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EXPERIMENT DATA REPORT FOR LOFT NUCLEAR SMALL BREAK EXPERIMENT L3-7

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ABSTRACT

Uninterpreted experimental data from the third nuclear small break loss-of-coolant experiment (Experiment L3-7) conducted in the Loss-of-Fluid Test facility are presented. Experiment L3-7 simulated a small break (equivalent to a 1-in.-diameter rupture in a commercial plant) in the primary coolant system cold leg. This report presents data from 174 direct measurement devices and 14 computed variables in the form of graphs in engineering units to facilitate the analysis of the system thermal-hydraulic behavior.

NRC FIN No. A6048 - LOFT Experimental Program

SUMMARY

This report presents experimental data from the third nuclear small break loss-of-coolant experiment (Experiment L3-7) conducted in the Loss-of-Fluid Test (LOFT) facility. The data are in an uninterpreted but readily usable form for use by the nuclear community in advance of detailed analysis and interpretation. Experiment L3-7 was performed on June 20, 1980, as part of the LOFT Experimental Program conducted by EG&G Idaho, Inc., for the U.S. Nuclear Regulatory Commission. This experiment is part of the LOFT Small Break Experiment Series L3 which was designed to provide data for investigating the thermal-hydraulic response of the LOFT reactor system to small primary coolant system ruptures. Experiment L3-7 was conducted at 49 ± 1 MW (yielding a maximum linear heat generation rate of 52.8 ± 3.7 kW/m). The objectives of LOFT Small Break Experiment Series L3 are to provide data for code assessment and development and to assist in answering the following questions concerning pressurized water reactor (PWR) system responses to small, primary system ruptures:

1. How does the primary coolant system (PCS) respond during a small break when the high-pressure injection system (HPIS) flow is of the same order of magnitude as the break flow when system pressure stabilizes later in the transient?

2. Can the secondary coolant system (SCS) effectively remove heat from the PCS when the PCS liquid level has dropped low enough to void the primary side of the steam generator?

3. What are the effects of turning off the HPIS injection flow later on in the transient?

4. How effectively do the major systems, such as low-pressure injection system (LPIS), accumulator, HPIS, steam generator, etc., perform to prevent core damage? Do any of these systems appear not to be needed for this particular break size and/or location?

5. What kind of recovery procedures should be used in the event of a small break loss-of-coolant accident (LOCA) and, in particular, which recovery heat transfer mode is most appropriate?

6. Are there key times in the transient when operator action is required to protect the core?

7. From an analysis point of view, are there operator/equipment actions that must not occur?

8. Given a small break occurrence of unknown size and location, are there operator actions that are dependent on the break unknowns that would aid plant recovery in one case and impede plant recovery in another case?

9. Are typical commercial reactor process instruments capable of providing accurate information on plant conditions during a transient? Specifically:

   a. Which instruments furnish relevant data and which do not?

   b. Can the operator use information from typical process instruments to estimate the break size and location?

   c. Can the instruments be arranged in the control room in a manner that would aid in diagnosing and following the transient?

10. Are there any additional measurements that should be provided in the control room? Are there improvements that can be made to typical commercial reactor instrumentation to monitor a small break LOCA?

11. Are there improvements that can be made in commercial plant design to improve the safety of the plant?

12. Are there data processing techniques and data display systems which will augment operator capabilities to diagnose plant status and respond to off-normal conditions?

The primary objectives of Experiment L3-7 are to impose a break flow equal to HPIS flow at an intermediate pressure during the transient, to establish conditions conducive to steam generator reflux cooling, to isolate the break and recover the plant to cold shutdown, and to analyze the data obtained to investigate associated phenomena.

The LOFT integral test facility has been designed to simulate the major components and system responses of a commercial, four-loop PWR [∼1000 MW(e)] during a LOCA. The LOFT facility consists of

1. A reactor vessel with a nuclear core (Core 1)

2. An intact loop with active steam generator, pressurizer, and two primary coolant pumps connected in parallel

3. A broken loop with simulated pump, simulated steam generator, and two quick-opening blowdown valve assemblies

4. A blowdown suppression system consisting of a header, suppression tank, and a spray system

5. An emergency core coolant (ECC) injection system consisting of two LPIS pumps, two HPIS pumps, and two accumulators.

For the performance of Experiment L3-7, the LOFT system was assembled to represent a postulated small break, equivalent to a 1-in.-diameter rupture, in the cold leg of a commercial PWR and establish conditions conducive to reflux cooling in the primary side of the steam generator.

Experiment L3-7 was initiated from PCS initial conditions of: hot leg temperature, 576.1 ± 0.5 K; cold leg temperature, 556 ± 3 K; hot leg pressure, 14.90 ± 0.25 MPa; and intact loop flow rate, 481.3 ± 6.3 kg/s. The pre-blowdown power level was 49 ± 1 MW, with a maximum linear heat generation rate of 52.8 ± 3.7 kW/m. Scaled ECC was directed into the intact loop cold leg injection line through use of an accumulator and a HPIS pump.

Steam generator feed and bleed was used to reduce primary system pressure to the residual heat removal initiation pressure for typical large PWRs (≈2.5 MPa). Purification system recirculation flow simulated a residual heat removal system during Experiment L3-7.

Experiment L3-7 appeared to satisfy the specified objectives. This report presents data from 174 direct measurement devices in the form of graphs in engineering (standard international) units. In conjunction with data obtained from direct measurement, 14 chosen computed variables are included to facilitate the analysis of the system thermal-hydraulic behavior.

ACKNOWLEDGMENTS

Appreciation is expressed to the Data Systems Branch, particularly to J. B. Marlow for preparation of the data plots. Appreciation is also expressed to the LOFT Data Analysis Branch, particularly S. A. Ploger and R. H. Averill for uncertainty analysis and instrument calibration, respectively. Special appreciation is expressed to G. Hammer for the technical editing.

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SHORT-TERM PLOTS
(-400 up to 2000 s)

MEDIUM-TERM PLOTS
(0 to 7500 s)

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ACRONYMS

BST	Blowdown suppression tank
BWST	Borated water storage tank
DAVDS	Data acquisition and visual display system
DTT	Drag disc turbine transducer
ECC	Emergency core cooling or coolant
ECCS	Emergency core cooling system
ESF	Engineered safety features
FM	Frequency modulation
HPIS	High-pressure injection system
LOCA	Loss-of-coolant accident
LOCE	Loss-of-coolant experiment
LOFT	Loss-of-Fluid Test
LPIS	Low-pressure injection system
PCP	Primary coolant pump
PCS	Primary coolant system
PNA	Pulsed neutron activation system
PORV	Power operated relief valve
PWR	Pressurized water reactor
QOBV	Quick-opening blowdown valve
RABV	Reflood assist bypass valve
RV	Reactor vessel
SCS	Secondary coolant system
SG	Steam generator
TIP	Traversing in-core probe
TTF	Transit time flowmeter
XRO	Orifice

EXPERIMENT DATA REPORT FOR LOFT NUCLEAR SMALL BREAK EXPERIMENT L3-7

1. INTRODUCTION

This report presents data from Experiment L3-7, which was conducted in the Loss-of-Fluid Test (LOFT) facility on June 20, 1980. The LOFT facility includes a 50 MW(t) pressurized water reactor (PWR) with instrumentation to measure and provide data on the thermal-hydraulic conditions throughout the system. Operation of the LOFT system is typical of a large [~1000 MW(e)] commercial PWR. Experiment L3-7 is the third nuclear experiment performed as part of LOFT Small Break Experiment Series L3 and simulated a 1-in.-diameter break in the cold leg of a four-loop, commercial PWR.

Experiment L3-7 was planned and supervised by the LOFT Experimental Program. The LOFT Experimental Program is one of several water reactor research experimental programs conducted by EG&G Idaho, Inc., for the U.S. Nuclear Regulatory Commission and administered by the U.S. Department of Energy at the Idaho National Engineering Laboratory.

The data presented in this report are from 174 of the 588 instruments that provided data during Experiment L3-7. Only the data considered pertinent to the understanding of this experiment are presented. The data are in an uninterpreted but readily usable form for use by the nuclear community in advance of detailed analysis and interpretation. The data, in the form of graphs in engineering units, have been analyzed only to the extent necessary to ensure that they are reasonable and consistent.

Section 1.1 of this introduction states the LOFT Experimental Program objectives. Section 1.2 states the Experiment Series L3 objectives. Section 1.3 presents the Experiment L3-7 objectives and briefly describes the experiment conditions and operation. Section 2 of this report briefly describes the LOFT system configuration. Section 3 discusses the LOFT instrumentation system and the methods of obtaining certain measurements. Section 4 summarizes Experiment L3-7 initial conditions and experimental procedure. Section 5 presents the data with supporting information for data interpretation. Appendix A discusses the methods used to verify the consistency and accuracy of the data. Appendix B contains a complete list of instruments available for use in Experiment L3-7.

1.1 LOFT Experimental Program Objectives

The LOFT integral[a] test facility was designed to simulate the major components of a four-loop, commercial PWR, thereby producing data on the thermal, hydraulic, nuclear, and structural processes expected to occur during a LOCA in a PWR. Reference 1 describes the LOFT facility in detail. The specific objectives of the LOFT Experimental Program are to:

1. Provide data required to evaluate the adequacy of and to improve the analytical methods currently used to predict the response of large PWRs to postulated accident conditions, the performance of engineered safety features (ESF) with particular emphasis on emergency core cooling system (ECCS), and the quantitative margins of safety inherent in the performance of the ESF.

2. Identify and investigate any unexpected event(s) or threshold(s) in the response of either the plant or the ESF and develop analytical techniques that adequately describe and account for the unexpected behavior(s).

a. The term "integral" is used to describe an experiment combining the nuclear, thermal, hydraulic, and structural processes occurring during a loss-of-coolant accident (LOCA) as distinguished from separate effects, nonnuclear, small-scale, and thermal-hydraulic experiments conducted for loss-of-coolant analyses.

3. Evaluate and develop methods to prepare, operate, and recover systems and plant for and from reactor accident conditions.

4. Identify and investigate methods by which reactor safety can be enhanced, with emphasis on the interaction of the operator with the plant.

1.2 Experiment Series L3 Objectives

LOFT Small Break Experiment Series L3 was designed to provide large-scale blowdown system data for a PWR small break transient. Parameters varied for nuclear Experiment Series L3 include break size and location, primary coolant pump operation, and recovery procedures.

The objectives of LOFT Small Break Experiment Series L3 are to provide data for code assessment and development and to assist in answering the following questions concerning PWR system responses to small, primary system ruptures:

1. How does the primary coolant system (PCS) respond during a small break when the high-pressure injection system (HPIS) flow is of the same order of magnitude as the break flow when system pressure stabilizes later in the transient?

2. Can the secondary coolant system (SCS) effectively remove heat from the PCS when the PCS liquid level has dropped low enough to void the primary side of the steam generator?

3. What are the effects of turning off the HPIS injection flow later on in the transient?

4. How effectively do the major systems, such as low-pressure injection system (LPIS), accumulator, HPIS, steam generator, etc., perform to prevent core damage? Do any of these systems appear not to be needed for this particular break size and/or location?

5. What kind of recovery procedures should be used in the event of a small break LOCA and, in particular, which recovery heat transfer mode is most appropriate?

6. Are there key times in the transient when operator action is required to protect the core?

7. From an analysis point of view, are there operator/equipment actions that must not occur?

8. Given a small break occurrence of unknown size and location, are there operator actions that are dependent on the break unknowns that would aid plant recovery in one case and impede plant recovery in another case?

9. Are typical commercial reactor process instruments capable of providing accurate information on plant conditions during a transient? Specifically:

   a. Which instruments furnish relevant data and which do not?

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   c. Can the instruments be arranged in the control room in a manner that would aid in diagnosing and following the transient?

10. Are there any additional measurements that should be provided in the control room? Are there improvements that can be made to typical commercial reactor instrumentation to monitor a small break LOCA?

11. Are there improvements that can be made in commercial plant design to improve the safety of the plant?

12. Are there data processing techniques and data display systems which will augment operator capabilities to diagnose plant status and respond to off-normal conditions?

1.3 Experiment L3-7 Objectives and Brief Description

The primary objectives of Experiment L3-7 are to impose a break flow equal to HPIS flow at an intermediate pressure during the transient, to establish conditions conducive to steam generator reflux cooling, to isolate the break and recover the plant to cold shutdown, and to analyze the data obtained to investigate associated phenomena. Experiment L3-7 simulated a small break (1-in. diameter) in the cold leg of a four-loop, commercial PWR with the break flow approximately equal to the HPIS flow at a pressure lower than the HPIS initiation pressure (13.16 ± 0.19 MPa) but greater than the accumulator initiation pressure (4.22 ± 0.17 MPa). At the time of experiment initiation, the LOFT reactor was operating (a) at a maximum linear heat generation rate of 52.8 ± 3.7 kW/m and a power of 49 ± 1 MW, which is about 98% of the LOFT rated power of 50 MW, and (b) at temperatures and pressure in the PCS intact loop of 576.1 ± 0.5 and 556 ± 3 K in the hot and cold legs, respectively, and 14.90 ± 0.25 MPa in the hot leg. The reactor was operated sufficiently long to establish a decay heat level at 1 h into the transient corresponding to 40 h of full-power operation.

2. SYSTEM CONFIGURATION

The LOFT facility[1] has been designed to simulate the major components and system responses of a commercial PWR during a LOCA. The experimental assembly comprises five major subsystems which have been instrumented such that system variables can be measured and recorded during a loss-of-coolant experiment (LOCE). The subsystems include: (a) the reactor vessel, (b) the intact loop, (c) the broken loop, (d) the blowdown suppression system, and (e) the ECCS. The LOFT major components are shown in Figure 2-1, and the LOFT piping configuration is shown in Figure 2-2.

The LOFT reactor vessel, which simulates the reactor vessel of a commercial PWR, has an annular downcomer, a lower plenum, lower core support plates, a nuclear core, and an upper plenum. The downcomer is connected to the cold legs of the intact and broken loops and contains two instrument stalks. The upper plenum is connected to the hot legs of the intact and broken loops. The core contains 1300 unpressurized nuclear fuel rods arranged in five square (15 x 15 assemblies) and four triangular (corner) fuel modules, shown in Figure 2-3 and described in Reference 2. The center assembly is highly instrumented. Two of the corner and one of the square fuel modules are not instrumented. The fuel rods have an active length of 1.67 m and an outside diameter of 10.72 mm.

The fuel consists of UO_2 sintered pellets with an average enrichment of 4.0 wt% fissile uranium (^{235}U) and with a density that is 93% of theoretical density. Fuel pellet diameter and length are 9.29 and 15.24 mm, respectively. Both ends of the pellets are dished with the total dish volume equal to 2% of the pellet volume. Cladding material is zircaloy-4. Cladding inside and outside diameters are 9.48 and 10.72 mm, respectively.

The intact loop simulates the three unbroken loops of a commercial, four-loop PWR and contains a steam generator, two primary coolant pumps in parallel, a pressurizer, a venturi flowmeter, and connecting piping.

The broken loop consists of a hot leg and a cold leg that are connected to the reactor vessel and the blowdown suppression tank (BST) header. Each leg consists of a break plane orifice, a quick-opening blowdown valve (QOBV), a recirculation line, an isolation valve, and connecting piping. The recirculation lines establish a small flow from the broken loop to the intact loop to maintain approximately equal loop temperatures. The hot leg valves (QOBV and isolation) remained closed and the recirculation lines were isolated during the experiment.

The broken loop hot leg also contains a simulated steam generator and a simulated pump. These simulators have hydraulic orifice plate assemblies that provide passive resistances to flow that are similar to the flow resistances in an active steam generator and a pump.

The blowdown suppression system is comprised of the BST header, the BST, the nitrogen pressurization system, and the BST spray system. The blowdown header is connected to the suppression tank downcomers that extend inside the tank and discharge below the water level. The nitrogen pressurization system is supplied by the LOFT inert gas system and uses a remote controlled pressure regulator to establish and maintain the specified BST initial pressure. The spray system consists of a centrifugal pump that discharges through a heatup heat exchanger and any of three spray headers or a pump recirculation line that contains a cooldown heat exchanger. The spray pump suction can be aligned to either the BST or the borated water storage tank (BWST). The three spray headers have flow rate capacities of 1.3, 3.8, and 13.9 L/s, respectively, and are located in the BST along the upper centerline. For Experiment L3-7, the BST spray pump suction was connected to the BST so that no heat was added or removed from the fluid.

The LOFT ECCS simulates the ECCS of a commercial PWR. The accumulator and the HPIS were used during Experiment L3-7. Each system was arranged to inject scaled flow rates of emergency core coolant (ECC) directly into the PCS intact loop cold leg. HPIS Pump A and Accumulator A started injecting ECC at predetermined PCS pressures of 13.16 ± 0.19 and 4.22 ± 0.17 MPa, respectively. During plant recovery, the purification system was used to simulate the residual heat removal system of a large commercial PWR.

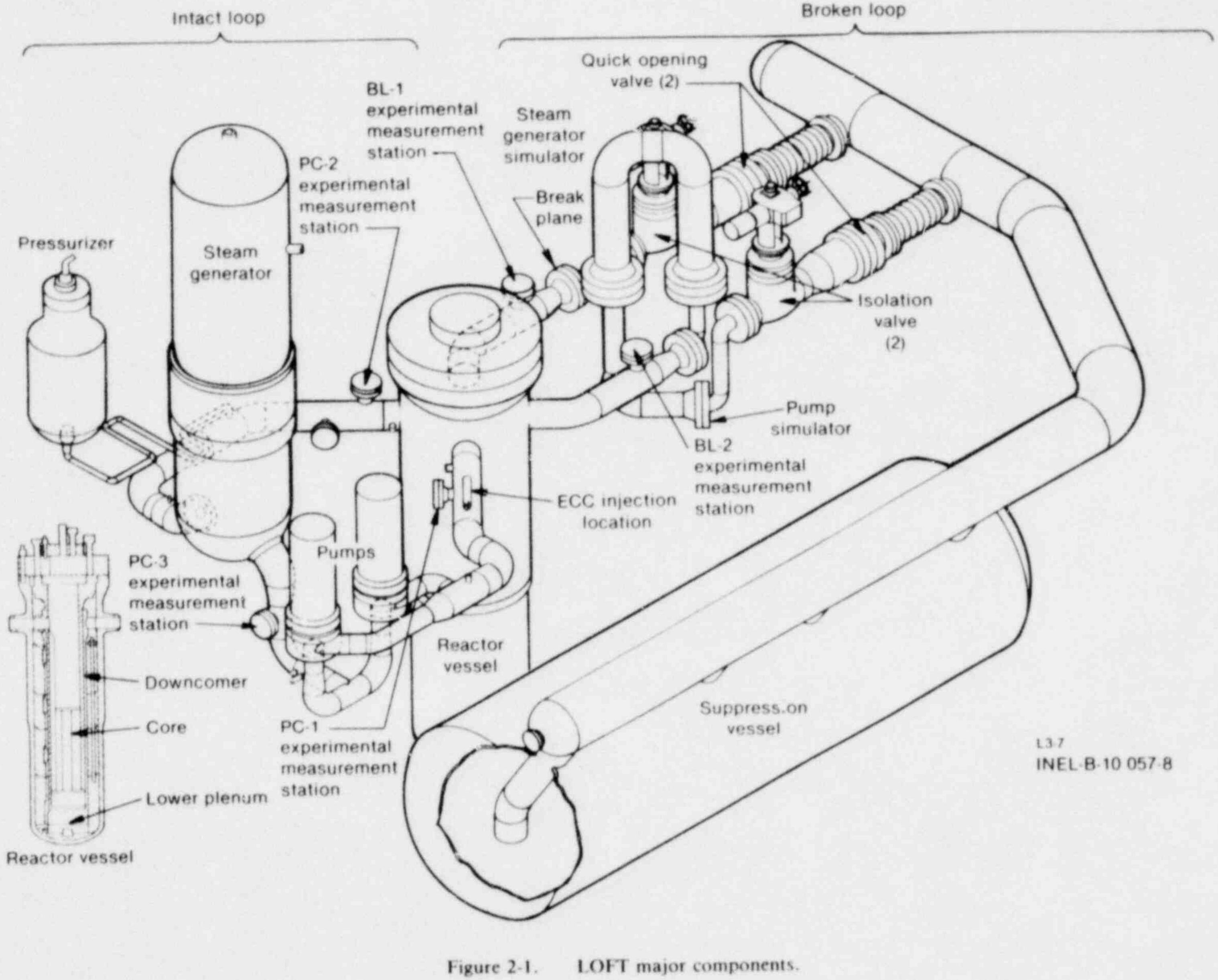


Figure 2-1. LOFT major components.

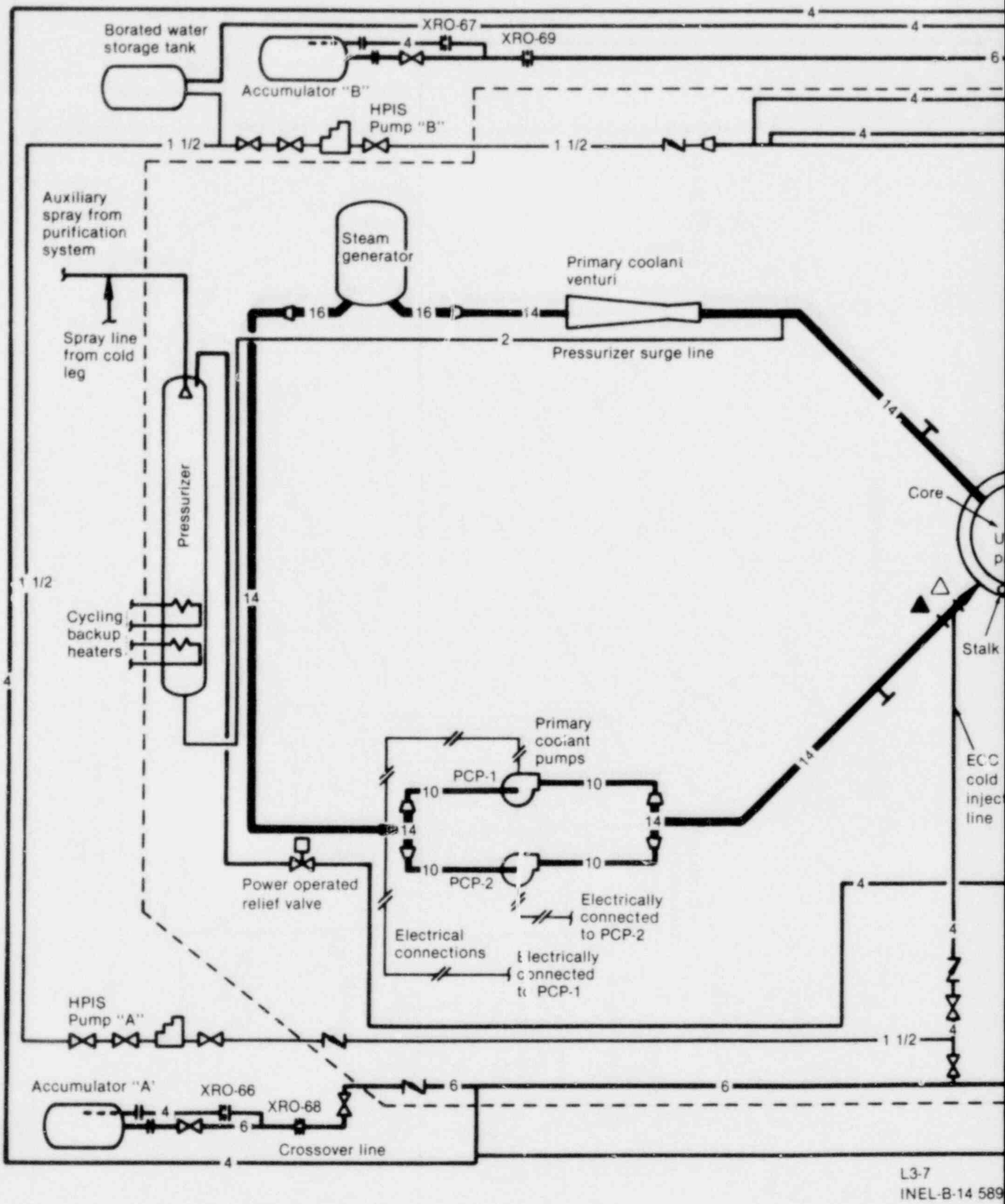
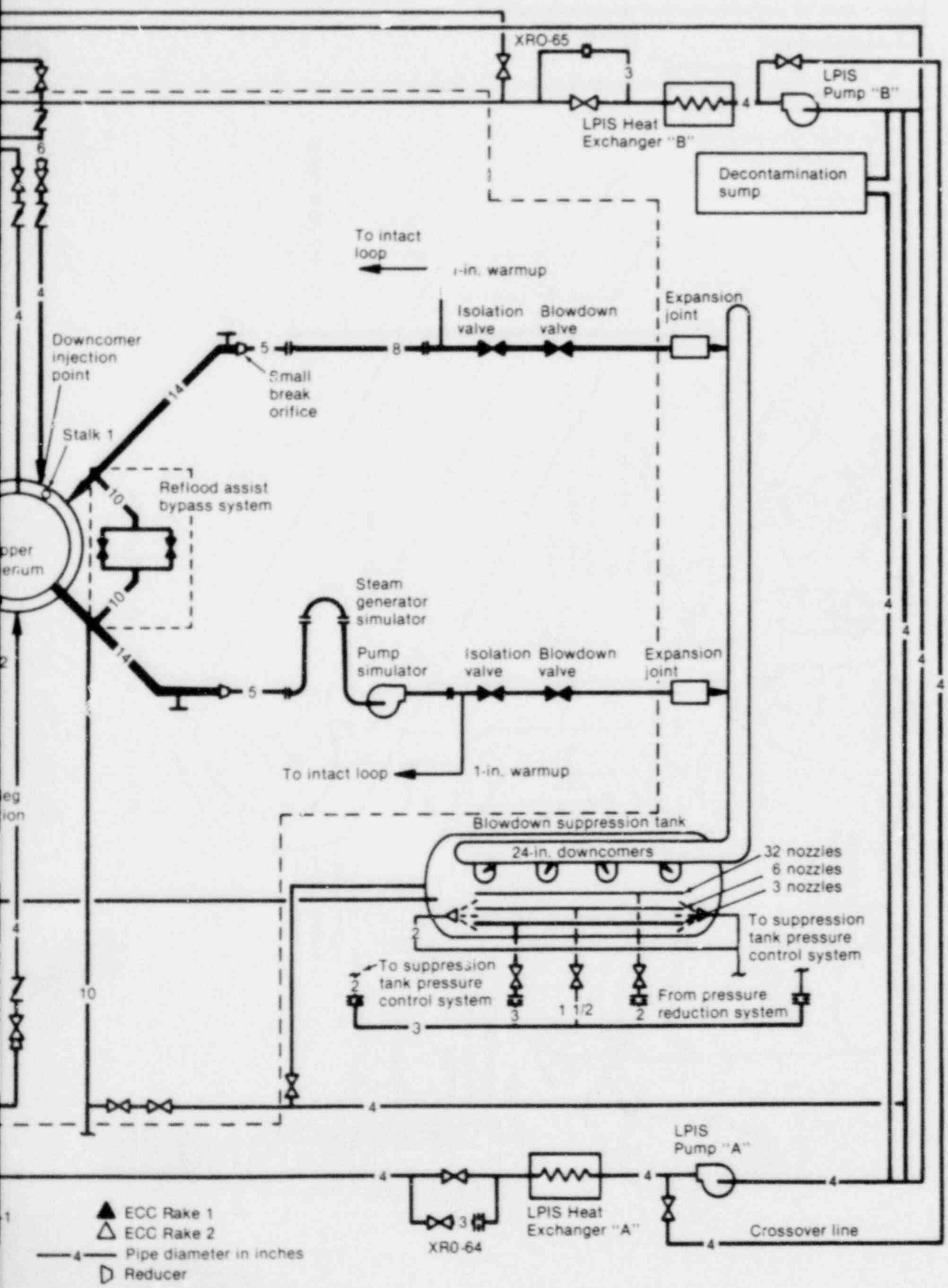


Figure 2-2. LOFT p



ping schematic.

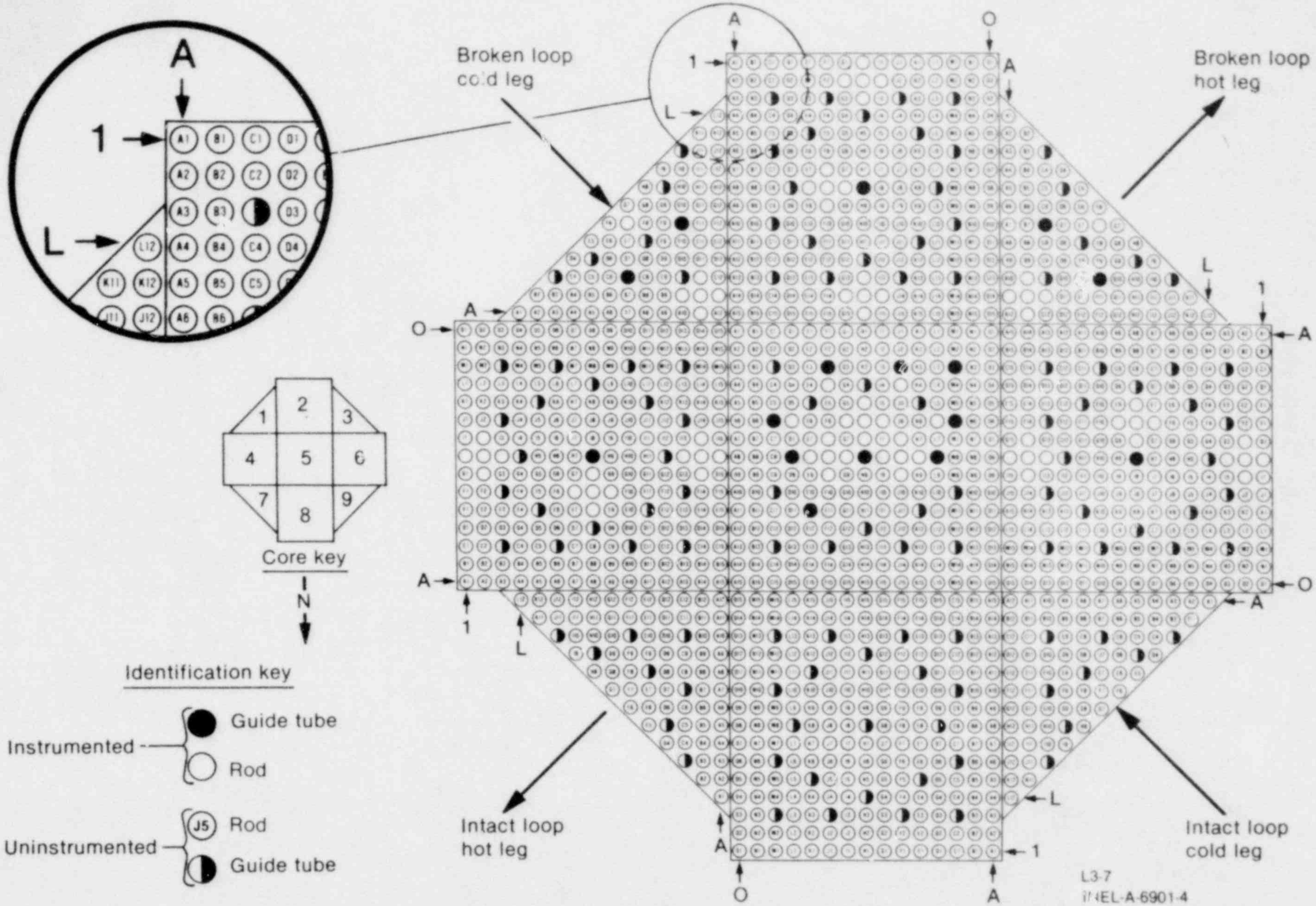


Figure 2-3. LOFT Core 1 configuration showing rod designations.

3. MEASUREMENTS AND INSTRUMENTATION

The LOFT instrumentation system was designed to measure and record the important parameters and events that occur during an experiment.

Temperatures at all major locations in the system were obtained from thermocouples and resistance temperature detectors.

Pressure measurements were obtained with strain-gage transducers with pressure transmission lines connecting the transducers to the measurement points.

Differential pressures were measured by strain-gage and balanced beam transducers with double chambers. The transducers were externally located and connected to the measurement points with pressure transmission lines.

Flow velocity was measured by three types of instruments:

1. A pulsed neutron activation (PNA) system located in the intact loop hot leg computed velocity by measuring the time required for an activated slug of coolant to traverse the distance between the neutron sources and the detectors, arranged as shown in Figure 3-1.

2. A transit time flowmeter in the broken loop cold leg determined velocity using cross correlation techniques on the time difference between two fast-response, matched thermocouples. These thermocouples are located a given distance apart in the fluid flow and sense the same local thermal disturbance.

3. Turbine flowmeters measured the velocity directly.

Momentum flux was measured by drag discs. The data presented for fluid velocity (from the turbine flowmeters) and momentum flux are based on the following flow areas at the instrument locations:

Instrument	Flow Area (m^2)
ME-2ST-1	0.141
FE-5UP-1, ME-1UP-1, ME-3UP-1, and ME-5UP-1	0.125
FE-PC-2A, -2B, and -2C, and ME-PC-2A, -2B, and -2C	0.0634

Fluid density was measured by gamma densitometers, each of which consists of a source and several detectors. Three detectors (A, B, and C shown in Figure 3-2) are aligned with collimated gamma ray beams passing through the pipe; the attenuation of the gamma rays vary inversely with the density of the fluid in the pipe. Each densitometer also has a detector (D) located so that it measures background radiation continuously. The densitometers are nuclear-hardened, have ^{60}Co sources, and are located in horizontal piping. Figure 3-2 shows the gamma densitometer configuration relative to the piping.

Liquid levels were obtained by means of (a) differential pressure transducers in the pressurizer, steam generator simulator, accumulator, steam generator secondary side, pump suction piping, and BST and (b) liquid detectors which sense the conductivity of the fluid near each of a series of electrical contacts in the reactor vessel.

Control rod position was indicated by means of proximity switches. The circuitry associated with the proximity switches controls a set of lamps. Each set of lamps consists of a "rod bottom" lamp and four "rod location" lamps. The rod bottom lamp lights only when the control rod is bottomed. Each rod location lamp lights as the leadscrew on the control rod passes its switch position during withdrawal, and it remains lit whenever the leadscrew is above this position.

Valve positions (analog indication from 0 to 100% of opening) were measured by either resistance potentiometers or differential transformers.

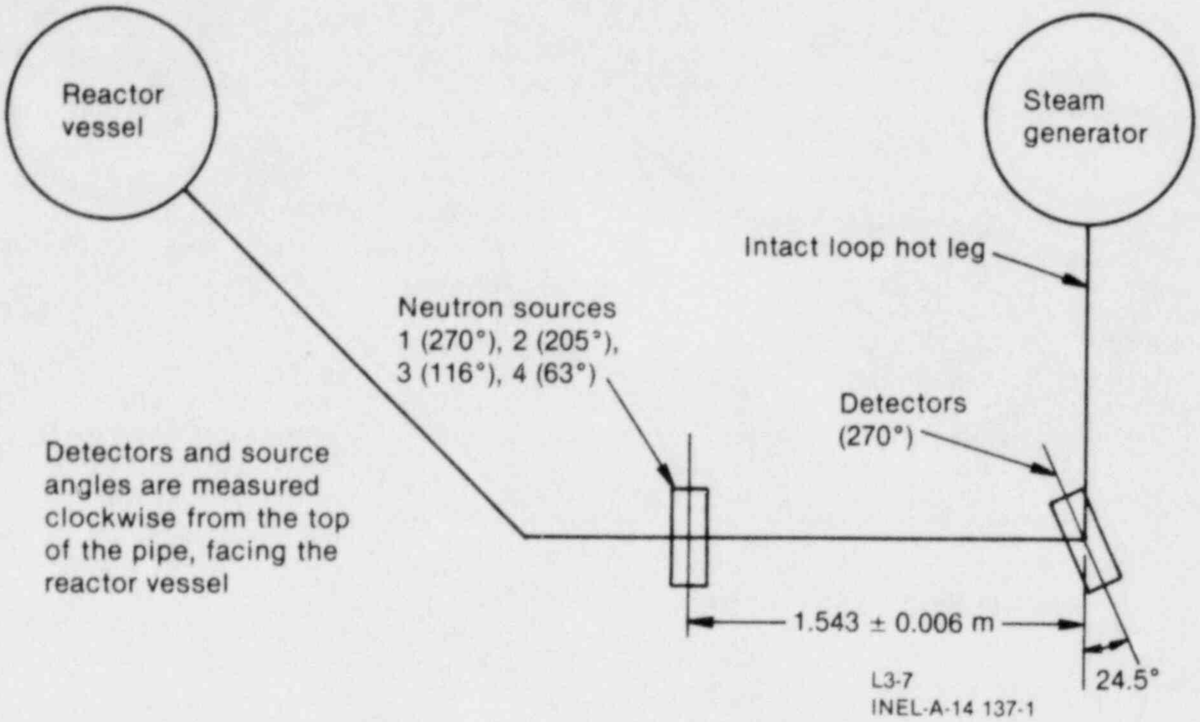


Figure 3-1. View of PNA sources and detectors.

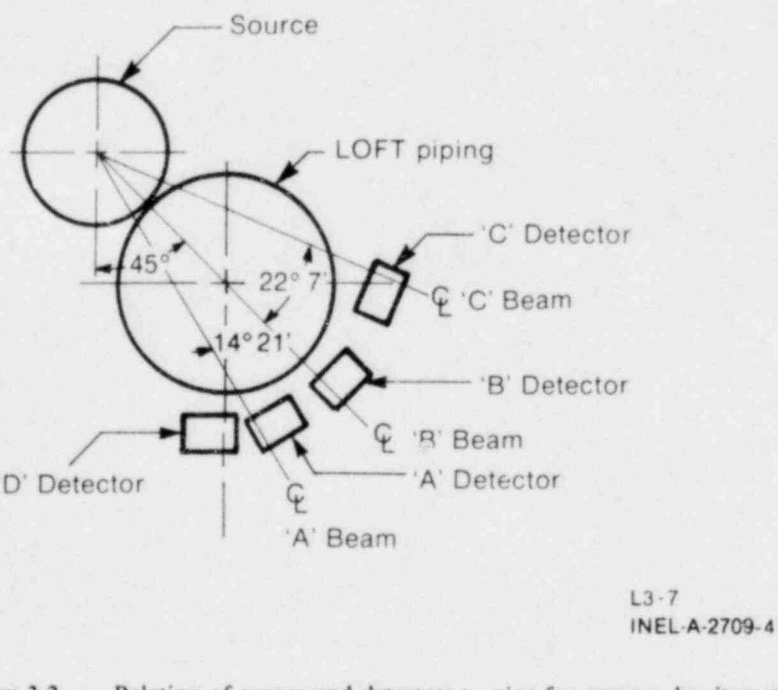


Figure 3-2. Relation of source and detectors to pipe for gamma densitometers.

Mechanical pump speed was measured by an eddy current displacement transducer that uses a slotted metallic target attached to the top of the pump motor shaft. The target contains six asymmetrical slots so that pump speed can be determined. Electrical pump power was measured by a wattmeter.

The steady state local linear heat generation rate was measured by self-powered neutron detectors. Each detector consists of a cylindrical ^{59}Co emitter, a layer of aluminum oxide for electrical insulation, and an outer sheath of Inconel. The cable connected to the detector consists of two Inconel wires in an Inconel sheath with magnesium oxide insulation. One of the wires is connected to the cobalt emitter and the other is open ended. The open-ended wire gives a background subtraction signal to compensate for the radiation sensitivity of the cable.

The steady state linear heat generation rate was determined from neutron flux measurements taken with a traversing in-core probe (TIP) at four guide tube locations in the core. This instrument consists of a ^{235}U fission chamber attached to a flexible cable and its own data recording system. The probe was withdrawn and stored outside the core prior to blowdown initiation.

The data acquisition and visual display system (DAVDS) was used to record measured data from the various instrumentation systems on a combination of digital recorders, wide-band frequency modulation (FM) tape recorders, and oscillographic recorders.[3] Redundant records were made where use dictated more than one recording mode or where an extra measure of assurance was desired for critical measurements.

A digital computer was used to collect the LOCE data in a multiplexed format at the LOFT facility and to perform equipment calibrations, posttest data reduction, and plotting.[4] The recorded FM data were converted into digital form and then demultiplexed to be compatible with the CDC CYBER 176 computer system.

The CDC CYBER 176 computer system was used to further reduce the data. Calibration factors were first applied to produce data plots in engineering units so that engineering specialists could examine each channel for discrepancies or unexpected events. Where possible, instrument channel outputs and computed variables were compared with test predictions, previous tests, corresponding parameter channels, and calculated quantities. Instruments were labeled as qualified if the measurement comparisons were determined to be within the accuracy of the particular instrument.

Most transducers were calibrated under laboratory conditions prior to installation in the LOFT system. Verification of calibration constants was accomplished by special tests performed during heatup and by analysis of initial conditions data. In addition, post-LOCE checks were performed to pinpoint questionable data and to verify data consistency. Appendix A discusses the techniques used to perform data consistency checks.

Figure 3-3 shows a piping schematic indicating instrument locations. Table 3-1 gives the nomenclature for LOFT experimental and process instrumentation. Data from both types of instrumentation are included in this report. Thermocouples and neutron flux detectors located in the nuclear core have special identification. Each of these transducers has been given an identification number which identifies the type of transducer and its location within the core as follows:

Transducer location (inches from bottom of fuel rod)
Fuel assembly row
Fuel assembly column
Fuel assembly number
Transducer type

TE-3B11-28

Figures 3-4 and 3-5 show isometric views of the major system components with instrument locations indicated. Figures 3-6 through 3-16 give more specific locations for instruments located on individual components. Some of the temperature instruments shown in the figures were not recorded during the experiment. Reference 1 may be consulted if additional details of instrument design and locations are desired.

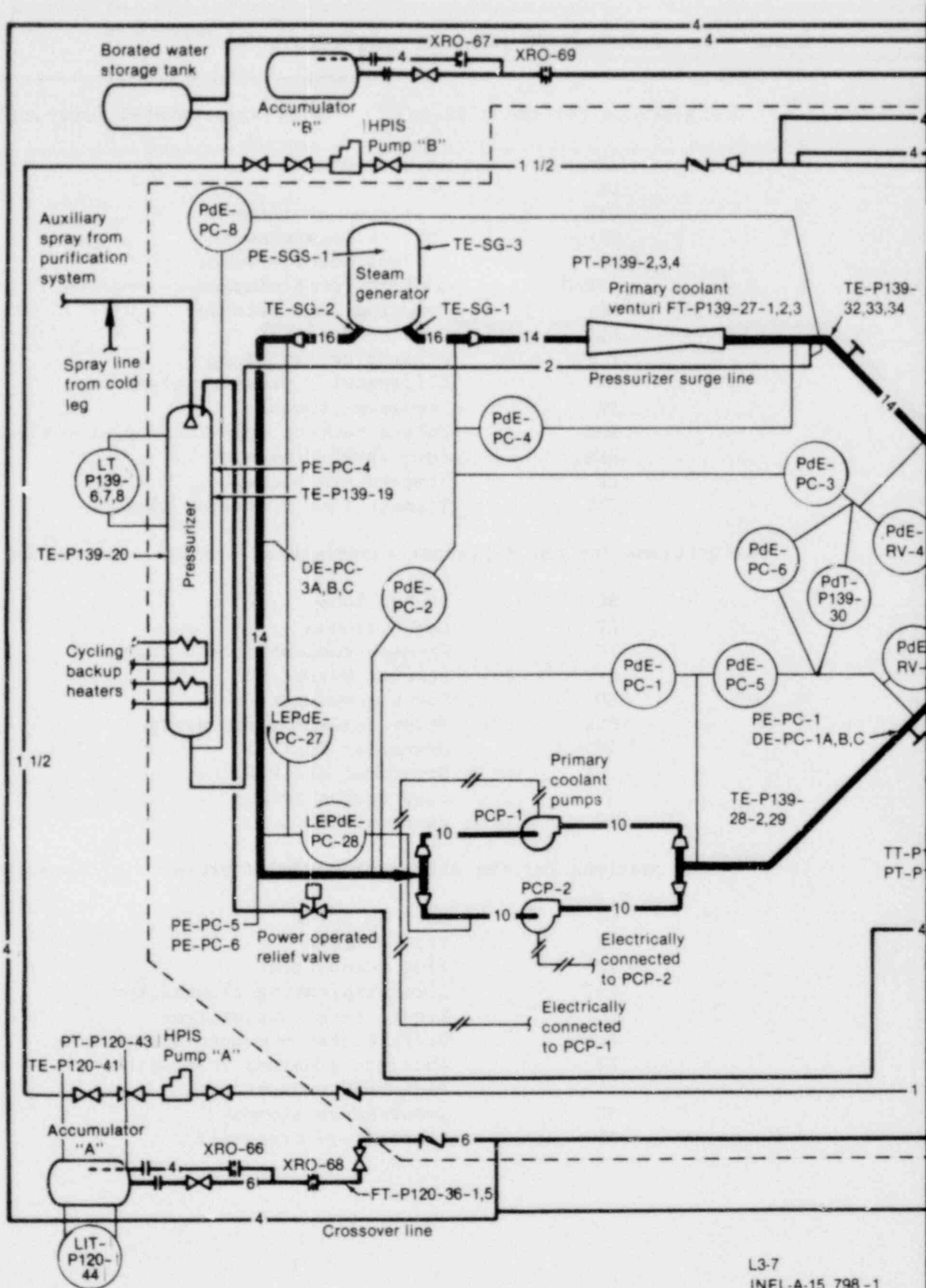
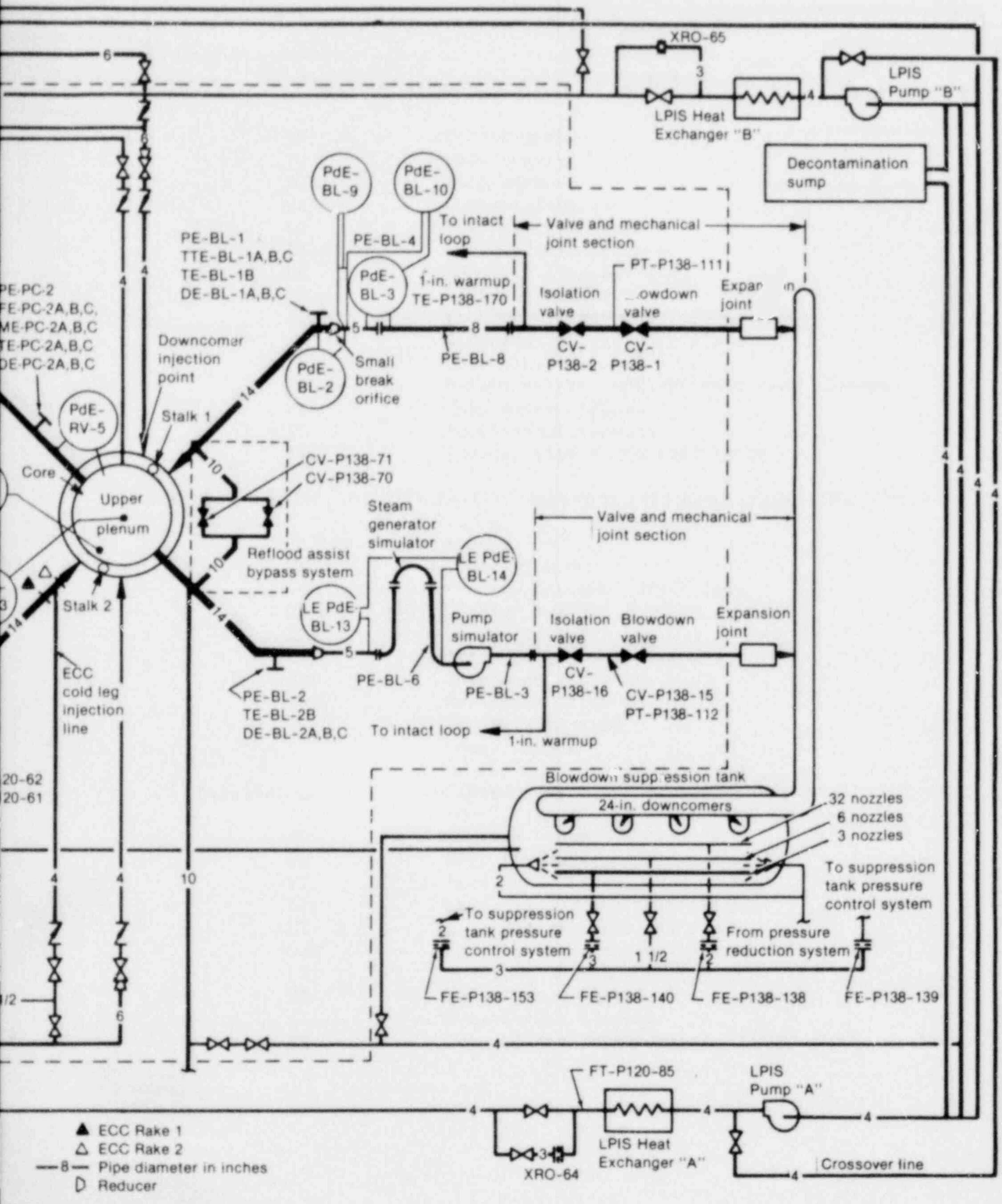


Figure 3-3. LOF



T piping schematic with instrumentation.

TABLE 3-1. NOMENCLATURE FOR LOFT INSTRUMENTATION

Designations for the different types of experimental instruments:

AE	Accelerometer
DE	Densitometer
DIE	Displacement element
FE	Coolant flow element
LE	Coolant level element
LEPdE	Coolant level element
ME	Momentum flux detector
NE	Neutron detector
PCP	Primary coolant pump
PdE	Differential pressure element
PE	Pressure element
PNE	Pulsed neutron activation system element
RPE	Pump speed element
TE	Temperature element
TTE	Transit time flowmeter element

Designations for the different experimental systems, except the core:

BL	Broken loop
LP	Lower plenum
PC	Primary coolant intact loop
RV	Reactor vessel
SG	Steam generator
SGS	Steam generator secondary
1ST	Downcomer Stalk 1
2ST	Downcomer Stalk 2
SV	Suppression tank
UP	Upper plenum

Designations for the different types of process instruments:

CV	Control valve
FE	Flow element
FT	Flow transmitter
LIT	Level indicating transmitter
LT	Liquid level transmitter
PdT	Differential pressure transmitter
PT	Absolute pressure transmitter
RE	Radiation element
TE	Temperature element
TT	Temperature transmitter

TABLE 3-1. (continued)

Designations for the different systems associated with process instruments:

P004	Secondary coolant system
P120	Emergency core coolant system
P128	Primary coolant addition and control system and HPIS
P138	Broken loop and pressure suppression system
P139	Intact loop
P141	Primary component cooling system
T-77, T-87	Power range

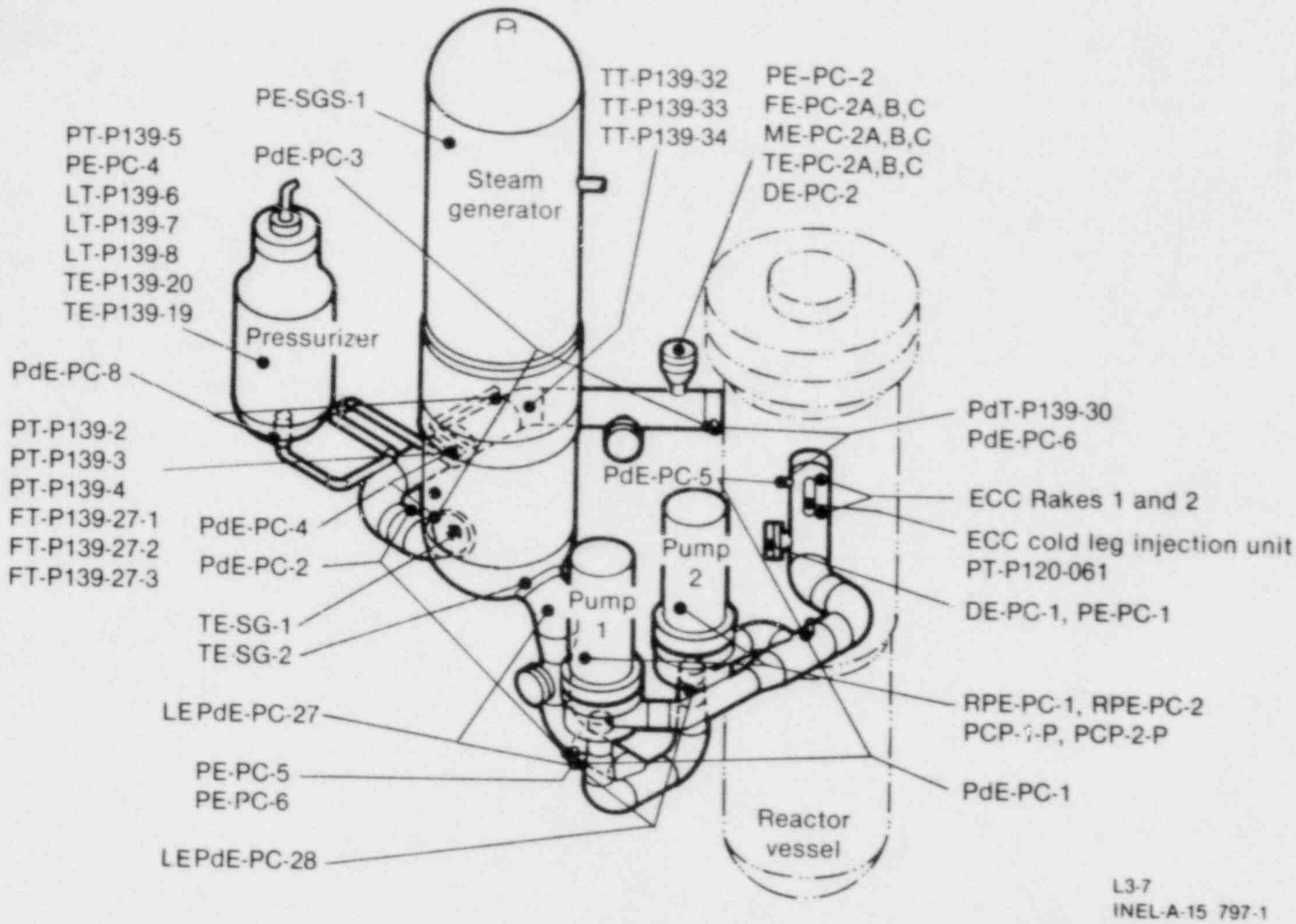


Figure 3-4. LOFT thermal-hydraulic instrumentation for intact loop.

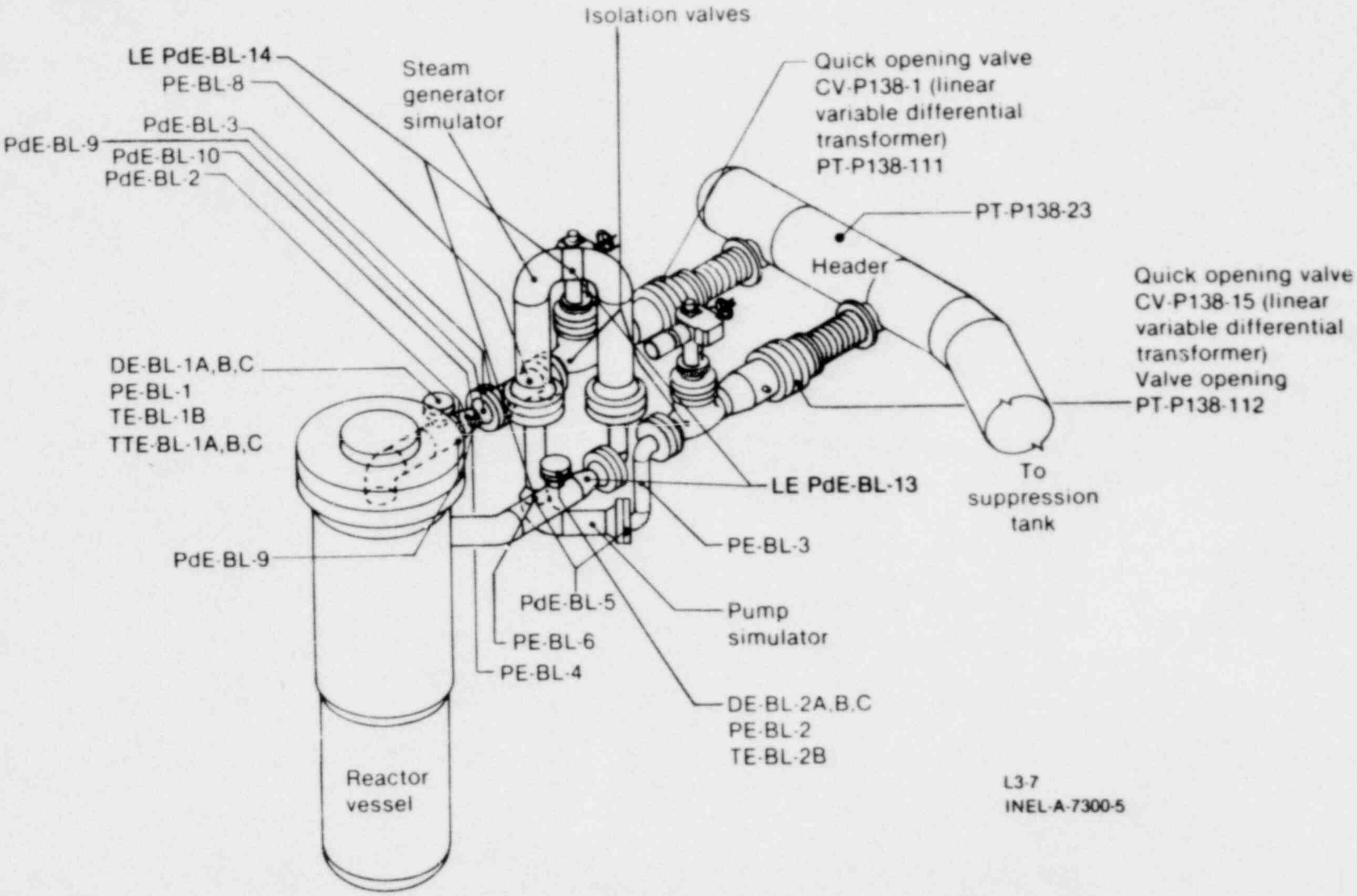
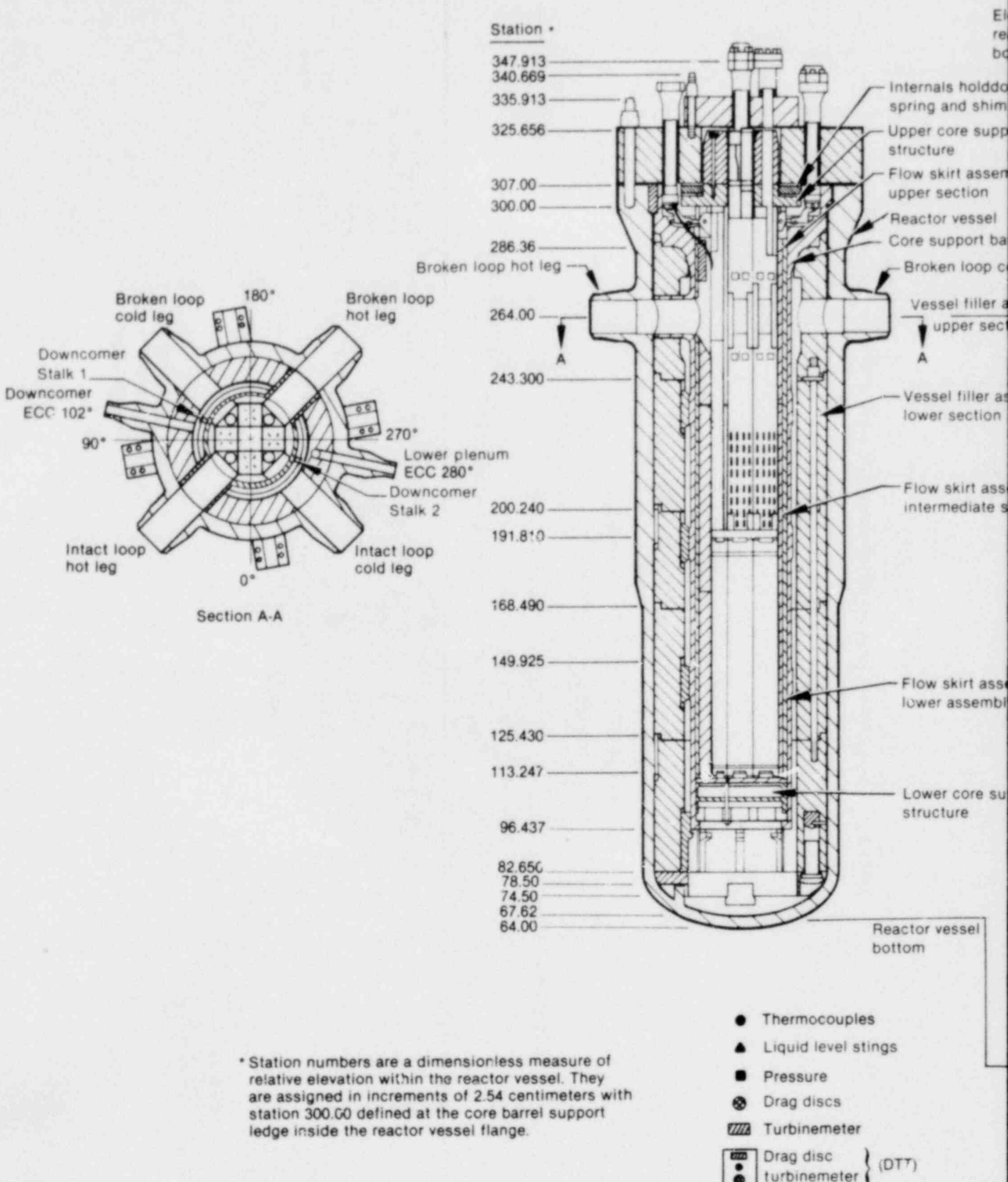
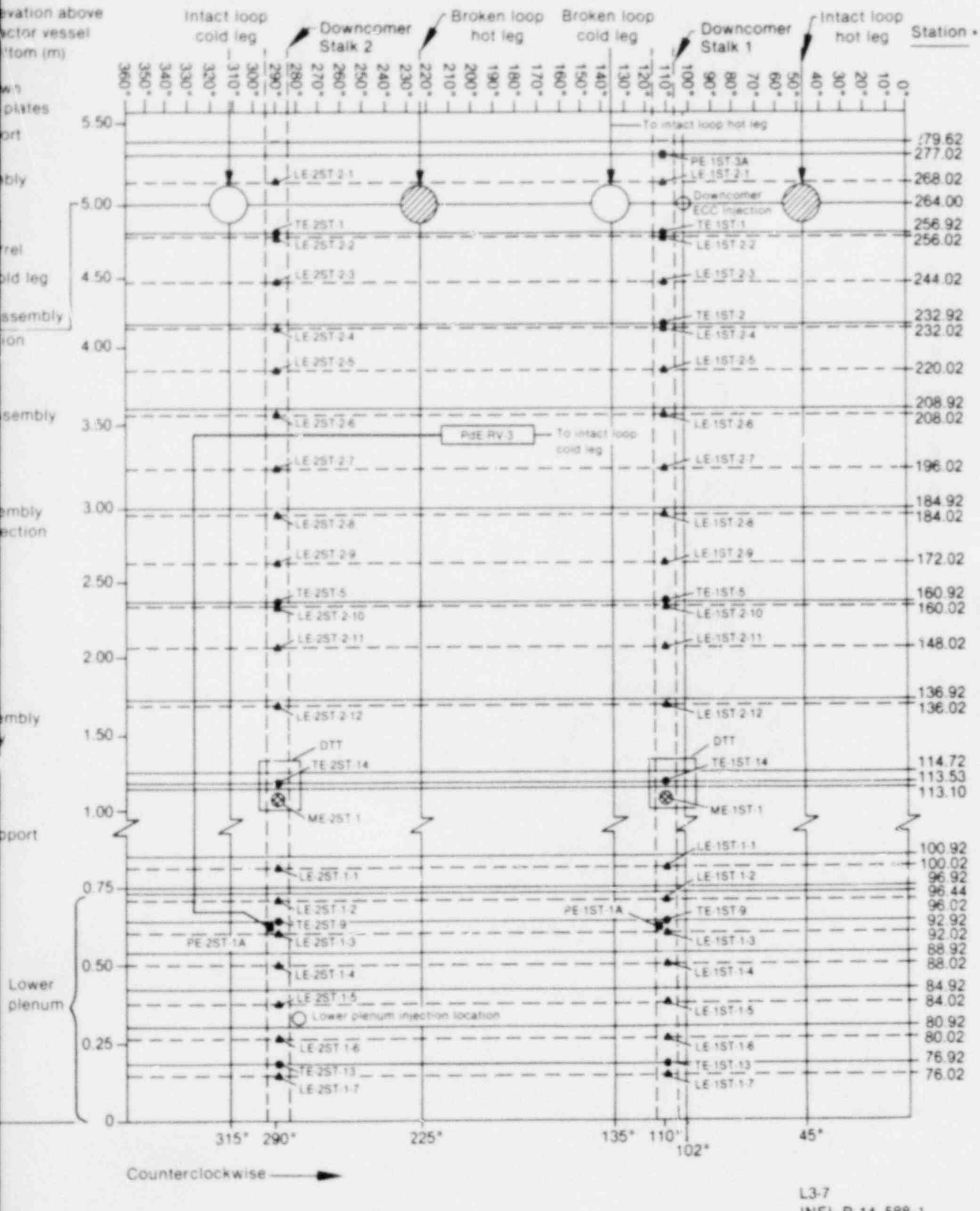


Figure 3-5. LOFT thermal-hydraulic instrumentation for broken loop.



* Station numbers are a dimensionless measure of relative elevation within the reactor vessel. They are assigned in increments of 2.54 centimeters with station 300.00 defined at the core barrel support ledge inside the reactor vessel flange.

Figure 3-6. LOFT reactor ve



ssel instrumentation.

* Station numbers are a dimensionless measure of relative elevation within the reactor vessel. They are assigned in increments of 25.4 mm with Station 300.00 defined at the core barrel support ledge inside the reactor vessel flange.

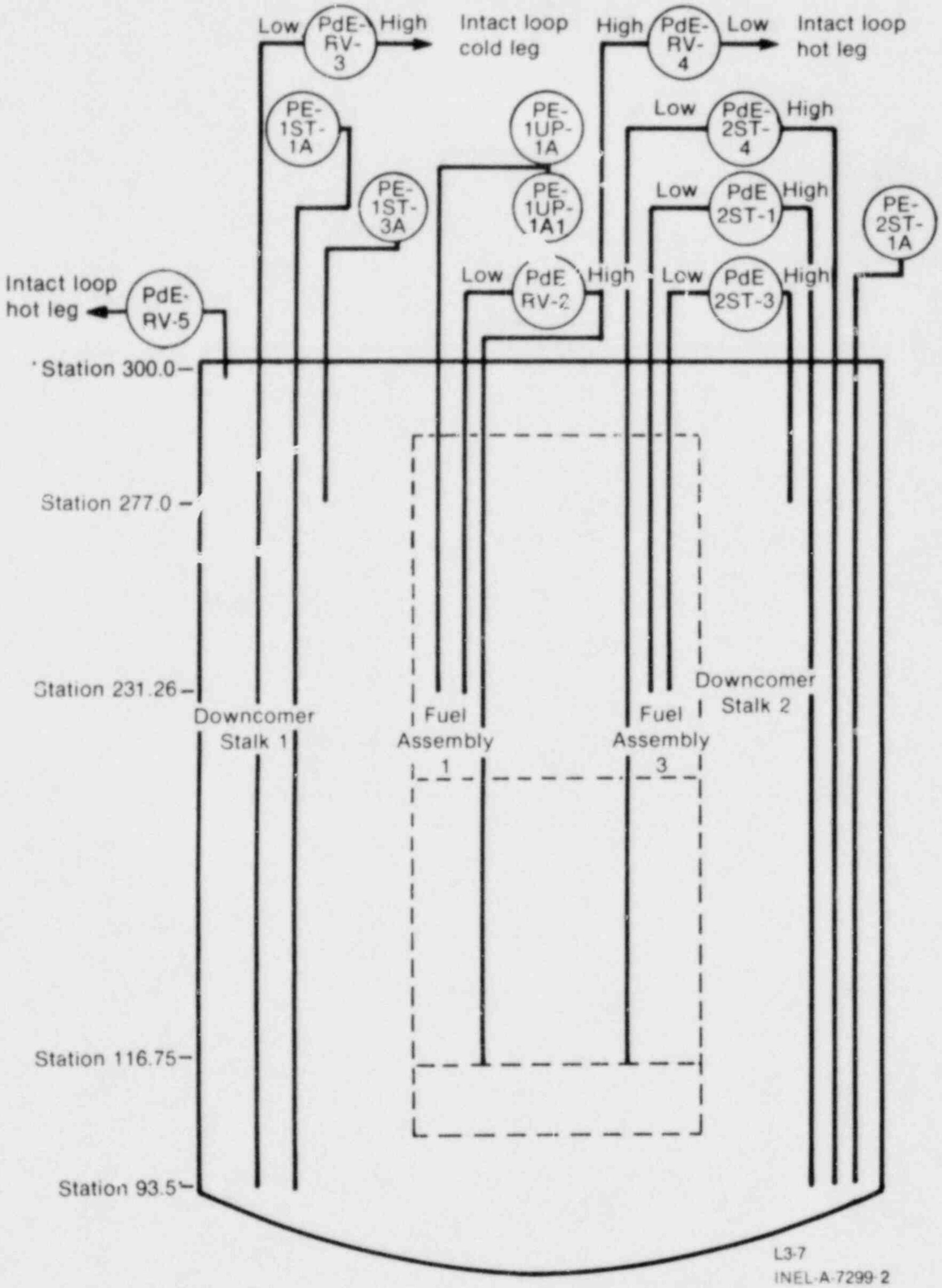
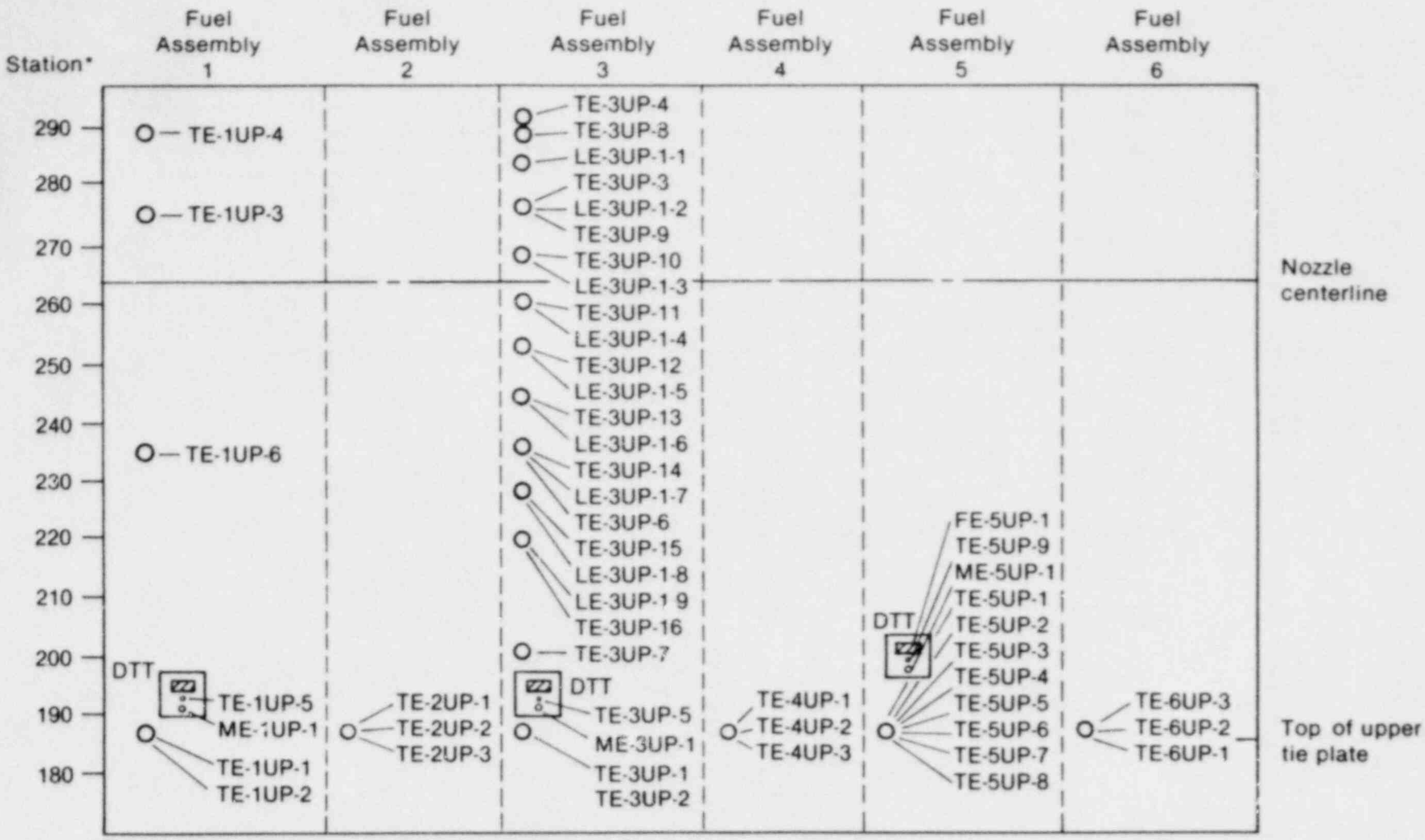


Figure 3-7. LOFT reactor vessel pressure and differential pressure instrumentation.



*Station numbers are a dimensionless measure of relative elevation within the reactor vessel. They are assigned in increments of 25.4 mm with station 300.00 defined at the core barrel support ledge inside the reactor vessel flange.

Figure 3-8. LOFT reactor vessel upper plenum DTT, LE, and TE elevations.

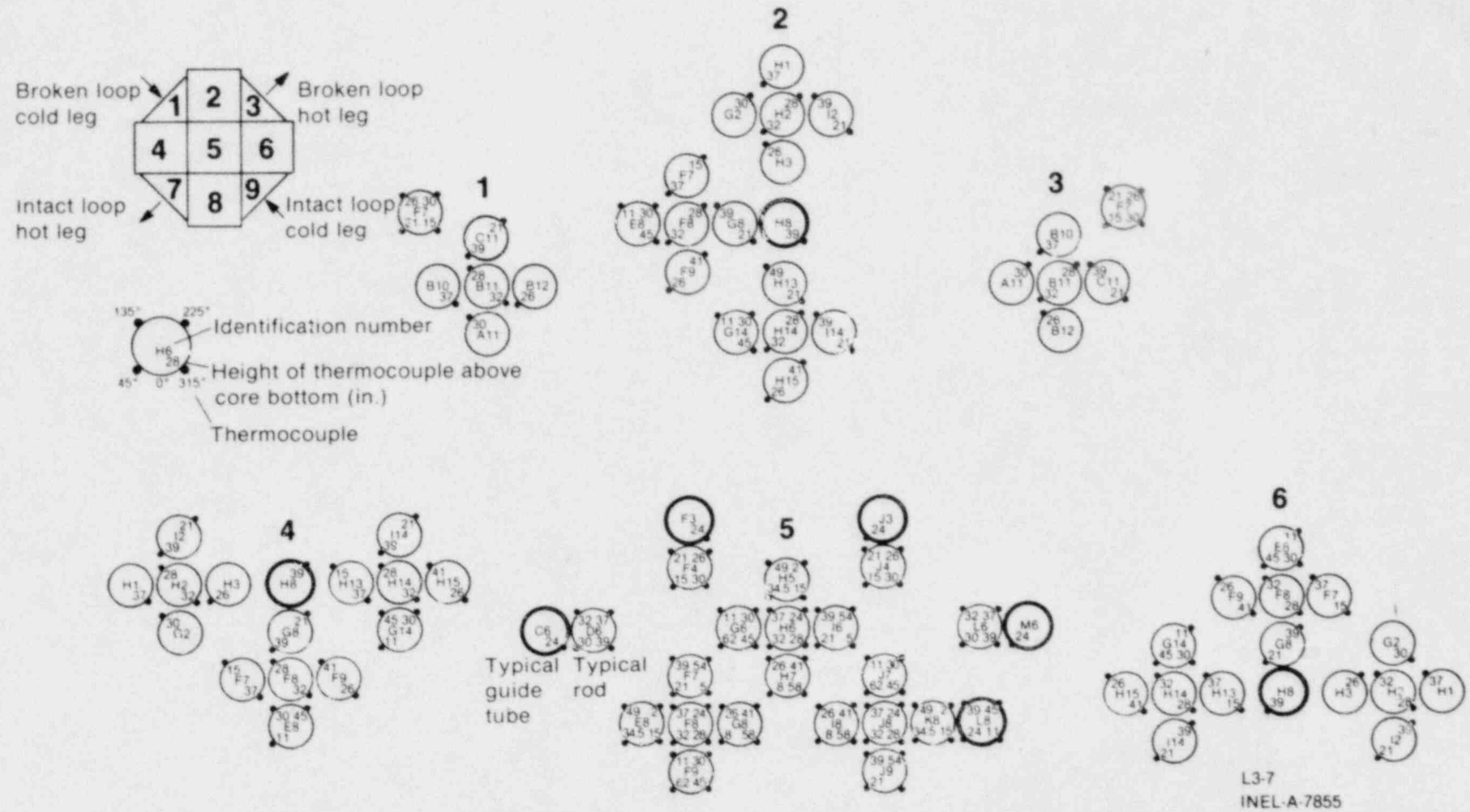


Figure 3-9. In-core thermocouple locations for LOFT Core 1.

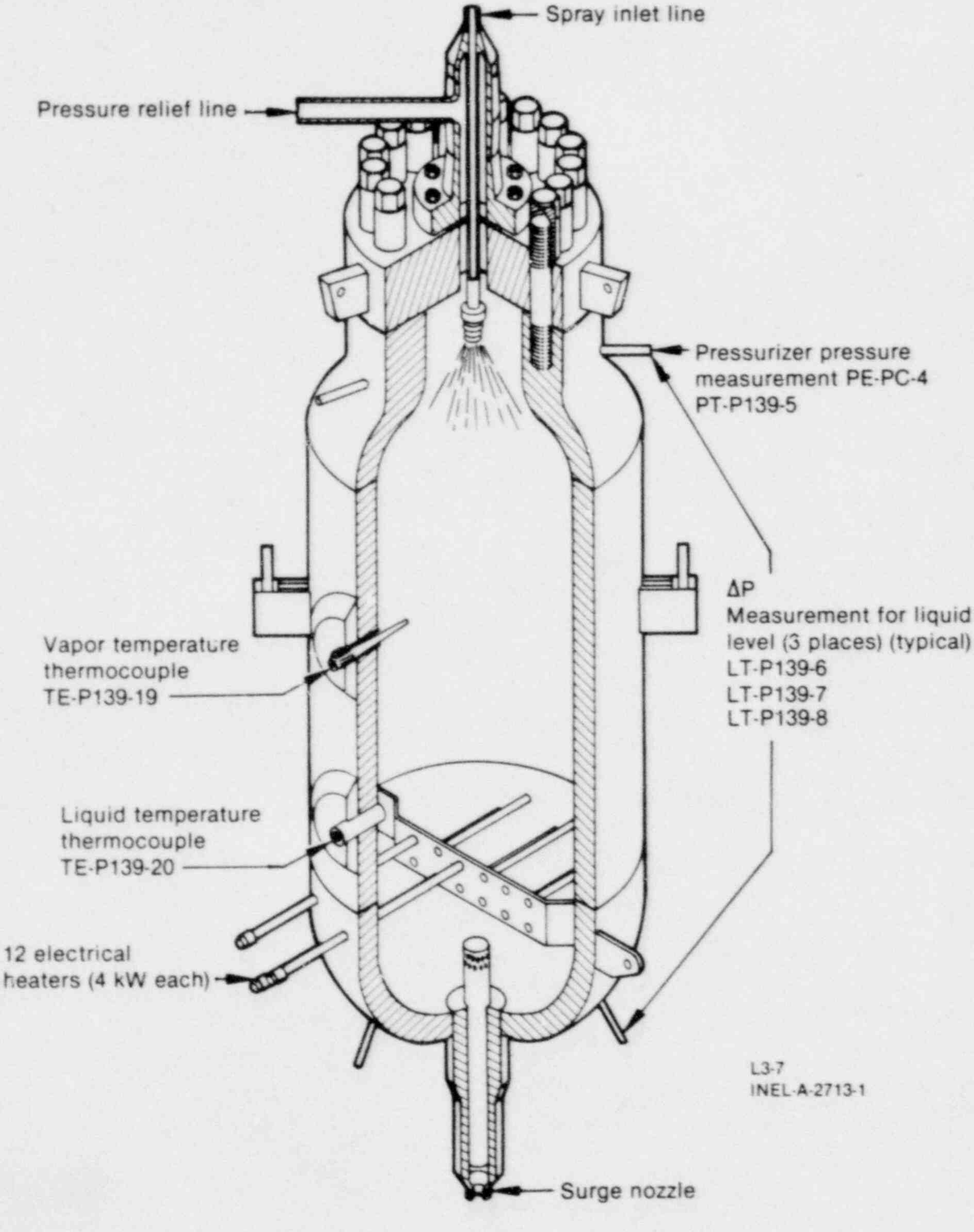


Figure 3-10. LOFT pressurizer instrumentation.

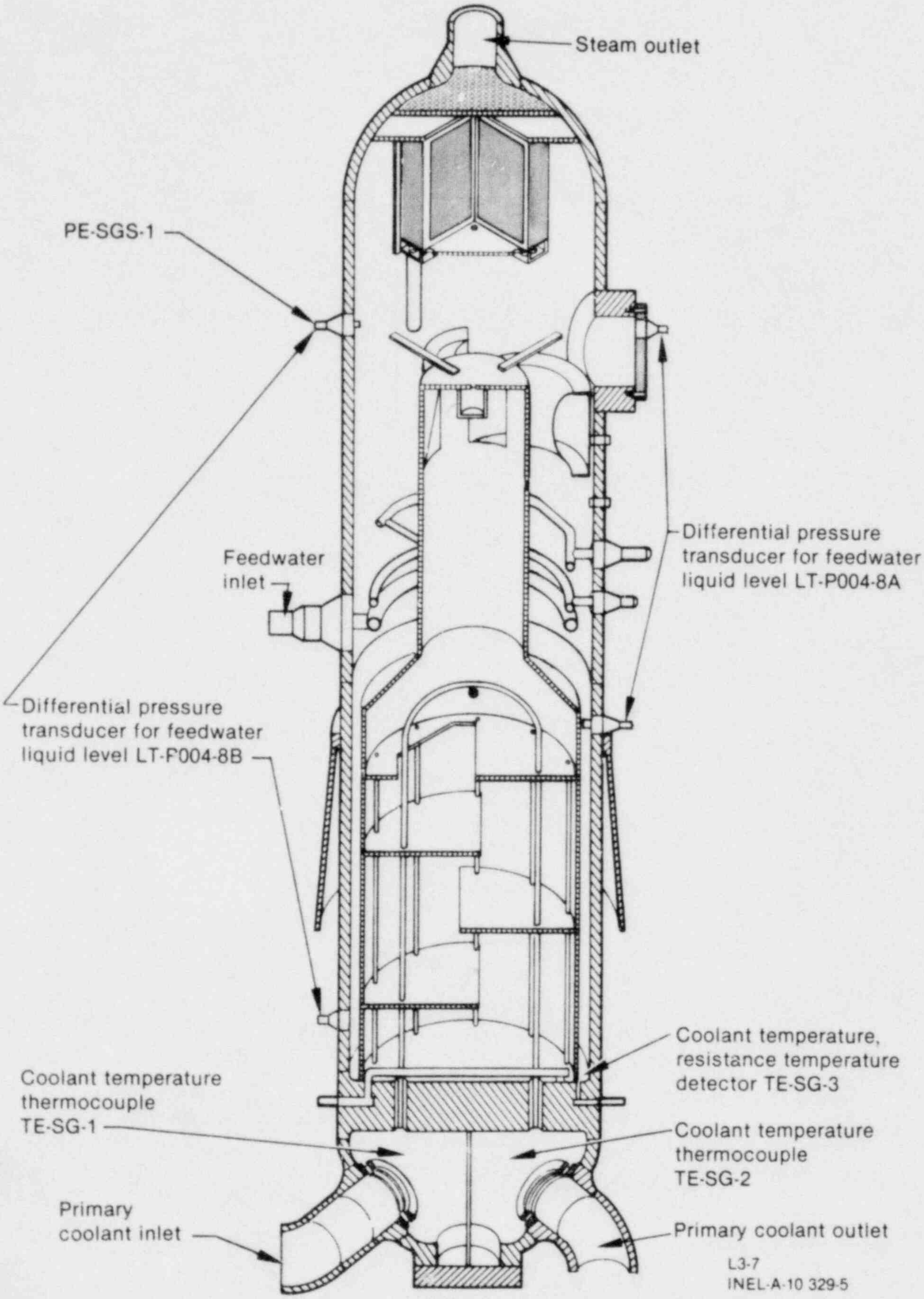


Figure 3-11. LOFT steam generator instrumentation.

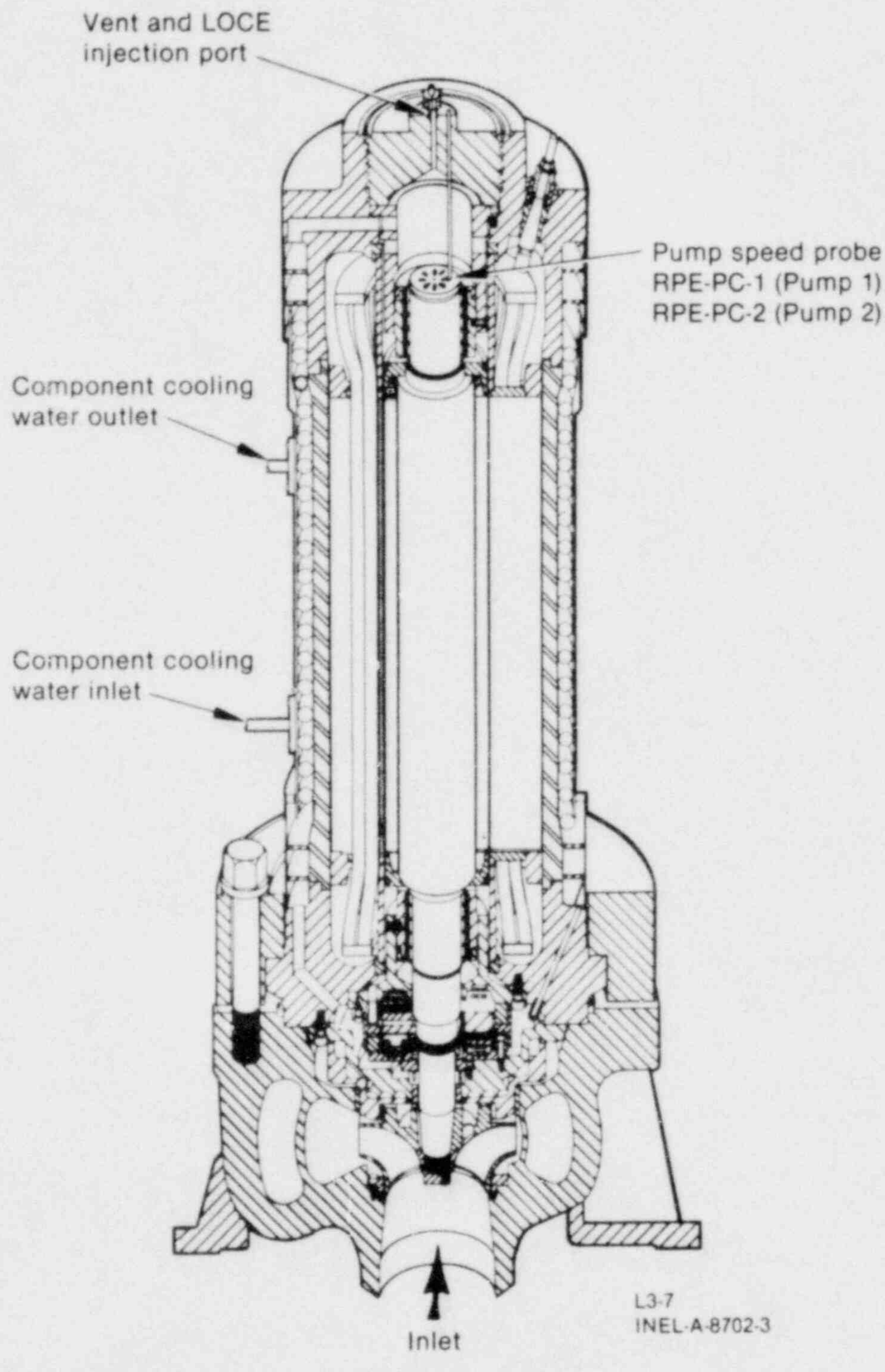


Figure 3-12. LOFT intact loop pump instrumentation.

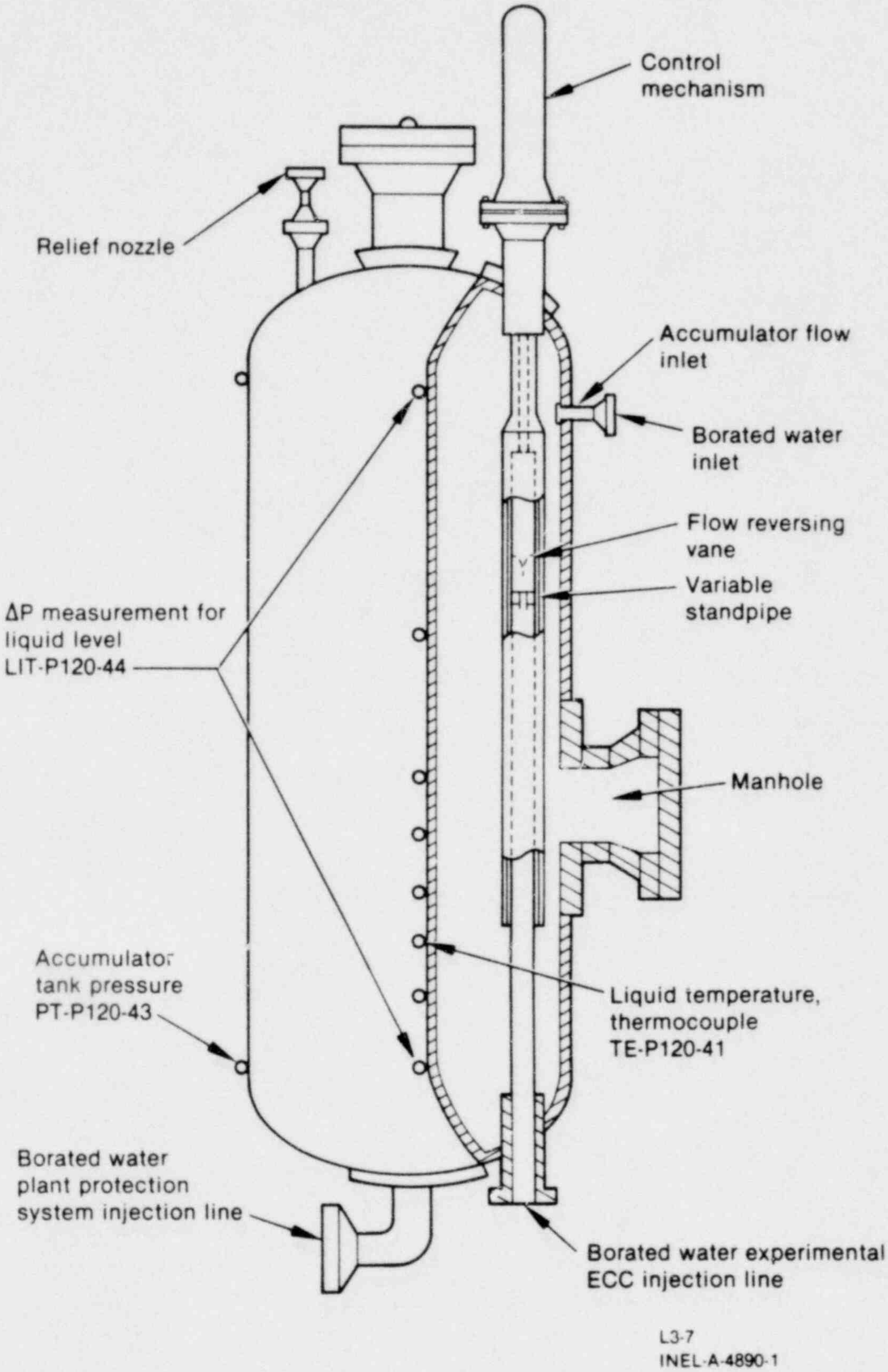


Figure 3-13. LOFT accumulator instrumentation.

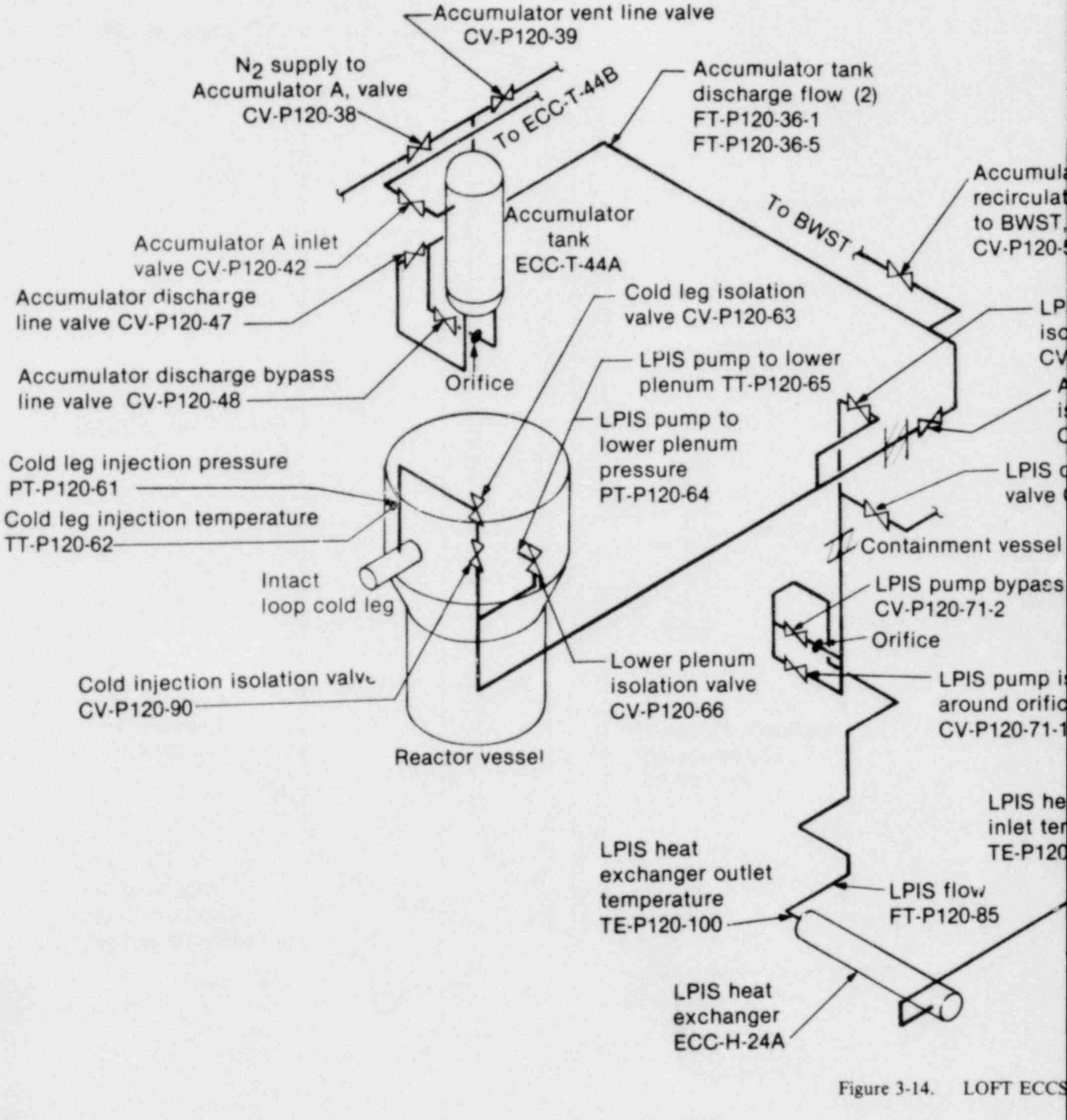
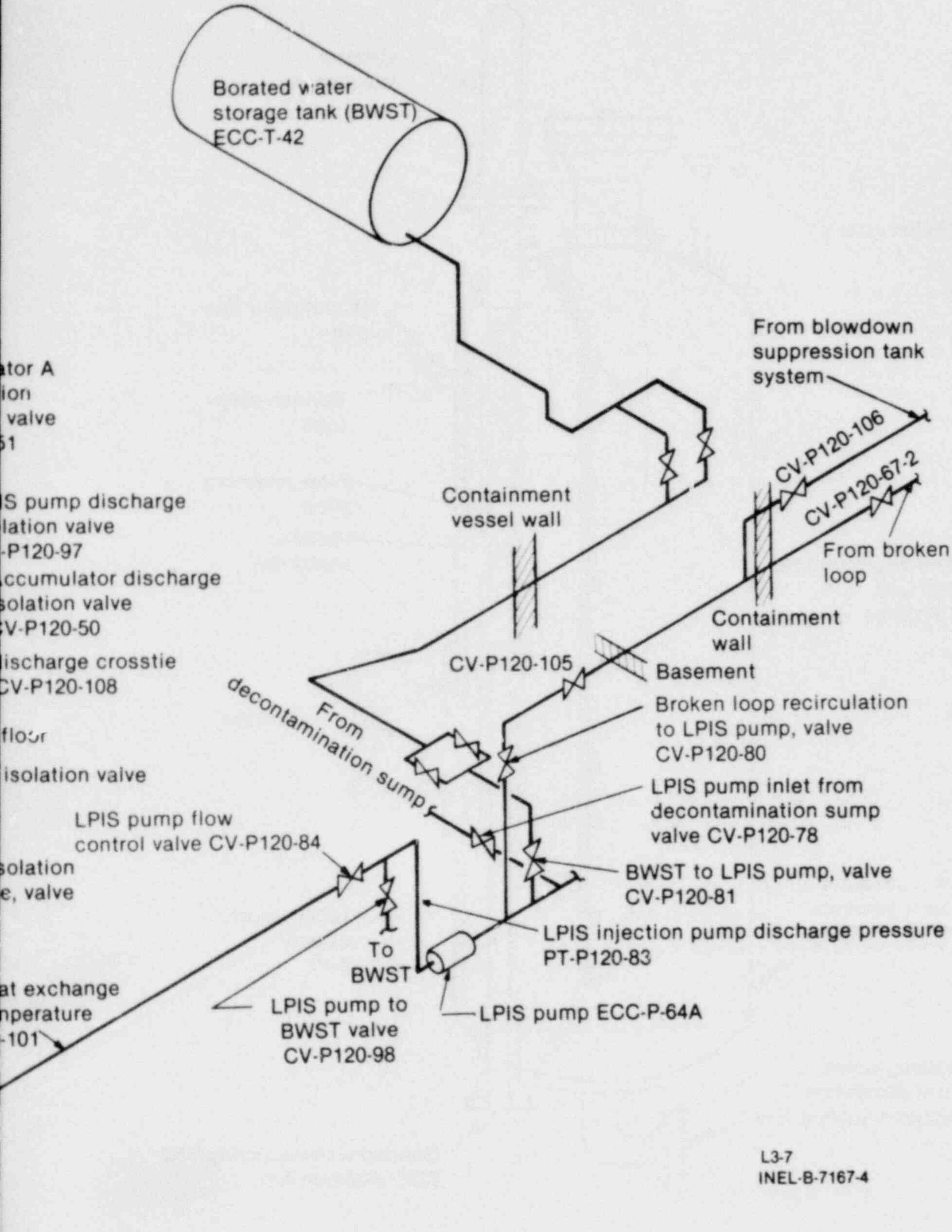
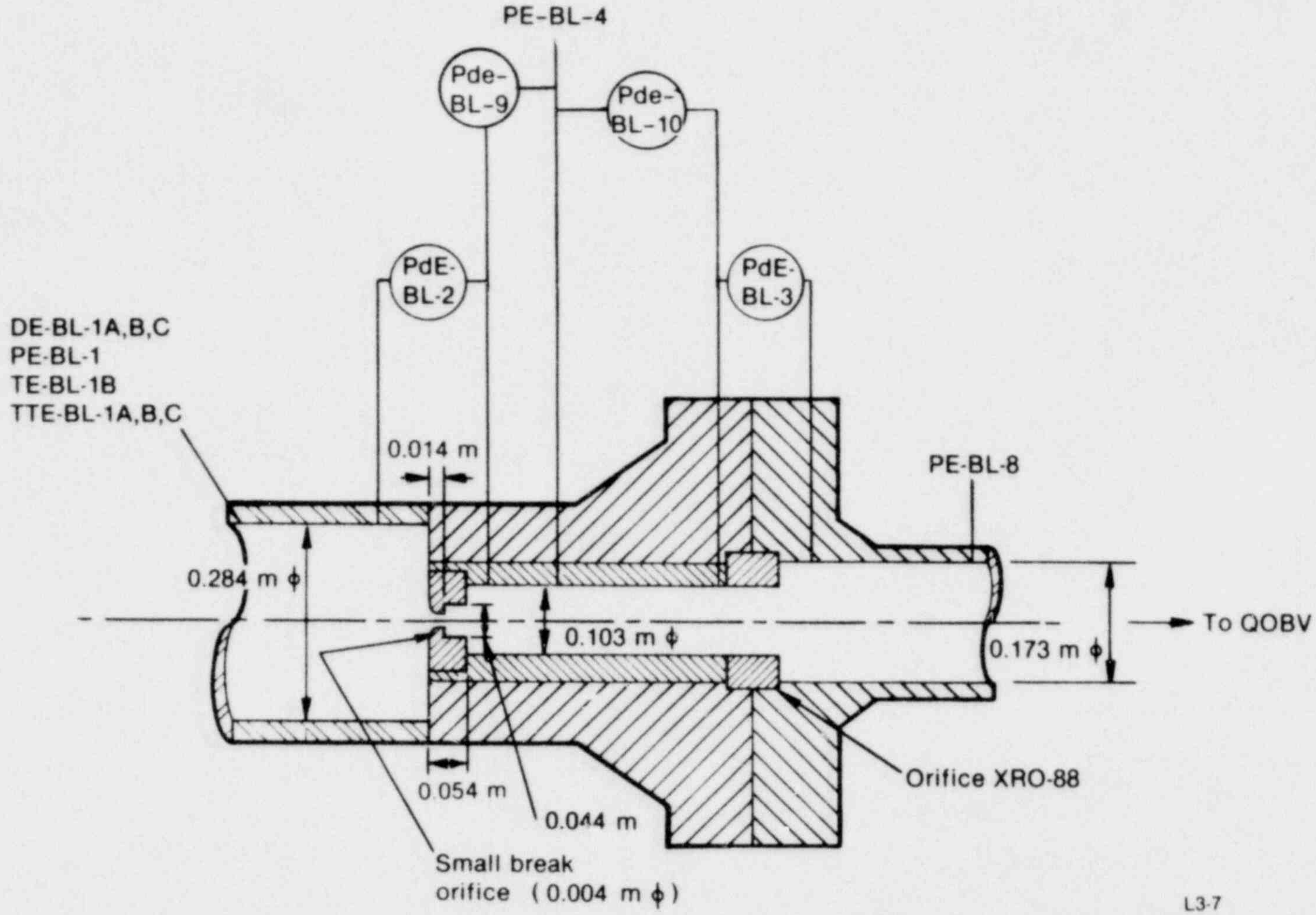


Figure 3-14. LOFT ECCS



instrumentation.



L3-7
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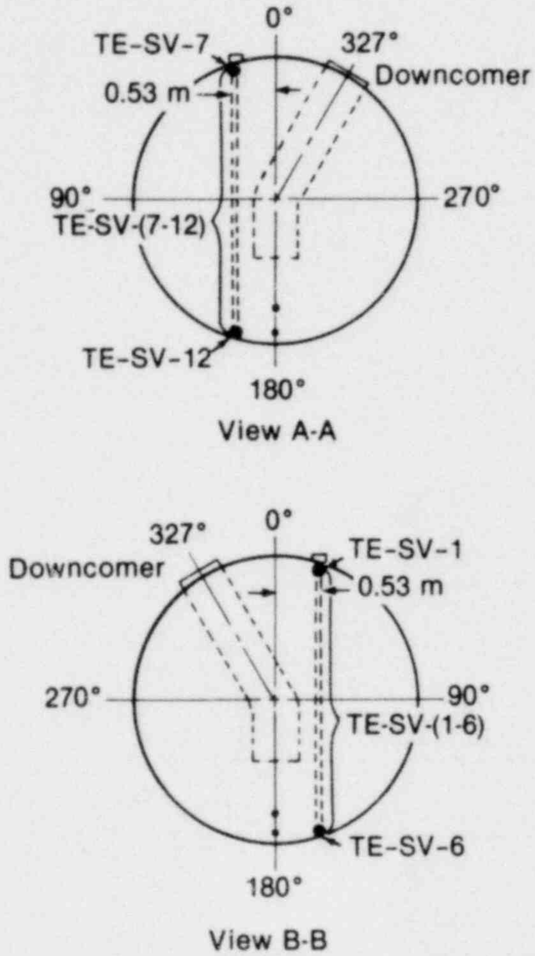


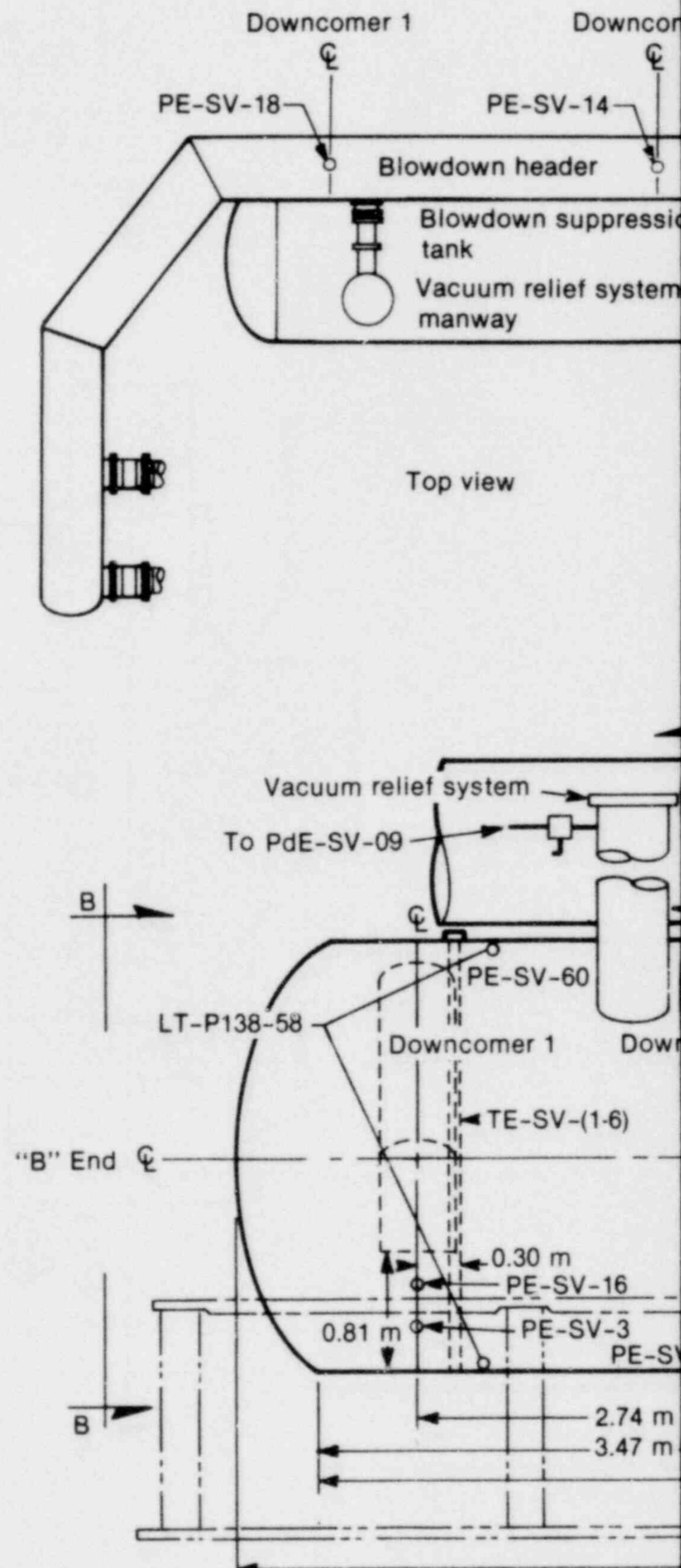
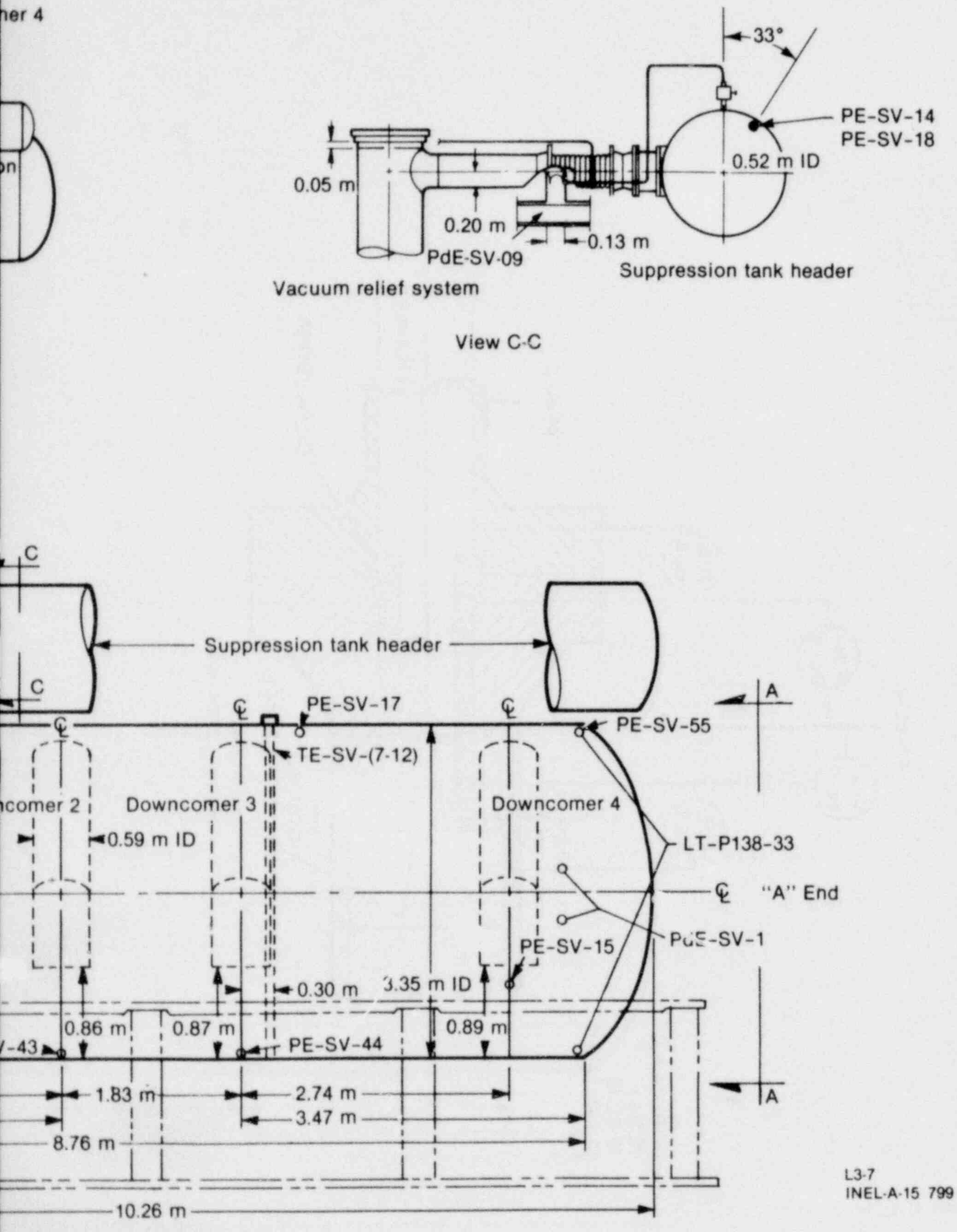


Figure 3-16. LOFT blowdown supp



ression tank instrumentation.

4. EXPERIMENTAL PROCEDURE AND INITIAL CONDITIONS

This section summarizes the experimental procedure, initial conditions, and the significant events recorded during the experiment.

4.1 Experimental Procedure

In preparation for Experiment L3-7, the PCS was filled and vented and the specified system water chemistry was established. Prior to the primary system heatup, several tests were performed on the LOFT system. These tests included plant requalification tests, QOBV operation and seat leakage checks, pump coastdown runs, LOCE control system checks, and operational verification of newly installed instrumentation. Selected system process instrumentation was calibrated and an electrical calibration was performed on the DAVDS.

The PCS pressure was increased and decreased to plateaus of 1.46, 3.53, 6.98, 10.43, 13.87, and 15.60 MPa at cold plant temperature and zero flow conditions. The DAVDS recorded 20 s of data at each pressure plateau to determine the degree of sensitivity of the pressure sensing instruments. The system was concurrently inspected for leakage at the various test pressures. The pumps were operated at 15, 20, 30, 40, 50, and 60 Hz with 20 s of data taken at each frequency. During heatup of the plant, the appropriate initial conditions were established for the BST, accumulator, and BWST.

The plant was stabilized at 422, 489, and 555 K during heatup. At each of these temperatures, 20 to 30 s of data were recorded for calibration checks and to determine the degree of instrument temperature sensitivity. At the 489- and 555-K stabilization points, the pumps were stopped and 20 s of data were recorded during flow coastdown and zero flow conditions. With the pumps off at the 555-K stabi' .ation point, 20 s of data were obtained at 14.95, 13.87, 12.50, 11.12, and 9.74 MPa in both the increasing and decreasing directions. Frequency tests were performed by varying the primary coolant pump frequency from 20 to 60 Hz in 10-Hz increments at 555-K. Before the reactor was brought critical, the DAVDS was calibrated and the boron concentration in the accumulators, BST, and BWST was verified.

Initial reactor criticality occurred approximately 148.5 h prior to experiment initiation. Two scrams occurred in power ascension and operation prior to the experiment. The power level reached 49 ± 1 MW at 17.7 h prior to the experiment and was maintained at that level until blowdown was initiated.

A plot of the power level versus time for the 148.5-h period prior to blowdown is given in Figure 4-1. During this time, measurements of power level were performed using a secondary calorimetric calculation and the following specified initial conditions in the PCS were established: (a) The flow rate was set at 478.8 ± 8.8 kg/s, and adjustment of the SCS was made to maintain the experiment power level. (b) The PCS boron concentration was adjusted to establish a reactor vessel inlet temperature of 556.8 ± 2.2 K at a hot leg pressure of 14.95 ± 0.34 MPa.

Prior to blowdown, a DAVDS calibration and a data integrity check were performed. During this period, the initial-condition water samples were taken from the PCS, the SCS, and the BST. The intact loop conditions were checked, and adjusted as necessary, to ensure the specified conditions discussed above were met at blowdown initiation. Purification lines were closed, broken loop recirculation lines were isolated, and pressurizer and broken loop hot leg heaters were turned off just prior to blowdown initiation.

The DAVDS was activated and data recording was started 7 min prior to the blowdown. The reactor was scrammed by the reactor shutdown system at 36.0 ± 0.1 s after blowdown initiation. When the four rod bottom lamps came on, indicating that the control rods were fully inserted, the primary coolant pumps were manually tripped. The pumps then coasted down under the influence of the flywheel system until the field breakers to the primary system motor generator sets tripped at 56.2 ± 0.1 s when the pumps coasted down below 12.5 Hz (750 rpm). The break orifice area (13.2 mm^2) corresponded to the flow area of a 1-in.-diameter break in a commercial PWR. The sequence of events for the experiment is provided in Table 4-1. Figure 4-2 shows the decay heat during the experiment, which was calculated using the American Nuclear Society Standard 5.1.[5]

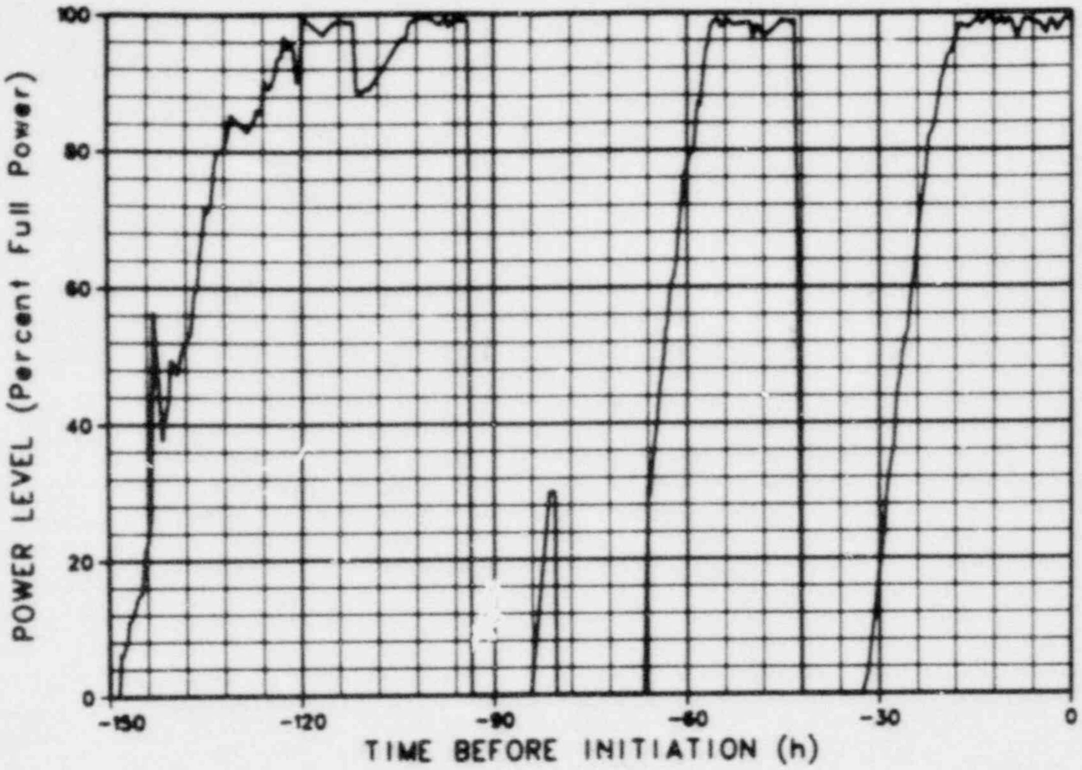


Figure 4-1. LOFT power history prior to Experiment L3-7 blowdown initiation [full power = 50 MW(t)].

ECC injection was directed to the intact loop cold leg during blowdown. The HPIS flow was initiated automatically when the PCS pressure had dropped to 13.16 ± 0.19 MPa at 65.6 ± 0.1 s after blowdown initiation. The HPIS was turned off at 1805.3 ± 0.1 s to hasten the loss of fluid inventory in an attempt to establish the conditions conducive to reflux flow. The HPIS flow was reinstated at 5974.2 ± 0.1 s. Accumulator A injection began 6028 ± 5 s after initiation of the blowdown when the PCS pressure had dropped to 4.22 ± 0.17 MPa and continued to inject water throughout the remainder of the experiment.

Operator actions involving the SCS and the purification system were used to reduce PCS pressure and temperature. The SCS auxiliary feed pump was operated for about 30 min starting at 1 min after scram to simulate the automatic initiation of auxiliary feed for a large PWR, and later during the transient to fill the steam generator during bleeding operations. The SCS steam bleed began at 3603 ± 1 s. The break was isolated 7302.0 ± 0.1 s after blowdown initiation. Beginning at 18 180 ± 60 s, circulation through the purification system heat exchanger was used to simulate the residual heat removal system of a large PWR.

The BST pressure was not controlled because the back pressure was not expected to affect the blowdown. BST recirculation through the spray headers was operated at full spray pump capacity throughout the transient to ensure homogeneous temperatures throughout the water volume in the BST.

4.2 Initial Conditions

The specified initial plant operating conditions (except for the linear heat generation rate conditions) and tolerance bands for Experiment L3-7 are presented in Table 4-2 along with the values measured immediately prior to the blowdown initiation. All initial conditions were within specified tolerances. Table 4-3 gives the linear heat generation rate versus height above the bottom of the core for three locations within the LOFT core prior to blowdown initiation. The data for Table 4-3 were obtained from the TIP system.

TABLE 4-1. SEQUENCE OF EVENTS FOR EXPERIMENT L3-7

Event	Time after LOCE Initiation (s)
LOCE initiated	0
Reactor scrammed	36.0 ± 0.1
Control rods reached bottom	38.1 ± 0.1
Primary coolant pumps tripped	39.3 ± 0.5
Primary coolant pump coastdown completed	56.2 ± 0.1
Core natural circulation first indicated	60.8 ± 0.5
HPIS injection initiated	65.6 ± 0.1
SCS auxiliary feed initiated	75 ± 3
Pressurizer emptied	264 ± 7
Upper plenum reached saturation pressure	382 ± 6
End of subcooled break flow	1037 ± 10
SCS auxiliary initial feed terminated	1800 ± 5
HPIS flow terminated	1805.3 ± 0.1
SCS steam bleed initiated	3603 ± 1
HPIS flow reinstated	5974.2 ± 0.1
Accumulator injection initiated	6028 ± 5
Break isolated	7302.0 ± 0.1
Primary system fluid became subcooled	7915 ± 20
Pressurizer refill initiated	8680 ± 10
Purification system recirculation initiated	18 180 ± 60
Pressurizer refill terminated[a]	19 900 ± 100
Experiment completed[b]	29 500 ± 100

a. The level at which pressurizer refill terminated was 1.4 m.

b. The experiment was finished when the PCS temperature dropped to 366.5 K.

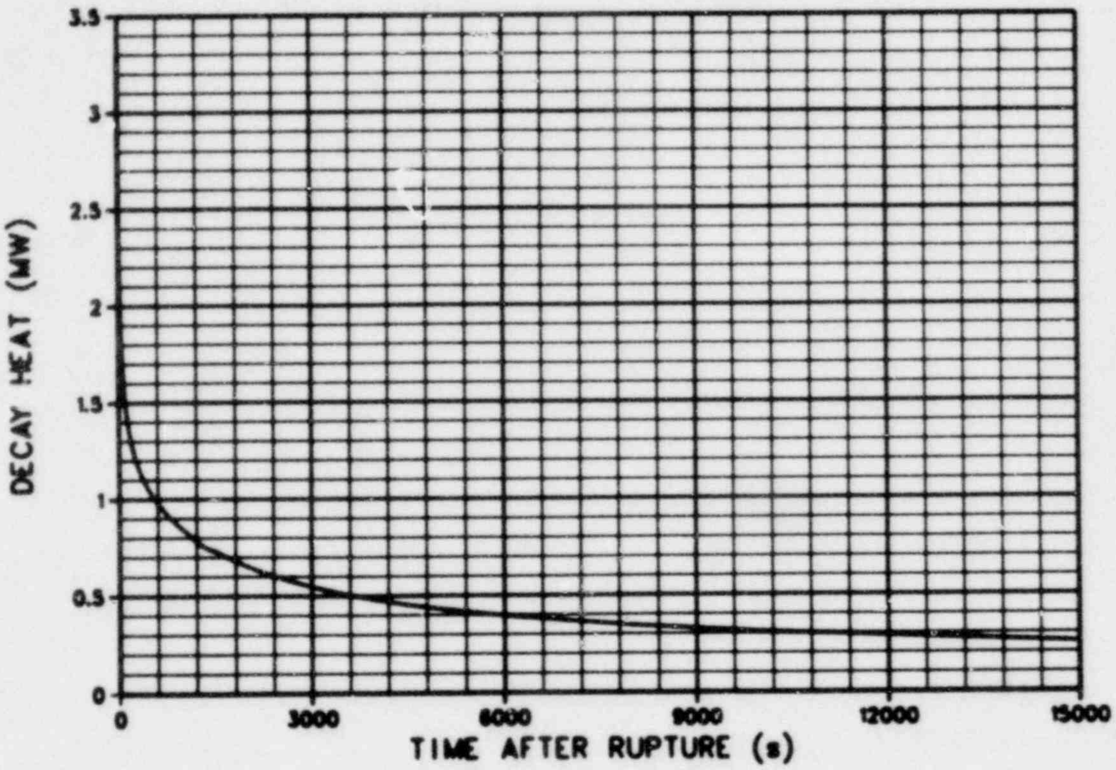


Figure 4-2. LOFT decay heat following Experiment L3-7 blowdown initiation.

Table 4-4 gives the measured fluid temperatures of the PCS immediately prior to blowdown initiation.

Table 4-5 specifies the required water chemistry for the PCS, the BST, and the SCS. In addition, the results of the water chemistry analyses for these systems are presented for pre-LOCE conditions and for the BST post-LOCE conditions. The pre-LOCE Accumulator A boron concentration was 3405 ± 15 ppm.

TABLE 4-2. INITIAL CONDITIONS FOR EXPERIMENT L3-7

Parameter	Specified Value[a]	Measured Value[b]
Primary Coolant System		
Mass flow rate (kg/s)	478.8 ± 8.8	481.3 ± 6.3
Hot leg pressure (MPa)	14.95 ± 0.34	14.90 ± 0.25
Cold leg temperature (K)	556.8 ± 2.2	556 ± 3
Hot leg temperature (K)	--	576.1 ± 0.5
Boron concentration (ppm)	As required to maintain temperature	726 ± 15
Reactor Vessel		
Power level (MW)	50 ± 1	49 ± 1
Maximum linear heat generation rate (kW/m)	--	52.8 ± 3.7
Control rod position (above full-in position) (m)	1.372 ± 0.013	1.373 ± 0.010
Pressurizer		
Steam volume (m^3)	--	0.30 ± 0.05
Liquid volume (m^3)	--	0.63 ± 0.05
Water temperature (K)	--	615.0 ± 0.3
Pressure (MPa)	14.95 ± 0.34	14.90 ± 0.04
Liquid level (m)	1.13 ± 0.18	1.10 ± 0.02
Broken Loop		
Cold leg temperature near reactor vessel (K)	--	557.7 ± 2.5
Hot leg temperature near reactor vessel (K)	--	561.4 ± 2.5
Steam Generator Secondary Side		
Water level (m)[c]	0.25 ± 0.05	0.25 ± 0.06
Water temperature (K)	--	544.0 ± 0.2
Pressure (MPa)	--	5.576 ± 0.012
Mass flow rate (kg/s)	--	28.0 ± 0.4
Accumulator A		
Liquid level (m)	1.85 ± 0.05	1.85 ± 0.01
Liquid volume (m^3)	--	2.60 ± 0.03
Gas volume (m^3)	--	1.19 ± 0.03
Pressure (MPa)	4.22 ± 0.17	4.31 ± 0.06
Temperature (K)	305.4 ± 5.6	306.6 ± 0.7
Boron concentration (ppm)	>3000	3405 ± 15

TABLE 4-2. (continued)

Parameter	Specified Value[a]	Measured Value[b]
HPIS		
Initial flow rate (L/s)	0.32 ± 0.13	0.32 ± 0.02
Initiation pressure (MPa)	13.16 ± 0.19	13.35 ± 0.24

a. The specified value tolerance is an indicated operating band.

b. The measured value tolerance is the uncertainty in the measurement.

c. The water level is defined as 0.0 at 2.95 m above the top of the tube sheet.

TABLE 4-3. LINEAR HEAT GENERATION RATE PRIOR TO EXPERIMENT L3-7
(Reading Uncertainty ± 7.6%)

Height above Core Bottom (m)	Linear Heat Generation Rate for Core Position (kW/m)		
	1C7	5H8	5M3
0.152	13.04	23.36	22.90
0.305	23.67	38.56	38.59
0.406	26.38	42.97	43.01
0.460	25.09	40.86	40.90
0.508	27.18	44.27	44.31
0.559	29.17	47.52	47.56
0.660	30.32	48.04	48.71
0.762	29.83	47.26	47.86
0.838	27.90	44.21	44.78
0.891	24.55	39.99	40.03
0.940	25.77	41.40	41.68
1.067	23.60	37.34	37.86
1.219	17.95	28.44	29.46
1.270	15.12	23.95	24.26
1.303	12.98	20.56	20.82
1.372	11.08	17.55	17.78
1.524	4.83	8.74	8.20
1.626	2.38	4.30	4.04
1.676	1.40	1.50	1.39

TABLE 4-4. PRIMARY COOLANT TEMPERATURES AT BLOWDOWN INITIATION

Location	Detector	Temperature (K)
Intact loop hot leg (near vessel)	TE-PC-002B	577.6 ± 0.6
Intact loop steam generator inlet	TE-SG-001	577.0 ± 0.8
Intact loop steam generator outlet	TE-SG-002	560.2 ± 0.8
Intact loop cold leg (near vessel)	TE-PC-004	559.4 ± 0.3
Reactor vessel downcomer:		
Instrument Stalk 1	TE-1ST-001	560.1 ± 0.7
Instrument Stalk 2	TE-2ST-001	561.5 ± 0.8
Reactor vessel lower plenum	TE-1LP-001	560.9 ± 0.7
Reactor vessel upper plenum	TE-1UP-001	586.6 ± 0.7
	TE-5UP-001	588.7 ± 1/0
Broken loop hot leg (near vessel)	TE-BL-002B	561.4 ± 0.3
Broken loop cold leg (near vessel)	TE-BL-001B	557.7 ± 0.2
Intact loop pressurizer (from saturation pressure)	PE-PC-004	615.5 ± 0.5

TABLE 4-5. WATER CHEMISTRY RESULTS FOR EXPERIMENT L3-7

	Primary Coolant System		Blowdown Suppression Tank			Secondary Coolant System	
Parameter	Specified	Pre-LOCE[a]	Specified	Pre-LOCE	Post-LOCE	Specified	Pre-LOCE
pH (each at 298 K)	4.2 to 10.5	5.87	4.2 to 10.5	4.70	4.78	9.0 to 10.2	10.12
Conductivity (μmho/cm^3) (each at 298 K)	60 maximum	2.63	60 maximum	11.65	10.26	2 maximum[b]	2.40
Total gas (cm^3/kg)	100 maximum	44.2	--	21.63	16.2	--	--
Dissolved oxygen (ppm)	--	--	--	--	--	0.05 maximum	0.01
Lithium (ppm)	0.2 to 2.2	--	--	--	--	--	--
Chloride (ppm)	0.15 maximum	<0.1	0.15 maximum	<0.1	<0.1	0.15 maximum	0.1
Undissolved solids (ppm)	1.0 maximum	<0.5	1.0 maximum	<0.5	<0.5	1.0 maximum	<0.9
Boron (ppm)	--	726	3050	3748	3308	--	0.032
Fluoride (ppm)	0.1 maximum	< 0.02	0.1 maximum	<0.02	< 0.02	--	--
Hydrogen (cm^3/kg)[c]	10 to 60	18.5	--	1.4	0.0	--	--
Total gross activity (μc/mL)	375 maximum	2.08×10^{-2}	--	--	0.0	--	--
Gross beta and gamma (μc/mL)	--	1.39×10^{-2}	--	--	1.4×10^{-3}	--	--
^{131}I (μc/mL)	0.37 maximum	0.0	--	--	0.0	9×10^{-4} maximum	0.0
^{135}I (μc/mL)	0.76 maximum	0.0	--	--	0.0	--	--

a. Sample taken upstream of the primary coolant system ion exchanger.

b. Cation conductivity.

c. Prior to depressurization.

5. DATA PRESENTATION

The data presented in this report include selected pertinent thermal-hydraulic and nuclear data from LOFT Experiment L3-7.

Error bands are presented on 21 critical measurements for ease in code comparisons. These along with the remainder of the uncertainty values are presented in Tables 5-1, 5-2, and B-1. Experimental Data Reports for future LOFT experiments will present uncertainty values on each plot.

The selected data have been divided into two categories, "Qualified" and "Failed." The qualified designation was applied to measurements that have been found to be within the uncertainty of the instrument. The absence of a comment following the qualified designation indicates that the data are valid (that is, within specified uncertainty bands) over the entire time span recorded. Restrictive statements accompany data that are invalid over a portion of the recorded time span. Instrument channels were not presented if the data were in the instrument dead band or showed a similar response to nearby like instruments (such as the core thermocouples). These data are available at EG&G Idaho, Inc., upon special request. The checks on data consistency and instrument performance are discussed in detail in Appendix A.

The data were processed and are presented in graphical form in SI units. Measurements were combined to produce computed variables, and graphs of similar variables at several locations were overlaid to facilitate comparison. The number of data points shown for each instrument have been reduced to 2000 for ease of plotting. To accomplish this reduction, the data were passed through a low-pass filter and then decimated.

The 2-σ confidence intervals have been determined from knowledge of the systematic and random errors of the sensors, data system calibration procedures, and the channel random noise during preexperiment calibrations. These are presented as functions of output level so that the user may determine the approximate uncertainty over each range of interest for a given variable.

Table 5-1 lists Experiment L3-7 instrumentation that provided data presented in this report and gives the detector location, range, initial condition uncertainty, uncertainty at specific readings, and recording frequency along with the figure numbers. This table also contains a "Comments" column which gives information relative to the usability of the data. A complete list of LOFT instrumentation available for Experiment L3-7 is contained in Appendix B.

Table 5-2 lists the variables that were computed from the transducer outputs and other factors, such as geometrical constants. This table also gives the equations used to compute these variables, the figure number, and comments which may reflect on the usefulness of the data.

The data are divided into five major sections with the individual plots in each section presented in alphanumeric order to facilitate comparison and location of desired variables. These data sections include

1. Experiment L3-7 Measured Variables, Short-Term Plots (-400 up to 2000 s), Figures 5S-1 through 5S-81

2. Experiment L3-7 Measured Variables, Medium-Term Plots (0 to 7500 s), Figures 5M-1 through 5M-101

3. Experiment L3-7 Measured Variables, Long-Term Plots (0 to 15 000 s), Figures 5L-1 through 5L-12

4. Experiment L3-7 Computed Variables, Figures 5C-1 through 5C-14

5. Experiment L3-7 Variables with Uncertainties, Figures 5U-1 through 5U-21.

TABLE 5-1. MEASURED VARIABLES FOR EXPERIMENT L3-7

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation: Reading	After Experiment Initiation: Uncertainty (±)	Figure Number[b]	Comments
VALVE OPENING								
Intact Loop								
CV-P004-008	Main feedwater control valve.	0 to 100%	1 Hz	3.2%	0% 25% 50% 100%	3.0% 3.13% 3.47% 4.61%	5M-1	Qualified.
CV-P004-010	Main steam control valve.	0 to 100%	1 Hz	4.06%	0% 25% 50% 100%	3.0% 3.13% 3.47% 4.61%	5M-2	Qualified.
CHORDAL DENSITY								
Broken Loop								
DE-BL-001A	Broken loop cold leg at drag disc turbine transducer (DTT) flange. Beam A is 14° 21 min from Beam B [CW looking toward reactor vessel (RV)].	0 to 1.0 Mg/m^3	10 Hz	--	--	0.068 Mg/m^3[c]	5S-3 5M-3	Qualified after reactor scram.
DE-BL-001B	Broken loop cold leg at DTT flange. Beam B through centerline of pipe 45° from vertical (CCW looking toward RV).	0 to 1.0 Mg/m^3	10 Hz	--	--	0.076 Mg/m^3	5S-4 5M-4 5U-2	Qualified after reactor scram.
DE-BL-001C	Broken loop cold leg at DTT flange. Beam C is 22° 7 min from Beam B (CCW looking toward RV).	0 to 1.0 Mg/m^3	10 Hz	--	--	0.11 Mg/m^3	5S-5 5M-5	Qualified after reactor scram.
DE-BL-002A	Broken loop hot leg at DTT flange. Beam A is 14° 21 min from Beam B (CCW looking toward RV).	0 to 1.0 Mg/m^3	10 Hz	--	--	0.12 Mg/m^3	5S-6 5M-6	Qualified after reactor scram.

TABLE 5-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation: Reading	After Experiment Initiation: Uncertainty (±)	Figure Number[b]	Comments
CHORDAL DENSITY (continued)								
Broken Loop (continued)								
DE-BL-002B	Broken loop hot leg at DTT flange. Beam B through centerline of pipe 45° from vertical (CW looking toward RV).	0 to 1.0 Mg/m^3	10 Hz	--	--	0.065 Mg/m^3	5S-7 5M-7	Qualified after reactor scram.
Intact Loop								
DE-PC-001B	Intact loop cold leg at DTT flange. Beam B through centerline of pipe 45° from vertical (CCW looking away from RV).	0 to 1.0 Mg/m^3	10 Hz	--	--	0.068 Mg/m^3	5S-8 5M-8 5U-3	Qualified after reactor scram.
DE-PC-001C	Intact loop cold leg at DTT flange. Beam C is 22° 7 min from Beam B (CCW looking away from RV).	0 to 1.0 Mg/m^3	10 Hz	--	--	0.092 Mg/m^3	5S-9 5M-9	Qualified after reactor scram.
DE-PC-002A	Intact loop hot leg at DTT flange. Beam A is 14° 21 min from Beam B (CW looking away from RV).	0 to 1.0 Mg/m^3	10 Hz	--	--	0.054 Mg/m^3	5S-10 5M-10	Qualified after reactor scram.
DE-PC-002B	Intact loop hot leg at DTT flange. Beam B through centerline of pipe 45° from vertical (CCW looking away from RV).	0 to 1.0 Mg/m^3	10 Hz	--	--	0.10 Mg/m^3	5S-11 5M-11 5U-4	Qualified after reactor scram.
DE-PC-002C	Intact loop hot leg at DTT flange. Beam C is 22° 7 min from Beam B (CCW looking away from RV).	0 to 1.0 Mg/m^3	10 Hz	--	--	0.091 Mg/m^3	5S-12 5M-12	Qualified after reactor scram.
FLUID VELOCITY								
Intact Loop								
FE-PC-002A	Hot leg DTT flange at bottom of pipe.	0.6 to 15.0 m/s	1 Hz	0.63 m/s	1 m/s 8 m/s 15 m/s	0.16 m/s[d] 0.48 m/s 0.86 m/s	5S-13 5M-13 5U-5	Qualified to 7500 s.

TABLE 5-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation: Reading	After Experiment Initiation: Uncertainty (±)	Figure Number[b]	Comments
FLUID VELOCITY (continued)								
Reactor Vessel								
FE-5UP-001	Above upper end box of Fuel Assembly 5.	0.5 to [illegible].0 m/s	1 Hz	0.23 m/s	1 m/s 5 m/s 10 m/s	0.06 m/s 0.28 m/s 0.56 m/s	5S-14 5M-14	Qualified, zero offset beyond 7500 s due to electronics.
FLOW RATE								
Intact Loop								
FT-P004-012	Inlet to air-cooled condenser inlet header.	0 to 40 kg/s	1 Hz	0.8 kg/s	--	0.8 kg/s	5M-15	Qualified.
Emergency Core Cooling System								
FT-P120-085	Low-pressure injection system (LPIS) Pump A in 4-in. line between heat exchanger and orifice.	0 to 25.2 L/s	1 Hz	2.5 L/s	--	2.5 L/s	5M-16	Qualified.
FT-P128-104	High-pressure injection system (HPIS) Pump A discharge.	0 to 1.89 L/s	1 Hz	0.02 L/s	--	0.02 L/s	5M-17 5U-6	Qualified.
Intact Loop								
FT-P139-27-1	Intact loop hot leg venturi flowmeter [right side facing steam generator (SG)].	0 to 630.0 kg/s	1 Hz	17 kg/s	--	17 kg/s	5S-15	Qualified, good for initial conditions only.
FT-P139-27-2	Intact loop hot leg venturi flowmeter (bottom of pipe).	0 to 630.0 kg/s	1 Hz	17 kg/s	--	17 kg/s	5S-16	Qualified, good for initial conditions only.
FT-P139-27-3	Intact loop hot leg venturi flowmeter (left side facing SG).	0 to 630.0 kg/s	1 Hz	17 kg/s	--	17 kg/s	5S-17	Qualified, good for initial conditions only.
Primary Component Cooling System								
FT-P141-022	Primary component cooling system.	0 to 22 L/s	10 Hz	0.11 L/s	--	0.11 L/s	5L-1	Qualified.

TABLE 5-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation Reading	After Experiment Initiation Uncertainty (±)	Figure Number[b]	Comments
LIQUID LEVEL								
Broken Loop								
LEPdE-BL-013	SG simulator, inlet to top.	0 to 3.38 m	1 Hz	0.095 m	--	0.096 m	5S-18 5M-18 5L-2 5U-7	Qualified.
LEPdE-BL-014	SG simulator, outlet to top.	0 to 4.59 m	1 Hz	0.137 m	--	0.137 m	5S-19 5M-19 5L-3 5U-8	Qualified, unexplained long-term drift, should read 4.59 m at 1200 s.
Intact Loop								
LEPdE-PC-027	SG outlet to pump suction, lowest point.	0 to 1.55 m	1 Hz	Not applicable, data meaningful only after 380 s.	--	0.088 m	5S-20 5M-20 5U-9	Qualified, unexplained long-term drift, should read 1.55 m at 1500 s.
LEPdE-PC-028	Pump suction, lowest point to Pump 2 inlet.	0 to 0.66 m	1 Hz	Not applicable, data meaningful only after 380 s.	--	0.099 m	5S-21 5M-21 5U-10	Qualified.
Emergency Core Cooling System System								
LIT-P120-044	Accumulator A.	0 to 3.0 m	1 Hz	0.02 m	--	0.02 m	5M-22 5L-4	Qualified, uncertainty of ±5% due to pressure sensitivity.
Secondary Coolant System								
LT-P004-008B	SG feedwater level (wide range).	-3.6 to 1.4 m[e]	1 Hz	0.05 m	--	0.05 m	5M-23 5U-11	Qualified.
Intact Loop								
LT-P004-042	Condensate receiver level, 1.83 m south of condensate receiver centerline.	0 to 1.2 m	1 Hz	0.02 m	--	0.02 m	5M-24	Qualified.
Blowdown Suppression Tank								
LT-P138-033	Blowdown suppression tank (BST) level on north end of tank.	0 to 3.4 m	1 Hz	0.05 m	--	0.05 m	5S-22 5M-25	Qualified.

TABLE 5-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation Reading	After Experiment Initiation Uncertainty (±)	Figure Number[b]	Comments
LIQUID LEVEL (continued)								
Blowdown Suppression Tank (continued)								
LT-P138-058	BST level on south end of tank.	0 to 3.4 m	1 Hz	0.09 m	--	0.09 m	5S-23	Qualified.
Intact Loop								
LT-P139-007	Pressurizer level on southwest side.	0 to 1.9 m	1 Hz	0.04 m	--	0.04 m	5S-24 5M-26 5U-12	Qualified, maximum measurement range is 1.8 m.
MOMENTUM FLUX								
Intact Loop								
ME-PC-002B	Hot leg DTT flange at middle of pipe.	1.0 to 21.0 $Mg/m \cdot s^2$	1 Hz	0.20 $Mg/m \cdot s^2$	1.0 $Mg/m \cdot s^2$ 11.0 $Mg/m \cdot s^2$ 21.0 $Mg/m \cdot s^2$	0.20 $Mg/m \cdot s^2$ 0.27 $Mg/m \cdot s^2$ 0.38 $Mg/m \cdot s^2$	5S-25 5M-27	Qualified.
ME-PC-002C	Hot leg DTT flange at top of pipe.	1.0 to 21.0 $Mg/m \cdot s^2$	1 Hz	0.20 $Mg/m \cdot s^2$	1.0 $Mg/m \cdot s^2$ 11.0 $Mg/m \cdot s^2$ 21.0 $Mg/m \cdot s^2$	0.20 $Mg/m \cdot s^2$ 0.27 $Mg/m \cdot s^2$ 0.38 $Mg/m \cdot s^2$	5S-25 5M-27	Qualified.
Reactor Vessel								
ME-1ST-001	Downcomer Stalk 1, 1.16 m above RV bottom.	0.3 to 5.2 $Mg/m \cdot s^2$	1 Hz	0.78 $Mg/m \cdot s^2$	--	0.78 $Mg/m \cdot s^2$	5S-26	Qualified.
ME-5UP-001	Fuel assembly 5 above upper end box.	0.3 to 5.2 $Mg/m \cdot s^2$	1 Hz	0.78 $Mg/m \cdot s^2$	--	0.78 $Mg/m \cdot s^2$	5S-27	Qualified.
DIFFERENTIAL PRESSURE								
Broken Loop								
PdE-BL-002	Broken loop cold leg across small break orifice.	±17.5 MPa (differential)	1 Hz	0.025 MPa	0 MPa 5 MPa 10 MPa 15 MPa	0.025 MPa 0.026 MPa 0.028 MPa 0.032 MPa	5S-28 5M-28 5L-5	Qualified.
Intact Loop								
PdE-PC-001	Intact loop cold leg across primary coolant pumps (PCPs).	±700 kPa (differential)	1 Hz	1.8 kPa	0 kPa 350 kPa 700 kPa	1.7 kPa 1.7 kPa 1.9 kPa	5S-29 5U-13	Qualified.

TABLE 5-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation: Reading	After Experiment Initiation: Uncertainty (±)	Figure Number[b]	Comments
DIFFERENTIAL PRESSURE (continued)								
Intact Loop (continued)								
PdE-PC-002	Intact loop across SG.	±350 kPa (differential)	1 Hz	0.94 kPa	0 kPa 150 kPa 300 kPa	0.89 kPa 0.90 kPa 0.98 kPa	5S-30	Qualified.
PdE-PC-003	Intact loop hot leg piping, RV to SG inlet.	±100 kPa (differential)	1 Hz	0.50 kPa	0 kPa 50 kPa 100 kPa	0.49 kPa 0.50 kPa 0.52 kPa	5S-31	Qualified, negative values indicate voiding in reference leg.
PdE-PC-005	Intact loop cold leg PCPs to RV nozzle.	±100 kPa (differential)	1 Hz	0.50 kPa	0 kPa 50 kPa 100 kPa	0.49 kPa 0.50 kPa 0.52 kPa	5S-32	Qualified, negative values are within measurement uncertainty.
PdE-PC-008	Intact loop across pressurizer surge line.	±10.34 kPa (differential)	1 Hz	0.025 kPa	0 kPa 5 kPa 10 kPa	0.025 kPa 0.026 kPa 0.028 kPa	5S-33	Qualified.
Reactor Vessel								
PdE-RV-005	Top of RV to intact loop hot leg.	±40 kPa (differential)	1 Hz	0.29 kPa	0 kPa 20 kPa 40 kPa	0.28 kPa 0.285 kPa 0.291 kPa	5S-34 5M-29	Qualified, no comparable measurement.
Blowdown Suppression Tank								
PdE-SV-001	BST.	0 to 25 kPa (differential)	1 Hz	0.042 kPa	0 kPa 12 kPa 25 kPa	0.039 kPa 0.043 kPa 0.055 kPa	5M-30	Qualified, good for initial conditions only.
Intact Loop								
PdT-P139-27-1	Intact loop venturi, Channel A.	0 to 200 kPa (differential)	1 Hz	2 kPa	--	2 kPa	5S-35	Qualified, good for initial conditions only.
PdT-P139-27-2	Intact loop venturi, Channel B.	0 to 200 kPa (differential)	1 Hz	2 kPa	--	2 kPa	5S-36	Qualified, good for initial conditions only.
PdT-P139-27-3	Intact loop venturi, Channel C.	0 to 200 kPa (differential)	1 Hz	2 kPa	--	2 kPa	5S-37	Qualified, good for initial conditions only.

TABLE 5-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation: Reading	After Experiment Initiation: Uncertainty (±)	Figure Number[b]	Comments
DIFFERENTIAL PRESSURE (continued)								
Intact Loop (continued)								
PdT-P139-030	Across RV just beyond intact loop inlet and and outlet nozzles.	0 to 300 kPa (differential)	1 Hz	3 kPa	--	3 kPa	5S-38	Qualified, good for initial conditions only.
PRESSURE[f]								
Broken Loop								
PE-BL-001	Broken loop cold leg at DTT flange.	0.1 to 20.8 MPa[f]	1 Hz	0.251 MPa	0 MPa 10 MPa 20 MPa	0.199 MPa 0.223 MPa 0.282 MPa	5S-39 5M-31 5U-14	Qualified.
PE-BL-002	Broken loop hot leg at DTT flange.	0.1 to 20.8 MPa	1 Hz	0.251 MPa	0 MPa 10 MPa 20 MPa	0.199 MPa 0.223 MPa 0.282 MPa	5M-32	Qualified.
PE-BL-003	Broken loop hot leg downstream of pump simulator.	0.1 to 20.8 MPa	1 Hz	0.251 MPa	0 MPa 10 MPa 20 MPa	0.199 MPa 0.223 MPa 0.282 MPa	5S-40	Qualified.
PE-BL-008	Broken loop cold leg in 8-in. pipe downstream of break.	0.1 to 20.8 MPa	1 Hz	0.251 MPa	0 MPa 10 MPa 20 MPa	0.199 MPa 0.223 MPa 0.282 MPa	5S-41	Qualified.
Intact Loop								
PE-PC-001	Intact loop cold leg at DTT flange.	0.1 to 20.8 MPa	1 Hz	0.251 MPa	0 MPa 10 MPa 20 MPa	0.199 MPa 0.223 MPa 0.282 MPa	5S-42	Qualified.
PE-PC-002	Intact loop hot leg at DTT flange.	0.1 to 20.8 MPa	1 Hz	0.251 MPa	0 MPa 10 MPa 20 MPa	0.199 MPa 0.223 MPa 0.282 MPa	5S-43 5M-33	Qualified.
PE-PC-004	Intact loop pressurizer vapor space.	0.1 to 20.8 MPa	1 Hz	0.251 MPa	0.1 MPa 10 MPa 20 MPa	0.199 MPa 0.223 MPa 0.282 MPa	5S-44 5M-34 5L-6	Qualified.
PE-PC-005	Intact loop reference pressure between SG outlet and pump inlet.	0.1 to 17.0 MPa	1 Hz	0.028 MPa	--	0.028 MPa	5S-45 5U-15	Qualified.
PE-SGS-001	SG dome pressure.	0.1 to [illegible].0 MPa	1 Hz	0.012 MPa	--	0.012 MPa	5S-46 5M-35 5U-16	Qualified.

TABLE 5-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation: Reading	After Experiment Initiation: Uncertainty (±)	Figure Number[b]	Comments
PRESSURE (continued)								
Blowdown Suppression System								
PE-SV-003	BST across from Downcomer 1 (south end), 157.5° from top vertical (CW looking north).	0.1 to 0.7 MPa	1 Hz	0.008 MPa	--	0.008 MPa	5M-36	Qualified.
PE-SV-014	BST header above Downcomer 4, 327° from top vertical (CW looking north).	0.1 to 0.7 MPa	1 Hz	0.008 MPa	--	0.008 MPa	5M-37	Qualified.
PE-SV-017	BST, 1.38 m north of Downcomer 3 centerline, 0° from top vertical (CW looking north).	0.1 to 0.7 MPa	1 Hz	0.008 MPa	--	0.008 MPa	5M-38	Qualified.
PE-SV-018	BST header above Downcomer 1.	0.1 to 0.7 MPa	1 Hz	0.008 MPa	--	0.008 MPa	5M-39	Qualified.
PE-SV-055	BST top, 0.15 m north of Downcomer 4 centerline.	0.1 to 0.7 MPa	1 Hz	0.008 MPa	--	0.008 MPa	5M-40	Qualified.
Reactor Vessel								
PE-1ST-001A	Downcomer Stalk 1, 0.62 m above RV bottom, wide range (0 to 20.8 MPa).	0.1 to 20.8 MPa	1 Hz	0.200 MPa	0.1 MPa 10.0 MPa 20.5 MPa	0.199 MPa 0.199 MPa 0.200 MPa	5M-41	Qualified.
PE-1ST-003A	Downcomer Stalk 1, 5.32 m above RV bottom, wide range (0 to 20.8 MPa).	0.1 to 20.8 MPa	1 Hz	0.25 MPa	0.1 MPa 10 MPa 20 MPa	0.2 MPa 0.22 MPa 0.28 MPa	5M-42	Qualified.
PE-1UP-001A	Above Fuel Assembly 1 upper end box, high range.	0.1 to 20.8 MPa	1 Hz	0.25 MPa	0.1 MPa 10 MPa 20 MPa	0.2 MPa 0.22 MPa 0.28 MPa	5M-43	Qualified.
PE-1UP-001A1	Above Fuel Assembly 1 upper end box, high range.	0.1 to 20.8 MPa	1 Hz	0.25 MPa	0.1 MPa 10 MPa 20 MPa	0.2 MPa 0.22 MPa 0.28 MPa	5S-47	Qualified.
PE-2ST-001A	Downcomer Stalk 2, 0.62 m above RV bottom, wide range (0 to 20.8 MPa).	0.1 to 20.8 MPa	1 Hz	0.25 MPa	0.1 MPa 10 MPa 20 MPa	0.2 MPa 0.22 MPa 0.28 MPa	5M-44	Qualified.

TABLE 5-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation Reading	After Experiment Initiation Uncertainty (±)	Figure Number[b]	Comments
PRESSURE (continued)								
Secondary Coolant System								
PT-P004-010A	In 10-in. line from SG.	0.1 to 8.4 MPa	1 Hz	0.110 MPa	--	0.110 MPa	5S-48 5M-45	Qualified.
PT-P004-085	Upstream of inlet to air-cooled condenser header.	0 to 2.8 MPa	1 Hz	0.075 MPa	--	0.075 MPa	5M-46	Qualified.
Emergency Core Cooling System								
PT-P120-043	Accumulator A, 0.69 m above water outlet.	0.1 to 7.0 MPa	1 Hz	0.055 MPa	--	0.055 MPa	5M-47	Qualified.
PT-P120-083	LPIS Pump A discharge.	0.1 to 7.0 MPa	1 Hz	0.04 MPa	--	0.04 MPa	5M-48	Qualified.
Intact Loop								
PT-P139-002	Intact loop hot leg at venturi on bottom.	0.1 to 20.8 MPa	1 Hz	0.25 MPa	--	0.25 MPa	5M-49	Qualified.
PT-P139-003	Intact loop hot leg at venturi on left side when looking toward SG.	0.1 to 20.8 MPa	1 Hz	0.25 MPa	--	0.25 MPa	5M-50	Qualified.
PT-P139-004	Intact loop hot leg at venturi on right side when looking toward SG.	0.1 to 20.8 MPa	1 Hz	0.25 MPa	--	0.25 MPa	5M-51	Qualified.
PT-P139-005	1.88 m above pressurizer bottom (vapor space).	10.3 to 17.2 MPa	1 Hz	0.12 MPa	--	0.12 MPa	5M-52	Qualified, narrow range instrument.
PUMP SPEED								
Intact Loop								
RPE-PC-001	Intact loop Pump 1.	0 to 10 000 rpm	1 Hz	10.26 rpm	1000 rpm 2000 rpm 3000 rpm 4000 rpm	7.65 rpm 8.825 rpm 10.10 rpm 11.66 rpm	5S-1	Qualified.
REACTIVITY								
Reactor Vessel								
RE-T-77-1A2	Power range, Channel A level.	0 to 100% power	1 Hz	3%	--	3%	5S-2	Qualified, good to to reactor scram.

TABLE 5-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation: Reading	After Experiment Initiation: Uncertainty (±)	Figure Number[b]	Comments
TEMPERATURE								
Broken Loop								
TE-BL-001B	Broken loop cold leg at DTT rake center.	255.2 to 588.6 K	1 Hz	2.5 K	350 K 450 K 550 K 650 K	2.4 K 2.5 K 2.5 K 3.2 K	5S-49 5M-53	Qualified.
TE-BL-002B	Broken loop hot leg at middle of DTT flange.	255.2 to 588.6 K	1 Hz	2.5 K	350 K 450 K 550 K 650 K	2.4 K 2.5 K 2.5 K 3.2 K	5M-54	Qualified.
Intact Loop								
TE-PC-002A	Intact loop hot leg DTT flange at bottom of pipe.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	5S-50 5M-55 5U-17	Qualified.
TE-PC-002B	Intact loop hot leg DTT flange at middle of pipe.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	5S-50 5M-55 5L-7	Qualified.
TE-PC-002C	Intact loop hot leg DTT flange at top of pipe.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	5S-50 5M-55	Qualified.
TE-PC-004	Bottom of ECC Rake 1 (between PdE-PC-014 and PdE-PC-018).	270 to 1530 K	1 Hz	3.1 K	350 K 450 K 550 K 650 K	2.8 K 2.9 K 3.0 K 3.6 K	5S-51 5M-56 5L-8	Qualified.
TE-PC-008	Bottom of ECC Rake 2 (between PdE-PC-022 and PdE-PC-026).	270 to 1530 K	1 Hz	3.1 K	350 K 450 K 550 K 650 K	2.8 K 2.9 K 3.0 K 3.6 K	5S-52	Qualified.
TE-PC-011	Top of ECC Rake 2 (between PdE-PC-019 and PdE-PC-023).	270 to 1530 K	1 Hz	3.1 K	350 K 450 K 550 K 650 K	2.8 K 2.9 K 3.0 K 3.6 K	5M-57	Qualified.
TE-P139-019	Pressurizer vapor space, 0.86 m above the heater rods.	588.6 to 644.1 K	1 Hz	0.5 K	--	0.5 K	5S-53	Qualified, initial conditions only, shows hot wall effects after blowdown initiation.

TABLE 5-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation: Reading	After Experiment Initiation: Uncertainty (±)	Figure Number[b]	Comments
TEMPERATURE (continued)								
Intact Loop (continued)								
TE-P139-020	Pressurizer liquid volume, 0.36 m above heater rods.	28[illegible] to [illegible] K	1 Hz	3.0 K	--	3.0 K	5S-53	Qualified, initial conditions only, shows hot wall effects after blowdown initiation.
TE-P139-28-2	Intact loop cold leg.	530 to 620 K	1 Hz	0.6 K	--	0.6 K	5M-59	Qualified, narrow range process instrument, response limited.
TE-P139-029	Intact loop cold leg.	280 to 620 K	1 Hz	2.1 K	--	2.1 K	5M-58	Qualified, process instrument, response limited.
TE-P139-32-1	Intact loop hot leg.	280 to 620 K	1 Hz	1.43 K	--	1.43 K	5S-54 5M-60	Qualified, process instrument, response limited.
Primary Component Cooling System								
TE-P141-94	Downstream from primary component cooling system heat exchanger.	275 to 350 K	10 Hz	0.32 K	--	0.32 K	5L-9	Qualified.
TE-P141-95	Upstream from primary component cooling system heat exchanger.	275 to 350 K	10 Hz	0.32 K	--	0.32 K	5L-10	Qualified.
Intact Loop								
TE-SG-001	Intact loop cold leg SG outlet.	253.2 to 977.4 K	1 Hz	2.8 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.7 K 3.3 K	5S-55 5M-61	Qualified.
TE-SG-002	Intact loop hot leg SG inlet.	253.2 to 977.4 K	1 Hz	2.8 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.7 K 3.3 K	5S-55 5M-61	Qualified.
Secondary Coolant System								
TE-SG-003	SG secondary side.	253.2 to 588.6 K	[illegible] Hz	2.5 K	350 K 450 K 550 K 650 K	2.4 K 2.5 K 2.5 K 3.2 K	5M-62	Qualified.

TABLE 5-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation: Reading	After Experiment Initiation: Uncertainty (±)	Figure Number[b]	Comments
TEMPERATURE (continued)								
Blowdown Suppression System								
TE-SV-002	BST, 0.3 m north of Downcomer 1, 0.53 m east of tank centerline, 2.36 m from tank bottom.	253.2 to 477.4 K	1 Hz	1.1 K	300 K 350 K 400 K	0.9 K 1.0 K 1.3 K	5M-63	Qualified.
TE-SV-004	BST, 0.3 m north of Downcomer 1, 0.53 m east of tank centerline, 1.45 m from tank bottom.	253.2 to 477.4 K	1 Hz	1.1 K	300 K 350 K 400 K	0.9 K 1.0 K 1.3 K	5M-64	Qualified.
TE-SV-006	BST, 0.3 m north of Downcomer 1, 0.53 m east of tank centerline, 0.37 m from tank bottom.	253.2 to 477.4 K	1 Hz	1.1 K	300 K 350 K 400 K	0.9 K 1.0 K 1.3 K	5M-65	Qualified.
TE-SV-008	BST, 0.3 m north of Downcomer 3, 0.53 m east of tank centerline, 2.36 m from tank bottom.	253.2 to 477.4 K	1 Hz	1.1 K	300 K 350 K 400 K	0.9 K 1.0 K 1.3 K	5M-63	Qualified.
TE-SV-010	BST, 0.3 m north of Downcomer 3, 0.53 m east of tank centerline, 1.45 m from tank bottom.	253.2 to 477.4 K	1 Hz	1.1 K	300 K 350 K 400 K	0.9 K 1.0 K 1.3 K	5M-64	Qualified.
TE-SV-011	BST, 0.3 m north of Downcomer 3, 0.53 m east of tank centerline, 0.99 m from tank bottom.	253.2 to 477.4 K	1 Hz	1.1 K	300 K 350 K 400 K	0.9 K 1.0 K 1.3 K	5M-66	Qualified.
Reactor Vessel								
TE-1F7-015	Fuel Assembly 1, Row F, Column 7, 0.381 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	5S-56 5M-67	Qualified.
TE-1F7-021	Fuel Assembly 1, Row F, Column 7, 0.533 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	5S-56	Qualified.

TABLE 5-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation: Reading	After Experiment Initiation: Uncertainty (±)	Figure Number[b]	Comments
TEMPERATURE (continued)								
Reactor Vessel (continued)								
TE-1F7-026	Fuel Assembly 1, Row F, Column 7, 0.660 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	5S-56	Qualified.
TE-1F7-030	Fuel Assembly 1, Row F, Column 7, 0.762 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	5S-56 5M-67	Qualified.
TE-1LP-001	Fuel Assembly 1 lower end box.	311 to 977.4 K	1 Hz	2.7 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	5S-57 5M-68	Qualified.
TE-1ST-001	Downcomer Stalk 1, 4.8 m from RV bottom.	253.2 to 977.4 K	1 Hz	2.7 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.7 K 3.3 K	5S-58 5M-69	Qualified.
TE-1ST-002	Downcomer Stalk 1, 4.2 m from RV bottom.	253.2 to 977.4 K	1 Hz	2.7 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.7 K 3.3 K	5M-69	Qualified.
TE-1ST-005	Downcomer Stalk 1, 2.37 m from RV bottom.	253.2 to 977.4 K	1 Hz	2.7 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.7 K 3.3 K	5M-69	Qualified.
TE-1ST-009	Downcomer Stalk 1, 0.64 m from RV bottom.	253.2 to 977.4 K	1 Hz	2.7 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.7 K 3.3 K	5M-70	Qualified.
TE-1ST-013	Downcomer Stalk 1, 0.24 m from RV bottom.	253.2 to 977.4 K	1 Hz	2.7 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.7 K 3.3 K	5M-70	Qualified.
TE-1UP-001	Fuel Assembly 1 upper end box.	311 to 977.4 K	1 Hz	2.9 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	5S-59 5M-71	Qualified.
TE-2G14-011	Cladding on Fuel Assembly 2, Row G, Column 14 at 0.28 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	5S-60 5M-72	Qualified.

TABLE 5-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation: Reading	After Experiment Initiation: Uncertainty (±)	Figure Number[b]	Comments
TEMPERATURE (continued)								
Reactor Vessel (continued)								
TE-2G14-030	Cladding on Fuel Assembly 2, Row G, Column 14 at 0.76 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.7 K 3.2 K 4.7 K 6.2 K	5S-60	Qualified.
TE-2G14-045	Cladding on Fuel Assembly 2, Row G, Column 14 at 1.14 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	400 K 600 K 800 K 1000 K	2.7 K 3.2 K 4.7 K 6.2 K	5S-60 5M-72	Qualified.
TE-2H01-037	Cladding on Fuel Assembly 2, Row H, Column 1 at 0.94 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	400 K 600 K 800 K 1000 K	2.7 K 3.2 K 4.7 K 6.2 K	5S-61 5M-73	Qualified.
TE-2H02-028	Cladding on Fuel Assembly 2, Row H, Column 2 at 0.71 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	400 K 600 K 800 K 1000 K	2.7 K 3.2 K 4.7 K 6.2 K	5M-73	Qualified.
TE-2H02-032	Cladding on Fuel Assembly 2, Row H, Column 2 at 0.81 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	400 K 600 K 800 K 1000 K	2.7 K 3.2 K 4.7 K 6.2 K	5M-73	Qualified.
TE-2LP-001	Fuel Assembly 2 lower end box.	311 to 977.4 K	1 Hz	2.7 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	5S-62 5M-74	Qualified.
TE-2ST-001	Downcomer Stalk 2, 4.8 m from RV bottom.	253.2 to 977.4 K	1 Hz	2.7 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.7 K 3.3 K	5M-75	Qualified.
TE-2ST-005	Downcomer Stalk 2, 2.37 m from RV bottom.	253.2 to 977.4 K	1 Hz	2.7 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.7 K 3.3 K	5M-76	Qualified.
TE-2UP-003	Fuel Assembly 2 upper end box.	311 to 977.4 K	1 Hz	2.9 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	5S-63 5M-77	Qualified.

TABLE 5-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation: Reading	After Experiment Initiation: Uncertainty (±)	Figure Number[b]	Comments
TEMPERATURE (continued)								
Reactor Vessel (continued)								
TE-3C11-039	Cladding on Fuel Assembly 3, Row C, Column 11 at 0.99 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	5S-64 5M-78	Qualified.
TE-3LP-001	Fuel Assembly 3 lower end box.	311 to 977.4 K	1 Hz	2.6 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.5 K 3.3 K	5S-65 5M-79	Qualified.
TE-3UP-001	Fuel Assembly 3 upper end box.	311 to 977.4 K	1 Hz	2.9 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	5S-66	Qualified.
TE-3UP-002	Fuel Assembly 3 upper end box.	311 to 977.4 K	1 Hz	2.9 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	5M-80	Qualified.
TE-3UP-003	Fuel Assembly 3 support column above RV nozzle.	311 to 977.4 K	1 Hz	2.8 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	5S-66	Qualified.
TE-3UP-004	Fuel Assembly 3 support column above RV nozzle.	311 to 977.4 K	1 Hz	2.8 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	5S-66	Qualified.
TE-3UP-006	Support column.	311 to 977.4 K	1 Hz	2.8 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	5S-67 5M-81	Qualified.
TE-3UP-008	Liquid level transducer above Fuel Assembly 3.	311 to 977.4 K	1 Hz	2.8 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	5S-68 5M-82	Qualified.
TE-3UP-010	Liquid level transducer above Fuel Assembly 3.	311 to 977.4 K	1 Hz	2.8 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	5S-69	Qualified.

TABLE 5-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation		Figure Number[b]	Comments
					Reading	Uncertainty (±)		
TEMPERATURE (continued)								
Reactor Vessel (continued)								
TE-3UP-011	Liquid level transducer above Fuel Assembly 3.	311 to 977.4 K	1 Hz	2.8 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	5M-83	Qualified.
TE-3UP-012	Liquid level transducer above Fuel Assembly 3.	311 to 977.4 K	1 Hz	2.8 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	5S-69	Qualified.
TE-3UP-014	Liquid level transducer above Fuel Assembly 3.	311 to 977.4 K	1 Hz	2.8 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	5M-84	Qualified.
TE-3UP-015	Liquid level transducer above Fuel Assembly 3.	311 to 977.4 K	1 Hz	2.8 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	5S-70	Qualified.
TE-3UP-016	Liquid level transducer above Fuel Assembly 3.	311 to 977.4 K	1 Hz	2.8 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	5S-70	Qualified.
TE-4LP-003	Fuel Assembly 4 lower end box.	311 to 977.4 K	1 Hz	2.6 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	5S-71 5M-85	Qualified.
TE-4UP-001	Fuel Assembly 4 upper end box.	311 to 977.4 K	1 Hz	2.8 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	5M-86	Qualified.
TE-5C6-024	Guide tube for Fuel Assembly 5, Row C, Column 6 at 0.61 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	5M-87	Qualified.
TE-5D6-030	Cladding on Fuel Assembly 5, Row D, Column 6 at 0.76 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	5M-88	Qualified.

TABLE 5-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation: Reading	After Experiment Initiation: Uncertainty (±)	Figure Number[b]	Comments
TEMPERATURE (continued)								
Reactor Vessel (continued)								
TE-5D6-039	Cladding on Fuel Assembly 5, Row D, Column 6 at 0.99 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	5M-88	Qualified.
TE-5E8-015	Cladding on Fuel Assembly 5, Row E, Column 8 at 0.38 m above bottom of fuel rod.	420 to 1810 K	1 Hz	4.1 K	450 K 600 K 800 K 1000 K	3.8 K 4.2 K 5.2 K 6.7 K	5S-72	Qualified.
TE-5E8-034.5	Cladding on Fuel Assembly 5, Row E, Column 8 at 0.88 m above bottom of fuel rod.	420 to 1810 K	1 Hz	4.2 K	450 K 600 K 800 K 1000 K	3.8 K 4.2 K 5.2 K 6.7 K	5S-72 5L-11	Qualified.
TE-5E8-049	Cladding on Fuel Assembly 5, Row E, Column 8 at 1.24 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	5S-72	Qualified.
TE-5F9-011	Cladding on Fuel Assembly 5, Row F, Column 9 at 0.28 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	5S-73 5M-89	Qualified.
TE-5F9-030	Cladding on Fuel Assembly 5, Row F, Column 9 at 0.76 m above bottom of fuel rod.	420 to 1810 K	1 Hz	4.2 K	450 K 600 K 800 K 1000 K	3.8 K 4.2 K 5.2 K 6.7 K	5S-73 5M-89	Qualified.
TE-5F9-045	Cladding on Fuel Assembly 5, Row F, Column 9 at 1.14 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	5S-73 5M-89 5U-18	Qualified.
TE-5F9-062	Cladding on Fuel Assembly 5, Row F, Column 9 at 1.57 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	5S-73 5M-89	Qualified.

TABLE 5-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation Reading	After Experiment Initiation Uncertainty (±)	Figure Number[b]	Comments
TEMPERATURE (continued)								
Reactor Vessel (continued)								
TE-5G6-011	Cladding on Fuel Assembly 5, Row G, Column 6 at 0.28 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	5S-74	Qualified.
TE-5G6-030	Cladding on Fuel Assembly 5, Rod G, Column 6 at 0.76 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	5S-74	Qualified.
TE-5G6-045	Cladding on Fuel Assembly 5, Row G, Column 6 at 1.14 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	5S-74 5M-90	Qualified.
TE-5G6-062	Cladding on Fuel Assembly 5, Row G, Column 6 at 1.57 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	5S-74	Qualified.
TE-5G8-008	Cladding on Fuel Assembly 5, Row G, Column 8 at 0.20 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	5M-91	Qualified.
TE-5G8-026	Cladding on Fuel Assembly 5, Row G, Column 8 at 0.66 m above bottom of fuel rod.	410 to 1820 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	3.8 K 4.2 K 5.2 K 6.7 K	5M-91	Qualified.
TE-5G8-058	Cladding on Fuel Assembly 5, Row G, Column 8 at 1.47 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	5M-91	Qualified.
TE-5H5-002	Cladding on Fuel Assembly 5, Row H, Column 5 at 0.05 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	45[illegible] 60[illegible] K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	5S-75 5M-92	Qualified.

TABLE 5-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation: Reading	After Experiment Initiation: Uncertainty (±)	Figure Number[b]	Comments
TEMPERATURE (continued)								
Reactor Vessel (continued)								
TE-5H5-015	Cladding on Fuel Assembly 5, Row H, Column 5 at 0.38 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	5S-75	Qualified.
TE-5H5-034.5	Cladding on Fuel Assembly 5, Row H, Column 5 at 0.88 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	5S-75	Qualified.
TE-5H5-049	Cladding on Fuel Assembly 5, Row H, Column 5 at 1.24 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	5S-75 5M-92	Qualified.
TE-5I8-008	Cladding on Fuel Assembly 5, Row I, Column 8 at 0.20 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	5M-93	Qualified.
TE-5I8-058	Cladding on Fuel Assembly 5, Row I, Column 8 at 1.47 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	5M-93	Qualified.
TE-5LP-001	Fuel Assembly 5 lower end box.	311 to 977.4 K	1 Hz	2.7 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	5S-76 5M-94	Qualified.
TE-5L8-011	Guide tube for Fuel Assembly 5, Row L, Column 8 at 0.28 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	5S-77 5M-95	Qualified.
TE-5L8-024	Guide tube for Fuel Assembly 5, Row L, Column 8 at 0.61 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	5S-77	Qualified.

TABLE 5-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation: Reading	After Experiment Initiation: Uncertainty (±)	Figure Number[b]	Comments
TEMPERATURE (continued)								
Reactor Vessel (continued)								
TE-5L8-039	Guide tube for Fuel Assembly 5, Row L, Column 8 at 0.99 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	5S-77	Qualified.
TE-5L8-045	Guide tube for Fuel Assembly 5, Row L, Column 8 at 1.14 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	5S-77 5M-95	Qualified.
TE-5UP-001	Fuel Assembly 5 upper end box.	311 to 977.4 K	1 Hz	2.9 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	5S-78 5M-96 5L-12	Qualified.
TE-5UP-005	Fuel Assembly 5 upper end box.	311 to 977.4 K	1 Hz	2.9 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	5M-97	Qualified.
TE-5UP-008	Fuel Assembly 5 upper end box.	311 to 977.4 K	1 Hz	2.9 K	350 K 450 K 550 650 K	2.5 K 2.6 K 2.6 K 3.3 K	5M-97	Qualified.
TE-6LP-001	Fuel Assembly 6 lower end box.	311 to 977.4 K	1 Hz	2.7 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	5S-79 5M-98	Qualified.
TE-6UP-001	Fuel Assembly 6 upper end box.	311 to 977.4 K	1 Hz	2.8 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	5S-80	Qualified.
TE-6UP-003	Fuel Assembly 6 upper end box.	311 to 977.4 K	1 Hz	2.9 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	5M-99	Qualified.
Secondary Coolant System								
TT-P004-004	Secondary coolant system feedwater.	366 to 505 K	1 Hz	0.9 K	--	0.9 K	5M-100	Qualified.

TABLE 5-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation		Figure Number[b]	Comments
					Reading	Uncertainty (±)		
TEMPERATURE (continued)								
Intact Loop								
TT-P139-032	Intact loop hot leg primary coolant, Channel A.	533 to 616 K	1 Hz	0.5 K	--	0.5 K	5S-81 5M-101	Qualified for initial conditions only.
TT-P139-033	Intact loop hot leg primary coolant, Channel B.	533 to 616 K	1 Hz	0.5 K	--	0.5 K	5M-101	Qualified for initial conditions only.

a. Recording frequency is the measurement channel bandwidth at the ±3-dB level.

b. Figure number refers to the figure caption on plots in Section 5 for short-, medium-, and long-term and uncertainty plots which are indicated as S, M, L, and U, respectively.

c. Reference 6.

d. Reference 7.

e. The steam generator level is defined as 0 at 2.95 m above the top of the tube sheet.

f. Pressure measurements are presented as absolute values.

TABLE 5-2. COMPUTED VARIABLES FOR EXPERIMENT L3-7

Variable, Location, and Detector	Units	Uncertainty	Calculation Method	Figure	Comments
DENSITY, AVERAGE	Mg/m^3	a	Except where the density distribution reduces to an average directly, the following method is used to determine the average density: 1. A calculated density profile is determined from an assumed distribution which has been "fit" to each beam measurement. These are optimized as shown below. 2. The least squares curve fits are compared to determine the optimum assumed density profile to fit the data. 3. The best profile is area averaged to give average density by $\bar{\rho} = 1/A \int \rho(r)dA$ where A = cross-sectional area of the pipe $\rho(r)$ = chordal profile. The assumed profiles are as follows:		The individual beam densities were averaged over 1-s intervals to reduce the sample rate from 80 samples per second prior to being used in the average calculation.
Broken Loop Cold Leg				5C-2 5C-6	Qualified after reactor scram.
DE-BL-1A (ρ_A) DE-BL-1B (ρ_B) } DE-BL-105 DE-BL-1C (ρ_C)		±0.076		5C-2 5C-6 5U-19	Qualified after reactor scram.
Intact Loop Hot Leg					
DE-PC-2A (ρ_A) DE-PC-2B (ρ_B) } DE-PC-215 DE-PC-2C (ρ_C)		±0.10		5C-3 5C-7 5U-19	Qualified after reactor scram.

TABLE 5-2. (continued)

Variable, Location, and Detector	Units	Uncertainty	Calculation Method	Figure	Comments
DENSITY, AVERAGE (continued)	Mg/m^3		1. For homogeneous flow, the average results directly in $\bar{\rho} = \frac{(\rho_A + \rho_B + \rho_C)}{3}$ where ρ_A, ρ_B, and ρ_C, = density along gamma densitometer beam lines A, B, and C. 2. For tilted stratified flow, $\rho(\bar{r}) = \rho_\ell - \frac{\rho_\ell - \rho_g}{1 + \exp\left[-4a(x-b)\right]}$ where a and b = two adjustable parameters ρ_g and ρ_ℓ = gas and liquid densities x = position in maximum density gradient direction. 3. For annular distribution, $(\bar{r}) = \begin{cases} \rho_c & \text{for } r < R\text{-}D \\ \rho_\ell & \text{for } r > R\text{-}D \end{cases}$ where ρ_c and D are two adjustable parameters. 4. Eccentric annular is the same as annular, except that the core region may be vertically displaced from the pipe center.		

TABLE 5-2. (continued)

Variable, Location, and Detector	Units	Uncertainty	Calculation Method	Figure	Comments
DENSITY, AVERAGE (continued)	Mg/m^3		5. For default calculation if the above distributions do not represent the data, the density is calculated by a beam length weighted average of the chordal average density readings ρ_i: $\bar{\rho} = 0.34485\ \rho_A + 0.40034\ \rho_B + 0.25481\ \rho_C$.		
FLUID VELOCITY	m/s				
Intact Loop Hot Leg					
PNE-PC-2		±20% of reading	The output from the detector is algebraically summed to give one plot of counts versus time for each pulsing of the neutron sources. A peak appears in the downstream detector's output, and its location (which corresponds to the time after the source pulsing) is determined. The distance between the sources and detector (see Figure 3-1) is divided by this time, giving the fluid velocity.	5C-4 5C-13 5U-21	Qualified; discrete values qualified, not continuous data.
LIQUID LEVEL	m		The liquid distribution was interpreted from the voltage output of the conductivity probes using the following criteria:		
Downcomer and Lower Plenum			1. A response time of 550 ms during dryout was assumed.		
LE-1ST-1		b		5C-10[c]	Qualified.

TABLE 5-2. (continued)

Variable, Location, and Detector	Units	Uncertainty	Calculation Method	Figure	Comments
LIQUID LEVEL (continued)	m		2. The void fraction is assumed to vary linearly with the voltage. The maximum voltage measured during the test from each probe is an indication of 100% void.		
Upper Plenum					
LE-3UP-1		b		5C-12[c]	Qualified.
Core			3. When there is a change in phase from water to steam, an X is indicated for void fractions less than 15% with the space left blank for void fractions greater than 15%. When there is a change in phase from steam to water, an X is indicated for void fractions less than 85% with the space left blank for void fractions greater than 85%.		
LE-1F10		b		5C-9[c]	Qualified.
LE-3F10				5C-11[c]	Qualified.
			Engineering judgment was required at times on each conductivity probe in order to best satisfy the preceding criteria.		
			Caution should be exercised in applying the in-core liquid level data to the core as a whole because the in-core liquid level stings are located at "cold spots" (that is, along guide tubes rather than fuel rods) in the core.		
MASS FLOW RATE	kg/s	±10% of reading	The first 25 s of the mass flow rate was obtained by subtracting changes in mass inventory in the PCS due to density changes from the mass flow rate out of the pressurizer. Data were unavailable between 25 and 75 s. Linear interpolation was used to approximate the mass flow during this interval.		
Broken Loop Cold Leg					
FR-BL-111				5C-1 5U-1	Qualified to 1800 s.

TABLE 5-2. (continued)

Variable, Location, and Detectors	Units	Uncertainty	Calculation Method	Figure	Comments
MASS FLOW RATE (continued)			The remainder of the mass flow rate is based on the BST level. The integrated level change was multiplied by the fluid density to yield an integrated mass increase in the tank. These data were then differentiated to give a mass flow rate.		
Secondary Coolant System					
FR-P004-107		0.2	The SCS mass flow rate was calculated using the equation: $\dot{m} = \sqrt{\Delta P}$ (5.777) (1.007) where ΔP is in kPa and is taken from FT-P004-072A, (5.777) is a conversion factor derived from industrial information, and (1.007) is the venturi flow multiplier.	5C-8	Qualified; negative values should read zero, but are within measurement uncertainty.
FLUID SUBCOOLING	K		The subcooling is defined as $T_{sat}-T$. The saturation temperature is calculated from the pressure reading of PE-1UP-001A1 using the following curve fits of steam table data:		
Upper Plenum					
SC-5UP-102		±3.4	for P < 1.4 MPa, $T_{sat} = 348.225 - 290.13P + 399.543P^2 + 298.730P^3 - 84.196P^4$ for 1.4 MPa ≤ P ≤ 12 MPa, $T_{sat} = 419.024 + 42.6705P - 5.63957P^2 + 0.433108P^3 - 0.0130329P^4$	5C-5 5C-14	Qualified.

TABLE 5-2. (continued)

Variable, Location, and Detector	Units	Uncertainty	Calculation Method	Figure	Comments
			for P > 12 MPa, $T_{sat} = 508.252 + 8.84806P - 0.114572P^2$. The measured temperature is an average of TE-5UP-1 through TE-5UP-8.		

a. Reference 8.

b. The uncertainty in each conductivity probe for (a) LE-1ST-1 is ±4.5% of range and (b) LE-1F10, LE-3F10, and LE-3UP-1 is ±2.9% of range. All conductivity probes have a response time of 340 ms.

c. Uneven intervals on the Y-axis are due to failed instruments.

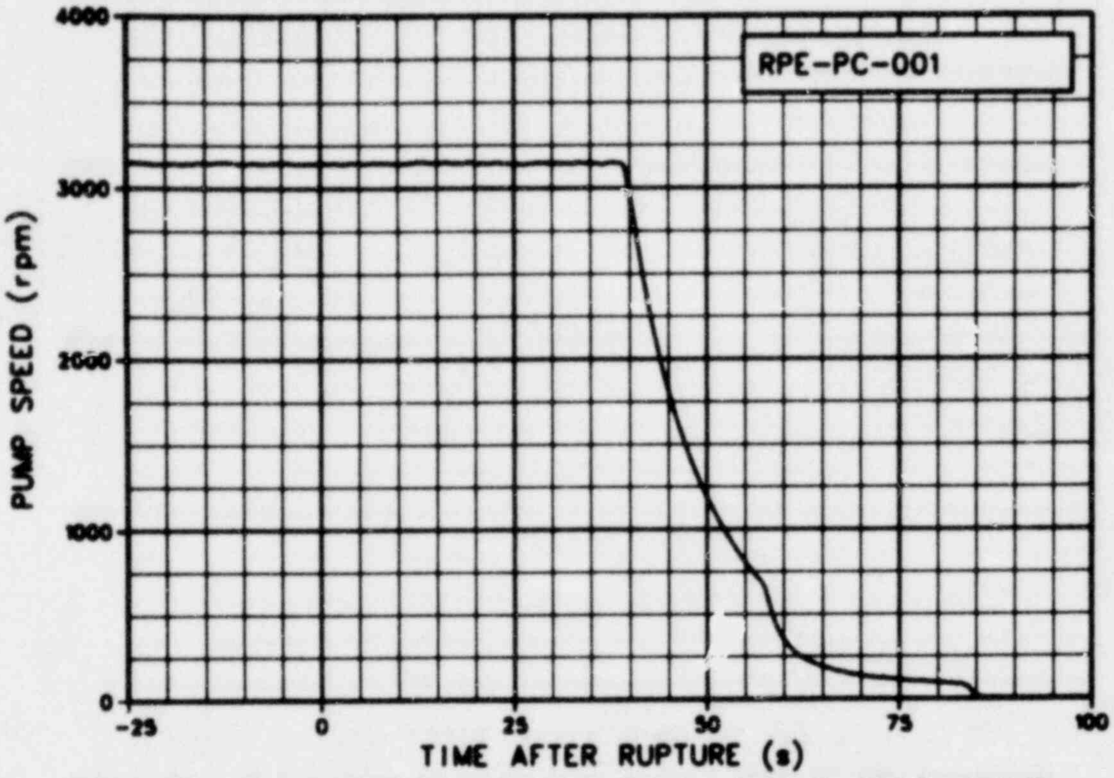


Figure 56-1. Pump speed in intact loop Pump 1 (RPE-PC-001) (qualified).

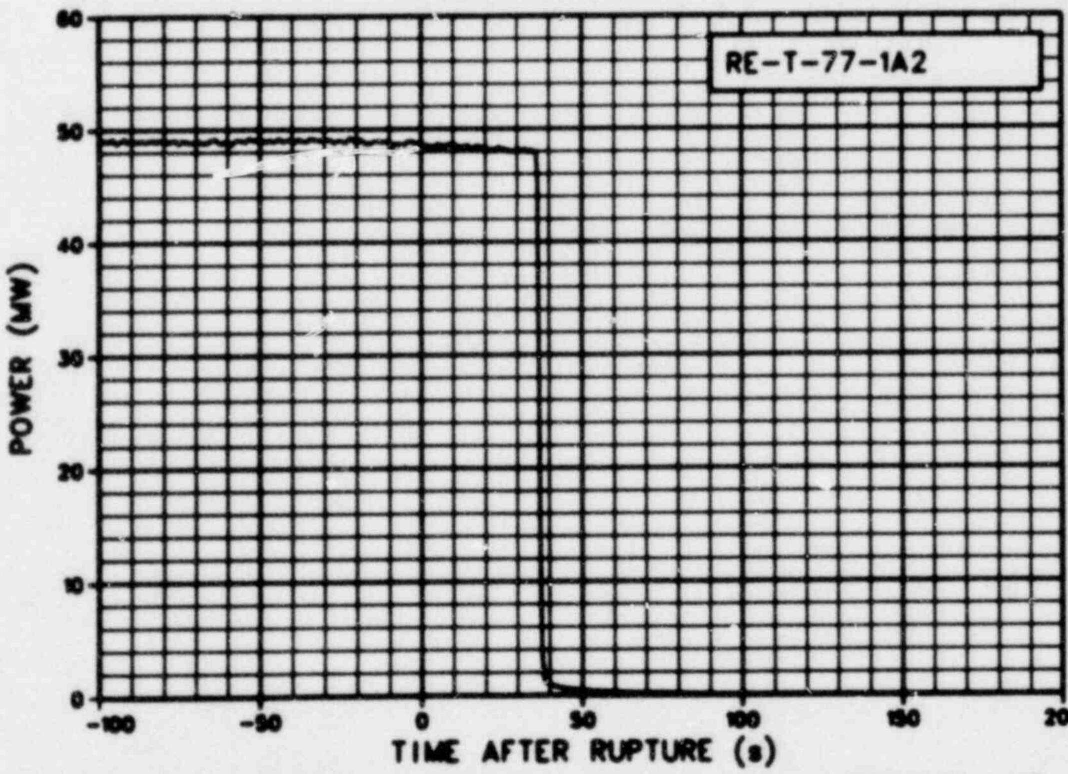


Figure 56-2. Power range in reactor vessel Channel A level (RE-T-77-1A2) (qualified, good to reactor scram).

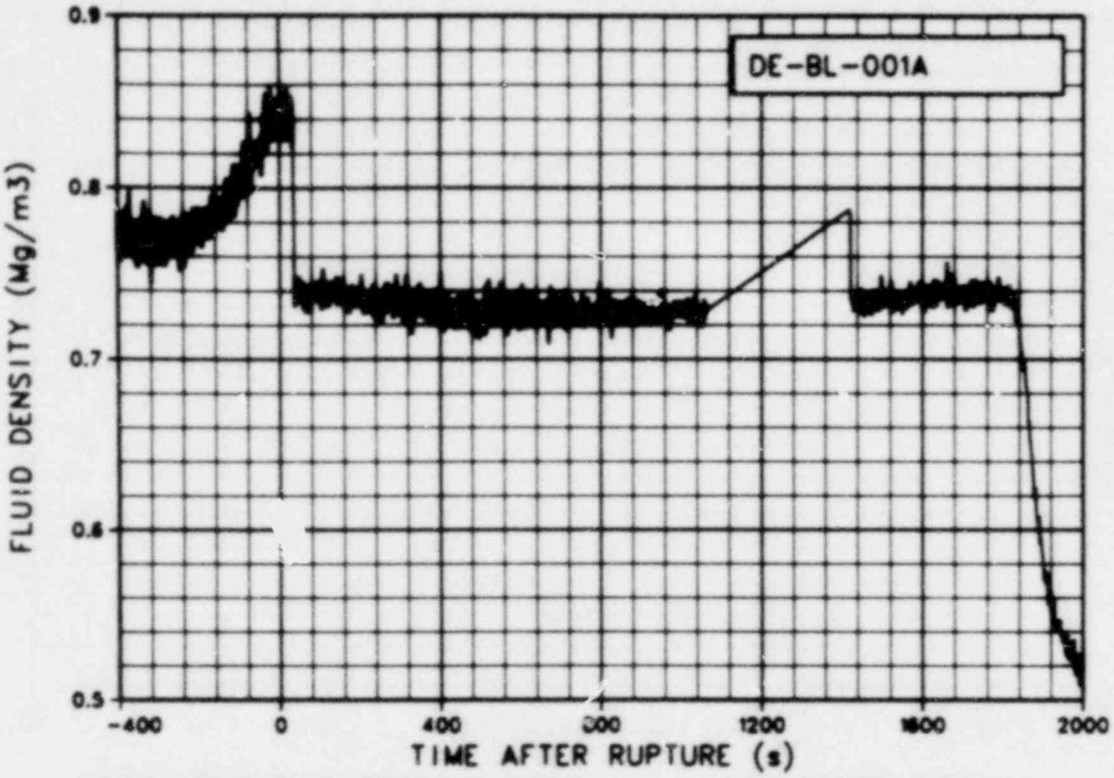


Figure 5S-3. Fluid density in broken loop cold leg, chordal density (DE-BL-001A) (qualified after reactor scram).

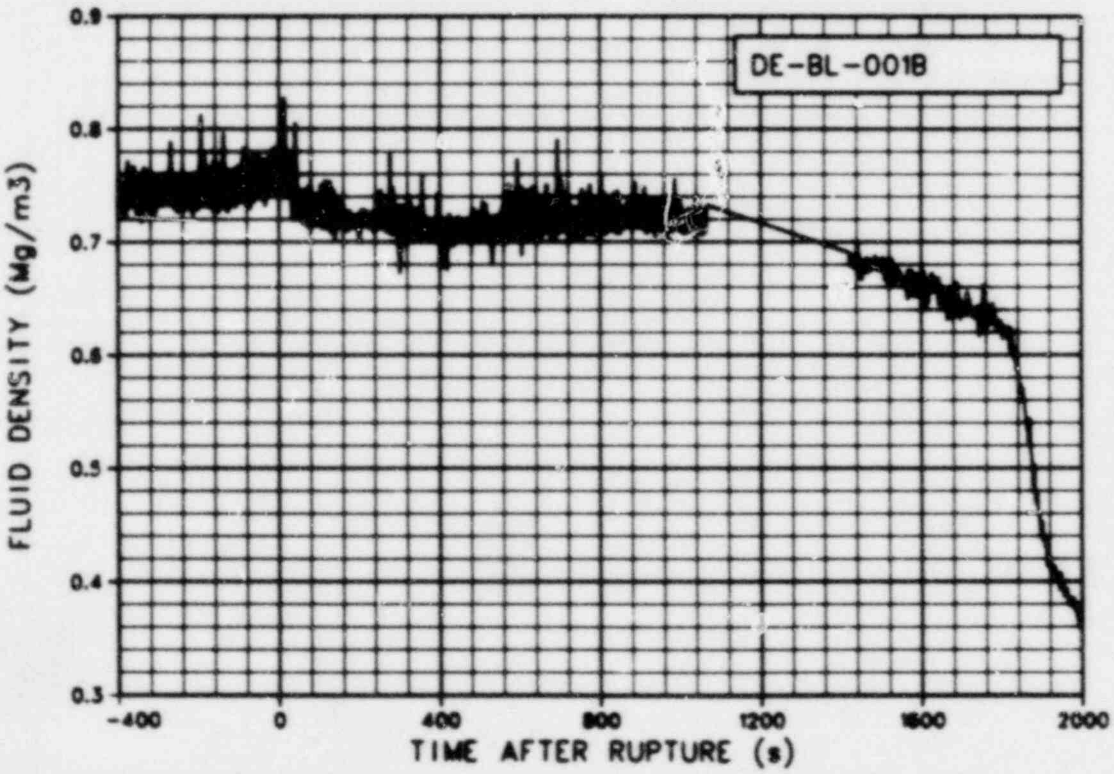


Figure 5S-4. Fluid density in broken loop cold leg, chordal density (DE-BL-001B) (qualified after reactor scram).

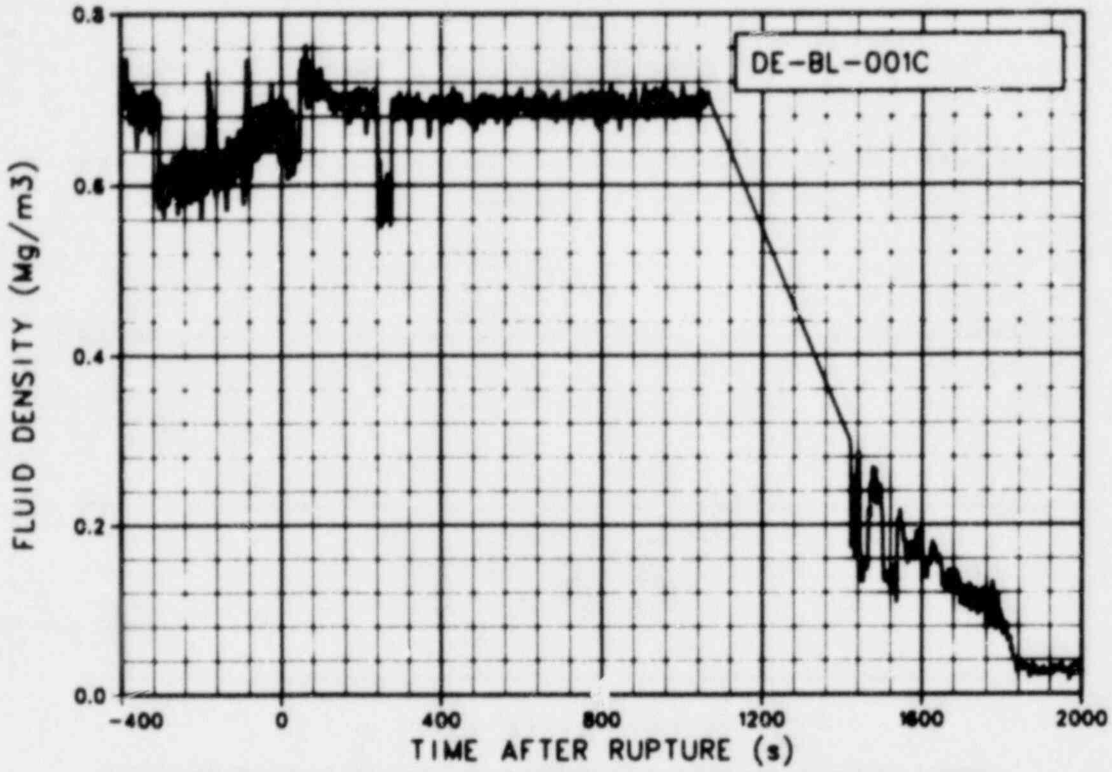


Figure 5S-5. Fluid density in broken loop cold leg, chordal density (DE-BL-001C) (qualified after reactor scram).

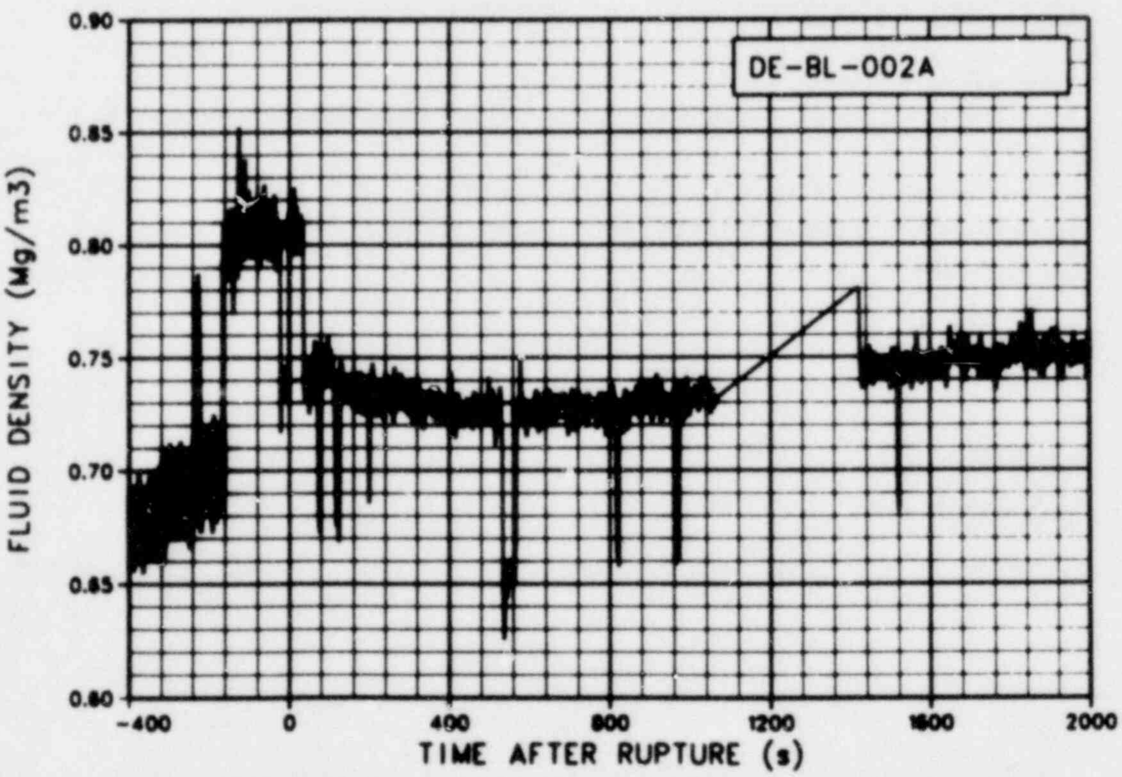


Figure 5S-6. Fluid density in broken loop hot leg, chordal density (DE-BL-002A) (qualified after reactor scram).

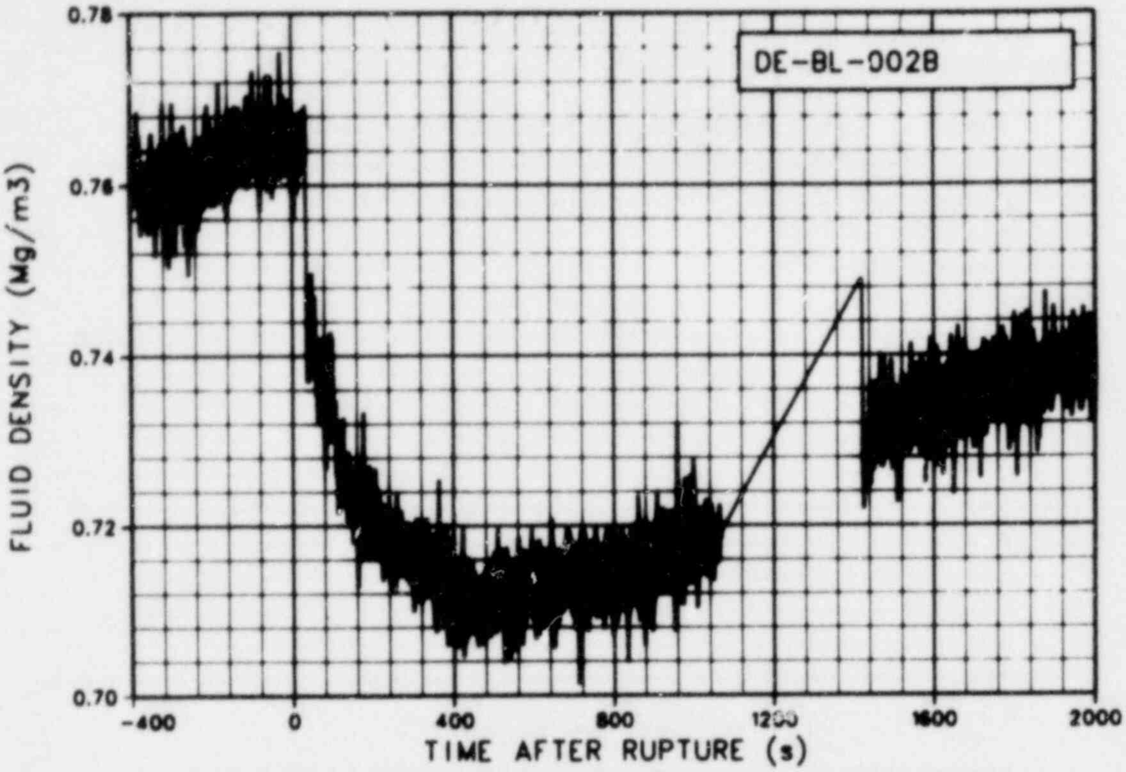


Figure 5S-7. Fluid density in broken loop hot leg, chordal density (DE-BL-002B) (qualified after reactor scram).

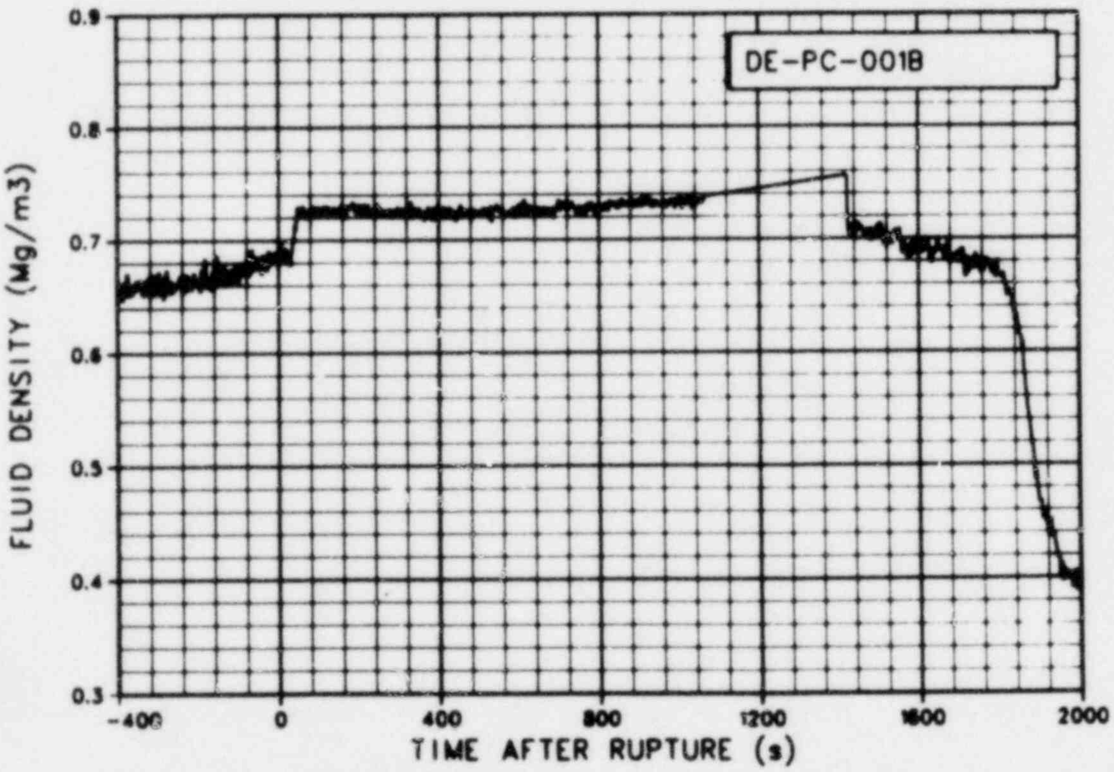


Figure 5S-8. Fluid density in intact loop cold leg, chordal density (DE-PC-001B) (qualified after reactor scram).

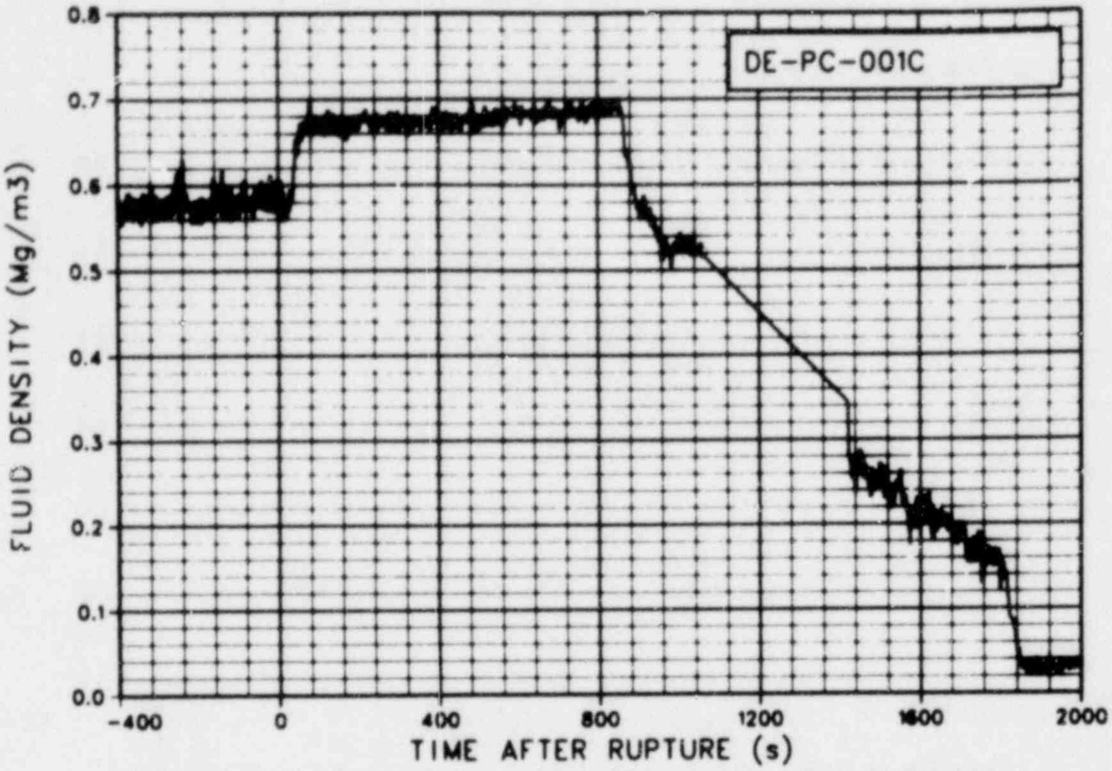


Figure 5S-9. Fluid density in intact loop cold leg, chordal density (DE-PC-001C) (qualified after reactor scram).

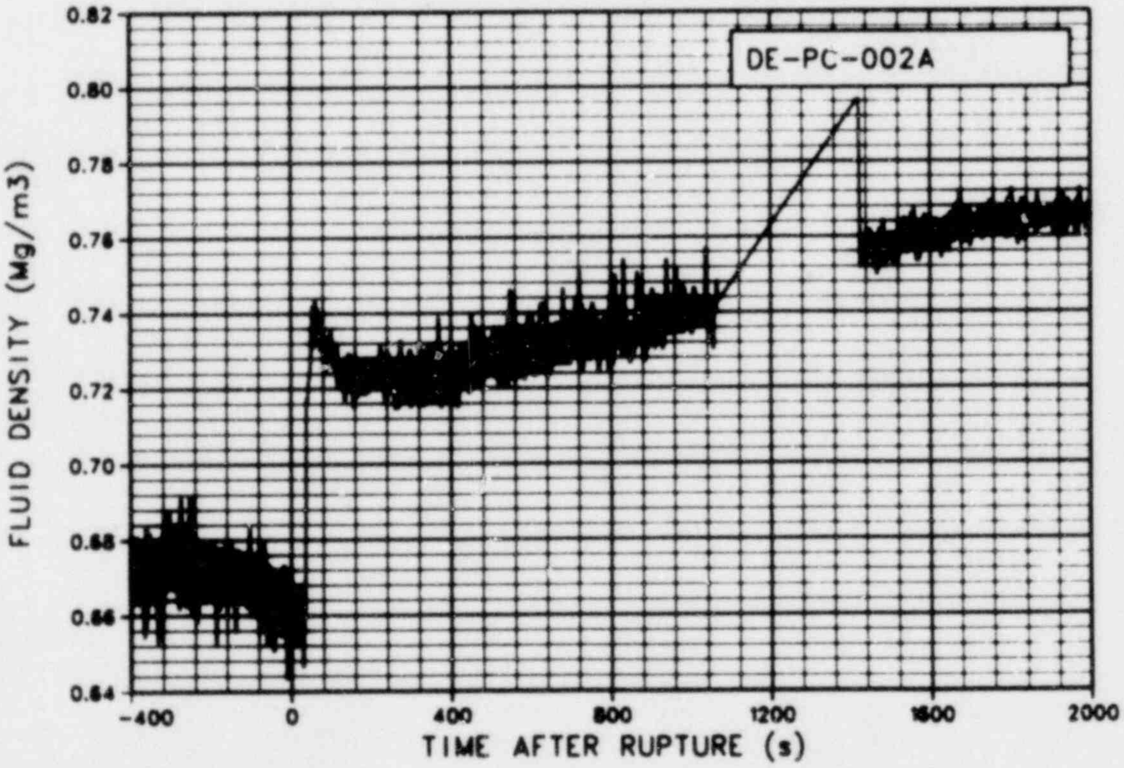


Figure 5S-10. Fluid density in intact loop hot leg, chordal density (DE-PC-002A) (qualified after reactor scram).

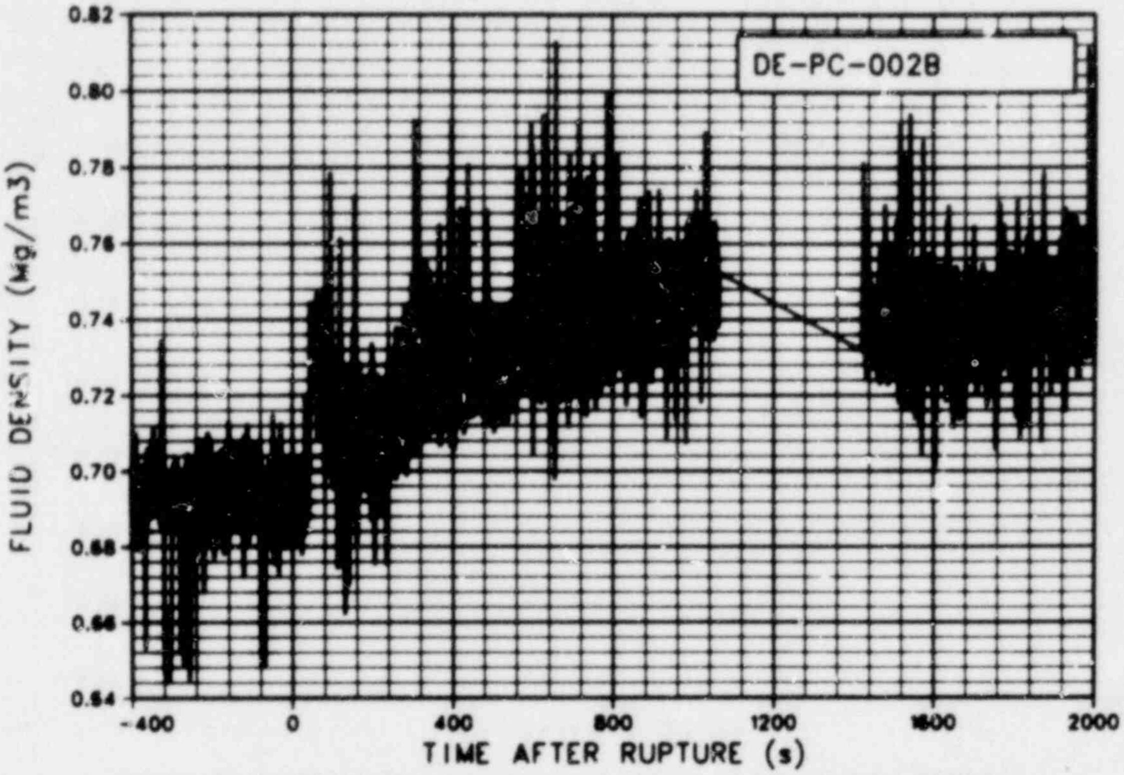


Figure 5S-11. Fluid density in intact loop hot leg, chordal density (DE-PC-002B) (qualified after reactor scram).

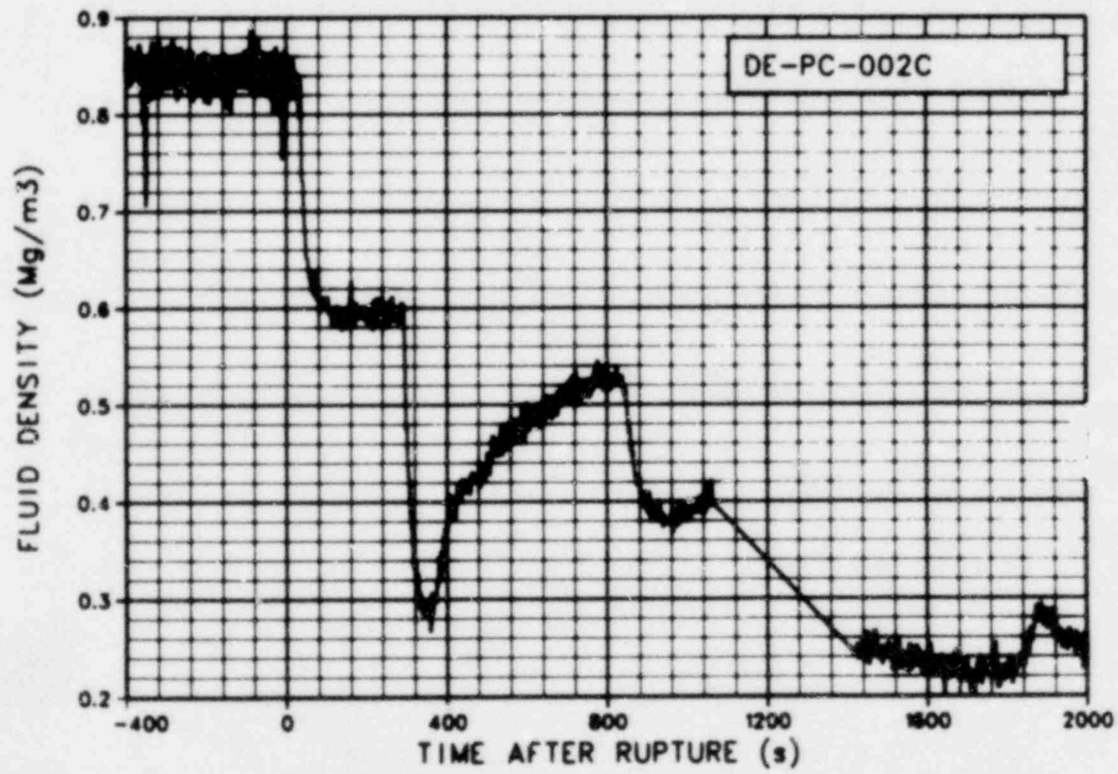


Figure 5S-12. Fluid density in intact loop hot leg, chordal density (DE-PC-002C) (qualified after reactor scram).

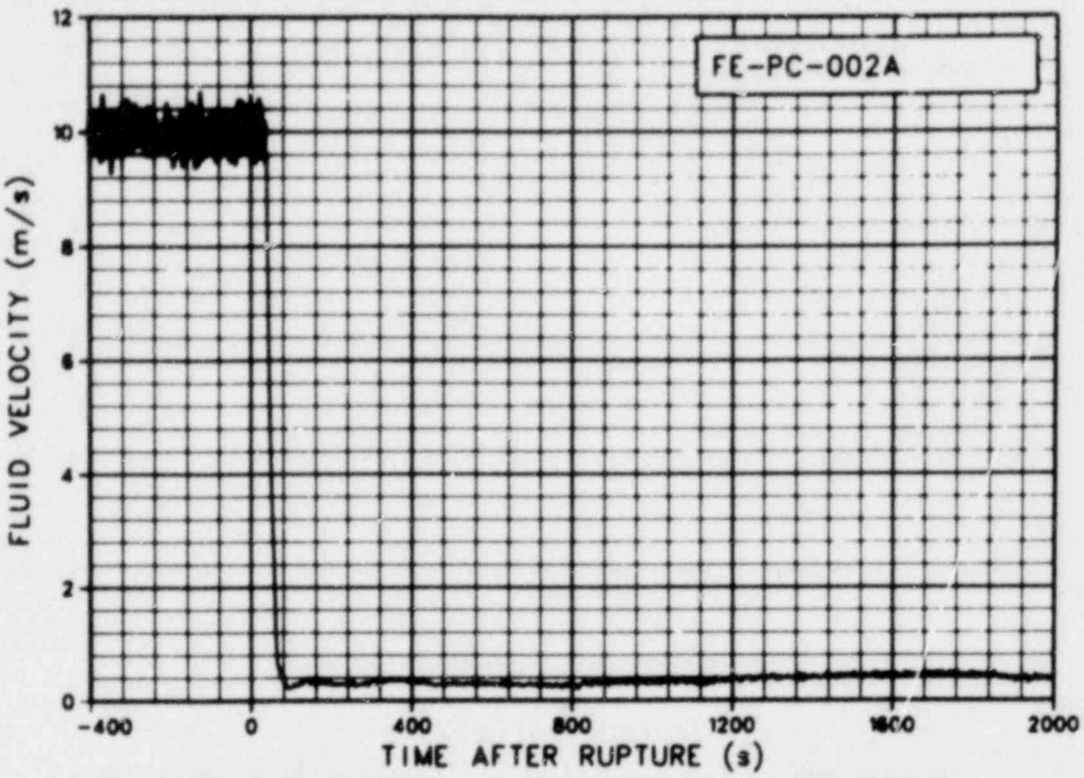


Figure 5S-13. Fluid velocity in intact loop hot leg DTT rake at bottom of pipe (FE-PC-002A) (qualified to 7500 s).

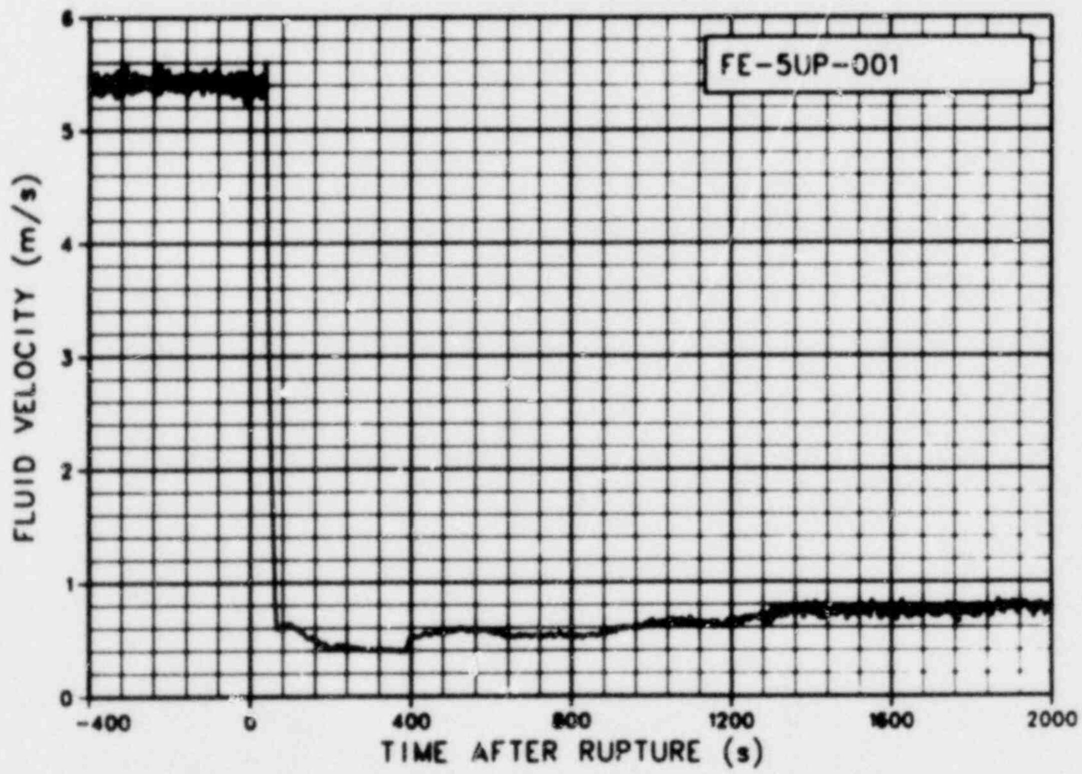


Figure 5S-14. Fluid velocity above upper end box of Fuel Assembly 5 (FE-5UP-001) (qualified, zero offset beyond 7500 s due to electronics).

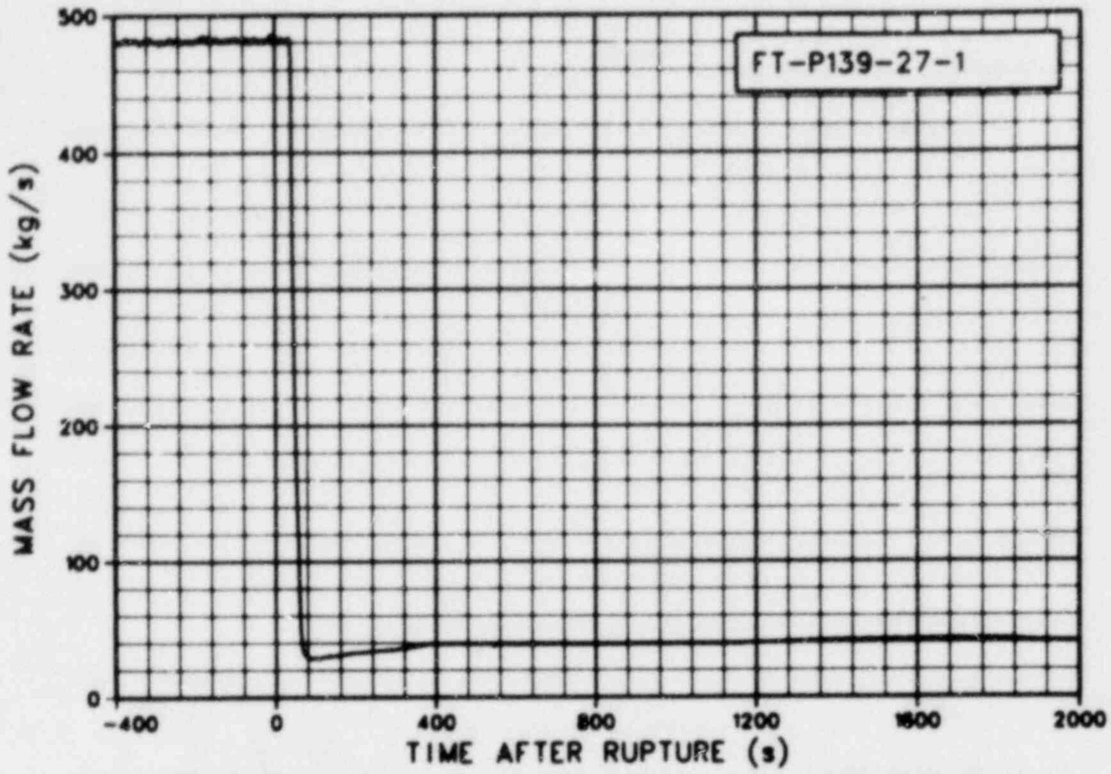


Figure 5S-15. Flow rate in intact loop hot leg venturi (FT-P139-27-1) (qualified for initial conditions only).

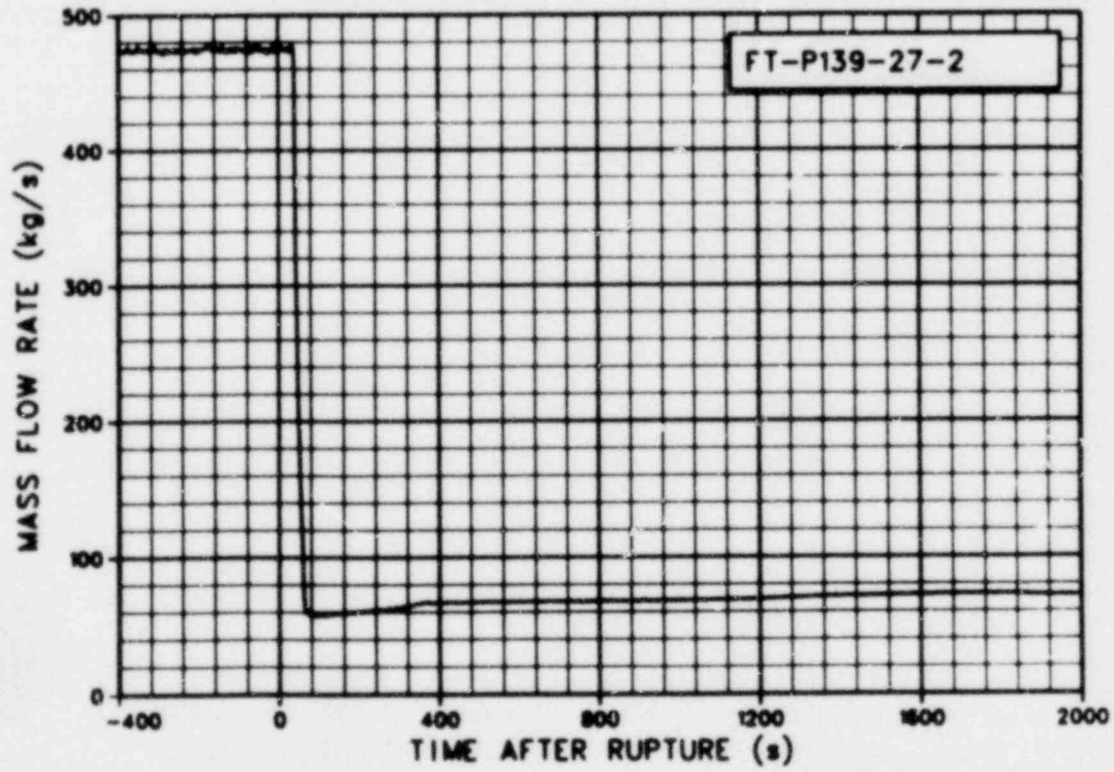


Figure 5S-16. Flow rate in intact loop hot leg venturi (FT-P139-27-2) (qualified for initial conditions only).

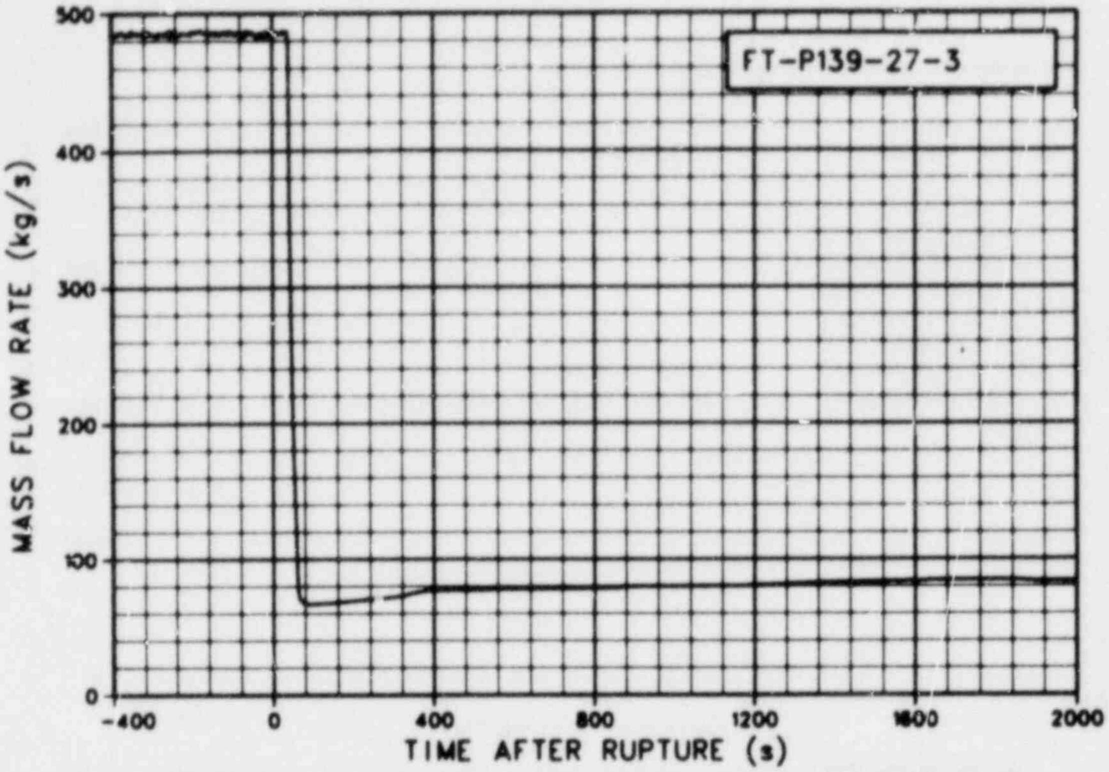


Figure 5S-17. Flow rate in intact loop hot leg venturi (FT-P139-27-3) (qualified for initial conditions only).

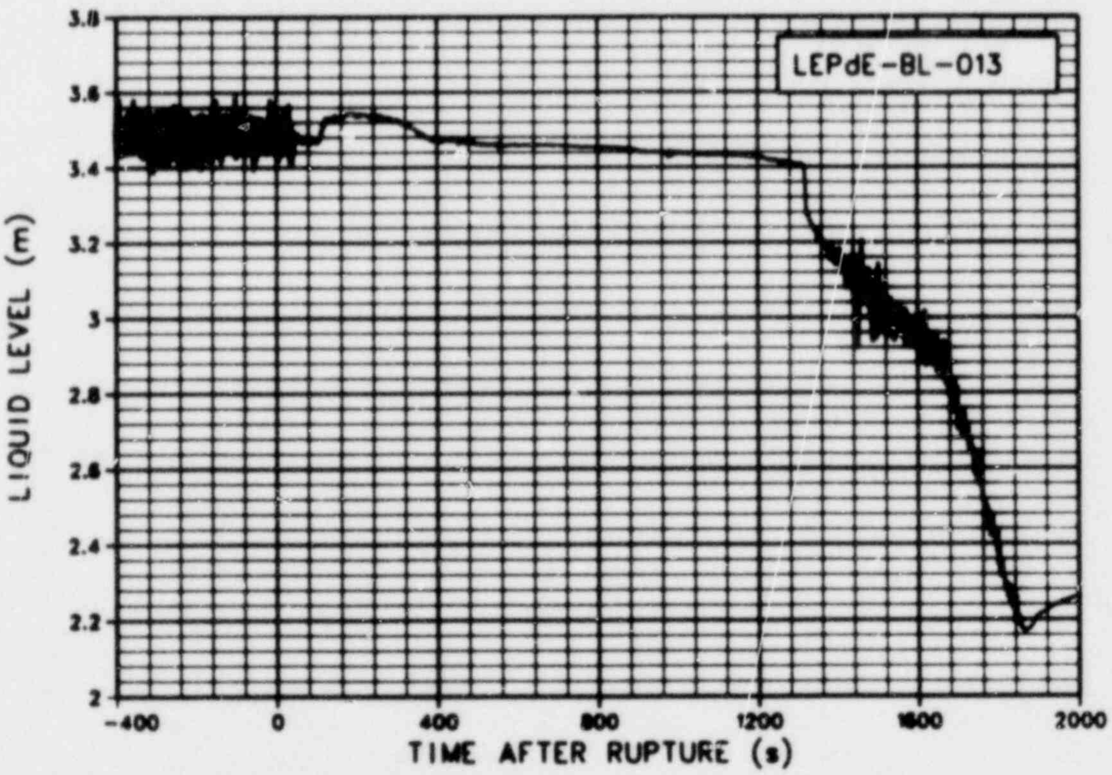


Figure 5S-18. Liquid level in broken loop steam generator simulator, inlet to top (LEPdE-BL-013) (qualified).

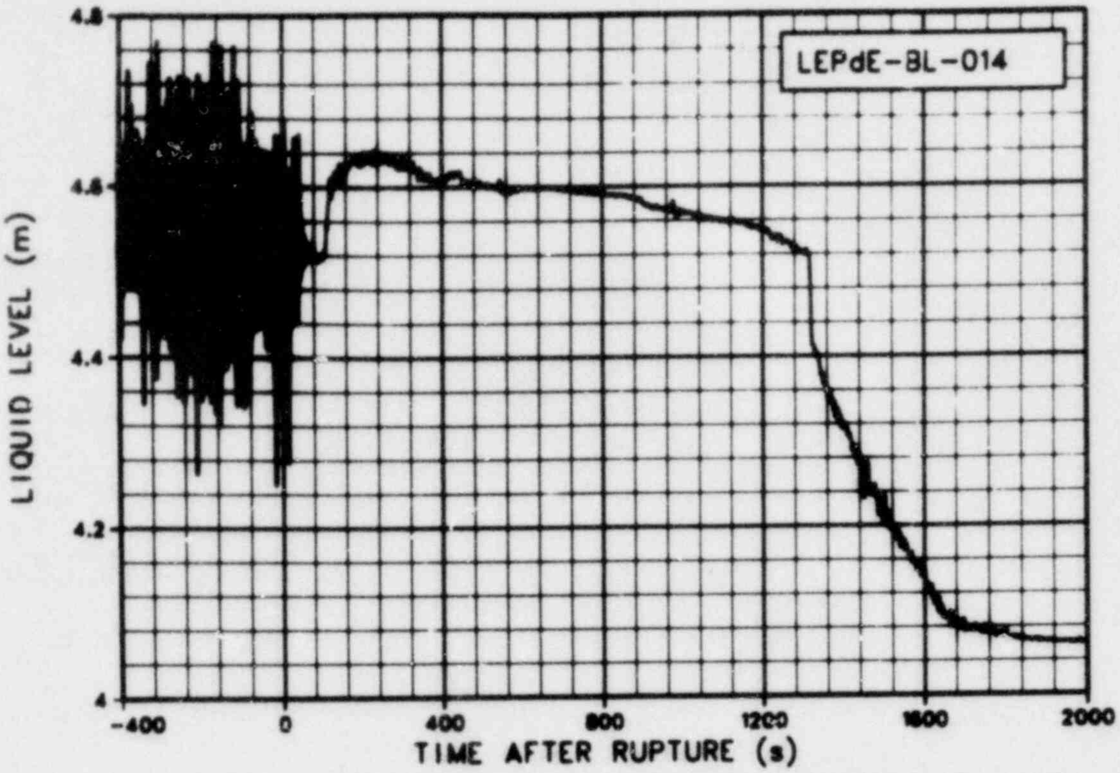


Figure 5S-19. Liquid level in broken loop steam generator simulator, outlet to top (LEPdE-BL-014) (qualified, unexplained long term drift should read 4.59 m at 1200 s).

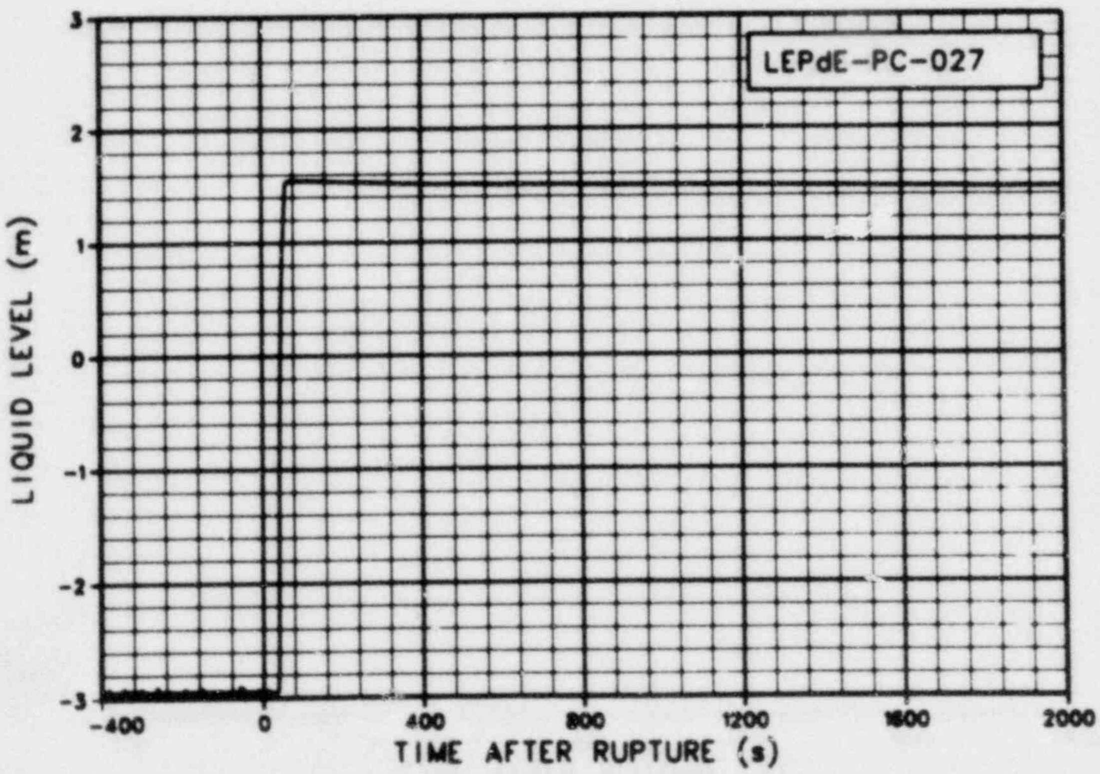


Figure 5S-20. Liquid level in intact loop between bottom of loop seal and steam generator outlet (LEPdE-PC-027) (qualified, unexplained long term drift should read 1.55 m at 1500 s).

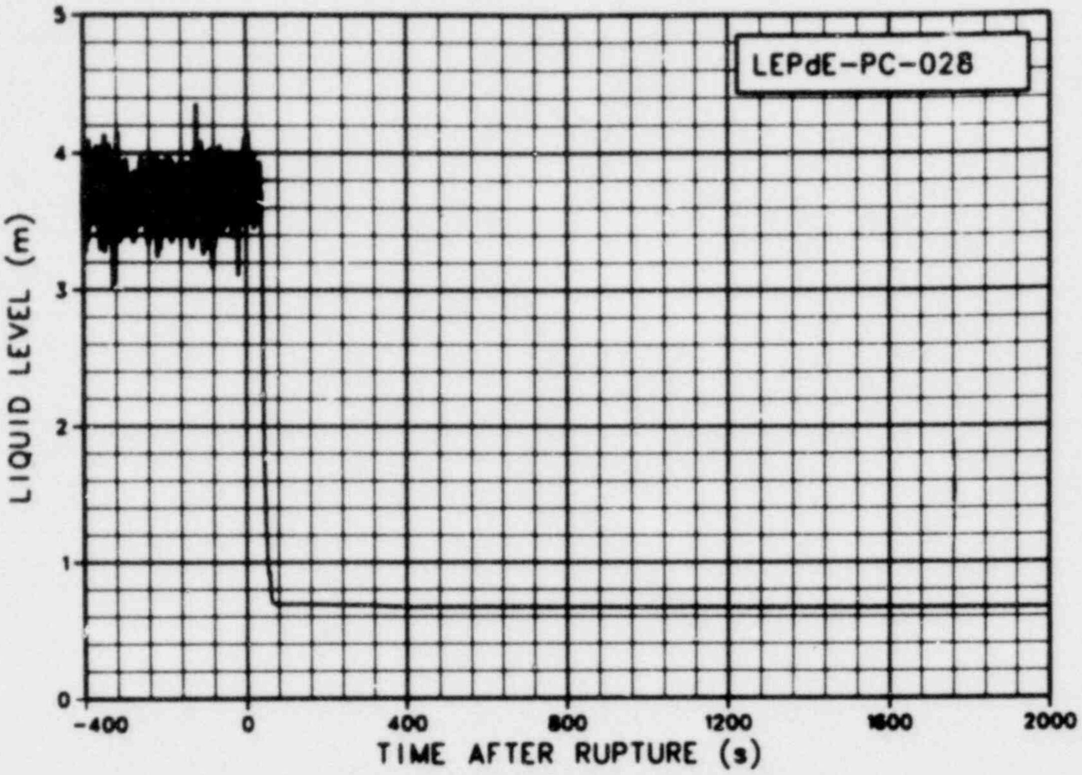


Figure 5S-21. Liquid level in intact loop between bottom of loop seal and primary coolant Pump 2 inlet (LEPdE-PC-028) (qualified).

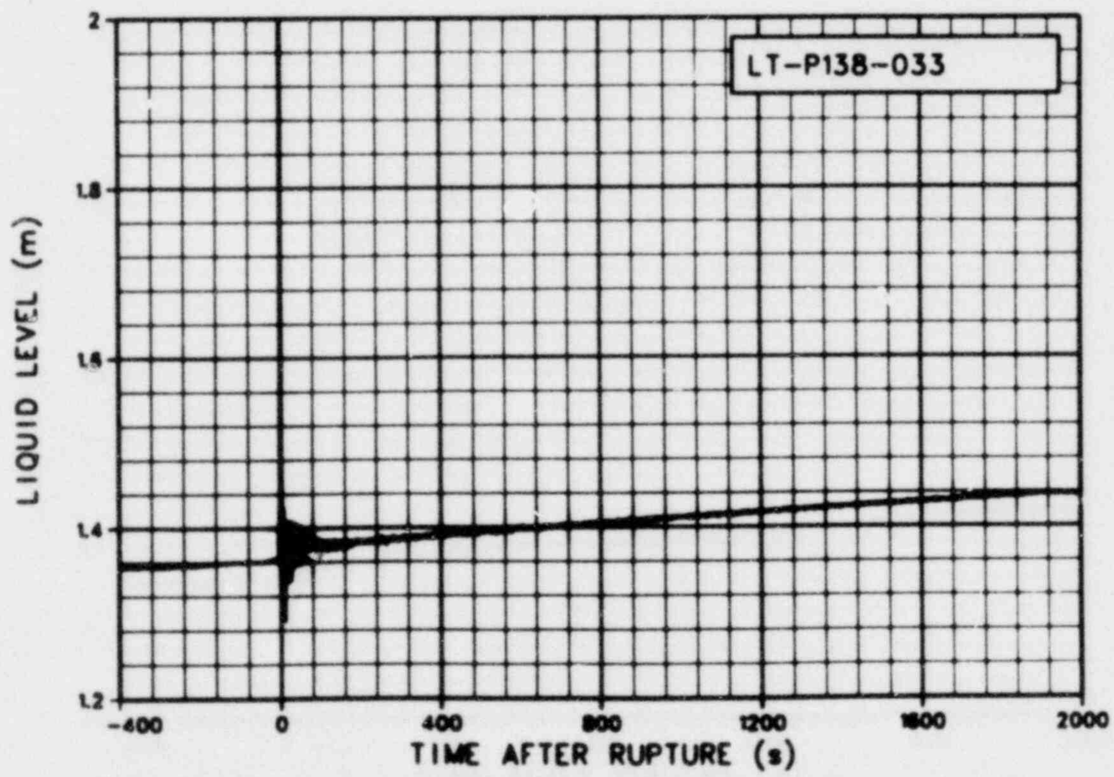


Figure 5S-22. Liquid level in blowdown suppression tank, north end (LT-P138-033) (qualified).

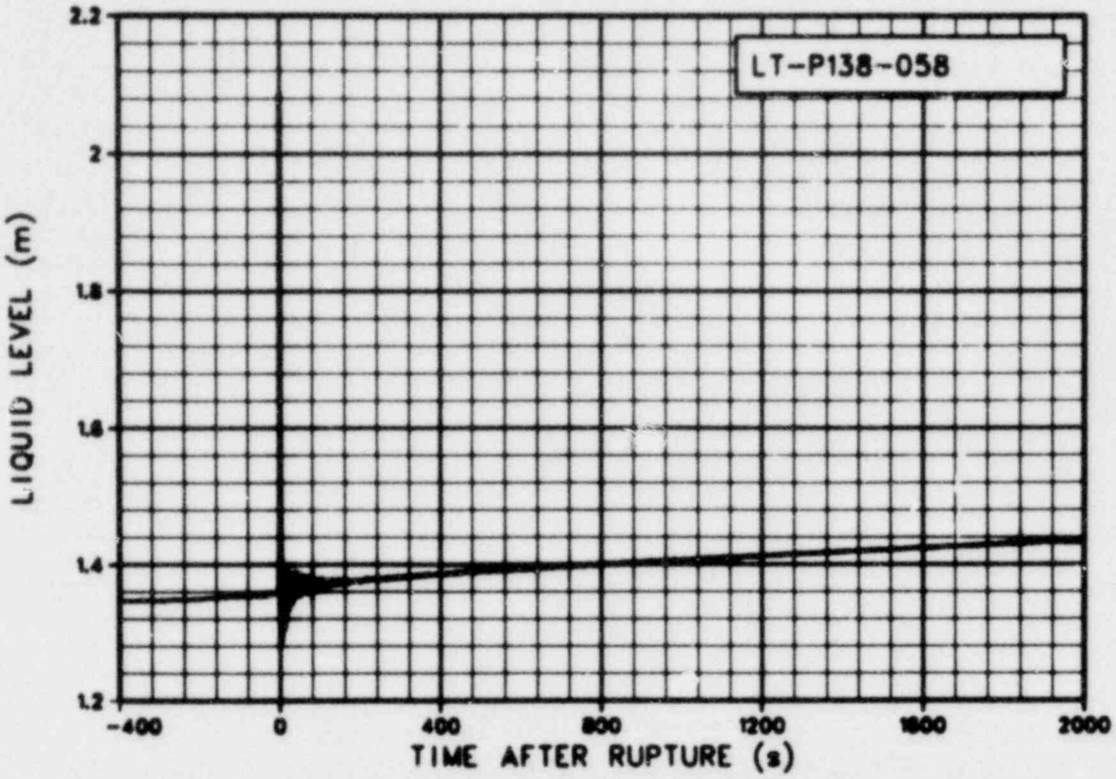


Figure 58-23. Liquid level in blowdown suppression tank, south end (LT-P138-058) (qualified).

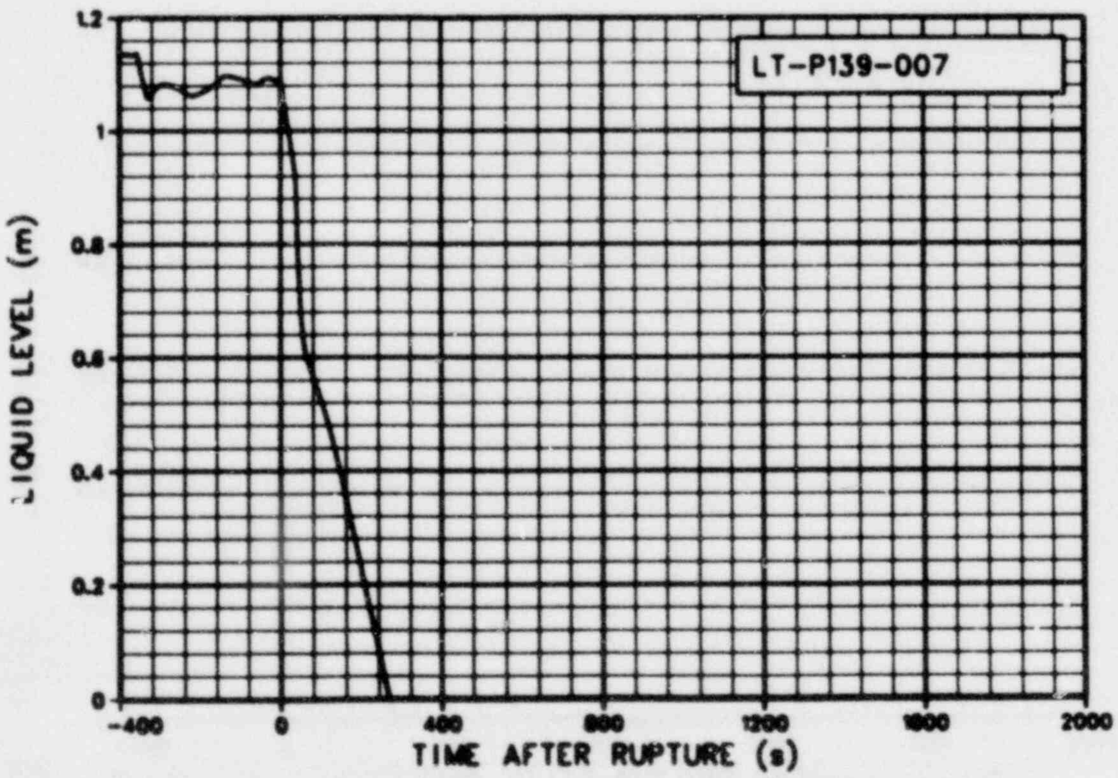


Figure 58-24. Liquid level in pressurizer (LT-P139-007) (qualified, maximum measurement range equals 1.8 m).

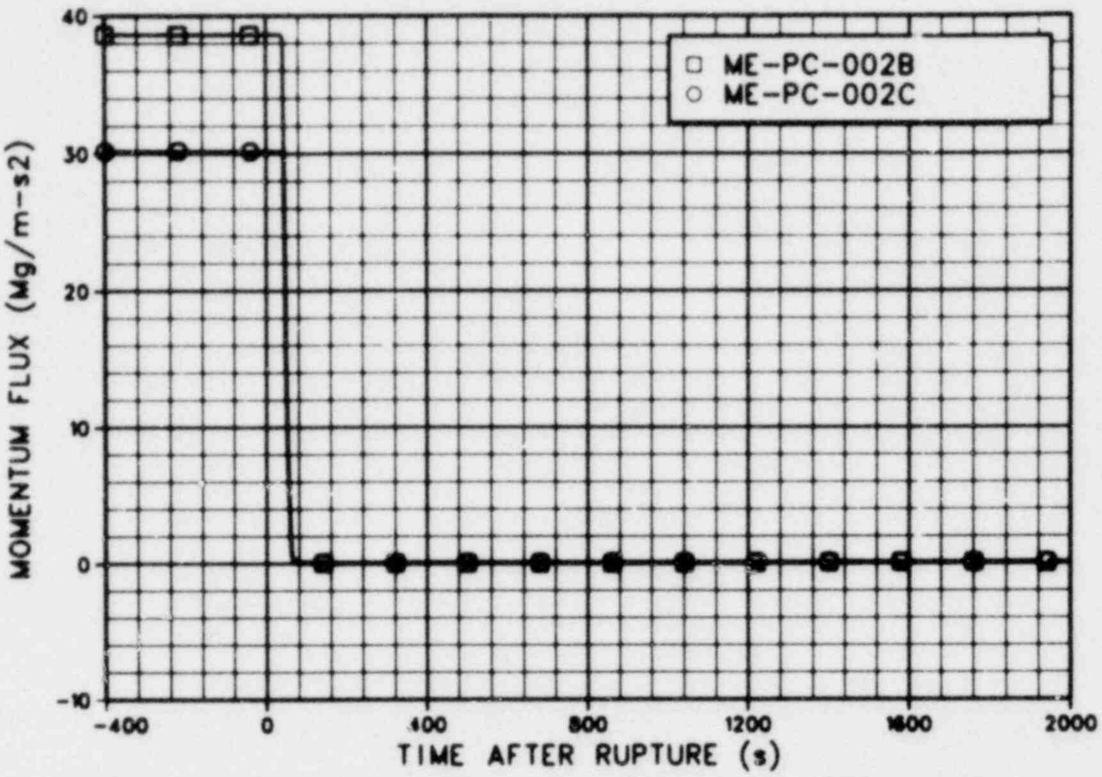


Figure 5S-25. Momentum flux in intact loop hot leg DTT rake at middle and top of pipe (ME-PC-002B and -002C) (qualified).

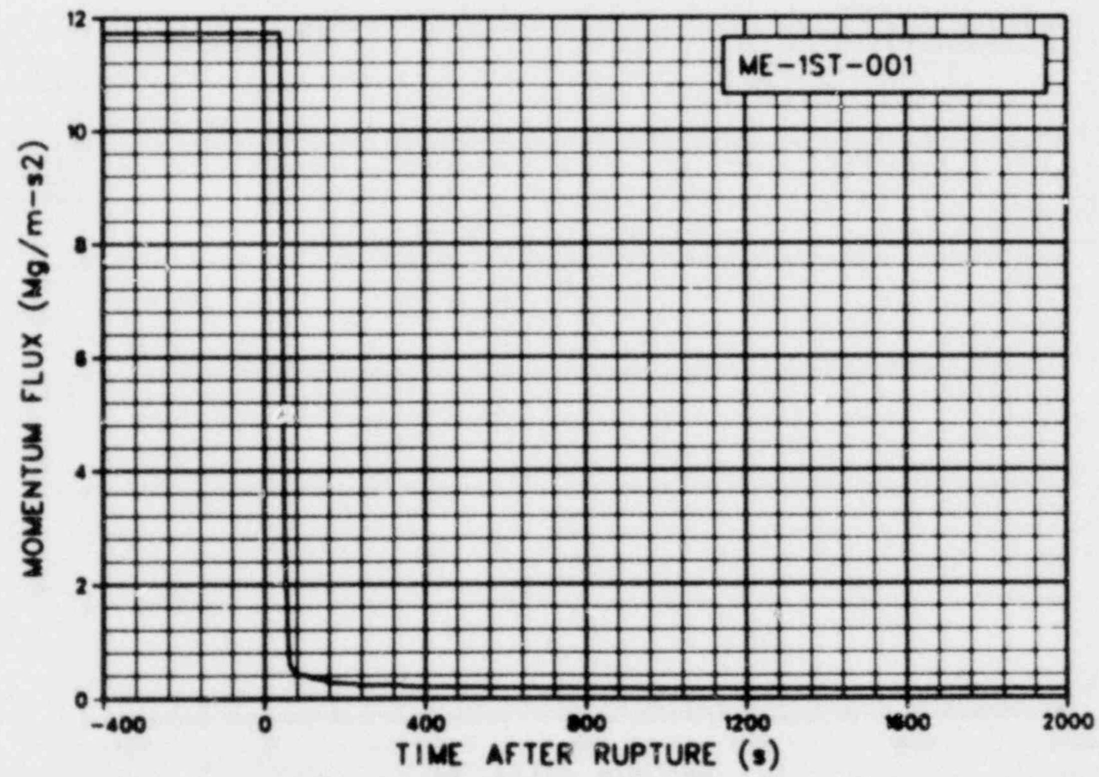


Figure 5S-26. Momentum flux in reactor vessel Downcomer Stalk 1, 1.16 m above reactor vessel bottom (ME-1ST-001) (qualified).

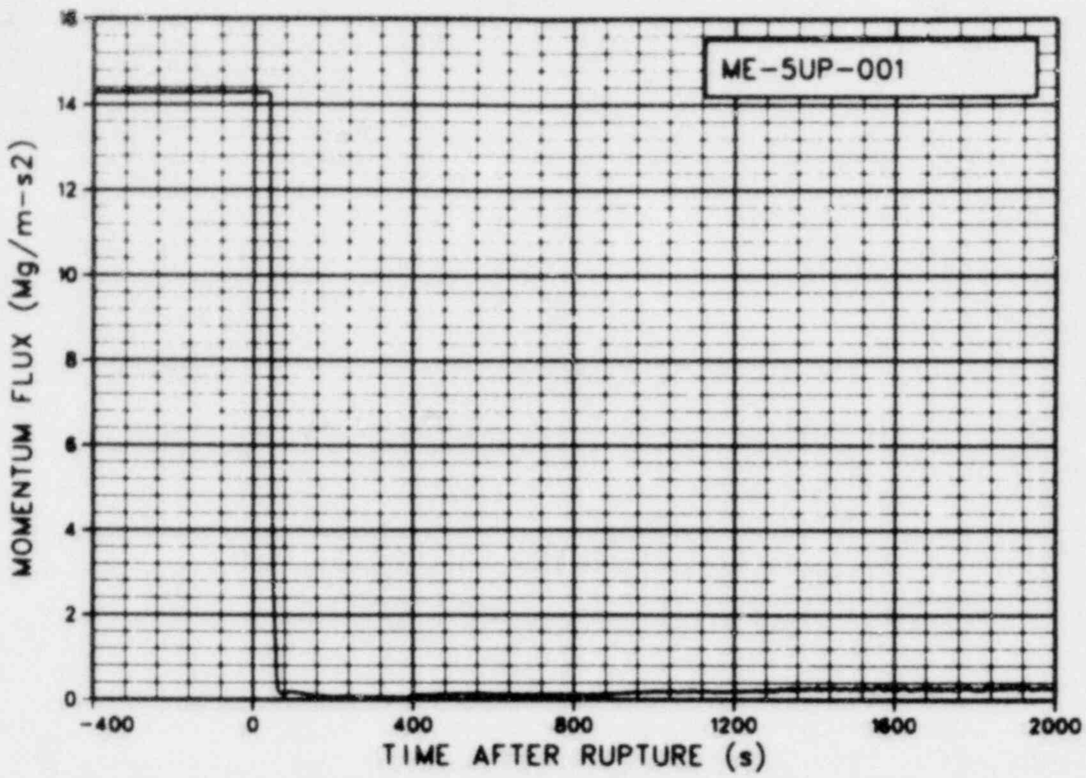


Figure 5S-27. Momentum flux in reactor vessel above upper end box of Fuel Assembly 5 (ME-5UP-001) (qualified).

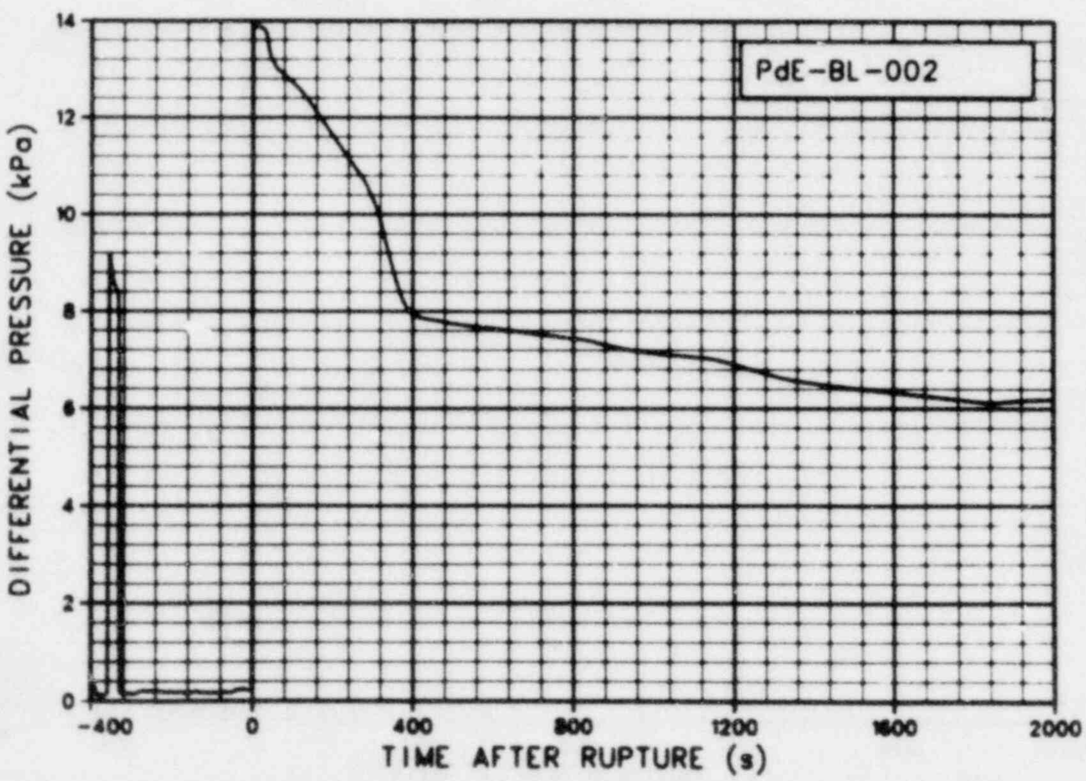


Figure 5S-28. Differential pressure in broken loop cold leg across small break orifice (PdE-BL-002) (qualified).

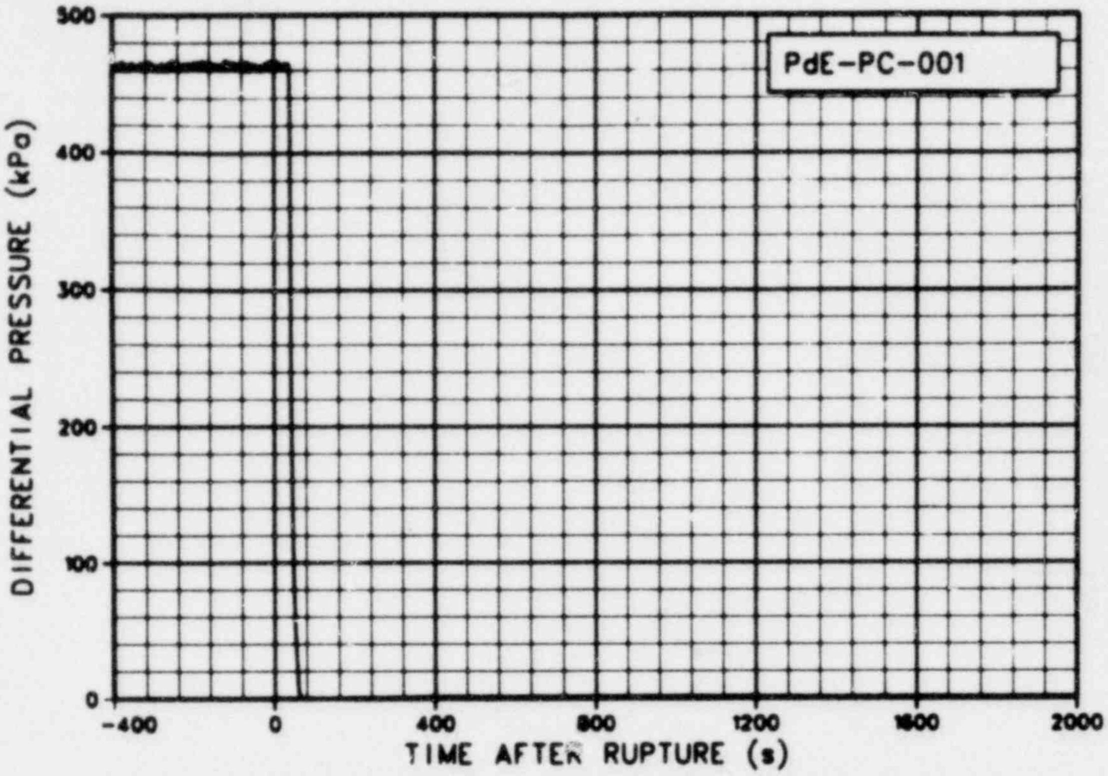


Figure 58-29. Differential pressure in intact loop across primary coolant Pumps 1 and 2 (PdE-PC-001) (qualified).

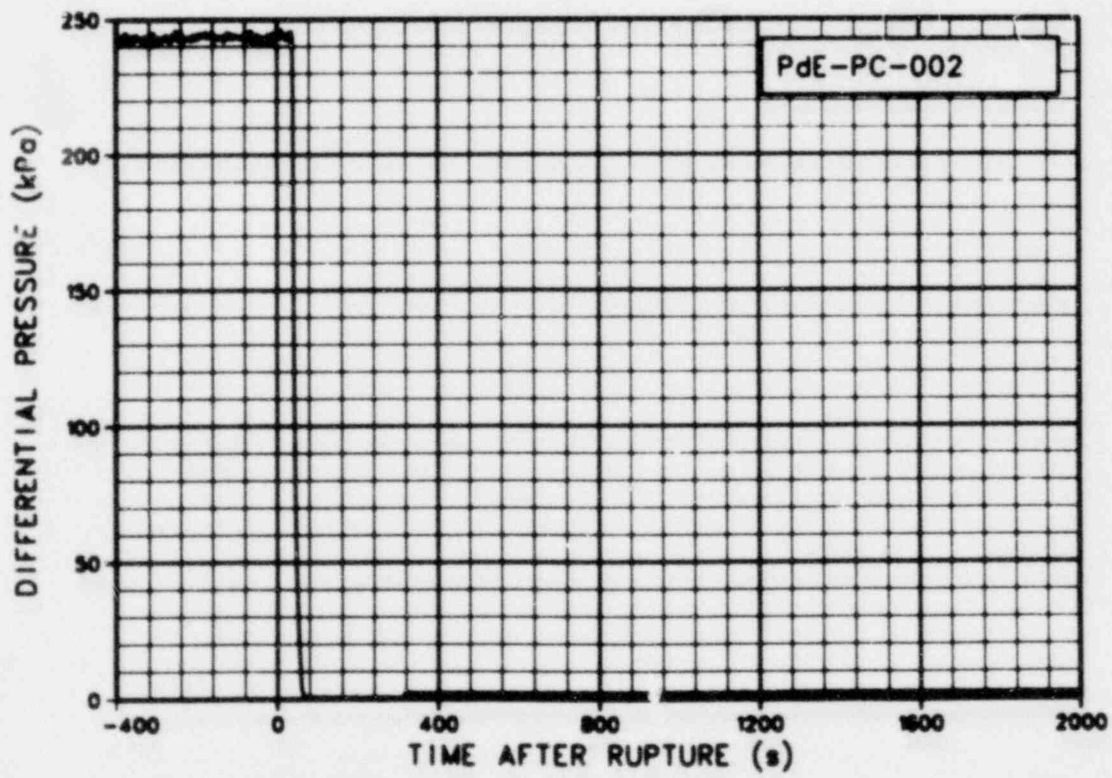


Figure 58-30. Differential pressure in intact loop across the steam generator (PdE-PC-002) (qualified).

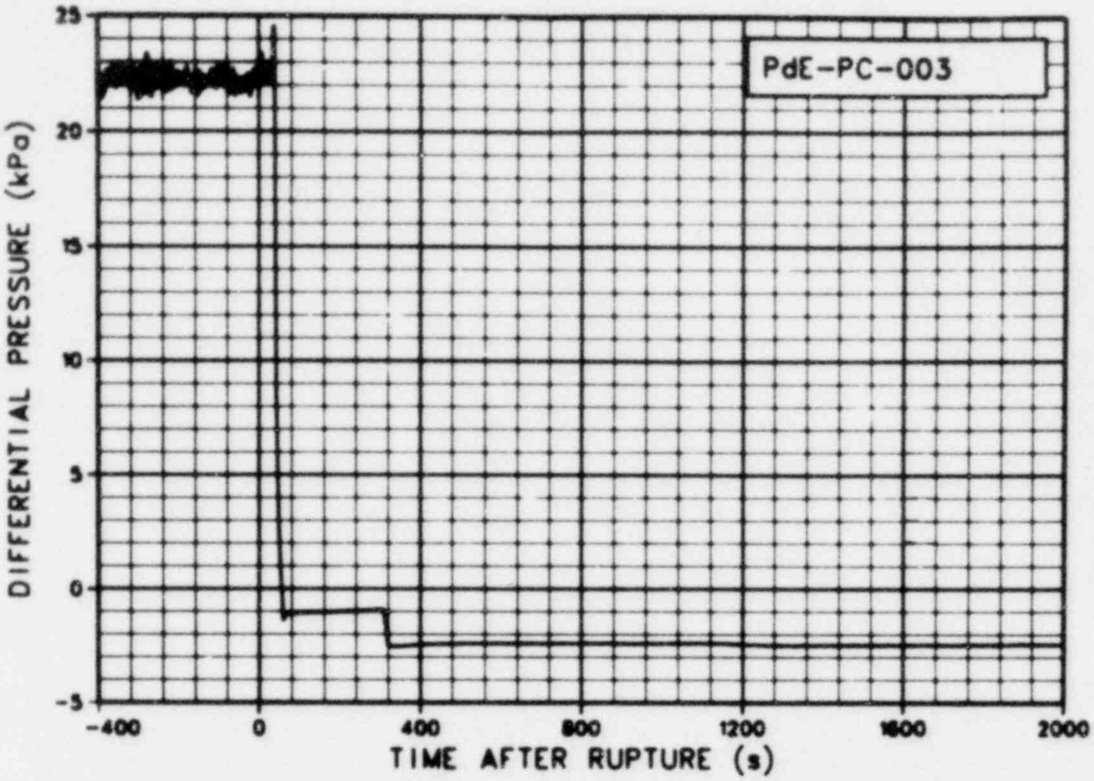


Figure 58-31. Differential pressure in intact loop hot leg from reactor vessel outlet to steam generator inlet (PdE-PC-003) (qualified, negative values indicate voiding in the reference leg).

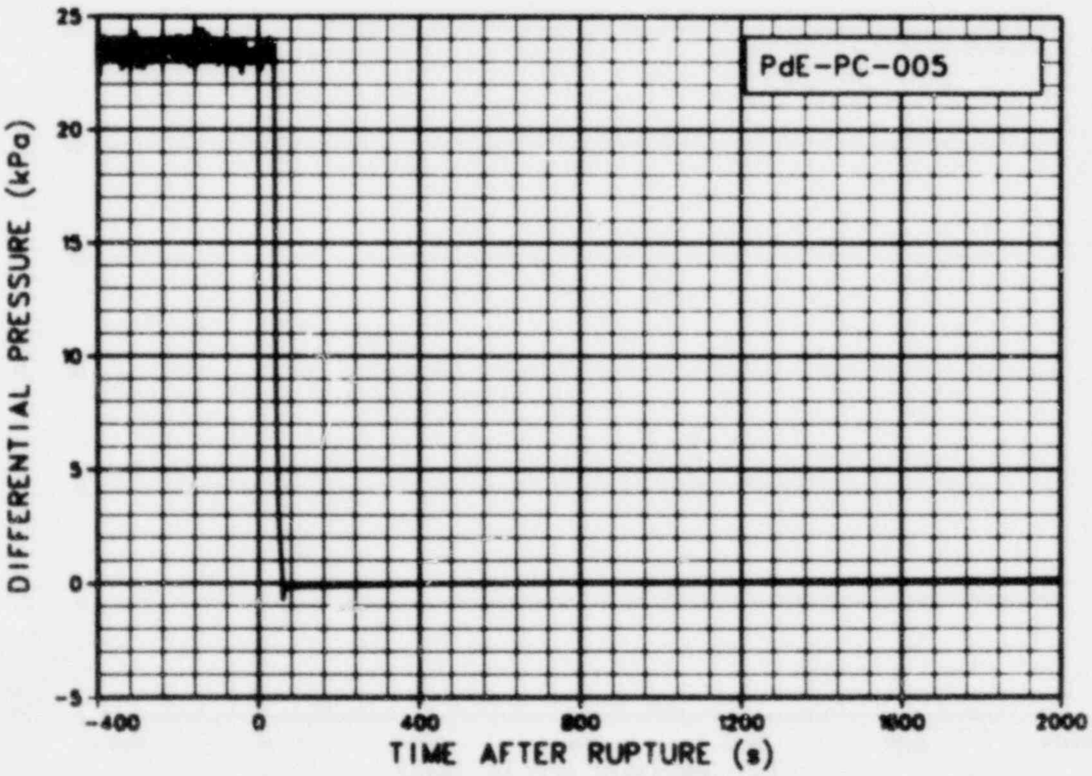


Figure 58-32. Differential pressure in intact loop cold leg from primary coolant pump discharge to reactor vessel inlet (PdE-PC-005) (qualified, negative values are within measurement uncertainty).

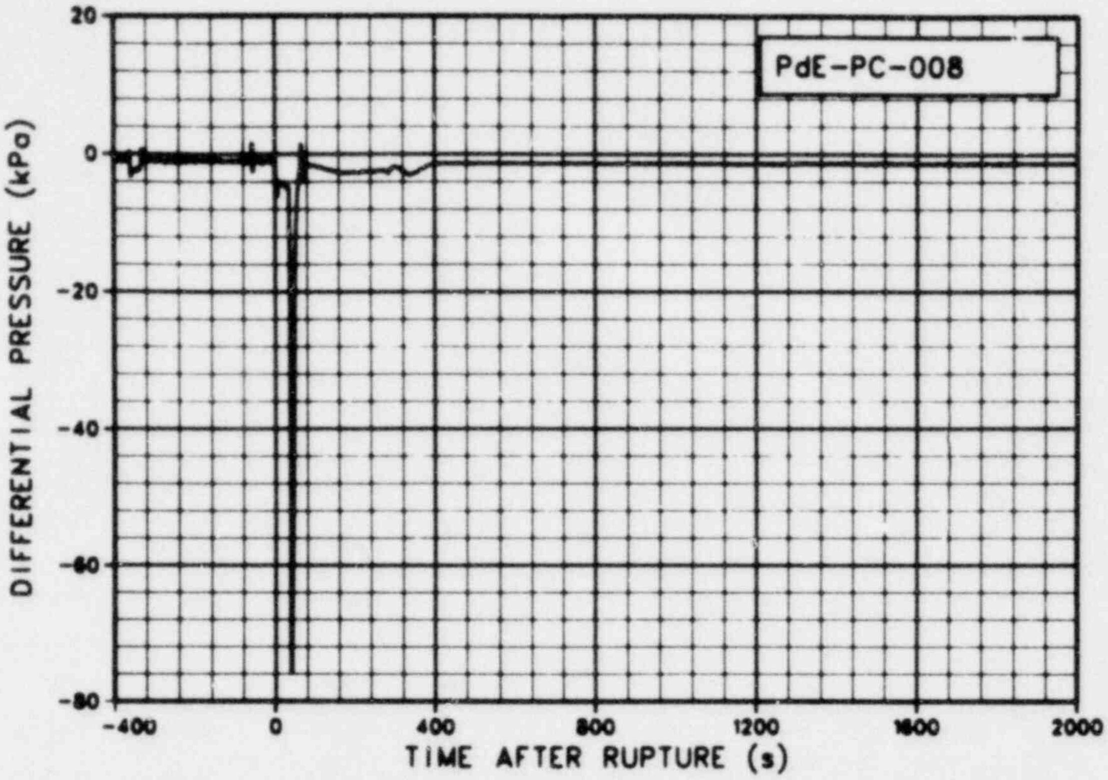


Figure 58-33. Differential pressure in intact loop across pressurizer surge line (PdE-PC-008) (qualified).

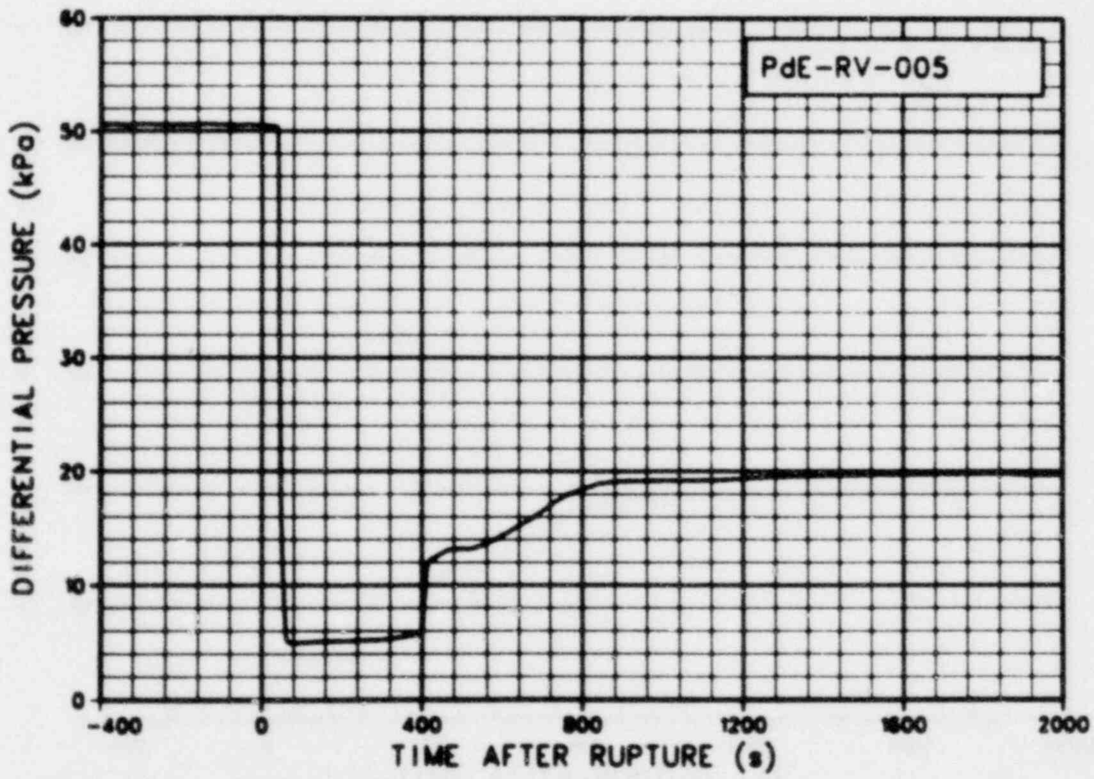


Figure 58-34. Differential pressure in reactor vessel from vessel top to intact loop hot leg outlet (PdE-RV-005) (qualified, no comparable measurement).

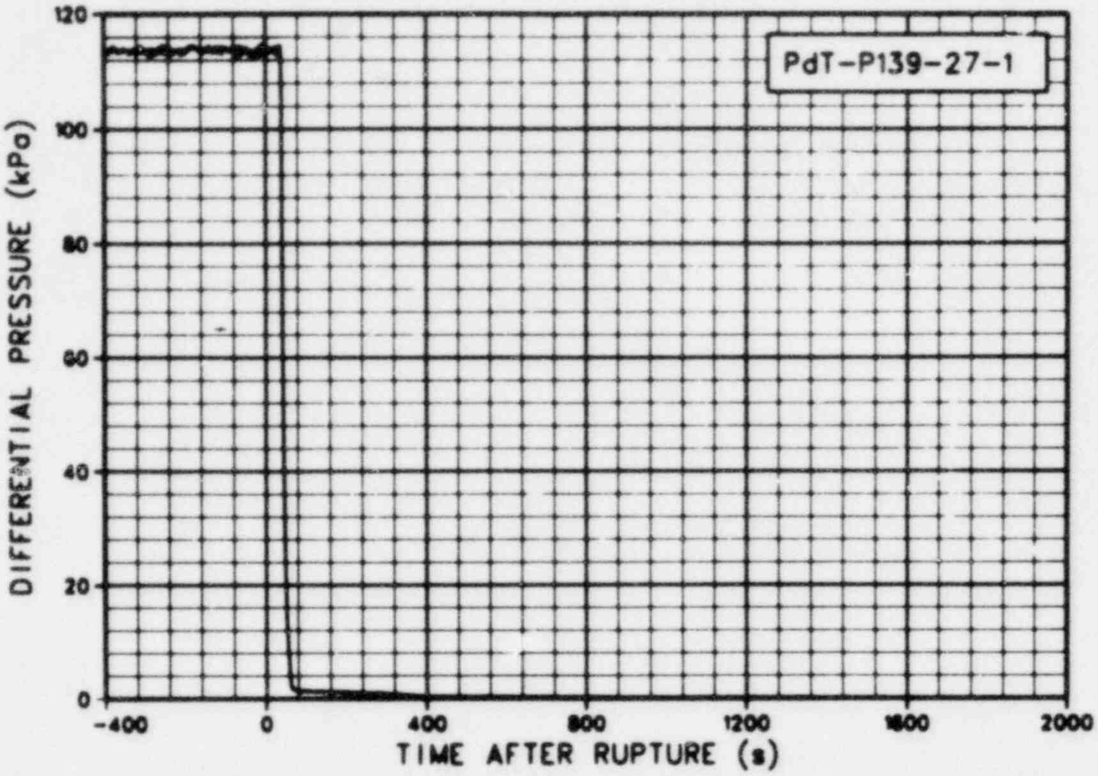


Figure 58-35. Differential pressure for primary coolant flow Channel A (PdT-P139-27-1) (qualified, good for initial conditions only).

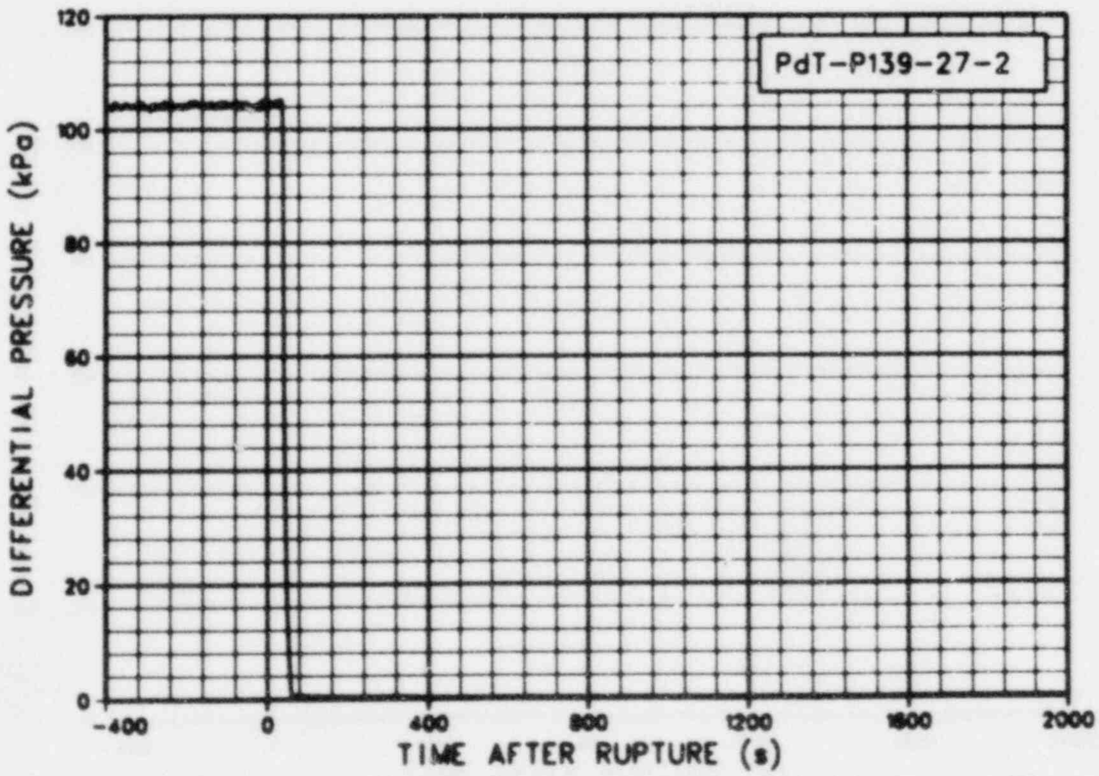


Figure 58-36. Differential pressure for primary coolant flow Channel B (PdT-P139-27-2) (qualified, good for initial conditions only).

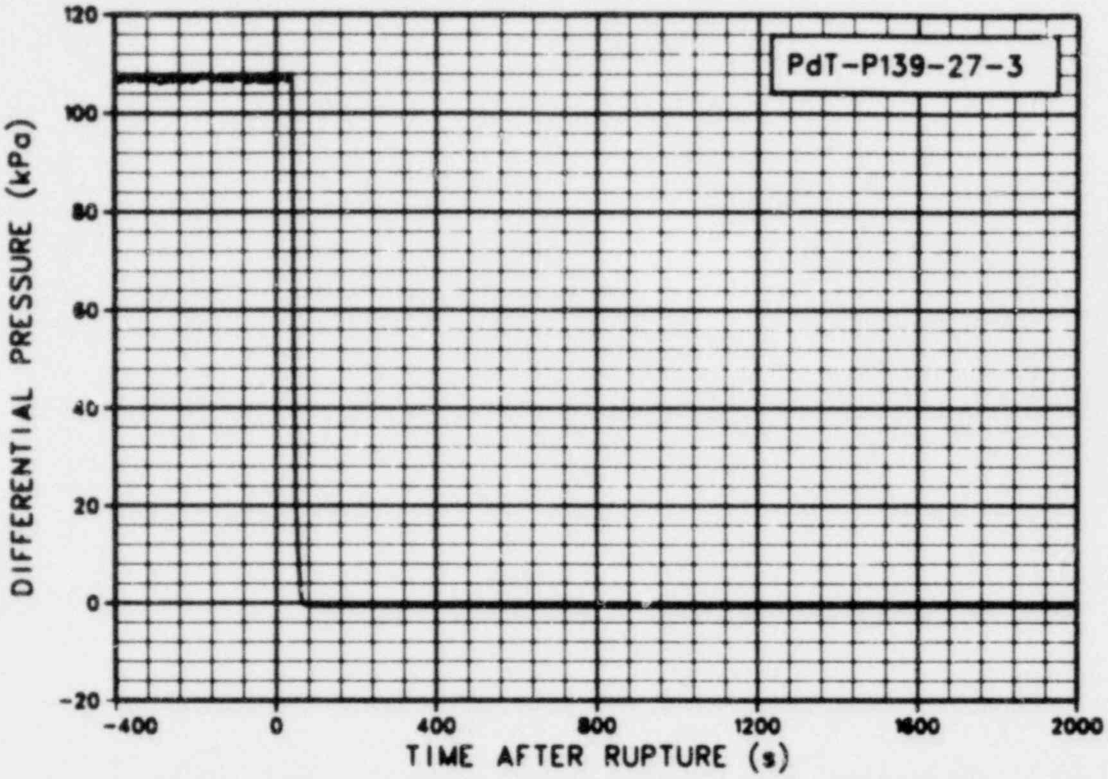


Figure 5S-37. Differential pressure for primary coolant flow Channel C (PdT-P139-27-3) (qualified, good for initial conditions only).

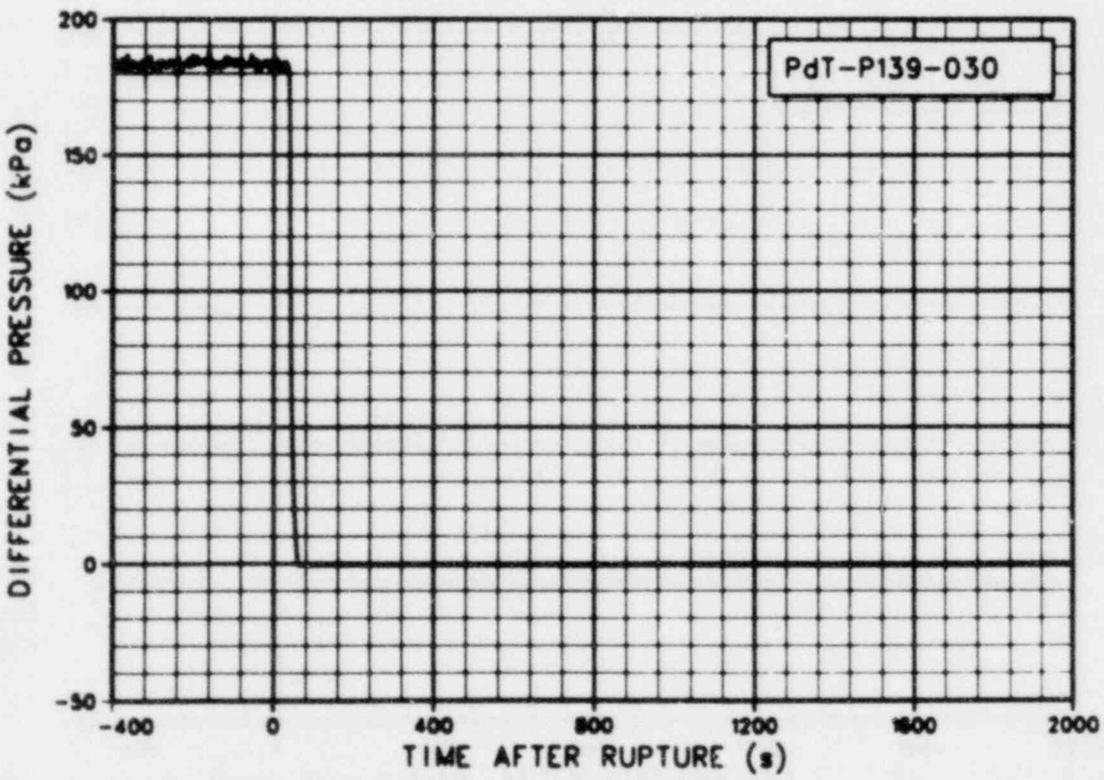


Figure 5S-38. Differential pressure in intact loop across reactor vessel (PdT-P139-030) (qualified, good for initial conditions only).

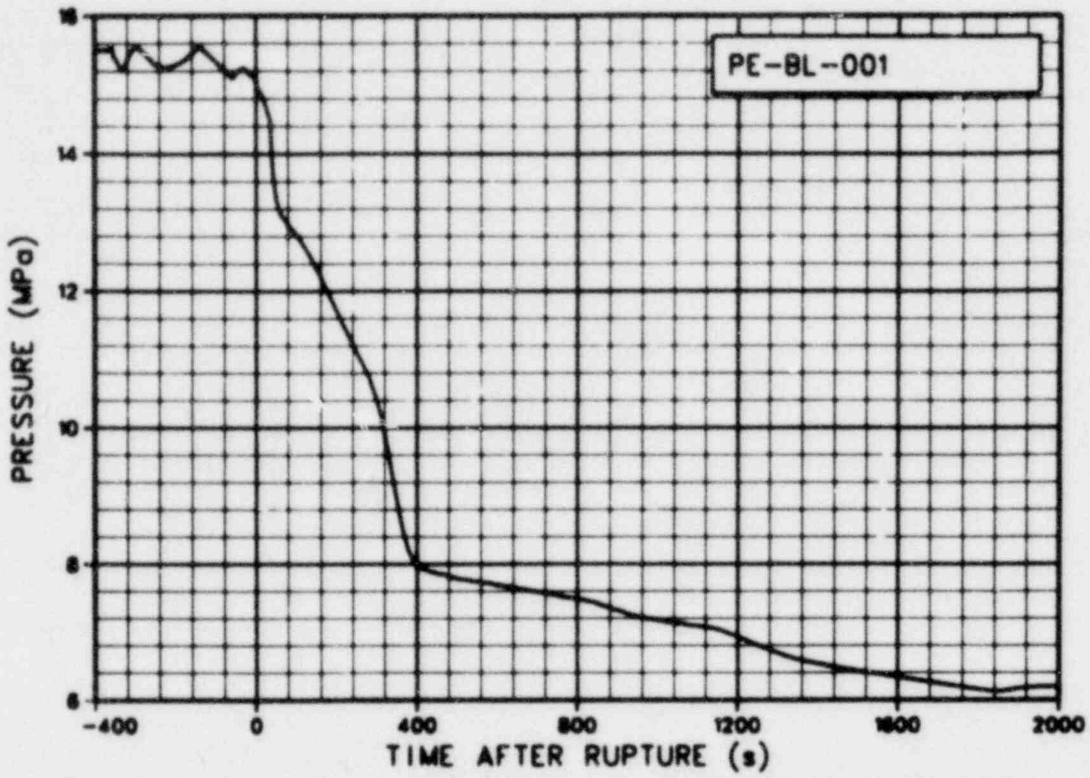


Figure 5S-39. Pressure in broken loop cold leg (PE-BL-001) (qualified).

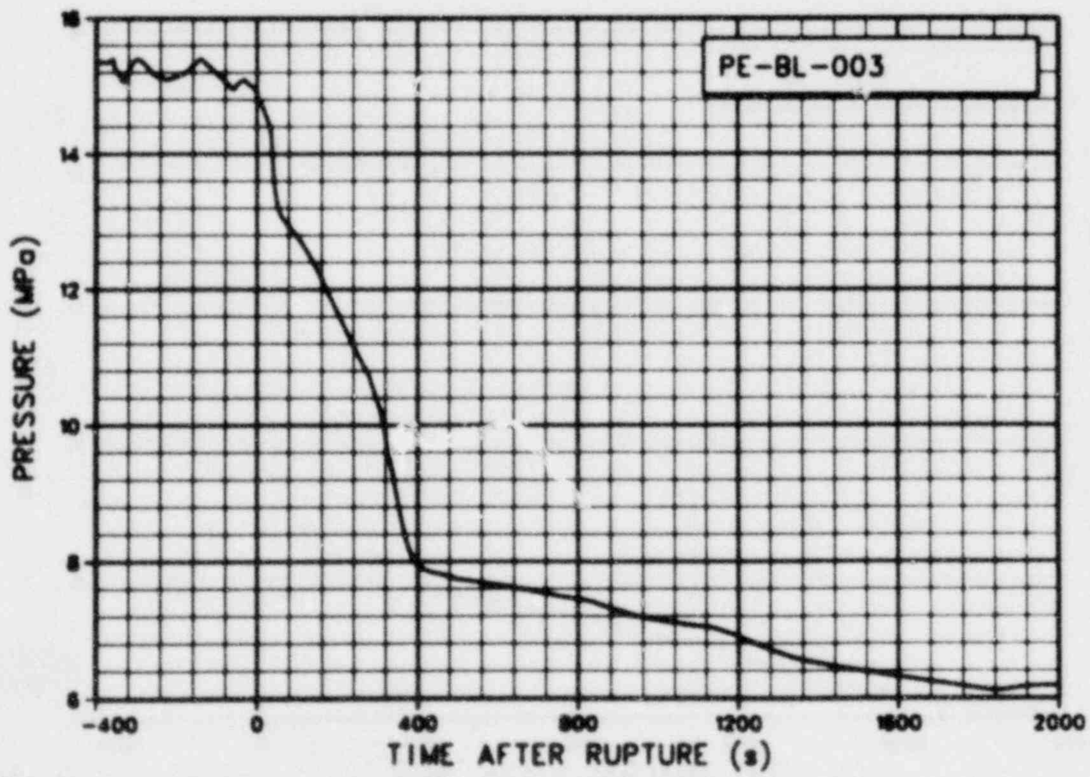


Figure 5S-40. Pressure in broken loop hot leg downstream of pump simulator (PE-BL-003) (qualified).

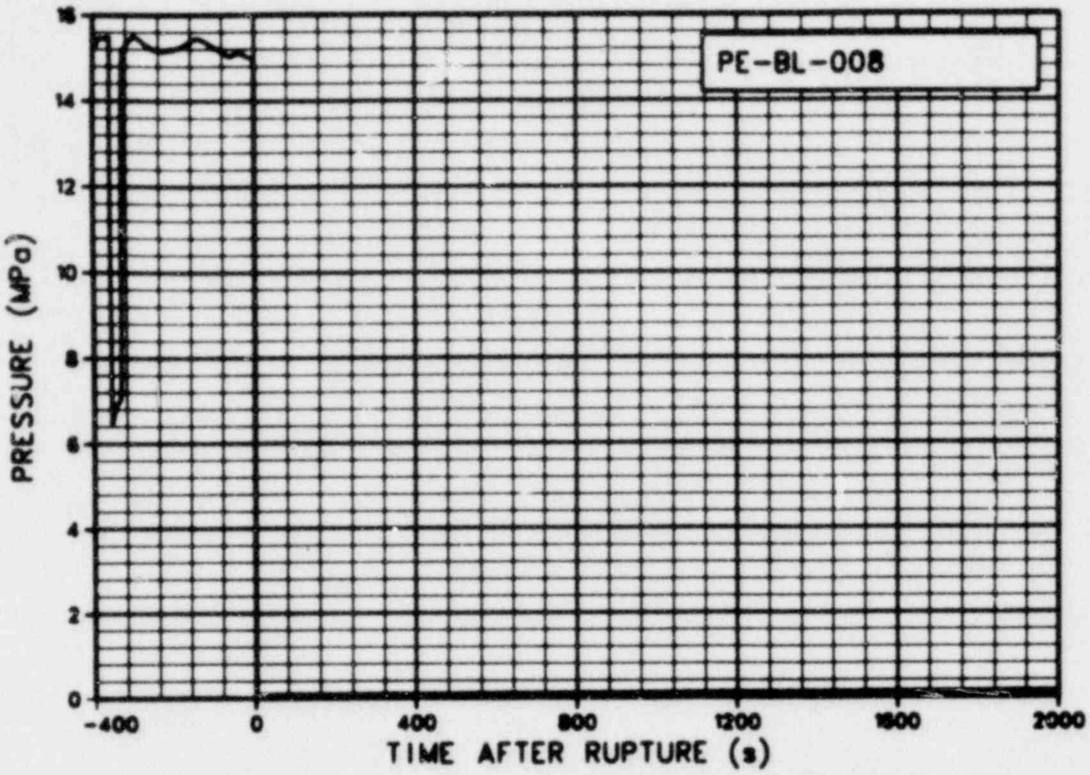


Figure 5S-41. Pressure in broken loop cold leg 8-inch pipe (PE-BL-008) (qualified).

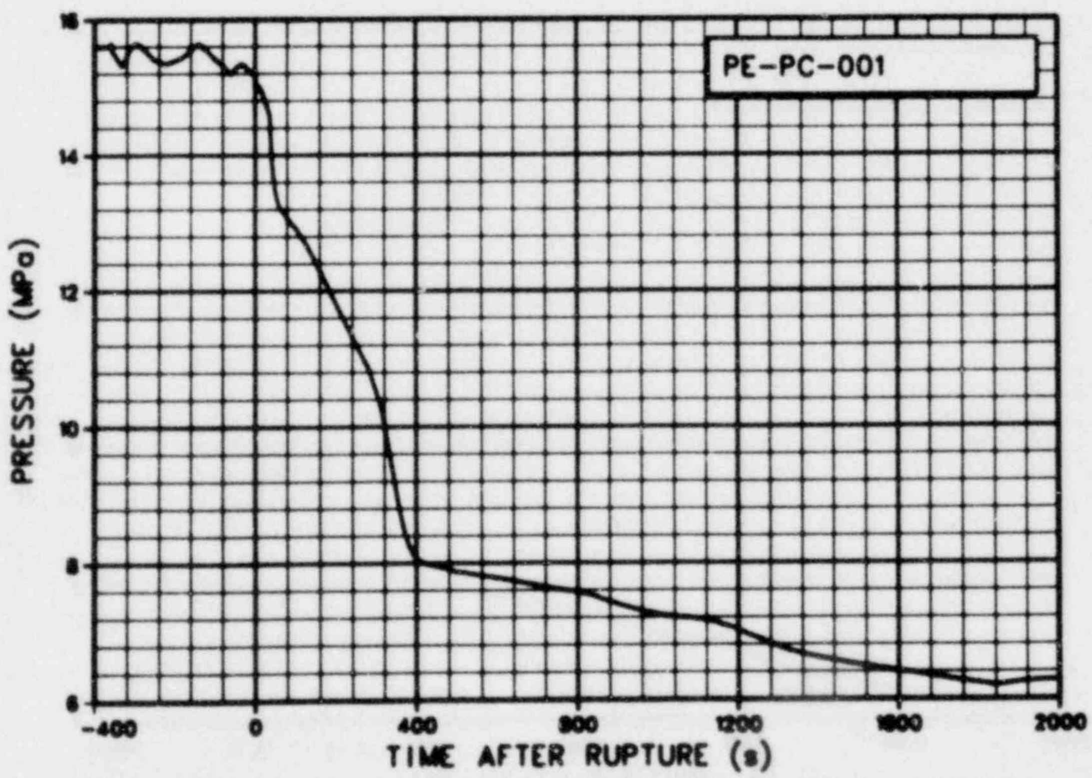


Figure 5S-42. Pressure in intact loop cold leg (PE-PC-001) (qualified).

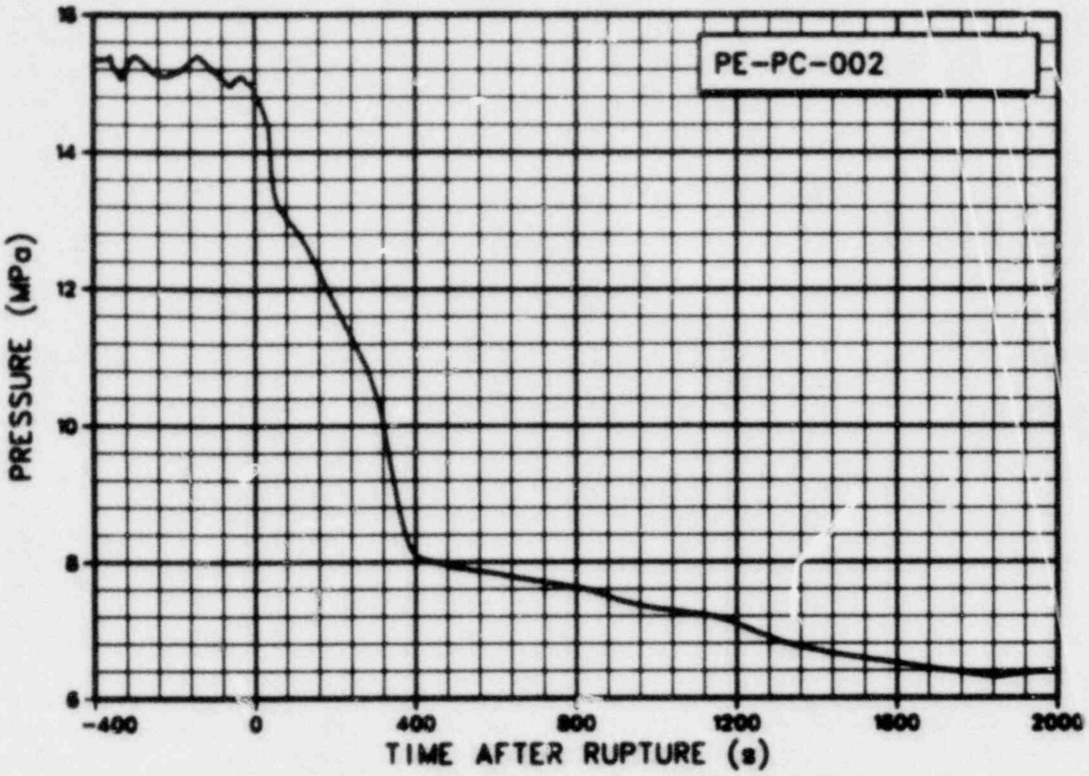


Figure 5B-43. Pressure in intact loop hot leg (PE-PC-002) (qualified).

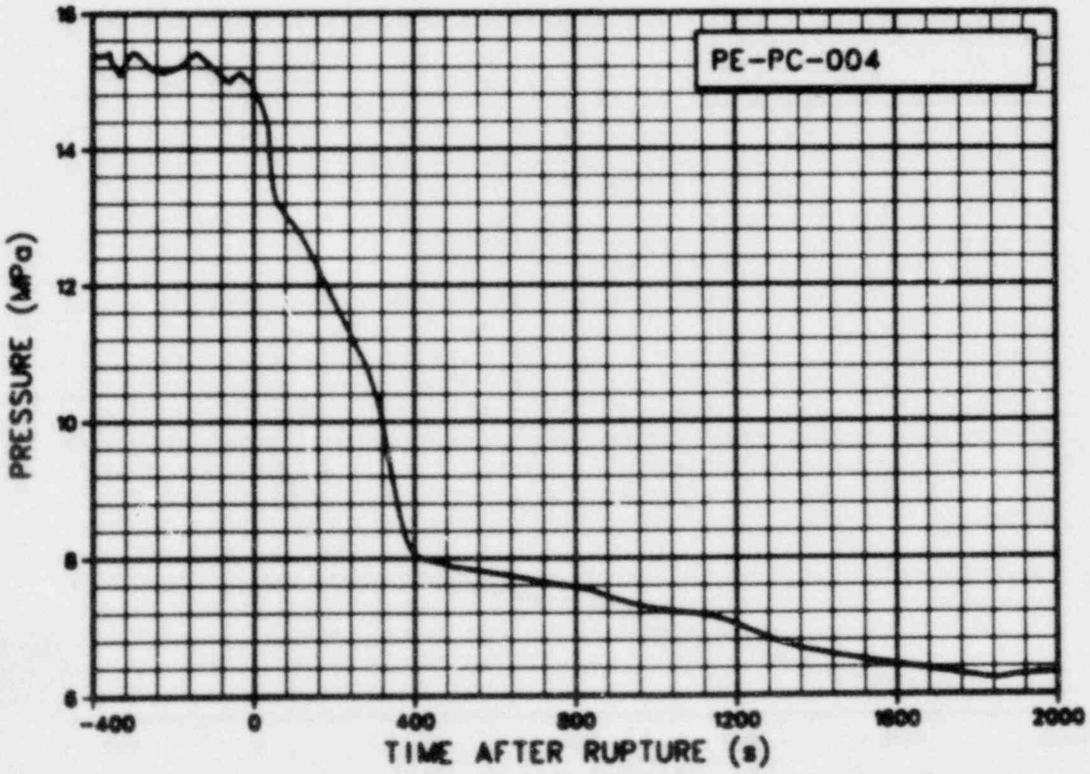


Figure 5B-44. Pressure in pressurizer (PE-PC-004) (qualified).

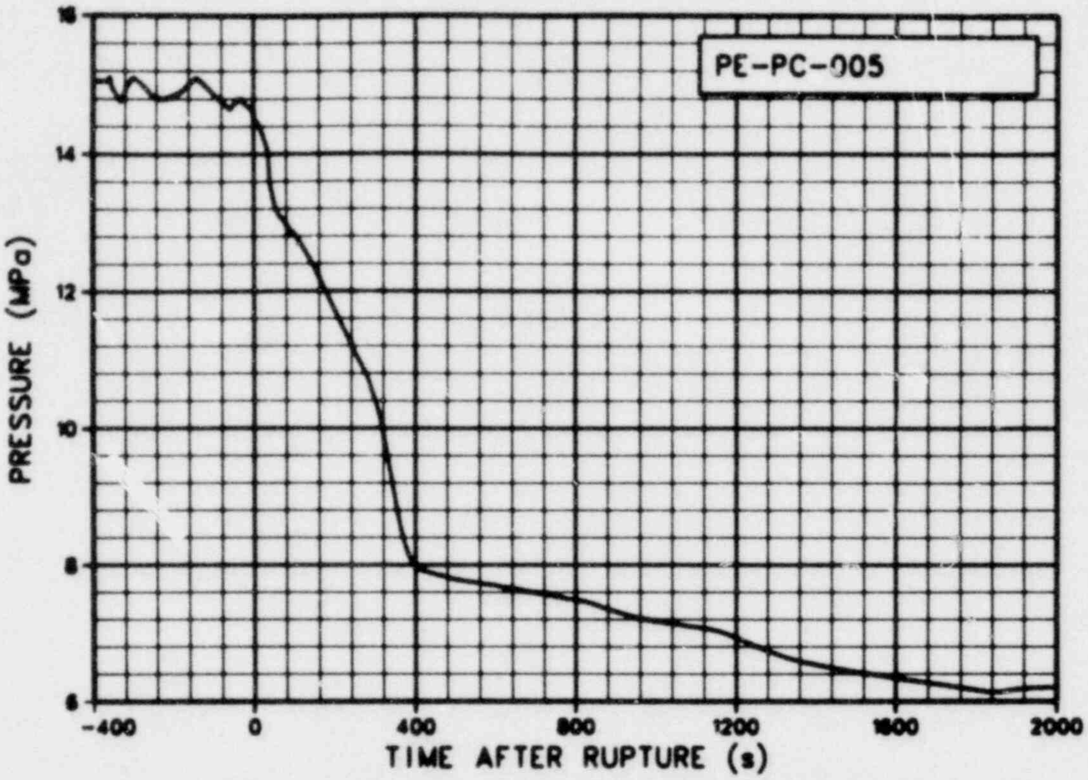


Figure 5S-45. Reference pressure in intact loop between steam generator outlet and pump inlet (PE-PC-005) (qualified).

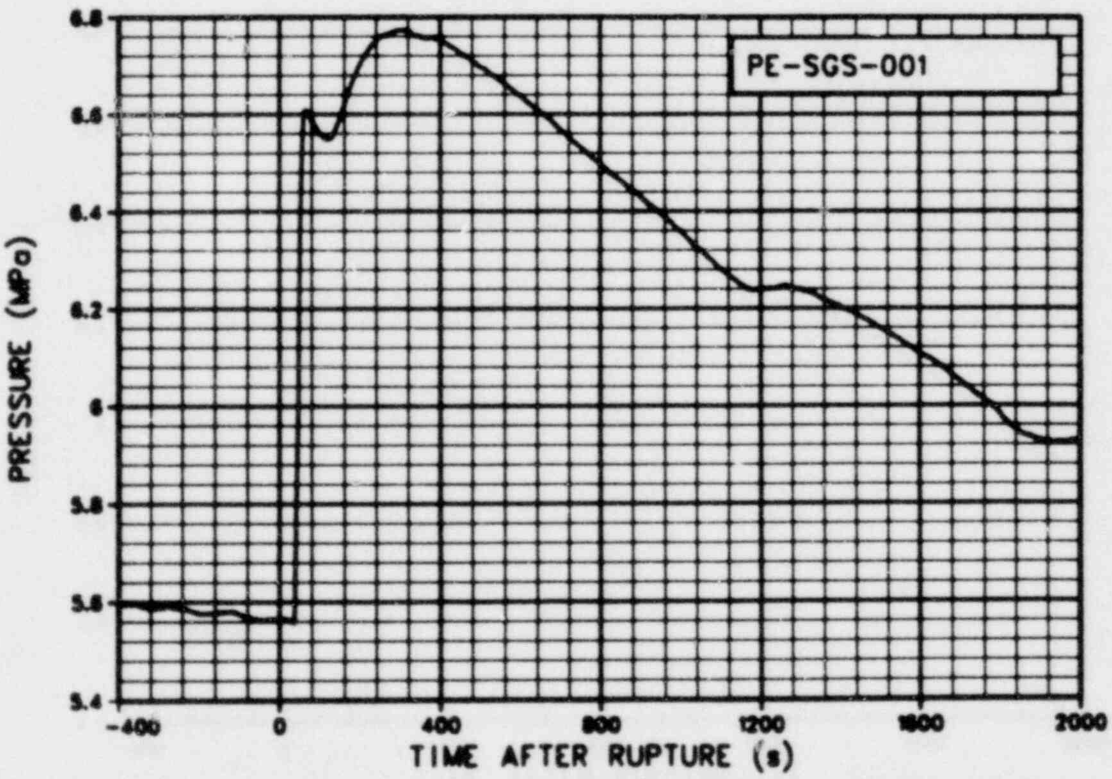


Figure 5S-46. Pressure in steam generator dome (PE-SGS-001) (qualified).

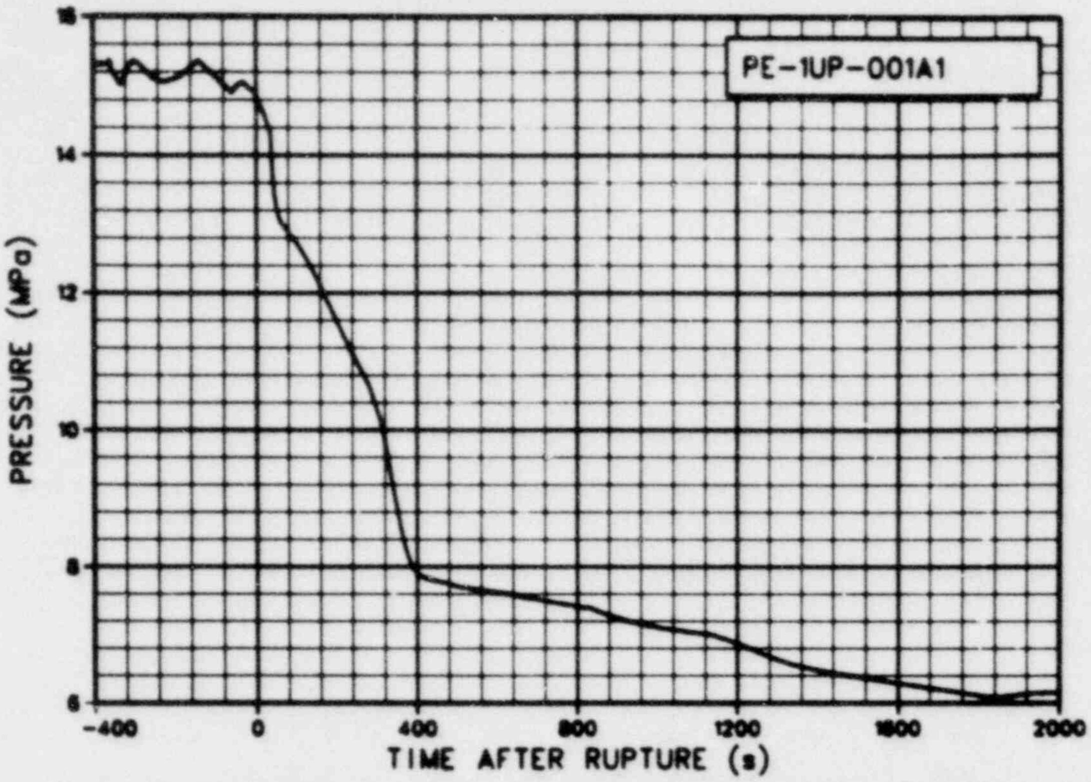


Figure 5B-47. Pressure in reactor vessel above upper end box of Fuel Assembly 1 (PE-1UP-001A1) (qualified).

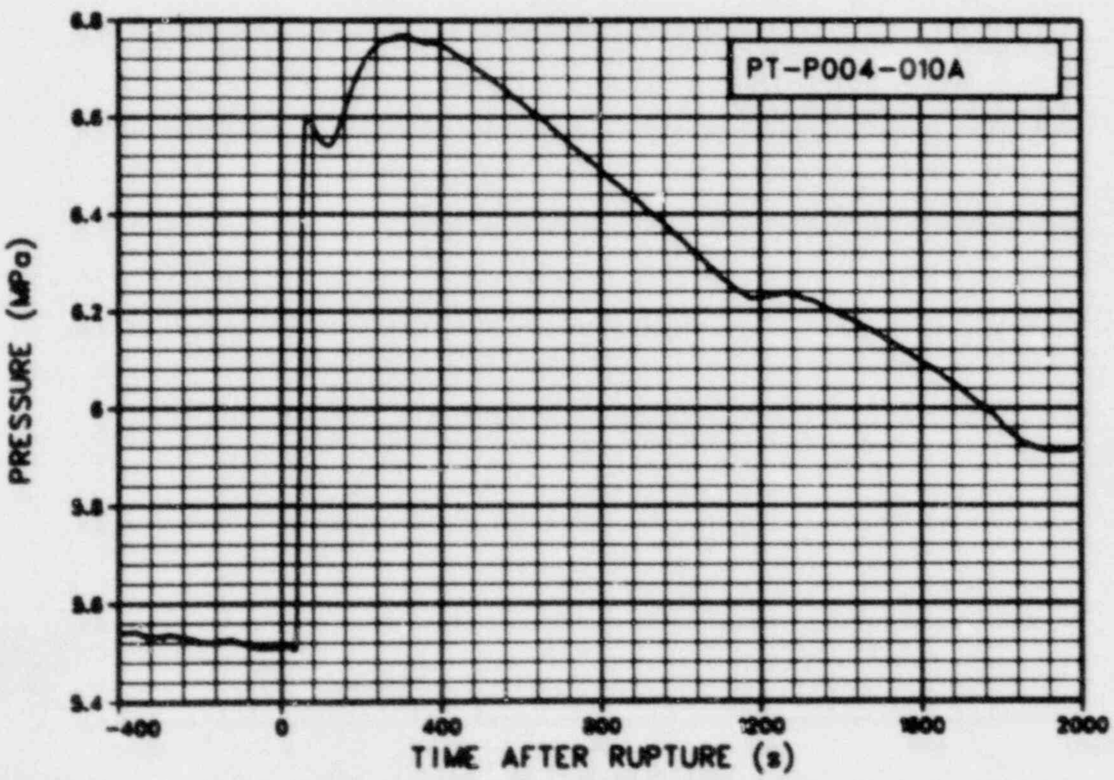


Figure 5B-48. Pressure in steam generator secondary side 10-inch outlet (PT-P004-010A) (qualified).

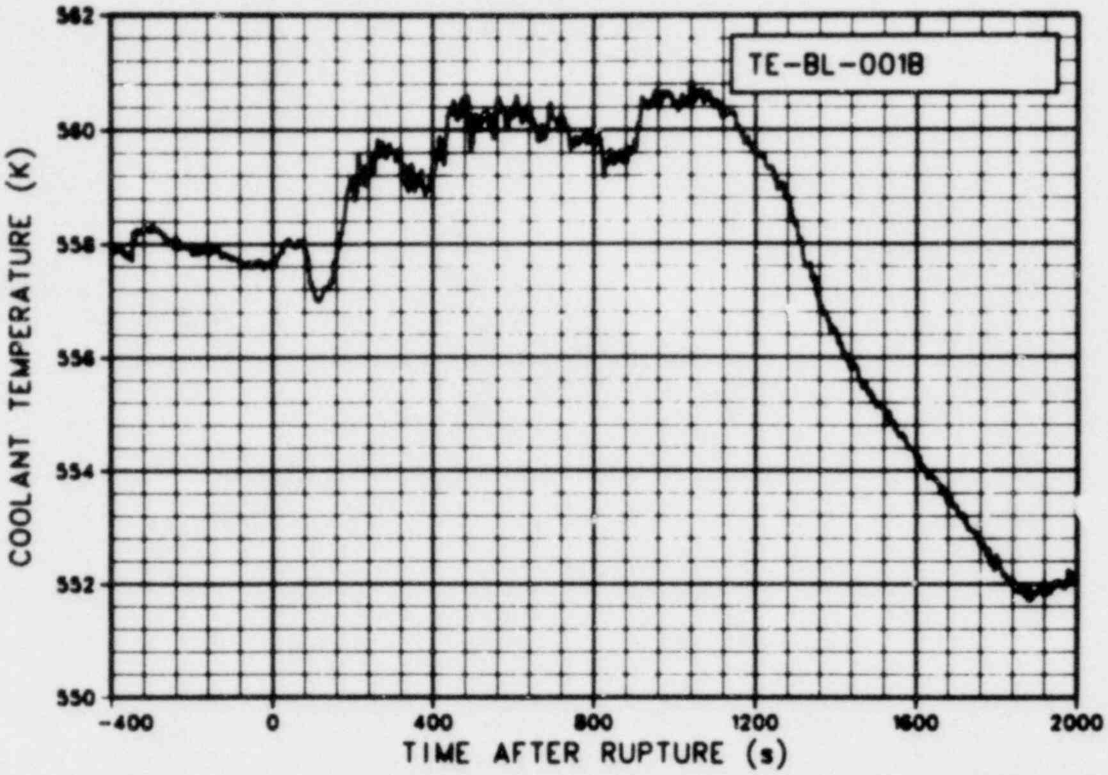


Figure 5S-49. Coolant temperature in broken loop cold leg (TE-BL-001B) (qualified).

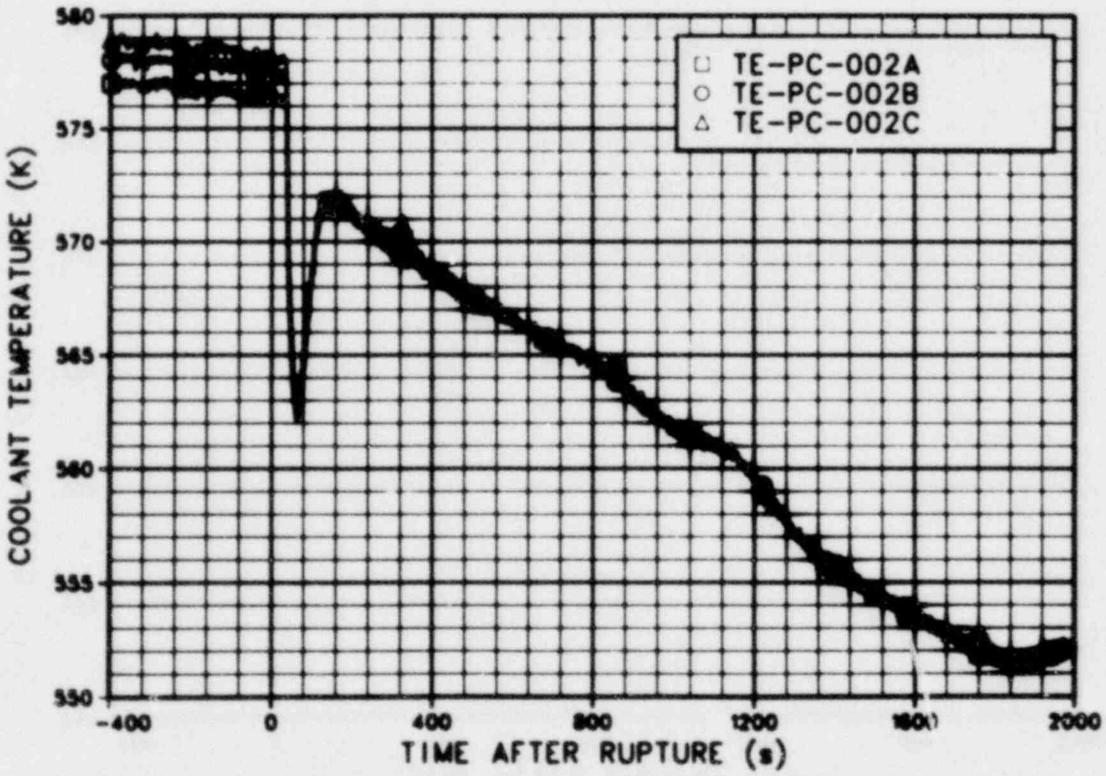


Figure 5S-50. Coolant temperature in intact loop hot leg DTT rake at bottom, middle, and top of pipe (TE-PC-002A, -002B, and -002C) (qualified).

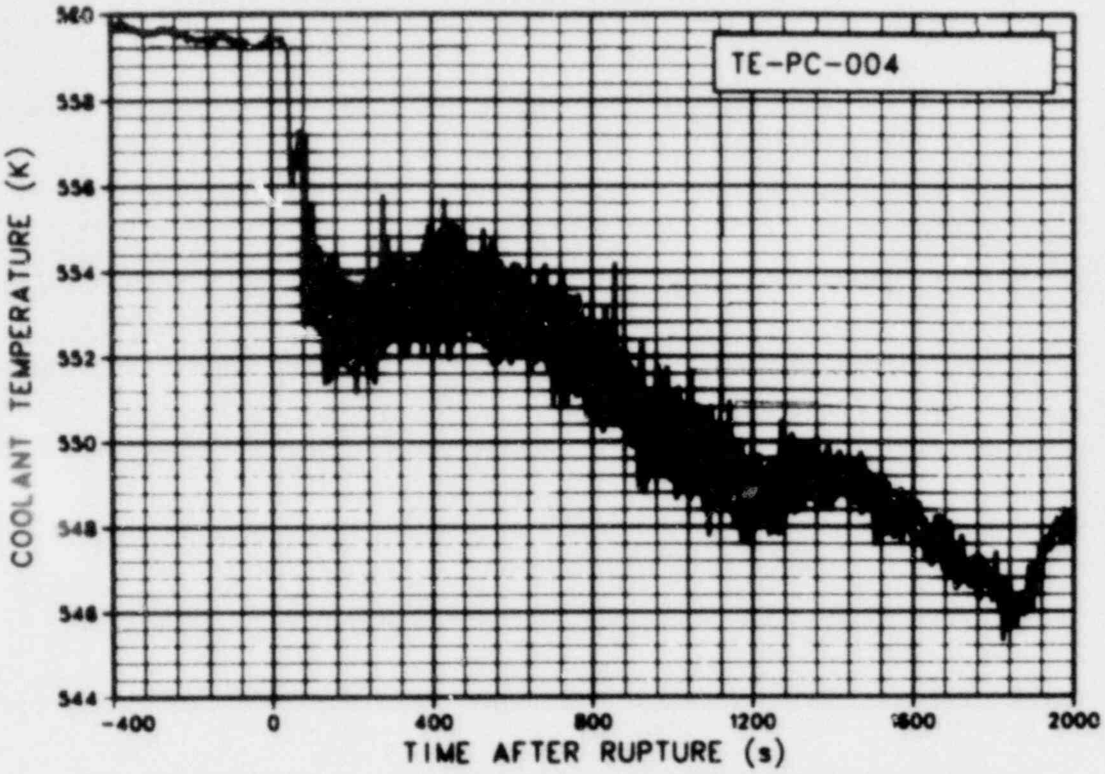


Figure 5S-51. Coolant temperature in intact loop cold leg at bottom of ECC rake 1 (TE-PC-004) (qualified).

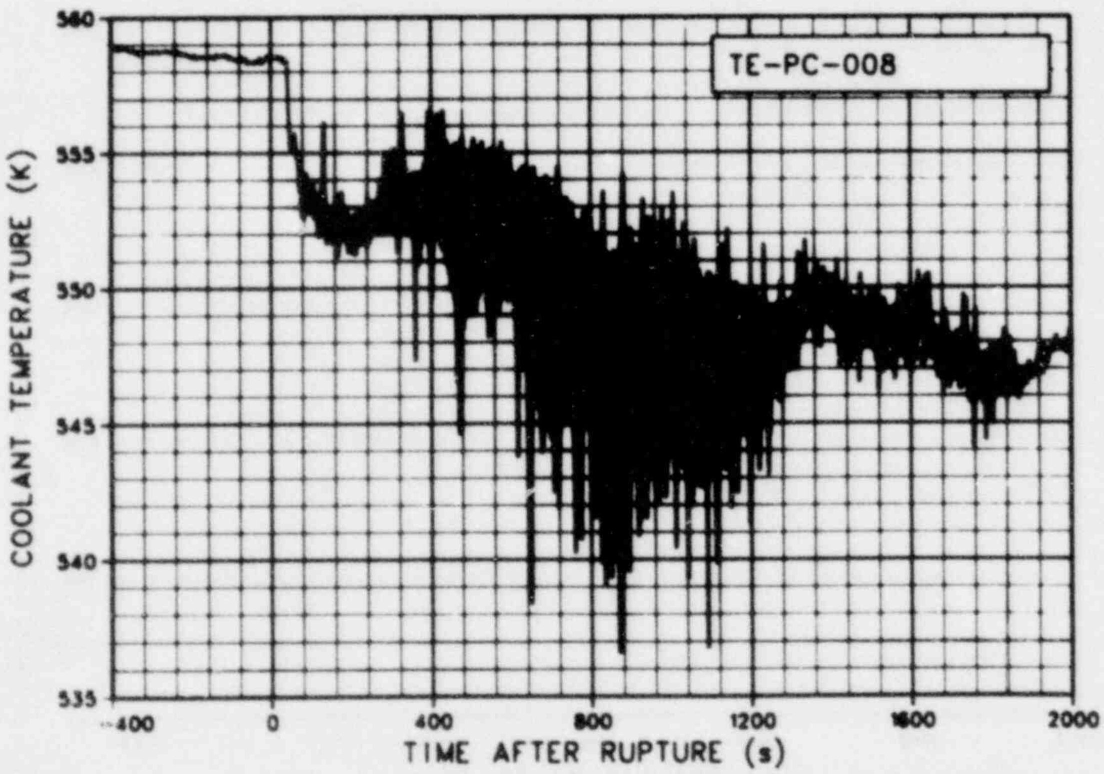


Figure 5S-52. Coolant temperature in intact loop cold leg at bottom of ECC rake 2 (TE-PC-008) (qualified).

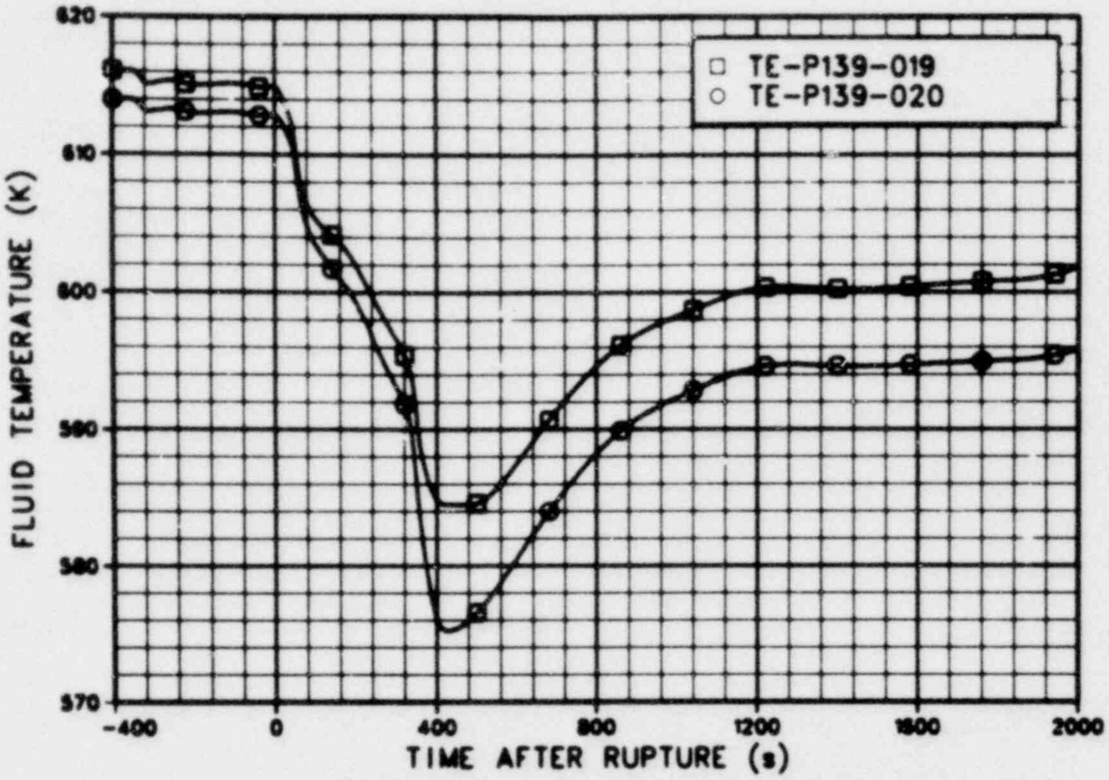


Figure 58-53. Fluid temperature in intact loop pressurizer vapor and liquid space (TE-P139-019 and -020) (qualified, initial conditions only, shows hot wall effects after blowdown initiation).

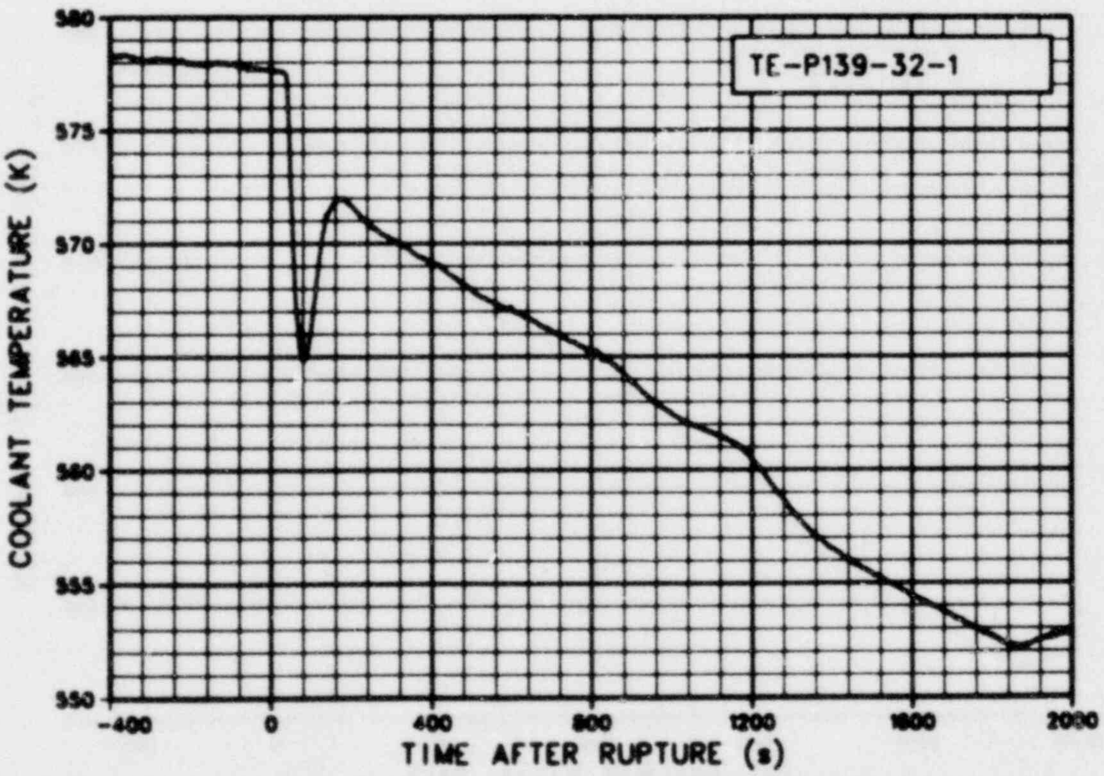


Figure 58-54. Coolant temperature in intact loop hot leg (TE-P139-32-1) (qualified, process instrument, response limited).

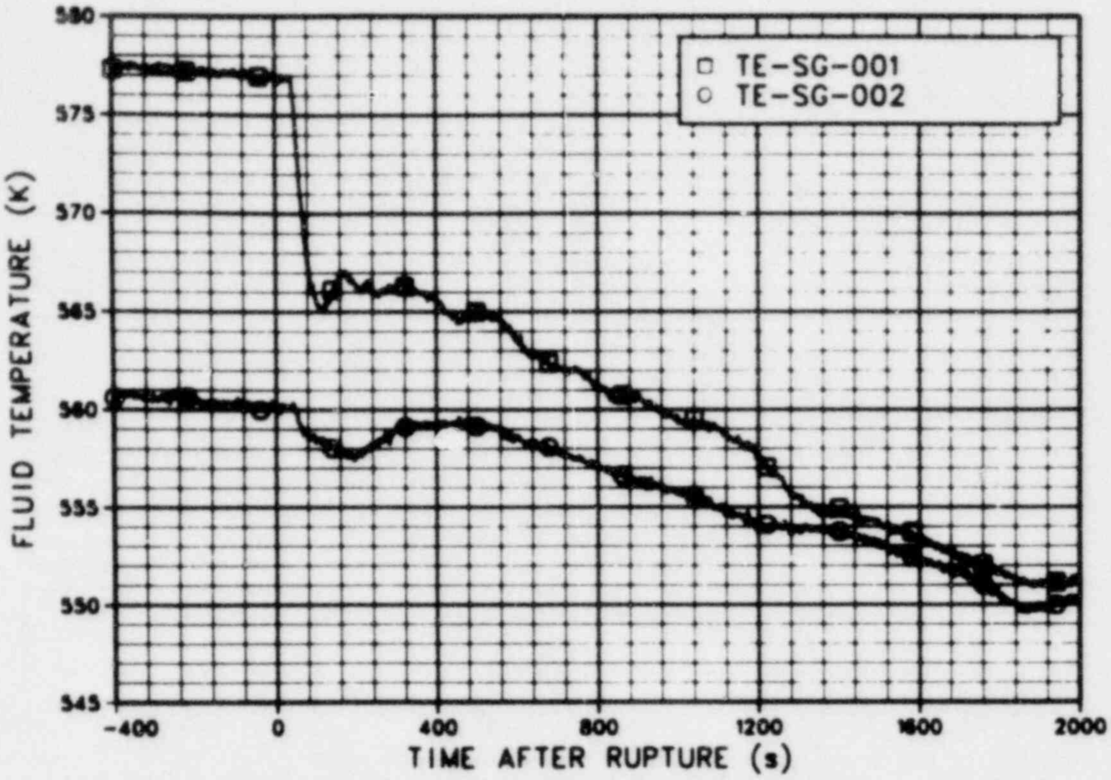


Figure 5S-55. Fluid temperature in intact loop steam generator inlet and outlet plenums (TE-SG-001 and -002) (qualified).

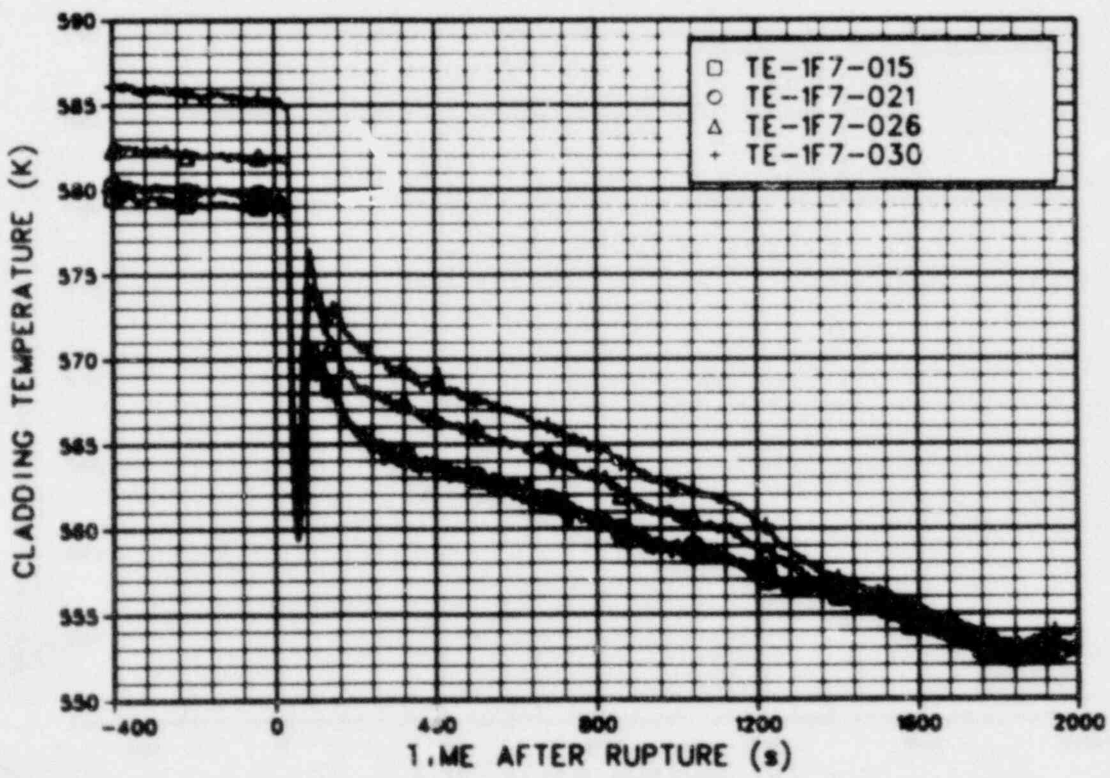


Figure 5S-56. Cladding temperature in reactor vessel at Fuel Assembly 1, Row F, Column 7 at 0.38, 0.53, 0.66, and 0.76 m above bottom of fuel rod (TE-1F7-015, -021, -026, and -030) (qualified).

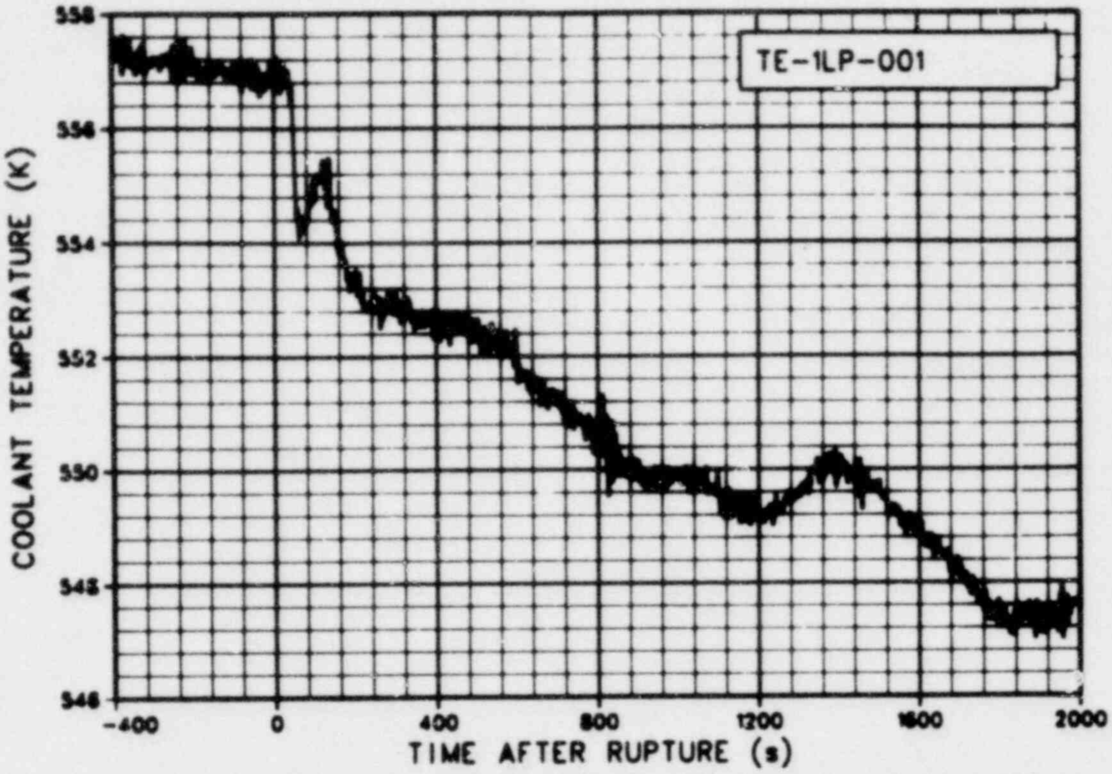


Figure 5S-57. Coolant temperature in reactor vessel at lower end box of Fuel Assembly 1 (TE-1LP-001) (qualified).

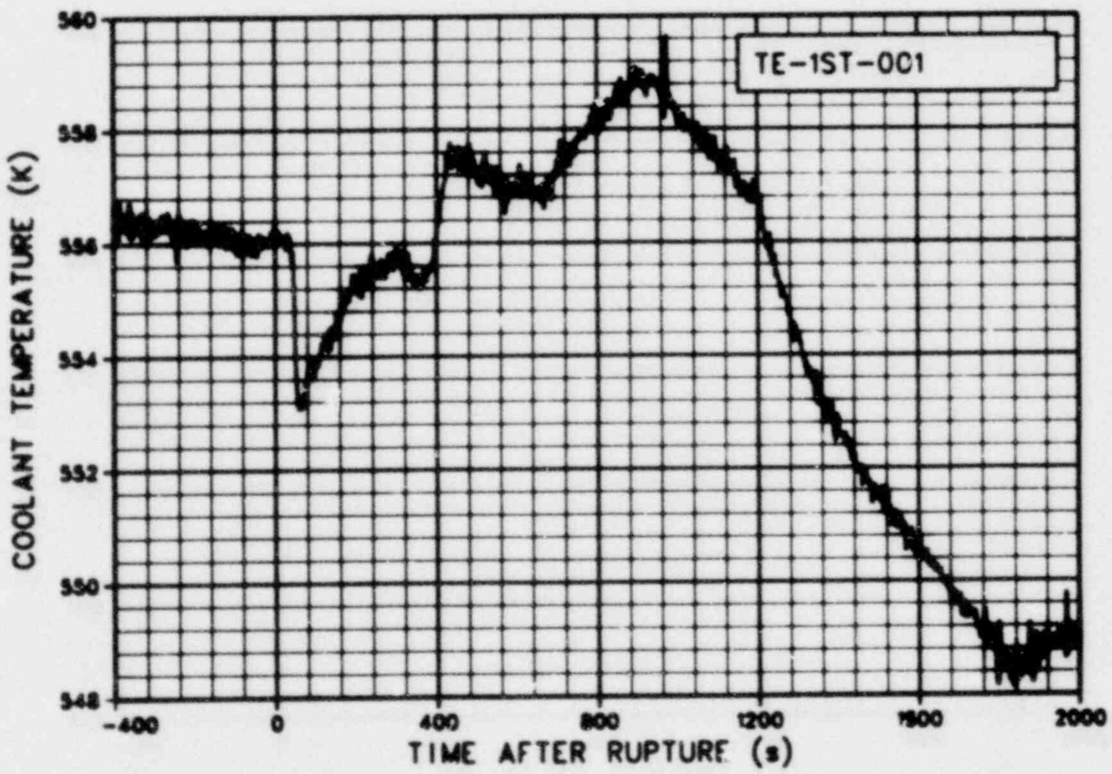


Figure 5S-58. Coolant temperature in reactor vessel at Downcomer Stalk 1, 4.8 m from reactor vessel bottom (TE-1ST-001) (qualified).

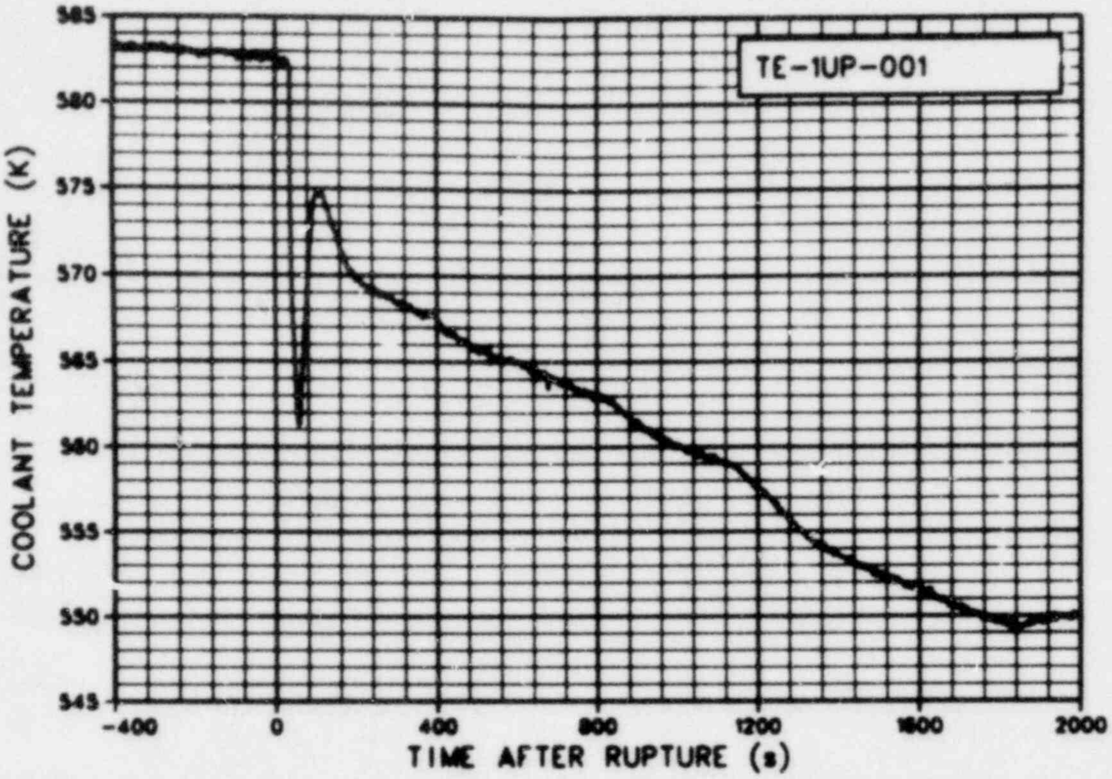


Figure 58-59. Coolant temperature in reactor vessel at upper end box of Fuel Assembly 1 (TE-1UP-001) (qualified).

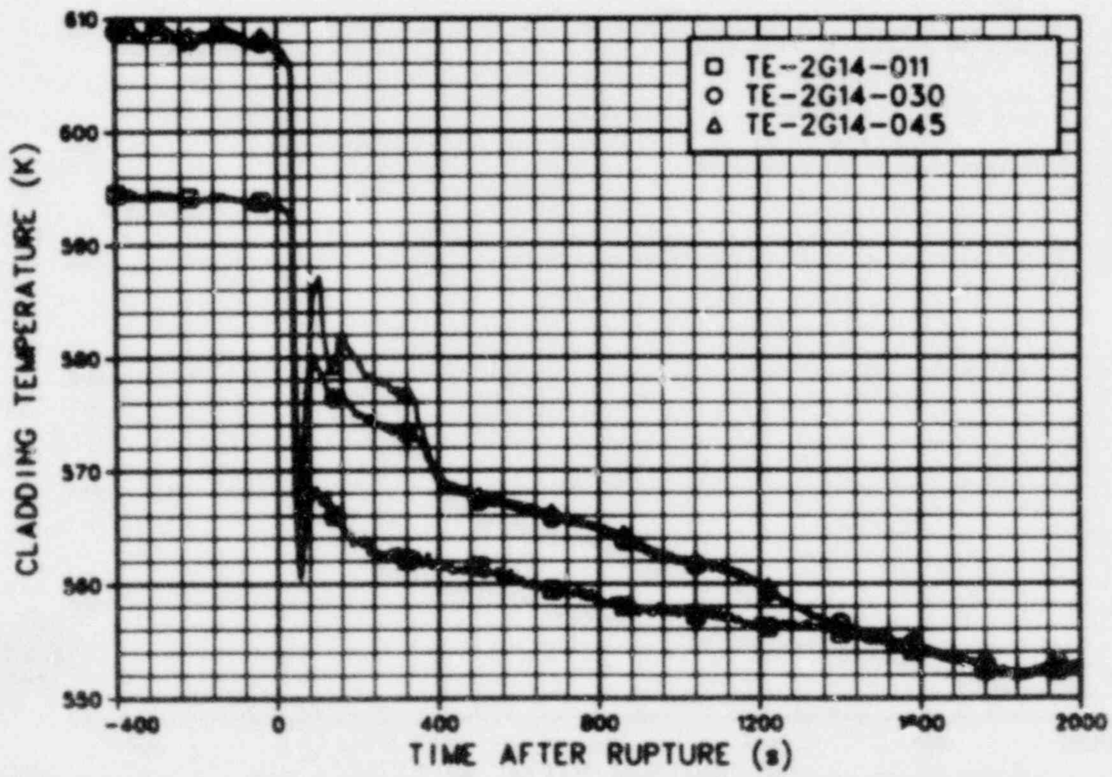


Figure 58-60. Cladding temperature in reactor vessel at Fuel Assembly 2, Row G, Column 14 at 0.28, 0.76, and 1.14 m above bottom of fuel rod (TE-2G14-011, -030, and -045) (qualified).

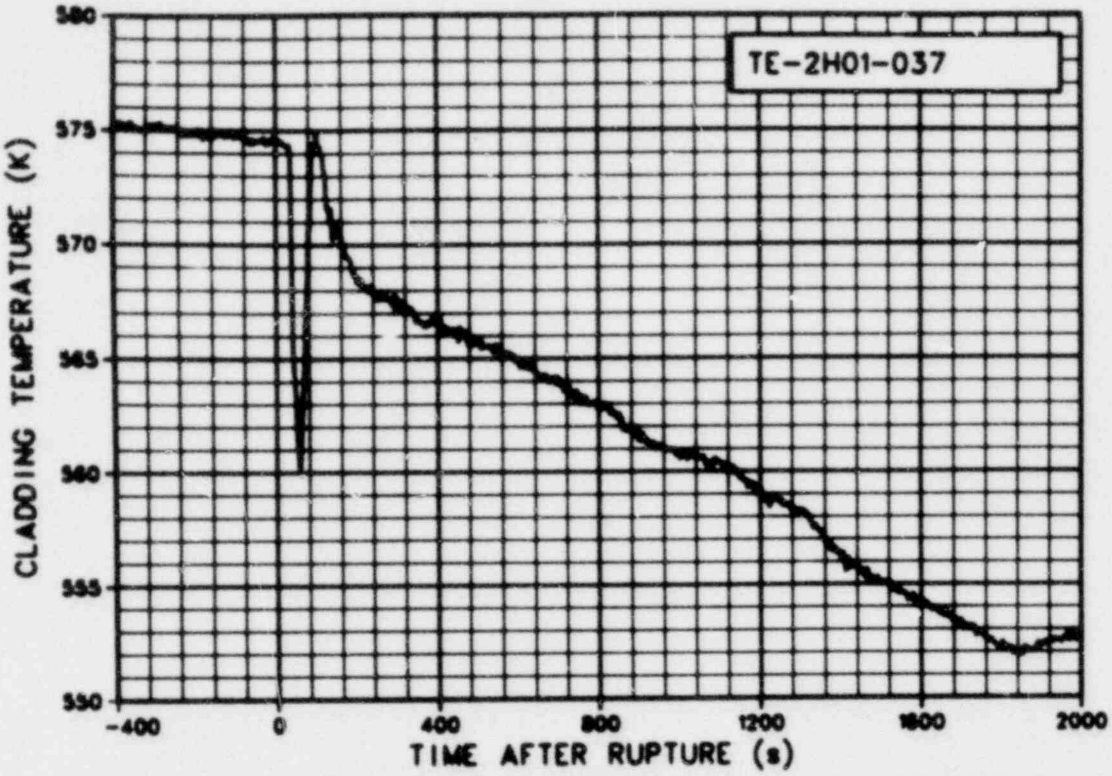


Figure 58-61. Cladding temperature in reactor vessel at Fuel Assembly 2, Row H, Column 1 at 0.94 m above bottom of fuel rod (TE-2H01-037) (qualified).

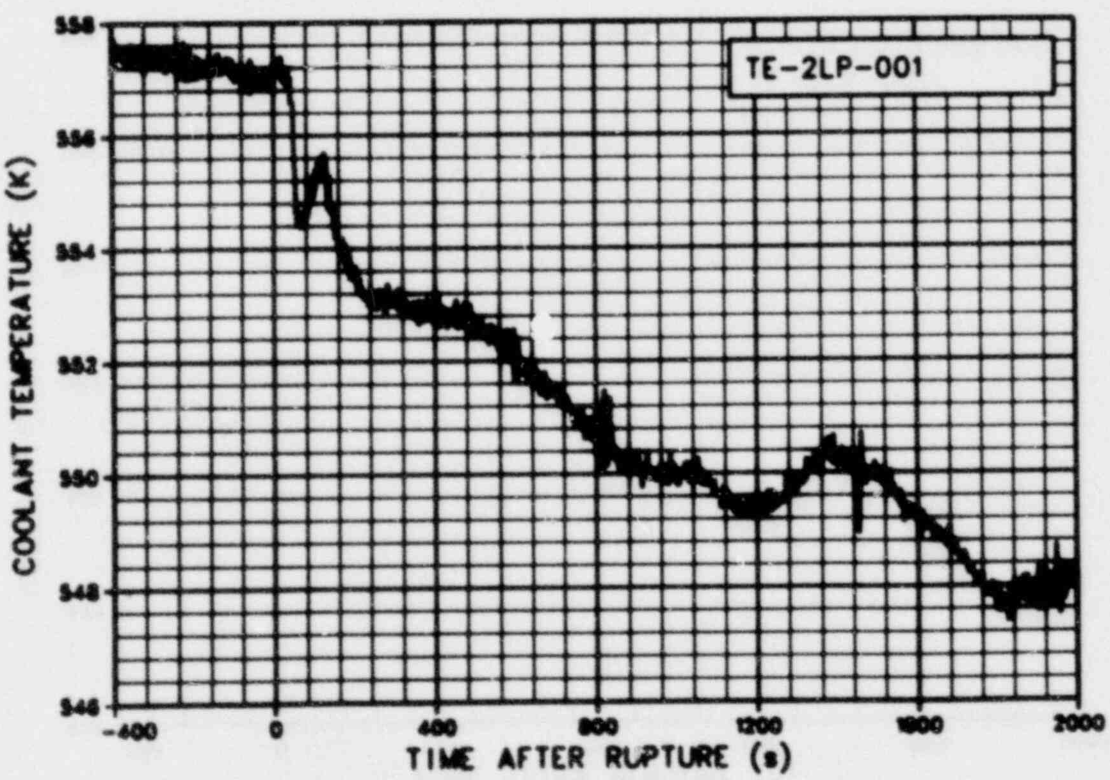


Figure 58-62. Coolant temperature in reactor vessel at lower end box of Fuel Assembly 2 (TE-2LP-001) (qualified).

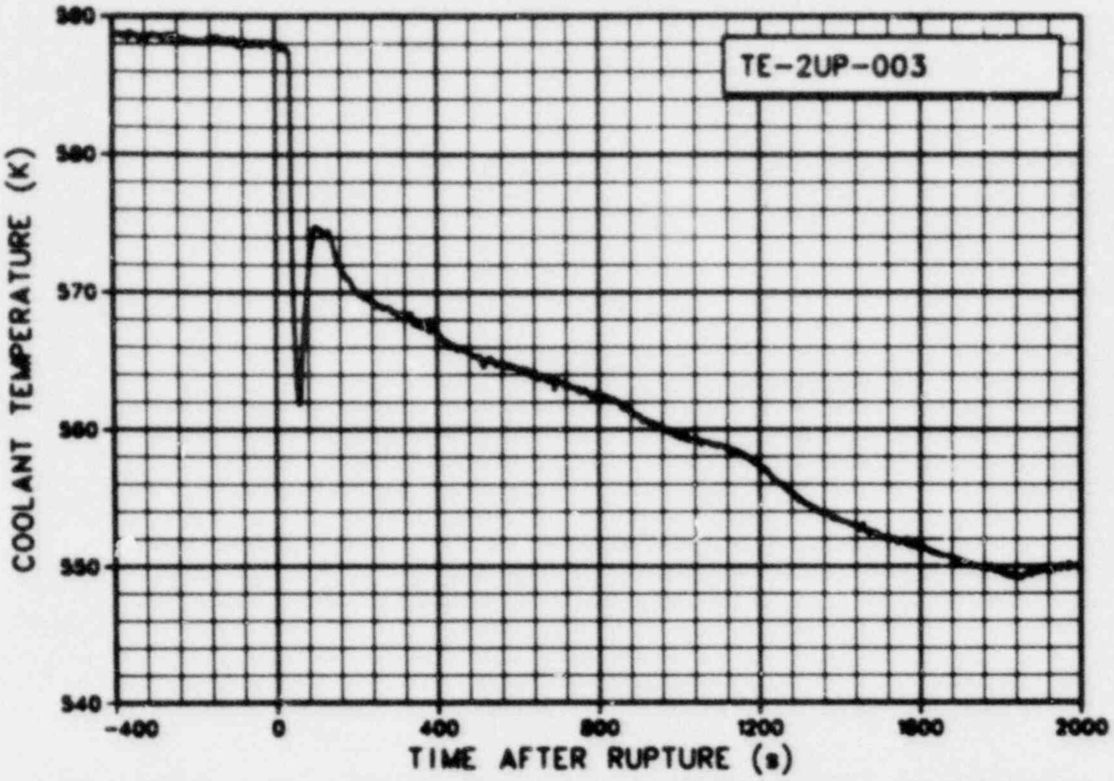


Figure 5B-63. Coolant temperature in reactor vessel at upper end box of Fuel Assembly 2 (TE-2UP-003) (qualified).

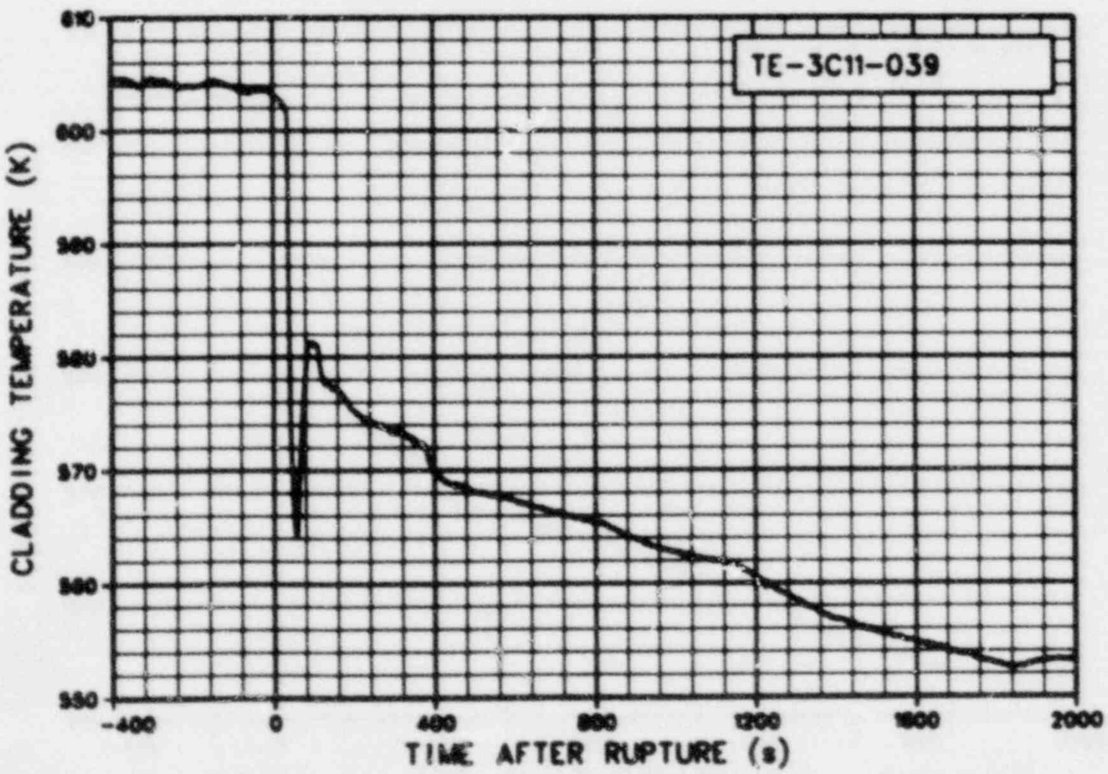


Figure 5B-64. Cladding temperature in reactor vessel at Fuel Assembly 3, Row C, Column 11 at 0.99 m above bottom of fuel rod (TE-3C11-039) (qualified).

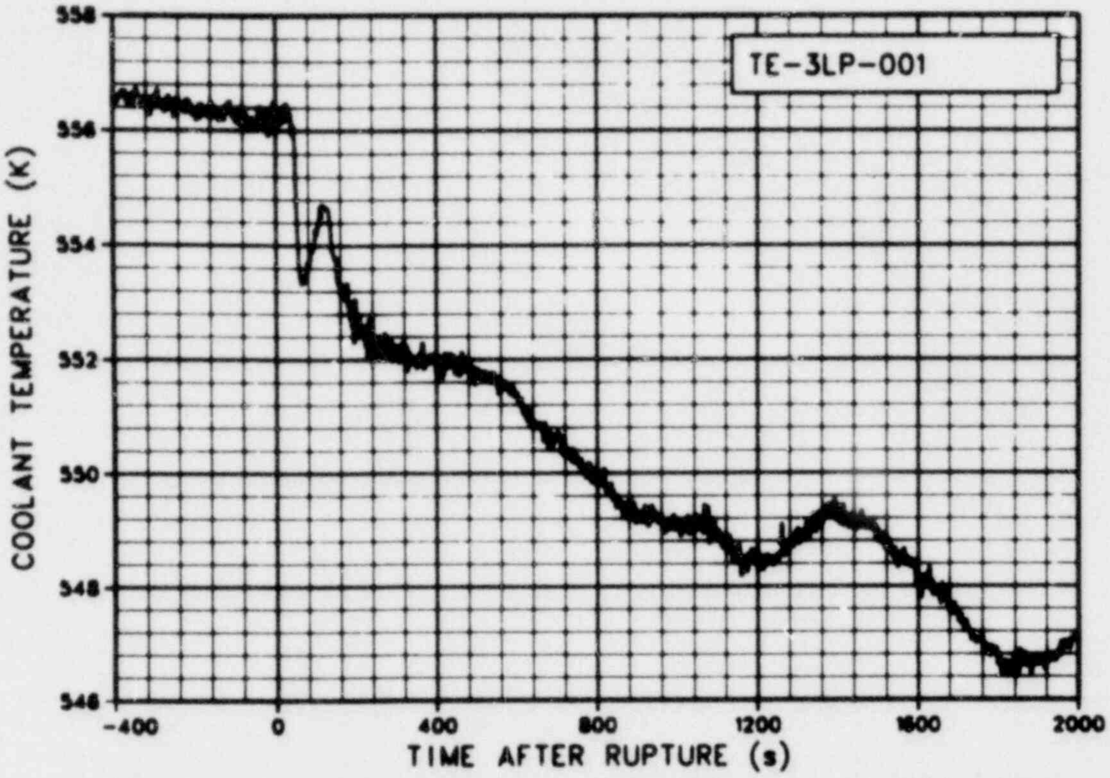


Figure S8-65. Coolant temperature in reactor vessel at lower end box of Fuel Assembly 3 (TE-3LP-001) (qualified).

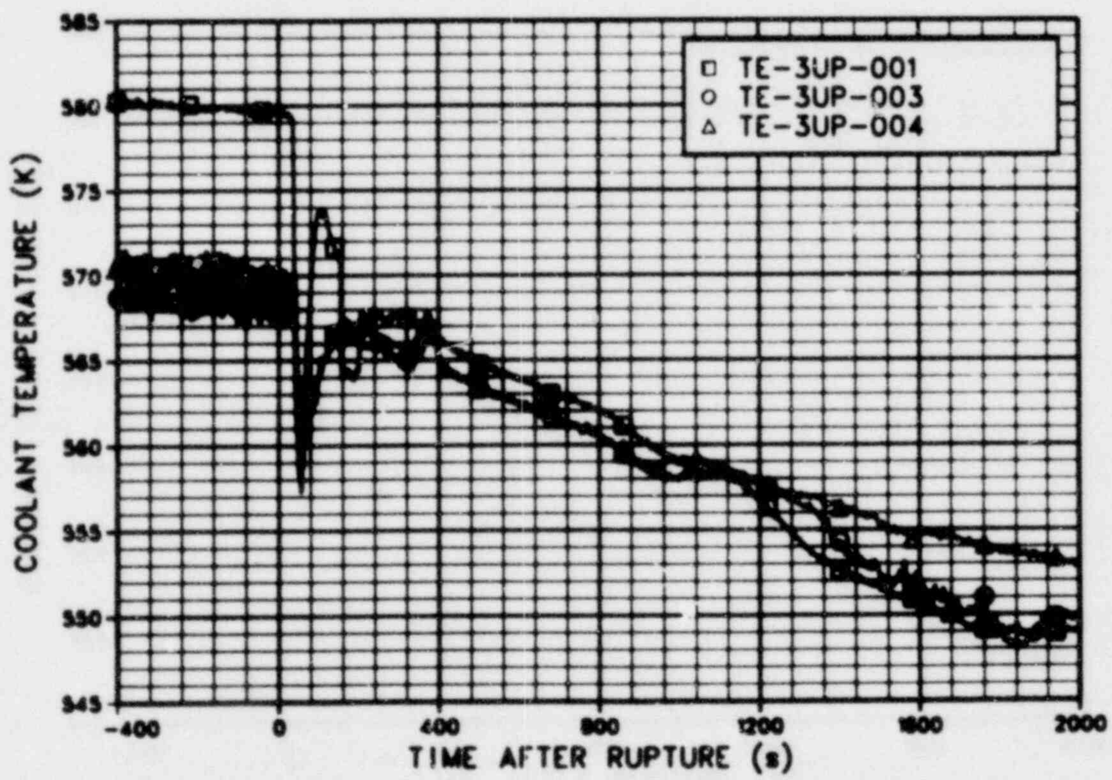


Figure S8-66. Coolant temperature in reactor vessel upper end box and above outlet nozzle at support column of Fuel Assembly 3 (TE-3UP-001, -003, and -004) (qualified).

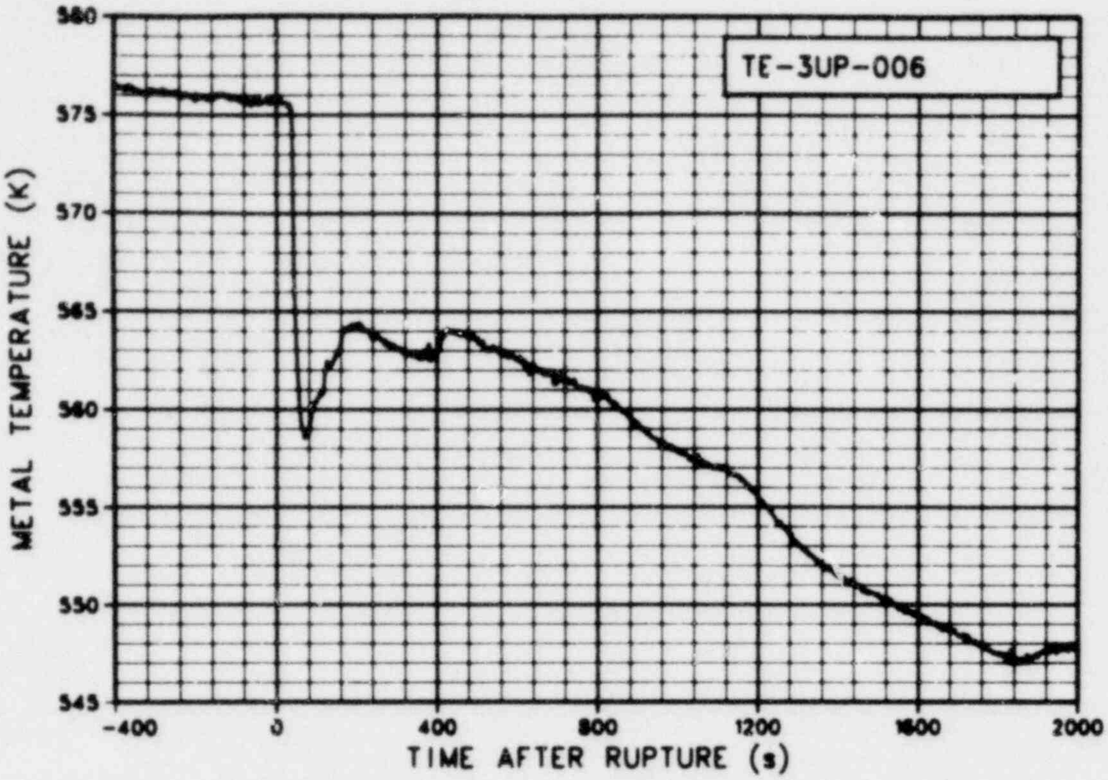


Figure 5S-67. Metal temperature on upper core support column of Fuel Assembly 3 (TE-3UP-006) (qualified).

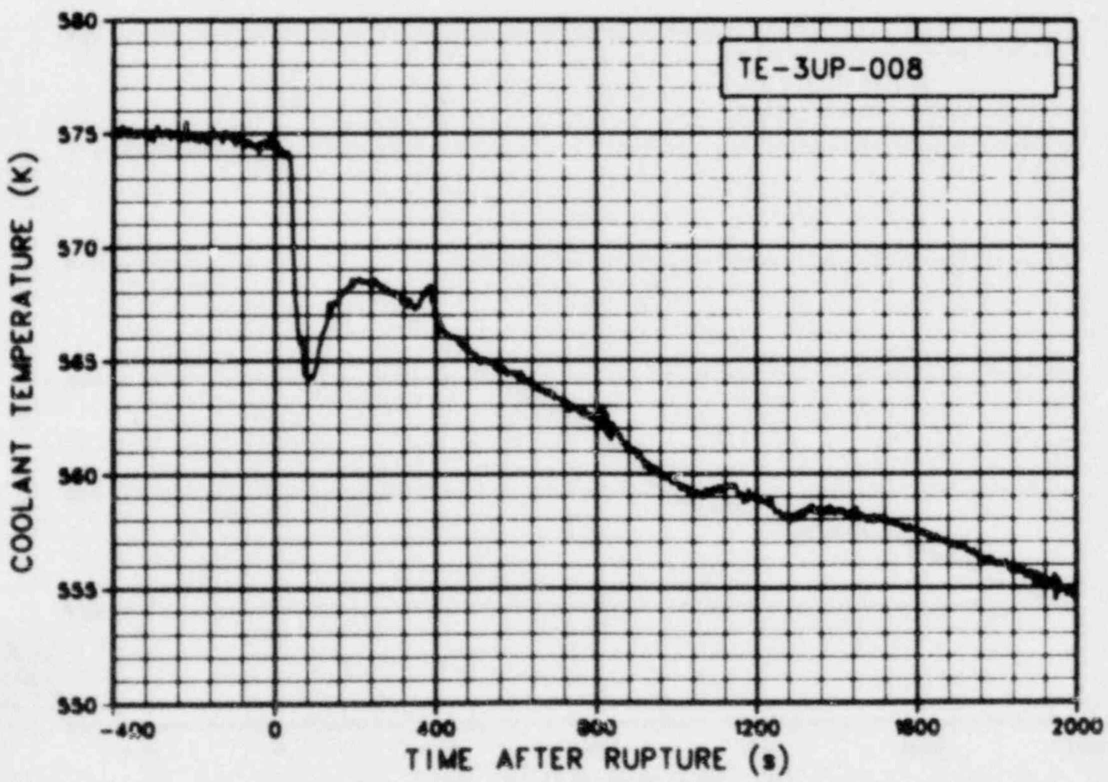


Figure 5S-68. Coolant temperature in reactor vessel at liquid level sting above Fuel Assembly 3 (TE-3UP-008) (qualified).

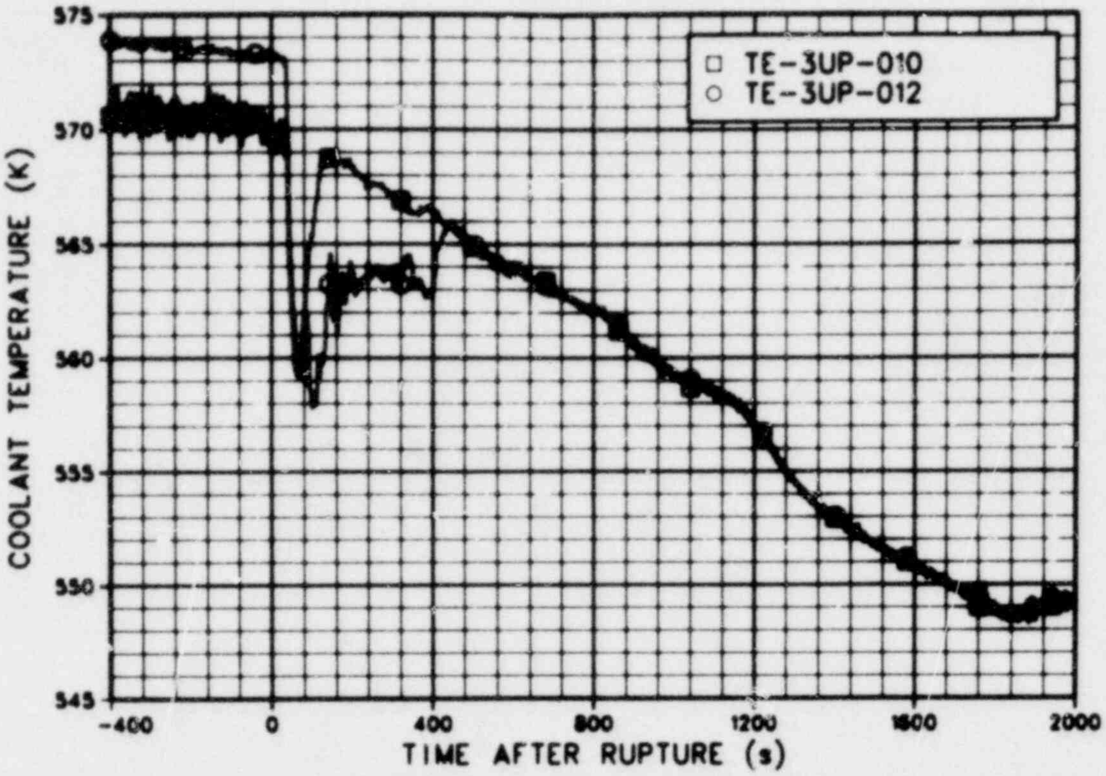


Figure 58-69. Coolant temperature in reactor vessel at liquid level sting above Fuel Assembly 3 (TE-3UP-010 and -012) (qualified).

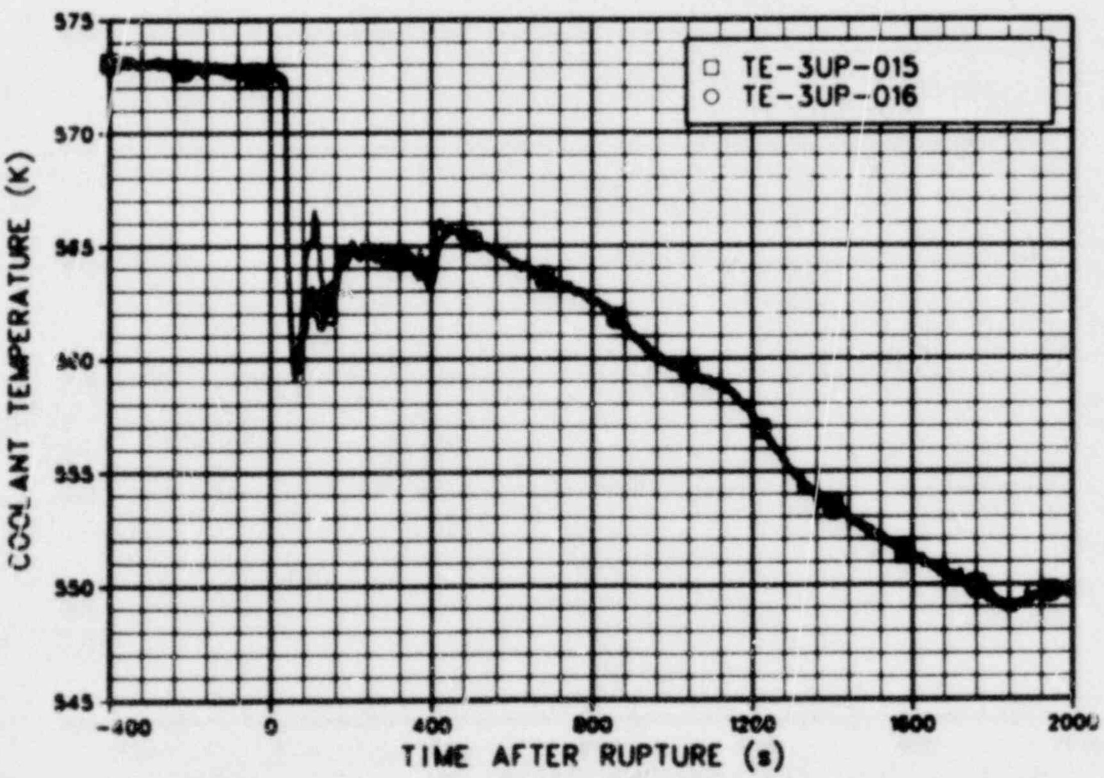


Figure 58-70. Coolant temperature in reactor vessel at liquid level sting above Fuel Assembly 3 (TE-3UP-015 and -016) (qualified).

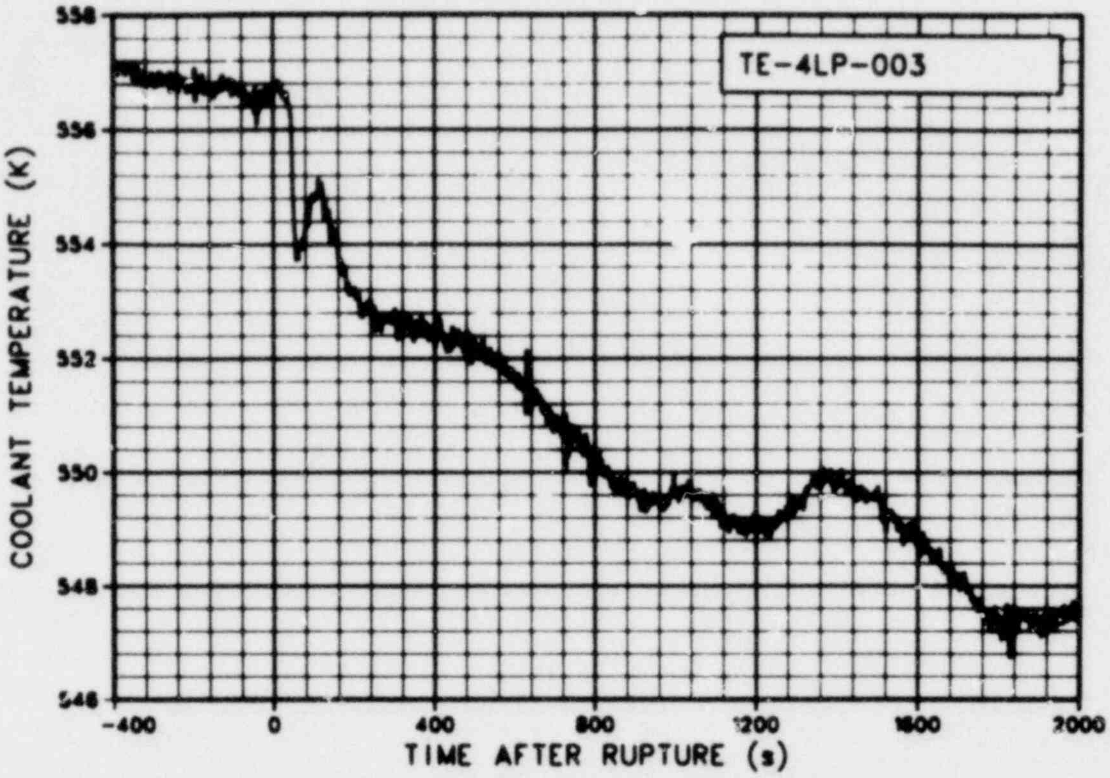


Figure 58-71. Coolant temperature in reactor vessel at lower end box of Fuel Assembly 4 (TE-4LP-003) (qualified).

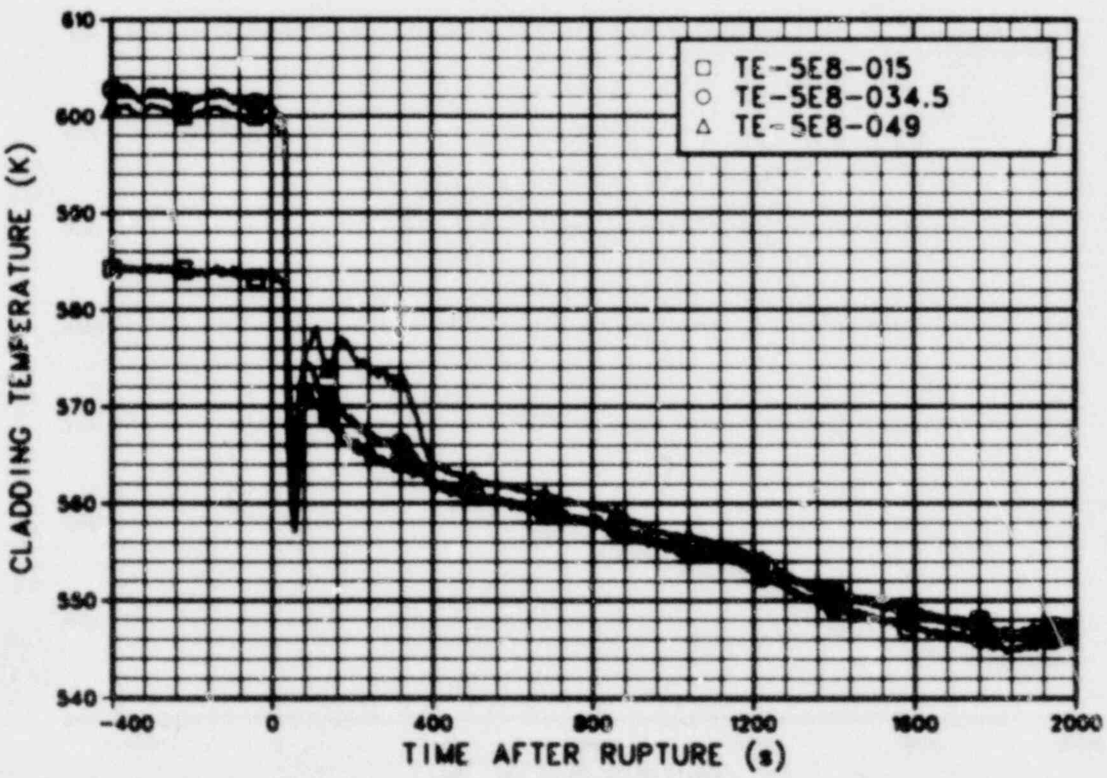


Figure 58-72. Cladding temperature in reactor vessel at Fuel Assembly 5, Row E, Column 8 at 0.38, 0.88, and 1.24 m above bottom of fuel rod (TE-5E8-015, -034.5, and -049) (qualified).

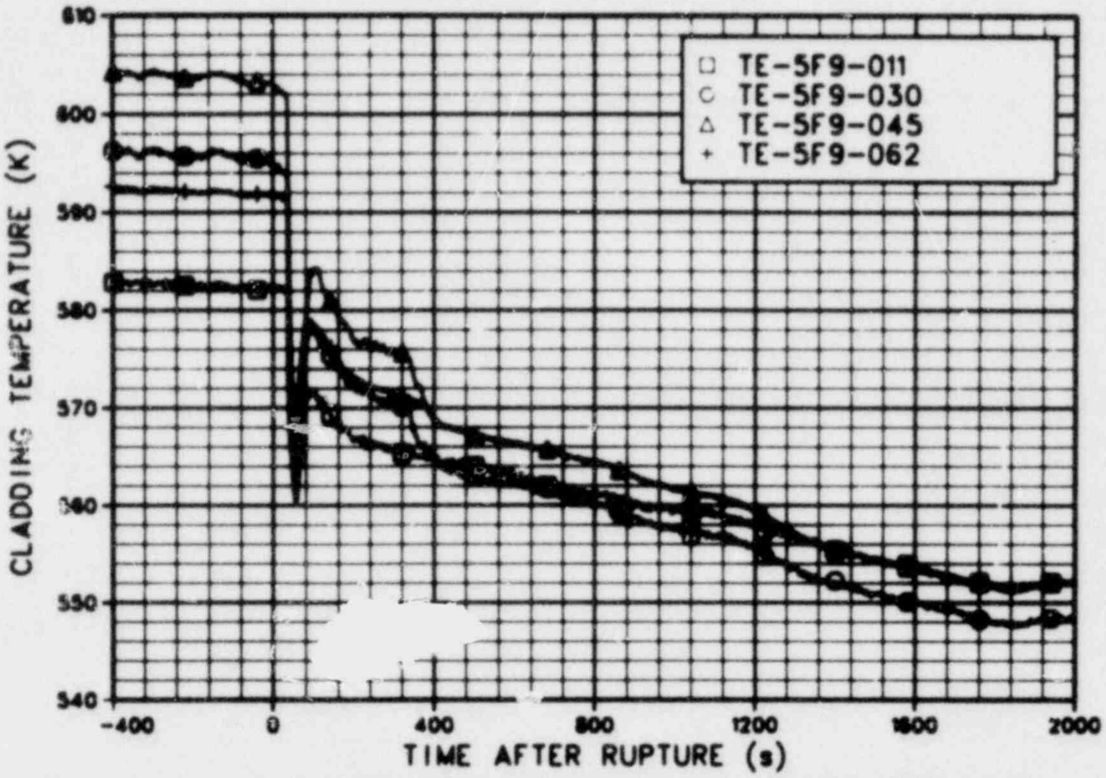


Figure 5S-73. Cladding temperature in reactor vessel at Fuel Assembly 5, Row F, Column 9 at 0.28, 0.76, 1.14, and 1.57 m above bottom of fuel rod (TE-5F9-011, -030, -045, and -062) (qualified).

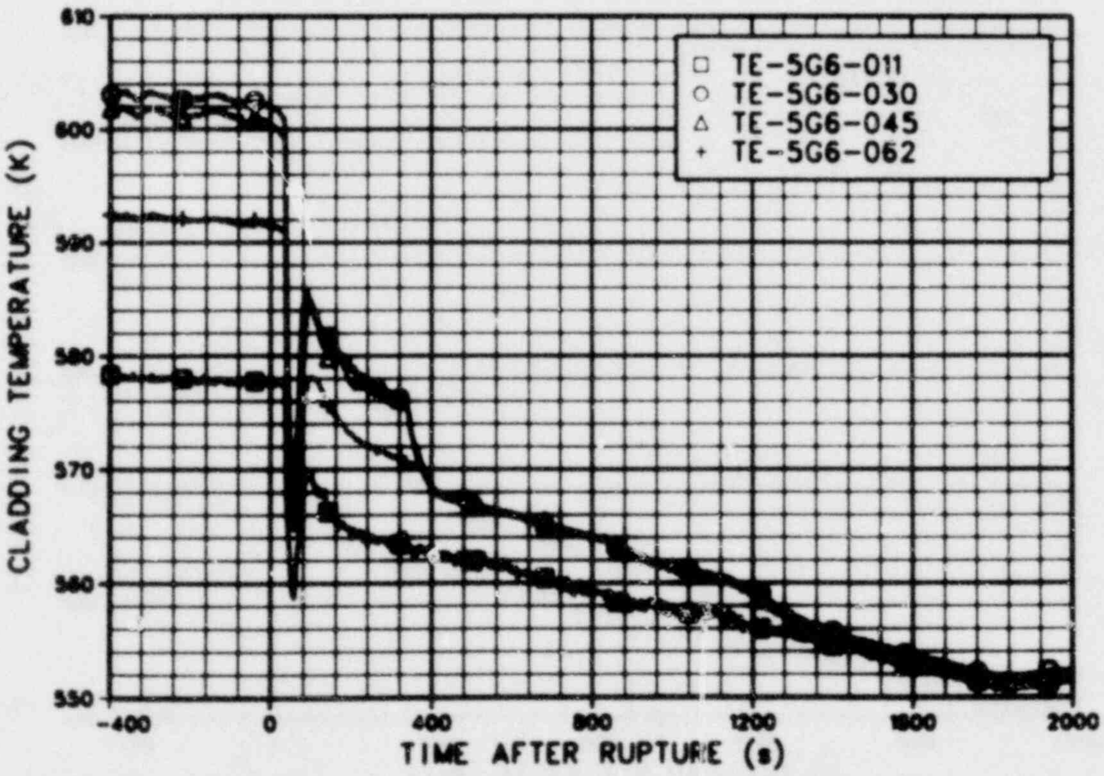


Figure 5S-74. Cladding temperature in reactor vessel at Fuel Assembly 5, Row G, Column 6 at 0.28, 0.76, 1.14, and 1.57 m above bottom of fuel rod (TE-5G6-011, -030, -045, and -062) (qualified).

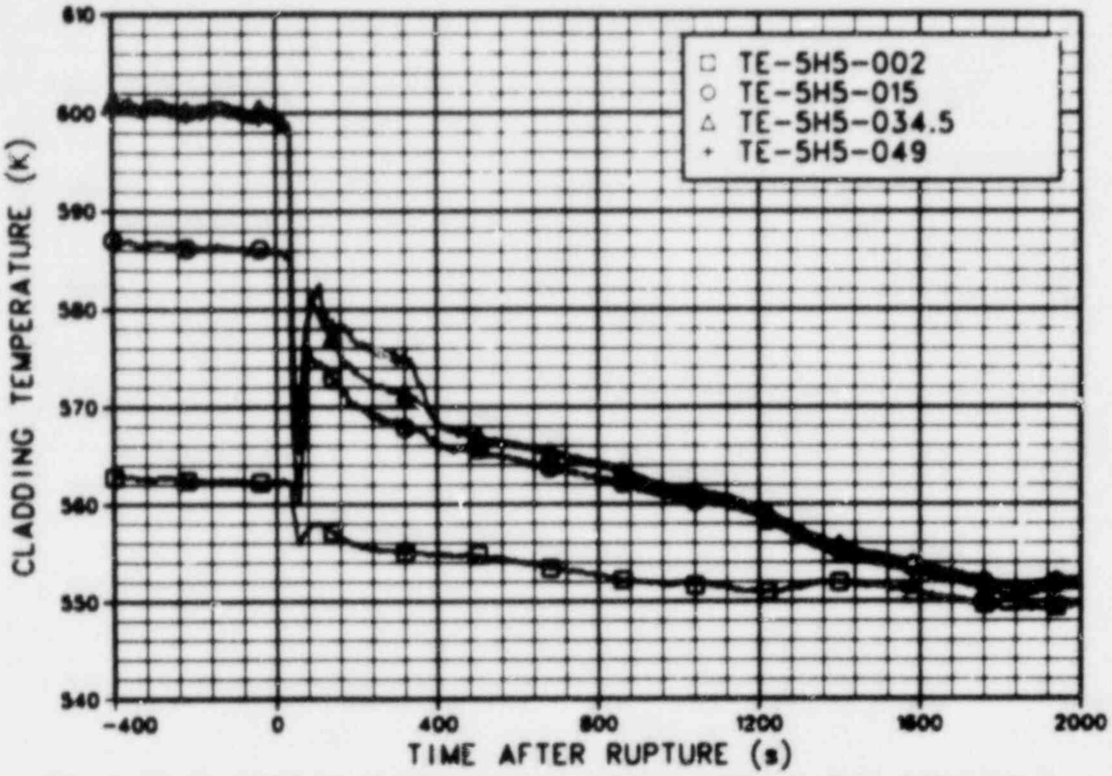


Figure 5S-75. Cladding temperature in reactor vessel at Fuel Assembly 5, Row H, Column 5 at 0.05, 0.38, 0.88, and 1.24 m above bottom of fuel rod (TE-5H5-002, -015, -034.5, and -049) (qualified).

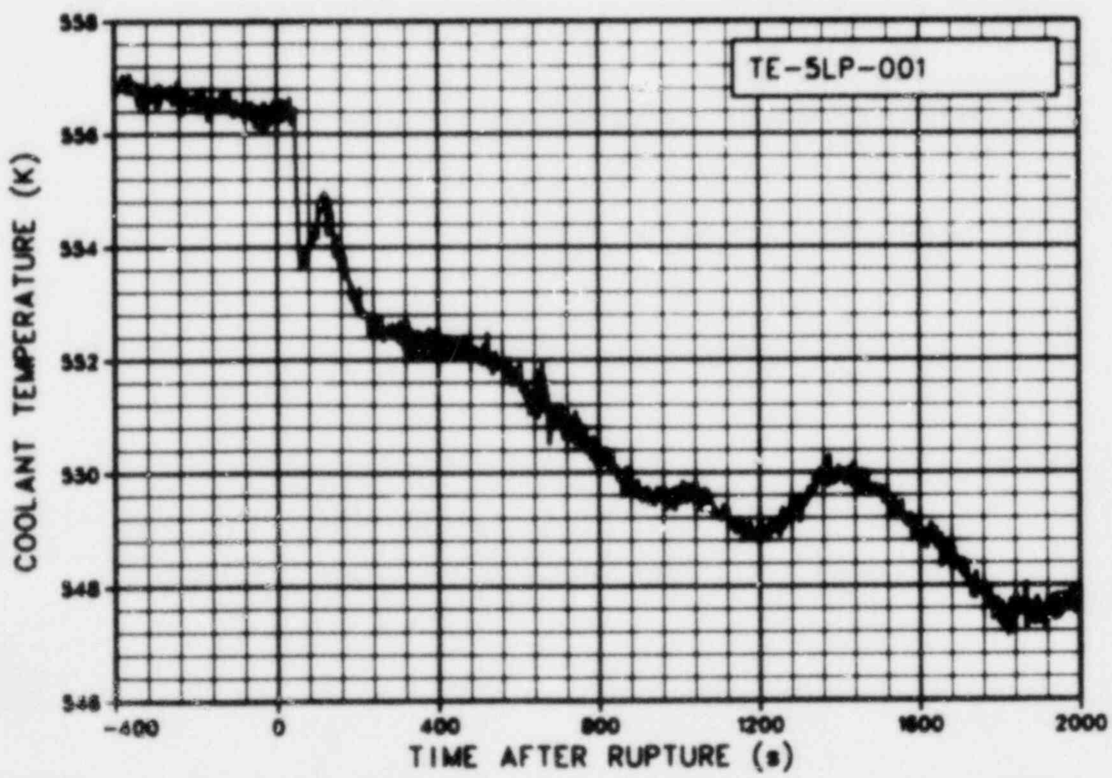


Figure 5S-76. Coolant temperature in reactor vessel at lower end box of Fuel Assembly 5 (TE-5LP-001) (qualified).

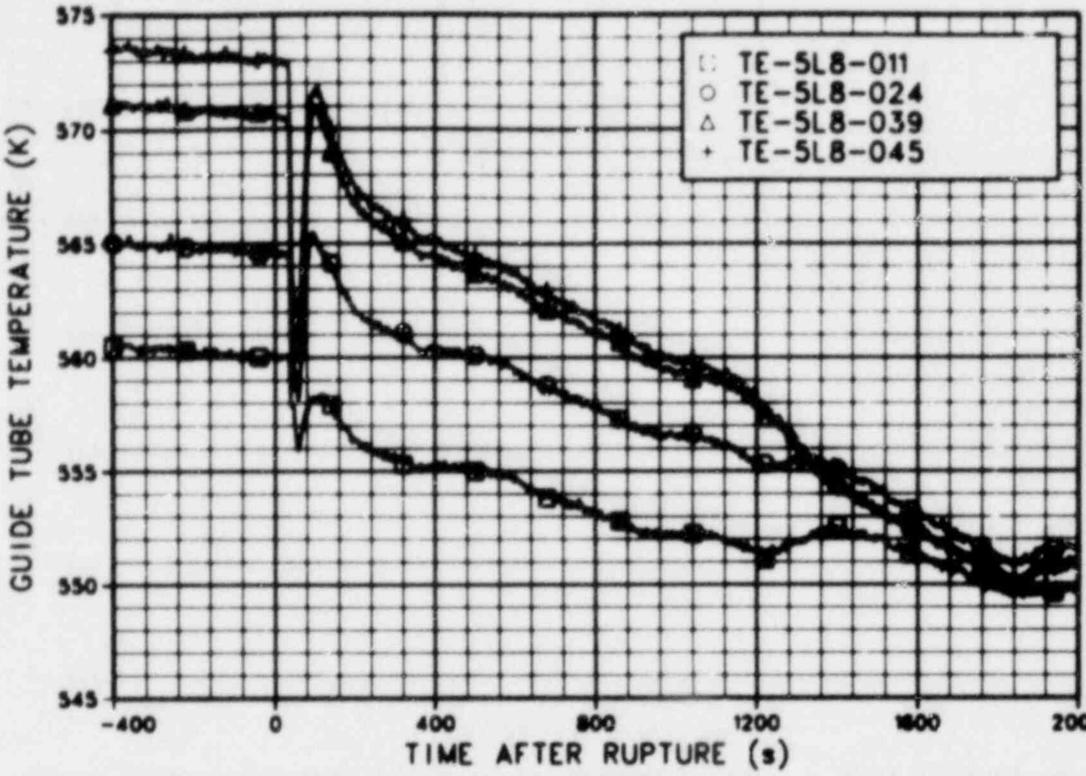


Figure 5S-77. Guide tube temperature in reactor vessel at Fuel Assembly 5, Row L, Column 8 at 0.28, 0.61, 0.99, and 1.14 m above bottom of guide tube (TE-5L8-011, -024, -039, and -045) (qualified).

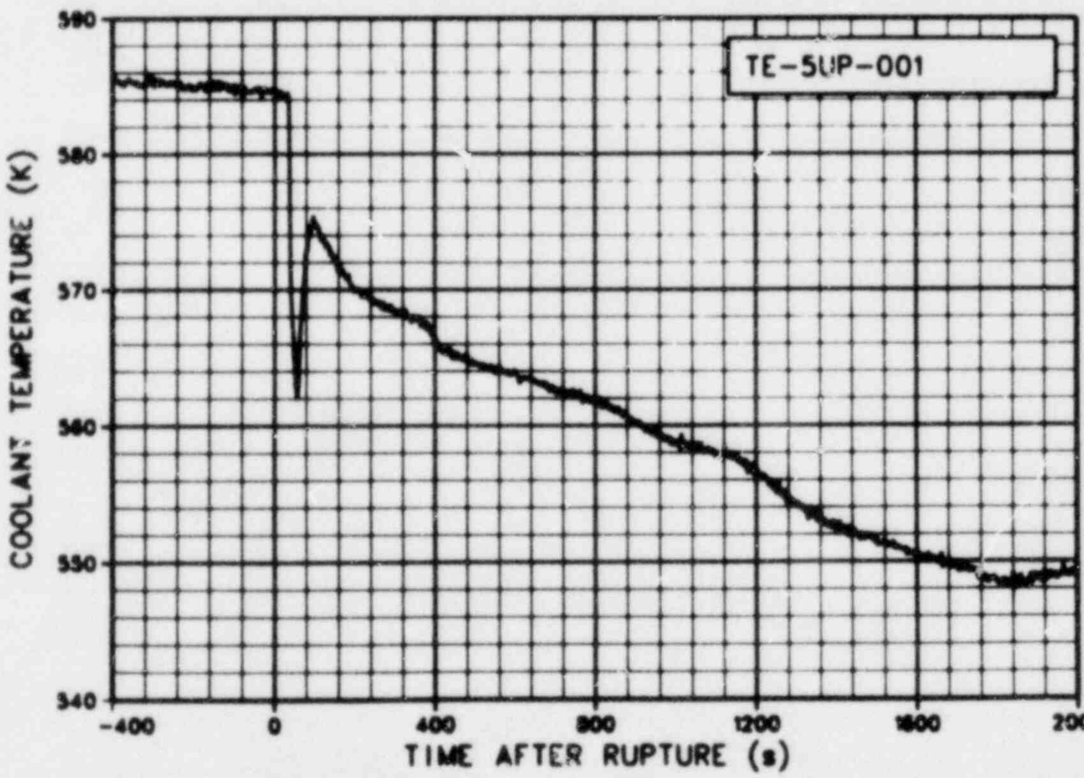


Figure 5S-78. Coolant temperature in reactor vessel at upper end box of Fuel Assembly 5 (TE-5UP-001) (qualified).

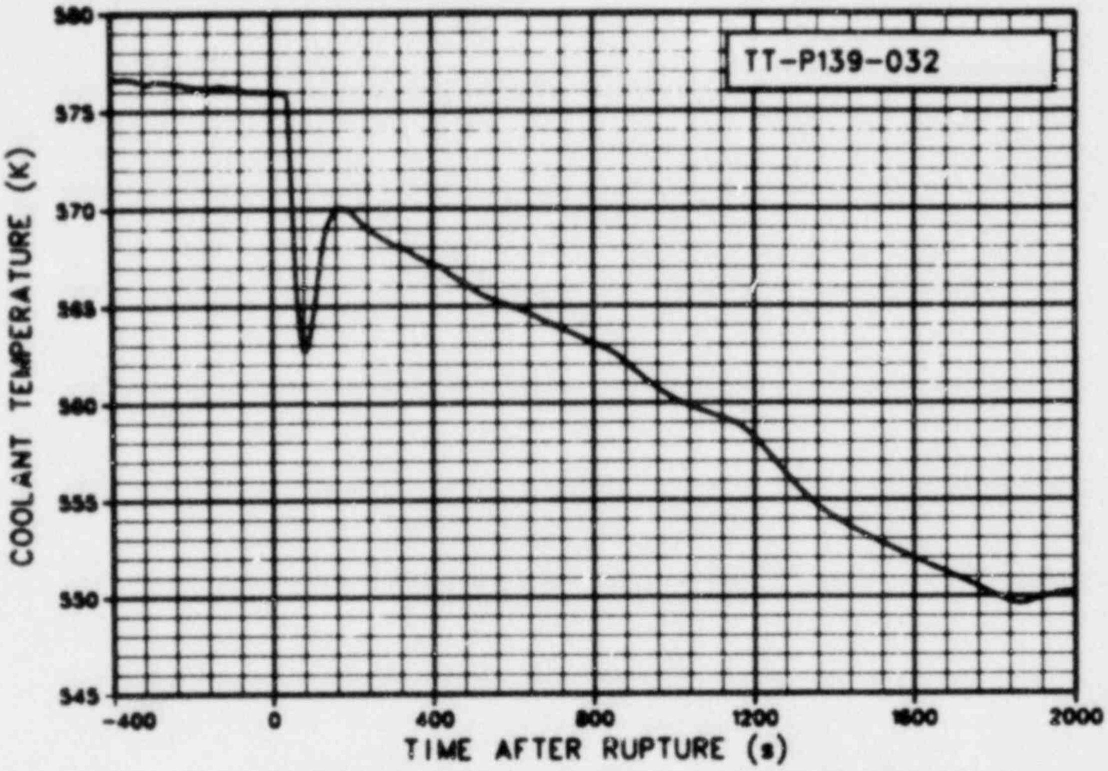


Figure 5S-81. Coolant temperature in intact loop hot leg, Channel A (TT-P139-032) (qualified for initial conditions only).

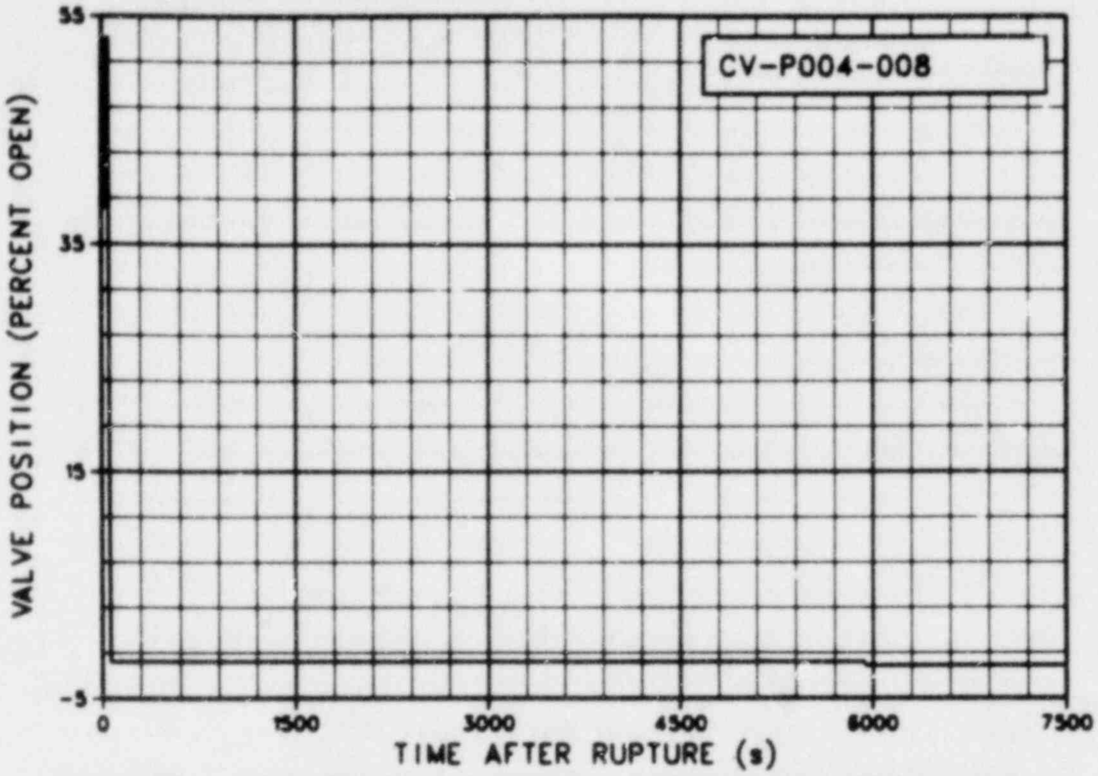


Figure 5M-1. Valve position for secondary feedwater flow control valve (CV-P004-008) (qualified).

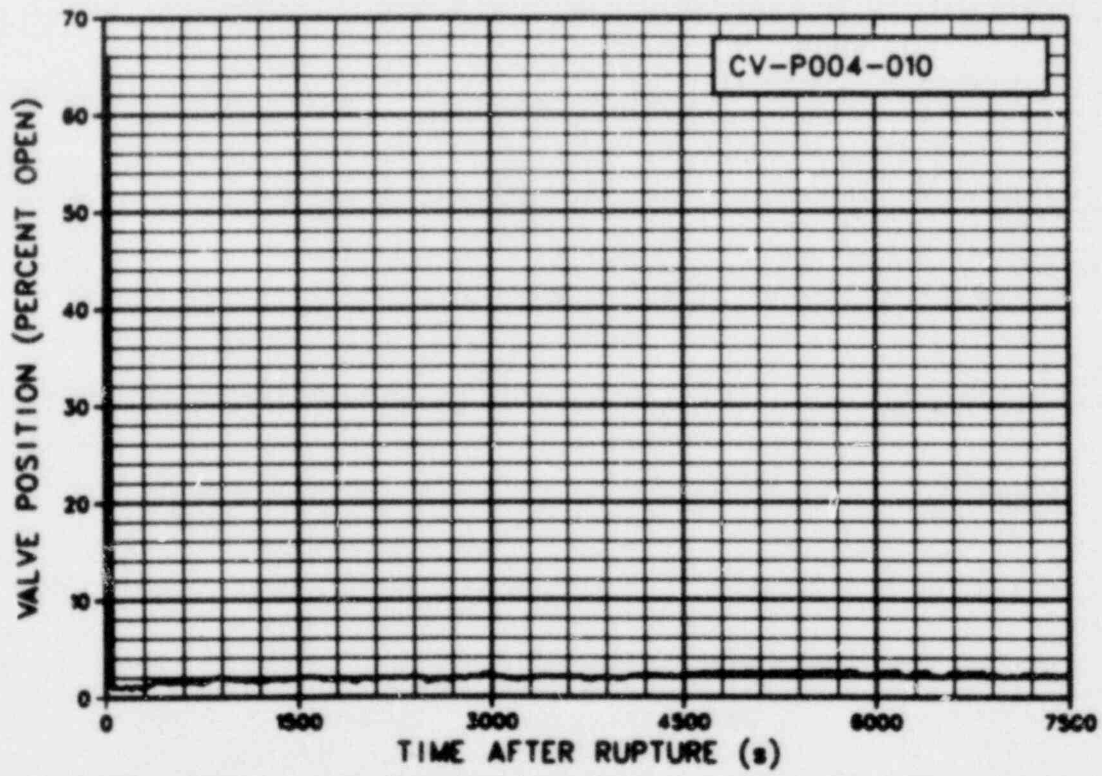


Figure 5M-2. Valve position for secondary coolant system steam flow control valve (CV-P004-010) (qualified).

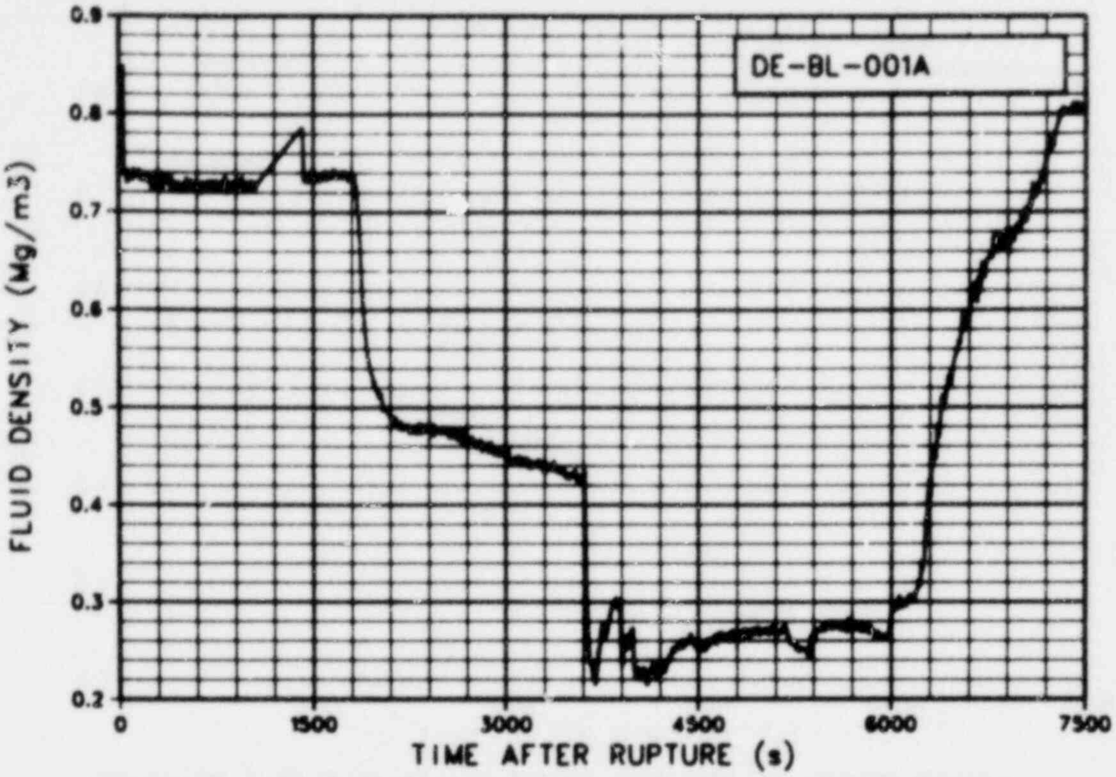


Figure 5M-3. Fluid density in broken loop cold leg, chordal density (DE-BL-001A) (qualified after reactor scram).

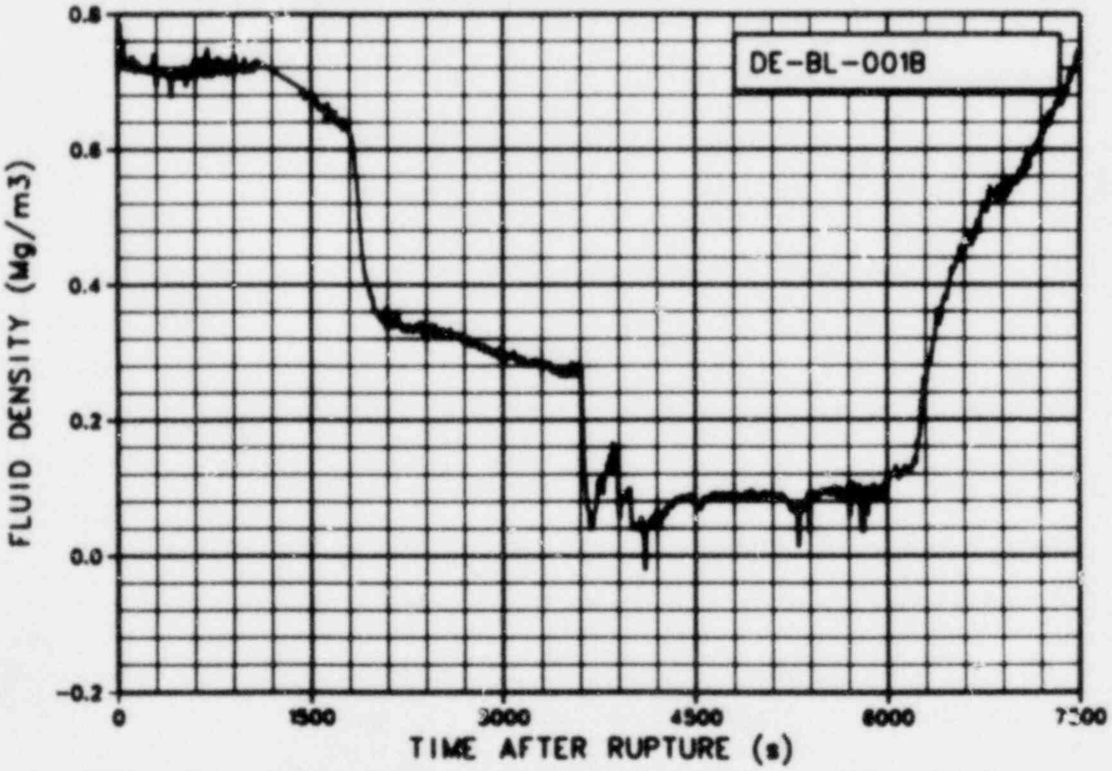


Figure 5M-4. Fluid density in broken loop cold leg, chordal density (DE-BL-001B) (qualified after reactor scram).

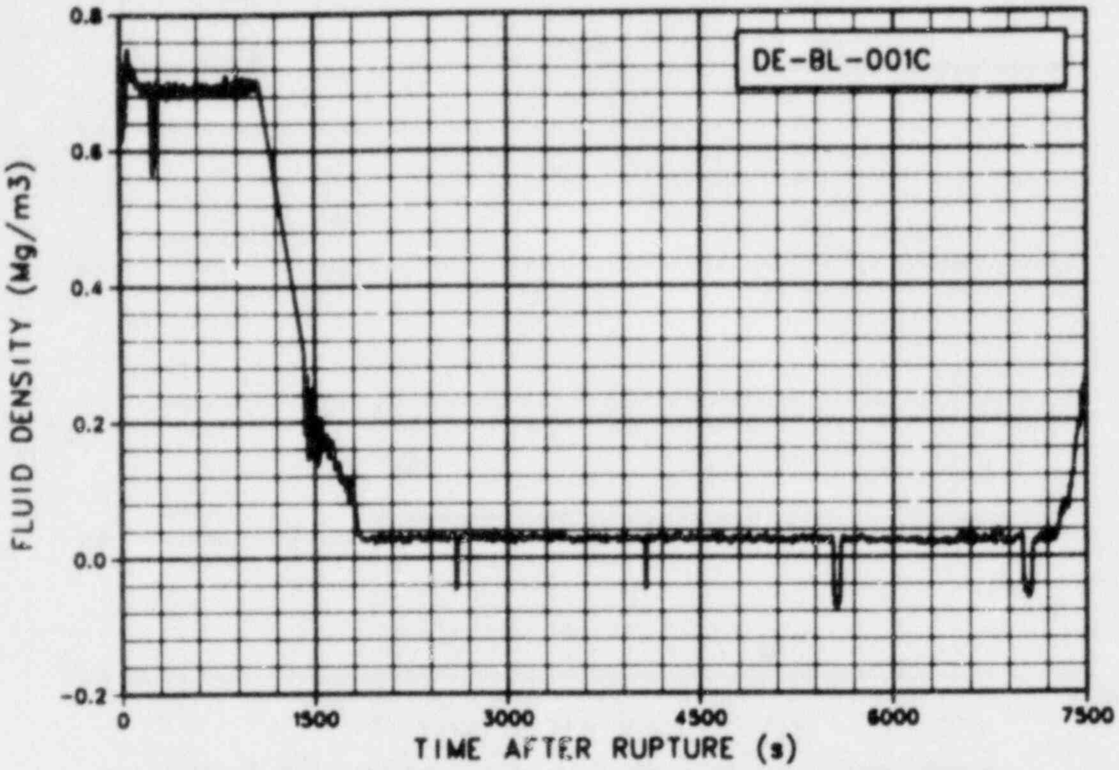


Figure 5M-5. Fluid density in broken loop cold leg, chordal density (DE-BL-001C) (qualified after reactor scram).

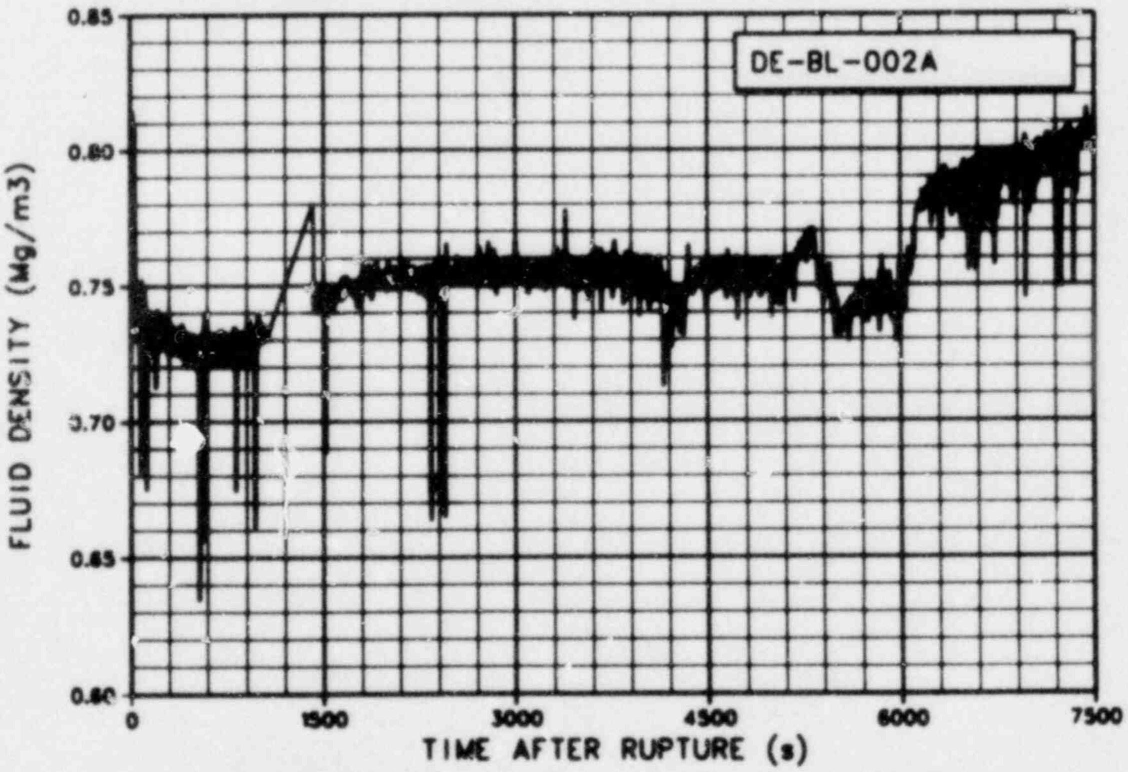


Figure 5M-6. Fluid density in broken loop hot leg, chordal density (DE-BL-002A) (qualified after reactor scram).

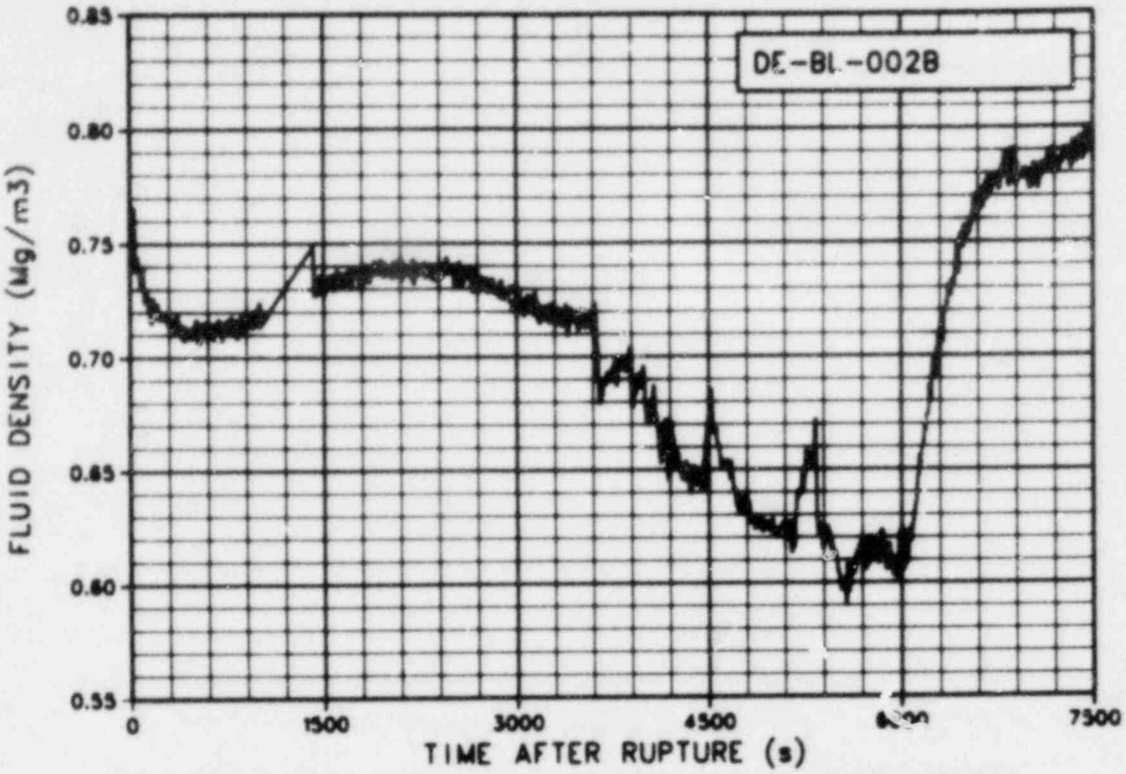


Figure 5M-7. Fluid density in broken loop hot leg, chordal density (DE-BL-002B) (qualified after reactor scram).

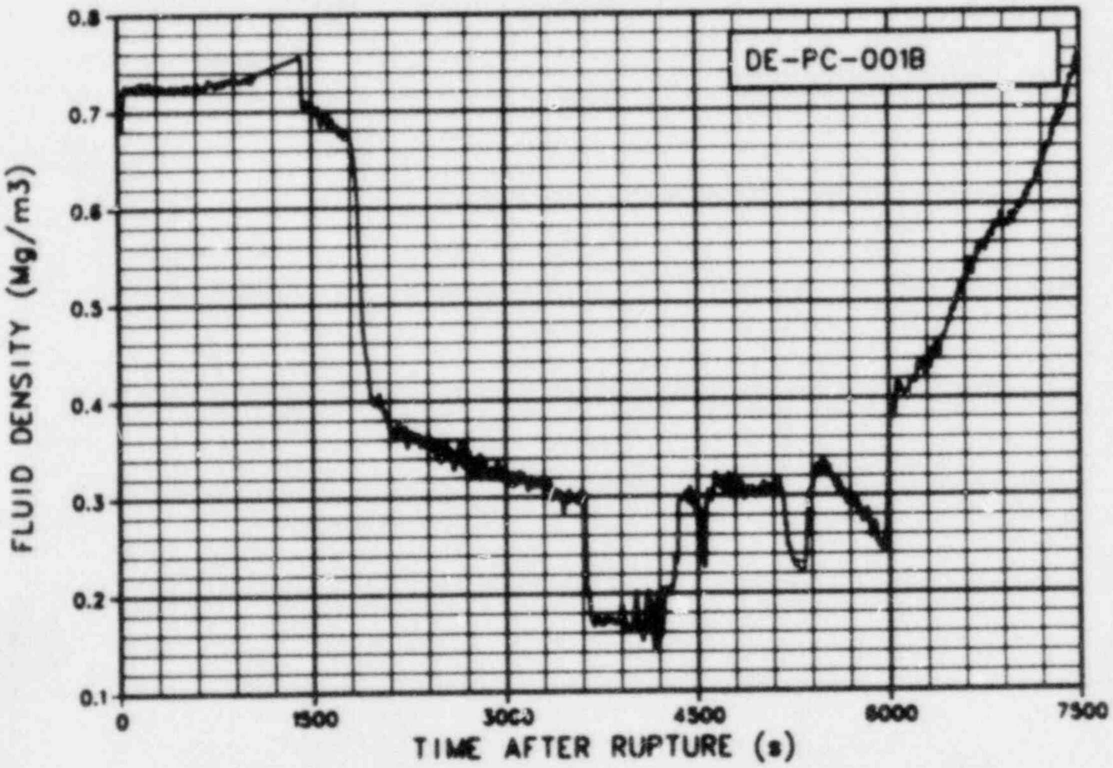


Figure 5M-8. Fluid density in intact loop cold leg, chordal density (DE-PC-001B) (qualified after reactor scram).

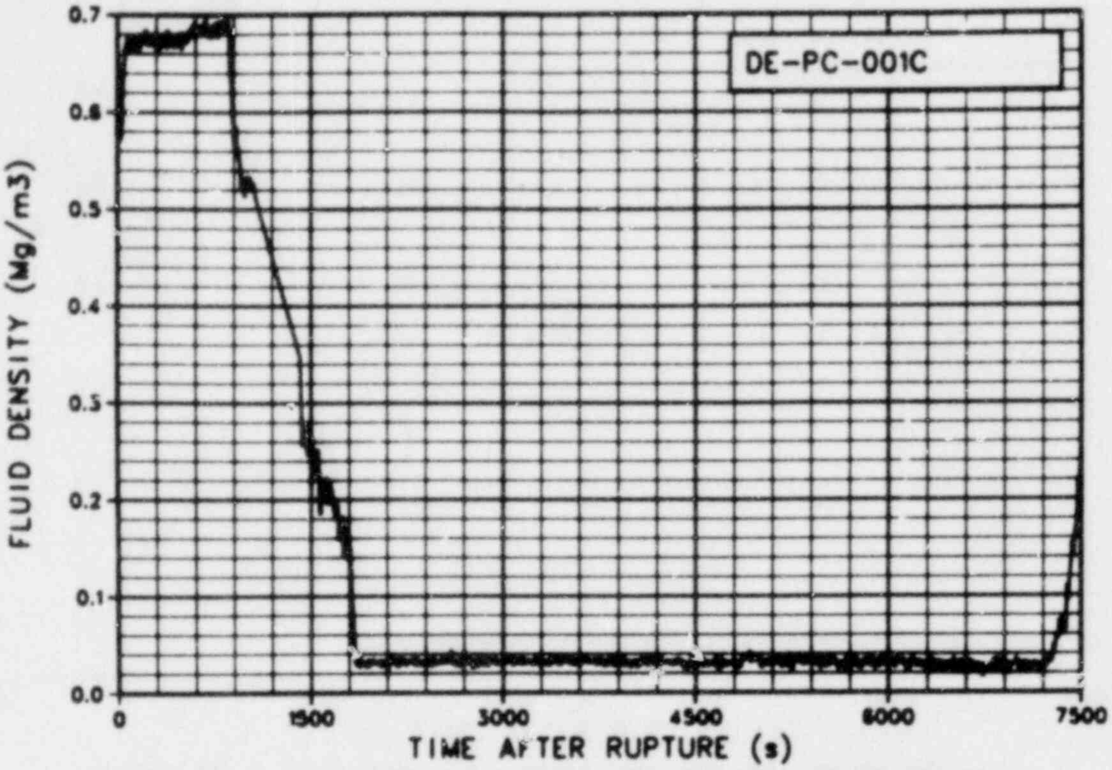


Figure 5M-9. Fluid density in intact loop cold leg, chordal density (DE-PC-001C) (qualified after reactor scram).

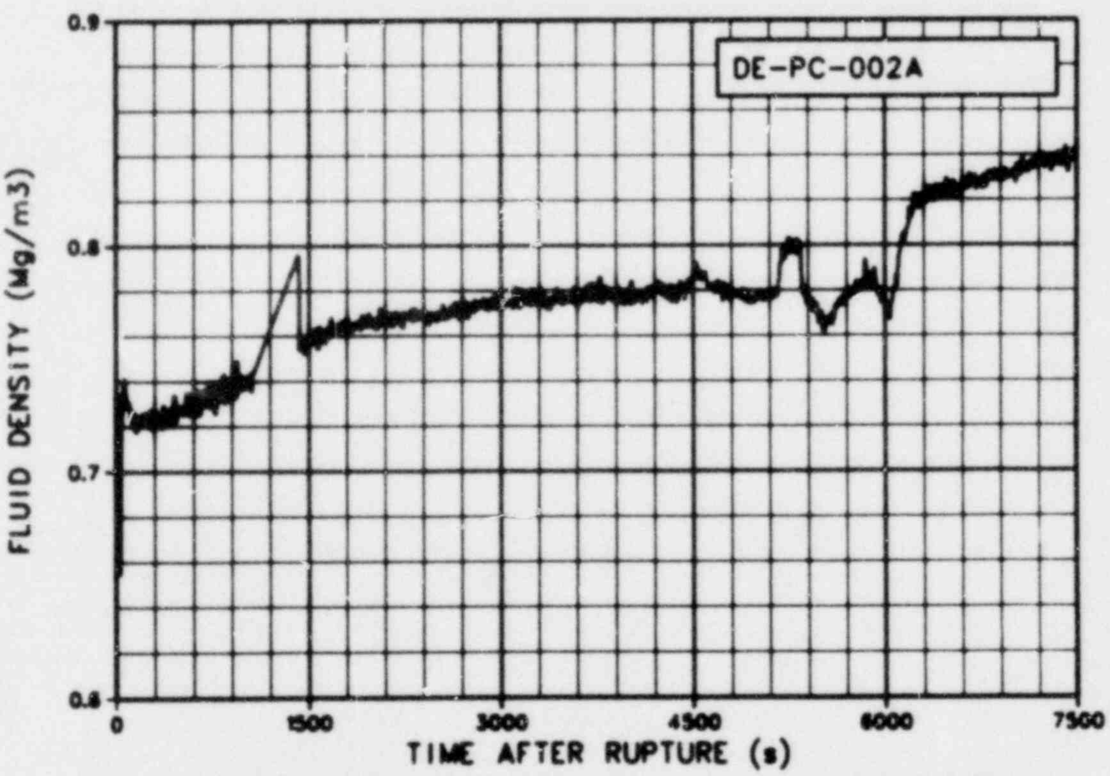


Figure 5M-10. Fluid density in intact loop hot leg, chordal density (DE-PC-002A) (qualified after reactor scram).

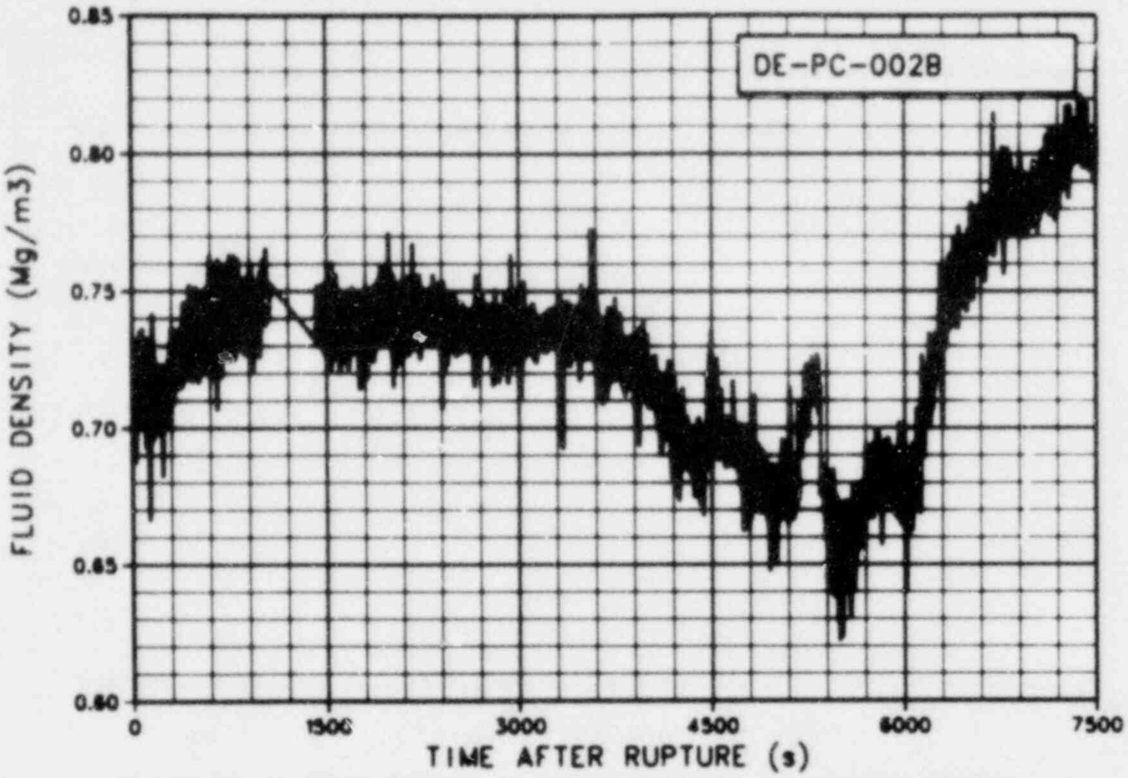


Figure 5M-11. Fluid density in intact loop hot leg, chordal density (DE-PC-002B) (qualified after reactor scram).

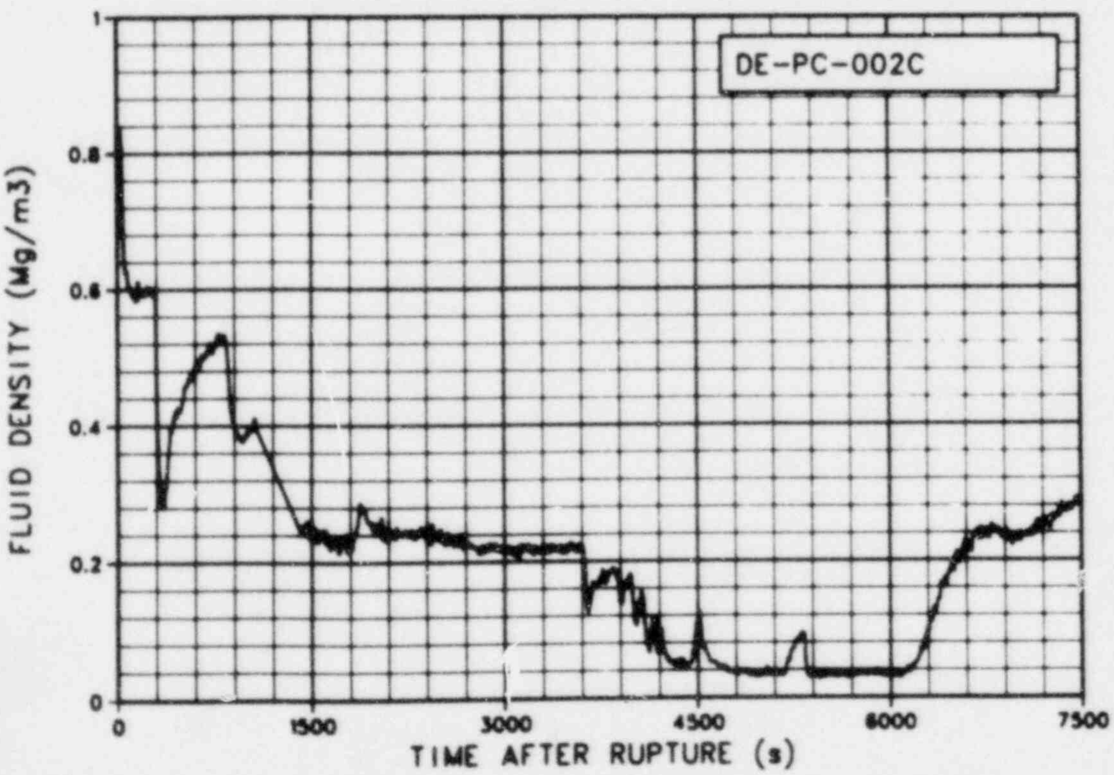


Figure 5M-12. Fluid density in intact loop hot leg, chordal density (DE-PC-002C) (qualified after reactor scram).

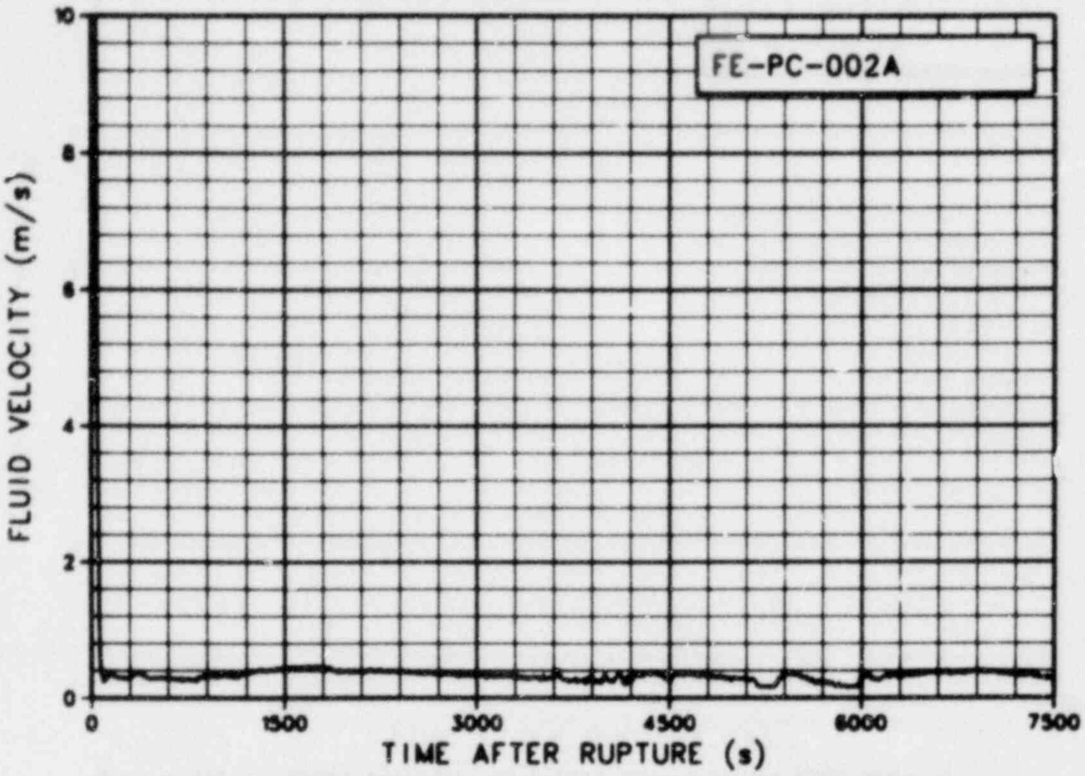


Figure 5M-13. Fluid velocity in intact loop hot leg DTT rake at bottom of pipe (FE-PC-002A) (qualified to 7500 s).

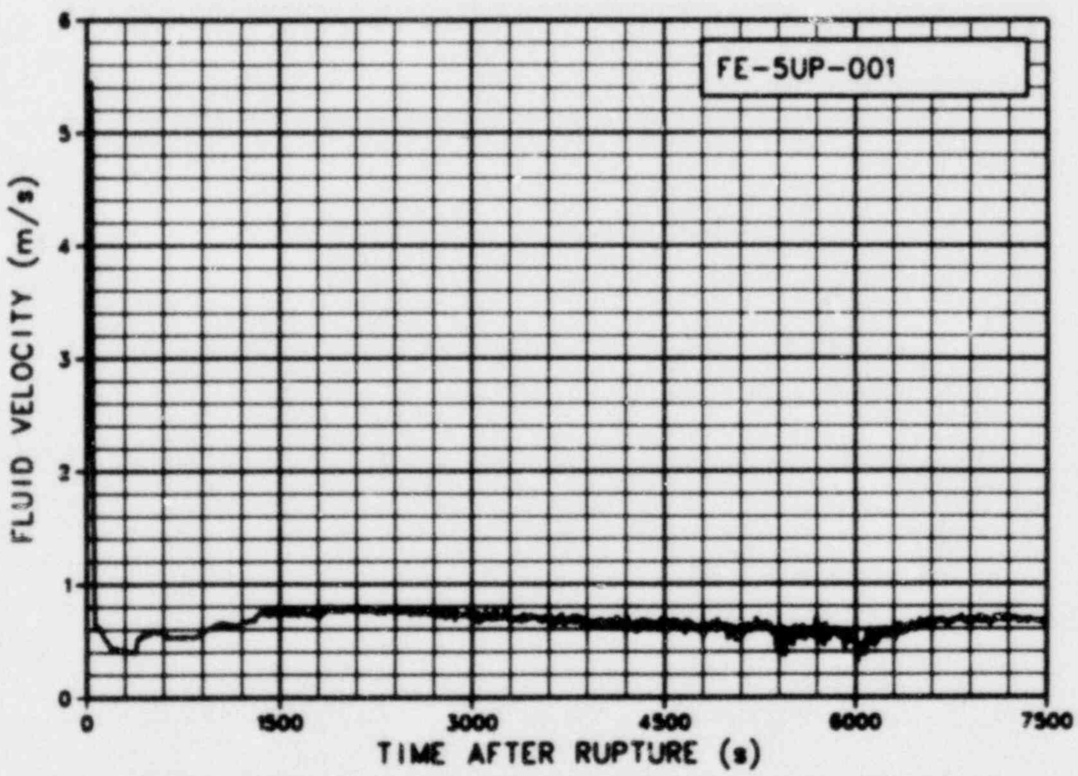


Figure 5M-14. Fluid velocity above upper end box of Fuel Assembly 5 (FE-5UP-001) (qualified, zero offset beyond 7500 s due to electronics).

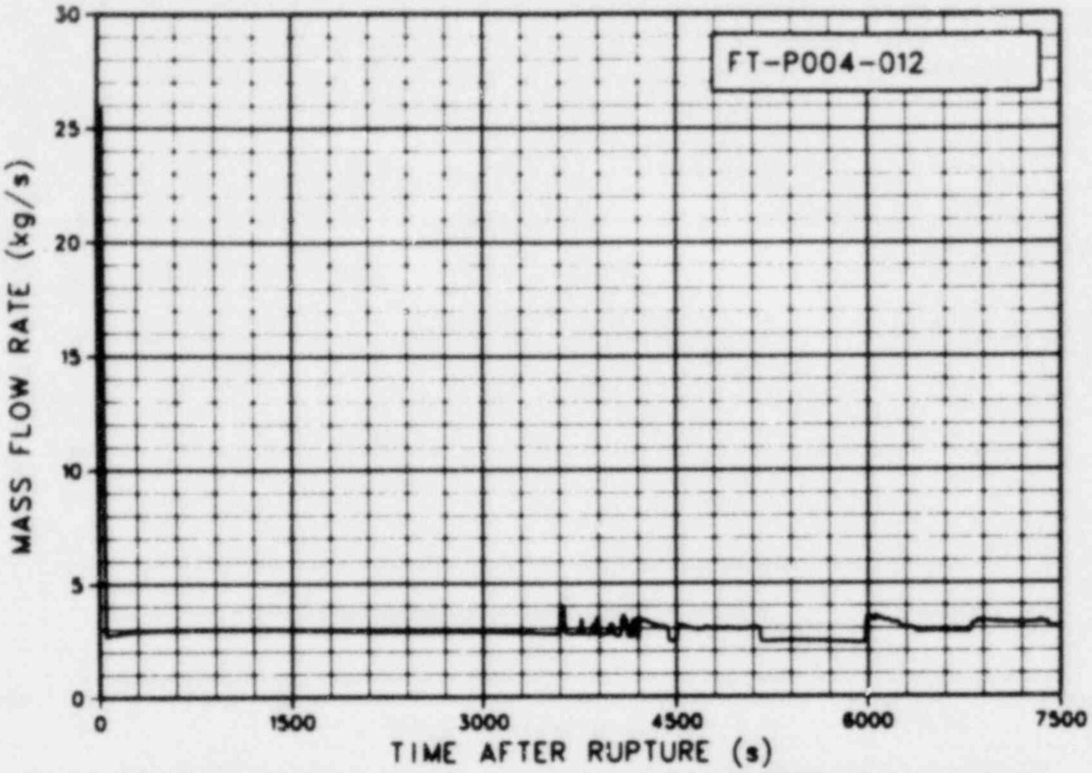


Figure 5M-15. Steam flow rate at condenser inlet (FT-P004-012) (qualified).

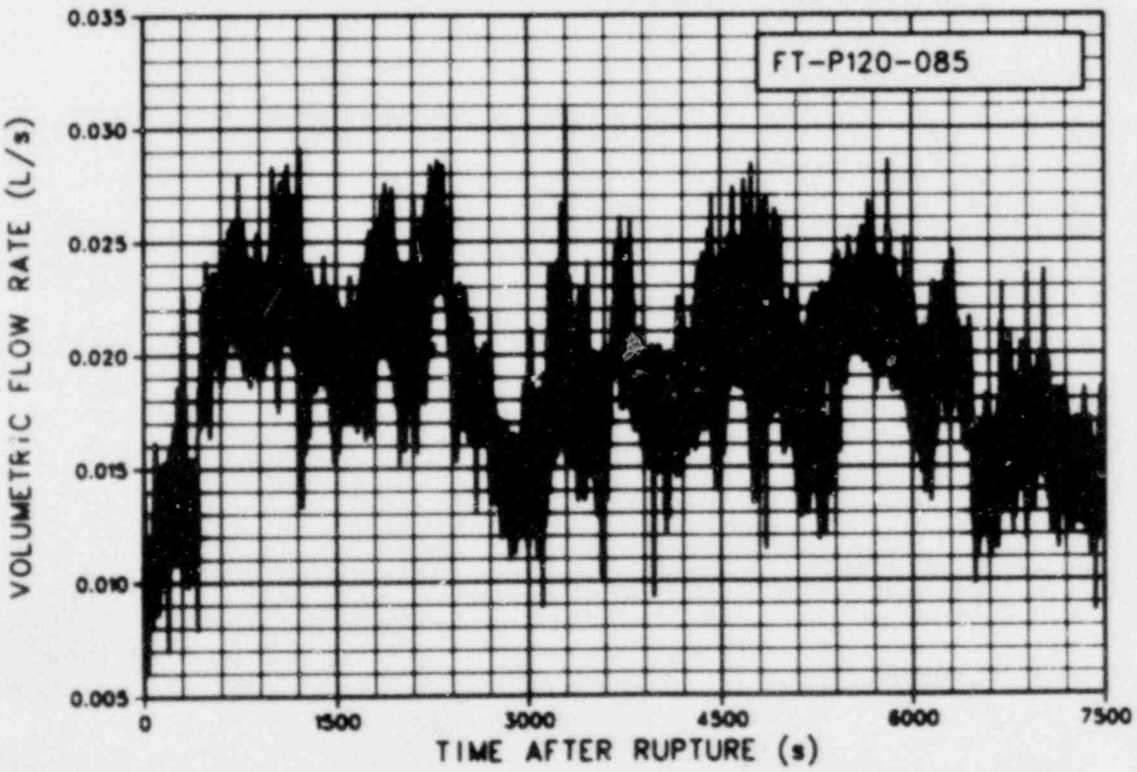


Figure 5M-16. Flow rate in ECCS LPIS Pump A discharge (FT-P120-085) (qualified).

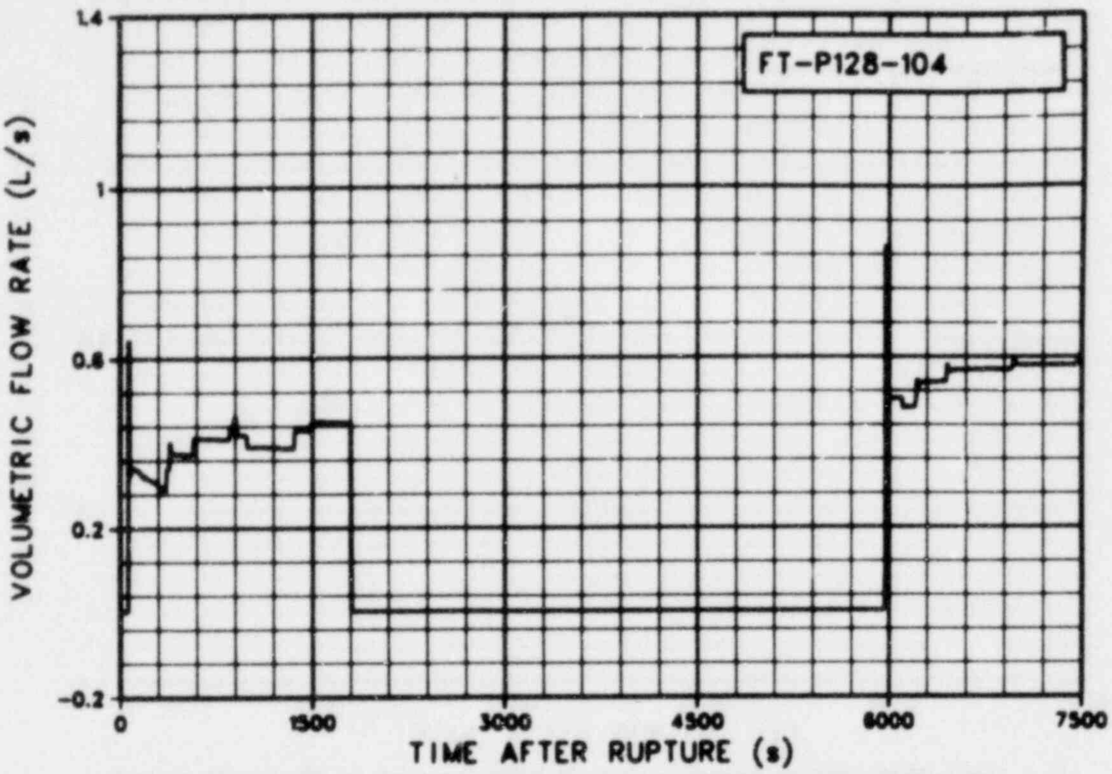


Figure 5M-17. Flow rate in HPIS Pump A discharge (FT-P128-104) (qualified).

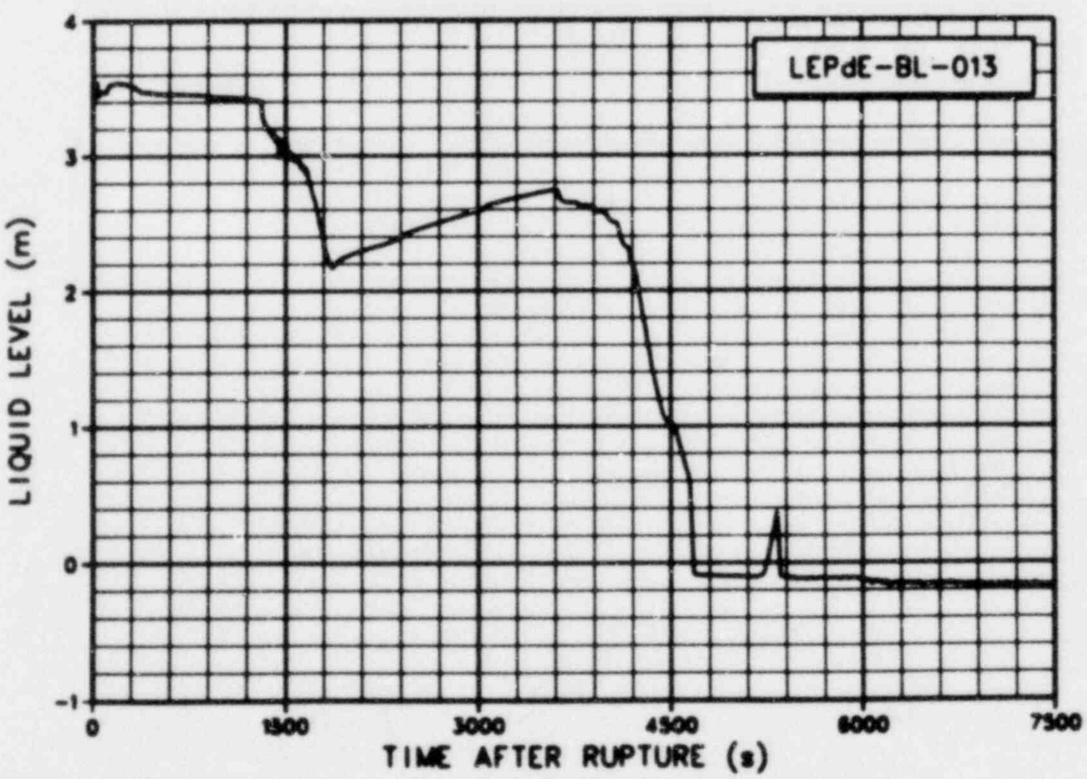


Figure 5M-18. Liquid level in broken loop steam generator simulator, inlet to top (LEPdE-BL-013) (qualified).

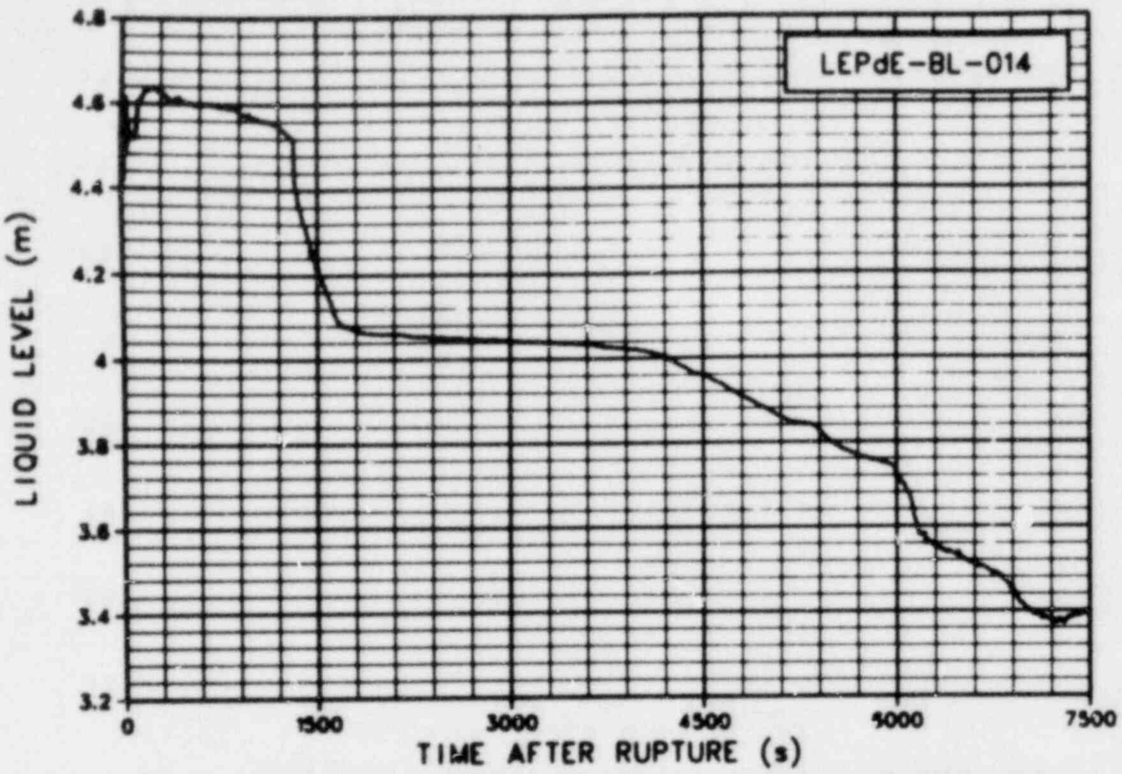


Figure 5M-19. Liquid level in broken loop steam generator simulator, outlet to top (LEPdE-BL-014) (qualified, unexplained long term drift should read 4.59 m at 1200 s).

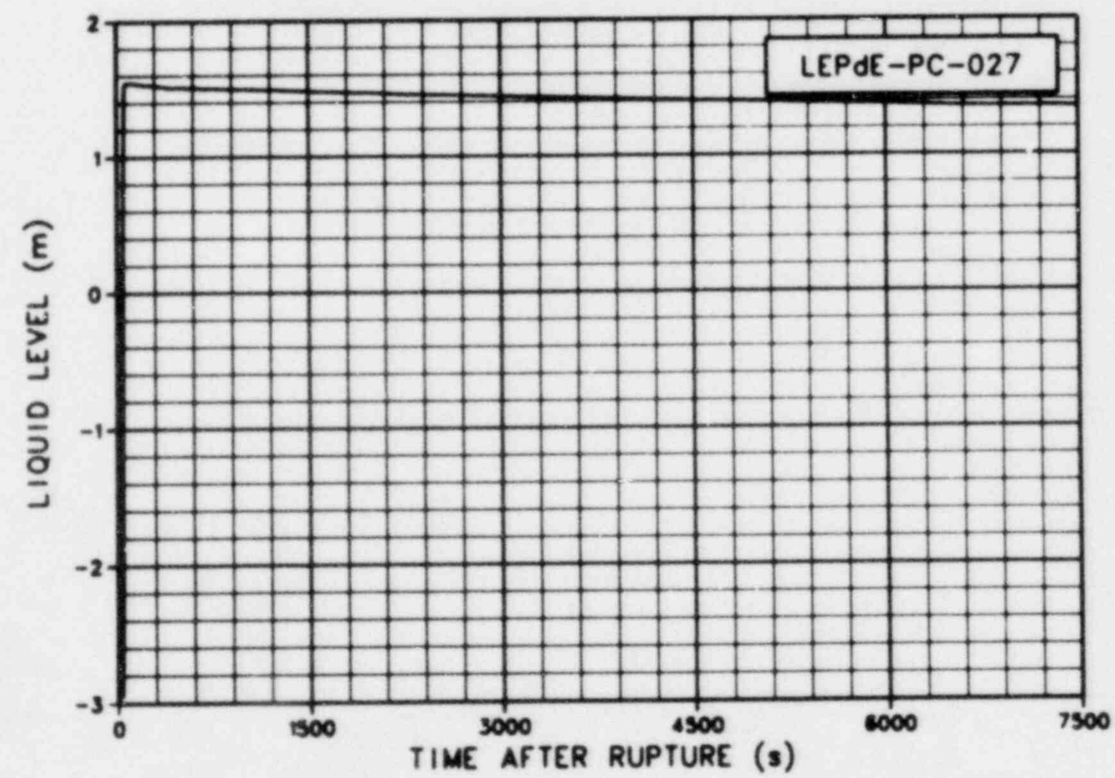


Figure 5M-20. Liquid level in intact loop between bottom of loop seal and steam generator outlet (LEPdE-PC-027) (qualified, unexplained long term drift should read 1.55 m at 1500 s).

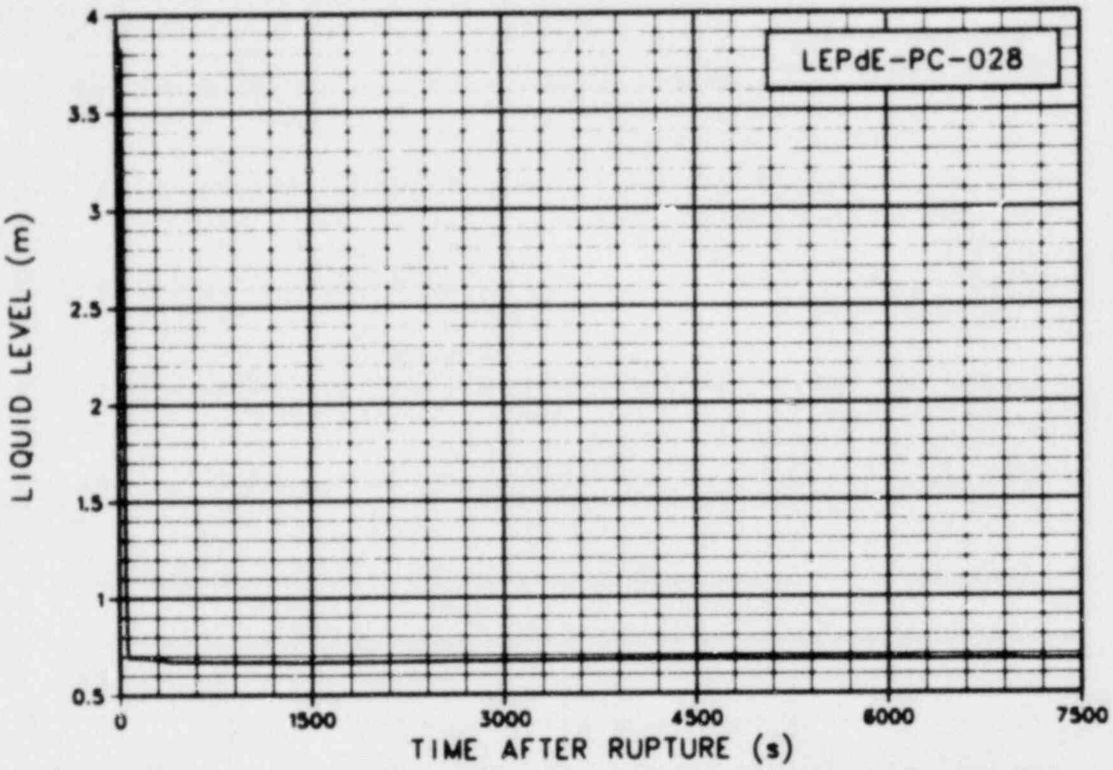


Figure 5M-21. Liquid level in intact loop between bottom of loop seal and primary coolant Pump 2 inlet (LEPdE-PC-028) (qualified).

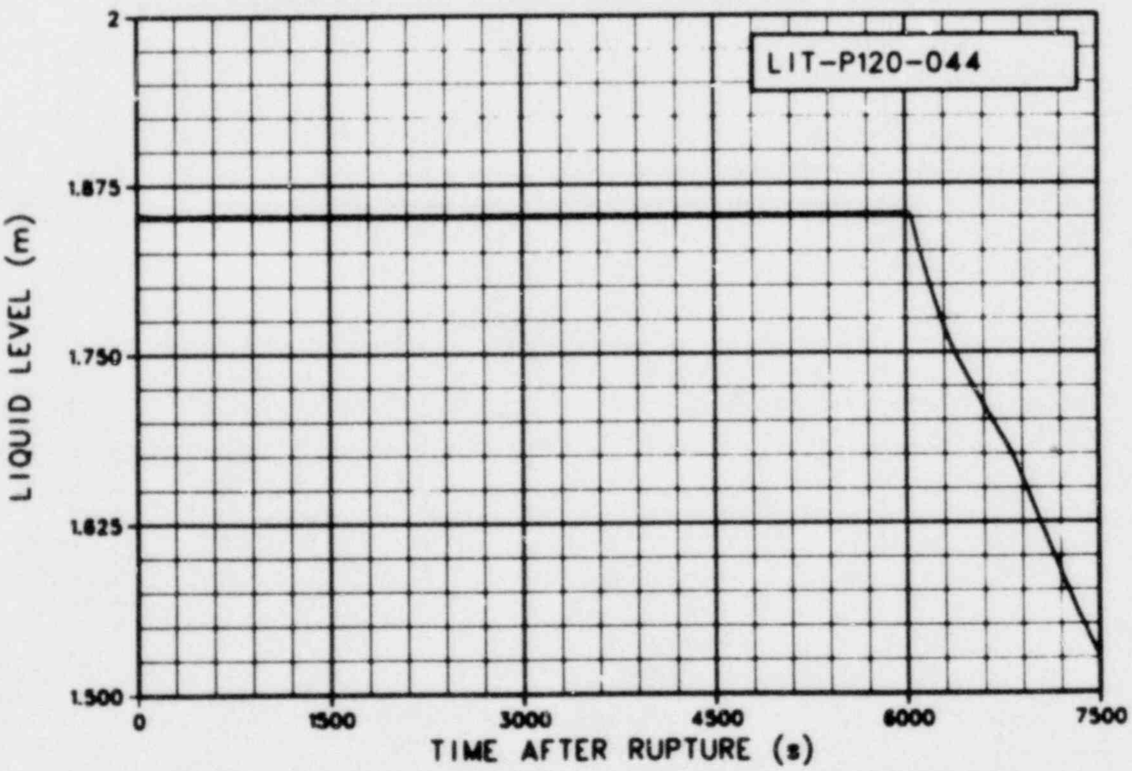


Figure 5M-22. Liquid level in ECCS Accumulator A (LIT-P120-044) (qualified, uncertainty of + or - 5 percent due to pressure sensitivity).

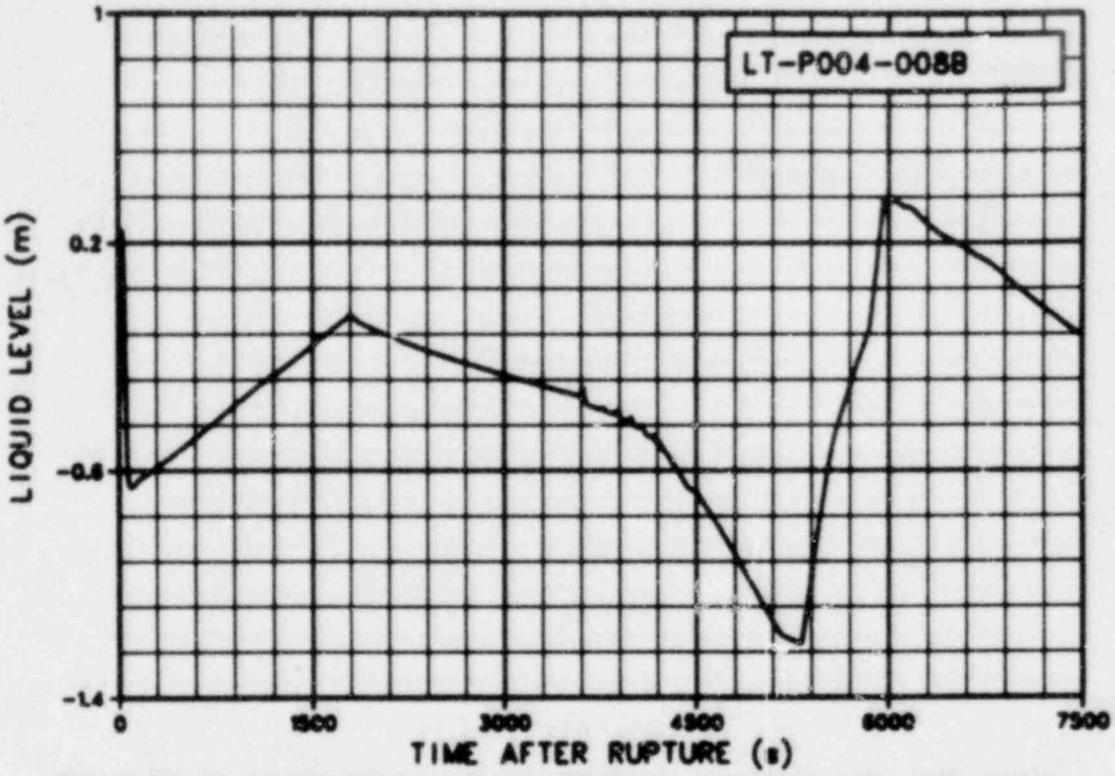


Figure 5M-23. Liquid level in steam generator secondary side, wide range (LT-P004-008B) (qualified).

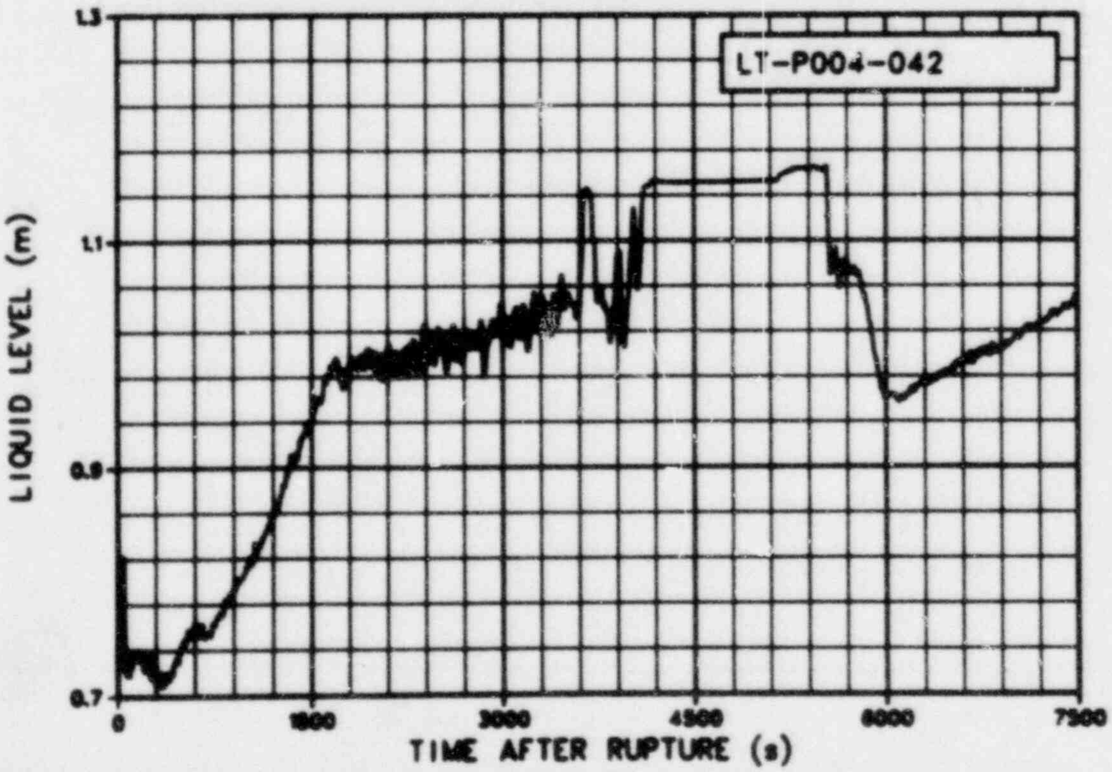


Figure 5M-24. Liquid level in intact loop 1.83 m south of condensate receiver centerline (LT-P004-042) (qualified).

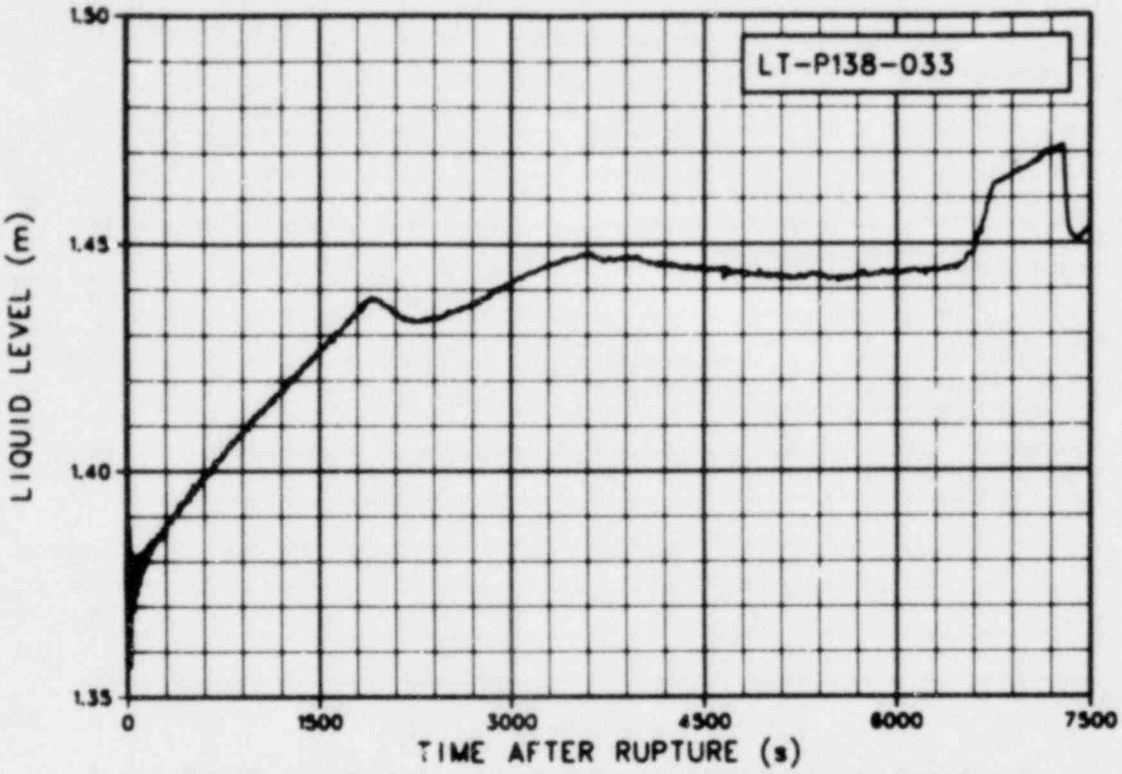


Figure 5M-25. Liquid level in blowdown suppression tank, north end (LT-P138-033) (qualified).

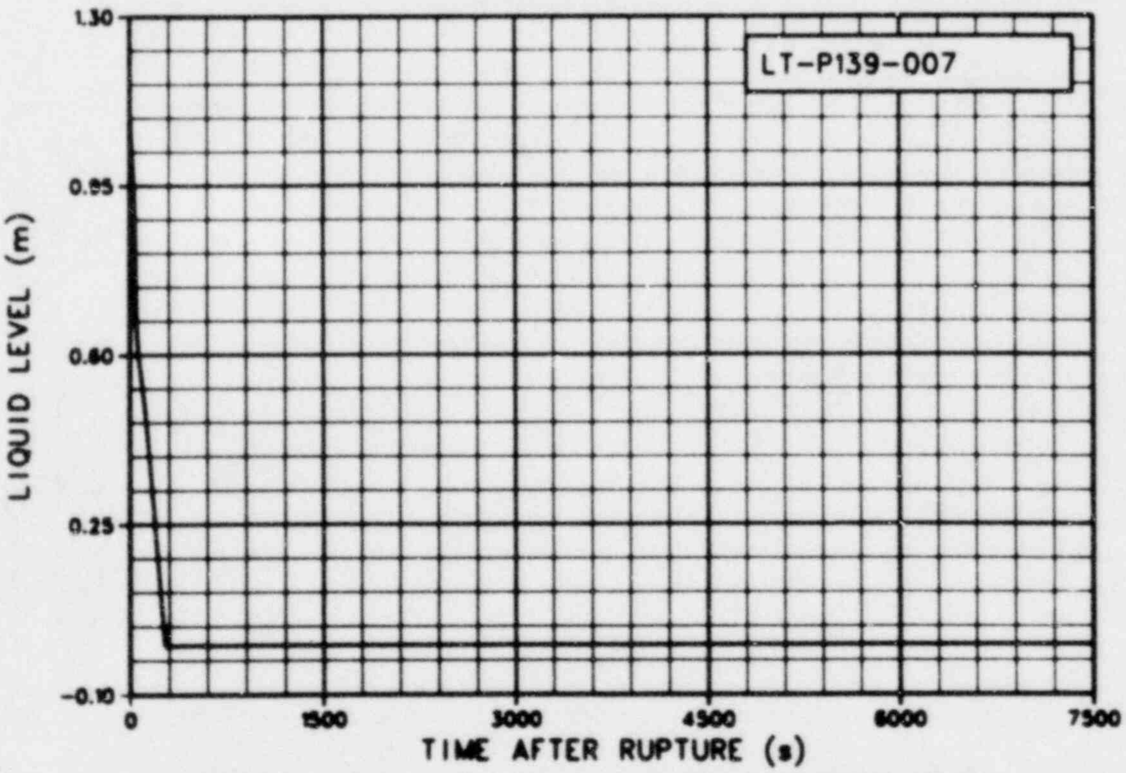


Figure 5M-26. Liquid level in pressurizer (LT-P139-007) (qualified, maximum measurement range equals 1.8 m).

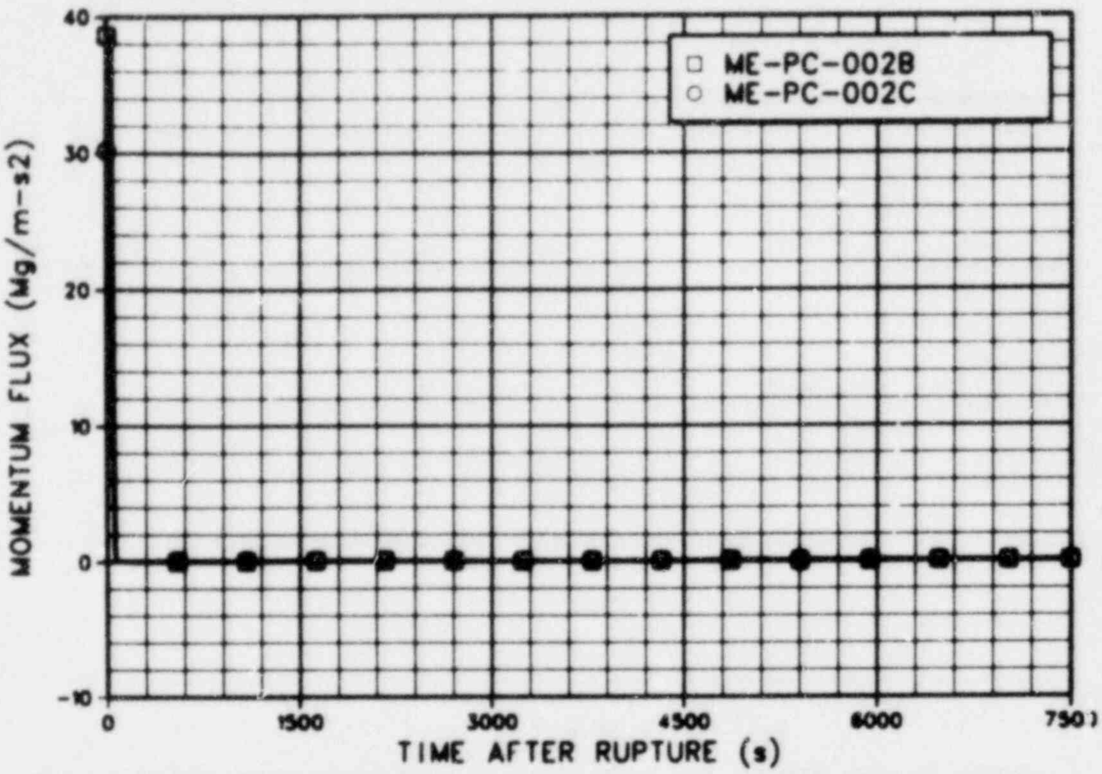


Figure 5M-27. Momentum flux in intact loop hot leg DTT rake at middle and top of pipe (ME-PC-002B and -002C) (qualified).

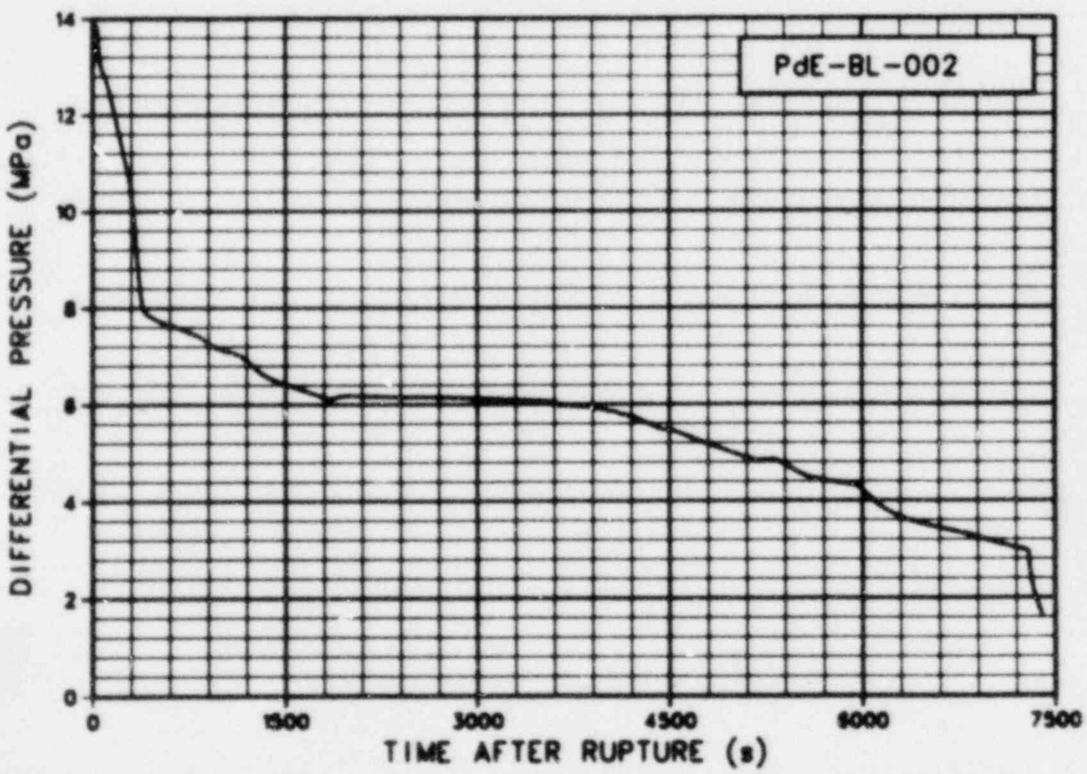


Figure 5M-28. Differential pressure in broken loop cold leg across small break orifice (PdE-BL-002) (qualified).

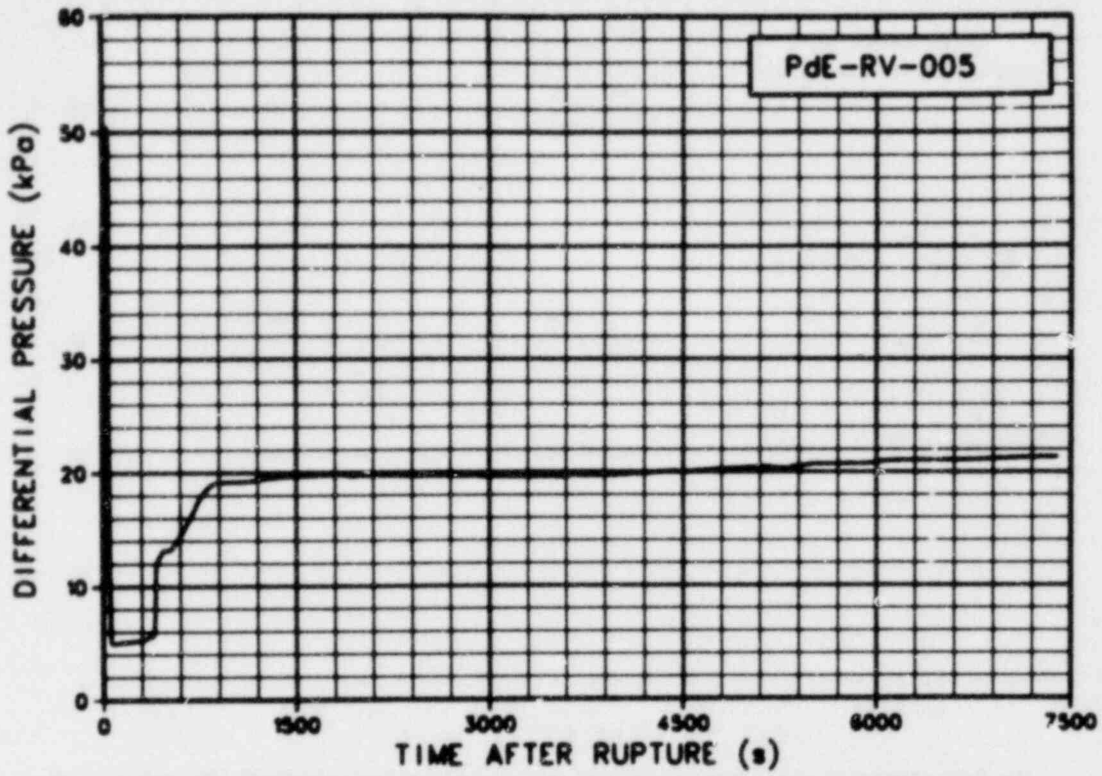


Figure 5M-29. Differential pressure in reactor vessel from vessel top to intact loop hot leg outlet (PdE-RV-005) (qualified, no comparable measurement).

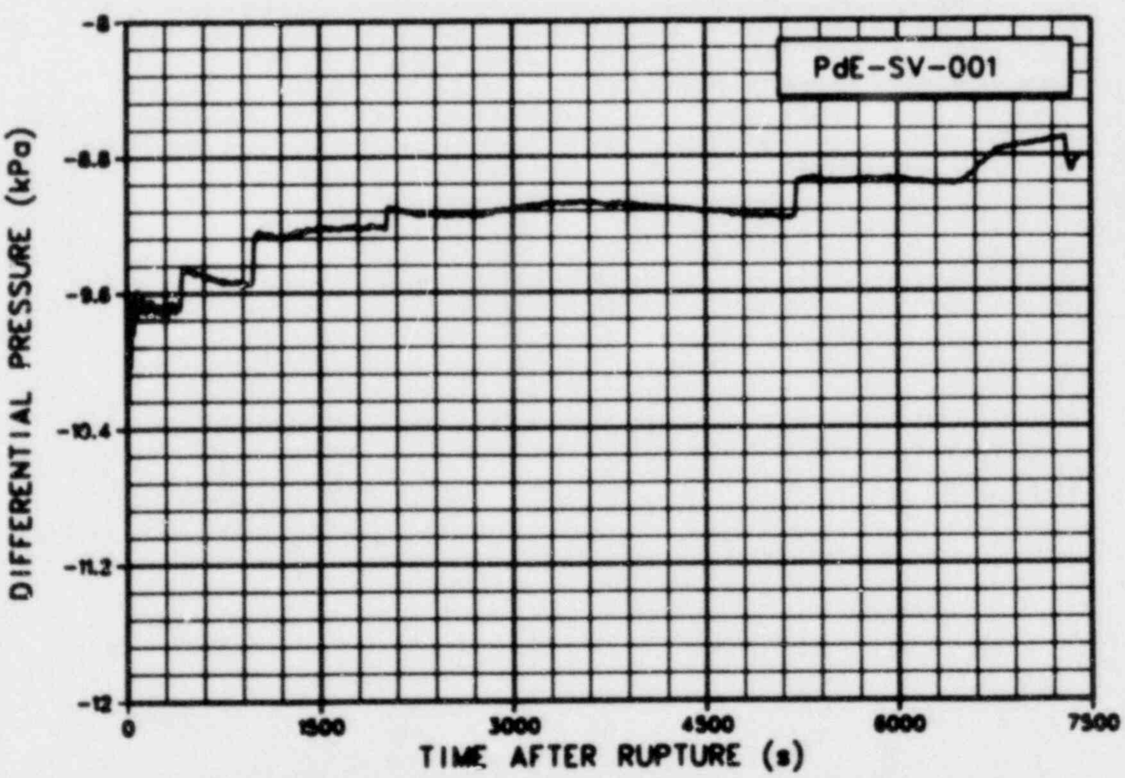


Figure 5M-30. Differential pressure in blowdown suppression tank (PdE-SV-001) (qualified, good for initial conditions only).

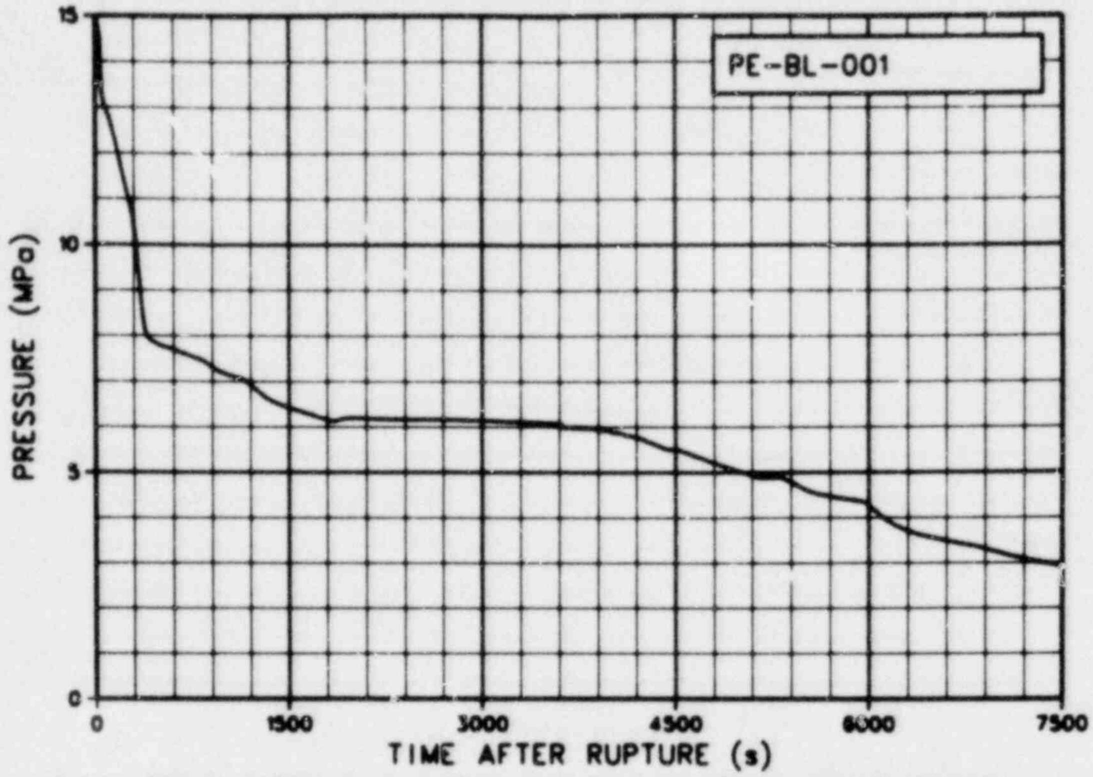


Figure 5M-31. Pressure in broken loop cold leg (PE-BL-001) (qualified).

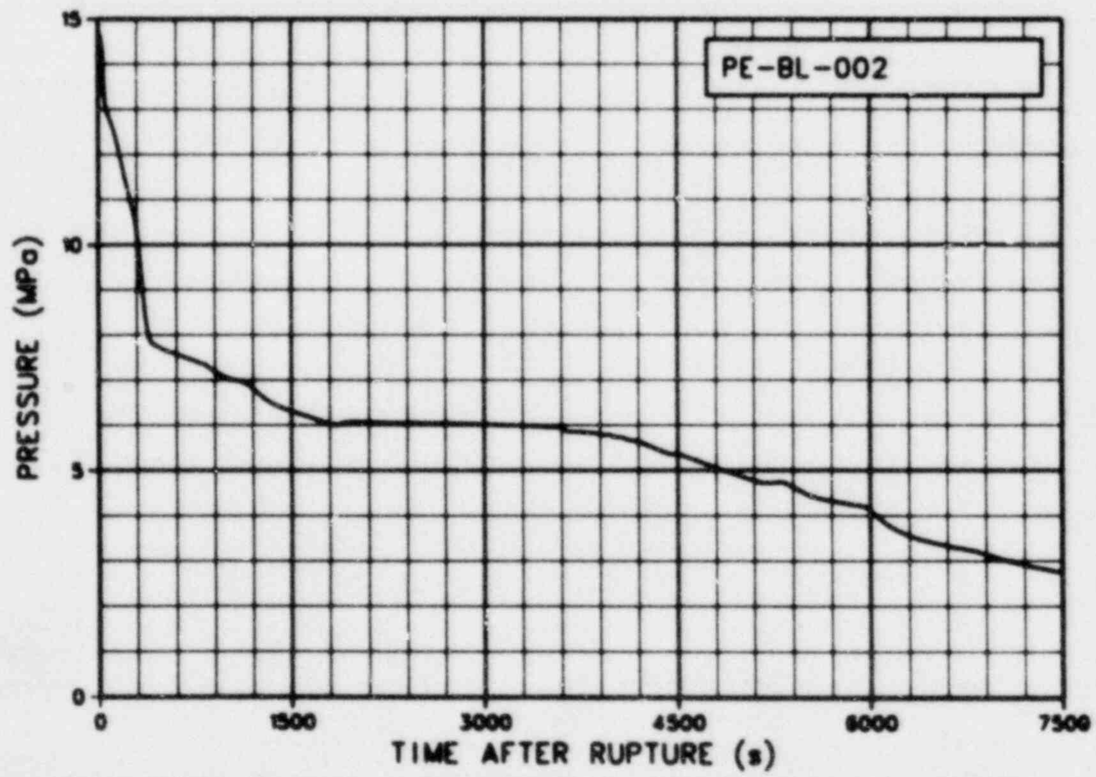


Figure 5M-32. Pressure in broken loop hot leg (PE-BL-002) (qualified).

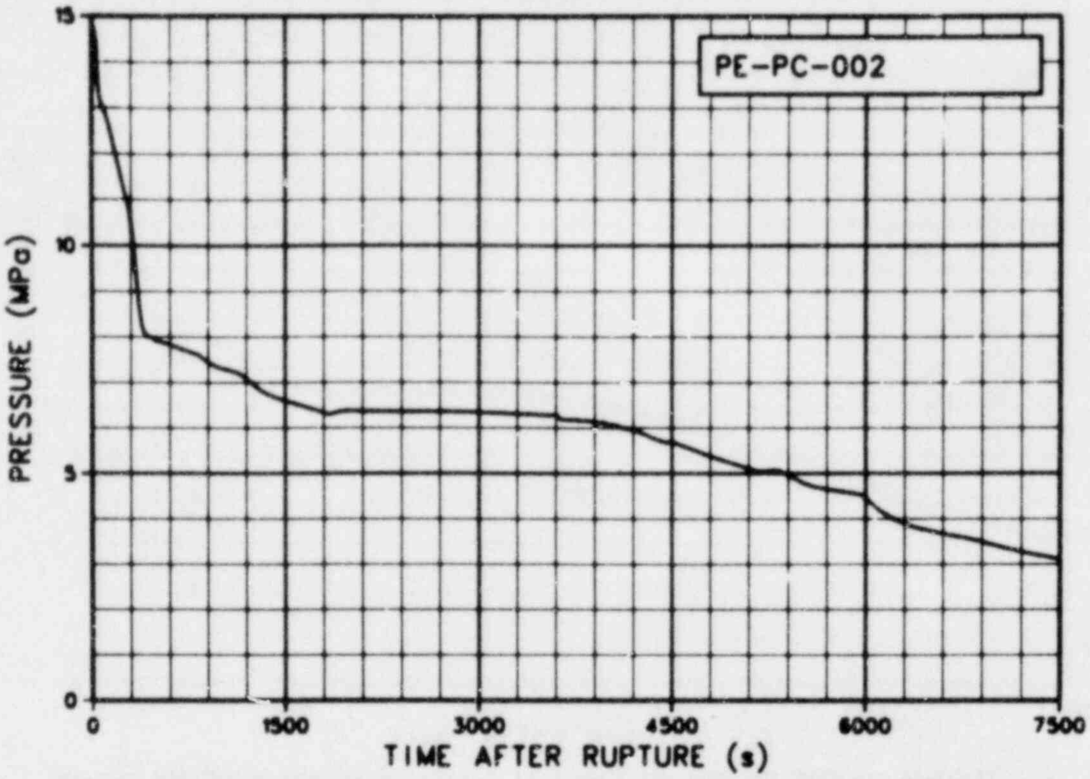


Figure 5M-33. Pressure in intact loop hot leg (PE-PC-002) (qualified).

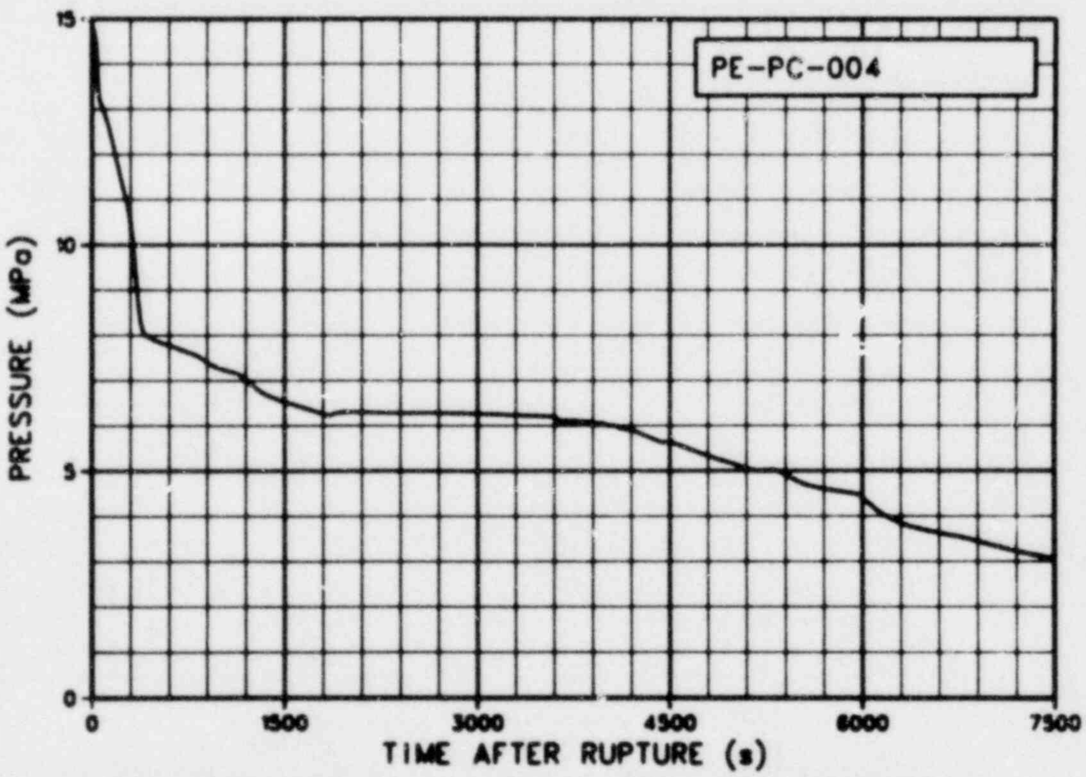


Figure 5M-34. Pressure in pressurizer (PE-PC-004) (qualified).

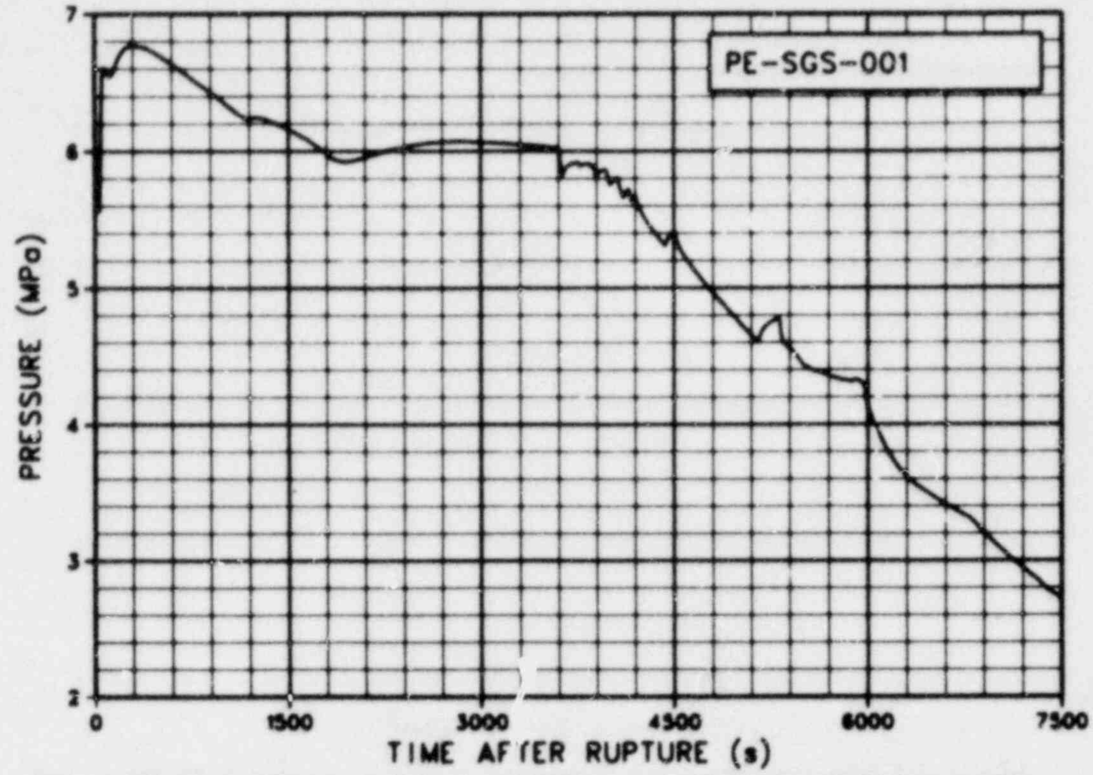


Figure 5M-35. Pressure in steam generator dome (PE-SGS-001) (qualified).

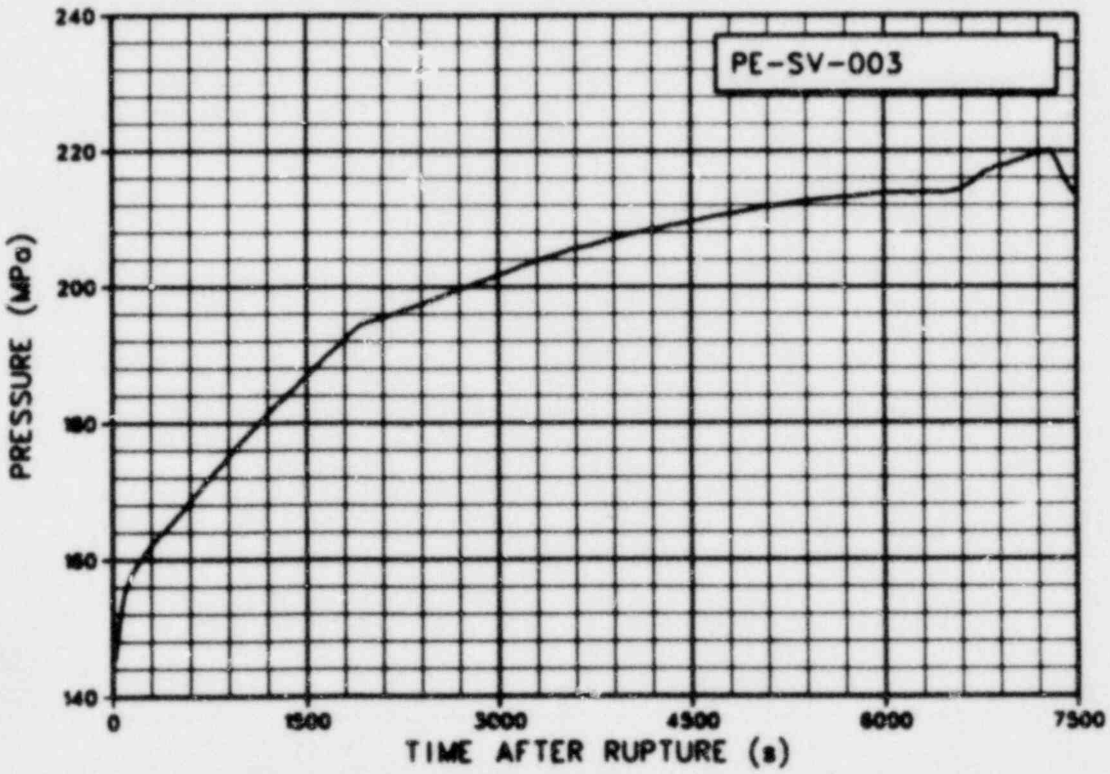


Figure 5M-36. Pressure in blowdown suppression tank submerged near Downcomer (PE-SV-003 (qualified).

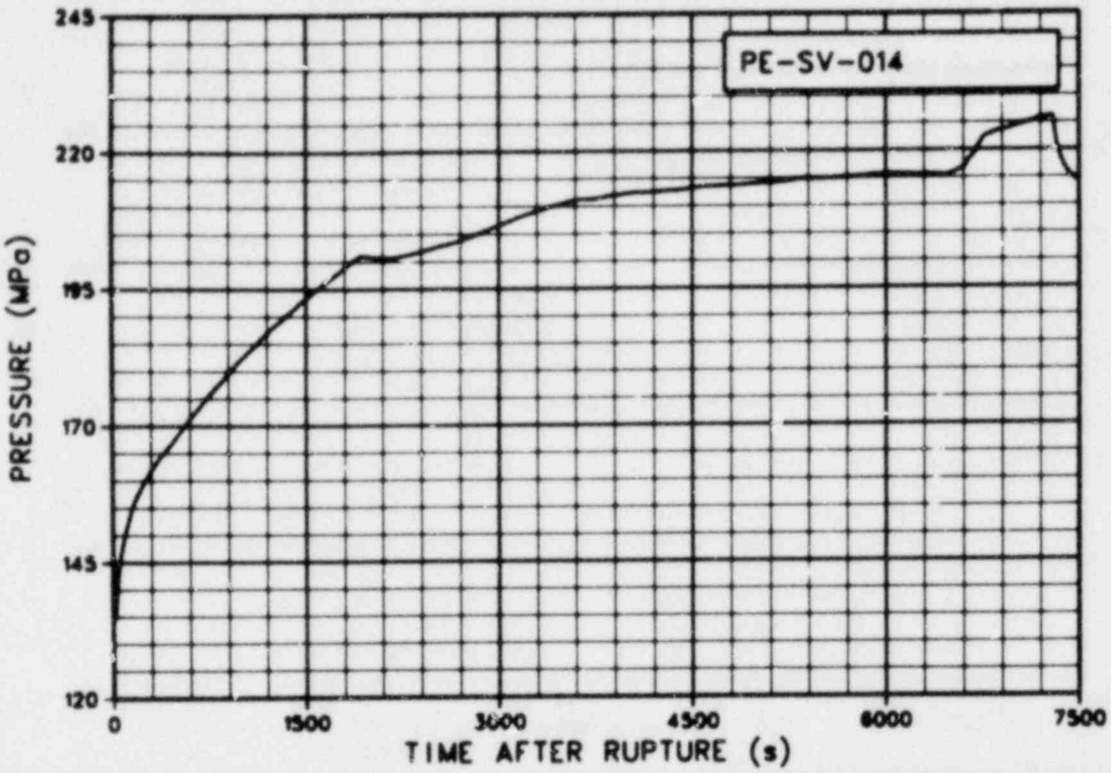


Figure 5M-37. Pressure in blowdown suppression tank header submerged above Downcomer 4 (PE-SV-014) (qualified).

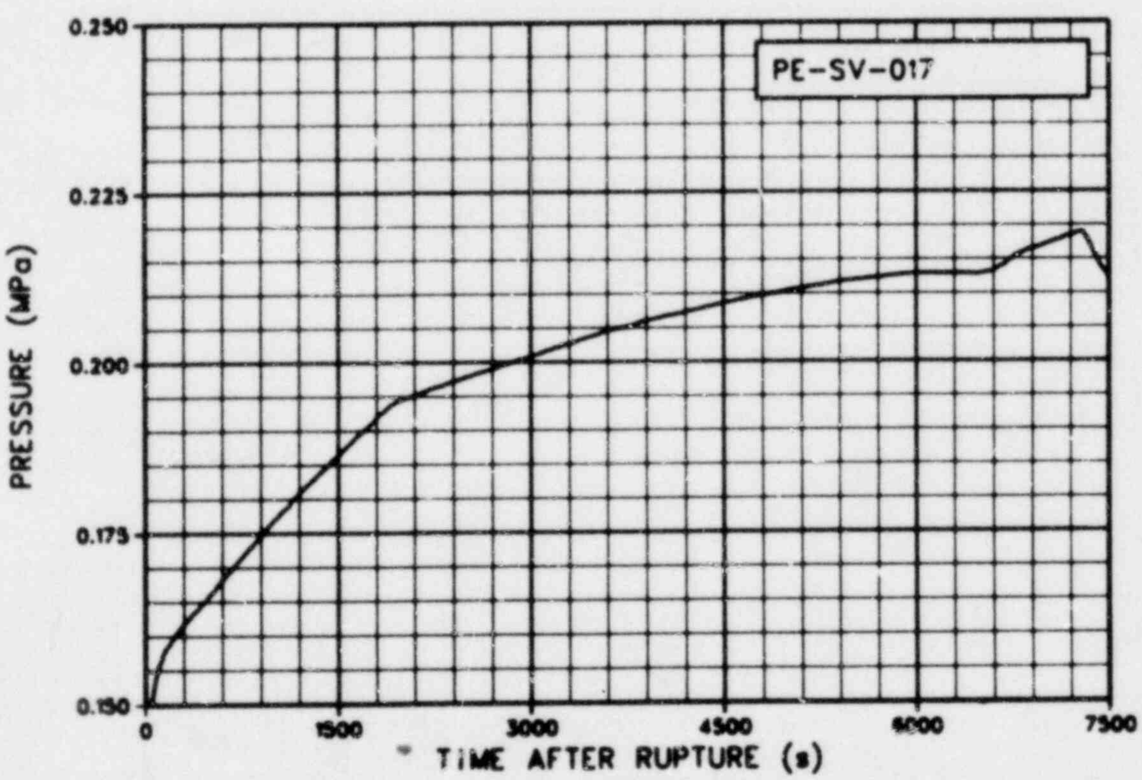


Figure 5M-38. Pressure in blowdown suppression tank top 1.38 m north of Downcomer 3 (PE-SV-017) (qualified).

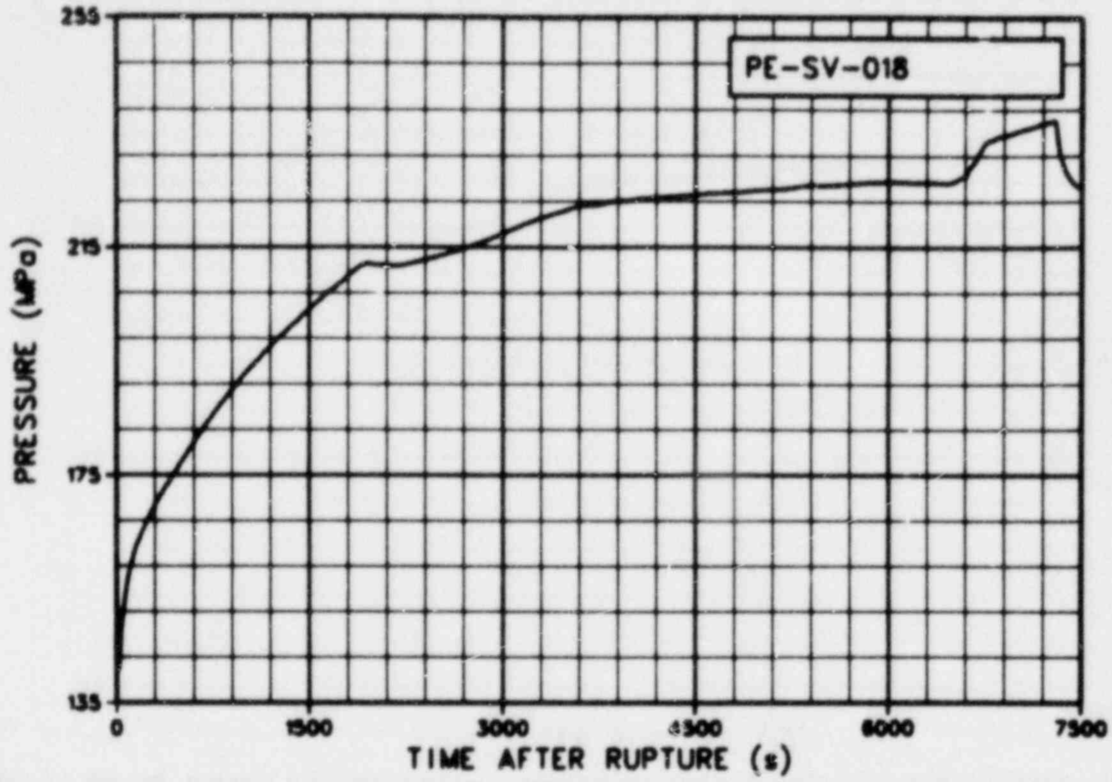


Figure 5M-39. Pressure in blowdown suppression tank header above Downcomer 1 (PE-SV-018) (qualified).

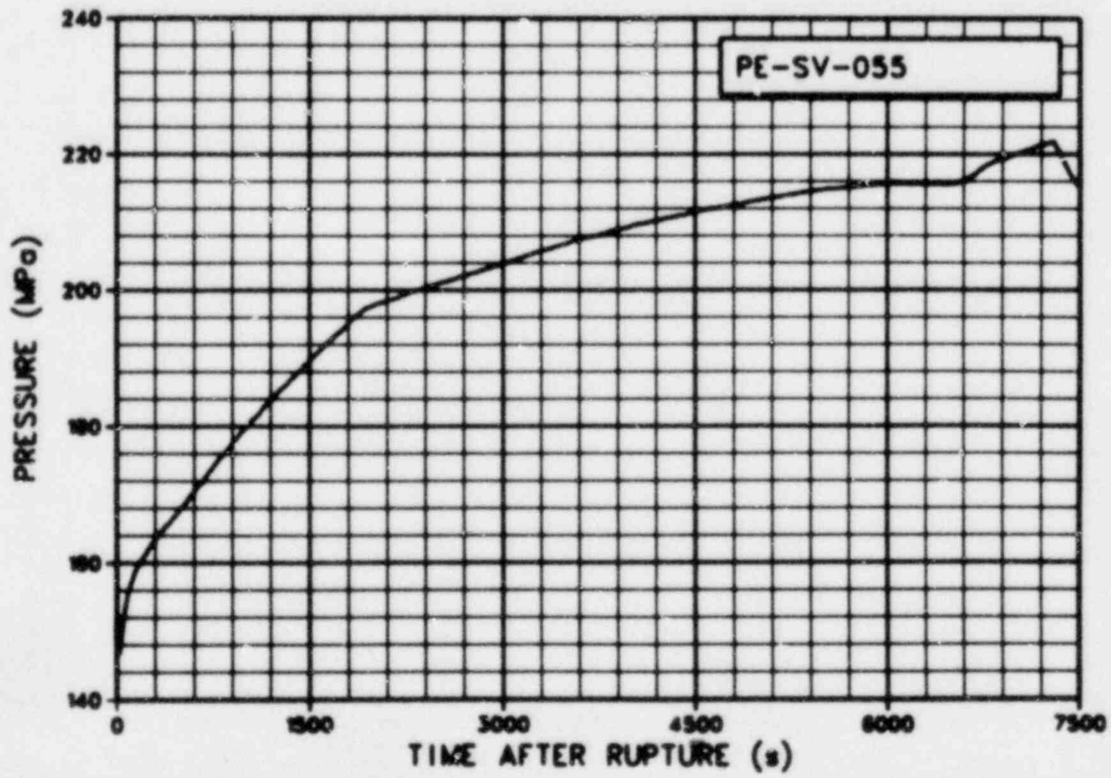


Figure 5M-40. Pressure in blowdown suppression tank top north of Downcomer 4 (PE-SV-055) (qualified).

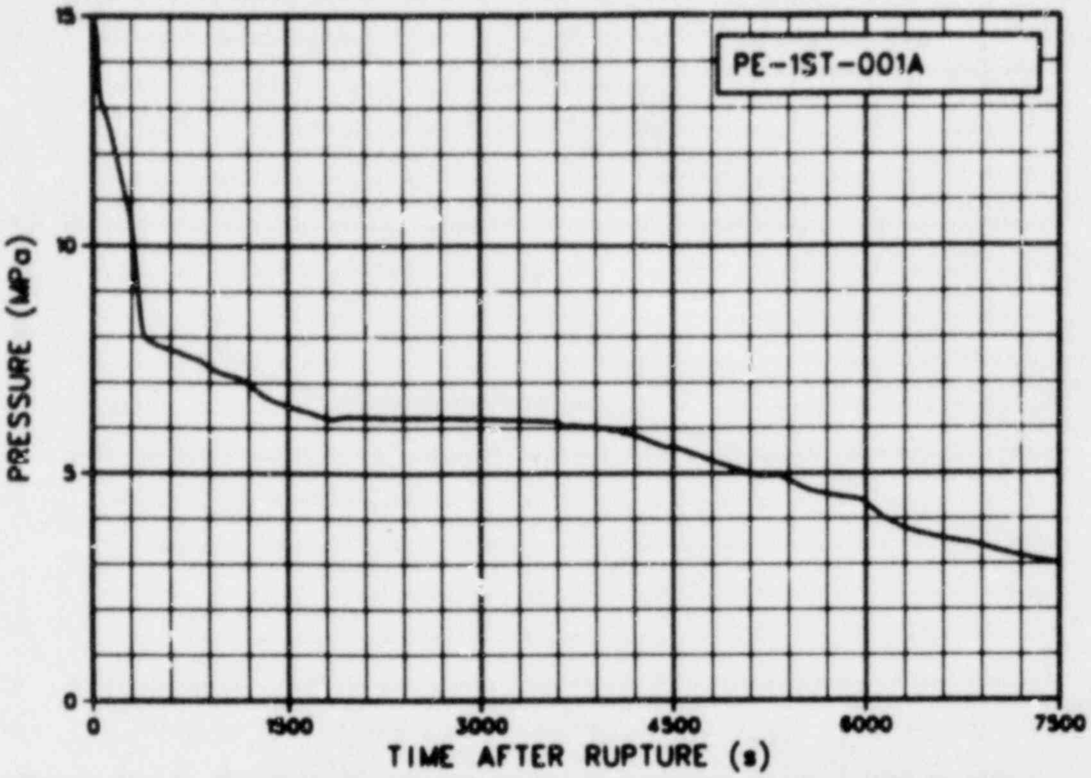


Figure 5M-41. Pressure in reactor vessel Downcomer Stalk 1, 0.62 m above reactor vessel bottom, wide range (PE-1ST-001A) (qualified).

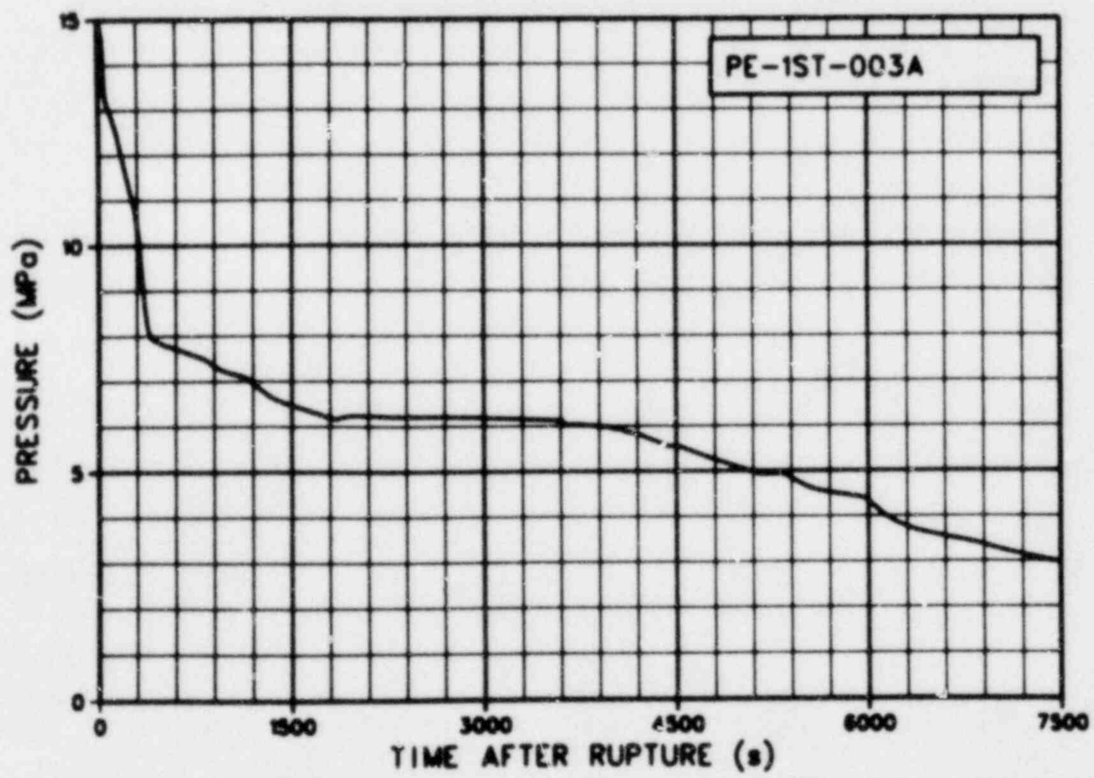


Figure 5M-42. Pressure in reactor vessel Downcomer Stalk 1, 5.32 m above reactor vessel bottom, wide range (PE-1ST-003A) (qualified).

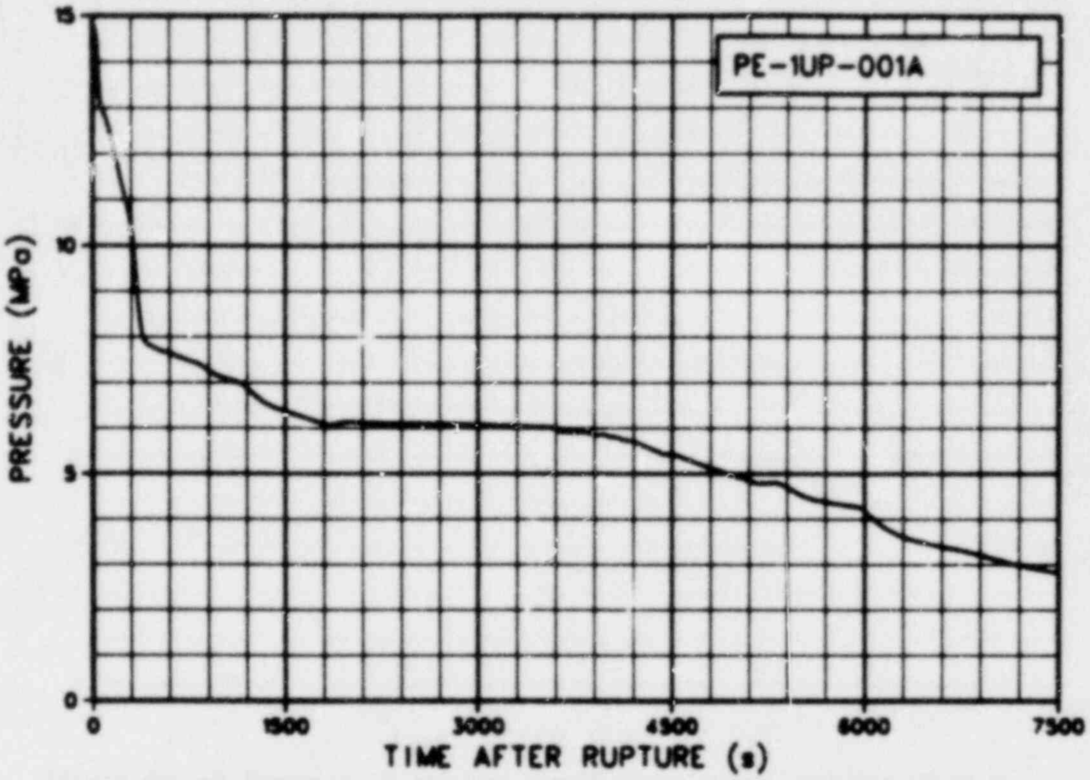


Figure 5M-43. Pressure in reactor vessel above upper end box of Fuel Assembly 1 (PE-1UP-001A) (qualified).

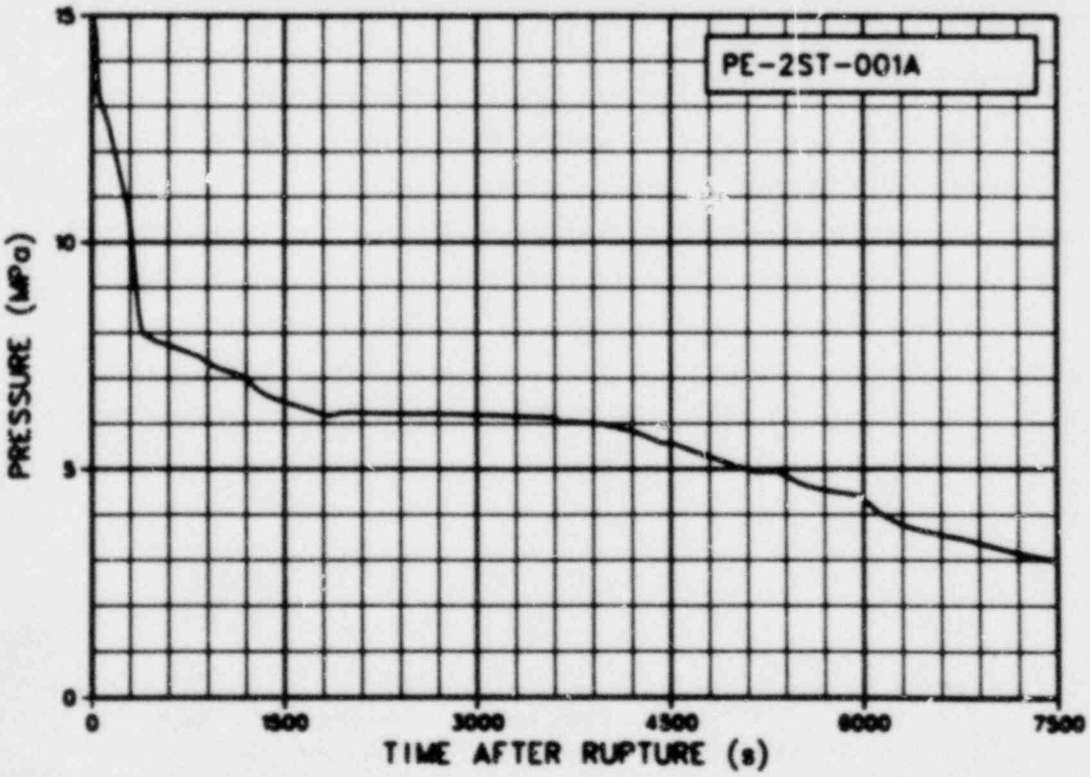


Figure 5M-44. Pressure in reactor vessel Downcomer Stalk 2, 0.82 m above reactor vessel bottom, wide range (PE-2ST-001A) (qualified).

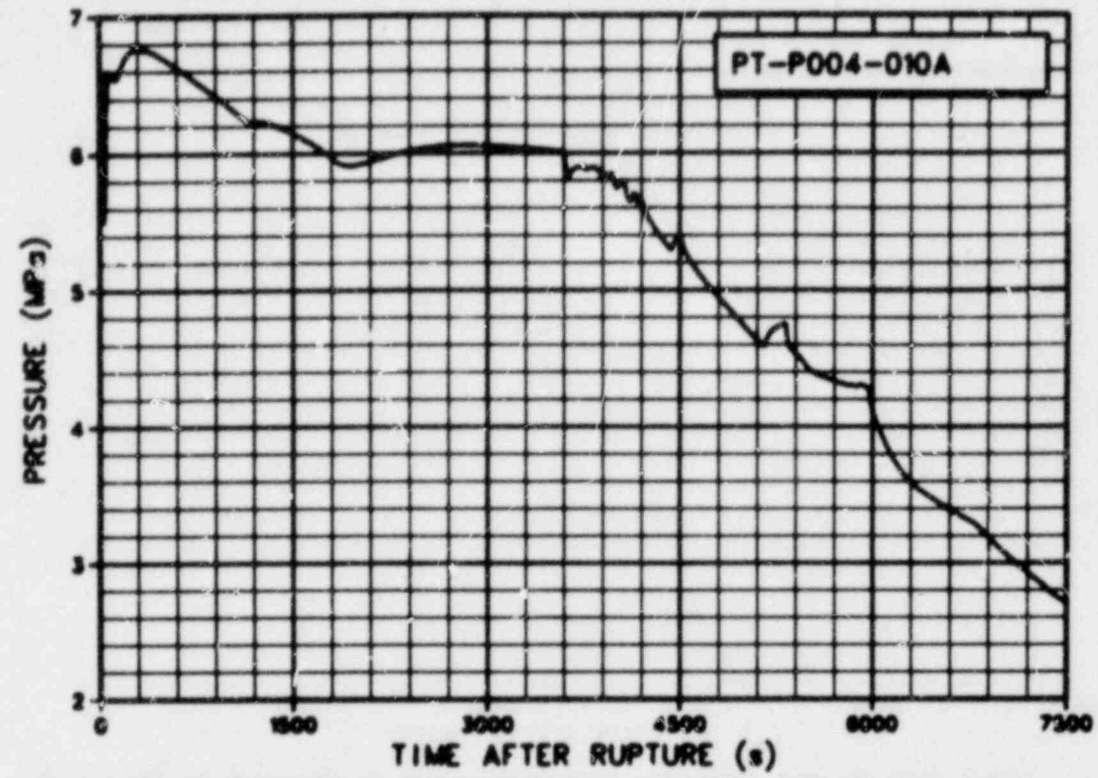


Figure 5M-45. Pressure in steam generator secondary side 10-inch outlet (PT-P004-010A) (qualified).

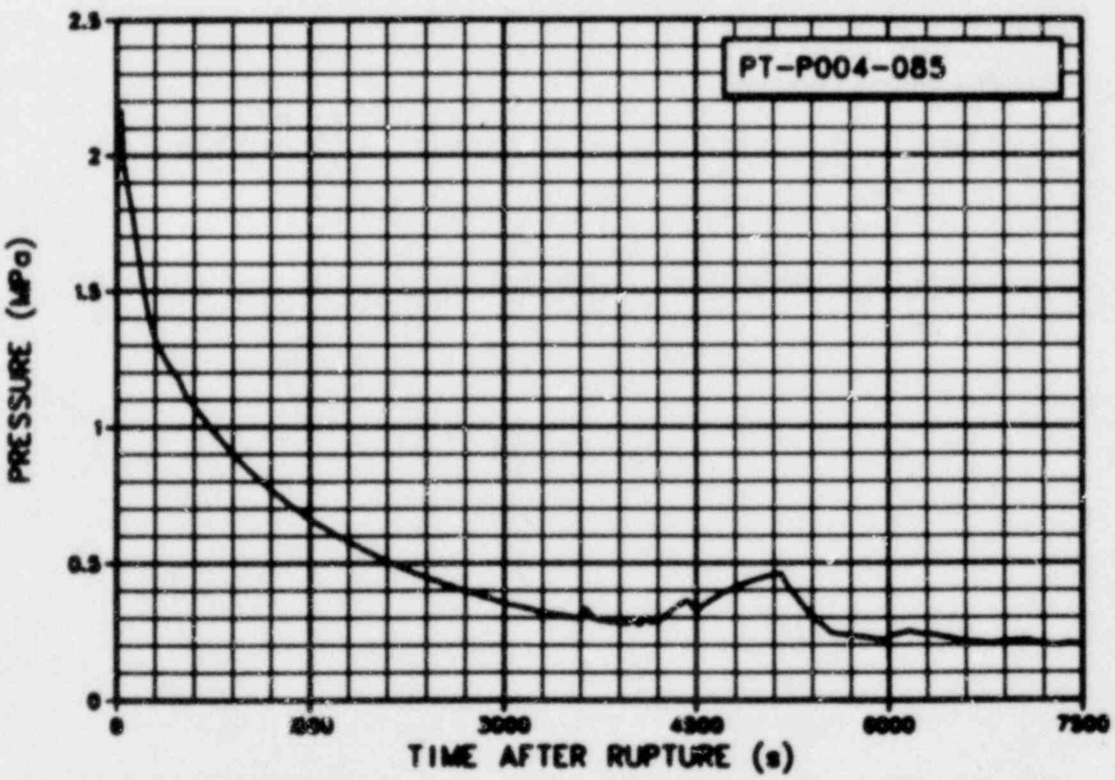


Figure 5M-46. Pressure in secondary coolant system condenser 12-inch inlet (PT-P004-085) (qualified).

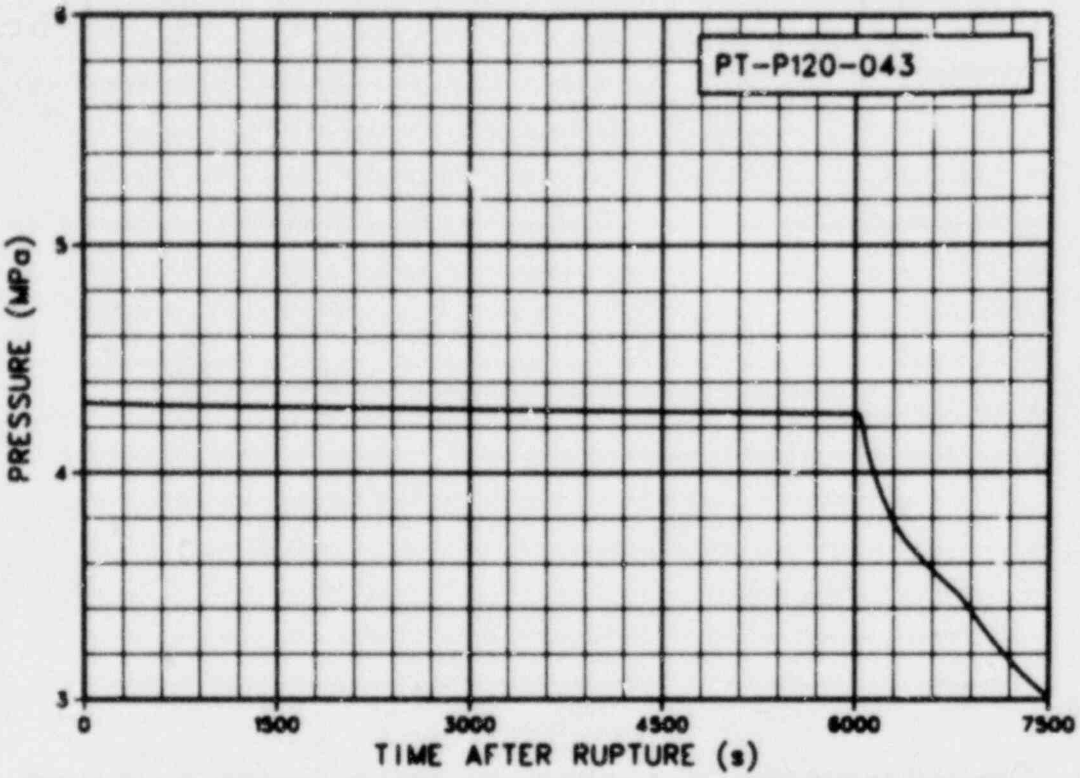


Figure 5M-47. Pressure in ECCS Accumulator A (PT-P120-043) (qualified).

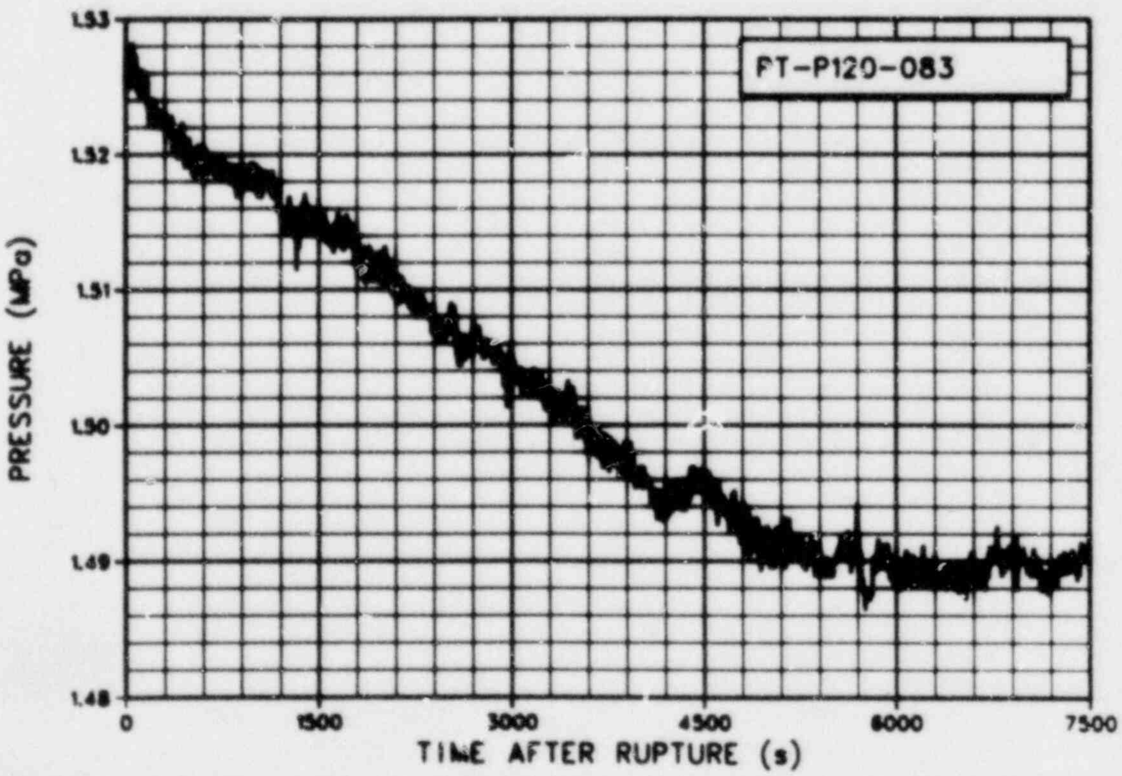


Figure 5M-48. Pressure in ECCS LPIS Pump A discharge (PT-P120-083) (qualified).

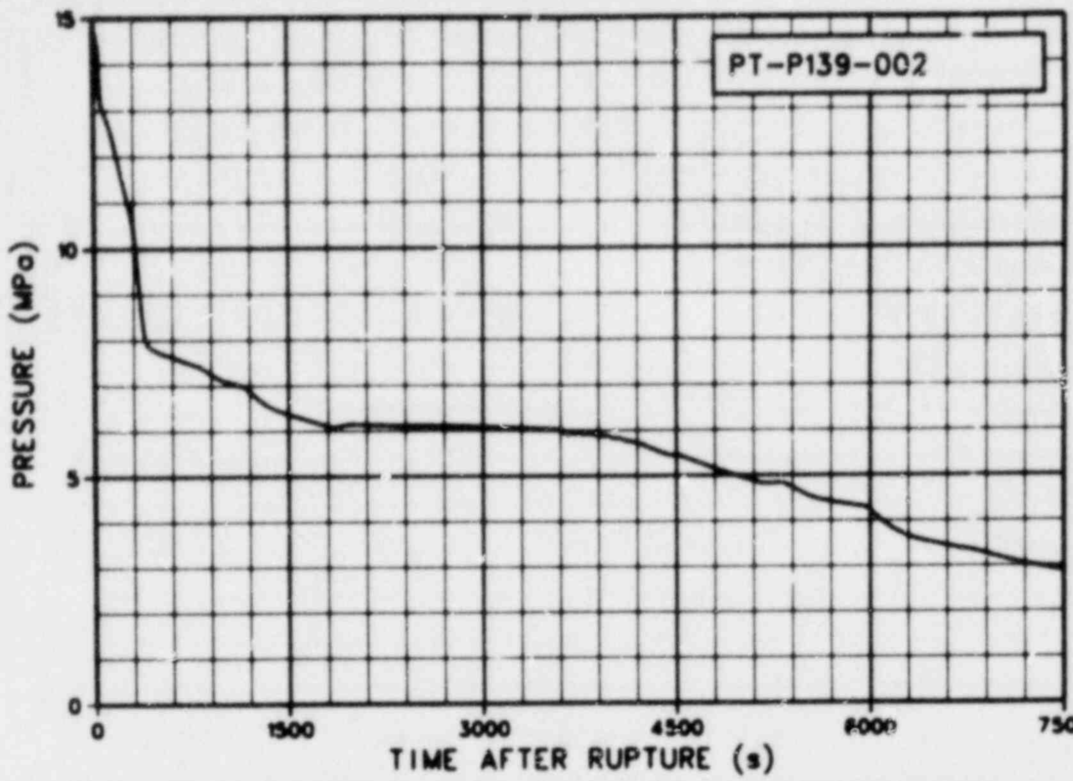


Figure 5M-49. Pressure in intact loop hot leg at venturi on bottom (PT-P139-002) (qualified).

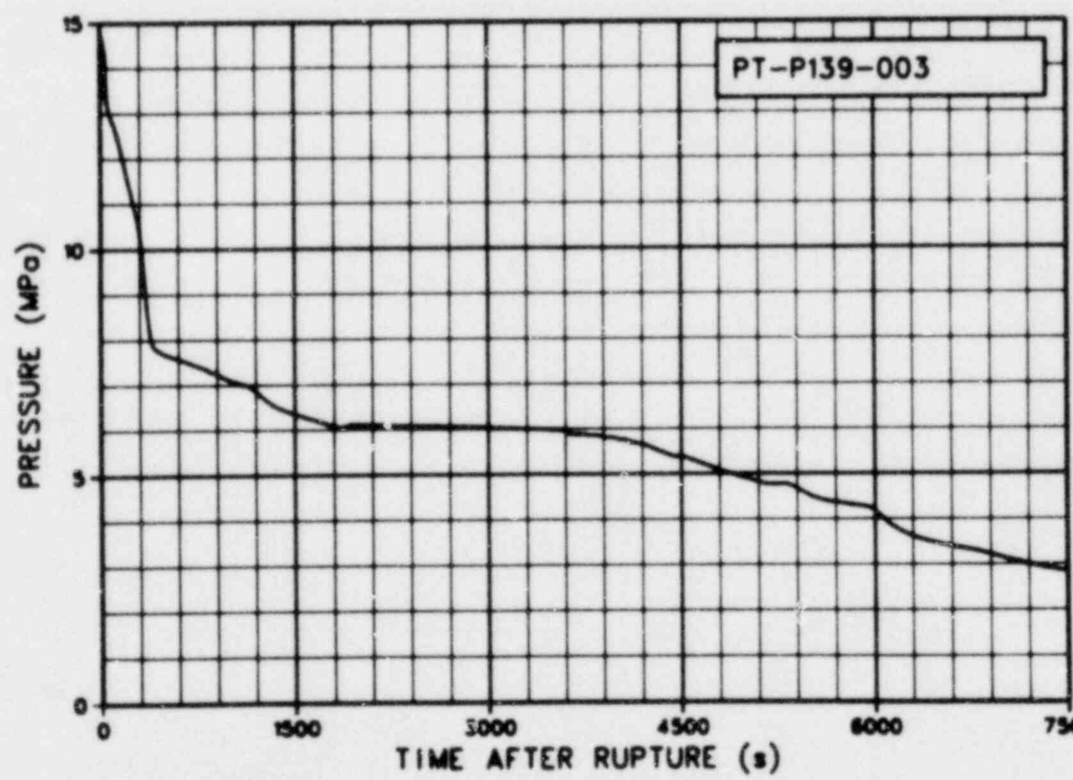


Figure 5M-50. Pressure in intact loop hot leg at venturi on left side looking toward steam generator (PT-P139-003) (qualified).

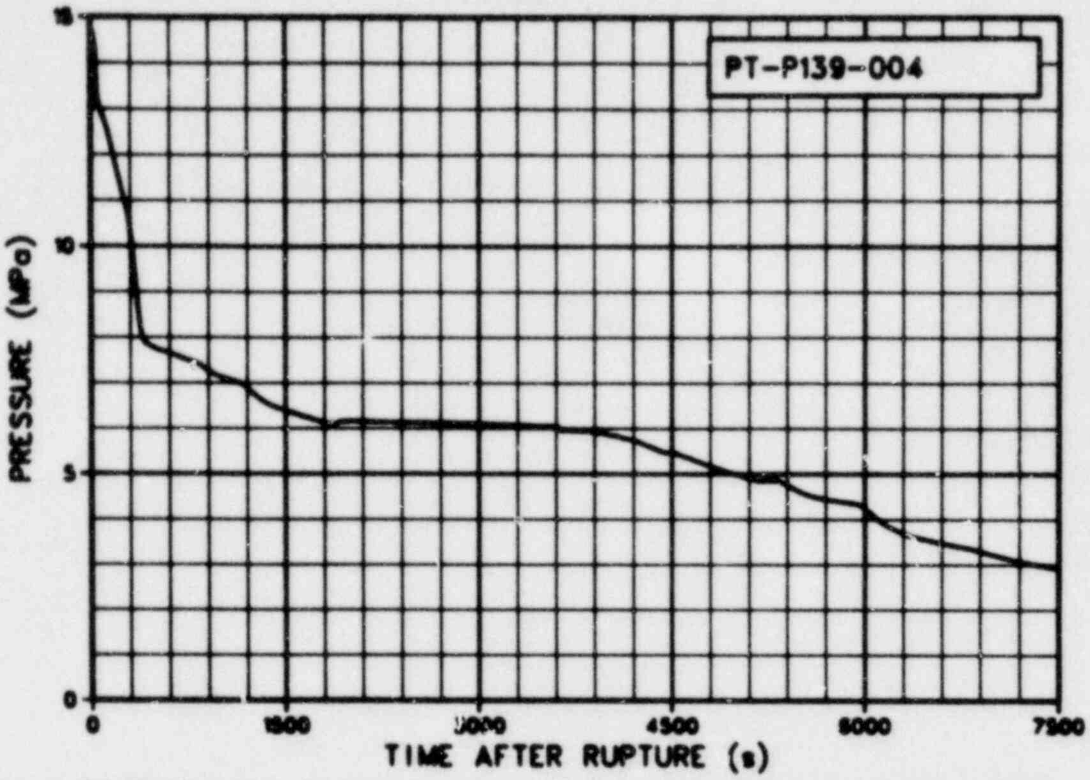


Figure 5M-51. Pressure in intact loop hot leg at venturi on right side looking toward steam generator (PT-P139-004) (qualified).

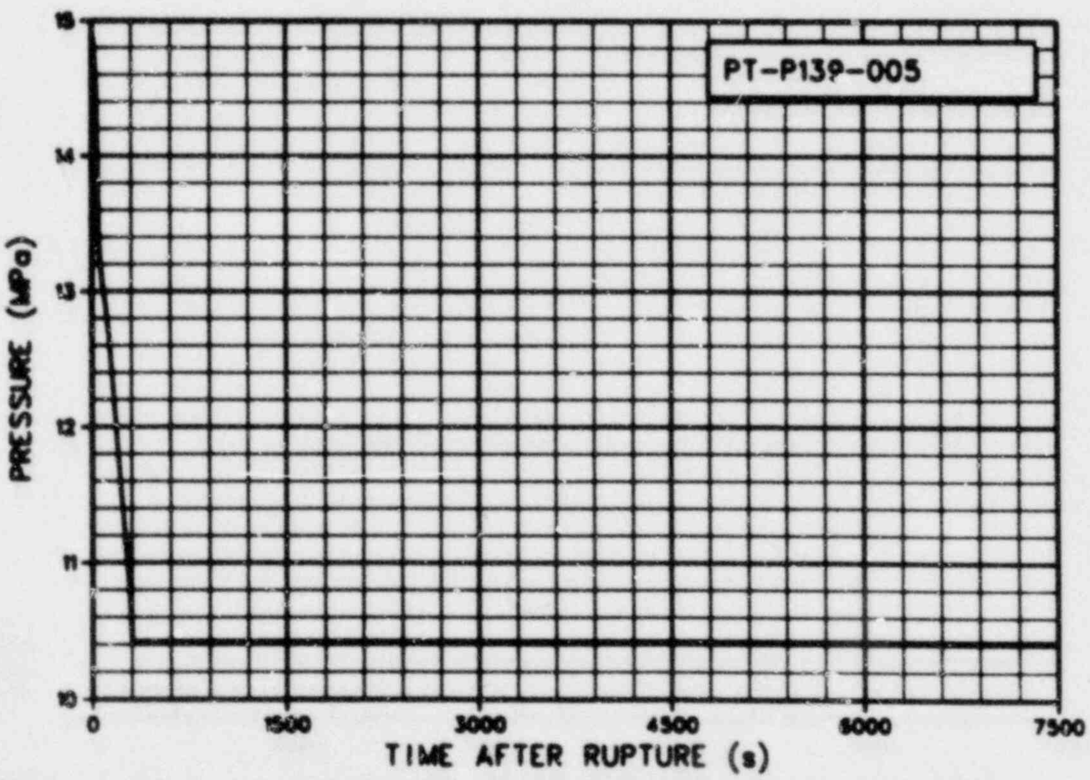


Figure 5M-52. Pressure in intact loop, 1.88 m above pressurizer bottom (PT-P139-005) (qualified, narrow range instrument).

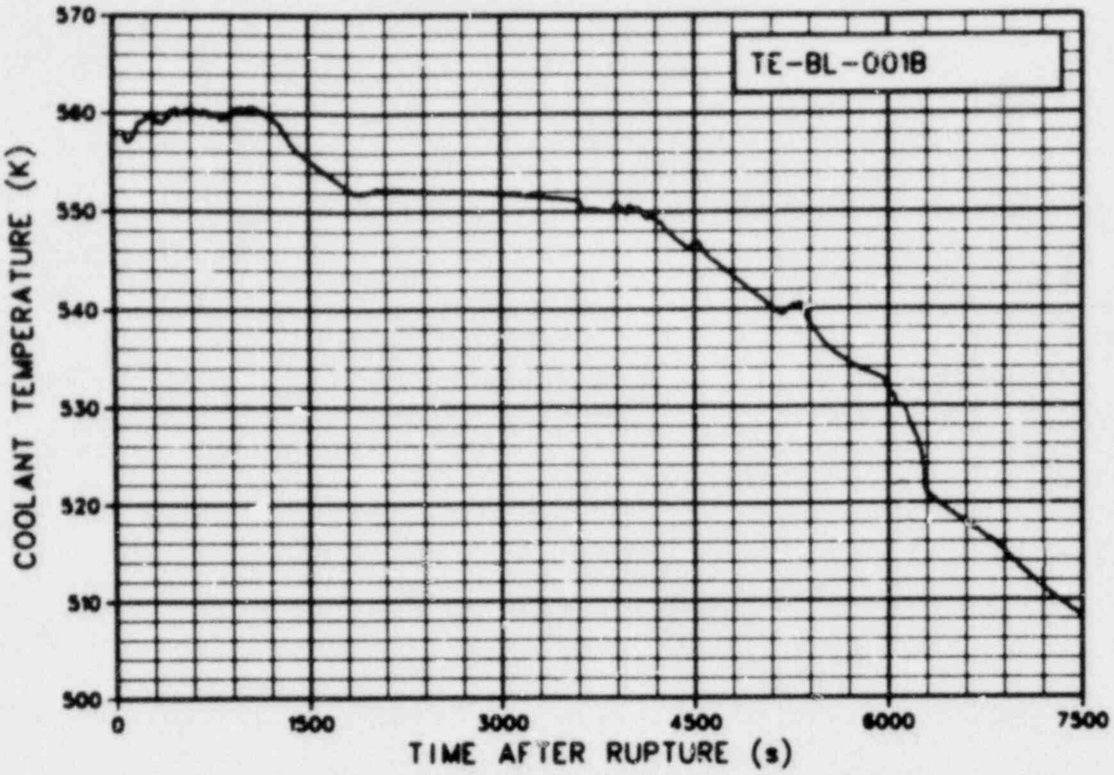


Figure 5M-53. Coolant temperature in broken loop cold leg (TE-BL-001B) (qualified).

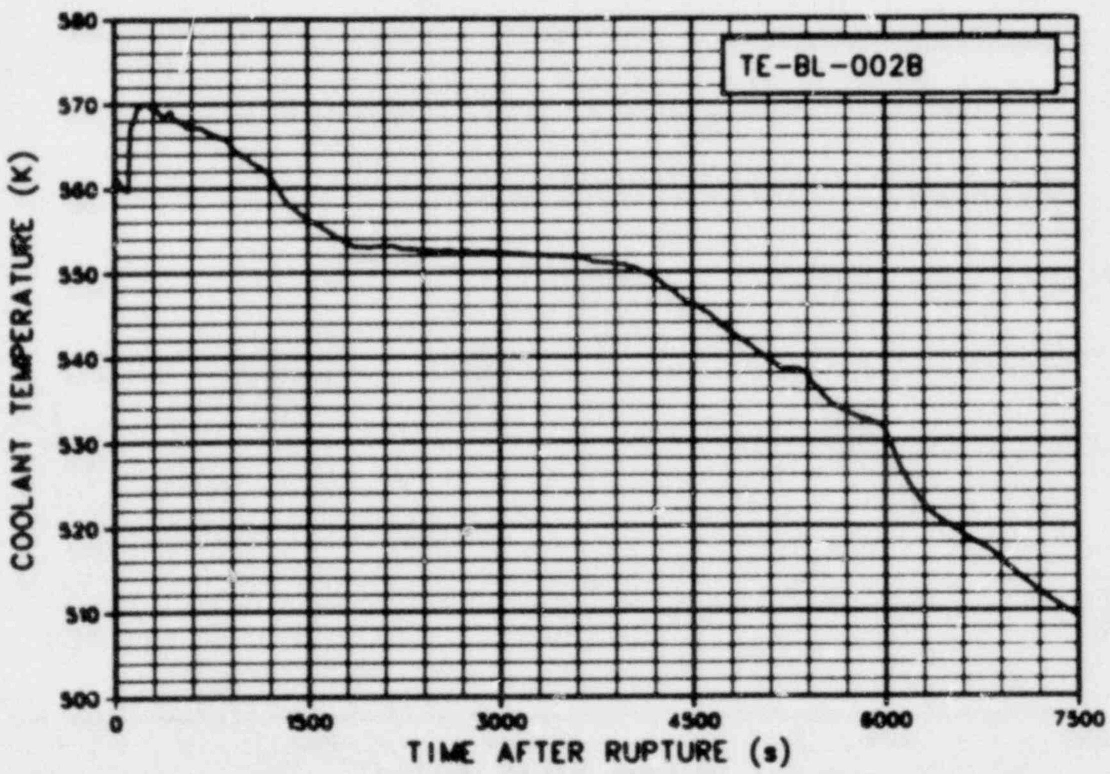


Figure 5M-54. Coolant temperature in broken loop hot leg (TE-BL-002B) (qualified).

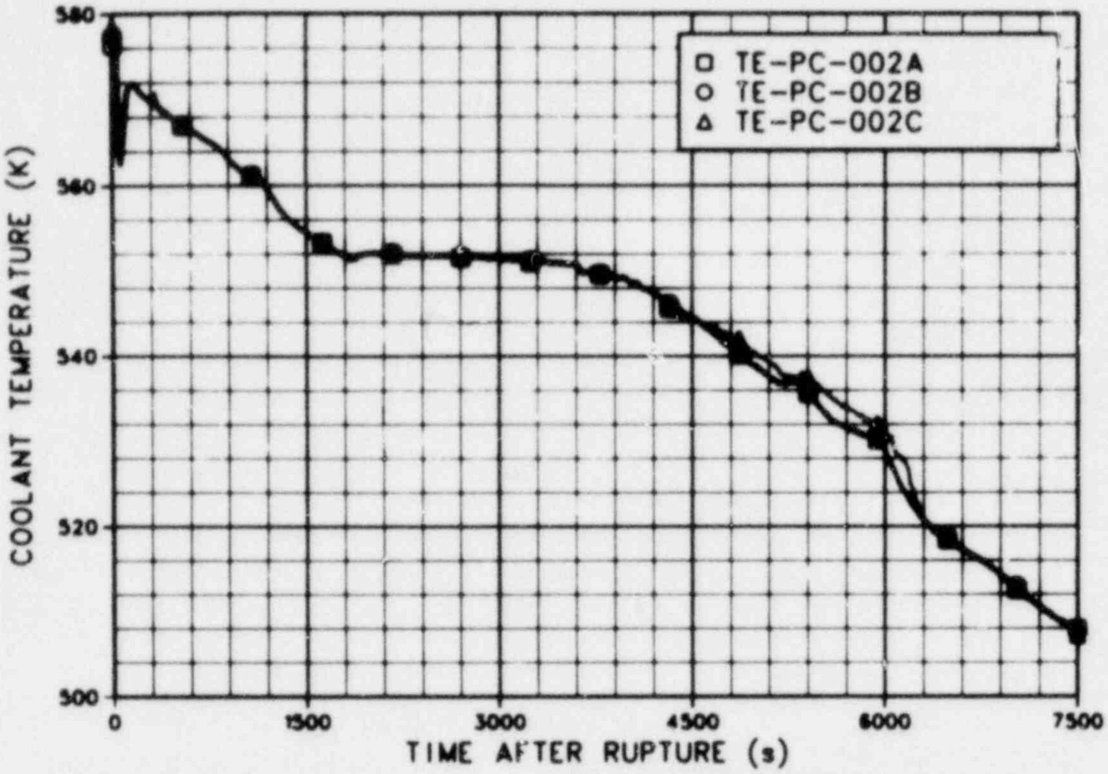


Figure 5M-55. Coolant temperature in intact loop hot leg DTT rake at bottom, middle, and top of pipe (TE-PC-002A, -002B, and -002C) (qualified).

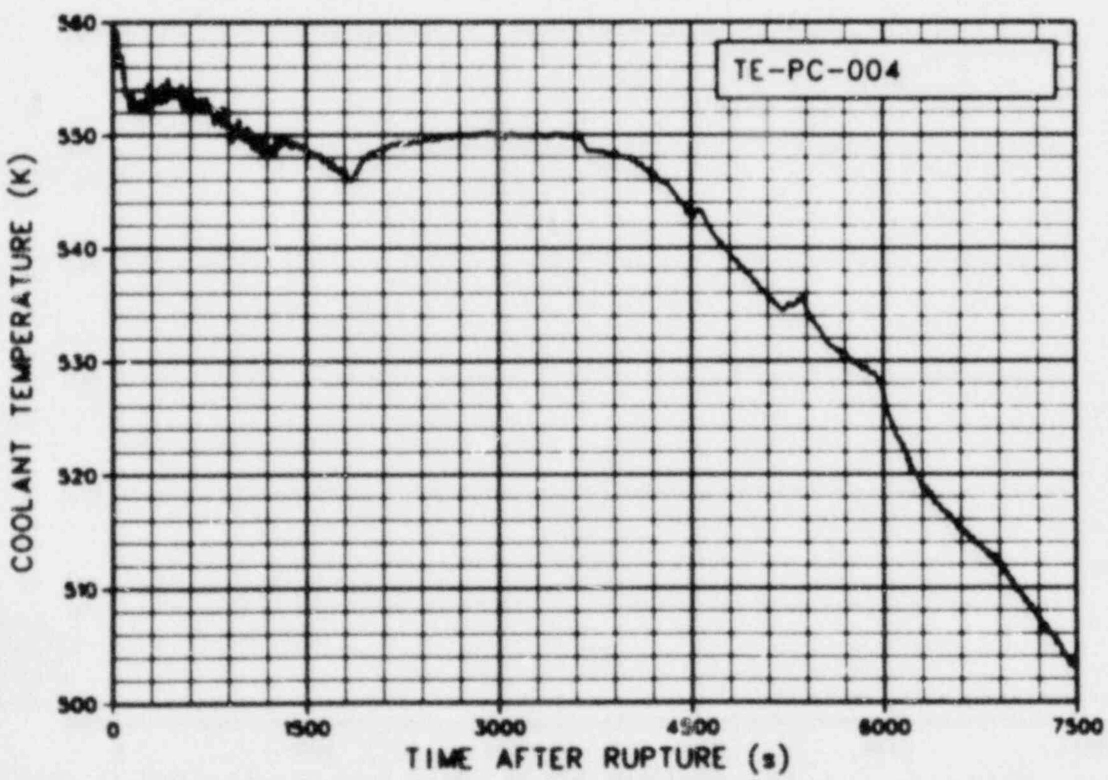


Figure 5M-56. Coolant temperature in intact loop cold leg at bottom of ECC rake 1 (TE-PC-004) (qualified).

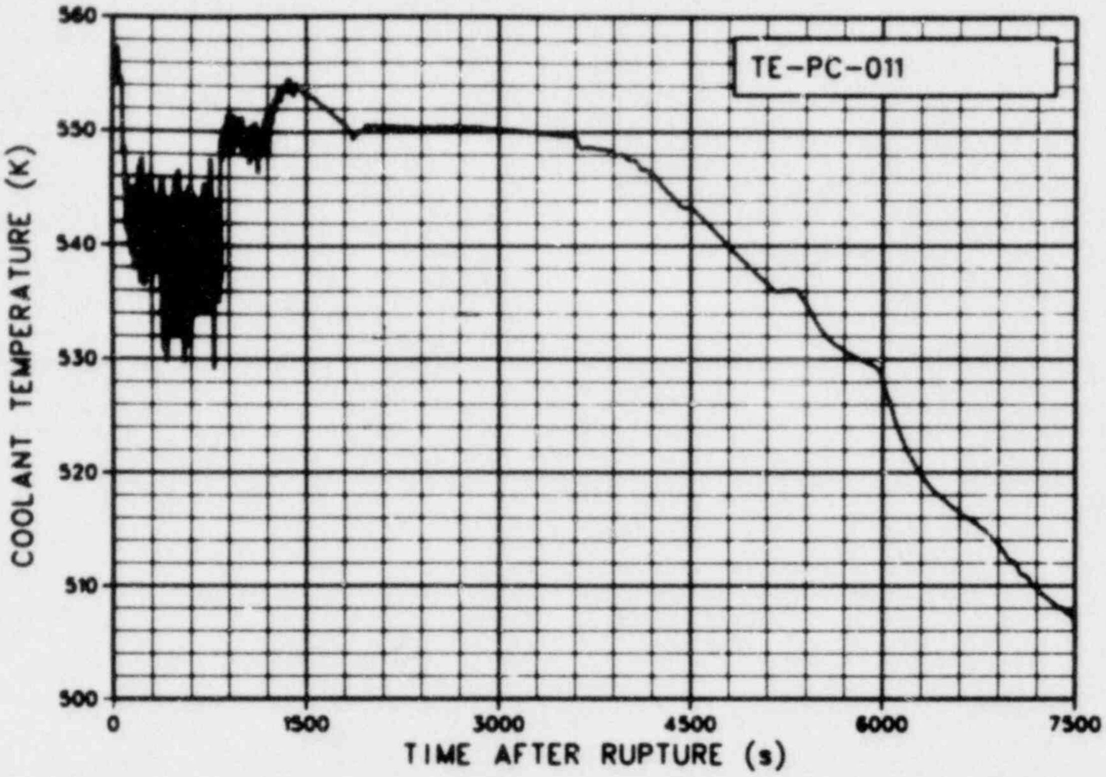


Figure 5M-57. Coolant temperature in intact loop cold leg at top of ECC rake 2 (TE-PC-011) (qualified).

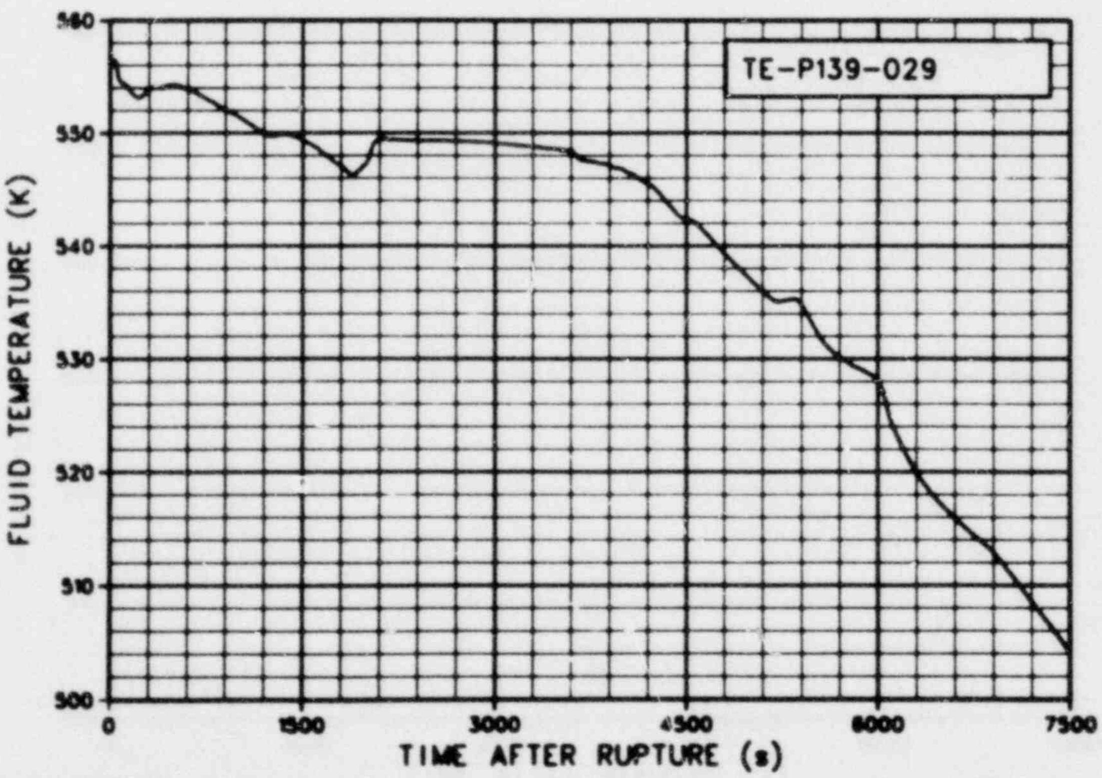


Figure 5M-58. Fluid temperature in intact loop cold leg upstream of DTT rake (TE-P139-029) (qualified, process instrument, response limited).

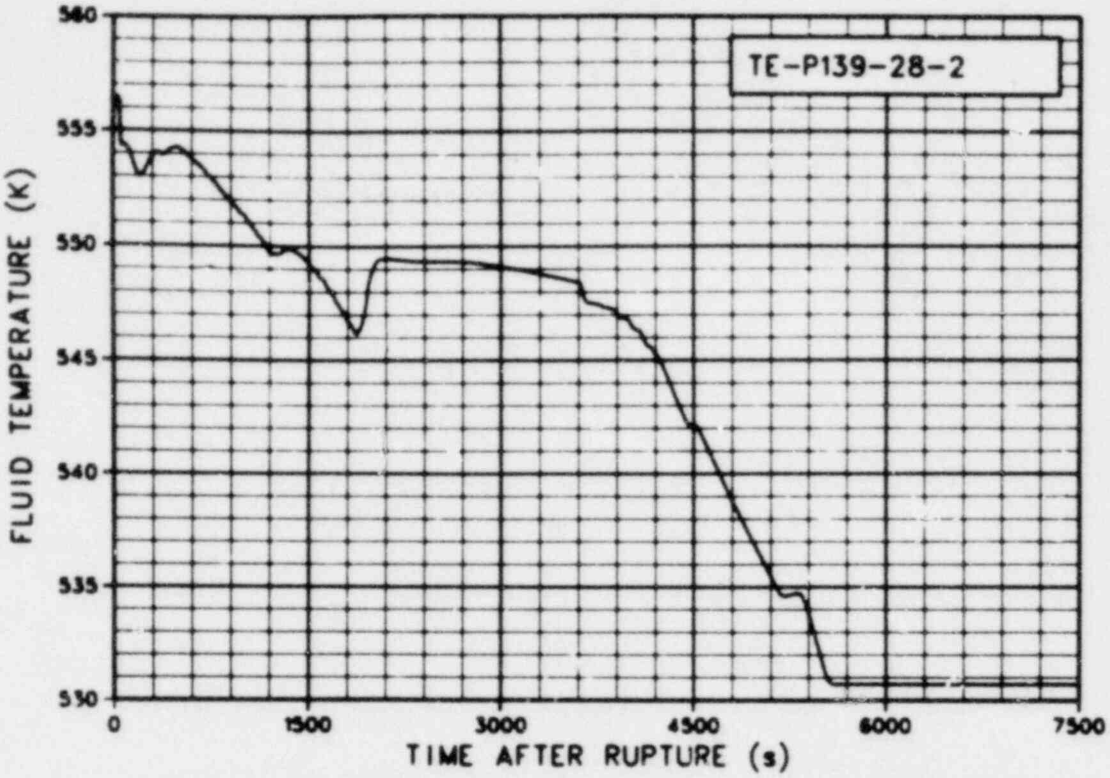


Figure 5M-59. Fluid temperature in intact loop cold leg (TE-P139-28-2) (qualified, narrow range process instrument, response limited).

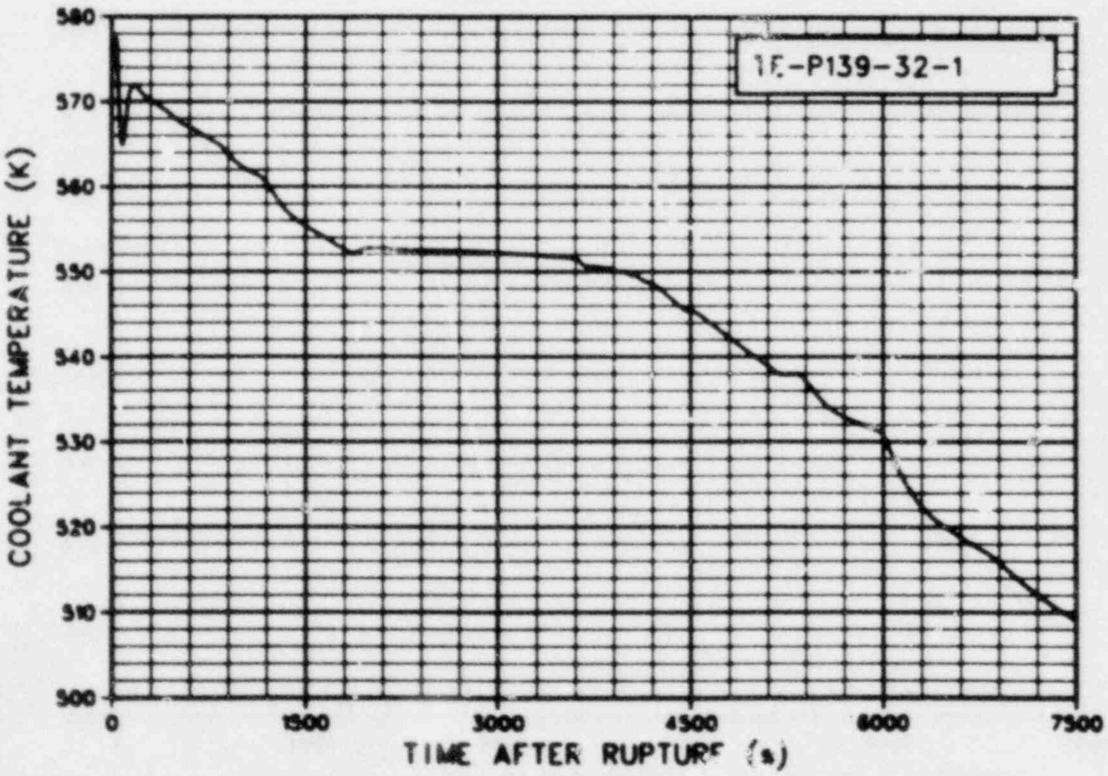


Figure 5M-60. Coolant temperature in intact loop hot leg (TE-P139-32-1) (qualified, process instrument, response limited).

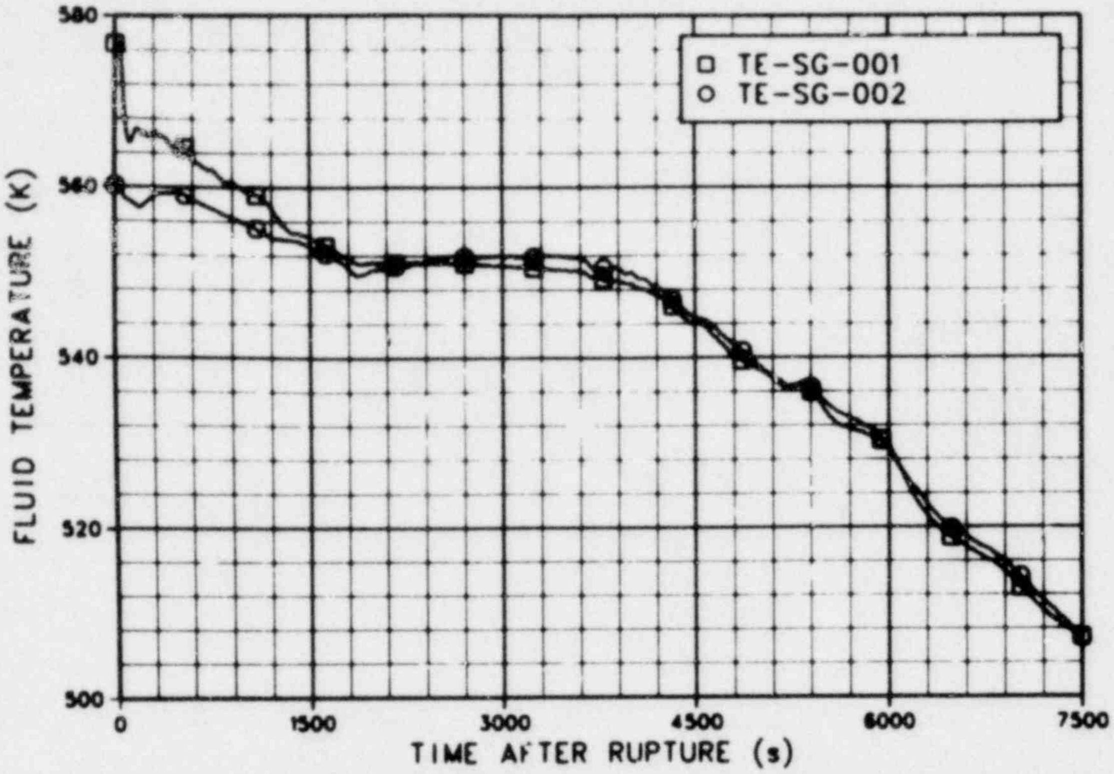


Figure 5M-61. Fluid temperature in intact loop steam generator inlet and outlet plenums (TE-SG-001 and -002) (qualified).

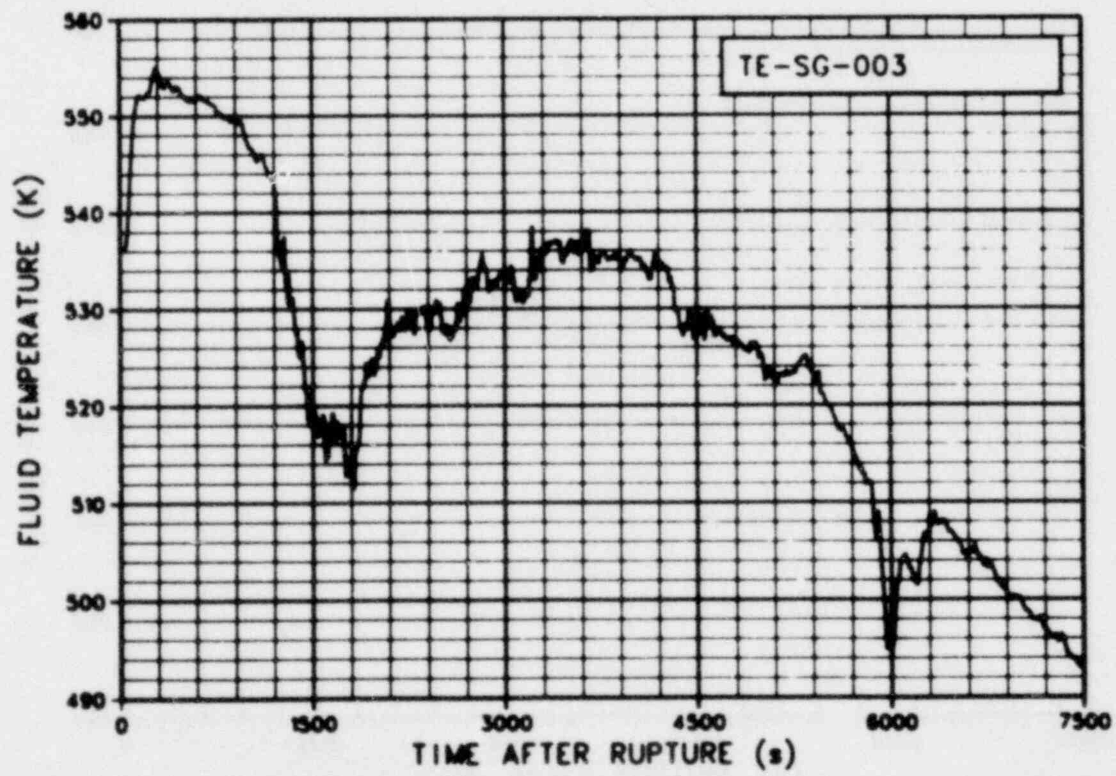


Figure 5M-62. Fluid temperature in steam generator secondary side downcomer (TE-SG-003) (qualified).

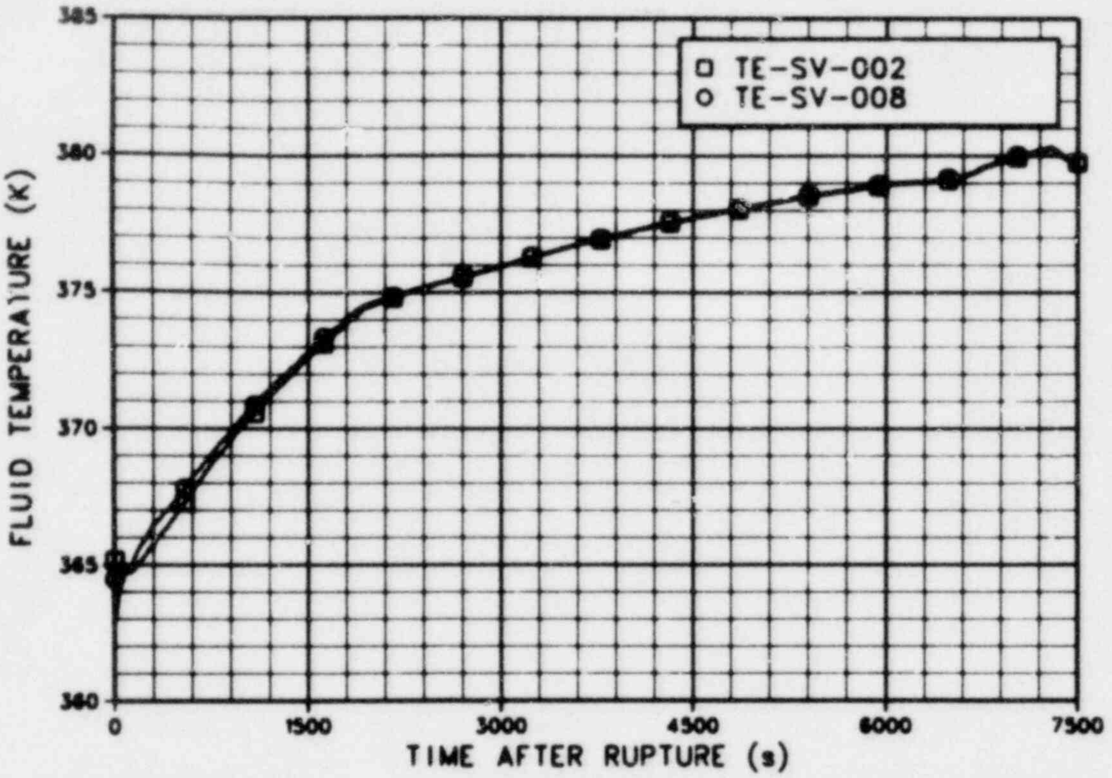


Figure 5M-63. Fluid temperature in blowdown suppression tank 2.36 m above tank bottom (TE-SV-002 and -008) (qualified).

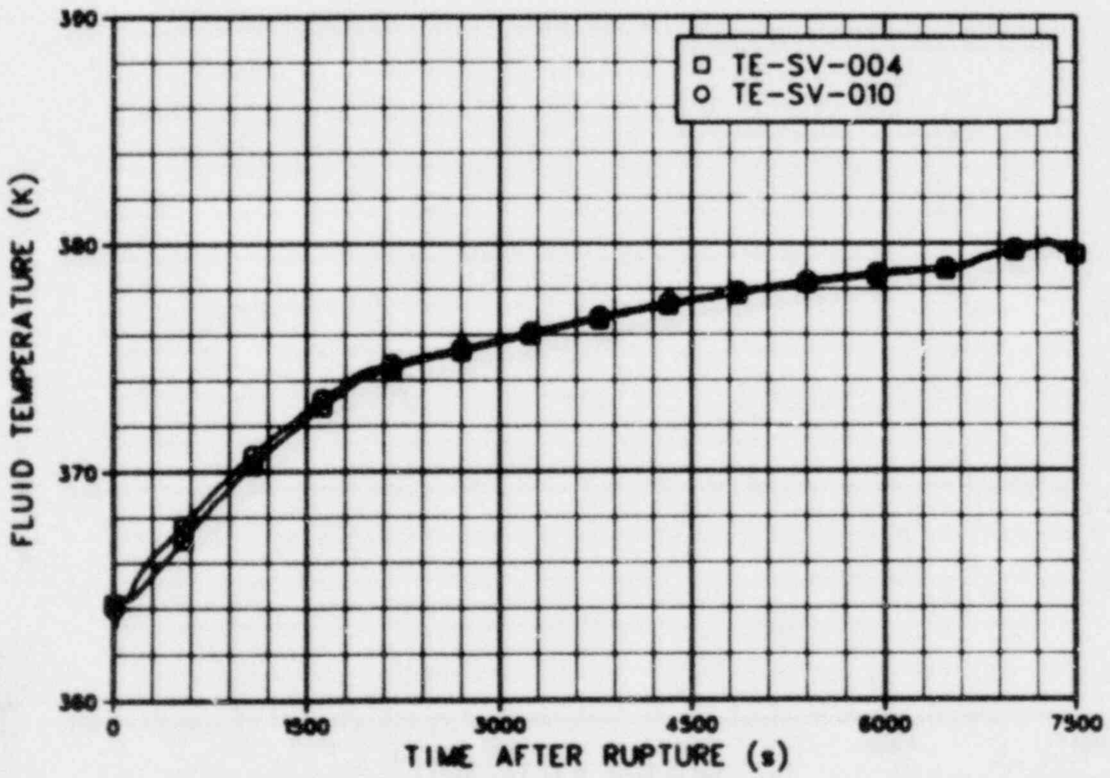


Figure 5M-64. Fluid temperature in blowdown suppression tank 1.45 m above tank bottom (TE-SV-004 and -010) (qualified).

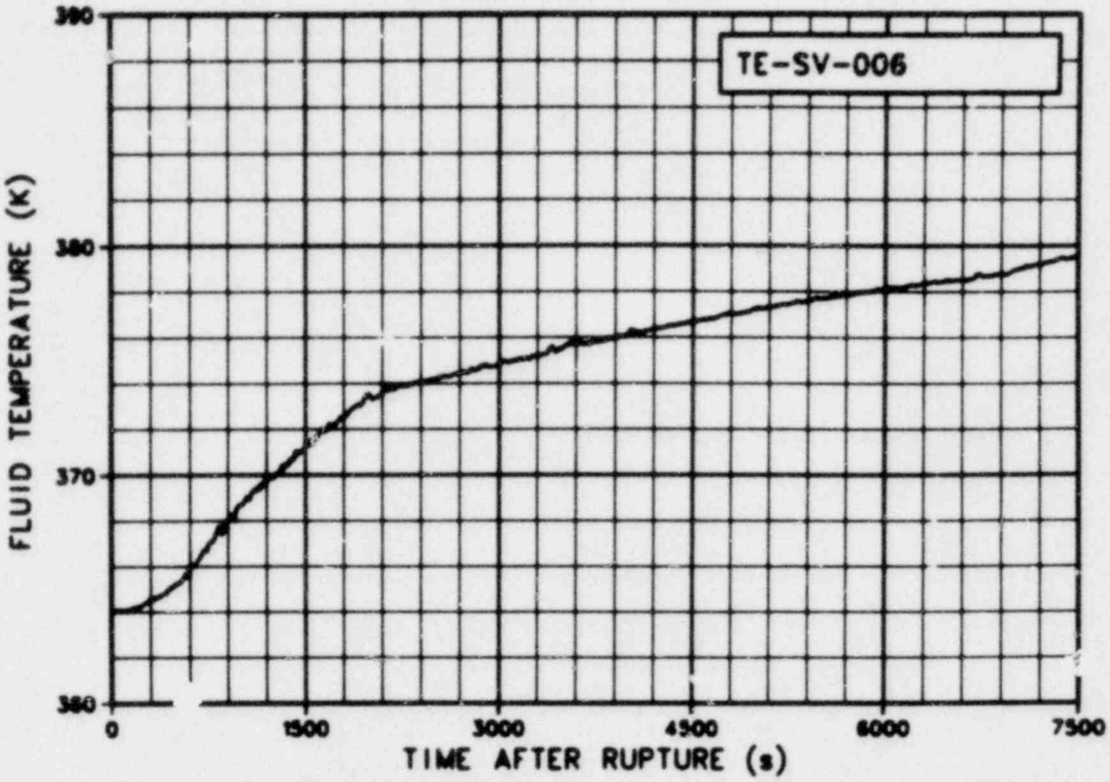


Figure 5M-65. Fluid temperature in blowdown suppression tank 0.37 m above tank bottom (TE-SV-006) (qualified).

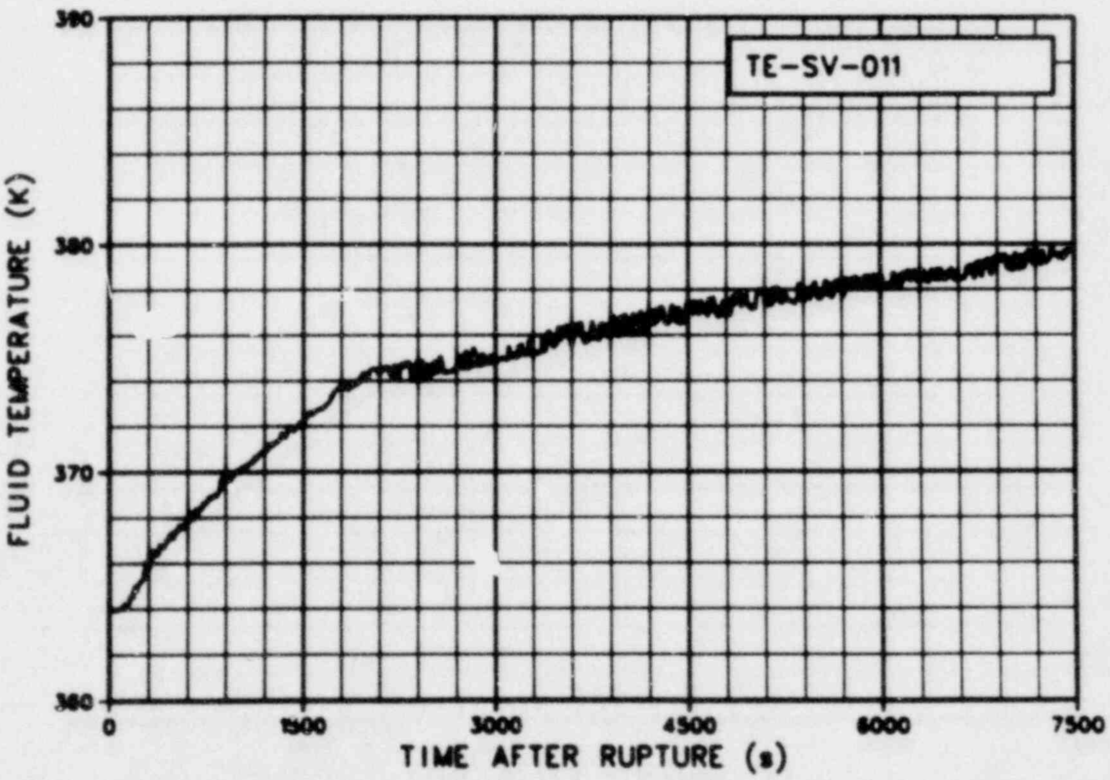


Figure 5M-66. Fluid temperature in blowdown suppression tank 0.99 m above tank bottom (TE-SV-011) (qualified).

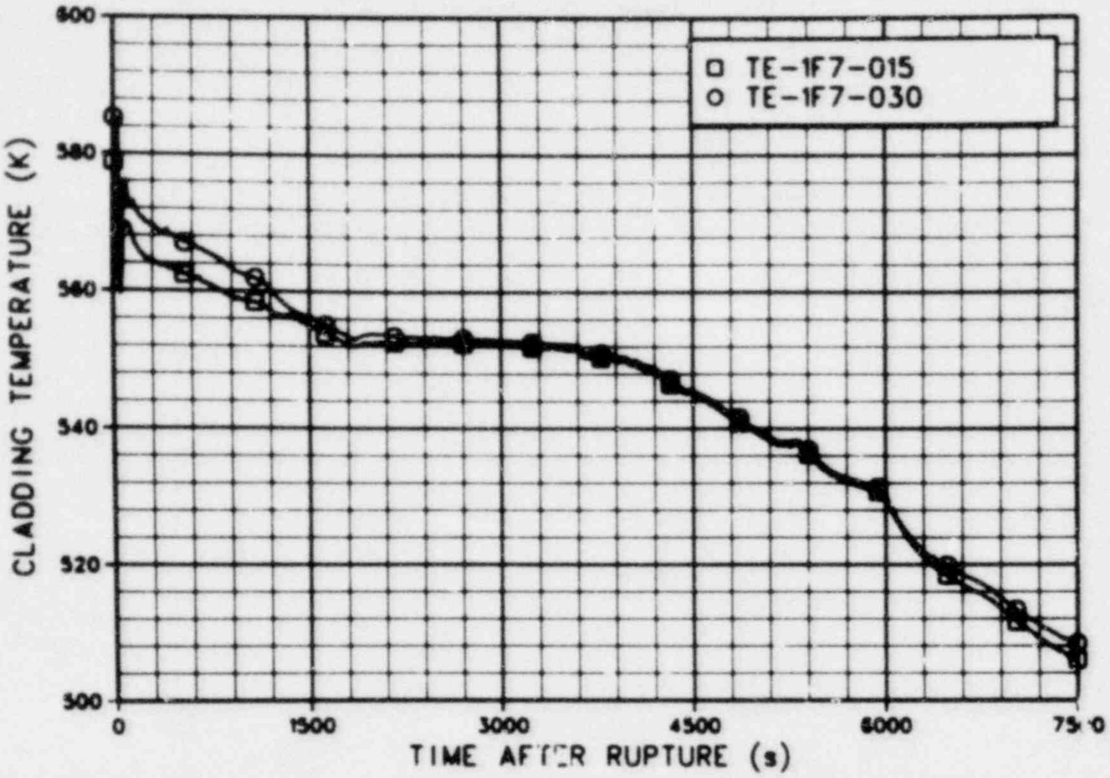


Figure 5M-67. Cladding temperature in reactor vessel at Fuel Assembly 1, Row F, Column 7 at 0.38 and 0.7? m above bottom of fuel rod (TE-1F7-015 and -030) (qualified).

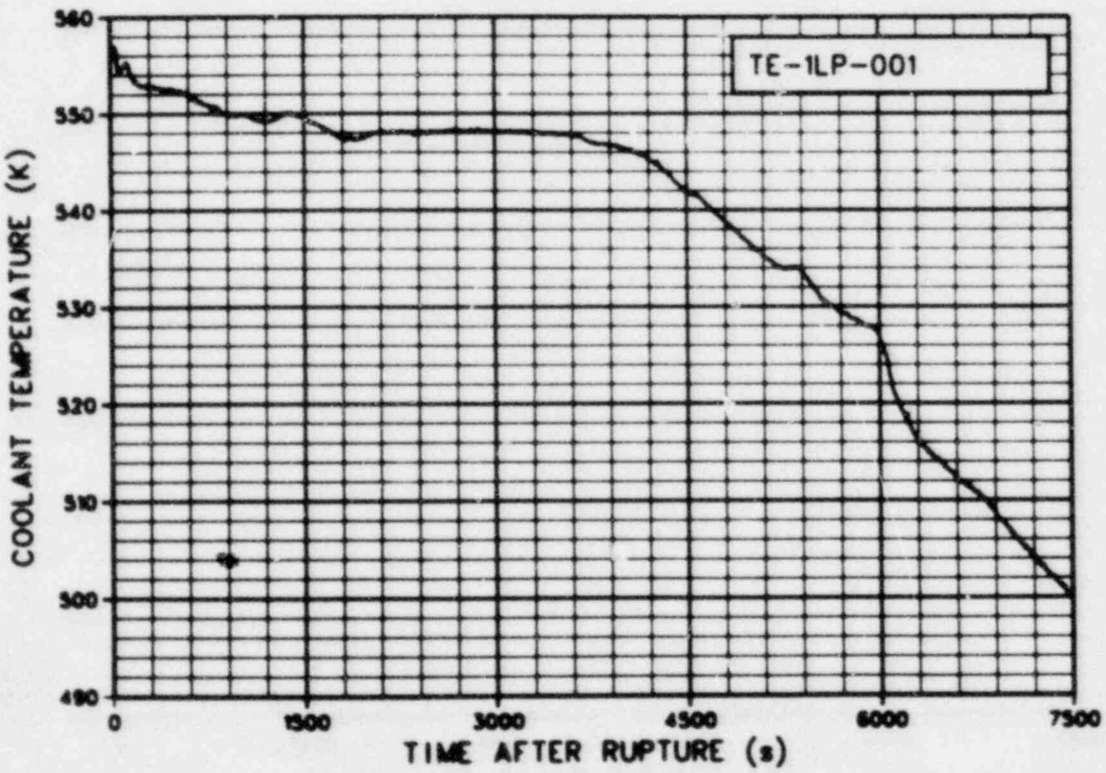


Figure 5M-68. Coolant temperature in reactor vessel at lower end box of Fuel Assembly 1 (TE-1LP-001) (qualified).

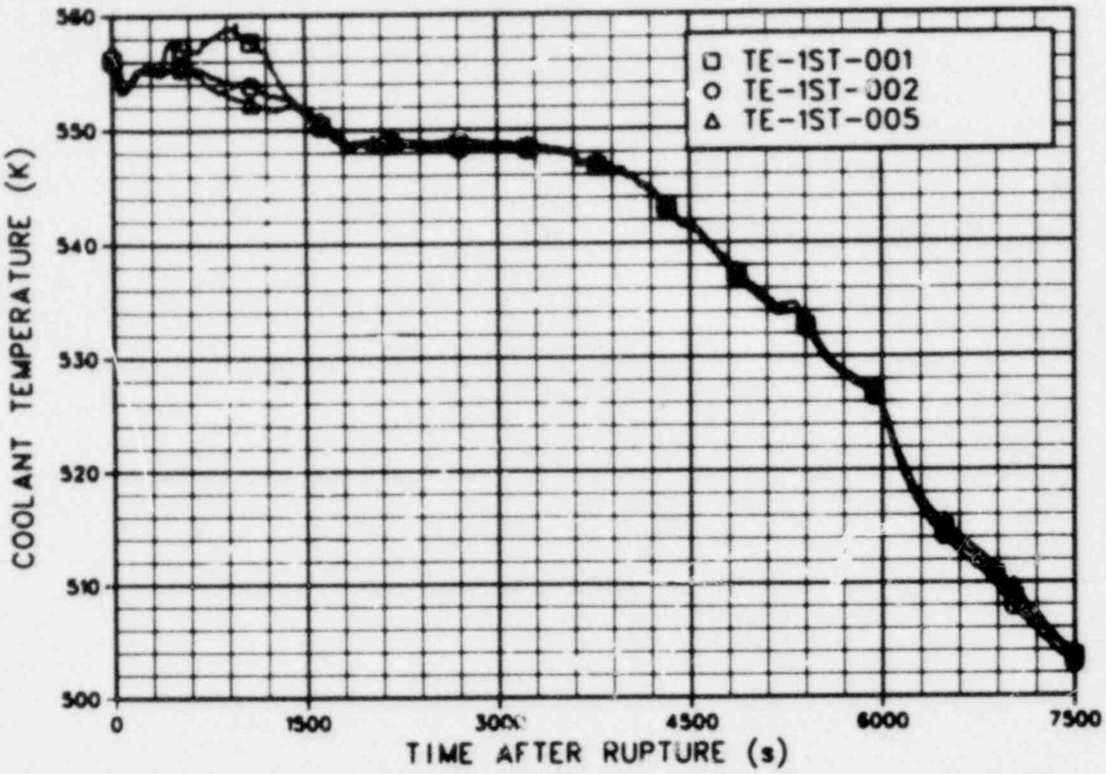


Figure 5M-69. Coolant temperature in reactor vessel Downcomer Stalk 1 at 4.8, 4.2, and 2.37 m from reactor vessel bottom (TE-1ST-001, -002, and -005) (qualified).

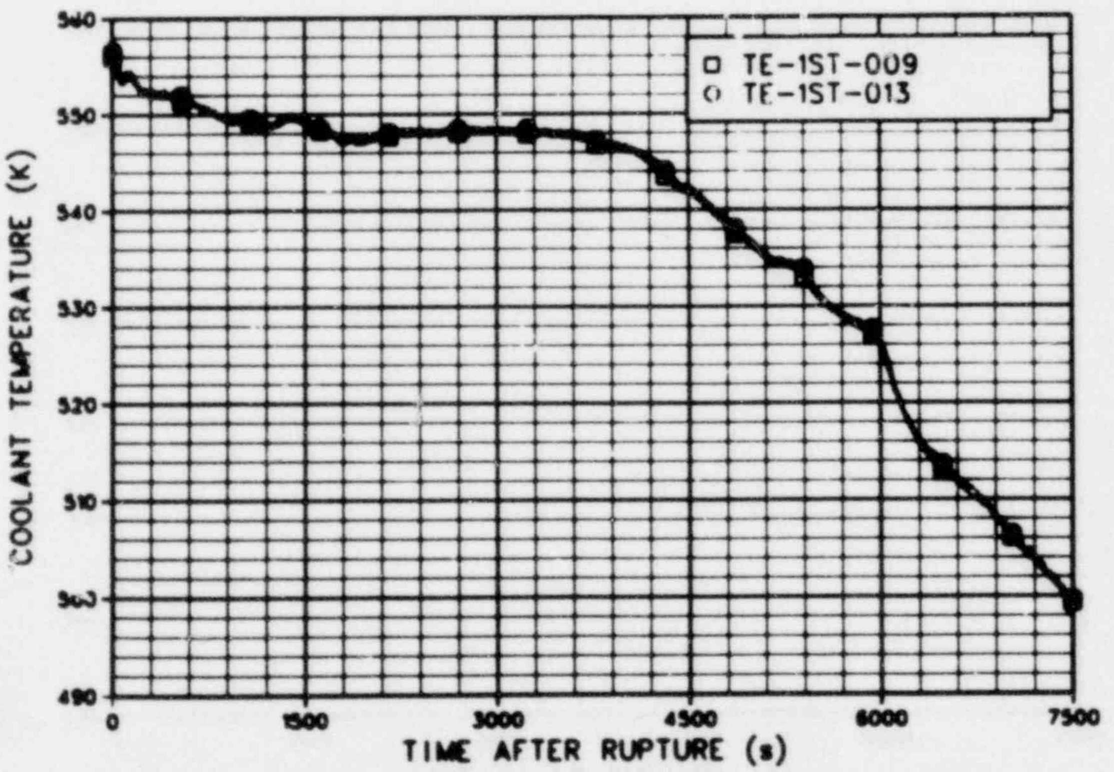


Figure 5M-70. Coolant temperature in reactor vessel Downcomer Stalk 1 at 0.64 and 0.24 m from reactor vessel bottom (TE-1ST-009 and -013) (qualified).

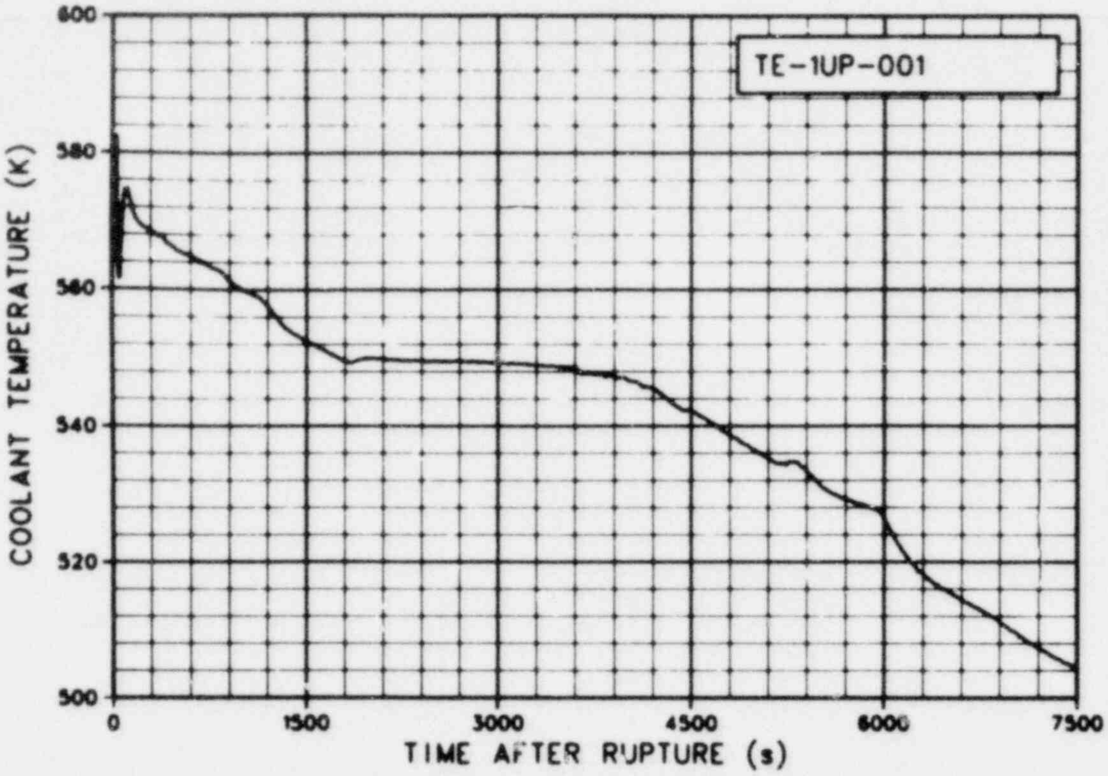


Figure 5M-71. Coolant temperature in reactor vessel at upper end box of Fuel Assembly 1 (TE-1UP-001) (qualified).

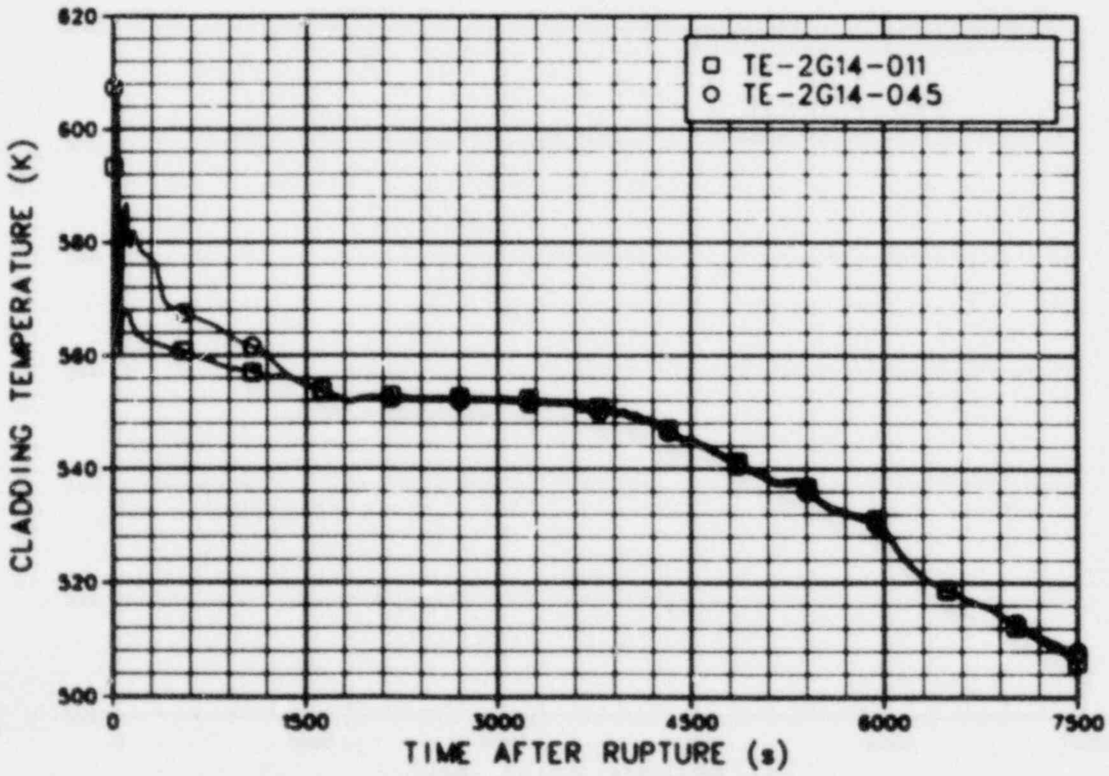


Figure 5M-72. Cladding temperature in reactor vessel at Fuel Assembly 2, Row G, Column 14 at 0.28 and 1.14 m above bottom of fuel rod (TE-2G14-011 and -045) (qualified).

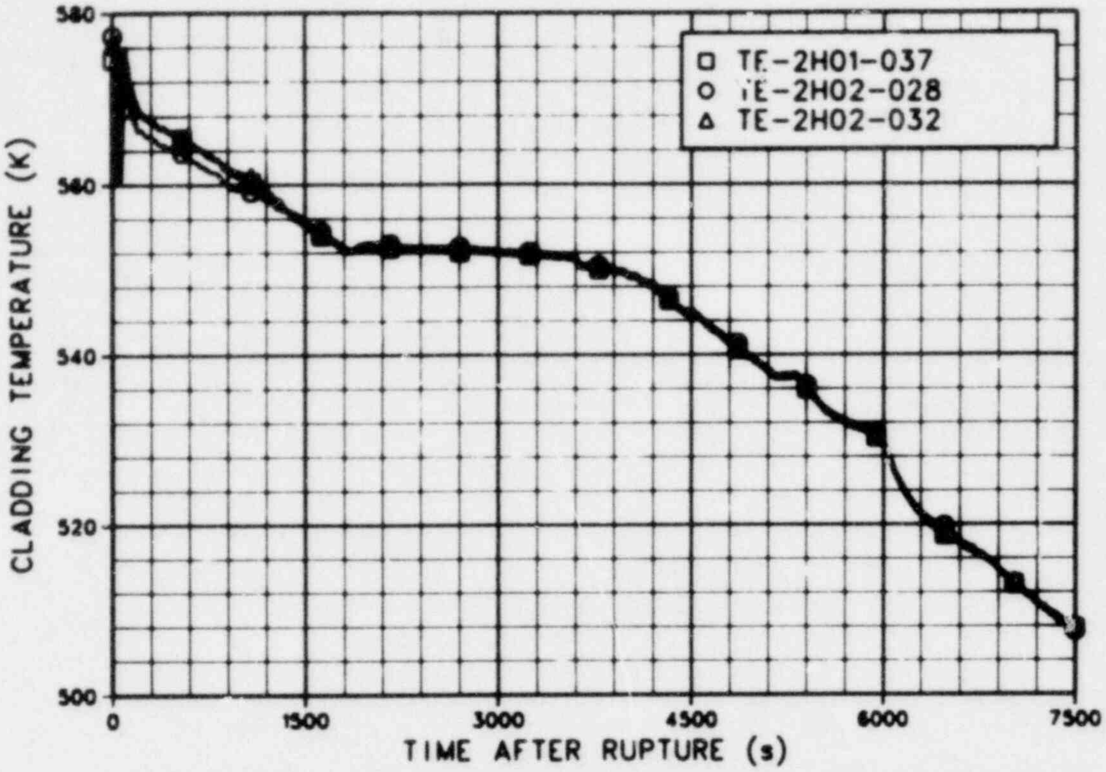


Figure 5M-73. Cladding temperature in reactor vessel at Fuel Assembly 2, Row H, Column 1 at 0.94 m and Column 2 at 0.71 and 0.81 m above bottom of fuel rod (TE-2H01-037, -2H02-028, and -032) (qualified).

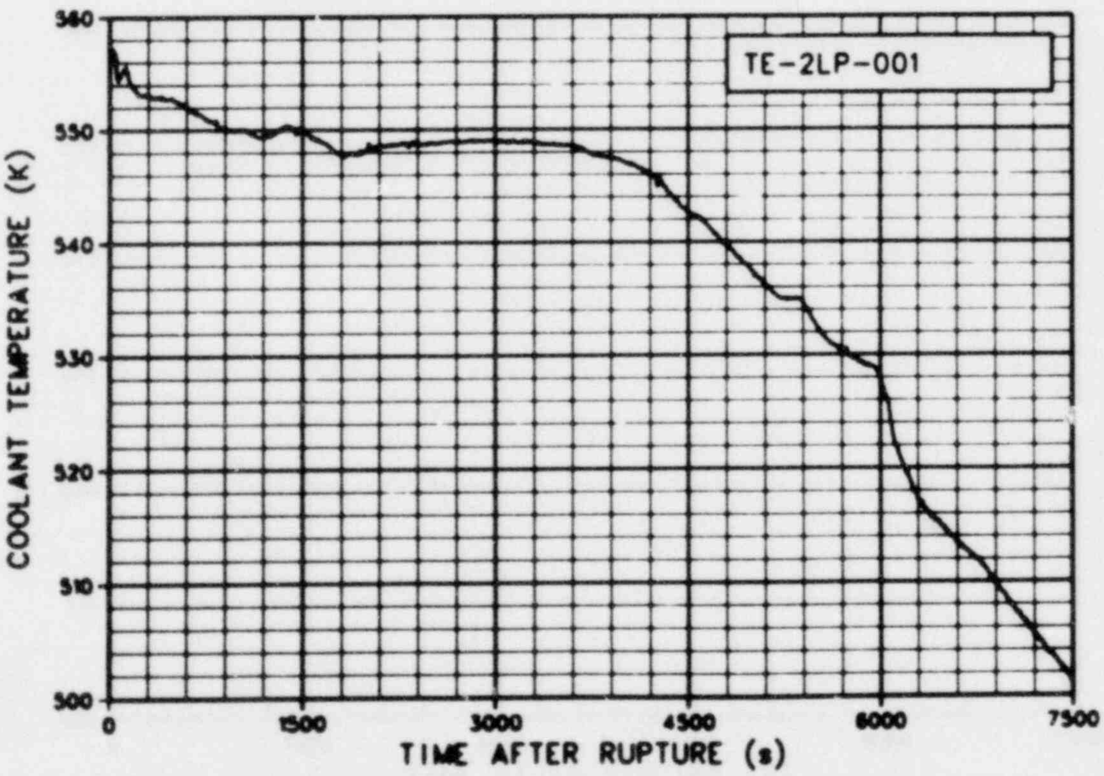


Figure 5M-74. Coolant temperature in reactor vessel at lower end box of Fuel Assembly 2 (TE-2LP-001) (qualified).

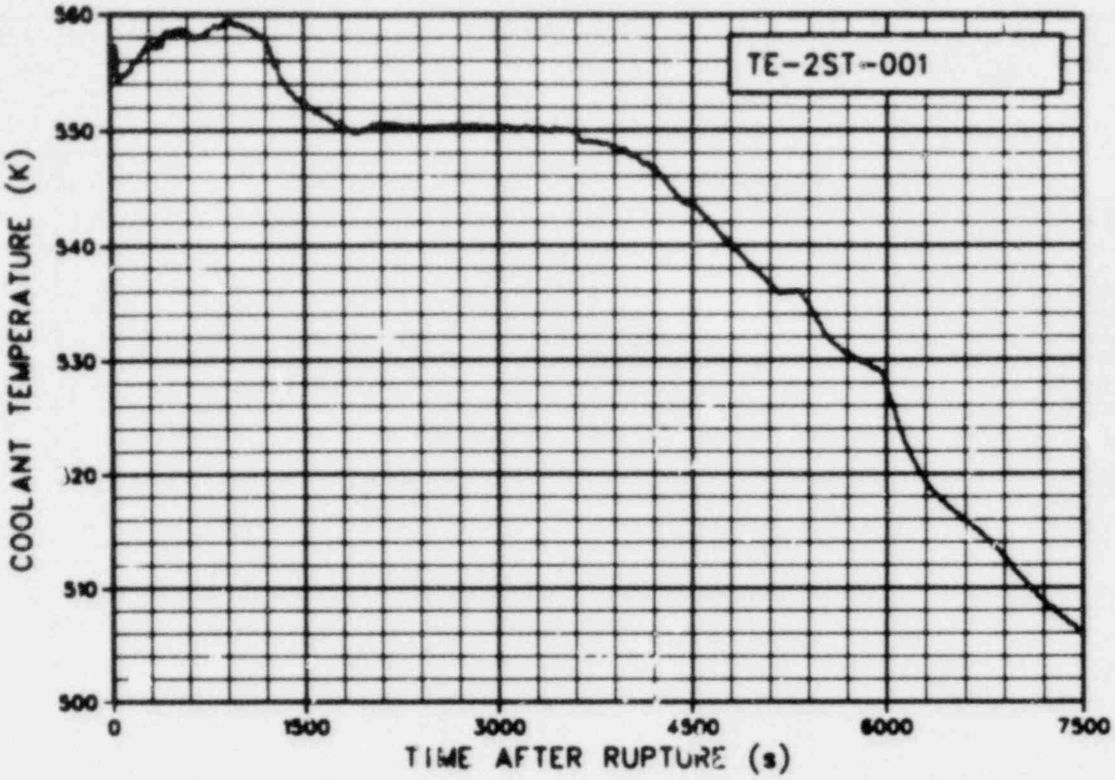


Figure 5M-75. Coolant temperature in reactor vessel Downcomer Stalk 2 at 4.8 m from reactor vessel bottom (TE-2ST-001) (qualified).

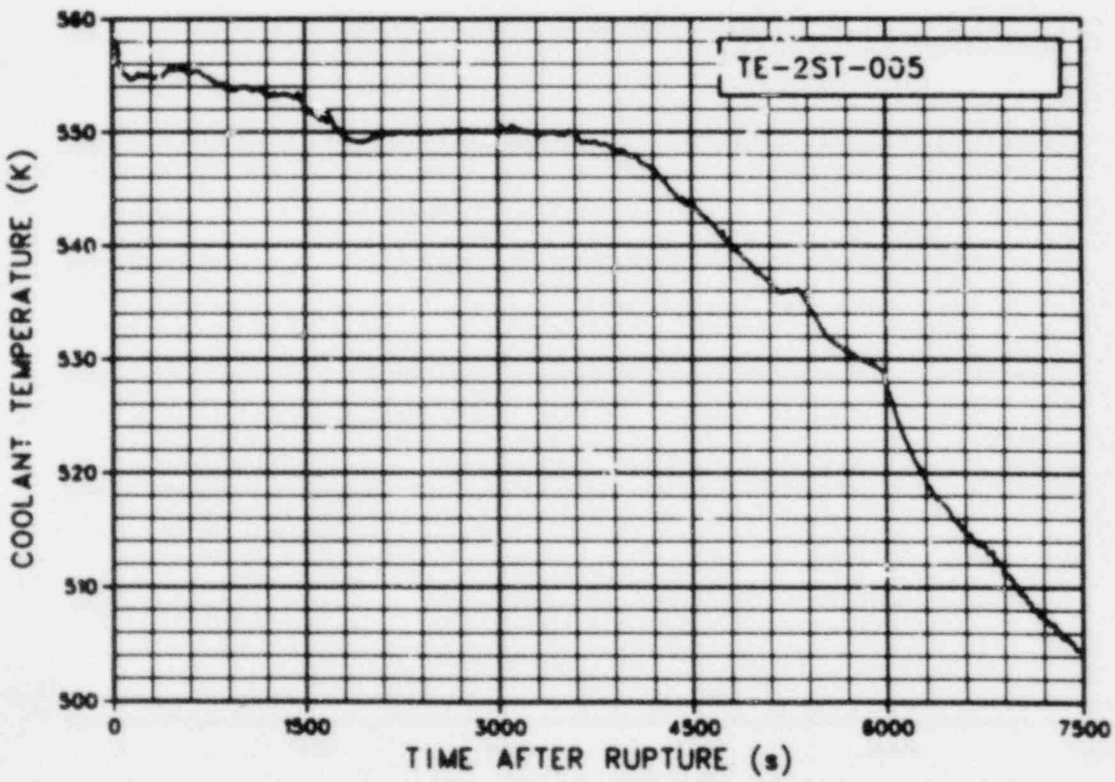


Figure 5M-76. Coolant temperature in reactor vessel Downcomer Stalk 2 at 2.37 m from reactor vessel bottom (TE-2ST-005) (qualified).

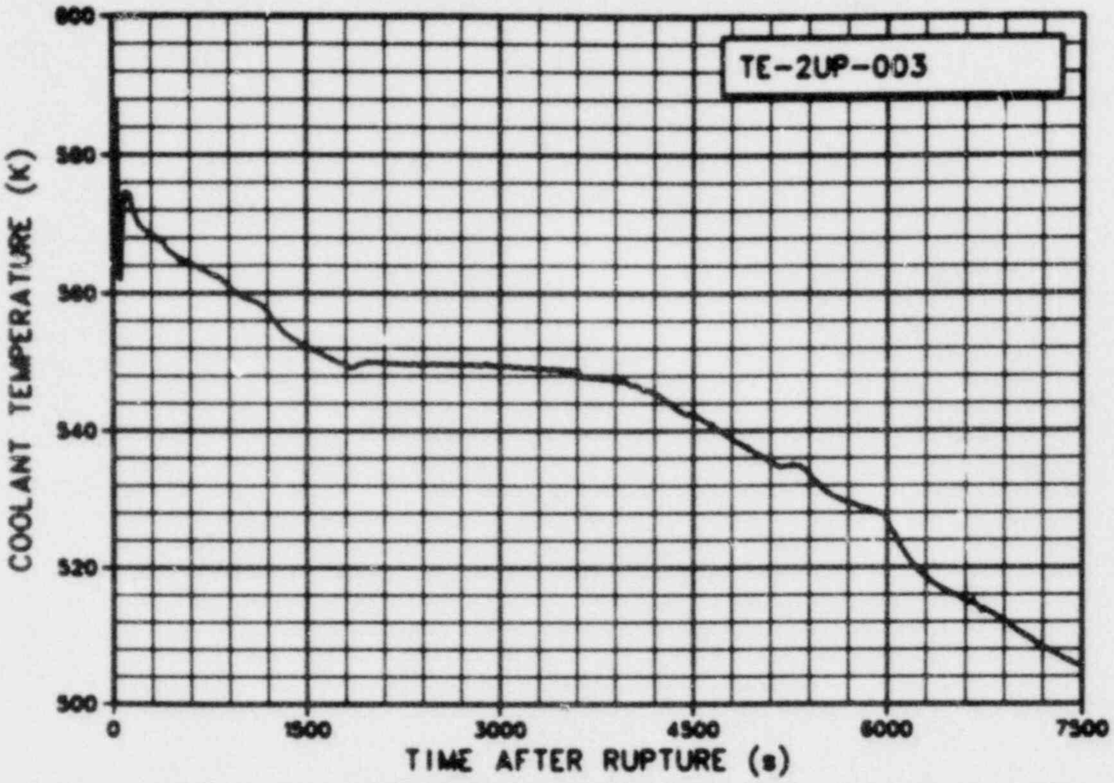


Figure 5M-77. Coolant temperature in reactor vessel at upper end box of Fuel Assembly 2 (TE-2UP-003) (qualified).

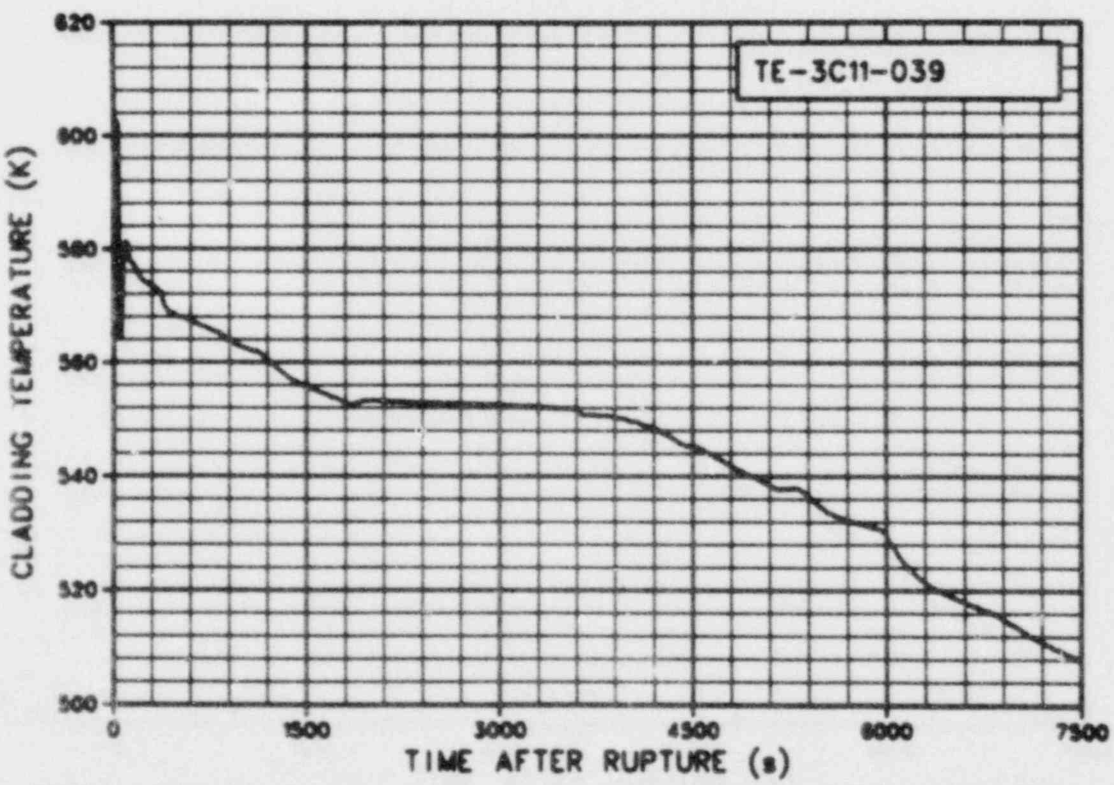


Figure 5M-78. Cladding temperature in reactor vessel at Fuel Assembly 3, Row C, Column 11 at 0.99 m above bottom of fuel rod (TE-3C11-039) (qualified).

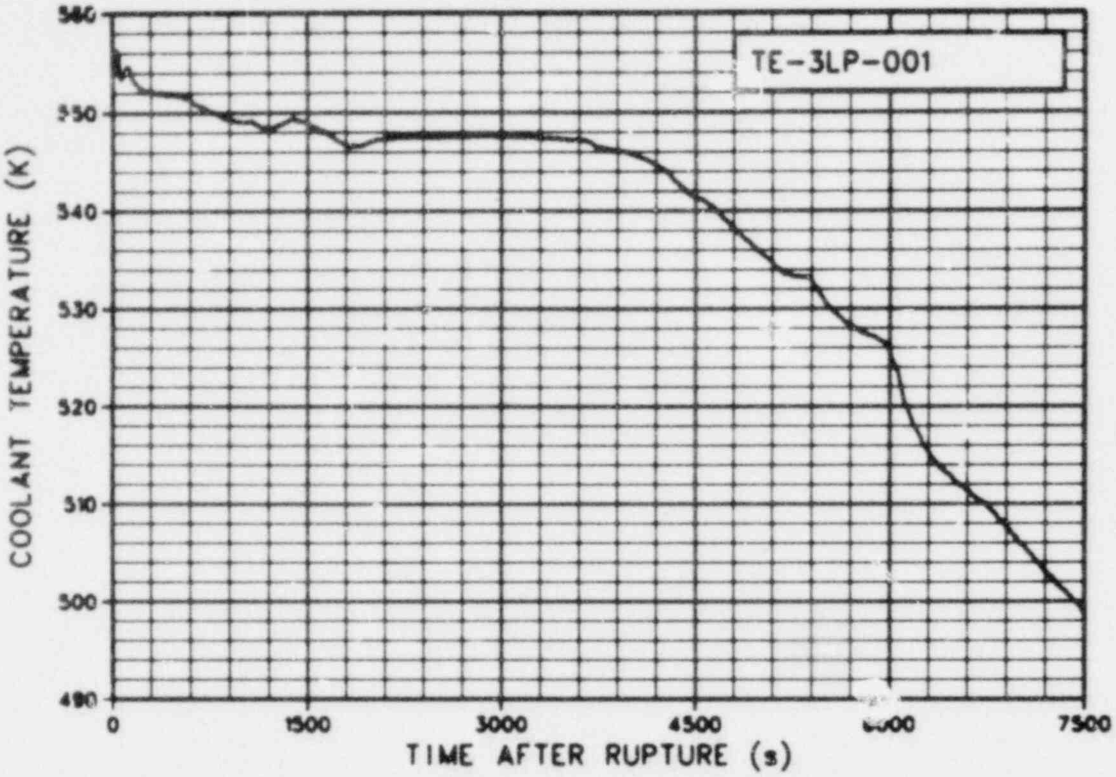


Figure 5M-79. Coolant temperature in reactor vessel at lower end box of Fuel Assembly 3 (TE-3LP-001) (qualified).

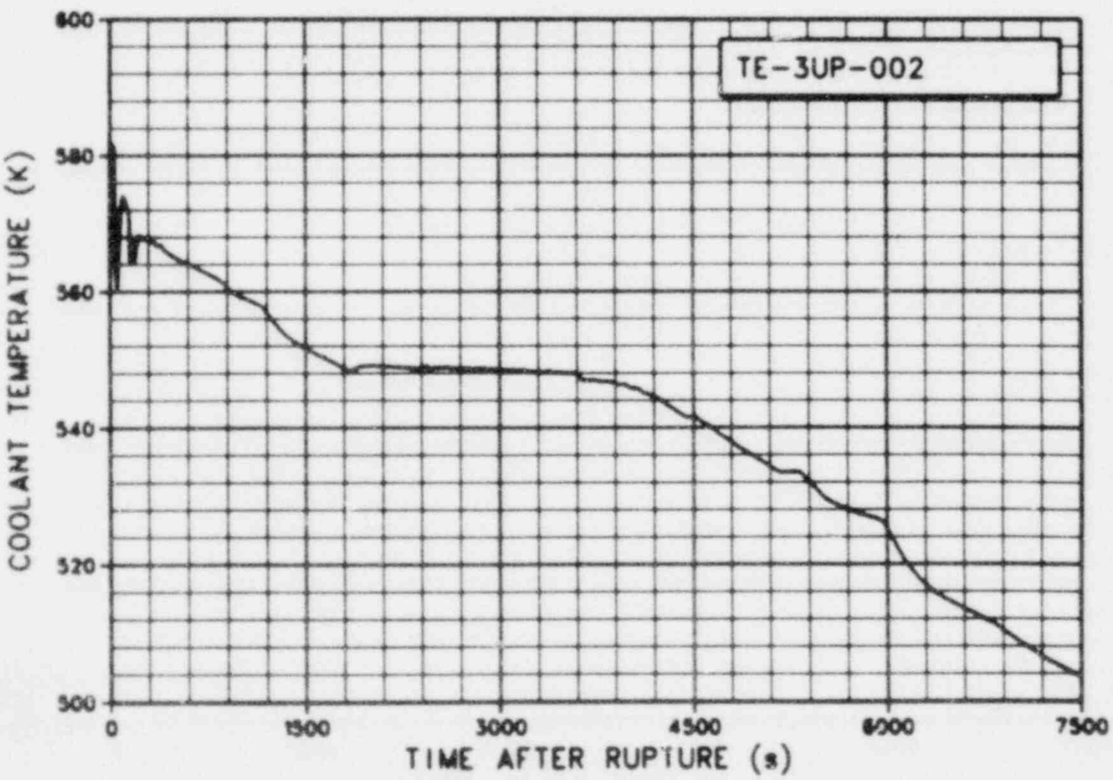


Figure 5M-80. Coolant temperature in reactor vessel at upper end box of Fuel Assembly 3 (TE-3UP-002) (qualified).

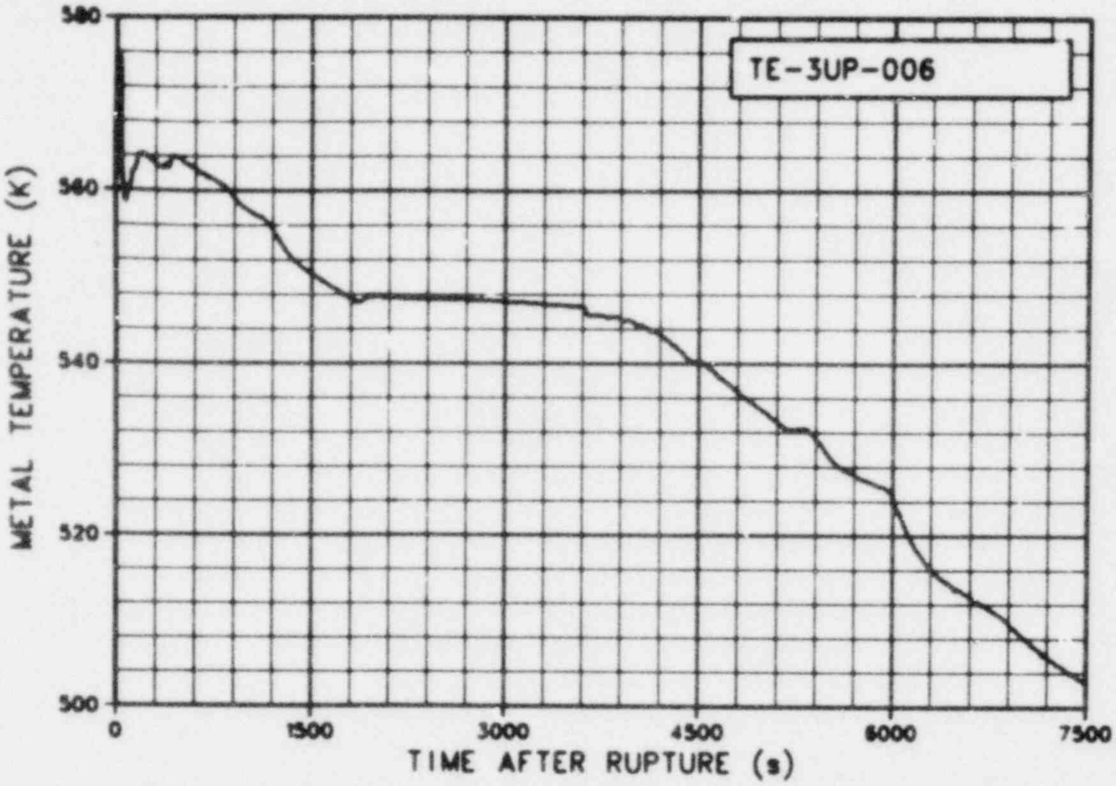


Figure 5M-81. Metal temperature on upper core support column of Fuel Assembly 3 (TE-3UP-006) (qualified).

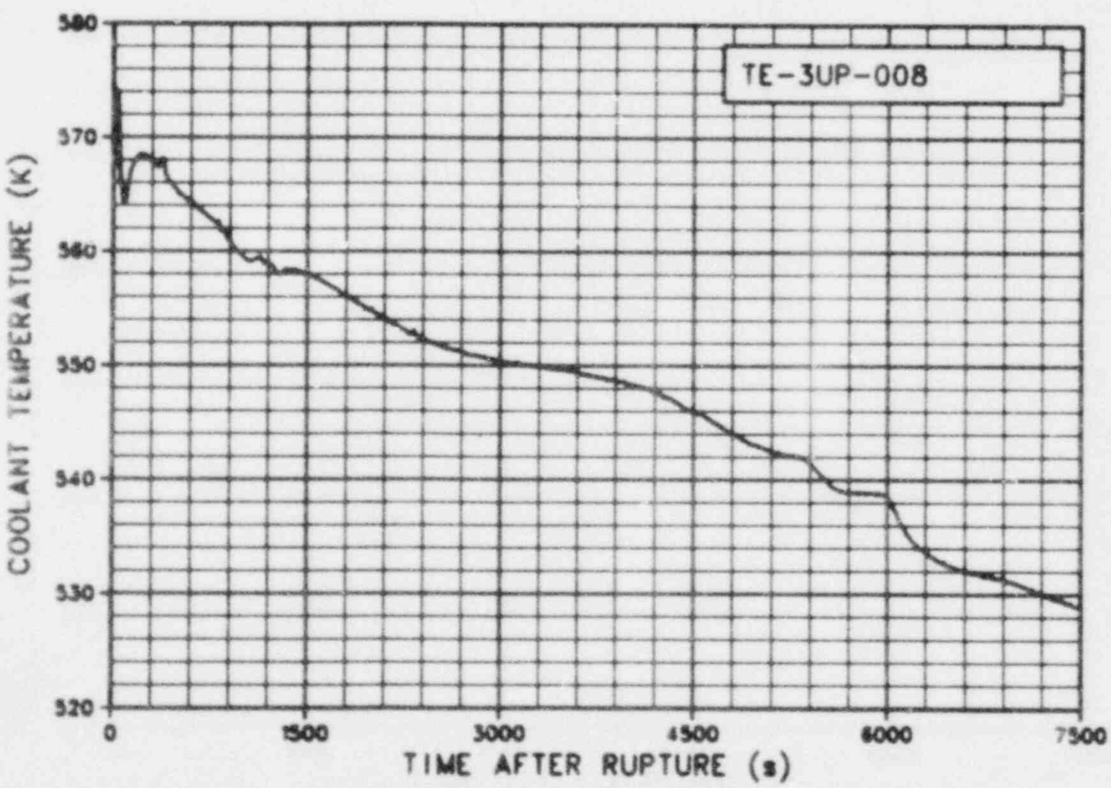


Figure 5M-82. Coolant temperature in reactor vessel at liquid level sting above Fuel Assembly 3 (TE-3UP-008) (qualified).

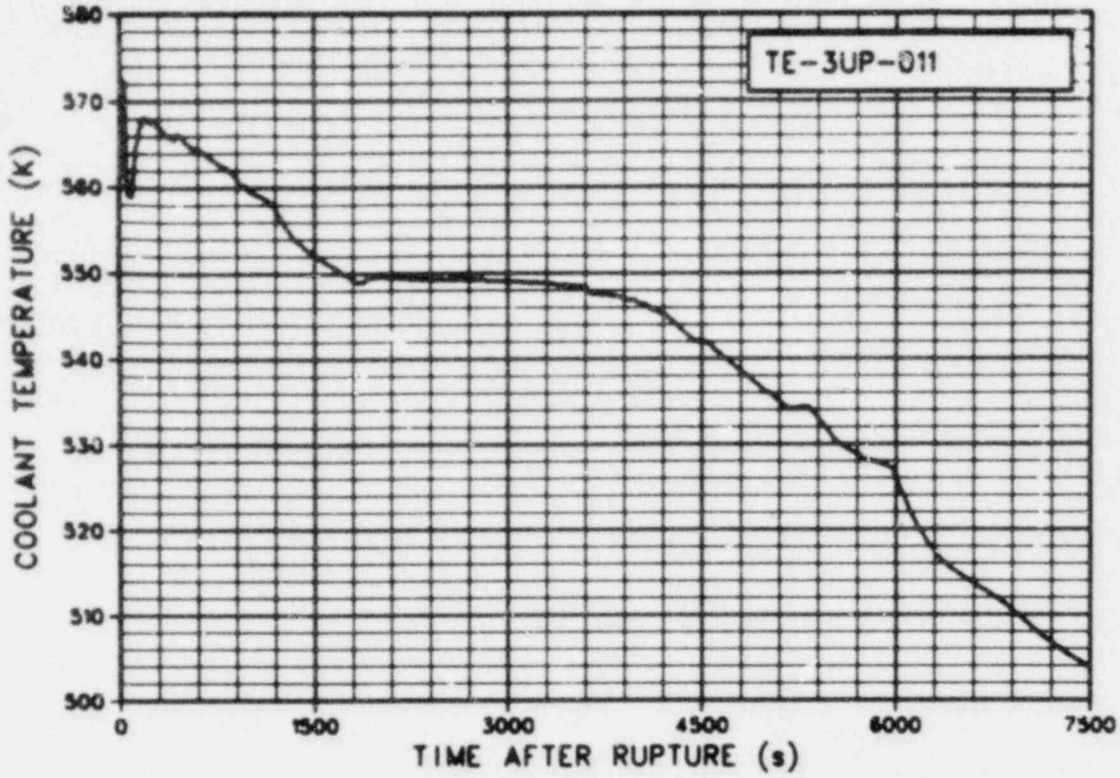


Figure 5M-83. Coolant temperature in reactor vessel at liquid level sting above Fuel Assembly 3 (TE-3UP-011) (qualified).

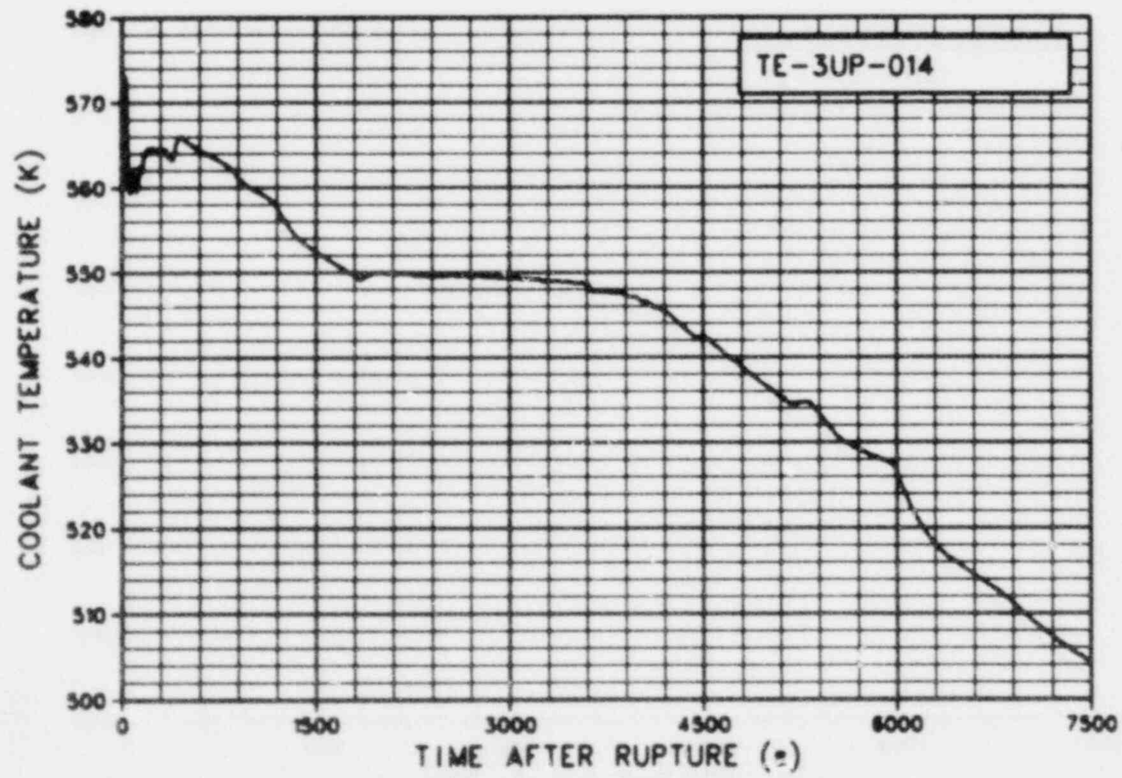


Figure 5M-84. Coolant temperature in reactor vessel at liquid level sting above Fuel Assembly 3 (TE-3UP-014) (qualified).

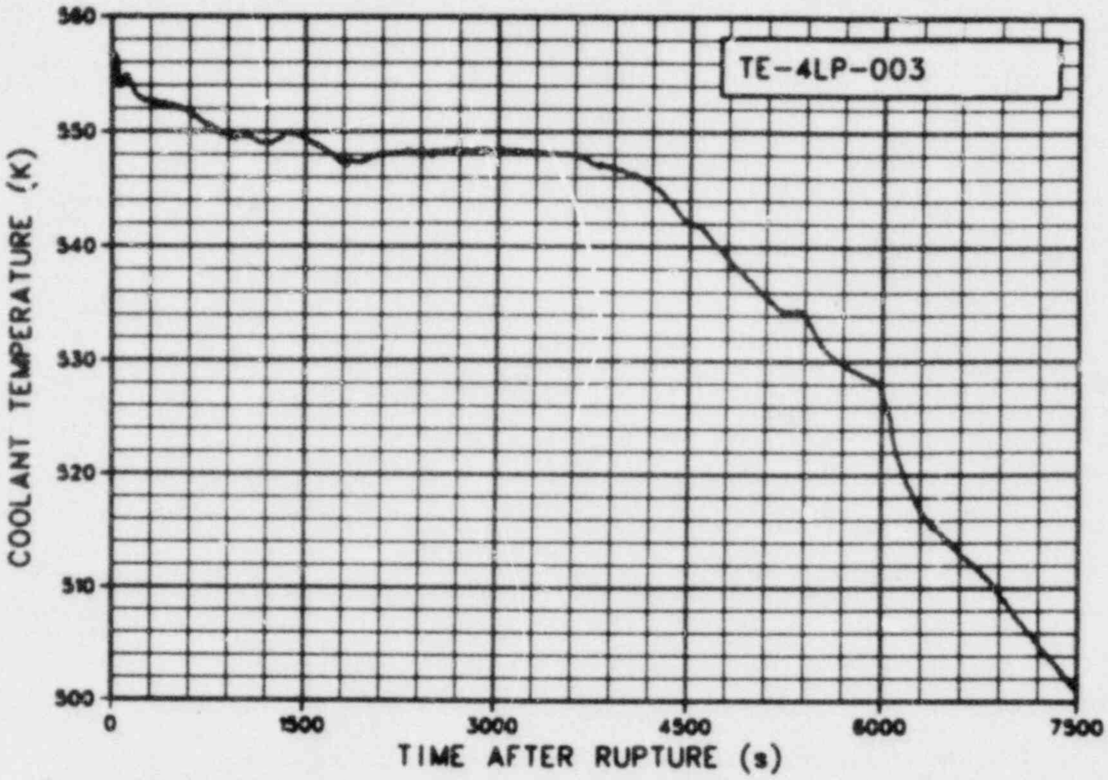


Figure 5M-85. Coolant temperature in reactor vessel at lower end box of Fuel Assembly 4 (TE-4LP-003) (qualified).

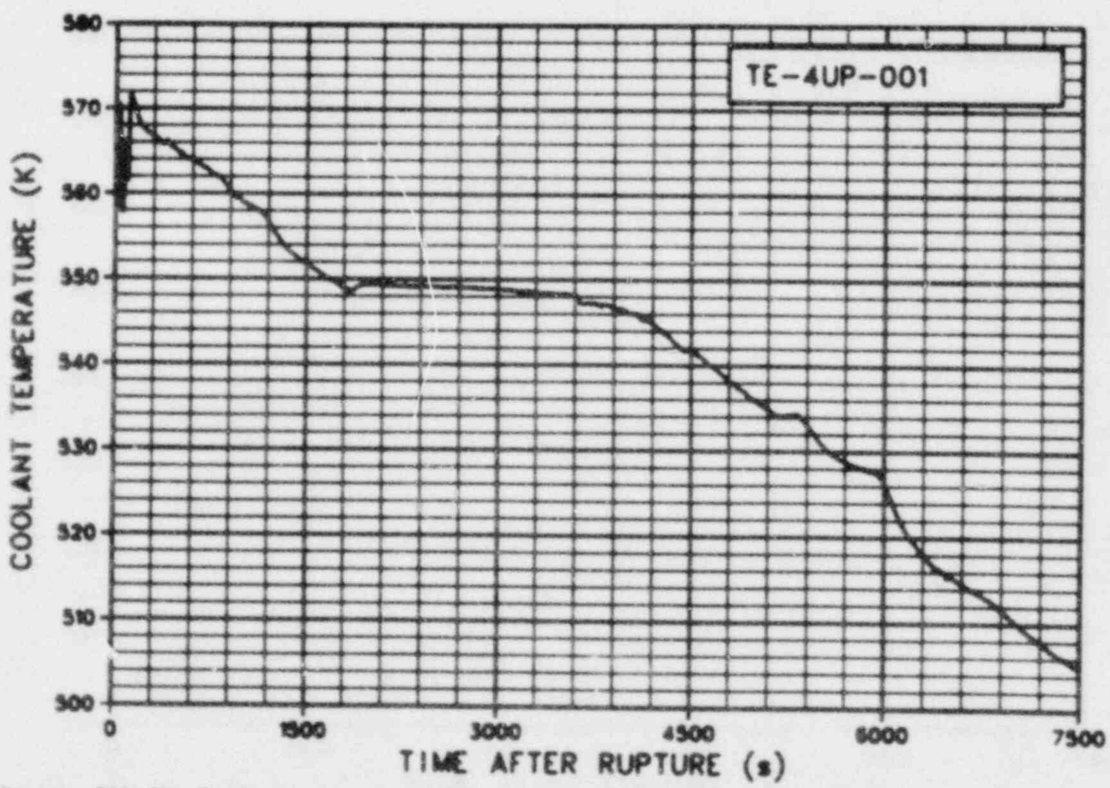


Figure 5M-86. Coolant temperature in reactor vessel at upper end box of Fuel Assembly 4 (TE-4UP-001) (qualified).

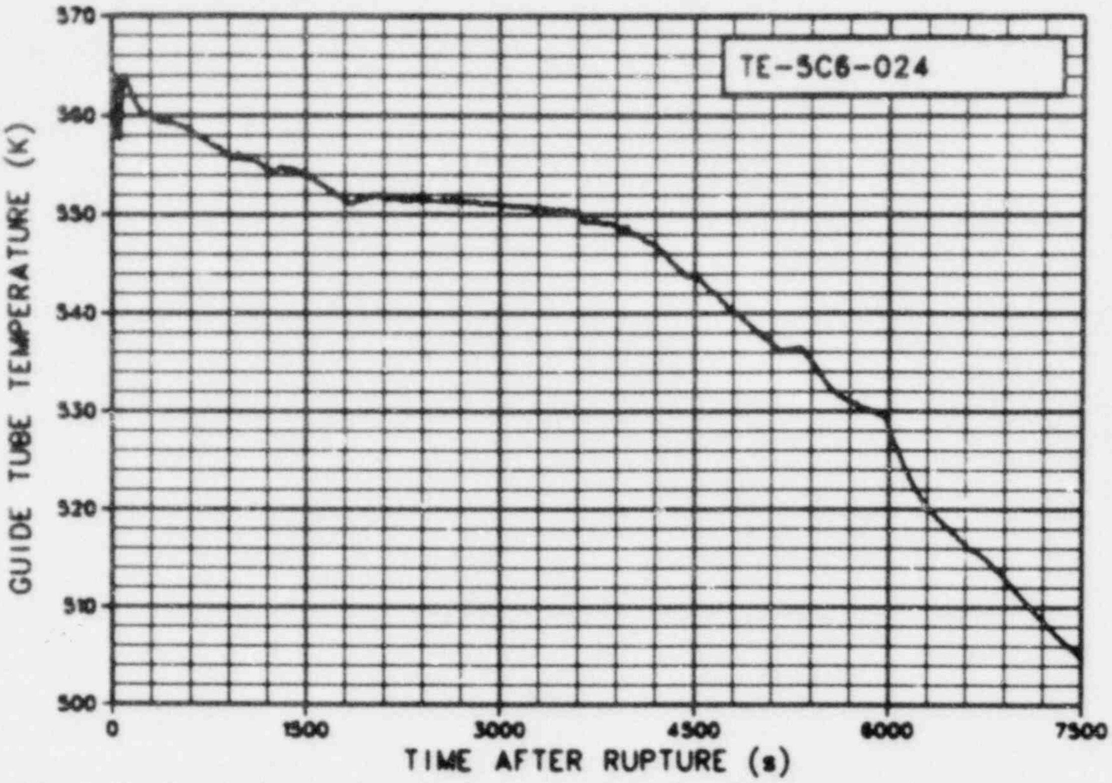


Figure 5M-87. Guide tube temperature in reactor vessel at Fuel Assembly 5, Row C, Column 6 at 0.61 m above bottom of guide tube (TE-5C6-024) (qualified).

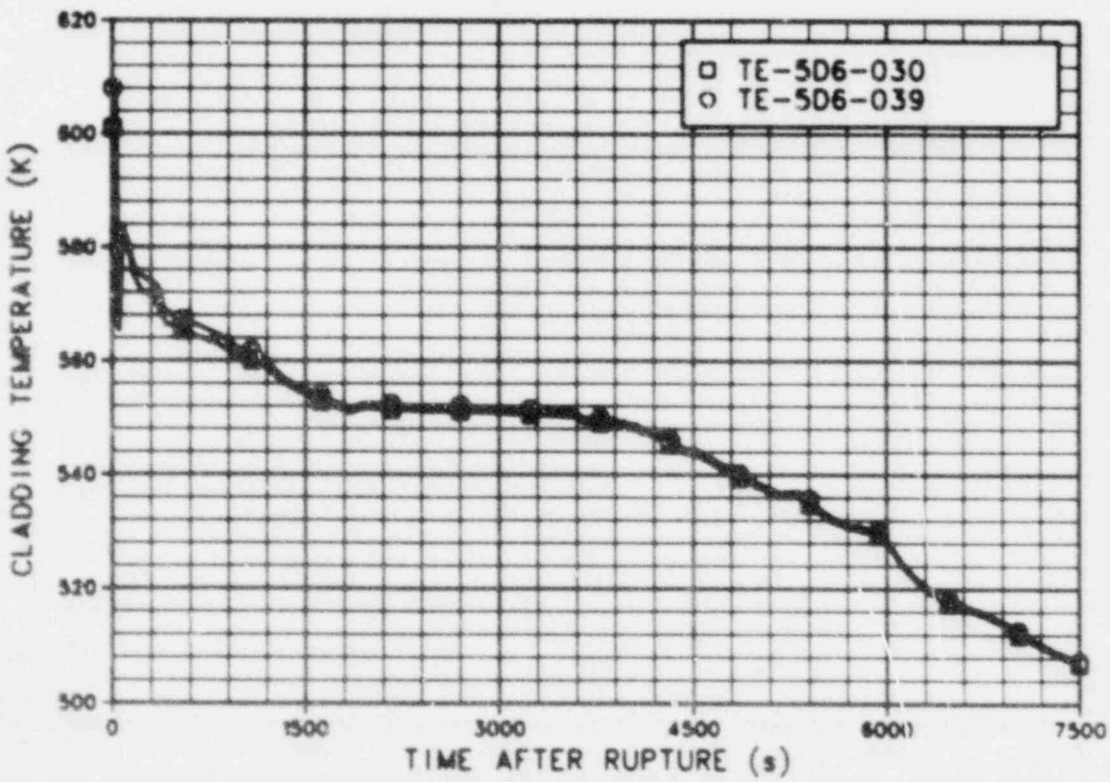


Figure 5M-88. Cladding temperature in reactor vessel at Fuel Assembly 5, Row D, Column 6 at 0.76 and 0.99 m above bottom of fuel rod (TE-5D6-030 and -039) (qualified).

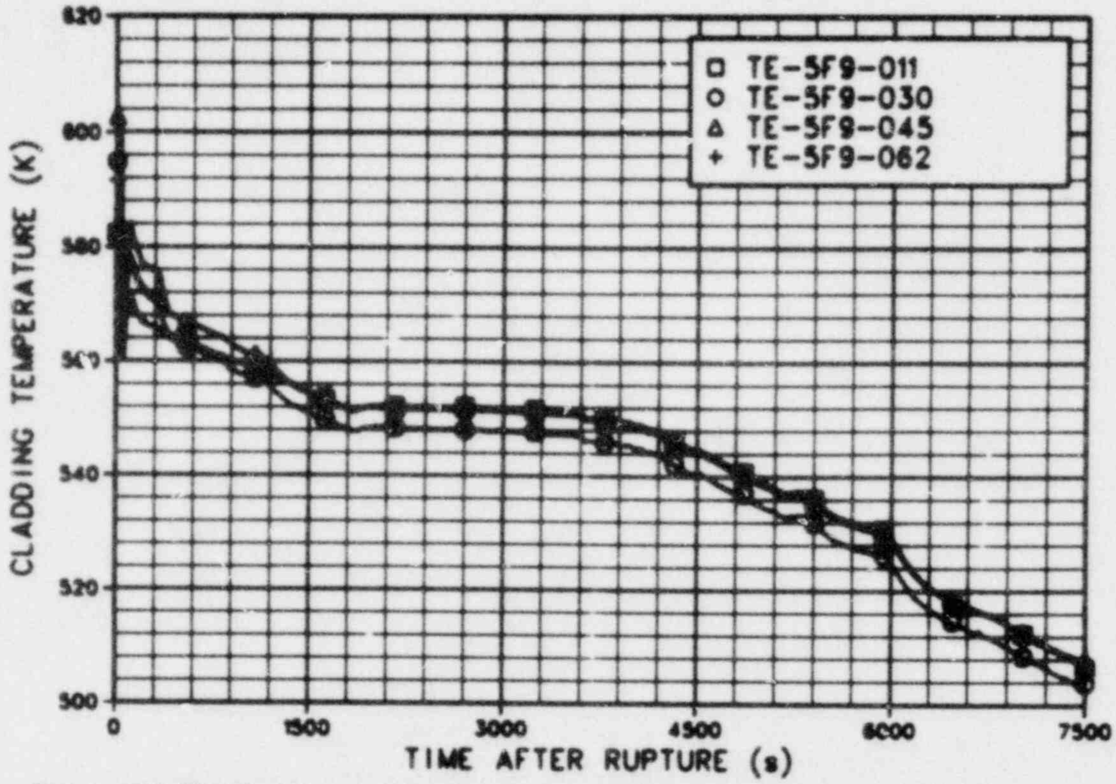


Figure 5M-89. Cladding temperature in reactor vessel at Fuel Assembly 5, Row F, Column 9 at 0.28, 0.76, 1.14, and 1.57 m above bottom of fuel rod (TE-5F9-011, -030, -045, and -062) (qualified).

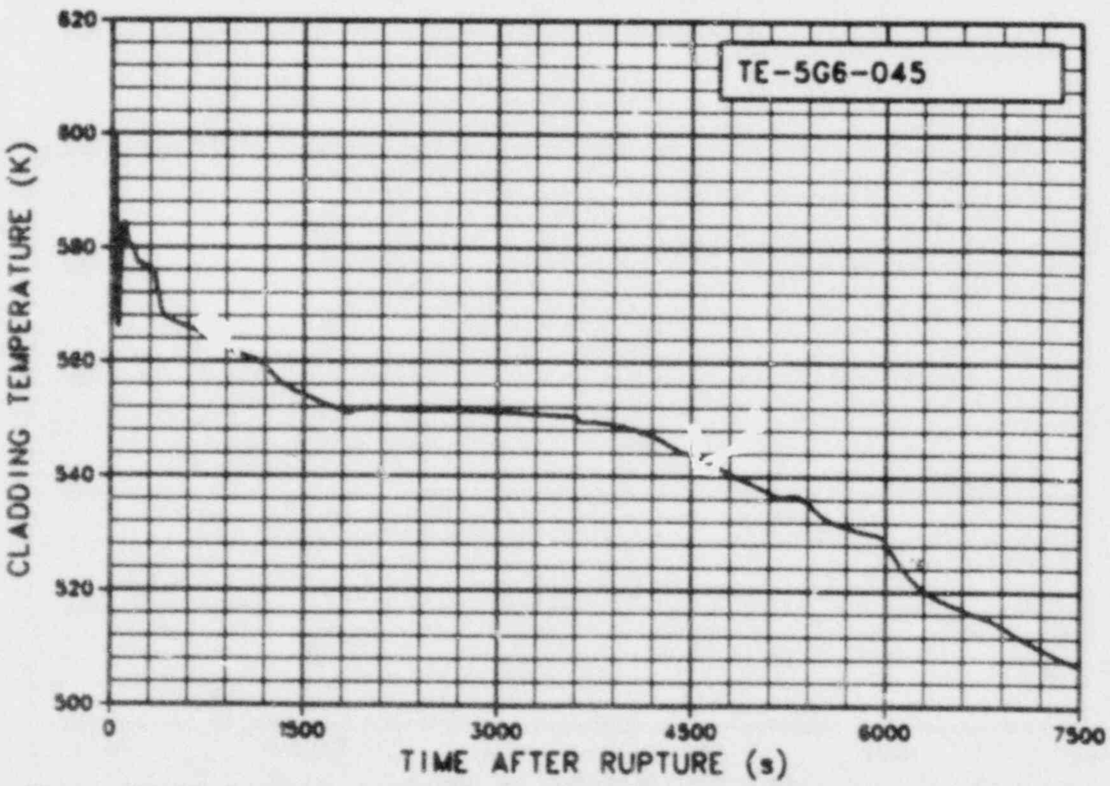


Figure 5M-90. Cladding temperature in reactor vessel at Fuel Assembly 5, Row G, Column 6 at 1.14 m above bottom of fuel rod (TE-5G6-045) (qualified).

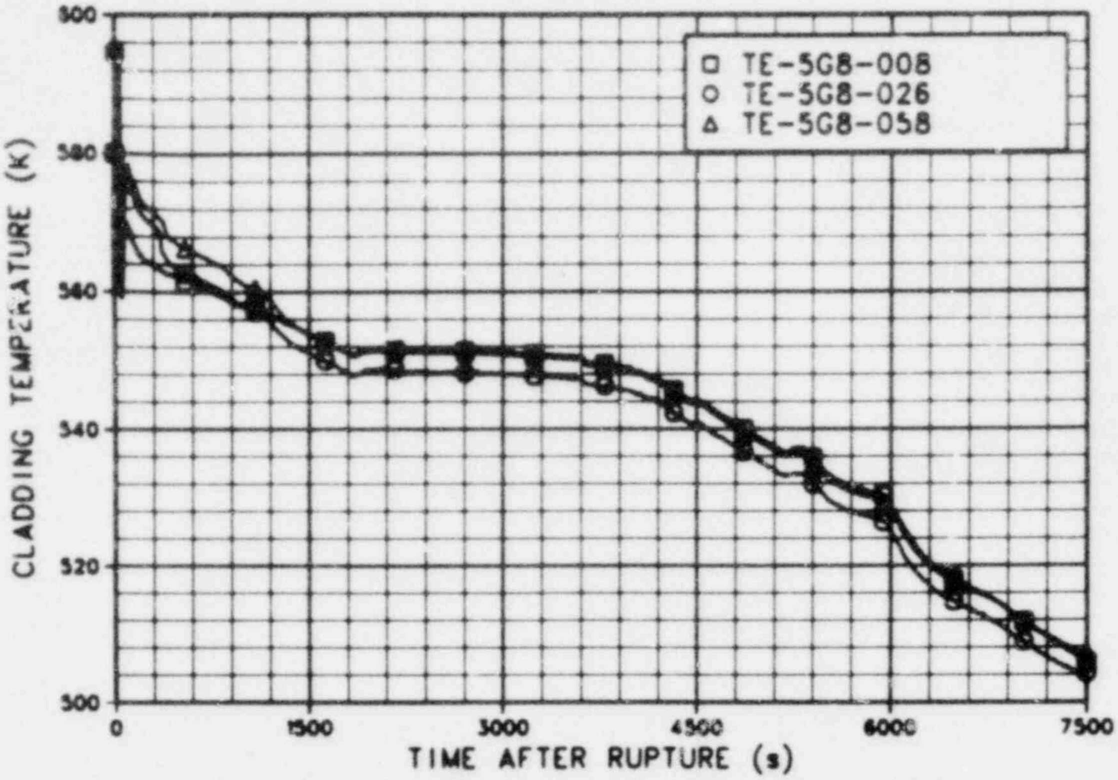


Figure 5M-91. Cladding temperature in reactor vessel at Fuel Assembly 5, Row G, Column 8 at 0.20, 0.66, and 1.47 m above bottom of fuel rod (TE-5G8-008, -026, and -058) (qualified).

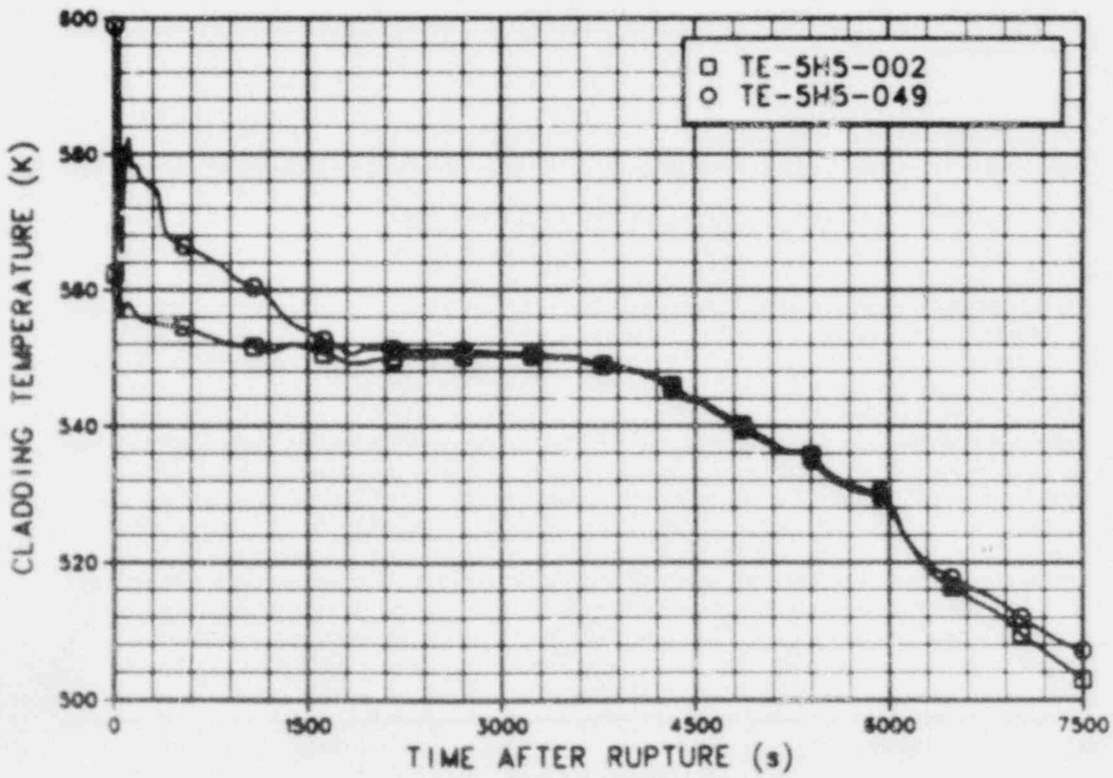


Figure 5M-92. Cladding temperature in reactor vessel at Fuel Assembly 5, Row H, Column 5 at 0.05 and 1.24 m above bottom of fuel rod (TE-5H5-002 and -049) (qualified).

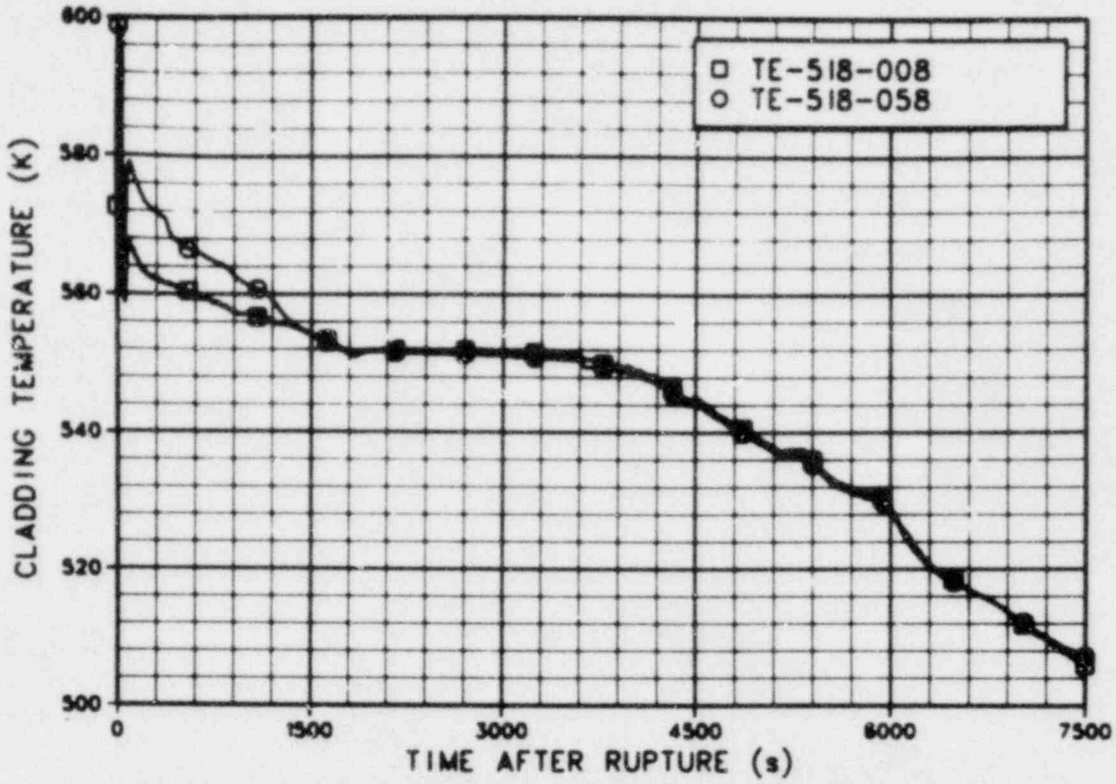


Figure 5M-93. Cladding temperature in reactor vessel at Fuel Assembly 5, Row I, Column 8 at 0.20 and 1.47 m above bottom of fuel rod (TE-518-008 and -058) (qualified).

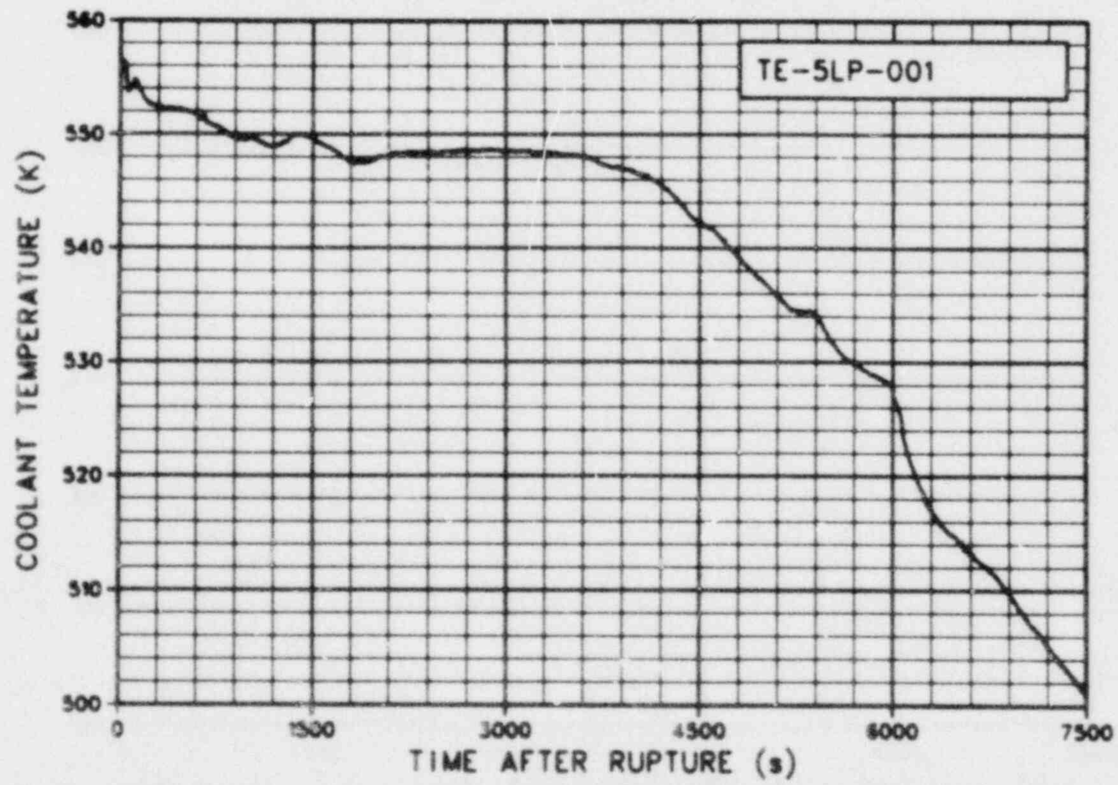


Figure 5M-94. Coolant temperature in reactor vessel at lower end box of Fuel Assembly 5 (TE-5LP-001) (qualified).

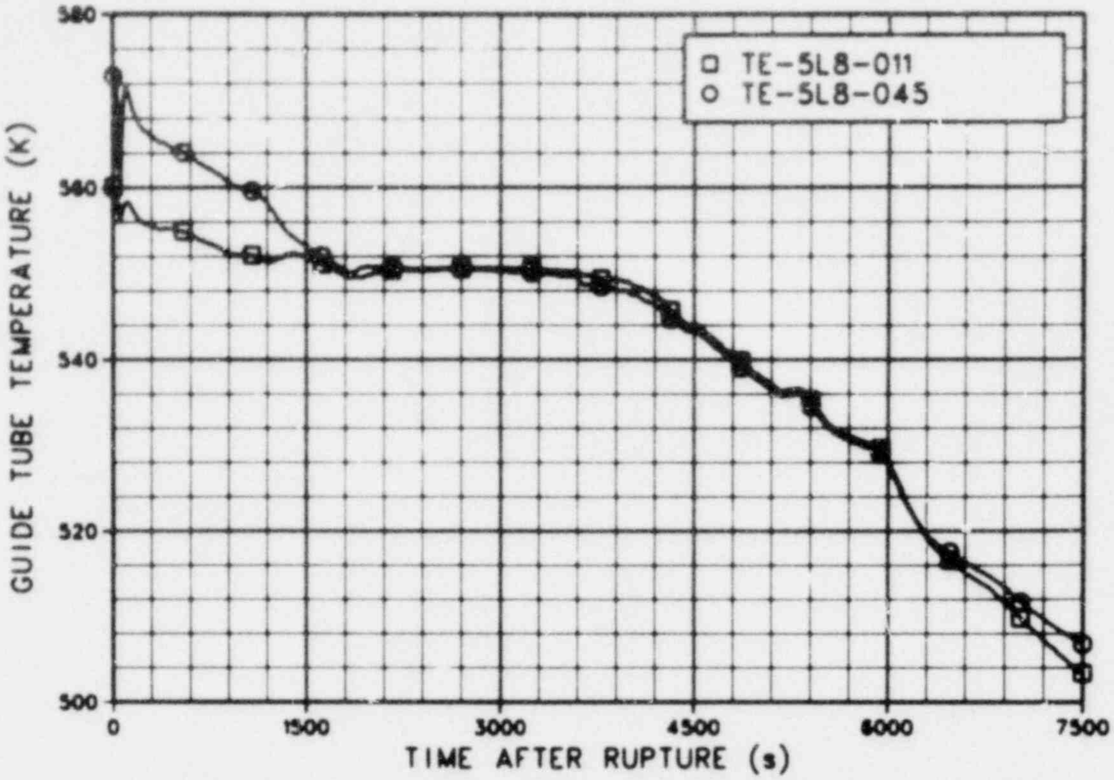


Figure 5M-95. Guide tube temperature in reactor vessel at Fuel Assembly 5, Row L, Column 8 at 0.28 and 1.14 m above bottom of guide tube (TE-5L8-011 and -045) (qualified).

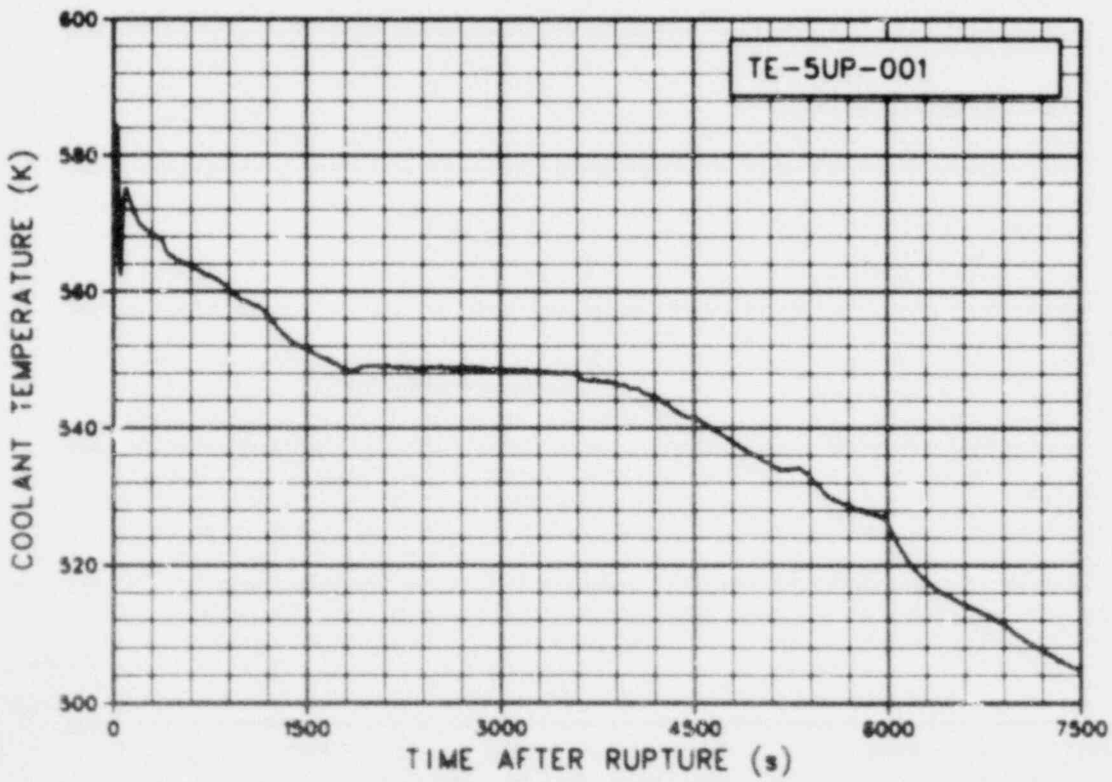


Figure 5M-96. Coolant temperature in reactor vessel at upper end box of Fuel Assembly 5 (TE-5UP-001) (qualified).

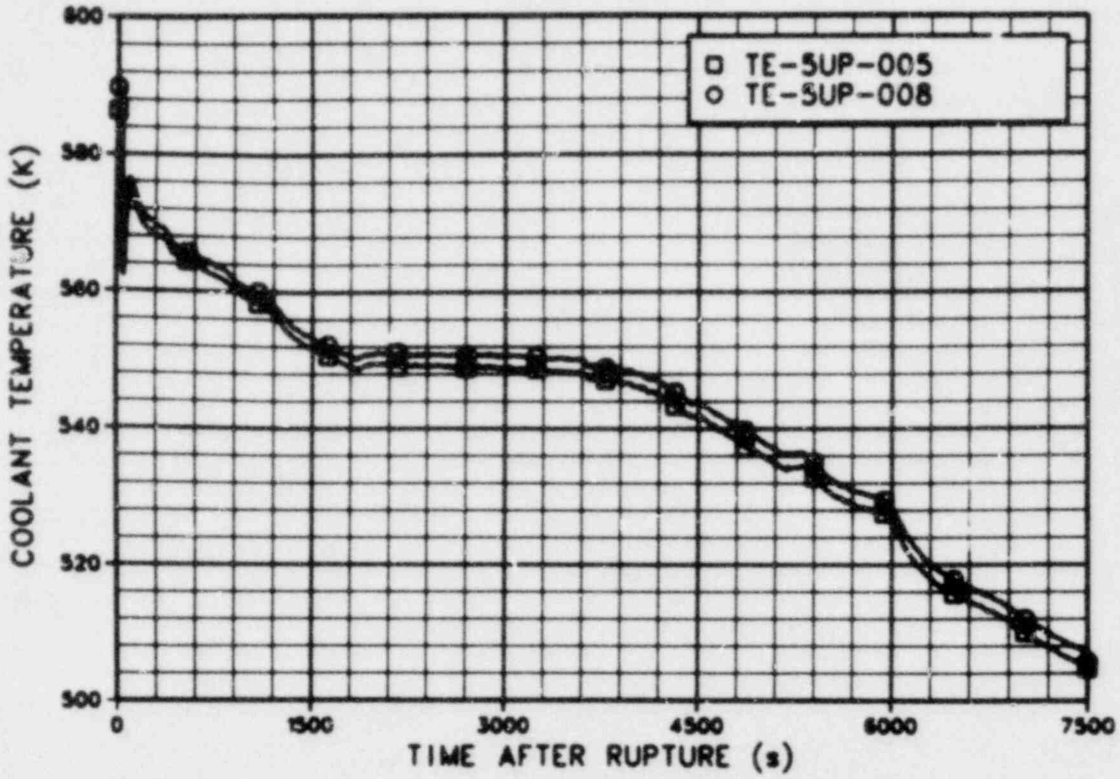


Figure 5M-97. Coolant temperature in reactor vessel at upper end box of Fuel Assembly 5 (TE-5UP-005 and -008) (qualified).

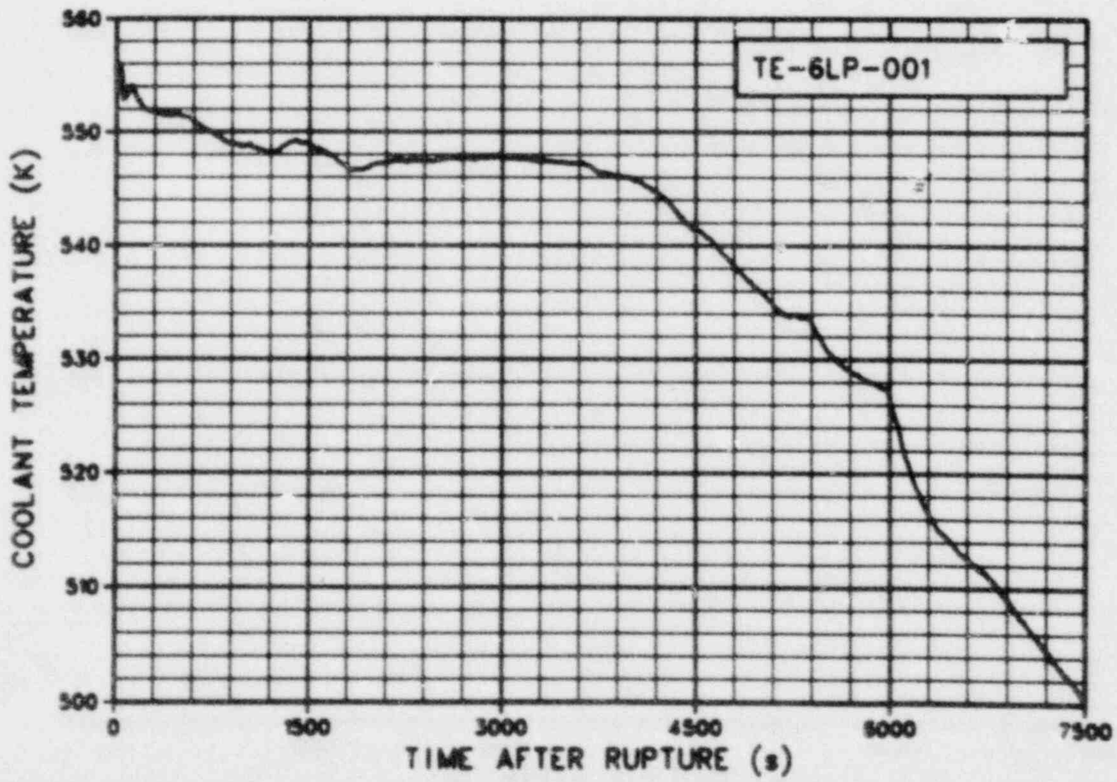


Figure 5M-98. Coolant temperature in reactor vessel at lower end box of Fuel Assembly 6 (TE-6LP-001) (qualified).

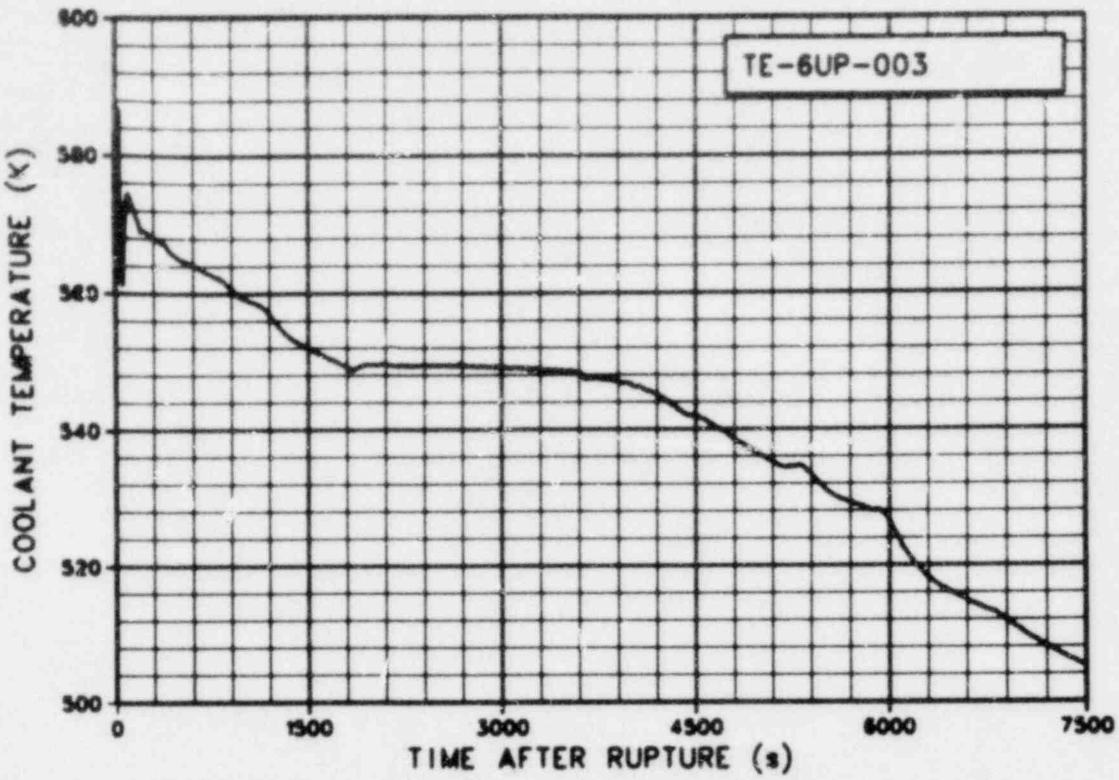


Figure 5M-99. Coolant temperature in reactor vessel at upper end box of Fuel Assembly 6 (TE-6UP-003) (qualified).

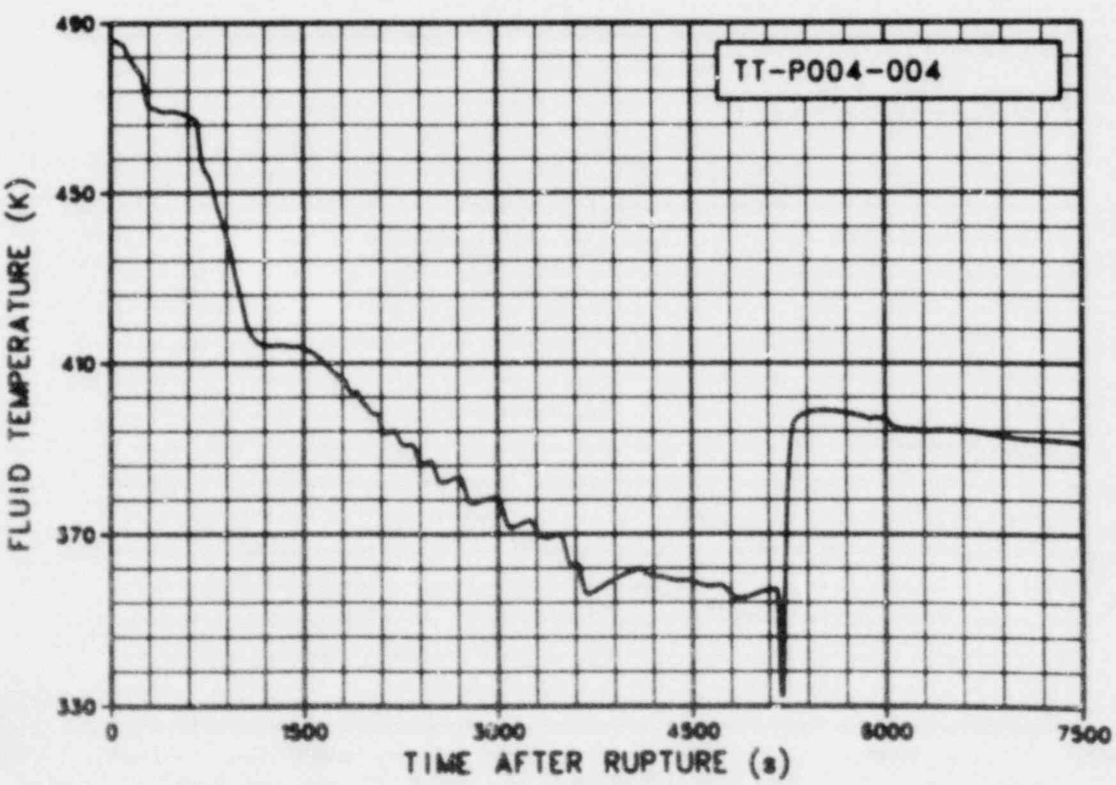


Figure 5M-100. Fluid temperature in secondary coolant system feedwater (TT-P004-004) (qualified).

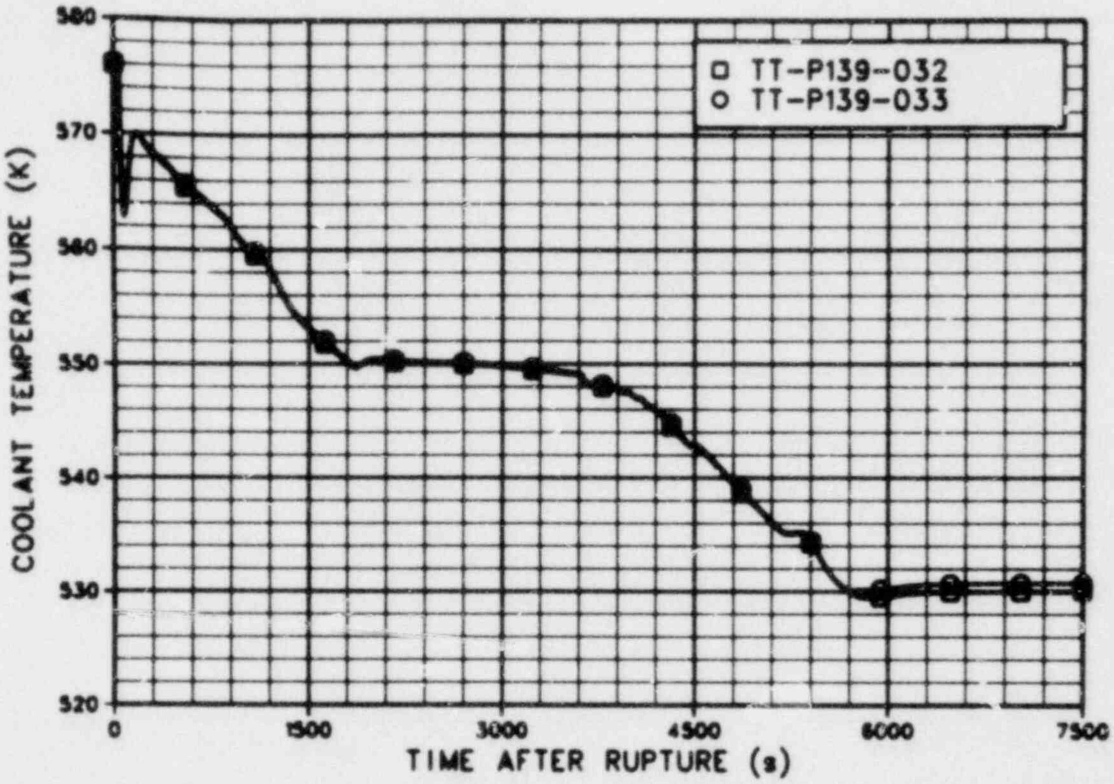
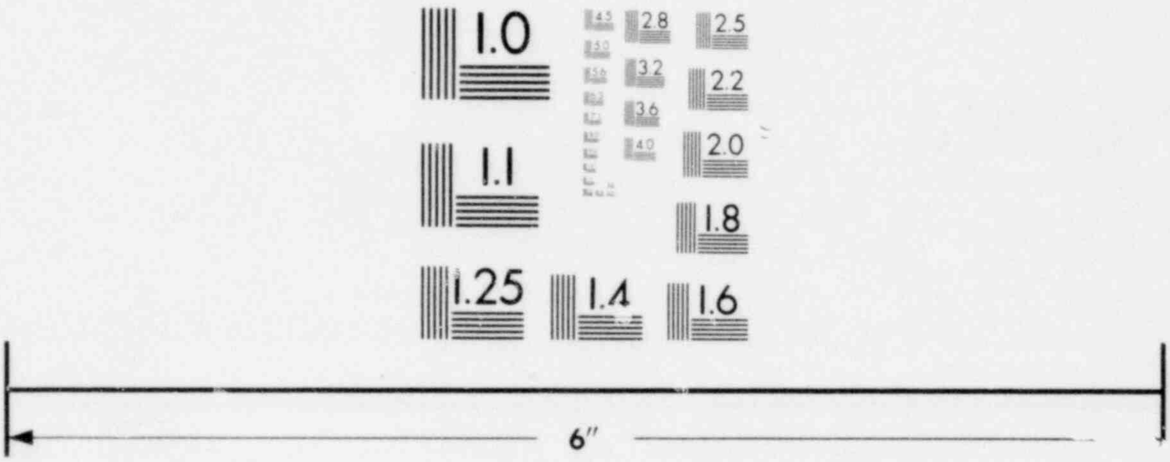


Figure 5M-101. Coolant temperature in intact loop hot leg Channels A and B (TT-P139-032 and -033) (qualified for initial conditions only).

IMAGE EVALUATION TEST TARGET (MT-3)

6"

IMAGE EVALUATION TEST TARGET (MT-3)



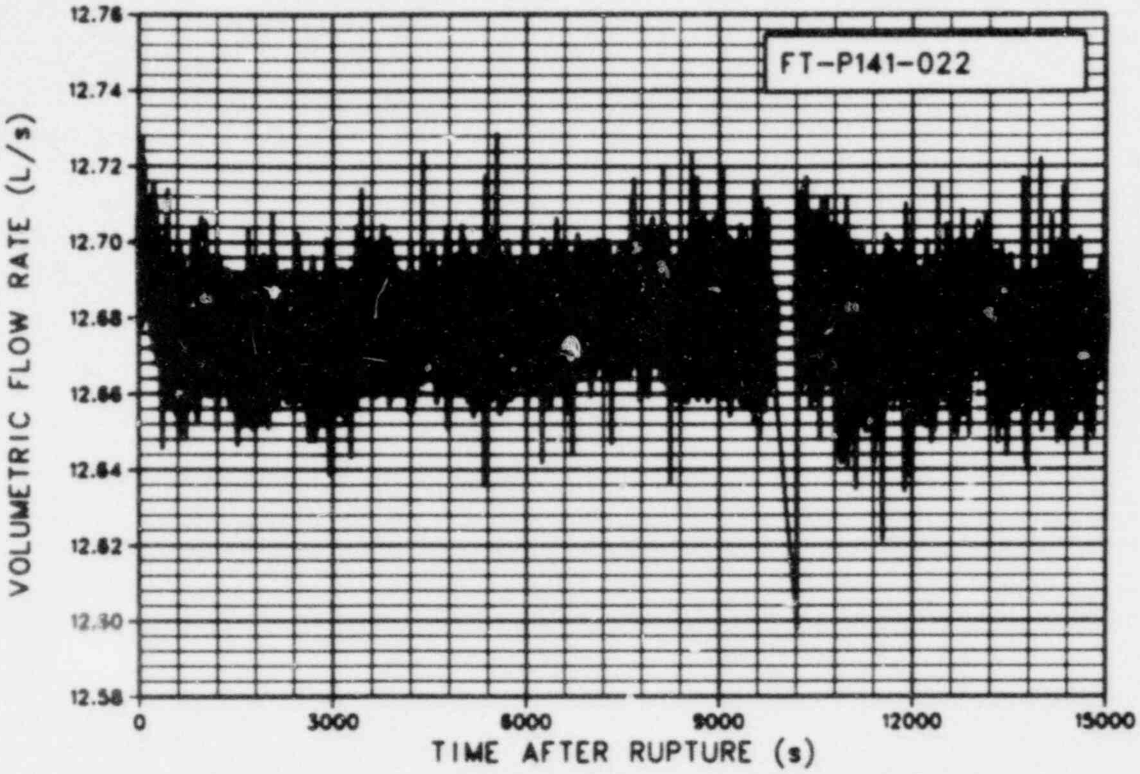


Figure 5L-1. Flow rate in primary component coolant pump discharge (FT-P141-022) (qualified).

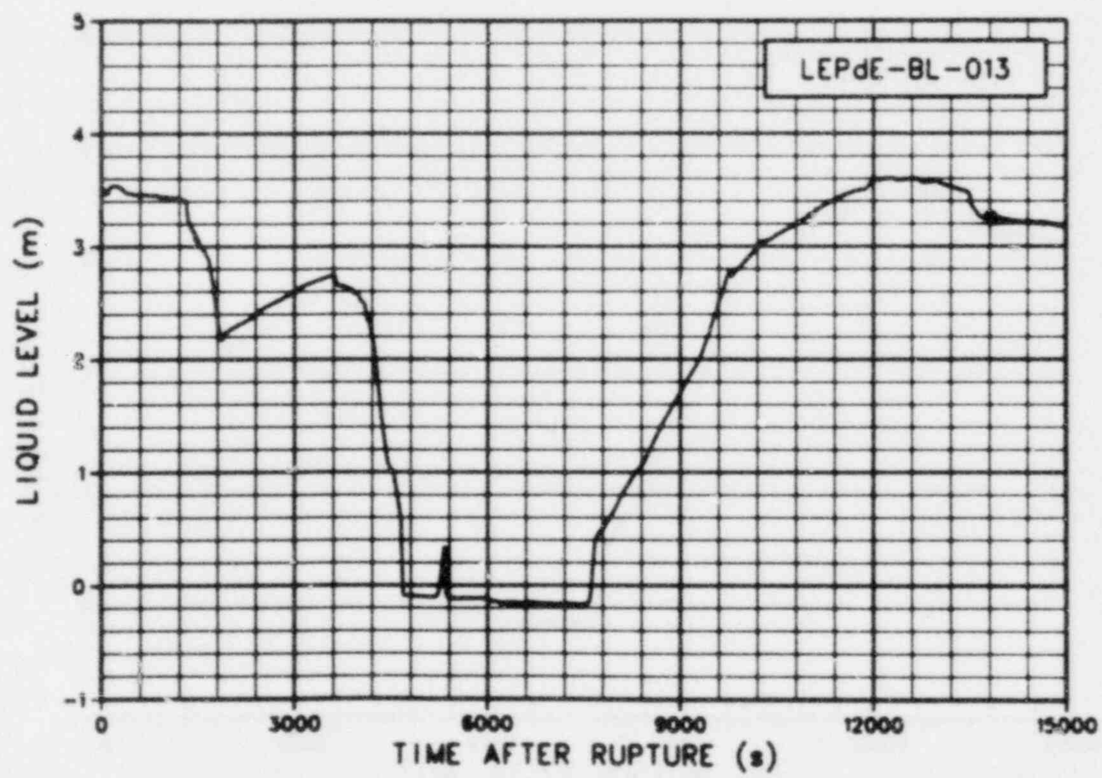


Figure 5L-2. Liquid level in broken loop steam generator simulator, inlet to top (LEPdE-BL-013) (qualified).

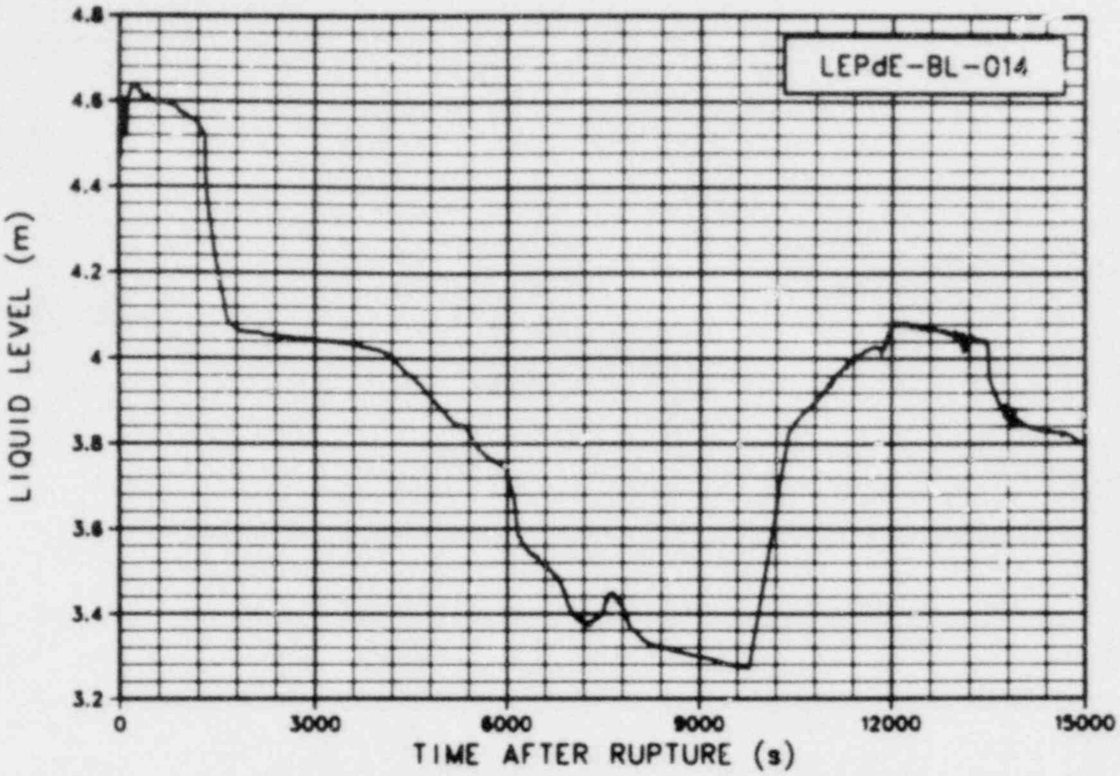


Figure 5L-3. Liquid level in broken loop steam generator simulator, outlet to top (LEPdE-BL-014) (qualified unexplained long term drift should read 4.59 m at 1200 s).

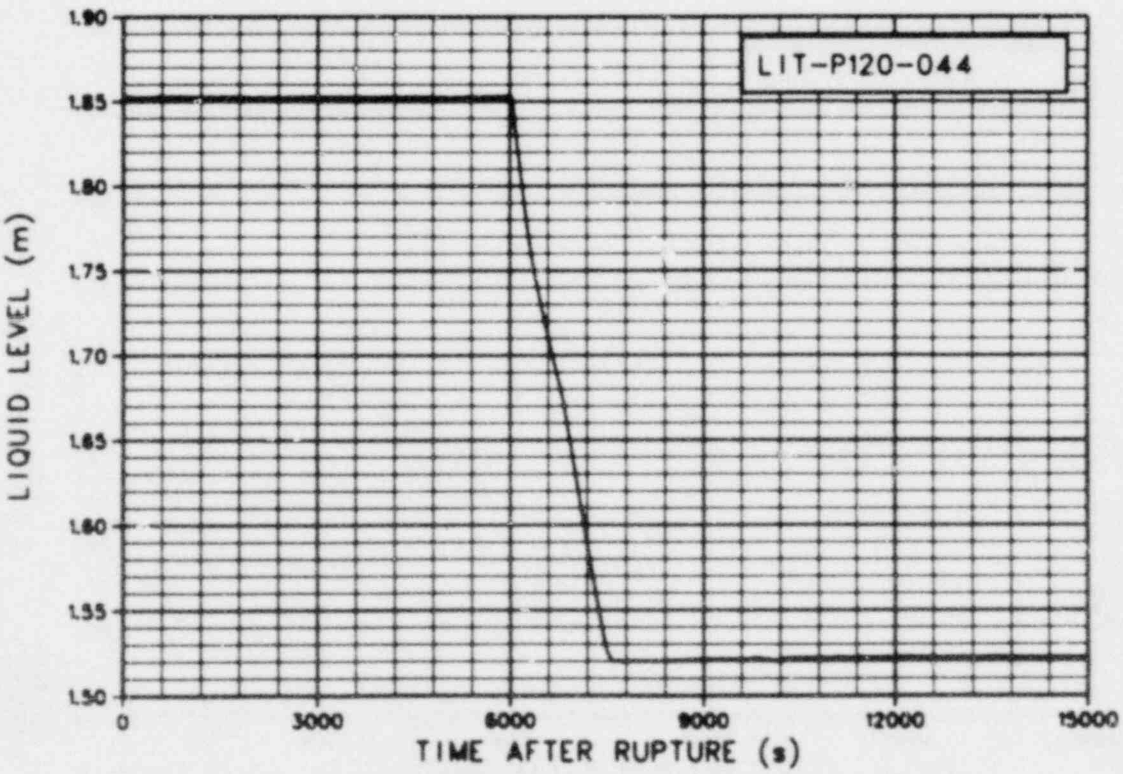


Figure 5L-4. Liquid level in ECCS Accumulator A (LIT-P120-044) (qualified, uncertainty of + or − 5 percent due to pressure sensitivity).

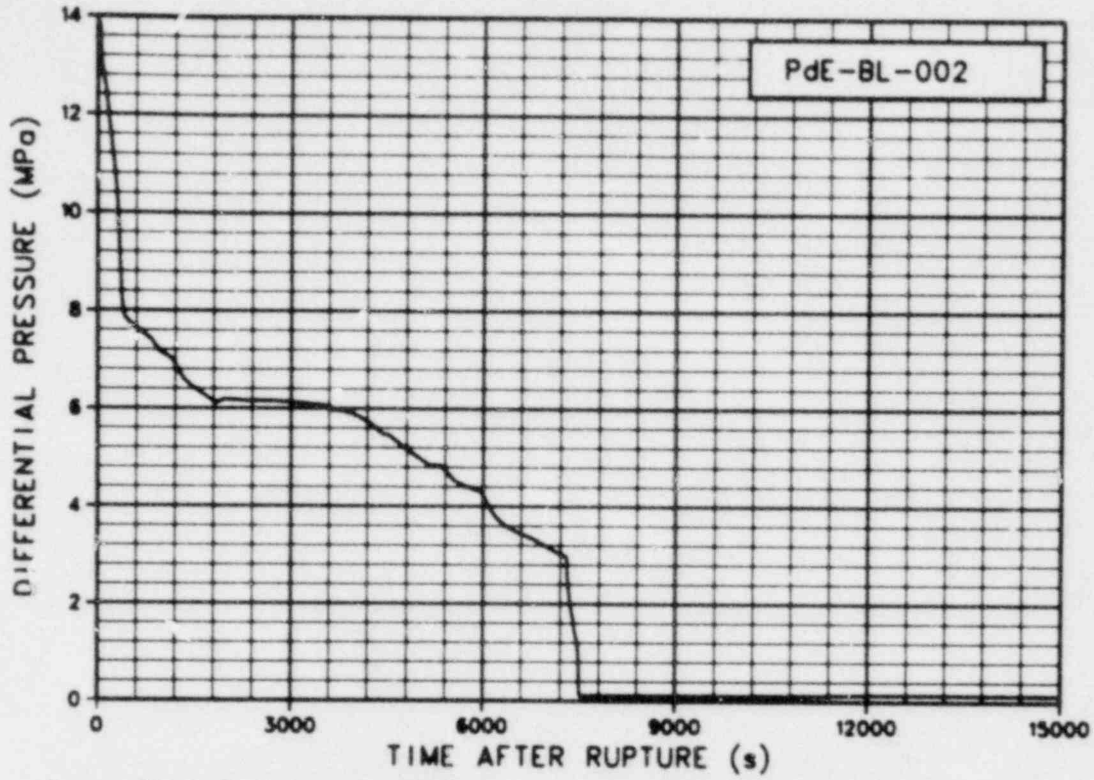


Figure 5L-5. Differential pressure in broken loop cold leg across small break orifice (PdE-BL-002) (qualified).

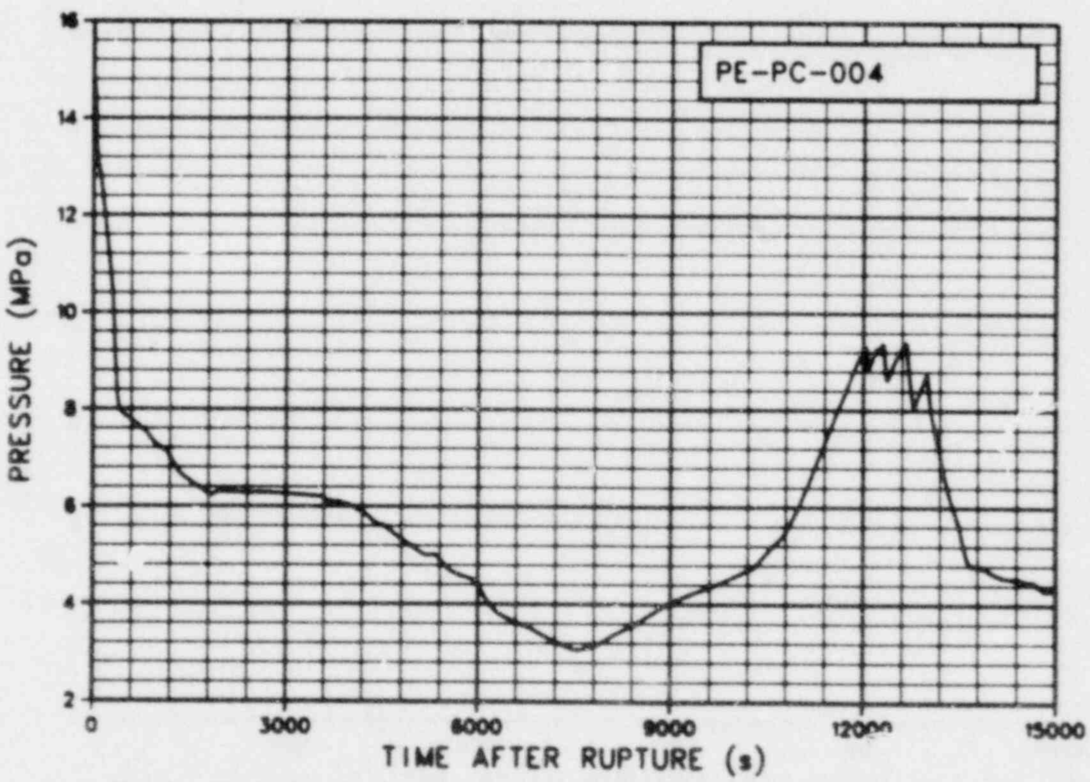


Figure 5L-6. Pressure in pressurizer (PE-PC-004) (qualified).

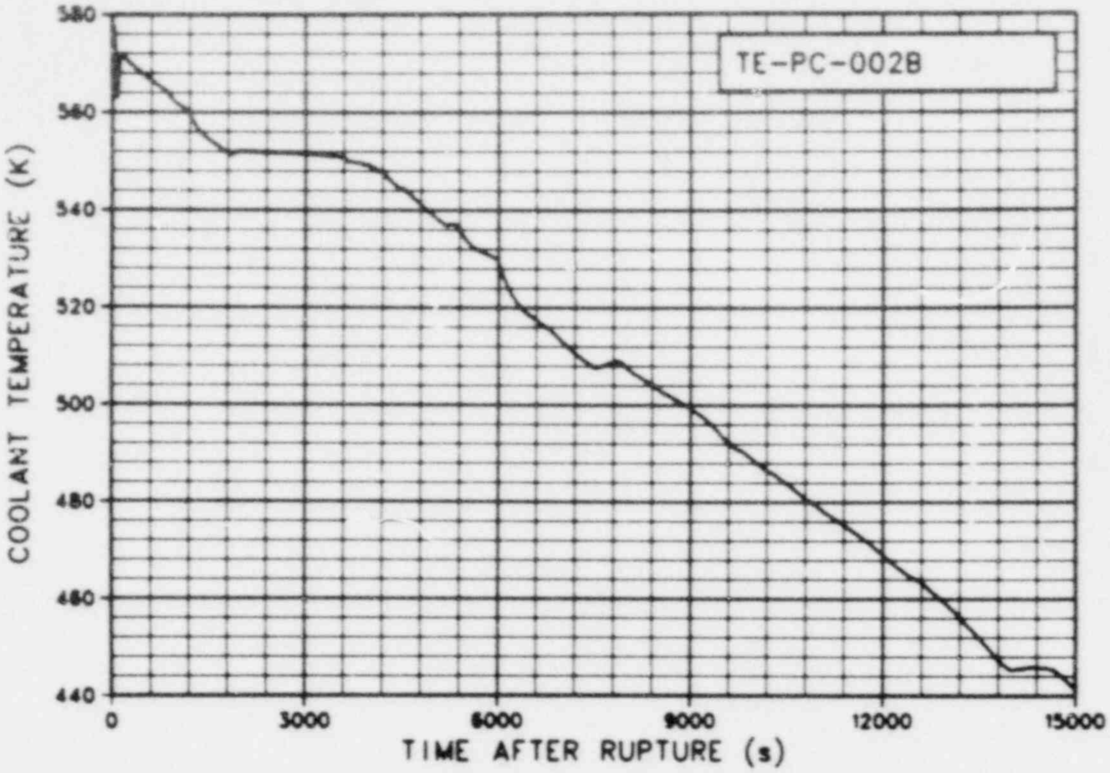


Figure 5L-7. Coolant temperature in intact loop hot leg DTT rake at middle of pipe (TE-PC-002B) (qualified).

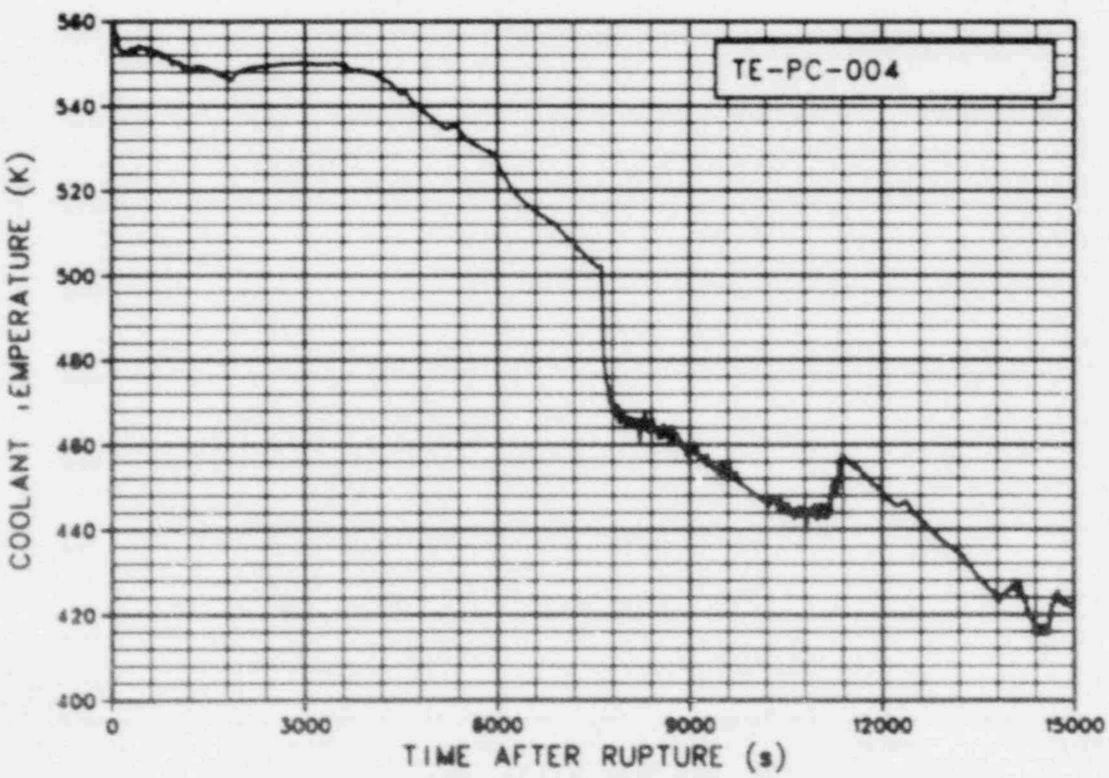


Figure 5L-8. Coolant temperature in intact loop cold leg at bottom of ECC rake 1 (TE-PC-004) (qualified).

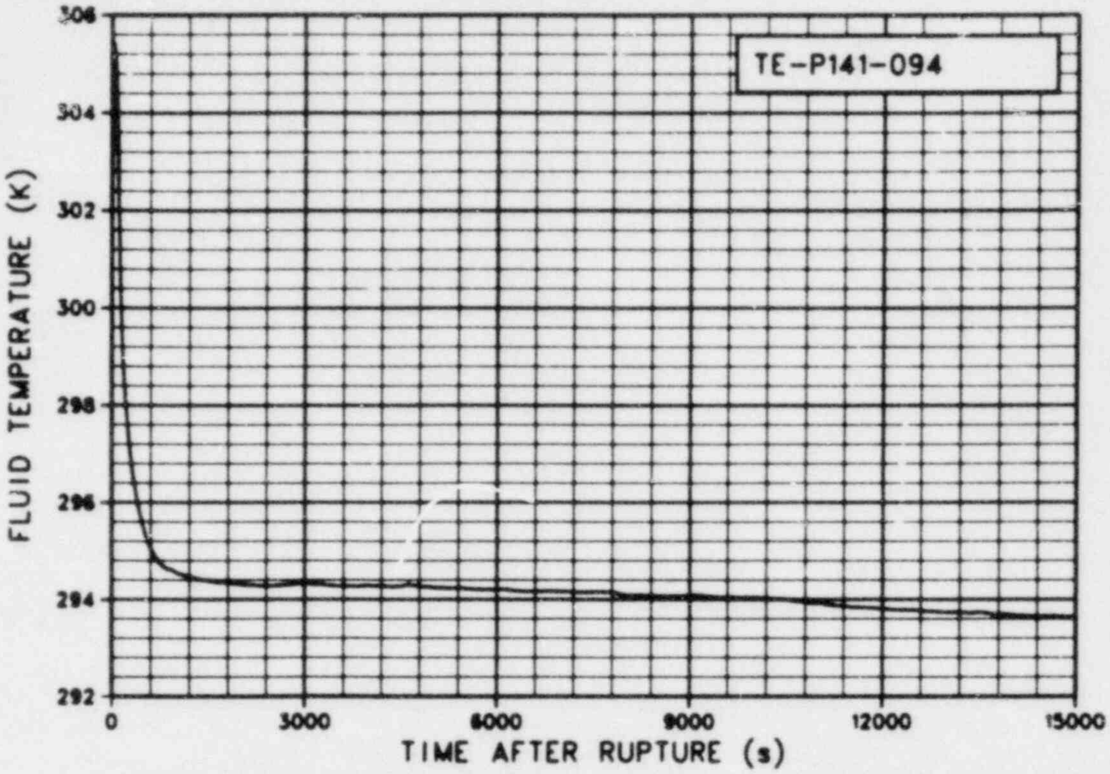


Figure 5L-9. Fluid temperature downstream from primary component cooling system heat exchanger hot leg (TE-P141-094) (qualified).

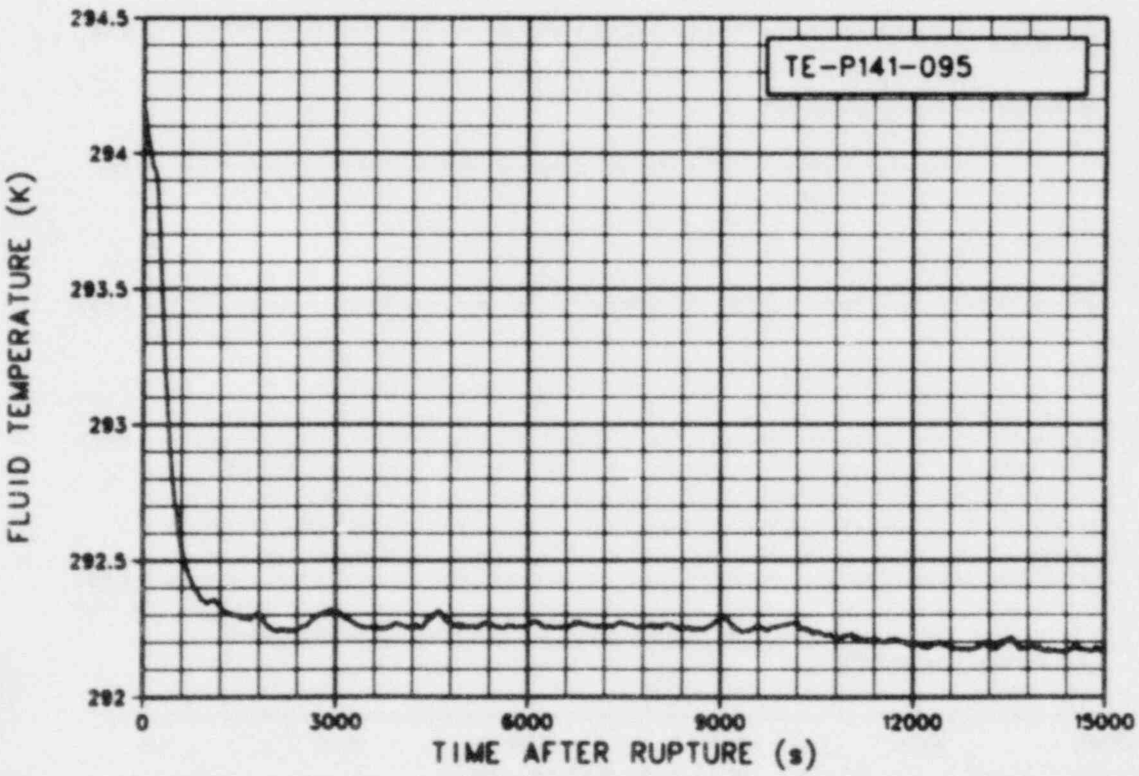


Figure 5L-10. Fluid temperature upstream from primary component cooling system heat exchanger cold leg (TE-P141-095) (qualified).

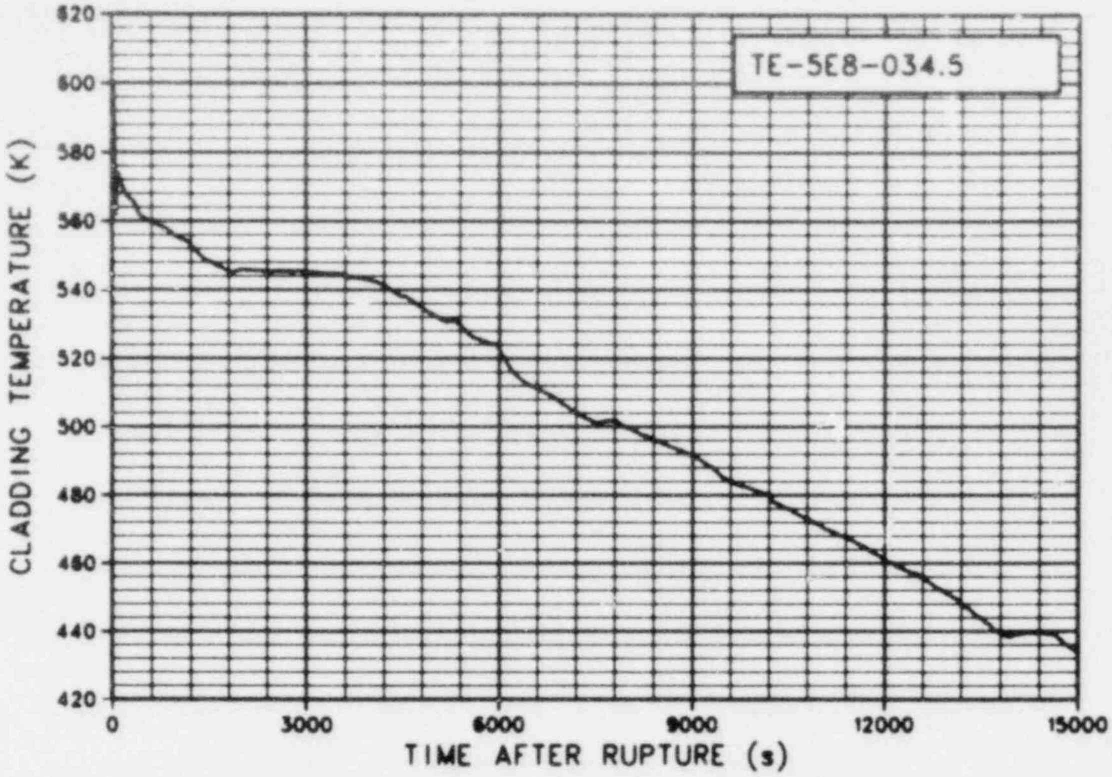


Figure 5L-11. Cladding temperature in reactor vessel at Fuel Assembly 5, Row E, Column 8 at 0.88 m above bottom of fuel rod (TE-5E8-034.5) (qualified).

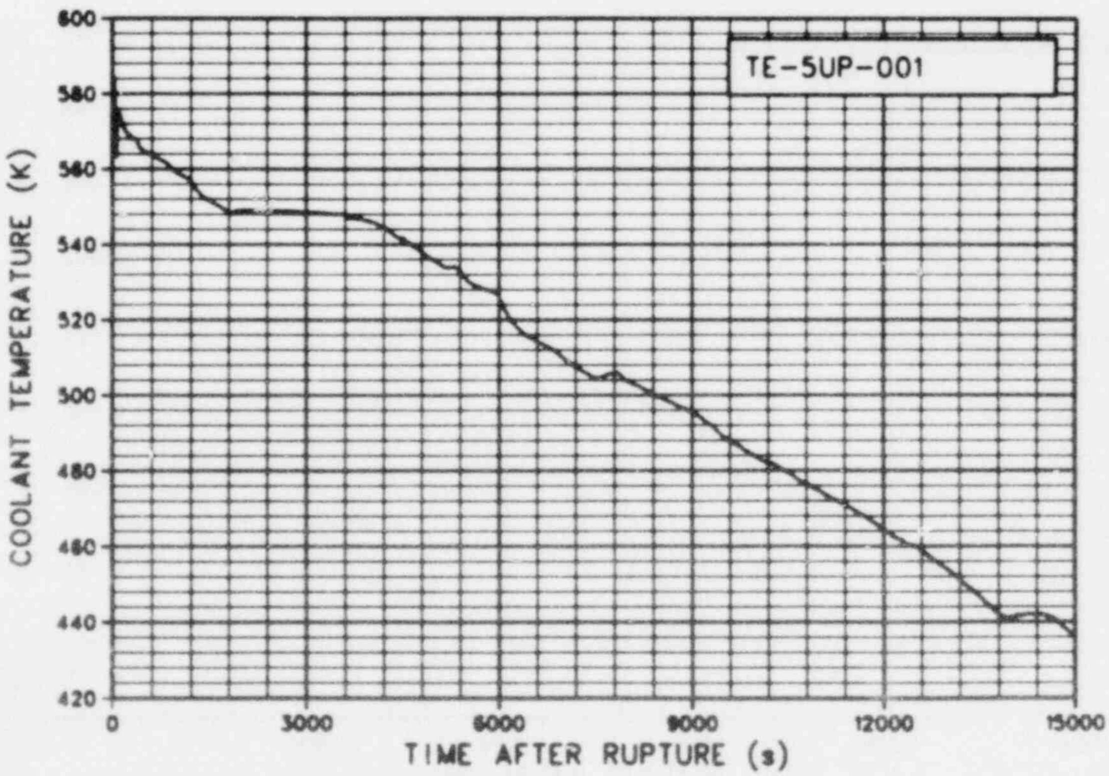


Figure 5L-12. Coolant temperature in reactor vessel at upper end box of Fuel Assembly 5 (TE-5UP-001) (qualified).

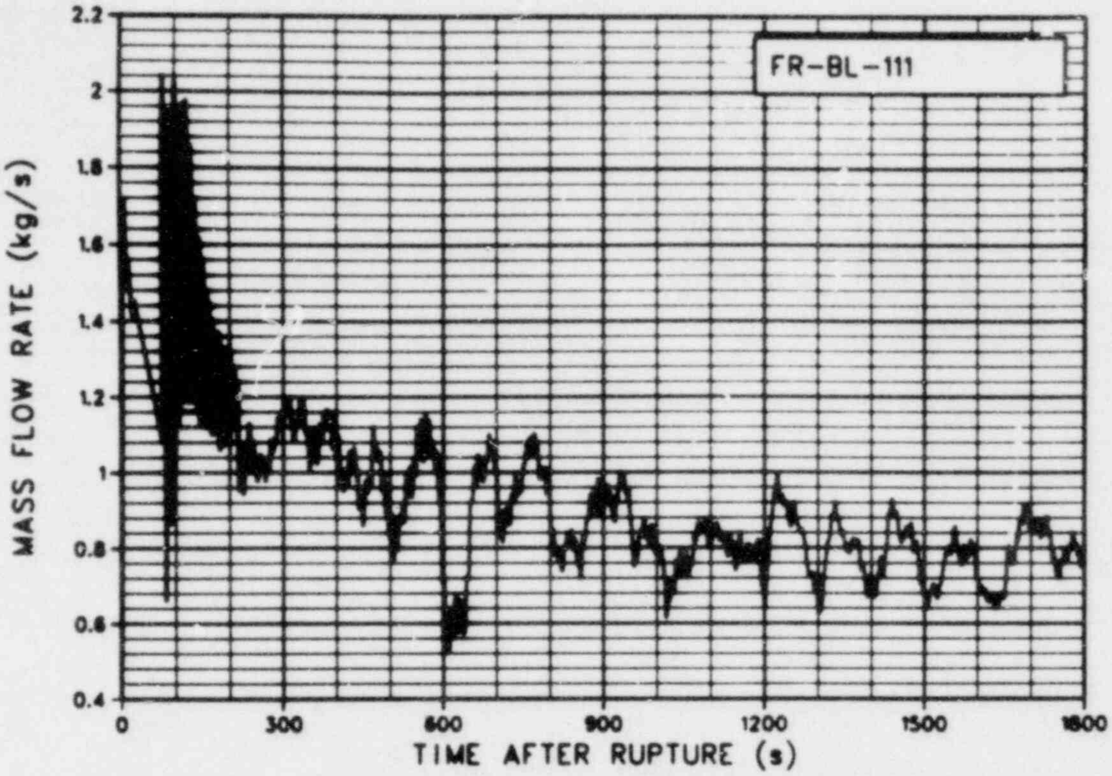


Figure 5C-1. Mass flow rate at break orifice (FR-BL-111) (qualified to 1800 s).

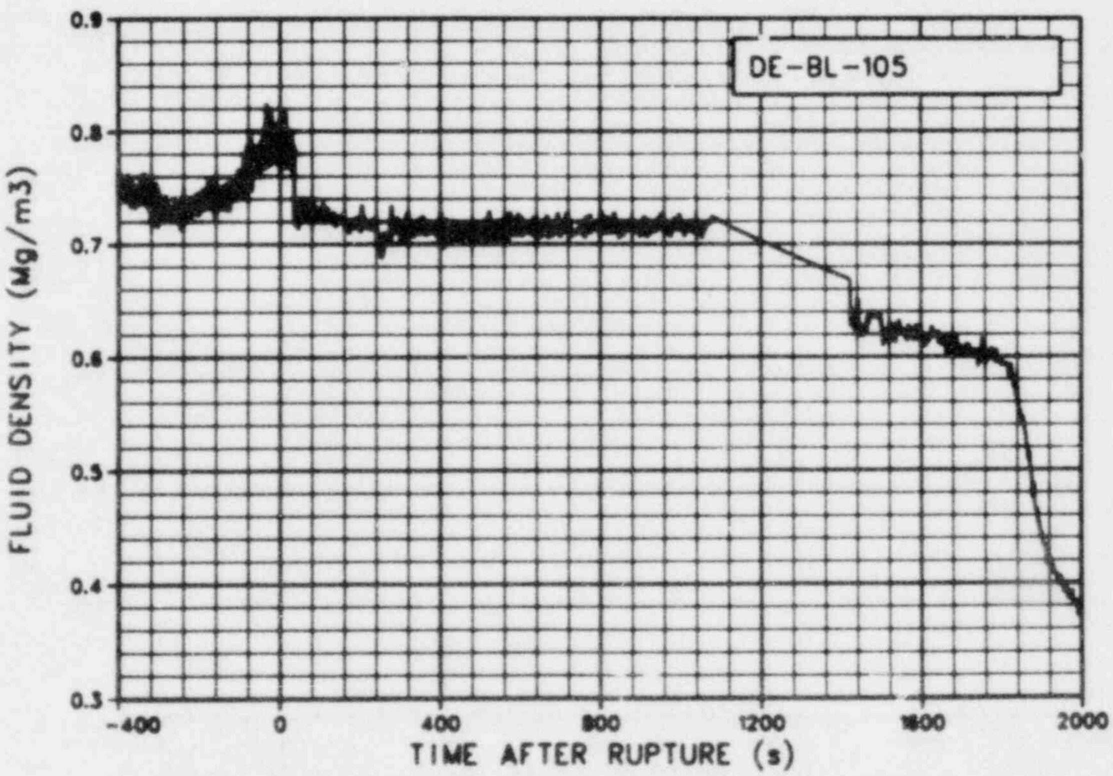


Figure 5C-2. Average fluid density in broken loop cold leg (DE-BL-105) (qualified after reactor scram).

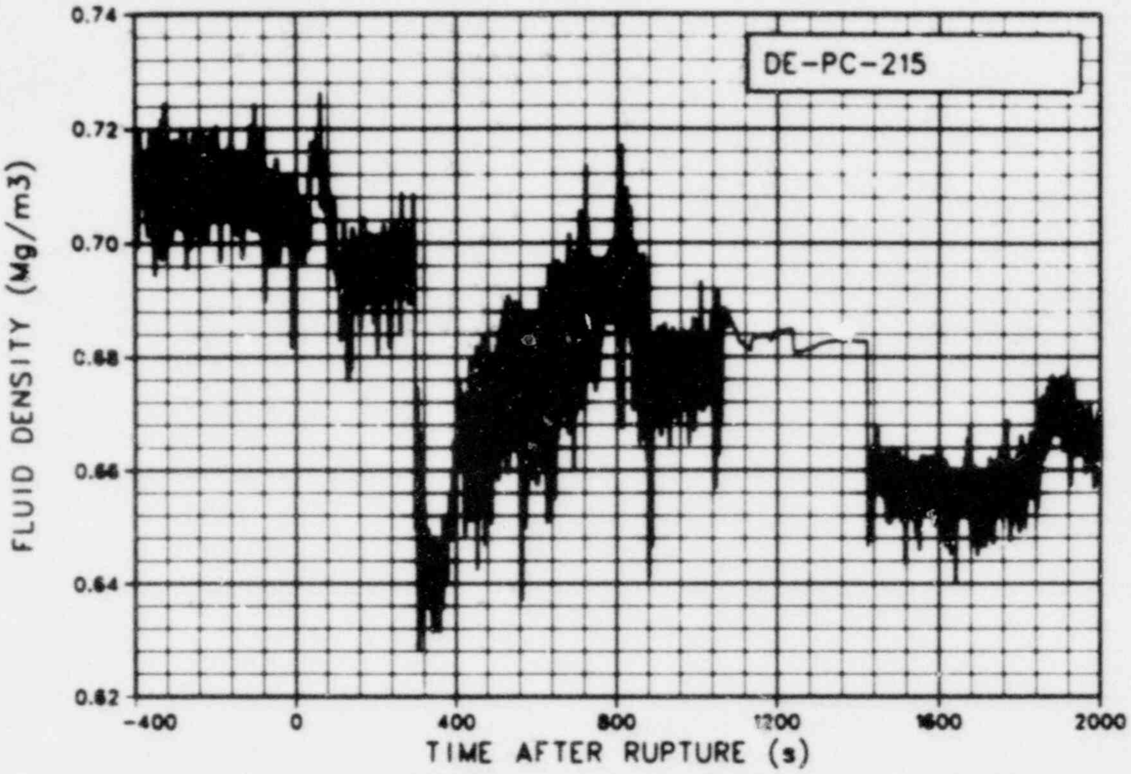


Figure 5C-3. Average fluid density in intact loop hot leg (DE-PC-215) (qualified after reactor scram).

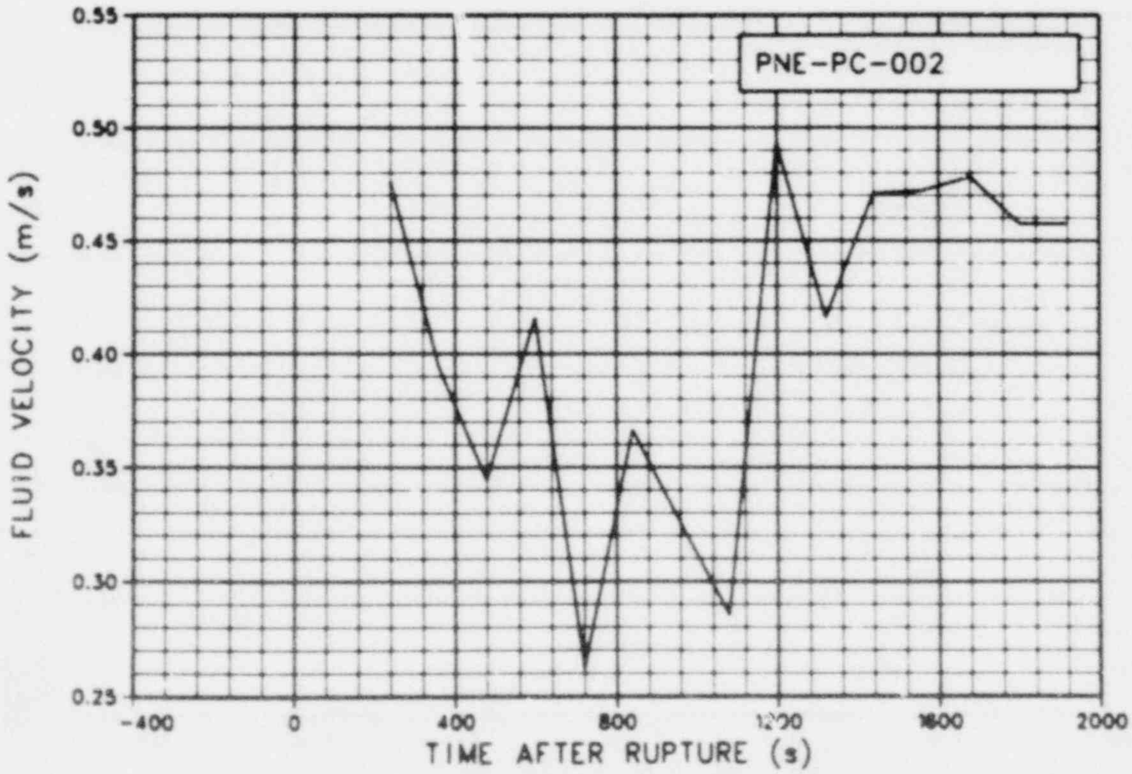


Figure 5C-4. Fluid velocity in intact loop hot leg (PNE-PC-002) (qualified; discrete values qualified, not continuous data).

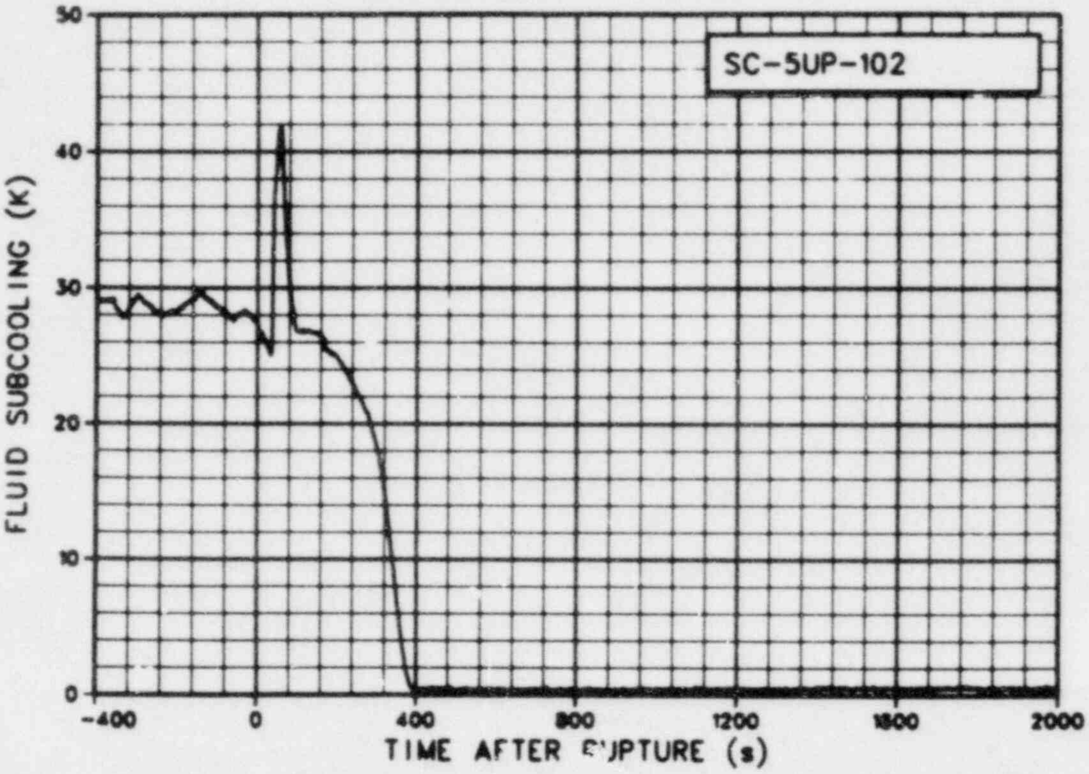


Figure 5C-5. Fluid subcooling in reactor vessel upper plenum (SC-5UP-102) (qualified).

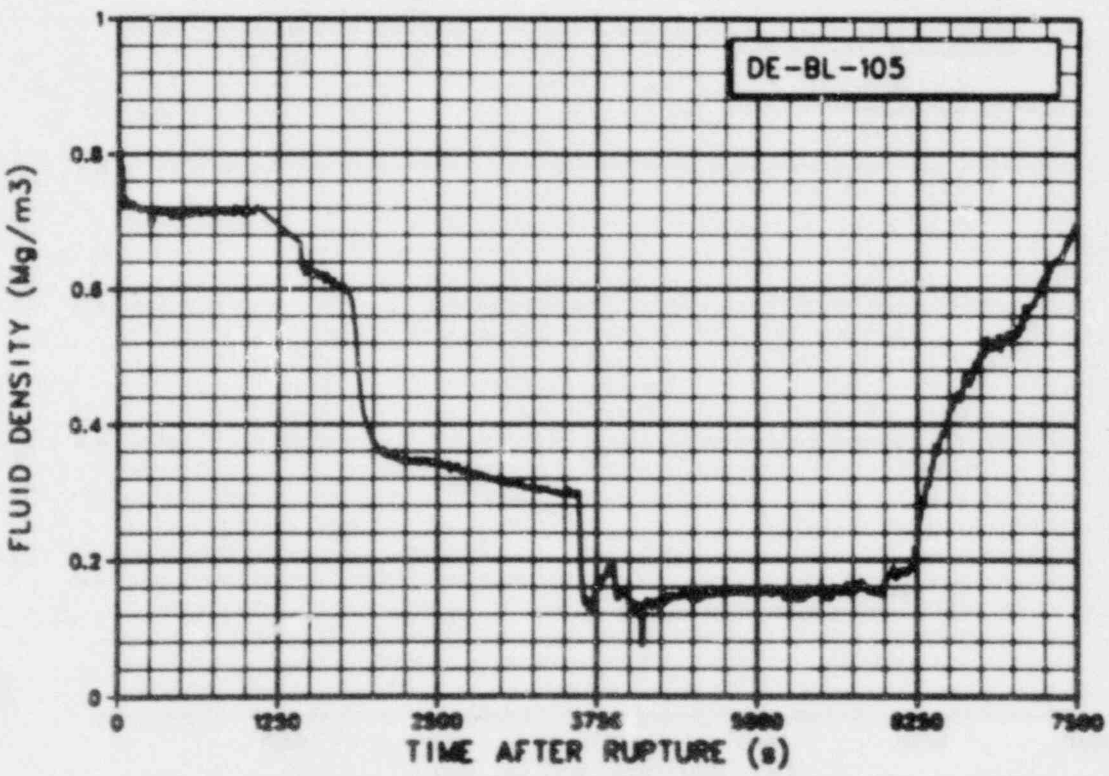


Figure 5C-6. Average fluid density in broken loop cold leg (DE-BL-105) (qualified after reactor scram).

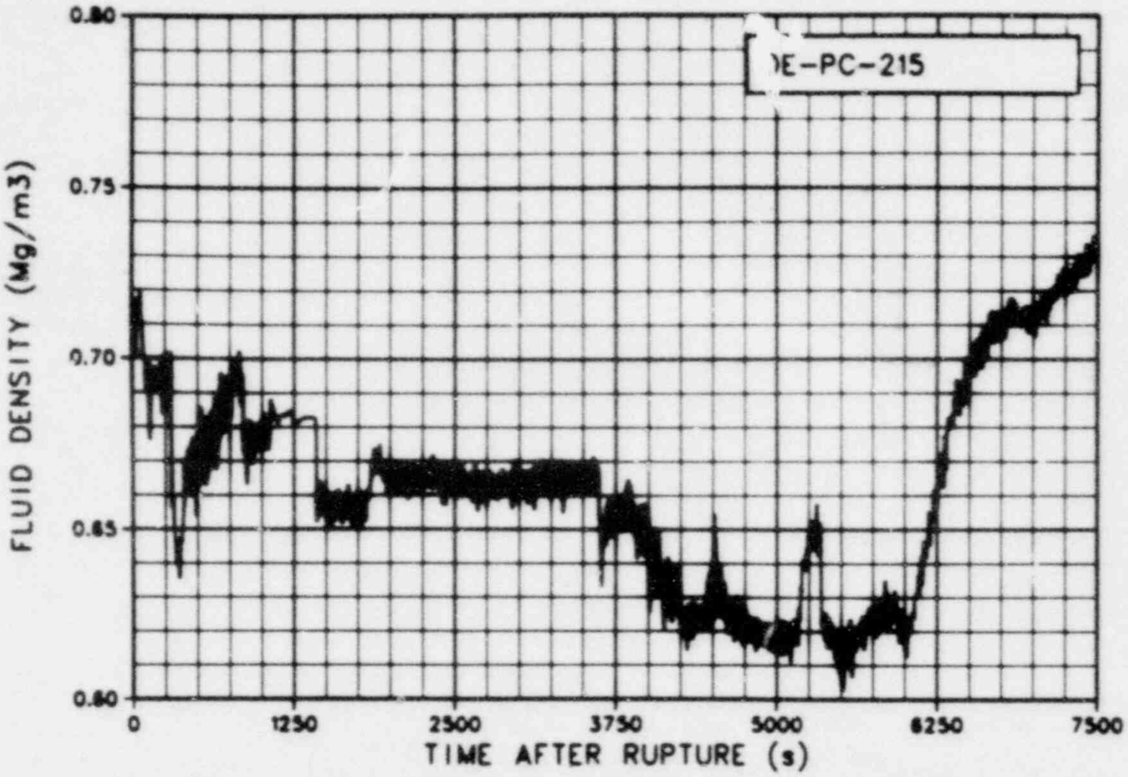


Figure 5C-7. Average fluid density in intact loop hot leg (DE-PC-215) (qualified after reactor scram).

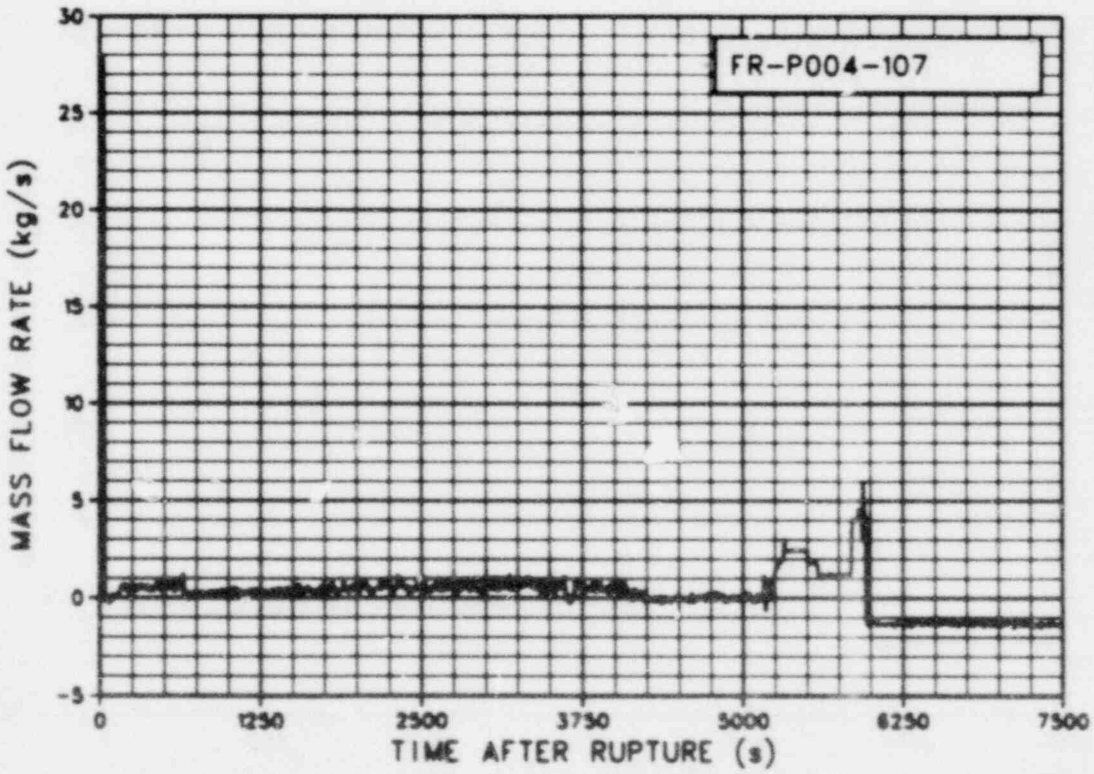
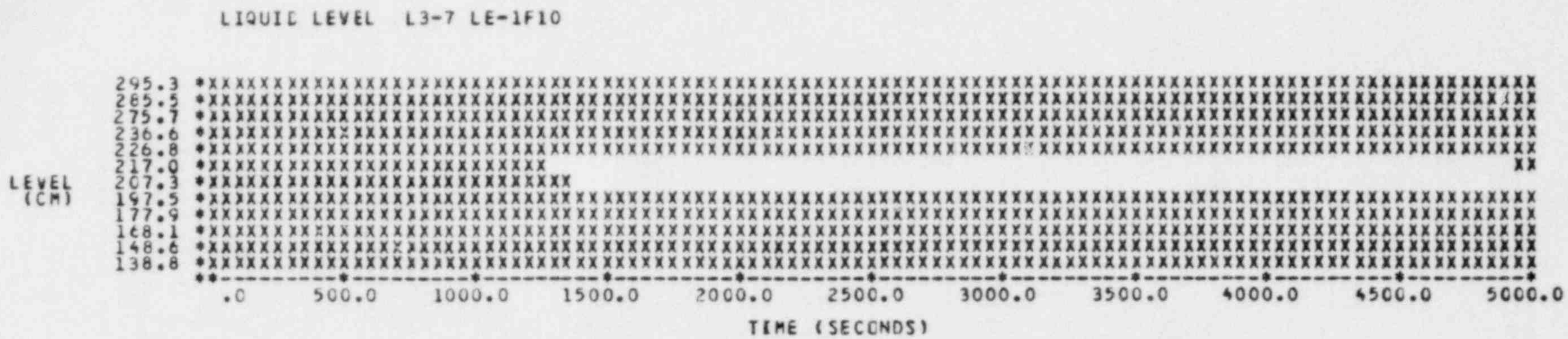


Figure 5C-8. Mass flow rate in intact loop main feedwater pump (FR-P004-107) (qualified, negative values should read zero, but are within measurement uncertainty).



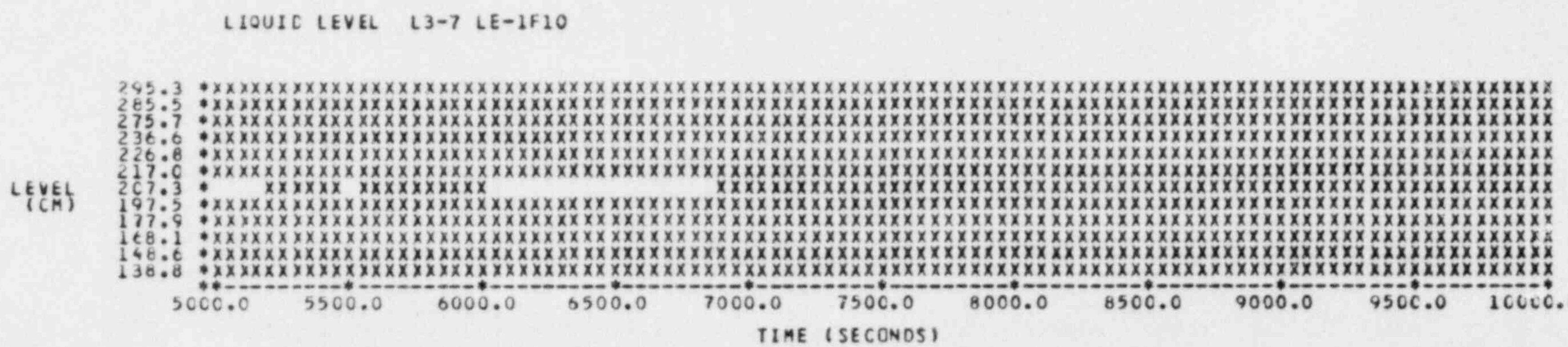


Figure 5C-9. Liquid level in reactor vessel core in Fuel Assembly 1, bubble plot (LE-1F10) (qualified).

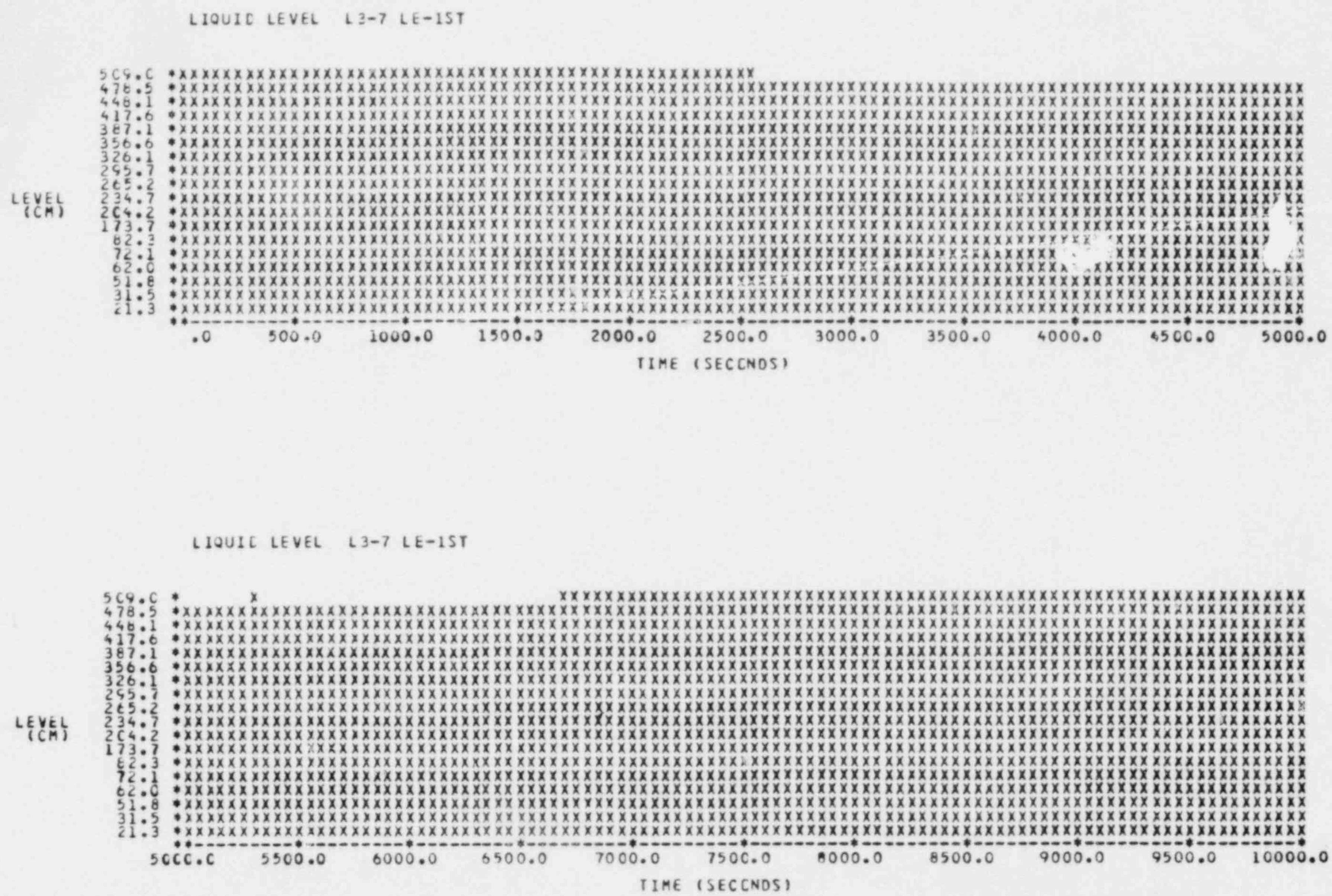


Figure 5C-10. Liquid level in reactor vessel lower plenum downcomer Stalk 1, bubble plot (LE-1ST) (qualified).

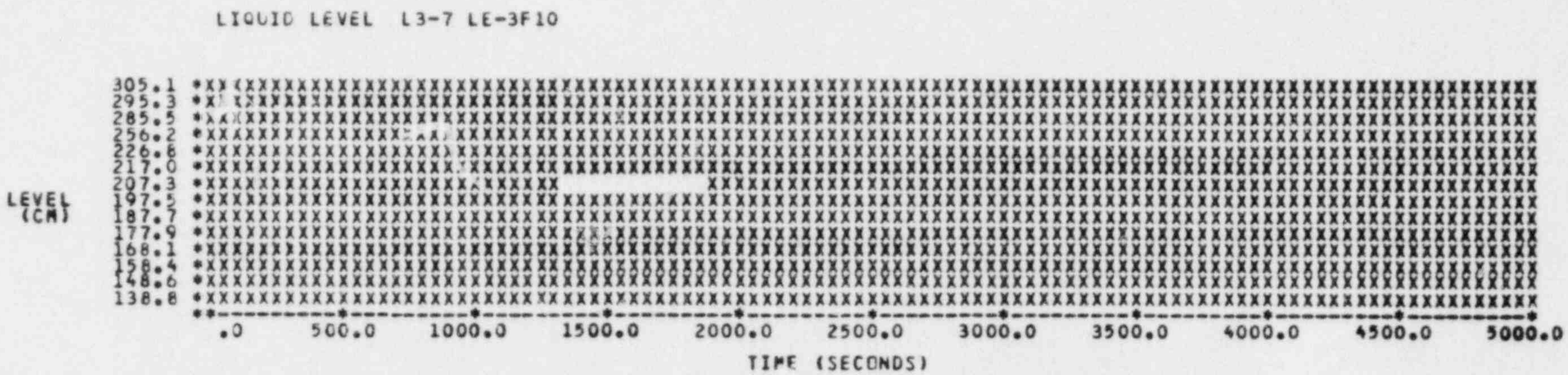
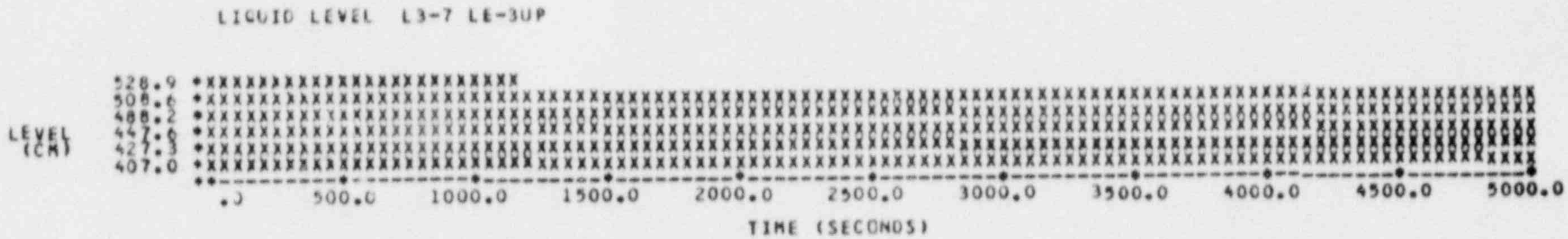


Figure 5C-11. Liquid level in reactor vessel core in Fuel Assembly 3, bubble plot (LE-3F10) (qualified).



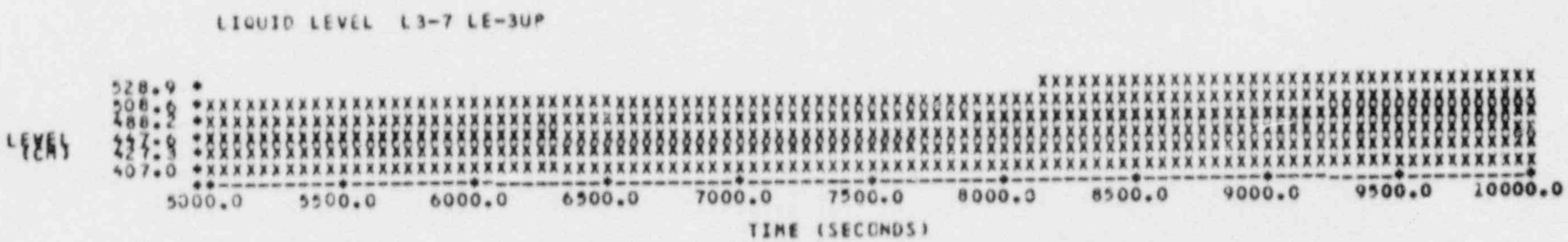


Figure 5C-12. Liquid level in reactor vessel upper plenum above Fuel Assembly 3, bubble plot (LE-3UP-1) (qualified).

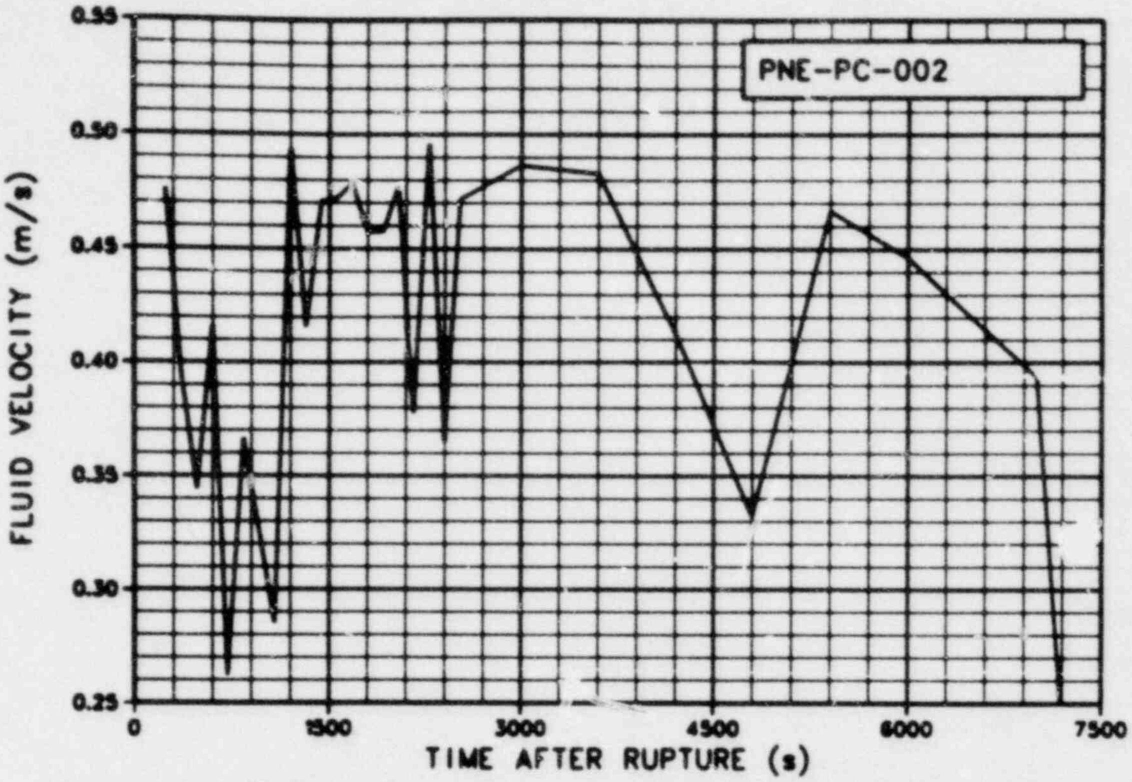


Figure 5C-13. Fluid velocity in intact loop hot leg (PNE-PC-002) (qualified; discrete values qualified, not continuous data).

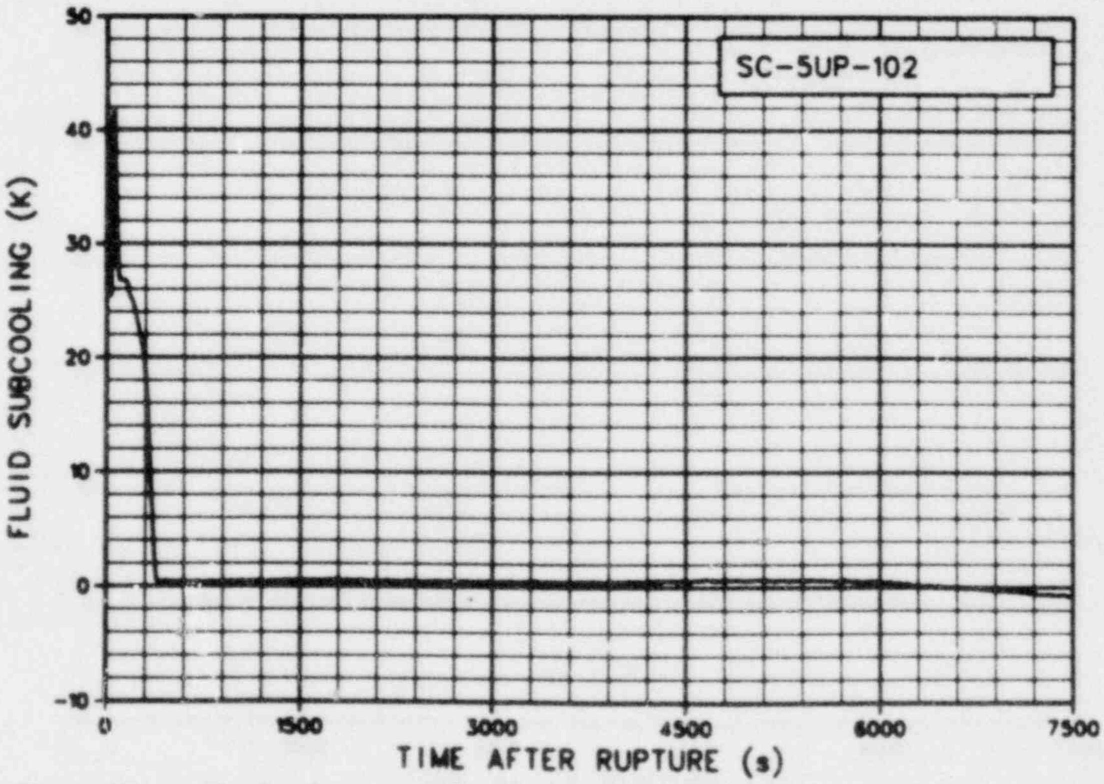


Figure 5C-14. Fluid subcooling in reactor vessel upper plenum (SC-5UP-102) (qualified).

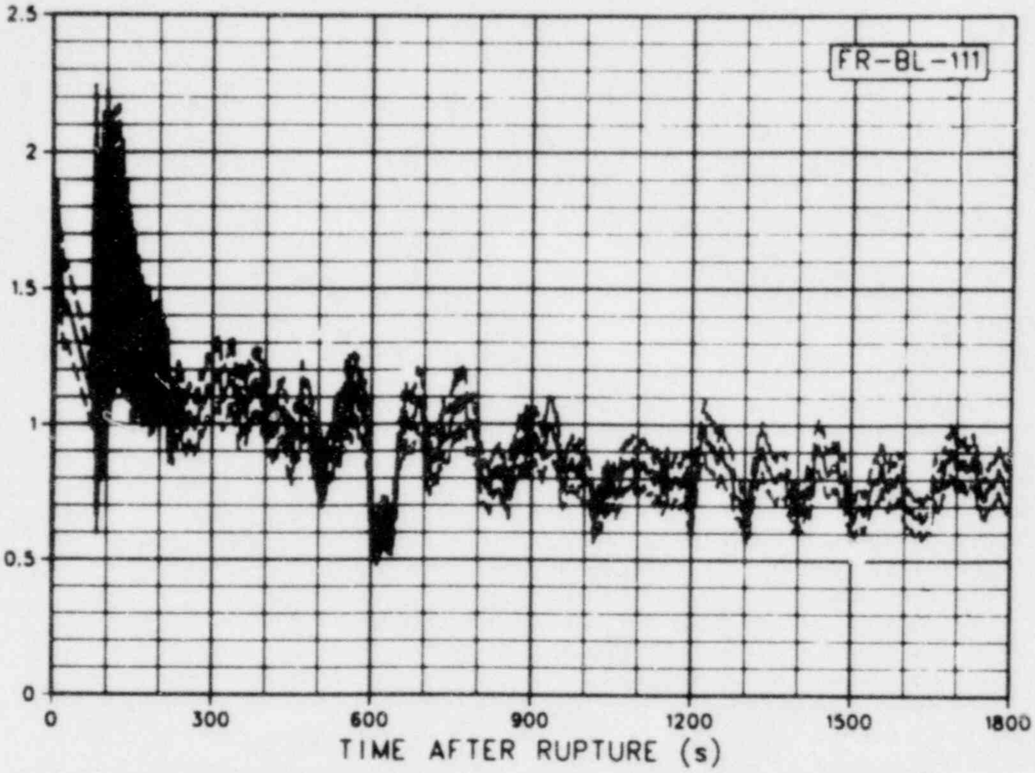


Figure 5U-1. Mass flow rate at break orifice (FR-BL-111) qualified to 1800 s, 2 sigma = + or − 10 percent of re[illegible]g).

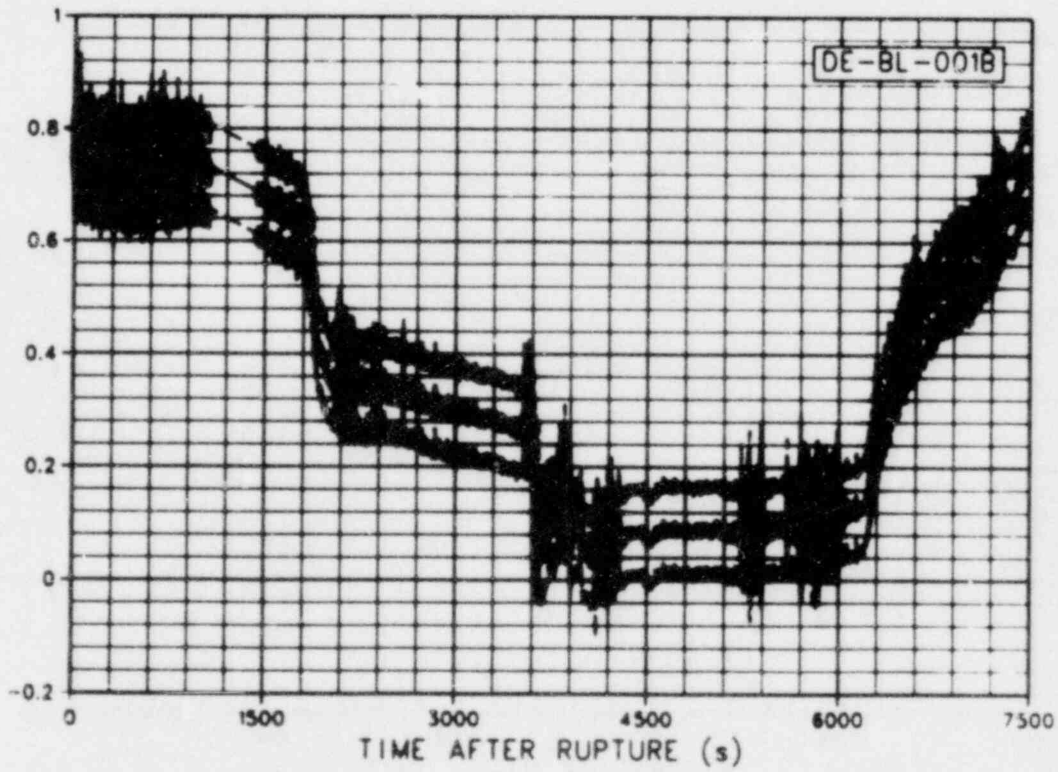


Figure 5U-2. Fluid density in broken loop cold leg, chordal density (DE-BL-001B) (qualified after reactor scram, range = 0 to 1.0 Mg/m³, 2 sigma = + or − 0.076 Mg/m³).

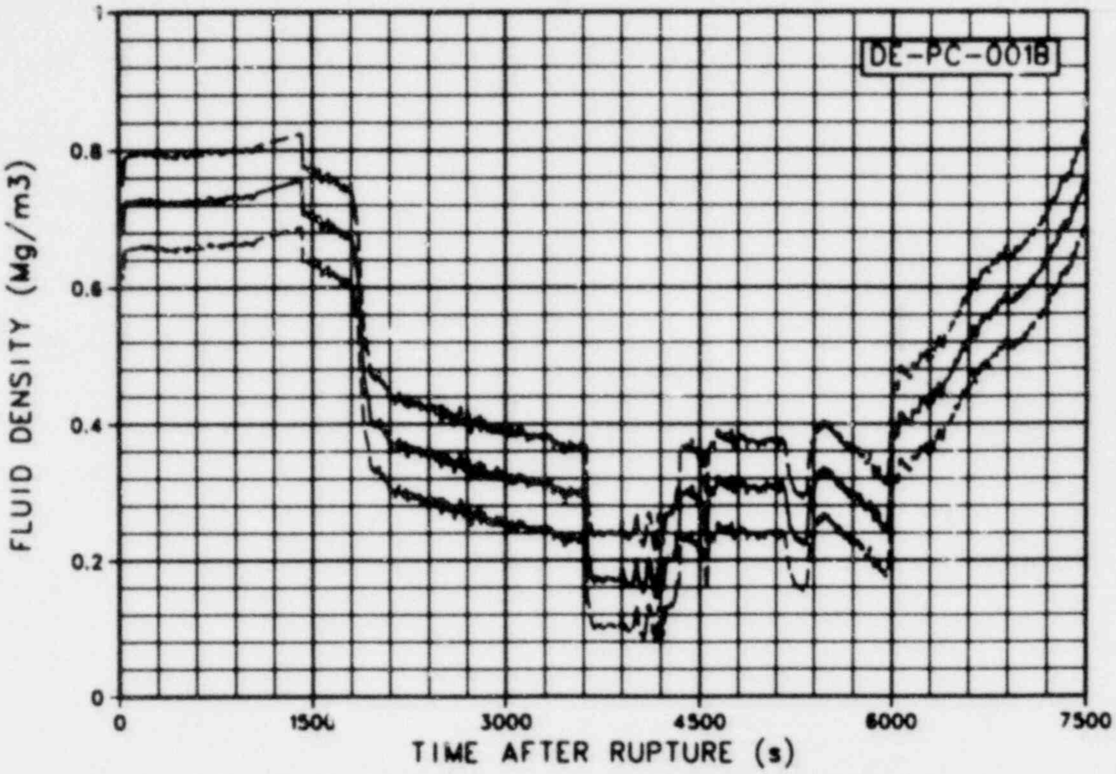


Figure 5U-3. Fluid density in intact loop cold leg, chordal density (DE-PC-001B) (qualified after reactor scram, range = 0 to 1.0 Mg/m^3, 2 sigma = + or - 0.068 Mg/m^3).

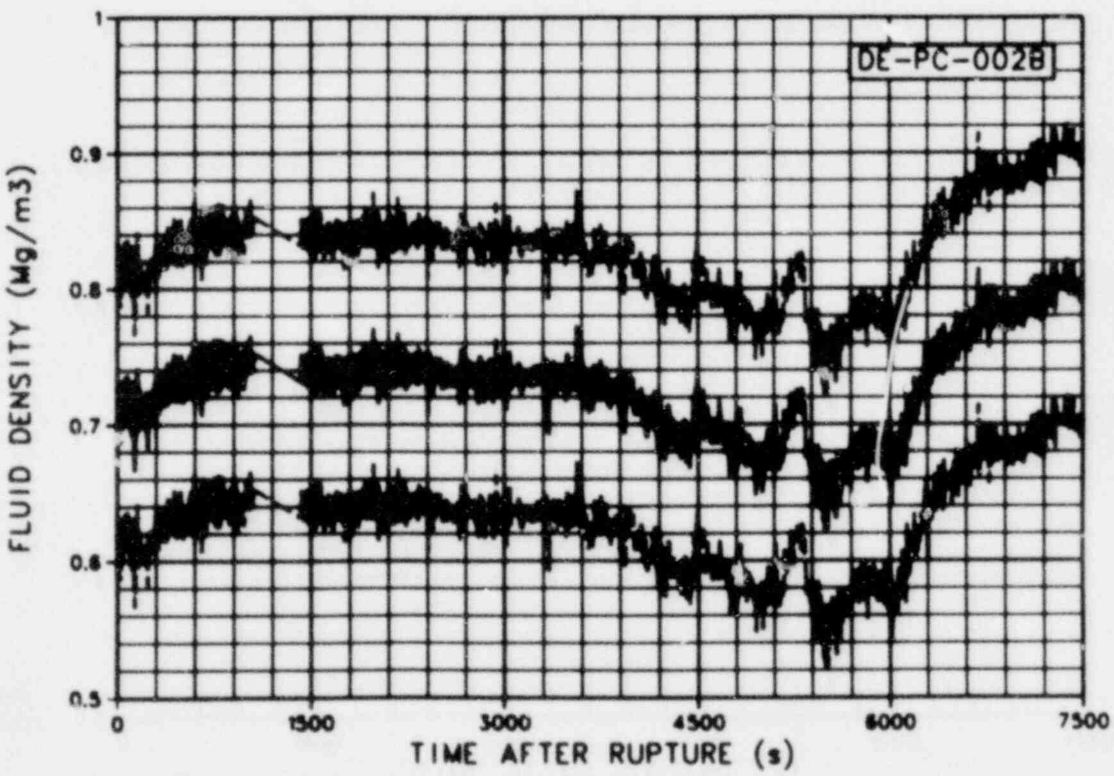


Figure 5U-4. Fluid density in intact loop hot leg, chordal density (DE-PC-002B) (qualified after reactor scram, range = 0 to 1.0 Mg/m^3, 2 sigma = + or - 0.10 Mg/m^3).

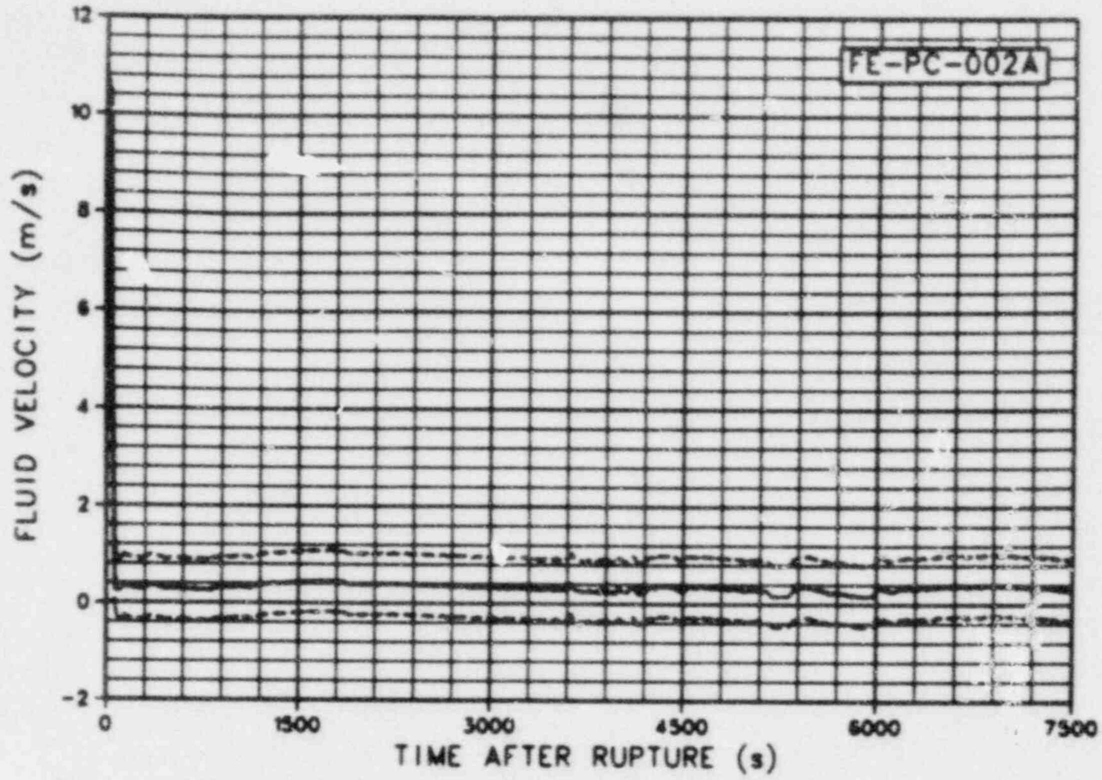


Figure 5U-5. Fluid velocity in intact loop hot leg DTT rake at bottom of pipe (FE-PC-002A) (qualified to 7500 s, range = 0.6 to 15.0 m/s, 2 sigma = + or - 0.63 m/s).

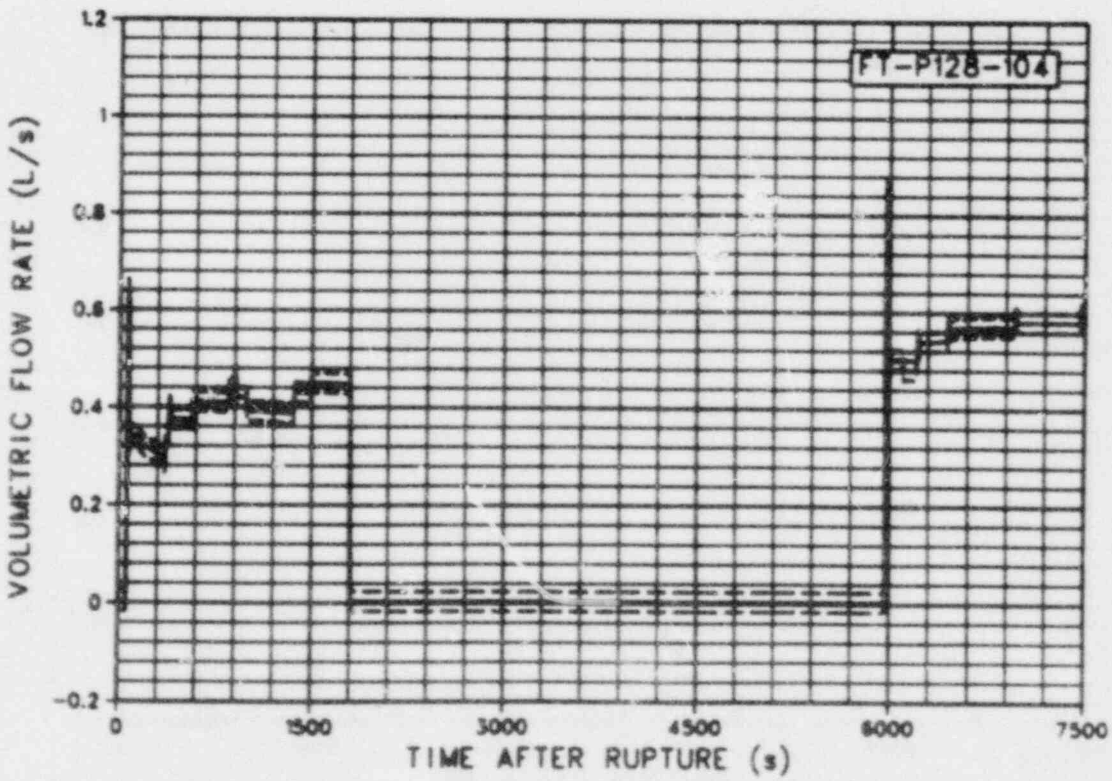


Figure 5U-6. Flow rate in HPIS Pump A discharge (FT-P128-104) (qualified, range = 0 to 1.89 L/s, 2 sigma = + or - 0.02 L/s)

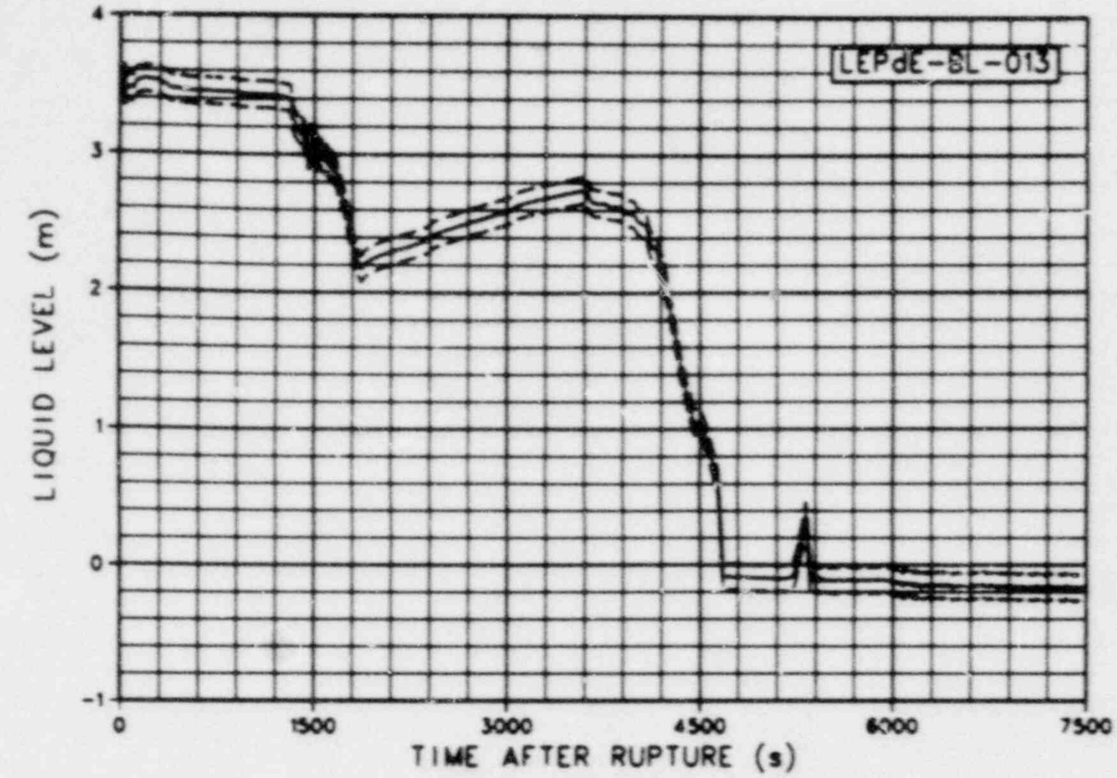


Figure 5U-7. Liquid level in broken loop steam generator simulator, inlet to top (LEPdE-BL-013) (qualified, range = 0 to 3.38 m, 2 sigma = + or - 0.096 m).

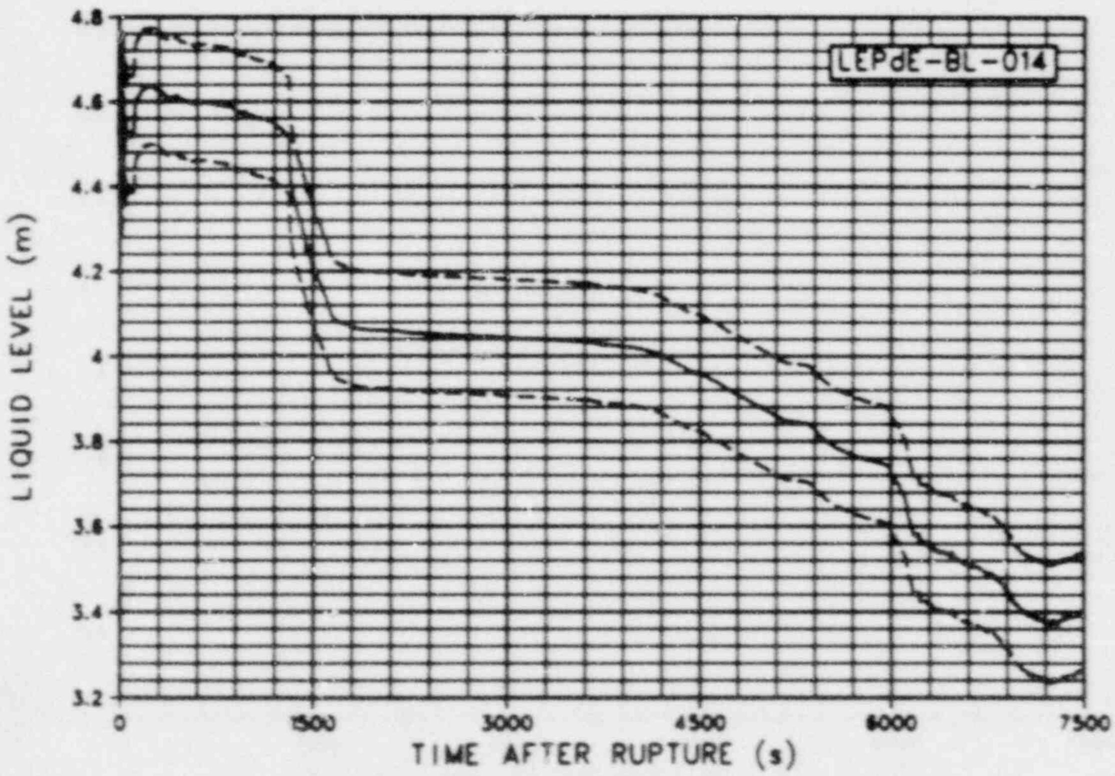


Figure 5U-8. Liquid level in broken loop steam generator simulator, outlet to top (LEPdE-BL-014) (qualified, unexplained long term drift should read 4.59 m at 1200 s, range = 0 to 4.59 m, 2 sigma = + or - 0.137 m).

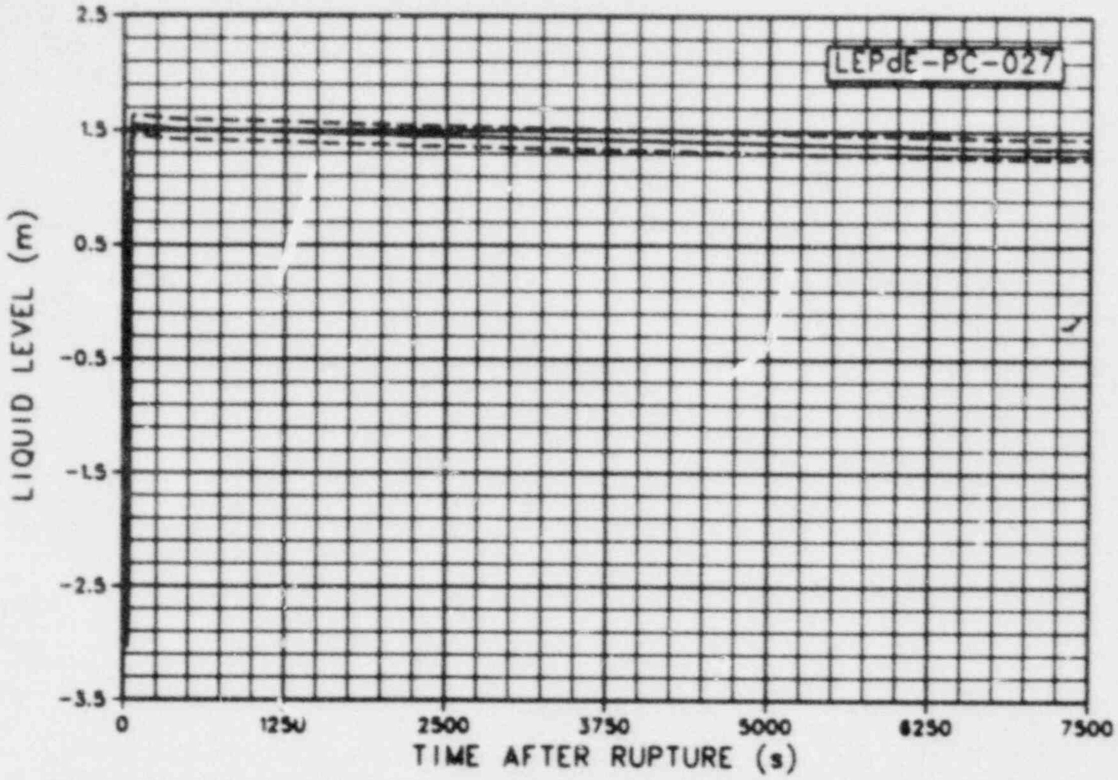


Figure 5U-9. Liquid level in intact loop between bottom of loop seal and steam generator outlet (LEPdE-PC-027) (qualified, unexplained long term drift should read 1.55 m at 1500 s, range = 0 to 1.55 m, 2 sigma = + or - 0.088 m).

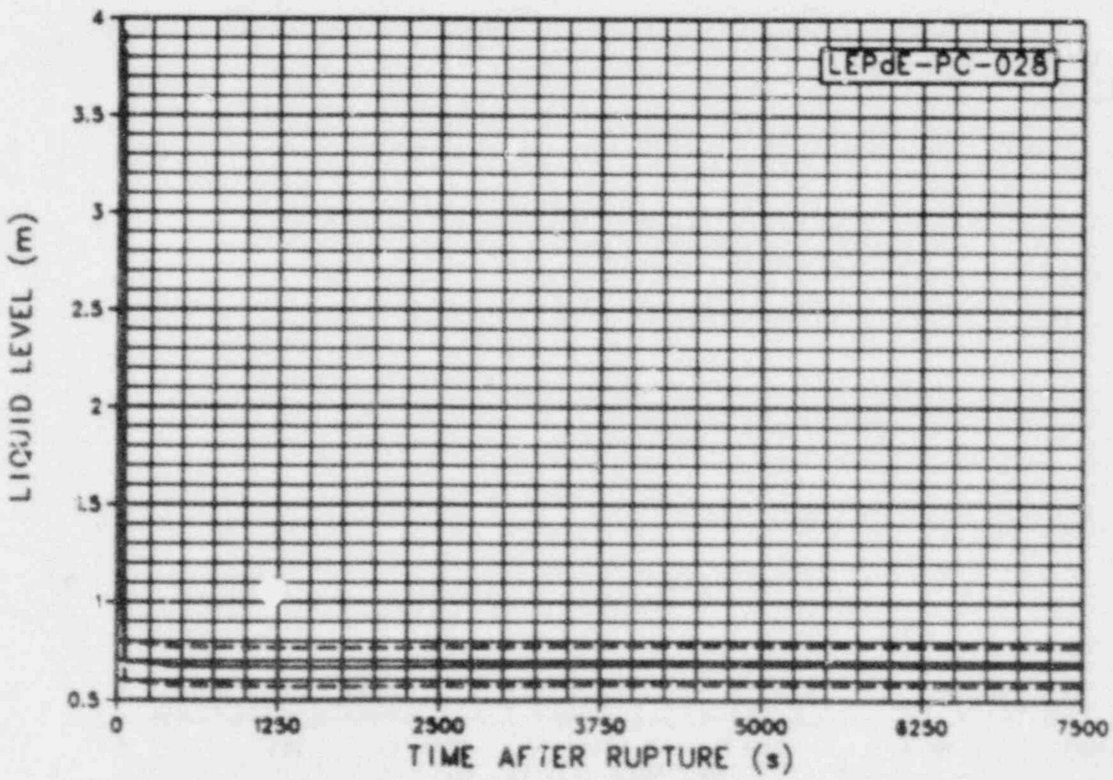


Figure 5U-10. Liquid level in intact loop between bottom of loop seal and primary coolant Pump 2 inlet (LEPdE-PC-029) (qualified, range = 0 to 0.66 m, 2 sigma = + or - 0.099 m).

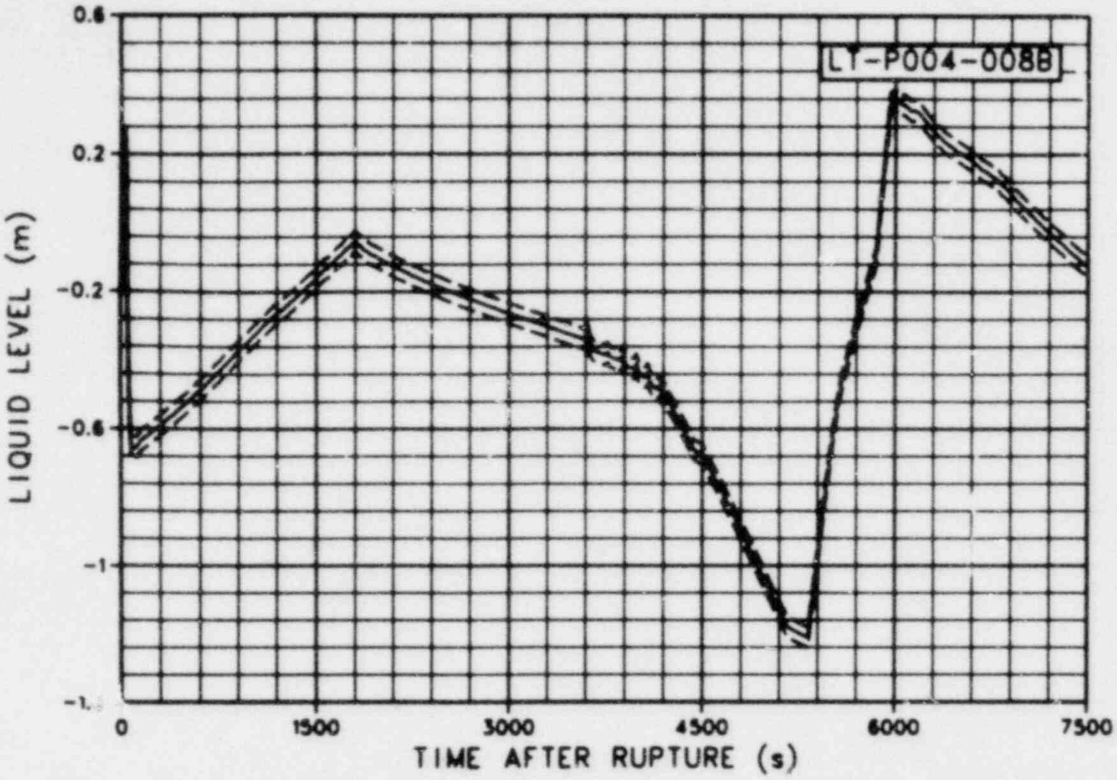


Figure 5U-11. Liquid level in steam generator secondary side, wide range (LT-P004-008B) (qualified, range = -3.6 to 1.4 m, 2 sigma = + or - 0.05 m).

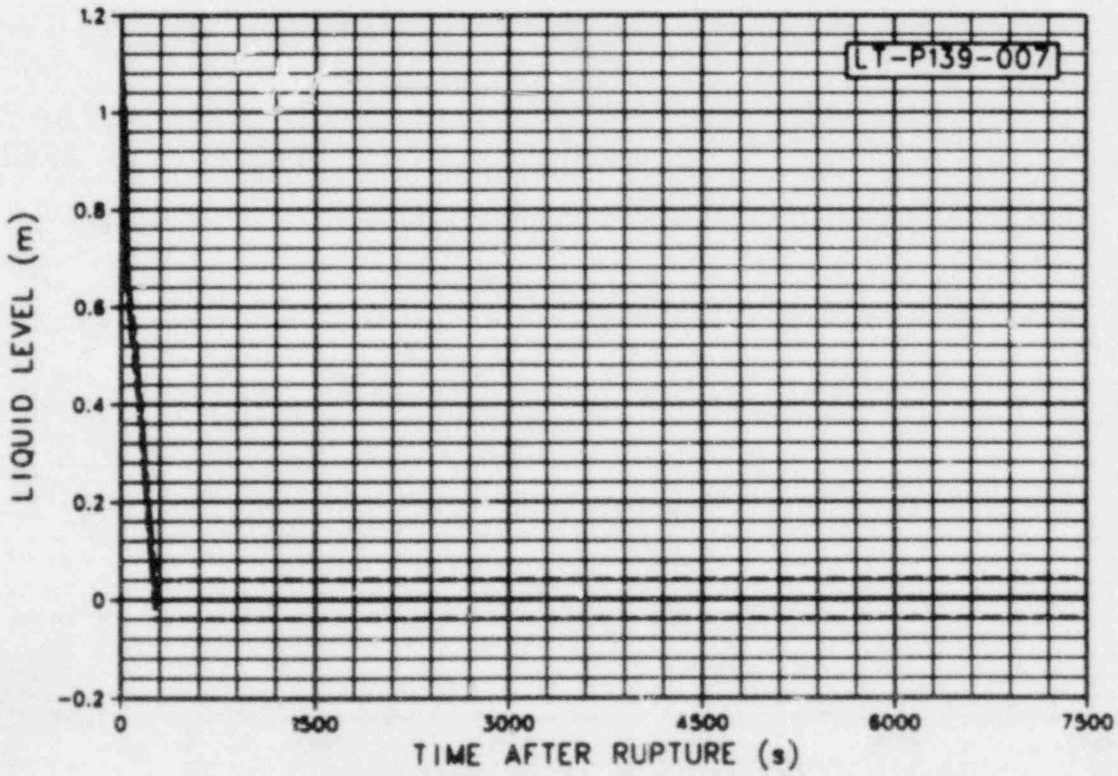


Figure 5U-12. Liquid level in pressurizer (LT-P139-007) (qualified, maximum range equals 1.8 m, range = 0 to 1.9 m, 2 sigma = + or - 0.04 m).

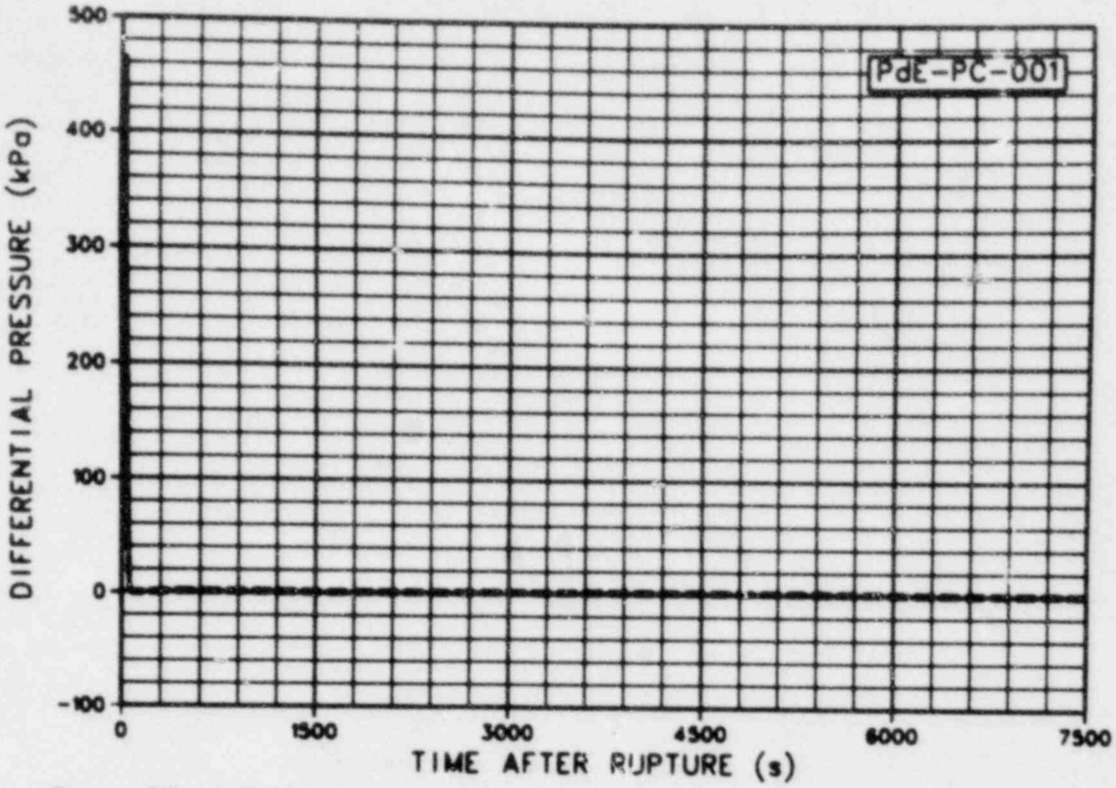


Figure 5U-13. Differential pressure in intact loop across primary coolant Pumps 1 and 2 (PdE-PC-001) (qualified, range = + or - 0.7 kPa (differential), 2 sigma = + or - 0.0017 kPa).

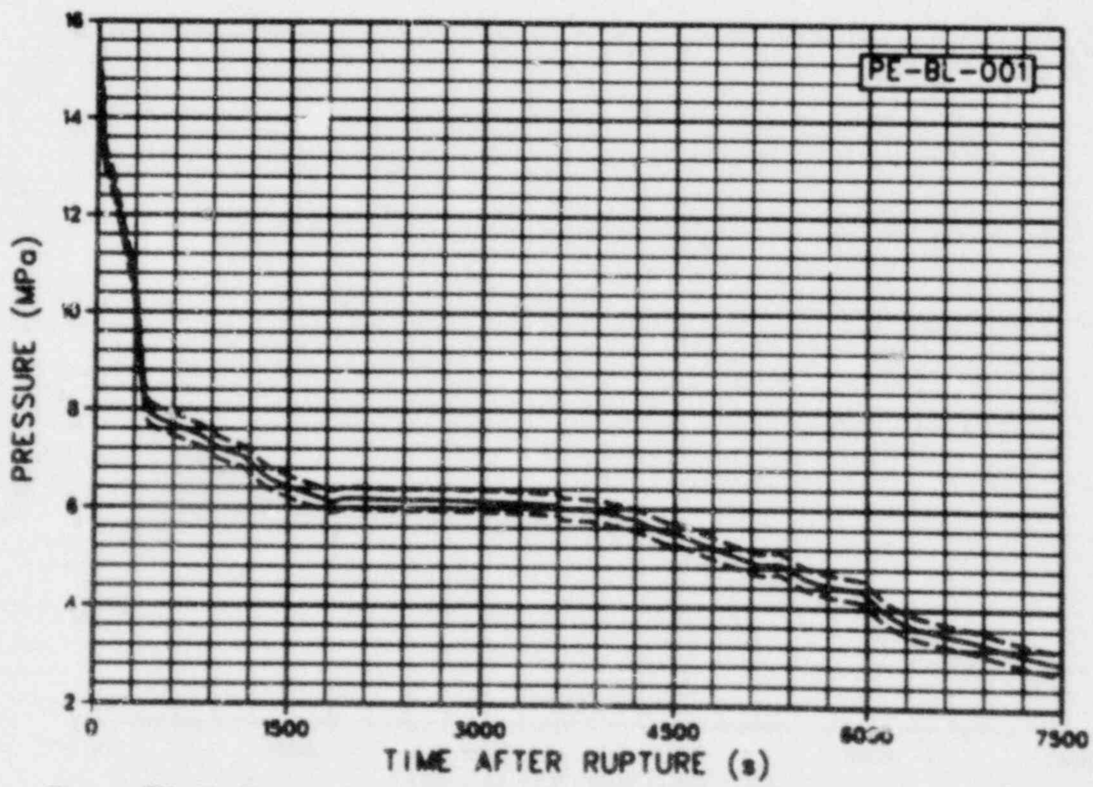


Figure 5U-14. Pressure in broken loop cold leg (PE-BL-001) (qualified, range = 0.1 to 20.8 MPa, 2 sigma = + or - 0.223 MPa).

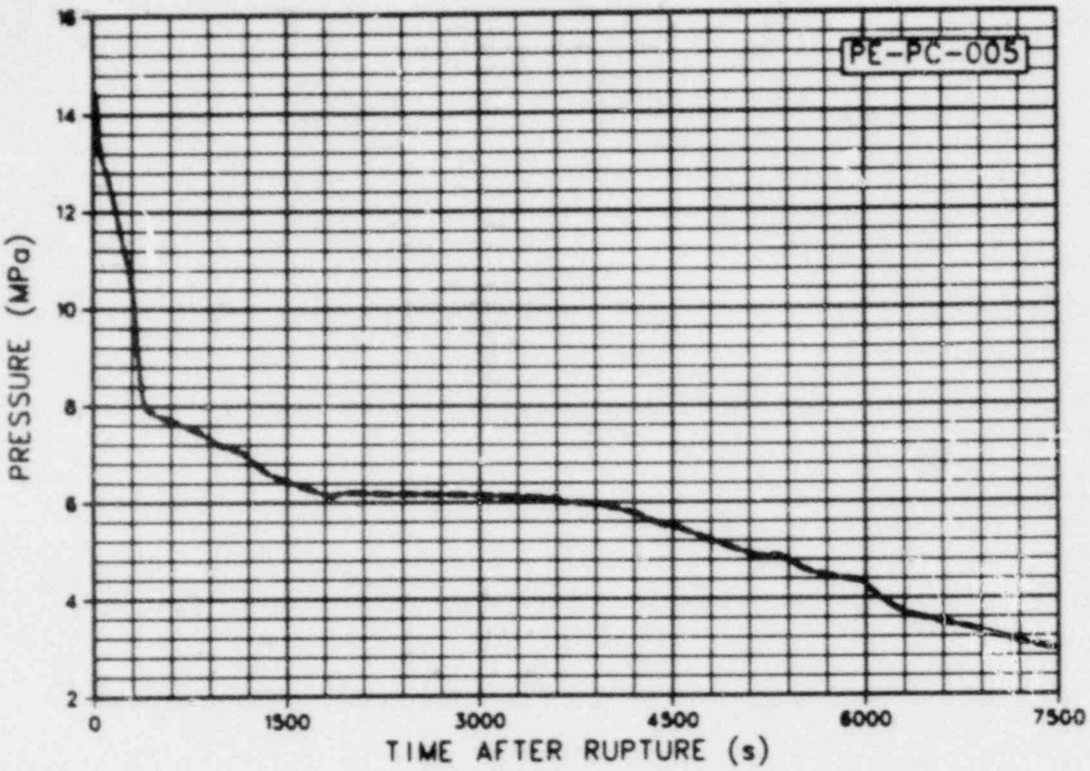


Figure 5U-15. Reference pressure in intact loop between steam generator outlet and pump inlet (PE-PC-005) (qualified, range = 0.1 to 17.0 MPa, 2 sigma = 0.028 MPa).

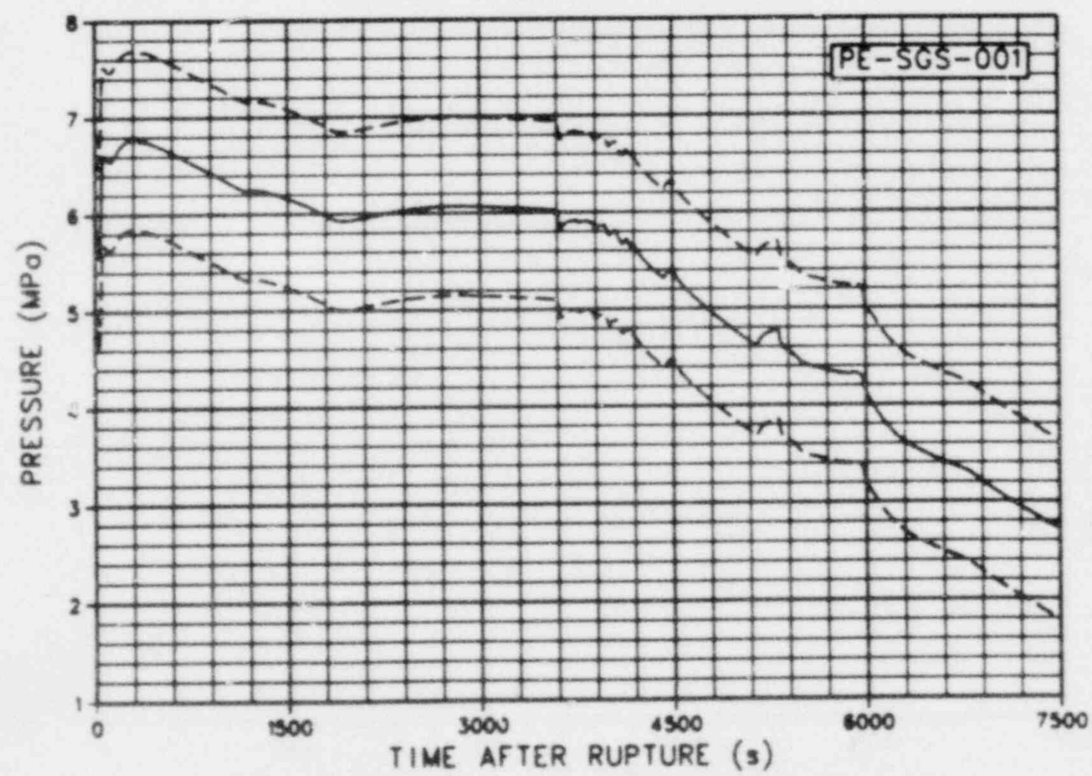


Figure 5U-16. Pressure in steam generator dome (PE-SGS-001) (qualified, range = 0.1 to 7.0 MPa, 2 sigma = + or - 0.012 MPa).

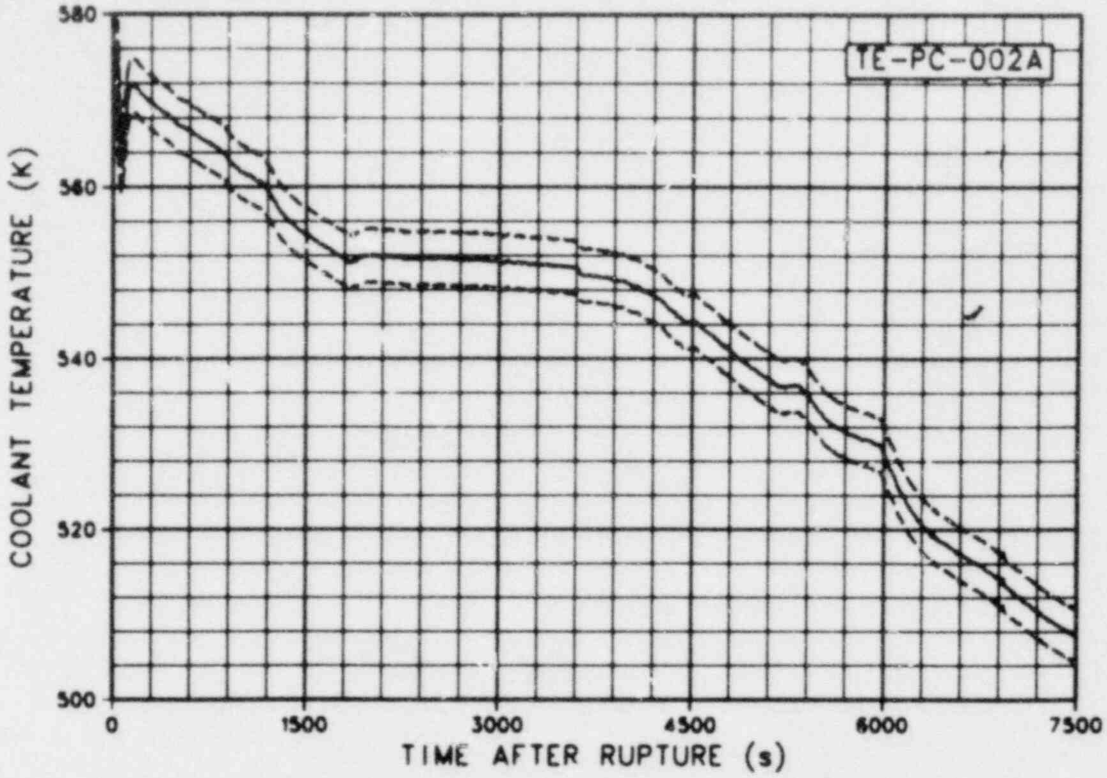


Figure 5U-17. Coolant temperature in intact loop hot leg DTT rake at bottom of pipe (TE-PC-002A) (qualified, range = 255.2 to 588.6 K, 2 sigma = + or − 2.5 K).

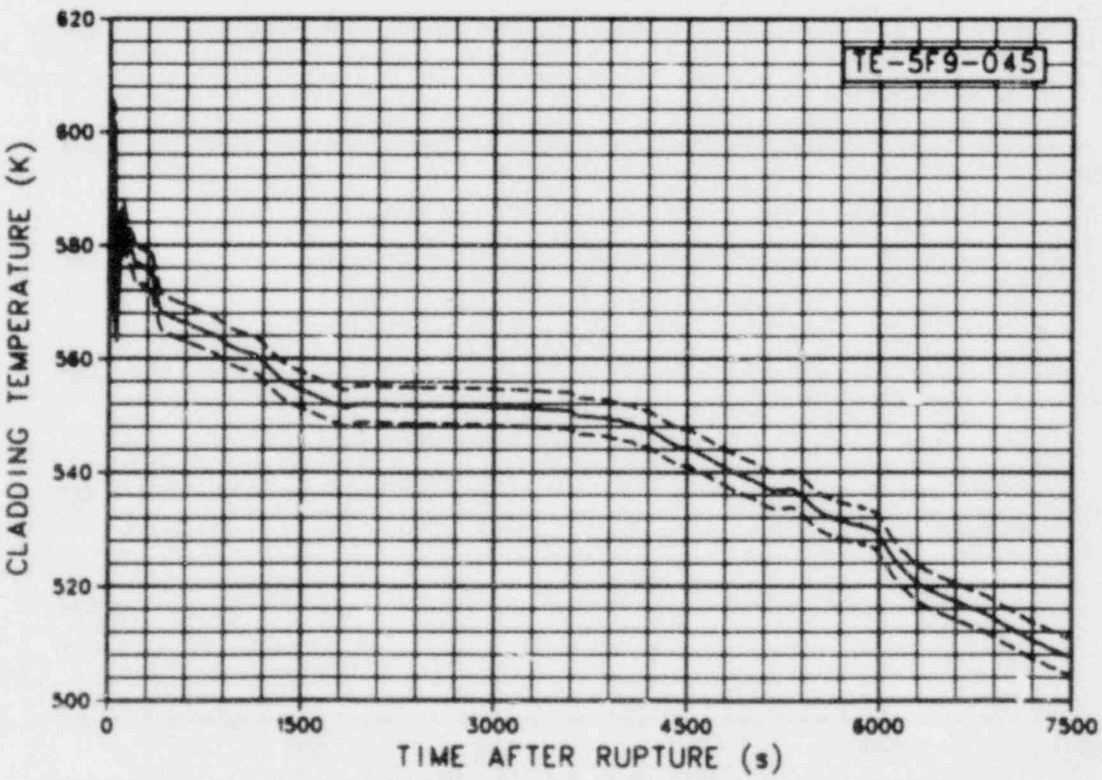


Figure 5U-18. Cladding temperature in reactor vessel at Fuel Assembly 5, Row F, Column 9 at 1.14 m above bottom of fuel rod (TE-5F9-045) (qualified, range = 422 to 1533 K, 2 sigma = + or − 3.0 K).

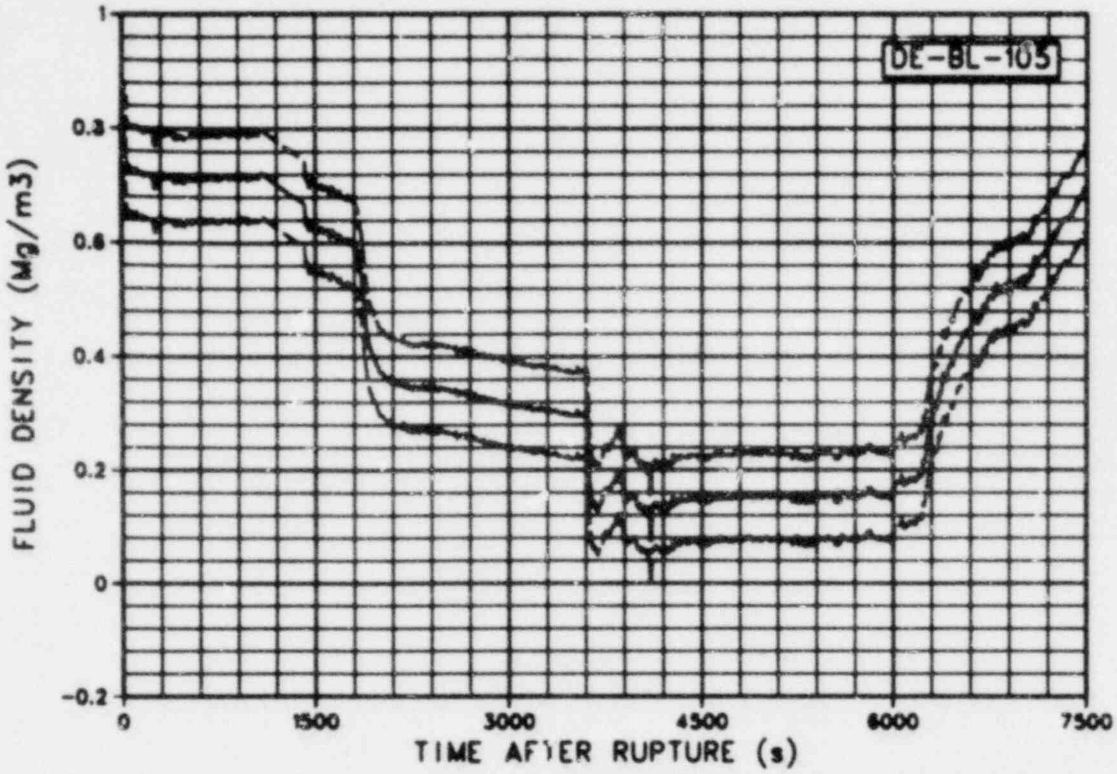


Figure 5U-19. Average fluid density in broken loop cold leg (DE-BL-105) (qualified after reactor scram, range = 0. to 1.0 Mg/m³, 2 sigma = + or − 0.076 Mg/m³).

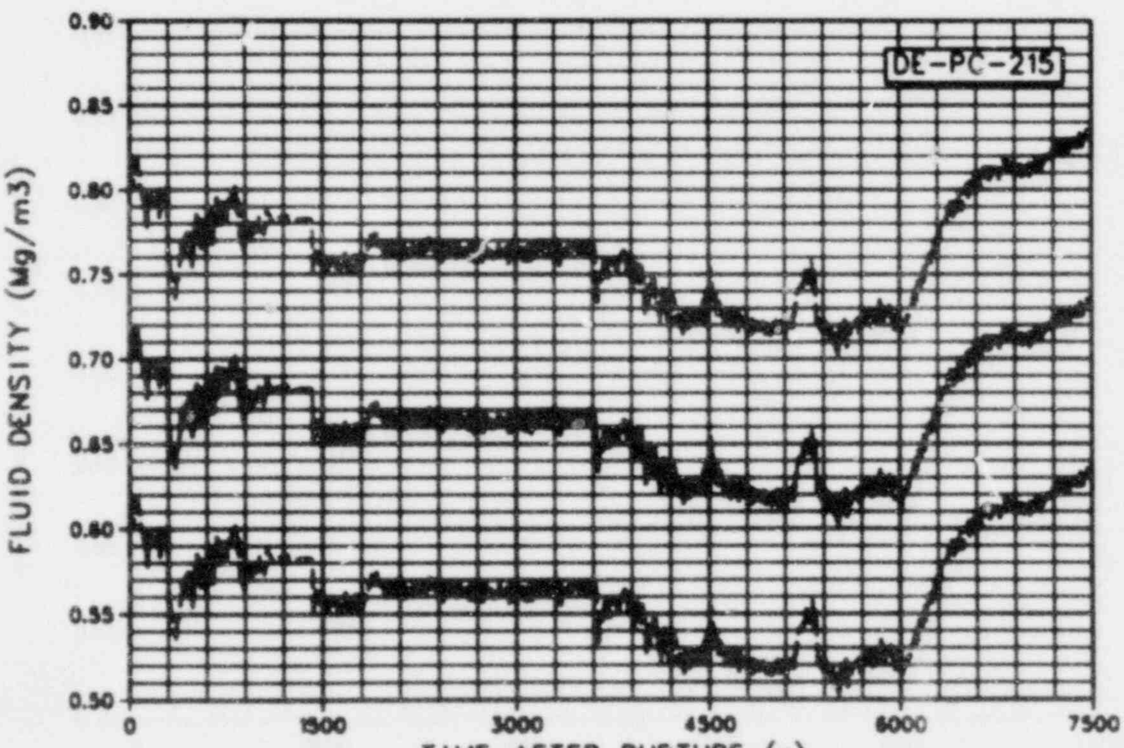


Figure 5U-20. Average fluid density in intact loop hot leg (DE-PC-215) (qualified after reactor scram, range = 0 to 1.0 Mg/m³, 2 sigma = + or − 0.10 Mg/m³).

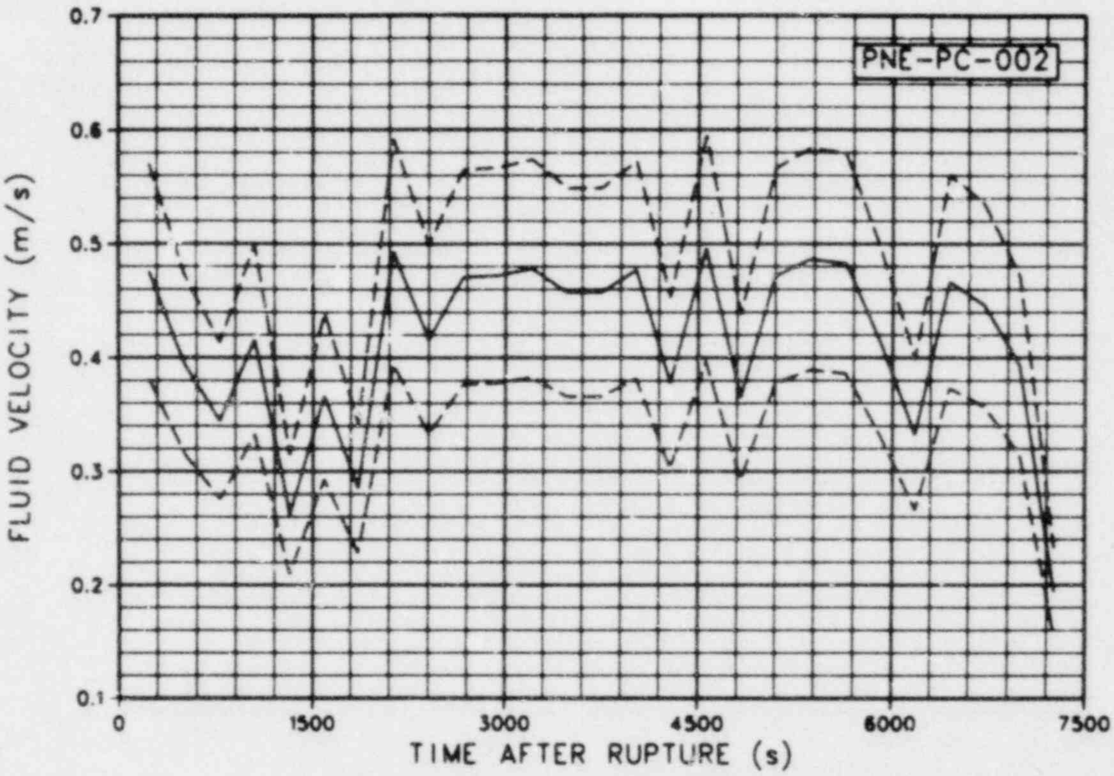


Figure 5U-21. Fluid velocity in intact loop hot leg (PNE-PC-002) (qualified; discrete values qualified, not continuous data, range = 0.08 to 7.0 m/s, 2 sigma = + or − 20 percent of reading).

6. REFERENCES

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APPENDIX A

DATA CONSISTENCY CHECKS

APPENDIX A

DATA CONSISTENCY CHECKS

The following discussion describes several techniques used to perform consistency checks on the data presented in this report. The purpose of these checks is to establish data integrity and to evaluate the performance of a given transducer.

1. CHECKS OF PREEXPERIMENT DATA

A series of tests was conducted at various temperatures, pressures, and flow rates prior to the loss-of-coolant experiment (LOCE). These tests included static pressure, steady state flow, zero flow, pump coastdown, isothermal, and accumulator blowdown tests. Using the data from these tests, the following checks were performed.

1.1 Absolute Pressure Data

During the approach to initial conditions, a series of static pressure tests was performed. After each test, the absolute pressure measurements were compared with two reference pressures (PE-PC-005 and -006). The pressure tests were used to evaluate the slope coefficient of the calibration equations, and to evaluate the pressure sensitivity of the transducers.

The blowdown suppression tank (BST) pressure measurements were checked against atmospheric pressure prior to the LOCE.

The steam generator pressure was checked against the temperature in the steam generator by comparing the pressure obtained from the steam tables, using the steam generator temperature, with the pressure transducer reading.

When the accumulator was pressurized, both accumulator pressure transducer readings were checked by comparing one with the other.

1.2 Flow Data

Measurements of fluid flow included pump speed, differential pressure, venturi, turbines, drag disks, the pulsed neutron activation system and transit time flowmeter. The measurements were analyzed primarily to check the zero offset. Turbine and drag disk measurements were also analyzed to check slope coefficient (gain) changes.

1.2.1 Pump Speed Data. The reference measurement for all intact loop flow measurements was primary coolant pump speed, because it is the most accurate and stable of the flow measurements. The pump speed measurement was adjusted using a square wave generator to calibrate the digital-to-analog conversion.

During heatup, the zero reading was checked at every zero flow point, and during flow tests, the pump speed was checked against pump frequency. Pump speed measurements were checked for consistency by comparison with pump speed as calculated from the primary system motor generator frequencies. This check was valid prior to and during the LOCE until the primary system motor generator field breakers were opened at 56.2 ± 0.1 s. Prior to the LOCE, the pump speed was further checked by reviewing the agreement with previous Loss-of-Fluid Test (LOFT) experiments. Pump-run voltages and currents were evaluated prior to the LOCE by calculating the pump electrical horsepower input, the pump water power, and finally the combined pump efficiency. These calculated efficiencies were then compared with previously recorded efficiencies determined during pump requalification tests.

1.2.2 Differential Pressure Data. Zero offsets were determined from flow data, static pressure tests, and temperature sensitivity data derived during the heatup. Steady state flow conditions for the primary coolant system (PCS) were then established, and selected PCS pressure drops were compared with predicted values. At various flow conditions, intact loop flow resistance coefficients were calculated and verified to remain essentially constant and to agree with previously tabulated data. Further consistency checks were performed on the intact loop differential pressure measurements by plotting the square root of the differential pressure against pump speed using data from the pump frequency tests. The results of the curve fits performed on those plots were then used to confirm zero offsets. Both prior to and during the LOCE, differential pressure measurements were compared with the differential pressure computed by subtracting appropriate absolute pressure measurements. Finally, pressure closure was calculated for the two flow loops: (a) the PCS intact loop, and (b) the broken loop cold leg to the blowdown suppression tank (BST).

1.2.3 Venturi Data. Consistency checks were performed by comparing the venturi mass flow rate with venturi mass flow rates from previous LOFT experiments (with the same loop resistance) and to each other. A comparison of the venturi with the pump speed consisted of performing a least-squares-fit of the venturi data versus the pump data (derived from the pump speed frequency test). The results were used to correct any zero offset in the venturi. The corrected venturi data were then used to calculate the average fluid velocity and momentum flux of the intact loop. The computed velocity was compared to the differential pressure measured across the pumps, the steam generator, and the reactor vessel.

In addition, the computed fluid velocity and the momentum flux were compared to the output of the turbines and drag disks in the reactor vessel.

1.2.4 Drag Disk Turbine (DTT) Data. Reactor vessel drag discs were compared with values calculated from venturi mass flow, assuming the full flow area. Slope coefficients were calculated, and the effect of temperature on the calibration coefficients was determined.

After the slope coefficients had been verified, the data for a given transducer were plotted against pump speed and a least-squares-fit performed. The zero offset from this curve fit was used to modify the zero offset of the transducers.

As an independent check, the turbine flowmeter and drag disk data were used to calculate fluid density. These values were then compared to the known single-phase density prior to the LOCE. This analysis was performed on all the turbine flowmeter and drag disk measurements with the exception of those that failed.

1.2.5 Pulsed Neutron Activation (PNA) System Data. Fluid velocities during steady state operation were measured by the PNA. These velocities were compared with fluid velocities as computed by the venturi.

1.2.6 Transit Time Flowmeter (TTF) Data. Checks of the TTF were performed during the pre-LOCE accumulator blowdown by comparing the computed velocity using different combinations of the TTF thermocouples.

In addition, a check of the TTF was performed by comparing the TTF data to the suppression tank liquid levels. The TTF data and the fluid density were used to calculate the total fluid mass that flowed out the break, which was then compared to the suppression tank fluid mass increase calculated using the liquid levels.

1.3 Gamma Densitometer Data

To evaluate the PCS average fluid densities, calculations were performed using the gamma densitometers. The densitometers were checked for normal operation by recording and examining data tapes approximately 1 day before the LOCE, and by observing spectra, count rate data, and live-time data on the densitometer system display console during and immediately before the LOCE.

1.4 Level Measurement Data

Five system level measurements were evaluated: (a) Accumulator A liquid level, (b) BST liquid level, (c) pressurizer coolant level, (d) pump suction liquid level, and (e) reactor vessel coolant level. The accumulator level was qualified by comparing the pre-LOCE liquid levels as measured with the level detector to the level measured by an external sightglass. BST liquid level measurements were qualified by comparing the three available measurements. Similarly, pressurizer level was reviewed by redundant level measurements. The pump suction liquid levels were checked at zero flow conditions with the plant full of water. The reactor vessel liquid level probes were verified by performing a preexperiment conductivity calibration with the vessel full under cold and hot plant conditions.

1.5 Thermocouple Data

Temperature measurements were analyzed by comparing them with other temperature data obtained during the isothermal tests. Resistance temperature measurements were used for reference where they existed. If saturation conditions existed, the temperature was compared with the temperature from the steam tables using pressure measurements as the reference. Temperature measurements outside the primary coolant were compared with any known temperature in the same area.

2. CHECKS DURING AND AFTER THE LOCE

The purpose of these checks was to further establish the data integrity. For each type of measurement, comparable data channels were evaluated and the determination of data consistency was identified The following is a brief summary of those checks.

2.1 Absolute Pressure Data

During the LOCE, the saturated steam temperature was determined from the saturated steam table using pressure transducer data. The computed temperature was compared with the temperature measured by the thermocouple. However, this was valid only during saturation. When complete voiding occurred, the measured temperature increased above the corresponding saturation temperature because of conduction and radiant heating of the detector element by the surrounding warmer environment (pipe walls, etc.).

2.2 Flow Data

Immediately after the LOCE, flow data are again compared for consistency. In addition, LOCE data were compared with previous, similar experiments. A summary of the consistency checks for the pump and flow transducer measurements follows.

2.2.1 Pump Speed Data. The primary coolant pump motor generator field breakers were opened at 56.2 ± 0.1 s after initiation of the LOCE. Pump speed measurements were compared during pump coastdown.

2.2.2 Differential Pressure Data. Immediately after the LOCE, when steady state operating conditions had been established, the differential pressure measurements around the intact loop were summed and compared with the differential pressure across the primary coolant pumps.

2.2.3 Venturi Data. The initial conditions data from the venturi were checked for data consistency by comparing them with pre-LOCE flow test data. The flow venturi was used only for steady state initial conditions information.

2.2.4 DTT Data. Initial conditions data were checked by calculating momentum flux from the venturi mass flow rate and from the known density for those DTTs that were not overranged. These values were then compared with the measured values from the DTT.

2.2.5 PNA System Data. The fluid velocity obtained from the PNA system was compared to the DDT data at the same location.

LOCE data were checked by comparing data from previous tests. An additional check was made by comparing the basic shape of the velocity or momentum flux curves with a differential pressure close to the DTT.

2.3 Gamma Densitometer Data

Checks of the calibration constants were obtained from the all-liquid readings a few seconds prior to the LOCE and half-liquid, half-steam conditions when the break orifice uncovered. The fluid densities for the all-liquid and all-steam conditions were determined from the steam tables using temperature and pressure measurements.

2.4 Liquid Level Data

The accumulator level was verified by comparing the pre-LOCE and post-LOCE liquid levels, as measured with the liquid level detector, with the level measured by an external sightglass. The BST liquid level was evaluated by comparing three independent liquid level measurements. Similarly, pressurizer liquid level was reviewed by redundant liquid level measurements. During the LOCE, the reactor vessel liquid level measurements were compared to core thermocouple data; when the liquid level dropped below a given thermocouple, the measured temperature increased.

2.5 Temperature Data

The temperatures during the LOCE were compared with saturation temperatures determined from the steam tables using pressure data and with previous data. Initial conditions were also checked by comparing all primary coolant thermocouple and resistance thermometer detector measurements. Suppression tank thermocouple measurements were compared in a like manner.

APPENDIX B

EXPERIMENT L3-7 INSTRUMENTATION LIST

APPENDIX B

EXPERIMENT L3-7 INSTRUMENTATION LIST

Table B-1 contains a list of all the instruments in the Loss-of-Fluid Test (LOFT) system that were available to be used for Experiment L3-7. Included in Table B-1 are the instrument location, range, initial condition uncertainty, uncertainty at specific readings, and recording frequency. The "Comments" column contains information relative to the usability of the data. No entry under the "Comments" column means that the instrument was recorded, but the data were not reviewed or presented. No entry under the "Initial Condition Uncertainty" column means that the instrument was recorded only on the plant log and surveillance system.

TABLE B-1. EXPERIMENT L3-7 INSTRUMENTATION LIST

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation: Reading	After Experiment Initiation: Uncertainty (±)	Comments
VALVE OPENING							
Intact Loop							
CV-P004-008	Main feedwater control valve.	0 to 100%	1 Hz	3.2%	0% 25% 50% 100%	3.0% 3.13% 3.47% 4.61%	Qualified.
CV-P004-010	Main steam control valve.	0 to 100%	1 Hz	4.06%	0% 25% 50% 100%	3.0% 3.13% 3.47% 4.61%	Qualified.
CV-P004-090	Main steam bypass valve.	0 to 100%	1 Hz	--	0% 25% 50% 100%	3.0% 3.13% 3.47% 4.61%	
CV-P004-091	Main feedwater bypass valve.	0 to 100%	1 Hz	3.0%	0% 25% 50% 100%	3.0% 3.13% 3.47% 4.61%	
Broken Loop							
CV-P138-001	Broken loop cold leg between break plane and suppression tank.	0 to 100%	1 Hz	3.0%	0% 25% 50% 100%	3.0% 3.13% 3.47% 4.61%	
CV-P138-015	Quick-opening blowdown valve (QOBV) in hot leg.	0 to 100%	1 Hz	3.0%	0% 25% 50% 100%	3.0% 3.13% 3.47% 4.61%	
CV-P138-070A	Blowdown system bypass valve.	0 to 100%	1 Hz	4.61%	0% 25% 50% 100%	3.0% 3.13% 3.47% 4.61%	
CV-P138-071A	Blowdown system bypass valve.	0 to 100%	1 Hz	4.61%	0% 25% 50% 100%	3.0% 3.13% 3.47% 4.61%	

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation		Comments
					Reading	Uncertainty (±)	
VALVE OPENING (continued)							
Broken Loop (continued)							
CV-P138-123	1.3-L/s spray header control valve.	0 to 100%	1 Hz	4.61%	0% 25% 50% 100%	3.0% 3.13% 3.47% 4.61%	
CV-P138-124	3.8-L/s spray header control valve.	0 to 100%	1 Hz	4.61%	0% 25% 50% 100%	3.0% 3.13% 3.47% 4.61%	
CV-P138-125	13.9-L/s spray header control valve.	0 to 100%	1 Hz	4.13%	0% 25% 50% 100%	3.0% 3.13% 3.47% 4.61%	
CHORDAL DENSITY							
Broken Loop							
DE-BL-001A	Broken loop cold leg at drag disc turbine transducer (DTT) flange. Beam A is 14^{o} 21 min from Beam B [CW looking toward reactor vessel (RV)].	0 to 1.0 Mg/m^3	10 Hz	--	--	0.068 Mg/m^3[b]	Qualified after reactor scram.
DE-BL-001B	Broken loop cold leg at DTT flange. Beam B through centerline of pipe 45^{o} from vertical (CCW looking toward RV).	0 to 1.0 Mg/m^3	10 Hz	--	--	0.076 Mg/m^3	Qualified after reactor scram.
DE-BL-001C	Broken loop cold leg at DTT flange. Beam C is 22^{o} 7 min from Beam B (CCW looking toward RV).	0 to 1.0 Mg/m^3	10 Hz	--	--	0.11 Mg/m^3	Qualified after reactor scram.

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation Reading	After Experiment Initiation Uncertainty (±)	Comments
CHORDAL DENSITY (continued)							
Broken Loop (continued)							
DE-BL-002A	Broken loop hot leg at DTT flange. Beam A is 14° 21 min from Beam B (CCW looking toward RV).	0 to 1.0 Mg/m^3	10 Hz	--	-	0.12 Mg/m^3	Qualified after reactor scram.
DE-BL-002B	Broken loop hot leg at DTT flange. Beam B through centerline of pipe 45° from vertical (CW looking toward RV).	0 to 1.0 Mg/m^3	10 Hz	--	--	0.065 Mg/m^3	Qualified after reactor scram.
DE-BL-002C	Broken loop hot leg at DTT flange. Beam C is 22° 7 min from Beam B (CW looking toward RV).	0 to 1.0 Mg/m^3	10 Hz	--	--	Not available.	Failed.
Intact Loop							
DE-PC-001A	Intact loop cold leg at DTT flange. Beam A is 14° 21 min from Beam B (CW looking away from RV).	0 to 1.0 Mg/m^3	10 Hz	--	--	Not available.	Failed.
DE-PC-001B	Intact loop cold leg at DTT flange. Beam B through centerline of pipe 45° from vertical (CCW looking away from RV).	0 to 1.0 Mg/m^3	10 Hz	--	--	0.068 Mg/m^3	Qualified after reactor scram.
DE-PC-001C	Intact loop cold leg at DTT flange. Beam C is 22° 7 min from Beam B (CCW looking away from RV).	0 to 1.0 Mg/m^3	10 Hz	--	--	0.092 Mg/m^3	Qualified after reactor scram.

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation: Reading	After Experiment Initiation: Uncertainty (±)	Comments
CHORDAL DENSITY (continued)							
Intact Loop (continued)							
DE-PC-002A	Intact loop hot leg at DTT flange. Beam A is 14° 21 min from Beam B (CW looking away from RV).	0 to 1.0 Mg/m^3	10 Hz	--	--	0.054 Mg/m^3	Qualified after reactor scram.
DE-PC-002B	Intact loop hot leg at DTT flange. Beam B through centerline of pipe 45° from vertical (CCW looking away from RV).	0 to 1.0 Mg/m^3	10 Hz	--	--	0.10 Mg/m^3	Qualified after reactor scram.
DE-PC-002C	Intact loop hot leg at DTT flange. Beam C is 22° 7 min from Beam B (CCW looking away from RV).	0 to 1.0 Mg/m^3	10 Hz	--	--	0.091 Mg/m^3	Qualified after reactor scram.
DE-PC-003A	Intact loop below steam generator (SG) at DTT flange. Beam C is 14° 21 min from Beam B (CCW looking away from RV).	0 to 1.0 Mg/m^3	1 Hz	--	--	Not available.	
DE-PC-003B	Intact loop below SG at DTT flange. Beam B through centerline of pipe 45° from vertical (CW looking away from RV).	0 to 1.0 Mg/m^3	1 Hz	--	--	Not available.	
DE-PC-003C	Intact loop below SG at DTT flange. Beam C is 22° 7 min from Beam B (CW looking away from RV).	0 to 1.0 Mg/m^3	1 Hz	--	--	Not available.	

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation		Comments
					Reading	Uncertainty (±)	
FUEL ASSEMBLY DISPLACEMENT							
Assembly 5							
DIE-5UP-001	At top center of Fuel Assembly 5.	±12.7 mm	100 Hz	0.3 mm	0 mm 6.35 mm 12.7 mm	0.3 mm[c] 0.33 mm 0.39 mm	
DIE-5UP-002	At top center of Fuel Assembly 5.	±12.. mm	100 Hz	0.3 mm	0 mm 6.35 mm 12.7 mm	0.3 mm 0.33 mm 0.39 mm	
FLUID VELOCITY							
Intact Loop							
FE-PC-002A	Hot leg DTT flange at bottom of pipe.	[illegible] to 15.0 m/s	1 Hz	0.63 m/s	1 m/s 8 m/s 15 m/s	0.16 m/s[d] 0.48 m/s 0.86 m/s	Qualified to 7500 s.
FE-PC-002B	Hot leg DTT flange at middle of pipe.	0.6 to 15.0 m/s	1 Hz	0.16 m/s	1 m/s 8 m/s 15 m/s	0.16 m/s 0.48 m/s 0.86 m/s	Failed.
FE-PC-002C	Hot leg DTT flange at top of pipe.	0.6 to 15.0 m/s	1 Hz	0.16 m/s	1 m/s 8 m/s 15 m/s	0.16 m/s 0.48 m/s 0.86 m/s	Failed.
Reactor Vessel							
FE-5UP-001	Above upper end box of Fuel Assembly 5.	0.5 to 10.0 m/s	1 Hz	0.23 m/s	1 m/s 5 m/s 10 m/s	0.06 m/s 0.28 m/s 0.56 m/s	Qualified, zero offset beyond 7500 s due to electronics.
FLOW RATE							
Blowdown Suppression Tank Spray System							
FE-P138-138	Blowdown suppression tank (BST) spray flow rate in the 3.79-L/s header.	0 to 6.3 L/s	1 Hz	0.07 L/s	0 L/s 4 L/s 6 L/s	0.06 L/s 0.23 L/s 0.35 L/s	

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation Reading	After Experiment Initiation Uncertainty (±)	Comments
FLOW RATE (continued)							
Blowdown Suppression Tank Spray System							
FE-P138-139	BST spray flow rate from pump discharge.	0 to 25.2 L/s	1 Hz	0.57 L/s	0 L/s 12 L/s 25 L/s	0.25 L/s 0.72 L/s 1.43 L/s	
FE-P138-140	BST spray flow rate in 13.9-L/s header.	0 to 18.9 L/s	1 Hz	0.83 L/s	0 L/s 10 L/s 18.9 L/s	0.19 L/s 0.60 L/s 1.08 L/s	
FE-P138-153	BST spray flow rate in the spray pump recirculation line.	0 to 9.5 L/s	1 Hz	0.14 L/s	0 L/s 5 L/s 9.5 L/s	0.10 L/s 0.30 L/s 0.54 L/s	
Intact Loop							
FT-P004-012	Inlet to air-cooled condenser inlet header.	0 to 40 kg/s	1 Hz	0.8 kg/s	--	0.8 kg/s	Qualified.
FT-P004-072A	Main feedwater pump discharge flow.	0 to 25 kPa	10 Hz	0.17 kPa	--	0.17 kPa	Qualified, negative values should read zero, but are within measurement uncertainty.
FT-P004-72-2	Flow out of main feedwater pump.	0 to 40 kg/s	1 Hz	0.8 kg/s	--	0.8 kg/s	
Emergency Core Cooling System							
FT-P120-36-1	Accumulator A in 6-in. line downstream of orifice.	0 to 126.2 L/s	1 Hz	3.5 L/s	--	3.5 L/s	
FT-P120-36-5	Accumulator A in 6-in. line downstream of orifice.	0 to 37.9 L/s	1 Hz	3.5 L/s	--	3.5 L/s	

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation Reading	After Experiment Initiation Uncertainty (±)	Comments
FLOW RATE (continued)							
Emergency Core Cooling System (continued)							
FT-P120-085	Low-pressure injection system (LPIS) Pump A in 4-in. line between heat exchanger and orifice.	[illegible] 25.2 L/s	1 Hz	2.5 L/s	--	2.5 L/s	Qualified.
FT-P128-085	Charging Pump AC-P-48 discharge.	0 to 1.89 L/s	1 Hz	0.02 L/s	--	0.02 L/s	
FT-P128-104	High-pressure injection system (HPIS) Pump A discharge.	0 to 1.89 L/s	1 Hz	0.02 L/s	--	0.02 L/s	Qualified.
Intact Loop							
FT-P139-27-1	Intact loop hot leg venturi flowmeter (right side facing SG).	0 to 630.0 kg/s	1 Hz	17 kg/s	--	17 kg/s	Qualified, good for initial conditions only.
FT-P139-27-2	Intact loop hot leg venturi flowmeter (bottom of pipe).	0 to 630.0 kg/s	1 Hz	17 kg/s	--	17 kg/s	Qualified for initial conditions only.
FT-P139-27-3	Intact loop hot leg venturi flowmeter (left side facing SG).	0 to 630.0 kg/s	1 Hz	17 kg/s	--	17 kg/s	Qualified for initial conditions only.
Primary Component Cooling System							
FT-P141-022	Primary component cooling system.	0 to 22 L/s	10 Hz	0.11 L/s	--	0.11 L/s	Qualified.

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation: Reading	After Experiment Initiation: Uncertainty (±)	Comments
LIQUID LEVEL							
Broken Loop							
LEPdE-BL-013	SG simulator, inlet to top.	0 to 3.38 m	1 Hz	0.096 m	--	0.096 m	Qualified.
LEPdE-BL-014	SG simulator, outlet to top.	0 to 4.59 m	1 Hz	0.137 m	--	0.137 m	Qualified, unexplained long-term drift, should read 4.59 m at 1200 s.
Intact Loop							
LEPdE-PC-027	SG outlet to Pump suction, lowest point.	0 to 1.55 m	1 Hz	Not applicable, data meaningful only after 380 s.	--	0.088 m	Qualified, unexplained long-term drift, should read 1.55 m at 1500 s.
LEPdE-PC-028	Pump suction, lowest point to Pump 2 inlet.	0 to 0.66 m	1 Hz	No applicable, data meaningful only after 380 s.	--	0.099 m	Qualified.
Emergency Core Cooling System							
LIT-P120-044	Accumulator A.	0 to 3.0 m	1 Hz	0.02 m	--	0.02 m	Qualified, uncertainty of ± 5% due to pressure sensitivity.
Secondary Coolant System							
LT-P004-008A	SG feedwater level (narrow range).	-1.1 to 1.5 m	1 Hz	0.03 m	--	0.03 m	
LT-P004-008B	SG feedwater level (wide range).	-3.6 to 1.4 m[e]	1 Hz	0.05 m	--	0.05 m	Qualified.

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation: Reading	After Experiment Initiation: Uncertainty (±)	Comments
LIQUID LEVEL (continued)							
Intact Loop							
LT-P004-042	Condensate receiver level, 1.83 m south of condensate receiver centerline.	0 to 1.2 m	1 Hz	0.02 m	--	0.02 m	Qualified.
Blowdown Suppression Tank							
LT-P138-033	BST level on north end of tank.	0 to 3.4 m	1 Hz	0.05 m	--	0.05 m	Qualified.
LT-P138-058	BST level on south end of tank.	0 to 3.4 m	1 Hz	0.09 m	--	0.09 m	Qualified.
Intact Loop							
LT-P139-006	Pressurizer level on southeast side.	0 to 1.9 m	1 Hz	0.04 m	--	0.04 m	
LT-P139-007	Pressurizer level on southwest side.	0 to 1.9 m	1 Hz	0.04 m	--	0.04 m	Qualified, maximum measurement range is 1.8 m.
LT-P139-008	Pressurizer level on north side.	0 to 1.9 m	1 Hz	0.04 m	--	0.04 m	
MOMENTUM FLUX							
Intact Loop							
ME-PC-002A	Hot leg DTT flange at bottom of pipe.	1.0 to 21.0 $Mg/m\cdot s^2$	1 Hz	0.20 $Mg/m\cdot s^2$	1.0 $Mg/m\cdot s^2$ 11.0 $Mg/m\cdot s^2$ 21.0 $Mg/m\cdot s^2$	0.20 $Mg/m\cdot s^2$ 0.27 $Mg/m\cdot s^2$ 0.38 $Mg/m\cdot s^2$	Failed.
ME-PC-002B	Hot leg DTT flange at middle of pipe.	1.0 to 21.0 $Mg/m\cdot s^2$	1 Hz	0.20 $Mg/m\cdot s^2$	1.0 $Mg/m\cdot s^2$ 11.0 $Mg/m\cdot s^2$ 21.0 $Mg/m\cdot s^2$	0.20 $Mg/m\cdot s^2$ 0.27 $Mg/m\cdot s^2$ 0.38 $Mg/m\cdot s^2$	Qualified.
ME-PC-002C	Hot leg DTT flange at top of pipe.	1.0 to 21.0 $Mg/m\cdot s^2$	1 Hz	0.20 $Mg/m\cdot s^2$	1.0 $Mg/m\cdot s^2$ 11.0 $Mg/m\cdot s^2$ 21.0 $Mg/m\cdot s^2$	0.20 $Mg/m\cdot s^2$ 0.27 $Mg/m\cdot s^2$ 0.38 $Mg/m\cdot s^2$	Qualified.

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation Reading	After Experiment Initiation Uncertainty (±)	Comments
MOMENTUM FLUX (continued)							
Reactor Vessel							
ME-1ST-001	Downcomer Stalk 1, 1.16 m above RV bottom.	0.3 to 5.2 $Mg/m \cdot s^2$	1 Hz	0.78 $Mg/m \cdot s^2$	--	0.78 $Mg/m \cdot s^2$	Qualified.
ME-1UP-001	Fuel Assembly 1 above upper end box.	0.3 to 5.2 $Mg/m \cdot s^2$	1 Hz	0.78 $Mg/m \cdot s^2$	--	0.78 $Mg/m \cdot s^2$	Failed.
ME-2ST-001	Downcomer Stalk 2, 1.16 m above RV bottom.	0.3 to 5.2 $Mg/m \cdot s^2$	1 Hz	0.78 $Mg/m \cdot s^2$	--	0.78 $Mg/m \cdot s^2$	Failed.
ME-3UP-001	Fuel Assembly 3 above upper end box.	0.3 to 5.2 $Mg/m \cdot s^2$	1 Hz	0.78 $Mg/m \cdot s^2$	--	0.78 $Mg/m \cdot s^2$	
ME-5UP-001	Fuel Assembly 5 above upper end box.	0.3 to 5.2 $Mg/m \cdot s^2$	1 Hz	0.78 $Mg/m \cdot s^2$	--	0.78 $Mg/m \cdot s^2$	Qualified.
NEUTRON DETECTION							
Reactor Vessel							
NE-2H8-26	Neutron detector in Fuel Assembly 2.	0 to 52.5 kW/m (local)	1 Hz	2.03 kW/m	--	2.03 kW/m[f]	Qualified, good to reactor scram.
NE-4H8-26	Neutron detector in Fuel Assembly 4.	0 to 52.5 kW/m (local)	1 Hz	2.03 kW/m	--	2.03 kW/m	Qualified, good to reactor scram.
NE-5D8-26	Neutron detector in Fuel Assembly 5.	0 to 52.5 kW/m (local)	1 Hz	2.03 kW/m	--	2.03 kW/m	Qualified, good to reactor scram.
NE-6H8-26	Neutron detector in Fuel Assembly 6.	0 to 52.5 kW/m (local)	1 Hz	2.03 kW/m	--	2.03 kW/m	Qualified, good to reactor scram.
ELECTRICAL FREQUENCY							
Intact Loop							
PCP-1-F	Intact loop Pump 1.	0 to 75 Hz	10 Hz	0.75 Hz	--	0.75 Hz[g]	
PCP-2-F	Intact loop Pump 2.	0 to 75 Hz	10 Hz	0.75 Hz	--	0.75 Hz	

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation: Reading	After Experiment Initiation: Uncertainty (±)	Comments
ELECTRICAL POWER							
Intact Loop							
PCP-1-P	Intact loop Pump 1.	0 to 1 MW	10 Hz	0.05 MW	--	0.05 MW	
PCP-2-P	Intact loop Pump 2.	0 to 1 MW	10 Hz	0.05 MW	--	0.05 MW	
DIFFERENTIAL PRESSURE							
Broken Loop							
PdE-BL-002	Broken loop cold leg across small break orifice.	±17.5 MPa (differential)	1 Hz	0.025 MPa	0 MPa 5 MPa 10 MPa 15 MPa	0.025 MPa 0.026 MPa 0.028 MPa 0.032 MPa	Qualified.
PdE-BL-003	Broken loop cold leg across 5- to 8-in. expansion.	±3.5 MPa (differential)	1 Hz	0.009 MPa	0 MPa 2 MPa 3.5 MPa	0.009 MPa 0.010 MPa 0.010 MPa	
PdE-BL-009	Broken loop from end to middle of 5-in. pipe.	±700 kPa (differential)	1 Hz	1.7 kPa	0 kPa 350 kPa 700 kPa	1.7 kPa 1.7 kPa 1.9 kPa	
PdE-BL-010	Broken loop from middle to end of 5-in. pipe.	±700 kPa (differential)	1 Hz	--	0 kPa 350 kPa 700 kPa	1.7 kPa 1.7 kPa 1.9 kPa	
PdE-BL-013	SG simulator, inlet to top.	±40 kPa	1 Hz	0.28 kPa	0 kPa 20 kPa 40 kPa	0.28 kPa 0.285 kPa 0.291 kPa	Qualified.
PdE-BL-014	SG simulator, outlet to top.	±40 kPa	1 Hz	0.28 kPa	0 kPa 20 kPa 40 kPa	0.28 kPa 0.285 kPa 0.291 kPa	Qualified.
Intact Loop							
PdE-PC-001	Intact loop cold leg across primary coolant pumps (PCPs).	±700 kPa (differential)	1 Hz	1.8 kPa	0 kPa 350 kPa 700 kPa	1.7 kPa 1.7 kPa 1.9 kPa	Qualified.
PdE-PC-002	Intact loop across SG.	±350 kPa (differential)	1 Hz	0.94 kPa	0 kPa 150 kPa 300 kPa	0.89 kPa 0.90 kPa 0.98 kPa	Qualified.

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation Reading	After Experiment Initiation Uncertainty (±)	Comments
DIFFERENTIAL PRESSURE (continued)							
Intact Loop (continued)							
PdE-PC-003	Intact loop hot leg piping, RV to SG inlet.	±100 kPa (differential)	1 Hz	0.50 kPa	0 kPa 50 kPa 100 kPa	0.49 kPa 0.50 kPa 0.52 kPa	Qualified, negative values indicate voiding in reference leg.
PdE-PC-004	Intact loop hot leg piping, surge line junction to SG inlet.	±100 kPa (differential)	1 Hz	0.50 kPa	0 kPa 50 kPa 100 kPa	0.49 kPa 0.50 kPa 0.52 kPa	
PdE-PC-005	Intact loop cold leg PCPs to RV nozzle.	±100 kPa (differential)	1 Hz	0.50 kPa	0 kPa 50 kPa 100 kPa	0.49 kPa 0.50 kPa 0.52 kPa	Qualified, negative values are within measurement uncertainty.
PdE-PC-006	Intact loop RV outlet to inlet.	±100 kPa (differential)	1 Hz	0.50 kPa	0 kPa 50 kPa 100 kPa	0.49 kPa 0.50 kPa 0.52 kPa	Failed.
PdE-PC-008	Intact loop across pressurizer surge line.	±10.34 kPa (differential)	1 Hz	0.025 kPa	0 kPa 5 kPa 10 kPa	0.025 kPa 0.026 kPa 0.028 kPa	Qualified.
PdE-PC-009	Intact loop across Pump 1.	±700 kPa (differential)	1 Hz	1.8 kPa	0 kPa 350 kPa 700 kPa	1.7 kPa 1.7 kPa 1.9 kPa	
PdE-PC-010	Intact loop across Pump 2.	±700 kPa (differential)	1 Hz	1.8 kPa	0 kPa 350 kPa 700 kPa	1.7 kPa 1.7 kPa 1.9 kPa	
PdE-PC-011	Pitot tube at top of emergency core coolant (ECC) Rake 1 (facing RV).	±40 kPa (differential)	1 Hz	0.29 kPa	0 kPa 20 kPa 40 kPa	0.28 kPa 0.285 kPa 0.291 kPa	
PdE-PC-012	Pitot tube next to top of ECC Rake 1 (facing RV).	±40 kPa (differential)	1 Hz	0.29 kPa	0 kPa 20 kPa 40 kPa	0.28 kPa 0.285 kPa 0.291 kPa	

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation: Reading	After Experiment Initiation: Uncertainty (±)	Comments
DIFFERENTIAL PRESSURE (continued)							
Intact Loop (continued)							
PdE-PC-015	Pitot tube at top of ECC Rake 1 (facing pump).	±40 kPa (differential)	1 Hz	0.29 kPa	0 kPa 20 kPa 40 kPa	0.28 kPa 0.285 kPa 0.291 kPa	
PdE-PC-016	Pitot tube next to top of ECC Rake 1 (facing pump).	±40 kPa (differential)	1 Hz	0.29 kPa	0 kPa 20 kPa 40 kPa	0.28 kPa 0.285 kPa 0.291 kPa	
PdE-PC-017	Pitot tube next to bottom of ECC Rake 1 (facing pump).	±40 kPa (differential)	1 Hz	0.29 kPa	0 kPa 20 kPa 40 kPa	0.28 kPa 0.285 kPa 0.291 kPa	
PdE-PC-17B	Pitot tube next to bottom of ECC Rake 1 (facing pump).	±5 kPa (differential)	1 Hz	0.037 kPa	--	0.037 kPa	
PdE-PC-018	Pitot tube at bottom of ECC Rake 1 (facing pump).	±40 kPa (differential)	1 Hz	--	0 kPa 20 kPa kPa	0.28 kPa 0.285 kPa 0.291 kPa	Not installed.
PdE-PC-18B	Pitot tube at bottom of ECC Rake 1 (facing pump).	±5 kPa (differential)	1 Hz	0.037 kPa	--	0.037 kPa	
PdE-PC-019	Pitot tube at top of ECC Rake 2 (facing RV).	±40 kPa (differential)	1 Hz	0.29 kPa	0 kPa 20 kPa 40 kPa	0.28 kPa 0.285 kPa 0.291 kPa	
PdE-PC-020	Pitot tube next to top of ECC Rake 2 (facing RV).	±40 kPa (differential)	1 Hz	0.29 kPa	0 kPa 20 kPa 40 kPa	0.28 kPa 0.285 kPa 0.291 kPa	
PdE-PC-023	Pitot tube at top of ECC Rake 2 (facing pump).	±40 kPa (differential)	1 Hz	0.284 kPa	0 kPa 20 kPa 40 kPa	0.28 kPa 0.285 kPa 0.291 kPa	
PdE-PC-024	Pitot tube next to top of ECC Rake 2 (facing pump).	±40 kPa (differential)	1 Hz	0.286 kPa	0 kPa 20 kPa 40 kPa	0.28 kPa 0.285 kPa 0.291 kPa	

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation: Reading	After Experiment Initiation: Uncertainty (±)	Comments
DIFFERENTIAL PRESSURE (continued)							
Intact Loop (continued)							
PdE-PC-025	Pitot tube next to bottom of ECC Rake 2 (facing pump).	±40 kPa (differential)	1 Hz	0.287 kPa	0 kPa 20 kPa 40 kPa	0.28 kPa 0.285 kPa 0.291 kPa	
PdE-PC-25B	Pitot tube next to bottom of ECC Rake 2 (facing pump).	±5 kPa (differential)	1 Hz	0.037 kPa	--	0.037 kPa	
PdE-PC-026	Pitot tube at bottom of ECC Rake 2 (facing pump).	±40 kPa (differential)	1 Hz	0.286 kPa	0 kPa 20 kPa 40 kPa	0.28 kPa 0.285 kPa 0.291 kPa	
PdE-PC-26B	Pitot tube at bottom of ECC Rake 2 (facing pump).	±5 kPa (differential)	1 Hz	0.037 kPa	--	0.037 kPa	
PdE-PC-027	SG outlet to pump suction (lowest point).	±40 kPa	1 Hz	0.29 kPa	0 kPa 20 kPa 40 kPa	0.28 kPa 0.285 kPa 0.291 kPa	Qualified.
PdE-PC-028	Pump suction (lowest point) to Pump inlet.	±40 kPa	1 Hz	0.284 kPa	0 kPa 20 kPa 40 kPa	0.28 kPa 0.285 kPa 0.291 kPa	Qualified.
PdE-PC-029	Pitot tube next to bottom of ECC Rake 1 (facing RV).	±40 kPa (differential)	1 Hz	0.29 kPa	0 kPa 20 kPa 40 kPa	0.28 kPa 0.285 kPa 0.291 kPa	
PdE-PC-030	Pitot tube at bottom of ECC Rake 1 (facing RV).	±40 kPa (differential)	1 Hz	0.29 kPa	0 kPa 20 kPa 40 kPa	0.28 kPa 0.285 kPa 0.291 kPa	
PdE-PC-031	Pitot tube next to bottom of ECC Rake 2 (facing RV).	±40 kPa (differential)	1 Hz	0.29 kPa	0 kPa 20 kPa 40 kPa	0.28 kPa 0.285 kPa 0.291 kPa	
PdE-PC-032	Pitot tube at bottom of ECC Rake 2 (facing RV).	±40 kPa (differential)	1 Hz	0.29 kPa	0 kPa 20 kPa 40 kPa	0.28 kPa 0.285 kPa 0.291 kPa	

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation Reading	After Experiment Initiation Uncertainty (±)	Comments
DIFFERENTIAL PRESSURE (continued)							
Reactor Vessel							
PdE-RV-002	Fuel Assembly 1 from lower end box to upper end box.	±175 kPa (differential)	1 Hz	1.3 kPa	0 kPa 100 kPa 175 kPa	1.3 kPa 1.3 kPa 1.4 kPa	
PdE-RV-003	Intact loop cold leg inlet to bottom of downcomer.	±100 kPa (differential)	1 Hz	0.50 kPa	0 kPa 50 kPa 100 kPa	0.49 kPa 0.50 kPa 0.52 kPa	
PdE-RV-004	Fuel Assembly 1 lower end box to the RV outlet nozzle in the intact loop hot leg.	±175 kPa (differential)	1 Hz	--	0 kPa 100 kPa 175 kPa	1.3 kPa 1.3 kPa 1.4 kPa	
PdE-RV-005	Top of RV to intact loop hot leg.	±40 kPa (differential)	1 Hz	0.29 kPa	0 kPa 20 kPa 40 kPa	0.28 kPa 0.285 kPa 0.291 kPa	Qualified, no comparable measurement.
Blowdown Suppression Tank							
PdE-SV-001	BST.	0 to 25 kPa (differential)	1 Hz	0.042 kPa	0 kPa 12 kPa 25 kPa	0.039 kPa 0.043 kPa 0.055 kPa	Qualified, good for initial conditions only.
PdE-SV-009	BST across the vacuum breaker line.	±70 kPa (differential)	10 Hz	0.55 kPa	0 kPa 30 kPa 70 kPa	0.55 kPa 0.56 kPa 0.56 kPa	
Reactor Vessel							
PdE-2ST-001	Bottom of Downcomer Stalk 2 to Fuel Assembly 3 upper end box.	±70 kPa (differential)	1 Hz	--	0 kPa 30 kPa 70 kPa	0.55 kPa 0.56 kPa 0.56 kPa	
PdE-2ST-003	Top of Downcomer Stalk 2 to Fuel Assembly 3 upper plenum.	±175 kPa (differential)	2.3 Hz	--	0 kPa 100 kPa 175 kPa	1.3 kPa 1.3 kPa 1.4 kPa	

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation Reading	After Experiment Initiation Uncertainty (±)	Comments
DIFFERENTIAL PRESSURE (continued)							
Reactor Vessel (continued)							
PdE-2ST-004	Bottom of Downcomer Stalk 2 to Fuel Assembly 3 lower end box.	±70 kPa (differential)	1 Hz	--	0 kPa 30 kPa 70 kPa	0.55 kPa 0.56 kPa 0.56 kPa	
Intact Loop							
PdT-P139-27-1	Intact loop venturi, Channel A.	0 to 200 kPa (differential)	1 Hz	2 kPa	--	2 kPa	Qualified, good for initial conditions only.
PdT-P139-27-2	Intact loop venturi, Channel B.	0 to 200 kPa (differential)	1 Hz	2 kPa	--	2 kPa	Qualified, good for initial conditions only.
PdT-P139-27-3	Intact loop venturi, Channel C.	0 to 200 kPa (differential)	1 Hz	2 kPa	--	2 kPa	Qualified, good for initial conditions only.
PdT-P139-030	Across RV just beyond intact loop inlet and outlet nozzles.	0 to 300 kPa (differential)	1 Hz	3 kPa	--	3 kPa	Qualified, good or initial conditions only.
PRESSURE[b]							
Broken Loop							
PE-BL-001	Broken loop cold leg at DTT flange.	0.1 to 20.8 MPa[b]	1 Hz	0.251 MPa	0 MPa 10 MPa 20 MPa	0.199 MPa 0.223 MPa 0.282 MPa	Qualified.
PE-BL-002	Broken loop hot leg at DTT flange.	0.1 to 20.8 MPa	1 Hz	0.251 MPa	0 MPa 10 MPa 20 MPa	0.199 MPa 0.223 MPa 0.282 MPa	Qualified.
PE-BL-003	Broken loop hot leg downstream of pump simulator.	0.1 to 20.8 MPa	1 Hz	0.251 MPa	0 MPa 10 MPa 20 MPa	0.199 MPa 0.223 MPa 0.282 MPa	Qualified.

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation Reading	After Experiment Initiation Uncertainty (±)	Comments
PRESSURE (continued)							
Intact Loop (continued)							
PE-BL-004	Broken loop cold leg at inlet of spool piece.	0.1 to 20.8 MPa	1 Hz	--	0 MPa 10 MPa 20 MPa	0.199 MPa 0.223 MPa 0.282 MPa	
PE-BL-006	Broken loop hot leg at outlet of SG simulator.	0.1 to 20.8 MPa	1 Hz	--	0 MPa 10 MPa 20 MPa	0.199 MPa 0.223 MPa 0.282 MPa	
PE-BL-008	Broken loop cold leg in 8-in. pipe downstream of break.	0.1 to 20.8 MPa	1 Hz	0.251 MPa	0 MPa 10 MPa 20 MPa	0.199 MPa 0.223 MPa 0.282 MPa	Qualified.
Intact Loop							
PE-PC-001	Intact loop cold leg at DTT flange.	0.1 to 20.8 MPa	1 Hz	0.251 MPa	0 MPa 10 MPa 20 MPa	0.199 MPa 0.223 MPa 0.282 MPa	Qualified.
PE-PC-002	Intact loop hot leg at DTT flange.	0.1 to 20.8 MPa	1 Hz	0.251 MPa	0 MPa 10 MPa 20 MPa	0.199 MPa 0.223 MPa 0.282 MPa	Qualified.
PE-PC-004	Intact loop pressurizer vapor space.	0.1 to 20.8 MPa	1 Hz	0.251 MPa	0.1 MPa 10 MPa 20 MPa	0.199 MPa 0.223 MPa 0.282 MPa	Qualified.
PE-PC-005	Intact loop reference pressure between SG outlet and pump inlet.	0.1 to 17.0 MPa	1 Hz	0.028 MPa	--	0.028 MPa	Qualified.
PE-PC-006	Intact loop reference pressure between SG outlet and pump inlet.	0.1 to 17.0 MPa	1 Hz	0.028 MPa	--	0.028 MPa	
PE-SGS-001	SG dome pressure.	0.1 to 7.0 MPa	1 Hz	0.012 MPa	--	0.012 MPa	Qualified.

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation Reading	After Experiment Initiation Uncertainty (±)	Comments
PRESSURE (continued)							
Blowdown Suppression System							
PE-SV-003	BST across from Downcomer 1 (south end), 157.5° from top vertical (CW looking north).	0.1 to 0.7 MPa	1 Hz	0.008 MPa	--	0.008 MPa	Qualified.
PE-SV-014	BST header above Downcomer 4, 327° from top vertical (CW looking north).	0.1 to 0.7 MPa	1 Hz	0.008 MPa	--	0.008 MPa	Qualified.
PE-SV-015	BST across from Downcomer 4, 230° from top vertical (CW looking north).	0.1 to 0.7 MPa	1 Hz	0.008 MPa	--	0.008 MPa	
PE-SV-016	BST across from Downcomer 1, 230° from top vertical (CW looking north).	0.1 to 0.7 MPa	1 Hz	0.008 MPa	--	0.008 MPa	
PE-SV-017	BST, 1.38 m north of Downcomer 3 centerline, 0° from top vertical (CW looking north).	0.1 to 0.7 MPa	1 Hz	0.008 MPa	--	0.008 MPa	Qualified.
PE-SV-018	BST header above Downcomer 1.	0.1 to 0.7 MPa	1 Hz	0.008 MPa	--	0.008 MPa	Qualified.
PE-SV-043	BST tank bottom under Downcomer 2.	0.1 to 0.7 MPa	1 Hz	0.008 MPa	--	0.008 MPa	Qualified.
PE-SV-044	BST bottom under Downcomer 3.	0.1 to 0.7 MPa	1 Hz	0.008 MPa	--	0.008 MPa	
PE-SV-055	BST top, 0.15 m north of Downcomer 4 centerline.	0.1 to 0.7 MPa	1 Hz	0.008 MPa	--	0.008 MPa	Qualified.

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation Reading	After Experiment Initiation Uncertainty (±)	Comments
PRESSURE (continued)							
Blowdown Suppression System (continued)							
PE-SV-060	BST top above Downcomer 1.	0.1 to 0.7 MPa	1 Hz	0.008 MPa	--	0.008 MPa	
Reactor Vessel							
PE-1ST-001A	Downcomer Stalk 1, 0.62 m above RV bottom, wide range (0 to 20.8 MPa).	0.1 to 20.8 MPa	1 Hz	0.200 MPa	0.1 MPa 10.0 MPa 20.5 MPa	0.199 MPa 0.199 MPa 0.200 MPa	Qualified.
PE-1ST-003A	Downcomer Stalk 1, 5.32 m above RV bottom, wide range (0 to 20.8 MPa).	0.1 to 20.8 MPa	1 Hz	0.25 MPa	0.1 MPa 10 MPa 20 MPa	0.2 MPa 0.22 MPa 0.28 MPa	Qualified.
PE-1UP-001A	Above Fuel Assembly 1 upper end box, high range.	0.1 to 20.8 MPa	1 Hz	0.25 MPa	0.1 MPa 10 MPa 20 MPa	0.2 MPa 0.22 MPa 0.28 MPa	Qualified.
PE-1UP-001A1	Above Fuel Assembly 1 upper end box, high range.	0.1 to 20.8 MPa	1 Hz	0.25 MPa	0.1 MPa 10 MPa 20 MPa	0.2 MPa 0.22 MPa 0.28 MPa	Qualified.
PE-2ST-001A	Downcomer Stalk 2, 0.62 m above RV bottom, wide range (0 to 20.8 MPa).	0.1 to 20.8 MPa	1 Hz	0.25 MPa	0.1 MPa 10 MPa 20 MPa	0.2 MPa 0.22 MPa 0.28 MPa	Qualified.
Secondary Coolant System							
PT-P004-010A	In 10-in. line from SG.	0.1 to 8.4 MPa	1 Hz	0.110 MPa	--	0.110 MPa	Qualified.
PT-P004-022	Condensate receiver pressure.	0 to 2.8 MPa	1 Hz	--	--	0.07[illegible] MPa	

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation Reading	After Experiment Initiation Uncertainty (±)	Comments
PRESSURE (continued)							
Secondary Coolant System (continued)							
PT-P004-034	Downstream of main feedwater pump.	0 to 10.3 MPa	10 Hz	0.07 MPa	--	0.07 MPa	
PT-P004-085	Upstream of inlet to air-cooled condenser header.	0 to 2.8 MPa	1 Hz	0.075 MPa	--	0.075 MPa	Qualified.
Emergency Core Cooling System							
PT-P120-029	Accumulator B, 0.69 m above water outlet.	0.1 to 7.0 MPa	1 Hz	0.055 MPa	--	0.055 MPa	
PT-P120-043	Accumulator A, 0.69 m above water outlet.	0.1 to 7.0 MPa	1 Hz	0.055 MPa	--	0.055 MPa	Qualified.
PT-P120-061	ECC injection.	0.1 to 20.8 MPa	1 Hz	0.158 MPa	--	0.158 MPa	
PT-P120-074	LPIS Pump B discharge.	0.1 to 7.0 MPa	1 Hz	0.055 MPa	--	0.055 MPa	
PT-P120-083	LPIS Pump A discharge.	0.1 to 7.0 MPa	1 Hz	0.04 MPa	--	0.04 MPa	Qualified.
Broken Loop							
PT-P138-023	Blowdown header.	0.1 to 1.4 MPa	10 Hz	--	--	0.007 MPa	
PT-P138-111	Broken loop cold leg QOBV inlet between isolation valve and QOBV.	0.1 to 13.9 MPa	100 Hz	--	--	0.20 MPa	
PT-P138-112	Broken loop hot leg QOBV inlet between isolation valve and QOBV.	0.1 to 13.9 MPa	100 Hz	--	--	0.20 MPa	
Intact Loop							
PT-P139-002	Intact loop hot leg at venturi on bottom.	0.1 to 20.8 MPa	1 Hz	0.25 MPa	--	0.25 MPa	Qualified.

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation Reading	After Experiment Initiation Uncertainty (±)	Comments
PRESSURE (continued)							
Intact Loop (continued)							
PT-P139-003	Intact loop hot leg at venturi on left side when looking toward SG.	0.1 to 20.8 MPa	1 Hz	0.25 MPa	--	0.25 MPa	Qualified.
PT-P139-004	Intact loop hot leg at venturi on right side when looking toward SG.	0.1 to 20.8 MPa	1 Hz	0.25 MPa	--	0.25 MPa	Qualified.
PT-P139-005	1.88 m above pressurizer bottom (vapor space).	10.3 to 17.2 MPa	1 Hz	0.12 MPa	--	0.12 MPa	Qualified, narrow range instrument.
PUMP SPEED							
RPE-PC-001	Intact loop Pump 1.	0 to 10 000 rpm	1 Hz	10.26 rpm	1000 rpm 2000 rpm 3000 rpm 4000 rpm	7.65 rpm 8.825 rpm 10.10 rpm 11.66 rpm	Qualified.
RPE-PC-002	Intact loop Pump 2.	0 to 10 000 rpm	1 Hz	10.27 rpm	1000 rpm 2000 rpm 3000 rpm 4000 rpm	7.65 rpm 8.825 rpm 10.10 rpm 11.66 rpm	Qualified.
REACTIVITY							
Reactor Vessel							
RE-TRM-86-5	Transient reactivity meter in shield tank.	±0.145 Rho	10 Hz	0.01 Rho	--	0.01 Rho	
RE-TRM-86-6	Transient reactivity meter in shield tank.	±0.145 Rho	10 Hz	0.01 Rho	--	0.01 Rho	
RE-T-77-1A2	Power range, Channel A level.	0 to 100% power	1 Hz	3%	--	3%	Qualified, good to reactor scram.

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation: Reading	After Experiment Initiation: Uncertainty (±)	Comments
REACTIVITY (continued)							
Reactor Vessel (continued)							
RE-T-77-2A2	Power range, Channel B level.	0 to 100% power	1 Hz	3%	--	3%	Qualified, good to reactor scram.
RE-T-77-3A2	Power range, Channel C level.	0 to 100% power	1 Hz	3%	--	3%	Qualified, good to reactor scram.
RE-T-87-4A2	Power range, Channel D level.	0 to 100% power	10 Hz	3%	--	3%	
TEMPERATURE							
Broken Loop							
TE-BL-001B	Broken loop cold leg at DTT rake center.	255.2 to 588.6 K	1 Hz	2.5 K	350 K 450 K 550 K 650 K	2.4 K 2.5 K 2.5 K 3.2 K	Qualified.
TE-BL-002B	Broken loop hot leg at middle of DTT flange.	255.2 to 588.6 K	1 Hz	2.5 K	350 K 450 K 550 K 650 K	2.4 K 2.5 K 2.5 K 3.2 K	Qualified.
Intact Loop							
TE-PC-002A	Intact loop hot leg DTT flange at bottom of pipe.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.
TE-PC-002B	Intact loop hot leg DTT flange at middle of pipe.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.
TE-PC-002C	Intact loop hot leg DTT flange at top of pipe.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation Reading	After Experiment Initiation Uncertainty (±)	Comments
TEMPERATURE (continued)							
Intact Loop (continued)							
TE-PC-004	Bottom of ECC Rake 1 (between PdE-PC-014 and PdE-PC-018).	270 to 1530 K	1 Hz	3.1 K	350 K 450 K 550 K 650 K	2.8 K 2.9 K 3.0 K 3.6 K	Qualified.
TE-PC-005	Next to bottom of ECC Rake 1 (between PdE-PC-013 and PdE-PC-017).	270 to 1530 K	1 Hz	3.1 K	350 K 450 K 550 K 650 K	2.8 K 2.9 K 3.0 K 3.6 K	Qualified.
TE-PC-006	Next to top of ECC Rake 1 (between PdE-PC-012 and PdE-PC-016).	270 to 1530 K	1 Hz	3.1 K	350 K 450 K 550 K 650 K	2.8 K 2.9 K 3.0 K 3.6 K	Qualified.
TE-PC-007	Top of ECC Rake 1 (between PdE-PC-011 and PdE-PC-015).	270 to 1530 K	1 Hz	3.1 K	350 K 450 K 550 K 650 K	2.8 K 2.9 K 3.0 K 3.6 K	
TE-PC-008	Bottom of ECC Rake 2 (between PdE-PC-022 and PdE-PC-026).	270 to 1530 K	1 Hz	3.1 K	350 K 450 K 550 K 650 K	2.8 K 2.9 K 3.0 K 3.6 K	Qualified.
TE-PC-009	Next to bottom of ECC Rake 2 (between PdE-PC-021 and PdE-PC-025).	270 to 1530 K	1 Hz	3.1 K	350 K 450 K 550 K 650 K	2.8 K 2.9 K 3.0 K 3.6 K	Qualified.
TE-PC-010	Next to top of ECC Rake 2 (between PdE-PC-020 and PdE-PC-024).	270 to 1530 K	1 Hz	3.1 K	350 K 450 K 550 K 650 K	2.8 K 2.9 K 3.0 K 3.6 K	Qualified.
TE-PC-011	Top of ECC Rake 2 (between PdE-PC-019 and PdE-PC-023).	270 to 1530 K	1 Hz	3.1 K	350 K 450 K 550 K 650 K	2.8 K 2.9 K 3.0 K 3.6 K	Qualified.

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation: Reading	After Experiment Initiation: Uncertainty (±)	Comments
TEMPERATURE (continued)							
Emergency Core Cooling System							
TE-P120-027	Accumulator B temperature.	255.2 to 366.3 K	1 Hz	0.7 K	--	0.7 K	
TE-P120-041	Accumulator A temperature.	255.2 to 366.3 K	1 Hz	0.7 K	--	0.7 K	
Blowdown Suppression Tank Spray System							
TE-P138-137	Outlet of BST spray system heat exchanger.	250 to 420 K	1 Hz	0.7 K	--	0.7 K	
TE-P138-141	Temperature of spray in 3.79-L/s header.	255.2 to 420 K	1 Hz	1.3 K	--	1.3 K	Qualified for response only, magnitude uncertain.
TE-P138-142	Temperature of spray pump discharge.	255.2 to 420 K	1 Hz	1.3 K	--	1.3 K	Qualified for response only, magnitude uncertain.
TE-P138-143	Temperature of spray in 13.88-L/s header.	255.2 to 420 K	1 Hz	1.3 K	--	1.3 K	Qualified for response only, magnitude uncertain.
Broken Loop							
TE-P138-170	Hot leg warm-up line.	73 to 622 K	1 Hz	2.1 K	--	2.1 K	
TE-P138-171	Cold leg warm-up line.	172 to 672 K	1 Hz	0.8 K	--	0.8 K	
Intact Loop							
TE-P139-019	Pressurizer vapor space, 0.86 m above the [illegible]ater rods.	588.6 to 644.1 K	1 Hz	0.5 K	--	0.5 K	Qualified for initial conditions only, shows hot wall effects after blowdown initiation.
TE-P139-020	Pressurizer liquid volume, 0.36 m above heater rods.	283 to 644.1 K	1 Hz	3.0 K	--	3.0 K	Qualified for initial conditions only, shows hot wall effects after blowdown initiation.

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation Reading	After Experiment Initiation Uncertainty (±)	Comments
TEMPERATURE (continued)							
Intact Loop (continued)							
TE-P139-028-2	Intact loop cold leg.	530 to 620 K	1 Hz	0.6 K	--	0.6 K	Qualified, narrow range process instrument, response limited.
TE-P139-029	Intact loop cold leg.	280 to 620 K	1 Hz	2.1 K	--	2.1 K	Qualified, process instrument, response limited.
TE-P139-32-1	Intact loop hot leg.	280 to 620 K	1 Hz	1.43 K	--	1.43 K	Qualified, process instrument, response limited.
Primary Component Cooling System							
TE-P141-94	Downstream from primary component cooling system heat exchanger.	275 to 350 K	10 Hz	0.32 K	--	0.32 K	Qualified.
TE-P141-95	Upstream from primary component cooling system heat exchanger.	275 to 350 K	10 Hz	0.32 K	--	0.32 K	Qualified.
Intact Loop							
TE-SG-001	Intact loop cold leg SG outlet.	253.2 to 977.4 K	1 Hz	2.8 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.7 K 3.3 K	Qualified.
TE-SG-002	Intact loop hot leg SG inlet.	253.2 to 977.4 K	1 Hz	2.8 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.7 K 3.3 K	Qualified.

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation Reading	After Experiment Initiation Uncertainty (±)	Comments
TEMPERATURE (continued)							
Secondary Coolant System							
TE-SG-003	SG secondary side.	253.2 to 588.6 K	1 Hz	2.5 K	350 K 450 K 550 K 650 K	2.4 K 2.5 K 2.5 K 3.2 K	Qualified.
Blowdown Suppression System							
TE-SV-001	BST, 0.3 m north of Downcomer 1, 0.53 m east of tank centerline, 2.72 m from tank bottom.	253.2 to 477.4 K	1 Hz	1.1 K	300 K 350 K [illegible] K	0.9 K 1.0 K 1.3 K	
TE-SV-002	BST, 0.3 m north of Downcomer 1, 0.53 m east of tank centerline, 2.36 m from tank bottom.	253.2 to 477.4 K	1 Hz	1.1 K	300 K 350 K 400 K	0.9 K 1.0 K 1.3 K	Qualified.
TE-SV-003	BST, 0.3 m north of Downcomer 1, 0.53 m east of tank centerline, 1.90 m from tank bottom.	253.2 to 477.4 K	1 Hz	1.1 K	300 K 350 K 400 K	0.9 K 1.0 K 1.3 K	
TE-SV-004	BST, 0.3 m north of Downcomer 1, 0.53 m east of tank centerline, 1.45 m from tank bottom.	253.2 to 477.4 K	1 Hz	1.1 K	300 K 350 K 400 K	0.9 K 1.0 K 1.3 K	Qualified.
TE-SV-005	BST, 0.3 m north of Downcomer 1, 0.53 m east of tank centerline, 0.99 m from tank bottom.	253.2 to 477.4 K	1 Hz	--	300 K 350 K 400 K	0.9 K 1.0 K 1.3 K	

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation Reading	After Experiment Initiation Uncertainty (±)	Comments
TEMPERATURE (continued)							
Blowdown Suppression System (continued)							
TE-SV-006	BST, 0.3 m north of Downcomer 1, 0.53 m east of tank centerline, 0.37 m from tank bottom.	253.2 to 477.4 K	1 Hz	1.1 K	300 K 350 K 400 K	0.9 K 1.0 K 1.3 K	Qualified.
TE-SV-007	BST, 0.3 m north of Downcomer 3, 0.53 m east of tank centerline, 2.72 m from tank bottom.	253.2 to 477.4 K	1 Hz	1.1 K	300 K 350 K 400 K	0.9 K 1.0 K 1.3 K	Qualified.
TE-SV-008	BST, 0.3 m north of Downcomer 3, 0.53 m east of tank centerline, 2.36 m from tank bottom.	253.2 to 477.4 K	1 Hz	1.1 K	300 K 350 K 400 K	0.9 K 1.0 K 1.3 K	Qualified.
TE-SV-009	BST, 0.3 m north of Downcomer 3, 0.53 m east of tank centerline, 1.90 m from tank bottom.	253.2 to 477.4 K	1 Hz	1.1 K	300 K 350 K 400 K	0.9 K 1.0 K 1.3 K	
TE-SV-010	BST, 0.3 m north of Downcomer 3, 0.53 m east of tank centerline, 1.45 m from tank bottom.	253.2 to 477.4 K	1 Hz	1.1 K	300 K 350 K 400 K	0.9 K 1.0 K 1.3 K	Qualified.
TE-SV-011	BST, 0.3 m north of Downcomer 3, 0.53 m east of tank centerline, 0.99 m from tank bottom.	253.2 to 477.4 K	1 Hz	1.1 K	300 K 350 K 400 K	0.9 K 1.0 K 1.3 K	Qualified.

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation		Comments
					Reading	Uncertainty (±)	
TEMPERATURE (continued)							
Blowdown Suppression System (continued)							
TE-SV-012	BST, 0.3 m north of Downcomer 3, 0.53 m east of tank centerline, 0.37 m from tank bottom.	253.2 to 477.4 K	1 Hz	1.1 K	300 K 350 K 400 K	0.9 K 1.0 K 1.3 K	Failed.
Reactor Vessel							
TE-1A11-030	Fuel Assembly 1, Row A, Column 11, 0.762 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-1B10-037	Fuel Assembly 1, Row B, Column 10, 0.940 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-1B12-026	Fuel Assembly 1, Row B, Column 12, 0.660 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-1C11-021	Fuel Assembly 1, Row C, Column 11, 0.533 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-1C11-039	Fuel Assembly 1, Row C, Column 11, 0.991 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-1F7-015	Fuel Assembly 1, Row F, Column 7, 0.381 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation: Reading	After Experiment Initiation: Uncertainty (±)	Comments
TEMPERATURE (continued)							
Reactor Vessel (continued)							
TE-1F7-021	Fuel Assembly 1, Row F, Column 7, 0.533 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.
TE-1F7-026	Fuel Assembly 1, Row F, Column 7, 0.660 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.
TE-1F7-030	Fuel Assembly 1, Row F, Column 7, 0.762 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.
TE-1LP-001	Fuel Assembly 1 lower end box.	311 to 977.4 K	1 Hz	2.7 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	Qualified
TE-1LP-002	Fuel Assembly 1 lower end box.	311 to 977.4 K	1 Hz	2.7 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	Qualified.
TE-1ST-001	Downcomer Stalk 1, 4.8 m from RV bottom.	253.2 to 977.4 K	1 Hz	2.7 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.7 K 3.3 K	Qualified.
TE-1ST-002	Downcomer Stalk 1, 4.2 m from RV bottom.	253.2 to 977.4 K	1 Hz	2.7 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.7 K 3.3 K	Qualified.

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation: Reading	After Experiment Initiation: Uncertainty (±)	Comments
TEMPERATURE (continued)							
Reactor Vessel (continued)							
TE-1ST-005	Downcomer Stalk 1, 2.37 m from RV bottom.	253.2 to 977.4 K	1 Hz	2.7 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.7 K 3.3 K	Qualified.
TE-1ST-009	Downcomer Stalk 1, 0.64 m from RV bottom.	253.2 to 977.4 K	1 Hz	2.7 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.7 K 3.3 K	Qualified.
TE-1ST-013	Downcomer Stalk 1, 0.24 m from RV bottom.	253.2 to 977.4 K	1 Hz	2.7 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.7 K 3.3 K	Qualified.
TE-1ST-014	Downcomer Stalk 1, 1.17 m from RV bottom (inside of DTT).	253.2 to 977.4 K	1 Hz	--	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.7 K 3.3 K	
TE-1UP-001	Fuel Assembly 1 upper end box.	311 to 977.4 K	1 Hz	2.9 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	Qualified.
TE-1UP-002	Fuel Assembly 1 upper end box.	311 to 977.4 K	1 Hz	2.9 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	
TE-1UP-003	Fuel Assembly 1 support column above RV nozzle.	311 to 977.4 K	1 Hz	--	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.5 K 3.3 K	
TE-1UP-004	Fuel Assembly 1 support column above RV nozzle.	311 to 977.4 K	10 Hz	2.8 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation Reading	After Experiment Initiation Uncertainty (±)	Comments
TEMPERATURE (continued)							
Reactor Vessel (continued)							
TE-1UP-005	DTT FE-1UP-1 above Fuel Assembly 1.	311 to 977.4 K	10 Hz	2.9 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	
TE-1UP-006	Fuel Assembly 1 support column.	311 to 977.4 K	1 Hz	2.9 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	
TE-2E8-045	Cladding on Fuel Assembly 2, Row E, Column 8 at 1.14 m above bottom of fuel rod.	422 to 1533 K	10 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-2F7-037	Cladding on Fuel Assembly 2, Row F, Column 7 at 0.94 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-2G14-011	Cladding on Fuel Assembly 2, Row G, Column 14 at 0.28 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.
TE-2G14-030	Cladding on Fuel Assembly 2, Row G, Column 14 at 0.76 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.7 K 3.2 K 4.7 K 6.2 K	Qualified.
TE-2G14-045	Cladding on Fuel Assembly 2, Row G, Column 14 at 1.14 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	400 K 600 K 800 K 1000 K	2.7 K 3.2 K 4.7 K 6.2 K	Qualified.

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation Reading	After Experiment Initiation Uncertainty (±)	Comments
TEMPERATURE (continued)							
Reactor Vessel (continued)							
TE-2H01-037	Cladding on Fuel Assembly 2, Row H, Column 1 at 0.94 . above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	400 K 600 K 800 K 1000 K	2.7 K 3.2 K 4.7 K 6.2 K	Qualified.
TE-2H02-028	Cladding on Fuel Assembly 2, Row H, Column 2 at 0.71 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	400 K 600 K 800 K 1000 K	2.7 K 3.2 K 4.7 K 6.2 K	Qualified.
TE-2H02-032	Cladding on Fuel Assembly 2, Row H, Column 2 at 0.81 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	400 K 600 K 800 K 1000 K	2.7 K 3.2 K 4.7 K 6.2 K	Qualified.
TE-2H08-039	Guide tube for Fuel Assembly 2, Row H, Column 8 at 0.99 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	400 K 600 K 800 K 1000 K	2.7 K 3.2 K 4.7 K 6.2 K	
TE-2LP-001	Fuel Assembly 2 lower end box.	311 to 977.4 K	1 Hz	2.7 K	350 K 450 K 550 K [illegible] K	2.5 K 2.6 K 2.6 K 3.3 K	Qualified.
TE-2LP-002	Fuel Assembly 2 lower end box.	311 to 977.4 K	1 Hz	2.7 K	3[illegible] 450 [illegible] 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	Qualified.
TE-2LP-003	Fuel Assembly 2 lower end box.	3[illegible] to 977.4 K	1 Hz	2.7 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation: Reading	After Experiment Initiation: Uncertainty (±)	Comments
TEMPERATURE (continued)							
Reactor Vessel (continued)							
TE-2ST-001	Downcomer Stalk 2, 4.8 m from RV bottom.	253.2 to 977.4 K	1 Hz	2.7 K	350 K	2.5 K	Qualified.
					450 K	2.6 K	
					550 K	2.7 K	
					650 K	3.3 K	
TE-2ST-005	Downcomer Stalk 2, 2.37 m from RV bottom.	253.2 to 977.4 K	1 Hz	2.7 K	350 K	2.5 K	Qualified.
					450 K	2.6 K	
					550 K	2.7 K	
					650 K	3.3 K	
TE-2ST-009	Downcomer Stalk 2, 0.64 m from RV bottom.	253.2 to 977.4 K	1 Hz	2.7 K	350 K	2.5 K	Failed.
					450 K	2.6 K	
					550 K	2.7 K	
					650 K	3.3 K	
TE-2ST-013	Downcomer Stalk 2, 0.24 m from RV bottom.	253.2 to 977.4 K	1 Hz	2.7 K	350 K	2.5 K	Failed.
					450 K	2.6 K	
					550 K	2.7 K	
					650 K	3.3 K	
TE-2ST-014	Downcomer Stalk 2, 1.17 m from RV bottom.	253.2 to 977.4 K	1 Hz	2.7 K	350 K	2.5 K	Failed.
					450 K	2.6 K	
					550 K	2.7 K	
					650 K	3.3 K	
TE-2UP-001	Fuel Assembly 2 upper end box.	311 to 977.4 K	1 Hz	--	350 K	2.5 K	
					450 K	2.6 K	
					550 K	2.6 K	
					650 K	3.3 K	
TE-2UP-002	Fuel Assembly 2 upper end box.	311 to 977.4 K	10 Hz	2.8 K	350 K	2.5 K	
					450 K	2.6 K	
					550 K	2.6 K	
					650 K	3.3 K	
TE-2UP-003	Fuel Assembly 2 upper end box.	311 to 977.4 K	1 Hz	2.9 K	350 K	2.5 K	Qualified.
					450 K	2.6 K	
					550 K	2.6 K	
					650 K	3.3 K	

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation Reading	After Experiment Initiation Uncertainty (±)	Comments
TEMPERATURE (continued)							
Reactor Vessel (continued)							
TE-3B12-026	Cladding on Fuel Assembly 3, Row B, Column 12 at 0.66 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-3C11-021	Cladding on Fuel Assembly 3, Row C, Column 11 at 0.53 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-3C11-039	Cladding on Fuel Assembly 3, Row C, Column 11 at 0.99 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.
TE-3F7-015	Cladding on Fuel Assembly 3, Row F, Column 7 at 0.38 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-3F7-021	Cladding on Fuel Assembly 3, Row F, Column 7 at 0.53 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-3F7-026	Cladding on Fuel Assembly 3, Row F, Column 7 at 0.66 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation Reading	After Experiment Initiation Uncertainty (±)	Comments
TEMPERATURE (continued)							
Reactor Vessel (continued)							
TE-3F -030	Cladding on Fuel Assembly 3, Row F, Column 7 at 0.76 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-3LP-001	Fuel Assembly 3 lower end box.	311 to 977.4 K	1 Hz	2.6 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	Qualified.
TE-3UP-001	Fuel Assembly 3 upper end box.	311 to 977.4 K	1 Hz	2.9 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	Qualified.
TE-3UP-002	Fuel Assembly 3 upper end box.	311 to 977.4 K	1 Hz	2.9 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	Qualified.
TE-3UP-003	Fuel Assembly 3 support column above RV nozzle.	311 to 977.4 K	1 Hz	2.8 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	Qualified.
TE-3UP-004	Fuel Assembly 3 support column above RV nozzle.	311 to 977.4 K	1 Hz	2.8 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	Qualified.
TE-3UP-005	DTT FE-3UP-1 above Fuel Assembly 3.	311 to 977.4 K	1 Hz	--	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation Reading	After Experiment Initiation Uncertainty (±)	Comments
TEMPERATURE (continued)							
Reactor Vessel (continued)							
TE-3UP-006	Support column.	311 to 977.4 K	1 Hz	2.8 K	350 K	2.5 K	Qualified.
					450 K	2.6 K	
					550 K	2.6 K	
					650 K	3.3 K	
TE-3UP-007	Support column.	311 to 977.4 K	1 Hz	--	350 K	2.5 K	
					450 K	2.6 K	
					550 K	2.6 K	
					650 K	3.3 K	
TE-3UP-008	Liquid level transducer above Fuel Assembly 3.	311 to 977.4 K	1 Hz	2.8 K	350 K	2.5 K	Qualified.
					450 K	2.6 K	
					550 K	2.6 K	
					650 K	3.3 K	
TE-3UP-009	Liquid level transducer above Fuel Assembly 3.	311 to 977.4 K	1 Hz	--	350 K	2.5 K	
					450 K	2.6 K	
					550 K	2.6 K	
					650 K	3.3 K	
TE-3UP-010	Liquid level transducer above Fuel Assembly 3.	311 to 977.4 K	1 Hz	2.8 K	350 K	2.5 K	Qualified.
					450 K	2.6 K	
					550 K	2.6 K	
					650 K	3.3 K	
TE-3UP-011	Liquid level transducer above Fuel Assembly 3.	311 to 977.4 K	1 Hz	2.8 K	350 K	2.5 K	Qualified.
					450 K	2.6 K	
					550 K	2.6 K	
					650 K	3.3 K	
TE-3UP-012	Liquid level transducer above Fuel Assembly 3.	311 to 977.4 K	1 Hz	2.8 K	350 K	2.5 K	Qualified.
					450 K	2.6 K	
					550 K	2.6 K	
					650 K	3.3 K	

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation: Reading	After Experiment Initiation: Uncertainty (±)	Comments
TEMPERATURE (continued)							
Reactor Vessel (continued)							
TE-3UP-013	Liquid level transducer above Fuel Assembly 3.	311 to 977.4 K	1 Hz	2.8 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	Qualified except for spike at approximately 12 000 s.
TE-3UP-014	Liquid level transducer above Fuel Assembly 3.	311 to 977.4 K	1 Hz	2.8 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	Qualified.
TE-3UP-015	Liquid level transducer above Fuel Assembly 3.	311 to 977.4 K	1 Hz	2.8 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	Qualified.
TE-3UP-016	Liquid level transducer above Fuel Assembly 3.	311 to 977.4 K	1 Hz	2.8 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	Qualified.
TE-4G14-011	Cladding on Fuel Assembly 4, Row G, Column 14 at 0.28 m above bottom of fuel rod.	422 to 1533 K	1 Hz	--	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-4G14-030	Cladding on Fuel Assembly 4, Row G, Column 14 at 0.76 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-4G14-045	Cladding on Fuel Assembly 4, Row G, Column 14 at 1.14 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation Reading	After Experiment Initiation Uncertainty (±)	Comments
TEMPERATURE (continued)							
Reactor Vessel (continued)							
TE-4H01-037	Cladding on Fuel Assembly 4, Row H, Column 1 at 0.94 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-4H02-028	Cladding on Fuel Assembly 4, Row H, Column 2 at 0.71 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-4H02-032	Cladding on Fuel Assembly 4, Row H, Column 2 at 0.81 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-4H08-039	Cladding on Fuel Assembly 4, Row H, Column 8 at 0.99 m above bottom of fuel rod.	422 to 1533 K	10 Hz	--	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-4LP-001	Fuel Assembly 4 lower end box.	311 to 977.4 K	1 Hz	2.6 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	
TE-4LP-003	Fuel Assembly 4 lower end box.	311 to 977.4 K	1 Hz	2.6 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	Qualified.
TE-4UP-001	Fuel Assembly 4 upper end box.	311 to 977.4 K	1 Hz	2.8 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	Qualified.

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation		Comments
					Reading	Uncertainty (±)	
TEMPERATURE (continued)							
Reactor Vessel (continued)							
TE-4UP-002	Fuel Assembly 4 upper end box.	311 to 977.4 K	1 Hz	2.6 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	
TE-4UP-003	Fuel Assembly 4 upper end box.	311 to 977.4 K	1 Hz	2.9 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	
TE-5C6-024	Guide tube for Fuel Assembly 5, Row C, Column 6 at 0.61 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.
TE-5D6-030	Cladding on Fuel Assembly 5, Row D, Column 6 at 0.76 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.
TE-5D6-032	Cladding on Fuel Assembly 5, Row D, Column 6 at 0.81 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.
TE-5D6-037	Cladding on Fuel Assembly 5, Row D, Column 6 at 0.94 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.
TE-5D6-039	Cladding on Fuel Assembly 5, Row D, Column 6 at 0.99 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation Reading	After Experiment Initiation Uncertainty (±)	Comments
TEMPERATURE (continued)							
Reactor Vessel (continued)							
TE-5E8-002	Cladding on Fuel Assembly 5, Row E, Column 8 at 0.05 m above bottom of fuel rod.	422 to 1533 K	1 Hz	--	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-5E8-015	Cladding on Fuel Assembly 5, Row E, Column 8 at 0.38 m above bottom of fuel rod.	420 to 1810 K	1 Hz	4.1 K	450 K 600 K 800 K 1000 K	3.8 K 4.2 K 5.2 K 6.7 K	Qualified.
TE-5E8-034.5	Cladding on Fuel Assembly 5, Row E, Column 8 at 0.88 m above bottom of fuel rod.	420 to 1810 K	1 Hz	4.2 K	450 K 600 K 800 K 1000 K	3.8 K 4.2 K 5.2 K 6.7 K	Qualified.
TE-5E8-049	Cladding on Fuel Assembly 5, Row E, Column 8 at 1.24 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.
TE-5F3-024	Cladding on Fuel Assembly 5, Row F, Column 3 at 0.61 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-5F4-015	Cladding on Fuel Assembly 5, Row F, Column 4 at 0.38 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.

TABLE B-1. (continued)

Variab System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation Reading	After Experiment Initiation Uncertainty (±)	Comments
TEMPERATURE (continued)							
Reactor Vessel (continued)							
TE-5F4-021	Cladding on Fuel Assembly 5, Row F, Column 4 at 0.53 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.
TE-5F4-026	Cladding on Fuel Assembly 5, Row F, Column 4 at 0.66 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	45 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.
TE-5F4-030	Cladding on Fuel Assembly 5, Row F, Column 4 at 0.76 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.
TE-5F7-005	Cladding on Fuel Assembly 5, Row F, Column 7 at 0.13 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-5F7-021	Cladding on Fuel Assembly 5, Row F, Column 7 at 0.53 m above bottom of fuel rod.	420 to 1810 K	1 Hz	--	450 K 600 K 800 K 1000 K	3.8 K 4.2 K 4.7 K 6.2 K	
TE-5F7-039	Cladding on Fuel Assembly 5, Row F, Column 7 at 0.99 m above bottom of fuel rod.	420 to 1810 K	1 Hz	--	450 K 600 K 800 K 1000 K	3.8 K 4.2 K 5.2 K 6.7 K	Failed.

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation: Reading	After Experiment Initiation: Uncertainty (±)	Comments
TEMPERATURE (continued)							
Reactor Vessel (continued)							
TE-5F7-054	Cladding on Fuel Assembly 5, Row F, Column 7 at 1.37 m above bottom of fuel rod.	422 to 1533 K	1 Hz	--	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-5F8-024	Cladding on Fuel Assembly 5, Row F, Column 8 at 0.61 m above bottom of fuel rod.	420 to 1810 K	1 Hz	4.1 K	450 K 600 K 800 K 1000 K	3.8 K 4.2 K 5.2 K 6.7 K	
TE-5F8-028	Cladding on Fuel Assembly 5, Row F, Column 8 at 0.71 m above bottom of fuel rod.	420 to 1810 K	1 Hz	4.1 K	450 K 600 K 800 K 1000 K	3.8 K 4.2 K 5.2 K 6.7 K	
TE-5F8-032	Cladding on Fuel Assembly 5, Row F, Column 8 at 0.81 m above bottom of fuel rod.	420 to 1810 K	1 Hz	4.1 K	450 K 600 K 800 K 1000 K	3.8 K 4.2 K 5.2 K 6.7 K	
TE-5F8-037	Cladding on Fuel Assembly 5, Row F, Column 8 at 0.94 m above bottom of fuel rod.	420 to 1810 K	1 Hz	--	450 K 600 K 800 K 1000 K	3.8 K 4.2 K 5.2 K 6.7 K	
TE-5F9-011	Cladding on Fuel Assembly 5, Row F, Column 9 at 0.28 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation		Comments
					Reading	Uncertainty (±)	
TEMPERATURE (continued)							
Reactor Vessel (continued)							
TE-5F9-030	Cladding on Fuel Assembly 5, Row F, Column 9 at 0.76 m above bottom of fuel rod.	420 to 1810 K	1 Hz	4.2 K	450 K 600 K 800 K 1000 K	3.8 K 4.2 K 5.2 K 6.7 K	Qualified.
TE-5F9-045	Cladding on Fuel Assembly 5, Row F, Column 9 at 1.14 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.
TE-5F9-062	Cladding on Fuel Assembly 5, Row F, Column 9 at 1.57 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.
TE-5G6-011	Cladding on Fuel Assembly 5, Row G, Column 6 at 0.28 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.
TE-5G6-030	Cladding on Fuel Assembly 5, Rod G, Column 6 at 0.76 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.
TE-5G6-045	Cladding on Fuel Assembly 5, Row G, Column 6 at 1.14 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation Reading	After Experiment Initiation Uncertainty (±)	Comments
TEMPERATURE (continued)							
Reactor Vessel (continued)							
TE-5G6-062	Cladding on Fuel Assembly 5, Row G, Column 6 at 1.57 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.
TL [illegible]8-008	Cladding on Fuel Assembly 5, Row G, Column 8 at 0.20 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.
TE-5G8-026	Cladding on Fuel Assembly 5, Row G, Column 8 at 0.66 m above bottom of fuel rod.	410 to 1820 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	3.8 K 4.2 K 5.2 K 6.7 K	Qualified.
TE-5G8-041	Cladding on Fuel Assembly 5, Row G, Column 8 at 1.04 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-5G8-058	Cladding on Fuel Assembly 5, Row G, Column 8 at 1.47 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.
TE-5H5-002	Cladding on Fuel Assembly 5, Row H, Column 5 at 0.05 m above bottom of fuel rod.	422 to 1533 K	1 [illegible]	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation: Reading	After Experiment Initiation: Uncertainty (±)	Comments
TEMPERATURE (continued)							
Reactor Vessel (continued)							
TE-5H5-015	Cladding on Fuel Assembly 5, Row H, Column 5 at 0.38 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.
TE-5H5-034.5	Cladding on Fuel Assembly 5, Row H, Column 5 at 0.88 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.
TE-5H5-049	Cladding on Fuel Assembly 5, Row H, Column 5 at 1.24 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.
TE-5H6-024	Cladding on Fuel Assembly 5, Row H, Column 6 at 0.61 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.
TE-5H6-028	Cladding on Fuel Assembly 5, Row H, Column 6 at 0.71 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.
TE-5H6-032	Cladding on Fuel Assembly 5, Row H, Column 6 at 0.81 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation: Reading	After Experiment Initiation: Uncertainty (±)	Comments
TEMPERATURE (continued)							
Reactor Vessel (continued)							
TE-5H6-037	Cladding on Fuel Assembly 5, Row H, Column 6 at 0.94 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.
TE-5H7-008	Cladding on Fuel Assembly 5, Row H, Column 7 at 0.20 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-5H7-026	Cladding on Fuel Assembly 5, Row H, Column 7 at 0.66 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-5H7-041	Cladding on Fuel Assembly 5, Row H, Column 7 at 1.04 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-5H7-058	Cladding on Fuel Assembly 5, Row H, Column 7 at 1.47 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-5I6-005	Cladding on Fuel Assembly 5, Row I, Column 6 at 0.13 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation Reading	After Experiment Initiation Uncertainty (±)	Comments
TEMPERATURE (continued)							
Reactor Vessel (continued)							
TE-516-021	Cladding on Fuel Assembly 5, Row I, Column 5 at 0.53 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-516-039	Cladding on Fuel Assembly 5, Row I, Column 6 at 0.99 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-516-054	Cladding on Fuel Assembly 5, Row I, Column 6 at 1.37 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-518-008	Cladding on Fuel Assembly 5, Row I, Column 8 at 0.20 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.
TE-518-026	Cladding on Fuel Assembly 5, Row I, Column 8 at 0.66 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.
TE-518-041	Cladding on Fuel Assembly 5, Row I, Column 8 at 1.04 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation: Reading	After Experiment Initiation: Uncertainty (±)	Comments
TEMPERATURE (continued)							
Reactor Vessel (continued)							
TE-5I8-058	Cladding on Fuel Assembly 5, Row I, Column 8 at 1.47 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.
TE-5J3-024	Cladding on Fuel Assembly 5, Row J, Column 3 at 0.61 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-5J4-015	Cladding on Fuel Assembly 5, Row J, Column 4 at 0.38 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-5J4-021	Cladding on Fuel Assembly 5, Row J, Column 4 at 0.53 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-5J4-026	Cladding on Fuel Assembly 5, Row J, Column 4 at 0.66 m above bottom of fuel rod.	422 to 1533 K	1 Hz	2.8 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-5J4-030	Cladding on Fuel Assembly 5, Row J, Column 4 at 0.76 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation: Reading	After Experiment Initiation: Uncertainty (±)	Comments
TEMPERATURE (continued)							
Reactor Vessel (continued)							
TE-5J7-011	Cladding on Fuel Assembly 5, Row J, Column 7 at 0.28 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-5J7-030	Cladding on Fuel Assembly 5, Row J, Column 7 at 0.76 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-5J7-045	Cladding on Fuel Assembly 5, Row J, Column 7 at 1.14 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-5J7-062	Cladding on Fuel Assembly 5, Row J, Column 7 at 1.57 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-5J8-024	Cladding on Fuel Assembly 5, Row J, Column 8 at 0.61 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-5J8-028	Cladding on Fuel Assembly 5, Row J, Column 8 at 0.71 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation Reading	After Experiment Initiation Uncertainty (±)	Comments
TEMPERATURE (continued)							
Reactor Vessel (continued)							
TE-5J8-032	Cladding on Fuel Assembly 5, Row J, Column 8 at 0.81 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-5J8-037	Cladding on Fuel Assembly 5, Row J, Column 8 at 0.[illegible]4 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-5J9-005	Cladding on Fuel Assembly 5, Row J, Column 9 at 0.13 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-5J9-021	Cladding on Fuel Assembly 5, Row J, Column 9 at 0.53 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-5J9-039	Cladding on Fuel Assembly 5, Row J, Column 9 at 0.99 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-5J9-054	Cladding on Fuel Assembly 5, Row J, Column 9 at 1.37 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation: Reading	After Experiment Initiation: Uncertainty (±)	Comments
TEMPERATURE (continued)							
Reactor Vessel (continued)							
TE-5K8-002	Cladding on Fuel Assembly 5, Row K, Column 8 at 0.05 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-5K8-015	Cladding on Fuel Assembly 5, Row K, Column 8 at 0.38 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-5K8-034.5	Cladding on Fuel Assembly 5, Row K, Column 8 at 0.88 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-5K8-049	Cladding on Fuel Assembly 5, Row K, Column 8 at 1.24 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-5LP-001	Fuel Assembly 5 lower end box.	311 to 977.4 K	1 Hz	2.7 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	Qualified.
TE-5LP-002	Fuel Assembly 5 lower end box.	311 to 977.4 K	1 Hz	2.7 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	
TE-5LP-003	Fuel Assembly 5 lower end box.	311 to 977.4 K	1 Hz	2.7 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation Reading	After Experiment Initiation Uncertainty (±)	Comments
TEMPERATURE (continued)							
Reactor Vessel (continued)							
TE-5LP-004	Fuel Assembly 5 lower end box.	311 to 977.4 K	1 Hz	2.7 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	
TE-5L6-030	Cladding on Fuel Assembly 5, Row L, Column 6 at 0.76 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-5L6-032	Cladding on Fuel Assembly 5, Row L, Column 6 at 0.81 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-5L6-037	Cladding on Fuel Assembly 5, Row L, Column 6 at 0.94 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-5L6-039	Cladding on Fuel Assembly 5, Row L, Column 6 at 0.99 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-5L8-011	Guide tube for Fuel Assembly 5, Row L, Column 8 at 0.28 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation Reading	After Experiment Initiation Uncertainty (±)	Comments
TEMPERATURE (continued)							
Reactor Vessel (continued)							
TE-5L8-024	Guide tube for Fuel Assembly 5, Row L, Column 8 at 0.61 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.
TE-5L8-039	Guide tube for Fuel Assembly 5, Row L, Column 8 at 0.99 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.
TE-5L8-045	Guide tube for Fuel Assembly 5, Row L, Column 8 at 1.14 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.
TE-5M6-024	Guide tube for Fuel Assembly 5, Row M, Column 6 at 0.61 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	Qualified.
TE-5UP-001	Fuel Assembly 5 upper end box.	311 to 977.4 K	1 Hz	2.9 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	Qualified.
TE-5UP-002	Fuel Assembly 5 upper end box.	311 to 977.4 K	1 Hz	2.9 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	Qualified.
TE-5UP-003	Fuel Assembly 5 upper end box.	311 to 977.4 K	1 Hz	2.9 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	Qualified.

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation: Reading	After Experiment Initiation: Uncertainty (±)	Comments
TEMPERATURE (continued)							
Reactor Vessel (continued)							
TE-5UP-004	Fuel Assembly 5 upper end box.	311 to 977.4 K	1 Hz	3.0 K	350 K	2.5 K	
					450 K	2.6 K	
					550 K	2.6 K	
					650 K	3.3 K	
TE-5UP-005	Fuel Assembly 5 upper end box.	311 to 977.4 K	1 Hz	2.9 K	350 K	2.5 K	Qualified.
					450 K	2.6 K	
					550 K	2.6 K	
					650 K	3.3 K	
TE-5UP-006	Fuel Assembly 5 upper end box.	311 to 977.4 K	1 Hz	2.9 K	350 K	2.5 K	Qualified.
					450 K	2.6 K	
					550 K	2.6 K	
					650 K	3.3 K	
TE-5UP-007	Fuel Assembly 5 upper end box.	311 to 977.4 K	1 Hz	2.9 K	350 K	2.5 K	Qualified.
					450 K	2.6 K	
					550 K	2.6 K	
					650 K	3.3 K	
TE-5UP-008	Fuel Assembly 5 upper end box.	311 to 977.4 K	1 Hz	2.9 K	350 K	2.5 K	Qualified.
					450 K	2.6 K	
					550 K	2.6 K	
					650 K	3.3 K	
TE-5UP-009	Fuel Assembly 5 upper end box.	311 to 977.4 K	1 Hz	2.9 K	350 K	2.5 K	Qualified.
					450 K	2.6 K	
					550 K	2.6 K	
					650 K	3.3 K	
TE-6E8-045	Cladding on Fuel Assembly 6, Row E, Column 8 at 1.14 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K	2.8 K	
					600 K	3.2 K	
					800 K	4.7 K	
					1000 K	6.2 K	

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation: Reading	After Experiment Initiation: Uncertainty (±)	Comments
TEMPERATURE (continued)							
Reactor Vessel (continued)							
TE-6G14-011	Cladding on Fuel Assembly 6, Row G, Column 14 at 0.28 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-6G14-030	Cladding on Fuel Assembly 6, Row G, Column 14 at 0.76 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-6G14-045	Cladding on Fuel Assembly 6, Row G, Column 14 at 1.14 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.2 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-6H01-037	Cladding on Fuel Assembly 6, Row H, Column 1 at 0.94 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-6H02-028	Cladding on Fuel Assembly 6, Row H, Column 2 at 0.71 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-6H02-032	Cladding on Fuel Assembly 6, Row H, Column 2 at 0.81 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation Reading	After Experiment Initiation Uncertainty (±)	Comments
TEMPERATURE (continued)							
Reactor Vessel (continued)							
TE-6H08-039	Cladding on Fuel Assembly 6, Row H, Column 8 at 0.99 m above bottom of fuel rod.	422 to 1533 K	1 Hz	3.1 K	450 K 600 K 800 K 1000 K	2.8 K 3.2 K 4.7 K 6.2 K	
TE-6LP-001	Fuel Assembly 6 lower end box.	311 to 977.4 K	1 Hz	2.7 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	Qualified.
TE-6LP-003	Fuel Assembly 6 lower end box.	311 to 977.4 K	1 Hz	2.7 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	
TE-6UP-001	Fuel Assembly 6 upper end box.	311 to 977.4 K	1 Hz	2.8 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	Qualified.
TE-6UP-003	Fuel Assembly 6 upper end box.	311 to 977.4 K	1 Hz	2.9 K	350 K 450 K 550 K 650 K	2.5 K 2.6 K 2.6 K 3.3 K	Qualified.
Secondary Coolant System							
TT-P004-004	Secondary coolant system feedwater.	366 to 505 K	1 Hz	0.9 K	--	0.9 K	Qualified.
Emergency Core Cooling System							
TT-P120-062	Cold leg injection in 4-in. line upstream of cold leg injection point.	280 to 620 K	1 Hz	2.1 K	--	2.1 K	

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation Reading	After Experiment Initiation Uncertainty (±)	Comments
TEMPERATURE (continued)							
Intact Loop							
TT-P139-032	Intact loop hot leg primary coolant, Channel A.	533 to 616 K	1 Hz	0.5 K	--	0.5 K	Qualified for initial conditions only.
TT-P139-033	Intact loop hot leg primary coolant, Channel B.	533 to 616 K	1 Hz	0.5 K	--	0.5 K	Qualified for initial conditions only.
TT-P139-034	Intact loop hot leg primary coolant, Channel C.	533 to 616 K	1 Hz	0.5 K	--	0.5 K	Qualified for initial conditions only.
TRANSIT TIME							
Broken Loop							
TTE-BL-01A-1	Cold leg, bottom, front.	±76 m/s	1 Hz	--	0 m/s 40 m/s 76 m/s	0.75 m/s 2.36 m/s 4.33 m/s	
TTE-BL-01A-2	Cold leg, bottom, center.	±76 m/s	1 Hz	--	0 m/s 40 m/s 76 m/s	0.75 m/s 2.36 m/s 4.33 m/s	
TTE-BL-01A-3	Cold leg, bottom, rear.	±76 m/s	1 Hz	--	0 m/s 40 m/s 76 m/s	0.75 m/s 2.36 m/s 4.33 m/s	
TTE-BL-01B-1	Cold leg, center, front.	±76 m/s	1 Hz	--	0 m/s 40 m/s 76 m/s	0.75 m/s 2.36 m/s 4.33 m/s	
TTE-BL-01B-3	Cold leg, center, rear.	±76 m/s	1 Hz	--	0 m/s 40 m/s 76 m/s	0.75 m/s 2.36 m/s 4.33 m/s	

TABLE B-1. (continued)

Variable, System, and Detector	Location	Measurement Range	Recording Frequency[a]	Initial Condition Uncertainty (±)	After Experiment Initiation: Reading	After Experiment Initiation: Uncertainty (±)	Comments
TRANSIT TIME (continued)							
Broken Loop (continued)							
TTE-BL-01C-1	Cold leg, top, front.	±76 m/s	1 Hz	--	0 m/s 40 m/s 76 m/s	0.75 m/s 2.36 m/s [illegible].33 m/s	
TTE-BL-01C-2	Cold leg, top, center.	±76 m/s	1 Hz	--	0 m/s 40 m/s 76 m/s	0.75 m/s 2.36 m/s 4.33 m/s	
TTE-BL-01C-3	Cold leg, top, rear.	±76 m/s	1 Hz	--	0 m/s 40 m/s 76 m/s	0.75 m/s 2.36 m/s 4.33 m/s	

a. Recording frequency is the measurement channel bandwidth at the ±3-dB level.

b. Reference B-1.

c. Reference B-2.

d. Reference B-3.

e. The steam generator level is defined as 0 at 2.95 m above the top of the tube sheet.

f. Reference B-4.

g. Reference B-5.

h. Pressure measurements are presented as absolute values.

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