Thus, the current Appendix 15A analysis assumes an operator action at 1015 seconds to initiate the APSS.

In response to a staff concern that this action was required to achieve acceptable consequences, the event was reanalyzed without operator action to initiate the APSS until two hours after the event initiation. The results of this analysis were transmitted in Reference 4.

A two-hour time delay was chosen for two reasons. First, this delay will maximize the two-hour Exclusion Area Boundary dose for this event. Second, the two-hour delay provides adequate time to manually establish auxiliary pressurizer spray, even in the event failures in the system occur, per BTP RSB 5-1.

In response to a staff concern that the APSS may remain inoperable longer than two hours, the event was reanalyzed with the APSS assumed inoperable throughout the entire event and with the pressurizer gas vent system (with flow restricted by a 7/32" orifice) assumed activiated by the operator at 2 hours.

IDENTIFICATION OF EVENT AND CAUSES

This transient analysis is similar to that described in the PVNGS FSAR Appendix 15A except that auxiliary pressurizer spray is never initiated and the pressurizer gas vent is opened at two hours. It assumes that the plant is challenged by a steam generator tube rupture including the conservative assumptions of the Standard Review Plan Section 15.6.3 (loss of offsite power, accident meterology, iodine spiking, etc.). In addition, the analysis postulates that 1) the operators open an ADV on the affected steam generator and 2) it runs to the full open position and 3) it sticks open for the duration of the transient.

SEQUENCES OF EVENTS AND SYSTEMS OPERATION

Refer to the PVNGS FSAR Appendix 15A for a description of the event assumptions. In addition, Table 1 of this Attachment 1 provides the sequence of events and setpoint values used for the revised steam generator tube rupture analysis. The sequence of events and setpoint values are identical to those described in the PVNGS FSAR Appendix 15A, through 1015 seconds, at which time it was assumed the operator initiated auxiliary pressurizer spray. This reanalysis conservatively assumes no initiation of auxiliary pressurizer spray and opening of the pressurizer gas vent two hours into the event. By delaying opening of the pressurizer gas vent to this time, the primary to secondary tube leak is maximized and therefore, the 0-2 hour exclusion area boundary (EAB) radiological consequences are maximized. Most of the radioactive releases contributing to the dose at the low population zone (LPZ) occur in the first two hours. At 8 hours, plant conditions are such that the operator initiates shutdown cooling system operation and the radioactive releases from the plant are terminated. The opening of the pressurizer gas vent at 2 hours permits gradual venting of the pressurizer steam bubble causing slow recovery of the pressurizer level. When the level is sufficiently high, the operator is permitted to throttle the high pressure safety injection (HPSI) pumps which results in a RCS depressurization.

Due to the delay in operator intervention from 1015 seconds to 7200 seconds, resulting in an increased primary to secondary leak rate, the steam generator tubes are covered at 1347 seconds which is slightly earlier than the PVNGS FSAR Appendix 15A analysis. Approximately 25 minutes after the pressurizer gas vent is opened, pressurizer level is regained. The operator then controls the HPSI flow to allow RCS depressurization and reduce the primary to secondary leak flow rate. At 22,106 seconds, the operator closes the pressurizer gas vent and uses the backup pressurizer heaters to maintain the 20°F subcooling criteria. At 28,800 seconds, the operator activates the shutdown cooling system. The dynamic behavior of important NSSS parameters following this revised steam generator tube rupture analysis are provided in Figure 1-14 of this Attachment 1.

ANALYSIS OF EVENTS AND CONSEQUENCES

The mathematical model used for this analysis is described in CESSAR Section 15D.3.1.A.

RADIOLOGICAL CONSEQUENCES

The physical model is the same as that discussed in CESSAR Section 15D.3.2 except that the ADV of the affected steam generator opens fully. In order to reduce the radiological releases, the operator takes appropriate actions to cover the U-tubes of the affected steam generator. Actions assumed in this analysis included overriding the automatic isolation of Auxiliary Feed Water (AFW) flow to the affected steam generator and diverting the flow of both AFW pumps to the affected steam generator.

The mathematical dose model is as described in CESSAR Section 15D.3.2.C.

The assumptions and conditions employed for the evaluation of radiological releases are the same as those discussed in CESSAR Section 15D.3.2.B with the exceptions of assumptions 7, 9, and 10. The assumptions used in this analysis are:

7. During the period when the water level in the affected steam generator is above the top of the U-tubes, the portion of the leaking primary fluid which flashes to steam upon entering the steam generator is assumed to be released to the atmosphere with a decontamination factor (DF) of 1.0. The portion of the leaked fluid that does not flash, mixes with the liquid in the steam generator and is released to the atmosphere with a DF of 100. During that period when the water level is below the top of the U-tubes, it is assumed that all the activity associated with the leaking primary fluid escapes to the atmosphere with a DF of 1.0, which is more conservative than the CESSAR assumptions. No credit is taken for the presence of steam separators and dryers which would retain a part of the escaping primary liquid in the steam generator.

9. The 0-2 hour and 2-8 hour primary-to-secondary leakage through the rupture are 447,600 lbm and 814,100 lbm, respectively.

10. The PVNGS site specific atmospheric dispersion factors employed in the analyses are: 3.1×10^{-4} sec/m^3 for the exclusion area boundary and 5.1×10^{-5} sec/m^3 for the low population zone.

The two-hour exclusion area boundary (EAB) and the eight-hour low population zone (LPZ) boundary inhalation doses for both the Generated Iodine Spike (GIS) and the Preaccident Iodine Spike (PIS) are presented in Table 2 of this Attachment 1. The calculated EAB and LPZ doses are well within the acceptance criteria of 10CFR Part 100. The dose results from the PVNGS FSAR Appendix 15A are also provided in Table 2 for reference.

CONCLUSIONS

Assuming the APSS is not actuated throughout the entire event, and that the pressurizer gas vent is opened at two hours after the event, the radiological releases calculated for the SGTR event with a loss of offsite power and a fully stuck open ADV are well within the acceptance criteria of 10CFR100. The secondary system pressures are well below 110% of the design pressure limits ensuring the integrity of these systems.

REFERENCES

(1) Letter from E. E. Van Brunt, Jr., ANPP, to G. W. Knighton, NRC, dated September 19, 1984, ANPP-30572. Subject: Steam Generator Tube Rupture Analysis.

(2) Letter from E. E. Van Brunt, Jr., ANPP, to G. W. Knighton, NRC, dated October 5, 1984, ANPP-30746. Subject: Steam Generator Tube Rupture Analysis.

(3) Letter from E. E. Van Brunt, Jr., ANPP, to G. W. Knighton, NRC, dated October 24, 1984, ANPP-30938. Subject: Steam Generator Tube Rupture Analysis.

(4) Letter from E. E. Van Brunt, Jr., ANPP, to G. W. Knighton, NRC, dated October 15, 1985, ANPP-33713. Subject: Auxiliary Pressurizer Spray Design.

TABLE 1

SEQUENCE OF EVENTS FOR A STEAM GENERATOR TUBE RUPTURE WITH A LOSS OF OFFSITE POWER AND FULLY STUCK OPEN ADV

(Auxiliary Spray System Inoperable)

(Sheet 1 of 3)

(Sec)	Event	Setpoint* or Value	Success Path or Comment
0.0	Tube Rupture Occurs	—	—
40	Third Charging Pump Started, feet below program level	-0.75	Primary System Integrity
40	Letdown Control Valve Throttled Back to Minimum Flow, feet below program level	-0.75	Primary System Integrity
47	CPC Hot Leg Saturation Trip Signal Generated	—	Reactivity Control
47.15	Trip Breakers Open	—	Reactivity Control
48	Turbine/Generator Trip	--	Secondary System Integrity
51	Loss of Offsite Power	—	—
52	LH Main Steam Safety Valves Open, psia	1265	Secondary System Integrity
52	RH Main Steam Safety Valves Open, psia	1265	Secondary System Integrity
56	Maximum Steam Generator Pressures Both Steam Generators, psia	1330	—
121	Steam Generator Water Level Reaches Auxiliary Feedwater Actuation Signal (AFAS) Analysis Setpoint in Unaffected Generator, percent wide range level	25	Secondary System Integrity
122	AFAS Generated	—	—

TABLE 1

SEQUENCE OF EVENTS FOR A STEAM GENERATOR TUBE RUPTURE WITH A LOSS OF OFFSITE POWER AND FULLY STUCK OPEN ADV
(Auxiliary Spray System Inoperable)
(Sheet 2 of 3)

(Sec)	Event	Setpoint* or Value	Success Path or Comment
131	Steam Generator Water Level Reaches AFAS Analysis Setpoint in the Affected Generator, percent wide range level	25	Secondary System Integrity
132	AFAS Generated	—	—
167.0	Auxiliary Feedwater Initiated to Unaffected Steam Generator	—	Secondary System Integrity
177.0	Auxiliary Feedwater Initiated to Affected Steam Generator	—	Secondary System Integrity
460	Operator Initiates Plant Cooldown by Opening One ADV on Each SG - ADV of the Affected SG Instantaneously Opens Fully	—	Reactor Heat Removal
484	Pressurizer Empties	—	—
513	MSIS Actuation, Secondary Pressure, psia	919	Secondary System Integrity
535	Automated Isolation of AFW to Affected SG, ΔP SGs, psi	185	Secondary System Integrity
581	Pressurizer Pressure Reaches Safety Injection Actuation Signal (SIAS) Analysis Setpoint, psia	1578 (1837)	Reactivity Control
581	Safety Injection Actuation Signal Generated	—	—
581	Safety Injection Flow Initiated	—	Reactivity Control
655	Operators Overrides the AFW Isolation Signal and Starts Feeding the Affected SG with AFW	—	—

[illegible]

[illegible]

[illegible]

[illegible]

TABLE 1

SEQUENCE OF EVENTS FOR A STEAM GENERATOR TUBE RUPTURE WITH A LOSS OF OFFSITE POWER AND FULLY STUCK OPEN ADV
(Auxiliary Spray System Inoperable)
(Sheet 3 of 3)

(Sec)	Event	Setpoint* or Value	Success Path or Comment
775	Operator Takes Manual Control of the AFW System, Feeds Affected SG with Both AFW Pumps	—	—
895	Operators Shuts the ADV of the Unaffected Steam Generator	—	—
1347	Level in the Affected SG Above the Top of U-tubes, percent wide range	71.5	—
7200	Operator Opens Pressurizer Steam Vent	—	—
8666	Pressurizer Level, percent	33	—
8906	Operator Throttles HPSI Pump Flow to Allow RCS Depressurization and Reduce the Leak Flow Rate	—	—
22,106	Pressurizer Heaters Actuated, Pressurizer Gas Vent Closed to Maintain Subcooling Criteria, °F	20	—
28,800	Shutdown Cooling Entry Conditions are Reached RCS psia/°F	400/350	—
28,800	Operator Activates Shutdown Cooling System	—	—

* Where the Technical Specification (TS) Setpoint is different from what was used, the TS value is listed in parenthesis for reference.

TABLE 2

RADIOLOGICAL CONSEQUENCES OF THE STEAM GENERATOR TUBE RUPTURE WITH A LOSS OF OFFSITE POWER AND FULLY STUCK OPEN ADV
(Auxiliary Spray System Inoperable)

Location	Offsite Doses, Rems	
	GIS	PIS
1. Exclusion Area Boundary 0-2 hr. Thyroid	42	208
2. Low Population Zone Outer Boundary 0-8 hr. Thyroid	22	44

RADIOLOGICAL CONSEQUENCES OF THE STEAM GENERATOR TUBE RUPTURE WITH A LOSS OF OFFSITE POWER AND FULLY STUCK OPEN ADV APSS OPERATION AT 1015 SECONDS
(PVNGS FSAR APPENDIX 15A)

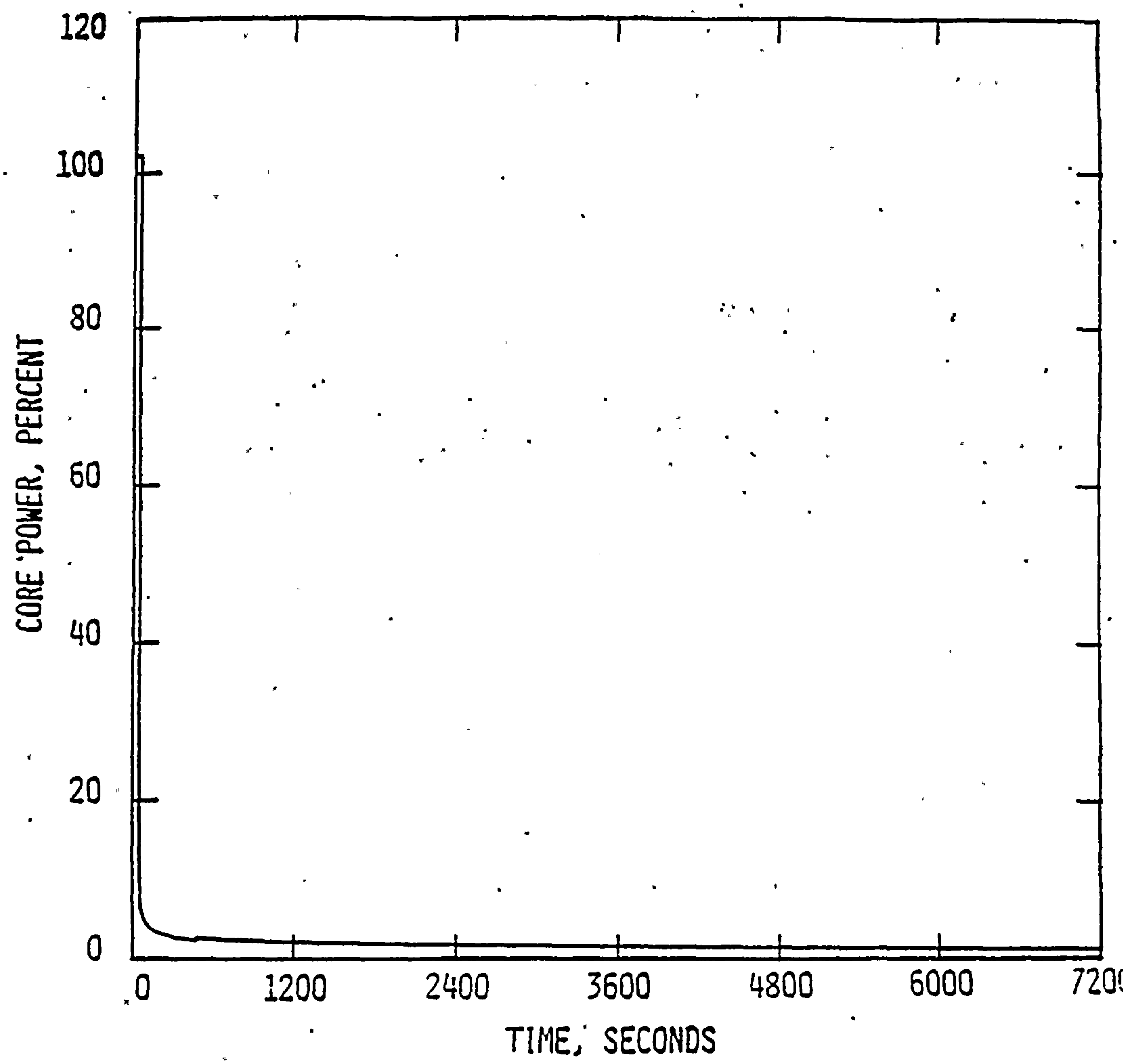
Location	Offsite Doses, Rems	
	GIS	PIS
1. Exclusion Area Boundary 0-2 hr. Thyroid	40	200
2. Low Population Zone Outer Boundary 0-8 hr. Thyroid	20	41

STEAM GENERATOR TUBE RUPTURE
WITH LOSS OF OFFSITE POWER AND
A FULLY STUCK OPEN ATMOSPHERIC
DUMP VALVE (ASSUMING AUXILIARY
PZR SPRAY IS INOPERABLE)

FIGURE 1

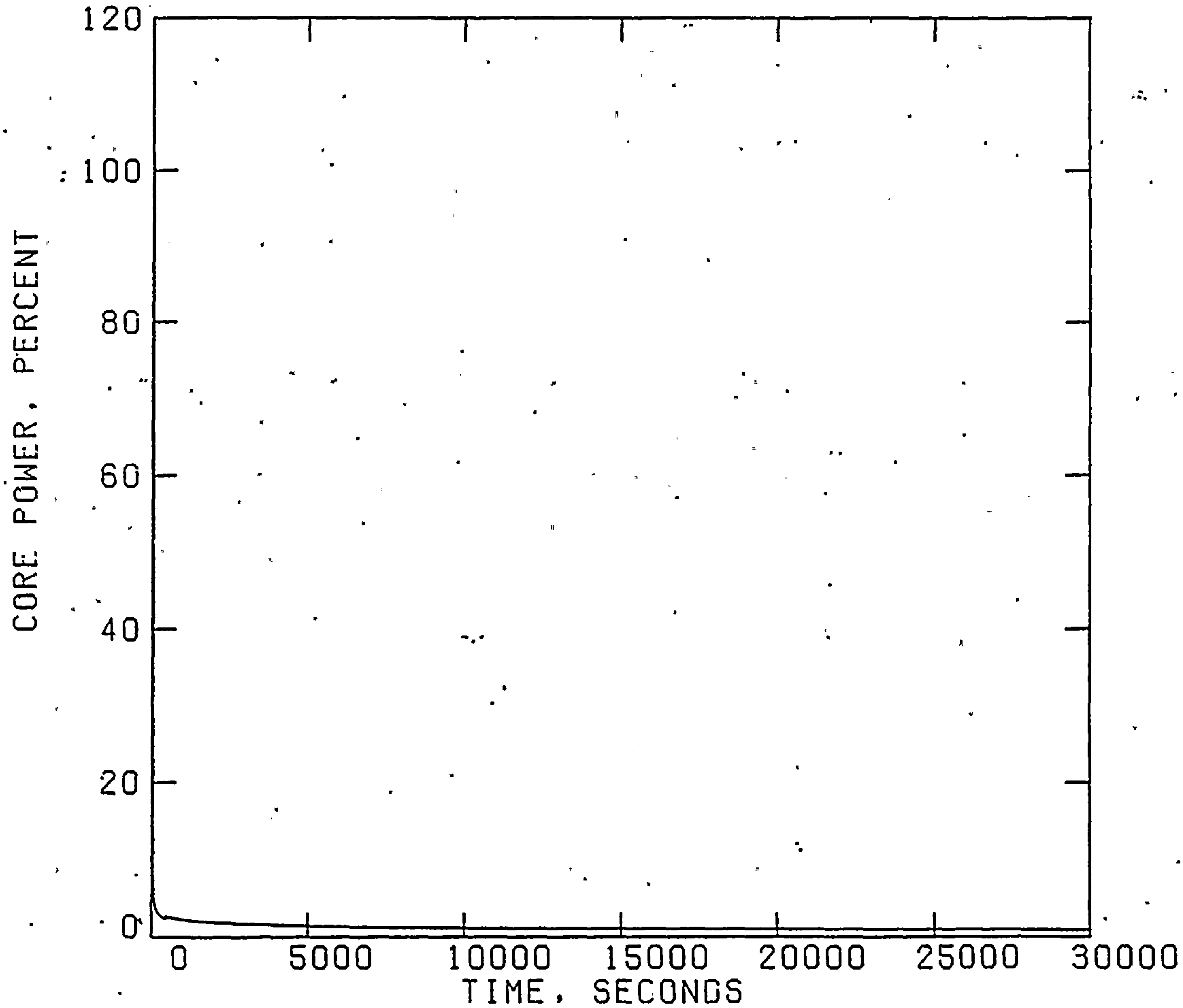
CORE POWER VS. TIME

(SHEET 1 OF 2)



STEAM GENERATOR TUBE RUPTURE
WITH LOSS OF OFFSITE POWER AND
A FULLY STUCK OPEN ATMOSPHERIC
DUMP VALVE (ASSUMING AUXILIARY
PZR SPRAY IS INOPERABLE)

Figure 1
CORE POWER VS. TIME
(Sheet 2 of 2)

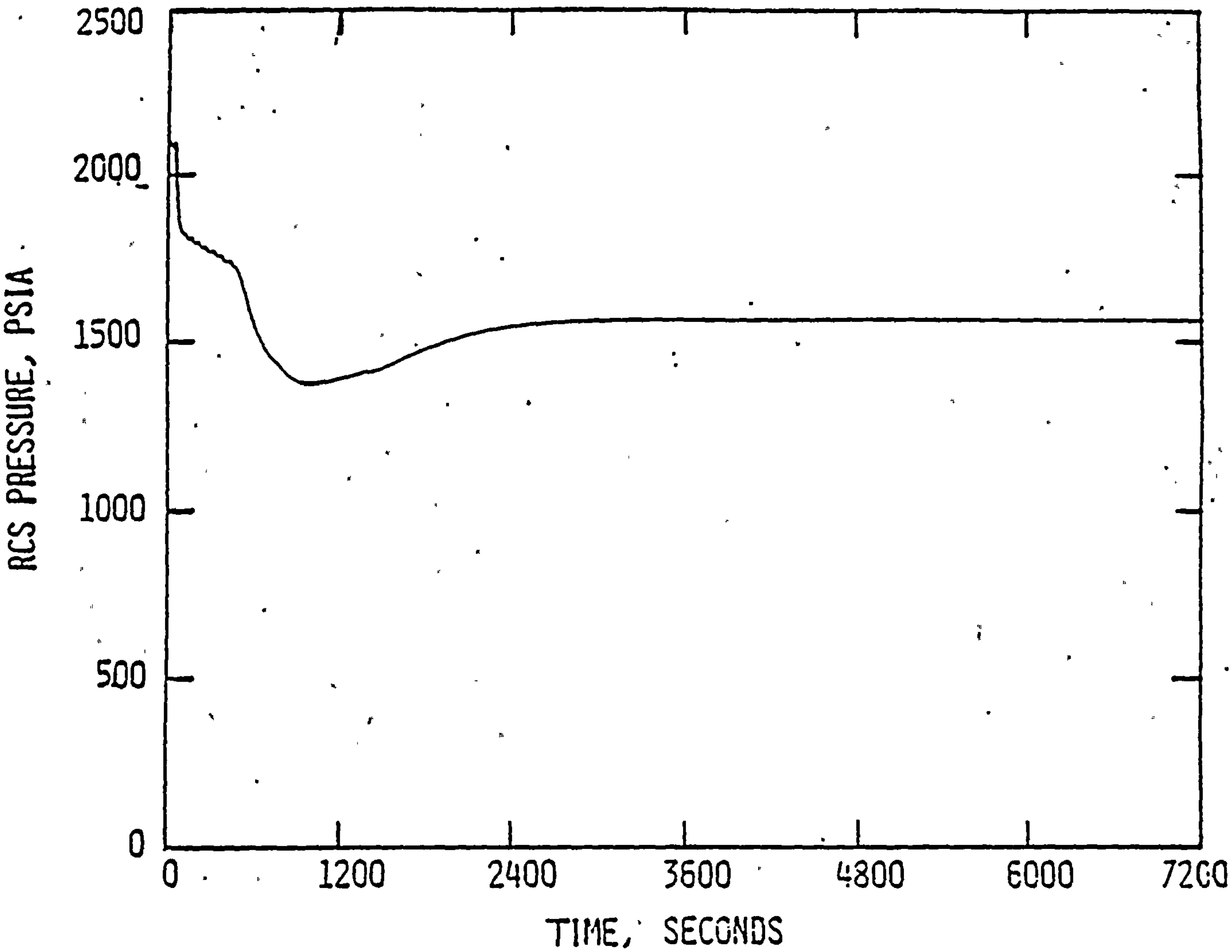


STEAM GENERATOR TUBE RUPTURE WITH LOSS OF OFFSITE POWER AND A FULLY STUCK OPEN ATMOSPHERIC DUMP VALVE (ASSUMING AUXILIARY PZR SPRAY IS INOPERABLE)

FIGURE 2

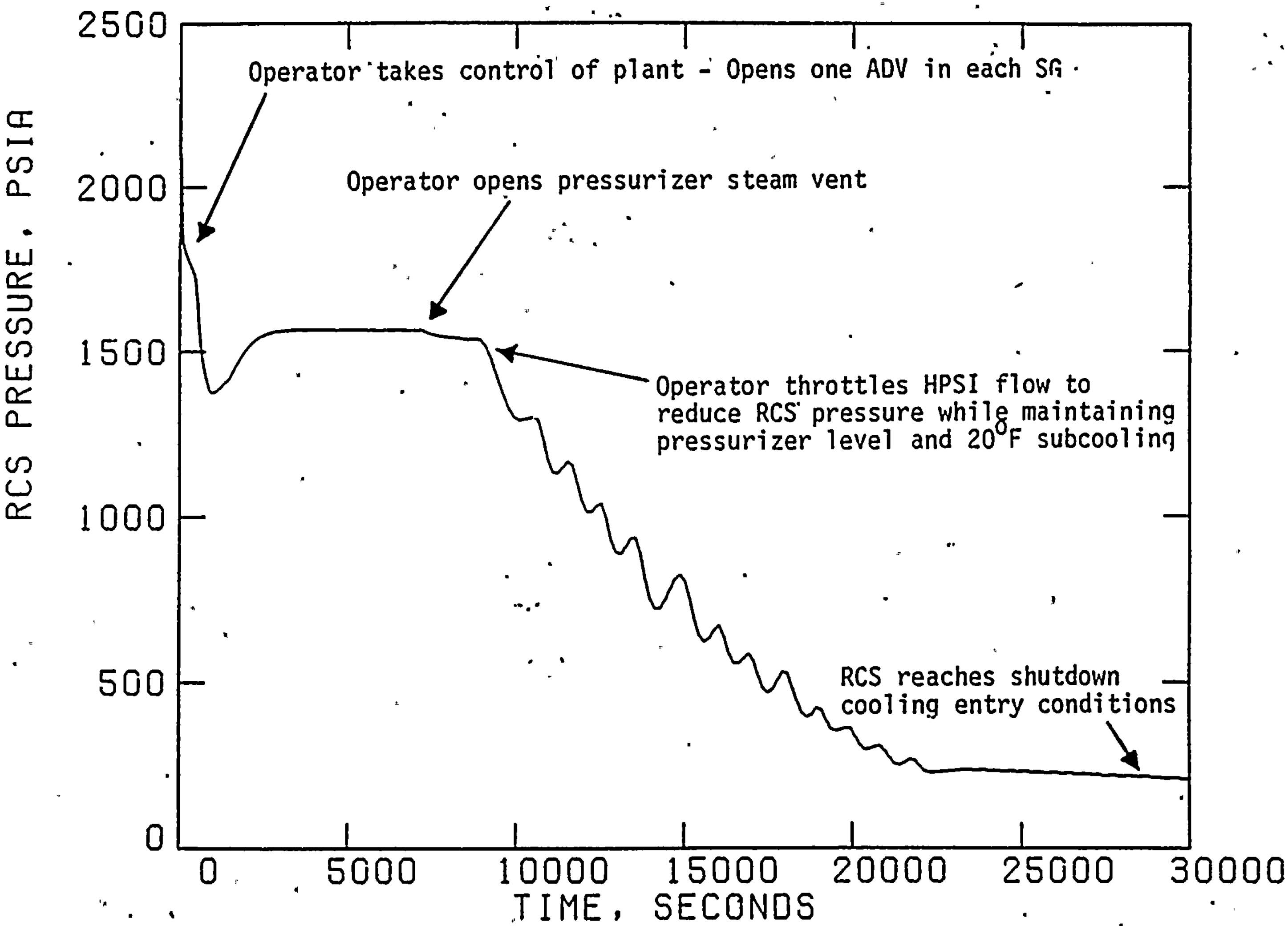
RCS PRESSURE VS. TIME

(SHEET 1 OF 2)



STEAM GENERATOR TUBE RUPTURE
WITH LOSS OF OFFSITE POWER AND
A FULLY STUCK OPEN ATMOSPHERIC
DUMP VALVE (ASSUMING AUXILIARY
PZR SPRAY IS INOPERABLE)

Figure 2
RCS PRESSURE VS. TIME
(Sheet 2 of 2)

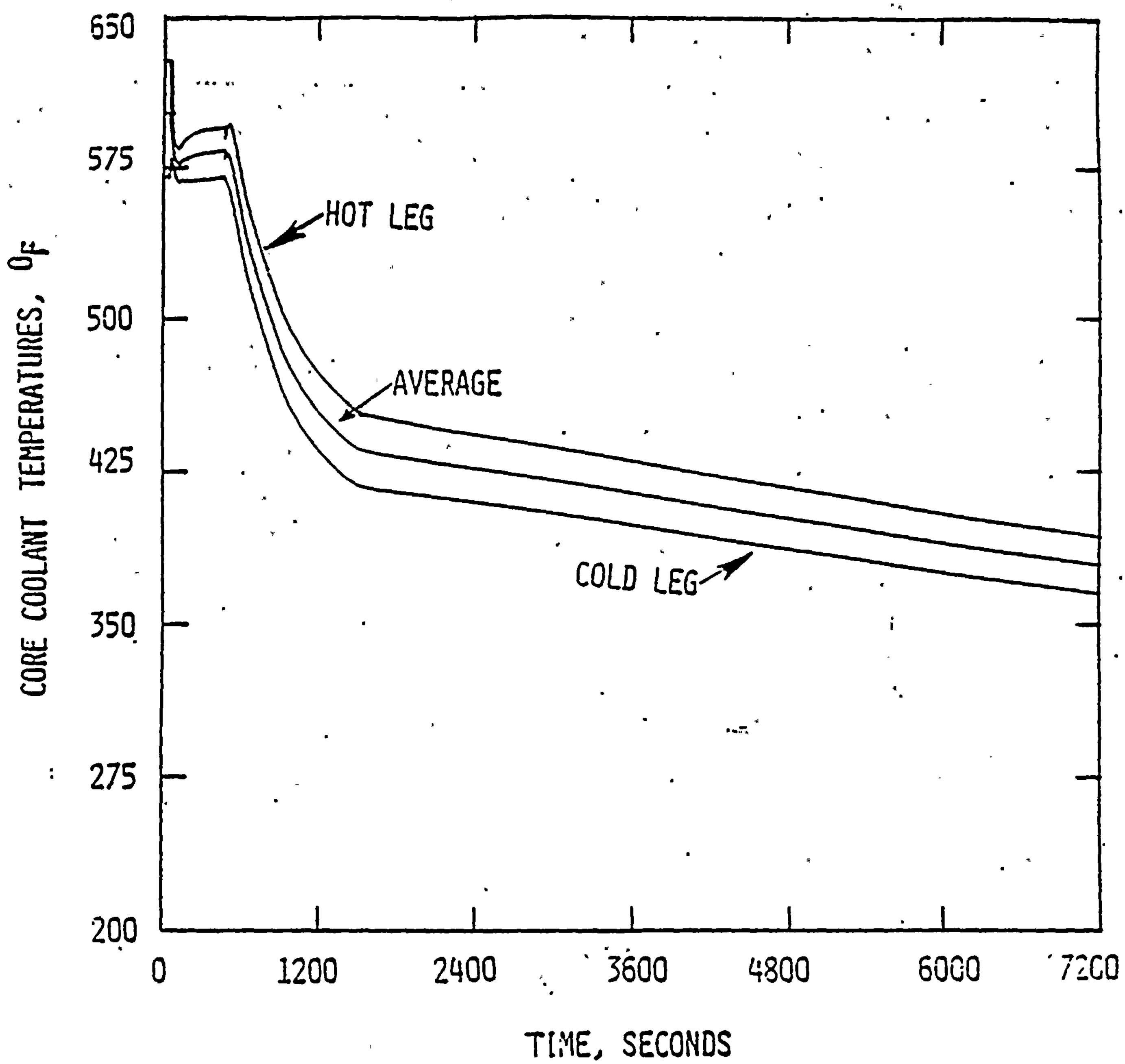


STEAM GENERATOR TUBE RUPTURE WITH LOSS OF OFFSITE POWER AND A FULLY STUCK OPEN ATMOSPHERIC DUMP VALVE (ASSUMING AUXILIARY PZR SPRAY IS INOPERABLE)

FIGURE 3

CORE COOLANT TEMPERATURES VS. TIME

(SHEET 1 OF 2)

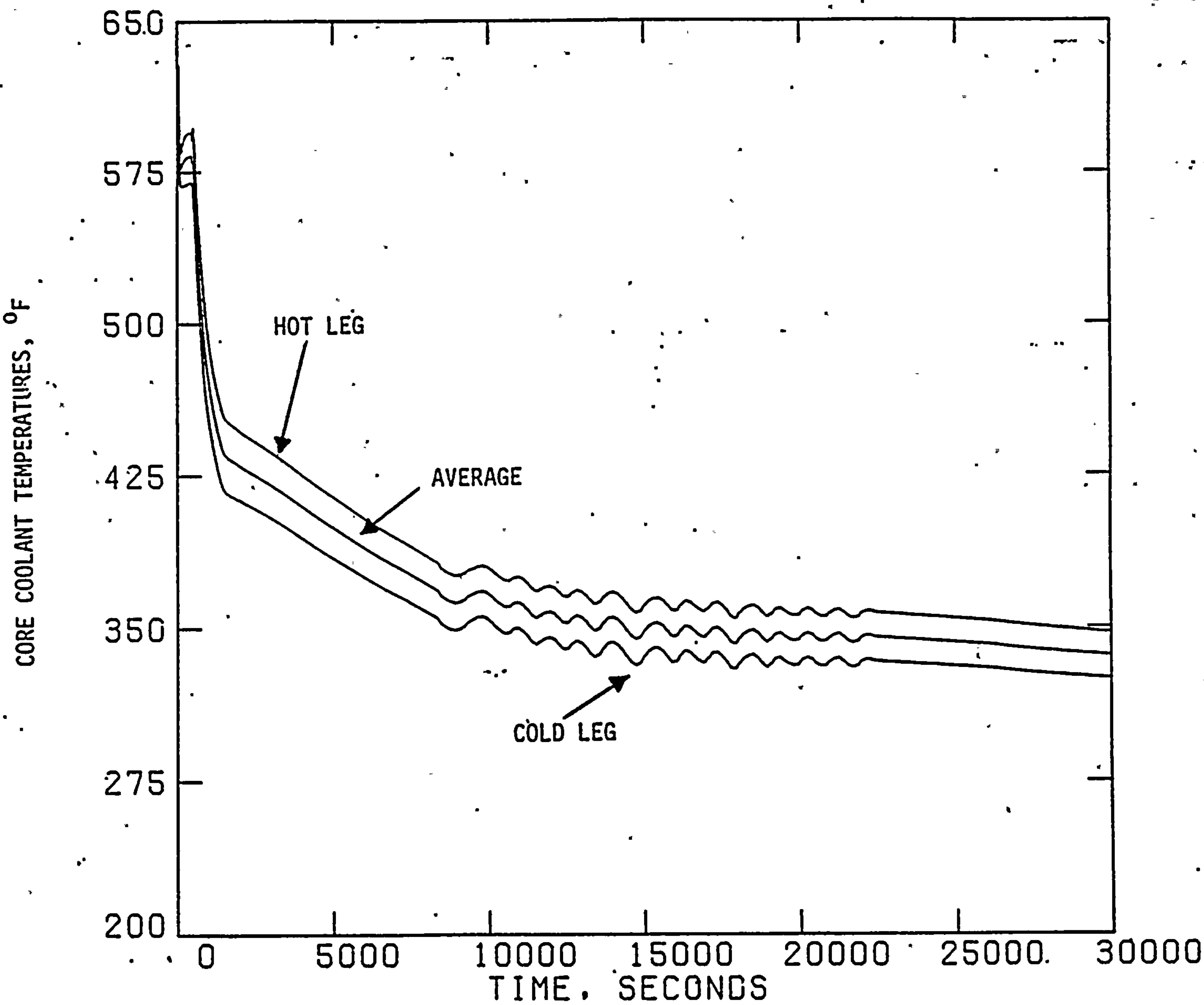


STEAM GENERATOR TUBE RUPTURE
WITH LOSS OF OFFSITE POWER AND
A FULLY STUCK OPEN ATMOSPHERIC
DUMP VALVE (ASSUMING AUXILIARY
PZR SPRAY IS INOPERABLE)

Figure 3

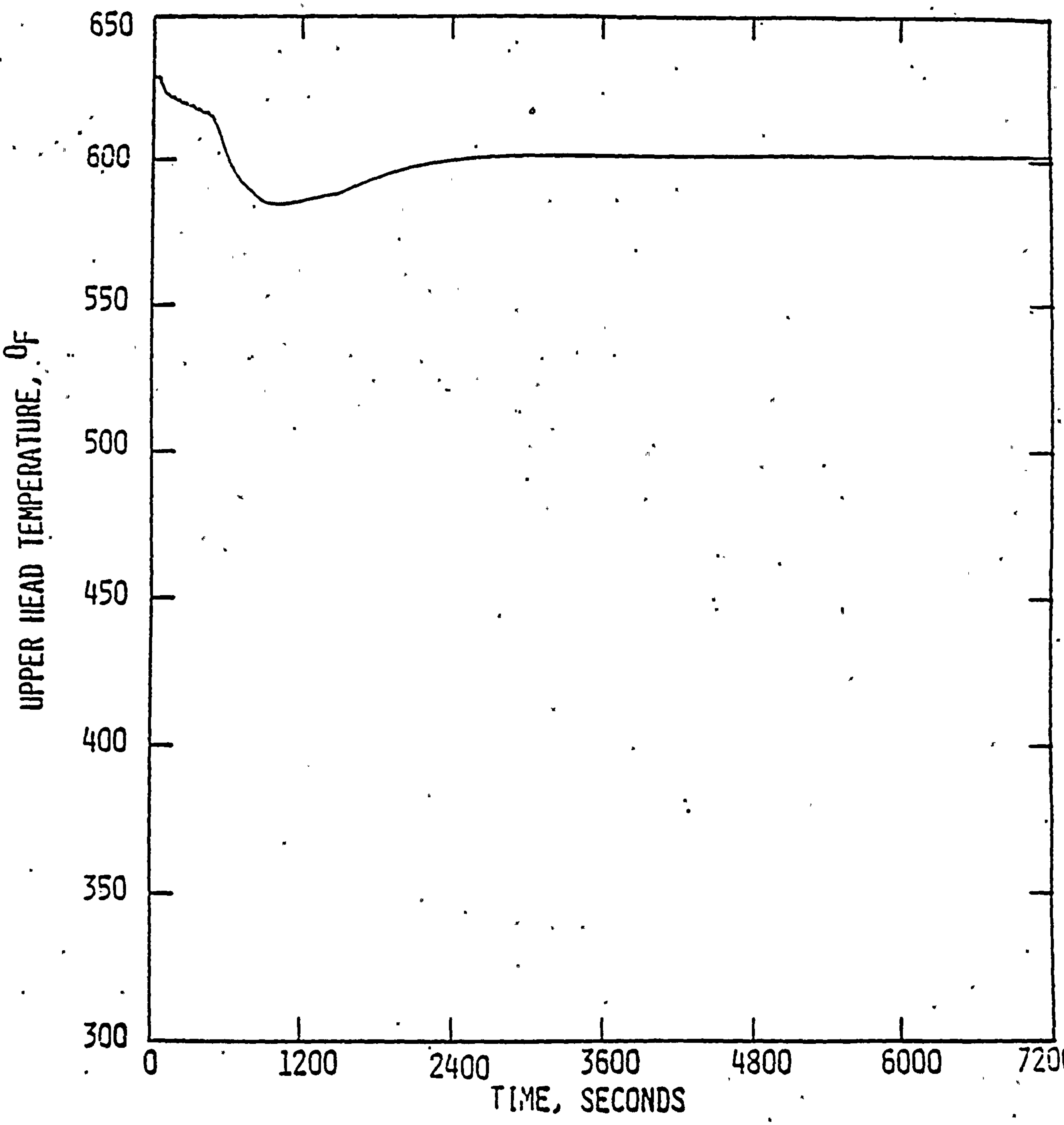
CORE COOLANT TEMPERATURE
VS. TIME

(Sheet 2 of 2)



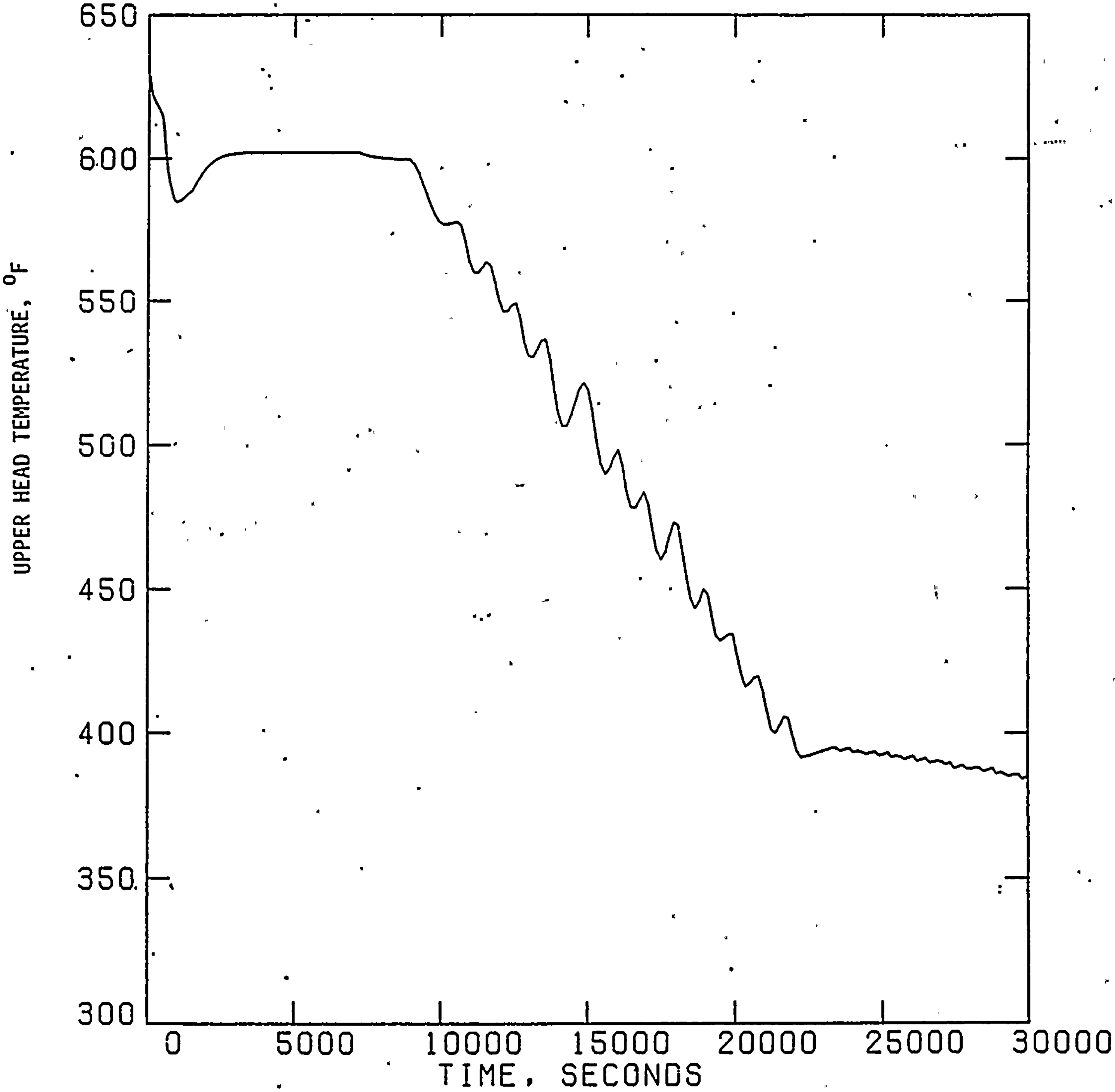
STEAM GENERATOR TUBE RUPTURE WITH LOSS OF OFFSITE POWER AND A FULLY STUCK OPEN ATMOSPHERIC DUMP VALVE (ASSUMING AUXILIARY PZR SPRAY IS INOPERABLE)

FIGURE 4
UPPER HEAD TEMPERATURE VS. TIME
(SHEET 1 OF 2)



STEAM GENERATOR TUBE RUPTURE WITH LOSS OF OFFSITE POWER AND A FULLY STUCK OPEN ATMOSPHERIC DUMP VALVE (ASSUMING AUXILIARY PZR SPRAY IS INOPERABLE)

Figure 4
UPPER HEAD TEMPERATURE VS. TIME
(Sheet 2 of 2)

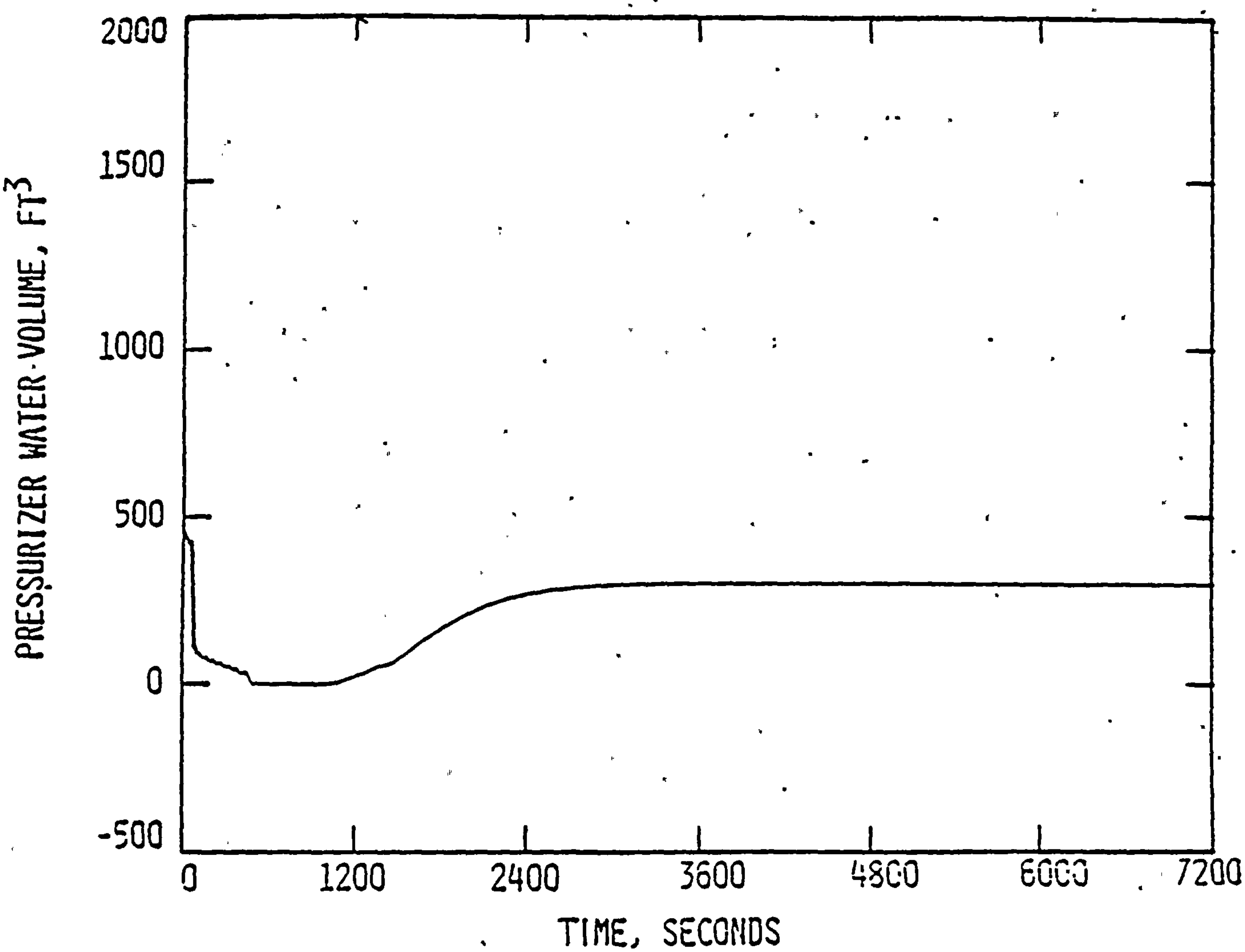


STEAM GENERATOR TUBE RUPTURE WITH LOSS OF OFFSITE POWER AND A FULLY STUCK OPEN ATMOSPHERIC DUMP VALVE (ASSUMING AUXILIARY PZR SPRAY IS INOPERABLE)

FIGURE 5

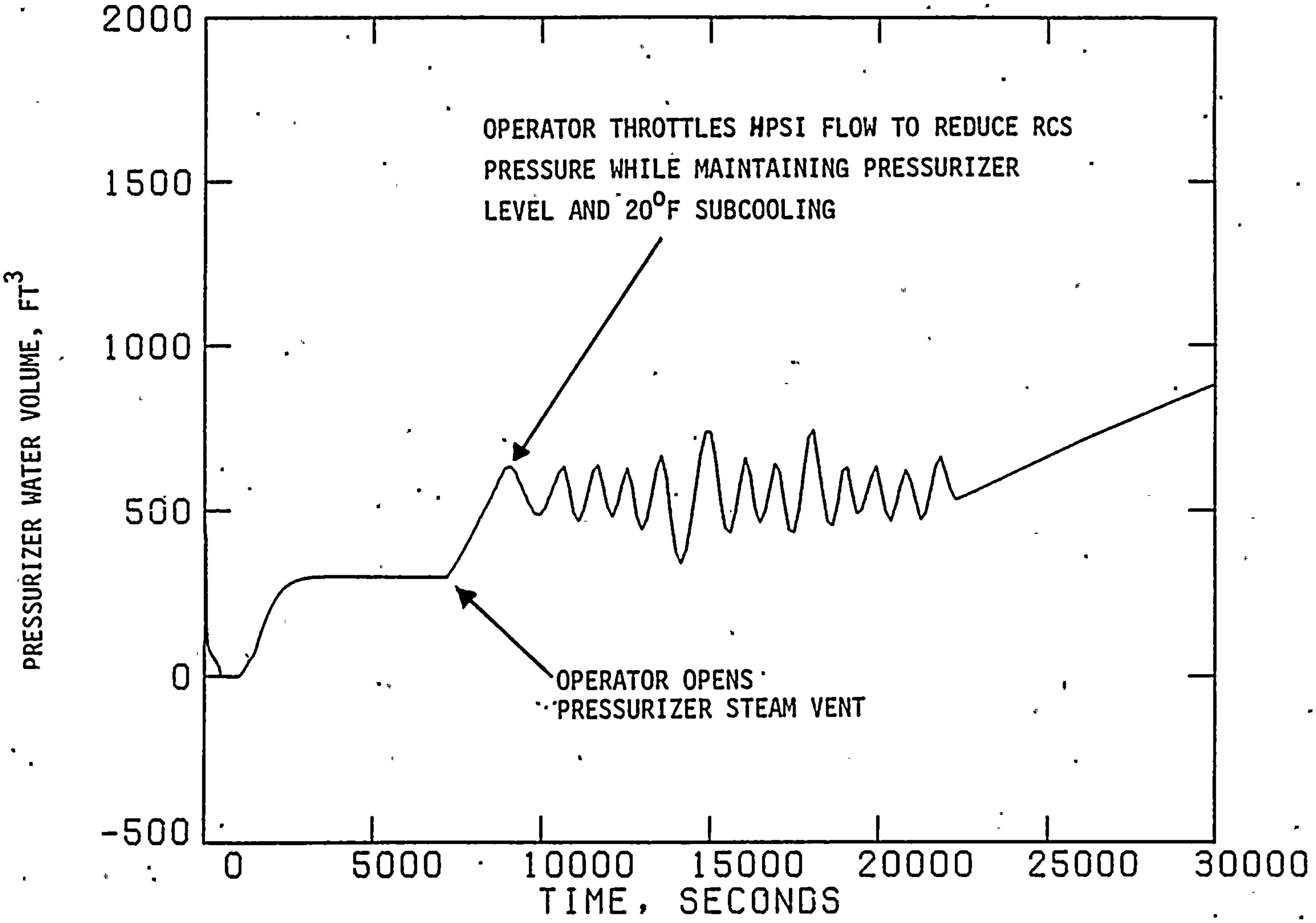
PRESSURIZER WATER VOLUME VS. TIME

(SHEET 1 OF 2)



STEAM GENERATOR TUBE RUPTURE
WITH LOSS OF OFFSITE POWER AND
A FULLY STUCK OPEN ATMOSPHERIC
DUMP VALVE (ASSUMING AUXILIARY
PZR SPRAY IS INOPERABLE)

Figure 5
PRESSURIZER WATER
VOLUME VS. TIME
(Sheet 2 of 2)

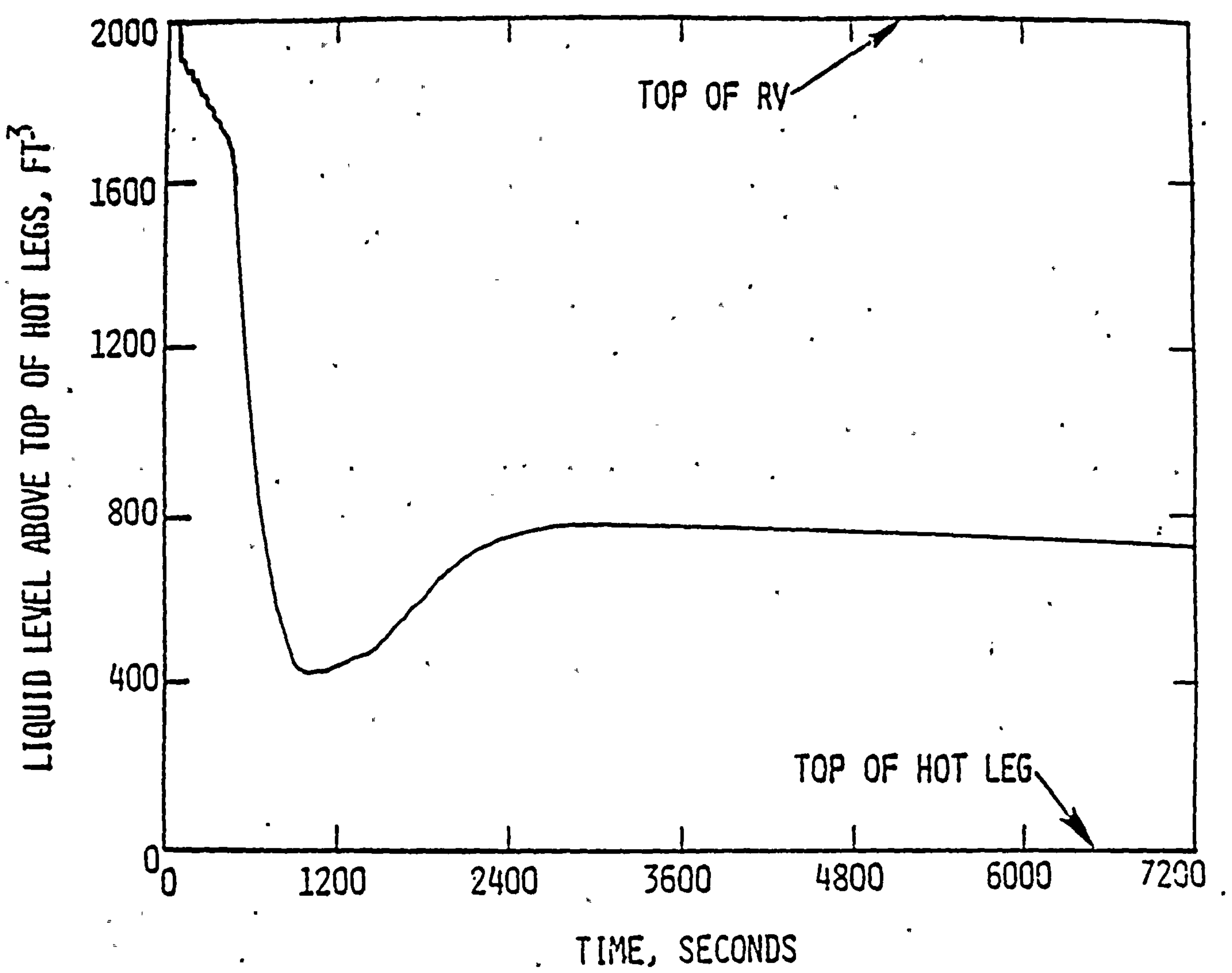


STEAM GENERATOR TUBE RUPTURE WITH LOSS OF OFFSITE POWER AND A FULLY STUCK OPEN ATMOSPHERIC DUMP VALVE (ASSUMING AUXILIARY PZR SPRAY IS INOPERABLE)

FIGURE 6

LIQUID LEVEL ABOVE TOP OF HOT LEGS

(SHEET 1 OF 2)

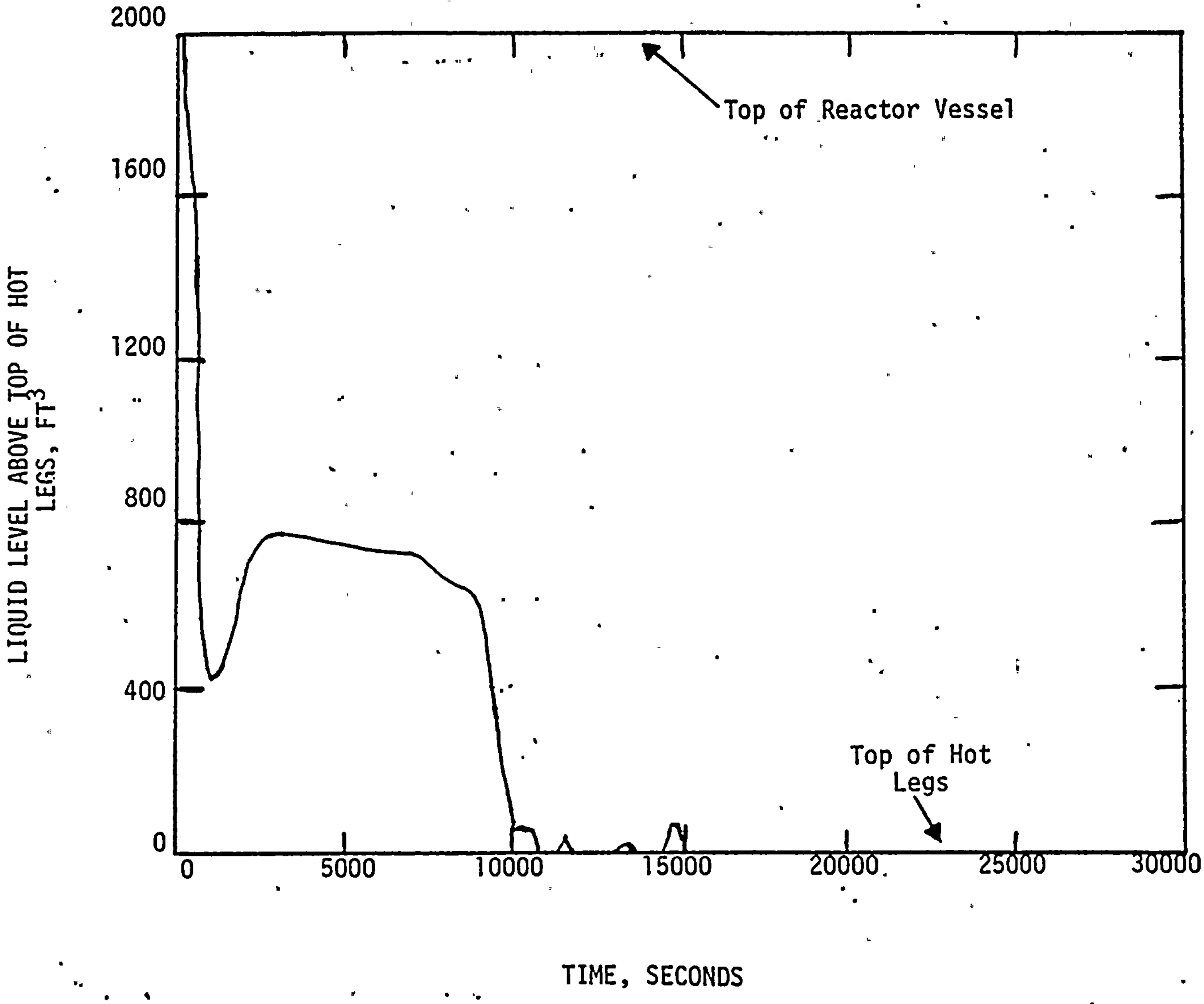


STEAM GENERATOR TUBE RUPTURE
WITH LOSS OF OFFSITE POWER AND
A FULLY STUCK OPEN ATMOSPHERIC
DUMP VALVE (ASSUMING AUXILIARY
PZR SPRAY IS INOPERABLE)

Figure 6

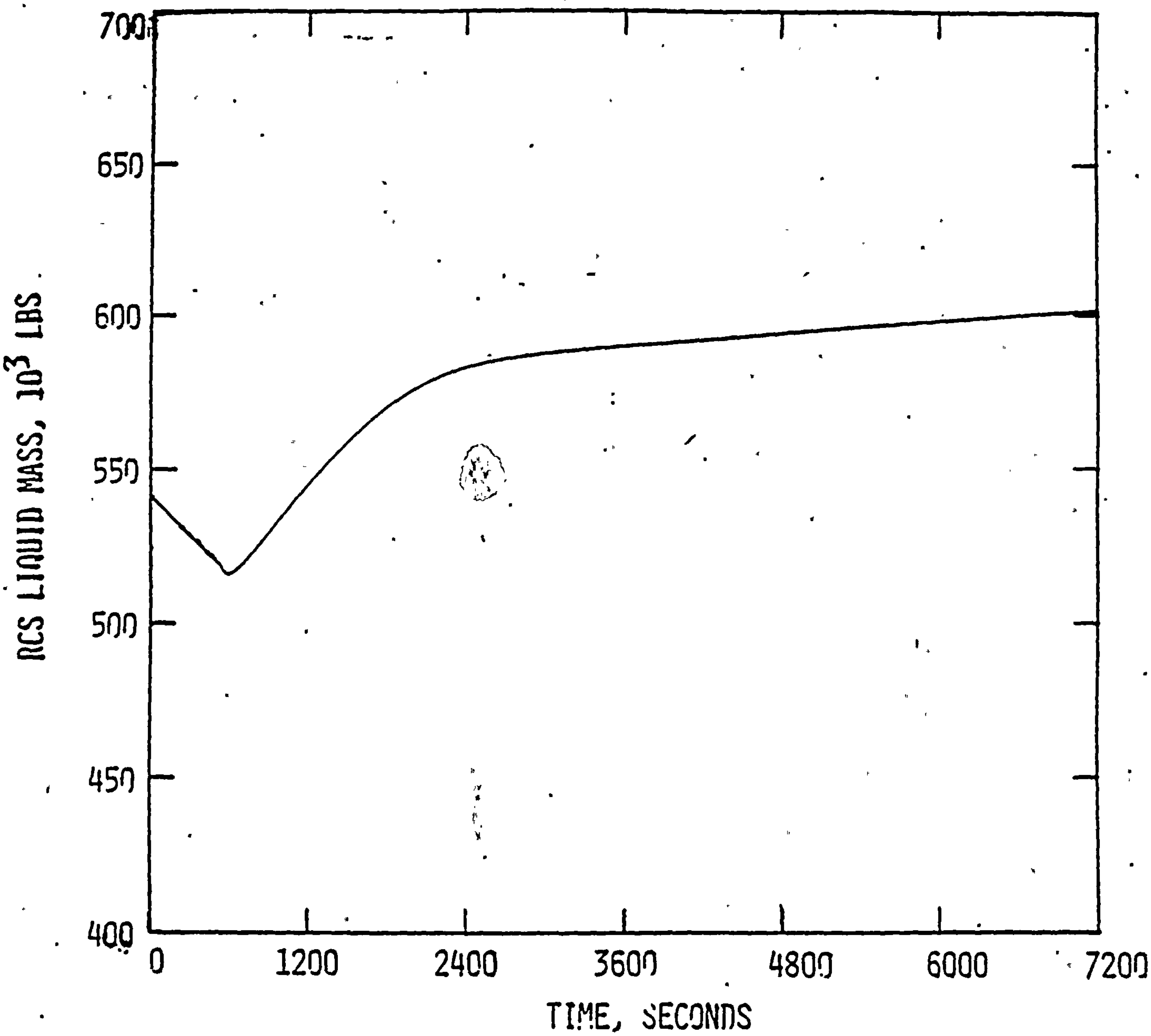
LIQUID LEVEL ABOVE TOP
OF HOT LEGS

(Sheet 2 of 2)



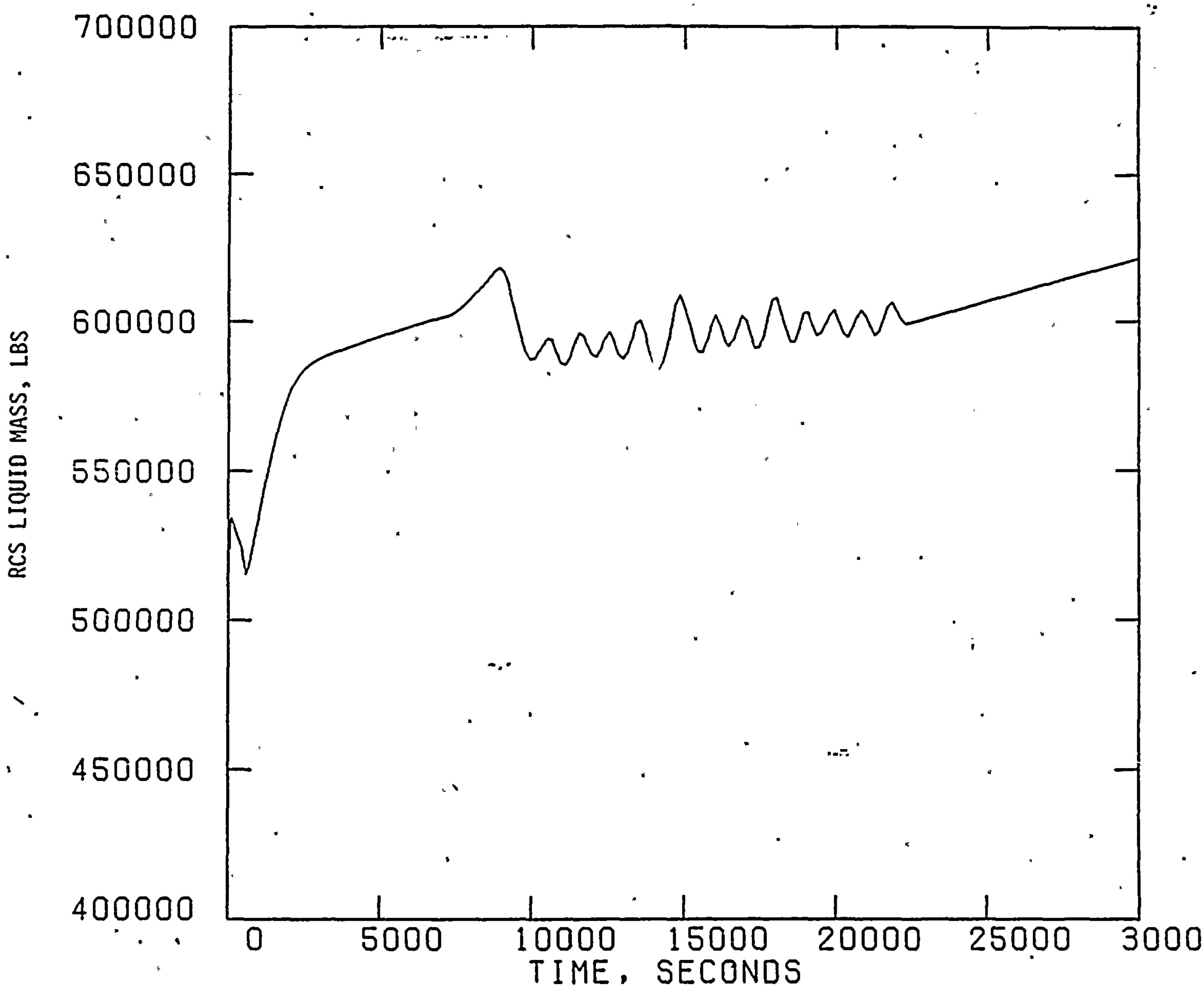
STEAM GENERATOR TUBE RUPTURE WITH LOSS OF OFFSITE POWER AND A FULLY STUCK OPEN ATMOSPHERIC DUMP VALVE (ASSUMING AUXILIARY PZR SPRAY IS INOPERABLE)

FIGURE 7
RCS LIQUID MASS VS. TIME
(SHEET 1 OF 2)



STEAM GENERATOR TUBE RUPTURE
WITH LOSS OF OFFSITE POWER AND
A FULLY STUCK OPEN ATMOSPHERIC
DUMP VALVE (ASSUMING AUXILIARY
PZR SPRAY IS INOPERABLE)

Figure 7
RCS LIQUID MASS VS. TIME
(Sheet 2 of 2)

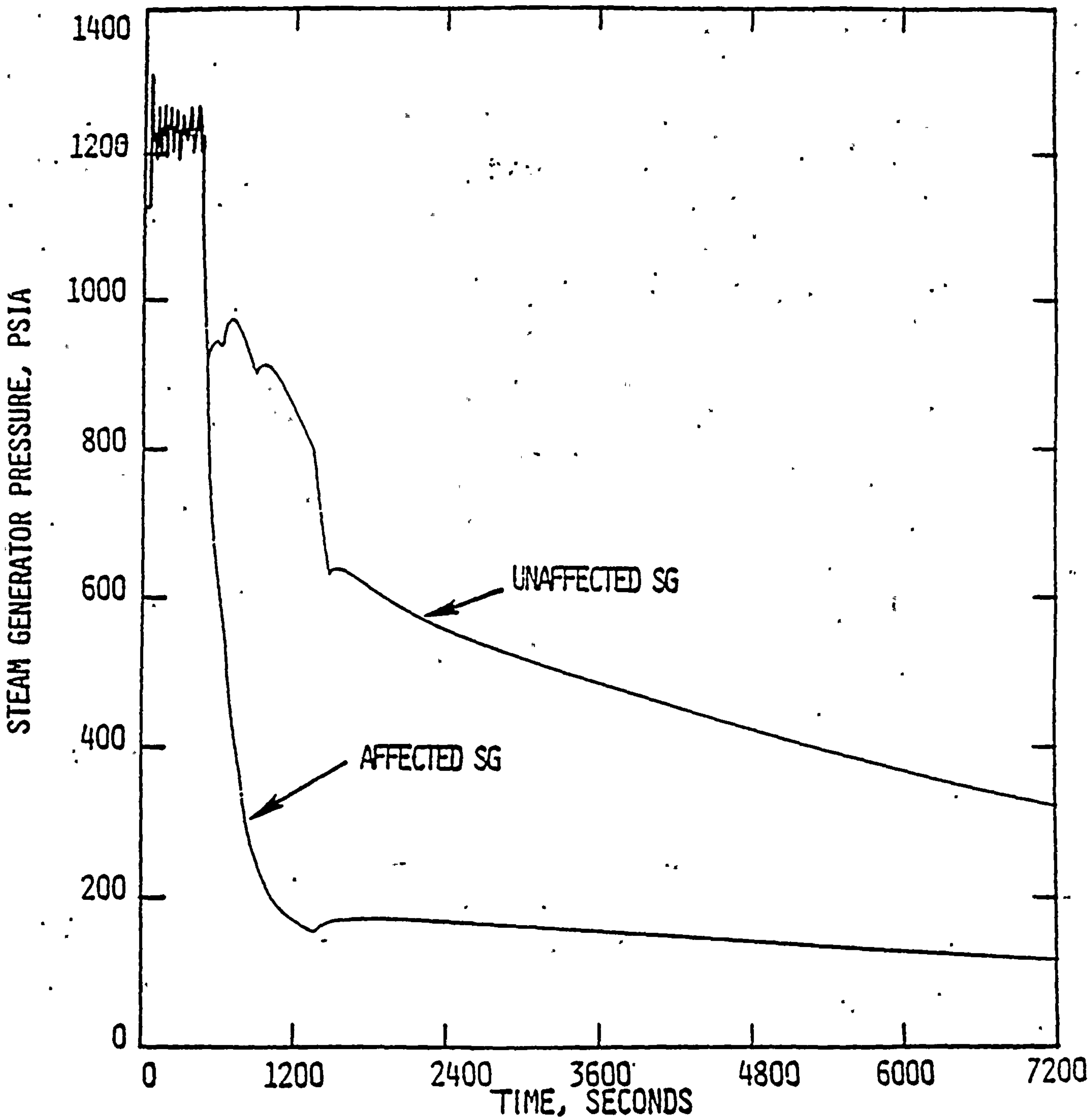


STEAM GENERATOR TUBE RUPTURE WITH LOSS OF OFFSITE POWER AND A FULLY STUCK OPEN ATMOSPHERIC DUMP VALVE (ASSUMING AUXILIARY PZR SPRAY IS INOPERABLE)

FIGURE 8

STEAM GENERATOR PRESSURE VS. TIME

(SHEET 1 OF 2)



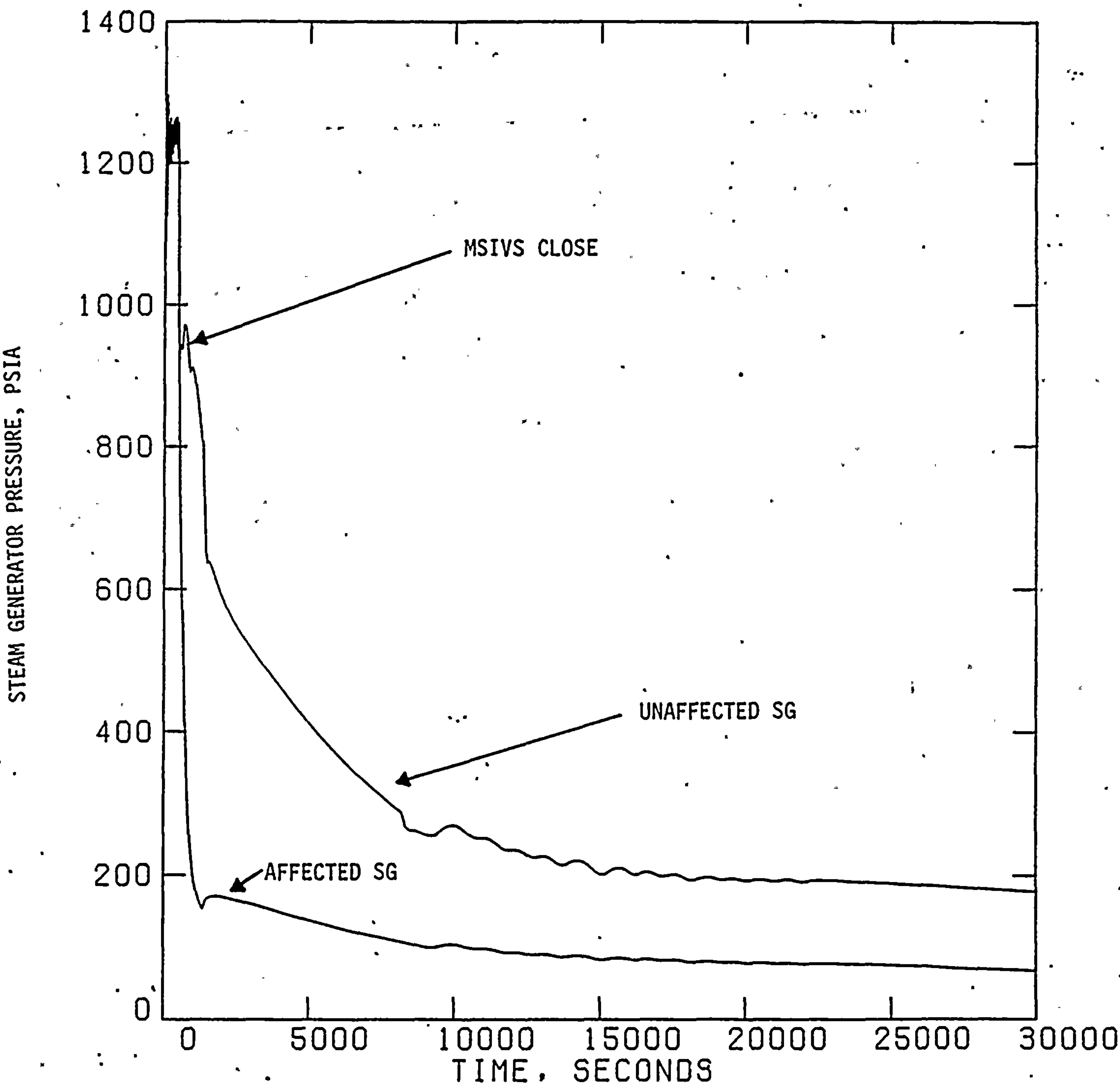
STEAM GENERATOR TUBE RUPTURE WITH LOSS OF OFFSITE POWER AND A FULLY STUCK OPEN ATMOSPHERIC DUMP VALVE (ASSUMING AUXILIARY PZR SPRAY IS INOPERABLE)

Figure 8

STEAM GENERATOR PRESSURE

VS. TIME

(Sheet 2 of 2)

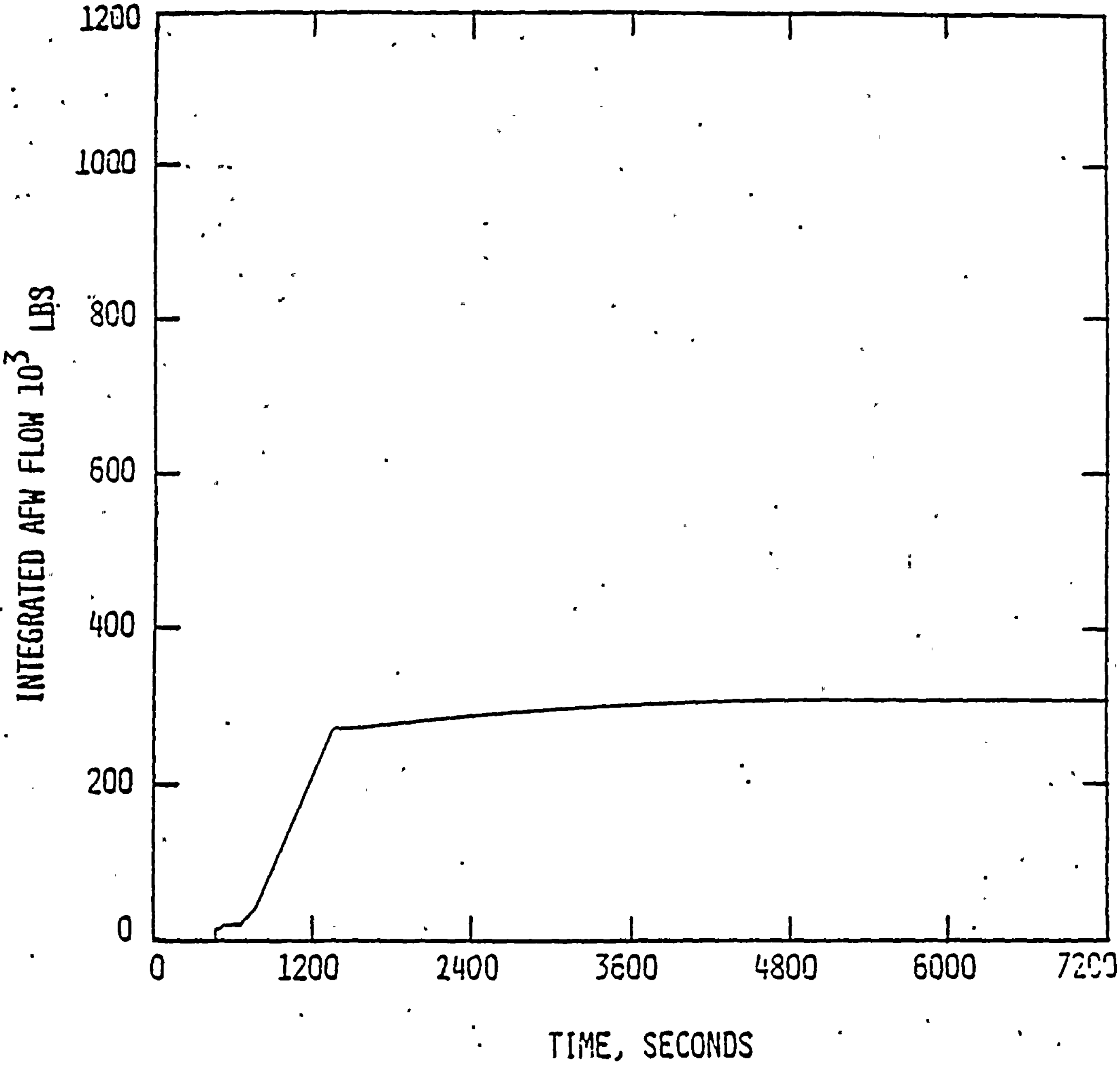


STEAM GENERATOR TUBE RUPTURE WITH LOSS OF OFFSITE POWER AND A FULLY STUCK OPEN ATMOSPHERIC DUMP VALVE (ASSUMING AUXILIARY PZR SPRAY IS INOPERABLE)

FIGURE 9

INTEGRATED AFW FLOW TO AFFECTED SG VS. TIME

(SHEET 1 OF 2)

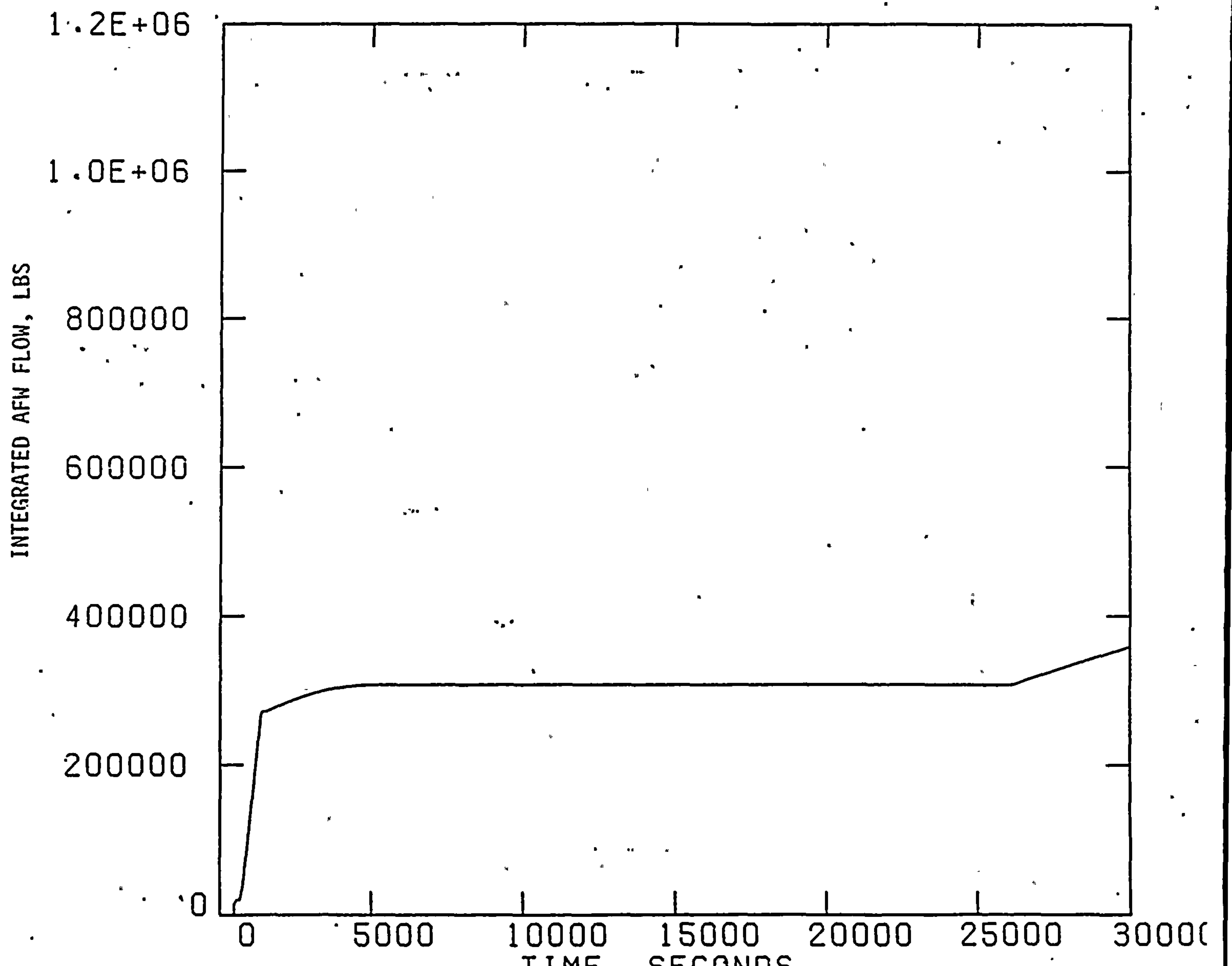


STEAM GENERATOR TUBE RUPTURE
WITH LOSS OF OFFSITE POWER AND
A FULLY STUCK OPEN ATMOSPHERIC
DUMP VALVE (ASSUMING AUXILIARY
PZR SPRAY IS INOPERABLE)

Figure 9

INTEGRATED AFW FLOW TO
AFFECTED STEAM GENERATOR VS. TIME

(Sheet 2 of 2)

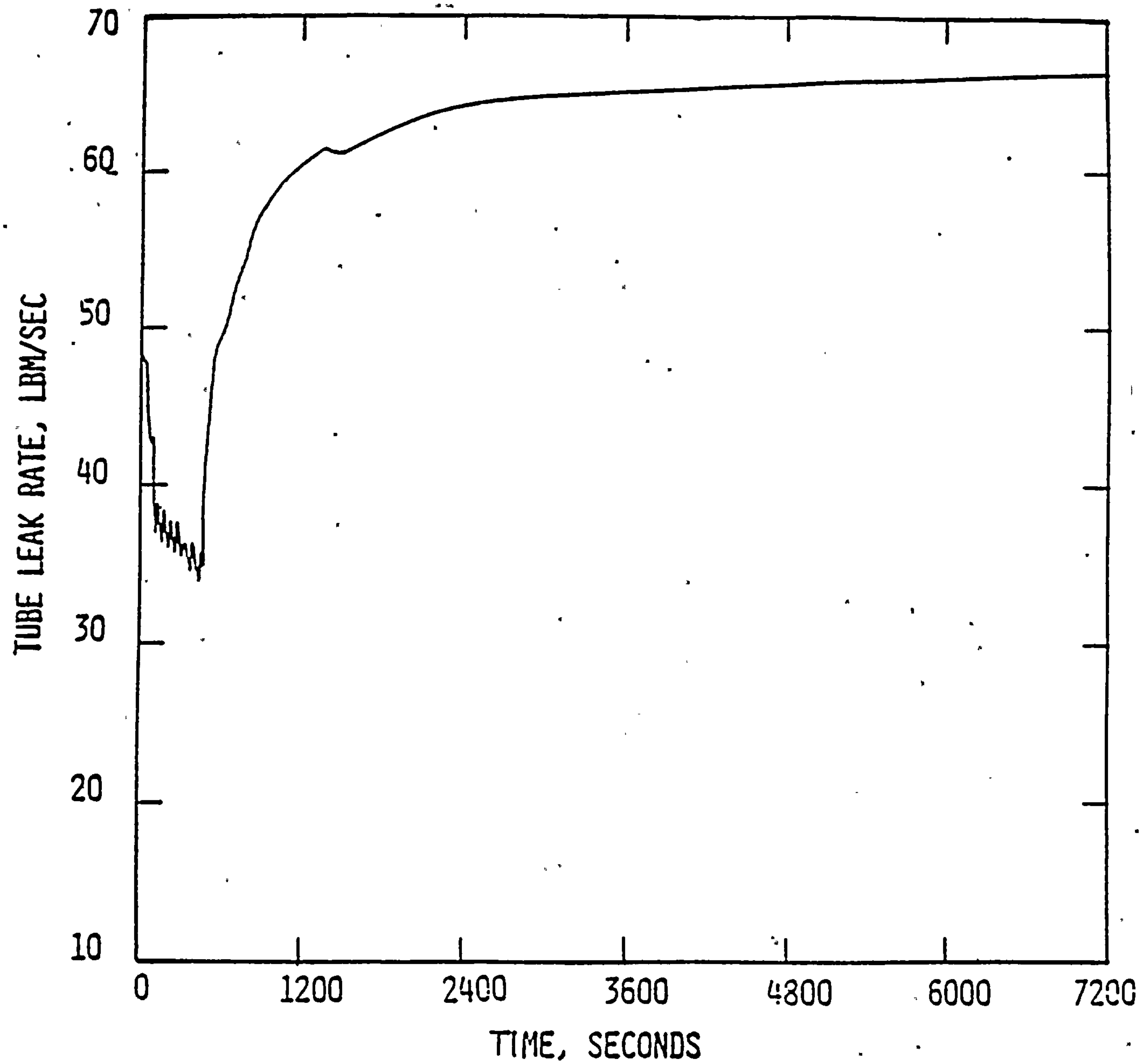


STEAM GENERATOR TUBE RUPTURE WITH LOSS OF OFFSITE POWER AND A FULLY STUCK OPEN ATMOSPHERIC DUMP VALVE (ASSUMING AUXILIARY PZR SPRAY IS INOPERABLE)

FIGURE 10

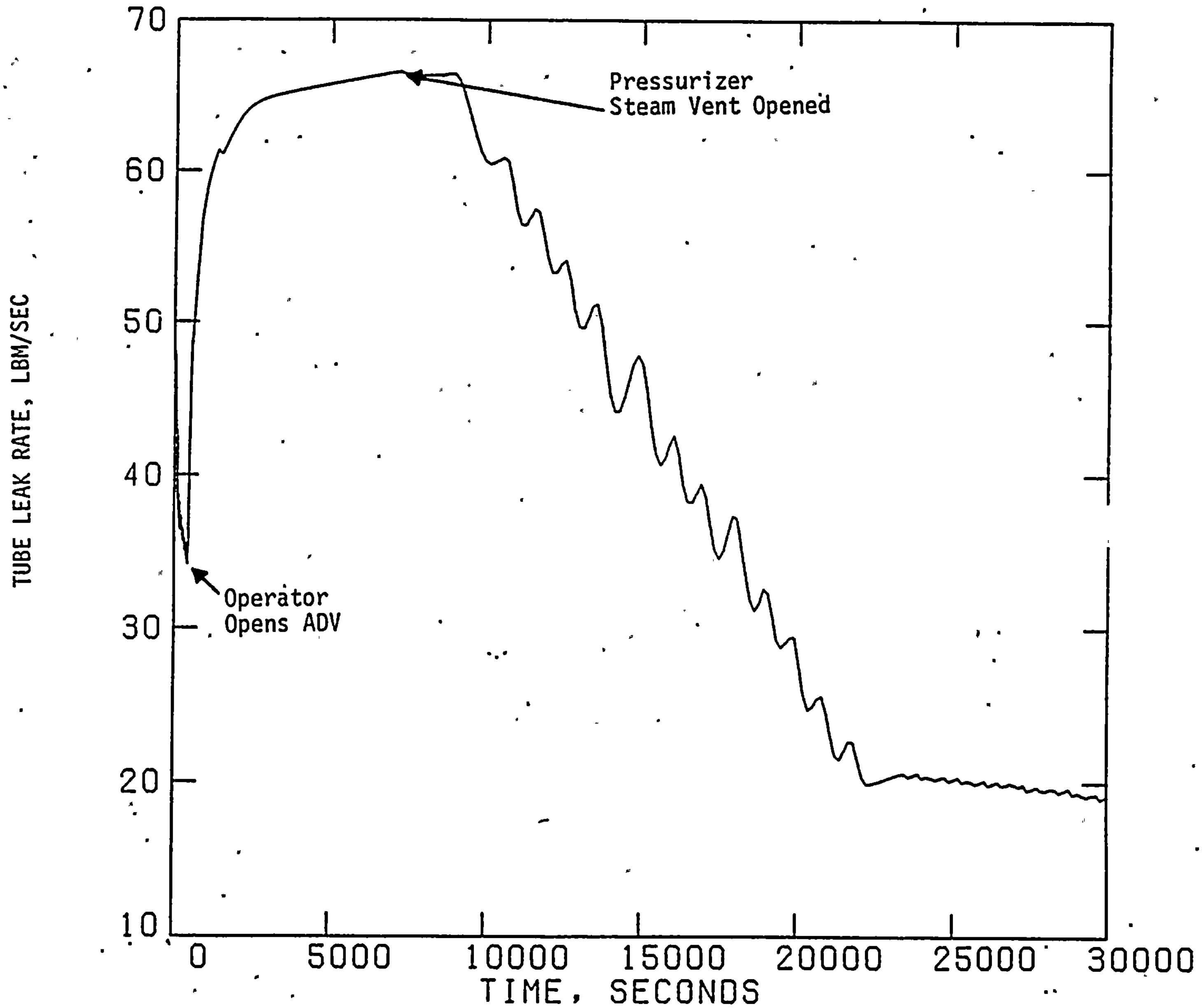
TUBE LEAK RATE VS. TIME

(SHEET 1 OF 2)



STEAM GENERATOR TUBE RUPTURE
WITH LOSS OF OFFSITE POWER AND
A FULLY STUCK OPEN ATMOSPHERIC
DUMP VALVE (ASSUMING AUXILIARY
PZR SPRAY IS INOPERABLE)

Figure 10
TUBE LEAK RATE VS. TIME
(Sheet 2 of 2)

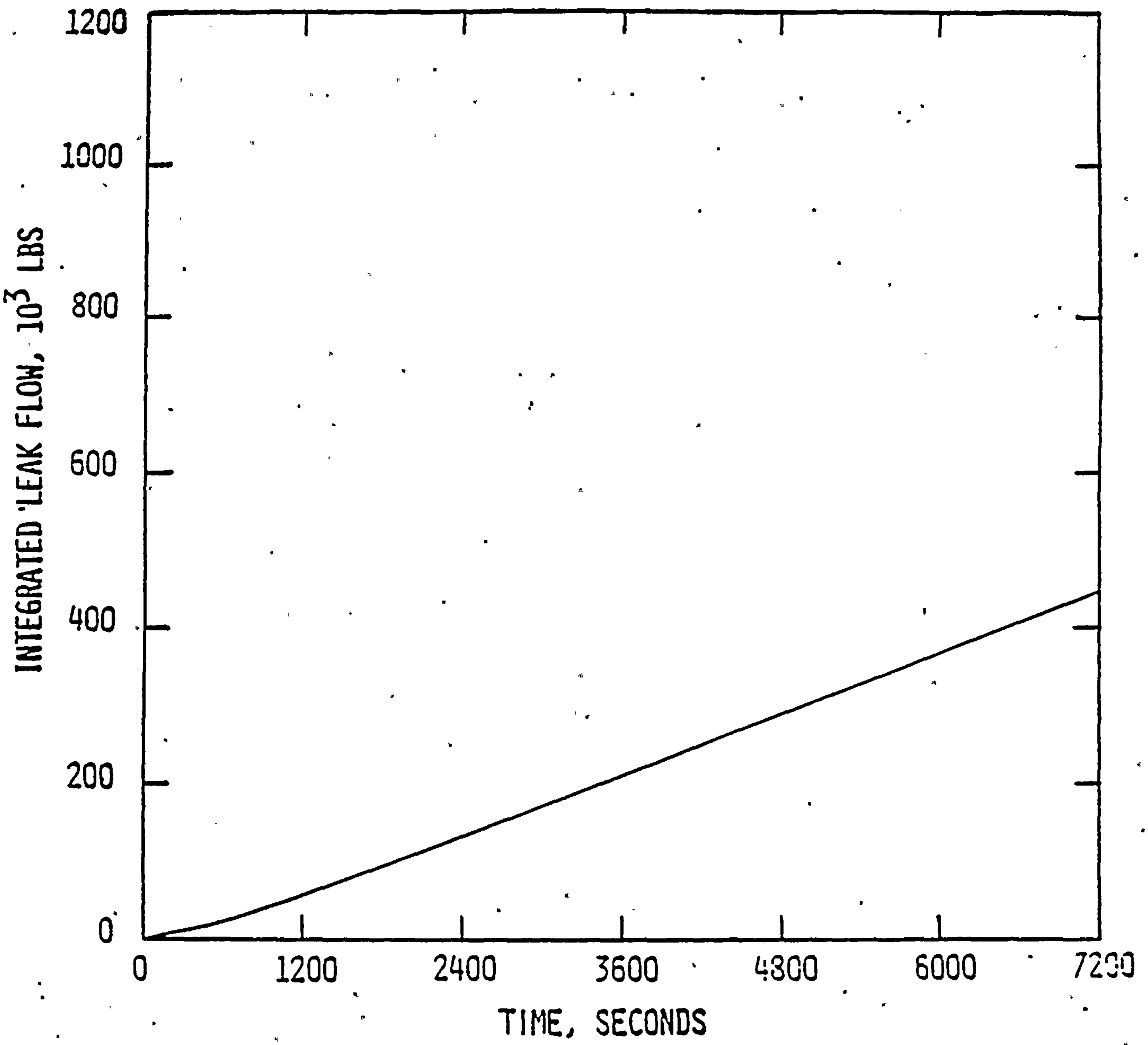


STEAM GENERATOR TUBE RUPTURE
WITH LOSS OF OFFSITE POWER AND
A FULLY STUCK OPEN ATMOSPHERIC
DUMP VALVE (ASSUMING AUXILIARY
PZR SPRAY IS INOPERABLE)

FIGURE 11

INTEGRATED LEAK FLOW VS. TIME

(SHEET 1 OF 2)



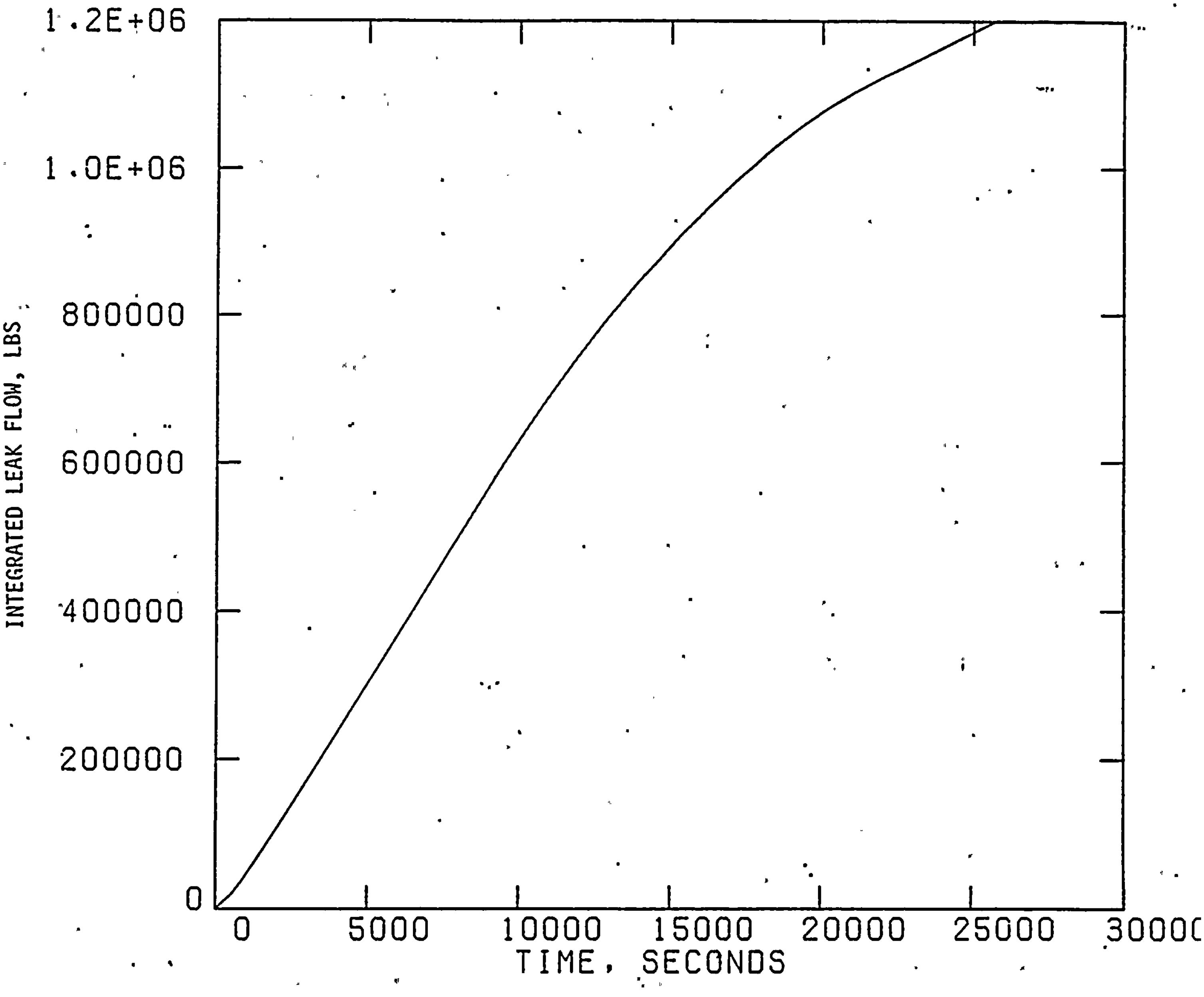
STEAM GENERATOR TUBE RUPTURE WITH LOSS OF OFFSITE POWER AND A FULLY STUCK OPEN ATMOSPHERIC DUMP VALVE (ASSUMING AUXILIARY PZR SPRAY IS INOPERABLE)

Figure 11

INTEGRATED LEAK FLOW

VS. TIME

(Sheet 2 of 2)



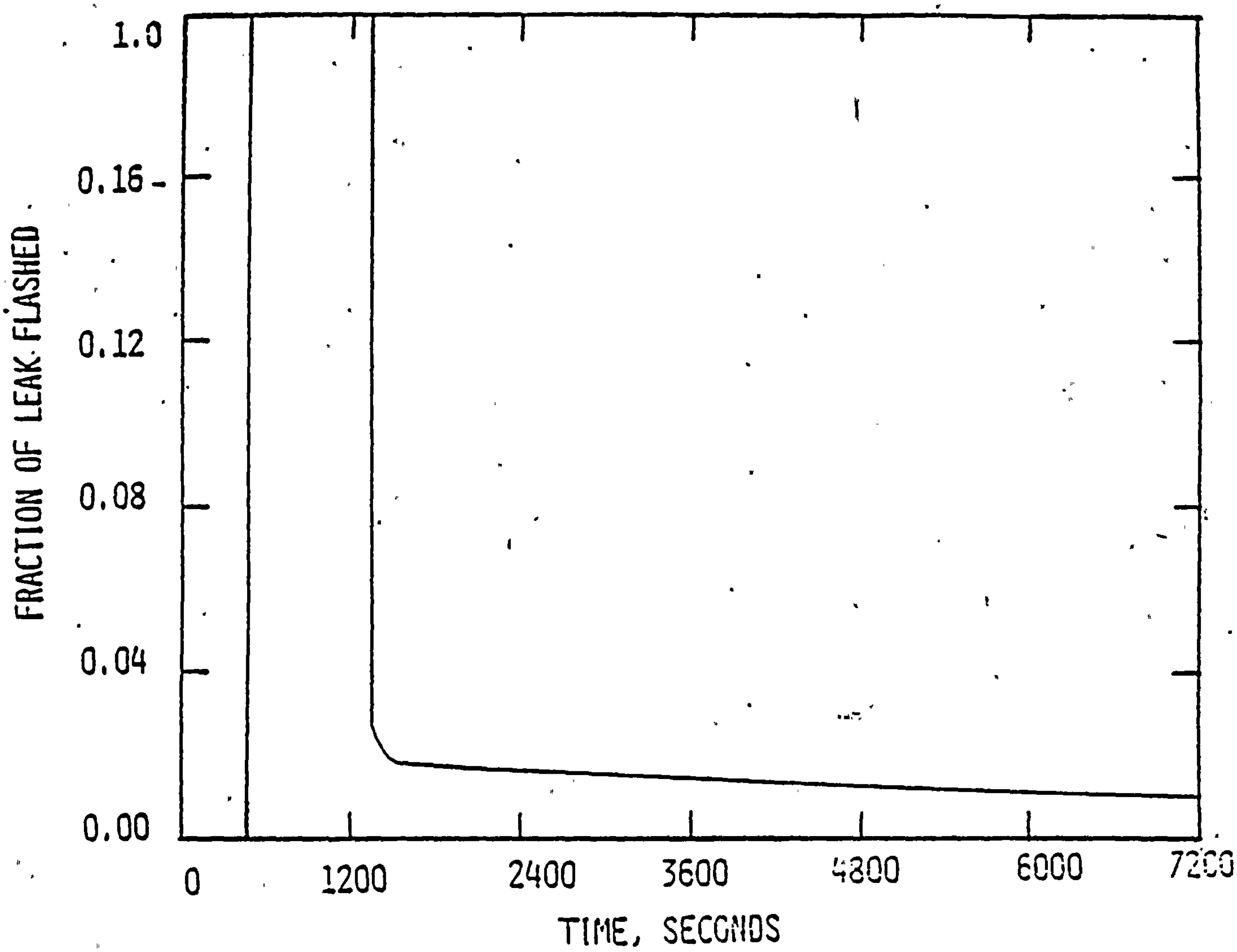
STEAM GENERATOR TUBE RUPTURE WITH LOSS OF OFFSITE POWER AND A FULLY STUCK OPEN ATMOSPHERIC DUMP VALVE (ASSUMING AUXILIARY PZR SPRAY IS INOPERABLE)

FIGURE 12

FRACTION OF LEAKED ACTIVITY

RELEASED IMMEDIATELY VS. TIME

(SHEET 1 of 2)



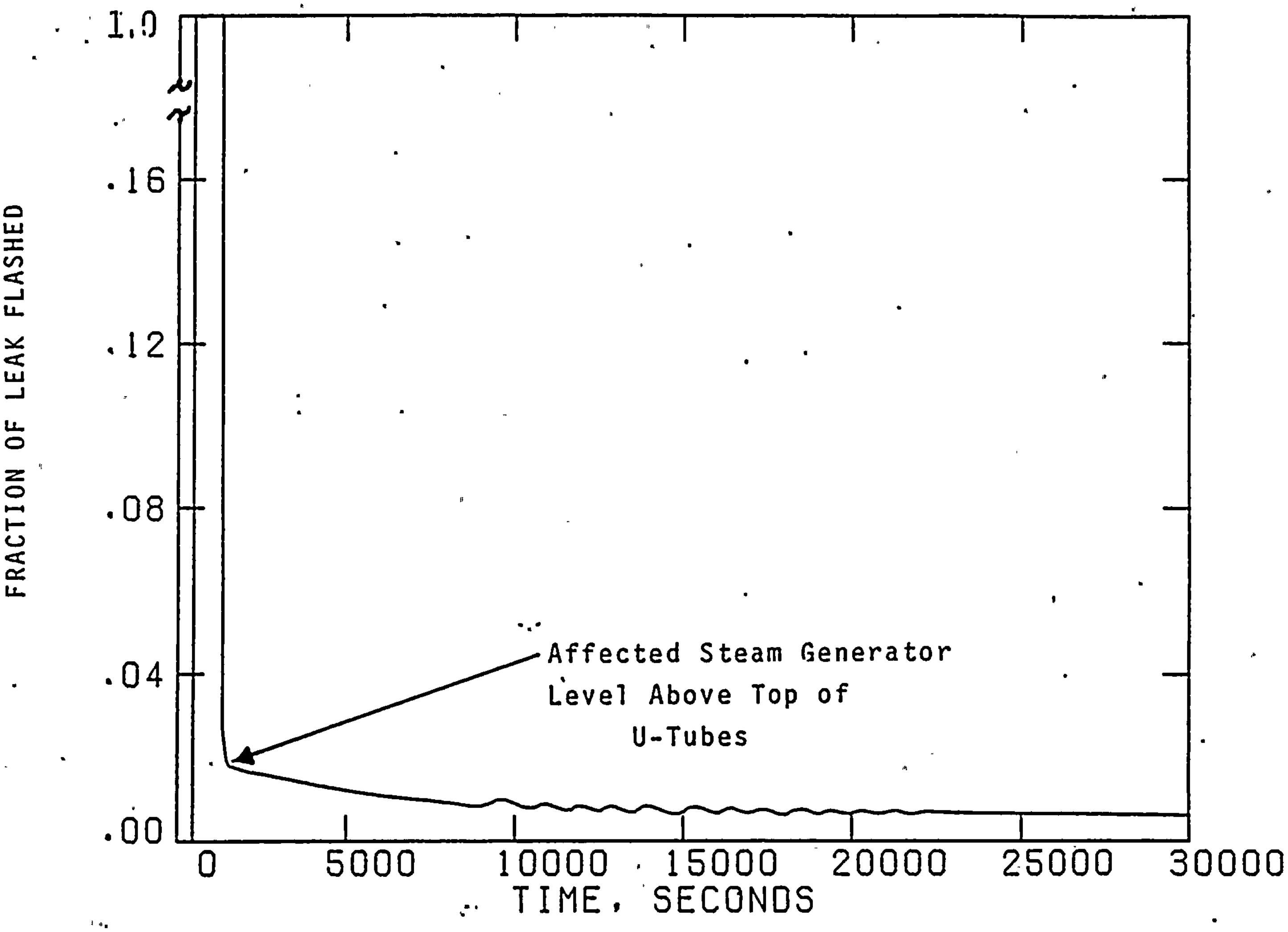
STEAM GENERATOR TUBE RUPTURE
WITH LOSS OF OFFSITE POWER AND
A FULLY STUCK OPEN ATMOSPHERIC
DUMP VALVE (ASSUMING AUXILIARY
PZR SPRAY IS INOPERABLE)

Figure 12

FRACTION OF LEAKED ACTIVITY

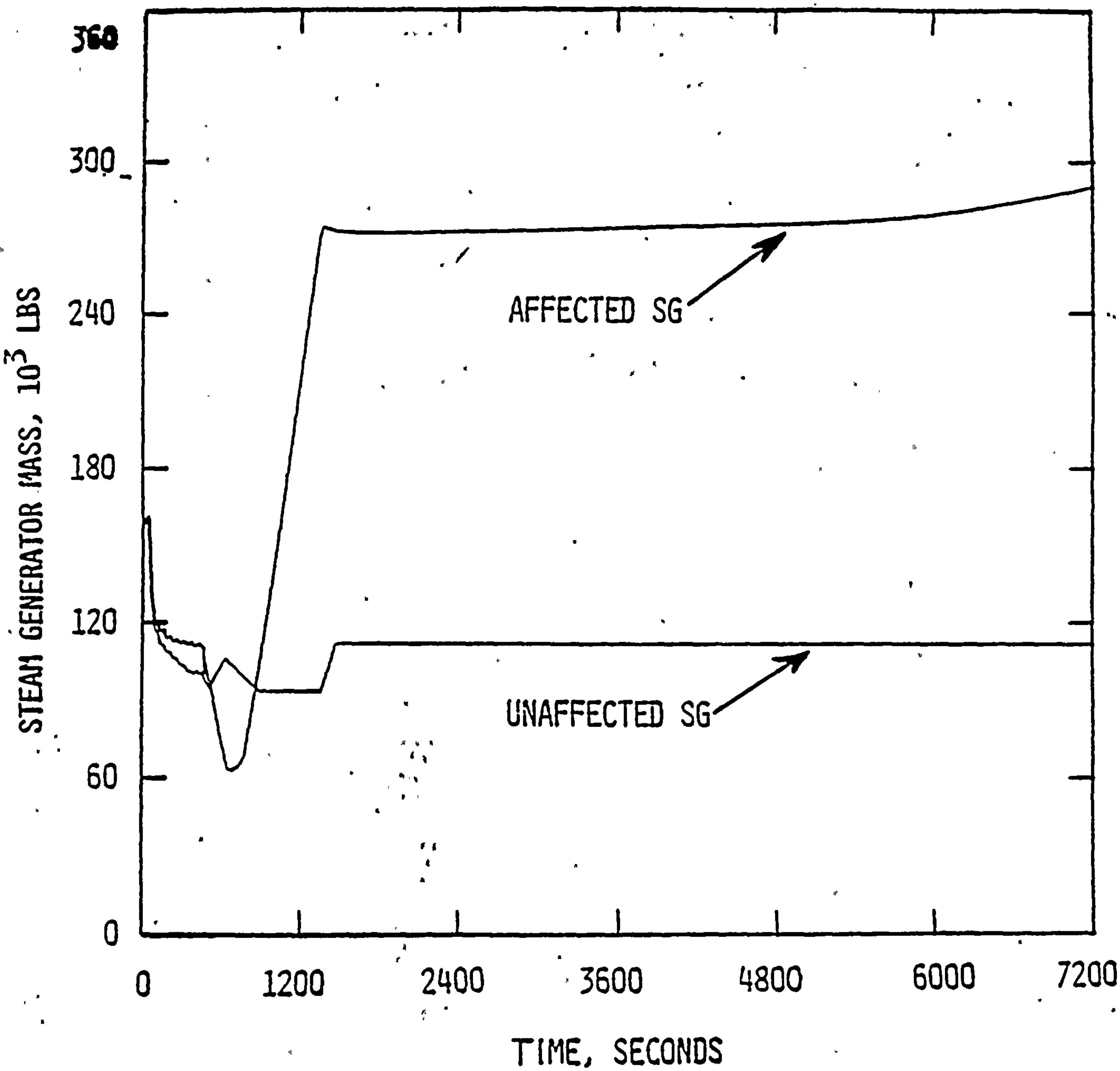
RELEASED IMMEDIATELY VS. TIME

(Sheet 2 of 2)



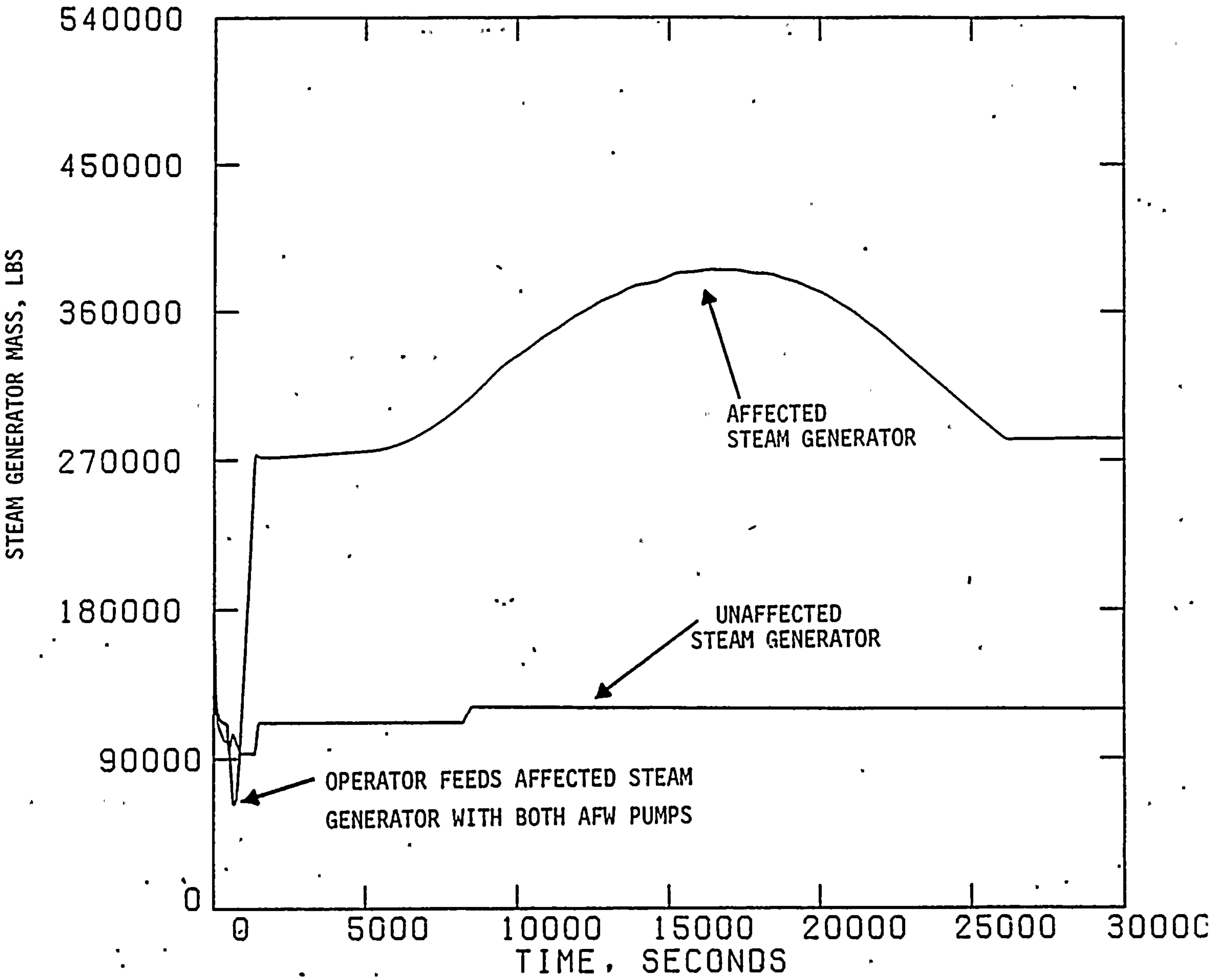
STEAM GENERATOR TUBE RUPTURE
WITH LOSS OF OFFSITE POWER AND
A FULLY STUCK OPEN ATMOSPHERIC
DUMP VALVE (ASSUMING AUXILIARY
PZR SPRAY IS INOPERABLE)

FIGURE 13
STEAM GENERATOR MASS VS. TIME
(SHEET 1 OF 2)



STEAM GENERATOR TUBE RUPTURE
WITH LOSS OF OFFSITE POWER AND
A FULLY STUCK OPEN ATMOSPHERIC
DUMP VALVE (ASSUMING AUXILIARY
PZR SPRAY IS INOPERABLE)

Figure 13
STEAM GENERATOR MASS
VS. TIME
(Sheet 2 of 2)

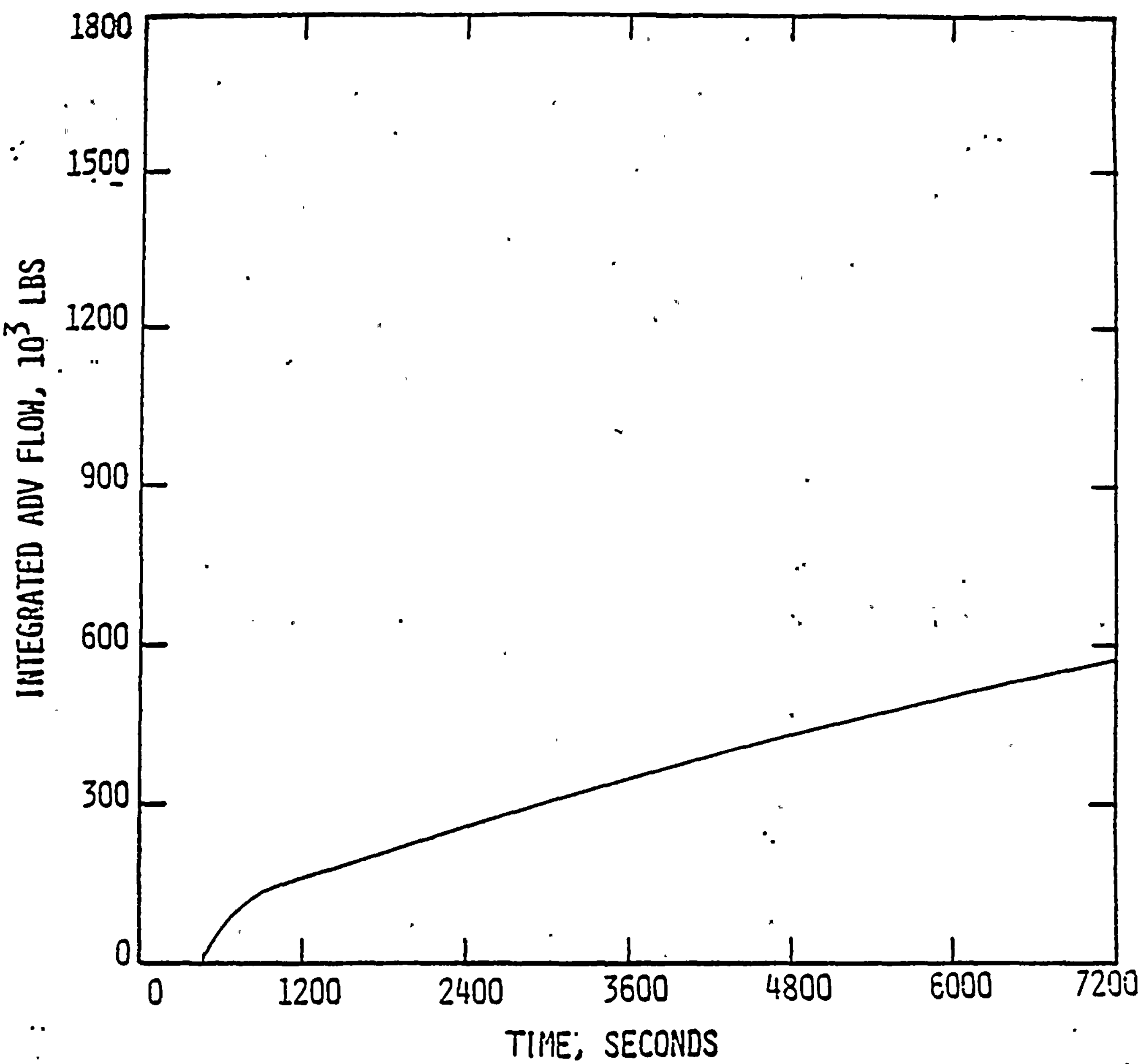


STEAM GENERATOR TUBE RUPTURE
WITH LOSS OF OFFSITE POWER AND
A FULLY STUCK OPEN ATMOSPHERIC
DUMP VALVE (ASSUMING AUXILIARY
PZR SPRAY IS INOPERABLE)

FIGURE 14

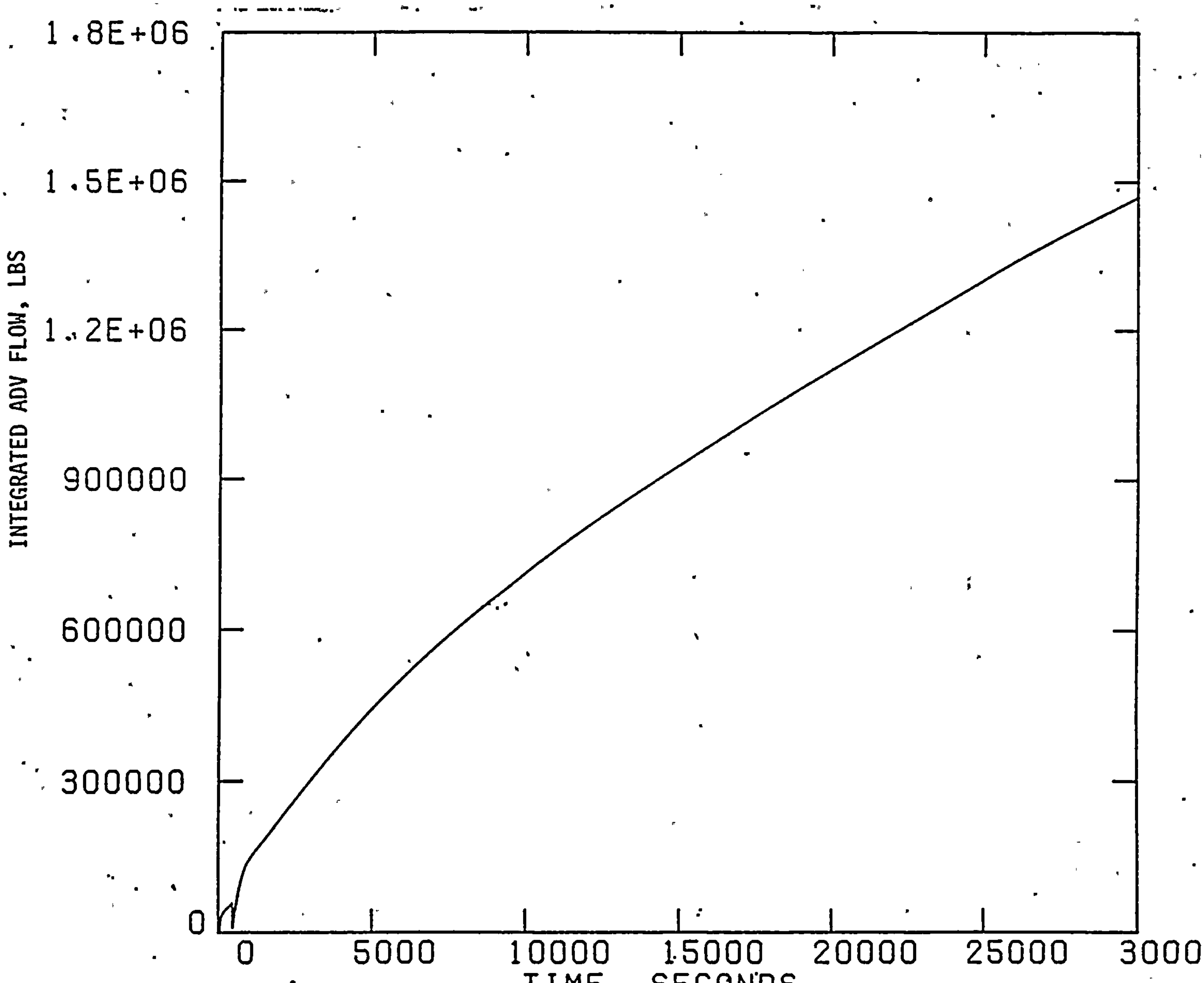
INTEGRATED ADV FLOW VS. TIME

(SHEET 1 OF 2)



STEAM GENERATOR TUBE RUPTURE
WITH LOSS OF OFFSITE POWER AND
A FULLY STUCK OPEN ATMOSPHERIC
DUMP VALVE (ASSUMING AUXILIARY
PZR SPRAY IS INOPERABLE)

Figure 14
INTEGRATED ADV FLOW
VS. TIME
(Sheet 2 of 2)



ATTACHMENT 2

SCHEDULE FOR IMPLEMENTATION OF MODIFICATIONS DESCRIBED IN ANPP-33713, DATED OCTOBER 15, 1985

Three modifications were discussed in detail in Attachment 3 of Reference 1. These modifications can be briefly described as: 1) provide power to Valves CH-501 and CH-536 from a 1E Motor Control Center (MCC), 2) enhanced automatic realignment to the refueling water tank (RWT) and, 3) enhanced volume control tank (VCT) level instrumentation.

The schedule for implementation for all of the modifications for each PVNGS Unit is as follows:

PVNGS Unit 1: Following completion of engineering and procurement, currently in process, implementation will be during the first outage of sufficient duration but not later than the completion of the first refueling outage.

PVNGS Unit 2: Prior to exceeding 5% power.

PVNGS Unit 3: Prior to fuel load.

REFERENCES

(1) Letter to G. W. Knighton, NRC, from E. E. Van Brunt, Jr., ANPP, dated October 15, 1985 (ANPP-33713); Subject: Auxiliary Pressurizer Spray Design

ATTACHMENT 3

ADDITIONAL CONSIDERATIONS TO
ANPP-33713, DATED OCTOBER 15, 1985

In addition to the items already considered in Reference 1, the NRC staff requested that ANPP review four additional areas of concern. The description and results of ANPPs evaluation for each of the items are described below.

Item 1: RWT Level Evaluation

The NRC concern was with respect to the availability of the auxiliary pressurizer spray system (APSS) for the Steam Generator Tube Rupture (SGTR) event as described in Reference 1 (APSS actuation at 7200 seconds into the event). The concern is based on the fact that the charging pumps (which provide flow for the APSS) draw their suction from the high suction nozzle on the refueling water tank (RWT).

Assuming that the RWT level is at its low level alarm setpoint, there would still be 25,000 gallons of water above the high suction nozzle in the RWT when the operator actuates the shutdown cooling system and the auxiliary pressurizer spray system is no longer needed. Even if the RWT level corresponds to the Technical Specification minimum required volume, the RWT level would not drop below the high suction nozzle until after approximately 5-1/2 hours following event initiation. The referenced analysis indicates that the RCS pressure and temperature at this time would be approximately 260 psia and 390^{o}F, respectively. A more aggressive cooldown would allow normal shutdown cooling entrance conditions to be reached within 5-1/2 hours instead of the currently assumed value of 8 hours. In addition, 5-1/2 hours is ample time for the operator to realign the charging pump suction to the lower nozzle on the RWT. Therefore, the RWT has sufficient inventory to satisfy the amount of water required for APSS availability.

Item 2: Verification of Equipment Qualification

The NRC requested that ANPP verify that Valve CH-239 and the heat exchanger CHE-E01 are qualified.

CH-239 - Fisher pneumatically operated valve has been verified to meet the requirements of the mechanical equipment and seismic qualification programs.

- The ASCO solenoid has been verified to meet the requirements of the environmental and seismic qualification programs.

- The NAMCO position switches have been verified to meet the requirements of the environmental and seismic qualification programs.

CHE-E01 - Regenerative heat exchanger has been verified to meet the requirements of the mechanical equipment and seismic qualification programs.

Item 3: Description of Preventative Maintenance (PM) Program and ASME Section XI Testing

The NRC has requested that ANPP provide a description of the PM program performed on the volume control tank (VCT) level instrumentation and the ASME Section XI testing that is performed on Valves CH-239, CH-240 and CH-501. These descriptions are provided below.

PM on The VCT Level Instrumentation

The water level in the reference leg is checked daily. This check consists of connecting a pressurized water source to the reference leg and monitoring the VCT level transmitter output (via a trace from the plant computer) for any change in the VCT indicated level. If the data obtained justifies a less frequent monitoring interval, ANPP will propose a different interval to the NRC staff.

ASME Section XI Testing Program on Valves CH-239, CH-240 and CH-501

These valves will be tested as part of the Section XI valve testing program. These valves will be full stroke tested during cold shutdowns per ASME Section XI Article IWV-3412.

Item 4: Valves CH-532 and CH-524

To ensure a flow path to the APSS, ANPP will lock open Valves CH-524 and CH-532. In addition to locking open CH-524, ANPP will also remove power from the valve. Implementation of these modifications, for each PVNGS Unit, will be performed consistent with the schedule provided in Attachment 2 of this letter.

REFERENCES

(1) Letter to G. W. Knighton, NRC, from E. E. Van Brunt, Jr., ANPP, dated October 15, 1985 (ANPP-33713); Subject: Auxiliary Pressurizer Spray Design

MAR - 3 1986

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DOCKET NO(S). STN 50-528
Mr. E. E. Van Brunt, Jr.
Executive Vice President
Arizona Nuclear Power Project
Post Office Box 52034
Phoenix, Arizona, 85072-2034

SUBJECT: ARIZONA PUBLIC SERVICE COMPANY
PALO VERDE NUCLEAR GENERATING STATION, UNIT 1

The following documents concerning our review of the subject facility are transmitted for your information.

- ☐ Notice of Receipt of Application, dated ______.
- ☐ Draft/Final Environmental Statment, dated ______.
- ☐ Notice of Availability of Draft/Final Environmental Statement, dated ______.
- ☐ Safety Evaluation Report, or Supplement No. ______, dated ______.
- ☐ Notice of Hearing on Application for Construction Permit, dated ______.
- ☐ Notice of Consideration of Issuance of Facility Operating License, dated ______.
- ☒ Bi-Weekly ~~XXXXXX~~ Notice; Applications and Amendments to Operating Licenses Involving no Significant Hazards Considerations, dated 2/12/86 (See page 5282).
- ☐ Application and Safety Analysis Report, Volume ______.
- ☐ Amendment No. ______ to Application/SAR dated ______.
- ☐ Construction Permit No. CPPR- ______, Amendment No. ______ dated ______.
- ☐ Facility Operating License No. ______, Amendment No. ______, dated ______.
- ☐ Order Extending Construction Completion Date, dated ______.
- ☐ Other *(Specify)* ______

Office of Nuclear Reactor Regulation

Enclosures:
As stated

cc: See next page

OFFICE	PBD7						
SURNAME	JLee						
DATE	2/28/86						

NRC FORM 318 (1/84) NRCM 0240

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

MAR 3 1986

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Mr. E. E. Van Brunt, Jr.
Executive Vice President
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☐ Other *(Specify)* ____________

Office of Nuclear Reactor Regulation

Enclosures:
As stated

cc: See next page

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Arizona Nuclear Power Project

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